Tionscadal Soláthair Uisce
Water Supply Project

Environmental Impact Assessment Report (EIAR)

Volume 6 of 6: Appendices

(Appendix 10.1) Ground Investigations

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Uisce Éireann
Irish Water

Jacobs

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WATER SUPPLY PROJECT
EASTERN AND MIDLANDS REGION

SITE INVESTIGATION CONTRACT
FACTUAL REPORT

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	Prepared by	Approved by	Rev. Issue Date:	Revision No.
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FOREWORD

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

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

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

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1.0 Introduction.

Irish Drilling Ltd. (IDL) was instructed by Jacobs Tobin JV, on behalf of Irish Water, to carry out a site investigation at the site of the proposed Water Supply Project, Eastern and Midland Region.

The Water Supply Project includes for the construction of a new water treatment plant, abstraction site, pumping stations, terminal point reservoir and accompanying pipeline.

This site investigation was carried out to provide detailed factual geotechnical information of the underlying ground conditions along the proposed pipeline route and in order to quantify potential impacts from construction methodologies for the preparation of an Environmental Impact Statement (EIS).

The fieldwork commenced on May 29th 2017 and was completed on December 7th 2017.

2.0 Site & Geology

The site is located between Parteen Basin in North Tipperary and Peamount Resevoir in West Dublin.

The proposed pipeline route will pass through counties Tipperary, Offaly, Kildare and Dublin.

The fieldwork was carried out predominantly on agricultural lands, industrial lands and local authority sites.

Weather conditions in general were quite variable with the majority of the fieldwork carried out over a typical summer/autumn period in Ireland. Agricultural lands in particular were occasionally difficult to access due to rutting of fields as land became soft caused by sustained wet periods. Tractors and excavators vehicles were occasionally used to assist moving of plant and machinery.

Site Plans, prepared by the client's representatives and showing approximate fieldwork locations, are included with this report.

The following were the main published information sources used:

Geological Map of Ireland: 1:750,000 scale map series.
Teagasc Subsoil Classification Map.

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.

<u>Overview of Subsoil Geology</u>

General Classification:
Cable Percussive borehole, Trial Pit data and the Teagasc Subsoil Classification map were reviewed to obtain information on subsoil classifications within the proposed route. The subsoil types underlying the proposed pipeline route is predominantly glacial till, with glacial outwash material and isolated deposits of peat.

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 often 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, clean limestones providing a relatively high proportion of silt, while shales, shaly limestones and mudstones break down to the finer clay sized particles.

Glacial Outwash Deposits:
Deposition of sand and gravel takes place mainly when glaciers are melting, which gives rise to large volumes of meltwater with great erosive and transporting power. The subsoils deposited in this environment are predominantly, but not exclusively, rounded to subrounded gravel and sand, with the finer fractions of clay and silt washed out.

Peat:
The deposition of peat occurred in post-glacial periods and is generally associated with the start of warmer and wetter climatic conditions. Peat is an unconsolidated usually dark brown to black organic material comprising a mixture of decomposed and undecomposed plant matter that accumulated in an acidic waterlogged environment. Peat has an extremely high water content generally averaging over 90% by volume.

Made Ground:
Made Ground is material which has been purposefully emplaced by humans.

Solid Geology:
General Classification:
The following 1:100,000 scale map series were used to identify the probable geological rock types underlying the proposed route.

'Geology of Tipperary: Sheet 18' was used in conjunction with the geological memoir 'Geology of Tipperary': A geological description to accompany the bedrock geology 1:100,000 scale map series'

'Geology of Galway – Offaly': Sheet 15' was used in conjunction with the geological memoir 'Geology of Galway – Offaly': A geological description to accompany the bedrock geology 1:100,000 scale map series'

'Geology of Kildare – Wicklow': Sheet 16' was used in conjunction with the geological memoir 'Geology of Kildare – Wicklow': A geological description to accompany the bedrock geology 1:100,000 scale map series'

The Solid Geology ranges from strata from the Ballysteen Formation, a dark grey bioclastic shale parted limestone, through to Old Red Sandstone as a red sandstone (undifferentiated), to Waulsortian Limestones a light grey sparry poly-mud micritic limestone to Lucan Formation as dark grey shaly cherty argillaceous limestone to the Calp as a dark grey to black limestone and shale (undifferentiated).

3.0 Fieldwork.

3.1 Fieldwork Plant:

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

Dando 2000 Cable Percussive Boring Rigs.
DeltaBase 520 and GT1100 GoTract Rotary Core Drilling Rigs.
Zaxis 130 Excavator.
JCB Excavator.
Geotool DPH Probing Rig.

Fieldwork carried out to date has included the following:

3.2 Cable Percussive Boreholes:

One hundred and thirty cable percussion (Shell & Auger) boreholes were completed using Dando 2000 Cable Percussive Boring Rigs. The boreholes were bored to 'refusal' or to depths as instructed by the client's representatives.

The borehole depths ranged from 1.00m to 16.30m below ground level.

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

Disturbed bulk and jar soil samples were taken at each change in strata and were returned to the laboratory and logged by a Geotechnical Engineer and presented for testing.

A 50mm diameter standpipe was installed in borehole BH 49, as instructed by the Client's Engineer, to allow for monitoring of groundwater levels over a prolonged period of time. A summary of water levels recorded during the fieldwork period is included with this report as Appendix 7.

A full summary of the cable percussive boreholes is included at the beginning of Appendix 1.

3.3 Rotary Core Boreholes:

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

The rotary core boreholes were predominantly carried out as ' extension follow-on' boreholes adjacent to locations where the cable percussive boreholes encountered 'refusals' at relatively shallow depths or as a 'stand-alone' rotary core borehole.

The boreholes were completed using wireline drilling techniques, and PQ size (84mm core diameter, 123mm hole diameter) drill strings to recover soil and 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.

Two of the boreholes were completed using GeoboreS (102mm core diameter, 146mm hole diameter) drilling methods to recover the soil and rock core samples. These boreholes were carried out predominantly at locations where the depth and type of overburden may not have allowed for target depths to be reached using cable percussive boring methods and there was a requirement to recover quality soil samples above rockhead.

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 depths ranging from 10.00m to 20.60m below ground level.

50mm diameter standpipes or 90mm diameter Standpipes were installed in a number of boreholes, as instructed by the Client's Engineer, to allow for monitoring of groundwater levels over a prolonged period of time. A summary of water levels recorded during the fieldwork period is included with this report as Appendix 7.

A full summary of the rotary core boreholes completed is included at the beginning of Appendix 2.

3.4 Trial Pits:

Four trial pits were excavated on site using a 13T wide-padded tracked excavator or JCB Excavator. The pits were logged and photographed by an Engineer with observations made on ground conditions, pit stability, water ingress and services encountered.

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

A full summary of the trial pits completed is included at the beginning of Appendix 4.

3.5 Dynamic Probes:

Thirty-nine dynamic probes were carried out to 'refusal' using a LMSR-V(k) Geotool Dynamic Probing Rig. The Dynamic Probing Rig involves the dropping of a 50 kg hammer onto rods from a standard height (500mm) and recording the number of blows it takes to penetrate the rods (with a cone tip) to depth of 100mm increments into the soil.

The dynamic probe engineering logs then graph the number of blow counts required to penetrate each 100mm incremental depth. The probe is considered to have encountered 'refusal' when a blow count of 25 does not achieve the full 100mm incremental depth.

A full summary of the dynamic probes completed is included at the beginning of Appendix 6.

3.9 Geophysical Survey:

A Geophysical Survey was carried out by Minerex Geophysics Limited.

The geophysical survey consisted of 2D-Resistivity and Seismic Refraction (p-wave) and the main objectives of the survey were to determine ground conditions, estimate the depth to rock, overburden thickness and reduce the risk of encountering unknown subsurface conditions (including soft ground, shallow bedrock or bedrock karstification) during construction.

The geophysical models and interpretations give guidance about the geological ground and in conjunction with the boreholes a detailed picture of the subsurface conditions.

The records of the geophysical survey and interpretations are included as a 'stand-alone' report in appendix 5 of this report.

3.10 Magnetometer Survey:

Two Magnetometer Surveys were also carried out by Minerex Geophysics Limited.

The purpose of the surveys was to determine if archaeological features or deposits exist under the site.

The first survey was carried out in the Tipperary and Offaly Region on three distinctive sites totalling 17.2ha in area.

The second survey was carried out at Loughtown Upper at two adjacent fields with a combined area of 8.3ha.

The records of the magnetometer surveys and interpretations are included as a 'stand-alone' report in appendix 6a and 6b of this report.

3.10 General Summary:

The borehole, probe and trial pit 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.

A pre-commencement and post-fieldwork ecological study was carried out by Moore Group Environmental Services and the records of same have been presented to the client's representatives as a 'stand-alone' report.

An Archaeological Study was also completed by Through Time Ltd. and the records of same have been presented as a 'stand-alone' report.

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

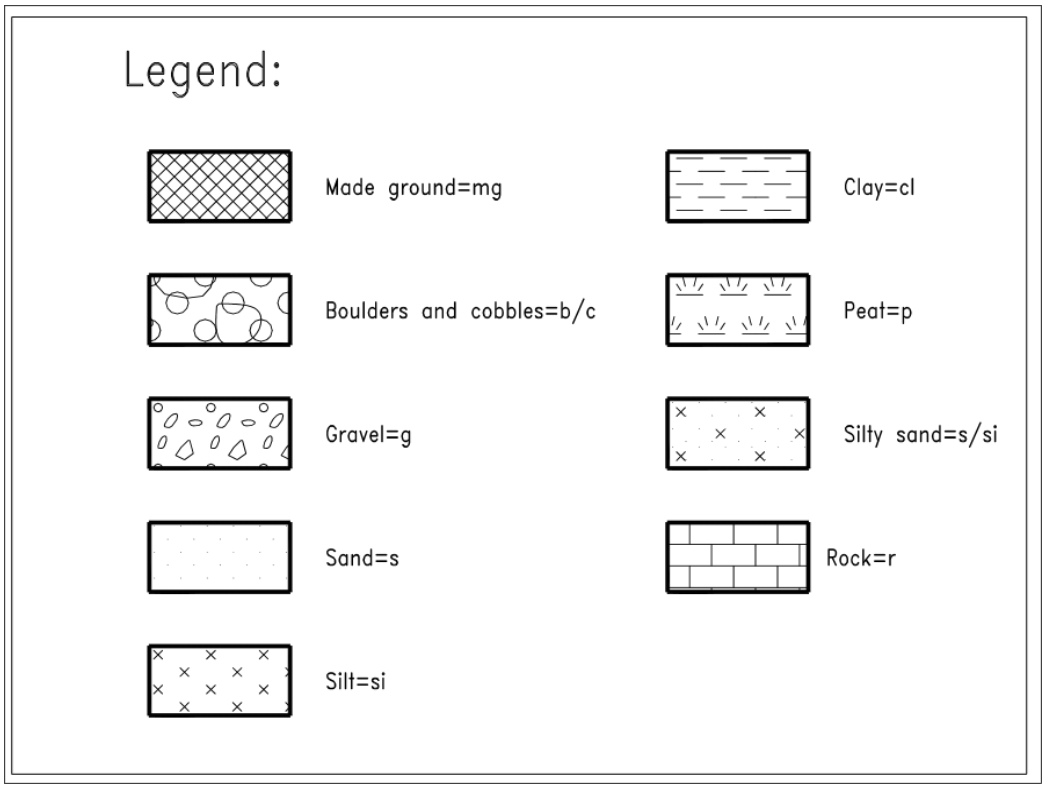
Made ground was encountered in a number of boreholes and pits while very soft peats and/or organic silts to depth were also frequently encountered.

Intact bedrock was encountered in the rotary core boreholes at depths varying from 0.80m to 18.20m below ground level. Weathered bedrock was also encountered in a number of boreholes at shallower depths.

It is further noted that bedrock was not encountered in a number of boreholes before termination and for detailed descriptions of bedrock please refer to the engineering logs included in the appendices to this report.

Reference should be made to the engineering logs for a detailed description of the ground conditions encountered.

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



A Condition Survey was carried out by IDL and the records of same have been presented to the client's representatives as a 'stand-alone' report.

The fieldwork was carried out in accordance with IS EN 1997-2 and BS5930, 1999 Code of Practice for Site Investigations with precedence given to IS EN 1997-2 where applicable.

4.0 Laboratory Testing

Representative samples recovered from the boreholes and trial pits were scheduled for testing in the laboratory. The test schedules were prepared by the Client's Engineer and included some or all of the following tests on disturbed and undisturbed soil samples:

* Natural Moisture Content.
* Atterberg Limits.
* Particle Size Distribution.
* Sedimentation.
* Compaction.
* Chemical (pH).
* Environmental.

The test schedules also included some or all of the following tests on rock core samples:

* Point Load Tests.
* Unconfined Compressive Strength (UCS).
* Petrographical Analysis.
* Calcium Carbonate.

The test schedules also included some or all of the following tests on water samples recovered during fieldwork operations:

* Environmental.

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 and environmental tests were carried out by Alcontrol Laboratories, UK.
Calcium Carbonate tests were carried out by Celtest, UK.
Petrographic Analysis Tests were completed by NUI, Galway.

Soil samples (disturbed and undisturbed) in general were recovered from the excavation of trial pits and completion of cable percussive boreholes and the records of soil laboratory test records carried out on same are reported in Appendix 8.

Rock core samples were recovered from the completion of rotary core boreholes and the records of rock laboratory test records carried out on of same are reported in Appendix 8.

Environmental tests were also carried out on soil samples and the records of same are presented in Appendix 8.

The soil and rock descriptions as noted on the borehole and trial pit logs are in general visual descriptions as observed and logged by our Engineers and are described in accordance with IS EN 1997-2 and BS5930, 1999 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.

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
Chartered Engineer
Irish Drilling Limited
February 20th 2018

irish drilling ltd
old galway road
loughrea

BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-06-17 28-06-17	29.71	E 570,839.1 N 670,092.4

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.10)	Reeds over firm greyish brown sandy CLAY.		
1.00	SPT	N = 6 (3, 1, 1, 1, 2, 2)		28.61		1.10	1.00m: firm.		
1.00	D2					(0.60)	Firm grey sandy gravelly SILT/CLAY.		
1.00-1.50	B4								
1.50	D5			28.01		1.70	Firm damp sandy CLAY with medium cobble content.		
2.00	CPT	N = 8 (1, 1, 1, 2, 3, 2)							
2.00-2.50	B7								
2.50	D8								
3.00	SPT	N = 12 (1, 3, 2, 4, 3, 3)							
3.00-3.50	B10								
3.50	D11								
4.00	SPT	N = 17 (2, 3, 3, 4, 5, 5)				(4.80)	4.00m: stiff.		
4.00-4.50	B13								
4.50	D14								
5.00	SPT	N = 23 (3, 4, 4, 5, 6, 8)							
5.00-5.50	B16								
5.50	D17								
6.50	CPT	N = 28 (5, 6, 4, 7, 8, 9)		23.21		6.50	Stiff dry very sandy CLAY with medium cobble content.		
6.50-7.00	B19								
7.00	D20								
8.00	CPT	N = 21 (2, 2, 5, 6, 4, 6)							
8.00-8.50	B22								
8.50	D23								
9.50	CPT	N = 21 (3, 4, 4, 5, 6, 6)							
9.50-10.00	B25					(6.80)			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-06-17 28-06-17	29.71	E 570,839.1 N 670,092.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 2 of 2 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
10.00	D26						Stiff dry very sandy CLAY with medium cobble content. *(continued)*		
11.00	CPT	N = 30 (5, 6, 7, 8, 8, 7)					11.00m: very stiff.		
11.00-11.50	B28								
11.50	D29								
12.50	CPT	N = 43 (11, 11, 9, 8, 9, 17)							
12.50-13.00	B31								
13.00	D32								
13.20	CPT	75 Seating Blows for 89 mm (25, 50)		16.41		13.30	13.20m: wet gravelly. Cobbles are rounded. BH terminated at 13.30m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
28-06-17	17.00	13.30	13.20	203	damp	13.2	13.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH002**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-10-17 25-10-17	65.86	E 576,221.5 N 671,330.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 1.00m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over brown CLAY with broken limestone.		
			▼1	64.86		(1.00) 1.00			
1.00	CPT	50 for 0 mm (25, -, 50)					BH terminated at 1.00m bgl - refusal.		
1.00	D2								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-10-17	14.00	1.00	1.00	203	1.00						BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH004**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-06-17 23-06-17	53.62	E 577,448.2 N 671,549.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			53.32		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(1.30)	Stiff brown CLAY with medium cobble content.		
1.00	SPT	N = 16 (3, 3, 4, 5, 3, 4)							
1.00	D2								
1.00-1.50	B4			52.02		1.60			
1.50	D5						Stiff brown very sandy CLAY.		
2.00	CPT	N = 34 (5, 8, 8, 9, 8, 9)					2.00m: very stiff.		
2.00-2.50	B7					(1.80)			
2.50	D8								
3.00	CPT	N = 40 (7, 11, 10, 9, 9, 12)							
3.00-3.50	B10			50.22		3.40			
3.50	D11						Very stiff brown CLAY with cobbles. Cobbles are rounded.		
4.00	CPT	N = 41 (8, 9, 9, 10, 11, 11)		49.42		(0.80) 4.20			
4.00-4.50	B13						Very stiff grey CLAY.		
4.50	D14					(1.20)			
5.00	CPT	55 for 265 mm (10, 10, 13, 16, 16, 10)							
5.00-5.50	B16			48.22		5.40			
5.50	CPT	75 Seating Blows for 112 mm (25, 50)		48.12		5.50	Obstruction as possible rock.		
5.50	D17						BH terminated at 5.50m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
23-06-17	17.00	5.50	4.50	203	dry	5.5	5.5	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH005**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-06-17 22-06-17	53.78	E 577,666.8 N 671,557.4

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			53.48		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(1.10)	Stiff very sandy CLAY.		
1.00	SPT	N = 12 (2, 1, 2, 2, 3, 5)							
1.00	D2			52.38		1.40			
1.00-1.50	B4						Stiff brown CLAY with cobbles.		
1.50	D5								
2.00	CPT	N = 27 (3, 5, 5, 6, 7, 9)							
2.00-2.50	B7					(1.90)			
2.50	D8								
3.00	CPT	N = 44 (8, 9, 10, 9, 9, 16)		50.48		3.30	3.00m: very stiff.		
3.00-3.50	B10						Very stiff brown CLAY with boulders. Boulders are of limestone.		
3.50	D11			50.08		3.70			
							Stiff brown laminated sandy CLAY.		
4.00	CPT	N = 27 (5, 6, 6, 7, 6, 8)							
4.00-4.50	B13								
4.50	D14					(1.90)			
5.00	CPT	N = 41 (8, 8, 9, 11, 10, 11)					5.00m: very stiff.		
5.00-5.50	B16								
5.50	D17			48.18		5.60			
5.60	CPT	11 for 10 mm (25, 39, 11)		48.08		5.70	Obstruction as possible rock.		
							BH terminated at 5.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
22-06-17	17.00	5.70	5.00	203	dry	3.4 5.6	3.6 5.7	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH006**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-07-17 12-07-17	54.47	E 582,121.6 N 676,833.0

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			54.17		0.30	TOPSOIL.		
						(0.80)	Soft locally firm grey sandy CLAY with cobbles. Cobbles are angular.		
1.00	SPT	N = 22 (2, 1, 2, 3, 3, 14)		53.37		1.10	1.00m: stiff.		
1.00 1.00-1.50 1.50	D2 B4 D5					(1.60)	Medium dense grey silty SAND with medium cobble content and boulders. Cobbles are rounded.		
2.00	CPT	N = 15 (3, 2, 4, 3, 3, 5)							
2.00-2.50 2.50	B7 D8			51.77		2.70			
3.00	CPT	N = 27 (3, 5, 5, 6, 7, 9)				(1.30)	Medium dense reddish brown sandy GRAVEL with cobbles.		
3.00-3.50 3.50	B10 D11								
				50.47		4.00			
4.00	CPT	75 Seating Blows for 81 mm (25, 50)		50.37		4.10	Obstruction as possible rock. BH terminated at 4.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
12-07-17	17.00	4.10	4.00	203	dry	1.5 4	1.8 4.1	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-06-17 26-06-17	54.49	E 582,263.1 N 677,382.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			54.19		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(0.80)	Stiff very sandy CLAY.		
1.00	SPT	N = 20 (3, 2, 6, 6, 3, 5)		53.39		1.10	1.00m: stiff.		
1.00	D2						Medium dense brown SAND with cobbles. Cobbles are rounded.		
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 52 (4, 8, 5, 10, 21, 16)					2.00m: very dense.		
2.00-2.50	B7								
2.50	D8					(3.40)			
3.00	CPT	N = 37 (8, 9, 9, 8, 10, 10)					3.00m: dense.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 52 (9, 9, 11, 13, 11, 17)					4.00m: very dense.		
4.00-4.50	B13			49.99		4.50			
4.50	D14			49.59		4.90	Very dense sandy COBBLES and BOULDERS.		
4.90	CPT	75 Seating Blows for 107 mm (25, 50)		49.49		5.00	Obstruction as possible rock.		
							BH terminated at 5.00m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
26-06-17	17.00	5.00	4.50	203	dry	2.4 4.9	2.7 5.0	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-07-17 05-07-17	72.27	E 590,032.8 N 687,993.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			71.97		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
							Firm brown CLAY with cobbles.		
1.00	SPT	N = 13 (2, 2, 3, 4, 3, 3)				(1.90)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	66 for 80 mm (3, 4, 27, 39)		70.07		2.20			
2.00-2.20	B7			69.97		2.30	Obstruction as possible rock.		
2.20	D8						BH terminated at 2.30m bgl - refusal.		
2.30		50 for 0 mm (25, -, 50)							

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
05-07-17	12.00	2.30	2.20	203	dry

Chiselling

From	To	Hours
0.3	0.7	1
2.2	2.3	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH011**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	16-08-17 16-08-17	78.96	E 590,100.8 N 688,020.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.80)	MADE GROUND: Stiff CLAY with cobbles and some concrete and tarmac.		
				78.16		0.80			
1.00	CPT	N = 27 (7, 8, 5, 6, 7, 9)					Stiff greyish brown sandy CLAY with cobbles.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 33 (4, 5, 7, 9, 8, 9)					2.00m: very stiff.		
2.00-2.50	B7					(3.20)			
2.50	D8								
3.00	CPT	N = 39 (8, 5, 9, 9, 10, 11)							
3.00-3.50	B10								
3.50	D11								
				74.96		4.00			
4.00	CPT	50 for 0 mm (25, -, 50)					BH terminated at 4.00m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
16-08-17	13.00	4.00	4.00	203	dry	3	4.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH012**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-10-17 24-10-17	46.29	E 606,674.9 N 695,027.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			45.29		(1.00) 1.00	Grass over black soils boulders onto grey brown clay.		
1.00	CPT	50 for 0 mm (25, -, 50)					BH terminated at 1.00m bgl - refusal.		
1.00	D2								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
24-10-17	17.00	1.00	1.00	203		1	1.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH014**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-08-17 28-08-17	73.26	E 607,222.7 N 696,124.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.10)	Grass over brown soils onto brown CLAY with cobbles.		
1.00	CPT	N = 24 (5, 4, 3, 5, 6, 10)		72.16		1.10			
1.00	D2						Stiff greyish brown sandy CLAY with cobbles.		
1.00-1.50	B4								
1.50	D5					(1.40)			
2.00	CPT	N = 31 (4, 5, 4, 8, 8, 11)					2.00m: very stiff.		
2.00-2.50	B7			70.76		2.50			
2.50	D8 CPT			70.66		2.60	Obstruction as possible rock.		
							BH terminated at 2.60m bgl - refusal.		
4.90		75 Seating Blows for 17 mm (25, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
28-08-17	12.00	2.60	2.50	203	dry	0.6 2.6	0.8 2.6	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH015**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-08-17 25-08-17	73.26	E 607,222.7 N 696,124.2

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			72.86		0.40	Grass over brown soils.		
				72.36		(0.50) 0.90	Stiff brown CLAY with large boulders.		
1.00	CPT	N = 32 (6, 7, 5, 8, 8, 11)					Firm grey brown sandy CLAY with cobbles. 1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 23 (4, 4, 5, 6, 5, 7)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 44 (6, 8, 5, 13, 16, 10)				(4.70)	3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 37 (5, 6, 6, 10, 9, 12)							
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 53 (7, 8, 10, 10, 9, 24)							
5.00-5.50	B16								
5.50	D17			67.66		5.60			
5.60	CPT	75 Seating Blows for 49 mm (25, 50)		67.56		5.70	Obstruction as possible rock. BH terminated at 5.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-08-17	14.00	5.70	5.50	203	damp	5.6	5.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH017**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	07-09-17 07-09-17	70.45	E 614,253.4 N 704,387.5

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			70.15		0.30	Grass over TOPSOIL.		
						(1.30)	Soft brown sandy CLAY with medium boulder content.		
1.00	CPT	N = 14 (2, 2, 3, 4, 4, 3)					1.00m: firm.		
1.00	D2								
1.00-1.50	B4			68.85		1.60			
1.50	D5						Grey silty SAND with cobbles and boulders.		
2.00	CPT	N = 26 (4, 5, 6, 6, 6, 8)					2.00m: medium dense.		
2.00-2.50	B7					(1.40)			
				67.45		3.00			
3.00	CPT	50 for 11 mm (21, 4, 50)		67.35		3.10	Obstruction as possible rock.		
							BH terminated at 3.10m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
07-09-17	17.00	3.10	3.00	203	3.1

Chiselling

From	To	Hours
0.3	0.6	1/2
3	3.1	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-10-17 20-10-17	66.26	E 615,020.0 N 705,707.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.50m; Rose to (@ 20 min.): 3.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over brown PEAT/CLAY.		
						(1.60)			
1.00	CPT	N = 5 (2, 1, 1, 1, 2, 1)					1.00m: soft.		
1.00	D2								
1.00-1.50	B4			64.66		1.60			
1.50	D5						Soft black PEAT.		
2.00	CPT	N = 2 (2, 1, -, 1, 1, 2)							
2.00-2.50	B7								
2.50	D8								
			1			(2.30)			
3.00	CPT	N = 9 (3, 2, 2, 2, 2, 3)							
3.00-3.50	B10								
3.50	D11								
				62.36		3.90			
4.00	CPT	N = 19 (5, 4, 4, 4, 5, 6)				(0.60)	Loose grey sandy silty GRAVEL. 4.00m: medium dense.		
4.00-4.50	B13			61.76		4.50			
4.50	D14						Medium dense rounded medium GRAVEL.		
5.00	CPT	N = 26 (5, 6, 6, 5, 7, 8)							
5.00-5.50	B16								
5.50	D17					(2.50)			
6.00	CPT	N = 33 (8, 8, 8, 6, 9, 10)					6.00m: dense.		
6.00-6.50	B19								
6.50	D20								
				59.26		7.00			
7.00	CPT	75 Seating Blows for 131 mm (25, 50)		59.16		7.10	Obstruction as possible rock. BH terminated at 7.10m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
19-10-17	17.00	4.00	4.00	203	3.00
20-10-17	08.00	4.00	4.00	203	2.50
20-10-17	12.00	7.10	7.00	203	2.50

Chiselling

From	To	Hours
7	7.1	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH019**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-10-17 19-10-17	67.64	E 615,026.5 N 705,740.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.20m; Rose to (@ 20 min.): 3.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Coarse sand and river gravel.		
						(1.60)			
1.00	CPT	N = 13 (2, 4, 3, 3, 3, 4)					1.00m: medium dense.		
1.00	D2								
1.00-1.50	B4			66.04		1.60			
							Slightly clayey gravelly SILT.		
2.00	CPT	N = 21 (5, 4, 5, 5, 4, 7)					2.00m: firm.		
2.00	D5								
2.00-2.50	B7								
			1						
3.00	CPT	N = 10 (5, 3, 2, 2, 2, 4)							
3.00	D8								
3.00-3.50	B10					(3.90)			
3.50	D11								
4.00	CPT	N = 24 (3, 4, 5, 5, 6, 8)					4.00m: stiff.		
4.00	B13								
4.50	D14								
5.00	CPT	62 for 267 mm (5, 8, 9, 16, 16, 21)							
5.00	B16			62.14		5.50			
5.50	D17			62.04		5.60	Obstruction as possible rock.		
5.60	CPT	75 Seating Blows for 26 mm (25, 50)					BH terminated at 5.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
19-10-17	15.00	5.60	5.50	203	2.70	5.6	5.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	08-08-17 08-08-17	81.35	E 623,444.2 N 713,482.1

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			81.05		0.30	TOPSOIL.		
1.00	CPT	N = 25 (4, 3, 6, 6, 7, 6)					Stiff greyish brown sandy CLAY with cobbles. Cobbles are angular.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 29 (5, 8, 8, 7, 6, 8)				(3.70)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 25 (5, 6, 5, 5, 7, 8)							
3.00-3.50	B10								
3.50	D11			77.35		4.00			
4.00	CPT	N = 35 (4, 8, 7, 9, 9, 10)					Very stiff dark brownish black CLAY with broken limestone.		
4.00-4.50	B13					(0.80)			
4.50	D14			76.55		4.80			
4.80	CPT	50 for 0 mm (25, -, 50)					BH terminated at 4.80m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
08-08-17	17.00	4.80	4.50	203	dry	4.8	4.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH021**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-08-17 11-08-17	79.47	E 623,494.3 N 713,532.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.90m Rose to (@ 20 min.): 3.60m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.60)	Grass over brown CLAY with cobbles.		
				78.87		0.60			
							Medium dense grey sandy clayey coarse GRAVEL with medium cobble content.		
1.00	CPT	N = 25 (13, 5, 6, 6, 6, 7)							
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 33 (4, 4, 7, 9, 8, 9)				(3.30)	2.00m: dense.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 28 (2, 2, 6, 8, 4, 10)					3.00m: medium dense.		
3.00-3.50	B10								
3.50	D11		1						
			1	75.57		3.90			
3.90	CPT	75 Seating Blows for 131 mm (25, 50)		75.37		4.10	Obstruction as possible rock.		
							BH terminated at 4.10m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
11-08-17	17.00	4.10	4.00	203	3.40

Chiselling

From	To	Hours
0.6	0.9	1/2
3.9	4.1	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH022**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-07-17 24-07-17	80.10	E 634,192.9 N 716,619.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.00m 2nd: 3rd: Rose to (@ 20 min.): 5.50m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			79.80		0.30	TOPSOIL.		
1.00	SPT	N = 15 (2, 5, 3, 4, 4, 4)				(1.50)	Firm brown sandy gravelly CLAY with cobbles.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			78.30		1.80			
2.00	CPT	N = 23 (4, 5, 6, 5, 5, 7)					Medium dense brown gravelly coarse SAND. Gravel is fine.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 26 (5, 4, 6, 7, 7, 6)				(2.40)			
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 32 (3, 4, 7, 8, 8, 9)		75.90		4.20			
4.00-4.50	B13						Stiff grey SILT with bands of sand.		
4.50	D14								
5.00	CPT	N = 23 (5, 4, 2, 3, 8, 10)	▼1						
5.00-5.50	B16								
5.50	D17					(3.90)			
6.50	CPT	N = 32 (8, 7, 6, 9, 9, 8)							
6.50-7.00	B19								
7.00	D20								
8.00	CPT	75 Seating Blows for 63 mm (25, 50)		72.00		8.10			
				71.80		8.30	Obstruction as possible rock.		
							BH terminated at 8.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
24-07-17	17.00	8.30	7.50	203	damp	8.1	8.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-07-17 24-07-17	80.01	E 634,245.9 N 716,632.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 3.70m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			79.61		0.40	TOPSOIL.		
1.00	SPT	N = 23 (4, 3, 5, 6, 6, 6)				(1.40)	Medium dense greyish brown clayey SAND with cobbles.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			78.21		1.80			
2.00	CPT	N = 14 (2, 3, 3, 4, 3, 4)					Medium dense dry grey SAND.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 20 (4, 5, 5, 6, 4, 5)				(2.60)			
3.00-3.50	B10								
3.50	D11		▼						
4.00	CPT	N = 35 (5, 6, 8, 8, 9, 10)							
4.00-4.50	B13			75.61		4.40			
4.50	D14						Dense grey silty GRAVEL with medium cobble content.		
5.00	CPT	39 for 265 mm (8, 9, 9, 10, 9, 11)				(1.20)			
5.00-5.50	B16								
5.50	D17			74.41		5.60			
5.60	CPT	75 Seating Blows for 136 mm (25, 50)		74.31		5.70	Obstruction as possible rock.		
							BH terminated at 5.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
24-07-17	13.00	5.70	5.70	203	4.10	5.6	5.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-07-17 25-07-17	104.37	E 637,128.2 N 718,184.1

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			104.07		0.30	TOPSOIL.		
							Stiff sandy CLAY with cobbles and boulders.		
1.00	CPT	N = 23 (4, 5, 6, 5, 5, 7)							
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 16 (3, 3, 4, 2, 5, 5)				(3.60)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 15 (2, 1, 2, 4, 5, 4)							
3.00-3.50	B10								
3.50	D11								
				100.47		3.90			
3.90	CPT	75 Seating Blows for 87 mm (25, 50)					BH terminated at 3.90m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-07-17	14.00	3.90	3.90	203	dry	3.9	3.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-08-17 02-08-17	107.97	E 637,262.7 N 718,139.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			107.67		0.30	TOPSOIL: Grass over stiff sandy CLAY.		
							Stiff brown sandy CLAY with cobbles.		
1.00	SPT	N = 24 (3, 5, 5, 6, 7, 6)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(3.30)			
2.00	CPT	N = 20 (3, 2, 4, 5, 6, 5)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 29 (3, 7, 6, 6, 8, 9)					3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11			104.37		3.60			
3.60	CPT	75 Seating Blows for 71 mm (25, 50)		104.27		3.70	Obstruction as possible rock. BH terminated at 3.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
02-08-17	13.00	3.70	3.60	203	dry	3.6	3.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	16-10-17 16-10-17	71.87	E 653,509.5 N 727,982.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.90m; Rose to (@ 20 min.): 4.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over very soft black PEAT.		
1.00	CPT	N = (-, -, -, -, -, -)							
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = (-, -, -, -, -, -)							
2.00-2.50	B7					(4.90)			
2.50	D8								
3.00	CPT	N = (-, -, -, -, -, -)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 4 (1, -, 1, 1, 1, 1)	1				4.00m: soft.		
4.00-4.50	B13								
4.50	D14		1	66.97		4.90			
5.00	CPT	N = 9 (2, 3, 2, 2, 2, 3)					Loose grey silty SAND with cobbles.		
5.00-5.50	B16								
5.50	D17					(2.10)			
6.00	CPT	N = 18 (3, 4, 4, 5, 4, 5)					6.00m: medium dense.		
6.00-6.50	B19								
6.50	D20			64.87		7.00			
7.00	CPT	75 Seating Blows for 51 mm (25, 50)		64.77		7.10	Obstruction as possible rock. BH terminated at 7.10m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
16-10-17	16.00	7.10	7.00	203	4.00	7	7.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH030**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-10-17 12-10-17	66.95	E 663,461.8 N 726,830.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.90m 2nd: 3rd: Rose to (@ 20 min.): 4.10m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass and reeds over soft black PEAT.		
						(1.70)			
1.00	CPT	N = (1, -, -, -, -, -)					1.00m: very soft.		
1.00	D2								
1.00-1.50	B4			65.25		1.70			
1.50	D5								
1.70-2.50	B6						Firm grey sandy organic SILT.		
1.70	D7								
2.00	CPT	N = 14 (3, 4, 4, 3, 4, 3)					2.00m: firm.		
2.00-2.50	B9					(1.20)			
2.50	D10								
				64.05		2.90			
3.00	CPT	N = 22 (3, 4, 3, 5, 7, 7)					Stiff grey sandy gravelly SILT. Gravel is rounded of limestone.		
3.00-3.50	B12								
3.50	D13								
			1						
4.00	CPT	N = 16 (3, 2, 4, 4, 4, 4)							
4.00-4.50	B15								
4.50	D16								
						(4.10)			
5.00	CPT	N = 17 (2, 5, 4, 4, 4, 5)							
5.00-5.50	B18								
5.50	D19								
			1						
6.00		N = 22 (5, 5, 6, 5, 4, 7)							
6.50-7.00	B21								
				59.95		7.00			
7.00	CPT	N = 50 (10, 10, 11, 10, 14, 15)					Very dense obstruction as possible rock.		
7.00	D22								
7.00-7.50	B24					(0.60)			
7.50	D25			59.35		7.60			
7.60	CPT	75 Seating Blows for 57 mm (25, 50)					BH terminated at 7.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
12-10-17	13.00	7.60	7.50	203	4.00	7.6	7.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH031**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-10-17 12-10-17	66.63	E 663,588.9 N 726,770.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.50m; Rose to (@ 20 min.): 4.20m; Sealed at: 4.20m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.30)	Grass over black PEAT.		
1.00	CPT	N = 17 (3, 2, 4, 4, 4, 5)		65.33		1.30	1.00m: stiff.		
1.00	D2						Stiff grey sandy SILT.		
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 19 (2, 4, 4, 5, 4, 6)				(2.40)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 16 (2, 3, 3, 4, 5, 4)							
3.00-3.50	B10								
3.50	D11			62.93		3.70			
4.00	CPT	N = 14 (2, 1, 2, 2, 4, 6)	1				Stiff grey slightly gravelly very sandy SILT.		
4.00-4.50	B13								
4.50	D14					(1.90)			
5.00	CPT	N = 25 (5, 3, 4, 4, 8, 9)							
5.00-5.50	B16		1						
5.50	D17			61.03		5.60			
5.60	CPT	30 Seating Blows for 110 mm (25, 5)		60.93		5.70	Obstruction as possible rock.		
							BH terminated at 5.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
12-10-17	17.30	5.70	5.50	203	4.00	5.6	5.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	79.38	E 670,689.4 N 729,446.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 2.60m; Rose to (@ 20 min.): 1.80m; Sealed at: 1.80m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.90)	Soft brown CLAY.		
				78.48		0.90			
1.00	CPT	N = 12 (2, 1, 2, 3, 3, 4)					Firm greyish black slightly sandy CLAY.		
1.00	D2								
1.00-1.50	B4								
1.50	D5		1						
2.00	CPT	N = 8 (2, 2, 1, 2, 2, 3)				(2.20)			
2.00-2.50	B7								
2.50	D8		1						
				76.28		3.10			
3.00	CPT	50 for 12 mm (10, 15, 50)		76.18		3.20	Obstruction as possible rock. BH terminated at 3.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
10-10-17	17.00	3.20	3.00	203	1.60	3.1	3.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH033**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-09-17 19-09-17	80.43	E 670,756.4 N 729,489.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			80.23		0.20	TOPSOIL.		
						(0.70)	Brown sandy CLAY.		
				79.53		0.90			
1.00	CPT	N = 7 (2, 3, 2, 2, 2, 1)					Soft moist grey sandy gravelly SILT with medium cobble content. Cobbles are angular.		
1.00 1.00-1.50	D2 B4								
2.00	CPT	N = 23 (4, 3, 5, 3, 6, 9)				(2.50)	2.00m: stiff.		
2.00 2.00-2.50	D5 B7								
3.00	CPT	N = 72 (8, 11, 18, 8, 21, 25)					3.00m to 3.40m: with boulders.		
3.00 3.40	D8 CPT	10 for 25 mm (25, 40, 10)		77.03		3.40			
							BH terminated at 3.40m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
19-09-17	15.30	3.40	3.00	203	2.20	3.3 3.4	3.4 3.4	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: DK	Logged By: DK

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH038**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-09-17 26-09-17	63.52	E 698,207.2 N 730,416.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			63.12		0.40	Stiff brown CLAY.		
1.00	CPT	N = 17 (2, 4, 4, 3, 5, 5)				(1.40)	Stiff greyish black CLAY with cobbles. Cobbles are of black limestone.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			61.72		1.80			
1.80	B6						Black LIMESTONE rock.		
1.80	D7			61.32		2.20			
2.00	CPT	75 Seating Blows for 24 mm (25, 50)					BH terminated at 2.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
26-09-17	17.00	2.20	2.00	203	1.10	2	2.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH039**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-09-17 27-09-17	64.06	E 698,328.0 N 730,409.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 3.00m 2.20m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.70)	Firm brown CLAY.		
				63.36		0.70			
1.00	CPT	N = 13 (2, 2, 3, 2, 4, 4)				(2.00)	Firm grey CLAY with cobbles. Cobbles are angular of limestone.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 13 (2, 1, 2, 3, 5, 3)	1						
2.00-2.50	B7								
2.50	D8			61.36		2.70			
			1	61.06		3.00	Wet COBBLES.		
3.00	CPT	75 Seating Blows for 77 mm (25, 50)		60.96		3.10	Obstruction as possible rock.		
							BH terminated at 3.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
27-09-17	17.00	3.10	3.00	203	2.20	3	3.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH040**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	08-09-17 08-09-17	102.38	E 616,230.4 N 708,805.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			101.88		(0.50) 0.50	Grass over stiff brown CLAY.		
1.00	CPT	N = 56 (7, 10, 8, 8, 11, 29)				(1.10)	Greyish brown CLAY with cobbles and boulders. 1.00m: very stiff.		
1.00 1.00-1.50 1.50 1.60	D2 B4 D5 CPT	75 Seating Blows for 16 mm (25, 50)		100.78 100.68		1.60 1.70	Obstruction as possible rock. BH terminated at 1.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
08-09-17	17.00	1.70	1.50	203	dry	0.6 1.6	0.7 1.7	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH045**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-08-17 14-08-17	111.62	E 639,352.3 N 718,797.3

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.30)	Grass over firm brown CLAY.		
1.00	CPT	61 for 150 mm (4, 5, 22, 39)		110.32		1.30			
1.00	D2			110.22		1.40	Obstruction as broken shale/limestone.		
1.00-1.30	B4						BH terminated at 1.40m bgl - obstruction.		
1.30	D5								
1.80		50 for 0 mm (25, -, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
14-08-17	17.00	1.40	1.30	203	dry	1.3	1.4	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH046**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	18-07-17 18-07-17	70.24	E 644,965.6 N 721,835.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 2.60m 2.00m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			69.84		0.40	MADE GROUND: GRAVEL.		
				69.44		0.80	Firm brown CLAY with roots and cobbles.		
1.00	CPT	N = 17 (2, 3, 4, 4, 5, 4)					Dense grey gravelly SAND with cobbles. Cobbles are rounded.		
1.00	D2								
1.00-1.50	B4								
1.50	D5		1						
2.00	CPT	N = 11 (2, 1, 2, 3, 3, 3)							
2.00-2.50	B7		1						
2.50	D8								
2.60	W9								
3.00	CPT	N = 8 (1, 2, 2, 1, 2, 3)					3.00m: medium dense.		
3.00-3.50	B11					(5.40)			
3.50	D12								
4.00	CPT	N = 5 (2, 1, 2, 1, 1, 1)							
4.00-4.50	B14								
4.50	D15								
5.00	CPT	N = 5 (1, -, 1, 1, 2, 1)							
5.00-5.50	B17								
5.50	D18								
6.00	CPT	62 for 250 mm (6, 7, 10, 22, 21, 9)		64.04		6.20			
				63.94		6.30	6.20m to 6.30m: wet. Obstruction as possible rock. BH terminated at 6.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
18-07-17	17.00	6.30	6.00	203	3.60	6.2	6.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH048**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-06-17 27-06-17	45.47	E 574,549.4 N 670,758.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 7.80m 2nd: 3rd: Rose to (@ 20 min.): 7.40m Sealed at: 7.40m	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			45.17		0.30	TOPSOIL: Grass over soft sandy CLAY.		
							Soft sandy CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 8 (1, 1, 1, 2, 3, 2)				(1.60)			
1.00	D2								
1.00-1.50	B4								
1.50	D5			43.57		1.90			
2.00	CPT	N = 21 (3, 5, 6, 5, 5, 5)					Firm slightly gravelly very sandy CLAY with cobbles.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 38 (5, 6, 7, 6, 8, 17)					3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 11 (1, 2, 2, 2, 3, 4)					4.00m: firm.		
4.00-4.50	B13								
4.50	D14					(5.90)			
5.00	CPT	N = 8 (3, 2, 1, 1, 3, 3)							
5.00-5.50	B16								
5.50	D17								
6.50	CPT	N = 15 (3, 3, 2, 4, 4, 5)							
6.50-7.00	B19								
7.00	D20		1						
			1	37.67		7.80			
8.00	CPT	N = 25 (5, 4, 5, 6, 7, 7)					Medium dense wet SAND with cobbles. Cobbles are rounded.		
8.00-8.50	B22								
8.50	D23					(1.20)			
				36.47		9.00			
9.00	CPT	75 Seating Blows for 116 mm (25, 50)		36.37		9.10	Obstruction as possible rock.		
							BH terminated at 9.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
27-06-17	14.00	9.10	9.00	203	6.00	0.35 9	3.7 9.1	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH049**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-06-17 22-06-17	53.32	E 578,629.7 N 672,345.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.00m 2nd: 3rd: 3.90m — Rose to (@ 20 min.): — Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			53.02		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(1.30)	Firm brown silty sandy CLAY with cobbles. Cobbles are of limestone.		
1.00	SPT	N = 23 (2, 5, 6, 5, 6, 6)					1.00m: stiff.		
1.00	D2								
1.00-1.50	B4			51.72		1.60			
1.50	D5						Stiff damp very sandy CLAY with cobbles.		
2.00	CPT	N = 36 (5, 6, 9, 8, 9, 10)					2.00m: very stiff.		
2.00-2.50	B7								
2.50	D8					(2.00)			
3.00	CPT	N = 32 (4, 5, 7, 7, 9, 9)							
3.00-3.50	B10			49.72		3.60			
3.50	D11		1				Very stiff dry grey sandy CLAY with cobbles.		
				49.32		4.00			
4.00	CPT	50 for 27 mm (18, 7, 50)		49.22		4.10	Obstruction as possible rock.		
							BH terminated at 4.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
22-06-17	12.00	4.10	4.10	203	3.60	2.4 4	2.6 4.1	1 1			50mm standpipe installed. Response zone - 1.00m to 4.10m bgl.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH050**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-06-17 21-06-17	54.82	E 578,966.9 N 672,764.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.10m; Rose to (@ 20 min.): 2.60m; Sealed at: 4.00m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			54.42		0.40	TOPSOIL: Grass over brown sandy CLAY.		
							Firm greyish brown slightly gravelly sandy CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 20 (2, 3, 3, 5, 6, 6)							
1.00	D2								
1.00-1.50	B4					(2.20)			
1.50	D5								
2.00	CPT	N = 35 (5, 6, 8, 8, 9, 10)					2.00m: very stiff.		
2.00-2.50	B7		1						
2.50	D8			52.22		2.60			
							Stiff damp brown sandy gravelly CLAY with cobbles.		
3.00	CPT	N = 21 (8, 7, 9, 6, 3, 3)							
3.00-3.50	B10					(1.40)			
3.50	D11								
				50.82		4.00			
4.00	CPT	N = 62 (4, 6, 11, 15, 16, 20)					Hard grey sandy CLAY with medium cobble content.		
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 46 (5, 10, 9, 10, 10, 17)				(2.20)	5.00m: very stiff.		
5.00-5.50	B16								
5.50	D17								
6.00	CPT	75 Seating Blows for 117 mm (25, 50)		48.62		6.20			
							BH terminated at 6.20m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
21-06-17	17.00	6.20	4.50	203	dry

Chiselling

From	To	Hours
6	6.2	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH051**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-06-17 20-06-17	55.41	E 579,591.7 N 673,385.1

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			55.11		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
1.00	SPT	N = 17 (2, 3, 4, 4, 5, 4)				(2.10)	Stiff brown CLAY with cobbles. Cobbles are of limestone.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	SPT	N = 11 (2, 1, 2, 3, 3, 3)		53.01		2.40			
2.00-2.50	B7								
2.50	D8						Medium dense damp brown slightly gravelly SAND with cobbles. Cobbles are rounded.		
3.00	SPT	N = 8 (1, 2, 2, 1, 2, 3)					3.00m: loose.		
3.00-3.50	B10								
3.50	D11					(3.10)			
4.00	SPT	N = 5 (2, 1, 2, 1, 1, 1)							
4.00-4.50	B13								
4.50	D14								
5.00	SPT	N = 5 (1, -, 1, 1, 2, 1)							
5.00-5.50	B16			49.91		5.50			
5.50	D17						Stiff slightly gravelly very sandy CLAY with boulders.		
6.00	CPT	62 for 250 mm (6, 7, 10, 22, 21, 9)				(0.90)			
6.00-6.50	B19			49.01		6.40			
6.50	D20			48.91		6.50	Obstruction as possible rock.		
							BH terminated at 6.50m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
						6.4	6.5	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH052**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-06-17 20-06-17	54.28	E 580,018.0 N 674,068.6

Engineer	GROUNDWATER STRIKES	Sheet
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			53.98		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
				53.48		(0.50) 0.80	Firm greyish brown sandy CLAY.		
1.00	SPT	N = 20 (3, 4, 4, 6, 5, 5)					Medium dense silty SAND with medium cobble content.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	SPT	N = 26 (2, 3, 4, 7, 7, 8)				(2.50)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	69 for 145 mm (3, 3, 9, 60)		50.98		3.30			
3.00-3.30	B10								
3.30	D11						BH terminated at 3.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
20-06-17	17.00	3.30	3.30	203	dry	3.3	3.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH053**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-06-17 19-06-17	52.83	E 580,716.2 N 674,844.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.60m Rose to (@ 20 min.): 4.80m Sealed at: 4.80m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			52.33		(0.50) 0.50	TOPSOIL: Grass over firm brown sandy CLAY.		
1.00	SPT	N = 14 (2, 2, 3, 2, 4, 5)				(1.10)	Firm brown silty sandy CLAY.		
1.00	D2								
1.00-1.50	B4			51.23		1.60			
1.50	D5						Firm brown very sandy CLAY with cobbles and boulders.		
2.00	CPT	N = 25 (3, 2, 3, 4, 8, 10)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 21 (2, 4, 4, 3, 6, 8)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 31 (3, 5, 5, 9, 9, 8)				(4.90)	4.00m: very stiff.		
4.00-4.50	B13								
4.50	D14		1						
5.00	CPT	N = 25 (5, 4, 6, 6, 6, 7)					6.00m: stiff.		
5.00-5.50	B16								
5.50	D17		1						
6.00	CPT	N = 53 (8, 9, 9, 12, 15, 17)					6.00m: very stiff.		
6.00-6.50	B19			46.33		6.50			
6.50	D20			46.23		6.60	Obstruction as possible rock.		
6.60	CPT	50 for 0 mm (25, -, 50)					BH terminated at 6.60m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
19-06-17	14.00	6.60	6.50	203	5.90

Chiselling

From	To	Hours
2.5	2.8	1/2
6.6	6.6	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH054**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-10-17 25-10-17	49.87	E 581,808.6 N 675,700.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.30m Rose to (@ 20 min.): 2.70m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			49.47		0.40	MADE GROUND: Grass over road fill and clays.		
				48.97		(0.50) 0.90	Soft brown CLAY with some black peat.		
1.00	CPT	N = 16 (2, 2, 3, 5, 4, 4)		48.47		(0.50) 1.40	Stiff grey sandy CLAY with cobbles. Sand is coarse.		
1.00	D2								
1.00-1.50	B4						Firm reddish grey sandy CLAY with boulders.		
1.50	D5								
2.00	CPT	N = 20 (3, 5, 4, 4, 6, 6)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8		1			(2.70)			
3.00	CPT	N = 24 (4, 4, 5, 4, 8, 7)	1						
3.00-3.50	B10								
3.50	D11								
4.00	CPT	50 for 40 mm (18, 7, 50)		45.77		4.10			
				45.67		4.20	Obstruction as possible rock.		
							BH terminated at 4.20m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
25-10-17	13.00	4.20	4.00	203	1.10

Chiselling

From	To	Hours
4.1	4.2	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH055**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-06-17 14-06-17	52.70	E 582,612.1 N 678,037.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			52.10		(0.60) 0.60	Reeds over soft black PEAT.		
1.00	SPT	N = 18 (2, 3, 5, 4, 4, 5)		51.40		(0.70) 1.30	Stiff greyish brown sandy CLAY with medium cobble content.		
1.00 1.00-1.50 1.50	D2 B4 D5						Medium dense damp silty very sandy GRAVEL.		
2.00 2.00-2.50	CPT B7	N = 24 (3, 5, 7, 4, 5, 8)		50.20		(1.20) 2.50			
2.50	D8						Stiff reddish brown CLAY with medium cobble content. Cobbles are angular.		
3.00 3.00-3.50 3.50	CPT B10 D11	N = 29 (2, 5, 5, 6, 10, 8)		48.50		(1.70) 4.20			
4.00 4.00-4.50 4.50	CPT B13 D14	N = 27 (5, 6, 6, 4, 8, 9)		47.40		(1.10) 5.30	Medium dense damp red SAND.		
5.00 5.00-5.30 5.30 5.40	CPT B16 ~~CPT~~ D17	61 for 127 mm (6, 8, 17, 44) 75 Seating Blows for 96 mm (25, 50)		47.30		5.40	Obstruction as possible rock. BH terminated at 5.40m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
14-06-17	13.00	5.40	5.40	203	damp

Chiselling

From	To	Hours
2.4	2.7	1/2
5.3	5.4	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH057**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-06-17 14-06-17	47.53	E 583,311.4 N 679,888.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			47.13		0.40	TOPSOIL: Grass over firm brown sandy CLAY.		
						(0.70)	Soft locally firm brown CLAY with cobbles.		
1.00	CPT	N = 12 (3, 2, 2, 4, 3, 3)		46.43		1.10			
1.00	D2						Firm greyish brown slightly sandy CLAY with cobbles. Cobbles are rounded.		
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 20 (3, 4, 4, 5, 5, 6)				(2.40)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 34 (8, 5, 6, 6, 10, 12)							
3.00-3.50	B10			44.03		3.50			
3.50	D11			43.93		3.60	Obstruction as possible rock.		
3.60	CPT	75 Seating Blows for 129 mm (25, 50)					BH terminated at 3.60m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
14-06-17	17.00	3.60	3.50	203	dry

Chiselling

From	To	Hours
2.7	2.9	1
3.5	3.6	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH059**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-06-17 19-06-17	49.69	E 583,942.6 N 681,846.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			49.39		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
							Limestone BOULDERS		
1.00	SPT	N = 37 (6, 8, 9, 10, 10, 8)				(1.50)	1.00m: dense.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			47.89		1.80			
							Stiff brown sandy CLAY with cobbles. Cobbles are of limestone.		
2.00	CPT	N = 16 (3, 2, 4, 4, 3, 5)				(0.70)			
2.00-2.50	B7			47.19		2.50			
2.50	D8			47.09		2.60	Obstruction as possible limestone rock.		
2.60	CPT	75 Seating Blows for 116 mm (25, 50)					BH terminated at 2.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
19-06-17	17.00	2.60	2.60	203	dry	1.5 2.6	1.7 2.6	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH060**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-07-17 04-07-17	45.64	E 585,235.6 N 683,302.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			45.24		0.40	TOPSOIL.		
							Stiff greyish brown CLAY.		
1.00	SPT	N = 19 (3, 2, 4, 5, 5, 5)				(1.90)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	SPT	N = 48 (8, 10, 10, 16, 11, 11)		43.34		2.30	2.00m: very stiff.		
2.00-2.50	B7			43.14		2.50	BOULDERS.		
2.50	D8			43.04		2.60	Obstruction as possible rock.		
2.60	CPT	75 Seating Blows for 25 mm (25, 50)					BH terminated at 2.60m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
04-07-17	13.00	2.60	2.50	203	dry	2.5	2.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH061**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	09-06-17 09-06-17	65.62	E 585,831.3 N 684,005.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			65.22		0.40	TOPSOIL: Grass over firm brown sandy CLAY.		
							Stiff brown slightly sandy CLAY with cobbles.		
1.00	CPT	N = 23 (4, 3, 5, 5, 6, 7)				(1.40)			
1.00	D2								
1.00-1.50	B4								
1.50	D5			63.82		1.80			
2.00	CPT	N = 31 (3, 5, 7, 7, 8, 9)					Stiff brown CLAY with cobbles. Cobbles are angular of limestone. 2.00m: becoming very stiff.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 39 (6, 8, 7, 9, 10, 13)							
3.00-3.50	B10								
3.50	D11					(4.20)			
4.00	CPT	62 for 295 mm (7, 6, 8, 18, 19, 17)							
4.00-4.50	B13								
4.50	D14								
5.00	CPT	57 for 260 mm (8, 10, 10, 16, 17, 14)							
5.00-5.50	B16								
5.50	D17								
				59.62		6.00			
6.00	CPT	75 Seating Blows for 47 mm (25, 50)					BH terminated at 6.00m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
09-06-17	15.00	6.00	5.80	203	dry

Chiselling

From	To	Hours
1.6	1.9	1
4.7	4.8	1/2
6	6.0	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH067**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	15-08-17 15-08-17	82.68	E 590,701.8 N 688,706.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			82.28		0.40	TOPSOIL.		
							Stiff brown CLAY with cobbles.		
1.00	CPT	N = 25 (4, 5, 5, 6, 7, 7)							
1.00	D2					(2.10)			
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 42 (5, 6, 8, 8, 9, 17)					2.00m: very stiff.		
2.00-2.50	B7			80.18		2.50			
2.50	D8			80.08		2.60	Obstruction as possible rock.		
2.60	CPT	50 for 0 mm (25, -, 50)					BH terminated at 2.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
15-08-17	17.00	2.60	2.50	203	dry	2.6	2.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH068**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	15-08-17 15-08-17	79.22	E 592,143.6 N 688,933.9

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.80)	MADE GROUND: Grass over clay fill and angular cobbles.		
				78.42		0.80			
1.00	SPT	N = 23 (3, 5, 7, 6, 5, 5)					Stiff greyish brown sandy CLAY with medium cobble content. Cobbles are angular.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 25 (5, 6, 6, 6, 7, 6)							
2.00-2.50	B7					(3.40)			
2.50	D8								
3.00	CPT	N = 37 (4, 7, 6, 10, 10, 11)					3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	50 for 52 mm (10, 15, 50)		75.02		4.20			
				74.92		4.30	Obstruction as possible rock.		
							BH terminated at 4.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
15-08-17	14.00	4.30	4.00	203	dry	3.4 4.2	3.7 4.3	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH069**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-07-17 05-07-17	76.69	E 592,720.9 N 689,241.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			76.39		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
							Very stiff greyish sandy CLAY with cobbles. Cobbles are rounded of limestone.		
1.00	SPT	N = 31 (4, 5, 4, 5, 5, 17)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.70)			
2.00	SPT	N = 27 (5, 7, 6, 6, 6, 9)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
				73.69		3.00			
3.00	CPT	75 Seating Blows for 133 mm (25, 50)		73.49		3.20	Obstruction as possible rock.		
							BH terminated at 3.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
05-07-17	17.00	3.20	3.10	203	dry	1.5 3	1.7 3.2	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH070**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-07-17 13-07-17	70.94	E 593,922.3 N 689,222.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			70.64		0.30	TOPSOIL.		
							Firm grey silty sandy CLAY.		
1.00	SPT	N = 9 (2, 3, 4, 2, 1, 2)				(1.80)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 32 (5, 7, 8, 8, 7, 9)		68.84		2.10	2.00m: very stiff.		
2.00-2.50	B7						Very stiff greyish brown CLAY with cobbles.		
2.50	D8								
3.00	CPT	N = 54 (8, 7, 10, 11, 17, 16)				(1.80)			
3.00-3.50	B10								
3.50	D11								
3.90	CPT	75 Seating Blows for 67 mm (25, 50)		67.04		3.90	BH terminated at 3.90m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
13-07-17	13.00	3.90	3.90	203	dry	3.9	3.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH071**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-07-17 13-07-17	76.79	E 594,940.0 N 689,458.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			76.59		0.20	TOPSOIL.		
							Very stiff sandy CLAY with cobbles. Cobbles are angular.		
1.00	SPT	58 for 250 mm (7, 10, 16, 16, 11, 15)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(3.20)			
2.00	CPT	N = 36 (6, 8, 7, 7, 10, 12)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	58 for 160 mm (9, 8, 17, 26, 15)							
3.00-3.40	B10			73.39		3.40			
3.40	D11			73.29		3.50	Obstruction as possible rock.		
3.50	CPT	50 for 0 mm (25, -, 50)					BH terminated at 3.50m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
13-07-17	17.00	3.50	3.40	203	dry

Chiselling

From	To	Hours
1.4	1.7	1
3.4	3.5	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH072**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-07-17 14-07-17	86.07	E 595,767.0 N 689,738.3

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			85.67		0.40	TOPSOIL.		
1.00	SPT	N = 24 (8, 4, 6, 6, 5, 7)				(1.60)	Firm brown sandy CLAY with cobbles. 1.00m: stiff.		
1.00 1.00-1.50 1.50	D2 B4 D5			84.07		2.00			
2.00	CPT	75 Seating Blows for 118 mm (25, 50)		83.87		2.20	Obstruction as possible rock. BH terminated at 2.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
14-07-17	16.00	2.20	2.00	203	dry	0.6 2	0.9 2.2	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH077**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-08-17 21-08-17	103.49	E 599,934.5 N 689,968.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			103.19		0.30	Grass over TOPSOIL.		
							Greyish brown sandy CLAY with cobbles and angular boulders.		
1.00	SPT	N = 39 (5, 6, 7, 6, 16, 10)				(1.60)	1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			101.59		1.90			
1.90	CPT	110 for 0 mm (25, -, 50, 60)					BH terminated at 1.90m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
21-08-17	12.00	1.50	1.90	203	dry	1.9	1.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH082**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	17-08-17 17-08-17	74.03	E 602,456.8 N 693,812.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 3.80m 2.60m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.60)	Grass over brown sandy soils.		
				73.43		0.60			
						(0.60)	Greyish brown sandy CLAY with some gravel and cobbles		
1.00	CPT	N = 15 (2, 4, 3, 3, 4, 5)		72.83		1.20	1.00m: stiff.		
1.00	D2						Soft grey silty sandy CLAY.		
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 12 (2, 2, 2, 3, 4, 3)					2.00m: firm.		
2.00-2.50	B7		1						
2.50	D8								
3.00	CPT	N = 30 (5, 8, 6, 6, 8, 10)					3.00m: very stiff.		
3.00-3.50	B10					(4.30)			
3.50	D11								
3.60	W12		1						
4.00	CPT	N = 14 (2, 3, 3, 2, 4, 5)					4.00m: firm.		
4.00-4.50	B14								
4.50	D15								
5.00	CPT	N = 31 (5, 6, 6, 8, 7, 10)					5.00m: very stiff.		
5.00-5.50	B17			68.53		5.50			
5.50	D18			68.43		5.60	Obstruction as possible rock.		
5.60	CPT	75 Seating Blows for 81 mm (25, 50)					BH terminated at 5.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
17-08-17	17.00	5.60	5.50	203	2.40	5.6	5.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH083**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-08-17 23-08-17	70.57	E 603,437.8 N 694,736.3

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.70m Rose to (@ 20 min.): 2.20m Sealed at: 2.20m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA					
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION	Geology	Instrument/ Backfill
0.00-1.00	B1						Grass reeds over soft blackish brown PEAT.		
						(1.70)			
1.00	CPT	N = (1, -, -, -, 1, -)					1.00m: very soft.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			68.87		1.70			
							Grey silty sandy CLAY with gravel and cobbles.		
2.00	CPT	N = 18 (2, 1, 3, 5, 6, 4)	1				2.00m: stiff.		
2.00-2.50	B7								
2.50	D8					(2.00)			
3.00	CPT	N = 28 (5, 6, 7, 6, 6, 9)							
3.00-3.50	B10								
3.50	D11			66.87		3.70			
							Wet sandy silty CLAY with gravel.		
4.00	CPT	N = 36 (2, 8, 4, 10, 11, 11)				(0.80)	4.00m: very stiff.		
4.00-4.50	B13			66.07		4.50			
4.50	D14			65.97		4.60	Obstruction as possible rock.		
4.60	CPT	75 Seating Blows for 54 mm (25, 50)					BH terminated at 4.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
22-08-17	08.00	4.50	4.50	203	2.00	4.6	4.7	1			BH backfilled.
22-08-17	14.00	4.60	4.60	203	1.90						
22-08-17	17.00	4.50	4.50	203	2.00						

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH084**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-08-17 24-08-17	75.53	E 604,493.4 N 694,910.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.80)	Grass over brown soil and compact clay.		
				74.73		0.80			
1.00	CPT	N = 12 (2, 2, 3, 2, 4, 3)					Firm brown sandy CLAY with small cobbles.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 19 (3, 3, 3, 4, 5, 7)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8					(4.20)			
3.00	CPT	N = 19 (5, 6, 4, 4, 5, 6)					3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 31 (5, 5, 7, 6, 8, 10)							
4.00-4.50	B13								
4.50	D14								
				70.53		5.00			
5.00	CPT	50 for 20 mm (19, 6, 50)		70.33		5.20	Obstruction as possible rock.		
							BH terminated at 5.20m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
23-08-17	17.00	4.00	4.00	203	dry
24-08-17	08.00	4.00	4.00	203	dry
24-08-17	11.00	5.20	5.00	203	dry

Chiselling

From	To	Hours
5	5.2	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH085**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-08-17 24-08-17	61.93	E 605,414.4 N 695,039.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: **dry** 2nd: 3rd: Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			61.53		0.40	TOPSOIL.		
				60.83		(0.70) 1.10	Stiff brown CLAY with small cobbles.		
1.00	CPT	65 for 235 mm (3, 7, 16, 18, 18, 13)		60.23		(0.60) 1.70	Stiff greyish brown CLAY with cobbles and large boulders.		
1.00	D2						BH terminated at 1.70m bgl - refusal.		
1.00-1.50	B4								
1.50	D5								
1.70	CPT	50 for 0 mm (25, -, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
24-08-17	15.00	1.70	1.50	203	dry	1.4 1.7	1.6 1.7	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH086**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-08-17 28-08-17	87.23	E 608,143.0 N 696,653.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 2.50m 2nd: 3rd: Rose to (@ 20 min.): 2.00m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			86.83		0.40	Grass black soils cobbles.		
1.00	CPT	N = 30 (3, 7, 4, 8, 9, 9)				(1.50)	Grey sandy CLAY with small cobbles and some boulders. 1.00m: stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5		1	85.33		1.90			
2.00	CPT	N = 5 (5, 6, 1, 1, 2, 1)					Loose medium GRAVEL with cobble bands and boulders. 2.00m: soft.		
2.00-2.50	B7		1						
2.50	D8								
3.00	CPT	N = 15 (2, 2, 2, 4, 4, 5)				(2.10)	3.00m: medium dense.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	50 for 11 mm (10, 15, 50)		83.23		4.00			
				82.93		4.30	Obstruction as large BOULDERS.		
							BH terminated at 4.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
28-08-17	17.00	4.30	4.00	203	3.80	4.1	4.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH087**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	30-08-17 30-08-17	95.35	E 608,622.2 N 697,584.8

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			95.05		0.30	Grass over TOPSOIL.		
				94.75		0.60	Stiff brown CLAY.		
1.00	CPT	N = 41 (6, 8, 9, 9, 10, 13)					Greyish brown sandy CLAY with cobbles and limestone boulders. 1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 29 (8, 7, 6, 9, 7, 7)				(3.40)	2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 39 (8, 6, 10, 9, 10, 10)					3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
				91.35		4.00			
4.00	CPT	75 Seating Blows for 27 mm (25, 50)		91.25		4.10	Obstruction as possible rock. BH terminated at 4.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
30-08-17	14.00	4.10	4.00	203	dry	4	4.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH088**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	30-08-17 30-08-17	80.79	E 608,628.6 N 698,498.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			80.49		0.30	Grass over TOPSOIL.		
							Stiff grey very sandy CLAY with rounded cobbles and large boulders.		
1.00	CPT	N = 52 (5, 8, 7, 10, 19, 16)				(1.40)	1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			79.09		1.70			
1.70	CPT	75 Seating Blows for 37 mm (25, 50)		78.99		1.80	Obstruction as possible rock.		
							BH terminated at 1.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
30-08-17	17.00	1.80	1.50	203	dry	1.7	1.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH089**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	29-08-17 29-08-17	96.59	E 608,919.8 N 699,461.6

Engineer	GROUNDWATER STRIKES	Sheet
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			96.29		0.30	Grass over TOPSOIL.		
						(1.00)	Stiff compacted greyish brown sandy CLAY with large cobbles and boulders.		
1.00	CPT	50 for 80 mm (18, 7, 42, 8)		95.29		1.30			
1.00	D2			95.19		1.40	Obstruction as possible rock.		
1.00-1.30	CBR						BH terminated at 1.40m bgl - obstruction.		
1.30	D5								
1.40		75 Seating Blows for 103 mm (25, 50)							

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
29-08-17	17.00	1.40	1.30	203	dry

Chiselling

From	To	Hours
0.4	0.6	1/2
1.3	1.4	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH090**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	29-08-17 29-08-17	77.10	E 609,003.8 N 700,483.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 1.60m 2nd: 3rd: Rose to (@ 20 min.): 0.70m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			76.70		0.40	Grass and reeds over black PEAT with cobbles.		
			1			(0.70)	Firm grey sandy silty CLAY with some boulders and cobbles.		
1.00	CPT	N = 37 (6, 7, 8, 8, 10, 11)		76.00		1.10	1.00m: very stiff.		
1.00	D2						GRAVEL with large angular boulders.		
1.00-1.50	B4					(0.90)			
1.50	D5								
				75.10		2.00			
2.10	CPT	75 Seating Blows for 81 mm (25, 50)		75.00		2.10	Obstruction as possible rock.		
							BH terminated at 2.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
29-08-17	11.30	2.10	1.90	203	0.70	2	2.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH091**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	30-08-17 30-08-17	72.92	E 609,581.2 N 701,357.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 1.60m Rose to (@ 20 min.): 1.10m Sealed at: 1.10m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			72.52		0.40	Grass black soils with cobbles		
							Stiff grey sandy CLAY with cobbles and angular boulders.		
1.00	CPT	N = 21 (3, 5, 4, 5, 5, 7)	1			(1.50)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
				71.02		1.90			
1.90	CPT	50 for 0 mm (25, -, 50)		70.92		2.00	Obstruction as possible rock.		
							BH terminated at 2.00m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
30-08-17	10.30	2.00	1.90	203	1.30	1.9	2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH092**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	01-09-17 01-09-17	68.01	E 610,024.9 N 702,056.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.70m 2nd: 3rd: Rose to (@ 20 min.): 5.00m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			67.61		0.40	Grass over black PEAT.		
				67.31		0.70	Soft greyish white SILT/MARL.		
1.00	CPT	N = 1 (1, -, 1, 1, -, 1)					Soft grey sandy SILT. 1.00m: very soft.		
1.00	D2								
1.00-1.50	B4								
1.50	D5					(1.90)			
2.00	CPT	N = (1, -, -, 1, -, -)					2.00m: very soft.		
2.00-2.50	B7								
2.50	D8			65.41		2.60			
3.00	CPT	N = (-, -, -, -, -, -)					Very soft grey sandy SILT. 3.00m: very soft.		
3.00-3.50	B10					(1.10)			
3.50	D11			64.31		3.70			
4.00	CPT	N = (-, -, -, -, -, -)					Very soft grey SILT.		
4.00-4.50	B13								
4.50	D14					(1.80)			
5.00	CPT	N = 16 (2, 2, 3, 4, 3, 6)	1				5.00m: stiff.		
5.00-5.50	B16			62.51		5.50			
5.50	D17		1				Medium dense silty sandy GRAVEL with cobbles.		
6.00	CPT	N = 16 (3, 2, 4, 3, 5, 4)				(1.40)			
6.00-6.50	B19								
6.50	D20			61.11		6.90			
6.90	CPT	75 Seating Blows for 59 mm (25, 50)		61.01		7.00	Obstruction as possible rock. BH terminated at 7.00m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
01-09-17	16.30	7.00	7.00	203	3.20	6.9	7.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH093**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-09-17 05-09-17	82.43	E 611,195.2 N 702,620.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.70m 2nd: 3rd: 3.80m Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			81.83		(0.60) 0.60	Grass over firm brown CLAY with cobbles.		
1.00	CPT	N = 34 (5, 3, 6, 9, 10, 9)					Soft greyish brown silty sandy CLAY with cobbles. Cobbles are of limestone. 1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 14 (3, 2, 3, 3, 5, 3)				(2.90)	2.00m: firm.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 9 (2, 1, 2, 2, 3, 2)					3.00m: soft.		
3.00-3.50	B10			78.93		3.50			
3.50	D11		1				Soft sandy CLAY with small cobbles.		
4.00	CPT	N = 9 (2, 3, 1, 1, 2, 5)				(1.20)			
4.00-4.50	B13								
4.50	D14		1	77.73		4.70			
4.70	CPT	75 Seating Blows for 113 mm (25, 50)		77.63		4.80	Obstruction as possible rock. BH terminated at 4.80m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
05-09-17	16.00	4.80	4.70	203	3.70

Chiselling

From	To	Hours
1.4	1.7	1
1.7	1.8	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH095**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	31-08-17 31-08-17	74.69	E 612,358.9 N 703,308.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.60m Rose to (@ 20 min.): 2.80m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			74.29		0.40	Grass over TOPSOIL.		
							Soft greyish brown sandy CLAY with cobbles. Cobbles are rounded.		
1.00	CPT	N = 11 (3, 3, 2, 4, 3, 2)					1.00m: firm.		
1.00	D2								
1.00-1.50	B4					(2.30)			
1.50	D5								
2.00	CPT	N = 26 (3, 2, 4, 5, 8, 9)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8		1	71.99		2.70			
							Stiff very sandy silty CLAY with cobbles.		
3.00	CPT	N = 21 (2, 7, 6, 5, 5, 5)							
3.00-3.50	B10					(1.10)			
3.50	D11		1						
				70.89		3.80			
3.80	CPT	75 Seating Blows for 97 mm (25, 50)		70.79		3.90	Obstruction as possible rock.		
							BH terminated at 3.90m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
31-08-17	14.00	3.90	3.80	203	2.70	3.8	3.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH096**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-09-17 04-09-17	72.41	E 613,333.8 N 703,795.7

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.60)	Firm brown CLAY with cobbles. Cobbles are of limestone.		
1.00	CPT	N = 42 (3, 2, 4, 5, 15, 18)					1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4			70.81		1.60			
1.50	GPT			70.71		1.70	Obstruction as possible rock.		
1.90		50 for 0 mm (25, -, 50)					BH terminated at 1.70m bgl - refusal.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m

Chiselling			Water Added	
From	To	Hours	From	To
0.5 1.6	0.8 1.7	1/2 1		

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH097**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-10-17 20-10-17	87.36	E 614,951.1 N 706,800.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.70)	Grass over firm brown CLAY.		
				86.66		0.70			
1.00	CPT	N = 21 (4, 3, 5, 5, 6, 5)				(1.30)	Greyish brown sandy CLAY with cobbles. 1.00m: stiff.		
1.00 1.00-1.50 1.50	D2 B4 D5								
				85.36		2.00			
2.00	CPT	50 for 0 mm (25, -, 50)		85.26		2.10	Obstruction as possible rock. BH terminated at 2.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
20-10-17	17.00	2.10	2.00	203		2	2.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH098**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-10-17 20-10-17	84.75	E 615,131.8 N 707,104.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			84.35		0.40	Grass over brown CLAY.		
						(1.30)	Soft greyish brown sandy CLAY. 1.00m: stiff.		
1.00	CPT	N = 17 (3, 2, 4, 4, 4, 5)							
1.00	D2								
1.00-1.50	B4								
1.50	D5			83.05		1.70			
1.70	CPT	75 Seating Blows for 98 mm (25, 50)		82.85		1.90	Obstruction. BH terminated at 1.90m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
20-10-17	14.00	1.90	1.50	203	dry	1.7	1.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH100**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-09-17 06-09-17	81.76	E 617,247.6 N 709,595.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 6.50m; Rose to (@ 20 min.): 4.70m; Sealed at: 4.70m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			81.46		0.30	Grass over TOPSOIL.		
							Stiff greyish brown CLAY with cobbles.		
1.00	CPT	N = 20 (4, 4, 5, 5, 4, 6)				(1.50)	1.00m: stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			79.96		1.80			
							Soft grey sandy SILT with cobbles. Cobbles are of limestone.		
2.00	CPT	N = 9 (3, 2, 2, 2, 2, 3)					2.00m: soft		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 57 (2, 1, 2, 2, 17, 36)					3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 14 (2, 2, 3, 2, 4, 5)				(4.60)	4.00m: firm.		
4.00-4.50	B13								
4.50	D14		1						
5.00	CPT	N = 23 (3, 4, 5, 5, 6, 7)					5.00m: stiff.		
5.00-5.50	B16								
5.50	D17								
6.00	CPT	58 for 247 mm (8, 9, 9, 8, 27, 14)							
6.00-6.50	B19		1	75.36		6.40			
6.50	D20			75.16		6.60	Obstruction as possible rock.		
6.60	CPT	50 for 0 mm (25, 50, 50)					BH terminated at 6.60m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
06-09-17	17.00	6.60	6.50	203	5.00

Chiselling

From	To	Hours
3.5	3.8	1
6.4	6.6	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH103**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	09-08-17 09-08-17	94.73	E 619,414.6 N 711,278.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			94.33		0.40	TOPSOIL.		
							Firm greyish brown sandy CLAY with medium cobble content and boulders.		
1.00	CPT	N = 14 (2, 2, 3, 2, 4, 5)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.90)			
2.00	CPT	N = 30 (5, 4, 8, 7, 7, 8)					2.00m: very stiff.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	50 for 90 mm (10, 15, 28, 22)		91.43		3.30			
3.00-3.30	B10			91.33		3.40	Obstruction as possible rock.		
3.30	CPT								
3.40		50 for 0 mm (25, -, 50)					BH terminated at 3.40m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
09-08-17	17.00	3.40	3.40	203	dry

Chiselling

From	To	Hours
3.3	3.4	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH104**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	09-08-17 09-08-17	96.83	E 620,369.0 N 711,342.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			96.43		0.40	Grass over brown sandy soils.		
							Stiff greyish brown sandy CLAY with cobbles. Cobbles are rounded.		
1.00	CPT	N = 20 (3, 3, 4, 6, 5, 5)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.70)			
2.00	CPT	N = 32 (5, 5, 7, 8, 8, 9)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	50 for 22 mm (18, 7, 50)		93.73		3.10			
				93.63		3.20	Obstruction as possible rock.		
							BH terminated at 3.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
09-08-17	13.00	3.20	3.10	203	dry	3.1	3.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH105**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-08-17 08-08-17	93.16	E 621,278.0 N 711,583.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			92.86		0.30	TOPSOIL.		
						(1.10)	Stiff greyish brown sandy CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 22 (5, 4, 5, 6, 6, 5)		91.76		1.40			
1.00	D2								
1.00-1.50	B4								
1.50	D5						Stiff grey sandy SILT/CLAY.		
2.00	CPT	N = 16 (3, 5, 4, 4, 4, 4)				(1.70)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	75 Seating Blows for 118 mm (25, 50)		90.06		3.10			
							BH terminated at 3.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
04-08-17	16.00	2.50	2.50	203	dry	3	3.1	1			BH backfilled.
08-08-17	08.00	2.50	2.50	203	dry						
08-08-17	11.00	3.10	3.00	203	dry						

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH106**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	08-08-17 08-08-17	93.93	E 622,058.1 N 711,808.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			93.13		(0.80) 0.80	MADE GROUND: Stone fill with brown clay and rounded cobbles.		
1.00	CPT	N = 29 (5, 8, 3, 9, 8, 9)		92.23		(0.90) 1.70	Stiff brown CLAY with boulders.		
1.00 1.00-1.50 1.50 1.70	D2 B4 D5 CPT	50 for 0 mm (25, -, 50)					BH terminated at 1.70m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
08-08-17	12.00	1.70	1.50	203	dry	0.4 1.7	0.8 1.7	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH107**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-08-17 04-08-17	95.14	E 622,774.8 N 712,477.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						MADE GROUND: Grass over stone fill and sandy clay.		
				94.54		(0.60) 0.60			
							Very stiff brown sandy CLAY with cobbles. Cobbles are rounded.		
1.00	CPT	N = 33 (3, 5, 9, 10, 8, 6)					1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 25 (2, 3, 5, 6, 5, 9)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8					(4.40)			
3.00	CPT	N = 18 (3, 2, 2, 6, 5, 5)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 23 (3, 4, 6, 6, 5, 6)							
4.00-4.50	B13								
4.50	D14								
				90.14		5.00			
5.00	CPT	75 Seating Blows for 103 mm (25, 50)		90.04		5.10	Obstruction as possible rock.		
							BH terminated at 5.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
04-08-17	13.00	5.10	5.00	203	dry	0.3 5	0.5 5.1	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH110**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-08-17 03-08-17	110.48	E 625,899.9 N 715,758.3

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			110.18		0.30	TOPSOIL.		
							Very stiff brown sandy CLAY with cobbles.		
1.00	SPT	N = 16 (5, 6, 3, 4, 4, 5)							
1.00	D2								
1.00-1.50	B4					(2.40)			
1.50	D5								
2.00	CPT	N = 18 (3, 2, 4, 4, 6, 4)							
2.00-2.50	B7								
2.50	D8			107.78		2.70			
							Firm greyish brown SILT/CLAY with cobbles. Cobbles are rounded of limestone.		
3.00	CPT	N = 20 (2, 4, 4, 4, 5, 7)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 5 (1, -, 1, 1, 1, 2)							
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 1 (1, 1, -, 1, 1, 1)							
5.00-5.50	B16								
5.50	D17								
6.50	CPT	N = 7 (1, 2, 1, 2, 2, 2)				(8.00)	6.50m: stiff.		
6.50-7.00	B19								
7.00	D20								
8.00	CPT	N = 30 (3, 2, 1, 2, 13, 14)							
8.00-8.50	B22								
8.50	D23								
8.60		75 Seating Blows for 125 mm (25, 50)							
9.50-10.00	B25								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
											BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH110**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-08-17 03-08-17	110.48	E 625,899.9 N 715,758.3

Engineer	GROUNDWATER STRIKES	Sheet
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 2 of 2 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
10.00	D26			99.78		10.70	Firm greyish brown SILT/CLAY with cobbles. Cobbles are rounded of limestone. *(continued)*		
	CPT						BH terminated at 10.70m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
03-08-17	17.00	10.70	9.00	203	dry	10.7	10.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH111**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-08-17 02-08-17	104.08	E 627,443.0 N 715,686.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.30)	Stiff brown sandy CLAY with cobbles. Cobbles are of limestone.		
1.00	CPT	N = 51 (8, 9, 9, 8, 10, 24)		102.78		1.30			
1.00 1.00-1.50 1.50	D2 B4 D5					(0.50)	Very stiff greyish brown CLAY with boulders. Boulders are of limestone.		
1.80	CPT	75 Seating Blows for 27 mm (25, 50)		102.28 102.18		1.80 1.90	Obstruction as possible rock. BH terminated at 1.90m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
02-08-17	17.00	1.90	1.50	203	dry	1.8	1.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH117**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-07-17 25-07-17	84.46	E 633,476.1 N 716,471.3

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			84.06		0.40	TOPSOIL: Brown sandy CLAY.		
							Very stiff brown sandy CLAY with cobbles.		
1.00	SPT	N = 43 (8, 7, 10, 11, 9, 13)							
1.00	D2								
1.00-1.50	B4					(2.30)			
1.50	D5								
2.00	CPT	N = 29 (5, 8, 9, 6, 7, 7)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8			81.76		2.70			
							Stiff greyish brown sandy CLAY with medium cobble content.		
3.00	CPT	N = 16 (2, 3, 3, 4, 3, 6)							
3.00-3.50	B10								
3.50	D11					(1.80)			
4.00	CPT	N = 52 (3, 3, 5, 8, 10, 29)					4.00m: very stiff.		
4.00-4.50	B13			79.96		4.50			
4.50	CPT	75 Seating Blows for 92 mm (25, 50)		79.86		4.60	Obstruction as possible rock.		
4.50	D14						BH terminated at 4.60m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-07-17	17.00	4.60	4.50	203	dry	4.5	4.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH118**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-07-17 26-07-17	87.96	E 635,413.2 N 716,859.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			87.56		0.40	TOPSOIL: Firm brown CLAY.		
							Stiff greyish brown sandy CLAY with cobbles. Cobbles are rounded of limestone.		
1.00	SPT	N = 35 (5, 8, 9, 8, 9, 9)							
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 29 (4, 7, 6, 6, 8, 9)				(3.30)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 42 (8, 10, 9, 10, 10, 13)							
3.00-3.50	B10								
3.50	D11			84.26		3.70			
3.70	CPT	75 Seating Blows for 61 mm (25, 50)		84.16		3.80	Obstruction as possible rock.		
							BH terminated at 3.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
26-07-17	13.00	3.80	3.60	203	dry	1.5 3.7	1.7 3.8	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH119**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-07-17 25-07-17	113.30	E 636,377.1 N 717,502.6

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			113.00		0.30	TOPSOIL: Firm brown sandy CLAY.		
							Stiff brown slightly sandy CLAY with medium cobble content. Cobbles are of limestone.		
1.00	SPT	N = 17 (3, 3, 4, 5, 4, 4)							
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 24 (3, 5, 7, 6, 5, 6)				(3.80)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 28 (5, 6, 6, 5, 7, 10)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	75 Seating Blows for 131 mm (25, 50)		109.20		4.10			
				109.10		4.20	Obstruction as possible rock.		
							BH terminated at 4.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-07-17	11.00	4.20	4.00	203	dry	3.5 4	3.6 4.2	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH120**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-08-17 14-08-17	111.57	E 638,551.1 N 718,460.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			111.27		0.30	TOPSOIL.		
				110.87		0.70	Stiff brown CLAY.		
1.00	CPT	N = 22 (3, 4, 5, 4, 6, 7)				(1.10)	Stiff grey sandy CLAY with cobbles. Cobbles are angular.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			109.77		1.80			
1.80	CPT	50 for 0 mm (25, -, 50)		109.57		2.00	Obstruction as possible rock.		
							BH terminated at 2.00m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
14-08-17	13.00	2.00	1.80	203	dry	1.8	2.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH121**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-07-17 19-07-17	84.78	E 641,185.6 N 720,237.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 7.00m 2nd: 3rd: Rose to (@ 20 min.): 6.70m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			84.58		0.20	TOPSOIL.		
							Medium dense coarse SAND with cobbles. Cobbles are rounded.		
1.00	CPT	N = 16 (5, 6, 3, 4, 4, 5)				(1.60)			
1.00	D2								
1.00-1.50	B4								
1.50	D5			82.98		1.80			
2.00	CPT	N = 18 (3, 2, 4, 4, 6, 4)					Stiff brown laminated sandy silty CLAY.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 20 (2, 4, 4, 4, 5, 7)				(2.40)			
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 5 (1, -, 1, 1, 1, 2)		80.58		4.20			
4.00-4.50	B13						Soft very sandy gravelly SILT with medium cobble content.		
4.50	D14								
5.00	CPT	N = 1 (1, 1, -, 1, 1, 1)							
5.00-5.50	B16								
5.50	D17								
6.50	CPT	N = 7 (1, 2, 1, 2, 2, 2)	1			(4.40)			
6.50-7.00	B19		1						
7.00	D20								
7.00	W21								
8.00	CPT	N = 30 (3, 2, 1, 2, 13, 14)					8.00m: very stiff.		
8.00-8.50	B23								
8.50	D24			76.18		8.60			
8.60	CPT	75 Seating Blows for 125 mm (25, 50)		76.08		8.70	Obstruction as possible rock.		
							BH terminated at 8.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
19-07-17	17.00	8.70	8.50	203	3.80	8.6	8.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH122**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-07-17 19-07-17	85.72	E 641,276.7 N 720,284.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.00m 2nd: 3rd: Rose to (@ 20 min.): 4.20m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			85.42		0.30	TOPSOIL.		
							Stiff brown laminated sandy silty CLAY.		
1.00	SPT	N = 16 (3, 2, 4, 4, 3, 5)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(3.10)			
2.00	CPT	N = 15 (4, 3, 5, 4, 4, 2)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 13 (2, 2, 4, 2, 3, 4)		82.32		3.40			
3.00-3.50	B10								
3.50	D11						Firm grey sandy CLAY.		
4.00	CPT	N = 19 (3, 4, 4, 6, 4, 5)	1						
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 28 (1, 1, 1, 2, 12, 13)	1						
5.00	W15								
5.00-5.50	B17					(4.30)			
5.50	D18								
6.50	CPT	N = 19 (2, 3, 7, 6, 3, 3)							
6.50-7.00	B20								
7.00	D21								
				78.02		7.70			
7.70	CPT	75 Seating Blows for 113 mm (25, 50)		77.92		7.80	Sandy GRAVEL with cobbles.		
							BH terminated at 7.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
19-07-17	13.00	7.80	7.30	203	3.20	5.5 7.7	5.7 7.8	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH123**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-10-17 19-10-17	90.23	E 642,541.2 N 720,668.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 6.60m; Rose to (@ 20 min.): 6.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Firm brown slightly sandy CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 16 (2, 2, 4, 4, 5, 3)					1.00m: stiff.		
1.00	D2					(2.60)			
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 12 (1, 2, 2, 4, 3, 3)							
2.00-2.50	B7								
				87.63		2.60			
2.50	D8						Stiff greyish brown sandy CLAY with cobbles. Cobbles are of limestone.		
3.00	CPT	N = 17 (5, 4, 5, 3, 4, 5)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 21 (4, 4, 5, 6, 5, 5)							
4.00-4.50	B13								
4.50	D14					(4.50)			
5.00	CPT	N = 13 (2, 4, 3, 3, 3, 4)							
5.00-5.50	B16								
5.50	D17		1						
6.00	CPT	N = 24 (5, 6, 5, 5, 6, 8)							
6.00-6.50	B19								
6.50	D20		1						
				83.13		7.10			
7.00	CPT	75 Seating Blows for 135 mm (25, 50)		83.03		7.20	Obstruction as possible rock.		
							BH terminated at 7.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
19-10-17	12.00	7.20	7.00	203	5.70	7.1	7.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH124**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	01-08-17 01-08-17	94.89	E 643,901.0 N 721,489.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.60m; Rose to (@ 20 min.): 4.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Very stiff brown CLAY.		
						(1.80)			
1.00	SPT	N = 17 (5, 4, 5, 3, 3, 6)					1.00m: stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			93.09		1.80			
2.00	CPT	N = 7 (3, 2, 1, 2, 2, 2)					Soft brown very sandy SILT/CLAY with medium cobble content.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 20 (2, 3, 5, 7, 4, 4)				(2.80)	3.00m: stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 12 (3, 2, 3, 3, 2, 4)	1						
4.00-4.50	B13								
4.50	D14			90.29		4.60			
5.00	CPT	N = 31 (3, 4, 5, 9, 8, 9)				(1.00)	Soft grey very sandy CLAY with cobbles. 5.00m: very stiff.		
5.00-5.50	B16								
5.50	D17		1	89.29		5.60			
5.60	CPT	50 for 0 mm (25, -, 50)		89.09		5.80	Obstruction as possible rock.		
							BH terminated at 5.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
01-08-17	17.00	5.80	5.60	203	2.40	5.6	5.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH138**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-07-17 03-07-17	30.61	E 570,315.8 N 670,237.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 6.30m 2nd: 3rd: Rose to (@ 20 min.): 5.80m Sealed at: 5.80m	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Firm brown CLAY with cobbles.		
						(1.60)			
1.00	SPT	N = 24 (4, 4, 5, 7, 6, 6)					1.00m: stiff.		
1.00	D2								
1.00-1.50	B4			29.01		1.60			
1.50	D5						Stiff brown sandy CLAY with cobbles.		
2.00	SPT	N = 20 (3, 3, 4, 5, 6, 5)							
2.00-2.50	B7								
2.50	D8								
						(2.70)			
3.00	CPT	N = 17 (3, 2, 4, 4, 4, 5)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 22 (2, 3, 5, 5, 6, 6)		26.31		4.30			
4.00-4.50	B13						Stiff sandy CLAY.		
4.50	D14								
5.00	CPT	N = 27 (4, 3, 6, 7, 6, 8)							
5.00-5.50	B16					(2.20)			
5.50	D17		1						
			1	24.11		6.50			
6.50	CPT	50 for 22 mm (18, 7, 50)		24.01		6.60	Obstruction as possible rock.		
							BH terminated at 6.60m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
03-07-17	16.00	6.60	6.50	203	4.40	1.7 6.5	1.9 6.6	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH145**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-09-17 20-09-17	84.67	E 671,615.3 N 730,072.9

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			84.47		0.20	TOPSOIL.		
						(0.60)	Firm brown sandy CLAY.		
				83.87		0.80			
1.00	CPT	N = 11 (1, 2, 3, 2, 2, 4)					Firm moist grey sandy gravelly SILT with high cobble content and boulders. Cobbles are rounded of limestone.		
1.00	D2								
1.00-1.50	B4								
2.00	CPT	N = 22 (3, 4, 5, 6, 5, 6)				(2.90)	2.00m: stiff.		
2.00	D5								
2.00-2.50	B7								
3.00	CPT	N = 27 (4, 5, 5, 5, 8, 9)							
3.00	D8								
3.00-3.50	B10								
				80.97		3.70			
3.70	CPT	50 for 85 mm (14, 10, 43, 7)					BH terminated at 3.70m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
20-09-17	11.00	3.70	3.70	203	dry	3.7	3.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: DK	Logged By: DK

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH158**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-10-17 06-10-17	81.88	E 682,438.5 N 734,565.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Firm brown CLAY.		
						(1.50)			
1.00	CPT	N = 17 (3, 2, 2, 4, 3, 8)					1.00m: stiff.		
1.00	D2			80.38		1.50			
1.00-1.50	B4								
1.50	D5			80.18		1.70	Very sandy CLAY with cobbles and boulders.		
1.70	CPT	50 for 0 mm (25, -, 50)		80.08		1.80	Obstruction as possible rock.		
							BH terminated at 1.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
06-10-17	15.00	1.80	1.50	203	dry	1.7	1.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH159**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-10-17 06-10-17	85.44	E 683,495.1 N 734,888.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.70m Rose to (@ 20 min.): 3.20m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			85.14		0.30	MADE GROUND: Fill with cobbles.		
							Stiff brown CLAY with cobbles and boulders. Boulders are rounded.		
1.00	CPT	N = 20 (3, 5, 5, 4, 5, 6)							
1.00	D2								
1.00-1.50	B4					(2.60)			
2.00	CPT	N = 27 (5, 6, 6, 6, 7, 8)							
2.00	D5								
2.00-2.50	B7								
				82.54		2.90			
3.00	CPT	N = 25 (4, 5, 5, 6, 7, 7)	1				Stiff brown CLAY.		
3.00	D8								
3.00-3.50	B10								
3.50	D11					(1.70)			
4.00	CPT	N = 21 (4, 5, 4, 5, 6, 6)							
4.00	B13								
4.50	D14		1	80.84		4.60			
							Stiff greyish brown gravelly CLAY.		
5.00	CPT	N = 29 (4, 6, 7, 6, 7, 9)							
5.00	B16					(1.10)			
5.50	D17			79.74		5.70			
5.70	CPT	50 for 0 mm (25, -, 50)		79.64		5.80	Obstruction as possible rock.		
							BH terminated at 5.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
06-10-17	11.00	5.80	5.50	203	3.10	5.7	5.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH160**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-10-17 05-10-17	81.16	E 684,297.4 N 735,204.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Stiff brown sandy CLAY with cobbles. Cobbles are of limestone.		
						(1.40)			
1.00	CPT	N = 31 (3, 4, 6, 8, 8, 9)					1.00m: very stiff.		
1.00	D2			79.76		1.40			
1.00-1.50	B4						Stiff greyish brown CLAY with cobbles.		
1.50	D5								
2.00	CPT	N = 22 (4, 3, 4, 6, 6, 6)					2.00m: stiff.		
2.00-2.50	B7								
						(2.90)			
3.00	CPT	N = 25 (5, 4, 3, 8, 8, 6)							
3.00	D8								
3.00-3.50	B10								
3.50	D11								
4.00	CPT	55 for 95 mm (10, 10, 27, 28)		76.86		4.30			
				76.76		4.40	Obstruction as possible rock.		
							BH terminated at 4.40m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
05-10-17	17.00	4.40	4.30	203		4.3	4.4	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH162**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-10-17 05-10-17	71.57	E 686,772.0 N 735,205.1

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			71.07		(0.50) 0.50	MADE GROUND: Sandy road fill and 2" and down and rounded cobbles.		
							Firm greyish brown CLAY with cobbles.		
1.00	CPT	N = 10 (2, 1, 1, 2, 3, 4)					1.00m: firm.		
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.70)			
2.00	CPT	N = 15 (3, 3, 4, 3, 4, 4)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	50 for 45 mm (18, 7, 50)		68.37		3.20			
				68.27		3.30	Obstruction as possible rock.		
							BH terminated at 3.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
05-10-17	11.00	3.30	3.00	203	damp	3.2	3.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH169**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-09-17 28-09-17	63.84	E 697,654.4 N 730,166.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			63.24		(0.60) 0.60	Firm brown CLAY.		
				62.74		(0.50) 1.10	Firm greyish brown CLAY.		
1.00	CPT	75 Seating Blows for 107 mm (25, 50)		62.64		1.20	Obstruction as possible LIMESTONE rock.		
1.00	D2						BH terminated at 1.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
						1.1	1.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH172**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	29-06-17 29-06-17	46.63	E 572,171.7 N 670,690.9

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.60)	Reeds over firm greyish brown slightly sandy CLAY.		
1.00	SPT	N = 7 (4, 3, 1, 2, 2, 2)					1.00m: stiff.		
1.00	D2								
1.00-1.50	B4			45.03		1.60			
1.50	D5						Stiff brown CLAY with cobbles.		
2.00	SPT	N = 21 (4, 4, 5, 6, 5, 5)							
2.00-2.50	B7								
2.50	D8								
3.00	SPT	N = 25 (5, 6, 7, 6, 6, 6)				(3.70)			
3.00-3.50	B10								
3.50	D11								
4.00	SPT	N = 27 (5, 7, 6, 6, 8, 7)							
4.00-4.50	B13								
4.50	D14								
5.00	SPT	N = 27 (8, 8, 7, 6, 7, 7)		41.33		5.30			
5.00-5.50	B16						Stiff damp greyish brown CLAY with cobbles.		
5.50	D17								
6.50	CPT	N = 32 (5, 7, 9, 6, 8, 9)					6.50m: very stiff.		
6.50-7.00	B19								
7.00	D20					(4.90)			
8.00	CPT	N = 35 (5, 6, 9, 9, 9, 8)							
8.00-8.50	B22								
8.50	D23								
9.50	CPT	N = 33 (6, 7, 7, 8, 10, 8)							

Boring Progress and Water Observations						Chiselling			Water Added	
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To

GENERAL REMARKS
BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH172**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	29-06-17 29-06-17	46.63	E 572,171.7 N 670,690.9

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
10.00-10.50	B25			36.43		10.20			
10.00	D26						Very stiff greyish brown slightly sandy CLAY with cobbles.		
11.00	CPT	N = 38 (9, 8, 8, 10, 9, 11)							
11.00-11.50	B28								
11.50	D29					(4.30)			
12.50	CPT	N = 40 (7, 7, 9, 10, 10, 11)							
12.50-13.00	B31								
13.00	D32								
14.00	CPT	N = 46 (8, 10, 11, 10, 12, 13)					14.00m: seepage of water.		
14.00-14.50	B34			32.13		14.50			
14.50	D35						Very stiff wet greyish brown gravelly CLAY with cobbles.		
15.50	CPT	58 for 275 mm (9, 8, 13, 16, 10, 19)				(1.70)			
15.50-16.00	B37								
16.00	D38			30.43		16.20			
16.20	CPT	75 Seating Blows for 106 mm (25, 50)		30.33		16.30	Obstruction as possible rock. BH terminated at 16.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
29-06-17	17.00	16.30	4.50	203	14.80	16.2	16.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH173**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	30-06-17 30-06-17	44.05	E 572,097.9 N 670,502.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 9.10m 8.00m 7.60m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Reeds over stiff greyish brown sandy CLAY with medium cobble content.		
1.00	SPT	N = 19 (3, 4, 5, 4, 4, 6)				(2.60)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	SPT	N = 29 (5, 6, 6, 7, 8, 8)							
2.00-2.50	B7								
2.50	D8			41.45		2.60			
3.00	CPT	N = 33 (6, 7, 6, 8, 9, 10)					Very stiff brown CLAY with medium cobble content. Cobbles are rounded. 3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 34 (6, 6, 7, 8, 8, 11)							
4.00-4.50	B13								
4.50	D14					(4.60)			
5.00	CPT	N = 37 (4, 7, 9, 9, 9, 10)							
5.00-5.50	B16								
5.50	D17								
6.50	CPT	N = 29 (7, 8, 6, 6, 9, 8)					6.50m: stiff.		
6.50-7.00	B19								
7.00	D20			36.85		7.20			
8.00	CPT	N = 45 (5, 7, 10, 11, 11, 13)	1				Very stiff brown gravelly CLAY with cobbles.		
8.00-8.50	B22					(1.90)			
8.50	D23								
9.10	CPT	75 Seating Blows for 87 mm (25, 50)	1	34.95		9.10			
				34.85		9.20	Obstruction as possible rock. BH terminated at 9.20m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
30-06-17	15.00	9.20	4.50	203	7.60

Chiselling

From	To	Hours
1.9	2.0	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH178**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	16-08-17 16-08-17	74.41	E 602,443.2 N 693,794.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.40m Rose to (@ 20 min.): 2.90m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over brownish black CLAY with cobbles.		
						(0.90)			
				73.51		0.90			
1.00	SPT	N = 12 (3, 2, 1, 3, 4, 4)					Stiff greyish brown silty sandy CLAY. 1.00m: firm.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 18 (3, 5, 6, 5, 3, 4)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8					(3.30)			
			▽1						
3.00	CPT	N = 20 (3, 4, 3, 6, 6, 5)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 11 (2, 1, 2, 2, 3, 4)	▼1	70.21		4.20			
4.00-4.50	B13						Firm sandy gravelly silty CLAY.		
4.50	D14								
						(1.50)			
5.00	CPT	N = 35 (5, 8, 10, 8, 8, 9)					5.00m: very stiff.		
5.00-5.50	B16								
5.50	D17			68.71		5.70			
				68.51		5.90	Obstruction as possible rock.		
5.80	CPT	75 Seating Blows for 32 mm (25, 50)					BH terminated at 5.90m bgl - obstruction.		
5.80	W19								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
16-08-17	17.00	5.90	5.60	203	2.30	5.8	5.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH179**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-08-17 23-08-17	71.52	E 603,425.0 N 694,809.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 2.20m 2nd: 3rd: Rose to (@ 20 min.): 2.00m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			71.12		0.40	Grass over soft blackish brown PEAT.		
1.00	CPT	N = 17 (2, 3, 3, 5, 5, 4)					Soft to firm grey sandy silty CLAY with small cobbles.		
1.00	D2					(2.00)	1.00m: stiff.		
1.00-1.50	B4								
1.50	D5		1						
2.00	CPT	N = 17 (5, 6, 4, 4, 5, 4)		69.12		2.40			
2.00-2.50	B7								
2.50	D8						Stiff wet sandy silty CLAY with gravel angular cobbles and boulders.		
3.00	CPT	N = 28 (4, 5, 8, 7, 6, 7)				(1.80)			
3.00-3.50	B10								
3.50	D11								
4.00	CPT	12 for 40 mm (25, 38, 12)		67.32		4.20			
				67.22		4.30	Obstruction as possible rock.		
							BH terminated at 4.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
23-08-17	17.00	4.30	4.30	203	2.40	4.2	4.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH183**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-10-17 11-10-17	76.78	E 670,457.1 N 728,886.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	**Water strikes: 1st: 3.00m Rose to (@ 20 min.): 1.80m Sealed at: 2nd: 3rd:**	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.10)	Very soft black PEAT.		
1.00	CPT	N = 13 (1, -, 2, 4, 3, 4)		75.68		1.10	1.00m: firm.		
1.00	D2						Firm greyish brown CLAY.		
1.00-1.50	B4								
1.50	D5		▽1						
2.00	CPT	N = 12 (2, 3, 1, 4, 3, 4)				(2.90)			
2.00-2.50	B7								
3.00	CPT	N = 23 (4, 5, 6, 4, 4, 9)	▼1				3.00m: stiff.		
3.00	D8								
3.00-3.50	B10								
3.50	D11			72.78		4.00			
4.00	CPT	75 Seating Blows for 89 mm (25, 50)		72.48		4.30	Obstruction as possible rock.		
							BH terminated at 4.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
11-10-17	13.00	4.30	4.20	203	1.70	4.2	4.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH185**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-09-17 24-08-17	78.56	E 701,000.3 N 731,087.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.90)	Firm brown CLAY.		
				77.66		0.90			
1.00	CPT	70 for 60 mm (2, 3, 70)		77.36		1.20	LIMESTONE rock.		
1.00	D2						BH terminated at 1.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
28-09-17	12.00	1.20	1.00	203	dry	1.1	1.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH186**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	29-09-17 29-09-17	77.99	E 701,096.9 N 731,240.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.70)	Firm brown CLAY.		
				77.29		0.70			
1.00	CPT	N = 30 (4, 5, 4, 8, 10, 8)				(1.00)	Firm grey slightly sandy CLAY with broken limestone clasts. 1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
1.70	CPT	50 for 0 mm (25, -, 50)		76.29		1.70			
				76.19		1.80	Obstruction as possible rock. BH terminated at 1.80m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
29-09-17	17.00	1.80	1.50	203	dry	1.7	1.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH188**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-06-17 13-06-17	39.69	E 584,727.9 N 682,437.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: **dry** 2nd: 3rd: Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			39.39		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(0.90)	Stiff brown CLAY with cobbles.		
1.00	CPT	71 for 95 mm (2, 2, 4, 67)		38.49		1.20			
1.00	CPT D2						BH terminated at 1.20m bgl - obstruction as possible rock.		
1.00-1.20	B4								
1.20		50 for 0 mm (25, -, 50)							
1.20	D5								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
13-06-17	13.00	1.20	1.20	203	dry	0.4 1.2	0.7 1.2	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH190**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-06-17 06-06-17	86.53	E 586,980.2 N 687,270.2

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			86.23		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(1.30)	Stiff brown sandy CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 24 (3, 5, 5, 4, 7, 8)							
1.00	D2								
1.00-1.50	B4			84.93		1.60			
1.50	D5						Stiff light brown sandy CLAY with cobbles.		
						(0.80)			
2.00	CPT	59 for 170 mm (7, 9, 11, 29, 19)							
2.00-2.40	B7			84.13		2.40			
2.40	D8			84.03		2.50	Obstruction as possible rock.		
2.50	CPT	75 Seating Blows for 5 mm (25, 50)					BH terminated at 2.50m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
						1.7	1.9	1			BH backfilled.
						2.4	2.5	1			

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH191**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	08-06-17 08-06-17	68.94	E 587,490.6 N 687,606.3

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			68.64		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(1.40)	Stiff brown CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 40 (6, 7, 10, 9, 10, 11)							
1.00	D2								
1.00-1.50	B4								
1.50	D5			67.24		1.70			
				67.04		1.90	Stiff grey CLAY with limestone fragments.		
1.90	CPT	75 Seating Blows for 74 mm (25, 50)		66.94		2.00	Obstruction as possible rock.		
							BH terminated at 2.00m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
08-06-17	13.00	2.00	1.90	203	dry	1.9	2.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH192**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	07-06-17 07-06-17	69.22	E 587,788.5 N 687,650.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			68.92		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
						(0.90)	Stiff greyish brown CLAY with cobbles. Cobbles are of limestone.		
1.00	CPT	9 for 15 mm (25, 41, 9)		68.02		1.20			
1.00	D2						BH terminated at 1.20m bgl - obstruction as possible limestone rock.		
1.00-1.20	B4								
1.20	D5								

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
07-06-17	12.00	1.20	1.20	203	dry

Chiselling

From	To	Hours
1.2	1.2	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH194**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-06-17 06-06-17	72.50	E 588,365.2 N 687,761.7

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			72.20		0.30	TOPSOIL: Grass over firm brown sandy CLAY.		
							Very stiff brown sandy gravelly CLAY with cobbles. Cobbles are of limestone.		
1.00	SPT	62 for 285 mm (6, 7, 9, 10, 21, 22)				(1.60)			
1.00	D2								
1.00-1.50	B4								
1.50	D5			70.60		1.90			
1.90	CPT	75 Seating Blows for 134 mm (25, 50)		70.50		2.00	Obstruction as possible limestone rock.		
							BH terminated at 2.00m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
06-06-17	13.00	2.00	2.00	203	dry	0.6 1.9	0.9 2.0	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH195**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-07-17 04-07-17	84.30	E 588,930.2 N 687,699.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.60)	MADE GROUND: Gravel and cobble road fill.		
				83.70		0.60			
							Stiff brown sandy CLAY with cobbles.		
1.00	SPT	N = 24 (5, 3, 6, 6, 7, 5)							
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.40)			
2.00	CPT	N = 20 (4, 3, 3, 3, 5, 9)							
2.00-2.50	B7								
2.50	D8								
				81.30		3.00			
3.00	CPT	75 Seating Blows for 135 mm (25, 50)		81.20		3.10	Obstruction as possible rock.		
							BH terminated at 3.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
04-07-17	17.00	3.10	3.00	203	dry	0.2 3	0.6 3.1	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH196**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-08-17 22-08-17	132.56	E 597,096.7 N 689,964.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			132.26		0.30	Grass over TOPSOIL.		
						(1.30)	Stiff greyish brown CLAY with small angular cobbles.		
1.00	CPT	N = 32 (4, 5, 7, 7, 8, 10)					1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4			130.96		1.60			
1.50	D5			130.86		1.70	Obstruction as possible rock.		
1.60	CPT	50 for 0 mm (25, -, 50)					BH terminated at 1.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
22-08-17	14.00	1.70	1.50	203	dry	1.6	1.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

IDL AGS3 UK BH WSP GI S&A ALL W COORDS NOV 21 2017.GPJ IDL TP TEMPLATE.GDT 20/02/18

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH197**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-08-17 22-08-17	126.09	E 597,518.3 N 690,043.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			125.69		0.40	Grass over sandy soil.		
				125.09		(0.60) 1.00	Brown sandy CLAY with small cobbles.		
1.00	CPT	50 for 0 mm (25, -, 50)					BH terminated at 1.00m bgl - refusal.		
1.00	D2								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
22-08-17	11.00	1.00	1.00	203	dry	1	1.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH199**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-08-17 21-08-17	101.51	E 599,298.6 N 690,078.5

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			101.21		0.30	Grass over TOPSOIL.		
							Stiff greyish brown sandy CLAY with small angular cobbles.		
1.00	CPT	N = 33 (5, 7, 5, 10, 9, 9)					1.00m: very stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.70)			
2.00	CPT	N = 26 (7, 10, 5, 6, 6, 9)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
				98.51		3.00			
3.00	CPT	75 Seating Blows for 56 mm (25, 50)		98.41		3.10	Obstruction as possible rock.		
							BH terminated at 3.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
21-08-17	17.00	3.10	3.00	203	dry	3	3.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH202**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	18-08-17 18-08-17	104.55	E 601,893.2 N 692,974.3

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Very stiff brown CLAY with small angular cobbles.		
						(1.40)			
1.00	CPT	N = 30 (4, 3, 6, 6, 7, 11)							
1.00	D2			103.15		1.40			
1.00-1.50	B4						Greyish brown slightly sandy CLAY with small cobbles.		
1.50	D5								
2.00	CPT	N = 28 (5, 6, 6, 5, 8, 9)				(1.60)			
2.00-2.50	B7								
2.50	D8			101.55		3.00			
3.00	CPT	57 for 230 mm (8, 10, 10, 17, 27, 3)					Very stiff greyish brown CLAY with small limestone cobbles.		
3.00-3.50	B10								
3.50	D11					(1.60)			
4.00	CPT	55 for 234 mm (10, 10, 12, 16, 16, 11)							
4.00-4.50	B13								
4.50	D14			99.95		4.60			
4.60	CPT	75 Seating Blows for 19 mm (25, 50)					BH terminated at 4.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
18-08-17	17.00	4.60	4.50	203	dry	0.4 4.6	0.8 4.6	1 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH203**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-10-17 24-10-17	103.07	E 616,035.4 N 708,171.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.80)	Firm brown CLAY.		
				102.27		0.80			
1.00	CPT	N = 13 (3, 3, 4, 3, 4, 2)					Firm greyish brown sandy CLAY with cobbles. 1.00m: firm.		
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.20)			
2.00	CPT	N = 18 (2, 3, 2, 4, 5, 7)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
				100.07		3.00			
3.00	CPT	75 Seating Blows for 110 mm (25, 50)		99.97		3.10	Obstruction as possible rock. BH terminated at 3.10m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
24-10-17	12.00	3.10	3.00	203		3	3.1	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH204**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-08-17 10-08-17	92.28	E 618,015.9 N 710,258.6

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.50)	TOPSOIL with limestone boulders.		
				91.78		0.50			
							Firm greyish brown sandy CLAY with cobbles and boulders.		
1.00	CPT	N = 16 (3, 2, 4, 4, 3, 5)					1.00m: stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 21 (2, 2, 8, 8, 3, 2)							
2.00-2.50	B7					(3.70)			
2.50	D8								
3.00	CPT	N = 29 (5, 2, 11, 12, 2, 4)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	63 for 145 mm (2, 4, 12, 51)		88.08		4.20			
4.00-4.20	B13			87.98		4.30	Obstruction as possible rock.		
4.20	D14						BH terminated at 4.30m bgl - refusal.		
4.30		75 Seating Blows for 32 mm (25, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
10-08-17	13.00	4.30	4.00	203	dry	3.4 4.2	3.6 4.3	1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH205**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-08-17 10-08-17	88.75	E 618,601.1 N 710,540.1

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.90m Rose to (@ 20 min.): 3.30m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			88.35		0.40	TOPSOIL.		
1.00	CPT	N = 9 (2, 2, 1, 3, 3, 2)				(1.40)	Firm grey slightly sandy CLAY with cobbles.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			86.95		1.80			
2.00	CPT	N = 3 (1, -, -, 2, 1, 4)					Soft grey silty sandy CLAY with cobbles.		
2.00-2.50	B7					(1.20)			
2.50	D8								
				85.75		3.00			
3.00	CPT	N = 23 (3, 4, 6, 7, 7, 3)	1				Stiff grey silty sandy CLAY with cobbles.		
3.00-3.50	B10					(0.90)			
3.50	D11								
			1	84.85		3.90			
3.90	CPT	50 for 0 mm (25, -, 50)		84.75		4.00	Obstruction as possible rock.		
							BH terminated at 4.00m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
10-08-17	17.00	4.00	4.00	203	3.20	3.9	4.0	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH207**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-10-17 13-10-17	67.19	E 661,721.6 N 727,901.1

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			66.79		0.40	MADE GROUND: Fill gravel and cobbles.		
				66.49		0.70	Soft brown CLAY with some peat.		
1.00	CPT	N = 3 (1, 2, 1, 1, 0, 1)				(0.80)	Soft dry black PEAT. 1.00m: very soft.		
1.00	D2			65.69		1.50			
1.00-1.50	B4						Very soft grey very sandy SILT.		
1.50	D5								
2.00	CPT	N = 8 (2, 3, 2, 2, 2, 2)					2.00m: soft.		
2.00-2.50	B7								
						(2.80)			
3.00	CPT	N = 8 (2, 2, 2, 1, 2, 3)							
3.00	D8								
3.00-3.50	B10								
3.50	D11								
4.00	CPT	68 for 170 mm (4, 3, 15, 15, 38)		62.89		4.30			
4.00-4.30	B13						BH terminated at 4.30m bgl - obstruction.		
4.30	D14								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
13-10-17	17.00	4.30	4.30	203	dry	4.3	4.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH208**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-09-17 21-09-17	81.60	E 672,715.5 N 731,330.6

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			81.30		0.30	Dry black PEAT.		
				80.90		0.70	Dry grey SAND.		
1.00	CPT	N = 19 (2, 3, 5, 4, 5, 5)					Grey sandy gravelly CLAY with cobbles and boulders. 1.00m: stiff.		
1.00-1.50	B3								
2.00	CPT	N = 23 (4, 5, 6, 7, 6, 4)							
2.00	D4								
2.00-2.50	B6					(3.90)			
3.00	CPT	N = 21 (5, 5, 5, 6, 4, 6)							
3.00	D7								
3.00-3.50	B9								
4.00	CPT	N = 36 (7, 6, 13, 4, 9, 10)					4.00m: very stiff.		
4.00	D10								
4.00-4.50	B11A			77.00		4.60			
5.00	CPT	N = 53 (8, 8, 9, 15, 14, 15)					Very stiff grey sandy gravelly SILT with cobbles and boulders. Cobbles are angular.		
5.00	D12								
5.00-5.50	B14					(1.60)			
6.00	CPT	25 for 25 mm (7, 8, 25)		75.40		6.20			
6.20	CPT	50 for 95 mm (18, 7, 48, 2)					BH terminated at 6.20m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
21-09-17	16.30	6.20	6.00	203	dry	5 6.2	5.5 6.2	3/4 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: DK	Logged By: DK

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH211**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-10-17 05-10-17	70.80	E 687,776.7 N 734,785.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.50m; Rose to (@ 20 min.): 1.80m; Sealed at: 1.80m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			70.20		(0.60) 0.60	Brown CLAY with cobbles.		
1.00	CPT	N = 21 (4, 4, 5, 6, 5, 5)					Stiff greyish brown slightly sandy CLAY with cobbles.		
1.00	D2								
1.00-1.50	B4								
1.50	D5		1						
2.00	CPT	N = 17 (3, 2, 4, 4, 3, 6)							
2.00-2.50	B7								
2.50	D8					(4.00)			
3.00	CPT	N = 19 (2, 4, 2, 5, 6, 6)							
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 33 (6, 5, 6, 5, 5, 17)					4.00m: very stiff.		
4.00-4.50	B13		1	66.20		4.60			
4.50	D14								
4.60	CPT	75 Seating Blows for 27 mm (25, 50)					BH terminated at 4.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
05-10-17	13.00	4.60	4.50	203	1.70	4.6	4.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH213**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-09-17 22-09-17	67.79	E 689,560.8 N 733,264.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			67.59		0.20	TOPSOIL.		
							Firm brownish grey slightly sandy CLAY.		
1.00	CPT	N = 8 (2, 3, 2, 2, 3, 1)							
1.00-1.50	B3					(3.00)			
2.00	CPT	N = 16 (2, 4, 5, 4, 4, 3)					2.00m: stiff.		
2.00-2.50	B5								
3.00	CPT	N = 21 (3, 4, 5, 5, 5, 6)		64.59		3.20			
3.00-3.30	B7						Stiff dark grey sandy gravelly CLAY with cobbles and boulders.		
4.00	CPT	N = 26 (5, 3, 9, 4, 8, 5)							
4.00-4.50	B9					(2.60)			
5.00	CPT	N = 23 (6, 4, 6, 5, 7, 5)							
5.00-5.50	B11								
				61.99		5.80			
6.00	CPT	N = 18 (3, 4, 5, 4, 5, 4)					Angular limestone COBBLES with gravelly silt. 6.00m: medium dense.		
6.00-6.50	B13					(0.80)			
				61.19		6.60			
6.60	CPT	15 for 20 mm (25, 35, 15)					BH terminated at 6.60m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
22-09-17	12.30	6.60	5.80	203	dry

Chiselling

From	To	Hours
4.2	4.7	1
6.6	6.6	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: DK	Logged By: DK

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH214**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-10-17 04-10-17	67.59	E 689,923.5 N 732,931.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 4.30m; Rose to (@ 20 min.): 3.20m; Sealed at: 3.20m; 2nd:; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Firm brown CLAY with cobbles. Cobbles are angular of limestone.		
						(1.60)			
1.00	CPT	N = 17 (3, 4, 4, 4, 5, 4)							
1.00	D2								
1.00-1.50	B4			65.99		1.60			
1.50	D5						Stiff grey slightly sandy CLAY.		
2.00	CPT	N = 19 (3, 2, 5, 4, 4, 6)					2.00m: stiff.		
2.00-2.50	B7								
2.50	D8								
						(2.70)			
3.00	CPT	N = 30 (5, 6, 6, 7, 10, 7)	▽1				3.00m: very stiff.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	50 for 92 mm (11, 14, 36, 14)	▼1	63.29		4.30			
4.00-4.30	B13			63.19		4.40	Obstruction as possible rock.		
4.30	D14						BH terminated at 4.40m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
04-10-17	17.00	4.40	4.40	203	3.00	4.3	4.4	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH215**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-10-17 04-10-17	67.43	E 690,651.2 N 732,608.5

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.10)	Firm brown CLAY with cobbles. Cobbles are of limestone.		
				66.33		1.10			
1.00	CPT	N = 35 (5, 6, 8, 11, 8, 8)					1.00m: very stiff.		
1.00	D2						Very stiff greyish brown CLAY with cobbles. Cobbles are of limestone.		
1.00-1.50	B4								
1.50	D5					(1.60)			
2.00	CPT	N = 38 (3, 4, 10, 16, 8, 4)							
2.00-2.50	B7								
2.50	D8			64.73		2.70			
3.00	CPT	N = 17 (4, 3, 4, 4, 4, 5)					Stiff greyish black sandy CLAY with cobbles.		
3.00-3.50	B10						3.00m: stiff.		
3.50	D11								
4.00	CPT	N = 22 (3, 4, 5, 5, 7, 5)							
4.00-4.50	B13								
4.50	D14					(3.90)			
5.00	CPT	N = 29 (6, 8, 7, 7, 8, 7)							
5.00-5.50	B16								
5.50	D17								
6.00	CPT	N = 37 (8, 8, 9, 10, 9, 9)					6.00m: very stiff.		
6.00-6.50	B19								
6.50	D20			60.83		6.60			
6.60	CPT	75 Seating Blows for 135 mm (25, 50)					BH terminated at 6.60m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
04-10-17	12.00	6.60	6.50	203	6.00

Chiselling

From	To	Hours
2.4	2.6	1/2
6.6	6.6	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH216**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-09-17 26-09-17	65.51	E 691,371.3 N 731,983.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 2.90m 2.50m 4.00m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			64.91		(0.60) 0.60	Firm brown CLAY.		
1.00	CPT	N = 23 (3, 4, 4, 6, 6, 7)		64.01		(0.90) 1.50	Medium dense greyish brown fine SAND.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 18 (3, 4, 5, 4, 4, 5)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 24 (4, 5, 5, 3, 8, 8)				(2.70)	Medium dense wet grey silty gravelly SAND.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 24 (4, 3, 5, 5, 6, 8)		61.31		4.20			
4.00-4.50	B13								
4.50	D14			60.51		(0.80) 5.00	Stiff greyish black gravelly CLAY with cobbles.		
5.00	CPT	50 for 80 mm (18, 7, 42, 8)		60.21		5.30	Obstruction as possible rock.		
							BH terminated at 5.30m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
26-09-17	14.00	5.30	5.00	203	dry	5.2	5.3	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH217**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-09-17 26-09-17	65.72	E 692,248.0 N 731,684.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 5.50m; Rose to (@ 20 min.): 4.30m; Sealed at: 4.30m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.20)	Topsoil over stiff brown CLAY.		
1.00	CPT	N = 21 (3, 3, 4, 6, 6, 5)		64.52		1.20			
1.00	D2						Stiff grey slightly sandy CLAY.		
1.00-1.50	B4			64.12		1.60			
1.50	D5						Stiff greyish black CLAY with medium cobble content. Cobbles are angular of limestone.		
2.00	CPT	N = 19 (2, 3, 3, 4, 6, 6)							
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 17 (3, 3, 2, 4, 6, 5)							
3.00-3.50	B10								
3.50	D11					(4.00)			
4.00	CPT	N = 12 (2, 2, 1, 3, 4, 4)	1						
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 29 (5, 6, 6, 8, 7, 8)							
5.00-5.50	B16		1						
5.50	D17			60.12		5.60			
5.60	CPT	50 for 0 mm (25, -, 50)		60.02		5.70	Obstruction as possible rock.		
							BH terminated at 5.70m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
26-09-17	11.00	5.70	5.60	203	4.10	5.6	5.7	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH218**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-09-17 25-09-17	70.83	E 693,226.9 N 731,383.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Stiff brown CLAY with medium cobble content. Cobbles are of limestone.		
1.00	CPT	N = 23 (4, 5, 5, 4, 6, 8)				(2.60)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 31 (6, 7, 6, 5, 9, 11)					2.00m: very stiff.		
2.00-2.50	B7								
2.50	D8			68.23		2.60			
2.60	CPT	0 for 0 mm (25, -, -)					BH terminated at 2.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-09-17	12.00	2.60	2.60	203	dry	2.6	2.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH219**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-10-17 03-10-17	56.37	E 694,226.4 N 730,578.6

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.40m; Rose to (@ 20 min.): 3.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over brown CLAY.		
				55.47		(0.90) 0.90			
1.00	CPT	N = 20 (3, 2, 3, 4, 6, 7)					Medium dense brown SAND and rounded medium GRAVEL.		
1.00	D2								
1.00-1.50	B4								
1.50	D5								
2.00	CPT	N = 16 (3, 4, 4, 4, 3, 5)				(2.60)			
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 24 (5, 6, 5, 5, 6, 8)	1						
3.00-3.50	B10		1	52.87		3.50			
3.50	D11						Firm greyish black sandy CLAY.		
4.00	CPT	N = 14 (3, 4, 3, 3, 3, 5)							
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 21 (4, 4, 5, 4, 6, 6)					5.00m: stiff.		
5.00-5.50	B16								
5.50	D17					(4.30)			
6.00	CPT	N = 21 (4, 5, 5, 4, 6, 6)							
6.00-6.50	B19								
6.50	D20								
7.00	CPT	N = 22 (5, 6, 7, 5, 5, 5)							
7.00-7.50	B22								
7.50	D23			48.57		7.80			
7.80	CPT	75 Seating Blows for 39 mm (25, 50)		48.47		7.90	Obstruction as possible rock. BH terminated at 7.90m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
03-10-17	16.00	7.90	7.90	203	5.00	7.8	7.9	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH220**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-10-17 02-10-17	55.90	E 694,261.0 N 730,587.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.00m 2nd: 3rd: Rose to (@ 20 min.): 2.60m Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over brown CLAY.		
						(1.40)			
1.00	CPT	N = 26 (2, 3, 3, 5, 9, 9)					1.00m: stiff.		
1.00	D2			54.50		1.40			
1.00-1.50	B4						Medium dense sandy GRAVEL with cobbles.		
1.50	D5								
2.00	CPT	N = 24 (4, 3, 5, 6, 6, 7)							
2.00-2.50	B7					(1.80)			
2.50	D8		1						
3.00	CPT	N = 14 (3, 2, 4, 3, 3, 4)		52.70		3.20			
3.00-3.50	B10						Firm greyish black sandy gravelly SILT/CLAY.		
3.50	D11								
4.00	CPT	N = 20 (3, 3, 4, 5, 6, 5)					4.00m: stiff.		
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 18 (4, 4, 3, 4, 5, 6)				(3.80)			
5.00-5.50	B16								
5.50	D17								
6.00	CPT	N = 25 (6, 5, 6, 6, 7, 6)							
6.00-6.50	B19								
6.50	D20								
				48.90		7.00			
7.00	CPT	N = 24 (5, 5, 6, 5, 6, 7)					Stiff very sandy CLAY.		
7.00-7.50	B22								
7.50	D23								
						(1.70)			
8.00	CPT	N = 27 (5, 6, 6, 6, 7, 8)							
8.00	B25								
8.50	D26			47.20		8.70			
				47.10		8.80	Obstruction as possible rock.		
8.80	CPT	50 for 0 mm (25, -, 50)					BH terminated at 8.80m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
02-10-17	18.00	8.80	8.80	203	3.00	8.8	8.8	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH221**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-10-17 02-10-17	55.44	E 695,063.7 N 730,336.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 2.00m Rose to (@ 20 min.): 1.80m Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			54.84		(0.60) 0.60	Grass over brown CLAY.		
1.00	CPT	N = 13 (3, 2, 4, 3, 3, 3)					Firm brownish black very sandy CLAY.		
1.00	D2					(1.40)			
1.00-1.50	B4								
1.50	D5		1	53.44		2.00			
2.00	CPT	N = 21 (3, 4, 4, 5, 6, 6)					Stiff greyish brown sandy gravelly CLAY.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 16 (2, 3, 2, 2, 5, 7)				(2.60)			
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 43 (8, 7, 8, 8, 10, 17)					4.00m: very stiff.		
4.00-4.50	B13								
4.50	D14			50.84		4.60			
4.60	CPT	50 for 0 mm (25, -, 50)					BH terminated at 4.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
02-10-17	11.00	4.60	4.50	203	3.10	4.6	4.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH222**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-09-17 25-09-17	58.66	E 693,663.2 N 731,149.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 3.80m; Rose to (@ 20 min.): 3.00m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Topsoil over firm brown CLAY.		
						(1.70)			
1.00	CPT	N = 12 (2, 1, 2, 3, 3, 4)							
1.00	D2								
1.00-1.50	B4								
1.50	D5			56.96		1.70			
							Firm greyish brown CLAY with medium cobble content. Cobbles are angular of limestone. 2.00m: stiff.		
2.00	CPT	N = 24 (3, 3, 5, 7, 6, 6)							
2.00-2.50	B7								
2.50	D8								
			1			(2.10)			
3.00	CPT	20 for 230 mm (4, 3, 4, 4, 5, 7)							
3.00-3.50	B10								
3.50	D11								
3.80	B12			54.86		3.80			
3.80	~~D13~~						Angular medium GRAVEL.		
4.00	~~CPT~~	75 Seating Blows for 80 mm (25, 50)		54.46		4.20			
							BH terminated at 4.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
25-09-17	17.00	4.20	4.00	203	1.30	4	4.2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH223**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-10-17 03-10-17	58.03	E 693,719.0 N 731,109.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 2.50m; Rose to (@ 20 min.): 1.10m; Sealed at: 1.10m; 2nd: ; 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.30)	Firm brownish black CLAY.		
1.00	CPT	N = 14 (3, 2, 2, 3, 4, 5)	1	56.73		1.30			
1.00	D2						Firm greyish black silty CLAY with cobbles. Cobbles are angular of limestone.		
1.00-1.50	B4								
1.50	D5					(1.20)			
2.00	CPT	N = 28 (4, 3, 3, 4, 5, 16)					2.00m: stiff.		
2.00-2.50	B7		1	55.53		2.50			
2.50	D8			55.43		2.60	Obstruction as possible rock.		
2.60	CPT	50 for 0 mm (25, -, 50)					BH terminated at 2.60m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
03-10-17	19.00	2.60	2.50	203	1.20	2.6	2.6	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH224**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	18-07-17 18-07-17	73.24	E 644,979.0 N 721,960.9

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: **dry** 2nd: 3rd: Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			72.64		(0.60) 0.60	TOPSOIL with roots.		
1.00	SPT	N = 8 (1, 1, 1, 2, 3, 2)					Stiff brown CLAY with cobbles and boulders.		
1.00	D2								
1.00-1.50	B4								
1.50	D5					(2.40)			
2.00	CPT	N = 21 (3, 5, 6, 5, 5, 5)							
2.00-2.50	B7								
2.50	D8			70.24		3.00			
3.00	CPT	N = 38 (5, 6, 7, 6, 8, 17)					Medium dense dry greyish brown gravelly SAND with boulders.		
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 11 (1, 2, 2, 2, 3, 4)					4.00m: dense.		
4.00-4.50	B13								
4.50	D14								
5.00	CPT	N = 8 (3, 2, 1, 1, 3, 3)				(4.70)			
5.00-5.50	B16								
5.50	D17								
6.50	CPT	N = 15 (3, 3, 2, 4, 4, 5)					6.50m: loose.		
6.50-7.00	B19								
7.00	D20			65.54		7.70			
	CPT						BH terminated at 7.70m bgl - refusal.		
8.00		N = 25 (5, 4, 5, 6, 7, 7)							
9.00		75 Seating Blows for 116 mm (25, 50)							

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m

Chiselling			Water Added	
From	To	Hours	From	To
1.5	1.7	1		
7.7	7.7	1		

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH225**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	01-08-17 01-08-17	78.92	E 645,271.3 N 721,997.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 7.40m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Grass over very stiff brown sandy CLAY.		
						(1.80)			
1.00	CPT	N = 21 (2, 4, 5, 5, 4, 7)					1.00m: stiff.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			77.12		1.80			
2.00	CPT	N = 28 (3, 2, 7, 10, 6, 5)					Stiff brown very sandy CLAY with medium cobble content. Cobbles are angular.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 25 (3, 3, 6, 5, 6, 8)				(2.90)			
3.00-3.50	B10								
3.50	D11								
4.00	CPT	N = 17 (2, 3, 4, 3, 3, 7)							
4.00-4.50	B13								
4.50	D14			74.22		4.70			
5.00	CPT	N = 19 (3, 4, 4, 4, 5, 6)					Stiff grey sandy CLAY with cobbles. Cobbles are rounded.		
5.00-5.50	B16								
5.50	D17					(2.70)			
6.50	CPT	N = 39 (6, 8, 9, 9, 10, 11)							
6.50-7.00	B19								
7.00	D20		▼	71.52		7.40			
7.40	CPT	75 Seating Blows for 141 mm (25, 50)		71.42		7.50	Obstruction as possible rock.		
							BH terminated at 7.50m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
01-08-17	14.00	7.50	7.50	203	damp

Chiselling

From	To	Hours
7.4	7.5	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH226**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-09-17 28-09-17	55.26	E 696,359.0 N 729,865.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: 1st: 1.80m; Rose to (@ 20 min.): 1.50m; Sealed at: 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			54.86		0.40	Stiff greyish brown CLAY.		
				54.56		0.70	Grey fine SAND.		
1.00	CPT	N = 27 (3, 3, 7, 7, 6, 7)				(1.10)	Stiff greyish black CLAY with cobbles.		
1.00	D2		1						
1.00-1.50	B4								
1.50	D5			53.46		1.80			
1.80	CPT	75 Seating Blows for 76 mm (25, 50)		53.36		1.90	Obstruction as possible rock.		
1.80	D7						BH terminated at 1.90m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
28-09-17	16.00	1.90	1.80	203	1.50

Chiselling

From	To	Hours
1.8	1.9	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH227**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-10-17 03-10-17	55.69	E 696,376.0 N 729,841.8

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

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(0.80)	MADE GROUND: 2" and down limestone fill.		
				54.89		0.80			
				54.59		1.10	Stiff greyish black CLAY with cobbles. Cobbles are angular. 1.00m: firm.		
1.00	CPT	N = 14 (5, 6, 4, 3, 3, 4)					Grey silty SAND.		
1.00	D2								
1.00-1.50	B4								
1.50	D5					(1.30)			
2.00	CPT	70 for 265 mm (3, 2, 2, 3, 15, 50)							
2.00-2.50	B7			53.29		2.40			
2.50	CPT	50 for 0 mm (25, -, 50)		53.19		2.50	Obstruction as black limestone.		
2.50	D8						BH terminated at 2.50m bgl - refusal.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
03-10-17	12.00	2.50	2.50	203	2.40

Chiselling

From	To	Hours
2.4	2.5	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH228**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-09-17 27-09-17	64.15	E 698,866.2 N 730,589.8

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			63.55		(0.60) 0.60	Stiff brown CLAY.		
1.00	CPT	N = 24 (5, 6, 4, 2, 8, 10)				(1.40)	Stiff grey CLAY with cobbles and boulders. Cobbles are angular.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			62.15		2.00			
2.00	CPT	75 Seating Blows for 27 mm (25, 50)		62.05		2.10	Obstruction as possible rock. BH terminated at 2.10m bgl - obstruction.		

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m
27-09-17	14.00	2.10	2.00	203	1.30

Chiselling

From	To	Hours
2	2.1	1

Water Added

From	To

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH229**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-09-17 27-09-17	62.79	E 698,862.8 N 730,812.2

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: **dry** 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1						Stiff greyish brown sandy CLAY with cobbles. Cobbles are angular.		
1.00	CPT	N = 24 (3, 5, 6, 6, 5, 7)				(2.00)			
1.00	D2								
1.00-1.50	B4								
1.50	D5								
				60.79		2.00			
2.00	CPT	75 Seating Blows for 60 mm (25, 50)					BH terminated at 2.00m bgl - refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
27-09-17	11.00	2.00	2.00	203	1.20	2	2	1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH230**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-09-17 28-09-17	62.98	E 699,018.0 N 730,943.4

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 2.40m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1					(1.30)	Firm brown sandy CLAY with cobbles.		
1.00	CPT	N = 19 (3, 3, 3, 4, 7, 5)		61.68		1.30	1.00m: stiff.		
1.00	D2						Stiff greyish black CLAY with cobbles. Cobbles are angular.		
1.00-1.50	B4								
1.50	D5					(0.90)			
2.00	CPT	N = 38 (2, 3, 5, 4, 14, 15)	▼1	60.78		2.20			
2.00-2.50	B7						Weathered black LIMESTONE rock.		
2.50	D8			60.38		2.60			
2.60	CPT	75 Seating Blows for 52 mm (25, 50)					BH terminated at 2.60m bgl - refusal.		

Boring Progress and Water Observations					
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m

Chiselling			Water Added	
From	To	Hours	From	To
2.6	2.6	1		

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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BOREHOLE LOG

Project	Location	BOREHOLE No
WSP Eastern and Midlands	Co Tipperary	**BH231**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	17-07-17 17-07-17	71.07	E 645,007.5 N 721,973.0

Engineer	GROUNDWATER STRIKES	Sheet / Rev.
Jacobs Tobins JV	Water strikes: Rose to (@ 20 min.): Sealed at: 1st: 5.00m 4.60m 2nd: 3rd:	Sheet 1 of 1 Rev. PRELIM

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-1.00	B1			70.67		0.40	TOPSOIL.		
1.00	SPT	N = 13 (2, 2, 3, 4, 3, 3)				(1.30)	Firm brown CLAY.		
1.00	D2								
1.00-1.50	B4								
1.50	D5			69.37		1.70			
2.00	SPT	N = 13 (2, 3, 2, 3, 4, 4)					Firm grey sandy CLAY with cobbles.		
2.00-2.50	B7								
2.50	D8								
3.00	CPT	N = 47 (5, 6, 5, 8, 18, 16)					3.00m: very stiff.		
3.00-3.50	B10					(3.50)			
3.50	D11								
4.00	CPT	N = 24 (2, 3, 7, 6, 6, 5)					4.00m: stiff.		
4.00-4.50	B13		1						
4.50	D14								
5.00	CPT	N = 36 (3, 5, 8, 9, 9, 10)		65.87		5.20			
5.00	W15						Dense GRAVEL with medium cobble content.		
5.00-5.50	B17								
5.50	D18					(1.90)			
6.50	CPT	N = 65 (6, 5, 7, 11, 17, 30)					6.50m: very dense.		
6.50-7.00	B20								
7.00	D21			63.97		7.10			
7.10	CPT	75 Seating Blows for 130 mm (25, 50)		63.87		7.20	Obstruction as possible rock. BH terminated at 7.20m bgl - obstruction.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water (bgl) Depth, m	From	To	Hours	From	To	
17-07-17	17.00	7.20	7.00	203	4.90	3.6 5.7 7.1	3.9 5.8 7.2	1 1/2 1			BH backfilled.

All dimensions in metres Scale 1:62.5	Client: Irish Water	Method/ Plant Used: Dando 2000	Bit Design	Driller: BT	Logged By: BT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-07-17 17-07-17	29.71	E 570,839.1 N 670,092.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
14-07 0.00						0.00 - 20.60 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(13.00)				

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	20.60	polymer	100

GENERAL REMARKS

4 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC001**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-07-17 17-07-17	29.71	E 570,839.1 N 670,092.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology / Instrument/ Backfill
13.00		NA	16.71		13.00			Open hole drilling - no recovery. *(continued)*	
14-07 14.60	53 (-) -		15.11		(1.60) 14.60			Orange brown slightly sandy SILT/CLAY. Sand is fine.	
14-07 14.60 16.10	47 (-) -	(44)			(1.80)			Dense light brown slightly silty sandy subangular to subrounded fine to coarse assorted brown and grey sandstone and assorted light grey and dark grey limestone GRAVEL. Sand is fine and medium. 16.10m: very dense.	
14-07 16.10		(60)	13.31		16.40				
17.60	53 (-) -	NA	13.01		16.70			Light brown slightly silty medium SAND.	
14-07 17.60		(46)	11.31		(1.70) 18.40			Light brown slightly silty sandy subangular to subrounded fine to coarse assorted brown and grey sandstone and assorted light grey and dark grey limestone GRAVEL. Sand is fine and medium. 17.60m: dense.	
19.10	73 (-) -		10.61		(0.70) 19.10			Orange brown SILT/CLAY.	
14-07 19.10		(44/75mm)						Light pinkish orangish brown slightly sandy slighty gravelly SILT/CLAY. Sand is fine and medium. Gravel is subangular to subrounded fine to coarse of assorted light grey and dark grey limestone GRAVEL.	
20.60	93 (-) -	NA	9.11		(1.50) 20.60				
20.60		(25/0mm)						BH terminated at 20.60m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
14-07-17	17.00	13.00	10.00	123	84		2.50
17-07-17	07.30	13.00	10.00	123	84		3.00

Rotary Flush

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

GENERAL REMARKS

4 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC004**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	19-07-17 20-07-17	53.62	E 577,448.2 N 671,549.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
19-07 0.00	0 (-) -	NA	48.12		(5.50) 5.50	0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
19-07 7.10	81 (-) -		47.72		5.90			Light brown silty fine and medium SAND. (0.40m recovered).		
19-07 8.60	47 (-) -		45.32		(2.40) 8.30			Light grey silty sandy subangular to subrounded fine and medium assorted brown and grey sandstone and assorted light grey and dark grey limestone GRAVEL.		
			45.02		8.60			Grey limestone COBBLES.		
19-07 8.60 10.10	53 (-) -	(50)	43.52		(1.50) 10.10			Very dense light grey silty sandy subangular to subrounded fine and medium assorted brown and grey sandstone and assorted light grey and dark grey limestone GRAVEL.		
10.10		(75)						BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
19-07-17	19.00	5.50	5.50	123	84		2.00
20-07-17	08.00	5.50	5.50	123	84		2.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	6.00	polymer	100
6	10.10	polymer	0

GENERAL REMARKS

4 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC005**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	18-07-17 19-07-17	53.78	E 577,666.8 N 671,557.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
18-07 0.00	0 (-) -	NA	48.28		(5.50)	0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
5.50					5.50					
18-07	94 (-) -							Stiff dark orangish brown slightly sandy gravelly SILT/CLAY. Sand is fine and medium. Gravel is subangular to subrounded fine to coarse of assorted brown and grey sandstone and assorted light grey and dark grey limestone.		
7.10										
18-07 7.10	33 (-) -	(42)			(3.10)			7.10m: very stiff.		
8.60			45.18		8.60					
18-07 8.60	40 (-) -	(44)			(1.50)			Dense grey slightly silty fine and medium SAND.		
10.10			43.68		10.10					
10.10		(58)						BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18-07-17	19.00	5.50	5.50	123	84		1.50
19-07-17	07.30	5.50	5.50	123	84		2.00

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

4 litres polydrill used.
50mm standpipe installed.
Response zone - 4.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC006**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-07-17 21-07-17	54.47	E 582,121.6 N 676,833.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 4.30 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(4.00)					
4.00			50.47		4.00					
		NA	50.17		4.30			Subangular to subrounded fine and medium assorted grey limestone and brown sandstone GRAVEL with a little light brown clay.		
	94 (70) 46	4				4.30 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 14 to 16°, stepped, rough, with 0.5 to 3mm thick light orange brown clay smear.		Very strong thinly bedded grey fine and medium grained SANDSTONE.		
5.60		6				5.20 - 5.30 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick light orange brown clay smear, open.				
	100 (95) 77	6				5.70 - 5.90 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orange brown clay smear and green chloritic smear, open.		6.70m to 6.76m: medium strong.		
7.10		9			(5.80)	7.05 - 8.10 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick light orange brown clay smear, open.				
	100 (93) 9									
8.60		15				8.30 - 9.05 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick light orange brown clay smear, open.		9.00m to 9.06m: medium strong.		
	100 (88) 34	7						9.30m to 9.38m: medium strong.		
10.10		NI	44.37		10.10	9.80 - 10.10 Probable joint, subvertical dip, stepped, rough, with 0.5 to 8mm thick light orange brown clay smear, non-intact.		9.95m to 10.00m: light pinkish brown silt.		
								BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
								0	10.10	polymer	100	2.5 litres polydrill used. BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-07-17 10-07-17	54.49	E 582,263.1 N 677,382.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	49.49		(5.00)	0.00 - 7.10 : overburden.	Open hole drilling - no recovery.		
5.00					5.00				
5.60	100 (-) -						Light orangish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subangular to rounded fine to coarse of assorted grey and black limestone. Cobbles are of dark grey bioclastic limestone.		
7.10	67 (-) -	NA	47.39		(2.10) 7.10				
7.10	100 (26) 17	(25/0mm) NI	46.29		(1.10) 8.20	7.10 - 8.20 Non-intact as possible weathered rock.	Possible weathered SILTSTONE rock. Recovered as dark reddish brown brown slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subrounded to subangular to angular of reddish brown siltstone.		
8.60		6				8.20 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 2mm thick light pinkish brown silt smear and minor dark orange brown iron stain. 8.30 - 8.80 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick dark reddish brown silt smear, open. 8.85 - 9.50 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick dark reddish brown silt smear,	Strong thinly laminated reddish brown and light grey fine and medium grained SANDSTONE.		
10.10	100 (90) 32	10	44.39		(1.90) 10.10		BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC007**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-07-17 10-07-17	54.49	E 582,263.1 N 677,382.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
						open. 9.80 - 9.90 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick reddish brown silt smear, open.			

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

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-09-17 13-09-17	72.27	E 590,032.8 N 687,993.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	69.27		(3.00)	0.00 - 6.40 : overburden.	Open hole drilling - no recovery.		
3.00					3.00				
3.60	100 (-) -						Orangish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine and coarse of assorted grey limestone. Cobbles are of assorted grey limestone.		
5.10	60 (-) -	NA			(3.40)				
5.10	73 (0) 0	(47/225mm)	65.87		6.40				
6.60						6.40 - 11.10 Non-intact as weathered rock. No recovery as washout of fines during drilling. No record of cavity.	Weathered LIMESTONE rock. Recovered as fine to coarse gravel and cobble sized clasts of grey and light grey limestone with some greenish orange brown silt/clay and much surficial orange brown and dark orange brown iron stain and powder.		
6.60	100 (30) 0	(25/0mm)							
8.10	87 (0) 0	NR/NI			(4.70)				
9.60	80 (25) 8	NR/NI							

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	11.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC010**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-09-17 13-09-17	72.27	E 590,032.8 N 687,993.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
11.10			61.17		11.10			BH terminated at 11.10m bgl on REs instruction.		

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

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC011**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-09-17 12-09-17	78.96	E 590,100.8 N 688,020.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(4.00)					
4.00			74.96		4.00					
	90 (-) -							Very stiff orangish brown slightly sandy slightly gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone.		
5.10										
5.10	47 (-) -	(41)								
6.60										
6.60	53 (-) -	(51/150mm) NA			(6.00)					
8.10										
8.10	100 (-) -	(62/225mm)								
9.60										
10.00	100 (-) -		68.96		10.00					
10.00		(44/75mm)						BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
								0	10.00	polymer	100	2 litres polydrill used. BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC012**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	09-11-17 09-11-17	49.40	E 606,241.5 N 694,894.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
09-11 0.00		NA			(1.00)	0.00 - 1.00 : overburden.	Open hole drilling - no recovery.		
1.00	0 (-)		48.40		1.00				
09-11 2.00	- 100 (86) 40	8				1.00 - 10.00 Discontinuities, medium spaced, locally very closely spaced to 4.80m, then medium spaced, dipping 14 to 16°, stepped, rough, with 0.5 to 2mm thick brown clay smear. 1.50 - 2.30 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orange brown clay smear over 2mm thick milky white calcitic smear, open to moderately wide. 2.65 - 2.80 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orange brown clay smear and minor orange and orange brown iron stain, open. 4.00 - 4.40 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear and minor orange iron stain, open.	Very strong apparently massive grey and bright grey sparry fine and medium grained LIMESTONE.		
2.60		10							
09-11 4.10	100 (91) 49	10							
09-11 5.60	100 (89) 55	10							
09-11 7.10	100 (98) 97	2 3			(9.00)				
09-11 8.60	100 (97) 94	1 3							
09-11 10.00	100 (98) 96	2	39.40		10.00				
							BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
09-11-17	16.25	10.00	1.00	123	84		1.10	0	10.00	water	100	BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC014**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	30-08-17 30-08-17	73.26	E 607,222.7 N 696,124.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	70.66		(2.60)	0.00 - 5.90 : overburden.		Open hole drilling - no recovery.		
2.60					2.60					
	87 (-) -							Assorted light grey and grey limestone COBBLES and BOULDERS with some light brown slightly sandy slightly gravelly silt/clay. Sand is fine and medium. Gravel is subangular fine of assorted limestone.		
4.10										
4.10	100 (-) -	(44/75mm) NA			(3.30)			Core run - 4.10m to 5.60m: 1 No light grey limestone boulder 390mm in length.		
5.60		(25/0mm)	67.36		5.90					
5.60	100 (74) 69	4				5.90 - 10.10 Discontinuities, medium spaced, locally very closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orange brown clay smear. 6.90 - 7.10 Joint, vertical dip, planar, smooth, with 0.5 to 2mm thick orange brown clay smear, open.		Very strong apparently massive grey and light grey sparry fine and coarse grained LIMESTONE with dark grey subangular and elongate coarse sand and fine gravel sized inclusions.		
7.10										
	100 (95) 91	4			(4.20)					
8.60		3				8.30 - 9.40 Joint, vertical dip, undulating, smooth, with 0.5 to 5mm thick orange brown silt smear, tight to 8.60m, moderately wide to 9.15m, then tight.				
	100 (96) 68	2								
10.10			63.16		10.10					
								BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	4.10	polymer	100
4.1	10.10	polymer	0

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC015**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	31-08-17 31-08-17	73.26	E 607,222.7 N 696,124.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 8.90 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(2.60)				
2.60			70.66		2.60				
	100 (-) -						Light greenish grey slightly sandy gravelly SILT/CLAY with cobbles and boulders. Sand is fine and medium. Gravel is subangular to subrounded fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone. Core run - 2.60m to 4.10m: 1 No light grey limestone boulder 230mm in length. 1 No grey limestone boulder 230mm in length.		
4.10									
	53 (-) -								
5.60					(5.80)				
	60 (-) -	NA							
7.10									
7.10		(35/75mm)							
	40 (-) -								
			64.86		8.40				
8.60			64.66		8.60		Greenish brown silty fine SAND.		
8.60		(32/75mm)	64.36		8.90		Greenish grey slightly sandy gravelly SILT/CLAY with cobbles and boulders. Sand is fine and medium. Gravel is subangular to subrounded fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone.		
	100 (79) 35	9				8.90 - 12.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick orange brown clay smear. 9.20 - 9.55 Joint, vertical dip, stepped, rough, with 0.5 to 3mm thick orange brown clay smear and minor orange brown iron stain, open to moderately wide.			
10.00									
	100 (91)	7			(3.10)		UCS - 10.20m to 10.47m: strong.		

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

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	12.00	water	100

GENERAL REMARKS
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC015**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	31-08-17 31-08-17	73.26	E 607,222.7 N 696,124.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
11.60 12.00	70 100 (100) 100	4	61.26		12.00	10.00 - 10.25 Joint, vertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open.	Very strong apparently massive light grey cherty fine and medium grained LIMESTONE with dark grey subangular and elongate coarse sand and fine gravel sized inclusions. *(continued)* BH terminated at 12.00m bgl on REs instruction.		

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

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used Hydreq	Bit PQ Design	Driller AS	Logged By EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC017**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-09-17 20-09-17	70.45	E 614,253.4 N 704,387.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -				(3.00)	0.00 - 10.00 : overburden.	Open hole drilling - no recovery.		
3.00			67.45		3.00				
3.60	67 (-) -						Grey slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone. (1.00m recovered).		
5.10	40 (-) -		65.35		(2.10) 5.10				
5.10		NA (27)	64.95		5.50		Medium dense grey silty fine to coarse SAND. (0.40m recovered).		
6.60	40 (-) -		63.85		(1.10) 6.60		Dark grey slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone. (0.30m recovered).		
6.60 7.10	20 (-) -	(33)	63.35		7.10		Dense greyish brown silty coarse SAND. (0.30m recovered).		
7.10	0 (-) -	(40)			(2.90)		No recovery. Drillers Comment: Sand.		
8.60									
8.60	0 (-) -	(39)							
10.00			60.45		10.00				
10.00		(47)					BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

2.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC018**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	07-11-17 07-11-17	66.26	E 615,020.0 N 705,707.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
07-11 0.00	0 (-) -	NA	59.26		(7.00)	0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
7.00					7.00					
07-11	0 (-) -							Drillers Comment: Sand clay.		
8.50										
07-11 8.50	0 (-) -	(24)	56.26		(3.00)			CPT @ 8.50m: N = 26.		
10.00					10.00					
10.00		(24)						CPT @ 10.00m: N = 24. BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
07-11-17	15.00	10.00	6.00	123	84		1.20

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

0.5 gallons polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC019**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-11-17 06-11-17	67.64	E 615,026.5 N 705,740.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
06-11 0.00						0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(5.60)					
5.60			62.04		5.60					
06-11								Drillers Comment: Sand gravel clay.		
	0 (-) -									
7.00										
06-11 7.00		(25)						CPT @ 7.00m: N = 25.		
	0 (-) -	NA			(4.40)					
8.60 8.50		(31)						CPT @ 8.50m: N = 31.		
06-11	0 (-) -									
10.10 10.00			57.64		10.00					
		(26)						CPT @ 10.00m: N = 26. BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
06-11-17	16.00	10.00	4.50	123	84		1.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

0.5 gallons polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC020**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-08-17 21-08-17	81.35	E 623,444.2 N 713,482.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
21-08 0.00	0 (-) -	NA	78.35		(3.00)	0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
3.00					3.00					
21-08 4.10	27 (-) -		77.25		(1.10) 4.10			Brown silty fine and coarse SAND. (0.50m recovered).		
21-08 5.60	60 (-) -				(1.80)			Subangular to subrounded fine to coarse brown sandstone and assorted grey limestone GRAVEL with cobbles. Cobbles are of reddish brown sandstone.		
21-08 5.60		(41)	75.45		5.90			5.60m: dense.		
7.10	27 (-) -	NA						Very stiff orangish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to angular fine to coarse of reddish brown sandstone and assorted grey limestone. Cobbles are of assorted grey limestone.		
21-08 7.10		(41)								
8.60	20 (-) -				(4.20)					
21-08 8.60		(40)								
10.10	27 (-) -		71.25		10.10					
10.10		(55)						BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
21-08-17	17.00	10.10	3.00	123	84		4.30

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

1 gallon polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC021**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	22-08-17 22-08-17	79.47	E 623,494.3 N 713,532.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail / Main	Geology	Instrument/ Backfill
22-08 0.00	0 (-) -	NA	76.47		(3.00)	0.00 - 10.00 : overburden.	Open hole drilling - no recovery.		
3.00					3.00				
22-08 4.10	27 (-) -		74.97		(1.50)		Subangular to subrounded medium to coarse brown sandstone and assorted grey limestone GRAVEL. (0.80m recovered).		
22-08 5.60	27 (-) -		73.87		(1.10)		Grey slightly silty fine and medium SAND. (0.30m recovered).		
22-08 7.00	93 (-) -	NA					Subangular to subrounded fine to coarse brown sandstone and assorted grey limestone GRAVEL with a little greenish brown slightly sandy silt/clay. Sand is fine and coarse.		
22-08 7.00	50 (-) -	(55)			(4.40)		7.00m: dense.		
8.60									
22-08 8.60	46 (-) -	(53)							
10.00			69.47		10.00				
10.00		(50)					BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
22-08-17	17.00	10.00	3.00	123	84		3.90

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

1 gallon polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC022**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-08-17 04-08-17	80.10	E 634,192.9 N 716,619.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
04-08 0.00	0 (-) -	NA	71.50		(8.60)	0.00 - 10.10 : overburden.	Open hole drilling - no recovery.		
5.00									
8.60					8.60				
04-08	67 (-) -		70.00		(1.50)		Subrounded to rounded fine to coarse brown sandstone and assorted grey limestone GRAVEL with a little light grey silt/clay.		
10.10					10.10				
10.10		(62/225mm)					BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
04-08-17	08.00	3.00	3.00	123	84		2.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

3 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC023**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	08-08-17 08-08-17	80.01	E 634,245.9 N 716,632.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	74.51		(5.50)	0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
5.50			74.41		5.60			Grey slightly silty medium SAND. (0.10m recovered).		
7.10	50 (-) -	(34)	72.71		(1.70) 7.30			Very stiff grey slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subangular to rounded fine to coarse of assorted grey limestone. Core run - 7.10m to 8.60m: 1 No light grey bioclastic limestone boulder 300mm in length.		
7.10	73 (-) -		72.41		7.60			Grey sandy SILT. Sand is fine and medium. (0.30m recovered).		
8.60	73 (-) -	(59/150mm)			(2.50)			Very stiff grey slightly sandy gravelly SILT/CLAY. with boulder. Sand is fine. Gravel is subangular to rounded fine to coarse of assorted grey limestone.		
10.10		(53/150mm)	69.91		10.10			BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-08-17 11-08-17	104.37	E 637,128.2 N 718,184.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
11-08 0.00						0.00 - 9.00 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(3.00)					
3.00			101.37		3.00					
11-08			101.27		3.10			Light greenish grey silty fine SAND. (0.10m recovered).		
	46 (-) -							Subrounded to rounded fine to coarse assorted grey limestone GRAVEL.		
4.10										
11-08	27 (-) -				(4.30)					
5.60										
11-08 5.60	33 (-) -	(65/90mm) NA								
7.10										
11-08 7.10		(61/85mm)	96.97		7.40					
	53 (-) -		96.87		7.50			Light greenish grey silty fine SAND. (0.10m recovered).		
8.60					(1.50)			Subrounded to angular fine to coarse assorted grey limestone GRAVEL.		
11-08 8.60	50 (-) -	(50/25mm)	95.37		9.00					
9.00 11-08						9.00 - 12.00 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 2mm thick grey silt smear.		Very strong thinly bedded grey cherty fine and medium grained LIMESTONE thickly interbedded with medium strong dark grey silty 5 to 8mm thick laminae.		
	100 (70) 23	13				9.15 - 9.50 Joint, subvertical dip, undulating, rough, with 0.5 to 1mm thick grey silt smear and orange and orange brown iron stain and powder,		10.40m to 10.41m: visible finely disseminated pyrite.		
10.50		14			(3.00)					
11-08										

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	12.00	water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC024**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-08-17 11-08-17	104.37	E 637,128.2 N 718,184.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
12.00	100 (84) 49	18	92.37		12.00	open. 10.00 - 10.10 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 10.20 - 10.30 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 10.75 - 10.85 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 11.50 - 11.60 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open.	BH terminated at 12.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
11-08-17	15.00	12.00	3.00	123	84		3.20

Rotary Flush

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	16-08-17 16-08-17	107.97	E 637,262.7 N 718,139.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
16-08 0.00						0.00 - 8.00 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(3.00)				
3.00			104.97		3.00				
16-08							Subangular to rounded fine to coarse assorted grey limestone GRAVEL.		
	13 (-) -								
4.50 16-08									
	25 (-) -								
5.50 16-08		(N/A)			(5.00)		5.50m: medium dense.		
5.50									
	19 (-) -								
7.10 16-08									
7.10		(31)					7.10m: dense.		
	47 (32) 23								
			99.97		8.00				
8.60 16-08		8				8.00 - 11.40 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 1mm thick grey silt smear. 8.90 - 9.15 Joint, subvertical dip, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 9.65 - 9.85 Joint, subvertical dip, planar, smooth, with 0.5mm thick grey silt smear, open.	Strong thinly bedded dark grey silty fine and medium grained LIMESTONE.		
	100 (83) 53	8			(3.40)				
10.10 16-08		8					10.05m to 10.06m: visible finely disseminated pyrite.		
	100 (94) 64								

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	11.40	water	100	BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC025**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	16-08-17 16-08-17	107.97	E 637,262.7 N 718,139.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
11.40		4	96.57		11.40			BH terminated at 11.40m bgl on REs instruction.		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
16-08-17	17.00	11.40	3.00	123	84		4.70					BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC027**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	01-11-17 01-11-17	71.87	E 653,509.5 N 727,982.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
01-11 0.00						0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(7.00)					
7.00			64.87		7.00					
01-11	40 (-) -		64.47		7.40			Stiff dark grey thinly laminated sandy SILT. Sand is fine. 0.40m recovered).		
8.00 01-11 8.50	40 (-) -	(NA)			(2.60)			Stiff dark greenish grey slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine. Gravel is subrounded to subangular fine to coarse of grey sandstone and assorted grey limestone. Cobbles are of grey limestone. (0.80m recovered) 8.50m: very stiff.		
9.00 01-11 10.00	40 (-) -		61.87		10.00					
10.00		(57/90mm)						BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
01-11-17	16.40	10.00	7.00	123	84		2.50

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

1 gallon polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC030**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-10-17 13-10-17	66.95	E 663,461.8 N 726,830.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
13-10 0.00						0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
7.60	0 (-) -	NA	59.35		(7.60) 7.60					
13-10 8.60	80 (-) -	(25/0mm) NA			(2.50)			Very stiff greyish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of brown sandstone and assorted grey limestone. Cobbles are of grey limestone.		
13-10 8.60	93 (-) -									
10.10			56.85		10.10					
10.10		(37/75mm)						BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
13-10-17	17.00	10.10	7.50	123	84		1.00

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC031**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	16-10-17 17-10-17	66.63	E 663,588.9 N 726,770.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
17-10 0.00	0 (-) -	NA	61.03		(5.60)	0.00 - 10.10 : overburden.	Open hole drilling - no recovery.		
5.60					5.60				
17-10	100 (-) -						Very stiff greyish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of brown sandstone and assorted grey limestone. Cobbles are of assorted grey limestone.		
7.10									
17-10	87 (-) -	NA			(4.50)				
8.60									
17-10 8.60	80 (-) -	(25/0mm)	56.53		10.10				
10.10		(25/0mm)					BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17-10-17	17.00	10.10	5.60	123	84		

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 11-10-17	79.38	E 670,689.4 N 729,446.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
01-10 0.00	0 (-) -	NA	76.38		(3.00) 3.00	0.00 - 7.40 : overburden.		Open hole drilling - no recovery.		
01-10 4.10	72 (-) -		75.98 75.28		3.40 (0.70) 4.10			Assorted grey and light grey limestone COBBLES. Light orangish brown slightly silty slightly gravelly fine SAND. Gravel is subrounded to subangular medium and coarse of assorted grey limestone.		
01-10 5.60	87 (-) -	(39) NA	74.98 73.78		4.40 (1.20) 5.60			Dense dark orangish brown slightly silty fine and medium SAND. Subrounded to subangular medium to coarse assorted grey and light grey limestone GRAVEL with cobbles. Cobbles are of assorted light grey limestone.		
01-10 7.10	60 (-) -	(40/75mm)	72.68		(1.10) 6.70			Dark orangish brown silty fine and medium SAND.		
01-10 8.60	100 (54) 21	(25/0mm)	71.98		(0.70) 7.40	7.40 - 11.10 Non intact as weathered rock.		Brown slightly silty gravelly fine and medium SAND. Gravel is subangular to subrounded fine and medium of assorted grey limestone. Very strong apparently massive greyish orangish brown 'marbled' light reddish brown crystalline sparry fine to coarse grained DOLOMITISED LIMESTONE.		
01-10 10.10	100 (51) 40	NI			(4.60)	9.40 - 9.50 Non intact as orange brown clay.		9.40m to 9.50m: very stiff orange brown clay.		
01-10	67 (35)	NI								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
10-10-17	17.00	3.00	3.00	123	84		0.30
11-10-17	08.00	3.00	3.00	123	84		0.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	12.00	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC032**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 11-10-17	79.38	E 670,689.4 N 729,446.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
	29					11.10 - 11.60 No recovery. Possible area of core loss. No record of cavity.			
11.60		NR?							
01-10 12.00	100 (32) 0	NI	67.38		12.00	11.60 - 11.90 Non intact as orange brown clay.	11.60m to 11.90m: very stiff orange brown clay.		
		0					BH terminated at 12.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
01-10-17	17.00	12.00	6.00	123	84		0.20

Rotary Flush

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

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC033**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	21-09-17 22-09-17	80.43	E 670,756.4 N 729,489.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
21-09 0.00	0 (-) -	NA			(4.00)	0.00 - 3.20 : overburden.	Open hole drilling - no recovery.		
3.00									
21-09	100 (21) 0	NA				3.20 - 5.50 Non intact as probable weathered rock.			
4.10			76.43		4.00				
21-09	100 (41) 36	NI					Very stiff orangish brown slightly sandy slightly gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone.		
5.60									
21-09	100 (79) 56	4				5.50 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 6mm thick light greyish orange brown clay smear.			
7.10		8			(6.10)	6.80 - 7.50 Possible joint, subvertical dip, stepped, rough, with 0.5 to 8mm thick light orange brown clay smear, open to moderately wide.			
21-09	100 (71) 45	9							
8.60		10				8.55 - 9.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick light grey silt smear, open to moderately wide.			
21-09	100 (63) 26	12				9.10 - 9.50 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick light grey silt smear and some orange and orange brown iron stain and smear, open to moderately wide.			
10.10			70.33		10.10		BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
21-09-17	17.00	3.00	3.00	123	84		1.00

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

3 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC038**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-09-17 27-09-17	63.52	E 698,207.2 N 730,416.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
0.00 1.50	0 (-) -	NA	62.02		(1.50) 1.50	0.00 - 1.50 : overburden.	Open hole drilling - no recovery.		
2.60	100 (42) 0	NI	58.42		(3.60) 5.10	1.50 - 5.10 Non intact as weathered rock.	Weathered LIMESTONE rock. Recovered as angular medium to coarse gravel sized clasts of medium strong dark blackish grey fine grained limestone.		
4.10	100 (35) 0								
5.60	100 (57) 18	9				5.10 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 18 to 20°, planar, smooth, with 0.5 to 2mm thick black silt smear.	Strong thinly bedded dark blackish grey fine grained LIMESTONE.		
7.10	100 (92) 39	11				5.20 - 5.50 Joint, subvertical dip, stepped, smooth, with 40 to 1mm thick black silt smear white milky white calcitic clasts to 5.30m then 0.5 to 1mm thick black silt smear, very wide to open.	5.90m to 5.95m: grey silt.		
8.60	100 (92) 39	7 9			(5.00)	7.05 - 7.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 7.25 - 7.65 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 7.50 - 7.65 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick brown clay smear, open.	6.66m to 6.70m: with visible finely disseminated pyrite. 7.55m to 7.56m: with visible finely disseminated pyrite.		
10.10	100 (89) 67	10	53.42		10.10	8.35 - 8.60 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick black silt smear, 0.5 to 35mm open to very wide. 9.00 - 9.20 Joint, subvertical dip, 'V' shaped, planar, smooth, with 0.5 to 1mm thick black silt smear, open.	9.30m to 9.33m: grey silt. 9.33m to 9.60m: with vertical and subvertical 1 to 8mm wide milky white calcitic veinlets. 9.60m to 9.85m: medium strong fissile black silty limestone. BH terminated at 10.10m bgl on REs instruction.		

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

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC039**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	29-09-17 29-09-17	64.06	E 698,328.0 N 730,409.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	61.46		(2.60) 2.60	0.00 - 2.60 : overburden.	Open hole drilling - no recovery.		
4.10	100 (48) 18	NI 13	60.76		(0.70) 3.30	2.60 - 3.30 Non-intact as weathered rock.	Weathered LIMESTONE rock. Recovered as angular fine to coarse gravel sized clasts of thinly bedded dark grey silty fine grained limestone with a little grey silt.		
5.60	100 (92) 46	12 7				3.30 - 10.10 Discontinuities, closely spaced, locally very closely spaced to 4.60m then closely spaced, locally medium spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 2mm thick dark grey silt smear. 4.30 - 4.40 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 4.60 - 4.70 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 5.15 - 5.25 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open.	Strong thinly bedded dark blackish grey thickly interbedded grey silty fine grained LIMESTONE with visible finely disseminated pyrite.		
7.10	100 (95) 63	11			(6.80)		6.40m to 6.55m: with milky white calcitic veinlets with 2mm quartz crystals with 10mm long 8mm wide 4mm deep vug. 6.80m to 6.82m: with visible finely disseminated pyrite.		
8.60	100 (96) 62	8 6				7.20 - 7.60 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick dark grey silt smear, open.	7.70m to 7.76m: very strong light grey. 7.76m to 7.79m: with visible finely disseminated pyrite. 8.60m to 9.70m: very strong.		
10.10	100 (92) 81	8	53.96		10.10	9.80 - 10.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick dark grey silt smear, open to moderately wide.	BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC045**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	18-08-17 18-08-17	111.62	E 639,352.3 N 718,797.3

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
18-08 0.00	0 (-) -	NA	110.22		(1.40)	0.00 - 1.60 : overburden.	Open hole drilling - no recovery.		
1.40			110.02		1.60				
18-08 2.60	85 (55) 0	NA 15 15				1.60 - 10.10 Discontinuities, very closely spaced to 2.30m, then closely spaced, locally medium spaced to 4.10m, then medium, locally closely spaced, dipping 10 to 12°, planar, smooth, with 0.5 to 3mm thick grey silt smear and orange brown iron stain to 2.00m. 2.85 - 3.30 Joint, subvertical dip, undulating, smooth, with 0.5mm thick dark grey silt smear, open.	Subangular to subrounded medium to coarse assorted grey limestone GRAVEL. Strong thinly bedded grey and dark grey silty fine and medium grained LIMESTONE.		
18-08 4.10	100 (85) 44	8							
18-08 5.60	100 (96) 85	5 8							
18-08 7.10	100 (97) 83	6			(8.50)	5.60 - 5.75 Joint, subvertical dip, stepped, rough, with 0.5mm thick grey silt smear, open.			
18-08 8.60	100 (84) 68	6 6				7.60 - 7.70 Joint, dipping 60°, undulating, smooth, with 0.5 to 3mm thick grey silt smear over 1mm thick milky white calcitic veneer, open to moderately wide.	7.55m to 7.60m: grey silt. 7.60m to 7.75m: medium strong with 'anastomosing' milky white calcitic veinlets. 7.75m to 9.80m: with subvertical milky white calcitic veinlets.		
18-08 10.10	100 (96) 77	9	101.52		10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
18-08-17	17.00	10.10	1.40	123	84		4.90

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	water	100

GENERAL REMARKS

50mm standpipe installed. Response zone - 3.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC046**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-07-17 27-07-17	70.24	E 644,965.6 N 721,835.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
25-07 0.00	0 (-) -	NA	64.64		(5.60)	0.00 - 8.40 : overburden.	Open hole drilling - no recovery.		
5.60					5.60				
25-07	93 (-) -						Brown silty sandy subangular to subrounded fine and medium assorted brown and grey sandstone and assorted light grey and dark grey limestone GRAVEL with cobbles and boulders. Cobbles are of assorted grey limestone.		
7.10					(2.80)				
25-07 7.10	100 (11) 7	NA (250mm)	61.84				Core run - 7.10m to 8.60m: 1 No grey limestone boulder 240mm in length.		
8.60					8.40				
25-07	100 (82) 33	11 10	60.14		(1.70)	8.40 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 18 to 20°, planar, smooth, with 0.5 to 4mm thick dark grey silt smear. 8.60 - 9.00 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick grey silt smear, open.	Strong thinly bedded dark grey slightly bioclastic fine and medium grained LIMESTONE. 9.00m to 9.25m: very strong.		
10.10					10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
25-07-17	19.00	6.00	6.00	123	84		1.50
27-07-17	08.00	6.00	6.00	123	84		2.00

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

3 litres polydrill used.
50mm standpipe installed.
Response zone - 6.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC061**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-07-17 06-07-17	65.62	E 585,831.3 N 684,005.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
05-07 0.00	0 (-) -	NA			(3.00)	0.00 - 8.80 : overburden.		Open hole drilling - no recovery.		
3.00			62.62		3.00					
05-07			62.32		3.30			Grey limestone COBBLES and BOULDERS. Core Run - 3.00m to 4.10m: 1 No grey limestone boulder 350mm in length.		
4.10	100 (-) -									
05-07 5.60	100 (-) -							Light orange brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted reddish brown and brown sandstone and assorted light grey and dark grey limestone. Cobbles are of grey limestone.		
05-07 7.10	47 (-) -	NA			(5.50)					
05-07 7.10	60 (-) -	(73)						CPT @ 7.10m: N = 73.		
8.60										
05-07 8.60	100 (81) 63	(25/0mm) 3	56.82		8.80	8.80 - 15.00 Discontinuities, medium spaced, locally closely spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 2mm thick orange brown clay smear. 9.50 - 9.80 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5 to 2mm thick orange brown clay smear, open. 10.45 - 10.65 Joint, subvertical dip,		Very strong thinly bedded grey slightly bioclastic sparry fine and coarse grained LIMESTONE.		
10.10										
05-07	100 (97)	4								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
05-07-17	19.00	10.10	6.00	123	84		3.00
06-07-17	07.30	10.10	6.00	123	84		3.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	15.00	polymer	100

GENERAL REMARKS

3 litres polydrill used.
50mm standpipe installed.
Response zone - 8.50m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC061**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-07-17 06-07-17	65.62	E 585,831.3 N 684,005.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
11.60	83	3				stepped, rough, with 0.5 to 1mm thick orange brown clay smear, open.	Very strong thinly bedded grey slightly bioclastic sparry fine and coarse grained LIMESTONE. *(continued)*		
05-07					(6.20)				
13.10	100 (96) 94	1							
05-07		4				13.80 - 13.95 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open.			
14.60	100 (93) 86								
05-07	100	1							
15.00	(100) 100		50.62		15.00		BH terminated at 15.00m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

3 litres polydrill used.
50mm standpipe installed.
Response zone - 8.50m to 15.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC067**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-09-17 11-09-17	82.68	E 590,701.8 N 688,706.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	80.58		(2.10) 2.10	0.00 - 2.10 : overburden.	Open hole drilling - no recovery.		
3.60	100 (81) 48	5 NI 6	78.88		(1.70) 3.80	2.10 - 10.00 Discontinuities, medium spaced, locally closely spaced, dipping 18 to 20°, stepped, rough, with 0.5 to 3mm thick orange brown clay smear. 3.00 - 3.10 Non intact as dark orange brown sandy silt.	Very strong apparently massive grey and light grey sparry fine and coarse grained LIMESTONE. 3.00m to 3.10m: dark orange brown sandy silt. Sand is fine and medium.		
5.10	100 (49) 10	NI 6	78.08		(0.80) 4.60	3.80 - 4.60 Probable joint, subvertical dip, stepped, rough, non-intact.	Weathered LIMESTONE rock. Recovered as angular coarse gravel and cobble sized clasts of grey limestone with some dark orange brown silt/clay.		
6.60	93 (53) 31	7 NI NR?				4.70 - 5.10 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick dark orange brown slightly sandy clay smear, open. 5.90 - 6.00 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick dark orange brown clay smear, open.	Very strong apparently massive grey and light grey sparry fine and coarse grained LIMESTONE. 6.00m to 6.10m: dark orange brown slightly sandy slightly gravelly silt/clay. Sand is fine and medium. Gravel is subangular fine of light grey limestone.		
8.10	100 (82) 63	8 1			(5.40)	6.00 - 6.10 Non intact as dark orange brown slightly gravelly silt/clay. 6.10 - 6.20 No recovery? Possible are of core loss. No record of cavity. 6.80 - 7.20 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 3mm thick dark orange brown clay smear, open to moderately wide.			
9.60	100 (96) 83	3 4				8.80 - 9.05 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick dark orange brown iron stain and powder, open.			
10.00	100 (93) 90		72.68		10.00				
							BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

1.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC068**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	07-09-17 07-09-17	79.22	E 592,143.6 N 688,933.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(4.30)					
4.30			74.92		4.30					
	100 (-) -							Light orangish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone.		
5.10										
5.10	100 (-) -	(25/0mm)								
6.60										
6.60	100 (-) -	(54) NA			(5.70)			6.60m: very stiff.		
8.10										
8.10	42 (-) -	(25/0mm)						8.40m to 10.00m: light grey.		
10.00			69.22		10.00					
10.00		(39)						BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

irish drilling ltd
old galway road
loughrea

DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC082**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-08-17 23-08-17	74.03	E 602,456.8 N 693,812.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
23-08 0.00	0 (-) -	NA			(3.00)	0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
3.00			71.03		3.00					
23-08 4.00	60 (-) -							Subangular to subrounded medium to coarse assorted grey limestone GRAVEL with cobbles and boulders. Cobbles are of grey limestone. Core run - 3.00m to 4.00m: 1 No grey limestone boulder 230mm in length.		
23-08 5.60	25 (-) -		68.43		(2.60) 5.60					
23-08			68.23		5.80			Grey slightly silty fine and coarse SAND. (0.20m recovered).		
			68.03		6.00			Subrounded to subangular medium and coarse assorted grey limestone GRAVEL with a little greenish brown slightly sandy silt/clay. Sand is fine and medium.		
7.10	40 (-) -	NA			(1.30)					
23-08 7.10		(37)	66.73		7.30			Greenish brown silty fine and coarse SAND. (0.20m recovered). 7.10m: dense.		
	87 (-) -				(1.30)					
8.60			65.43		8.60			Very stiff greenish grey SILT thinly interlaminated with dustings of light grey fine sand.		
23-08 8.60		(33)						Very stiff greenish grey slightly sandy gravelly SILT/CLAY. Sand is fine and coarse. Gravel is subrounded to subangular fine to coarse of assorted grey limestone.		
	50 (-) -				(1.40)					
10.00			64.03		10.00					
10.00		(46)						BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
23-08-17	18.00	10.00	3.00	123	84		2.20

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

1 gallon polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: DC	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC083**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-08-17 29-08-17	70.57	E 603,437.8 N 694,736.3

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
28-08 0.00						0.00 - 6.70 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(4.50)					
4.50			66.07		4.50					
28-08			65.77		4.80			Subangular to subrounded fine to coarse assorted grey limestone GRAVEL.		
	100 (-) -									
5.60								Orange brown slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subangular fine and medium of brown sandstone and assorted grey limestone.		
28-08		NA			(1.90)					
	87 (25) 21									
			63.87		6.70			6.50m to 6.70m: with grey limestone cobbles.		
7.10		2				6.70 - 10.10 Discontinuities, closely spaced, locally medium spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 2mm thick orange brown clay smear.		Very strong apparently massive grey and light grey slightly bioclastic sparry fine to coarse grained LIMESTONE.		
28-08		6				7.20 - 7.30 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open.				
	100 (96) 84									
8.60		5			(3.40)	8.60 - 8.90 Joint, subvertical dip to 8.75m, then vertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open.				
28-08						9.15 - 9.25 Joint, dipping 60°, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open.				
	100 (96) 84	5								
10.10			60.47		10.10					
								BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
28-08-17	19.00	3.00	3.00	123	84		0.50
29-08-17	18.00	10.10	4.50	123	84		0.70

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC118**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-08-17 10-08-17	87.96	E 635,413.2 N 716,859.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
10-08 0.00	0 (-) -	NA	84.96		(3.00)	0.00 - 7.10 : overburden.	Open hole drilling - no recovery.		
3.00					3.00				
10-08	36 (-) -				(1.20)		Subrounded to subangular fine to coarse assorted grey limestone GRAVEL. (0.70m recovered).		
4.10			83.76		4.20				
10-08	13 (-) -	NA			(1.40)		Grey silty fine and medium SAND. (0.20m recovered).		
5.60			82.36		5.60				
10-08 5.60	53 (-) -	(63/115mm)			(1.50)		Subrounded to subangular fine to coarse assorted grey limestone GRAVEL with boulders and a little light greenish brown slightly sandy slightly gravelly silt/clay. Sand is fine and medium. Gravel is subangular fine of assorted grey limestone. Core run - 5.60m to 7.10m: 1 No grey limestone boulder 270mm in length.		
7.10			80.86		7.10				
10-08 7.10	100 (31) 8	(50/20mm) NI	80.16		(0.70)	7.10 - 7.80 Non-intact as weathered rock.	Weathered LIMESTONE rock. Recovered as angular fine to coarse gravel sized clasts of dark grey silty limestone with surficial orange and orange brown iron stain and powder.		
7.80					7.80				
8.60		28				7.80 - 10.10 Discontinuities, closely spaced, locally very closely spaced, dipping 14 to 16 to 8.50m, then 20 to 22°, planar, smooth, with 0.5 to 5mm thick grey silt smear.			
10-08	100 (77) 19				(2.30)		Strong thinly bedded dark grey silty fine and medium grained LIMESTONE. 8.15m to 8.16m: with visible finely disseminated pyrite.		
10.10		10	77.86		10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
10-08-17	15.00	10.10	3.00	123	84		3.20

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: IP	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC119**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	09-08-17 09-08-17	113.30	E 636,377.1 N 717,502.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
09-08 0.00	0 (-) -	NA	110.30		(3.00)	0.00 - 7.80 : overburden.		Open hole drilling - no recovery.		
3.00					3.00					
09-08 4.50	27 (-) -		108.60		(1.70) 4.70			Subangular to subrounded fine and medium brown sandstone and assorted grey limestone GRAVEL.		
09-08 6.00	67 (-) -	NA	108.50		4.80			Core run - 4.50m to 6.00m: 1 No grey limestone boulder 320mm in length. Grey silty fine and medium SAND. (0.10m recovered).		
09-08 7.50	67 (-) -	(55/95mm)			(3.00)			Subangular to subrounded fine and medium assorted grey limestone GRAVEL with cobbles and boulders and some orange brown slightly sandy slightly gravelly silt/clay. Sand is fine and medium. Gravel is subangular fine of assorted grey limestone. Cobbles are of assorted grey limestone. Core run - 6.00m to 7.50m: 1 No grey limestone boulder 250mm in length.		
09-08 8.00	100 (86) 68		105.50		7.80			7.70m to 7.80m: silt/clay is grey.		
09-08	100 (89) 74	3 4 1			(2.70)	7.80 - 10.50 Discontinuities, medium spaced, dipping 10 to 12°, stepped, locally undulating, smooth, with 0.5 to 1mm thick grey silt smear.		Strong thinly bedded grey silty fine and medium grained LIMESTONE. 8.95m to 9.10m: subvertical 80mm wide milky white calcitic vein. 9.10m to 9.25m: milky white calcitic veinlets. UCS - 9.90m to 10.25m: strong.		
10.50			102.80		10.50	10.30 - 10.45 Joint, subvertical dip, undulating, rough, with 0.5 to 1mm thick grey silt smear, open.		BH terminated at 10.50m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
09-08-17	15.00	10.50	3.00	123	84		2.90

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.50	water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC120**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	17-08-17 17-08-17	111.57	E 638,551.1 N 718,460.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument / Backfill
17-08 0.00	0 (-) -	NA	110.07		(1.50)	0.00 - 1.60 : overburden.	Open hole drilling - no recovery.		
1.50					1.50				
17-08	94 (57) 21	NA 1 13	109.97		1.60	1.60 - 10.10 Discontinuities, closely spaced, locally medium spaced to 4.20m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 1mm thick orange brown silt smear and orange and orange brown iron stain and powder.	Subangular and angular medium limestone GRAVEL. Very strong thinly bedded grey and dark grey silty fine grained LIMESTONE.		
3.00									
17-08	100 (91) 0	18				2.00 - 2.80 Joint, subvertical dip, stepped, smooth, with 0.5mm thick orange brown silt smear and orange and orange brown iron stain and powder, open.			
4.10									
17-08	100 (91) 77	4				3.40 - 3.60 Joint, subvertical dip, stepped, smooth, with 0.5mm thick orange brown silt smear and orange and orange brown iron stain and powder, open.	UCS - 4.26m to 4.55m: medium strong.		
5.60		6							
17-08	100 (97) 77	3			(8.50)				
7.10									
17-08	100 (92) 66	7							
8.60		8				8.35 - 8.60 Joint, subvertical dip, stepped, rough, with 0.5mm thick orange brown silt smear and orange and dark orange brown iron stain and powder, open.			
17-08	100 (85) 44	11				8.65 - 8.85 Joint, subvertical dip, stepped, rough, with 0.5mm thick orange brown silt smear and orange and dark orange brown iron stain and powder, open.			
10.10			101.47		10.10	9.60 - 9.85 Joint, subvertical dip, stepped, rough, with 0.5mm thick	BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
17-08-17	17.00	10.10	1.50	123	84		2.60

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC120**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	17-08-17 17-08-17	111.57	E 638,551.1 N 718,460.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
						orange brown silt smear and orange and dark orange brown iron stain and powder, open.			

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

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC121**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-08-17 02-08-17	84.78	E 641,185.6 N 720,237.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 8.60 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(8.50)					
8.50			76.28		8.50					
		NA	76.18		8.60	8.60 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 2mm thick greenish grey silt smear.		Light grey slightly sandy gravelly SILT/CLAY. Sand is fine and medium. Gravel is subangular fine and medium of assorted grey limestone.		
	94 (85) 69	1			(1.50)			Very strong thinly bedded grey silty fine and medium grained LIMESTONE with black angular and elongate fine gravel sized silty inclusions.		
10.10		4	74.68		10.10			BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
								0	10.10	polymer	100	2 litres polydrill used. BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC122**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-08-17 03-08-17	85.72	E 641,276.7 N 720,284.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(7.10)					
7.10			78.62		7.10					
			78.32		7.40			Grey slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subangular to rounded fine to coarse of assorted grey limestone.		
	53 (-) -		78.02		7.70			Light grey slightly silty fine and medium SAND. (0.30m recovered).		
8.60			77.02		(1.00) 8.70			Grey slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subangular to rounded fine to coarse of assorted grey limestone. (0.30m recovered).		
8.60		(NA)	76.72		9.00			Light grey slightly silty fine and medium SAND. (0.30m recovered).		
	53 (-) -				(1.10)			Grey slightly sandy gravelly SILT/CLAY with cobbles. Sand is		
10.10			75.62		10.10					
10.10		(25/0mm)								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC122**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-08-17 03-08-17	85.72	E 641,276.7 N 720,284.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
								fine. Gravel is subangular to rounded fine to coarse of assorted grey limestone. Cobbles are of brown sandstone and grey limestone. (0.30m recovered). BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

2.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC138**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-09-17 18-09-17	30.61	E 570,315.8 N 670,237.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
14-09 0.00						0.00 - 15.20 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(6.60)					
6.60			24.01		6.60			6.00m to 6.10m: dark orange brown slightly sandy slightly gravelly silt/clay. Sand is fine and medium. Gravel is subangular fine of light grey limestone.		
14-09	47 (-) -	(37) NA						Light brown slightly sandy slightly gravelly SILT/CLAY with cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of assorted grey and brown sandstone and assorted grey limestone. Cobbles are of assorted grey limestone. 8.10m to 11.10m: very stiff.		
8.10 14-09 8.10	73 (-) -									
9.60 14-09 9.60	40 (-) -	(36)			(8.60)					

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
								0	20.10	polymer	100	4 litres polydrill used. BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC138**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-09-17 18-09-17	30.61	E 570,315.8 N 670,237.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS						STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
11.10 14-09		(43)						Light brown slightly sandy slightly gravelly SILT/CLAY with cobbles. Sand is fine. Gravel is subangular to subrounded fine to coarse of assorted grey and brown sandstone and assorted grey limestone. Cobbles are of assorted grey limestone. *(continued)*		
12.60	60 (-) -									
14-09	67 (-) -	NA								
14.10										
14-09	40 (13) 0		15.41		15.20					
15.60		NI	14.81		(0.60) 15.80	15.20 - 15.80 Non intact as weathered rock.		Weathered LIMESTONE rock. Recovered as angular fine to coarse gravel and cobble sized clasts of grey limestone with some light grey silt.		
14-09	100 (85) 68	2 4				15.60 - 15.80 Joint, subvertical dip, stepped, rough, with 0.5 to 6mm thick light brown clay smear, open to moderately wide.		Very strong thinly bedded grey and dark grey sparry bioclastic fine and coarse grained LIMESTONE.		
17.10						15.80 - 20.10 Discontinuities, medium spaced, locally very closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 2mm thick brown clay smear.				
14-09	100 (95) 88	4			(4.30)					
18.60		2								
14-09	100 (97) 91	3								
20.10			10.51		20.10					
								BH terminated at 20.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
14-09-17	17.00	11.10	6.60	123	84		2.00
15-09-17	08.00	11.10	6.60	123	84		3.00

Rotary Flush

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

GENERAL REMARKS

4 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

irish drilling ltd
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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC172**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-07-17 14-07-17	46.63	E 572,171.7 N 670,690.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
13-07 0.00	0 (-) -	NA			(14.60)	0.00 - 18.20 : overburden.	Open hole drilling - no recovery.		
10.00 13-07									

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	20.60	polymer	100	2 litres polydrill used. BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC172**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-07-17 14-07-17	46.63	E 572,171.7 N 670,690.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology / Instrument/ Backfill
14.60	0 (-) -	NA	32.03		14.60			Open hole drilling - no recovery. *(continued)*	
13-07 16.10	93 (-) -	NA	28.43		(3.60) 18.20			Very stiff light orangish brown slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subrounded to subangular fine and medium of assorted brown sandstone and assorted grey limestone. 14.90m to 17.50m: slightly gravelly.	
13-07 17.60	87 (-) -								
13-07 17.60	87 (59) 29	(25/0mm)							
19.10		10				18.20 - 20.60 Discontinuities, very closely spaced, locally closely spaced to 18.80m, then medium spaced, locally closely spaced, dipping 10 to 12°, stepped, smooth, with 0.5 to 1mm thick light grey silt smear.		Extremely strong thinly bedded grey and dark grey sparry highly bioclastic fine and coarse grained LIMESTONE. 18.80m to 19.10m: very strong.	
13-07 20.60	100 (98) 89	5	26.03		(2.40) 20.60			19.96m to 20.00m: light grey silt.	
		2							
								BH terminated at 20.60m bgl on REs instruction.	

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
13-07-17	07.30	14.60	15.00	123	84		2.00

Rotary Flush

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

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC173**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-07-17 12-07-17	44.05	E 572,097.9 N 670,502.7

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
11-07 0.00						0.00 - 10.90 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(8.60)					
8.60			35.45		8.60					
11-07 10.10	100 (-) -	NA			(2.30)			Very stiff orangish brown slightly sandy gravelly SILT/CLAY. Sand is fine. Gravel is subrounded to subangular fine and medium of assorted brown and reddish brown sandstone and assorted grey limestone. 9.60m: becoming light orangish brown.		
11-07 10.10	100 (43)	(44/75mm) NA	33.15		10.90					

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0 14.6	14.60	polymer	100

GENERAL REMARKS

3 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC173**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	11-07-17 12-07-17	44.05	E 572,097.9 N 670,502.7

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS						STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
11.60	16	8				10.90 - 20.60 Discontinuities, medium spaced, locally closely spaced, dipping 16 to 18°, stepped, rough, with 0.5 to 3mm thick light orange brown clay smear.	Very strong thinly bedded grey and dark grey sparry highly bioclastic fine and coarse grained LIMESTONE. *(continued)*		
11-07 13.10	100 (96) 89	6				11.05 - 11.20 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick light brown silt smear, open.	11.40m to 11.43m: medium strong thinly laminated dark grey fine grained siltstone. 11.50m to 11.62m: strong. 12.60m to 12.69m: brownish green silt/clay.		
11-07 14.60	100 (98) 85	2 4				13.15 - 13.35 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light brown silt smear, open.	14.20m to 14.30m: medium strong thinly laminated dark grey fine grained siltstone.		
11-07 16.10	100 (95) 90	3			(9.70)		15.00m to 15.05m: grey silt.		
11-07 17.60	100 (94) 91	1 2				17.05 - 17.15 Joint, dipping 60°, undulating, smooth, with 0.5 to 1mm thick dark grey silt smear, open.	16.35m to 16.40m: medium strong thinly laminated dark grey fine grained siltstone. 17.00m to 17.05m: medium strong thinly laminated dark grey fine grained siltstone.		
11-07 19.10	100 (97) 89	5				18.20 - 18.25 Joint, dipping 48°, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.	18.10m to 18.15m: medium strong thinly laminated dark grey fine grained siltstone.		
11-07 20.60	100 (97) 96	2 1	23.45		20.60				
							BH terminated at 20.60m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
11-07-17	19.00	14.60	9.00	123	84		3.00

Rotary Flush			
From (m)	To (m)	Type	Return (%)
	20.60	polymer	100

GENERAL REMARKS

3 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC178**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-08-17 24-08-17	74.41	E 602,443.2 N 693,794.7

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
24-08 0.00						0.00 - 9.40 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(4.60)				
4.60			69.81		4.60				
24-08			69.51		4.90		Grey slightly silty fine and coarse SAND. (0.30m recovered).		
	55 (-) -						Subangular to subrounded fine to coarse assorted grey limestone GRAVEL with cobbles. Cobbles are of assorted grey limestone.		
5.60					(2.00)				
24-08	20 (-) -								
7.10			67.51		6.90				
24-08 7.10		NA (47)					Very stiff greenish grey SILT thinly interlaminated with dustings of light grey fine sand.		
	100 (-) -				(1.80)				
8.60			65.71		8.70				
24-08 8.60		(55)					Very stiff grey slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and coarse. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of grey limestone.		
	100 (42) 29				(0.70)				
			65.01		9.40				
		15				9.40 - 9.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open.			
10.10						9.40 - 13.10 Discontinuities, closely spaced, locally medium spaced, dipping 12 to 14°, undulating, smooth, with 0.5 to 2mm thick grey			
24-08		13							
	100 (73)								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	13.10	water	100

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC178**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	24-08-17 24-08-17	74.41	E 602,443.2 N 693,794.7

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
	29				(3.70)	silt smear. 9.70 - 10.10 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 10.45 - 10.60 Joint, vertical dip, stepped, smooth, with 20mm thick grey gravelly silt/clay smear, wide. 11.20 - 11.60 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick grey silt smear, open to moderately wide.	Strong thinly bedded grey and dark grey sparry bioclastic fine to coarse grained LIMESTONE with rounded and elongate light grey fine grained limestone with dark grey coarse sand and fine gravel sized silty inclusions. *(continued)* 11.15m to 11.20m: grey silt. 11.20m to 11.25m: medium strong. 12.30m to 12.35m: grey silt.		
11.60		16							
24-08	100 (91) 69	9	61.31		13.10				
13.10							BH terminated at 13.10m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
24-08-17	18.00	13.10	4.60	123	84		2.30

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

GENERAL REMARKS

BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: DC	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC179**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-08-17 28-08-17	71.52	E 603,425.0 N 694,809.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
0.00						0.00 - 4.70 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(4.10)				
4.10			67.42		4.10				
			67.22		4.30		Subangular to subrounded fine and medium green sandstone and assorted grey limestone GRAVEL.		
		NA	66.82		4.70				
	87 (21) 0					4.70 - 6.80 Non-intact as probable weathered rock.	Greyish brown slightly silty fine and medium SAND.		
5.60							Probable weathered LIMESTONE rock. Recovered as coarse gravel and cobble sized clasts of apparently massive grey and light grey sparry limestone interbedded with orange brown slightly sandy slightly gravelly silt/clay. Sand is fine and medium. Gravel is subangular and subrounded fine of dark grey limestone.		
		NI?			(2.10)				
	100 (59) 11		64.72		6.80				
7.10						6.80 - 7.15 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open. 6.80 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 1mm thick orange brown silt/clay smear.	Very strong apparently massive grey and light grey slightly bioclastic sparry fine to coarse grained LIMESTONE.		
		6							
	100 (93) 89								
8.60		4			(3.30)				
	100 (97) 94	2							
10.10			61.42		10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: DC/AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC183**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	12-10-17 12-10-17	76.78	E 670,457.1 N 728,886.7

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
12-10 0.00	0 (-) -	NA	72.68		(4.10) 4.10	0.00 - 5.20 : overburden.	Open hole drilling - no recovery.		
12-10 5.60	93 (0) 0	NA	72.28 71.58		4.50 (0.70) 5.20		Subrounded to subangular fine to coarse assorted grey limestone GRAVEL with a little orange brown clay. Subrounded to subangular fine to coarse assorted grey limestone GRAVEL with a little light brown silty sand. Sand is fine and medium.		
12-10 5.60 7.10	100 (8) 0	(25/0mm)				5.20 - 10.10 Non intact as weathered rock. 5.21 - 10.10 Discontinuities, apparently closely spaced, locally medium spaced, dipping 18 to 20°, stepped, rough, with 0.5 to 15mm thick orange brown clay smear.	Weathered LIMESTONE rock. Recovered as angular fine to coarse gravel cobble and boulder sized clasts of strong thickly bedded light grey and grey sparry cherty fine and medium grained LIMESTONE.		
12-10 8.60	100 (62) 39	NI			(4.90)	6.80 - 7.60 Probable joint, apparently subvertical dip, stepped, rough, with 0.5 to 6mm thick orange brown clay smear, open to moderately wide.			
12-10 10.10	100 (46) 9		66.68		10.10	8.60 - 9.40 Probable joint, apparently subvertical dip, stepped, rough, with 0.5 to 6mm thick orange brown clay smear, open to moderately wide.			
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
12-10-17	17.00	10.10	4.50	123	84		0.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC185**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-10-17 03-10-17	78.56	E 701,000.3 N 731,087.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
02-10 0.00	0 (-) -	NA	77.36		(1.20) 1.20	0.00 - 1.20 : overburden.	Open hole drilling - no recovery.		
02-10 2.60	100 (58) 8	NI 9 17	76.96		1.60	1.20 - 1.60 Non intact as weathered rock. 1.60 - 20.60 Discontinuities, medium spaced, locally very closely spaced to 4.10m, then medium spaced, locally very closely spaced, dipping 14 to 16°, stepped, locally planar, rough, with 0.5 to 1mm thick orange brown clay smear. 1.61 - 2.30 Joint, subvertical dip, planar, locally stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 2.60 - 3.00 Joint, subvertical dip, planar, smooth, with 0.5 to 1mm thick orange brown clay smear, open. 3.80 - 3.90 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick grey silt smear, open. 4.35 - 4.50 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orange brown clay smear, open.	Weathered LIMESTONE rock. Recovered as angular medium to coarse gravel sized clasts of strong grey fine and medium grained limestone. Very strong thinly bedded dark blackish grey silty fine grained LIMESTONE thickly interbedded with light grey thinly bedded fine and medium grained limestone with subvertical and vertical milky white calcitic veinlets. 2.60m to 3.20m: strong locally medium strong thinly laminated dark grey fissile fine grained. 4.60m to 4.80m: strong thinly laminated dark grey fine grained. 7.60m to 7.85m: strong thinly laminated dark grey fine grained with visible cubic pyrite. 8.05m to 8.45m: strong thinly laminated dark grey fine grained with visible cubic pyrite.		
02-10 4.10	100 (81) 32	20							
02-10 5.60	100 (92) 54	12 6							
02-10 7.10	100 (97) 85	8							
02-10 8.60	100 (93) 82	4 4							
02-10 10.10	100 (85) 64	10				9.70 - 9.90 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open. 10.65 - 10.75 Joint, dipping 60°,	9.90m to 10.10m: medium strong thinly laminated dark grey fissile fine grained.		
02-10	100 (95)	7							

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

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC185**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-10-17 03-10-17	78.56	E 701,000.3 N 731,087.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS						STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
11.60	85	5			(19.00)	stepped, smooth, with 0.5 to 1mm thick grey silt smear, open. 11.60 - 11.80 Joint, subvertical dip, undulating, tight.	Very strong thinly bedded dark blackish grey silty fine grained LIMESTONE thickly interbedded with light grey thinly bedded fine and medium grained limestone with subvertical and vertical milky white calcitic veinlets. *(continued)*		
02-10 13.10	100 (97) 89	3					12.80m to 12.85m: medium strong thinly laminated dark grey fissile fine grained. 13.45m to 13.50m: medium strong thinly laminated dark grey fissile fine grained.		
02-10 14.60	100 (96) 85	3					14.60m to 14.75m: medium strong thinly laminated dark grey fine grained with visible cubic pyrite.		
02-10 16.10	100 (96) 85	3							
02-10 17.60	100 (96) 65	9				16.00 - 16.25 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey fine sand smear, open. 16.70 - 17.05 Joint, subvertical dip, stepped, rough, with 0.5mm thick finely disseminated pyrite smear, open.			
02-10 19.10	100 (91) 81	6 3					17.75m to 17.90m: medium strong thinly laminated dark grey fine grained with visible finely disseminated pyrite.		
02-10 20.60	100 (97) 95	3 0	57.96		20.60		19.80m to 20.00m: medium strong thinly laminated dark grey fine grained with visible finely disseminated pyrite.		
							BH terminated at 20.60m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
02-10-17	19.00	20.60	1.20	123	84		0.50
03-10-17	08.00	20.60	1.20	123	84		4.20

Rotary Flush

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

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC186**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-10-17 04-10-17	77.99	E 701,096.9 N 731,240.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
03-10 0.00	0 (-) -	NA	76.39		(1.60) 1.60	0.00 - 1.60 : overburden.	Open hole drilling - no recovery.		
03-10 2.60	100 (32) 0	NI	75.29		(1.10) 2.70	1.60 - 2.70 Non intact as weathered rock.	Weathered LIMESTONE rock. Recovered as angular coarse gravel and cobble sized clasts of strong grey fine and medium grained limestone.		
03-10 4.10	100 (94) 74	2 6				2.70 - 20.60 Discontinuities, closely spaced, locally medium spaced to 6.50m, then medium spaced, locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 1mm thick grey silt smear. 3.70 - 3.80 Joint, subvertical dip, 'V' shaped, stepped, smooth, with 0.5mm thick orange brown clay smear, open.	Very strong thinly bedded dark blackish grey silty fine grained LIMESTONE thickly interbedded with light grey thinly bedded fine and medium grained limestone with subvertical and vertical milky white calcitic veinlets. 3.60m to 3.68m: medium strong thinly laminated dark grey fissile fine grained.		
03-10 5.60	100 (96) 54	10 5				5.40 - 5.60 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.			
03-10 7.10	100 (94) 81	8 6					6.35m to 6.40m: medium strong thinly laminated dark grey fissile fine grained.		
03-10 8.60	100 (94) 85	2 4				7.75 - 7.85 Joint, dipping 60°, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open.			
03-10 10.10	100 (91) 65	4 4					9.60m to 9.63m: medium strong thinly laminated dark grey fissile fine grained with visible finely disseminated pyrite.		
03-10	100 (95)					10.70 - 11.10 Joint, subvertical dip,			

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

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	20.60	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

irish drilling ltd
old galway road
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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC186**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	03-10-17 04-10-17	77.99	E 701,096.9 N 731,240.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
11.60	62	8			(17.90)	stepped, rough, with 0.5 to 1mm thick grey silt smear, open.	Very strong thinly bedded dark blackish grey silty fine grained LIMESTONE thickly interbedded with light grey thinly bedded fine and medium grained limestone with subvertical and vertical milky white calcitic veinlets. *(continued)*		
03-10 13.10	100 (96) 89	3				12.10 - 12.20 Joint, dipping 60°, stepped, tight.			
03-10 14.60	100 (95) 87	2 5							
03-10 16.10	100 (96) 91	2					14.55m to 14.90m: strong dark grey fine grained.		
03-10 17.60	100 (95) 74	3 5					15.95m to 16.00m: strong dark grey fine grained.		
03-10 19.10	100 (97) 94	1							
03-10 20.60	100 (93) 91	3 1	57.39		20.60		20.20m to 20.25m: strong dark grey fine grained.		
							BH terminated at 20.60m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
03-10-17	19.00	20.60	1.50	123	84		0.60
04-10-17	08.00	20.60	1.50	123	84		4.00

Rotary Flush

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

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC188**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-07-17 07-07-17	39.69	E 584,727.9 N 682,437.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
0.00 0.80	0 (-) -	NA	38.89		(0.80) 0.80	0.00 - 0.80 : overburden.	Open hole drilling - no recovery.		
2.60	100 (89) 49	10 9				0.80 - 10.10 Discontinuities, closely spaced, locally very closely spaced to 6.70m, then medium spaced, locally closely spaced, dipping 14 to 16°, stepped, rough, with 0.5 to 4mm thick light orange brown clay smear and orange orange brown dark orange brown iron stain. 1.30 - 1.50 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick light orange brown clay smear and orange orange brown and dark orange brown iron stain, open. 1.90 - 2.00 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick light orange brown clay smear and orange orange brown and dark orange brown iron stain, open. 4.15 - 4.30 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orange brown clay smear, open.	Very strong apparently massive grey and light grey sparry bioclastic fine and medium grained LIMESTONE with 'anastomosing' milky white calcitic veinlets. 2.38m to 2.52m: strong.		
4.10	100 (91) 45	11							
5.60	100 (96) 62	8 9			(9.30)				
7.10	100 (90) 32	11				5.00 - 5.15 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick light orange brown clay smear, open. 5.70 - 6.60 Joint, vertical dip, stepped, rough, with 0.5 to 3mm thick light orange brown clay smear and orange brown and dark orange brown iron stain and smear, open to moderately wide.			
8.60	100 (97) 55	9 4				7.00 - 7.10 Joint, dipping 60°, stepped, rough, with 0.5 to 3mm thick light orange brown clay smear and orange and dark orange brown iron stain, open to moderately wide. 7.30 - 8.10 Joint, vertical dip, stepped, rough, with 0.5 to 3mm thick light orange brown clay smear and orange brown and dark orange brown iron stain and smear, tight to 7.50m, then open to moderately wide.			
10.10	100 (97) 83	5	29.59		10.10	8.10 - 8.35 Joint, subvertical dip, undulating, tight.			
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC191**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-06-17 21-06-17	68.94	E 587,490.6 N 687,606.3

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
20-06 0.00	0 (-) -	NA			(3.00)	0.00 - 5.60 : overburden.	Open hole drilling - no recovery.		
3.00			65.94		3.00				
20-06 3.50	55 (-) -	(77)					Subrounded to subangular fine to coarse assorted light grey and dark grey limestone GRAVEL with a little grey silt. CPT @ 3.50m: N = 77.		
4.10									
20-06 4.10	90 (-) -	(50/0mm) NA			(2.20)				
			63.74		5.20				
5.60			63.34		5.60		Very stiff orange brown slightly sandy slightly gravelly SILT/CLAY. Sand is fine. gravel is subangular fine of assorted grey limestone.		
20-06 5.60	100 (73) 35	(50/0mm) 4				5.60 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 40mm thick orange brown slightly gravelly clay smear and infill. 5.73 - 6.05 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear and orange and orange brown iron stain, open. 6.32 - 7.00 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orange brown clay smear and minor dark orange brown iron stain, open to moderately wide. 7.34 - 7.46 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open.	Very strong thinly bedded grey silty bioclastic fine and medium grained LIMESTONE. 5.71m to 5.73m: orange brown slightly gravelly orange brown CLAY. Gravel is angular fine of limestone. 6.28m to 6.32m: orange brown slightly gravelly orange brown CLAY. Gravel is angular fine of limestone. 6.61m to 6.68m: orange brown slightly gravelly orange brown CLAY. Gravel is angular fine of limestone. 6.95m to 7.00m: orange brown CLAY. 7.30m to 7.34m: orange brown CLAY. 7.55m to 7.58m: orange brown mottled green CLAY. 8.17m to 8.20m: orange brown CLAY. 8.50m to 8.65m: orange brown CLAY.		
7.10		18							
20-06	100 (59) 45	NI			(3.20)				
8.60		11							
20-06		NI	60.14		8.80				
			59.94		9.00		8.80m to 9.00m: Possible residual rock as orange brown slightly gravelly orange brown clay. Gravel is angular fine of brown limestone.		
10.10	100 (71) 67	2	58.84		(1.10) 10.10		Strong thinly bedded dark orangish		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
20-06-17	17.00	10.10	3.00	146	102		3.00
21-06-17	08.00	10.10	3.00	146	102		3.50

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

3 litres polydrill used.
50mm standpipe installed.
Response zone - 5.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: GBS	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC191**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	20-06-17 21-06-17	68.94	E 587,490.6 N 687,606.3

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
								brown silty bioclastic fine and medium grained LIMESTONE. Very strong thinly bedded grey silty bioclastic fine and medium grained LIMESTONE. BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

3 litres polydrill used.
50mm standpipe installed.
Response zone - 5.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: GBS	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC192**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-06-17 15-06-17	69.22	E 587,788.5 N 687,650.5

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
14-06 0.00	0 (-) -	NA	68.02		(1.20) 1.20	0.00 - 2.10 : overburden.	Open hole drilling - no recovery.		
14-06 2.60	85 (14) 0	NA	67.12		(0.90) 2.10		Subangular medium to coarse grey limestone GRAVEL with some orange brown clay.		
14-06 4.10	100 (43) 10	NI	65.42		(1.70) 3.80	2.10 - 3.80 Non-intact as weathered rock.	Weathered LIMESTONE rock. Recovered as the angular fine to coarse gravel and cobble sized clasts of grey limestone with some orange brown clay and surficial light orange iron stain.		
14-06 5.60	100 (90) 35	6 15 9				3.80 - 10.10 Discontinuities, closely spaced, locally very closely spaced to 4.50m, then medium spaced, locally closely spaced, dipping 10 to 12°, stepped, rough, with 0.5 to 3mm thick light orange brown clay smear. 3.81 - 3.95 Joint, subvertical dip, stepped, smooth, with 0.5 to 5mm thick light orange brown clay smear, open to moderately wide.	Very strong thinly bedded grey silty bioclastic fine and medium grained LIMESTONE.		
14-06 7.10	100 (74) 56	7			(6.30)				
14-06 8.60	100 (78) 35	8 9				7.25 - 7.45 Joint, vertical dip, undulating, tight, open as drilling induced? 8.15 - 8.25 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick grey silt smear, open. 8.60 - 8.80 Joint, subvertical dip, undulating, tight.	8.10m to 8.13m: grey silt.		
14-06 10.10	100 (91) 84	5	59.12		10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
14-06-17	17.00	2.60	1.50	146	102		3.60
15-06-17	08.00	2.60	1.50	146	102		3.90
15-06-17	17.00	10.10	1.50	146	102		3.40

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	3.00	polymer	100
3	10.10	polymer	0

GENERAL REMARKS

3 litres polydrill used.
90mm pipe installed to 2.60m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: GBS	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC196**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-09-17 06-09-17	132.56	E 597,096.7 N 689,964.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA			(1.70)	0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
1.70			130.86		1.70					
2.10	100 (-) -		130.46		2.10			Subangular to subrounded fine to coarse assorted grey limestone GRAVEL with cobbles. Cobbles are of assorted grey limestone.		
3.60	100 (-) -							Light orangish brown slightly sandy gravelly SILT/CLAY with cobbles. Sand is fine and medium. Gravel is subrounded to subangular fine to coarse of assorted grey limestone. Cobbles are of assorted grey limestone.		
3.60	80 (-) -	(25/0mm)			(5.60)					
5.10	100 (-) -	(53) NA						5.10m: very stiff.		
6.60	33 (-) -	(36)						6.60m: very stiff.		
8.10			124.86		7.70					
8.10	100 (-) -	(40/75mm)	124.46		8.10			Light orangish grey mottled orange brown SILT/CLAY.		
9.60	75 (-) -				(1.90)	9.40 - 9.70 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open.		Light creamish white mottled orangish brown slightly sandy gravelly SILT/CLAY. Sand is medium. Gravel is subrounded to subangular fine and medium of orangish brown limestone. 9.50m: light creamish white.		
10.00		(56/150mm)	122.56		10.00	9.40 - 13.10 Discontinuities, closely spaced, locally medium spaced, dipping 12 to 14°, undulating, smooth, with 0.5 to 2mm thick grey		BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC196**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-09-17 06-09-17	132.56	E 597,096.7 N 689,964.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
						silt smear. 9.70 - 10.10 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. Joint, vertical dip, stepped, smooth, with 20mm thick grey gravelly silt/clay smear, wide. Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick grey silt smear, open to moderately wide.			

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

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC197**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-09-17 05-09-17	126.09	E 597,518.3 N 690,043.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
0.00	70 (14) 0	NA	124.69		(1.40) 1.40	0.00 - 1.40 : overburden.	Orange brown slightly sandy gravelly SILT/CLAY. Sand is fine and medium. Gravel is subangular fine to coarse of gey limestone.		
2.00		NI	123.99		(0.70) 2.10	1.40 - 2.10 Non-intact as weathered rock.	Weathered LIMESTONE rock. Recovered as medium to coarse gravel and cobble sized clasts of apparently massive grey and light grey sparry limestone with a little orange brown clay.		
3.60	94 (77) 35	8 6				2.10 - 11.10 Discontinuities, medium spaced, locally closely spaced, dipping 18 to 20°, stepped, rough, with 0.5 to 3mm thick orange brown clay smear and minor orange brown iron stain and powder. 2.70 - 3.15 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear and minor orange brown iron stain, open.	Very strong apparently massive grey and light grey sparry fine and coarse grained LIMESTONE.		
5.10	100 (96) 65	7 5					UCS - 4.00m to 4.30m: strong.		
6.60	100 (92) 38	6 6			(9.00)	4.80 - 5.30 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear, open to 5.20m, then tight. 5.35 - 5.60 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orange brown clay smear and orange brown iron stain, open. 5.80 - 6.15 Joint, subvertical dip, 'V' shaped, stepped, rough, with 0.5 to 1mm thick orange brown clay smear and orange brown and dark orange brown iron stain, open. 6.45 - 6.55 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick light grey silt smear, open.			
8.10	100 (97) 95	2 4							
9.60	100 (97) 81	4 6				9.15 - 9.20 Joint, dipping ~48°, stepped, rough, with 0.5 to 1mm thick light grey silt smear, open. 9.80 - 10.05 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick greyish brown silt/clay smear, open. 10.25 - 10.50 Joint, subvertical dip,			
	100 (95) 49								

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	11.10	polymer	100

GENERAL REMARKS

1 litre polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC197**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-09-17 05-09-17	126.09	E 597,518.3 N 690,043.8

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Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
11.10			114.99		11.10	stepped, rough, with 0.5 to 1mm thick orange brown clay smear and minor orange brown iron stain, open. 10.70 - 10.90 Joint, subvertical dip, stepped, rough, with 0.5mm thick grey silt smear and minor dark orange brown iron stain, open as drilling induced?	BH terminated at 11.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

1 litre polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH WSP GI RCS ALL W LAB JAN 12 2018.GPJ IDL TP TEMPLATE.GDT 20/02/18

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC207**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	67.19	E 661,721.6 N 727,901.1

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
26-10 0.00	0 (-) -	NA	63.19		(4.00) 4.00	0.00 - 10.00 : overburden.		Open hole drilling - no recovery.		
4.00										
26-10	47 (-) -	NA	62.49		(0.70) 4.70			Subrounded to subangular fine to medium brown sandstone and assorted grey limestone GRAVEL. (0.70m recovered).		
5.50								No recovery. Drillers Comment: Sandy clay.		
26-10 5.50	0 (-) -	(25)						CPT @ 5.50m: N = 25.		
7.00										
26-10 7.00	0 (-) -	(34) NR			(5.30)			CPT @ 7.00m: N = 34.		
8.50										
26-10 8.50	0 (-) -	(37)						CPT @ 8.50m: N = 37.		
10.00			57.19		10.00					
10.00		(33)						CPT @ 10.00m: N = 33. BH terminated at 10.00m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
26-10-17	17.25	10.00	4.00	123	84		3.10

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.00	polymer	100

GENERAL REMARKS

1 gallon polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: GF	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC208**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	25-09-17 25-09-17	81.60	E 672,715.5 N 731,330.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 10.10 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(5.60)				
5.60			76.00		5.60				
	100 (-) -						Brownish grey slightly sandy gravelly SILT/CLAY with cobbles and boulders. Sand is fine. Gravel is subangular to subrounded fine to coarse of assorted grey limestone. Cobbles are of light grey limestone.		
7.10									
	67 (-) -	NA			(3.30)		Core run - 7.10m to 8.60m: 1 No strong light grey limestone boulder 240mm in length. 7.36m to 7.52m: strong.		
8.60									
8.60		(50/150mm)	72.70		8.90				
	80 (-) -				(1.20)		Very stiff orange brown SILT/CLAY thickly interlaminated with light grey ~1mm thick silt laminae.		
10.10			71.50		10.10				
10.10		(60/150mm)					BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC219**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	06-10-17 06-10-17	56.37	E 694,226.4 N 730,578.6

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
06-10 0.00						0.00 - 10.10 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(7.10)					
7.10			49.27		7.10					
06-10			49.17		7.20			Subrounded to subangular medium and coarse brown sandstone and assorted grey limestone GRAVEL.		
	100 (-) -		48.67		7.70			Very stiff dark greyish brown SILT/CLAY.		
8.60								Subangular to subrounded fine to coarse reddish brown and brown sandstone and assorted grey limestone GRAVEL with a little dark brown silt/clay.		
06-10 8.60		(66/225mm)			(2.40)					
	53 (-) -									
10.10 10.00		(57/75mm)	46.27		10.10			BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
06-10-17	17.00	10.10	7.50	123	84		0.80

Rotary Flush			
From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC223**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	09-10-17 09-10-17	58.03	E 693,719.0 N 731,109.4

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
0.00						0.00 - 2.00 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(2.00)				
2.00			56.03		2.00				
2.60	100 (28) 25					2.00 - 10.10 Discontinuities, very closely spaced, locally closely spaced to 7.20m, then locally medium spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 3mm thick dark grey silt smear.	Very strong thinly interlaminated grey light grey and dark grey slightly bioclastic fine and medium grained LIMESTONE with subvertical and vertical milky white calcitic veinlets and visible finely disseminated pyrite. 2.15m to 2.60m: medium strong thinly laminated dark grey fissile fine grained.		
4.10	100 (41) 9								
5.60	100 (60) 0	NI					5.00m to 5.10m: medium strong thinly laminated dark grey fissile fine grained.		
7.10	100 (63) 9				(8.10)		6.36m to 6.40m: medium strong thinly laminated dark grey fissile fine grained.		
8.60	100 (89) 23					8.15 - 8.40 Joint, subvertical dip to 8.25m, then vertical, planar, stepped, rough, with 0.5 to 2mm thick grey silt smear, open.	7.70m to 7.78m: medium strong thinly laminated dark grey fissile fine grained.		
		26							
10.10	100 (95) 52	18	47.93		10.10		9.45m to 9.50m: medium strong thinly laminated dark grey fissile fine grained.		
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

1.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC224**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-07-17 28-07-17	73.24	E 644,979.0 N 721,960.9

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Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
27-07 0.00						0.00 - 7.90 : overburden.		Open hole drilling - no recovery.		
7.00	0 (-) -	NA	66.24		(7.00) 7.00					
27-07	100 (43) 24	NA	65.34		(0.90) 7.90			Assorted grey limestone COBBLES with some orange brown slightly sand silt/clay.		
8.60		9				7.90 - 10.10 Discontinuities, closely spaced, locally very closely spaced, dipping 20 to 22°, planar, smooth, with 0.5 to 3mm thick dark grey silt smear.		Strong thinly bedded grey fine and medium grained LIMESTONE with a little finely disseminated pyrite.		
27-07	100 (64) 15	20			(2.20)	7.95 - 8.15 Joint, subvertical dip, stepped, rough, with 0.5 to 3mm thick orange brown clay smear, open to moderately wide.		8.40m to 8.55m: very strong.		
10.10			63.14		10.10	8.60 - 9.15 Joint, subvertical dip, planar, smooth, with 0.5 to 2mm thick dark grey silt smear, open.		9.30m to 9.33m: weak fissile black silty fine grained as probable residual rock.		
						9.35 - 9.55 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick orange brown clay smear and		9.50m to 9.55m: medium strong fissile black silty fine grained.		
								BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
27-07-17	19.00	7.00	4.00	123	84		0.30
28-07-17	08.00	7.00	4.00	123	84		0.70

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	5.00	polymer	100
5	10.10	polymer	0

GENERAL REMARKS

2.5 litres polydrill used.
50mm standpipe installed.
Response zone - 6.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC224**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	27-07-17 28-07-17	73.24	E 644,979.0 N 721,960.9

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
						minor orange and orange brown iron stain, open. 9.70 - 10.05 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.			

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

2.5 litres polydrill used.
50mm standpipe installed.
Response zone - 6.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC225**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	01-08-17 01-08-17	78.92	E 645,271.3 N 721,997.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 9.70 : overburden.	Open hole drilling - no recovery.		
	0 (-) -	NA			(7.50)				
7.50			71.42		7.50				
	73 (-) -						Grey slightly sandy gravelly SILT/CLAY. Sand is fine and medium. Gravel is subangular to subrounded fine to coarse of assorted light grey and dark grey limestone.		
8.60							8.60m: hard.		
8.60	87 (15) 0	(NA)			(2.20)				
			69.22		9.70				
10.10		15	68.82		10.10	9.70 - 10.10 Discontinuities, very closely spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 2mm thick grey silt smear. 9.71 - 10.10 Joint, subvertical dip, planar, smooth, with 0.5 to 3mm	Strong thinly laminated grey fine and medium grained LIMESTONE. BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2.5 litres polydrill used.
50mm standpipe installed.
Response zone - 6.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC225**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	01-08-17 01-08-17	78.92	E 645,271.3 N 721,997.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
						thick grey silt smear, open to moderately wide.			

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

2.5 litres polydrill used.
50mm standpipe installed.
Response zone - 6.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC226**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-10-17 05-10-17	55.26	E 696,359.0 N 729,865.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 2	PRELIM

RUN DETAILS						STRATA			
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities Detail	Main	Geology	Instrument/ Backfill
04-10 0.00	0 (-) -	NA			(1.50)	0.00 - 1.60 : overburden.	Open hole drilling - no recovery.		
1.50			53.76		1.50				
04-10	100 (57) 16	NA 3	53.66		1.60	1.60 - 10.10 Discontinuities, closely spaced, locally very closely spaced to 3.20m, then medium spaced locally closely spaced, dipping 12 to 14°, stepped, smooth, with 0.5 to 1mm thick grey silt smear. 1.75 - 2.50 Joint, subvertical dip, planar, locally stepped, rough, with 0.5 to 6mm thick grey silt smear, open to moderately wide. 2.90 - 3.60 Joint, subvertical dip, planar, smooth, with 0.5 to 6mm thick grey silt smear, open to moderately wide. 4.00 - 4.50 Joint, subvertical dip, stepped, locally planar, smooth, with 0.5 to 2mm thick grey silt smear, open. 5.30 - 5.70 Joint, subvertical dip, stepped, locally planar, smooth, with 0.5 to 2mm thick grey silt smear, open.	Subrounded to subangular fine to coarse assorted grey limestone with a little greenish brown silt/clay. Very strong thinly bedded grey sparry fine and medium grained LIMESTONE thickly interbedded with thinly bedded dark grey fine grained limestone. 1.90m to 2.07m: grey silt. 2.05m to 2.55m: medium strong thinly laminated dark grey fine grained. 4.60m to 4.80m: medium strong thinly laminated dark grey fine grained. 5.90m to 5.99m: grey silt. 5.99m to 6.05m: medium strong thinly laminated dark grey fissile fine grained with visible finely disseminated pyrite. 6.10m to 6.25m: medium strong thinly laminated dark grey fissile fine grained with visible finely disseminated pyrite.		
2.60		28							
04-10 4.10	100 (63) 22	26							
04-10 5.60	100 (78) 40	16 12							
04-10 7.10	100 (94) 62	9			(8.50)				
04-10 8.60	100 (94) 61	6 8				8.15 - 8.30 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open.	8.05m to 8.15m: medium strong thinly laminated dark grey fissile fine grained with visible finely disseminated pyrite. 8.30m to 8.35m: medium strong thinly laminated dark grey fissile fine grained with visible finely disseminated pyrite.		
04-10 10.10	100 (89) 61	9	45.16		10.10	9.15 - 9.45 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick grey silt smear, open. 9.25 - 9.35 Joint, dipping 60°, stepped, smooth, with 0.5 to 1mm thick grey silt smear, open. 9.60 - 9.80 2 No perpendicular joints, subvertical dip, stepped, smooth, with 0.5 to 2mm thick greenish grey	BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
04-10-17	18.00	8.60	1.50	123	84		0.40
05-10-17	08.00	10.10	1.50	123	84		1.00

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

1.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC226**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	04-10-17 05-10-17	55.26	E 696,359.0 N 729,865.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	2 of 2	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
						silt smear, open.			

Drilling Progress and Water Observations

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

Rotary Flush

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

GENERAL REMARKS

1.5 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC227**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	05-10-17 05-10-17	55.69	E 696,376.0 N 729,841.8

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities / Detail	DESCRIPTION: Main	Geology	Instrument/ Backfill
05-10 0.00	0 (-) -	NA			(1.80)	0.00 - 1.90 : overburden.	Open hole drilling - no recovery.		
1.80			53.89		1.80				
05-10	100 (68) 33	NA	53.79		1.90	1.90 - 10.10 Discontinuities, medium spaced, locally closely spaced, dipping 14 to 16°, stepped, smooth, with 0.5 to 9mm thick grey silt smear. 1.95 - 2.55 Joint, subvertical dip, planar, locally stepped, rough, with 0.5 to 1mm thick grey silt smear, open to 2.35m, then tight with 2mm thick milky white calcitic veinlet. 2.65 - 3.55 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open. 4.45 - 6.15 Joint, subvertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear, open.	CONCRETE. Very strong thinly bedded grey sparry fine and medium grained LIMESTONE thickly interbedded with thinly bedded dark grey slightly bioclastic fine grained limestone with a little finely disseminated pyrite. 2.60m to 2.65m: grey silt.		
2.60		15							
05-10	100 (73) 15	26							
4.10									
05-10	100 (65) 17	16							
5.60		12					5.60m to 5.65m: grey silt.		
05-10	100 (81) 41	9			(8.20)				
7.10						6.90 - 7.10 Joint, subvertical dip, stepped, smooth, with 0.5 to 3mm thick grey silt smear, open to moderately wide. 7.45 - 7.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 50mm thick grey silt smear, open to very wide.	7.00m to 7.10m: medium strong thinly laminated dark grey fissile fine grained.		
05-10	100 (92) 48	10							
8.60		9							
05-10	100 (91) 76	3					8.95m to 9.00m: medium strong thinly laminated dark grey fissile fine grained.		
10.10			45.59		10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
05-10-17	13.00	10.10	1.80	123	84		1.00

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC229**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	28-09-17 28-09-17	62.79	E 698,862.8 N 730,812.2

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities / Detail	Main	Geology	Instrument/ Backfill
0.00	0 (-) -	NA	60.79		(2.00)	0.00 - 2.20 : overburden.	Open hole drilling - no recovery.		
2.00			60.59		2.20				
2.60	100 (38) 17	NA 16				2.20 - 10.10 Discontinuities, extremely closely spaced, locally closely spaced to 4.10m then closely spaced, locally medium spaced, dipping 18 to 20°, planar, locally stepped, smooth, with 0.5 to 2mm thick black silt smear.	Subangular fine to medium assorted dark grey limestone GRAVEL with a little dark grey silt. Strong thinly bedded dark blackish grey silty fine grained LIMESTONE with visible finely disseminated and cubic pyrite. 3.20m to 3.30m: subvertical 'V' shaped 30mm wide milky white calcitic vein. 3.70m to 3.78m: medium strong fissile.		
4.10	100 (67) 9	25							
5.60	100 (27) 27	18 11				4.40 - 4.55 Joint, subvertical dip, planar, smooth, with 0.5 to 1mm thick black silt smear, open.			
7.10	100 (31) 31	14			(7.90)		6.10m to 6.45m: medium strong thinly laminated. 6.20m to 6.30m: thinly interlaminated with milky white calcite.		
8.60	100 (30) 30	18 9				7.20 - 7.30 Joint, dipping 60°, planar, smooth, with 0.5 to 1mm thick black silt smear, open.	7.15m to 7.30m: subvertical 5 to 10mm wide milky white calcitic vein. 7.35m to 7.45m: subvertical 40mm wide milky white calcitic vein. UCS - 8.23m to 8.47m: strong.		
10.10	100 (65) 65	9	52.69		10.10				
							BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	10.10	polymer	100

GENERAL REMARKS

2 litres polydrill used.
BH backfilled.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit: PQ Design	Driller: AS	Logged By: EAT

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DRILLHOLE LOG

Project	Location	DRILLHOLE No
WSP Eastern and Midlands	Co Tipperary	**RC231**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	31-07-17 31-07-17	71.07	E 645,007.5 N 721,973.0

Engineer	Sheet	Rev.
Jacobs Tobin JV	1 of 1	PRELIM

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
0.00						0.00 - 7.60 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(7.50)					
7.00										
		NA	63.57		7.50					
	100 (61) 16	2	63.47		7.60	7.60 - 10.10 Discontinuities, closely spaced, locally very closely spaced to 10.00m, them medium spaced, locally closely spaced, dipping 12 to 14°, planar, smooth, with 0.5 to 5mm thick grey silt smear.		Subrounded to subangular fine and medium assorted light grey and dark grey limestone GRAVEL with a little grey sandy silt. Sand is fine and medium.		
8.60		18			(2.50)			Strong thinly interbedded grey and dark grey fine and medium grained LIMESTONE with subangular dark grey medium and coarse gravel sized siltstone inclusions. UCS - 9.00m to 9.30m: very strong.		
	100 (89) 44	9								
10.10			60.97		10.10					
								BH terminated at 10.10m bgl on REs instruction.		

Drilling Progress and Water Observations

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

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	4.00	polymer	100
4	10.10	polymer	0

GENERAL REMARKS

2.5 litres polydrill used.
50mm standpipe installed.
Response zone - 6.50m to 10.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: Hydreq	Bit Design: PQ	Driller: AS	Logged By: EAT

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-041**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	77.59	E 651,806.2 N 727,597.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 1 1 2 4 3 5 5 4 5 6 6 8 8 8	5 10 15 20 25 30		
2	9 15 10 20 15 22 25			Refusal. 25 blows for 0mm.
3				
4				
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 2.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

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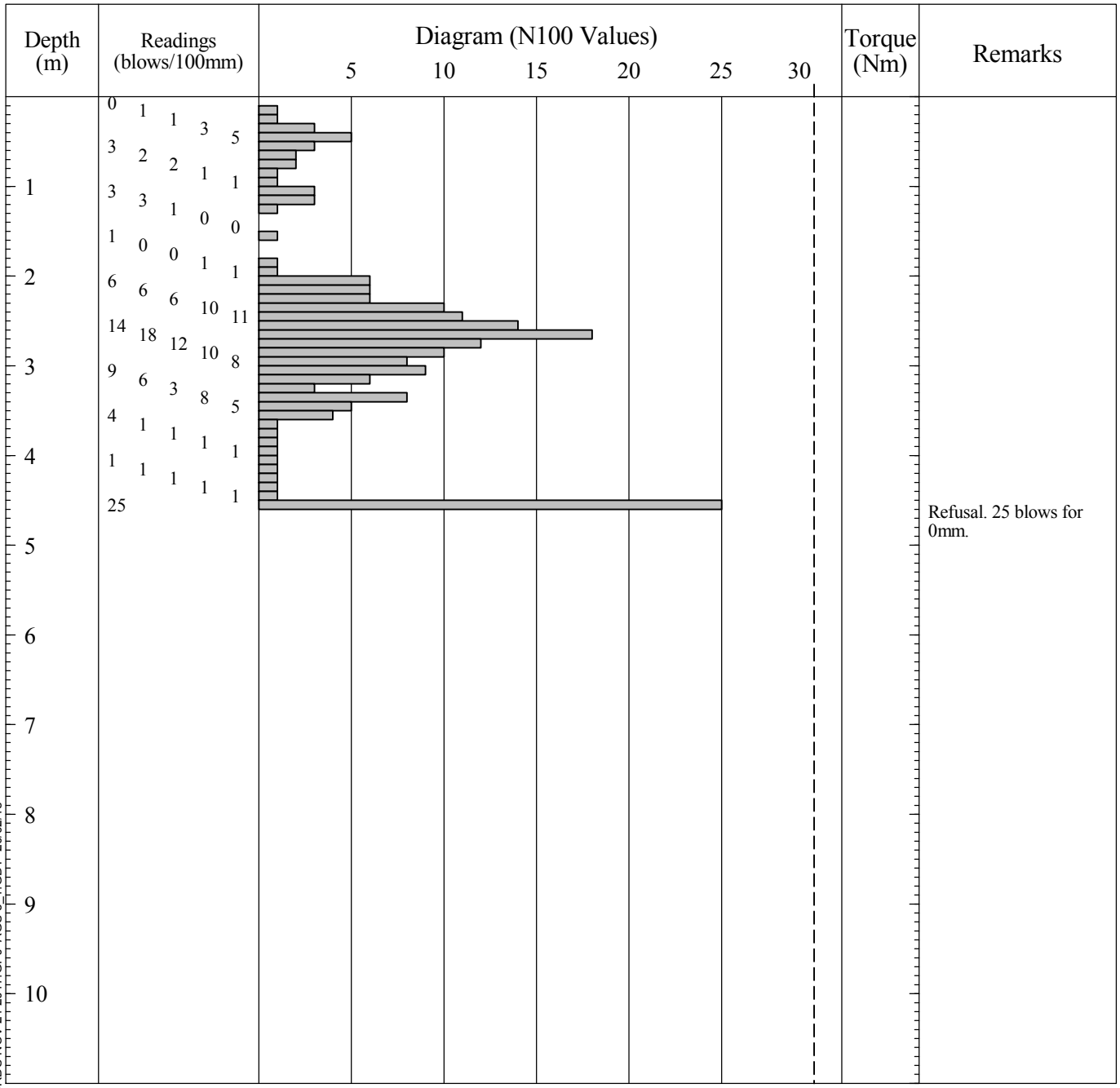
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-078**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-10-17 23-10-17	86.84	E 600,644.3 N 690,650.1

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.50m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

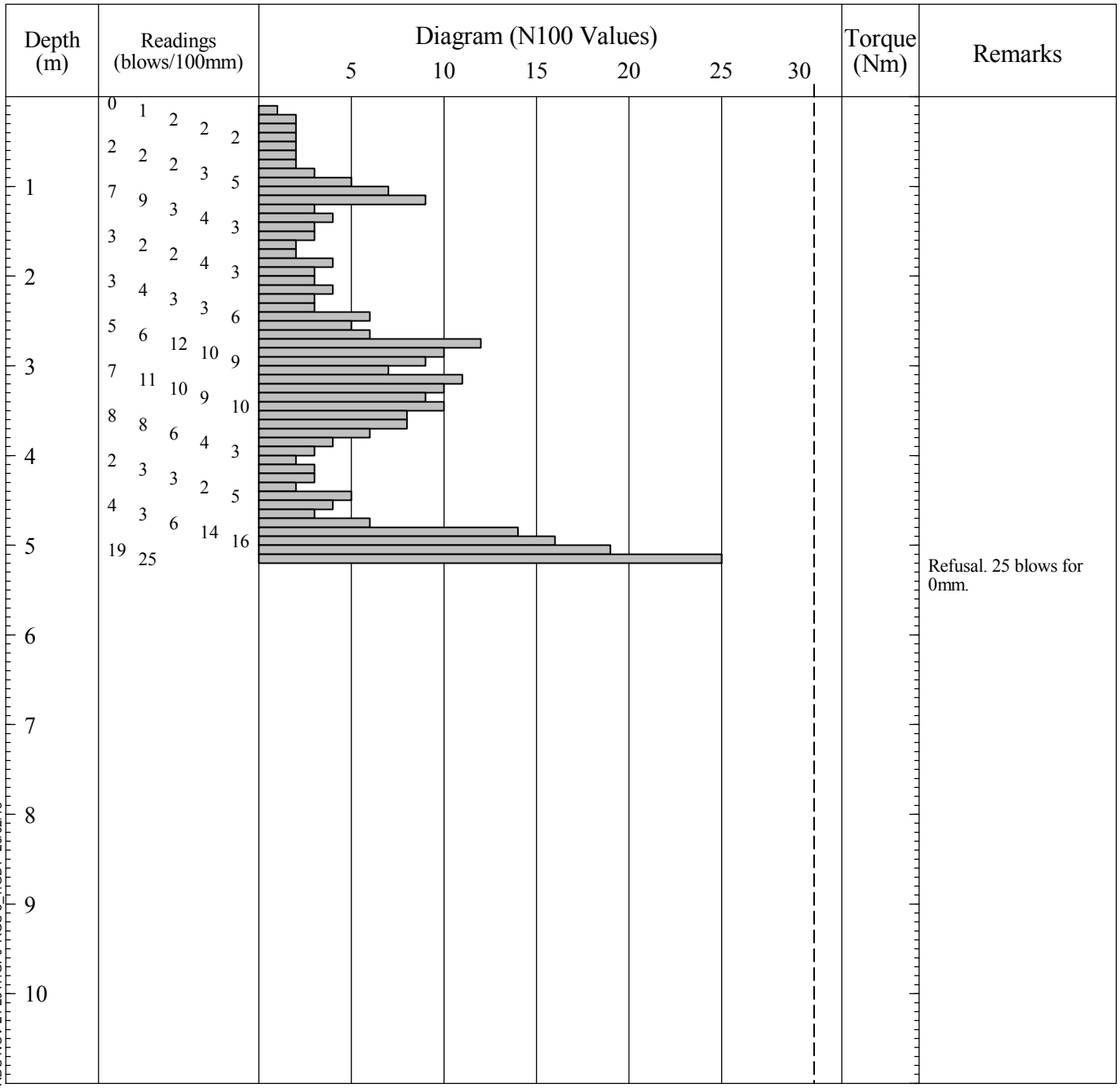
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-094**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-10-17 23-10-17	78.43	E 611,840.2 N 703,048.9

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 5.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

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DYNAMIC PROBE LOG

Project: WSP Eastern and Midlands		Location: Co Tipperary	PROBE No: **DP-108**
Job No: 2017T101	Date: 02-11-17 02-11-17	Ground Level (m OD): 89.03	Co-Ordinates (): E 624,701.5 N 714,133.5
Engineer: Jacobs Tobin JV			Sheet: Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 1 1 2 1 / 1 1 1 4 8 / 8 9 8 7 25	5 10 15 20 25 30		Refusal. 25 blows for 0mm.

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.40m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

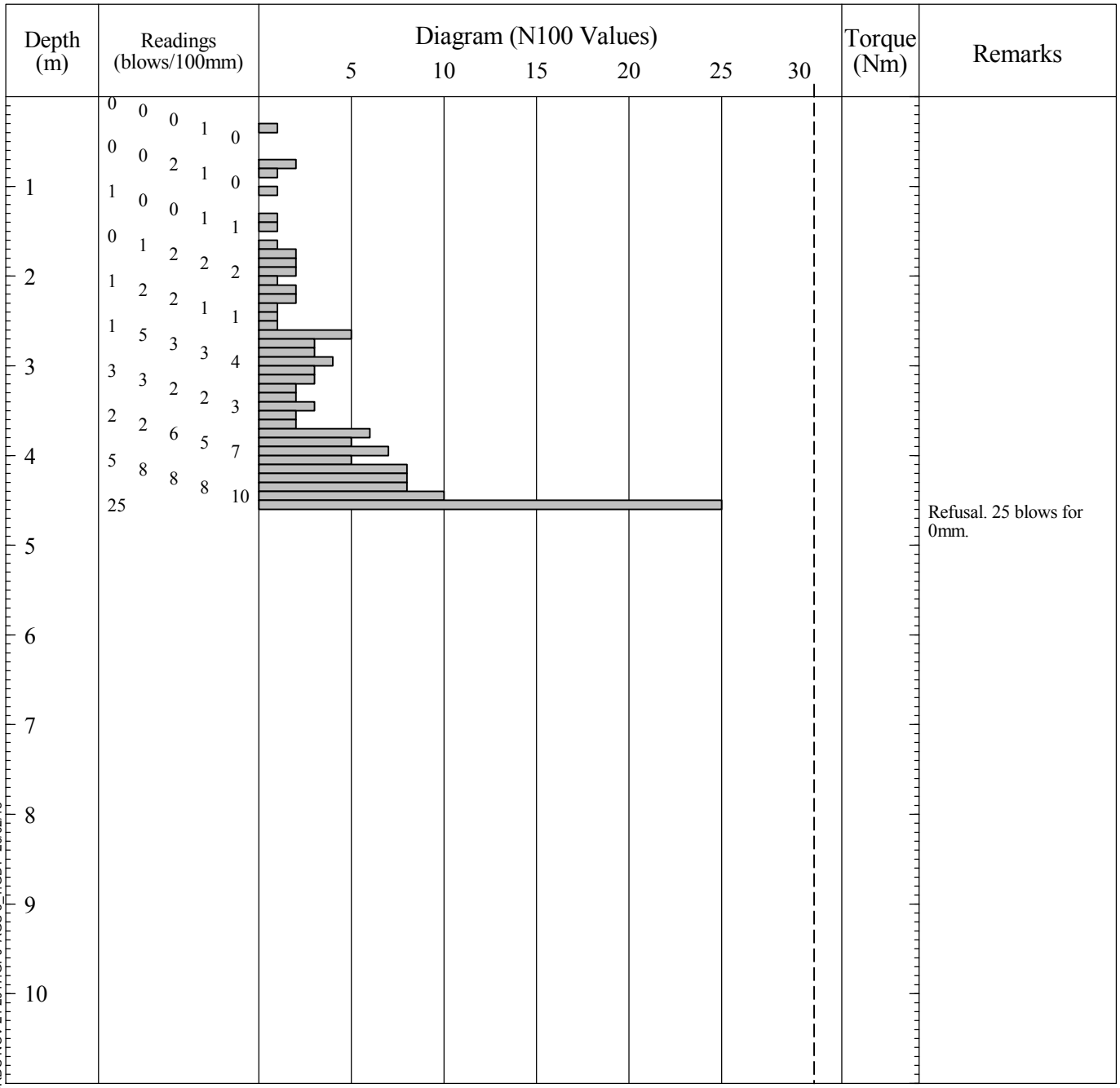
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-109**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-11-17 02-11-17	90.77	E 625,134.1 N 715,137.1

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.50m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

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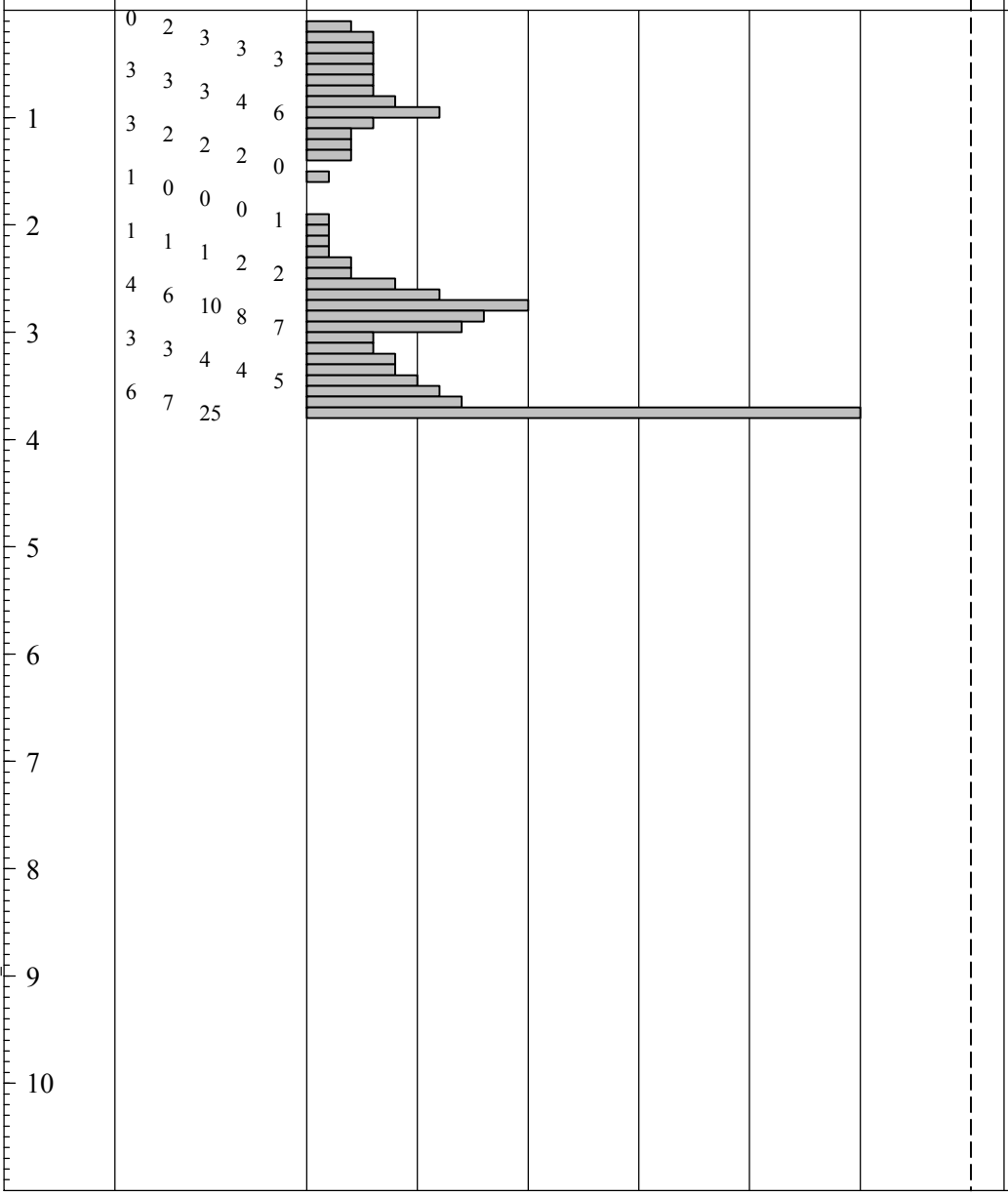
DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-112**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-11-17 02-11-17	98.18	E 628,437.4 N 715,724.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	2 3 3 3			
1	3 3 3 4 6			
2	3 2 2 2 0			
3	1 0 0 0 1			
4	1 1 1 2 2			
5	4 6 10 8 7			
6	3 3 4 4 5			
7	6 7 25			Refusal. 25 blows for 0mm.
8				
9				
10				



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.70m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-113**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-11-17 02-11-17	97.35	E 629,293.9 N 715,888.4

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	1 1 1 1 1	5 10 15 20 25 30		
1	2 2 2 2 1			
2	1 1 1 2 2			
3	1 1 1 2 1			
4	2 1 1 1 1			Refusal. 25 blows for 0mm.
5	2 1 1 2 2			
6	2 4 6 5 25			
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.40m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used DPH Rig	Bit Design	Driller GF	Logged By GF

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-114**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-11-17 02-11-17	92.99	E 630,332.3 N 715,558.7

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	0 0 0 0 1	5 10 15 20 25 30		
1	0 0 1 1 1			
2	1 2 1 1 2			
3	1 1 2 1 1			Refusal. 25 blows for 0mm.
4	2 4 5 5 25			
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 2.40m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-115**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-11-17 02-11-17	89.78	E 630,835.1 N 715,561.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 1 1 1 1 4 5 4 3 1 1 0 0 1 7 25	5 10 15 20 25 30		Refusal. 25 blows for 0mm.
2				
3				
4				
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.50m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-116**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	02-11-17 02-11-17	86.99	E 632,287.4 N 715,915.7

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 2 2 3 1 1 2 2 1 1 1 2 2 3 6 9 25	5 10 15 20 25 30		Refusal. 25 blows for 0mm.
2				
3				
4				
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.60m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used DPH Rig	Bit Design	Driller GF	Logged By GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

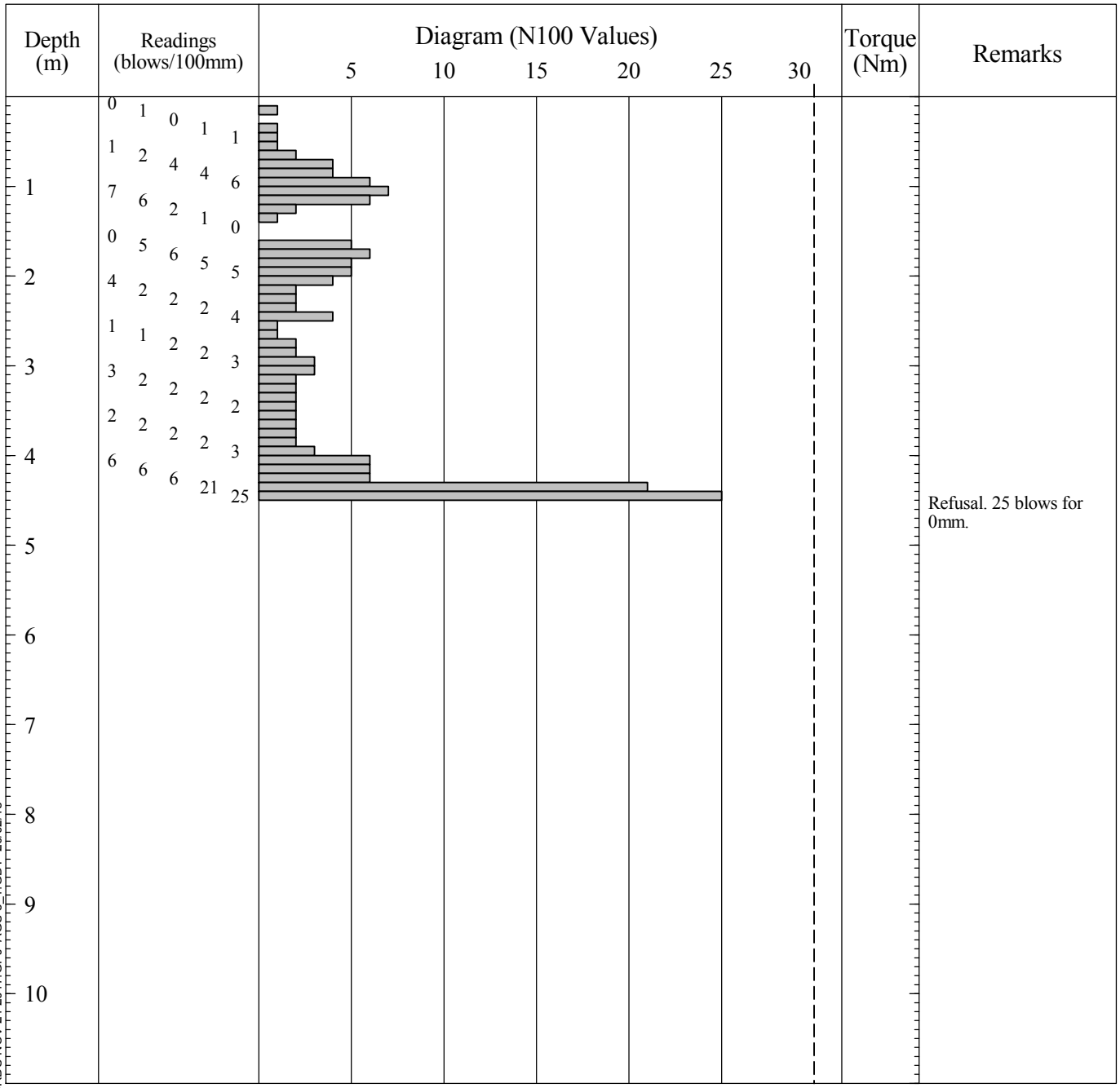
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-125**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	80.11	E 646,001.5 N 722,375.1

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.40m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-126**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	89.45	E 647,146.8 N 723,146.9

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	1 1 2 3			
1	4 4 4 6 5			
2	2 1 2 1 1			
3	2 1 2 2 1			
4	2 3 3 4 3			
5	4 4 5 4 5			
6	5 5 4 5 5			
7	6 5 6 5 6			
8	6 5 4 6 8			
9	8 10 16 16 21			Refusal. 25 blows for 0mm.
10	25			

Diagram (N100 Values): 5 10 15 20 25 30

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 5.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-127**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-11-17 13-11-17	81.62	E 647,917.4 N 724,433.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 1 1 1 1 1 0 0 0 0 0 0 0 0 0	5 10 15 20 25 30		
2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
4	1 0 1 1 1 1 2 2 2 3			
5	3 2 2 2 2 2 3 2 2 3			
6	4 3 4 4 5 4 3 4 25			Refusal. 25 blows for 0mm.
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 6.80m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-132**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-11-17 10-11-17	72.97	E 654,976.6 N 727,969.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 10 15 20 25 30		
2	0 1 1 1 1 1 1 1 1 1			
3	1 11 1 1 1			
4	1 1 2 5 3 5 7 10 25			Refusal. 25 blows for 0mm.
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.30m bgl.

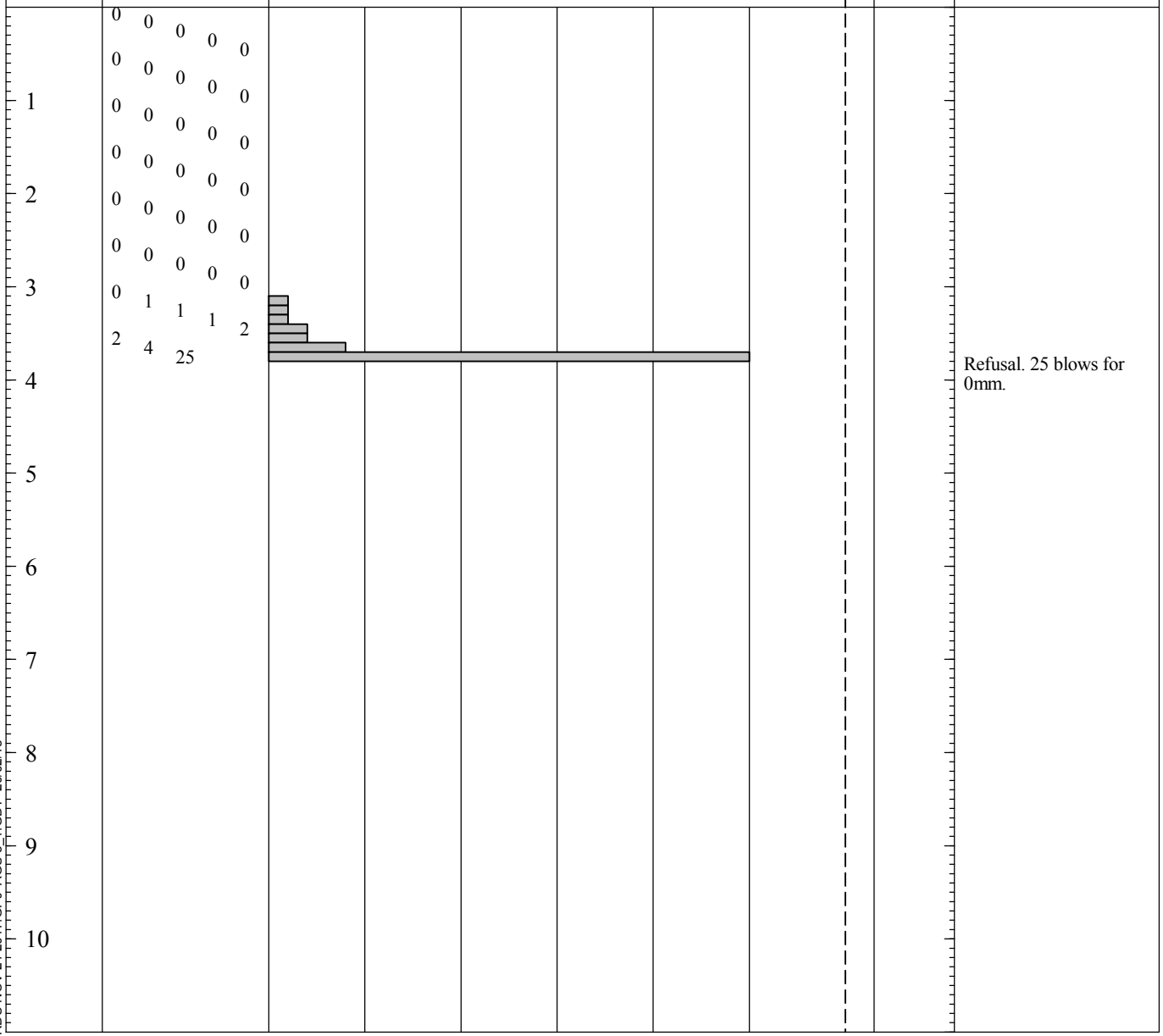
All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

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DYNAMIC PROBE LOG

Project: WSP Eastern and Midlands		Location: Co Tipperary	PROBE No: **DP-133**
Job No: 2017T101	Date: 10-11-17 / 10-11-17	Ground Level (m OD): 71.53	Co-Ordinates (): E 654,161.1 N 727,898.6
Engineer: Jacobs Tobin JV			Sheet: Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.70m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

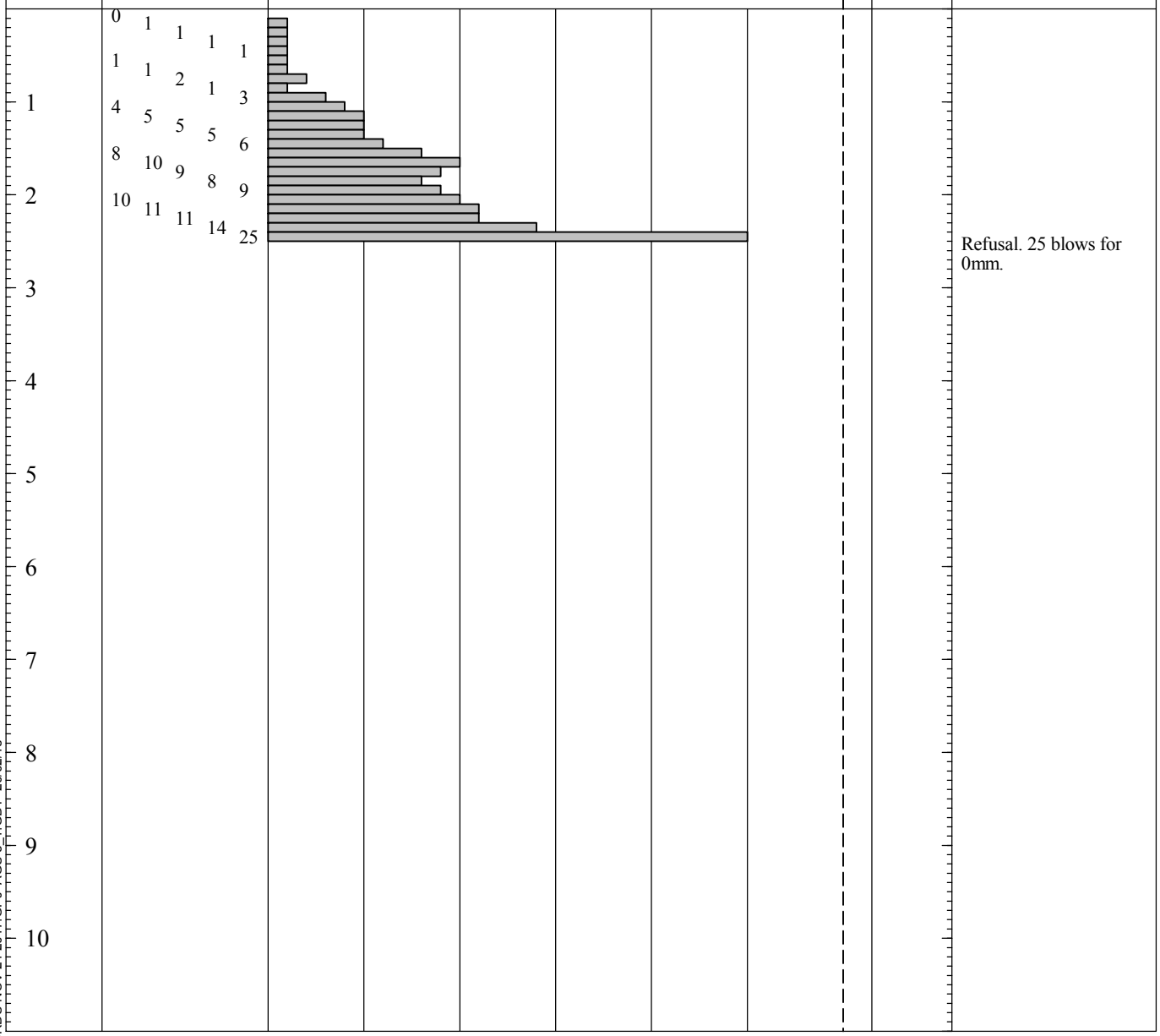
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-134**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-11-17 13-11-17	74.30	E 657,069.0 N 728,276.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 2.40m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-135**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	76.92	E 657,640.0 N 728,470.3

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	1 4 5 5	5 10 15 20 25 30		
1	9 12 10 11 10			
2	10 6 9 13 13			Refusal. 25 blows for 0mm.
3	19 25			
4				
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.60m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

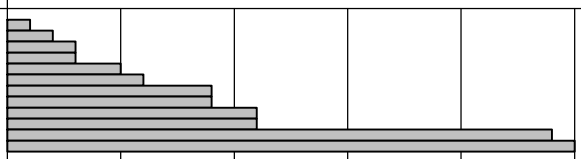
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-136**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	78.27	E 658,756.9 N 728,416.4

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 1 2 3 3 5 6 9 9 11 11 24 25			Refusal. 25 blows for 0mm.

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

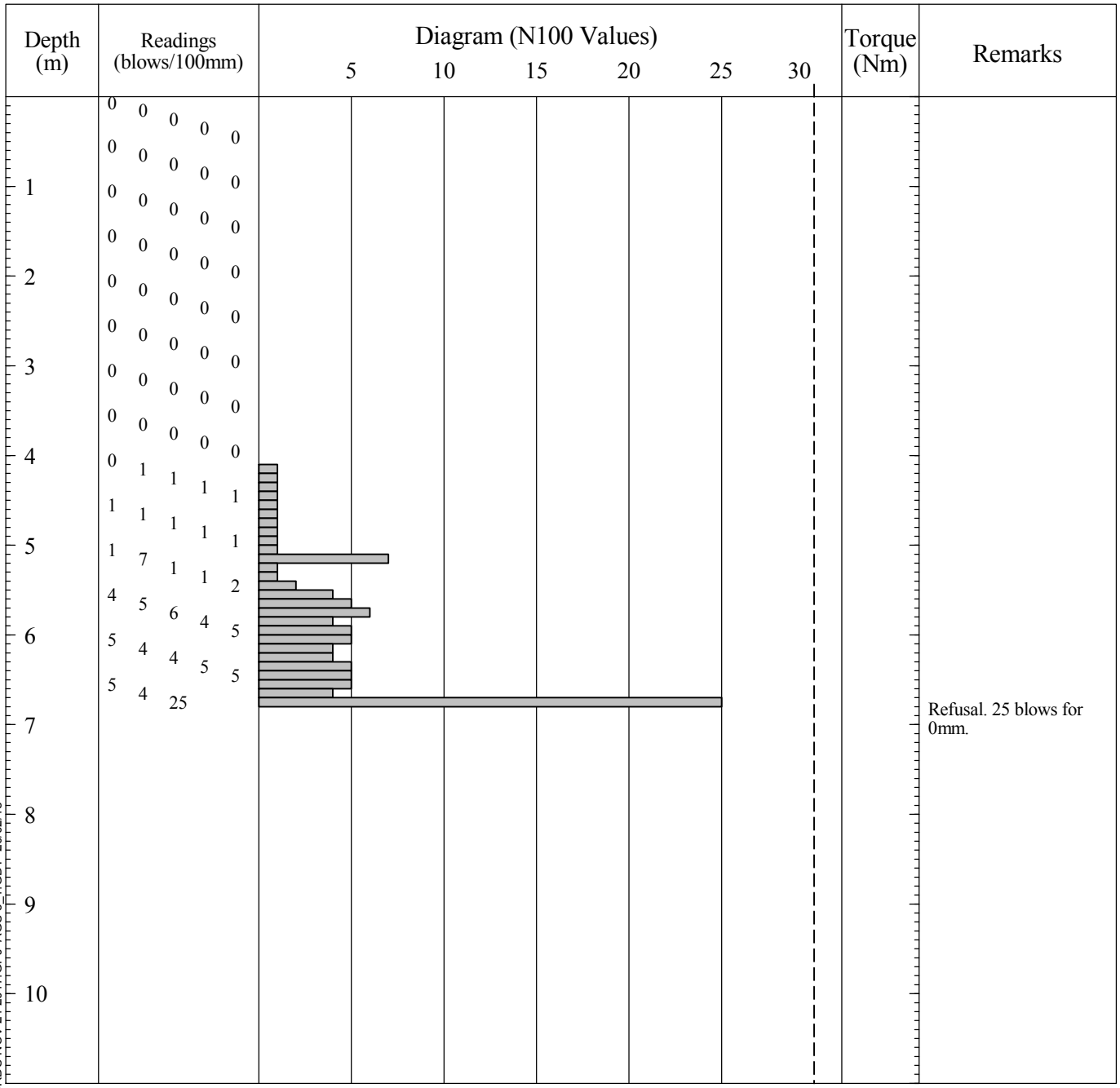
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-137**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	13-11-17 13-11-17	69.60	E 660,453.2 N 728,003.7

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 6.70m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

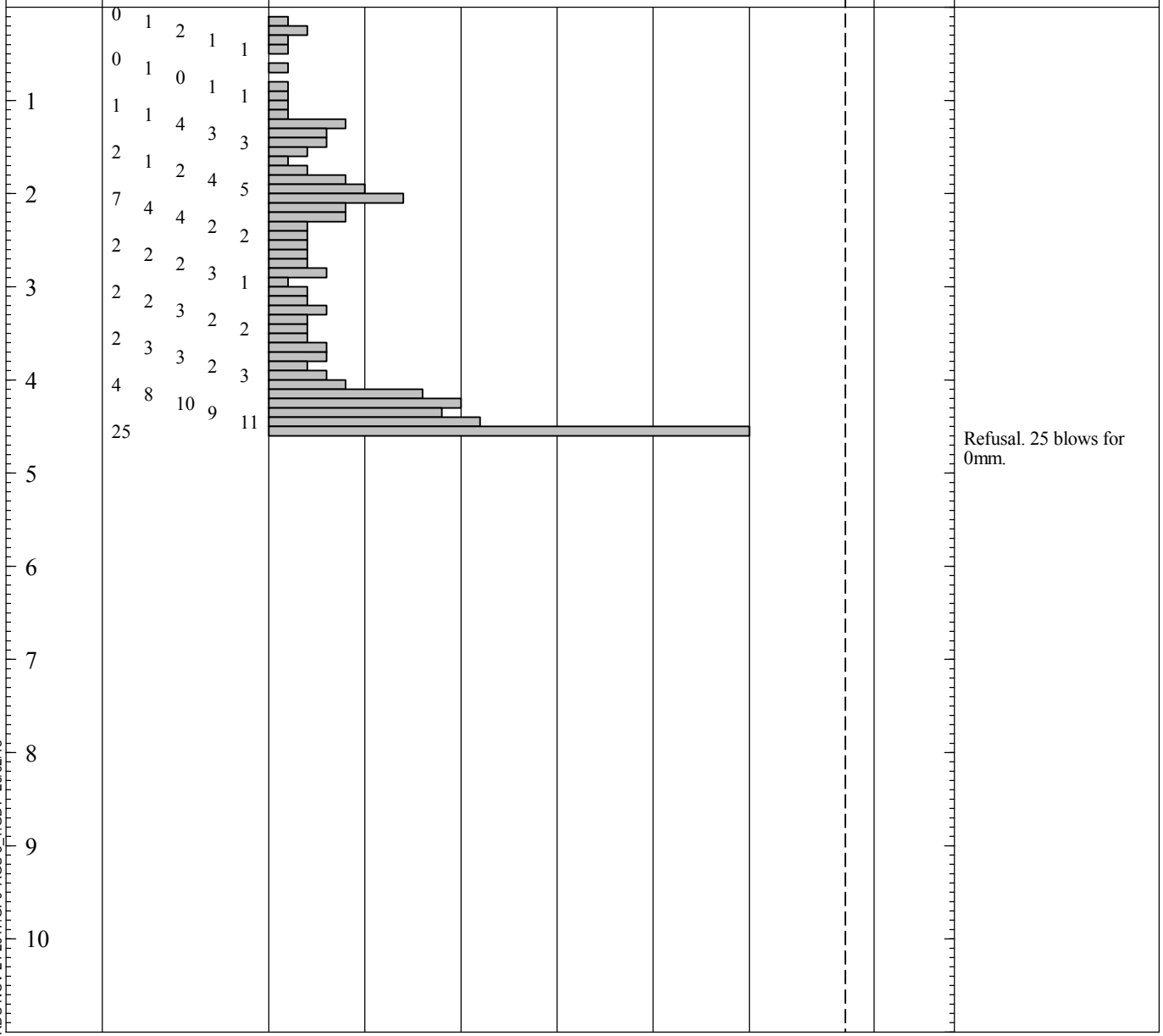
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-139**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	69.56	E 665,063.0 N 726,318.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.50m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project: WSP Eastern and Midlands		Location: Co Tipperary	PROBE No: **DP-141**
Job No: 2017T101	Date: 14-11-17 / 14-11-17	Ground Level (m OD): 72.83	Co-Ordinates (): E 667,299.1 N 726,950.3
Engineer: Jacobs Tobin JV			Sheet: Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 0 0 0 0			
	0 0 0 0 0			
	0 0 0 0 0			
	0 0 0 0 0			
2	0 0 0 0 0			
	0 0 1 1 1			
3	1 2 1 1 1			
	5 3 1 1 1			
4	1 3 2 2 2			
	2 2 3 6 8			
5	13 8 6 7 6			
	8 7 25			Refusal. 25 blows for 0mm.
6				
7				
8				
9				
10				

Diagram (N100 Values) axis: 5, 10, 15, 20, 25, 30

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 5.70m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-142**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-11-17 14-11-17	74.10	E 667,972.4 N 727,514.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 10 15 20 25 30		
2	0 1 0 1 1 1 1 1 3 4			
3	4 4 3 3 3 3 3 3 2 1			
4	1 2 2 3 25			Refusal. 25 blows for 0mm.
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.90m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

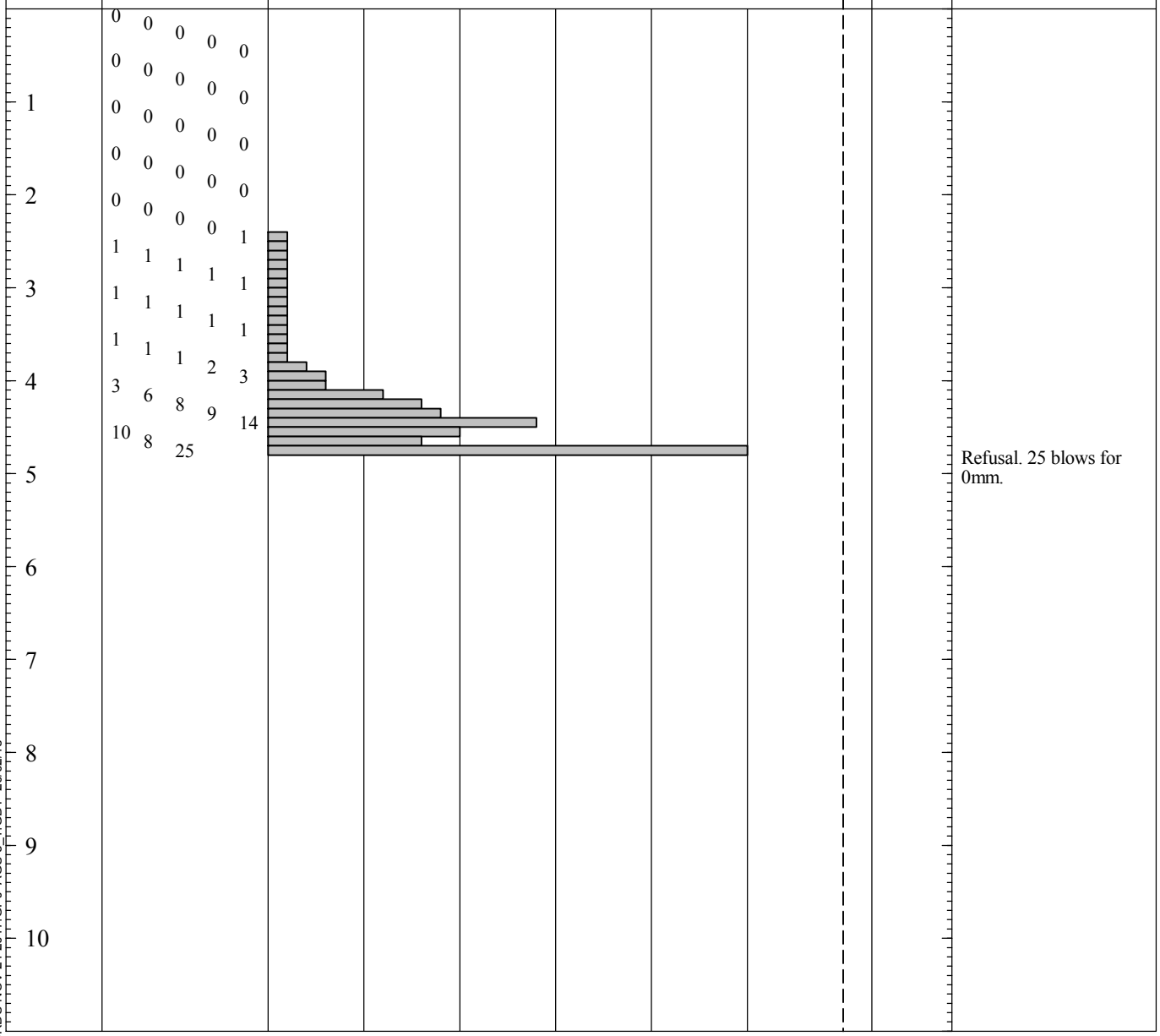
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old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-143**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-11-17 14-11-17	73.45	E 668,770.5 N 728,208.6

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.70m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

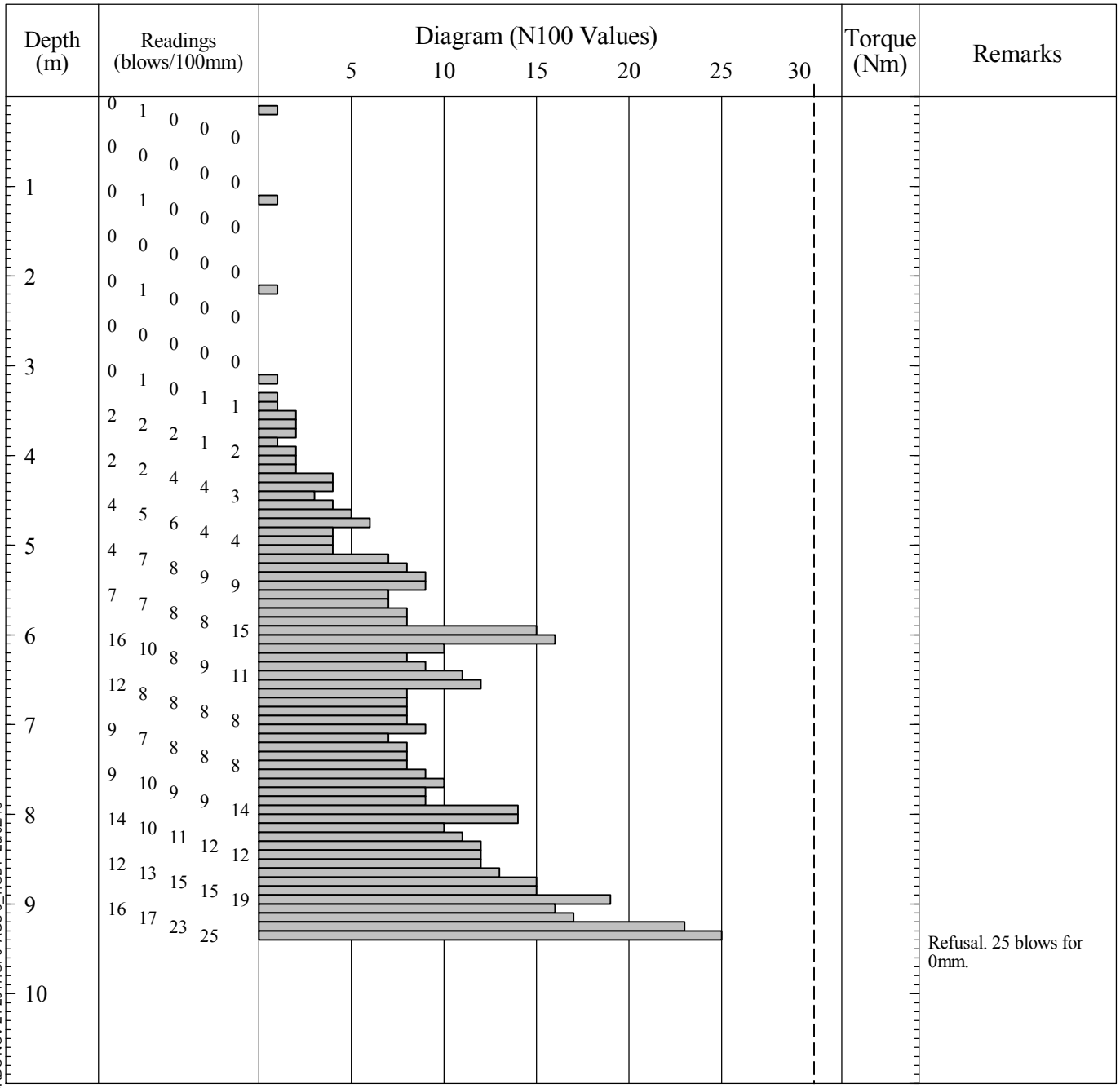
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-150**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	87.37	E 674,983.1 N 733,020.6

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 9.30m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-151**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	80.88	E 676,159.3 N 733,261.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	4 7 9 8	5 10 15 20 25 30		
1	5 2 3 3 2			
2	2 2 1 2 2			
3	3 2 2 2 3			
4	2 2 3 1 2			
5	2 2 3 2 3			
6	3 2 2 2 2			
7	2 2 3 2 2			
8	3 1 2 1 2			
9	3 2 2 2 3			
10	2 3 3 4 5			
	6 6 6 5 7			
	6 5 4 4 5			
	6 6 5 6 15			Refusal. 25 blows for 0mm.
	15 18 22 25			

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 7.30m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used DPH Rig	Bit Design	Driller BT	Logged By BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-152**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	78.93	E 677,106.3 N 733,512.1

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	2 2 3 4	5 10 15 20 25 30		
1	5 5 4 4 4			
2	4 4 5 5 4			
3	6 5 5 6 6			
4	6 4 4 4 5			
5	4 6 7 7 6			
6	5 24 25			Refusal. 25 blows for 0mm.
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-153**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	76.61	E 677,818.3 N 733,744.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 2 1 1 0 1 0 1 4 5 10 25	5 10 15 20 25 30		Refusal. 25 blows for 0mm.

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.10m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-153A**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	76.61	E 677,821.4 N 733,746.6

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
1	0 2 2 1 1 0 1 0 1 3 6 17 25	5 10 15 20 25 30		Refusal. 25 blows for 0mm.

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

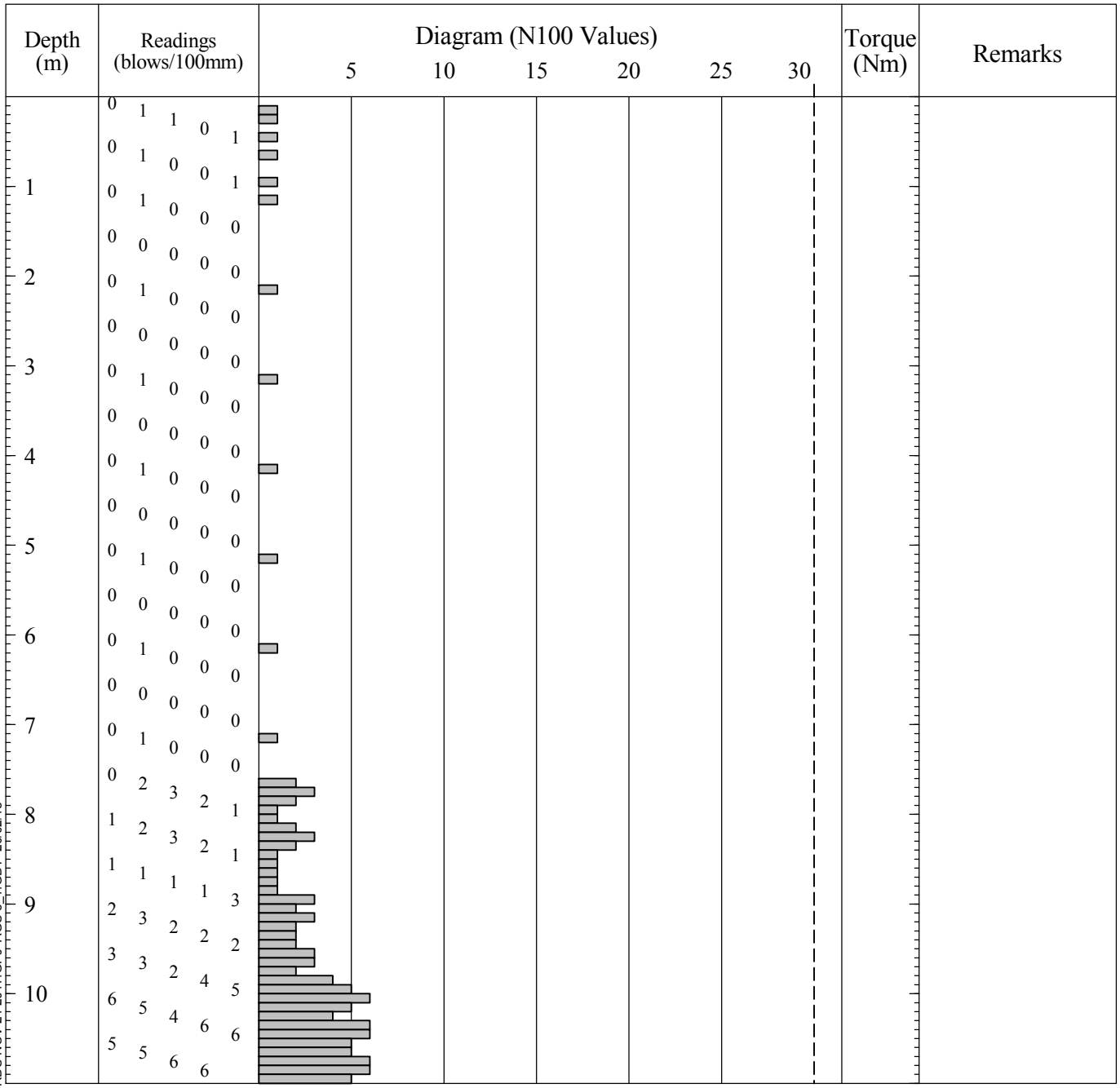
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-154**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	73.58	E 679,438.3 N 734,073.9

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 2



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 12.30m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used DPH Rig	Bit Design	Driller BT	Logged By BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-154**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	73.58	E 679,438.3 N 734,073.9

Engineer	Sheet
Jacobs Tobin JV	Rev. 2 of 2

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
12	5 5 5 6 5 7 7 8 7 7 8 18 20 25 8	5 10 15 20 25 30		Refusal. 25 blows for 0mm.
13				
14				
15				
16				
17				
18				
19				
20				
21				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 12.30m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

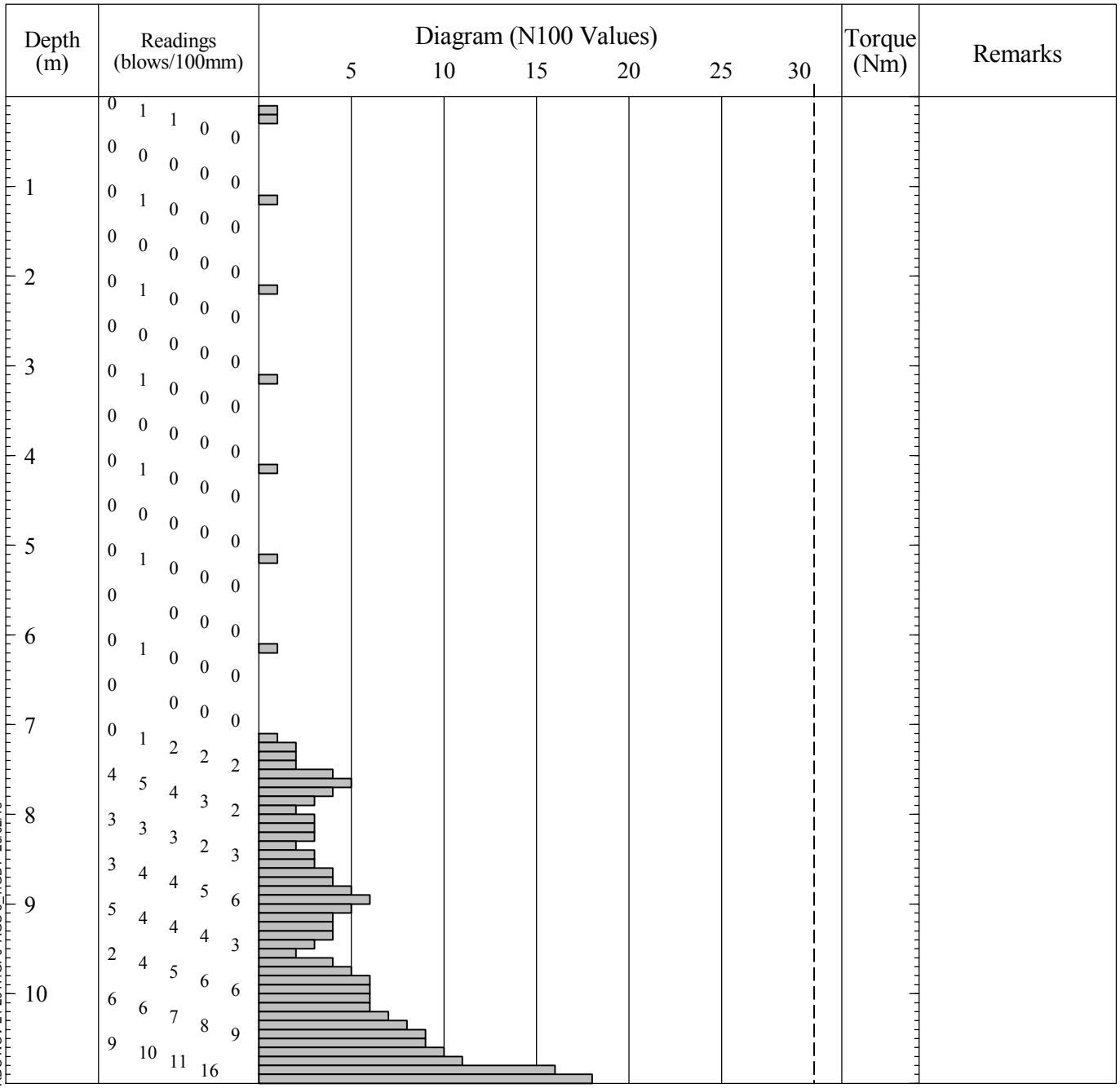
irish drilling ltd
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-155**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	73.62	E 679,475.3 N 734,056.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 2



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 11.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-155**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	73.62	E 679,475.3 N 734,056.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 2 of 2

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
12	20 21 25 18	5 10 15 20 25 30		Refusal. 25 blows for 0mm.
13				
14				
15				
16				
17				
18				
19				
20				
21				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 11.20m bgl.

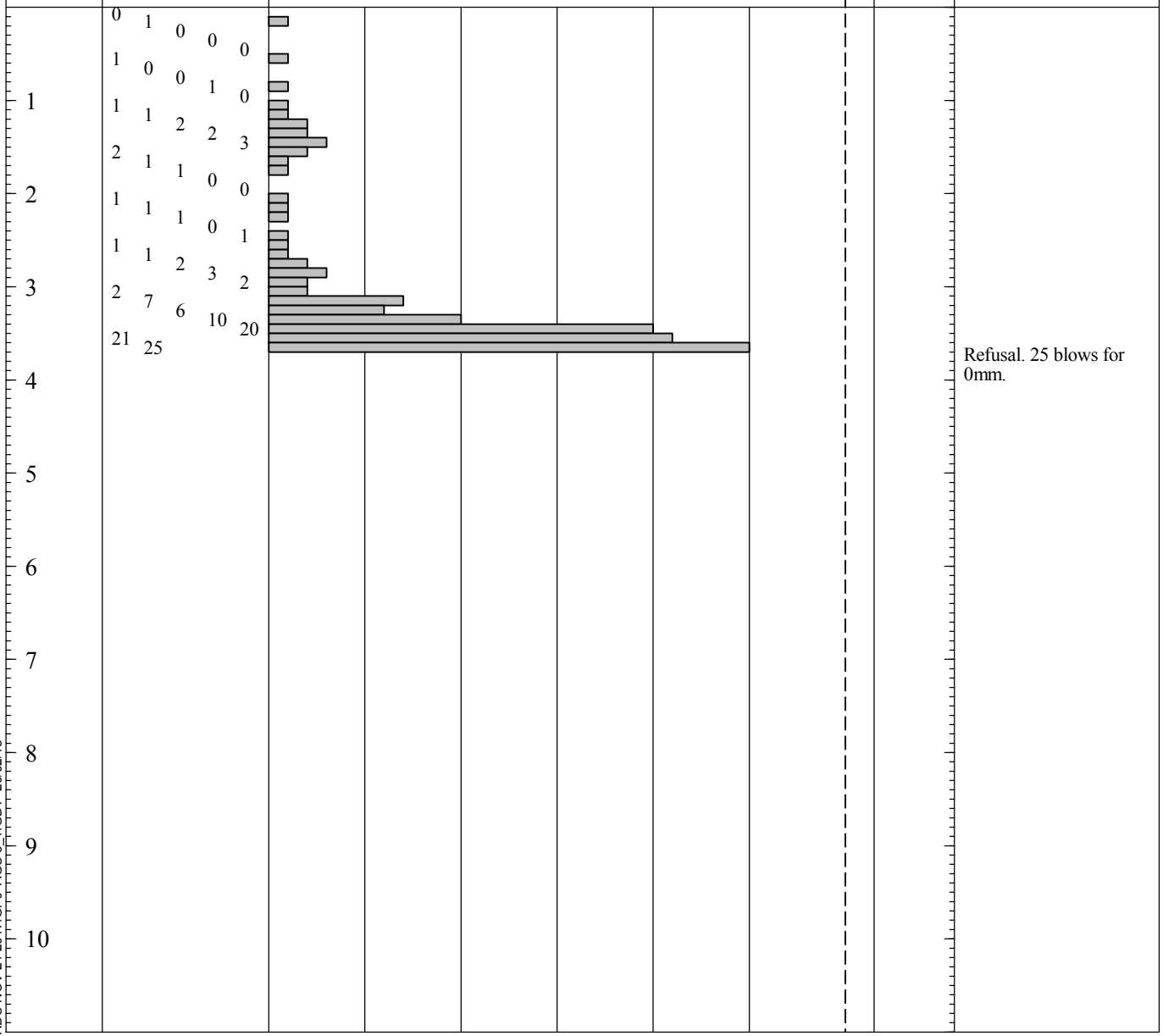
All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project: WSP Eastern and Midlands		Location: Co Tipperary	PROBE No: **DP-156**
Job No: 2017T101	Date: 10-10-17 / 10-10-17	Ground Level (m OD): 76.75	Co-Ordinates (): E 680,394.4 N 733,801.5
Engineer: Jacobs Tobin JV			Sheet: Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.60m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

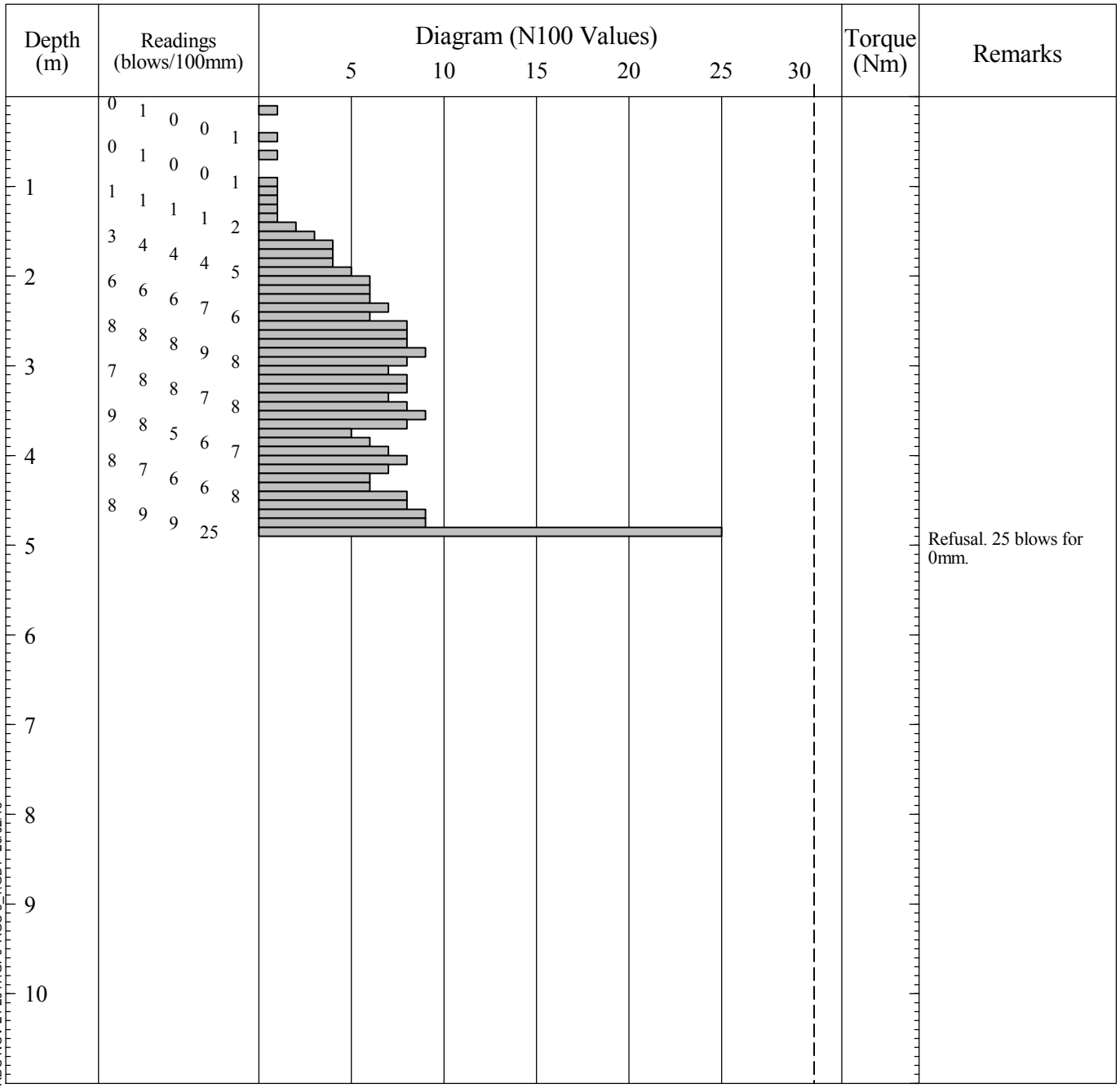
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loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-157**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	71.07	E 681,561.2 N 734,132.1

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.80m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

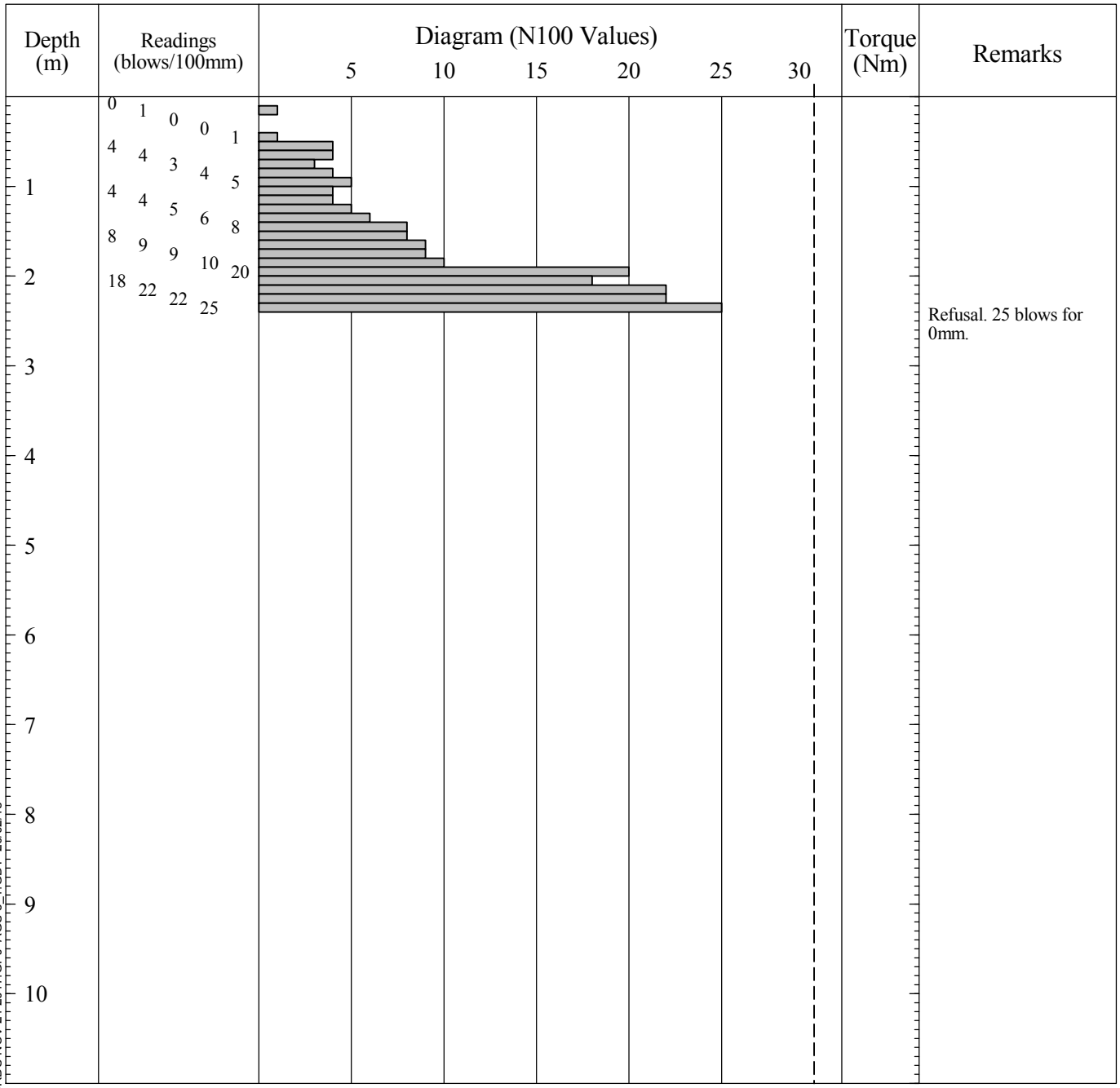
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-180**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	69.78	E 652,172.0 N 727,782.5

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 2.30m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-181**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	26-10-17 26-10-17	70.59	E 652,137.9 N 727,634.4

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	1 1 2 4	5 10 15 20 25 30		
1	6 9 6 5 5			
2	5 6 6 4 3			
3	4 4 4 3 3			
4	4 5 7 4 2			
5	2 3 5 6 6			
6	25			Refusal. 25 blows for 0mm.
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 3.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

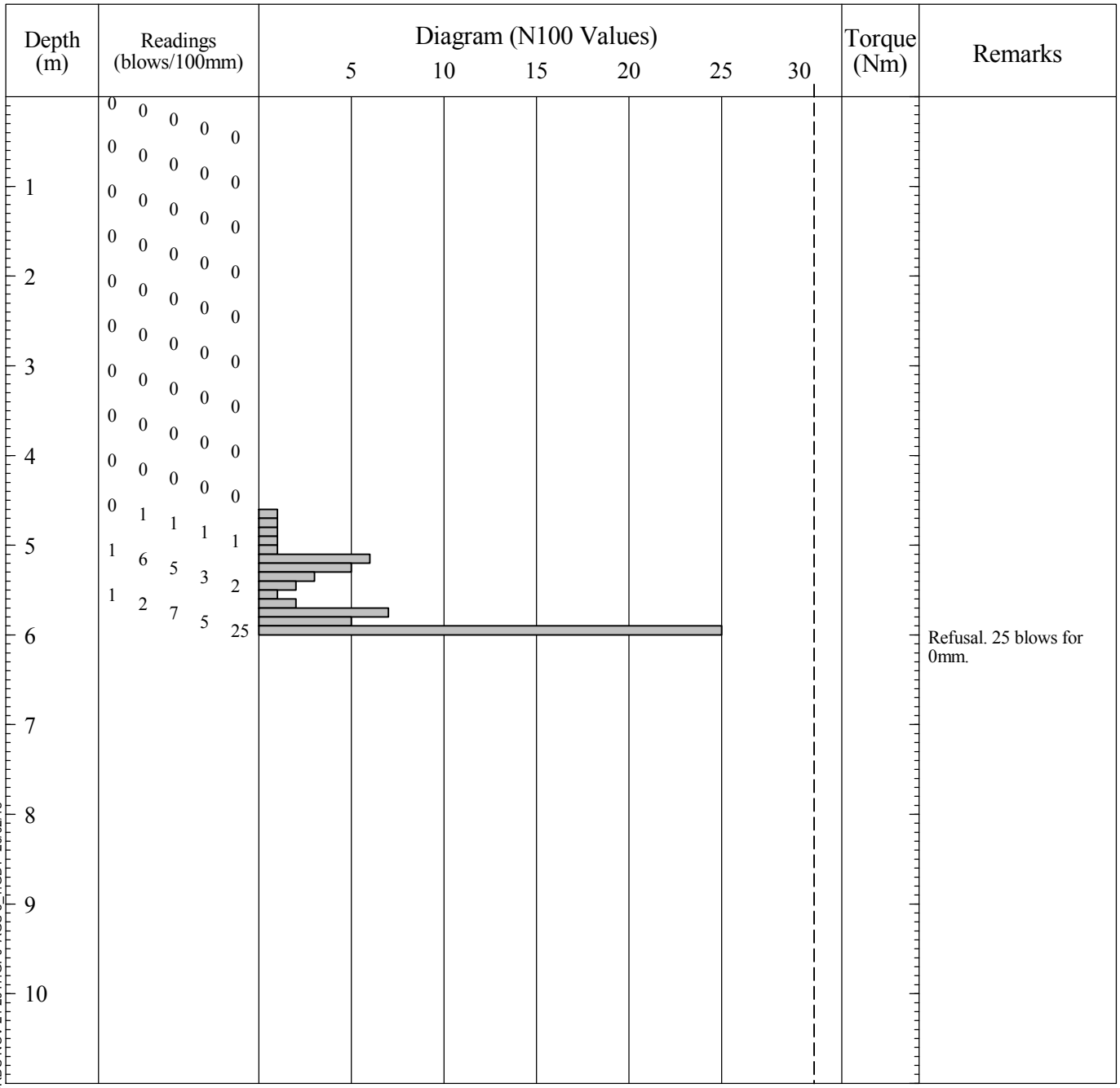
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old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-182**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-11-17 10-11-17	71.24	E 656,063.0 N 728,045.8

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 5.90m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

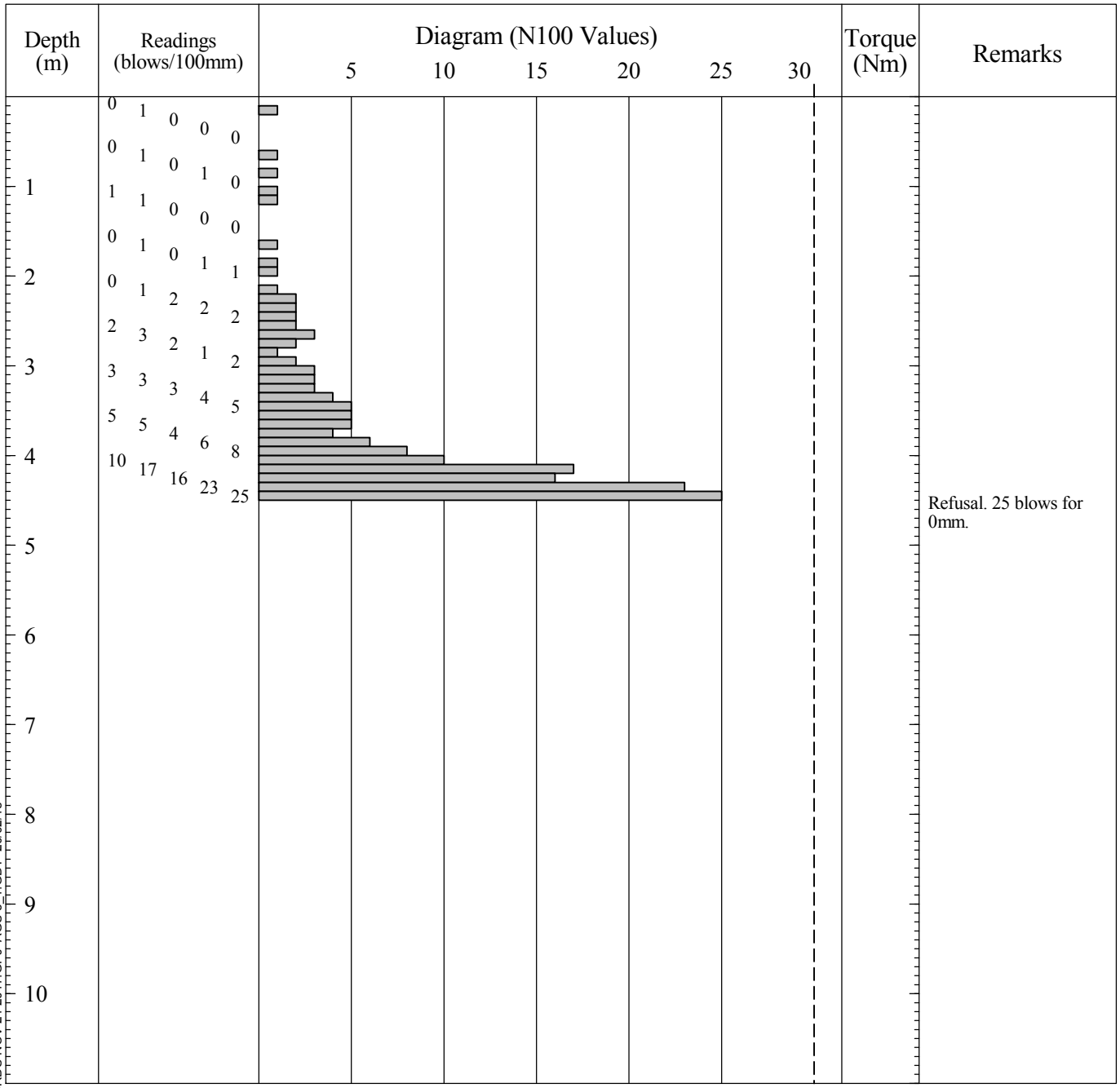
irish drilling ltd
old galway road
loughrea

DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-184**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	10-10-17 10-10-17	71.46	E 681,759.3 N 734,287.2

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.40m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-200**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	23-10-17 23-10-17	84.47	E 600,833.3 N 691,625.7

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	1 3 7 5			
1	4 3 3 2 2			
2	1 3 2 6 5			
3	2 2 3 3 2			
4	1 6 7 11 11			
	9 9 11 13 16			
	18 10 10 10 6			
	4 2 1 1 4			Refusal. 25 blows for 0mm.
	3 17 25			

Diagram (N100 Values): 5 10 15 20 25 30

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

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DYNAMIC PROBE LOG

Project: WSP Eastern and Midlands		Location: Co Tipperary	PROBE No: **DP-201**
Job No: 2017T101	Date: 23-10-17 23-10-17	Ground Level (m OD): 81.75	Co-Ordinates (): E 601,506.7 N 692,292.1
Engineer: Jacobs Tobin JV			Sheet: Rev. 1 of 1

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values)	Torque (Nm)	Remarks
0	1 1 1 2	5 10 15 20 25 30		
1	3 6 6 5 6			
2	12 16 5 25			Refusal. 25 blows for 0mm.
3				
4				
5				
6				
7				
8				
9				
10				

Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 1.20m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: BT	Logged By: BT

AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

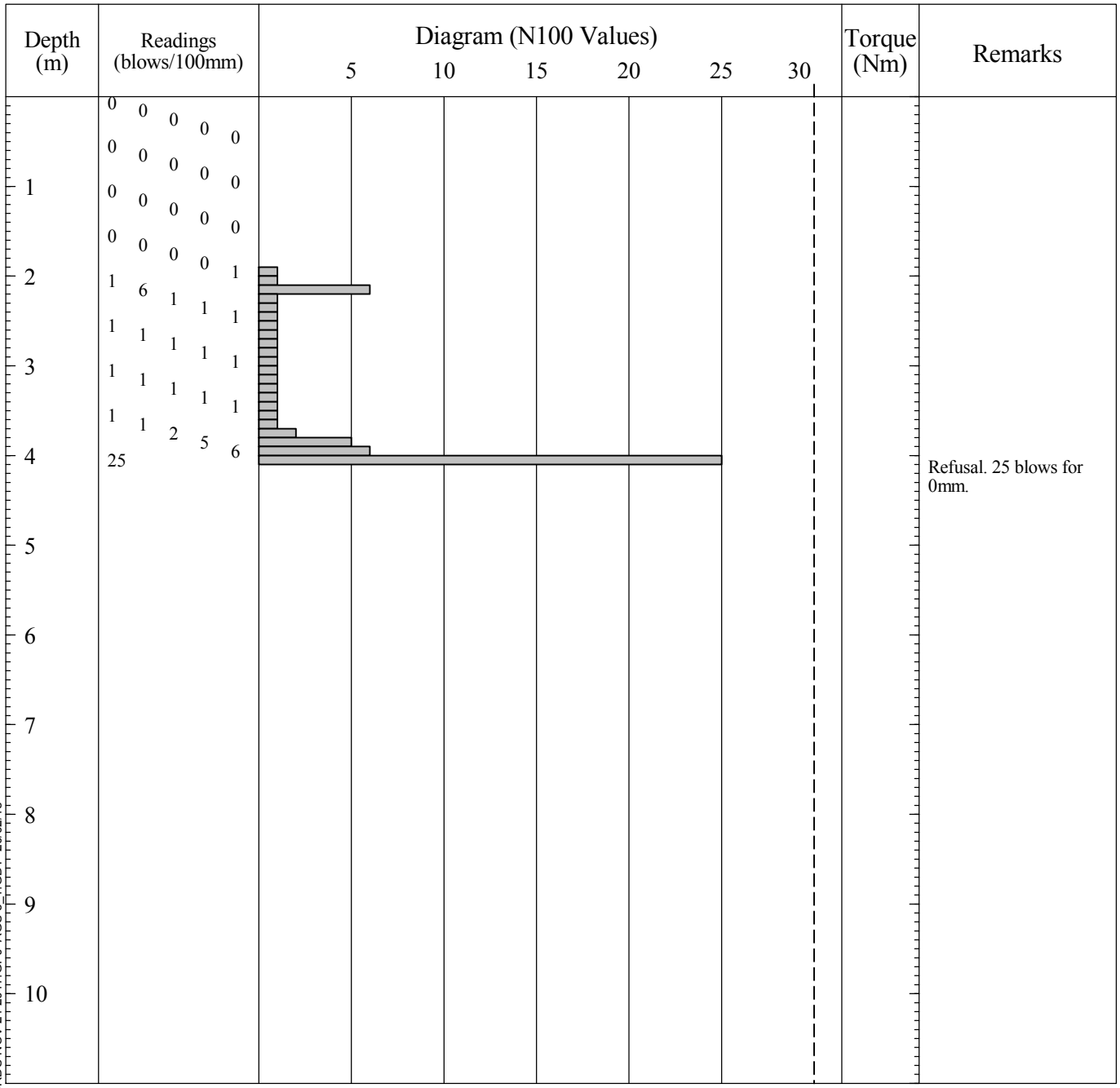
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DYNAMIC PROBE LOG

Project	Location	PROBE No
WSP Eastern and Midlands	Co Tipperary	**DP-210**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017T101	14-11-17 14-11-17	83.43	E 673,359.2 N 731,553.0

Engineer	Sheet
Jacobs Tobin JV	Rev. 1 of 1



Hammer Wt (kg)	50
Hammer Drop (mm)	500
Cone Dia (mm)	40
Cone Type	
Damper	

GENERAL REMARKS

DP terminated at 4.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Irish Water	Method/ Plant Used: DPH Rig	Bit Design	Driller: GF	Logged By: GF

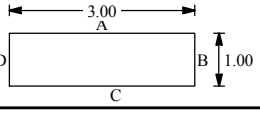
AGS3 DYNAMIC PROBE WSP GI DPS ALL W COORDS NOV 21 2017.GPJ AGS 3_1.GDT 20/02/18

PROJECT: WSP Eastern and Midlands	**TRIALPIT: TP003**
LOCATION: Co Tipperary	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Zaxis 135**
ENGINEER: Jacobs Tobin JV	**E 616,245.0 N 708,852.0** **Rev: PRELIM**
Ground level: 100.26m O.D.	**DATE: 6.11.17**

GROUNDWATER

Water strikes: Rose to after:
1st: dry
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 1.00 * 3.00m
LOGGED BY: DOR



Shoring/Support: N/A
Stability: Pit stable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							99.96	0.30	Dark brown TOPSOIL.
			B 1	0.80-1.20					Firm light brown slightly gravelly very sandy SILT with medium cobble content and low boulder content. Cobbles are subangular and angular of limestone. Boulders are subangular of limestone.
1									
			B 2	1.70-2.00					
2							98.26	2.00	
						END			TP terminated at 2.00m bgl - obstruction as possible rock.
3									
4									
5									

Remarks: Pit dry on excavation.
TP backfilled with arisings.

Scale: 1:27.5

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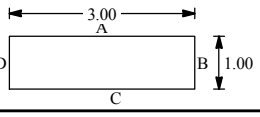
TRIAL PIT VANE & WL RISES WSP GI TPS FILE 1 W COORDS NOV 23 2017.GPJ IRISHDRL.GDT 20/02/18

PROJECT: WSP Eastern and Midlands	**TRIALPIT: TP004**
LOCATION: Co Tipperary	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Zaxis 135**
ENGINEER: Jacobs Tobin JV	**E 651,771.6 N 727,540.2** **Rev: PRELIM**
Ground level: 81.67m O.D.	**DATE: 7.11.17**

GROUNDWATER

Water strikes: Rose to after:
1st: dry
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 1.00 * 3.00m
LOGGED BY: DOR



Shoring/Support: N/A
Stability: Pit stable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							81.37	0.30	Dark brown TOPSOIL.
			B 1	0.80-1.30			79.97	1.70	Firm light brown very sandy SILT with high cobble content and medium boulder content. Cobbles are angular and subangular of siltstone. Boulders are angular and subangular of siltstone.
						END			TP terminated at 1.70m bgl - obstruction as possible rock.
1									
2									
3									
4									
5									

Remarks: Pit dry on excavation.
TP backfilled with arisings.

Scale: 1:27.5

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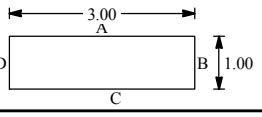
TRIAL PIT VANE & WL RISES WSP GI TPS FILE 1 W COORDS NOV 23 2017.GPJ IRISHDRL.GDT 20/02/18

PROJECT: WSP Eastern and Midlands	**TRIALPIT: TP007**
LOCATION: Co Tipperary	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** **Rig: Zaxis 135**
ENGINEER: Jacobs Tobin JV	**E 700,705.7 N 730,285.5** **Rev: PRELIM**
Ground level: 74.98m O.D.	**DATE: 7.11.17**

GROUNDWATER

Water strikes: Rose to after:
1st: dry
2nd:
3rd:

PIT DIRECTION: 000-180
PIT DIMENSION: 1.00 * 3.00m
LOGGED BY: DOR



Shoring/Support: N/A
Stability: Pit stable.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0									
							74.58	0.40	Dark brown TOPSOIL.
			B 1	0.50-0.90					Soft to firm dark brown slightly gravelly SILT with low cobble content. Cobbles are angular and subangular of limestone.
1							73.98	1.00	
						END			TP terminated at 1.00m bgl - obstruction as limestone rock.
2									
3									
4									
5									

Remarks: Pit dry on excavation.
TP backfilled with arisings.

Scale: 1:27.5

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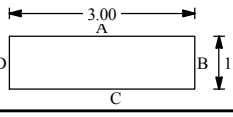
TRIAL PIT VANE & WL RISES WSP GI TPS FILE 1 W COORDS NOV 23 2017.GPJ IRISHDRL.GDT 20/02/18

PROJECT: WSP Eastern and Midlands	**TRIALPIT: TP009**
LOCATION: Co Tipperary	**Sheet 1 of 1**
CLIENT: Irish Water	**Co-ordinates:** E 639,228.0 N 718,922.6 — **Rig: Zaxis 135**
ENGINEER: Jacobs Tobin JV	**Rev: PRELIM**
Ground level: 111.52m O.D.	**DATE: 6.11.17**

GROUNDWATER

Water strikes: Rose to after:
1st: 2.30m
2nd:
3rd:

PIT DIRECTION: 090-270
PIT DIMENSION: 1.00 * 3.00m
LOGGED BY: DOR



Shoring/Support: N/A
Stability: Pit unstable. Sidewall collapse.

Depth (m)	Date	Water	Samples	Depth (m)	In-situ Vane Tests	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0							111.02	0.50	Dark brown TOPSOIL.
			B 1	0.90-1.20			110.02	1.50	Soft to firm light brown slightly gravelly SILT with medium cobble content. Cobbles are subangular of limestone.
			B 2	1.80-2.20			108.92	2.60	Soft greyish brown gravelly SILT with medium cobble content and low boulder content. Cobbles are subangular of limestone. Boulders are up to 800mm in length.
						END			TP terminated at 2.60m bgl - obstruction as possible rock.

Remarks: Moderate ingress of water at 2.30m bgl.
TP backfilled with arisings.

Scale: 1:27.5

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TRIAL PIT VANE & WL RISES WSP GI TPS FILE 1 W COORDS NOV 23 2017.GPJ IRISHDRL.GDT 20/02/18

Water Supply Project Eastern and Midlands Region

Ground Investigation Contract

Geophysical Survey Water Crossings

Report Status: Draft

MGX Project Number: 6209

MGX File Ref: 6209b-005.doc

27th July 2017

Confidential Report To:

Irish Drilling Ltd.
Old Galway Road
Loughrea
Co. Galway

Report submitted by :
Minerex Geophysics Limited

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Maynooth, Co. Kildare
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Tel.: 01-6510030
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Issued by:

Author: John Connaughton (Geophysicist)

Reviewer: Hartmut Krahn (Senior Geophysicist)

Minerex
Geophysics Limited

Subsurface Geophysical Investigations

EXECUTIVE SUMMARY

1. Minerex Geophysics Ltd. (MGX) carried out a geophysical survey consisting of 2D-Resistivity and seismic refraction (p-wave) surveying for the ground investigation for the Water Supply Project Eastern and Midlands Region.
2. The main objectives of the survey were to determine the ground conditions under the site, determine the depth to rock and the overburden thickness, to estimate the strength/stiffness/compaction of overburden and the rock quality, to establish the presence of faults and fracture zones and to detect possible karstified rock.
3. The survey was carried out at 22 water crossings that include ditches, rivers, streams, the Grand Canal and the River Liffey. Generally three 93m 2D-Resistivity and seismic refraction profiles were carried out crossing the water but in some locations this profile alignment had to be changed because of local conditions (vegetation, slope, land access).
4. In three locations the total distance surveyed was less than 279m because of a lack of space available for undertaking the survey due to land access and vegetation issues.
5. Seven seismic velocity layers were used for this project ranging from a peat layer to a good rock layer.
6. Subdividing these layers using the 2D-Resistivities resulted in there being 19 layers used for the interpretation.
7. For the construction of the pipeline soft ground, shallow rock and karstified rock are the primary geological constraints.
8. Peat was encountered on site in the areas on Maps 12, 13, 14, 15 and 19. The deepest peat area was on Map 19 where peat was eight metres deep.
9. The fastest seismic velocity layer, interpreted as good rock, was less than four metres below the ground surface in the area on Maps 1, 16, 17 and 20.
10. The resistivities indicate possible karst features present on maps 1, 3, 4, 5, 9, 16, 17 and 20, however the Geological Survey of Ireland (GSI) map do not note any karst features near these areas.
11. This report will be reviewed and finalised after the complete direct ground investigation data has been received.

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1. INTRODUCTION

1.1 Background

Minerex Geophysics Ltd. (MGX) carried out a geophysical survey for the Water Supply Project Eastern and Midland Region. This survey was done at 22 water crossing locations. The survey consisted of 2D-Resistivity and seismic refraction (p-wave) measurements. The survey was commissioned by Irish Drilling Ltd.

The survey employed various geophysical methods that complement each other and improve the interpretation. The role of geophysics as a non-destructive fast method is to allow later targeted direct investigations. Those results can then be used to improve the initial results and interpretation.

The proposed development is a large 2 m diameter water supply pipeline from the River Shannon to Dublin. The proposed depth to the top of the pipeline is not known but expected to be around 1 – 2 m.

1.2 Objectives

The main objectives of the geophysical survey were:

- To determine the ground conditions under the site
- To determine the depth to rock and the overburden thickness
- To estimate the strength/stiffness/compaction of overburden materials and the rock quality
- To determine the type of overburden and rock
- To detect lateral changes within the geological layers
- To determine the presence of possible faults and fracture zones
- To detect possible karstified zones within the rock

1.3 Site Description

The 22 site are located along the proposed water pipeline route. For naming the locations the chainage available at the time of the survey is used in the annotations in this report. The name of the location, folio number, watercourse and townland are summarised in Table 1.

1.4 Geology

The overburden and bedrock geological conditions as taken from the Geological Survey of Ireland map (GSI, 2017) are shown in Table 1. There were no Karst features noted near the survey areas on the GSI map while the only shallow rock (less than two metres deep) was located 100m to the SE of the survey area on Map 20.

1.5 Report

This report includes the results and interpretation of the geophysical survey. Maps, figures and tables are included to illustrate the results of the survey. More detailed descriptions of geophysical methods and measurements can be found in GSEG (2002), Milsom (1989) and Reynolds (1997).

The client provided maps of the site and the digital version was used as the background map in this report. Elevations were surveyed on site and are used in the vertical sections.

The interpretative nature and the non-invasive survey methods must be taken into account when considering the results of this survey and Minerex Geophysics Limited, while using appropriate practice to execute, interpret and present the data, give no guarantees in relation to the existing subsurface.

2. GEOPHYSICAL SURVEY

2.1 Methodology

The methodology was given by Irish Water and consisted of 2D-Resistivity Profiling and Seismic Refraction Profiles.

The survey locations are indicated on the maps. The profiles, locations and parameters are tabulated in Table 1. Most locations consisted of three 93m long profiles, however, in three locations (Maps 10, 13, 22) access constraints led to a smaller total amount of surveying being carried out.

The total length of 2D-Resistivity and Seismic Refraction is 5904 m for each method.

All geophysical surveys are acquired, processed and reported in accordance with British Standards BS 5930:1999 +A2:2010 'Code of Practice for Site Investigations'.

2.2 2D-Resistivity

2D-Resistivity profiles were surveyed with an electrode spacing of 3 m, up to 32 electrodes per set-up and a maximum length of 93 m per profile. The readings were taken with a Tigre Resistivity Meter, Imager Cables, stainless steel electrodes, laptop and ImagerPro acquisition software.

During 2D-Resistivity surveying data is acquired in the form of linear profiles using a suite of metal electrodes. A current is injected into the ground via a pair of electrodes while a potential difference is measured across a second pair of electrodes. This allows for the recording of the apparent resistivity in a two-dimensional arrangement below the profile. The data is inverted after the survey to obtain a model of subsurface resistivities. The generated model resistivity values and their spatial distribution can then be related to typical values for different geological materials.

The penetration depth of a resistivity profile increases towards the centre where it reaches an approx. value of 1/6th of the layout length.

2D-Resistivity has proven zones of anomalous rock/karstified rock with lateral extents of 5 m and more.

2.3 Seismic Refraction

Seismic refraction profiles were surveyed with geophone spacing of 3m and concatenated geophone layouts resulting in continuous coverage along each profile line. The recording equipment consisted of a 24 Channel GEOMETRICS ES-3000 engineering seismograph with 4.5 Hz vertical geophones on land or hydrophones in water. The seismic energy source consisted of a hammer and plate or a seismic gun where peat was present. A zero delay trigger was used to start the recording. Normally 7 shot points per p-wave profile were used.

Set-ups were acquired in 93 m continuous profiles using common shot points between set-ups and concatenating into longer profiles at the processing stage.

In the seismic refraction survey method a p-wave is generated by a source at the surface resulting in energy travelling through surface layers directly and along boundaries between layers of differing seismic wave velocities. Processing of the seismic data allows geological layer thicknesses and boundaries to be established.

Seismic Refraction generally determines the depth to horizontal or near horizontal layers where the compaction/strength/rock quality changes with an accuracy of 10 – 20% of depth to that layer. Where low velocity layers or shadow zones are present (e.g. below solid ground surface) or where layers dip with more than 20 degrees angle the accuracy becomes much less.

2.4 Site Work

The data acquisition was carried out between the 6th June and 13th July 2017. The weather conditions were variable throughout the acquisition period. Health and safety standards were adhered to at all times.

The locations and elevations were surveyed with a TRIMBLE RTK-GPS to accuracy < 0.02 m.

3. RESULTS AND INTERPRETATION

The interpretation of geophysical data was carried out utilising the known response of geophysical measurements, typical physical parameters for subsurface features that may underlay the site, and the experience of the authors.

3.1 2D-Resistivity

The 2D-Resistivity data was positioned and inverted with the RES2DINV inversion package. The programme uses a smoothness constrained least-squares inversion method to produce a 2D model of the subsurface resistivities from the recorded apparent resistivity values. Three variations of the least squares method are available and for this project the Jacobian Matrix was recalculated for the first three iterations, then a Quasi-Newton approximation was used for subsequent iterations. Each dataset was inverted using seven iterations resulting in a typical RMS error of < 3.0%. The resulting models were colour contoured with the same resistivity scale for all profiles and they are displayed as cross sections (Figures 1a to 22a).

Resistivities are characteristic for certain overburden and rock types. If there is a high content of clay minerals (which are electrically conductive) then the overburden resistivity will be lower than if there is a high content of clastic grains like sand or gravel. The purer the clay and the lower the sand/gravel content the lower the resistivity. The water content in the overburden also influences the resistivities but generally the clay content has a larger effect.

The resistivities cover a range typical for materials from clay rich overburden (low resistivities) to fresh strong unweathered bedrock (high resistivities). The ranges have been taken into the consideration for the interpretation. Low resistivity values (< 250 Ohmm) typically indicate overburden with high clay content. Medium values (250 - 500 Ohmm) show sand/gravel in the overburden and weathered bedrock. High resistivities (> 1500 Ohmm) indicate bedrock types like clean limestone. Where low values occur at depth they can indicate a bedrock type like shale, mudstone or alternatively karstified limestone.

Within bedrock types like clean limestone, high resistivities indicate a fresh strong unweathered rock. As the weathering in the rock increases, the resistivity gets lower because of weathering products, remineralisation of rock and infill of cracks, faults and voids with clay and water. Weathering within rock is typically indicated by lower resistivity values in the cross sections.

In limestone areas karstified rock is defined in this report as a formerly intact clean limestone rock, liable to karstification, that has been partially dissolved by water over a long geological time scales and where the cavities and voids have either remained empty (filled by air) or became filled by overburden sediment (clay, silt, sand), weathering products of the broken rock itself or water. This process would lead to a reduction of the resistivity of the overall rock and therefore karstified rock has a lower resistivity than intact clean limestone rock. This is generally indicated by lower resistivities embedded within high resistivity at depth.

3.2 Seismic Refraction

The seismic refraction data was positioned and processed with the SEISIMAGER software package to give a layered model of the subsurface. The numbers of layers has been determined by analysing the seismic traces and 7 layers in total were used in the models ranging from 3 to 5 layer models. All seismic profiles were subject to a standardised processing sequence which consisted of a topographic correction which was based on integrated elevation data, first break picking, tomographic inversion, travel-time computation via ray-tracing and velocity modelling. Residual deviations of typically 0.4 to 1.8 msec RMS have been obtained for each profile. Following each processing stage QC procedures were adhered to. The resulting layer boundaries are shown as thick lines overlaid on the 2D-Resistivity cross sections (Figures 1a to 22a). The average seismic velocities obtained within the layers are annotated on the sections as bold black numbers.

The p-wave seismic velocity is closely linked to the density of subsurface materials and to parameters like compaction, stiffness, strength and rock quality. The higher the density of the subsurface materials the higher the seismic velocity. Similarly for the other parameters it is generally valid that a more compacted, stiffer and stronger material will have a higher seismic velocity. For rock, the seismic velocity is higher when the rock is stronger, less weathered and has a higher quality. If the rock is more weathered, broken, fractured, fissured or karstified then the seismic velocity will be reduced compared to that of intact fresh rock.

Because of the above relationship, the seismic refraction method and seismic velocities are suitable to investigate ground where the layers get denser, more compacted and stronger with depth. A disadvantage is that some materials may have the same seismic velocity: Very stiff to hard or very dense highly consolidated overburden and a weathered rock can have the same seismic velocity range.

3.3 Interpretation of Resistivity and Seismic Refraction

Table 2 summarises the interpretation. The stiffness or compaction and the rock strength or quality have been estimated from the seismic velocity. The estimation of the excavatability for the bedrock has been made according to the caterpillar chart published in Reynolds (1997). The geotechnical assessment for rippability will have to take factors like rock type and jointing into account and the estimation in this report is solely based on the seismic velocities.

Interpreted cross sections are shown in Figure 1b to 22b. The interpretation has been made from all available information. For overburden layers and the top of the rock, the seismic refraction data has been used as seismic refraction is the best method to delineate layer boundaries. The resistivity models have been used to delineate generalised types of overburden and rock. Resistivity data is better suited to show rock types and features within the rock while seismic refraction velocities are indicating the change of compaction, stiffness or rock quality with depth. Along short profile parts where only one data type is available an interpolation for the interpreted layers was made.

Table 2: Summary of Results and Interpretation

Layer	General Seismic Velocity Range (m/sec)	General Resistivity Range (Ohmm)	Stiffness/ Compaction or Rock Strength/ Quality	Interpretation	Estimated Excavation Method
1	<150	N/A		Peat	Diggable
2	200 – 400	N/A	Soft or loose	Topsoil	Diggable
3A	500 - 900	<62.5	Firm	Clay	Diggable
3B	500 - 900	62.5 - 250	Firm	Sandy gravelly Clay or Silt	Diggable
4A	1000 – 1500	<62.5	Stiff	Clay	Diggable
4B	1000 – 1500	62.5 - 250	Stiff	Sandy gravelly Clay or Silt	Diggable
4C	1000 – 1500	250 - 500	Dense	Clayey silty Sand or Gravel	Diggable
4D	1000 – 1500	500 - 2000	Dense	Sand or Gravel	Diggable
5A	1600 – 2000	<62.5	Very Stiff or Poor	Clay or Very Weathered Mudstone or Shale or very infilled Limestone	Diggable/Rippable
5B	1600 – 2000	62.5 - 250	Very Stiff or Poor	Sandy gravelly Clay or Silt or very Weathered Mudstone or Shale or infilled Limestone	Diggable/Rippable
5C	1600 – 2000	250 - 500	Very Dense or Poor	Clayey silty Sand or Gravel or very Weathered Shale or Limestone	Diggable/Rippable
6A	2100 – 2900	<62.5	Fair or hard	Weathered Mudstone or Shale or very infilled Limestone or Clay	Diggable/Rippable
6B	2100 – 2900	62.5 - 250	Fair or Very Stiff	Weathered Mudstone or Shale or very infilled Limestone or sandy gravelly Clay or Silt	Rippable/Marginal Rippable or Breaking and Blasting
6C	2100 – 2900	250 - 500	Fair or Very Dense	Weathered Shale or infilled	Rippable/Marginal

				Limestone or clayey silty Sand or Gravel	Rippable or Breaking and Blasting
6D	2100 – 2900	500 - 2000	Fair or Very Dense	Weathered Shale or Limestone or Sand or Gravel	Rippable/Marginal Rippable or Breaking and Blasting
7B	>3000	62.5 - 250	Good	Mudstone, Shale or very infilled Limestone	Breaking or Blasting
7C	>3000	250 - 500	Good	Shale or Infilled Limestone	Breaking or Blasting
7D	>3000	500 - 2000	Good	Shale or Limestone	Breaking or Blasting
7E	>3000	>2000	Good	Clean Limestone	Breaking or Blasting

4. INTERPRETATION BY LOCATION

Due to the large distances covered during this project and the space between each survey box the geology varies greatly throughout the project. In this chapter the interpretations are divided into a section for each box.

4.1 CH22100

Map and Figures: 1

Profiles: 8, 9 and 10

Location Comment: This proposed box was only on one side of the Nenagh River due to landowner access restrictions. Three 93 m profiles were carried out at the eastern side of the river and parallel to the river.

GI Points: N/A

The seismic refraction velocities give a three layer model of soft or loose to dense overburden over good to very good limestone. The resistivities increase with depth but decrease laterally to the NW.

Resistivities at depth are generally high which indicates a clean limestone type that is liable to karstification.

The overburden is interpreted as a clayey silty sand or gravel increasing from loose to dense with depth. The overburden becomes a cleaner sand or gravel to the southeast. This is underlain by good limestone with the top of rock at depths of between 3.5 and 7m below ground level (bgl). The depth to rock under the river is likely less than 3.5 m and this would require breaking or blasting when excavation.

The limestone becomes infilled to the west as can be seen by lower resistivities on all profiles (around 80 m on R8 to 60 m on R10). The interpretation of infilled limestone indicates that this limestone is weathered and karstified.

It is concluded that the river crossing of the pipeline should be done away from the anomalous rock zone that is in the SE part of the profiles.

4.2 CH47340

Map and Figures: 2

Profiles: 11, 12 and 13

Location Comment: Three 93 m profiles were carried out at this location. All three profiles crossed the small stream where access through the hedgerows was possible.

GI Points: N/A

The seismic refraction profiles show a four layer model ranging from overburden to good rock. The resistivities are very low throughout the profiles even at depth.

The overburden contains primarily stiff sandy gravelly clay or silt with a very thin layer of soft topsoil above it. Beneath the overburden at depths of between 2 and 5 m is a thick layer of fair weathered mudstone or shale which is deepest beneath the stream. This layer may also contain some hard or very dense overburden. The strong rock layer is 8.5 to 14 m below ground level.

The geological map also indicates mudstone as the rock type. At the top of the interpreted weathered mudstone or shale layer the seismic velocity varies between 2100 and 2200 m/s which is quite low for rock and this rock should be excavatable by digging. At this level there could be also quite consolidated overburden.

4.3 CH48780

Map and Figures: 3

Profiles: 14, 15 and 16

Location Comment: Three 93 m profiles were carried out at this location. All three profiles were centred on the small stream.

GI Points: N/A

The seismic refraction profiles consist of four layer models of soft to stiff overburden over weathered to good rock. Resistivities increase with depth but are lower in profile 16 and highest in the centre of profiles 14 and 15 at depth.

The overburden is primarily a sandy gravelly clay or silt with approximately two metres of soft overburden over another two metres of stiff overburden. This is underlain by a layer of weathered limestone (3 – 4 m depth bgl.) with the good to very good rock layer at a depth of between 6 and 8.5 m.

Within the rock layer the rock appears to be strongest beneath the stream and becomes more weathered further away from the stream while the strong change in the resistivities along profile 16 compared to 14 and 15 may indicate a change in geology or a greater weathering of the rock to the northwest. This area could be karstified.

4.4 CH52300

Map and Figures: 4

Profiles: 17, 18 and 19

Location Comment: Three 93 m profiles were carried out at this location, running parallel to the Little Brosna River. High and steep banks, vegetation and high fences along the river meant profiles crossing the river were not possible.

GI Points: N/A

The resistivities vary with depth from very low resistivities of <62.5 to >2000 Ohmm at the very bottom of the profiles while the seismic refraction models contain four layers from 200 m/s at the surface to 4000 m/s at depths of 6.5 to 8.5 m below ground level.

The overburden ranges from soft to very stiff clay with depth. The third seismic layer beginning at depths of 3 to 5 m may contain very stiff clay or a very weathered mudstone.

The low resistivities along with the GSI information for overburden indicates there may also be some peat within the overburden however this was not observed on site and the seismic velocities do not necessarily show this.

The geological map indicates a Limestone-Mudstone as the bedrock type. The interpreted strong rock layer starts at 6 to 10 m. The depth to the top of this layer varies by up to five metres along profile 17 and is flatter along profiles 18 and 19. The bedrock resistivities vary quite a bit and indicates mudstone over shale or infilled limestone. The area could be potentially karstified though the presence of mudstone and shale seems more likely.

4.5 CH65390

Map and Figures: 5

Profiles: 29, 30 and 31

Location Comment: Three 93 m profiles were carried out at this location, running parallel to the Camor River. Very high and steep banks with bushes along the river made access to the river impossible.

GI Points: N/A

The seismic refraction velocities range varies from 200 to 2400 m/s after approximately 3.5 m depth. The seismic refraction profiles do not change much throughout the three profiles. A good rock layer is not identified within the limits of the profile. The resistivity profiles begin at around 62.5 Ohmm but vary at depth throughout the three profiles with very low resistivities occurring deep within all profiles, while at a depth of 10 m bgl. resistivities range from 125 to 500 Ohmm.

The initial 3 m bgl is primarily made up of soft to firm sandy gravelly clay or silt while below this the geology may contain fair weathered Shale, infilled Limestone or a combination of hard sandy gravelly clay or silt and very dense clayey silty sand or gravel. The area could be potentially karstified though the presence of shale (which cannot contain karst) seems more likely.

Throughout this location there may be fair weathered rock at depths of 3 - 4 m which would require ripping or heavy ripping.

4.6 CH67000

Map and Figures: 6

Profiles: 20, 21 and 25

Location Comment: Three 93 m profiles were carried out parallel to the Camor River at this location. Both river banks were heavily overgrown meaning setting out profiles across the river was not possible.

GI Points: N/A

The seismic refraction velocities show a three layer model varying from 200 to 2400 m/s. The resistivities stay relatively consistent throughout the profiles and change only slightly with depth.

There is a relatively thick layer of soft or loose topsoil in this area reaching depths of six metres in some locations. The low resistivities along with the GSI information for overburden indicates this layer may be comprised of peat, however this was not observed on site and the seismic velocities do not necessarily show this.

In the layer below this the seismic velocity increases to 1400 m/s while the resistivities do not increase much. This layer is interpreted as primarily stiff clay and reaches depths of between 6.5 and 12 m bgl.

The third layer is interpreted as a fair weathered shale while this layer may also contain hard sandy gravelly clay or silt. No strong rock was identified within the survey depth range.

The thickness of the soft or loose topsoil layer and the possibility of peat may be of concern for the integrity of the pipeline and it is concluded that crossing the river where this layer is thinnest is the best option.

4.7 CH80080

Map and Figures: 7

Profiles: 22, 23 and 24

Location Comment: Three 93 m profiles were carried out roughly parallel to the Silver River at this location. Both river banks were very overgrown meaning running profiles across the river was not possible. Profile 24 was carried out at the closest location to the south bank of the river that could be accessed.

GI Points: N/A

There are three seismic velocity layers modelled in this location. The high velocity good rock layer is not found within the limits of the survey. The depth of the layers fluctuate more along profile 24 than along profiles 22 and 23. Resistivities do not change much throughout the three profiles but profile 24 has slightly higher resistivities in the first seven metres bgl. compared to the other profiles.

The first 1.5 to 2.5 m is interpreted as soft or loose topsoil. The second and third layers are likely to be made up of very stiff to hard gravelly sandy clay or silt or very dense clayey silty sand or gravel with the top of the

third layer beginning at depths of between 3.5 and 4.5 m along profiles 22 and 23 and between 4.5 and 7.5 m along profile 24. This difference is primarily due to the difference in the ground elevations between the profiles and not a change in geology across the river.

The second and third layers may however contain within them poor very weathered to fair weathered shale which could require ripping, particularly within the third layer. The consistency of the third layer at an elevation of 75 mOD indicates it is likely to be at the same elevation beneath the river.

The third layer could be also made of highly consolidated and compacted glacial till in which case no rock would be encountered.

4.8 CH92280

Map and Figures: 8

Profiles: 26, 27 and 28

Location Comment: Three 93 m profiles were carried out along the River Clodiagh at this location. The profiles were slightly offset from the proposed box due to vegetation along the river and within the fields.

GI Points: N/A

The seismic refractions model contains four layers with velocities increasing from 200 m/s in the first layer to 4000 m/s in the fourth layer. The resistivities generally decrease with depth particularly within the third seismic layer. The resistivities increase again within the fourth layer but not to a great extent.

The higher resistivities within the first two layers and relativity low seismic velocities are interpreted as a dense clayey silty sand or gravel overlain by about four metres of loose topsoil. The top of the third layer begins at about six to seven metres bgl and is interpreted as a fair weathered mudstone or shale or could be made of highly consolidated and compacted glacial till. The good rock layer is quite deep and does not begin until at least eleven metres bgl.

It is possible the second layer contains very weathered rock however the drop in resistivity into the third layer would indicate a sand and gravel rather than a very weathered rock.

4.9 CH114550

Map and Figures: 9

Profiles: 32, 33 and 34

Location Comment: Three 93 m profiles were carried out along the Phillipstown River at this location. High steep banks along the river meant profiles could not be carried out across the river.

GI Points: N/A

The seismic refractions velocities increase from 300 m/s near the surface to 4000 m/s at between five and eight metres bgl. The resistivities increase with depth from 62.5 Ohmm at the surface to 4000 Ohmm at a depth of five metres along the east of the profiles.

The profiles contain a thin layer of soft or loose topsoil over a one to three metre thick layer of stiff sandy gravelly clay or silt. Below this layer at depths of between two and four metres the higher velocities and resistivities are interpreted as a fair weathered shale or limestone. This layer may also contain very dense sand or gravel.

The good rock layer is found at depths of between five and eight metres. The higher resistivities particularly near the end of the profiles would indicate that the rock is limestone while the lower resistivities along profile 34 between distances of 50 and 80 m may indicate karstification of the rock.

When the pipeline is crossing the river it is concluded that it should be carried out in the West part of the profiles away from the anomalous rock zone.

4.10 CH115900

Map and Figures: 10

Profiles: 44 and 45

Location Comment: Two 93 m profiles were carried out along the East bank of the Doden River at this location. The west bank of the river was too overgrown with vegetation to carry out a profile and there was no sufficient space for a third profile on the east bank.

GI Points: N/A

The seismic refractions models contain four velocity layers while a good rock layer was not interpreted within the range of the survey. The resistivities begin very low throughout the two profiles and increase variably with depth. Along profile 44 between distances of 40 and 50 m the resistivities do not increase past 250 Ohmm while from 0 to 40 m the resistivities increase to 1000 Ohmm.

The low resistivities near the surface and the proximity of the location to a Bord na Mona bog means that while it was not noted on site, there may be peat present at this location. The increase in the resistivities means that if there is peat it does not extend past a depth of three metres.

The low seismic velocities even at depth are interpreted as deep overburden and if rock is encountered it would be a fair weathered shale or limestone with good rock not present within 15m bgl.

The overburden extends to depths of at least 8 and 12 m. The change in resistivities and seismic velocities within this depth range means the overburden is interpreted as soft or loose topsoil over firm clay which becomes stiffer with greater sand and gravel content with depth. The fourth seismic layer may contain hard or very dense overburden but is more likely a fair weathered shale or infilled limestone.

4.11 CH118420

Map and Figures: 11

Profiles: 35, 36 and 37

Location Comment: Three 93 m profiles were carried out at the location at the Doden River. Two of the profiles crossed the river at the only locations where a reduction in vegetation allowed it, while the third profile was carried out perpendicular to the river on the east bank.

GI Points: N/A

The seismic refraction velocity layers increase quickly from the first layer (300 m/s) to the third layer (2700 m/s) at about four metres bgl. The fourth layer with velocities of 4000 m/s is much deeper, beginning at eleven metres bgl.

The resistivities do not vary as much, remaining relatively similar throughout the site other than a few small areas close to the river. This variation may be due to the strong topographical changes along the banks of the river.

The first two layers are interpreted as soft or loose overburden over stiff sandy gravelly clay or silt. The third layer begins at about four metres bgl. but is much shallower beneath the river and is interpreted as a fair weathered infilled limestone, though this could be also highly consolidated glacial till. The fourth layer at depths greater that eleven metres bgl is interpreted as very infilled limestone.

4.12 CH123900

Map and Figures: 12

Profiles: 41, 42 and 43

Location Comment: Three 93 m profiles were carried out parallel to the Figile River at this location. Due to dense vegetation along the riverbanks the profiles could not cross the river. Two profiles were to the East while one was to the West of the river. All profiles were run as close to the road in the South as possible.

GI Points: N/A

Profile 41 consists of four seismic velocity layers while profiles 42 and 43 contain a fifth layer which begins at least ten metres bgl. The fourth seismic velocity layer is deeper than the resistivity profile along both profile lines.

The resistivity is very low throughout all three profiles with nearly all of the resistivities being below 125 Ohmm.

The top one to two metres below the surface consists of peat with the deepest peat area being in the NW of profile 42. Below the peat, the low resistivities and relatively low seismic velocities of layers two, three and four is interpreted as soft topsoil over stiff to very stiff clay with a greater sand and gravel content at depth.

Layer five is interpreted as a good shale or very infilled limestone. This rock may extent into layer four however it would be very weathered in this layer and should be able to be extracted by digging or ripping.

4.13 CH124000

Map and Figures: 13

Profiles: 38, 39 and 40

Location Comment: The west side of this box was not accessible due to land owner access restrictions. The east side of the stream was within a Coillte forest which made extending profiles very difficult. For this reason two of the profiles (39 and 40) run perpendicular to the stream for a length of 69 m while the third profile (38) runs parallel to the stream and extends to 93 m.

GI Points: N/A

The seismic refraction profiles contain three velocity layers, with the first layer (200 – 350 m/s) being roughly one metre deep and the third layer (2200 – 2300 m/s) beginning at a depth of between three and seven metres.

The resistivity profile is very uniform throughout the three profiles remaining between 62.5 and 250 Ohmm.

There is a thin layer of peat beneath the surface reaching depths no greater than one metre. The second seismic velocity layer which is thinnest near the river is interpreted as a stiff sandy gravelly clay or silt.

The third layer, which begins three to four metres bgl along the river and drops to seven metres bgl away from the river is interpreted as a fair weathered shale or clay infilled limestone. This layer may also contain a hard sandy gravelly clay or silt from compacted glacial till.

A good rock layer was not interpreted within the depth limits of this survey area.

4.14 CH126500

Map and Figures: 14

Profiles: 46, 47 and 48

Location Comment: Three 93 m profiles were carried out at this location near the Figile River. This proposed box did not cross the river and the three profiles ran NE to SW. Profiles 46 and 47 extend across a small gravel track that runs along the west of the box.

GI Points: N/A

There are five seismic refraction velocity layers along these profiles starting with a low velocity peat layer (150 m/s) and extending to a good rock layer (4500 m/s) at the base of the profiles. The resistivities increase with depth from <62.5 Ohmm near the surface to 4000 Ohmm at depths of greater than 15 m.

The peat layer thickness varies between one and two metres. Layer two below is interpreted as a loose topsoil which extends to four metres bgl in the NE and is shallower in the SW, particularly underneath the gravel track where the topsoil would have become more compact.

The seismic velocities increase to 1400 – 1500 m/s in layer three while the resistivities remain low. This layer is interpreted as a stiff sandy gravelly clay or silt. The bottom of this layer is between five and seven metres bgl.

The velocities and resistivities increase in the fourth layer and this is interpreted as a fair weathered shale or limestone. There may be some hard or very dense overburden within this layer as well.

The top of the final seismic velocity layer is 14 – 15 m bgl and is interpreted as a good shale or limestone.

4.15 CH129300

Map and Figures: 15

Profiles: 52, 59 and 60

Location Comment: Three 93m profiles were carried out at this location crossing the Cushnaling stream. All the profiles were centred on the stream.

GI Points: N/A

There are three seismic refraction velocity layers within the profiles while a good rock layer was not identified by the velocities. The resistivities at the surface are very low (<62.5 Ohmm) but increase to 250 Ohmm at a depth of about 3.5 m bgl.

The first seismic velocity layer (150 m/s) is interpreted as a peat layer. This layer is between one and two metres thick.

The second layer (1800 m/s) is interpreted as a very stiff gravelly sandy clay or silt or dense clayey silty sand or gravel. The resistivities increase within this layer and the higher resistivities may be due to the presence of a very weathered shale or limestone. If rock is present within this layer the relatively low velocities indicate that it should be diggable or rippable.

The top of the third seismic velocity layer is mostly between five and six metres bgl while it is deeper in the east of profile 52. This layer is interpreted as a fair weathered shale or limestone. The lower resistivities in the middle of the profiles would indicate greater clay infill within the rock. The seismic velocities do not indicate the presence of a good rock layer within the limits of the profiles.

4.16 CH134700

Map and Figures: 16

Profiles: 49, 50 and 51

Location Comment: Three 93 m profiles were carried out at this location at the Abbeylough stream. South of the stream was inaccessible due to vegetation, while crops in the field north of the stream restricted where profiles could be carried out.

GI Points: N/A

The seismic refraction models contain four velocity layers. The deepest layer (4000 m/s) begins at between five and six metres bgl. The resistivities increase with depth but laterally are higher in the north than in the south within layer four.

The first two seismic velocity layers are interpreted as soft topsoil over firm sandy gravelly clay or silt. The bottom of the second layer is between two and four metres deep.

The third seismic velocity layer is interpreted as very stiff gravelly sandy clay or silt and dense clayey silty sand or gravel. Within this layer, particularly at the bottom there may also be poor very weathered limestone.

The fourth seismic velocity layer is interpreted as a good limestone. The sharp drop in resistivities in the south may be due to weathering or a slight karstification of the rock. The resistivities in this weathered area are higher in the west and it is concluded that when building the pipeline the river should be crossed at the west of this box to attempt to avoid any karstified rock.

4.17 CH135400

Map and Figures: 17

Profiles: 53, 54 and 55

Location Comment: Three 93 m profiles were carried out at this location at the Grand Canal. It was not possible to cross the field boundary SW of the canal and the field boundary to the NE had only two locations when profiles could be set out. Therefore, two of the profiles started at the field boundary in the SW and crossed the canal while the third profile ran along the NE bank of the canal.

GI Points: N/A

There are four velocity layers within the seismic refraction models. The first layer is very thin while the fourth layer becomes deeper in the NW of the site. The resistivities are lowest beneath the canal and increase with depth while within layer four the resistivities are higher in the SE.

The topsoil layer is very thin throughout this location while the second layer (1000 – 1100 m/s) is also very thin but becomes thicker in the SW. This layer is interpreted as a stiff sandy gravelly clay or silt.

The top of the third layer is between 1.5 and 3.5 m bgl while it is slightly deeper at the beginning of profile 53. The seismic velocities in this layer would be interpreted as a fair weathered limestone.

The fourth seismic velocity layer is interpreted as a good limestone. The top of the fourth seismic velocity layer varies throughout the location as do the resistivities within the layer. This layer is shallowest and has the highest resistivities in the SE while the top of this layer and the resistivities drop towards profile 53 in the NW. Along profile 54, the top of layer four is between 3.5 and 5 m bgl but this drops to between 5 and 7.5 m along profile 53. Along profile 55 at a distance of 70 m, the top of this layer drops quickly from five metres to twelve metres bgl.

This drop in resistivities in layer four may be due to a weathering or karstification of the rock to the NW. In order to avoid this area of possible karst when building the pipeline it is concluded that the pipeline should cross the canal in the SE of the box.

4.18 CH138350

Map and Figures: 18

Profiles: 56, 57 and 58

Location Comment: Three 93 m profiles were carried out at this location along the Cushaling River. Due to dense vegetation and very high and steep banks along the river the profiles were carried out parallel to the river with two profiles to the south and one to the north.

GI Points: N/A

The seismic velocities in this area are all relatively low with the highest velocities in the third layer at 1900 m/s. The resistivities generally decrease with depth along these profiles with the lowest resistivities being ten metres bgl along profiles 56 and 57 and the highest being between six and seven metres bgl along profiles 57 and 58.

The first seismic velocity layer is interpreted as loose or soft topsoil and has a thickness of between one and two metres. The second layer is interpreted as a firm sandy gravelly clay or silt.

The top of the third layer varies between 2.5 m in the south at the start of profile 57 and six metres in the north along profile 68. This layer is interpreted as a very stiff gravelly sandy clay or silt, however, there may also be a poor very weathered mudstone within this layer particularly where the resistivities decrease at a depth of eight metres bgl.

The relatively low seismic velocities indicate that if this is rock it would be of very poor quality and could be extracted by digging or ripping.

4.19 CH146500

Map and Figures: 19

Profiles: 64, 65 and 66

Location Comment: Three 93 m profiles were carried centred on the small stream and spaced approx. 25m apart.

GI Points: N/A

The seismic refraction velocities indicate a three layer model within this area, however, the third layer becomes very deep in parts and is not found within the survey limits in the first 30 m of profile 65 and the first 50 m of profile 66. The first layer has a very low seismic velocity and becomes deeper along all the profiles to the NW.

The resistivities begin very low near the surface with low resistivities being deeper in the NW. They increase in the second layer but mostly do not pass 500 Ohmm even within the third seismic velocity layer.

The low velocities and very low resistivities in the first layer show this to be a peat layer. This layer becomes deeper to the NW where it reaches depths of eight metres. Due to the increase in seismic velocities and resistivities, the second layer is interpreted as a stiff sandy gravelly clay or silt. Along profile 64 the thickness of this layer is relatively uniform while along profiles 65 and 66 this layer becomes thicker to the NW.

The third seismic profile is interpreted as a good shale or infilled limestone. The top of this layer is shallowest along profile 64, particularly in the SE where it is eight metres bgl. Throughout this location this rock layer becomes deeper to the NW and becomes deeper than 15 m along the first 50 m of profiles 65 and 66.

Beneath the stream the peat layer is thinnest at profile 64 with its base at an elevation of 69 mOD and thickest at profile 66 where its base is at an elevation of 66 mOD.

4.20 CH148700

Map and Figures: 20

Profiles: 61, 62 and 63

Location Comment: This proposed box was entirely on the west bank of the Blackwater River. Three 93 m profiles were carried parallel to the river.

GI Points: N/A

The seismic refraction velocities in the location indicate a three layer model consisting of a soft top soil layer (250m/s), a stiff overburden layer (1000m/s) and a good rock layer (3500m/s) the thickness and depth of these layer is very uniform throughout this location, particularly along profiles 62 and 63.

The resistivities in this area range from very low (<62.5 Ohmm) near the surface to high (>500 Ohmm) in parts of the third seismic refraction layer.

The geological map and very low resistivities near the surface indicate the possible presence of peat up to five metres thick in this area, however, no peat was noted on site. The first two seismic refraction layers are interpreted as loose topsoil over a stiff clay which contains a greater sand or gravel content at its base.

The increase in resistivities and seismic velocities means the third seismic refraction layer is interpreted as a good limestone or shale. Where the resistivities are lower within this layer, particularly between 20 – 40 m along profile 61 a weathering or infilling of the rock would be interpreted. If the rock is a limestone this weathering may be due to karstification of the rock.

4.21 CH163900

Map and Figures: 21

Profiles: 67, 68 and 69

Location Comment: This survey location consisted of three 93 m profiles crossing the river Liffey. The location of these profiles was moved from the original proposed box location to the updated proposed pipeline river crossing location farther to the north.

GI Points: N/A

The seismic refraction velocities show a three layer model with velocities increasing from 200 to 2000 m/s. The first two layers are both quite thin reaching a maximum depth of 4.5 m bgl. The resistivities are generally low throughout the site and only increase above 500 Ohmm for a small section of profile 68 at a distance of 60 m at a depth of five metres.

The first seismic refraction layer is around one metre thick throughout the site and is interpreted as soft or loose topsoil. The second layer is also generally thin throughout the site with a maximum thickness of 3.5 m. This layer is interpreted as a firm sandy gravelly clay or silt.

The third seismic refraction layer is interpreted as a very stiff sandy gravelly clay or silt. At a distance of between 50 and 80 m along profiles 68 and 69 at a depth of greater than 7 m bgl the increase in resistivities would indicate a dense clayey silty sand or gravel. The third seismic refraction layer may also contain poor very weathered shale or limestone.

The poor quality of this rock would mean that for excavation this layer would be diggable or rippable. A good rock layer was not interpreted within the survey limits.

4.22 CH168300

Map and Figures: 22

Profiles: 70 and 71

Location Comment: Vegetation and landowner access restrictions meant the north side of the Grand Canal was not accessible. Landowner access restrictions to the field in the south of the proposed location left a narrow area of land between the canal and the field boundary to carry out the survey. Within this area two 93 m profiles were carried out parallel to the canal.

GI Points: N/A

The seismic refraction velocities show a four layer model with the first and third layer both being relatively thin. The fourth layer begins at about eight metres and is relatively flat along both profiles. The resistivities show a strong change within layer three with low resistivities above and higher resistivities below.

The first seismic velocity layer is a thin topsoil layer with a maximum thickness of two metres. The second layer is interpreted as a stiff sandy gravelly clay or silt. The bottom of this layer is between five and seven metres bgl.

The strong increase in resistivities within the third seismic refraction layer indicates that there is a transition between overburden and rock within this layer. The layer would therefore be interpreted as a combination of fair weathered limestone and very stiff sandy gravelly clay or silt.

The fourth layer is interpreted as a good limestone. The top of this layer is between eight and nine metres bgl. Excavation of this layer would require breaking or blasting while excavating layer three may also require breaking or blasting.

5. CONCLUSIONS

The following conclusions are made:

- The large distances covered during this project and the space between each survey box means the geology varies greatly throughout the project.
- Soft ground (Peat), shallow rock and karstified rock are the main concerns when constructing a pipeline.
- Peat was encountered on site in the areas on Maps 12, 13, 14, 15 and 19. The deepest peat area was on Map 19 where peat was eight metres deep.
- Peat is also noted as an overburden type in Table 1 for Maps 3, 4, 6, 9, 10, 11, 16 and 20 but was not noted on site. Low resistivities indicate the possibility of deep peat in the area on Maps 4, 6 and 20.
- Layer seven is interpreted as the good rock layer which will require breaking and blasting for removal. This layer is less than four metres deep in parts of Maps 1, 16, 17 and 20.
- The resistivities in a number of area indicate the possibility of karstification of the rock in these areas. They include Maps 1, 3, 4, 5, 9, 16, 17 and 20.
- This report will be reviewed and finalised after the complete direct ground investigation data has been received.

6. REFERENCES

1. **GSEG 2002.** Geophysics in Engineering Investigations. Geological Society Engineering Geology Special Publication 19, London, 2002.

2. **GSI, 2017.** Bedrock Geological Map of Ireland. Geological Survey of Ireland 2017.

3. **Milsom, 1989.** Field Geophysics. John Wiley and Sons.

4. **Reynolds, 1997.** An Introduction to Applied and Environmental Geophysics. John Wiley and Son.

Table 1: Geophysical Survey Locations and Background Information

IW Map No.	MGX Report Map/Figure No.	Folio	Townland	County	Watercourse Name	Survey Date	Profile Numbers	Combined Profile Length	Chainage
			Seis + Res Areas 50 x 50m Box						
12	1	TY6538N/TY10871N	Ballyannymore	Tipperary	Nenagh River	06/06/2017	8, 9, 10	279	22100
24	2	OY3648N/TY4343N	Toora/ Quakerstown	Offaly/Tipperary	Unknown	07/06/2017	11,12,13	279	47340
25	3	OY3601N	Quakerstown/ Kilmurryely	Tipperary/Offaly	Unknown	08/06/2017	14,15,16	279	48780
26	4	OY7742N/OY14423N	Tubbrid/Boveen	Offaly/Tipperary	Little Brosna River	09/06/2017	17,18,19	279	52300
33	5	OY5987N/OY14423N	Breaghmore	Offaly	Camcor	15/06/2017	29,30,31	279	65390
34	6	OY11453N	Cloghanmore	Offaly	Camcor	12/06/2017	20,21,25	279	67000
40	7	OY5136N/OY13263N/UNROFF8	Ballynacarrig/ Derries	Offaly	Silver River	13/06/2017	22,23,24	279	80080
47	8	OY5451N/OY7177N	Gorteen/Ballinvarry	Offaly	Clodiagh River	14/06/2017	26,27,28	279	92280
59	9	OY7501F/OY9970F/OY12591F	Drumcaw or Mountlucas/ Esker Beg	Offaly	Philipstown/Figile River	16/06/2017	32,33,34	279	114550
60	10	OY18096N/OY26178F/OY8610N	Ballycon/Newtown	Offaly	Doden River	26/06/2017	44,45	186	115900
61	11	OY10331F	Esker More	Offaly	Doden River	21/06/2017	35,36,37	279	118420
64	12	OY5019N/OY20807F	Ballykilleen/Shean	Offaly	Figile River	23/06/2017	41,42,43	279	123400
64	13	OY1812L/OY15337N/OY9255N	Shean/Kilcumber	Offaly	Figile River	22/06/2017	38,39,40	231	124000
65/66	14	OY-15327N/1812L/16981N/9161F/4020F	Cloncant	Offaly	Figile River	27/06/2017	46,47,48	279	126500
67	15	OY5006N	Cushaling	Offaly	Cushnaling River	04/07/2017	52,59,60	279	129300
69/70	16	KE13755N	Kilpatrick	Kildare	Abbeylough River	28/06/2017	49,50,51	279	134700
70	17	KE17311N/UNRKIL2	Kilpatrick	Kildare	Grand Canal	05/07/2017	53,54,55	279	135400
71	18	KE31210F/KE3815N	Kilkeaskin/ Drummond	Kildare	Cushaling River	06/06/2017	56,57,58	279	138350
76/77	19	KE27309F/KE15578F	Derrylahen	Kildare	Stream to River Blackwater	11/07/2017	64,65,66	279	146500
78	20	KE40753F	Derrycrib	Kildare	Blackwater	10/07/2017	61,62,63	279	148700
86	21	KE3126N/UNRKIL8	Castledillon Upper	Kildare	River Liffey	12/07/2017	67,68,69	279	163900
88	22	UNRKIL6/DN6109F	Colganstown	Dublin	Grand Canal	13/07/2017	70,71	186	168300

Table 1: Geophysical Survey Locations and Background Information

IW Map No.	MGX Report Map/Figure No.	Proposed Boreholes	Bedrock	Soil	Subsoil
			From Geological Survey of Irelannd Database		
12	1	BH-188	Waulsortian Limestone-Massive unbedded limestone-mudstone	Alluvium/Glaciofluvial S+G	Alluvium/Glaciofluvial S+G
24	2	BH-82/178	Ballysteen Formation-Dark muddy Limestone Shale	Alluvium	Alluvium
25	3	BH-83/179	Waulsortian Limestone-Massive unbedded limestone-mudstone	Cut Peat	Peat
26	4	BH-12/13	Waulsortian Limestone-Massive unbedded limestone-mudstone	Alluvium/Peat	Alluvium/Peat
33	5	BH-16/17	Lucan Formation - Dark Limestone & Shale/Oldcourt Cherty Limestone Formation - Grey Limestone & dark chert	Alluvium	Alluvium
34	6	BH-18/19	Lucan Formation-Dark Limestone & Shale	Alluvium/Cut Peat	Alluvium/Cut Peat
40	7	BH-20/21	Ballysteen Formation-Dark muddy Limestone Shale	Alluvium	Alluvium
47	8	BH-22/23	Waulsortian Limestone-Massive unbedded limestone-mudstone/Ballysteen Formation - Dark muddy limestone,shale	Alluvium/Glaciofluvial S+G	Alluvium/Glaciofluvial S+G
59	9	BH-180/181	Waulsortian Limestone-Massive unbedded limestone-mudstone/ Edenderry Oolite Member - Oolitic Limestone	Peat	Peat
60	10	BH-26	Edenderry Oolite Member - Oolitic Limestone	Peat	Peat
61	11	BH-182	Edenderry Oolite Member - Oolitic Limestone	Peat	Peat
64	12	None	Lucan Formation - Dark Limestone & Shale	Peat	Peat
64	13	BH-206/207	Lucan Formation - Dark Limestone & Shale	Peat	Peat
65/66	14	BH-30/31	Lucan Formation - Dark Limestone & Shale	Peat	Peat
67	15	BH-140	Lucan Formation - Dark Limestone & Shale/ (Ballyadams Formation - Crinoidal wackestone/packstone Limestone to the East)	Peat	Peat
69/70	16	BH-144/183	Allenwood Formation - Thick-bedded Limestone, locally peoloidal	Peat/Limestone Till	Peat/Limestone Till
70	17	BH32/33	Allenwood Formation - Thick-bedded Limestone, locally peoloidal/Waulsortian Limestone - Massive unbedded lime-mudstone	Limestone Till	Limestone Till
71	18	BH-208/209	Waulsortian Limestone-Massive unbedded limestone-mudstone	Alluvium	Alluvium
76/77	19	BH-154/155	Lucan Formation - Dark Limestone & Shale	Peat	Peat
78	20	BH-157/184	Lucan Formation - Dark Limestone & Shale	Peat	Peat
86	21	BH-219/220	Lucan Formation - Dark Limestone & Shale	Alluvium	Alluvium
88	22	BH-38/39	Lucan Formation - Dark Limestone & Shale	Limestone Till	Limestone Till

LEGEND: Interpretation of Resistivities and Seismic Velocities:

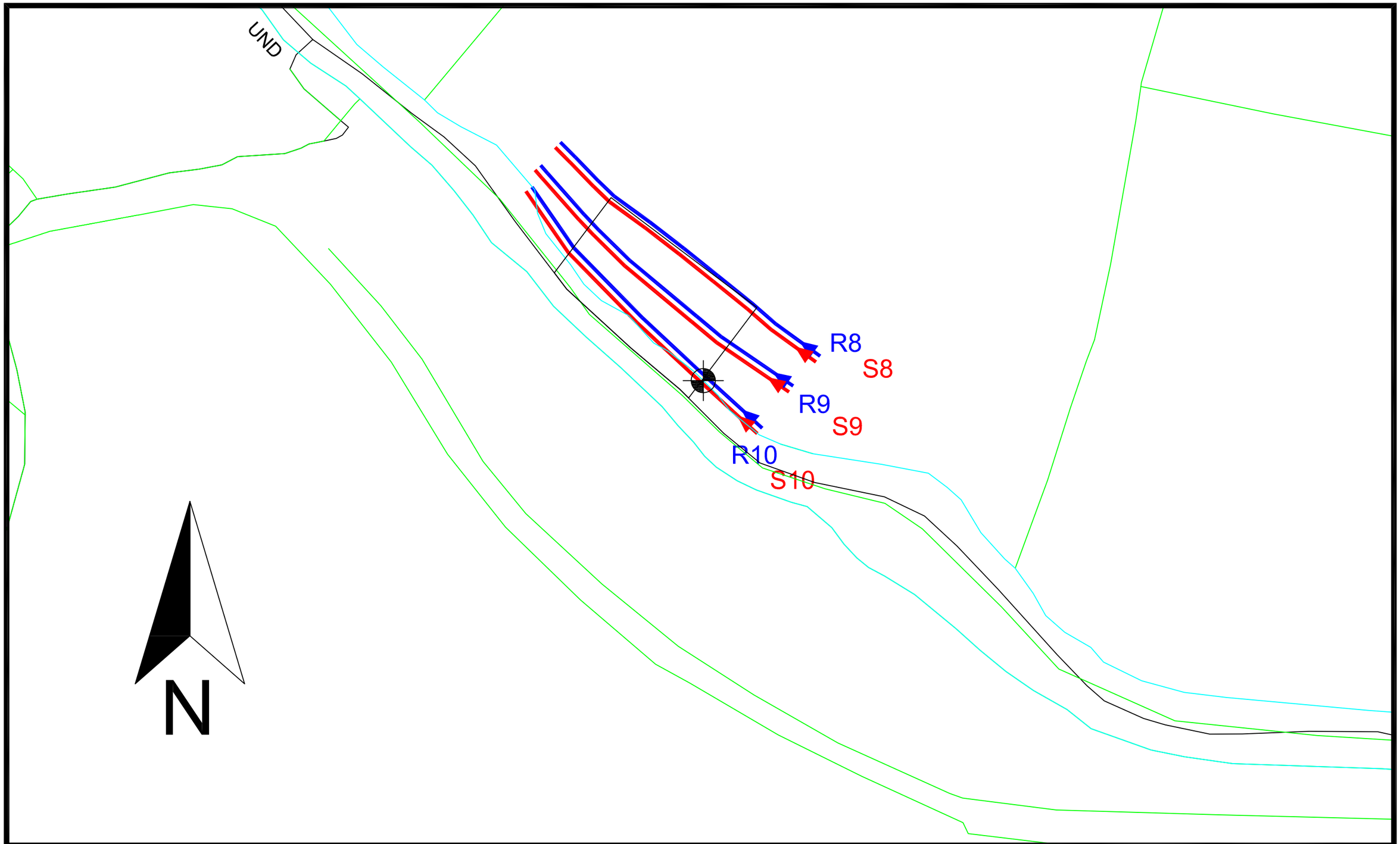
- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone

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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Legend for Interpretation of Seismic Refraction & 2D Resistivity Profiles

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PROJECT:	6209
DRAWN:	JC
DATE:	06/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

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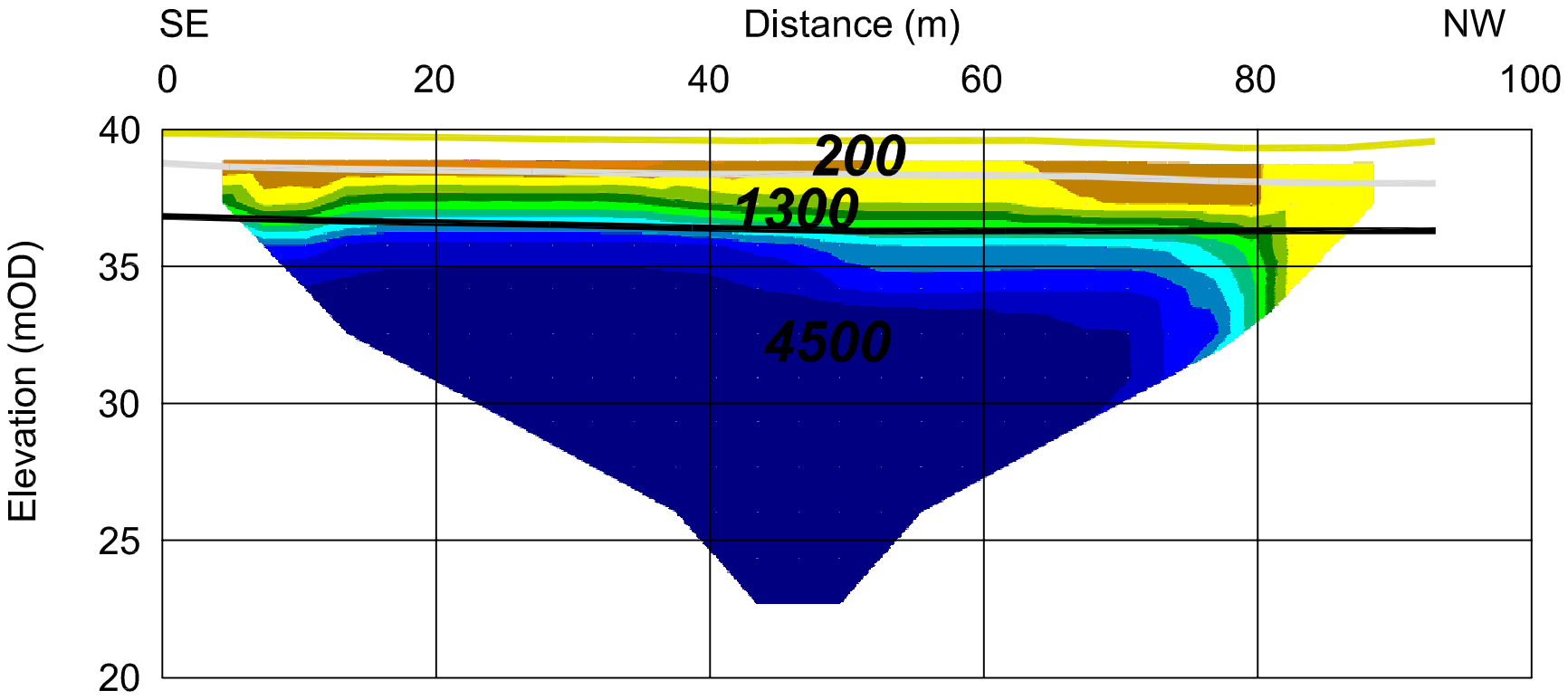
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 1: Geophysical Survey Location Map CH22100

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STATUS:	Draft

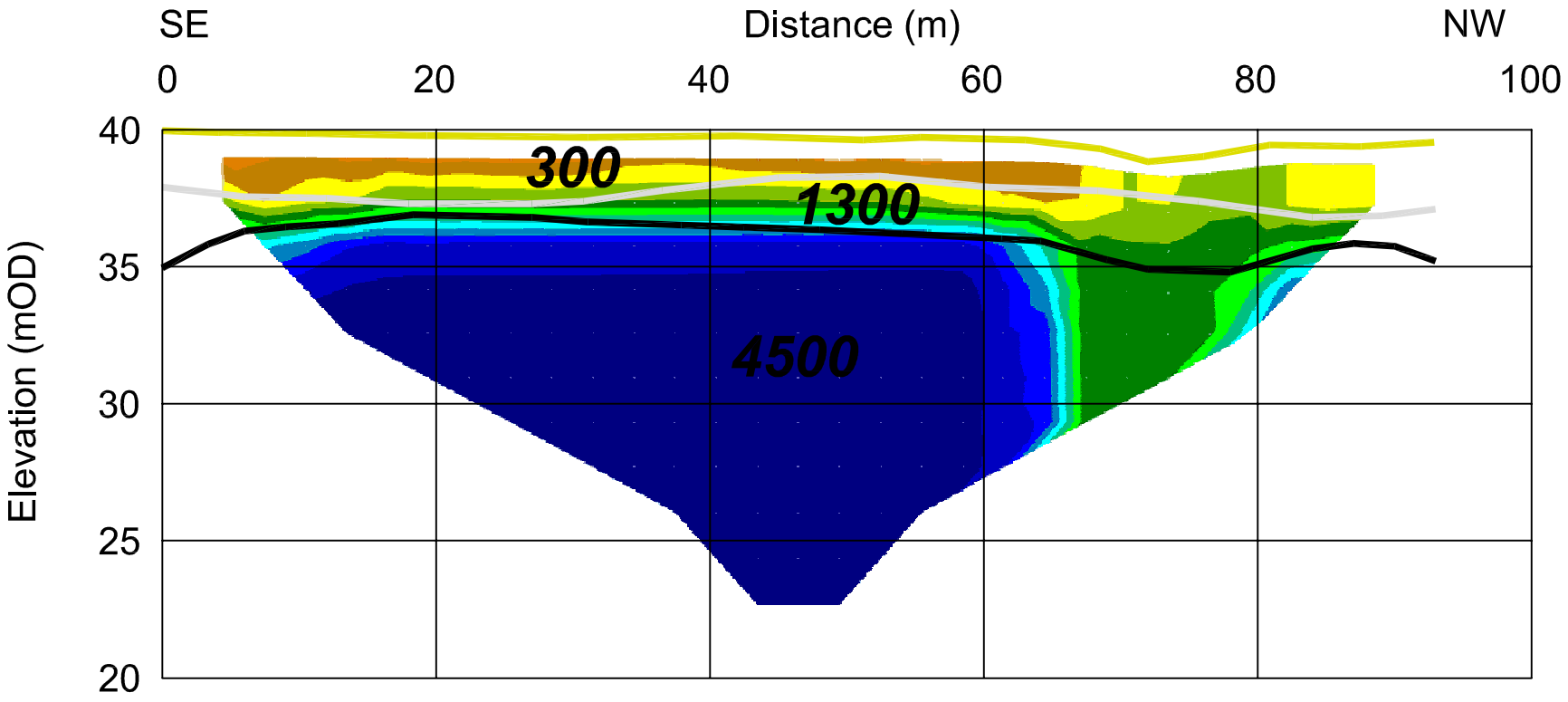
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- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

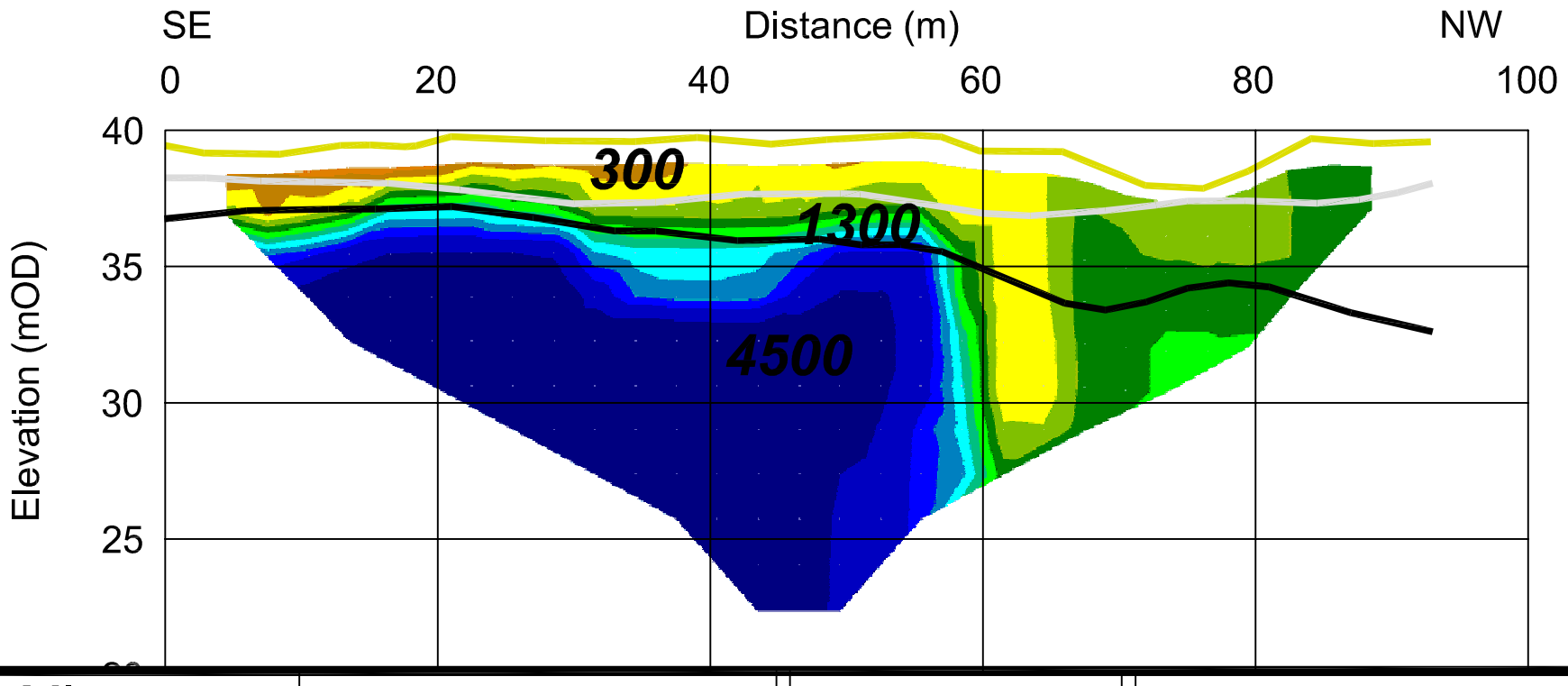
2D-Resistivity Profile R8 and Seismic Refraction Profile S8 Model



2D-Resistivity Profile R9 and Seismic Refraction Profile S9 Model



2D-Resistivity Profile R10 and Seismic Refraction Profile S10 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 1a: Models of of Geophysical Survey CH22100

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	06/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

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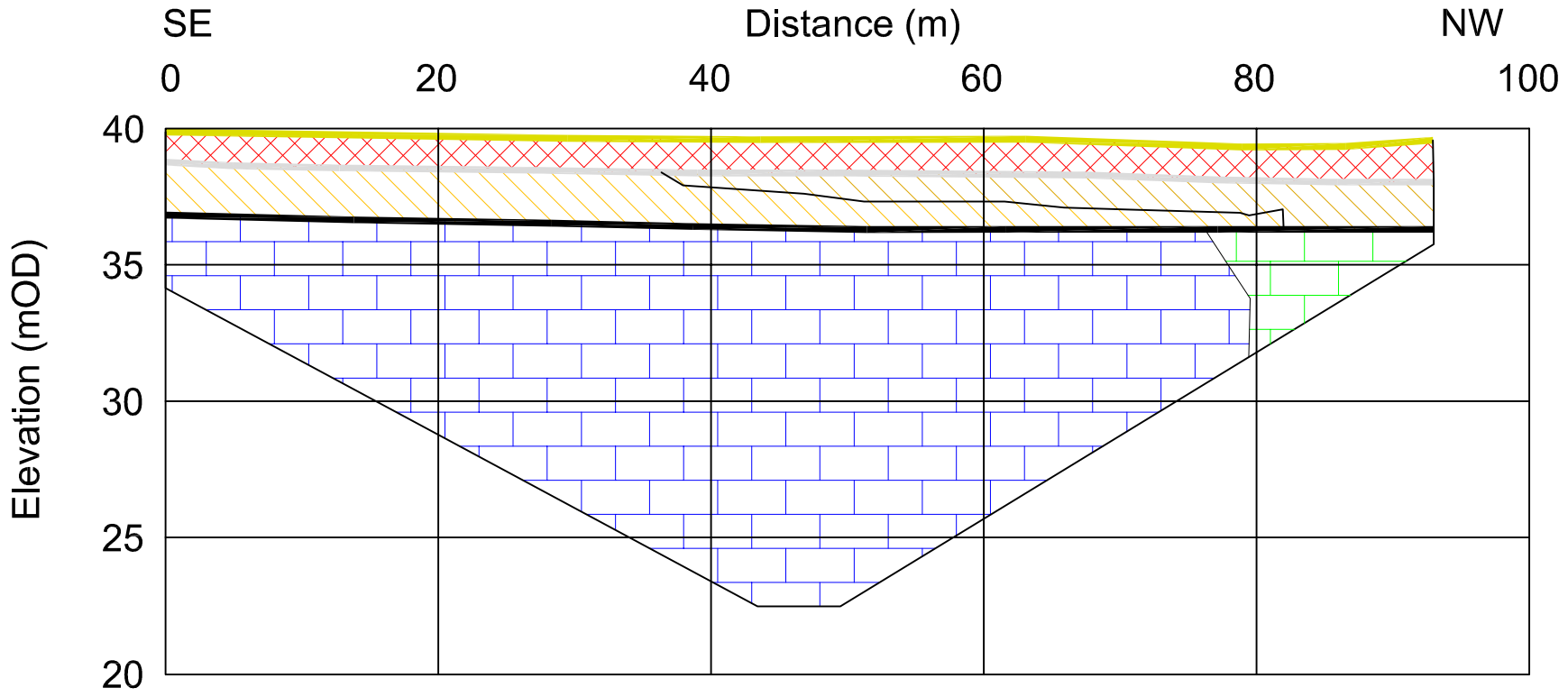
Layers from Seismic Refraction Model:

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- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

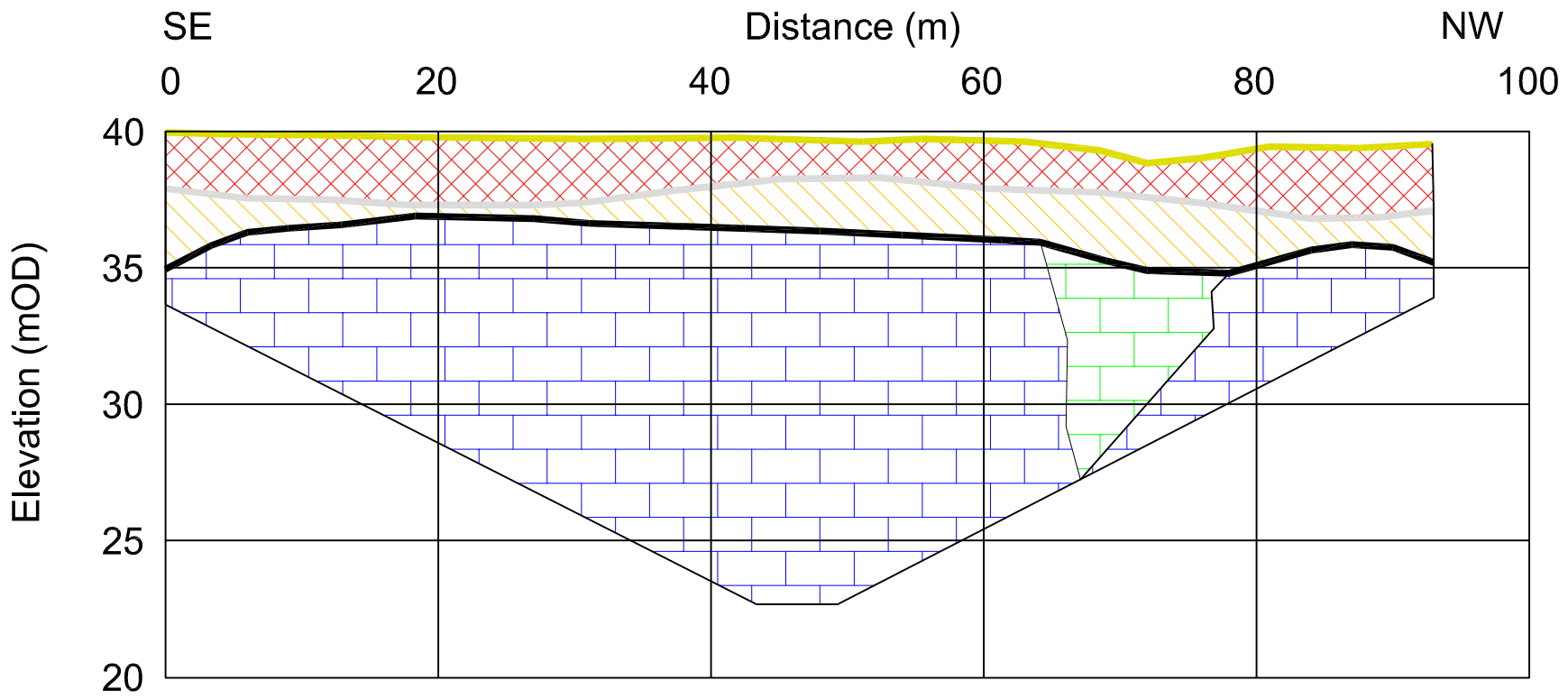
Resistivities (Ohmm) for 2D-Resistivity Model

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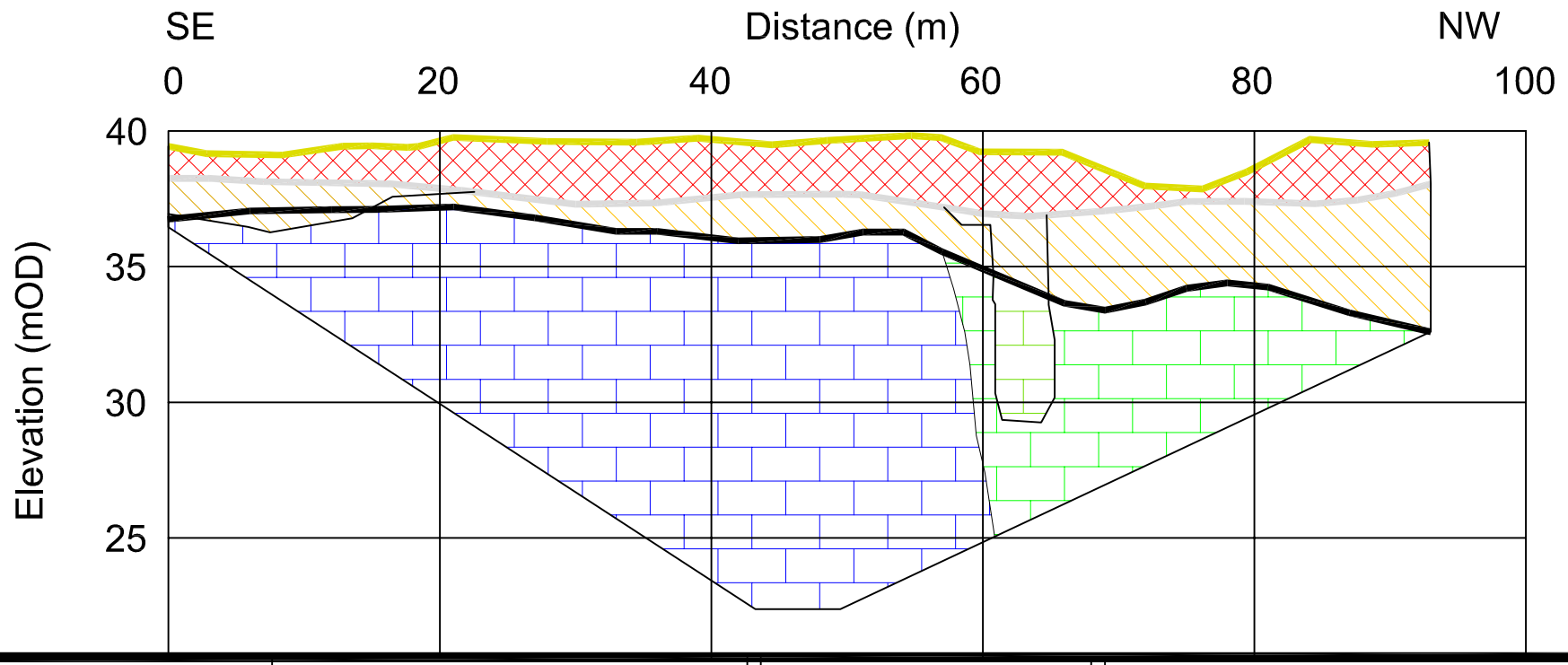
2D-Resistivity Profile R8 and Seismic Refraction Profile S8 Interpretation



2D-Resistivity Profile R9 and Seismic Refraction Profile S9 Interpretation



2D-Resistivity Prof. R10 and Seismic Refraction Prof. S10 Interpretation



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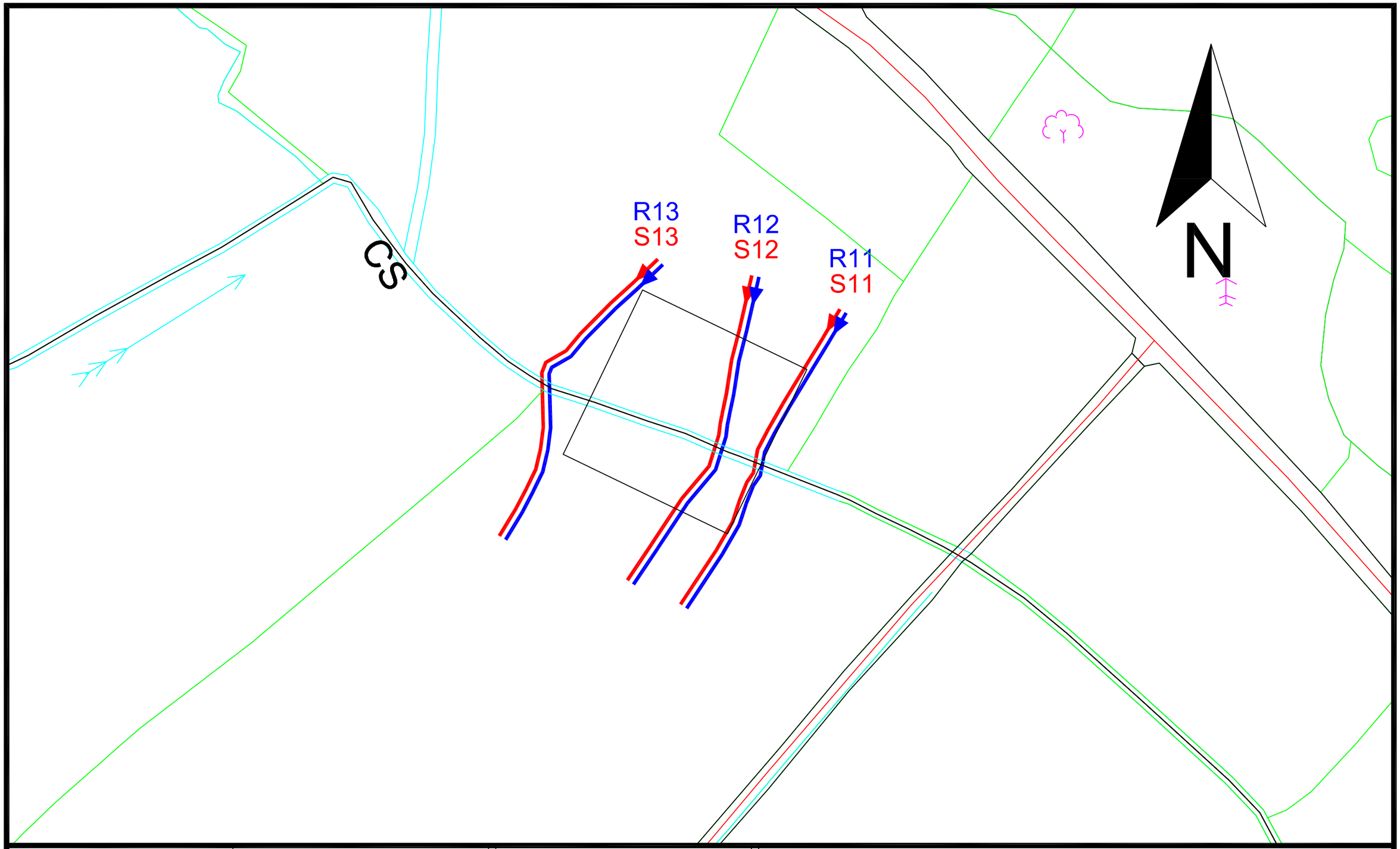
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 1b: Interpretation of of Geophysical Survey CH22100

SCALE:	1:500 @ A3, VE x 2
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DRAWN:	JC
DATE:	06/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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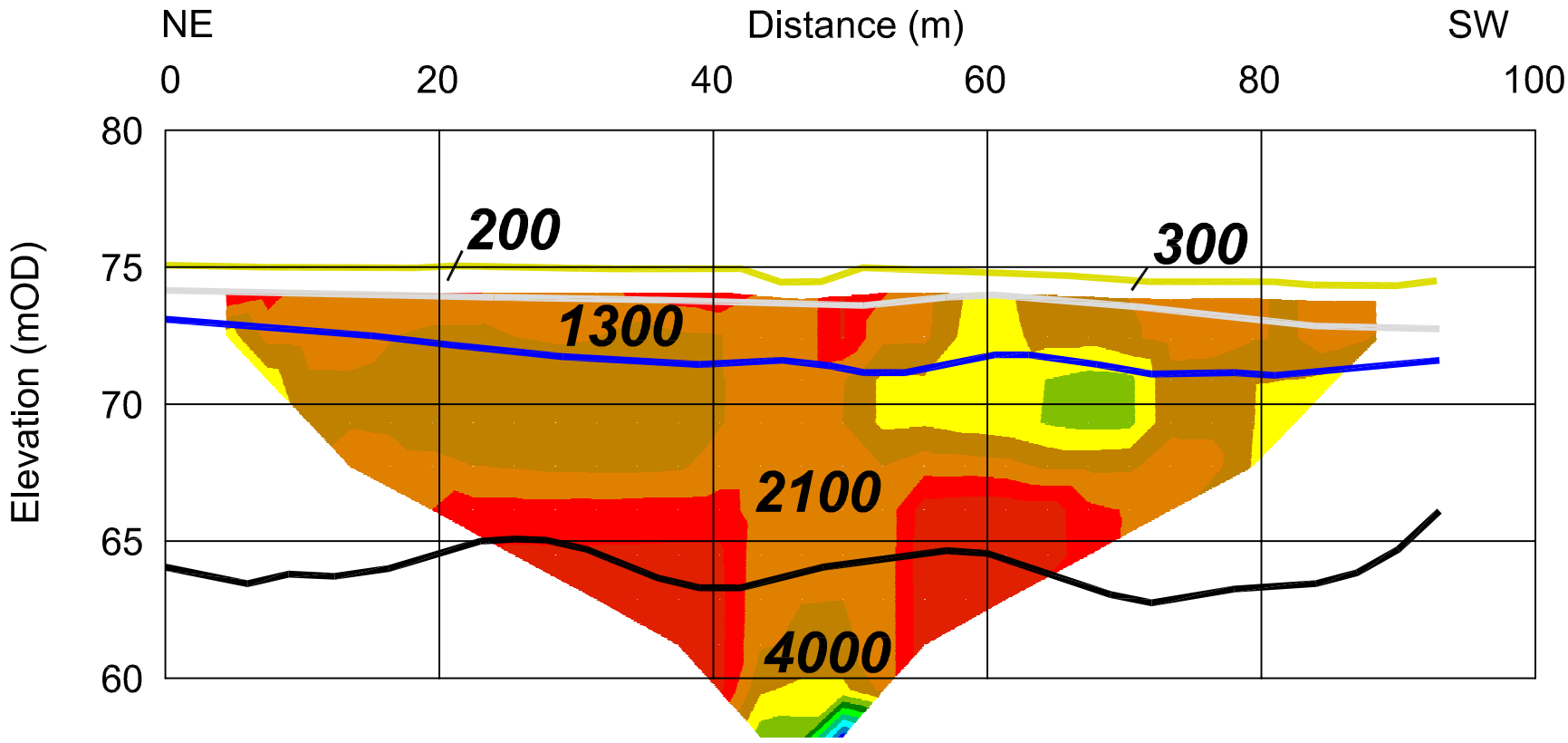
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
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DATE:	13/06/2017
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STATUS:	Draft

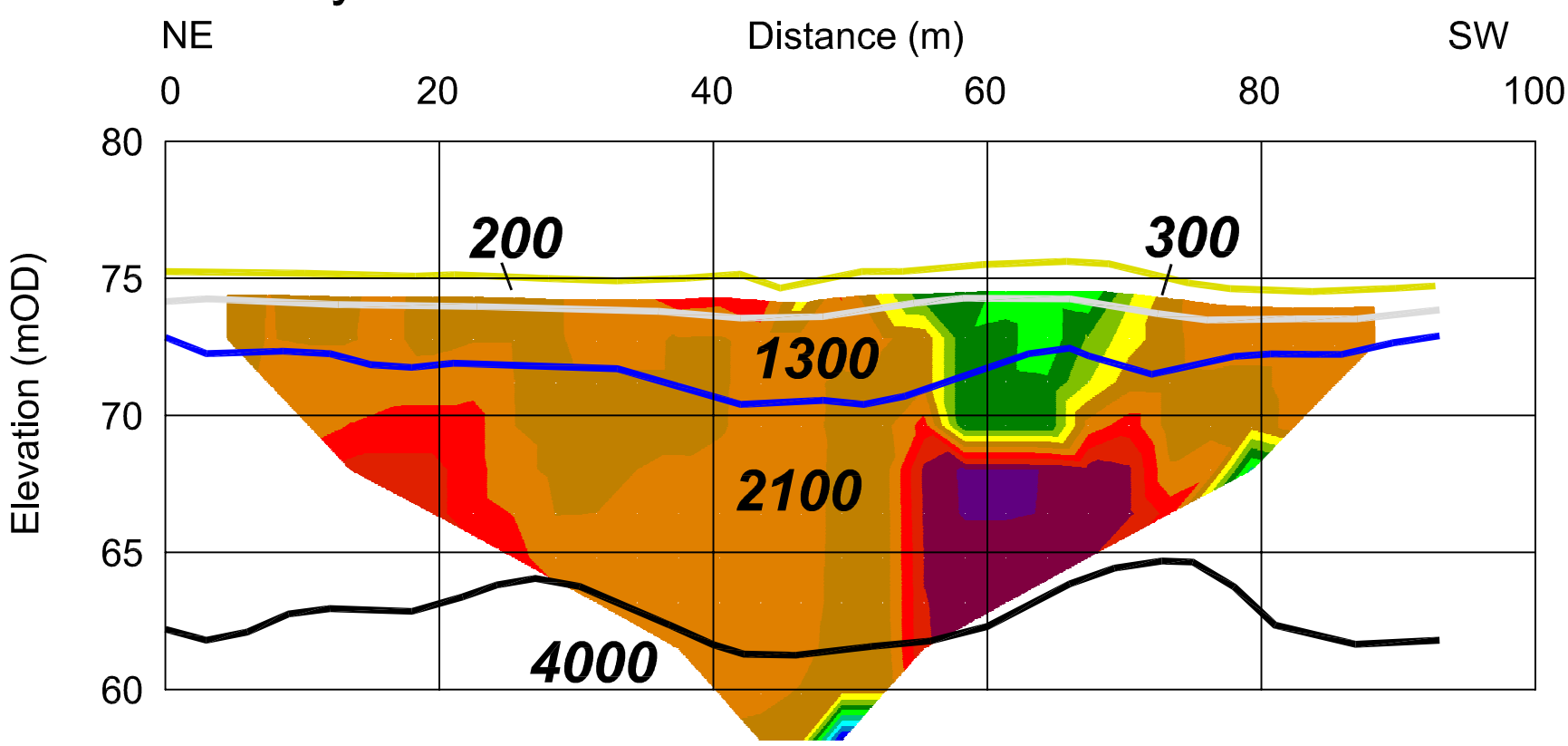
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

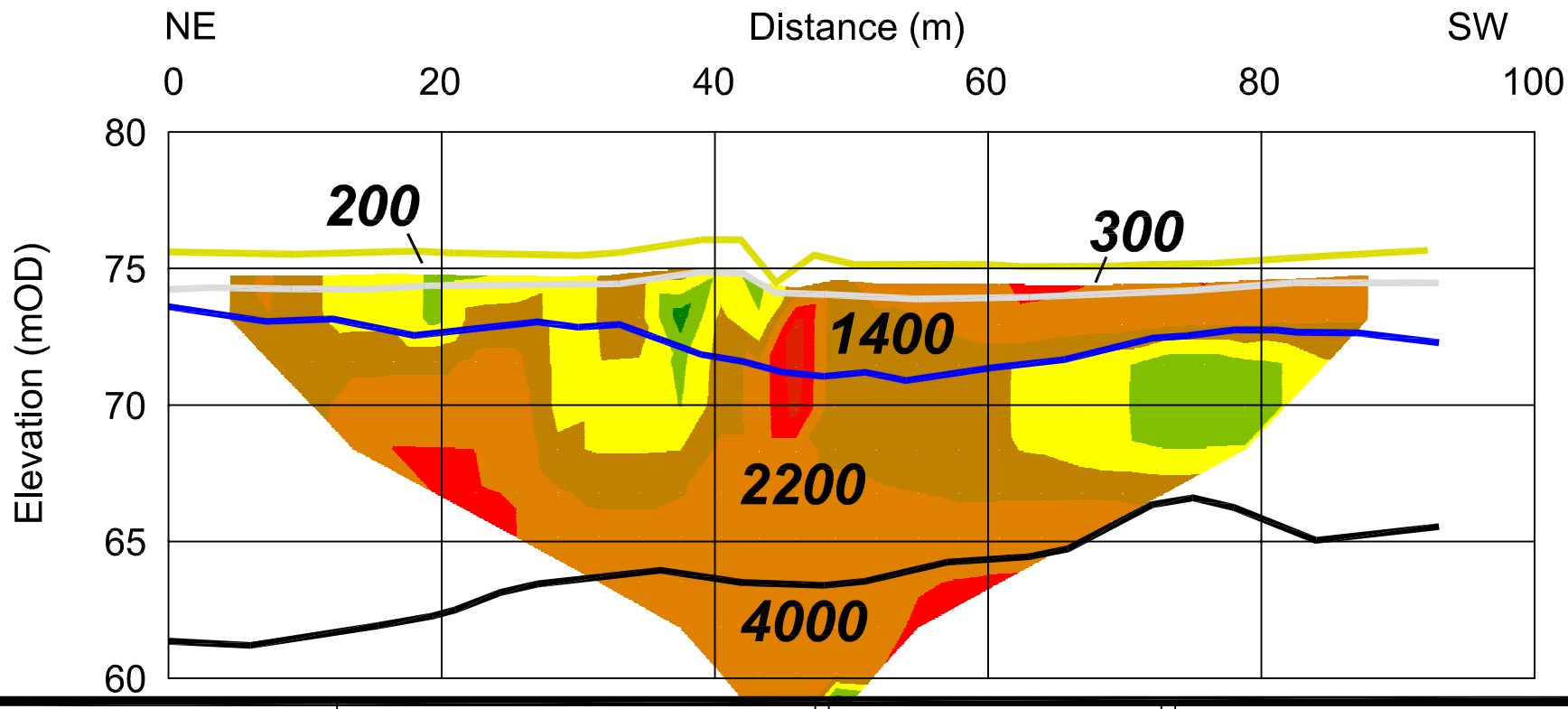
2D-Resistivity Profile R11 and Seismic Refraction Profile S11 Model



2D-Resistivity Profile R12 and Seismic Refraction Profile S12 Model



2D-Resistivity Profile R13 and Seismic Refraction Profile S13 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 2a: Models of of Geophysical Survey CH47340

SCALE:	1:500 @ A3, VE x 2
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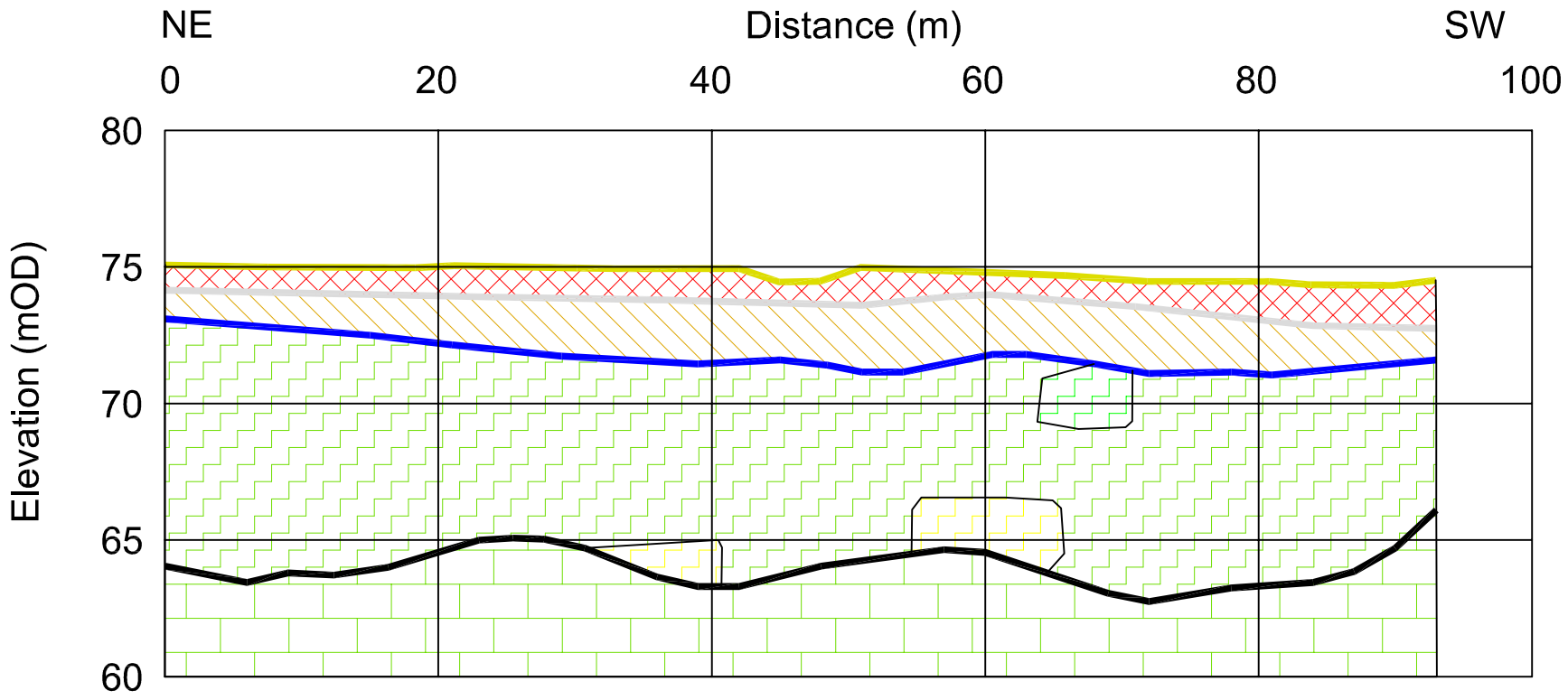
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

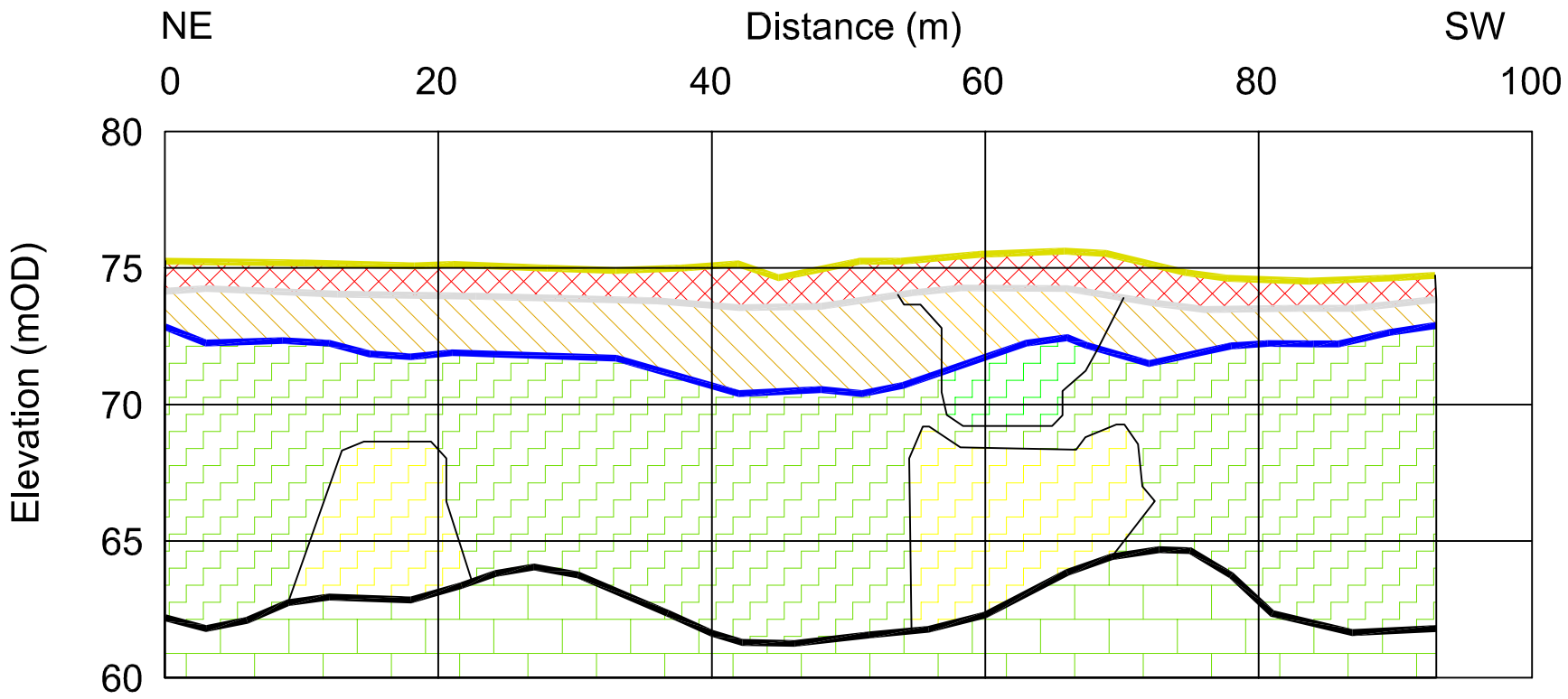
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 | 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000

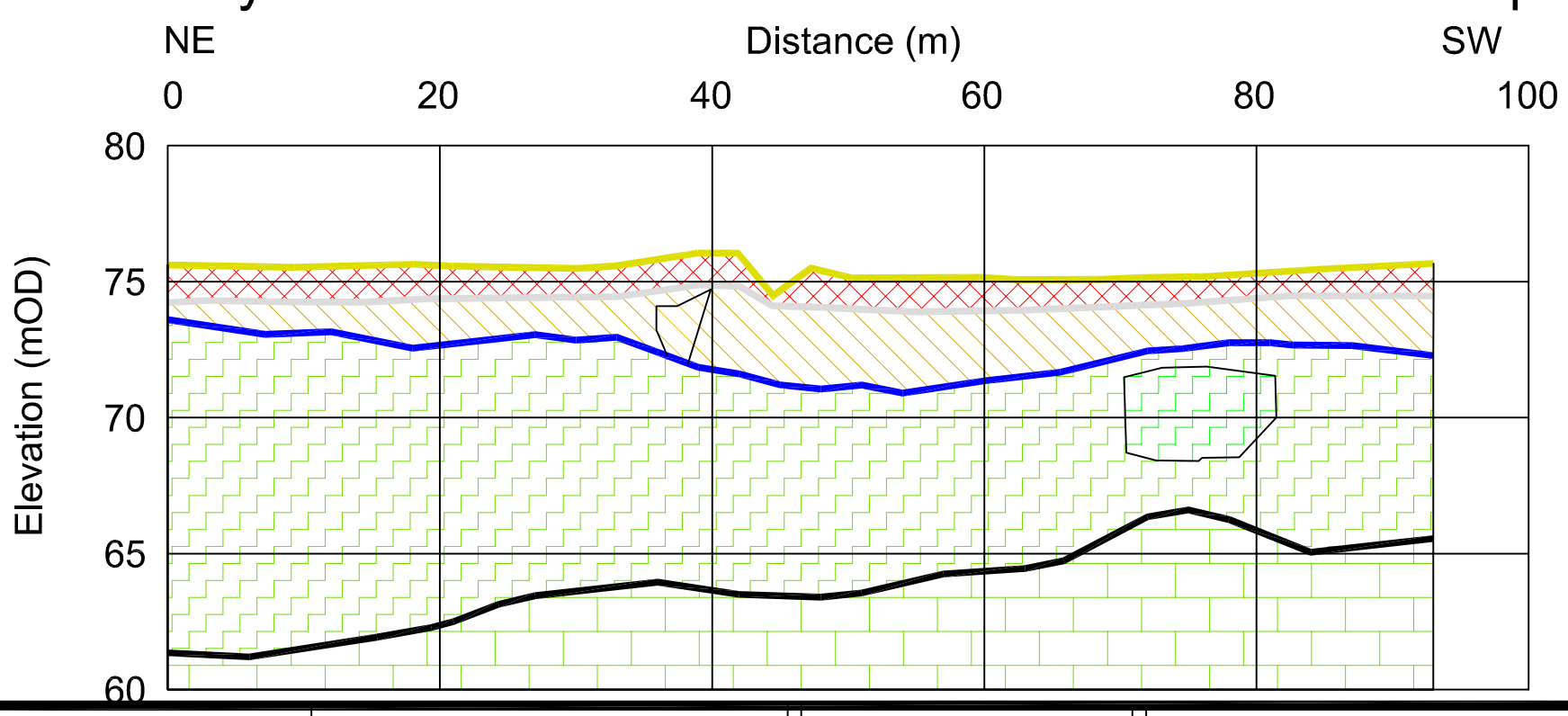
2D-Resistivity Prof. R11 and Seismic Refraction Prof. S11 Interpretation



2D-Resistivity Prof. R12 and Seismic Refraction Prof. S12 Interpretation



2D-Resistivity Prof. R13 and Seismic Refraction Prof. S13 Interpretation



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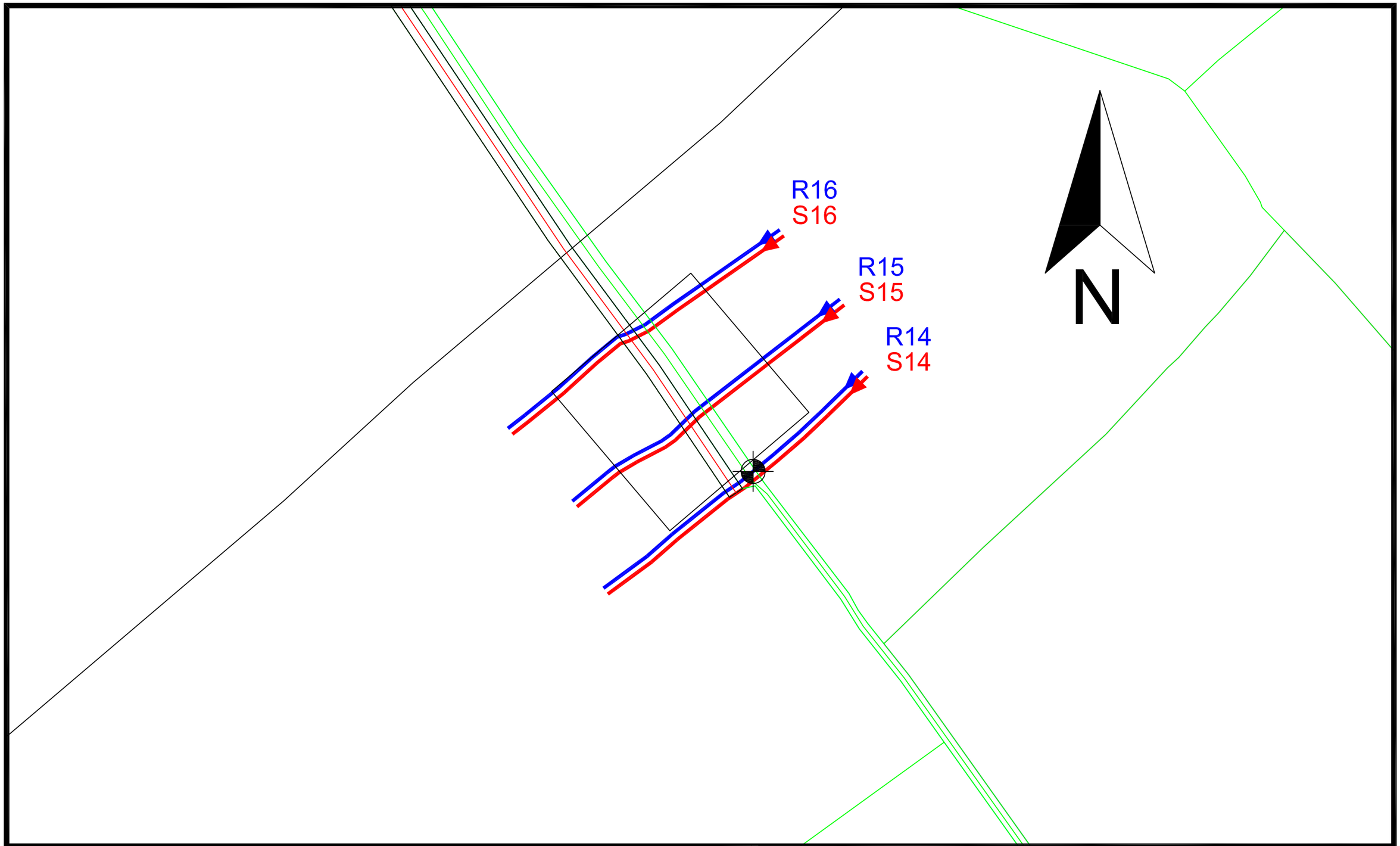
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Email: info@mgx.ie
Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 2b: Interpretation of of Geophysical Survey CH47340

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	13/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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Web: www.mgx.ie

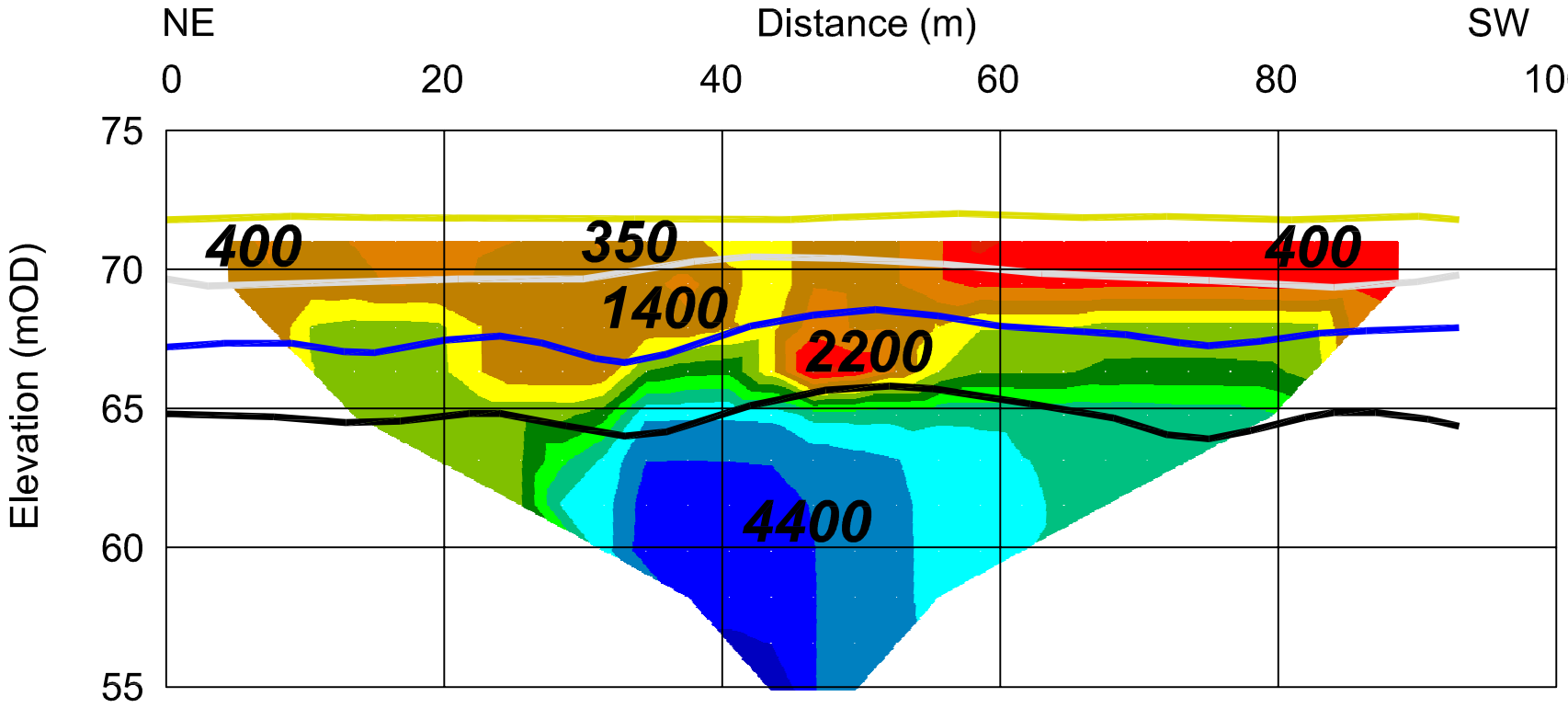
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 3: Geophysical Survey Location Map CH48780

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

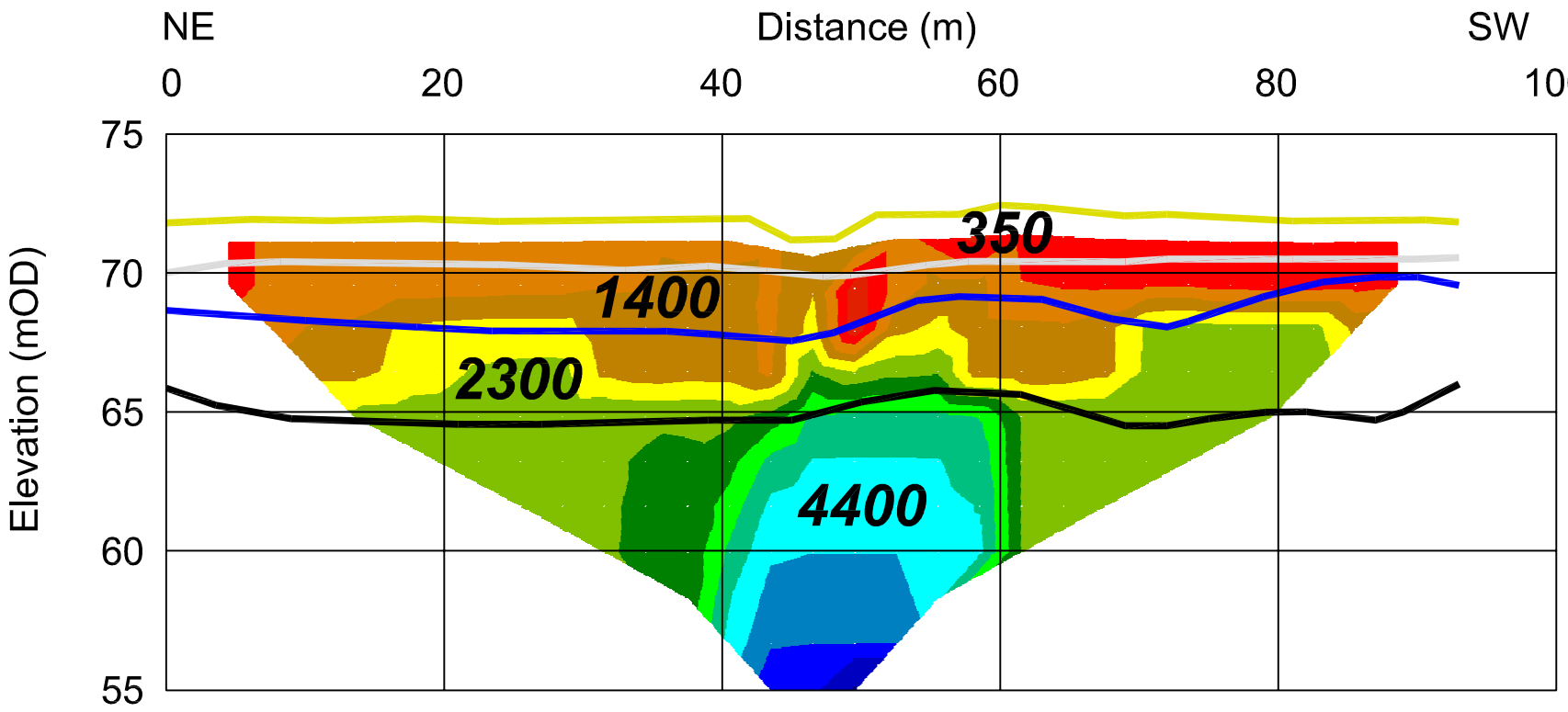
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

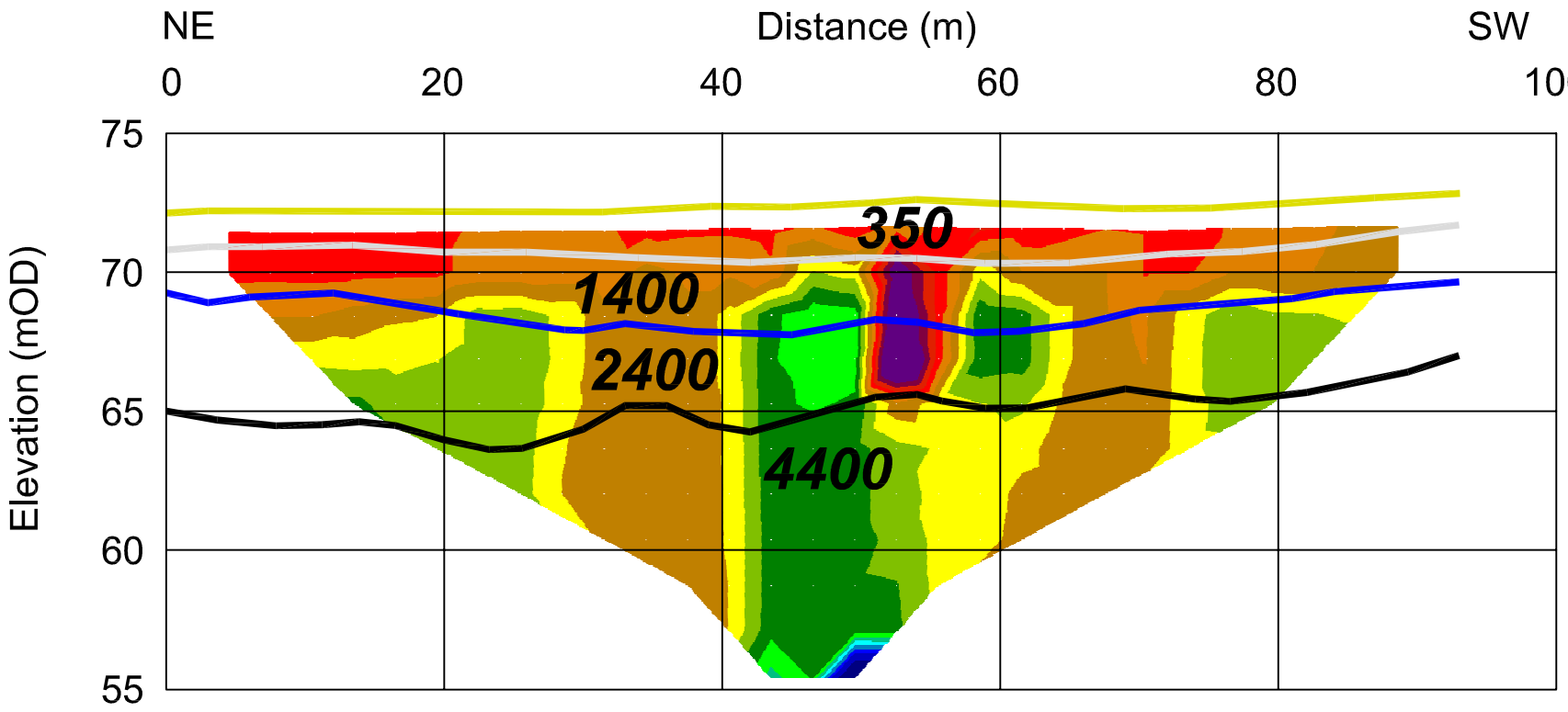
2D-Resistivity Profile R14 and Seismic Refraction Profile S14 Model



2D-Resistivity Profile R15 and Seismic Refraction Profile S15 Model



2D-Resistivity Profile R16 and Seismic Refraction Profile S16 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 3a: Models of of Geophysical Survey CH48780

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

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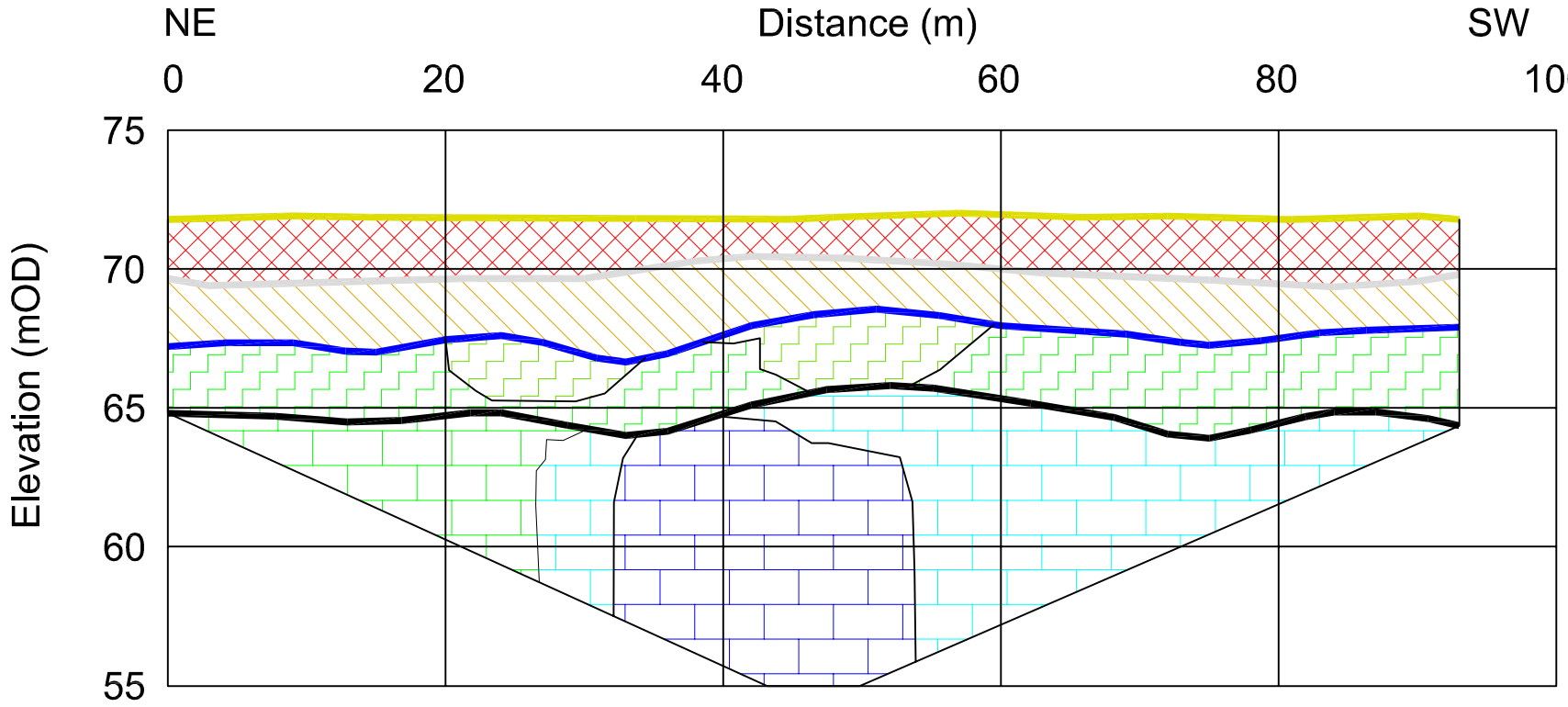
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

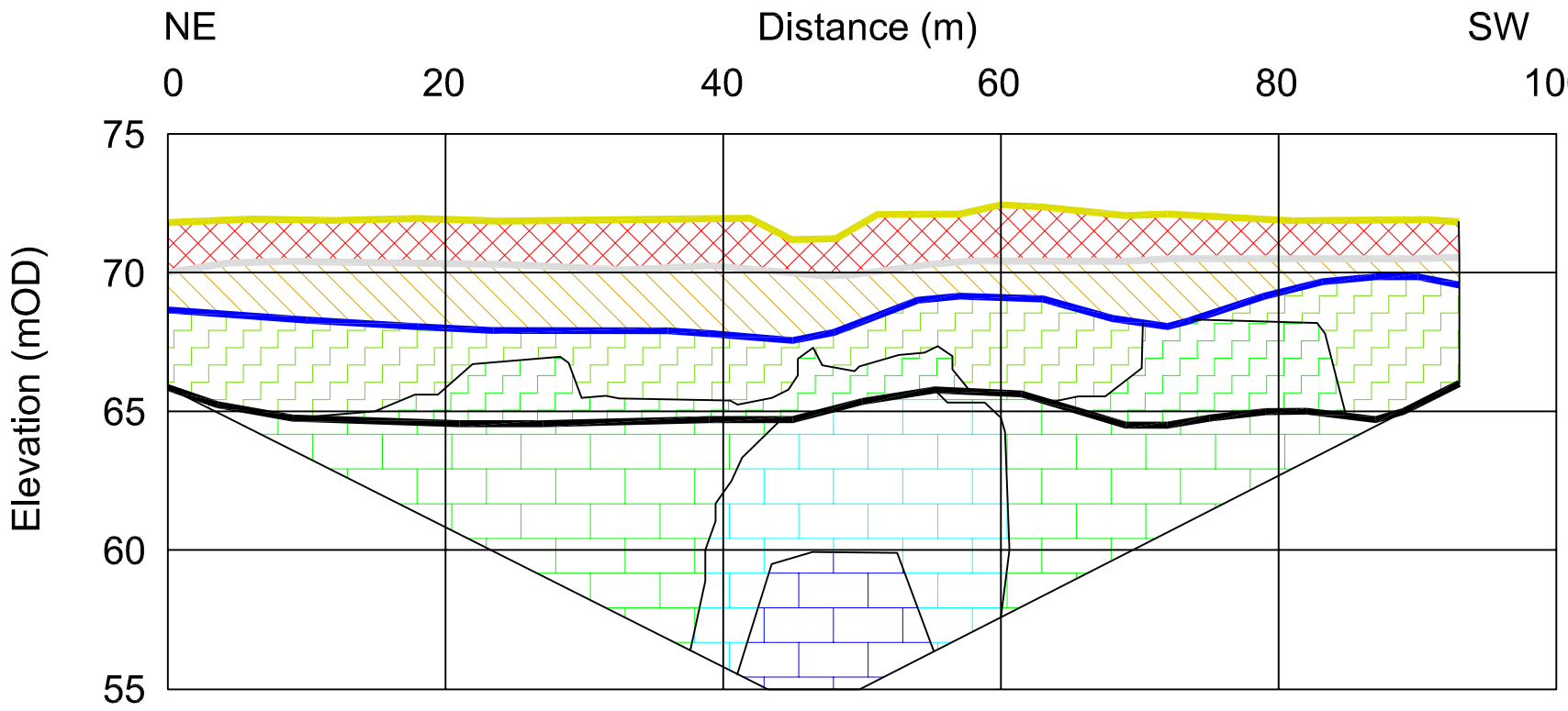
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

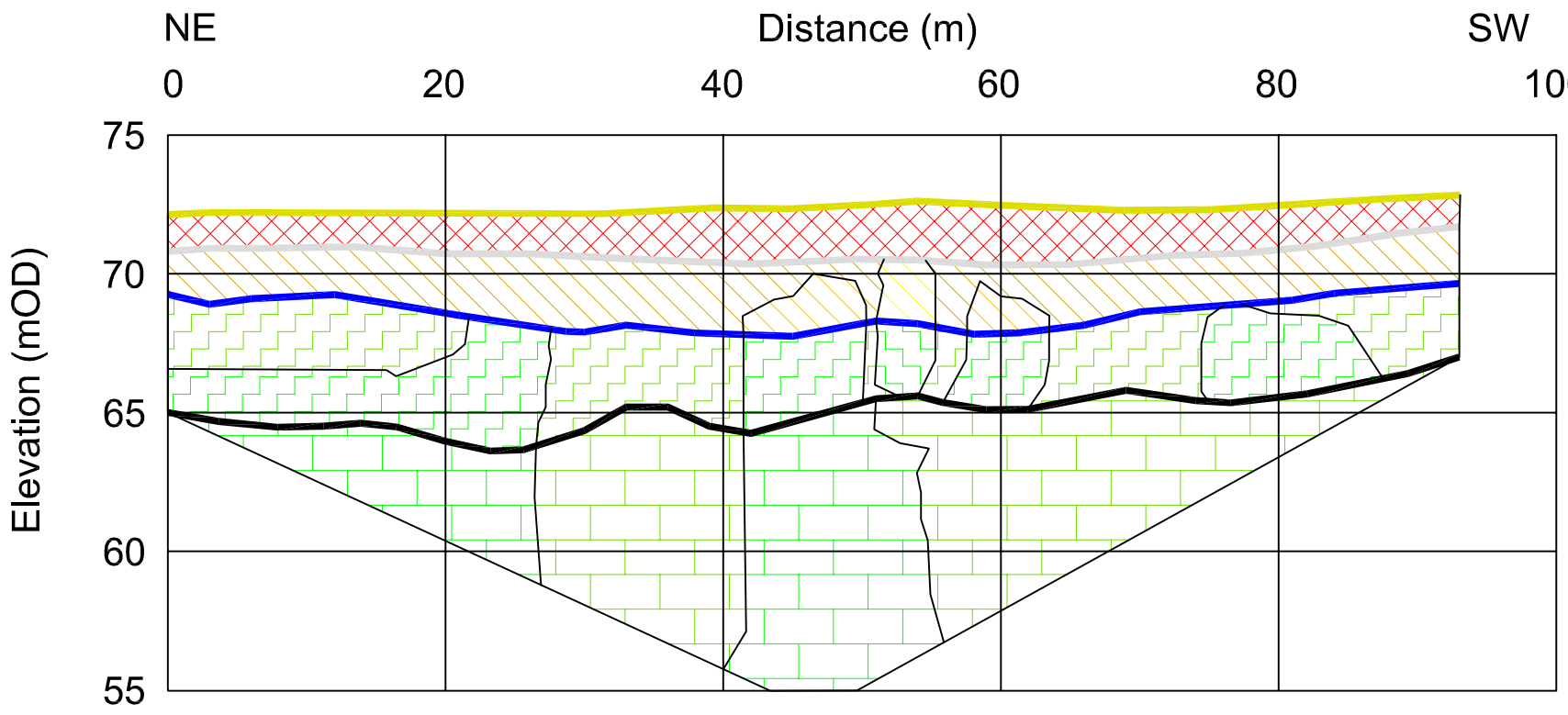
2D-Resistivity Prof. R14 and Seismic Refraction Prof. S14 Interpretation



2D-Resistivity Prof. R15 and Seismic Refraction Prof. S15 Interpretation



2D-Resistivity Prof. R16 and Seismic Refraction Prof. S16 Interpretation



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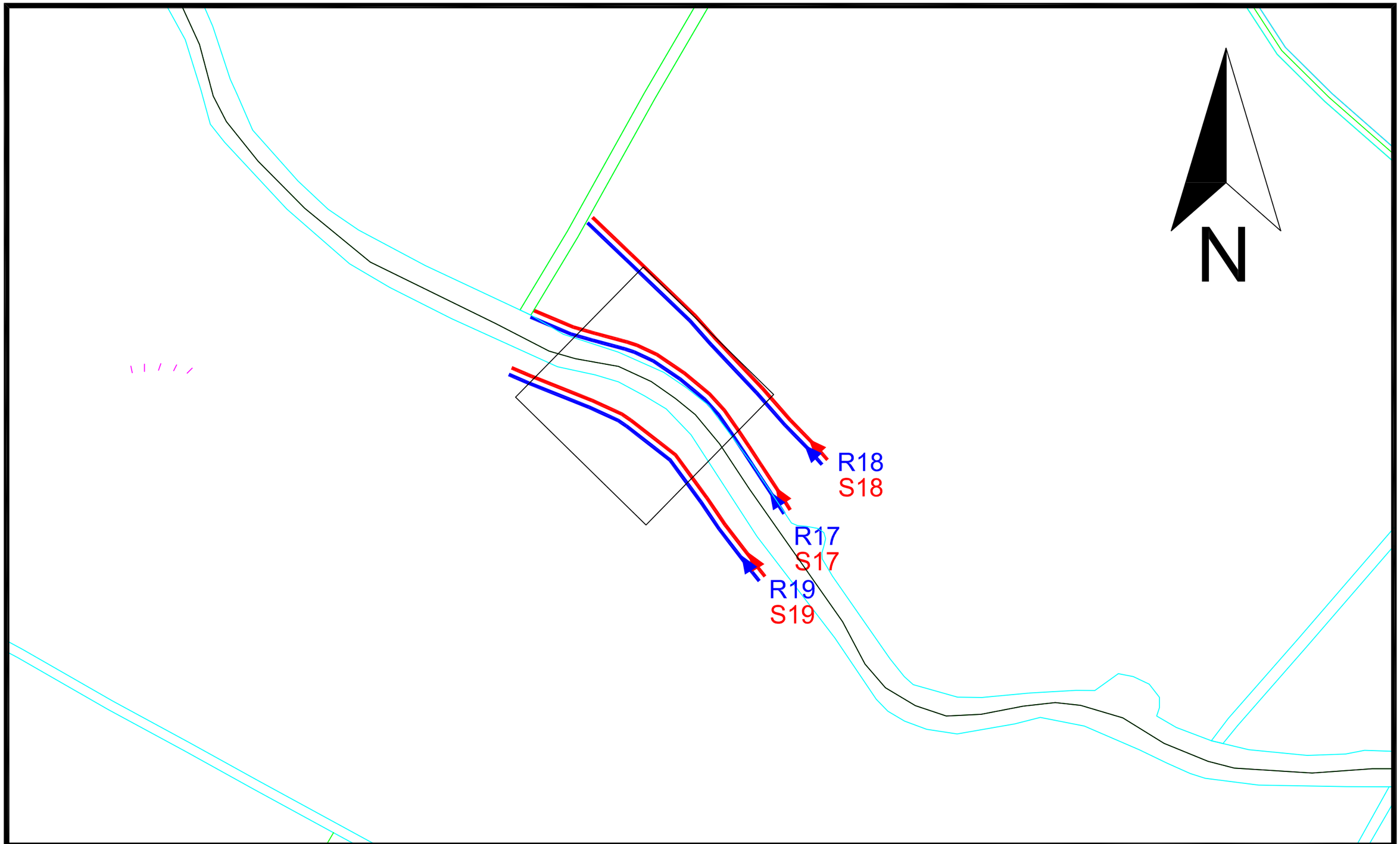
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 3a: Models of of Geophysical Survey CH48780

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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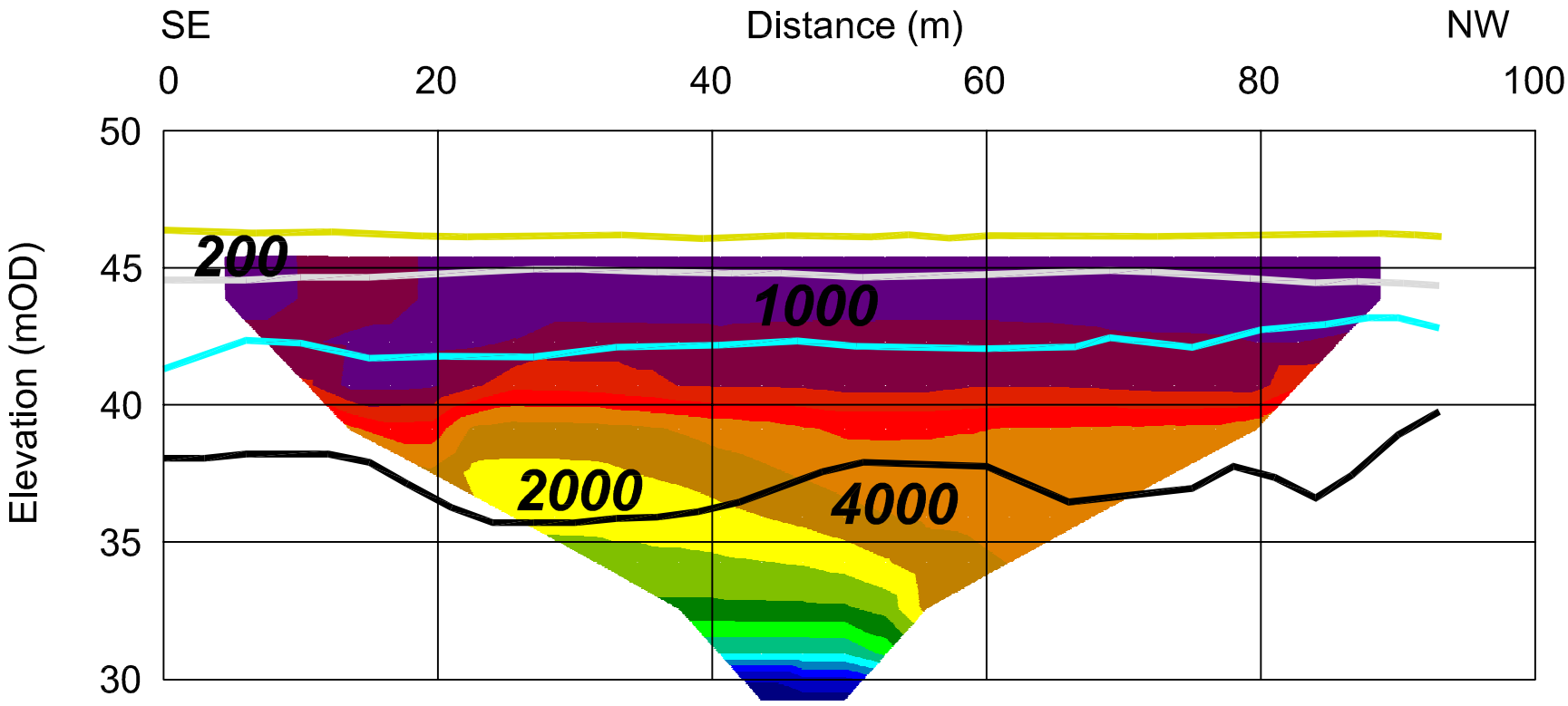
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 4: Geophysical Survey Location Map CH52300

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	13/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

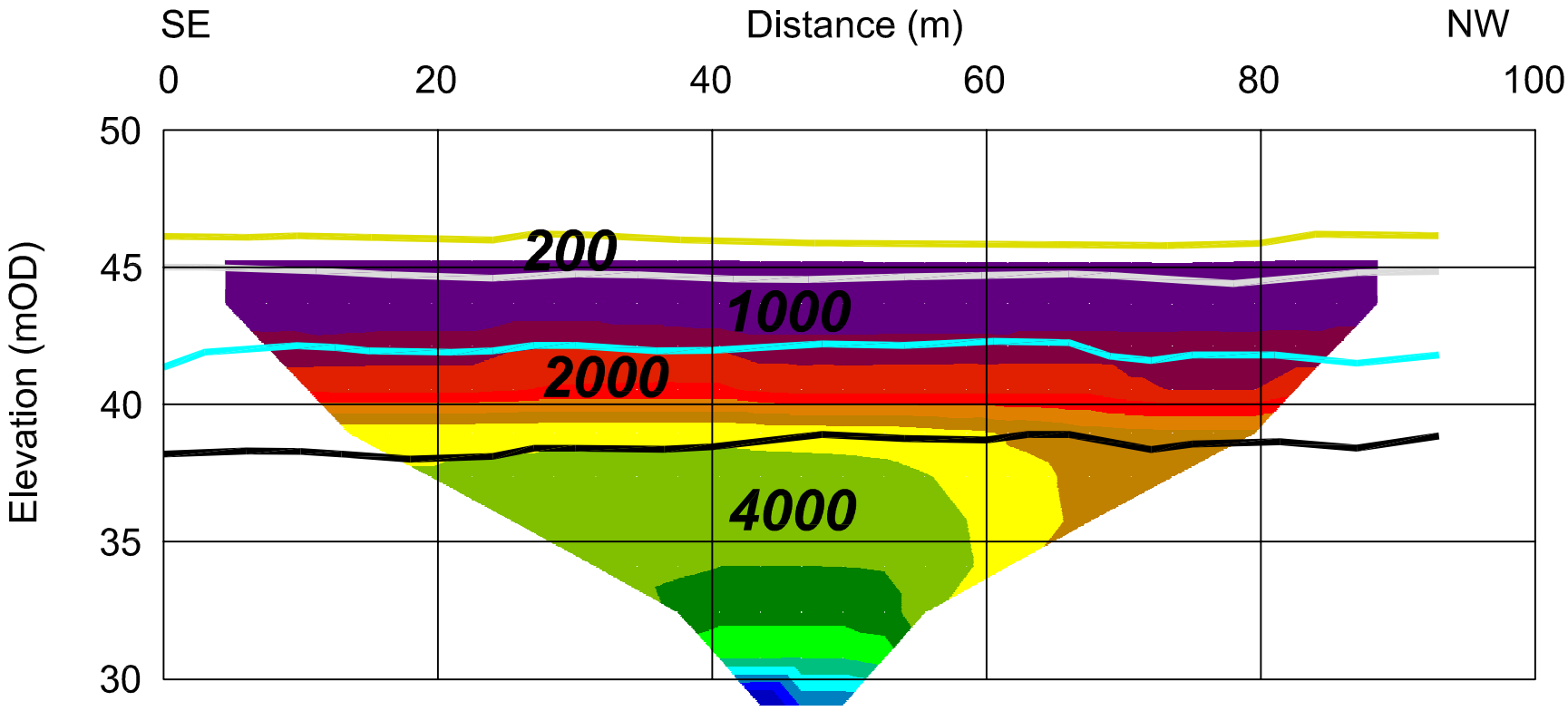
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

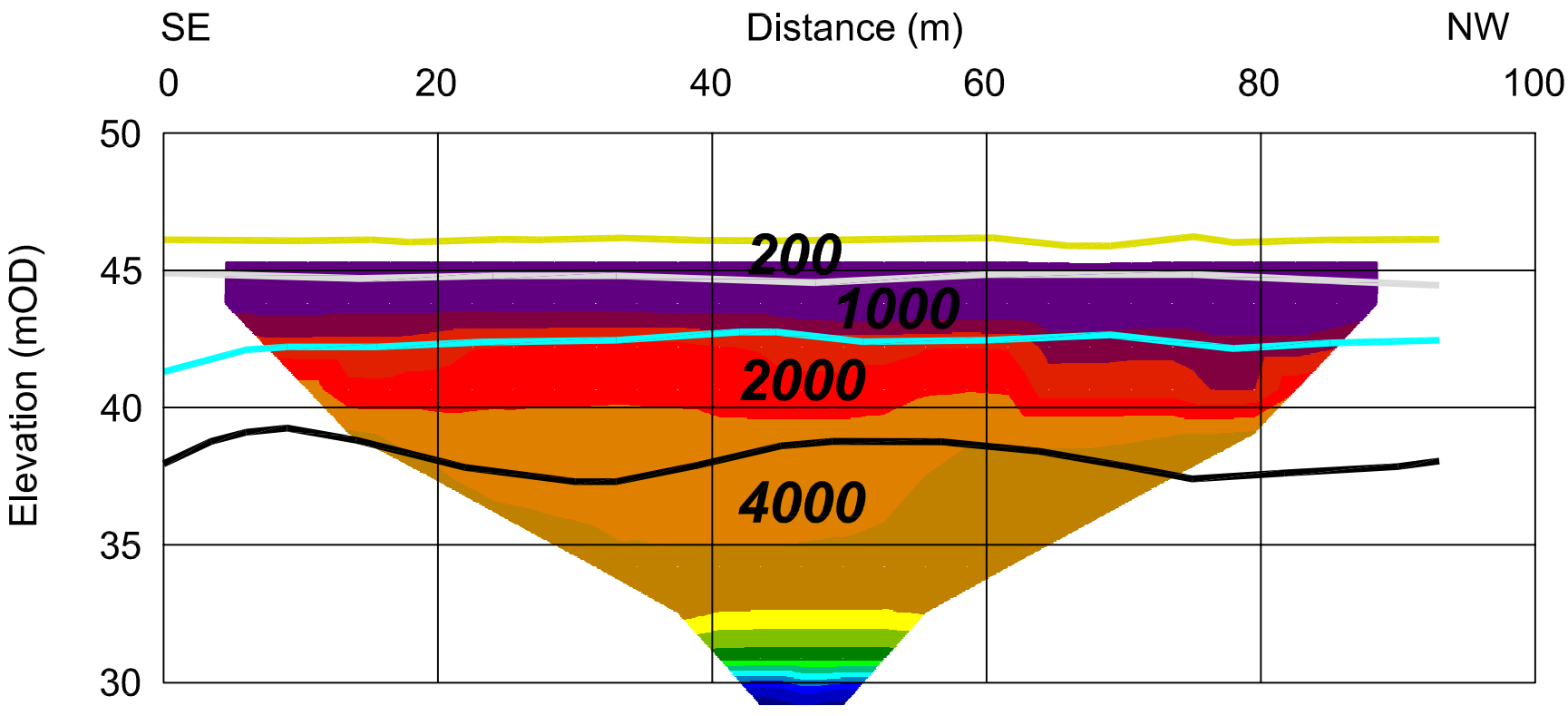
2D-Resistivity Profile R17 and Seismic Refraction Profile S17 Model



2D-Resistivity Profile R18 and Seismic Refraction Profile S18 Model



2D-Resistivity Profile R19 and Seismic Refraction Profile S19 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 4a: Models of of Geophysical Survey CH52300

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	13/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

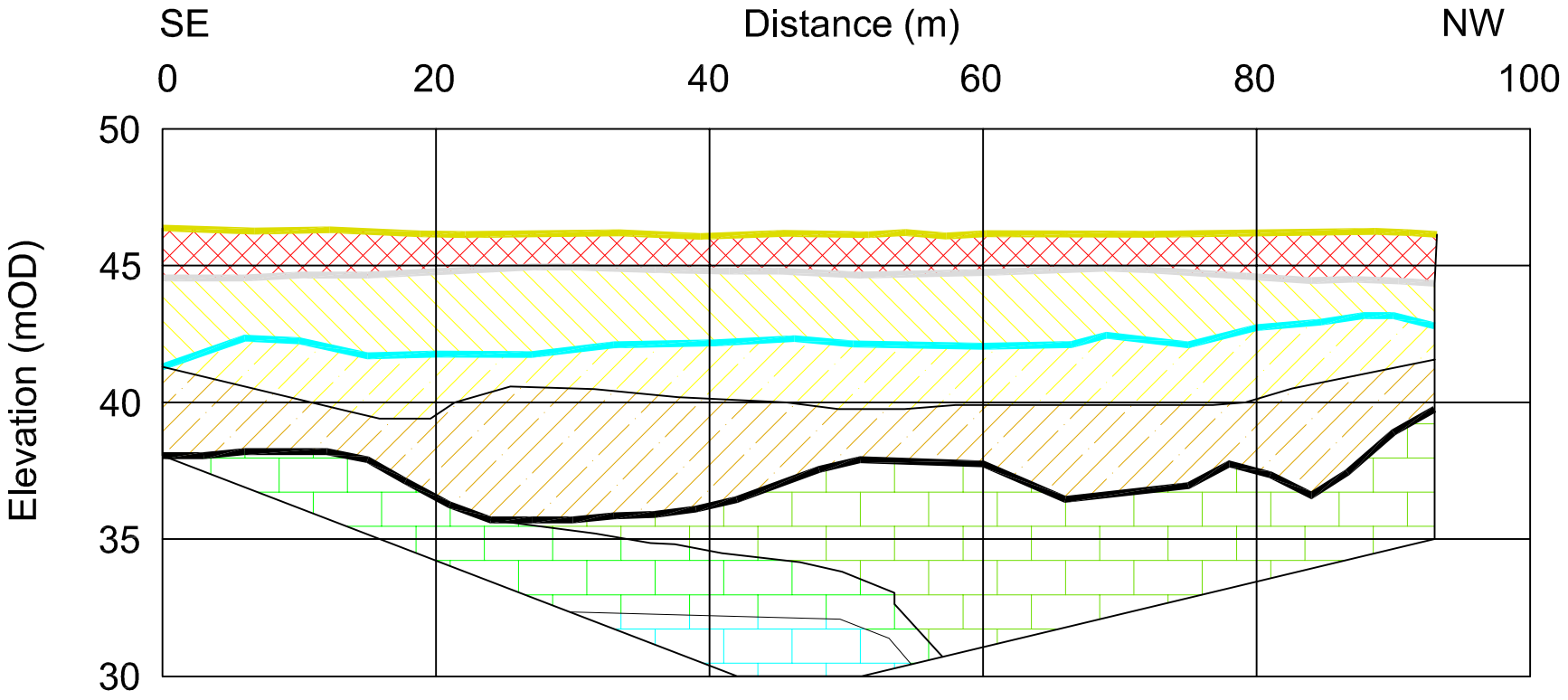
LEGEND: Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2200-2900 m/s)
- Top of Layer 7 (>3000 m/s)

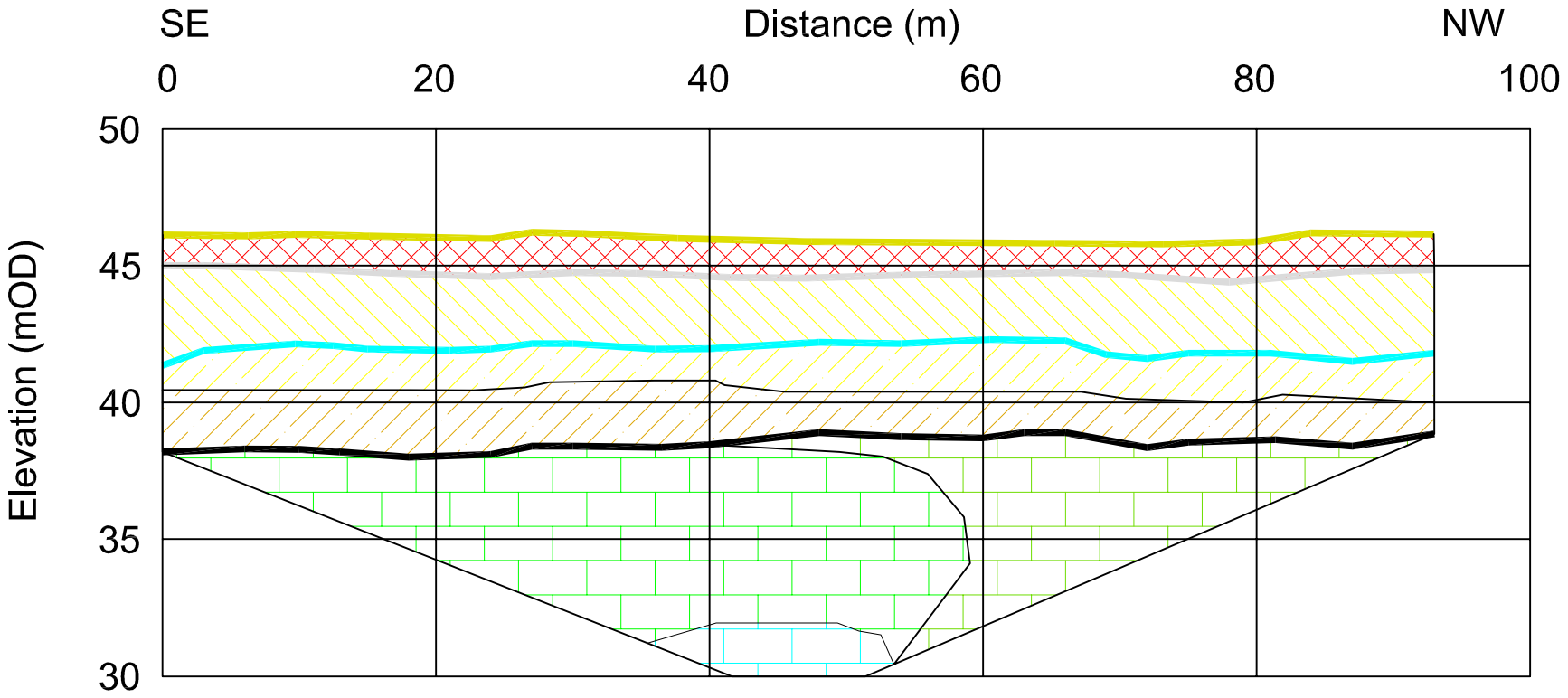
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

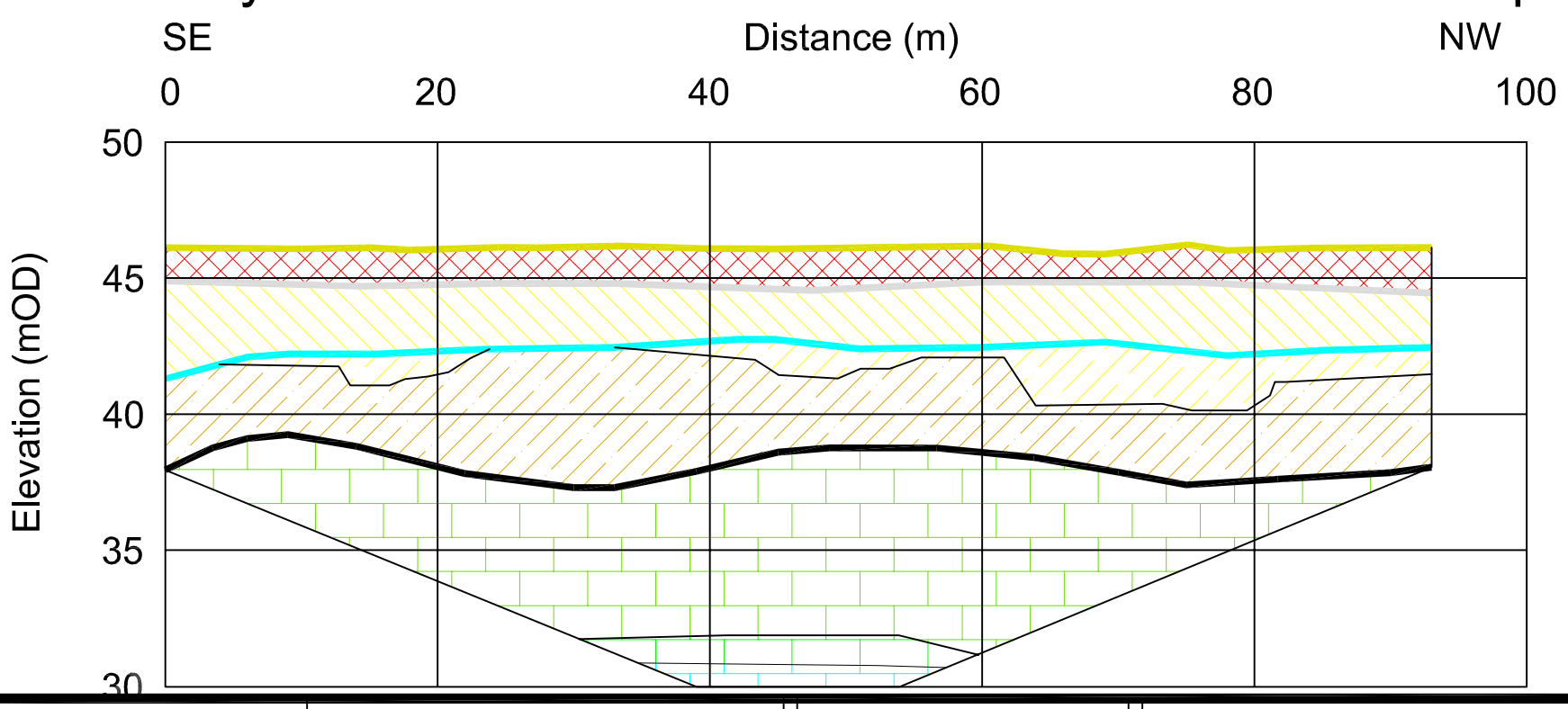
2D-Resistivity Prof. R17 and Seismic Refraction Prof. S17 Interpretation



2D-Resistivity Prof. R18 and Seismic Refraction Prof. S18 Interpretation



2D-Resistivity Prof. R19 and Seismic Refraction Prof. S19 Interpretation



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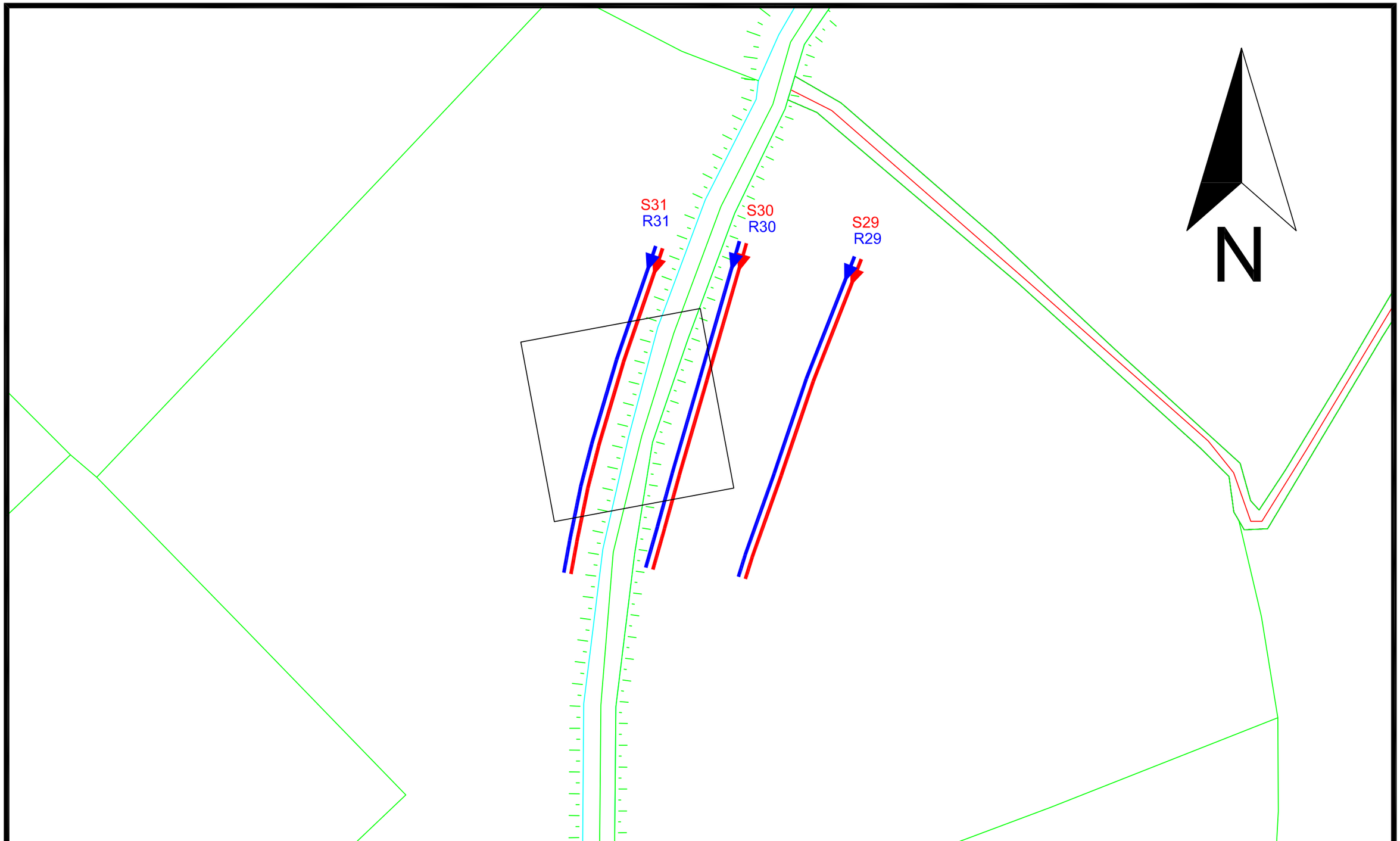
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 4b: Interpretation of of Geophysical Survey CH52300

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	13/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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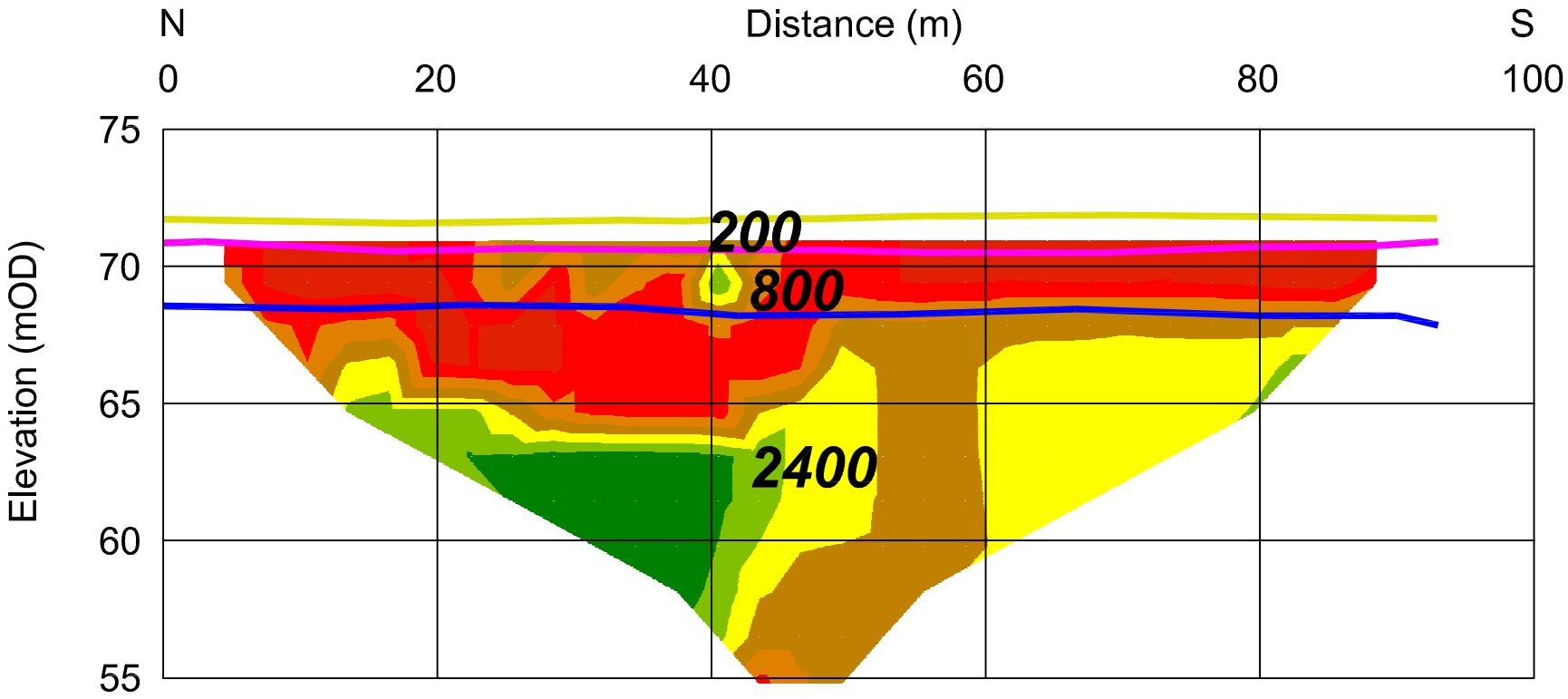
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 5: Geophysical Survey Location Map CH65390

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

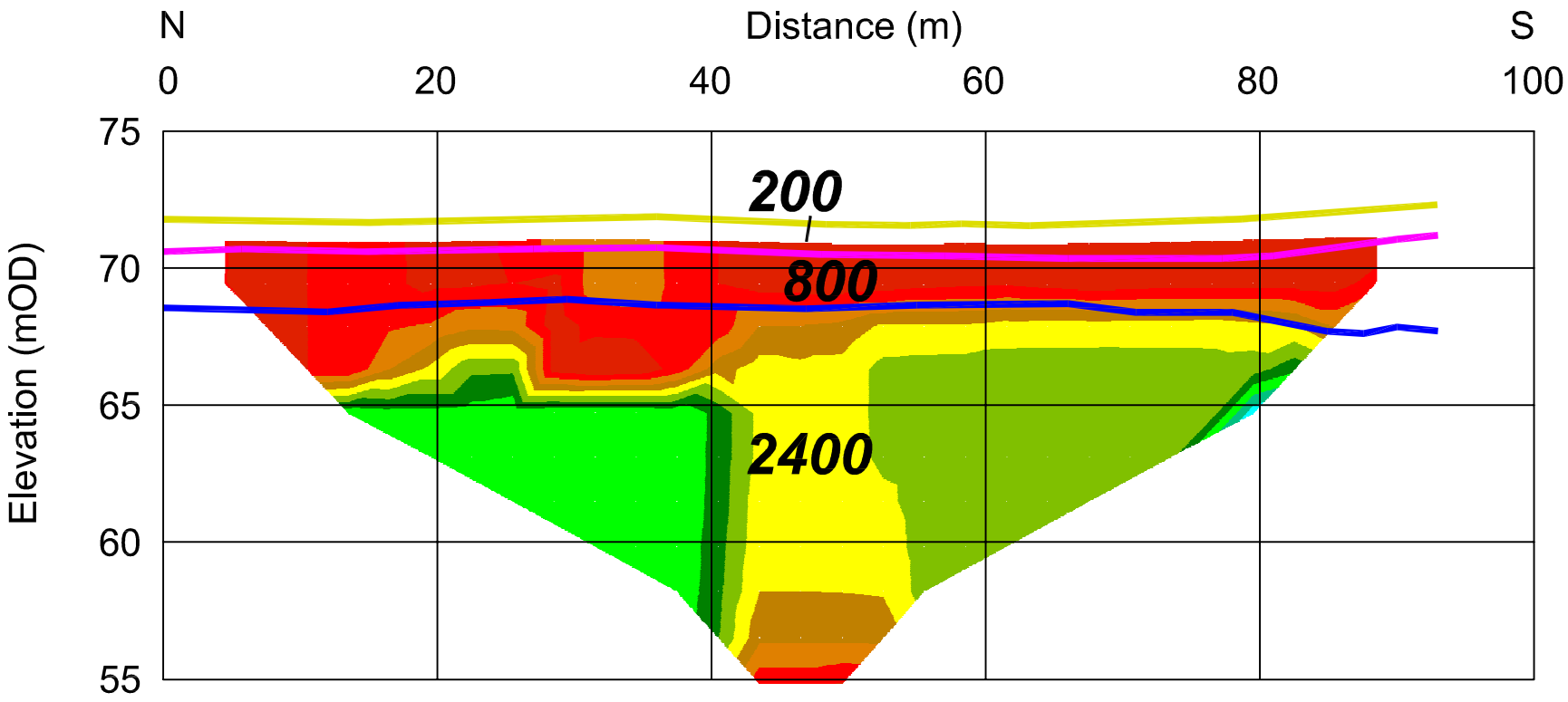
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

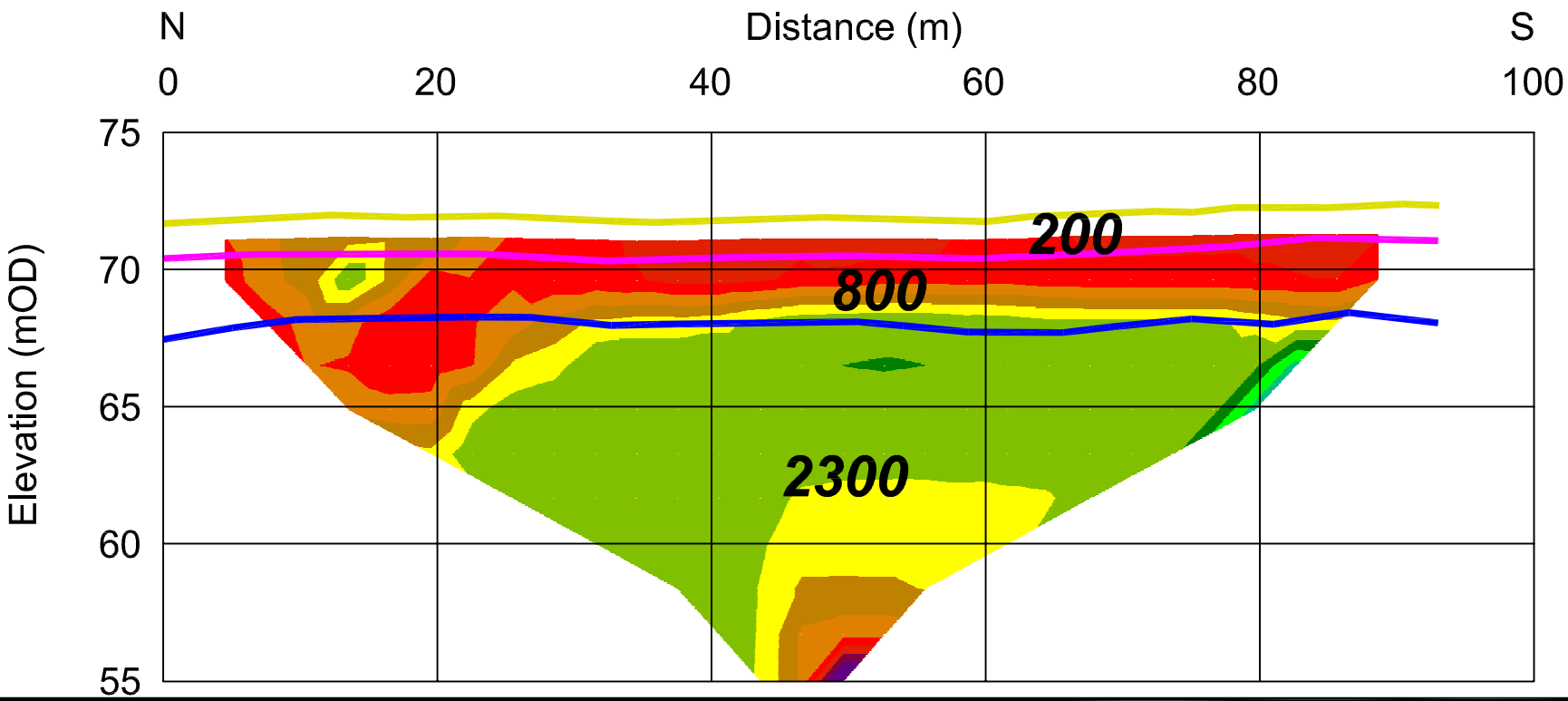
2D-Resistivity Profile R29 and Seismic Refraction Profile S29 Model



2D-Resistivity Profile R30 and Seismic Refraction Profile S30 Model



2D-Resistivity Profile R31 and Seismic Refraction Profile S31 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 5a: Models of of Geophysical Survey CH65390

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

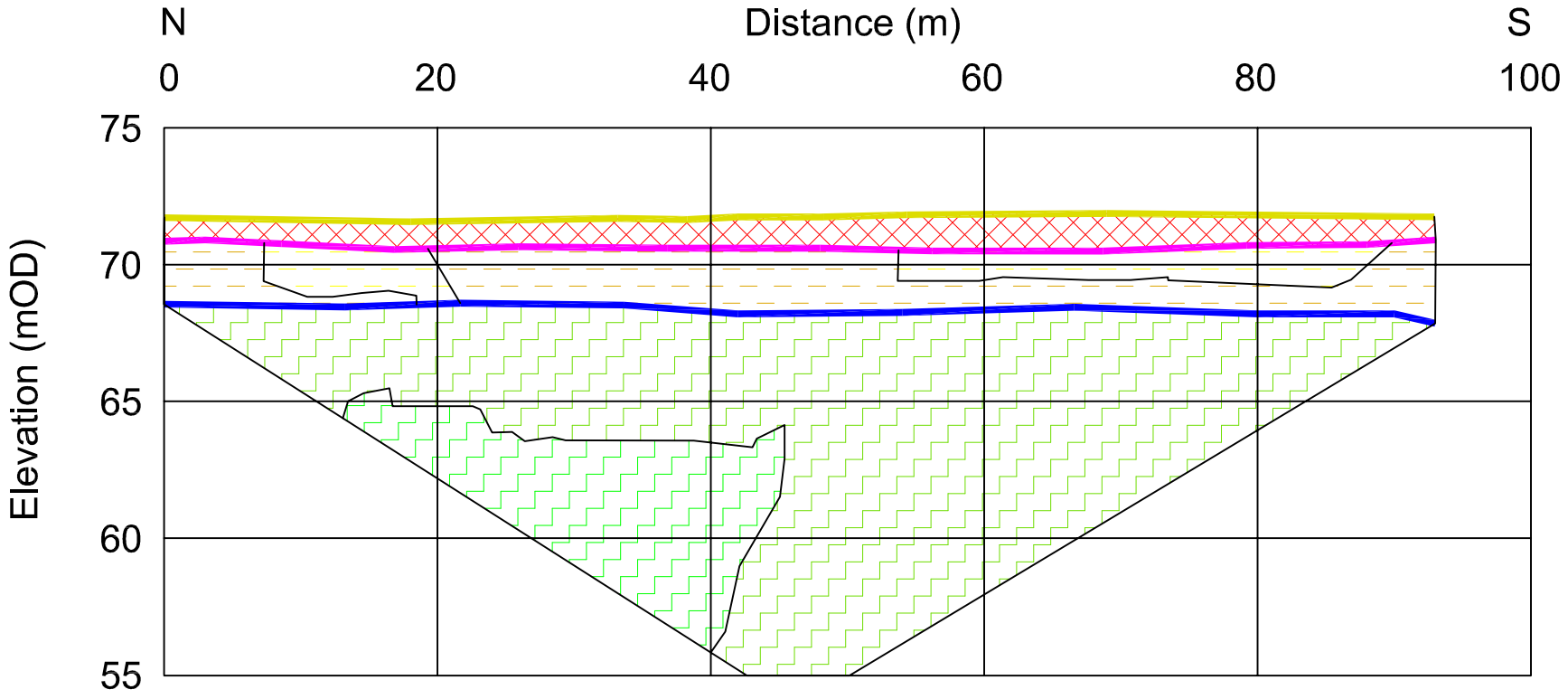
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

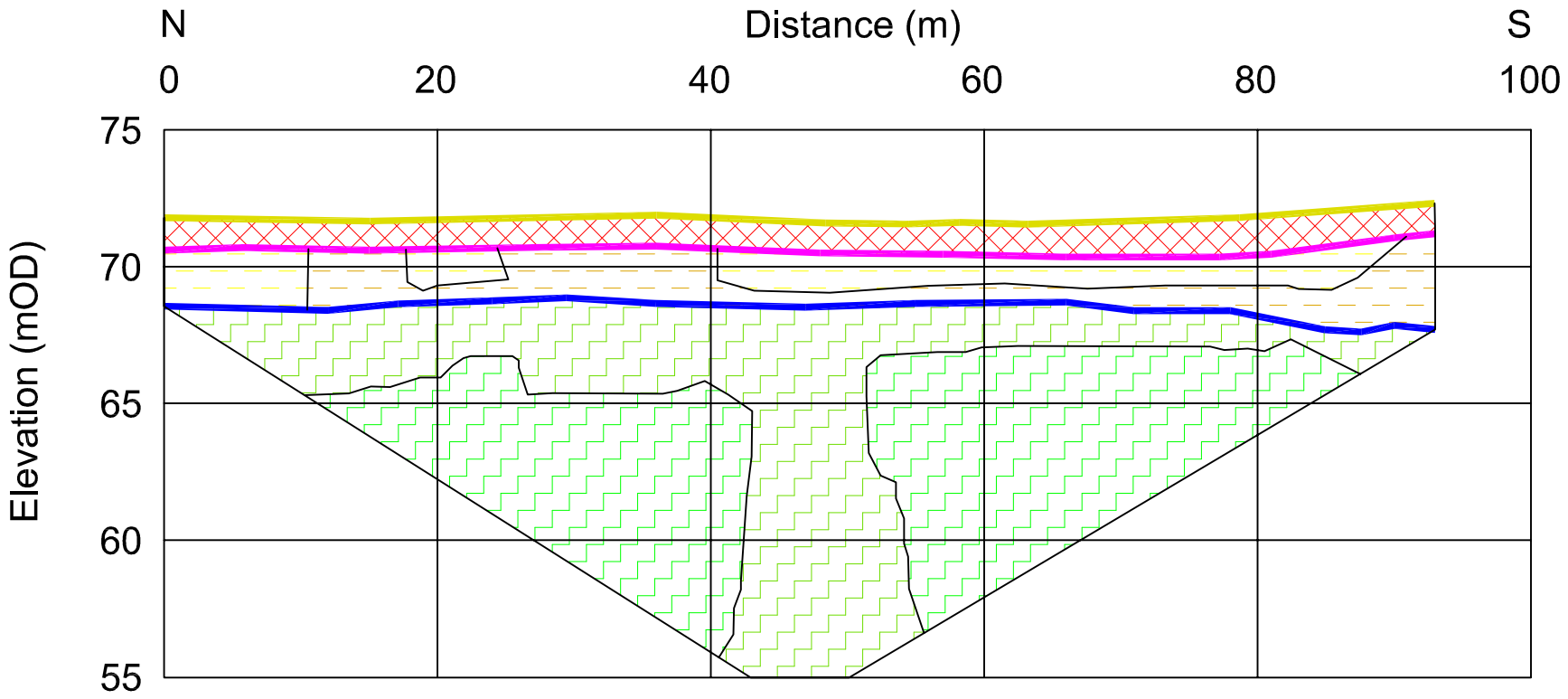
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

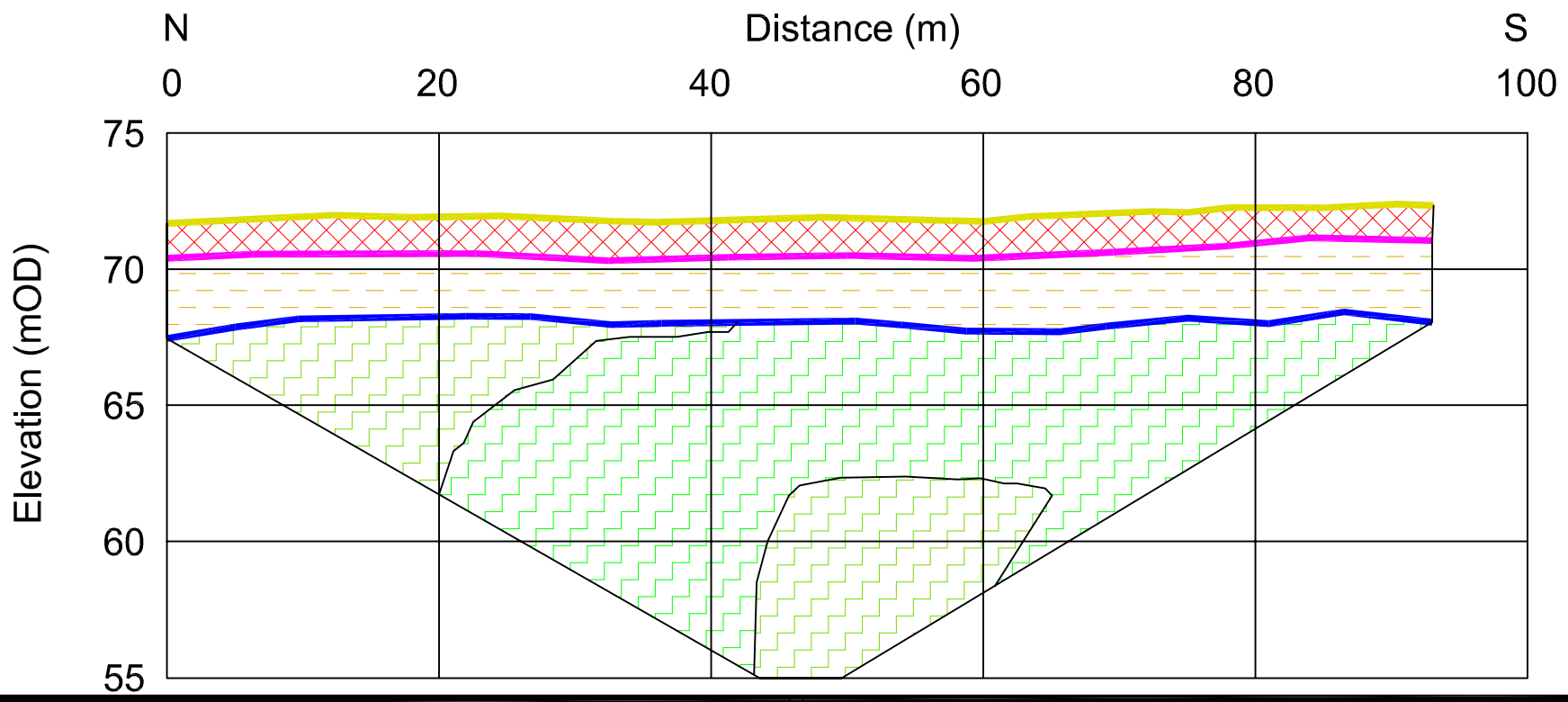
2D-Resistivity Prof. R29 and Seismic Refraction Prof. S29 Interpretation



2D-Resistivity Prof. R30 and Seismic Refraction Prof. S30 Interpretation



2D-Resistivity Prof. R31 and Seismic Refraction Prof. S31 Interpretation



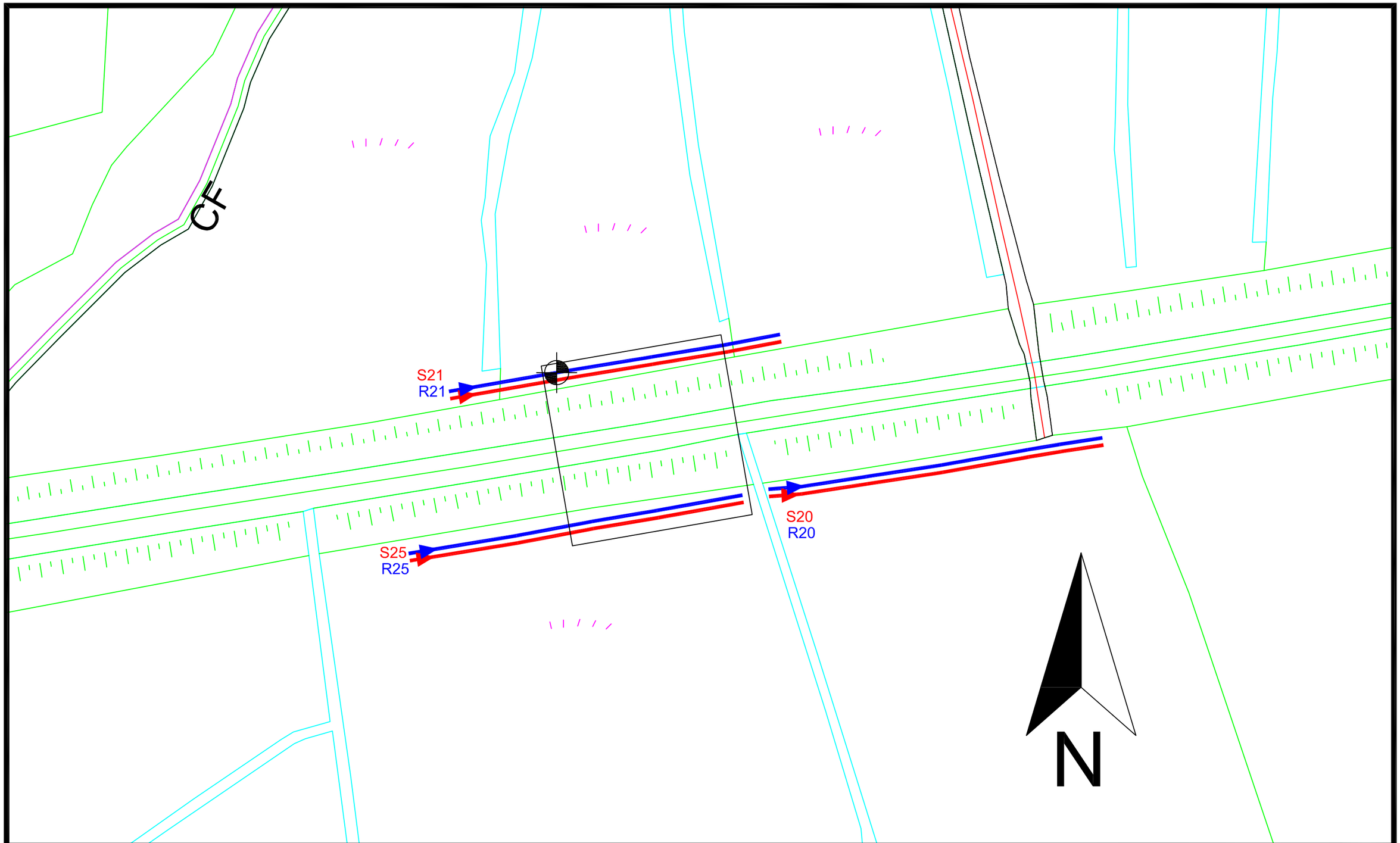
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Email: info@mgx.ie
Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 5b: Interpretation of of Geophysical Survey CH65390

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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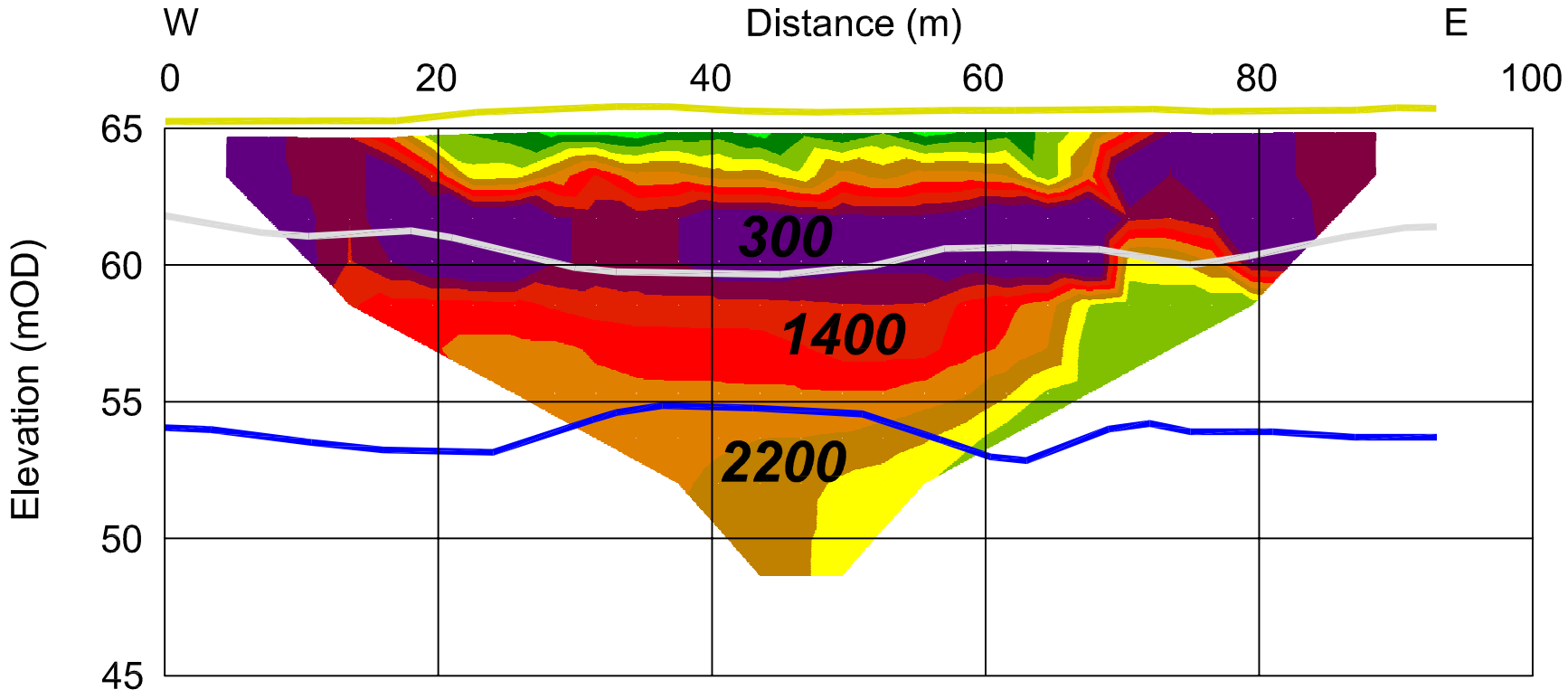
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 6: Geophysical Survey Location Map CH67000

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

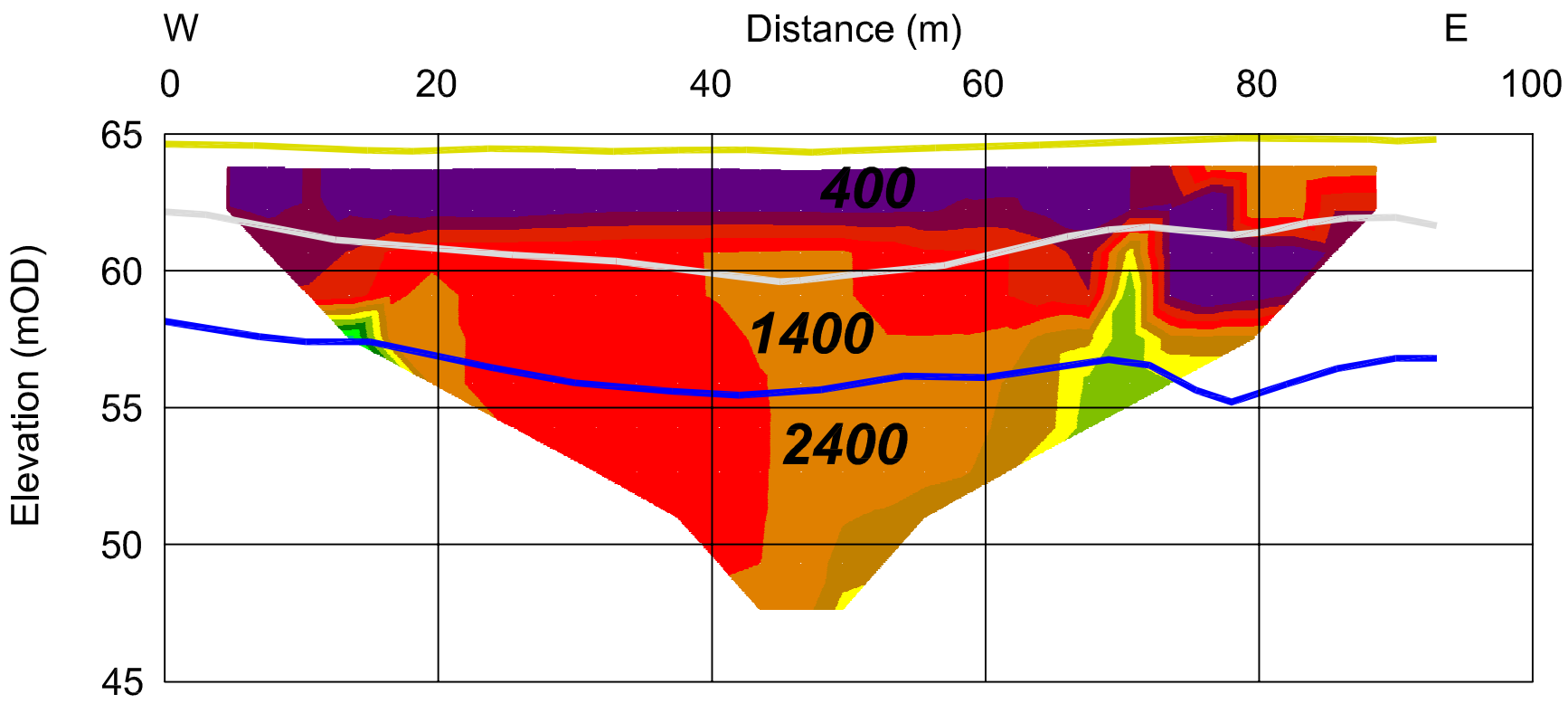
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

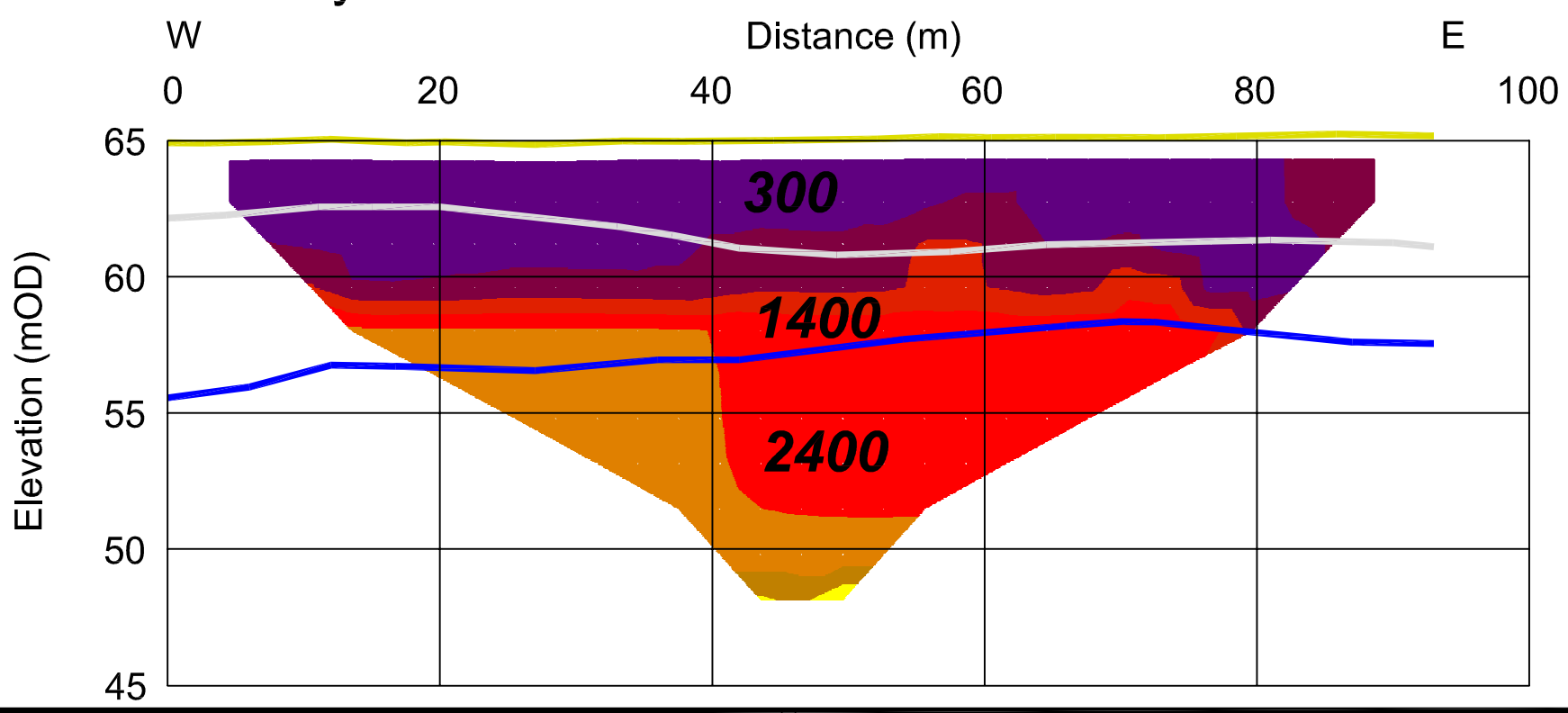
2D-Resistivity Profile R20 and Seismic Refraction Profile S20 Model



2D-Resistivity Profile R21 and Seismic Refraction Profile S21 Model



2D-Resistivity Profile R25 and Seismic Refraction Profile S25 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 6a: Models of of Geophysical Survey CH67000

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

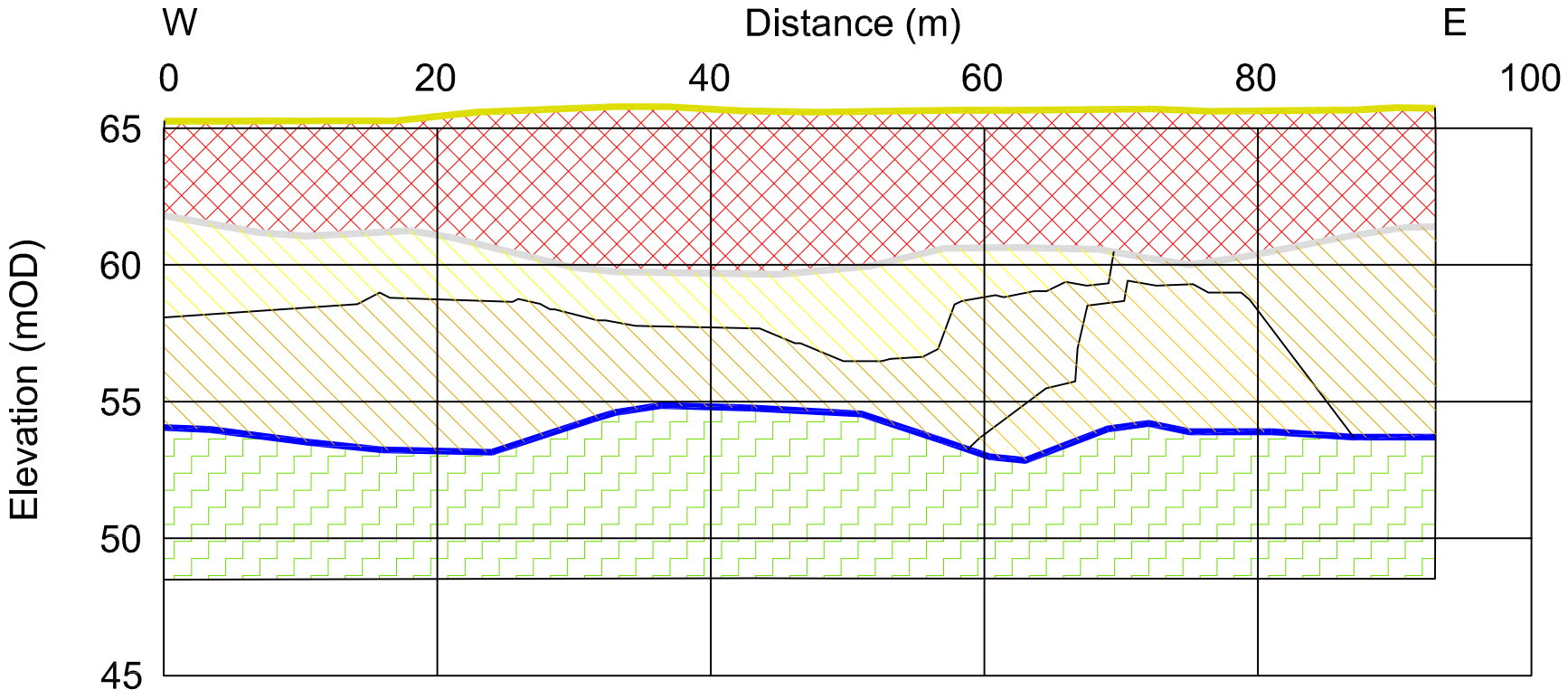
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

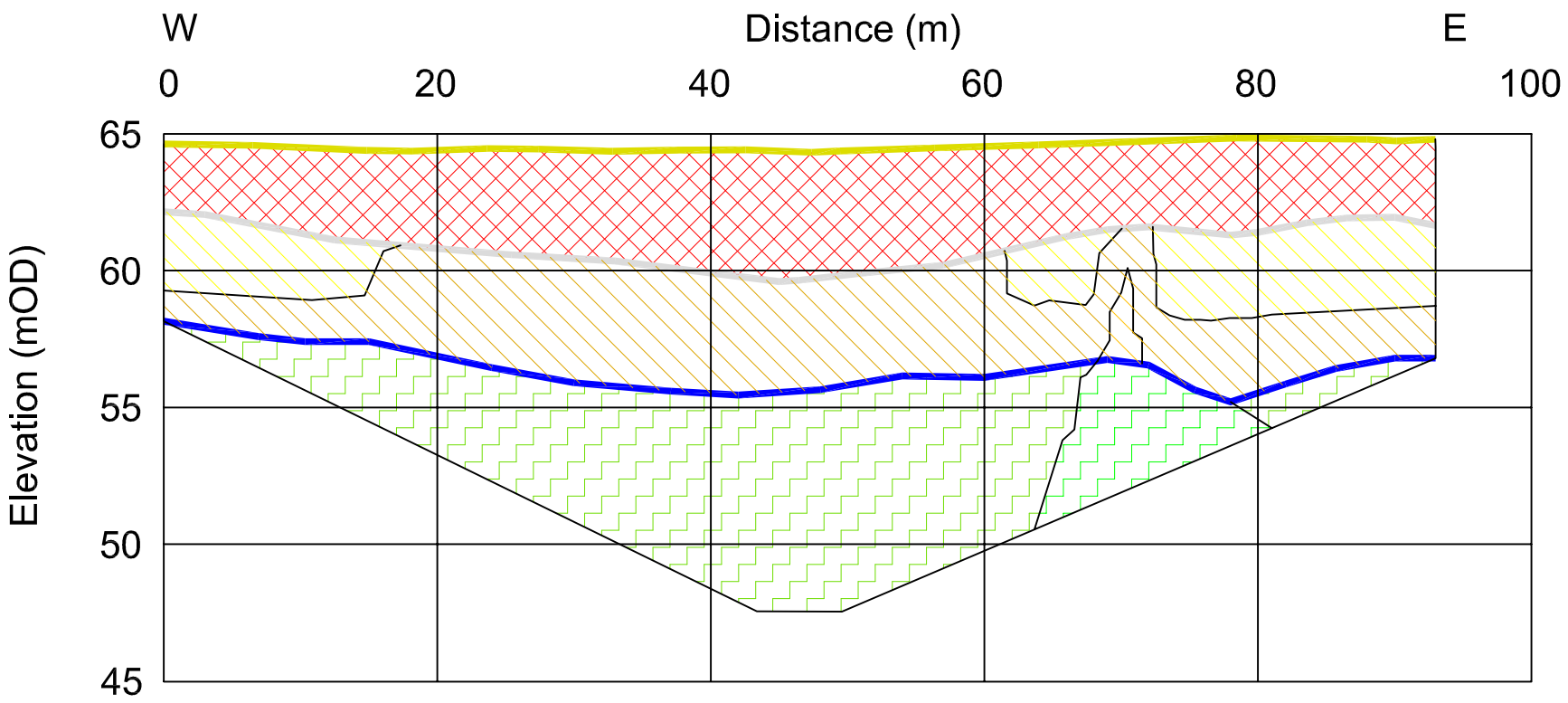
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

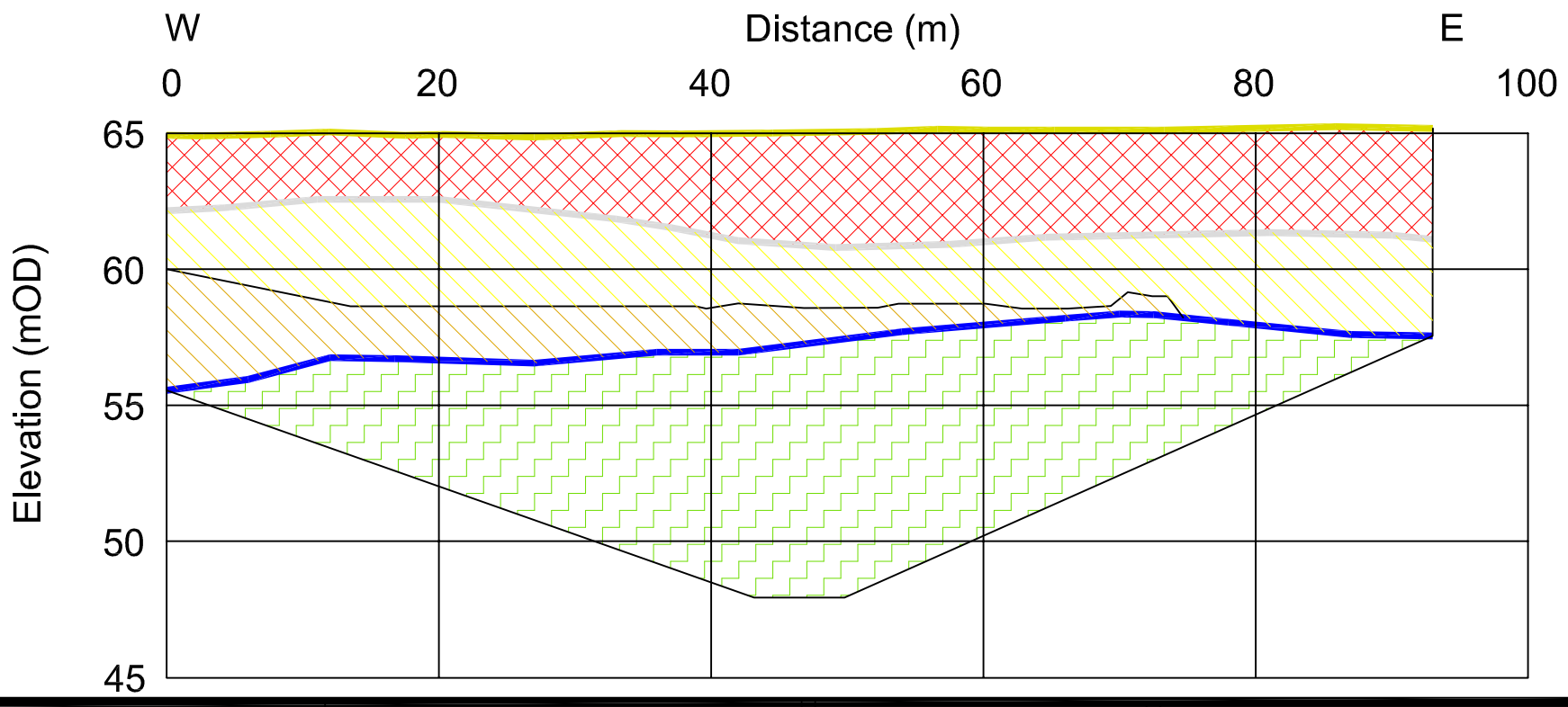
2D-Resistivity Prof. R20 and Seismic Refraction Prof. S20 Interpretation



2D-Resistivity Prof. R21 and Seismic Refraction Prof. S21 Interpretation



2D-Resistivity Prof. R25 and Seismic Refraction Prof. S25 Interpretation



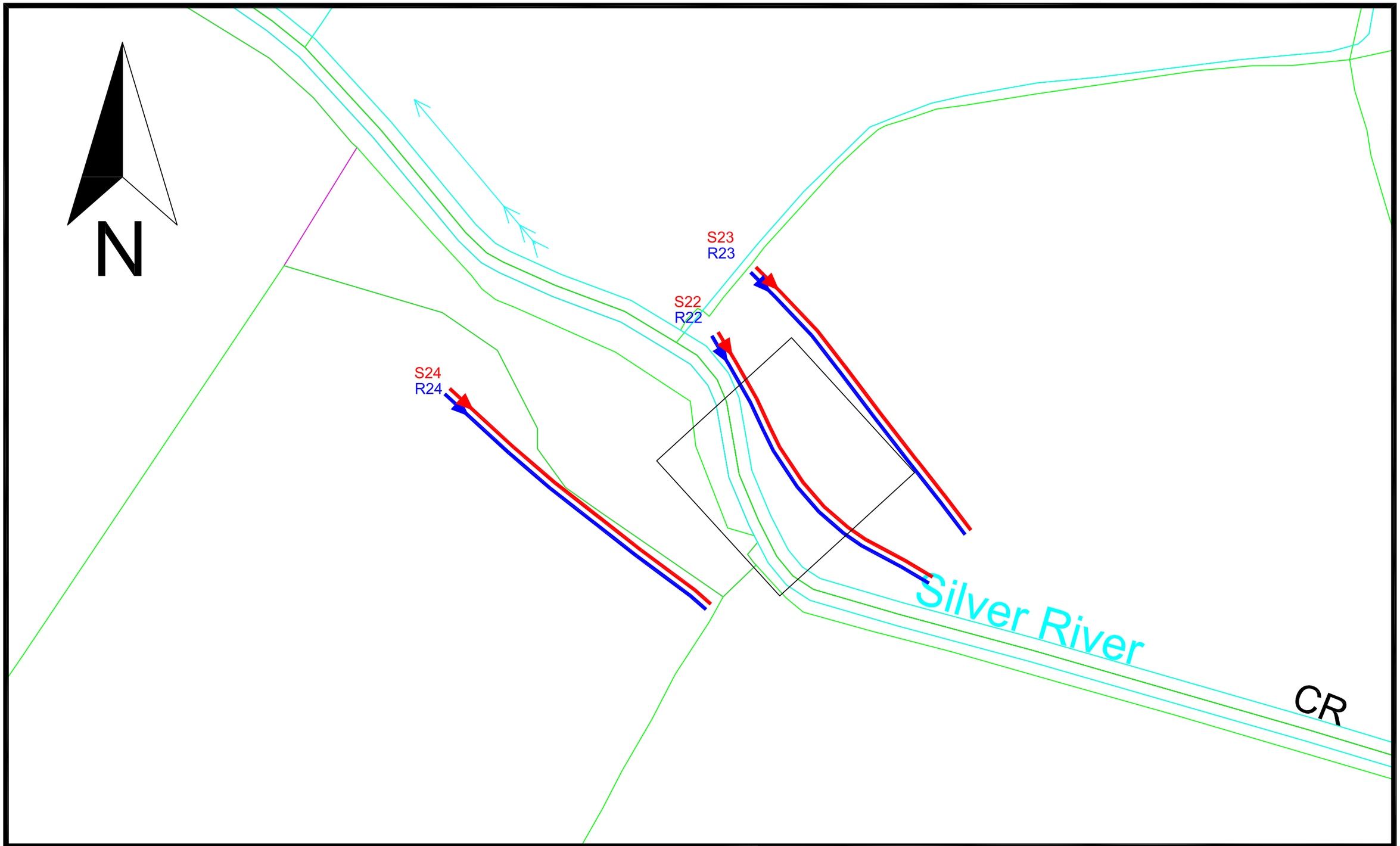
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Email: info@mgx.ie
Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 6b: Interpretation of of Geophysical Survey CH67000

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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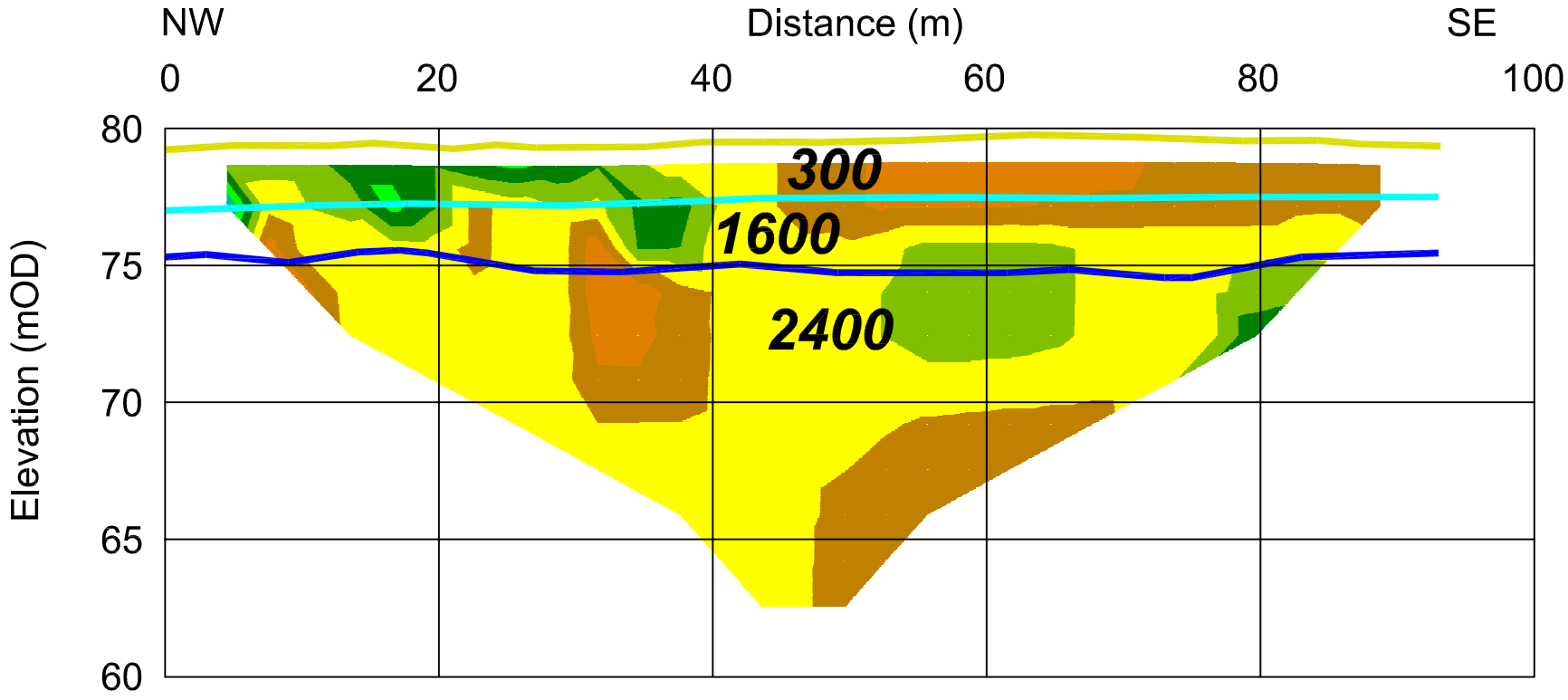
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 7: Geophysical Survey Location Map CH80080

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

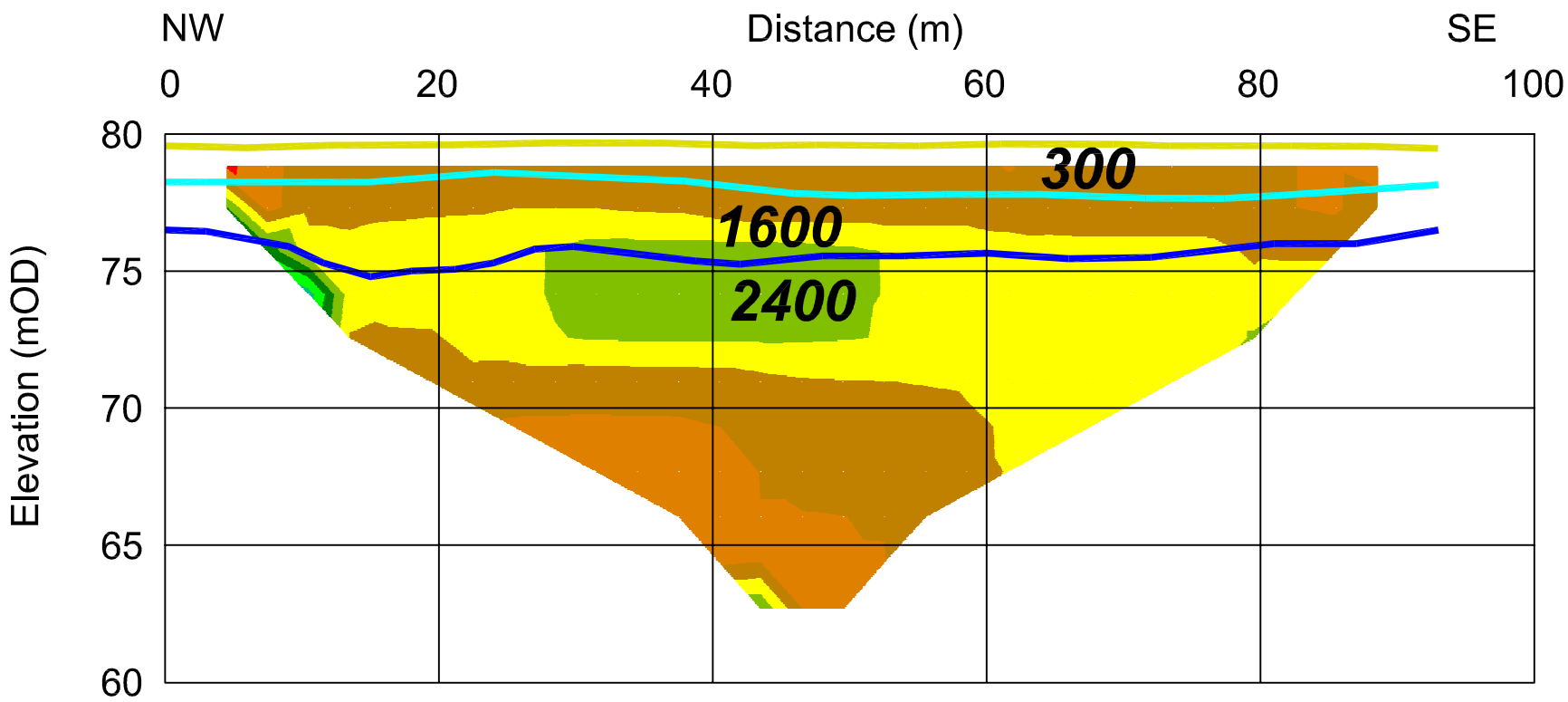
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

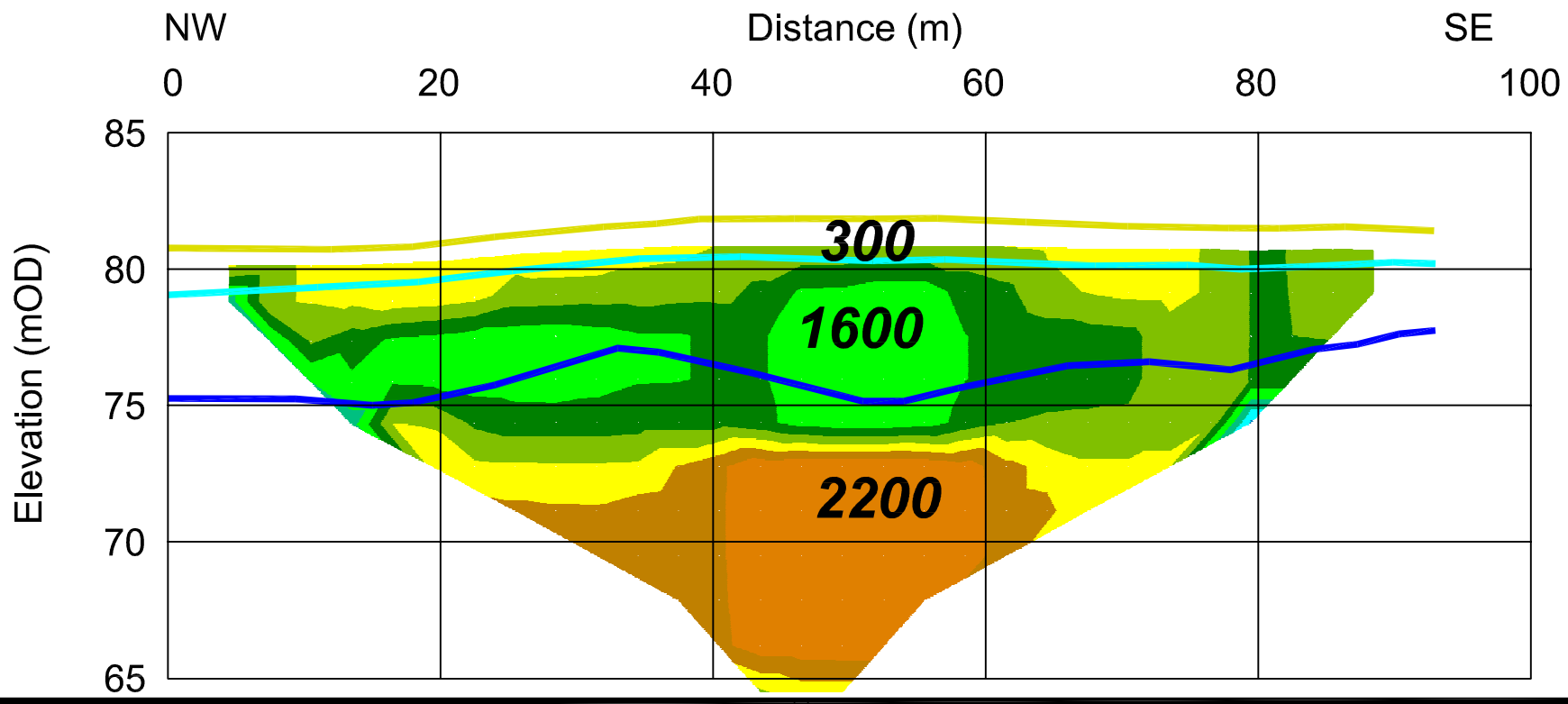
2D-Resistivity Profile R22 and Seismic Refraction Profile S22 Model



2D-Resistivity Profile R23 and Seismic Refraction Profile S23 Model



2D-Resistivity Profile R24 and Seismic Refraction Profile S24 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 7a: Models of of Geophysical Survey CH80080

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

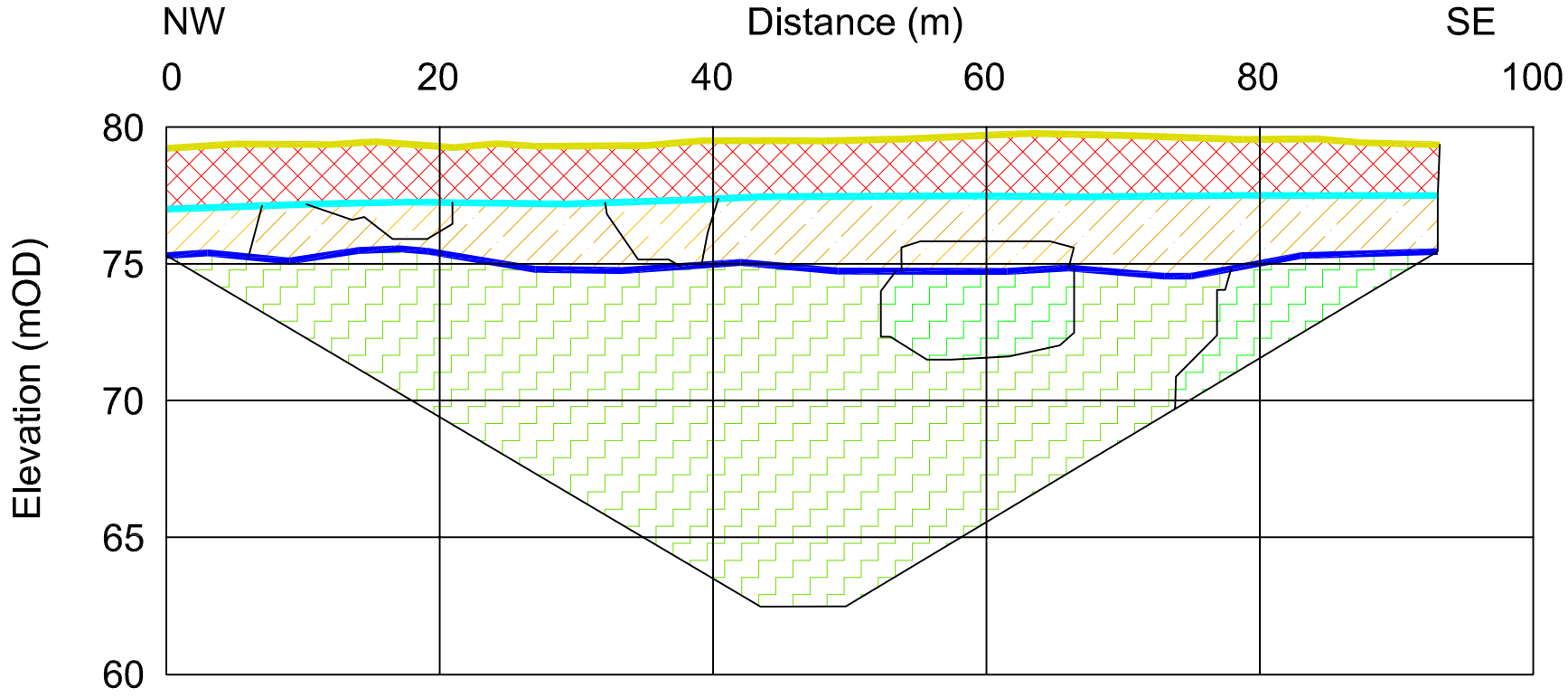
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

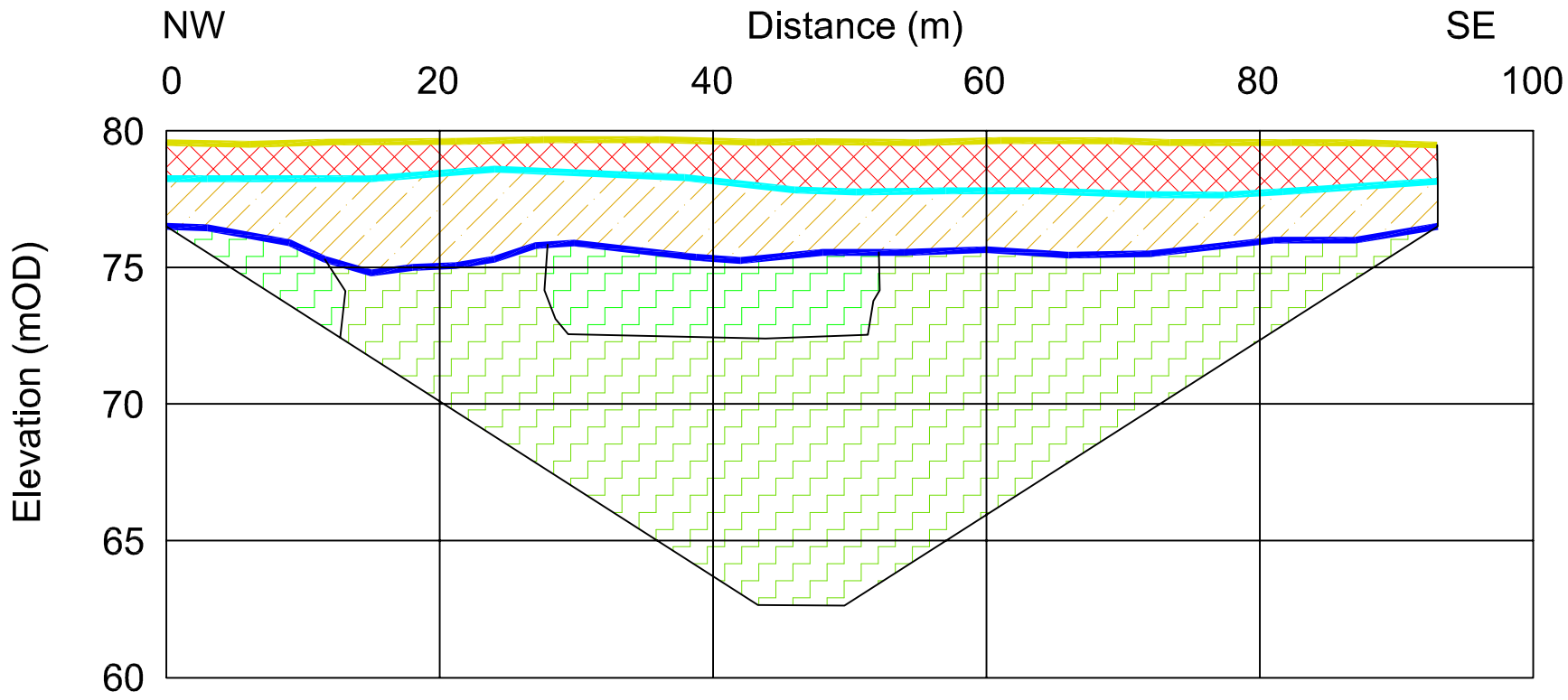
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 | 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000

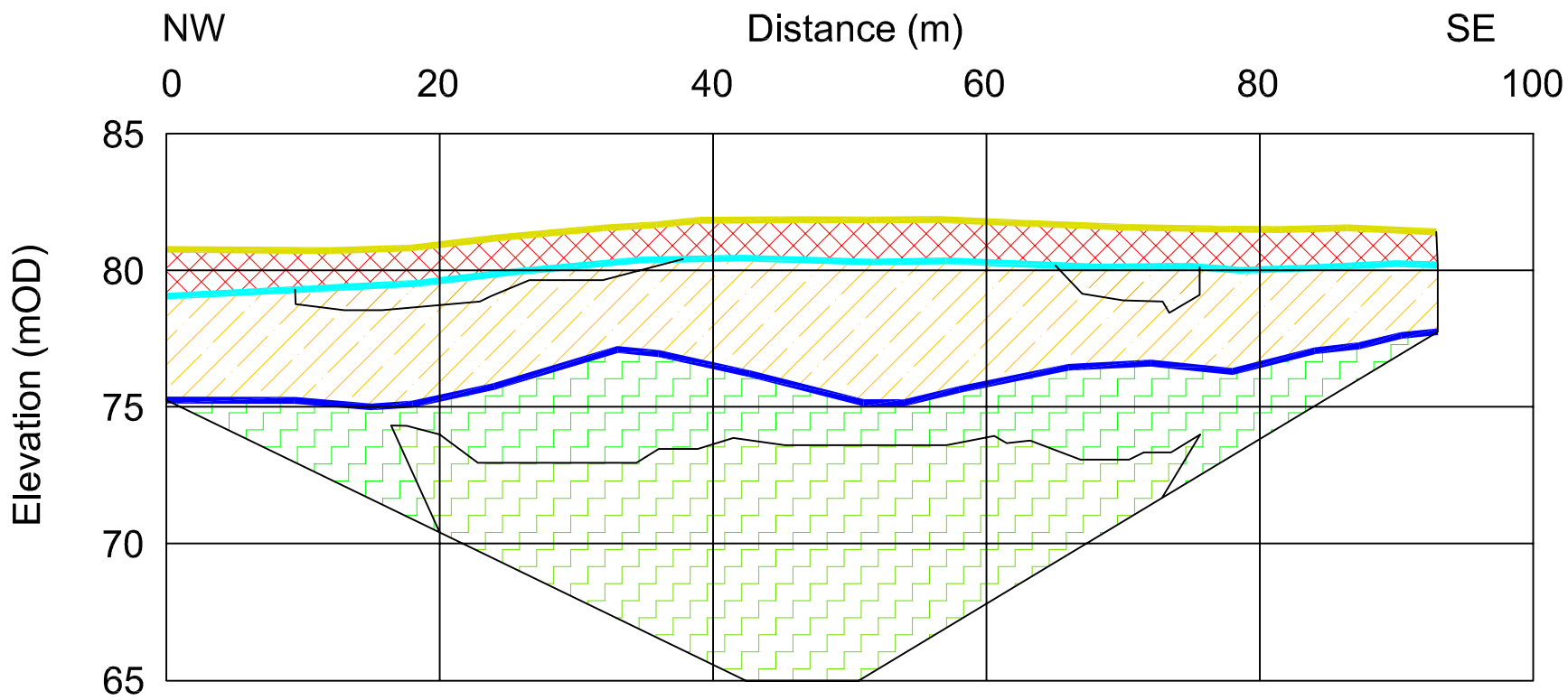
2D-Resistivity Prof. R22 and Seismic Refraction Prof. S22 Interpretation



2D-Resistivity Prof. R23 and Seismic Refraction Prof. S23 Interpretation



2D-Resistivity Prof. R24 and Seismic Refraction Prof. S24 Interpretationl



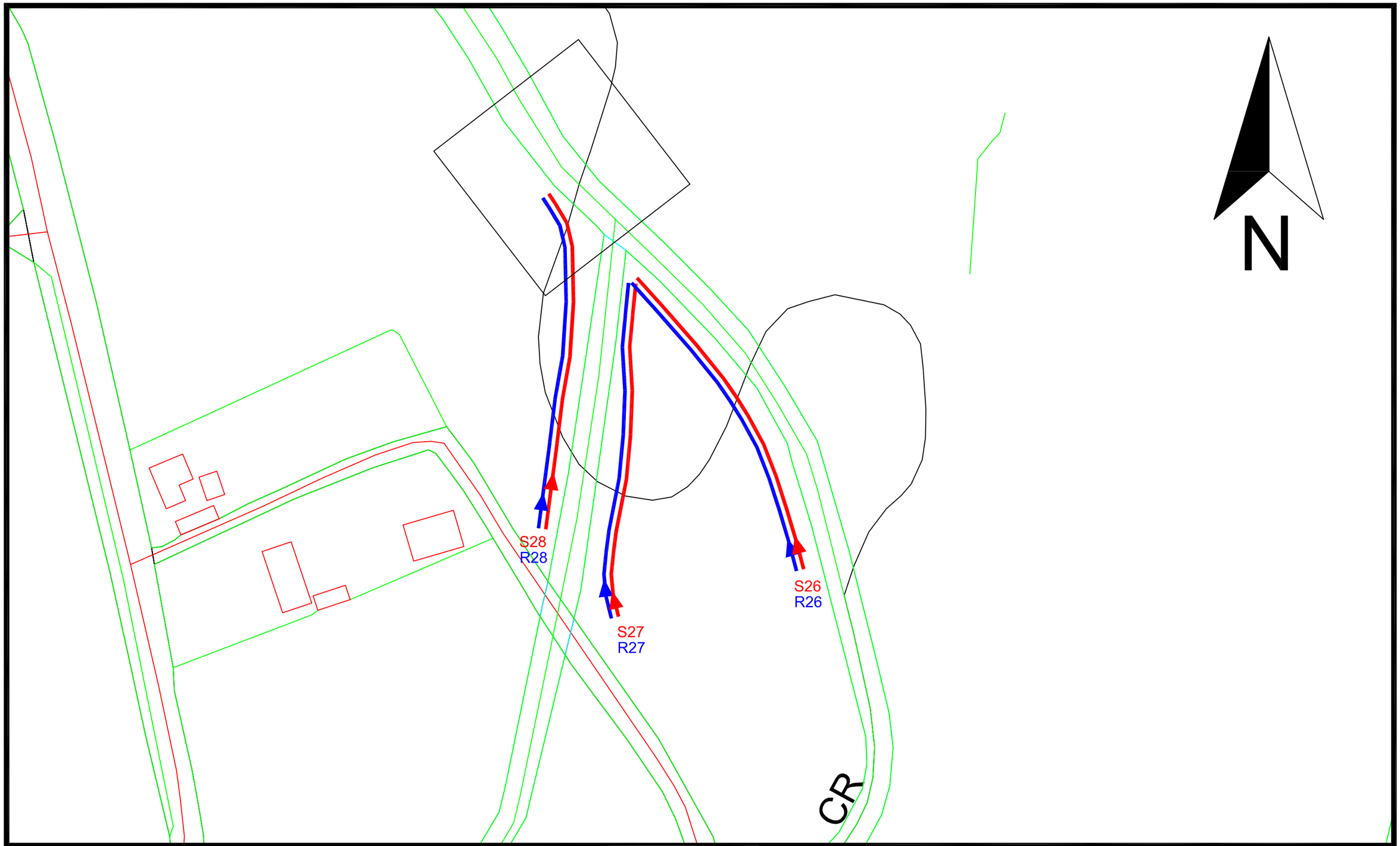
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 7b: Interpretation of of Geophysical Survey CH80080

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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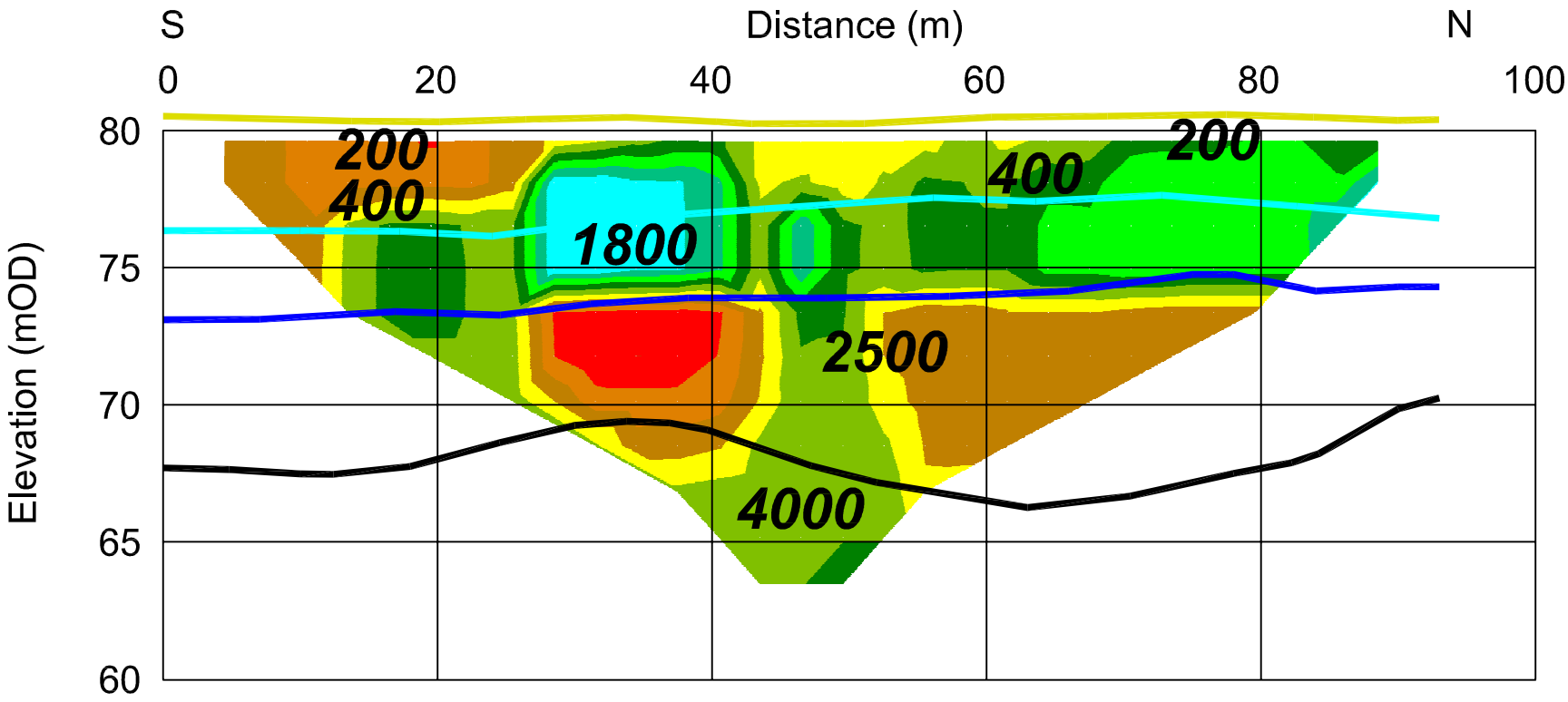
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 8: Geophysical Survey Location Map CH92280

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

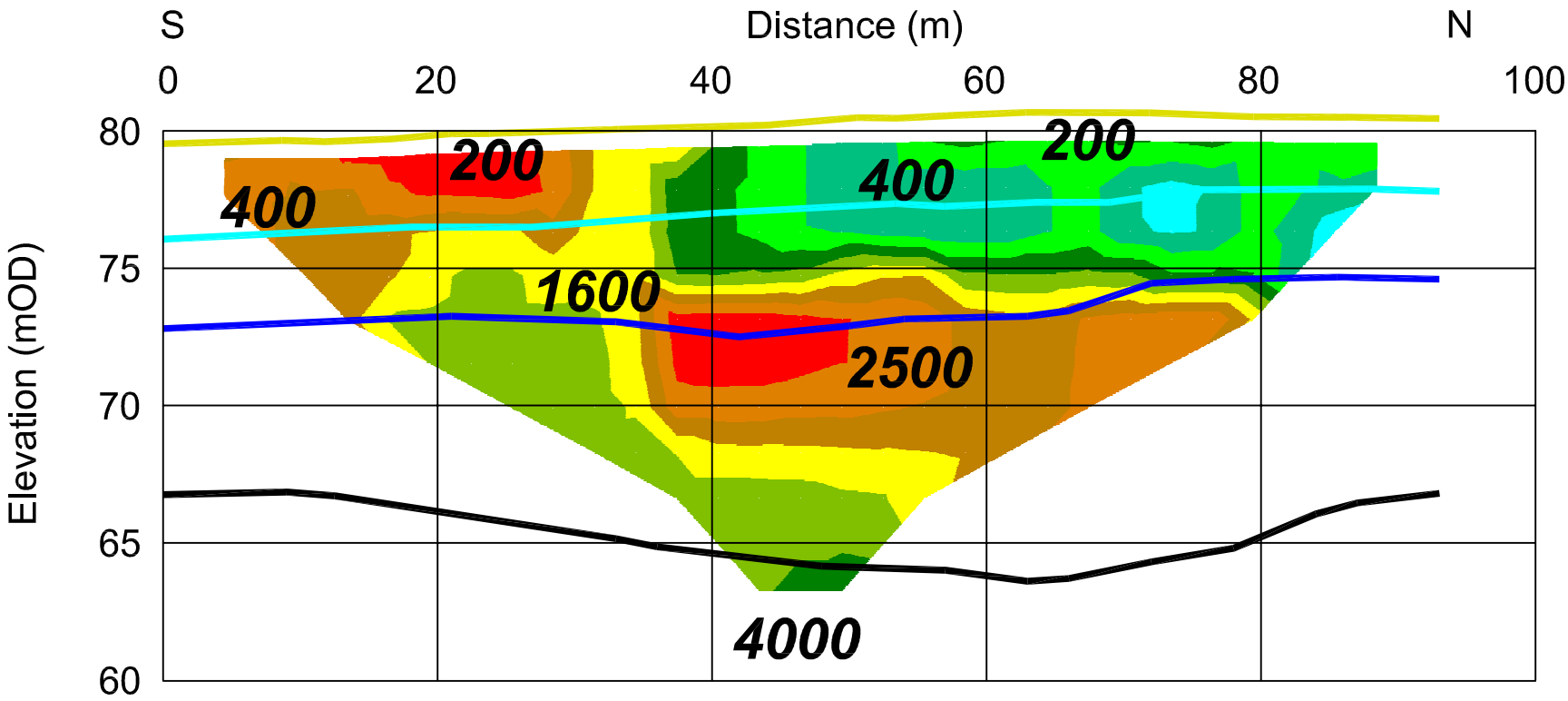
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

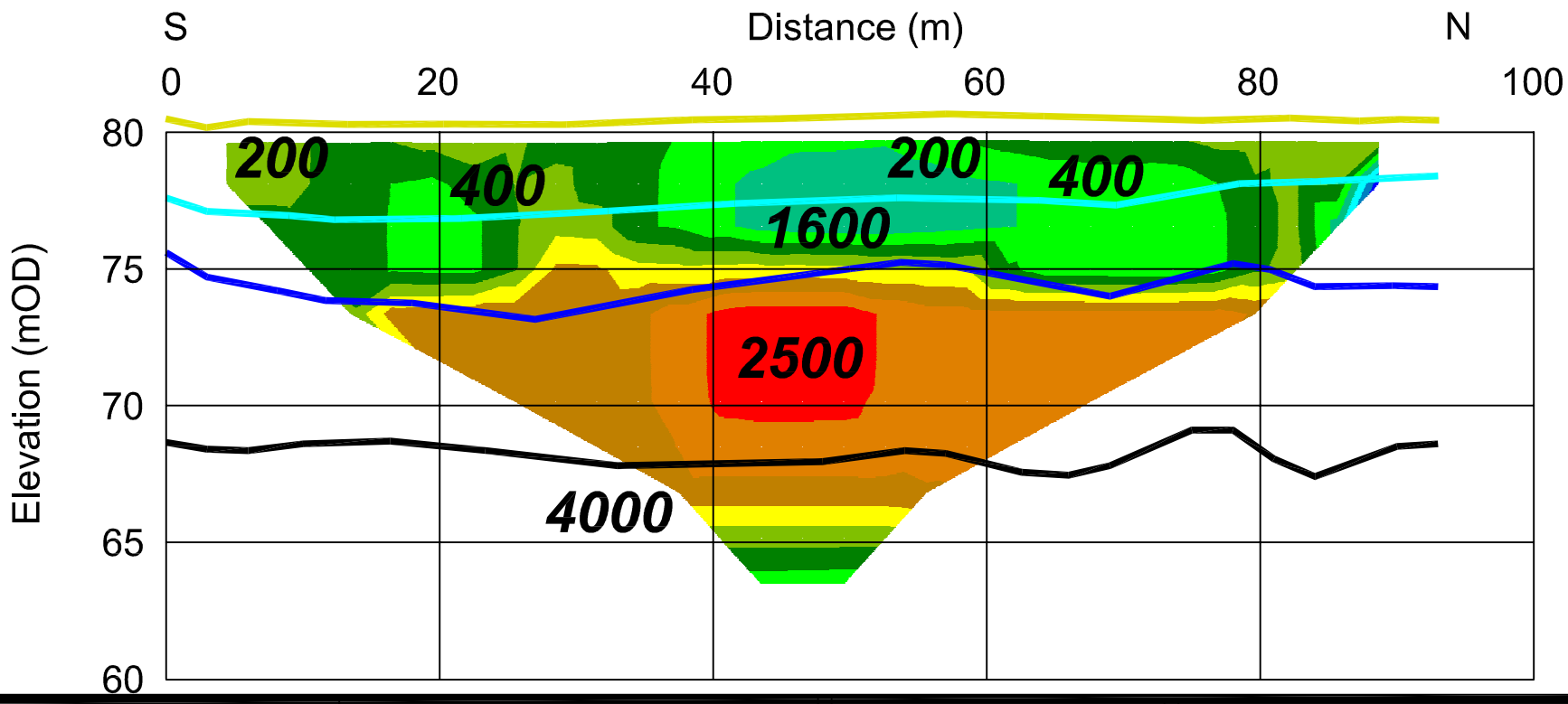
2D-Resistivity Profile R26 and Seismic Refraction Profile S26 Model



2D-Resistivity Profile R27 and Seismic Refraction Profile S27 Model



2D-Resistivity Profile R28 and Seismic Refraction Profile S28 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 8a: Models of of Geophysical Survey CH92280

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

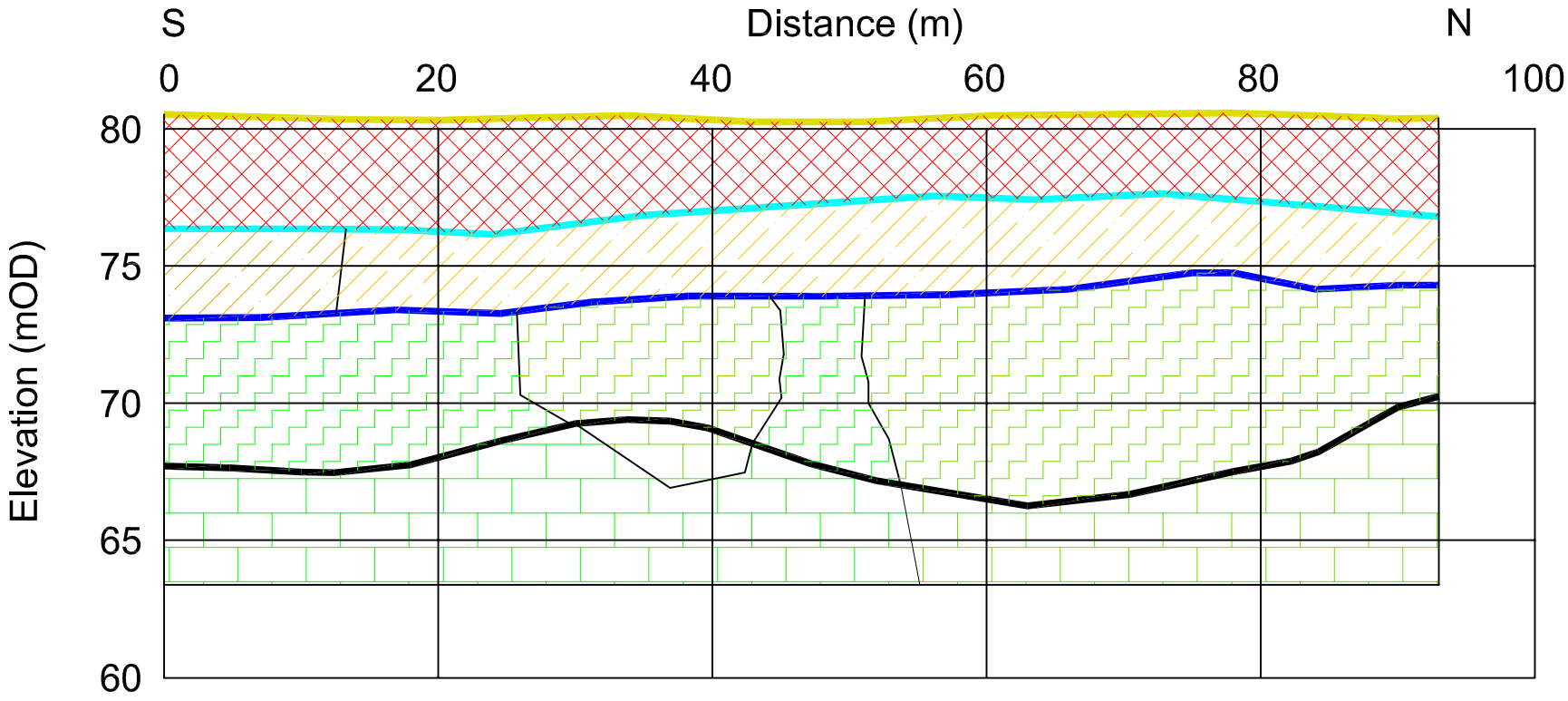
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

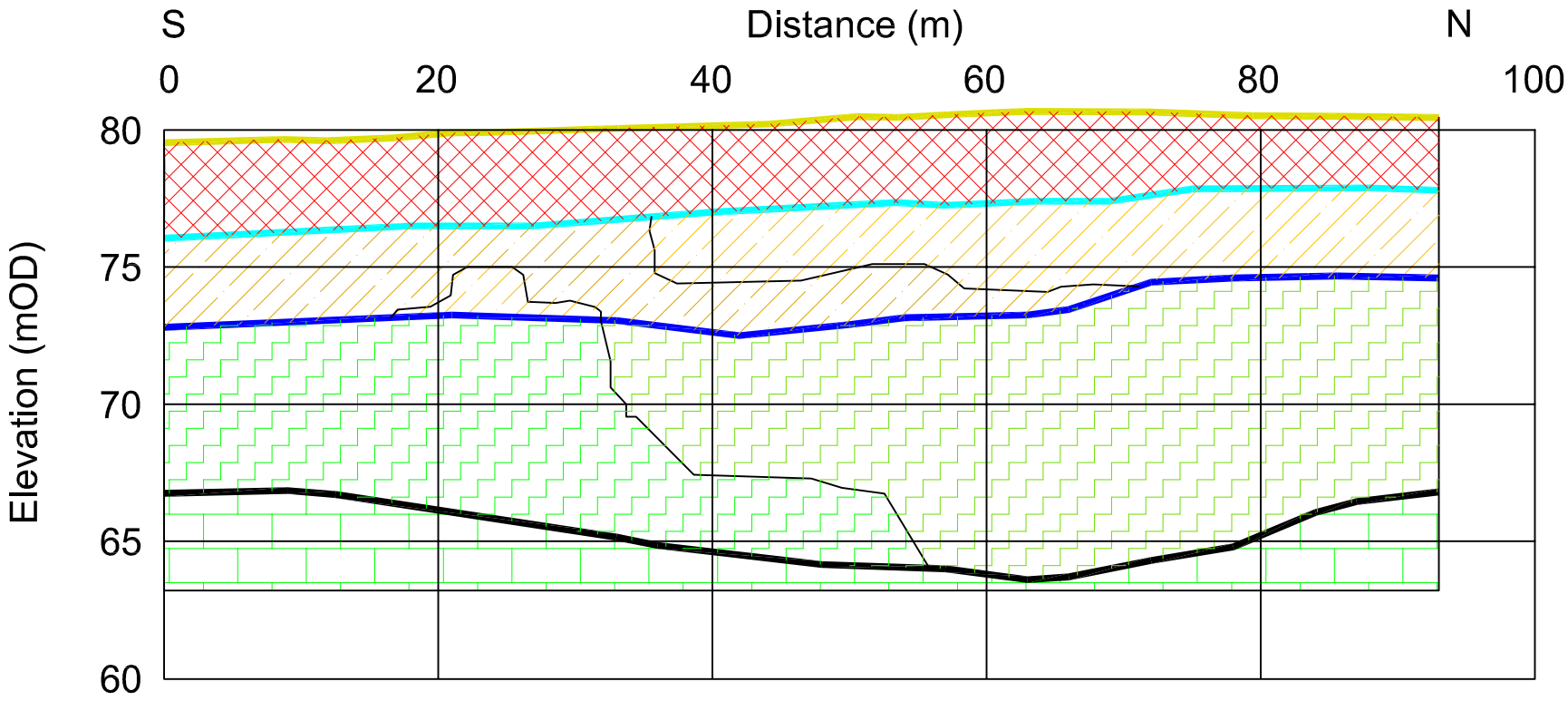
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

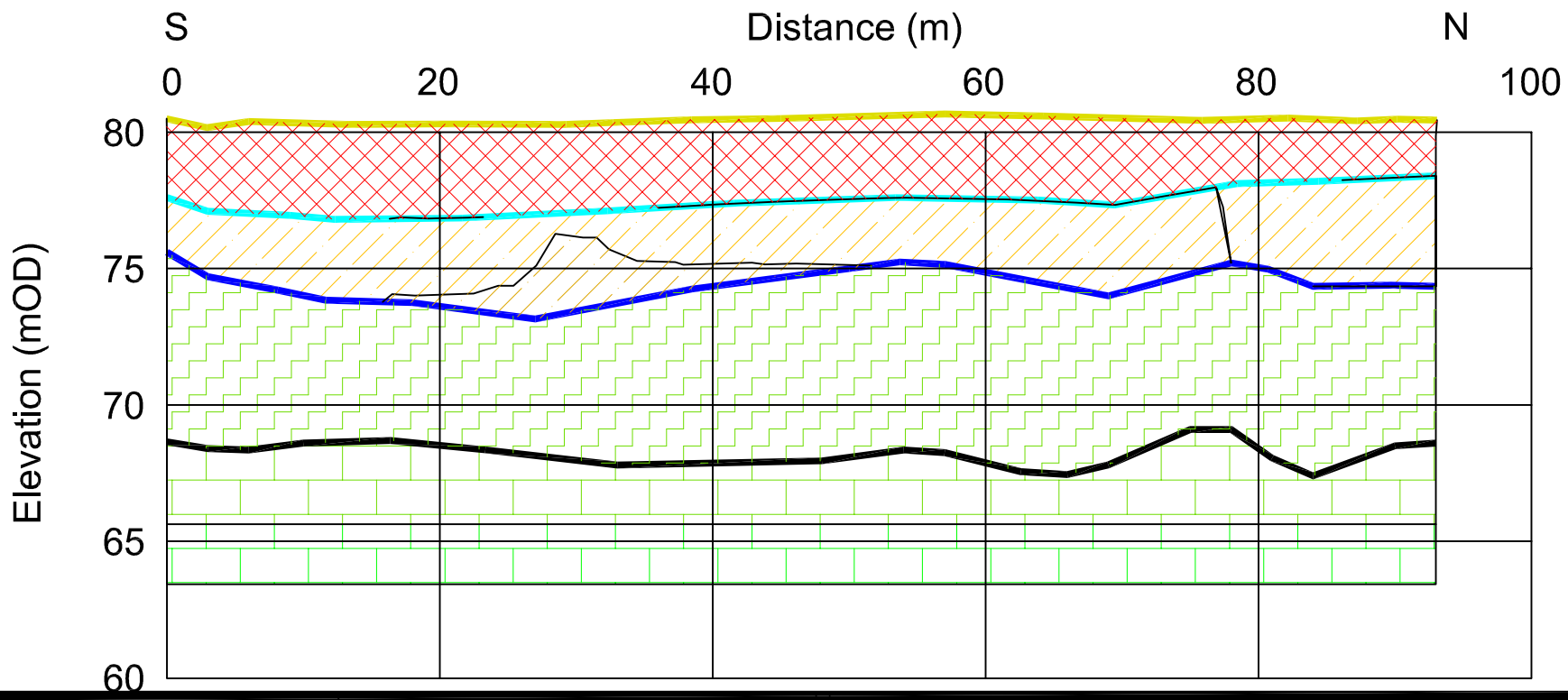
2D-Resistivity Prof. R26 and Seismic Refraction Prof. S26 Interpretation



2D-Resistivity Prof. R27 and Seismic Refraction Prof. S27 Interpretation



2D-Resistivity Prof. R28 and Seismic Refraction Prof. S28 Interpretation



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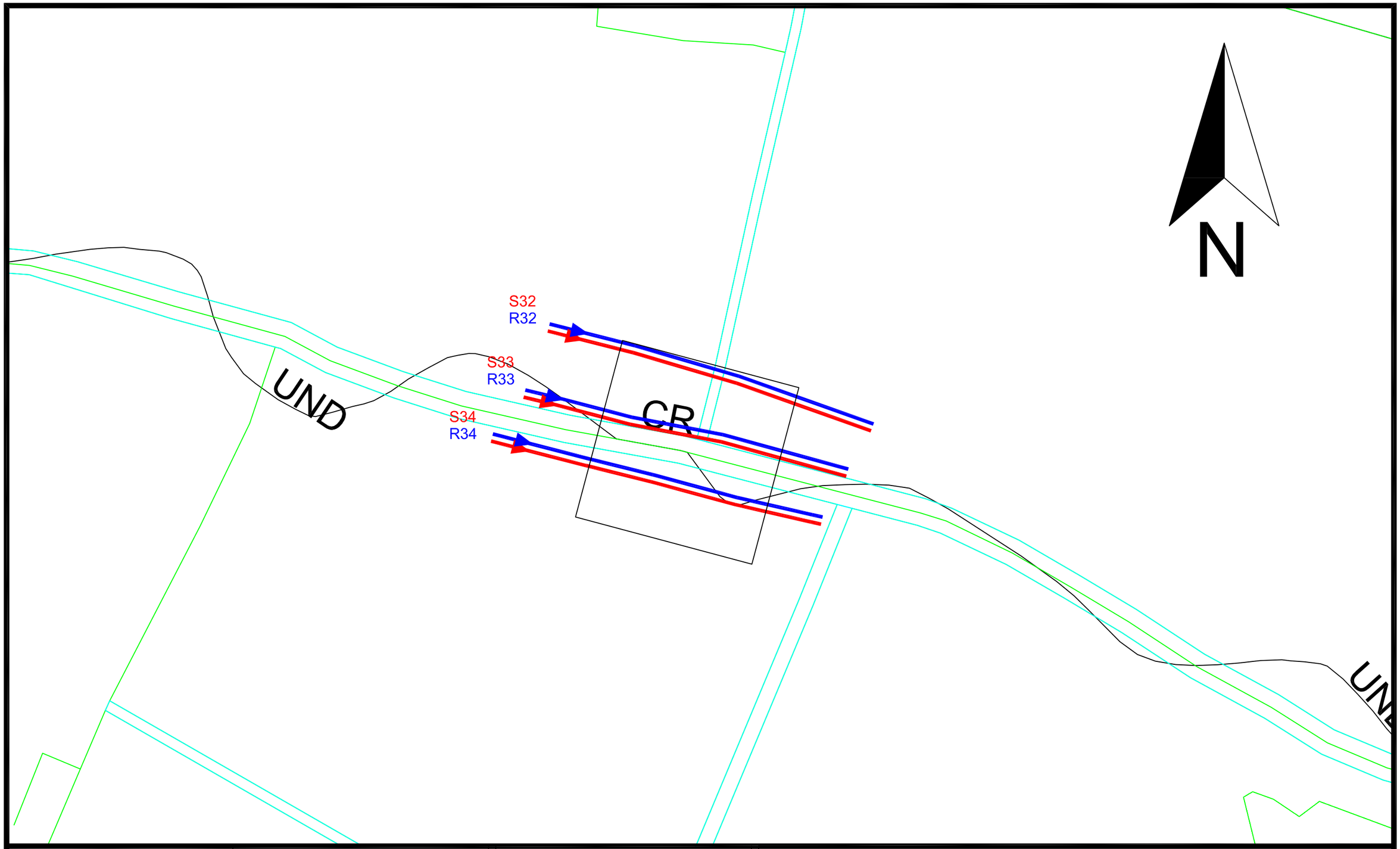
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Email: info@mgx.ie
Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 8b: Interpretation of of Geophysical Survey CH92280

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	26/06/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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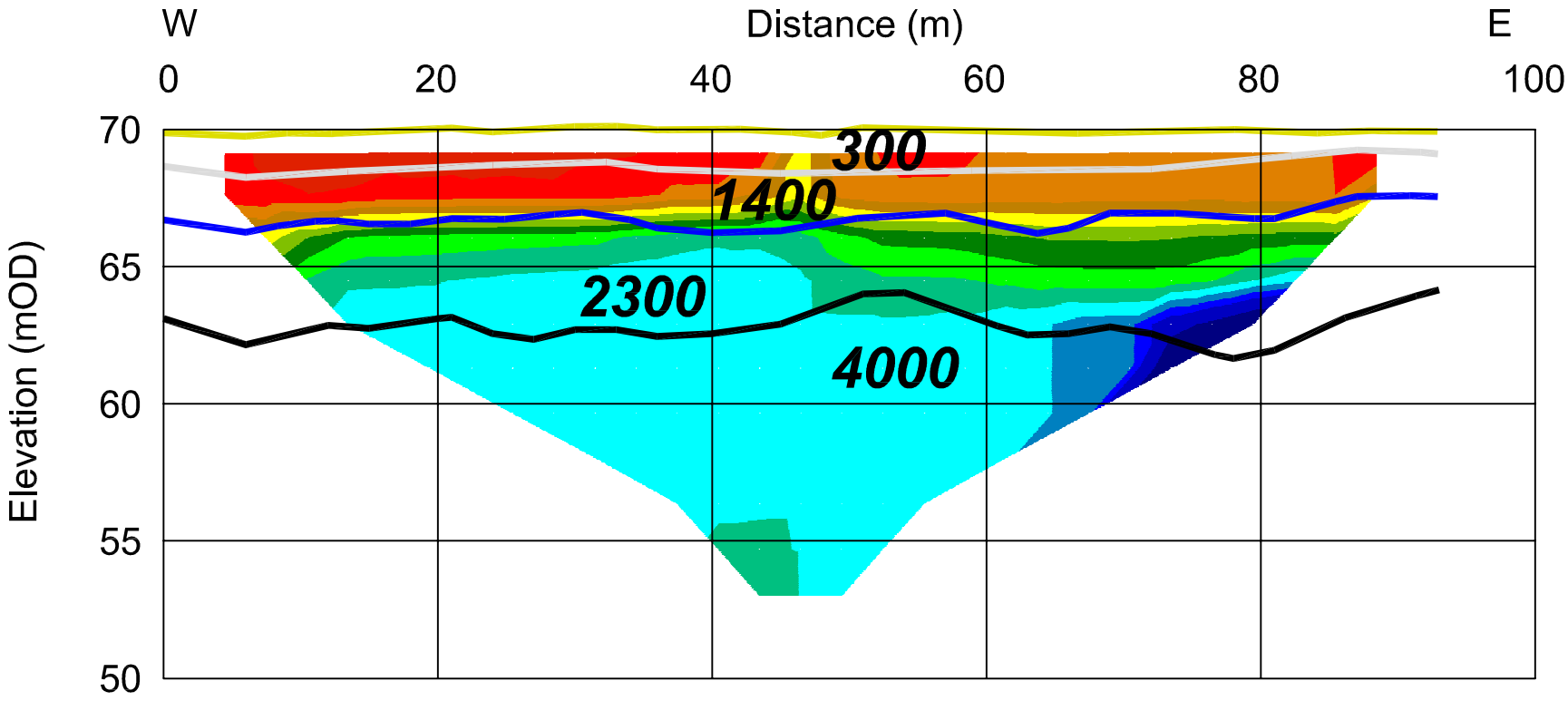
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 9: Geophysical Survey Location Map CH114550

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

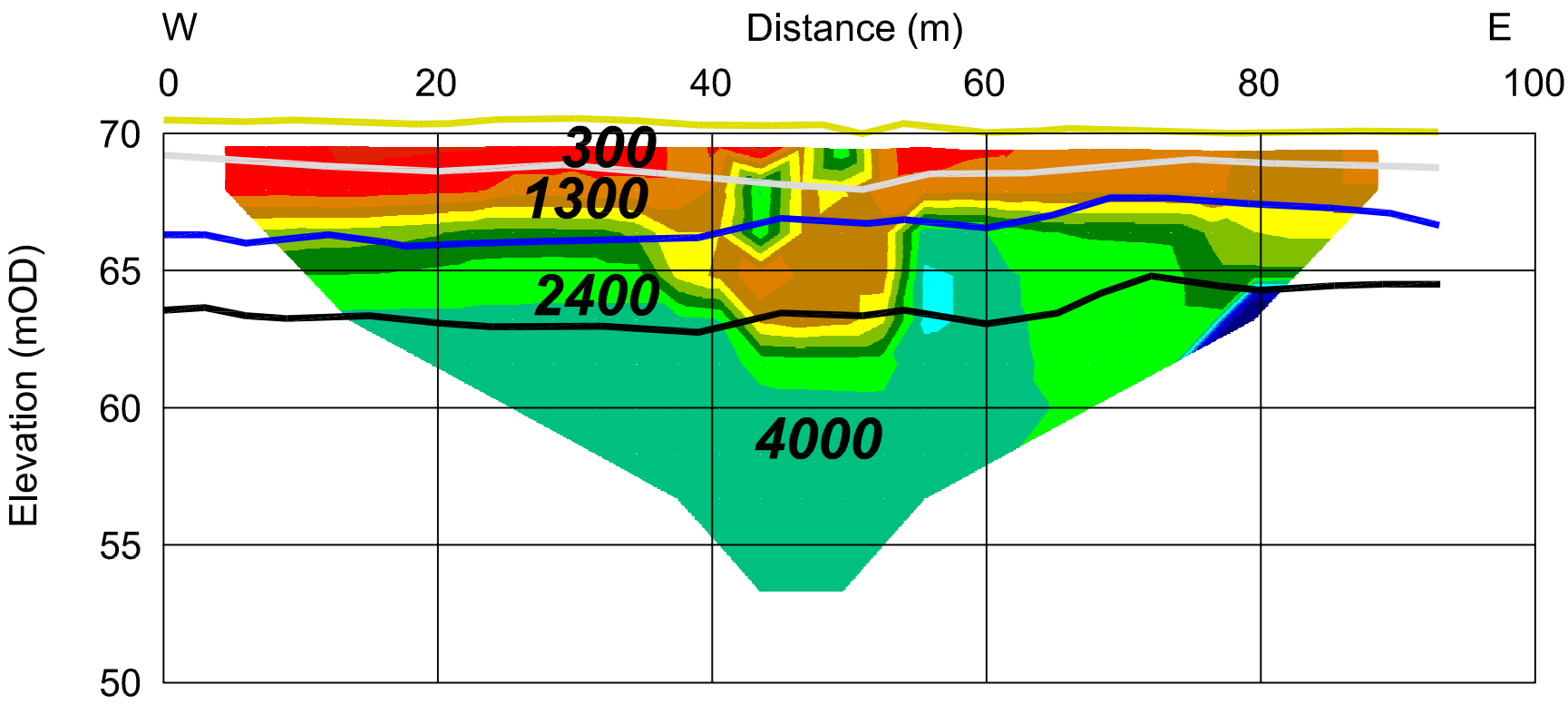
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

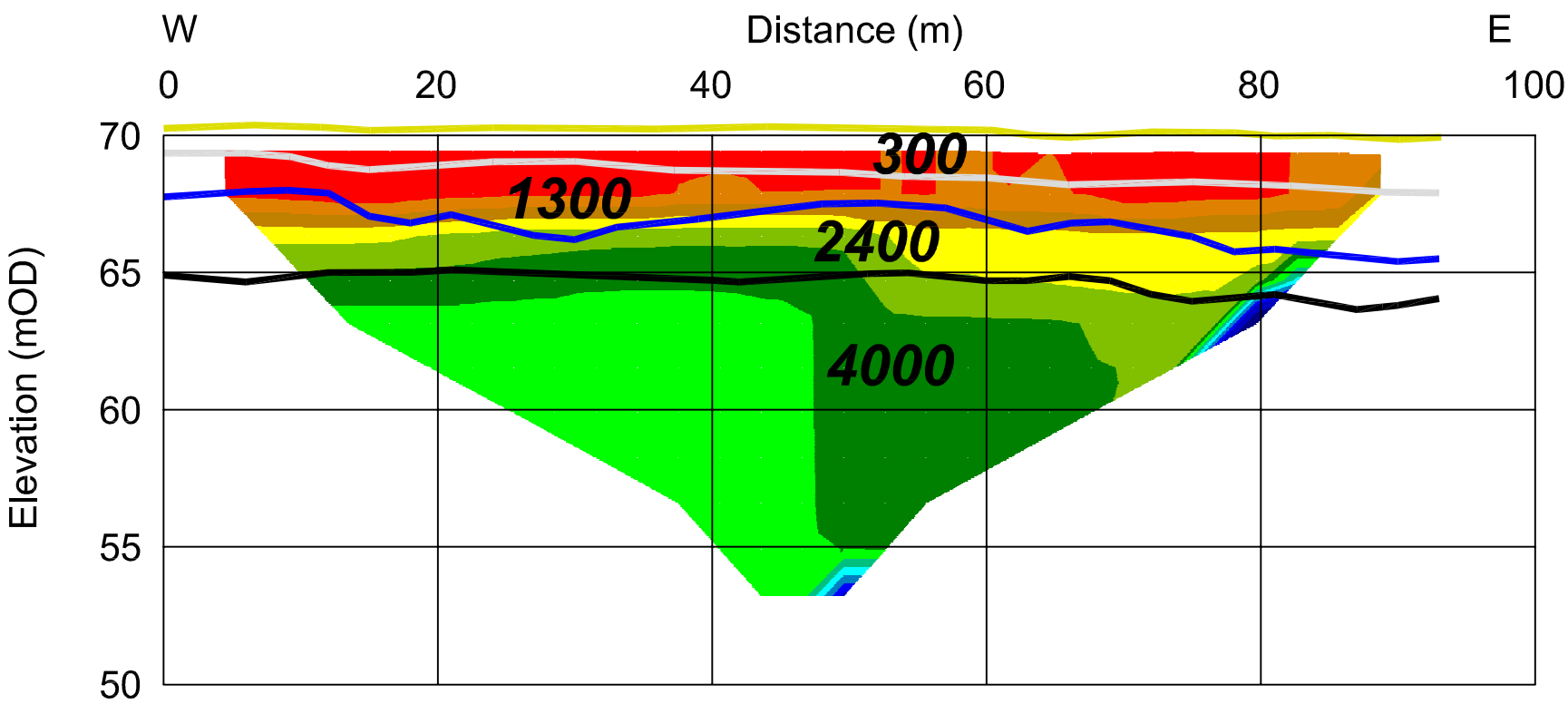
2D-Resistivity Profile R32 and Seismic Refraction Profile S32 Model



2D-Resistivity Profile R33 and Seismic Refraction Profile S33 Model



2D-Resistivity Profile R34 and Seismic Refraction Profile S34 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 9a: Models of of Geophysical Survey CH114550

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

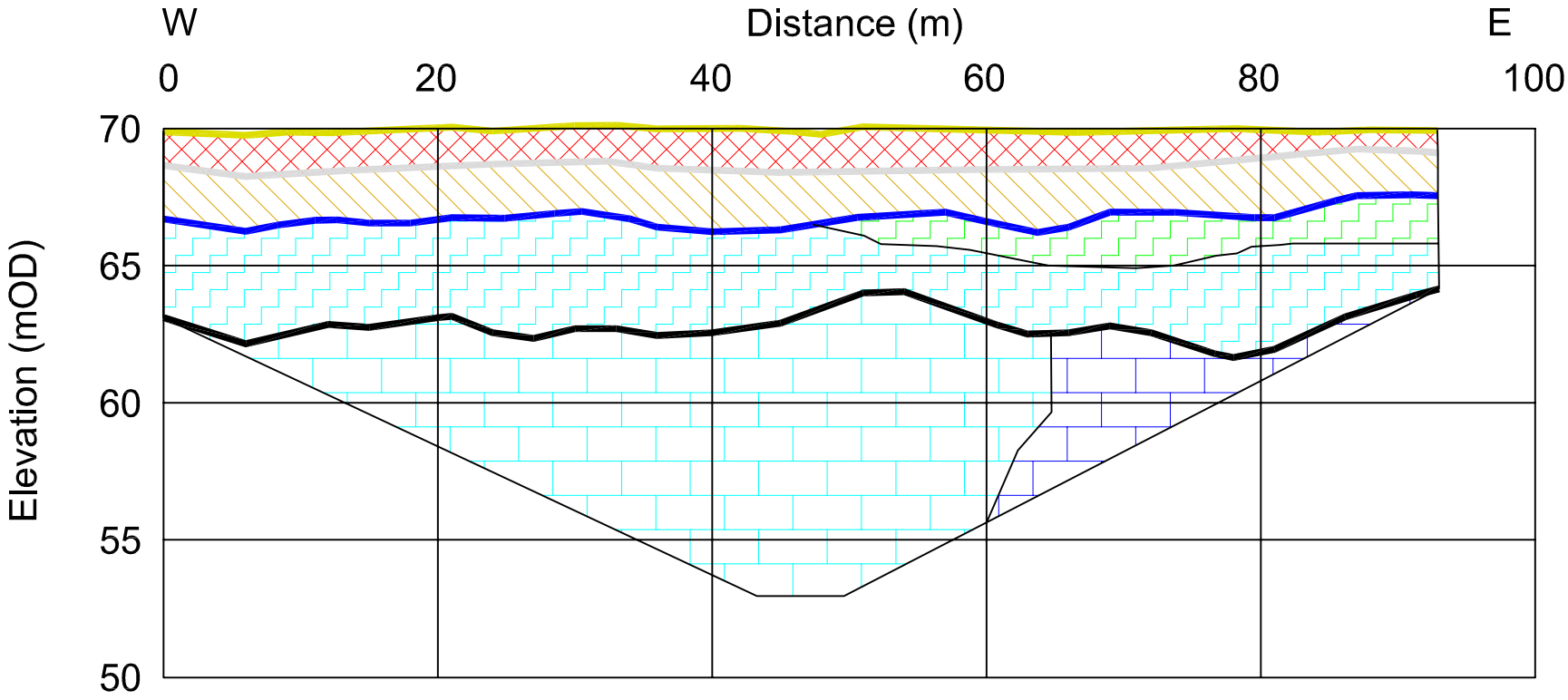
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

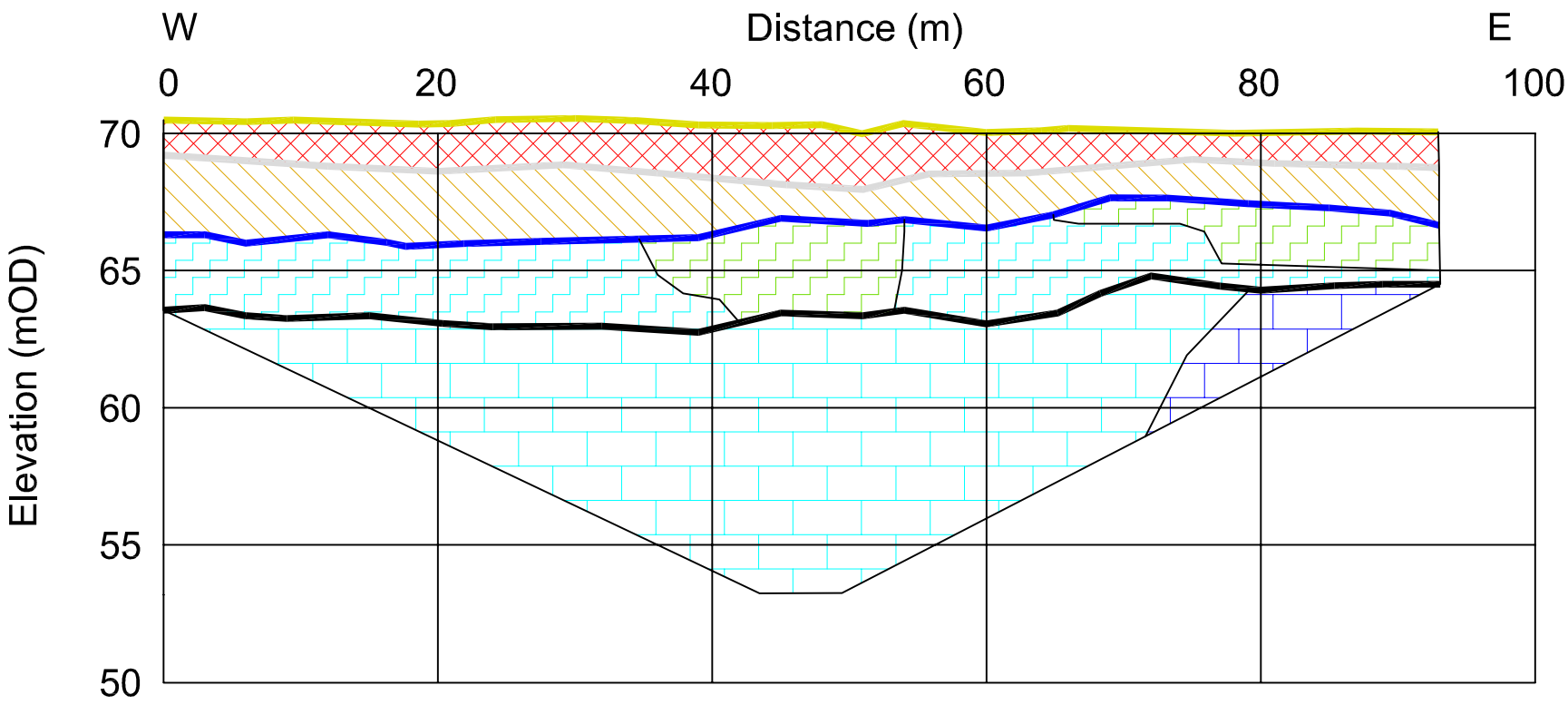
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

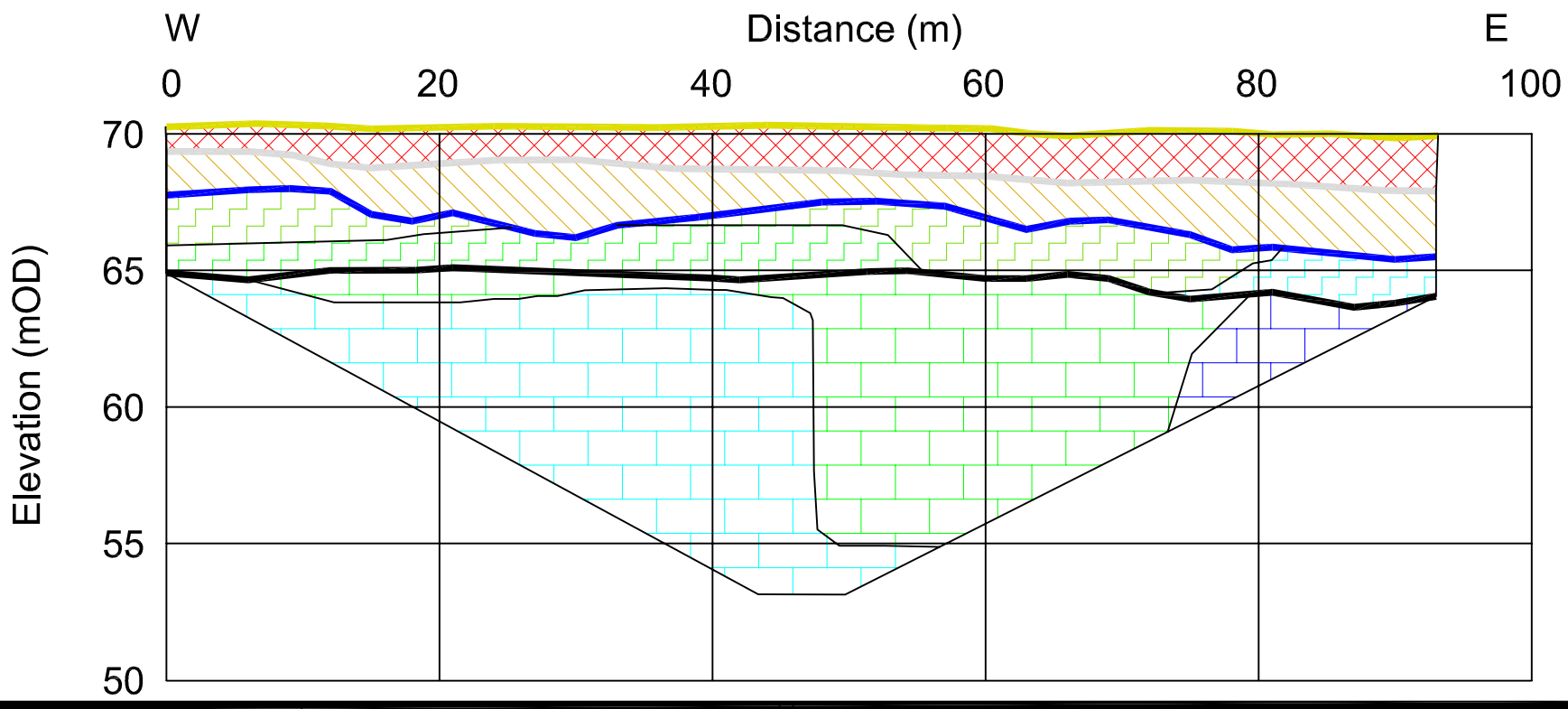
2D-Resistivity Prof. R32 and Seismic Refraction Prof. S32 Interpretation



2D-Resistivity Prof. R33 and Seismic Refraction Prof. S33 Interpretation



2D-Resistivity Prof. R34 and Seismic Refraction Prof. S34 Interpretation



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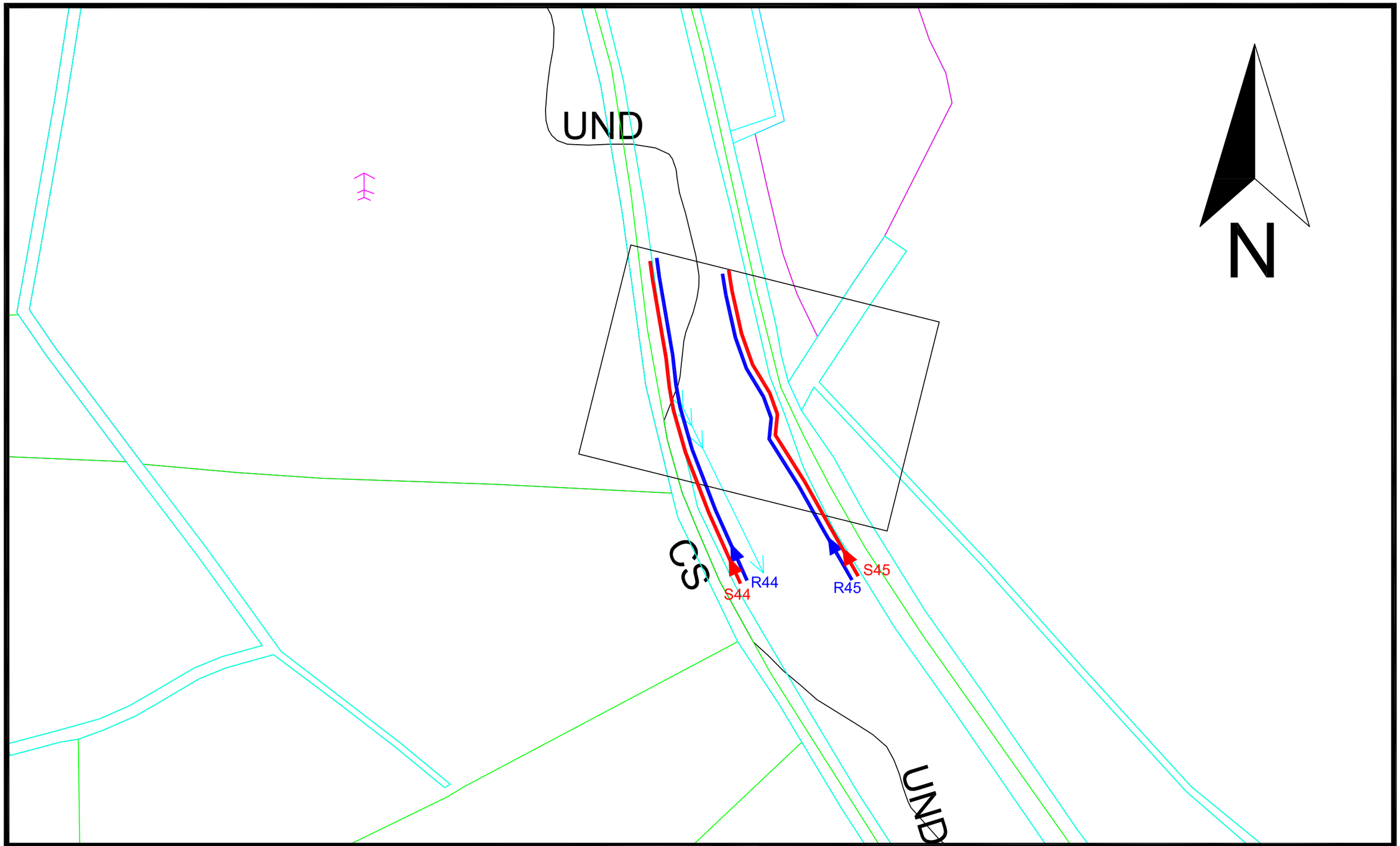
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 9b:Interpretation of of Geophysical Survey CH114550

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
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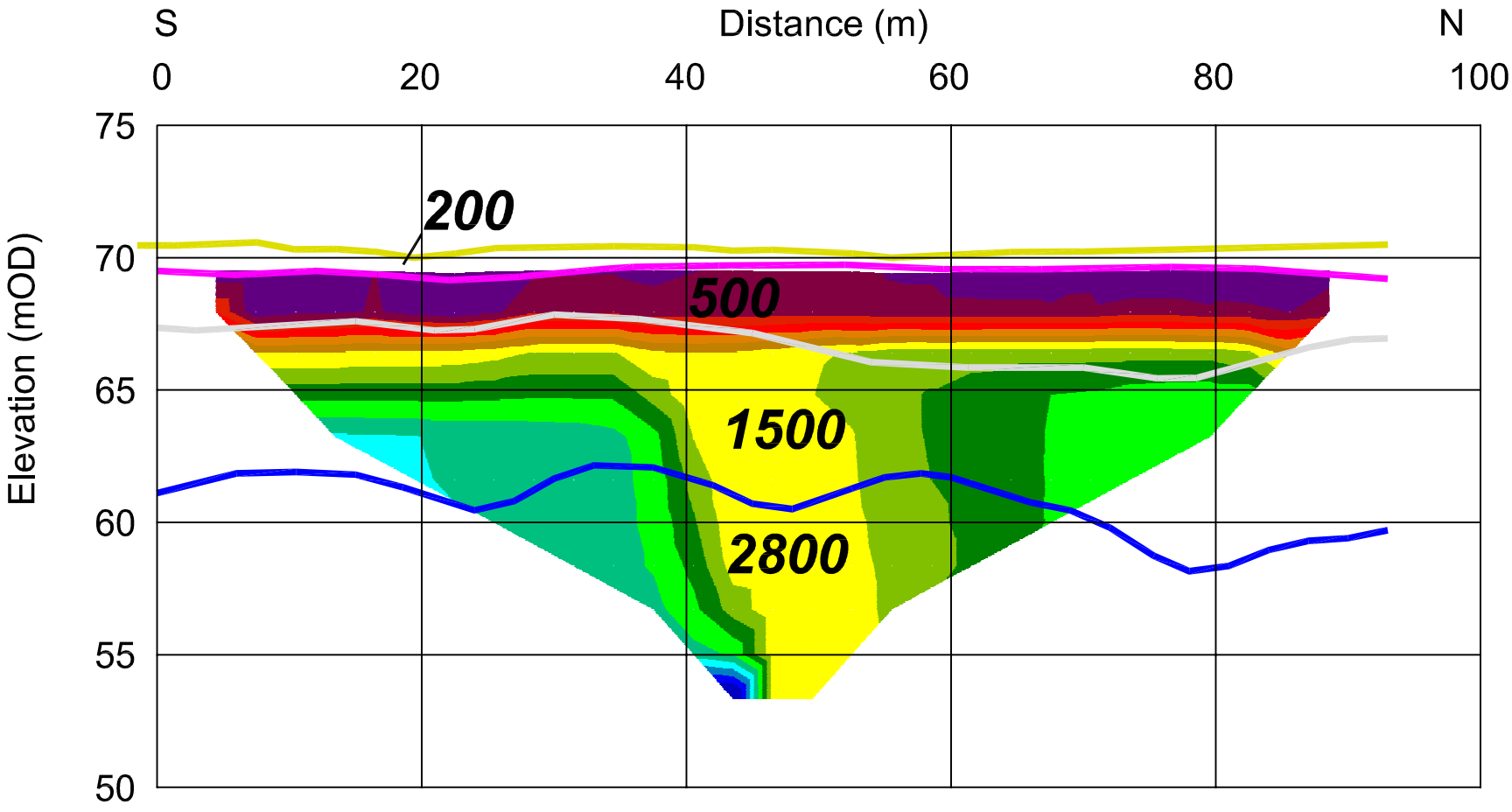
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 10: Geophysical Survey Location Map CH115900

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

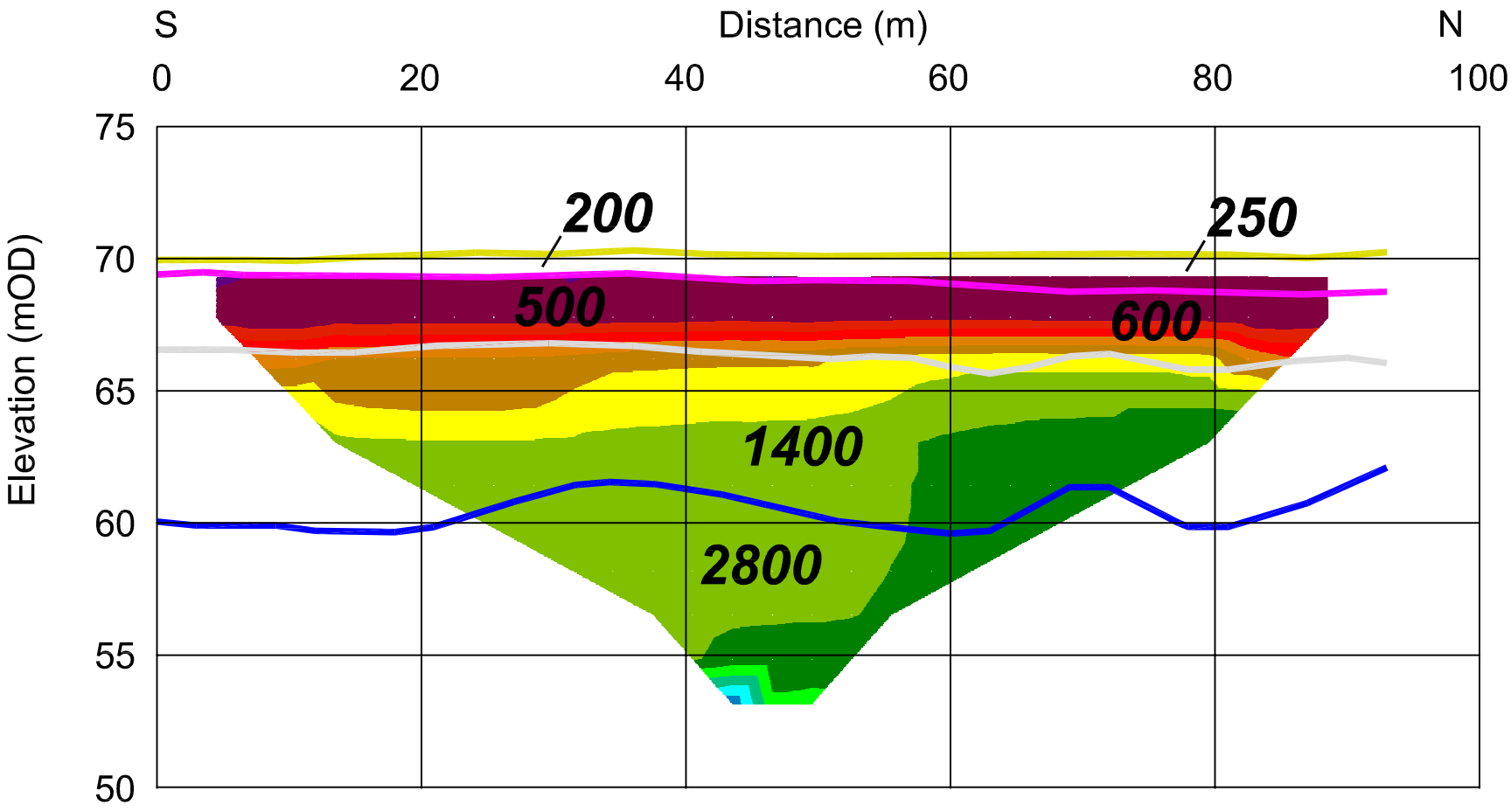
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

2D-Resistivity Profile R44 and Seismic Refraction Profile S44 Model



2D-Resistivity Profile R45 and Seismic Refraction Profile S45 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 10a: Models of of Geophysical Survey CH115900

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

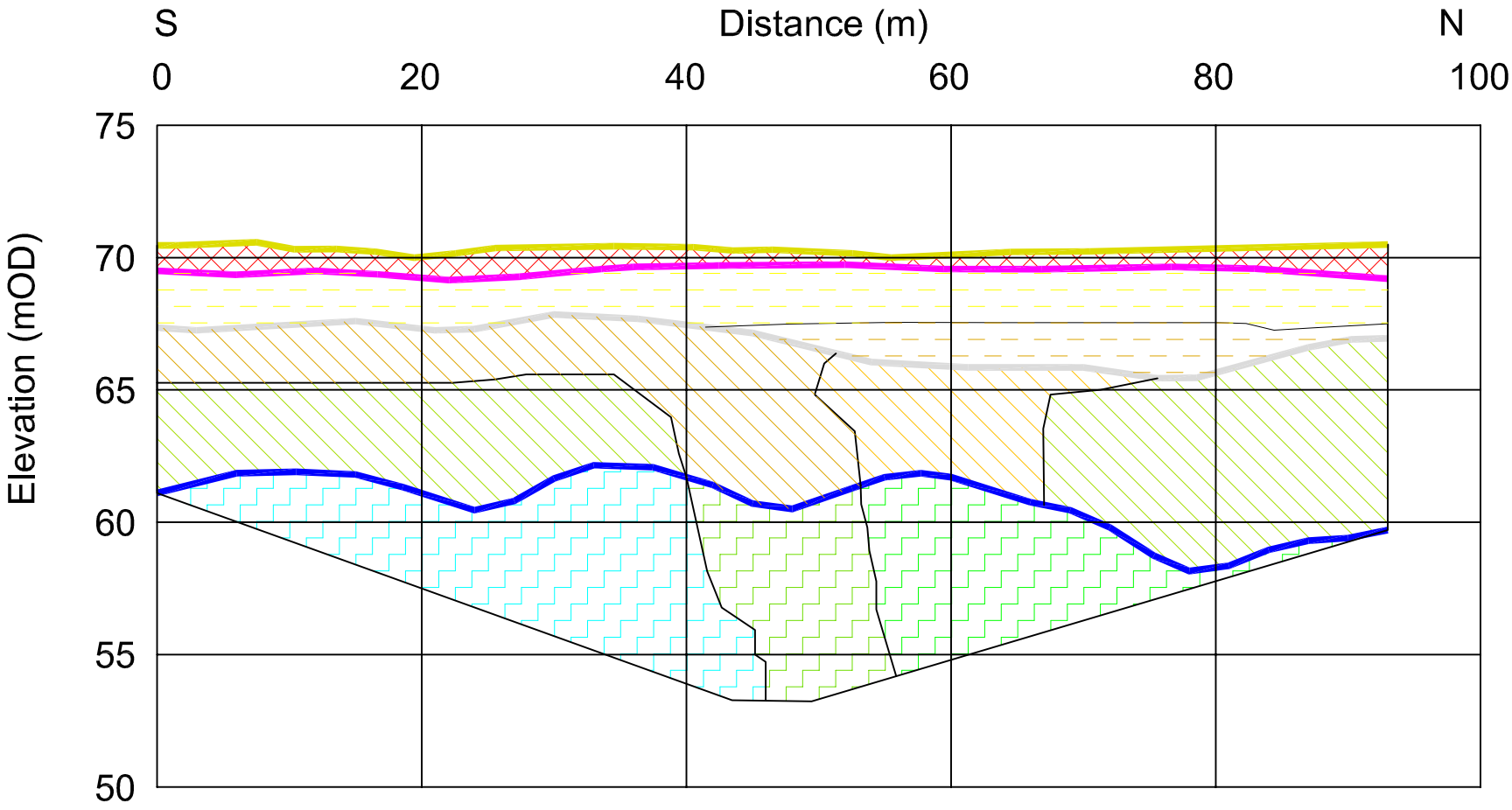
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

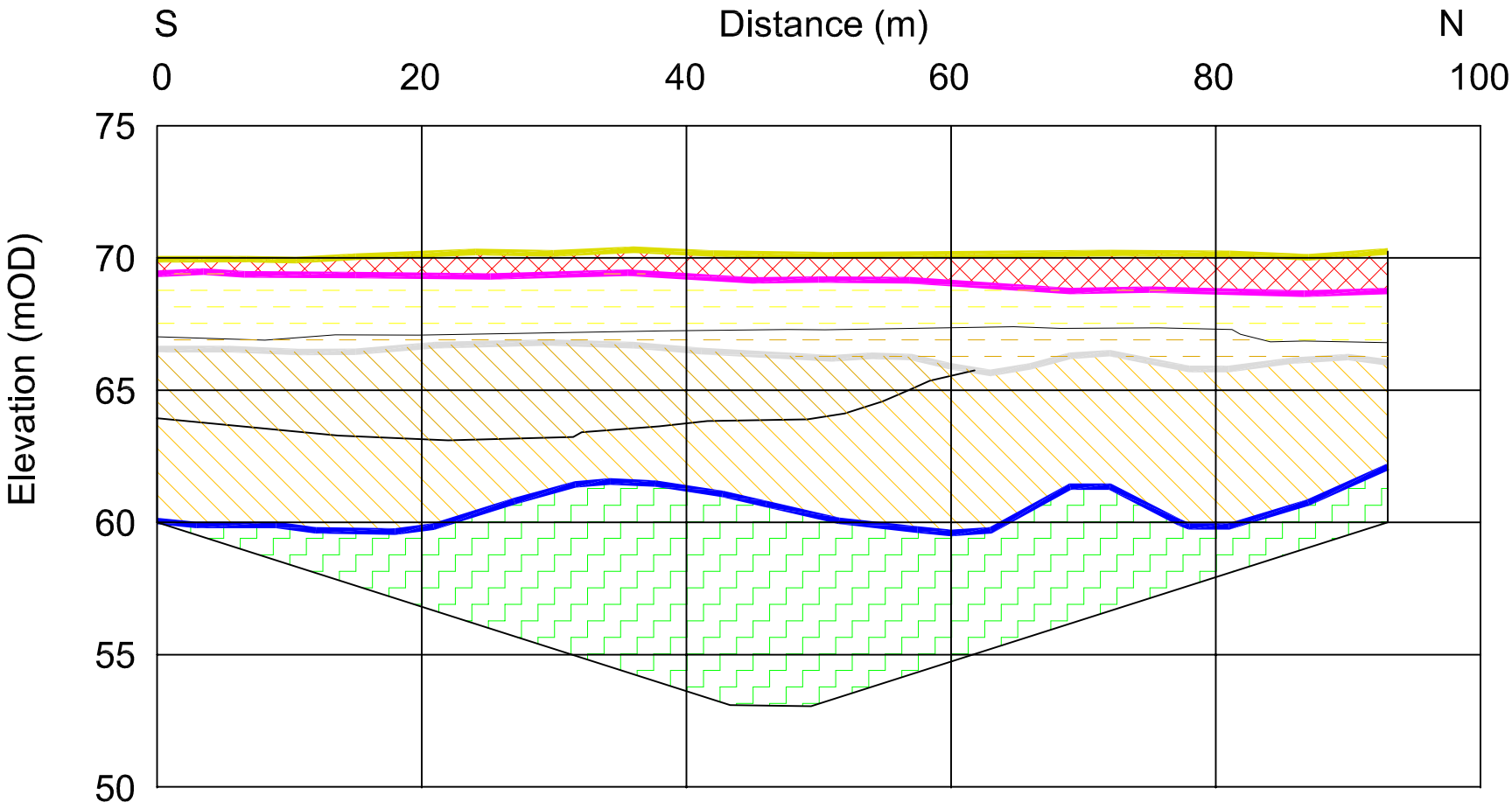
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 | 62.5 | 125 | 250 | 500 | 1000 | 2000 | 4000

2D-Resistivity Prof. R44 and Seismic Refraction Prof. S44 Interpretation



2D-Resistivity Prof. R45 and Seismic Refraction Prof. S45 Interpretation



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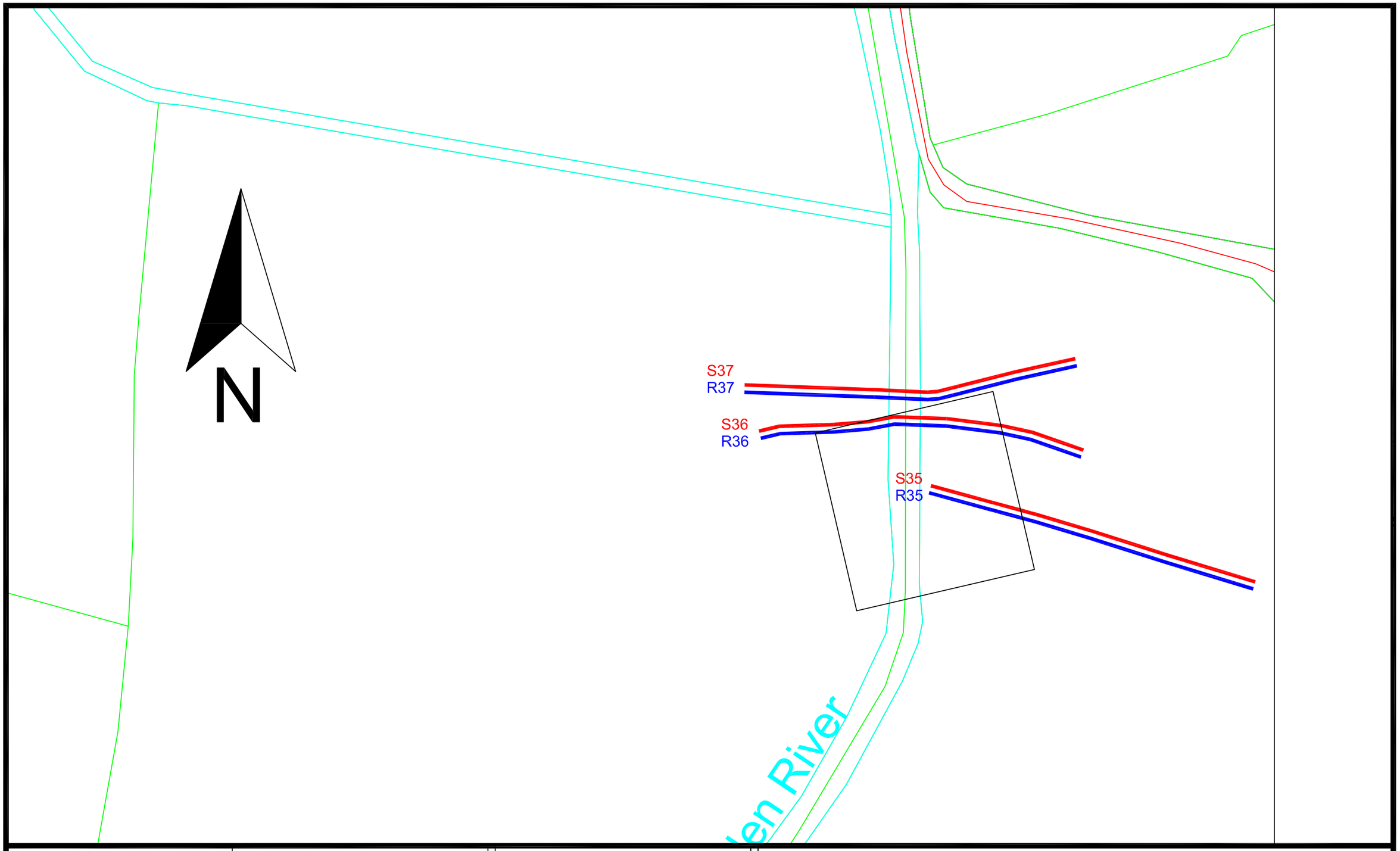
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 10b: Interpretation of of Geophysical Survey CH115900

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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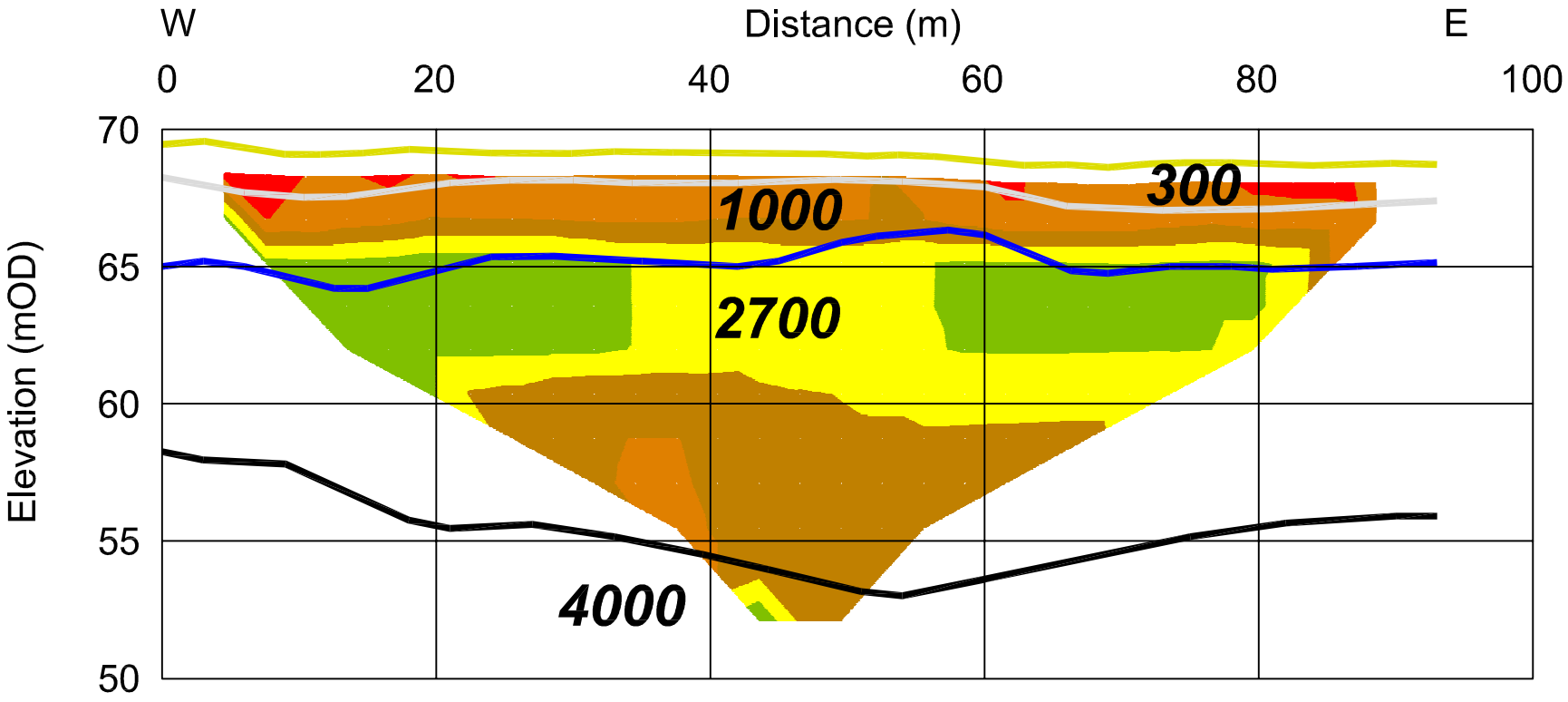
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 11: Geophysical Survey Location Map CH118420

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

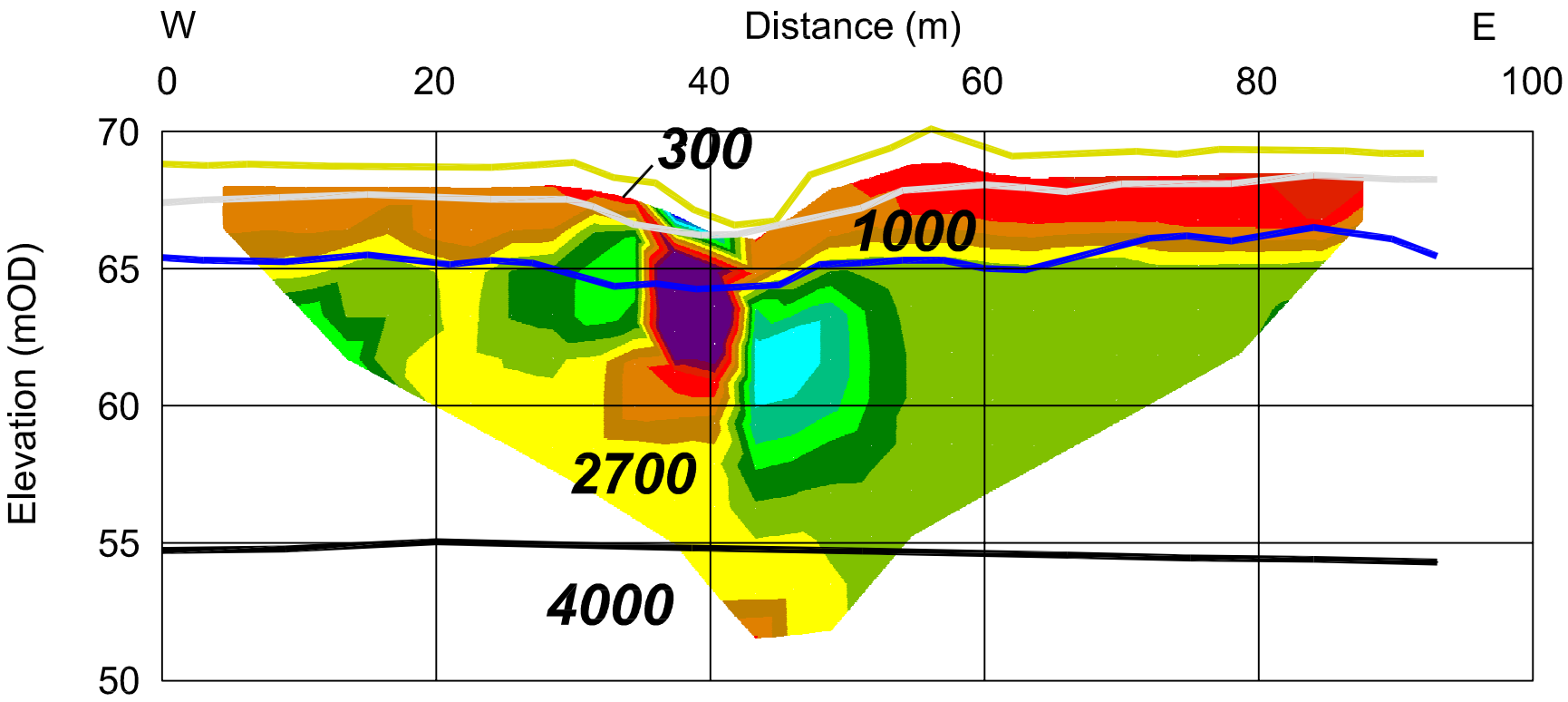
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

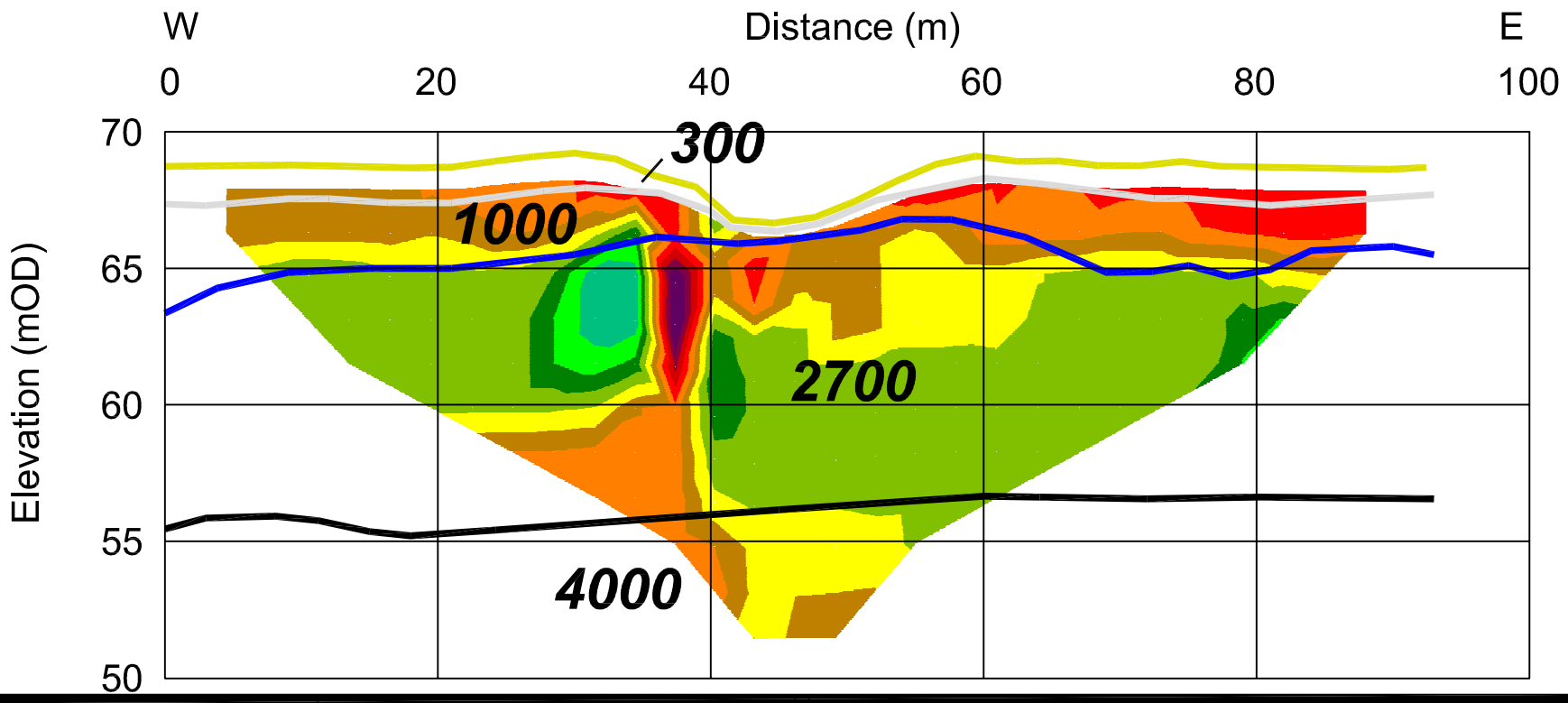
2D-Resistivity Profile R35 and Seismic Refraction Profile S35 Model



2D-Resistivity Profile R36 and Seismic Refraction Profile S36 Model



2D-Resistivity Profile R37 and Seismic Refraction Profile S37 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 11a: Models of of Geophysical Survey CH118420

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

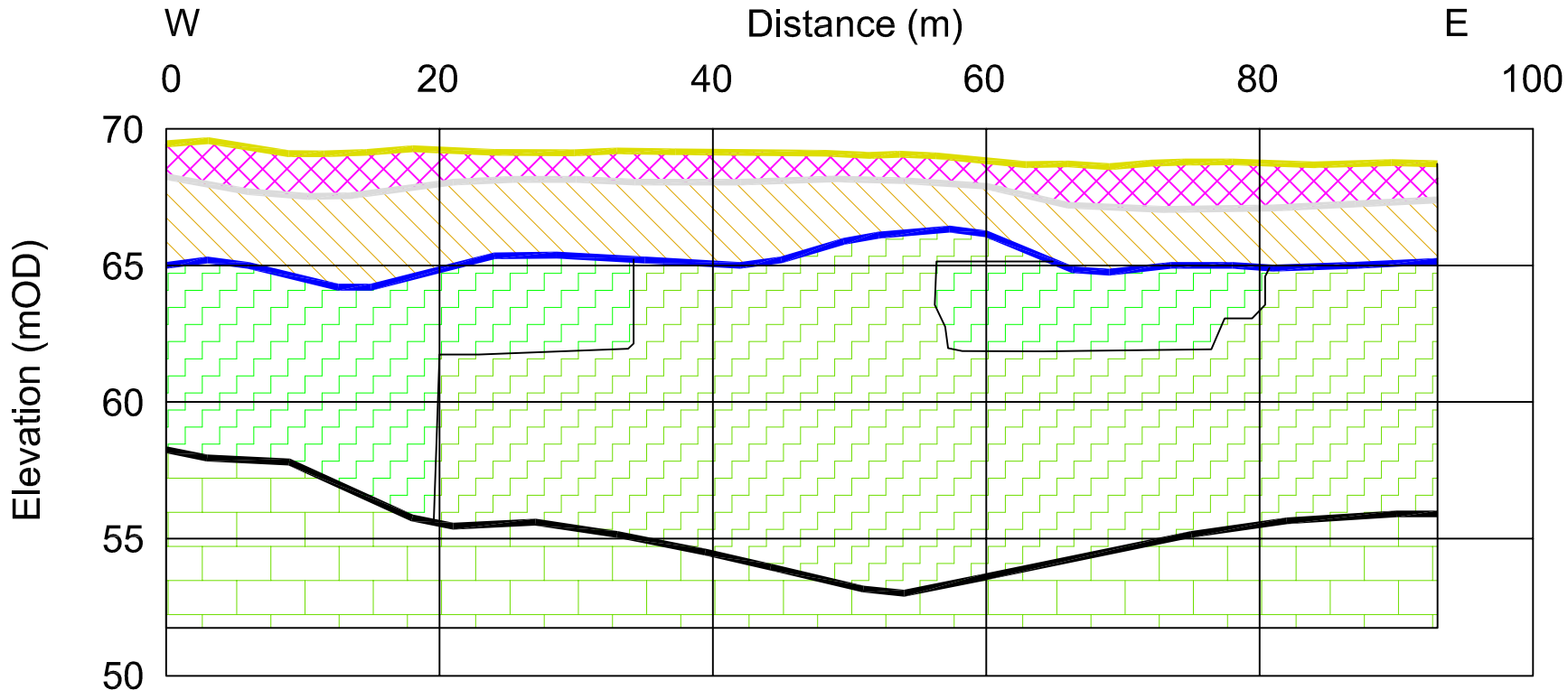
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

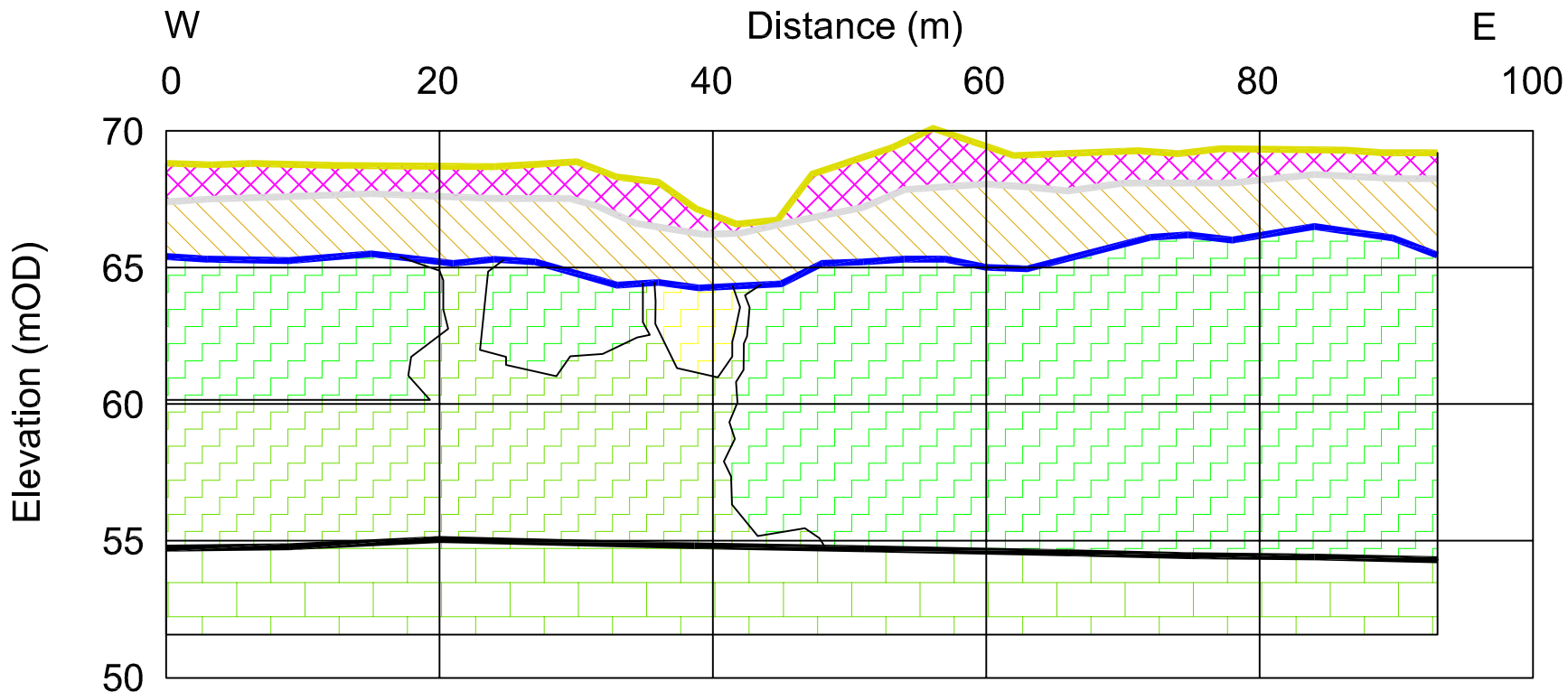
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

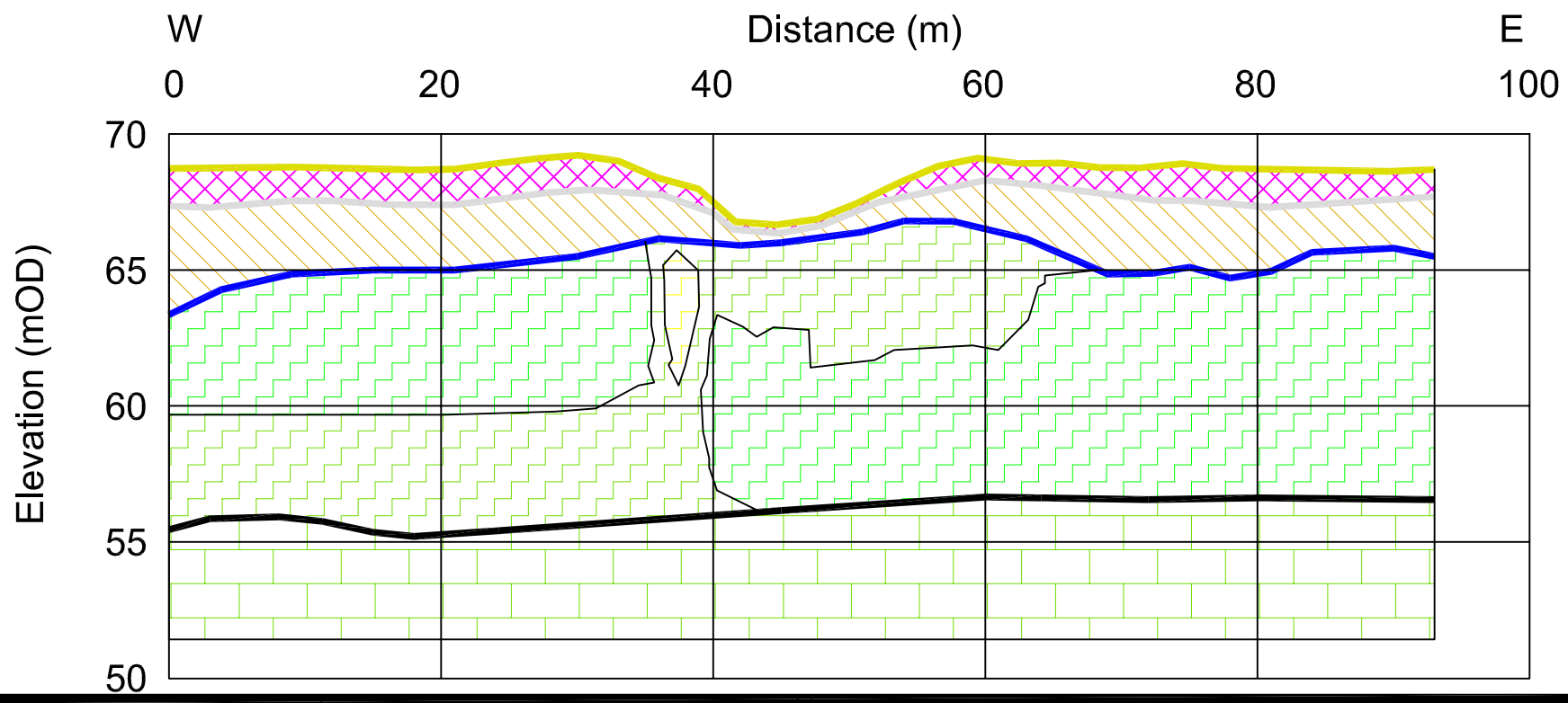
2D-Resistivity Prof. R35 and Seismic Refraction Prof. S35 Interpretation



2D-Resistivity Prof. R36 and Seismic Refraction Prof. S36 Interpretation



2D-Resistivity Prof. R37 and Seismic Refraction Prof. S37 Interpretation



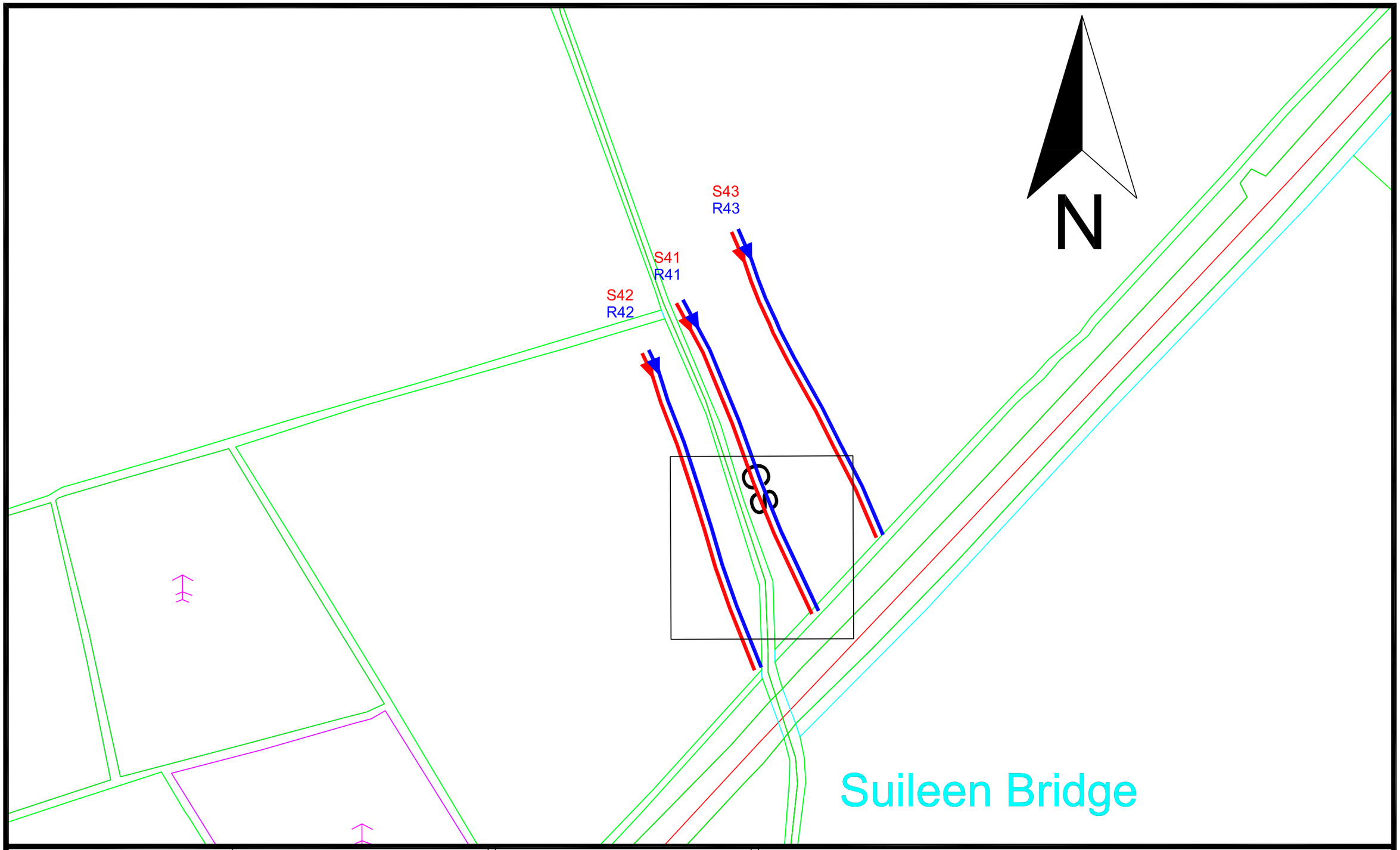
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 11b: Interpretation of of Geophysical Survey CH118420

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	1907/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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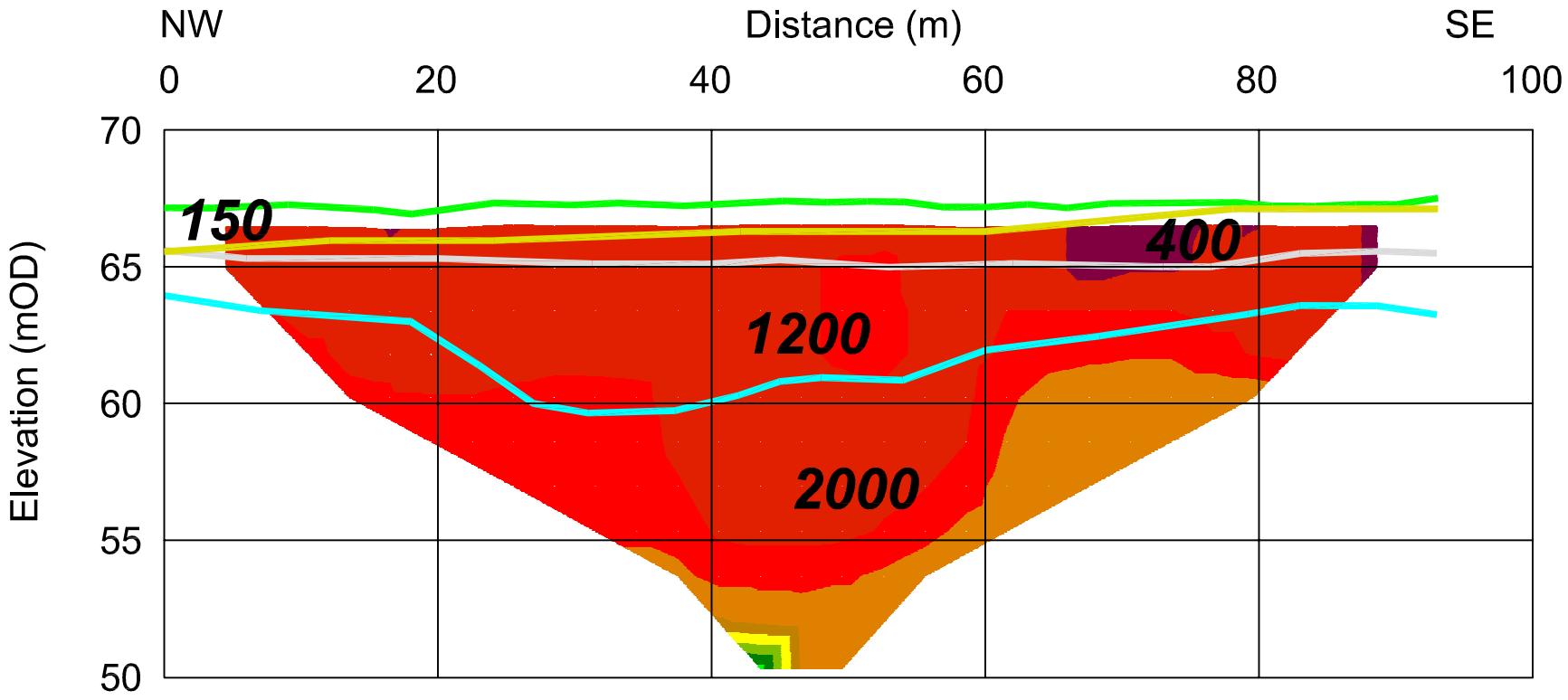
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 12: Geophysical Survey Location Map CH123900

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

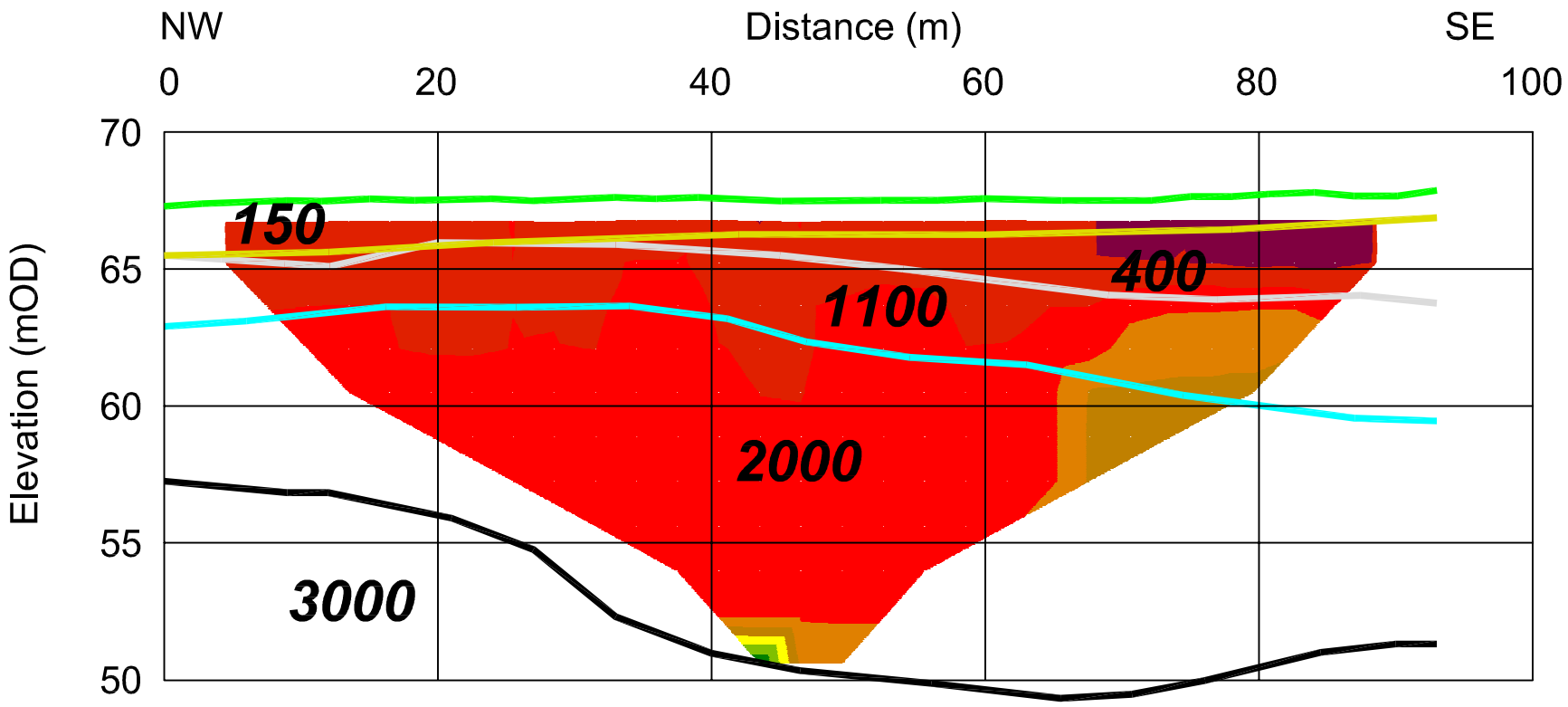
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

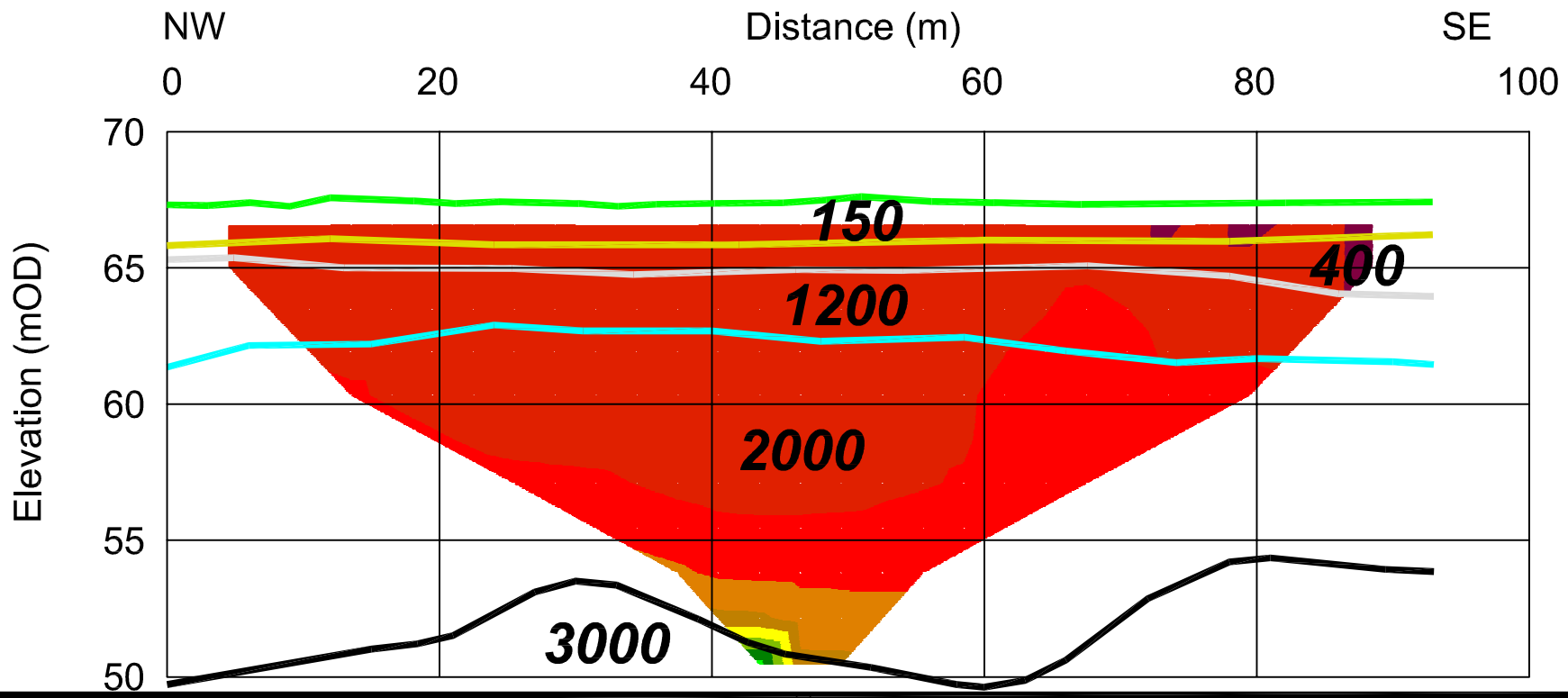
2D-Resistivity Profile R41 and Seismic Refraction Profile S41 Model



2D-Resistivity Profile R42 and Seismic Refraction Profile S42 Model



2D-Resistivity Profile R43 and Seismic Refraction Profile S43 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 12a: Models of of Geophysical Survey CH123900

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

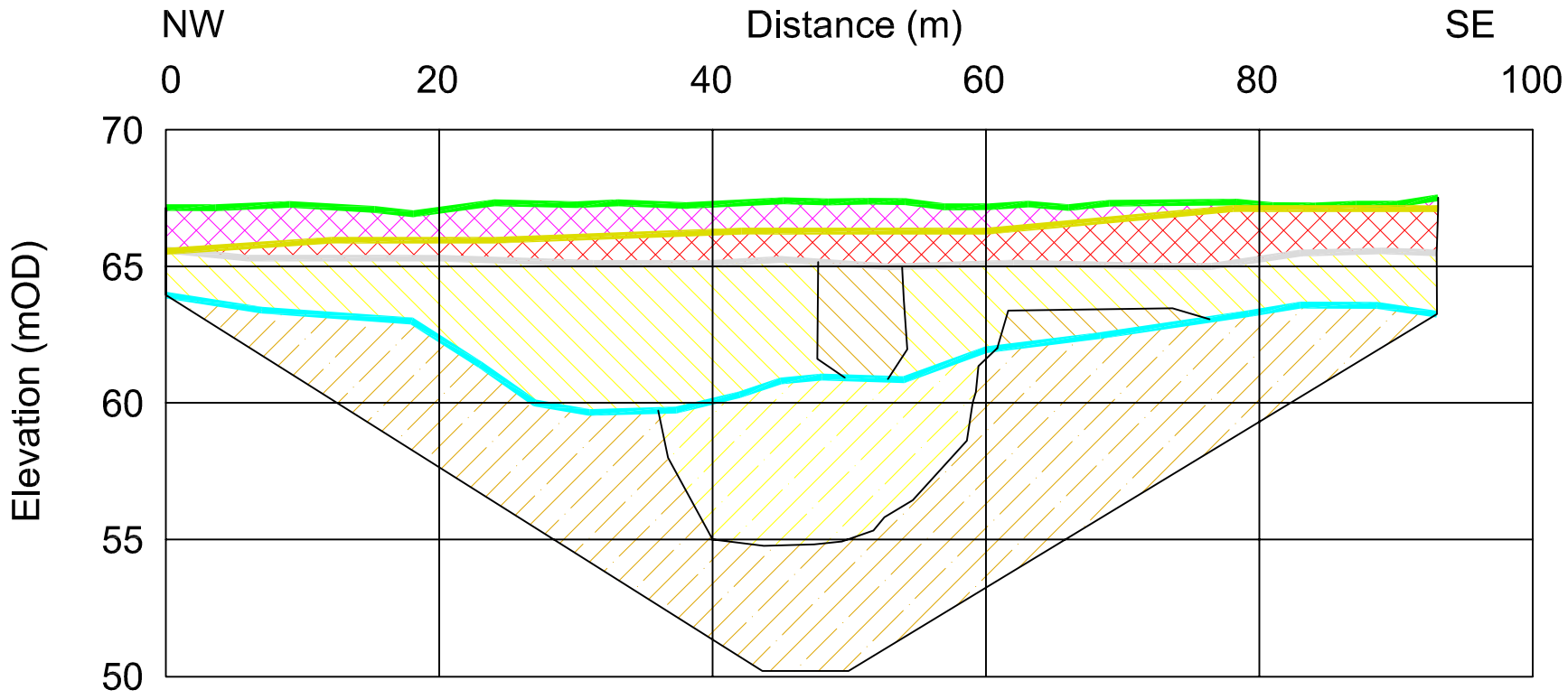
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

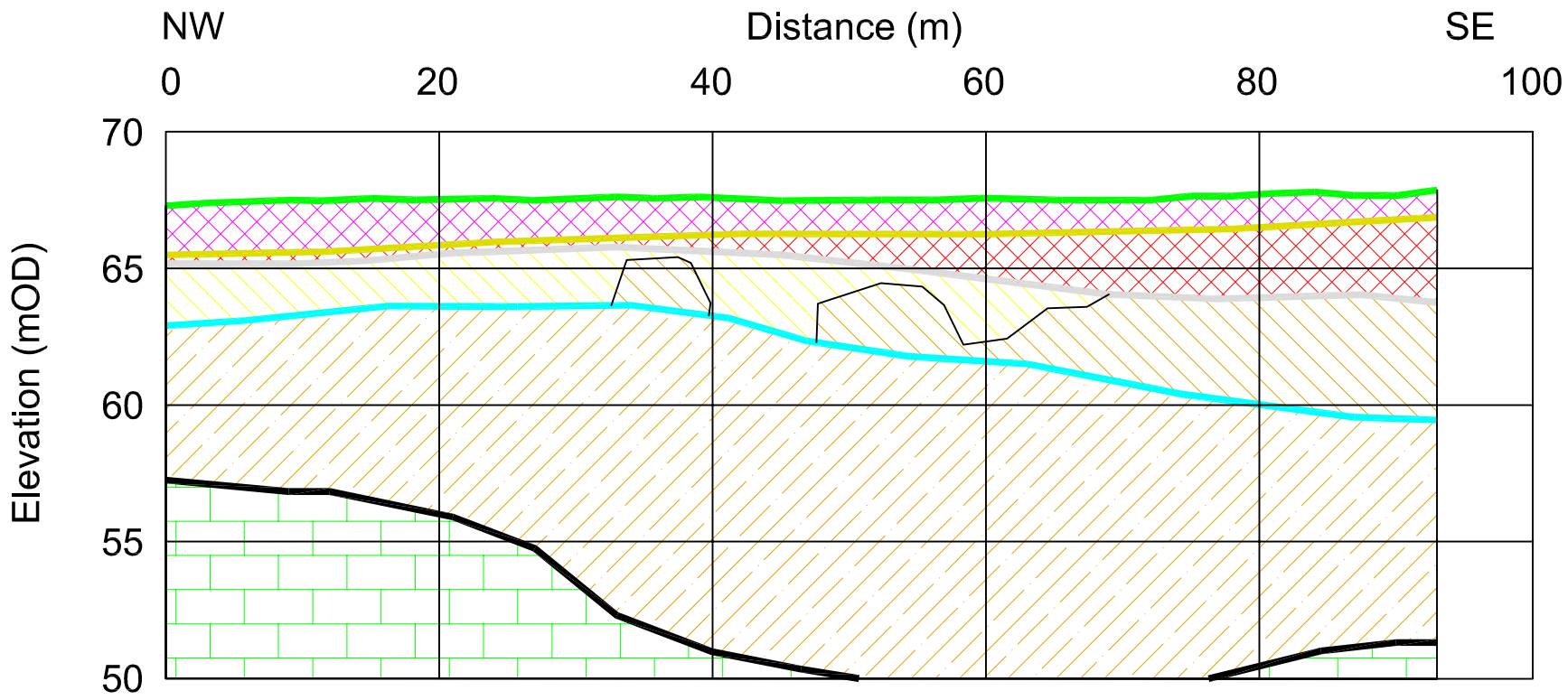
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

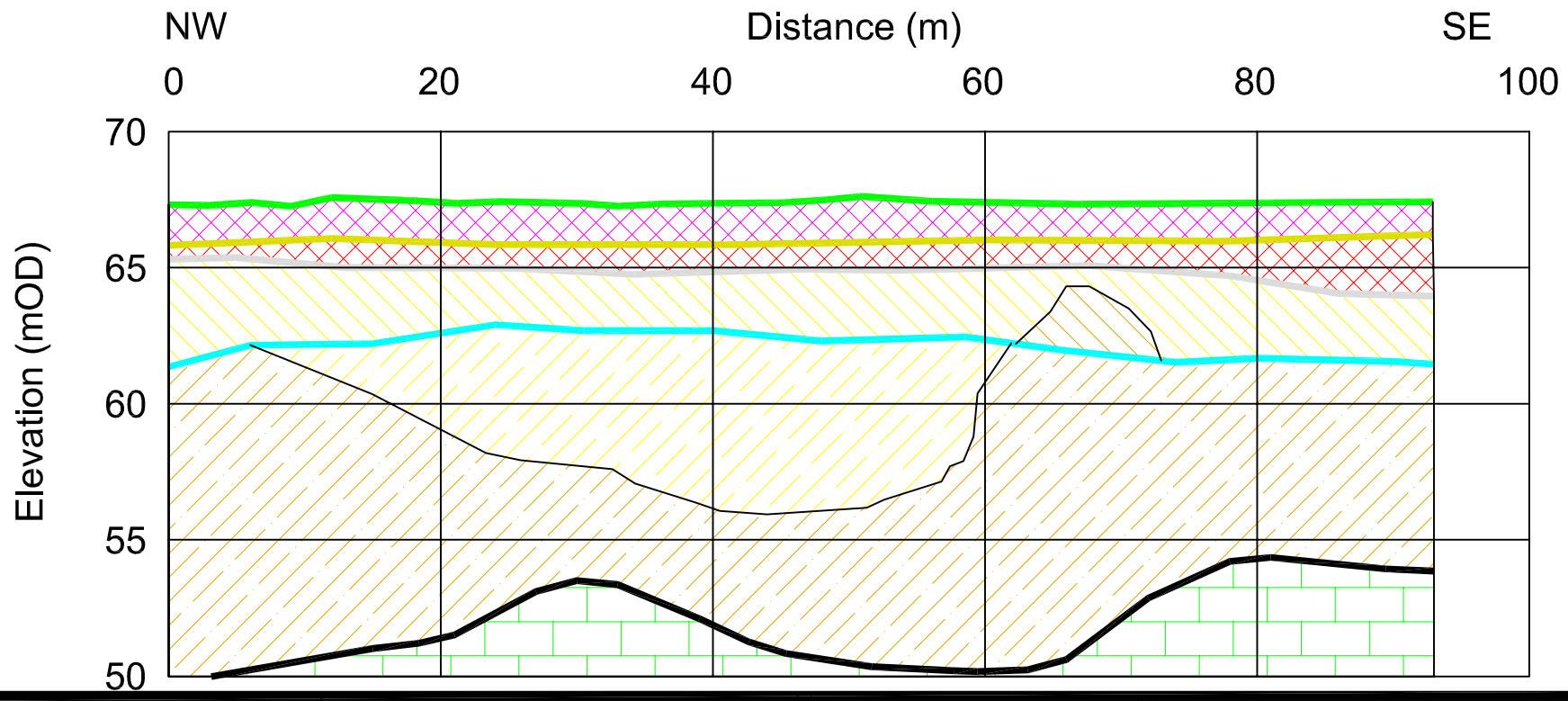
2D-Resistivity Prof. R41 and Seismic Refraction Prof. S41 Interpretation



2D-Resistivity Prof. R42 and Seismic Refraction Prof S42 Interpretation



2D-Resistivity Prof. R43 and Seismic Refraction Prof. S43 Interpretation



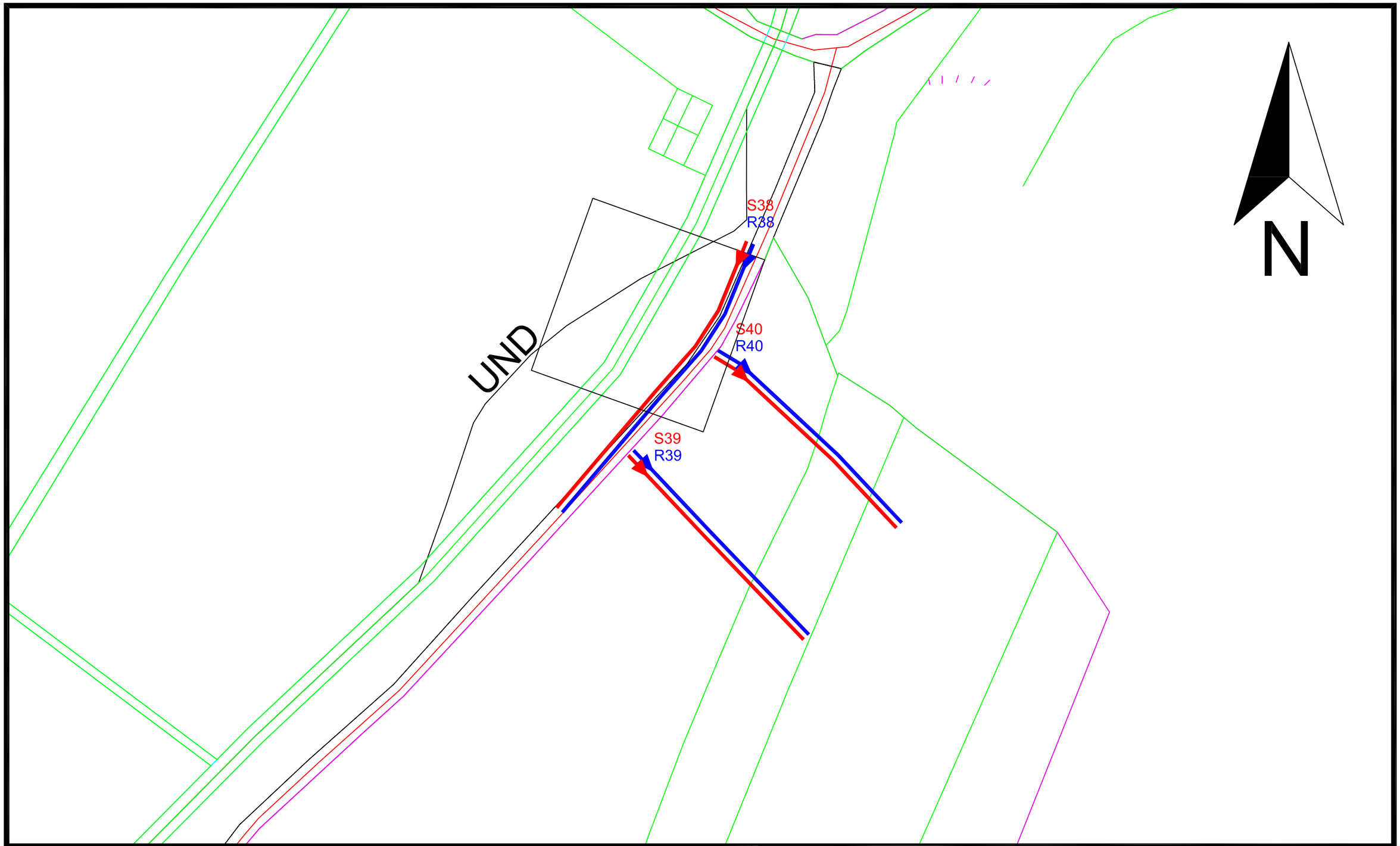
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 12b: Interpretation of of Geophysical Survey CH123900

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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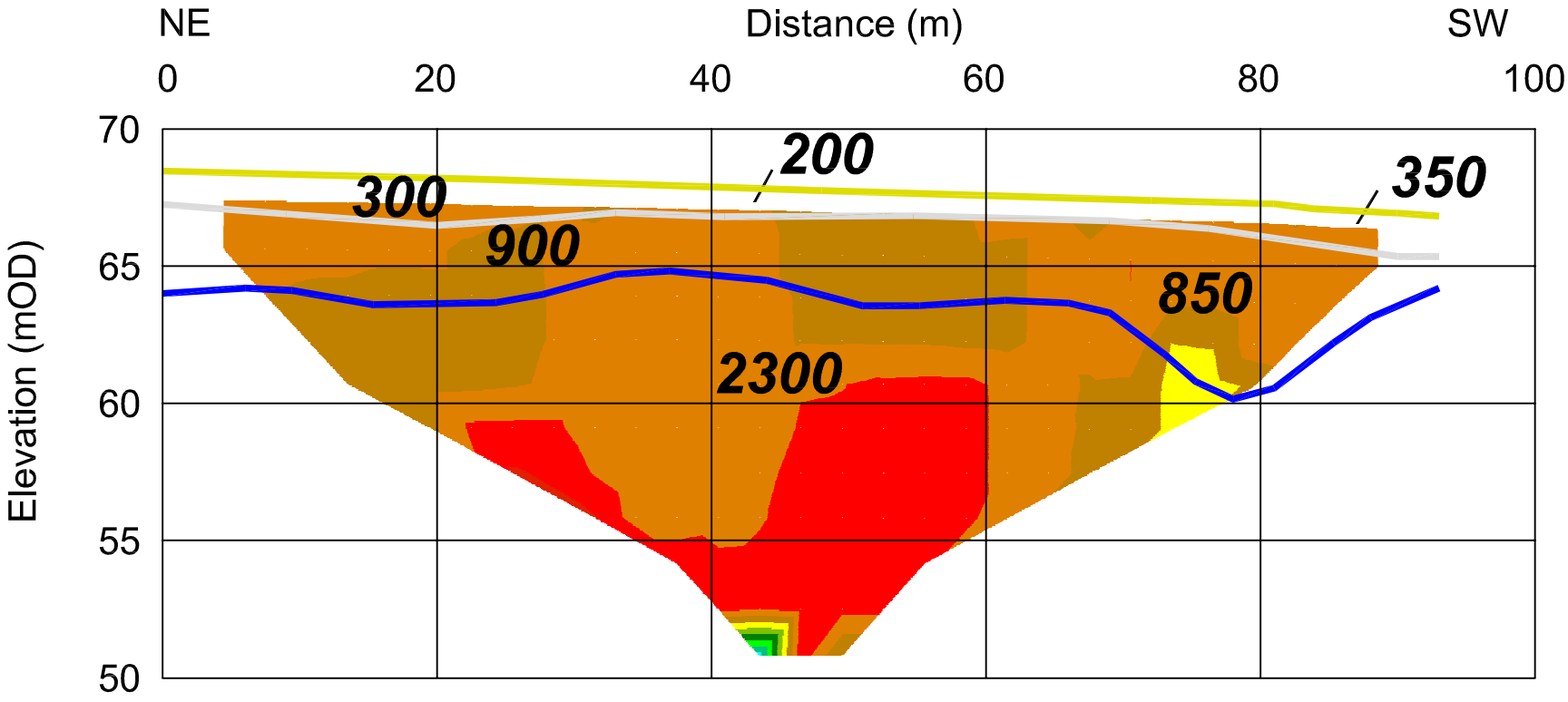
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 13: Geophysical Survey Location Map CH124000

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

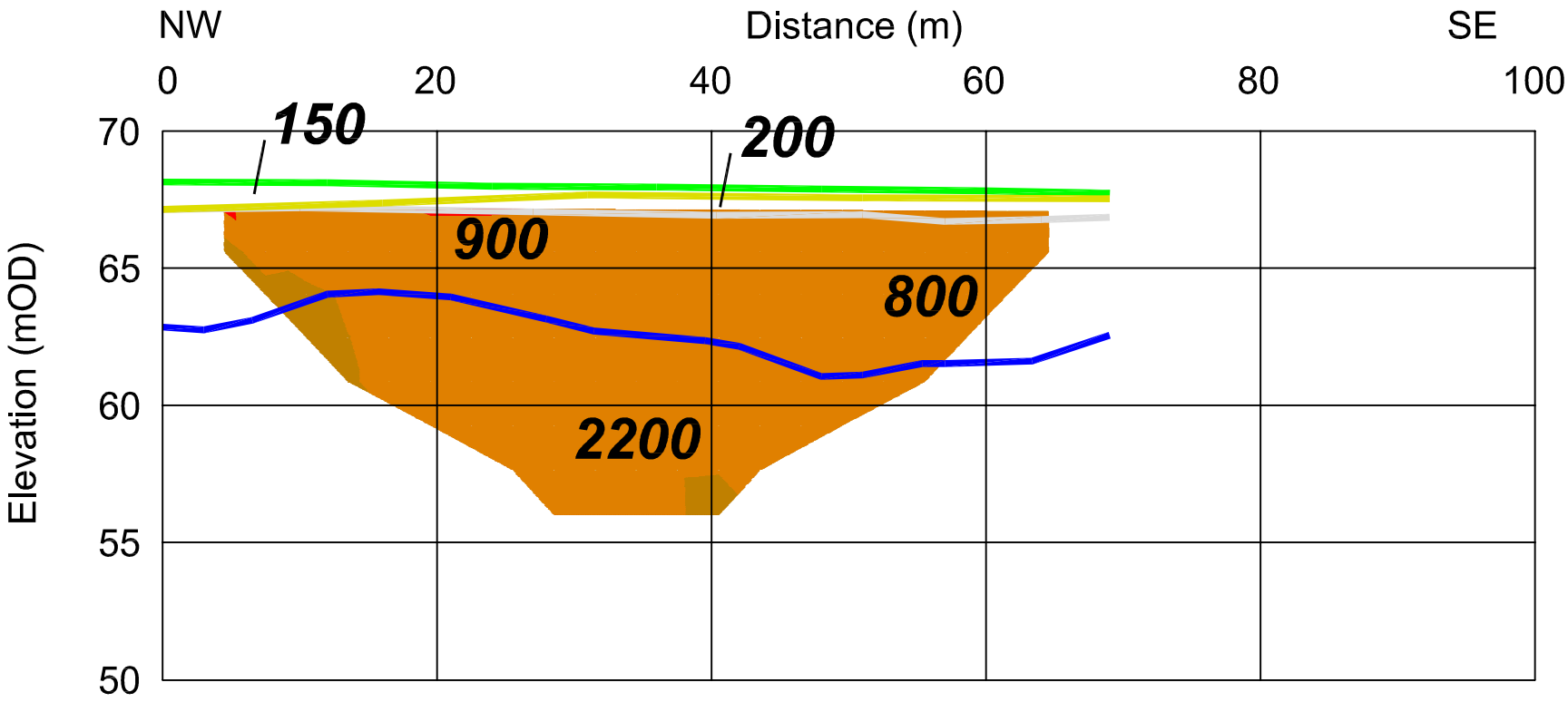
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

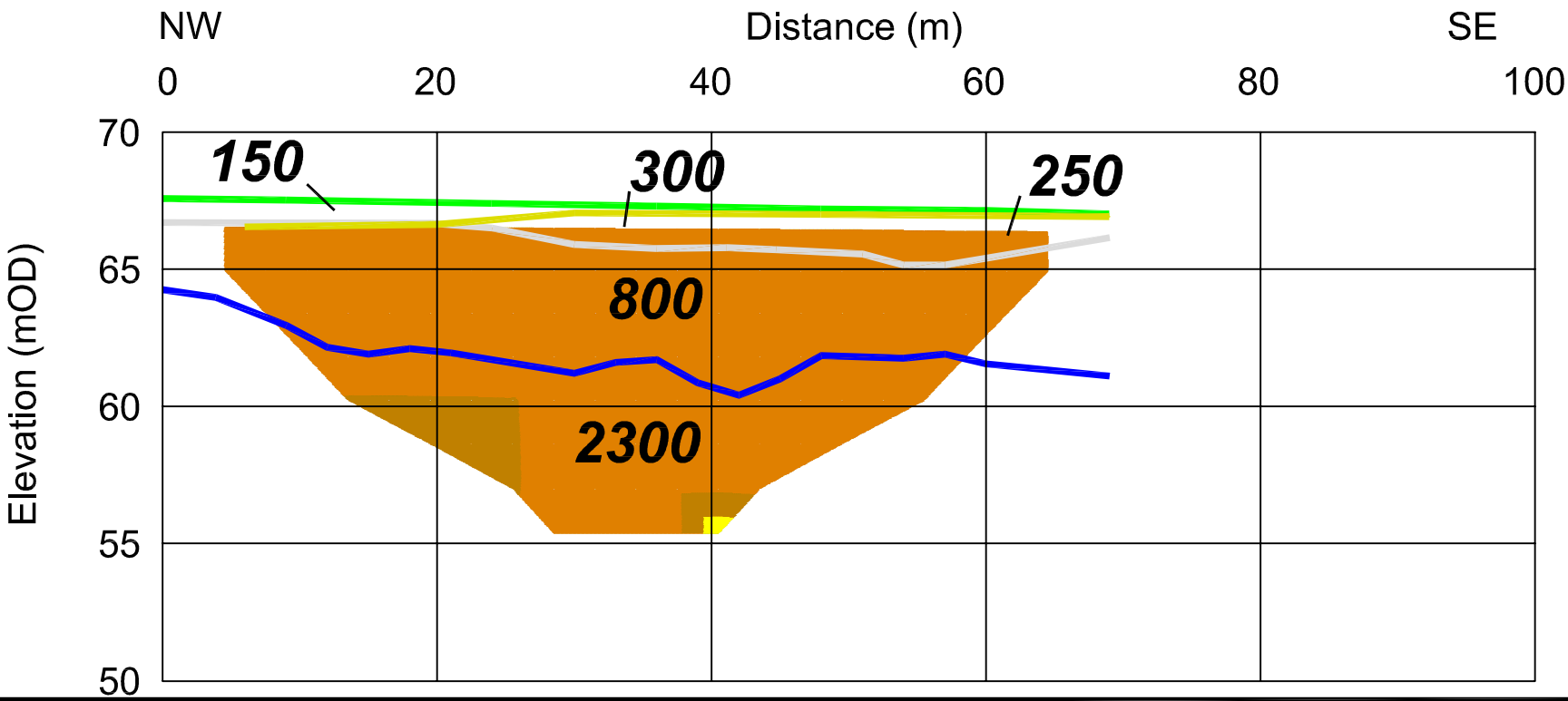
2D-Resistivity Profile R38 and Seismic Refraction Profile S38 Model



2D-Resistivity Profile R39 and Seismic Refraction Profile S39 Model



2D-Resistivity Profile R40 and Seismic Refraction Profile S40 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 13a: Models of of Geophysical Survey CH124000

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

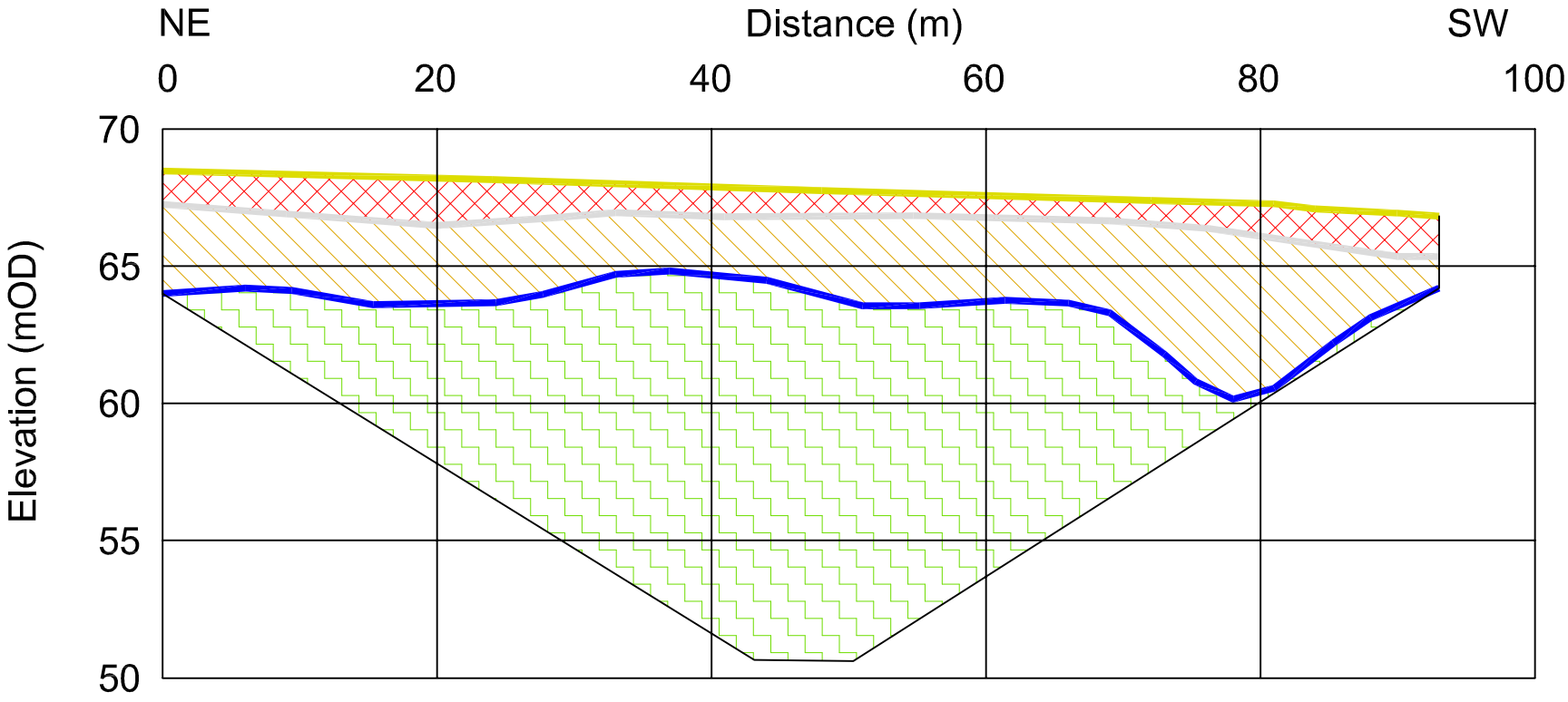
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

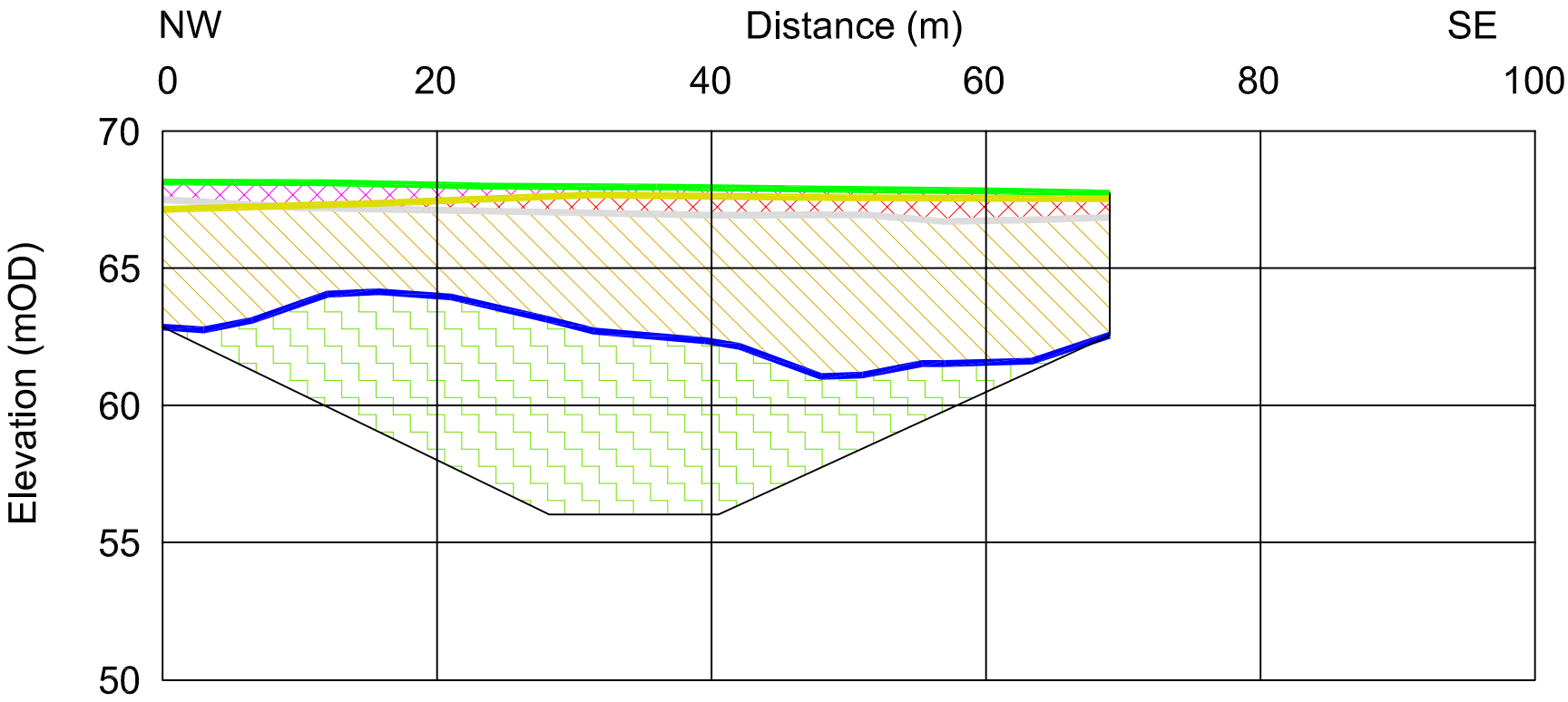
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

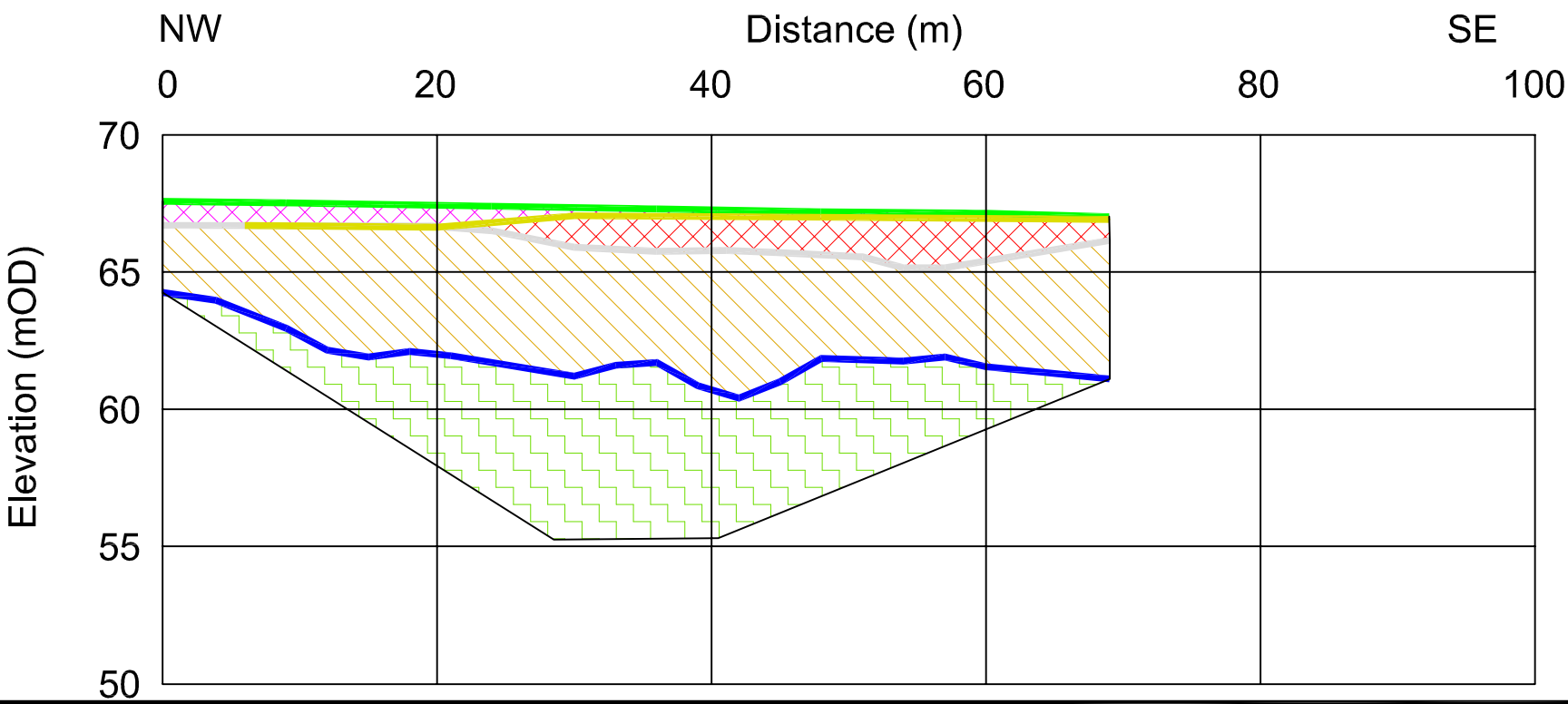
2D-Resistivity Prof. R38 and Seismic Refraction Prof. S38 Interpretation



2D-Resistivity Prof. R39 and Seismic Refraction Prof. S39 Interpretation



2D-Resistivity Pro. R40 and Seismic Refraction Prof. S40 Interpretation



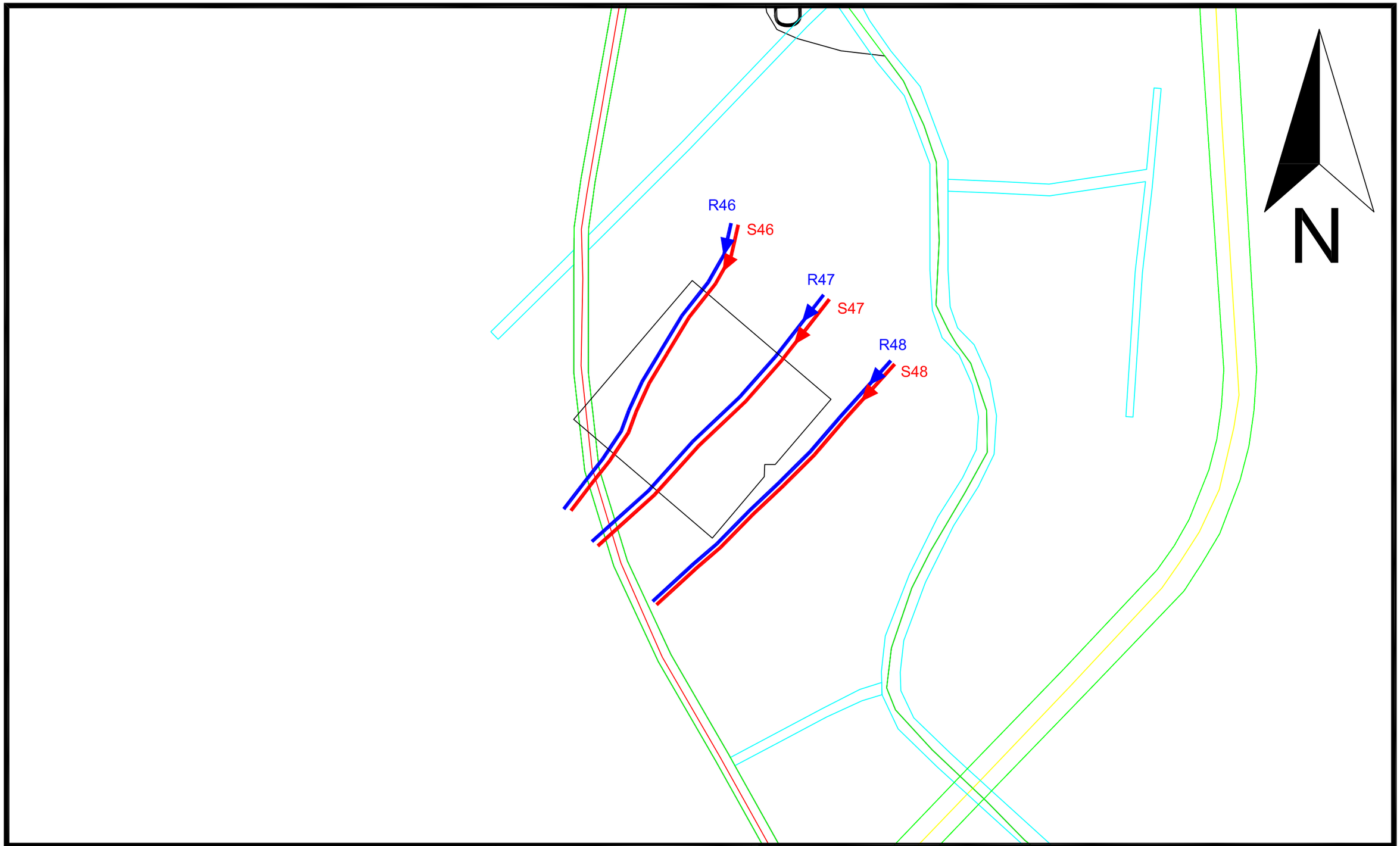
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 13b: Interpretation of of Geophysical Survey CH124000

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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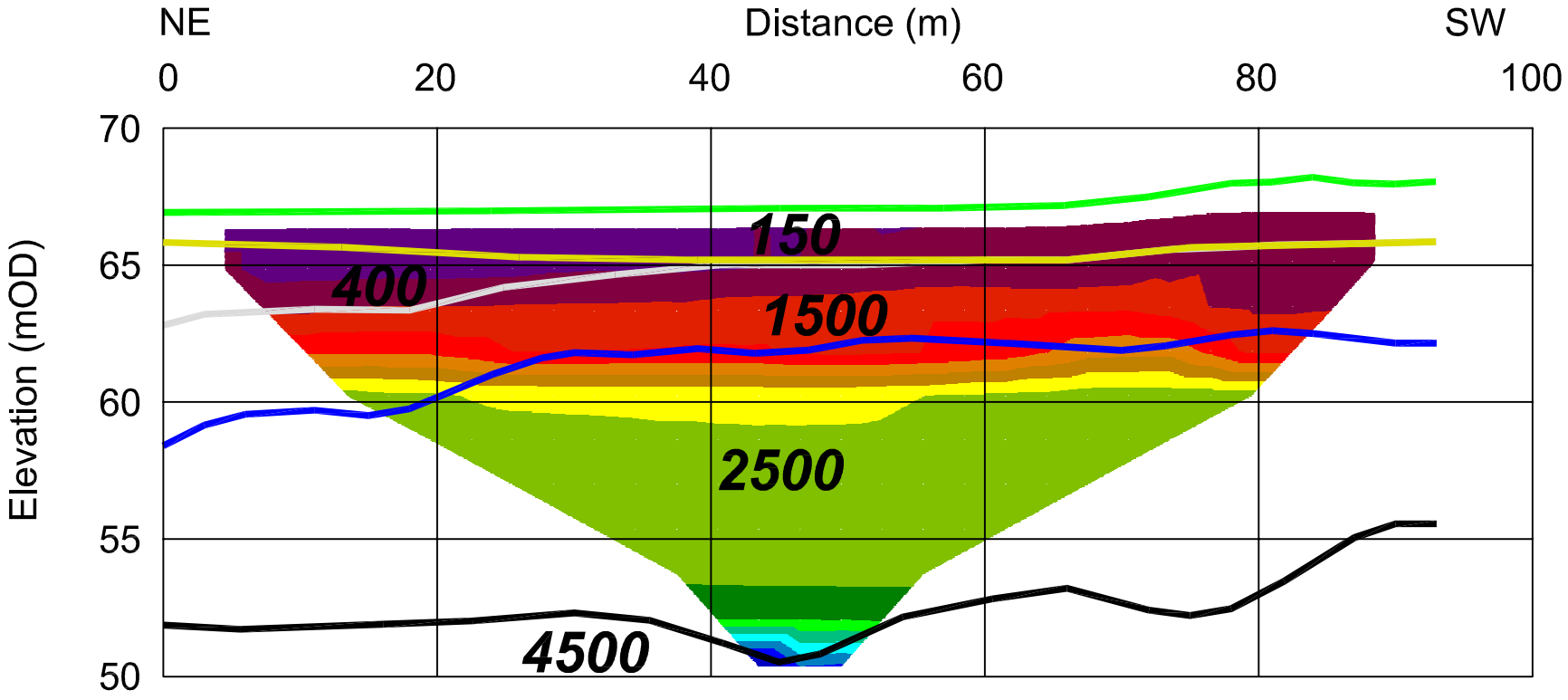
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 14: Geophysical Survey Location Map CH126500

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

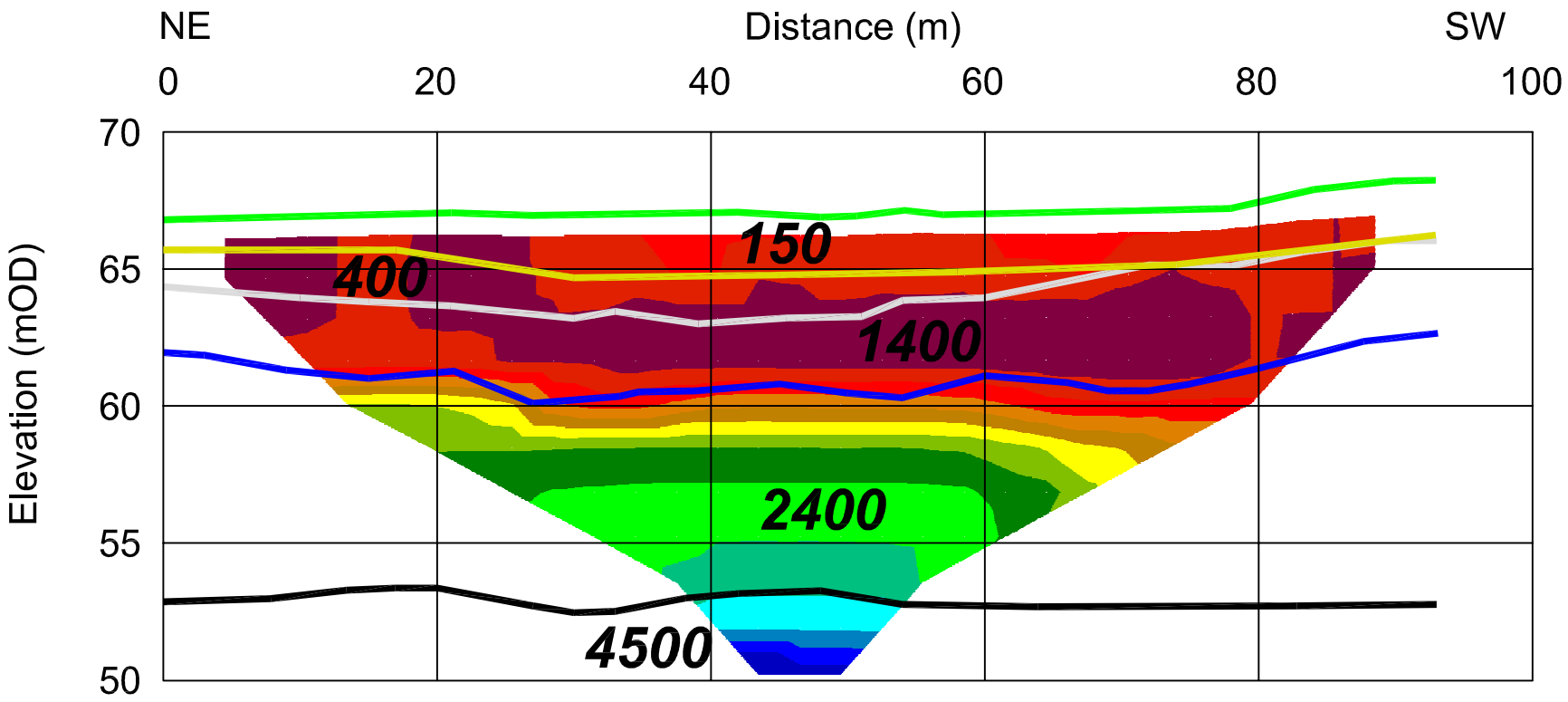
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

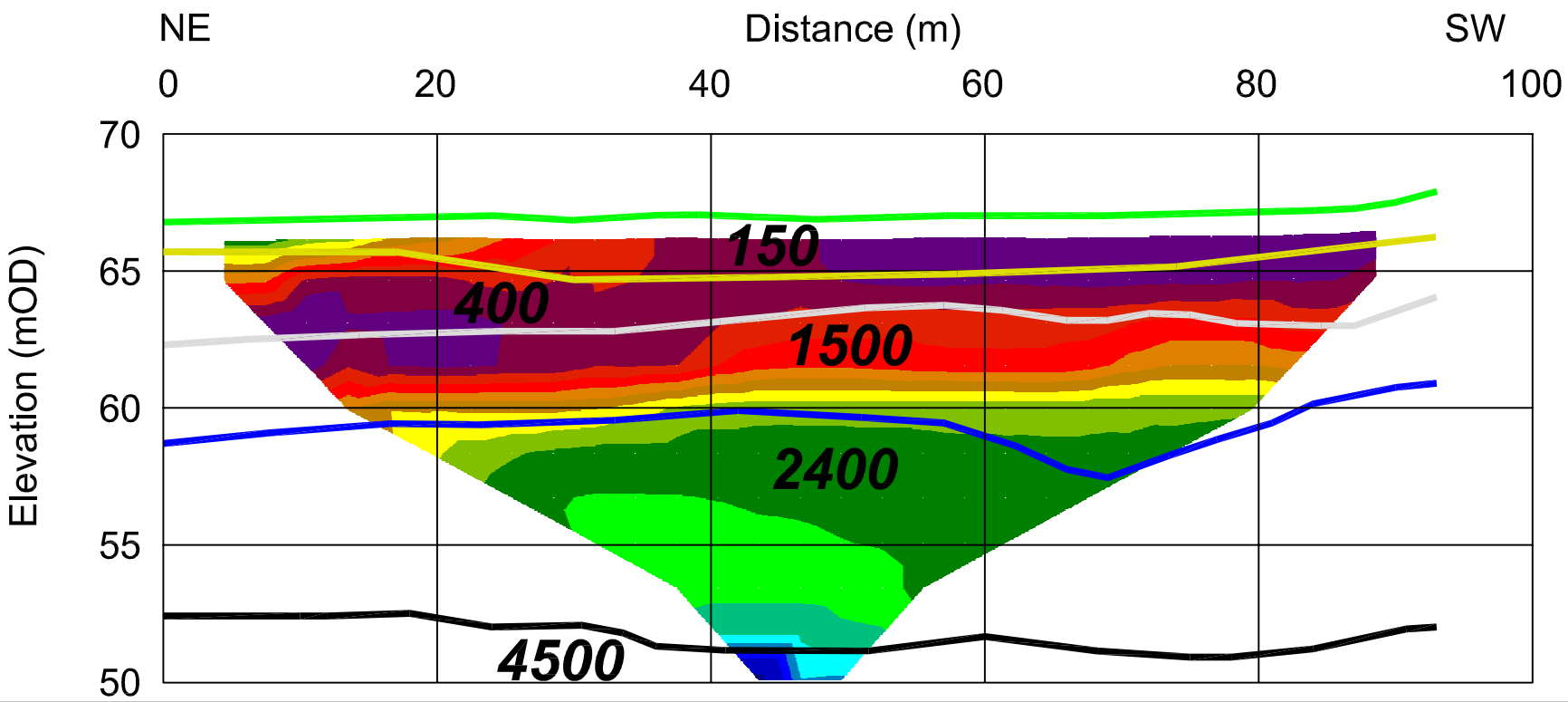
2D-Resistivity Profile R46 and Seismic Refraction Profile S46 Model



2D-Resistivity Profile R47 and Seismic Refraction Profile S47 Model



2D-Resistivity Profile R48 and Seismic Refraction Profile S48 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 14a: Models of of Geophysical Survey CH126500

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

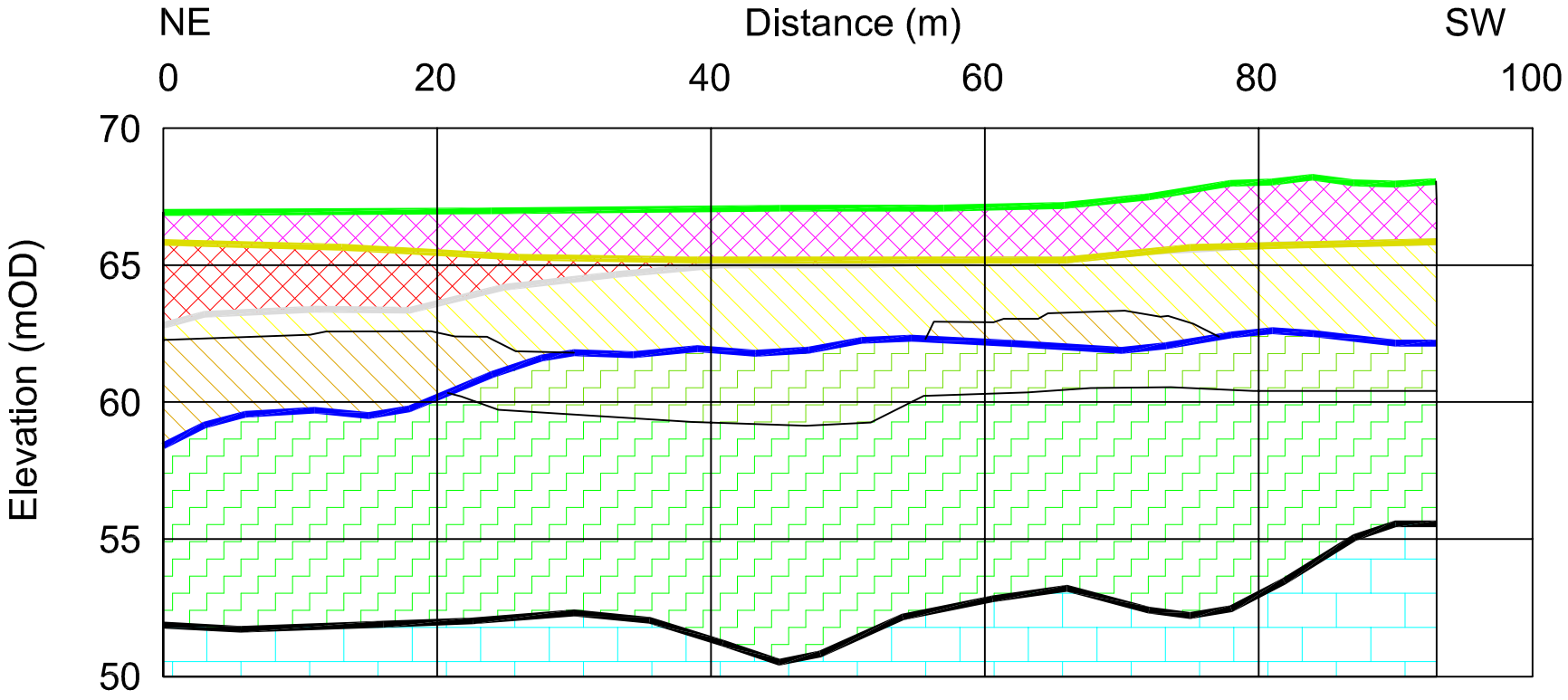
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

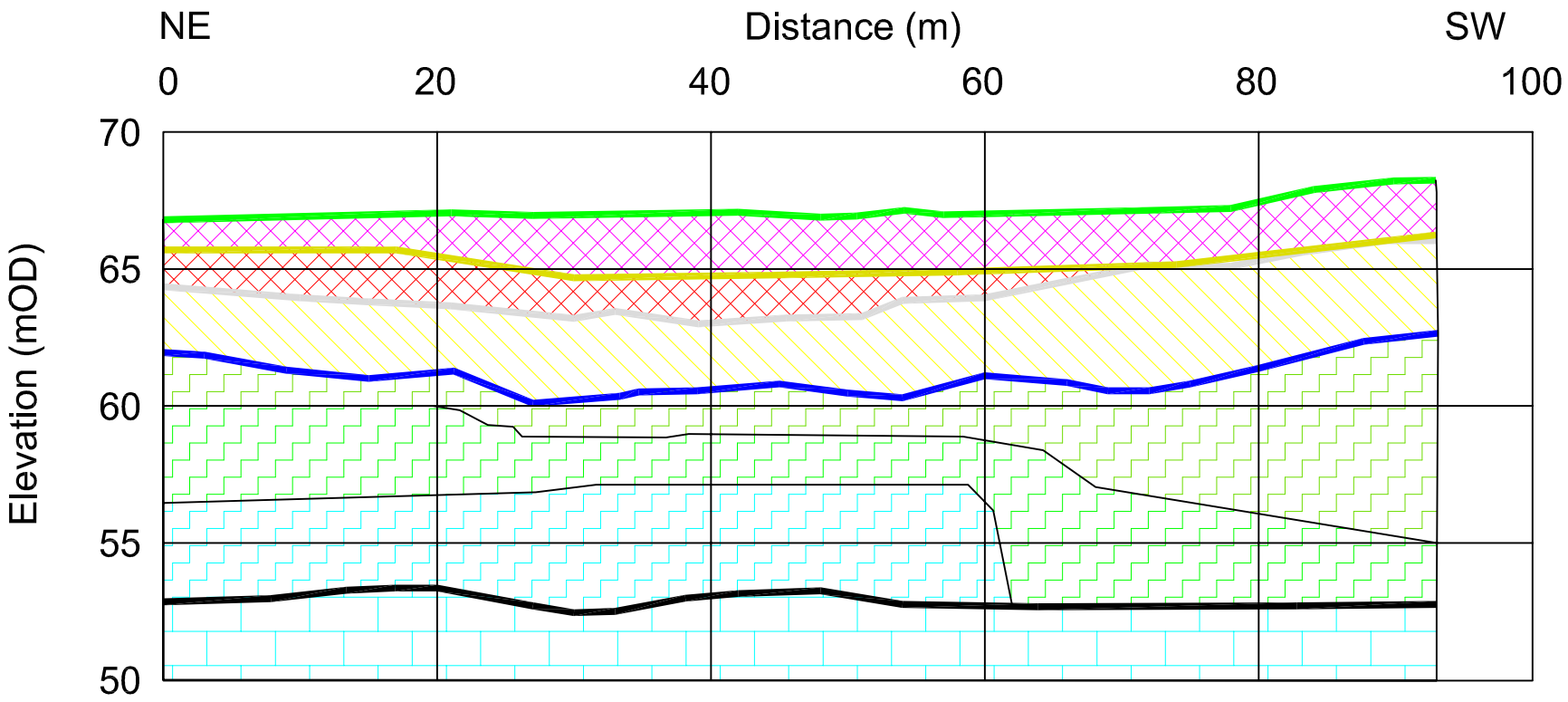
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

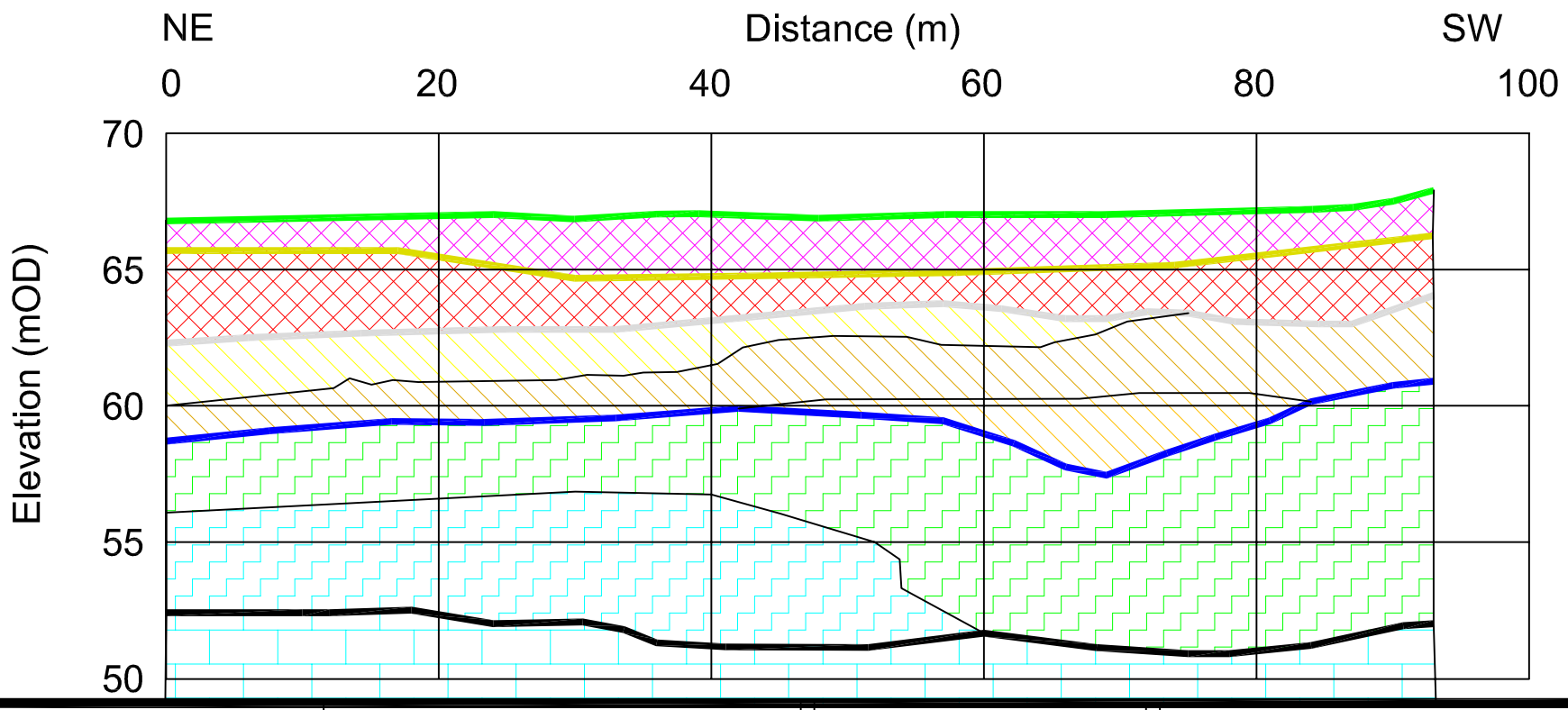
2D-Resistivity Prof. R46 and Seismic Refraction Prof. S46 Interpretation



2D-Resistivity Prof. R47 and Seismic Refraction Prof. S47 Interpretation



2D-Resistivity Prof. R48 and Seismic Refraction Prof. S48 Interpretation



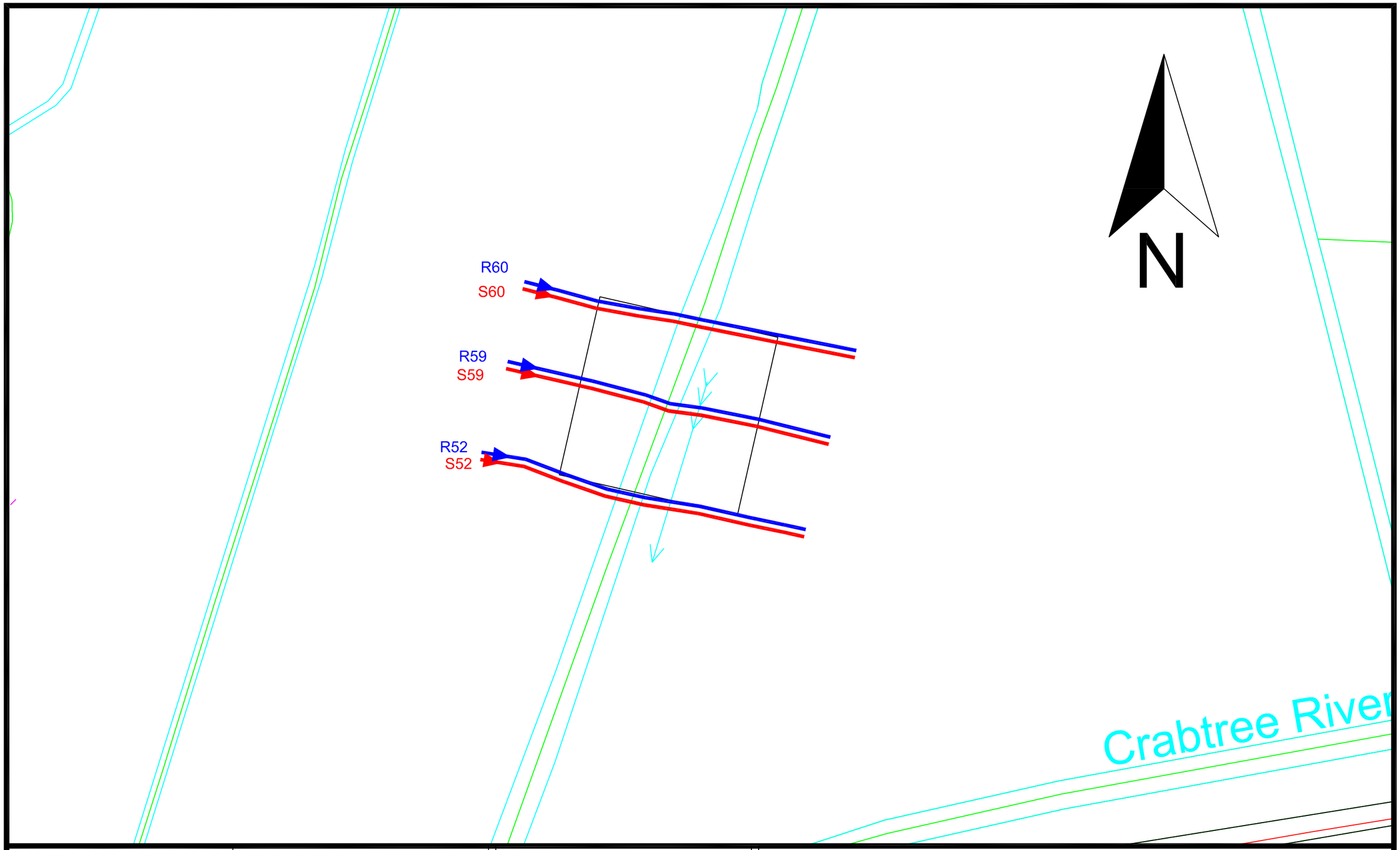
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 14b: Interpretation of of Geophysical Survey CH126500

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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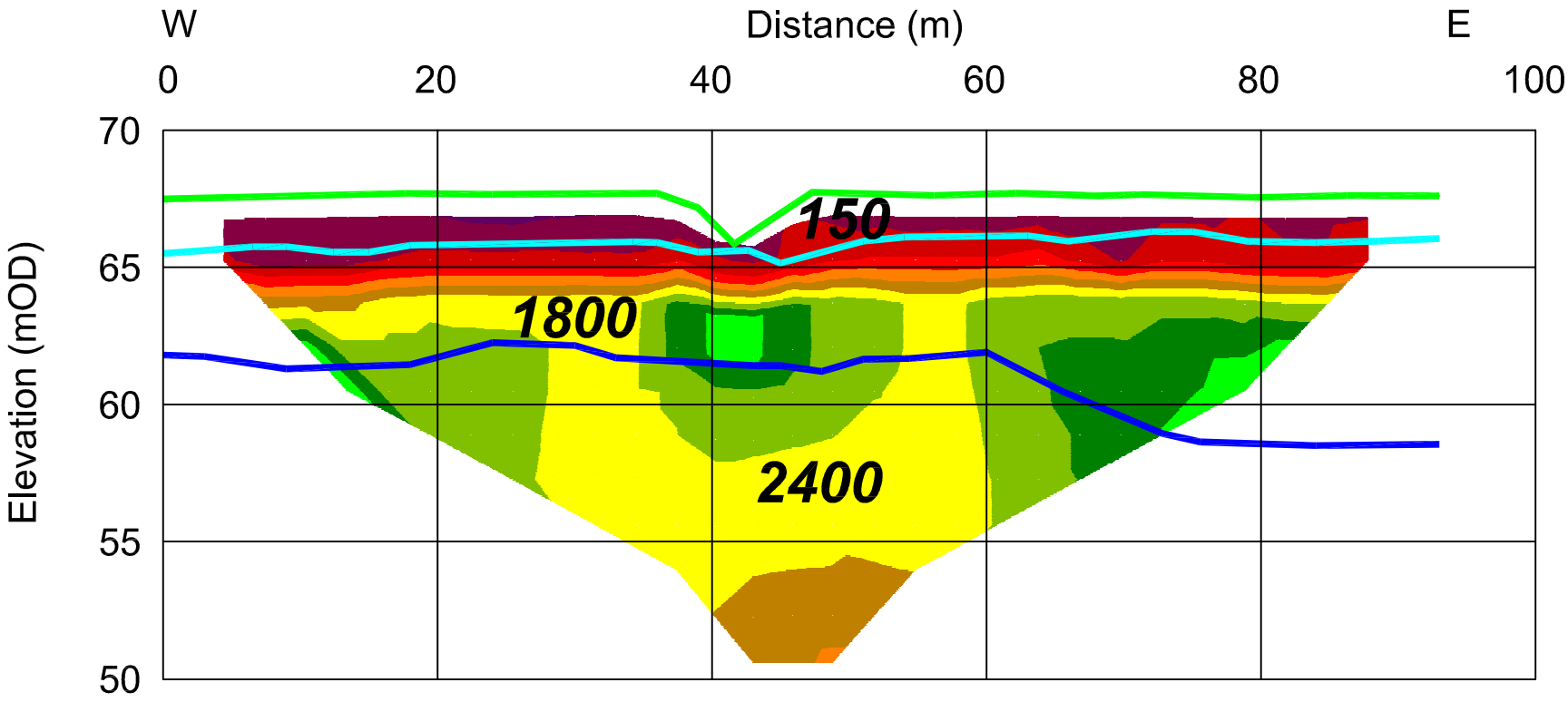
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 15: Geophysical Survey Location Map CH129300

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

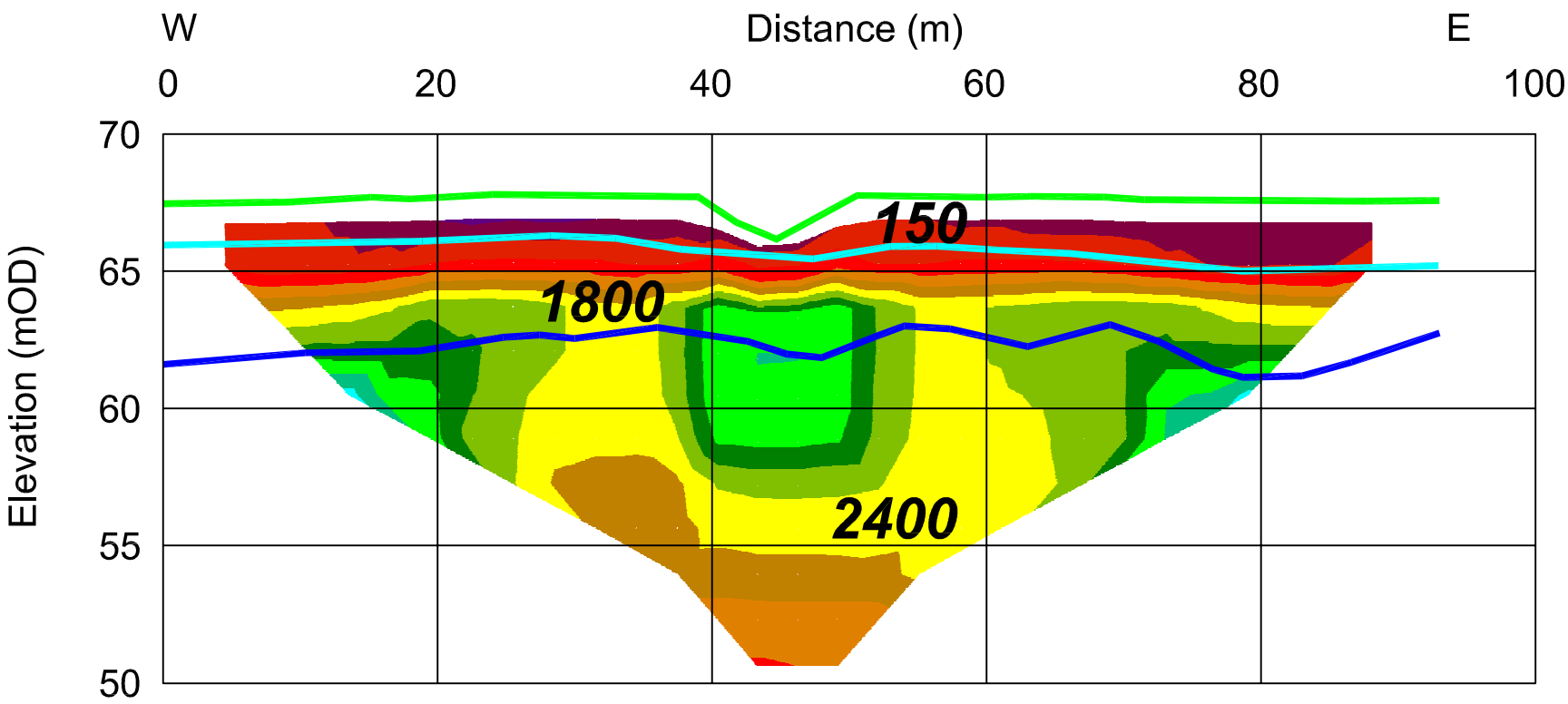
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

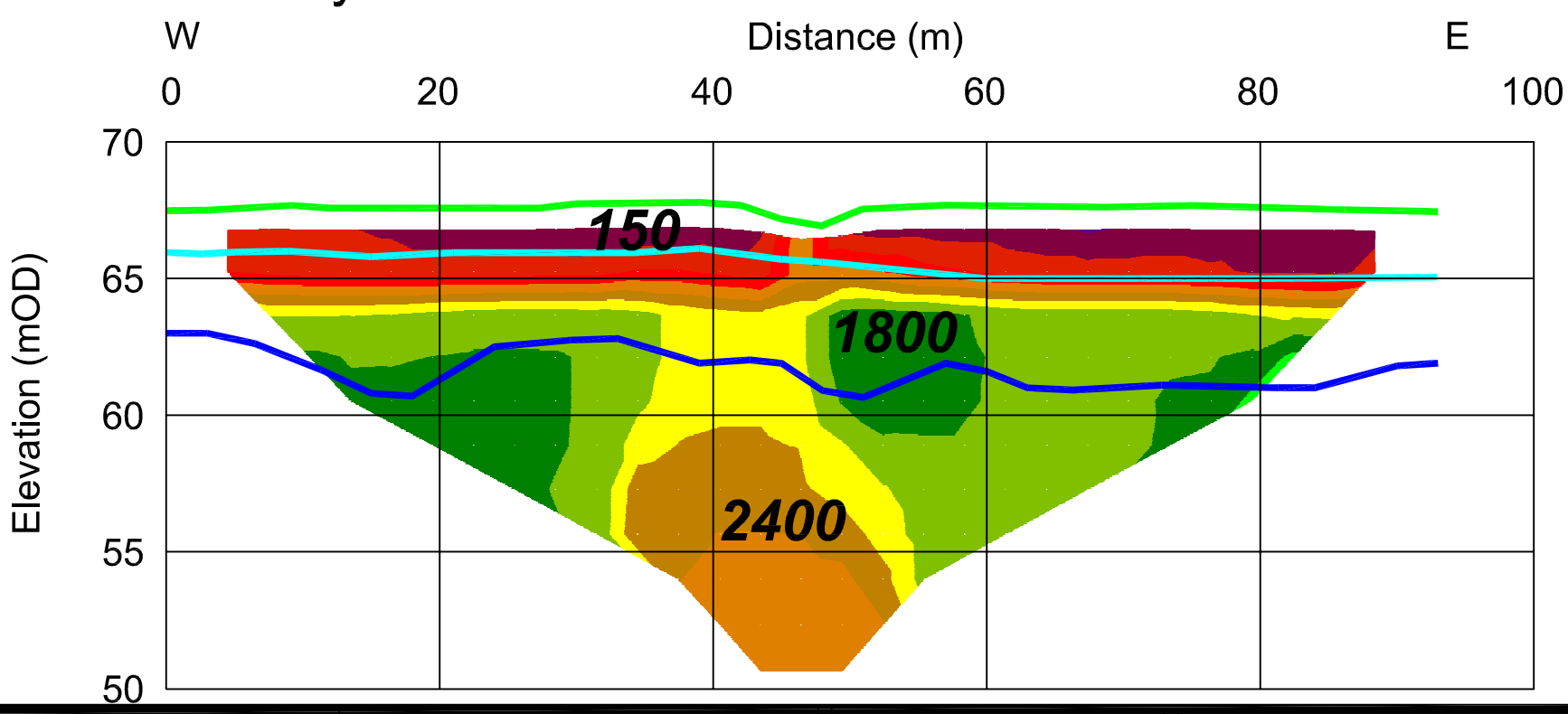
2D-Resistivity Profile R52 and Seismic Refraction Profile S52 Model



2D-Resistivity Profile R59 and Seismic Refraction Profile S59 Model



2D-Resistivity Profile R60 and Seismic Refraction Profile S60 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 15a: Models of of Geophysical Survey CH129300

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

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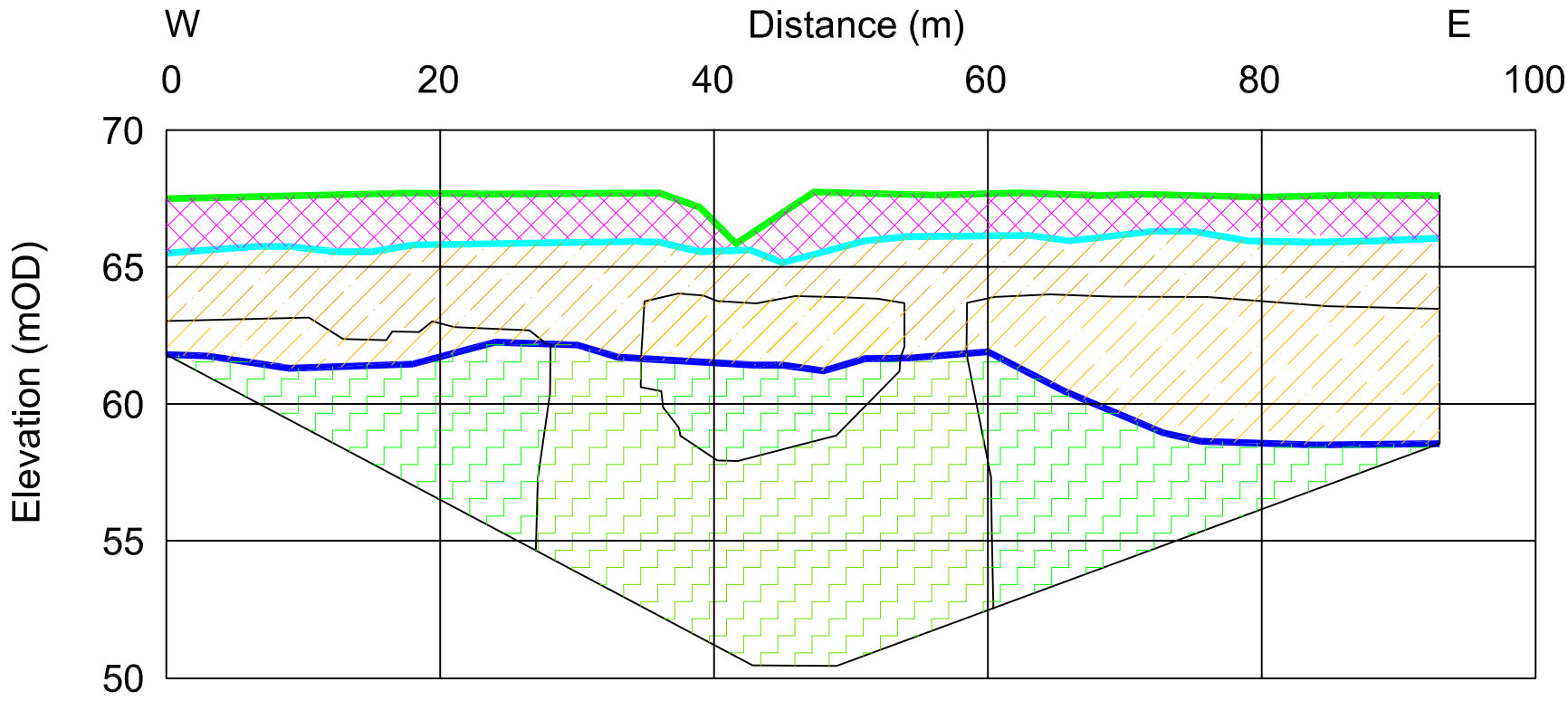
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

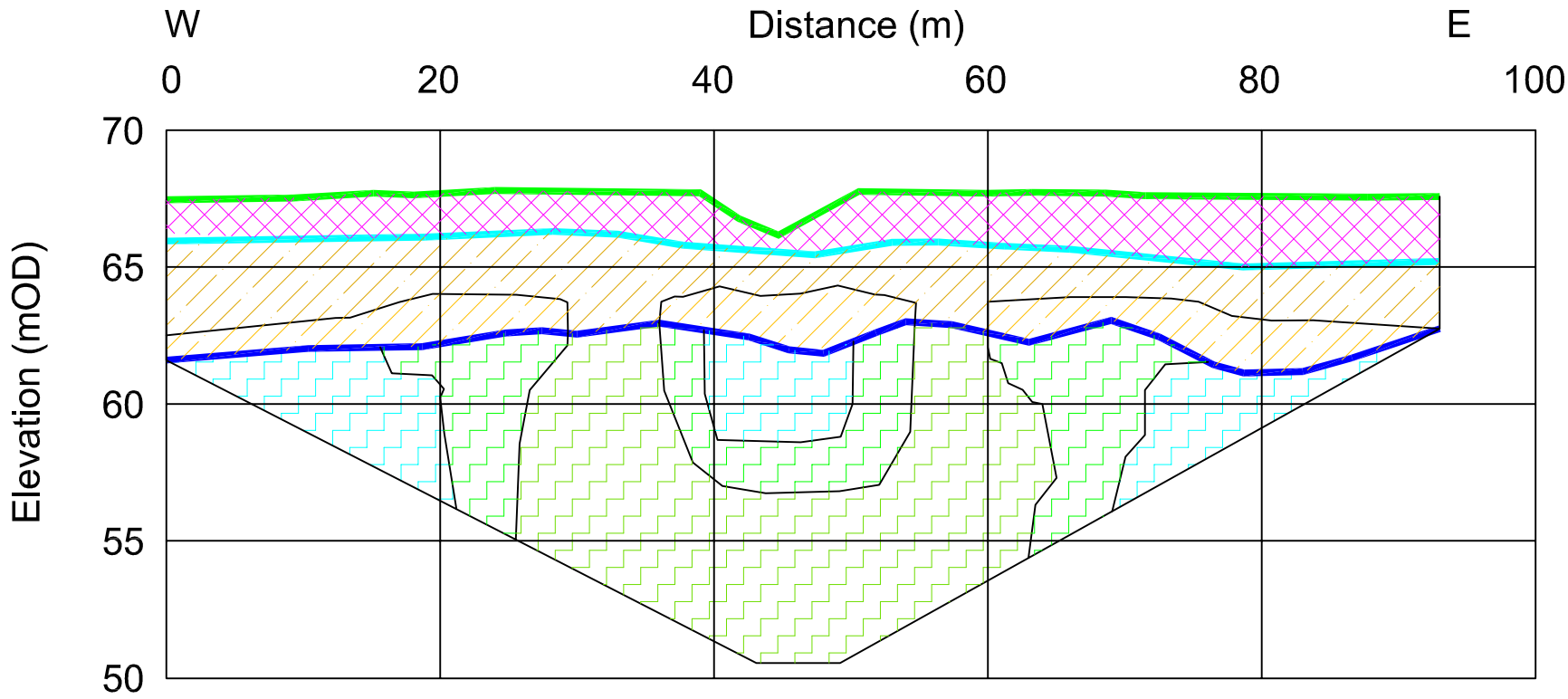
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

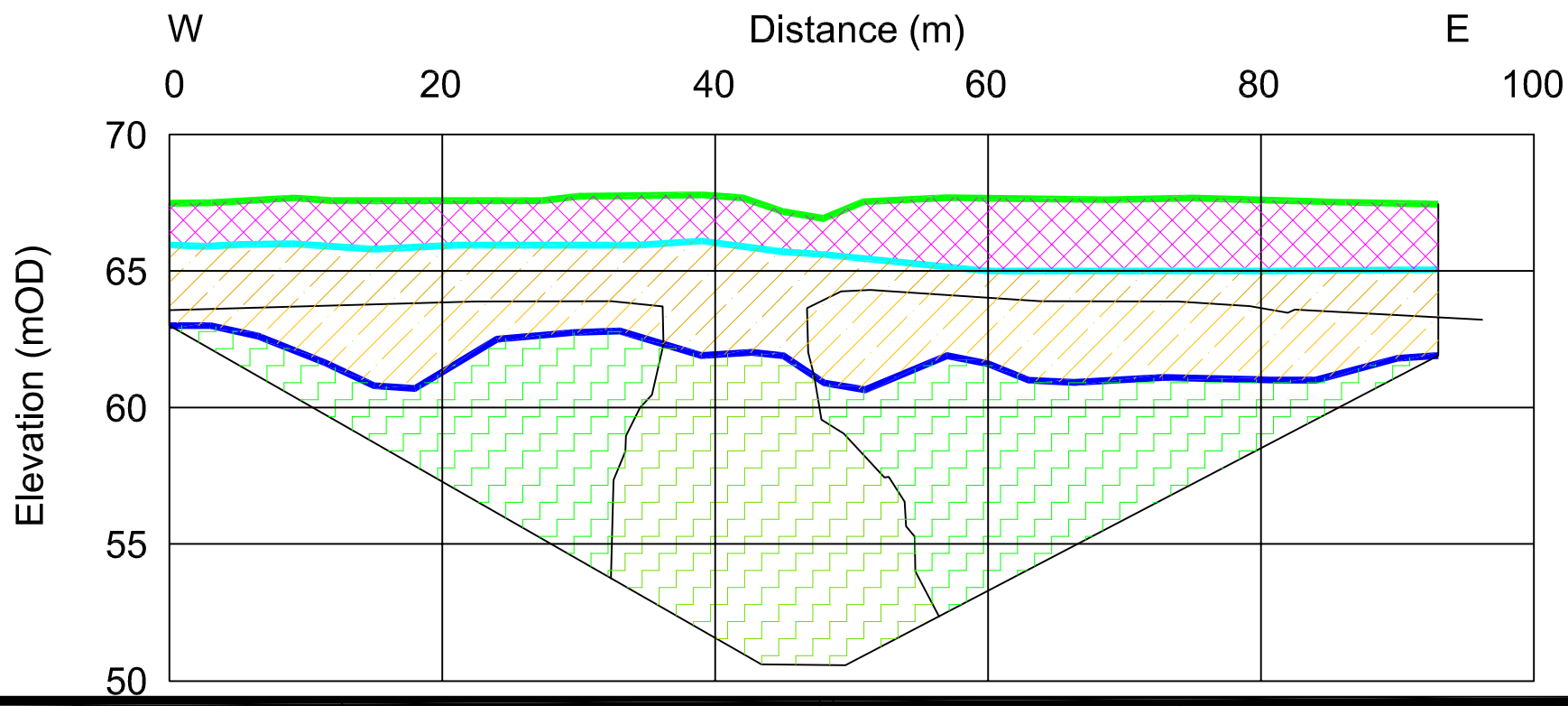
2D-Resistivity Prof. R52 and Seismic Refraction Prof. S52 Interpretation



2D-Resistivity Prof. R59 and Seismic Refraction Prof. S59 Interpretation



2D-Resistivity Prof. R60 and Seismic Refraction Prof. S60 Interpretation



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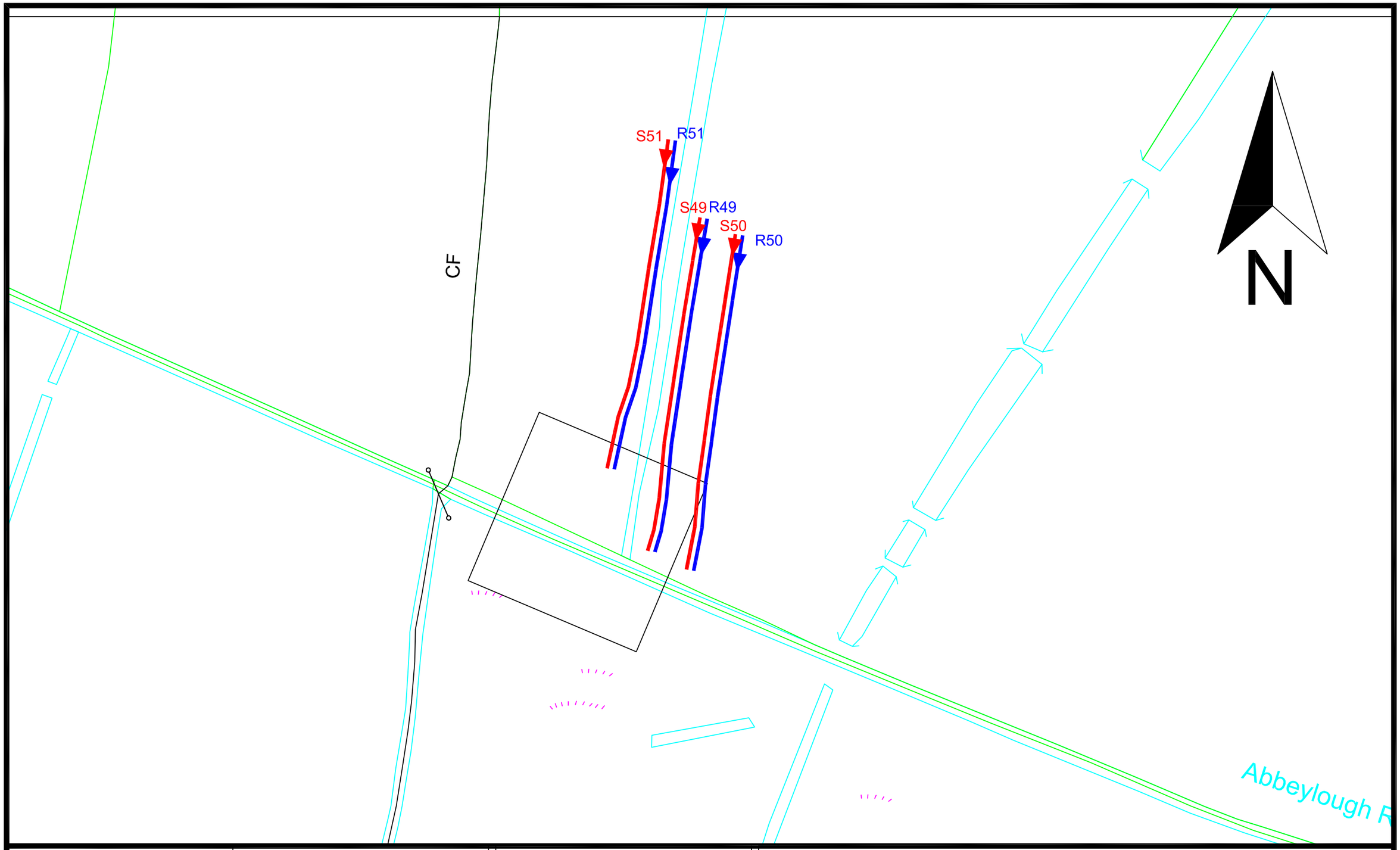
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 15b: Interpretation of of Geophysical Survey CH129300

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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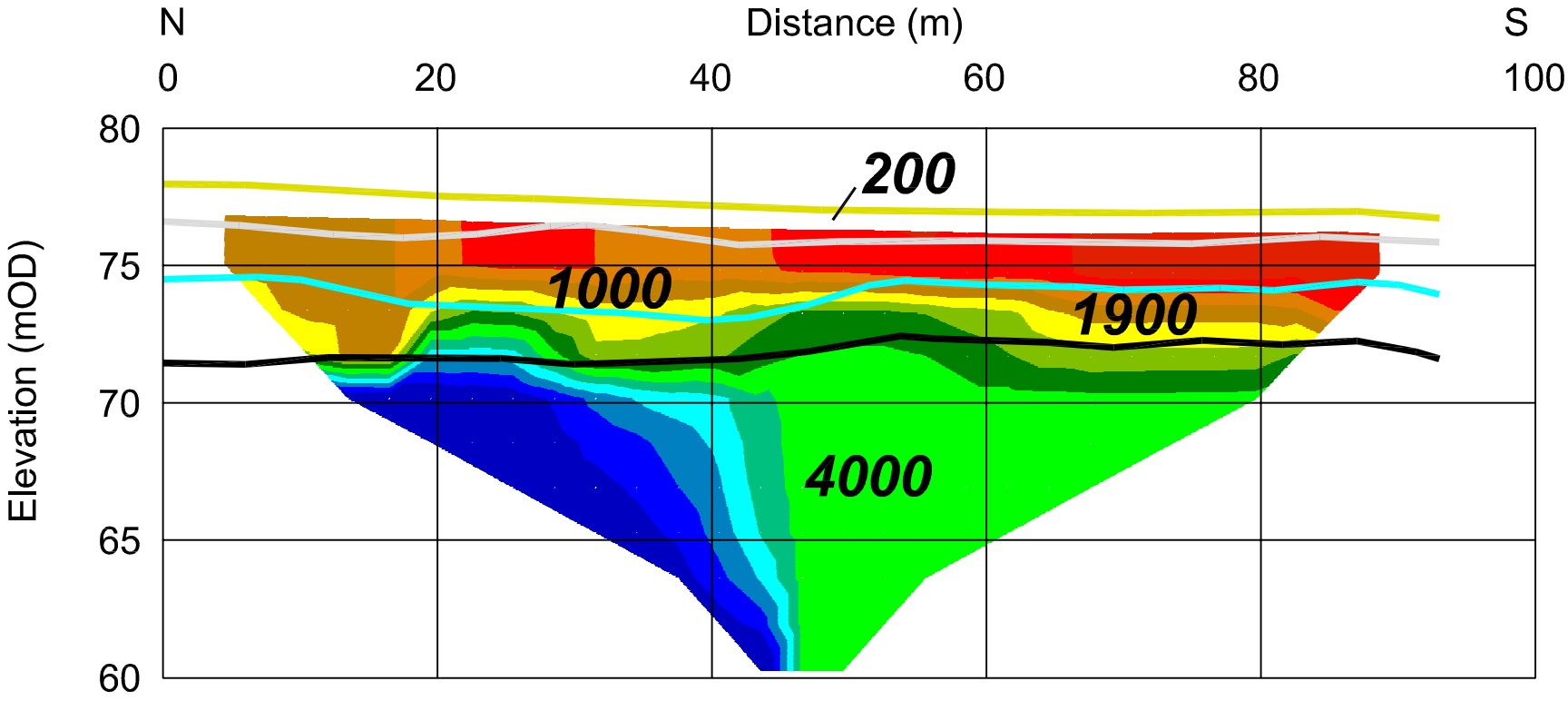
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 16: Geophysical Survey Location Map CH134700

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

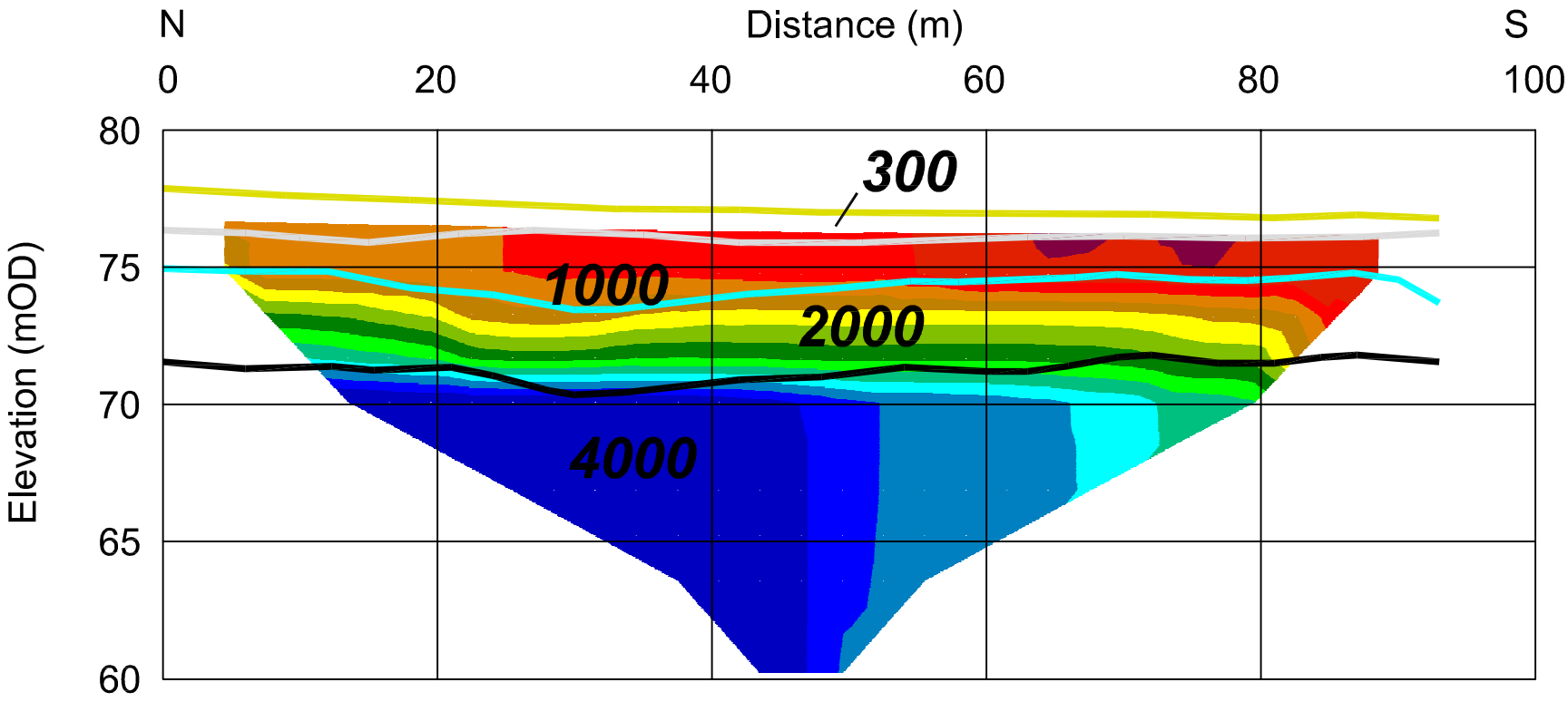
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

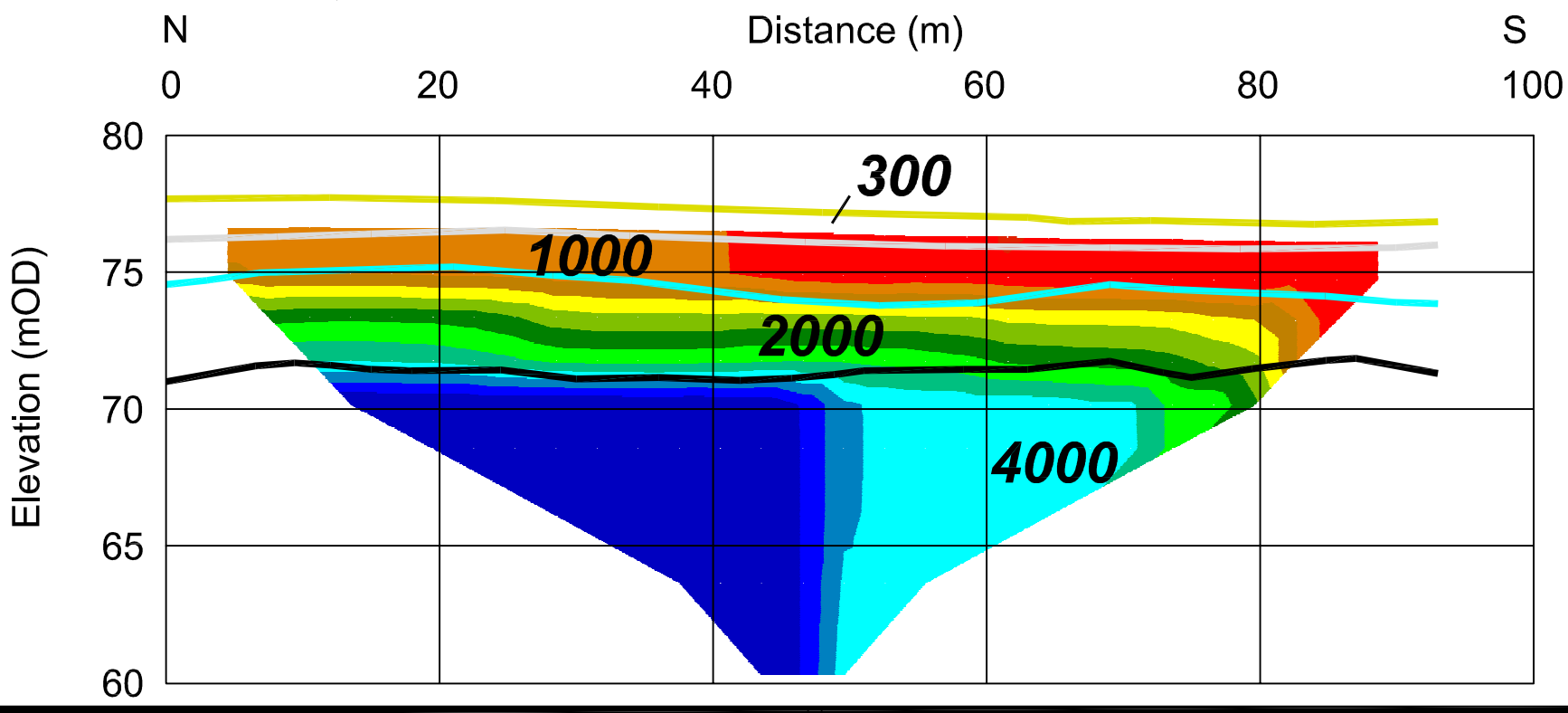
2D-Resistivity Profile R49 and Seismic Refraction Profile S49 Model



2D-Resistivity Profile R50 and Seismic Refraction Profile S50 Model



2D-Resistivity Profile R51 and Seismic Refraction Profile S51 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 16a: Models of of Geophysical Survey CH134700

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

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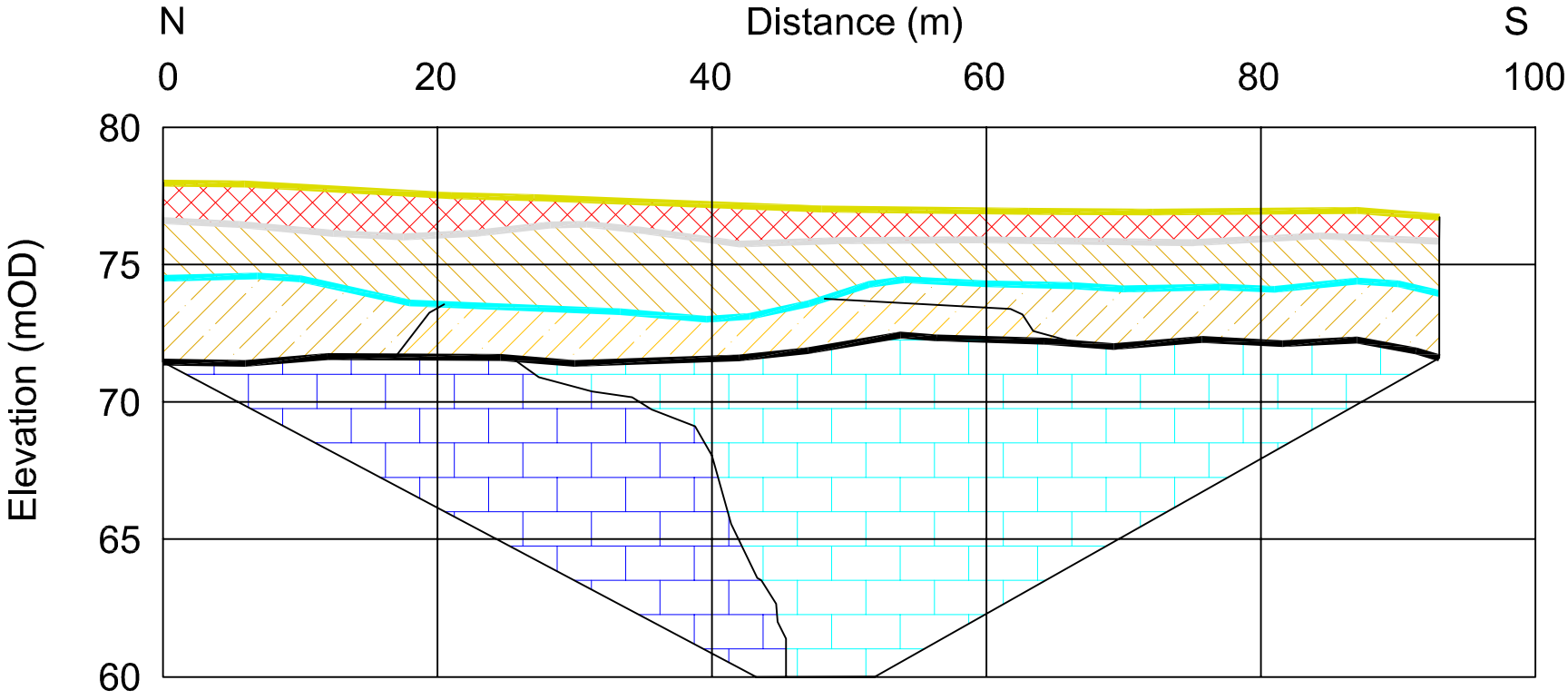
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

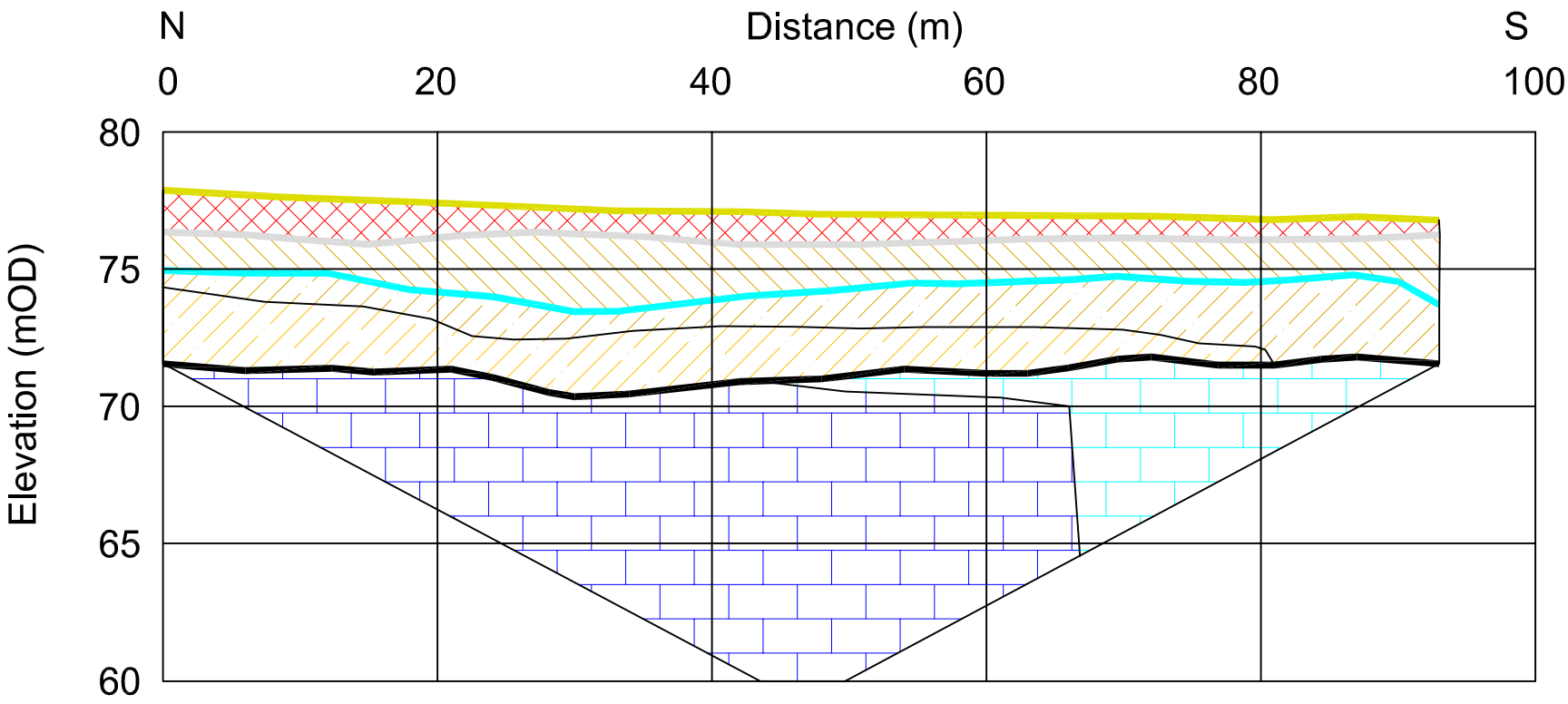
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

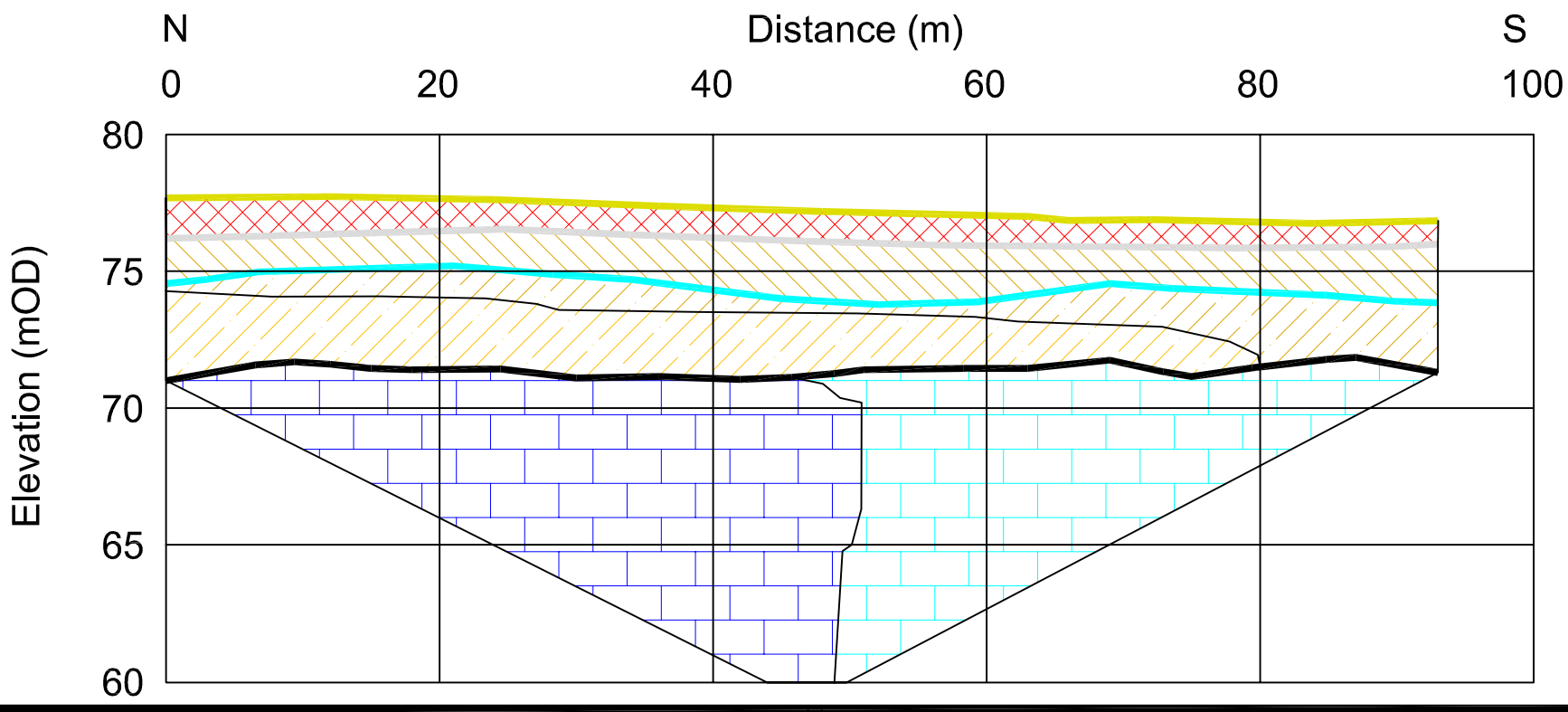
2D-Resistivity Prof. R49 and Seismic Refraction Prof. S49 Interpretation



2D-Resistivity Prof. R50 and Seismic Refraction Prof. S50 Interpretation



2D-Resistivity Prof. R51 and Seismic Refraction Prof. S51 Interpretation



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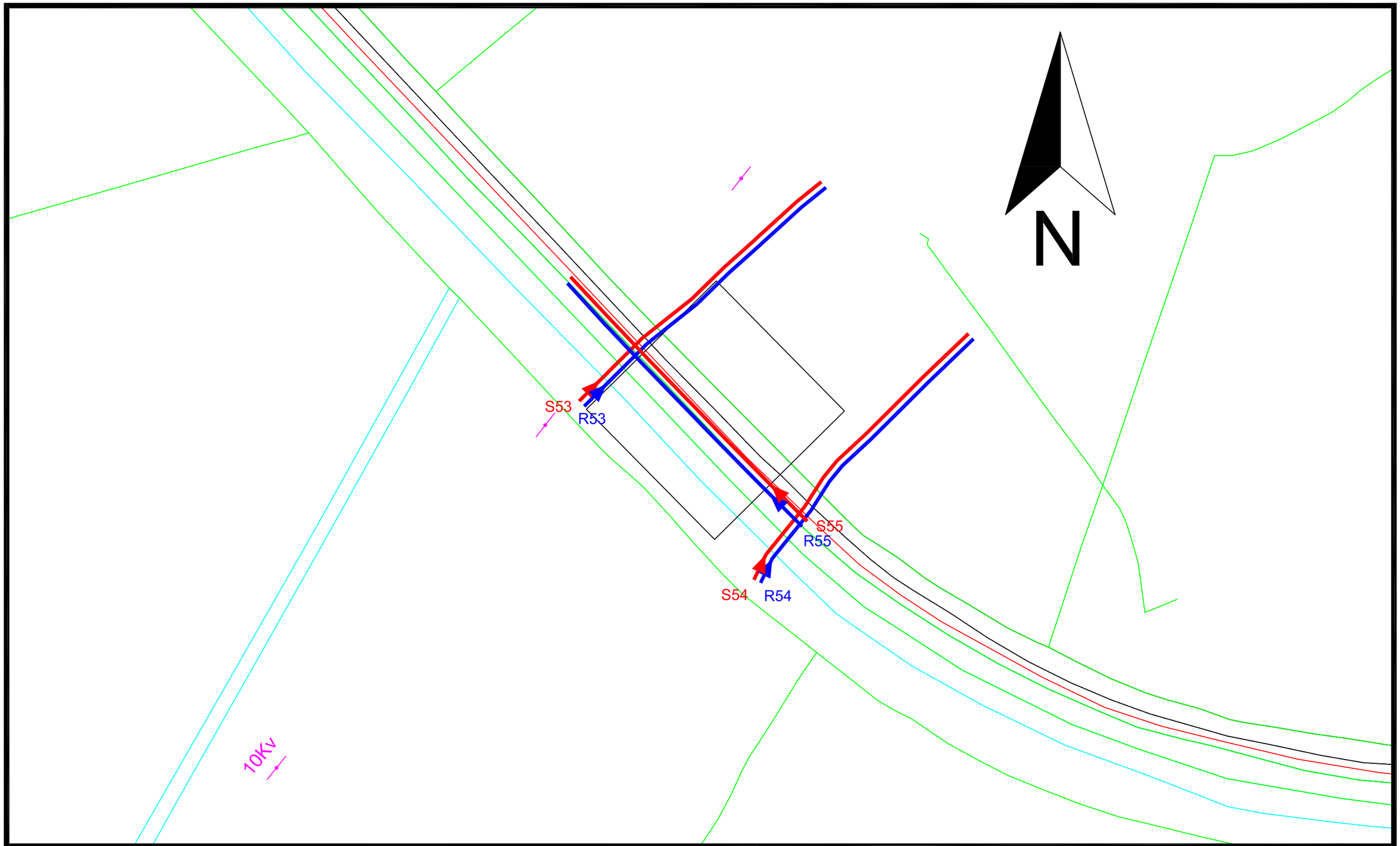
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Fax. (01) 6510033
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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 16a: Models of of Geophysical Survey CH134700

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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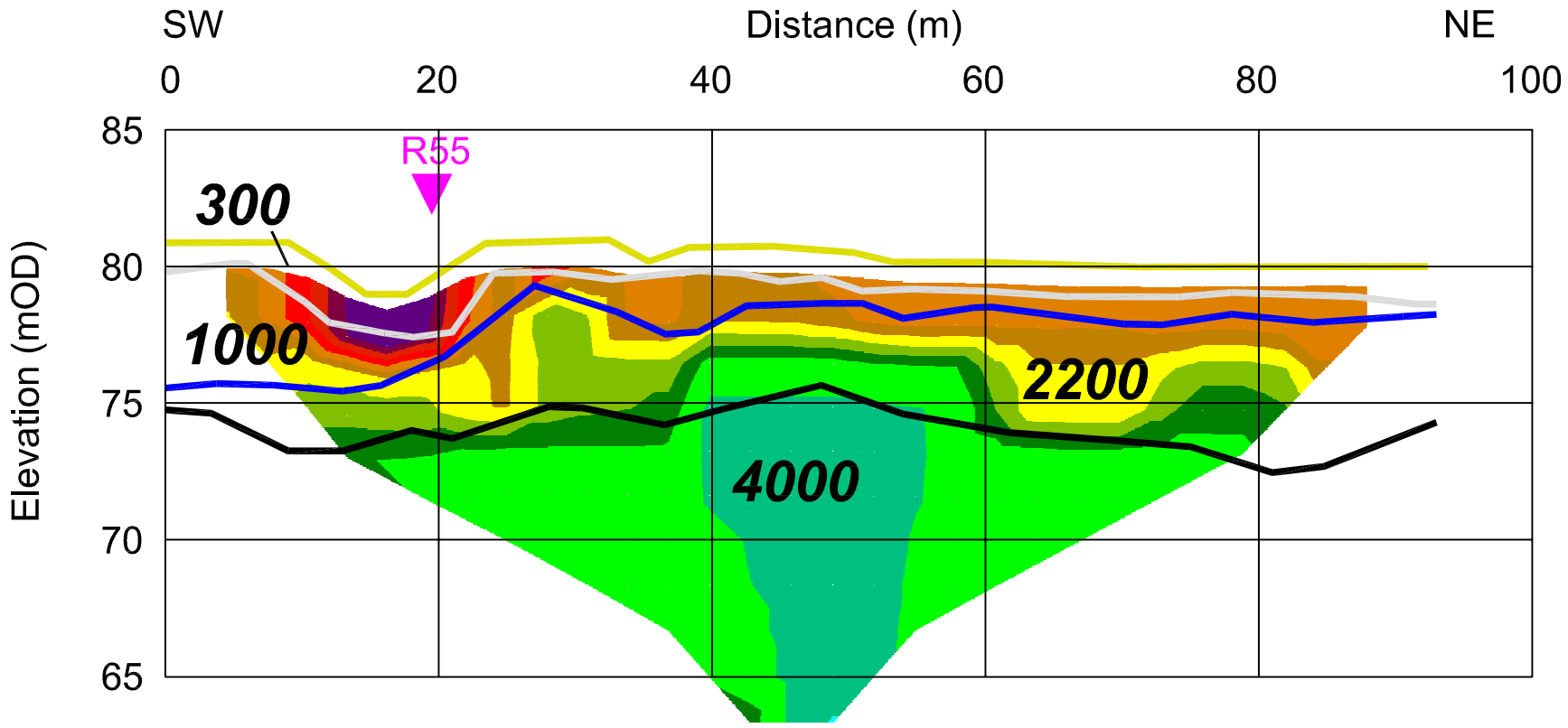
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 17: Geophysical Survey Location Map CH135400

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

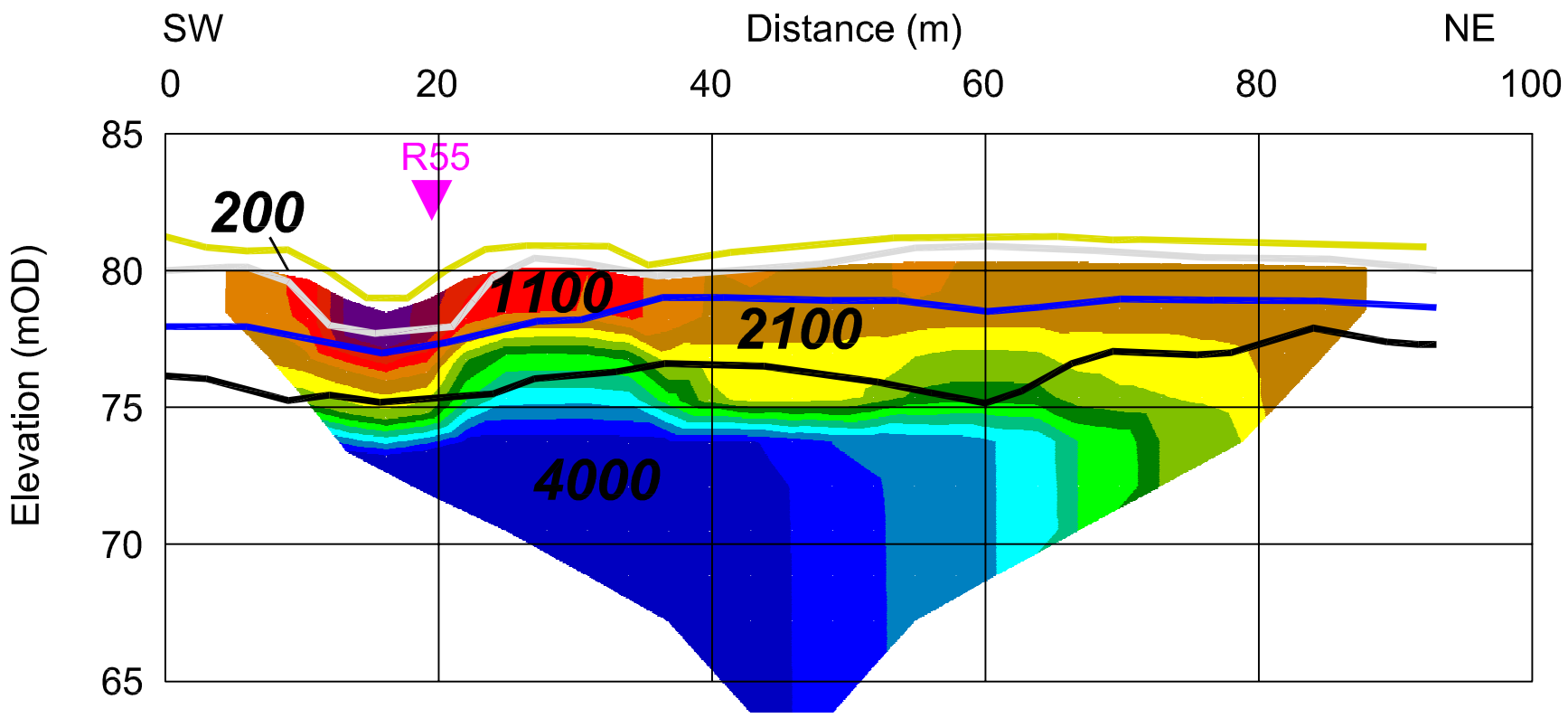
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

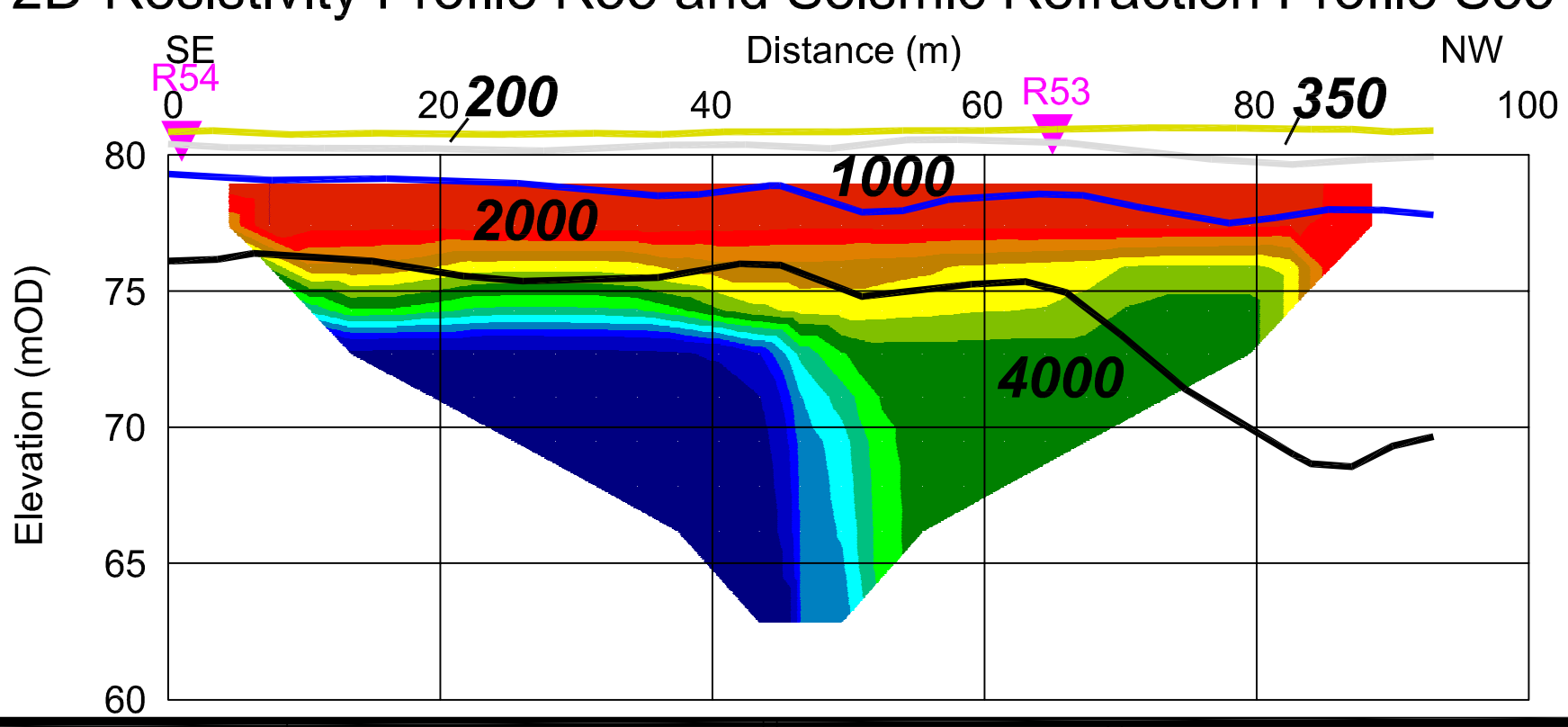
2D-Resistivity Profile R53 and Seismic Refraction Profile S53 Model



2D-Resistivity Profile R54 and Seismic Refraction Profile S54 Model



2D-Resistivity Profile R55 and Seismic Refraction Profile S55 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 17a: Models of of Geophysical Survey CH135400

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

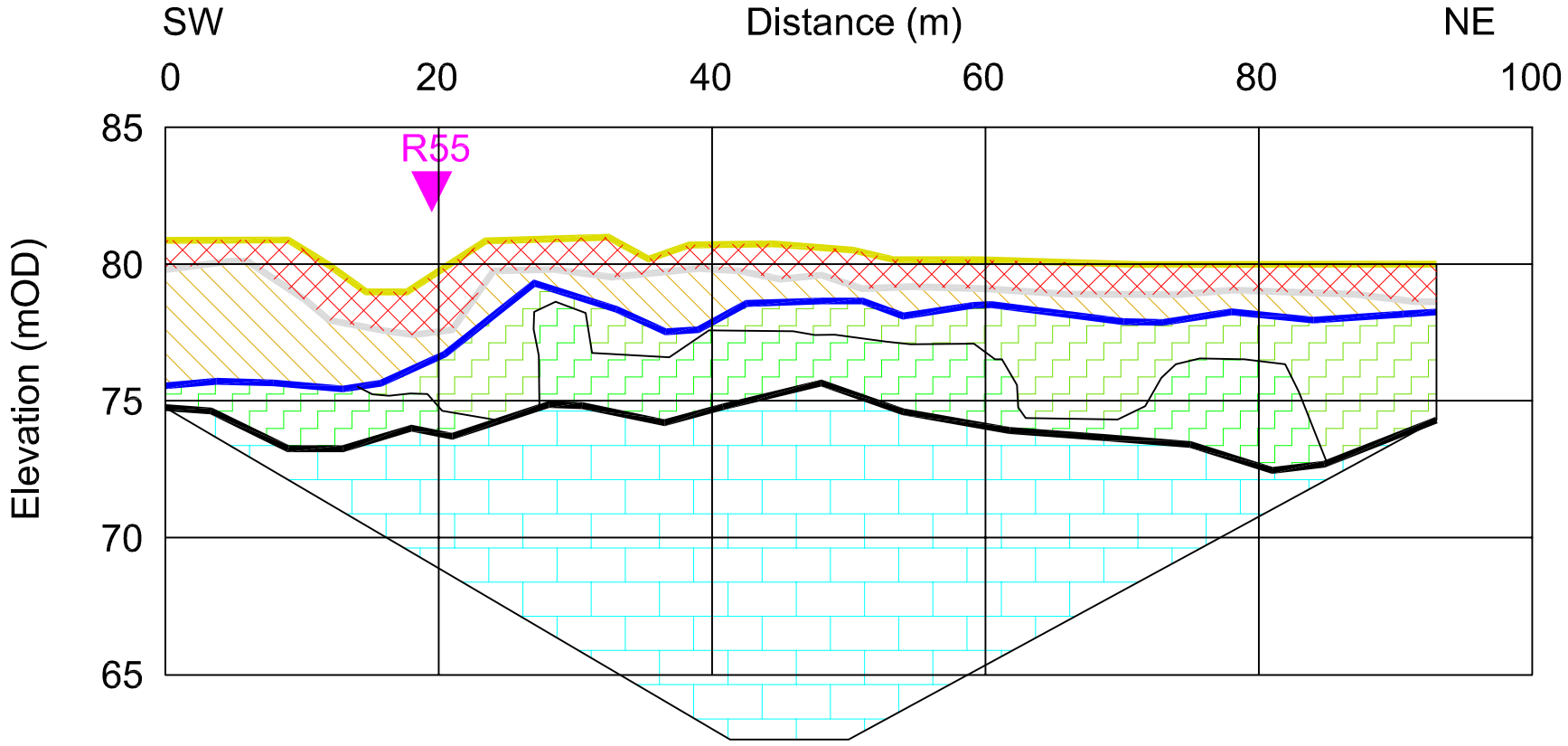
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

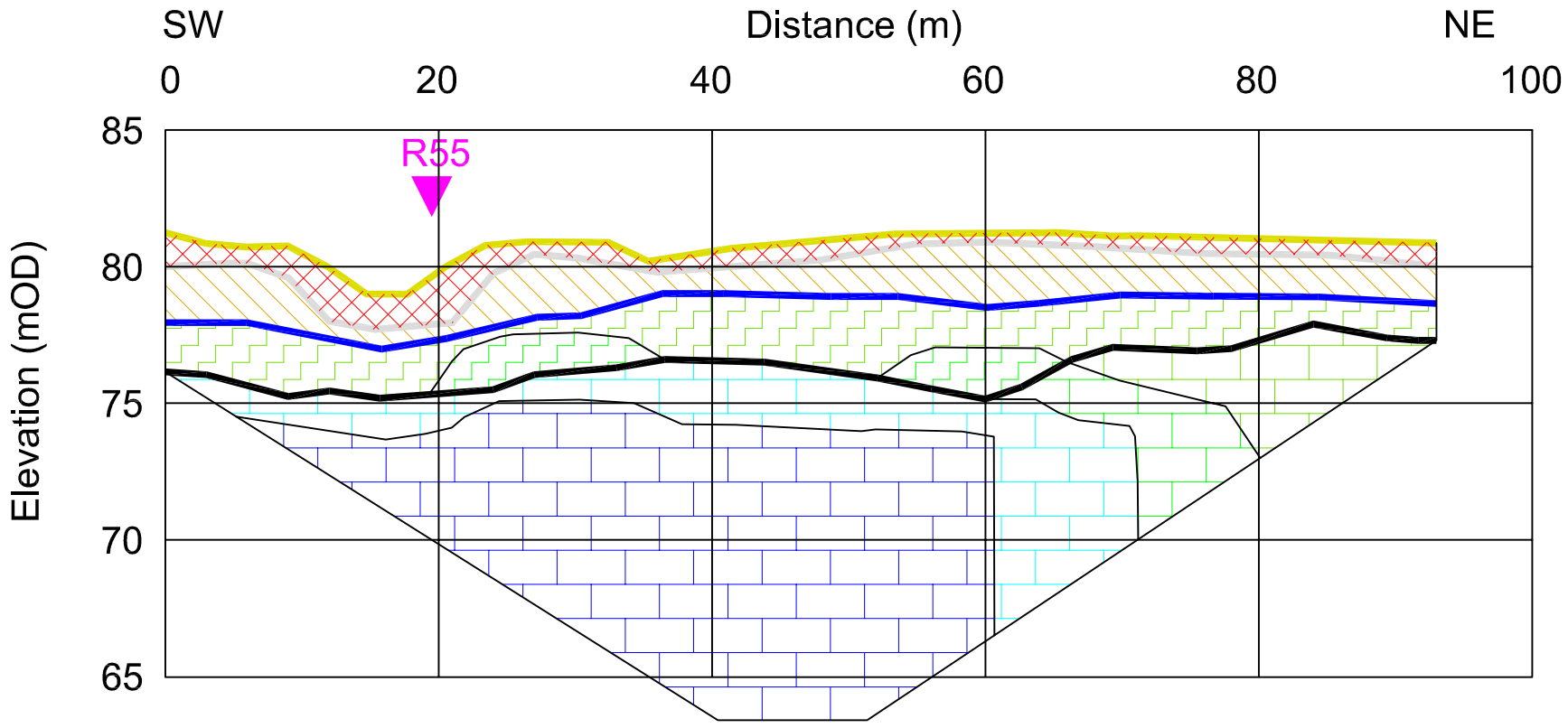
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

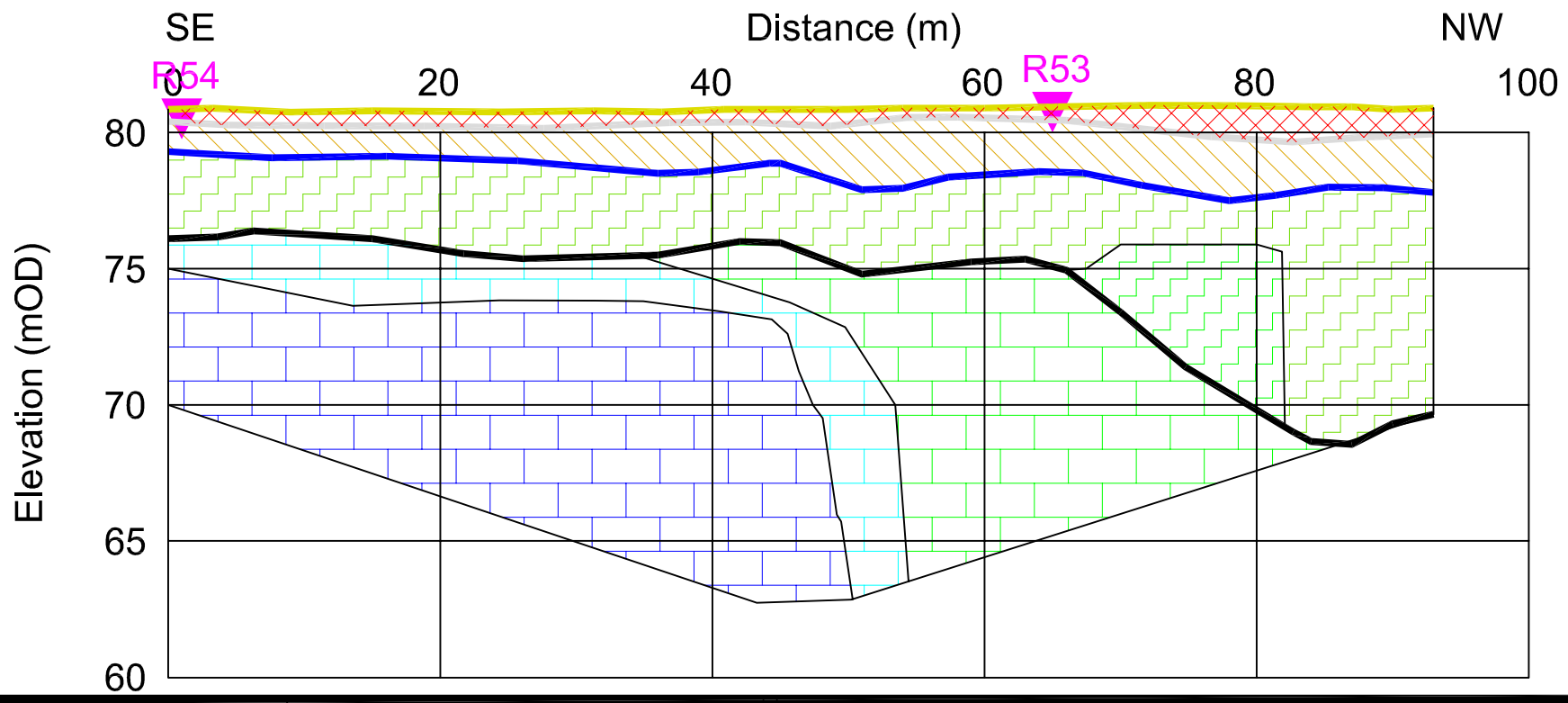
2D-Resistivity Prof. R53 and Seismic Refraction Prof. S53 Interpretation



2D-Resistivity Prof. R54 and Seismic Refraction Prof. S54 Interpretation



2D-Resistivity Prof. R55 and Seismic Refraction Prof. S55 Interpretation



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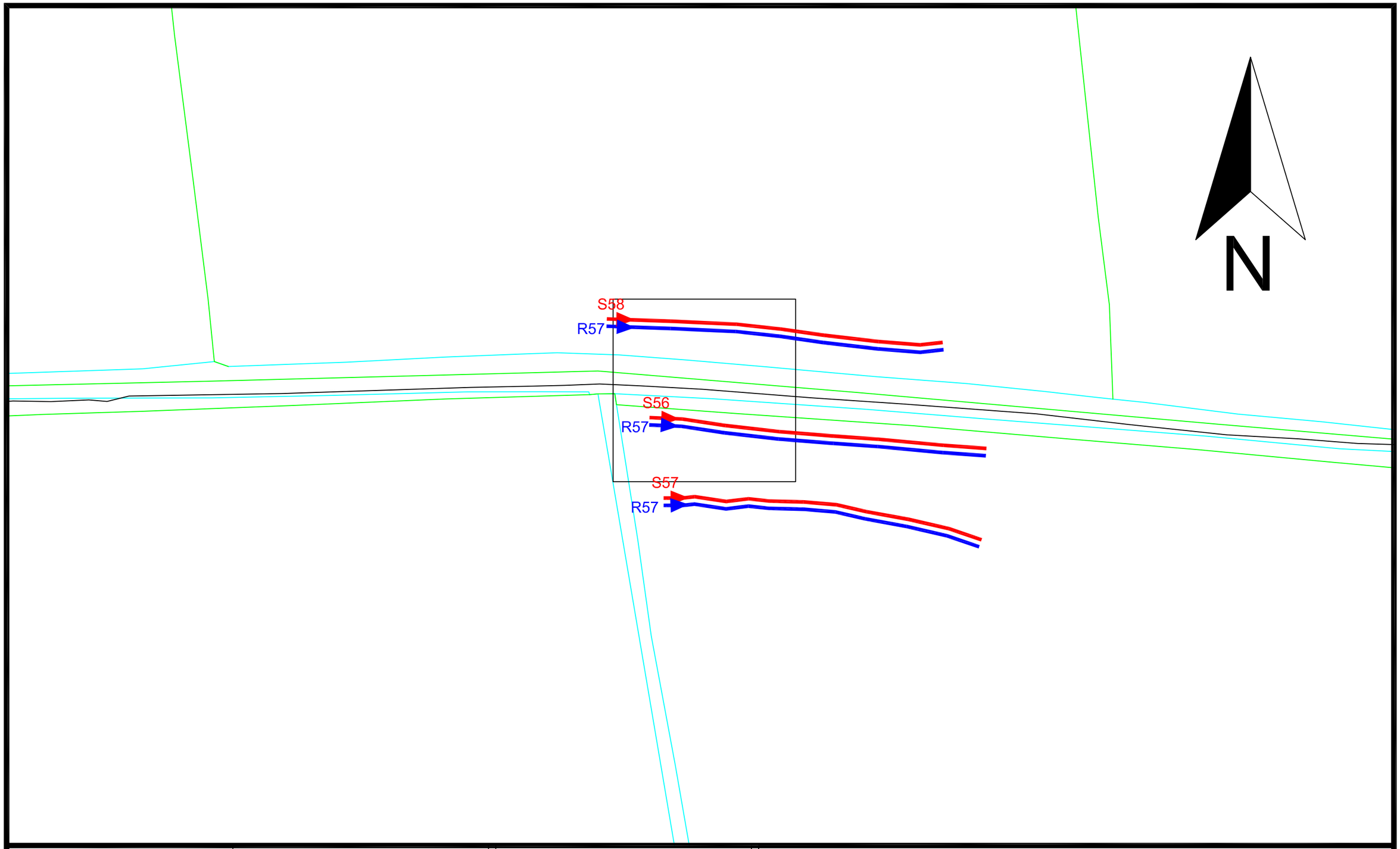
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Email: info@mgx.ie
Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 17b: Interpretation of of Geophysical Survey CH135400

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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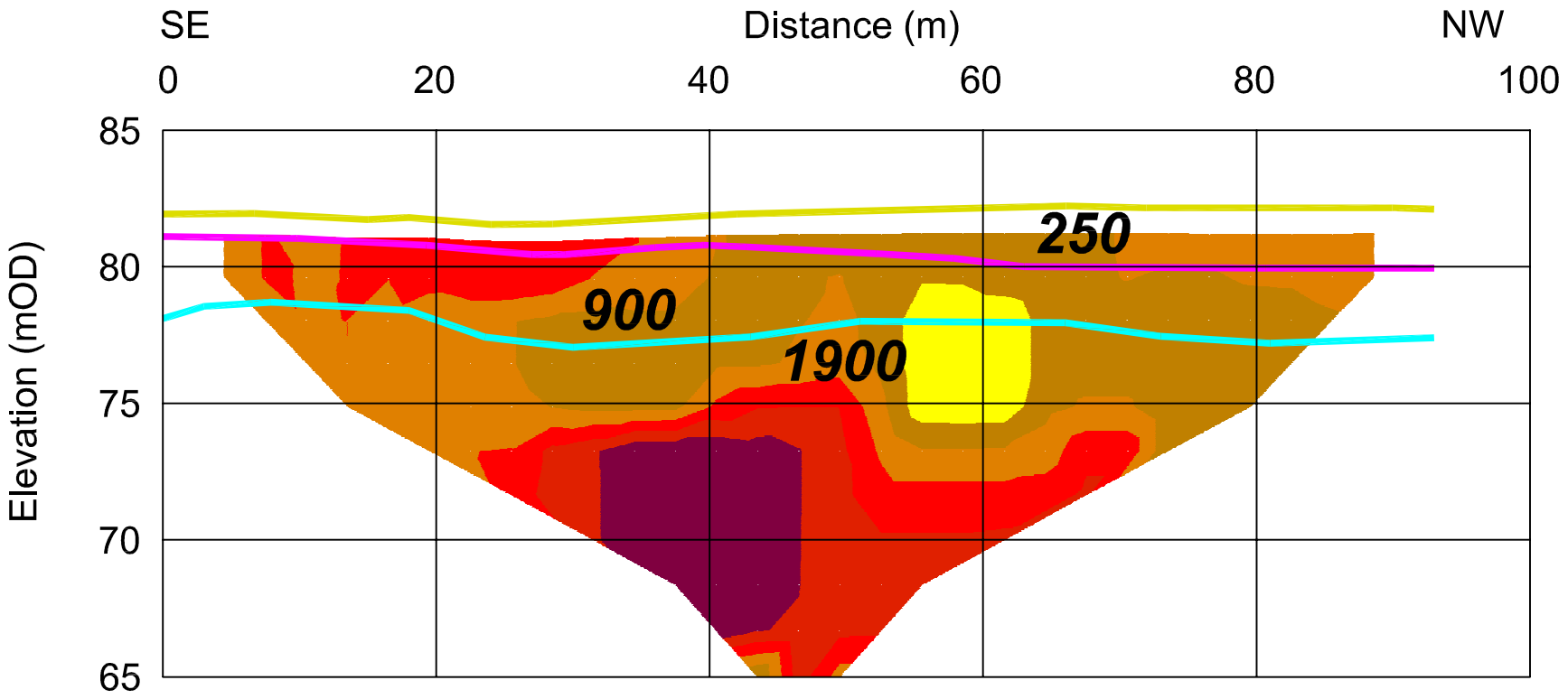
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 18: Geophysical Survey Location Map CH138350

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

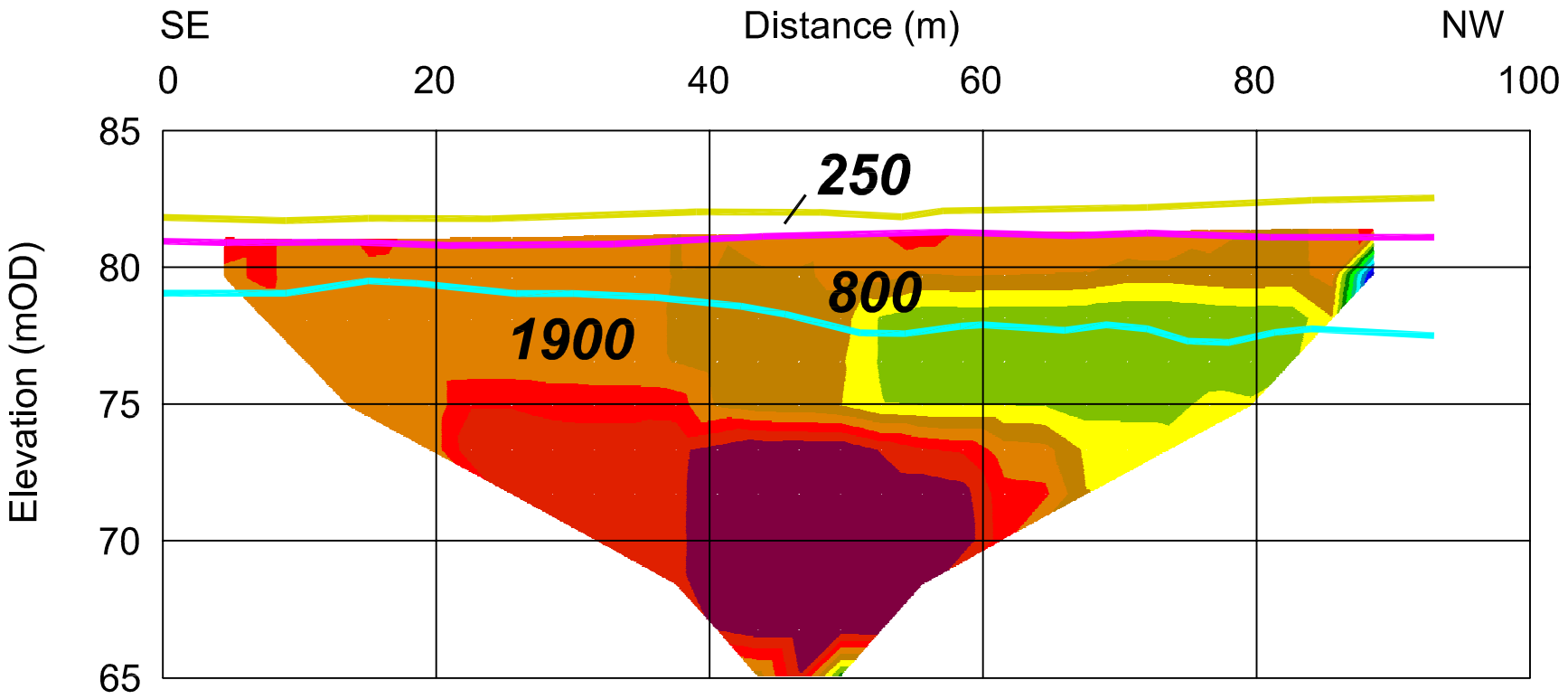
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

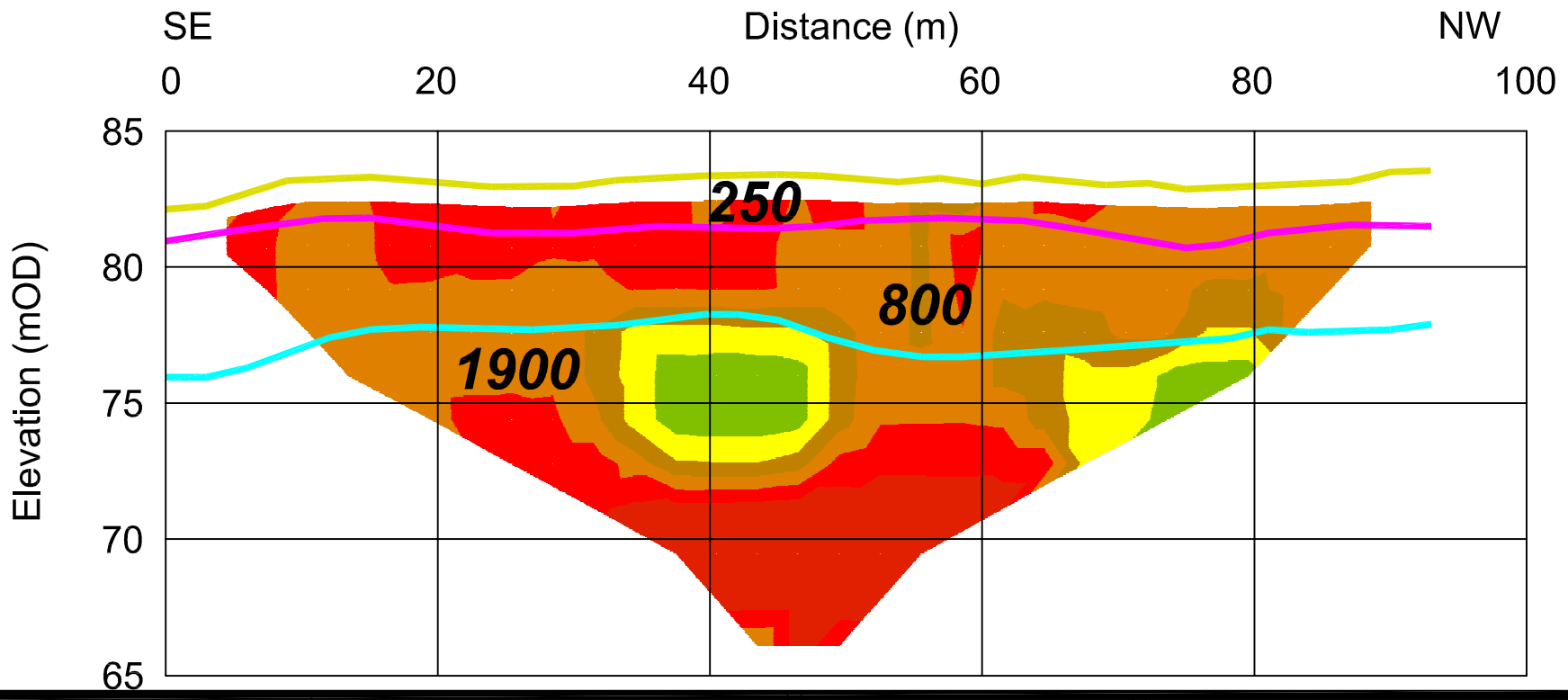
2D-Resistivity Profile R56 and Seismic Refraction Profile S56 Model



2D-Resistivity Profile R57 and Seismic Refraction Profile S57 Model



2D-Resistivity Profile R58 and Seismic Refraction Profile S58 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 18a: Models of of Geophysical Survey CH138350

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	04/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

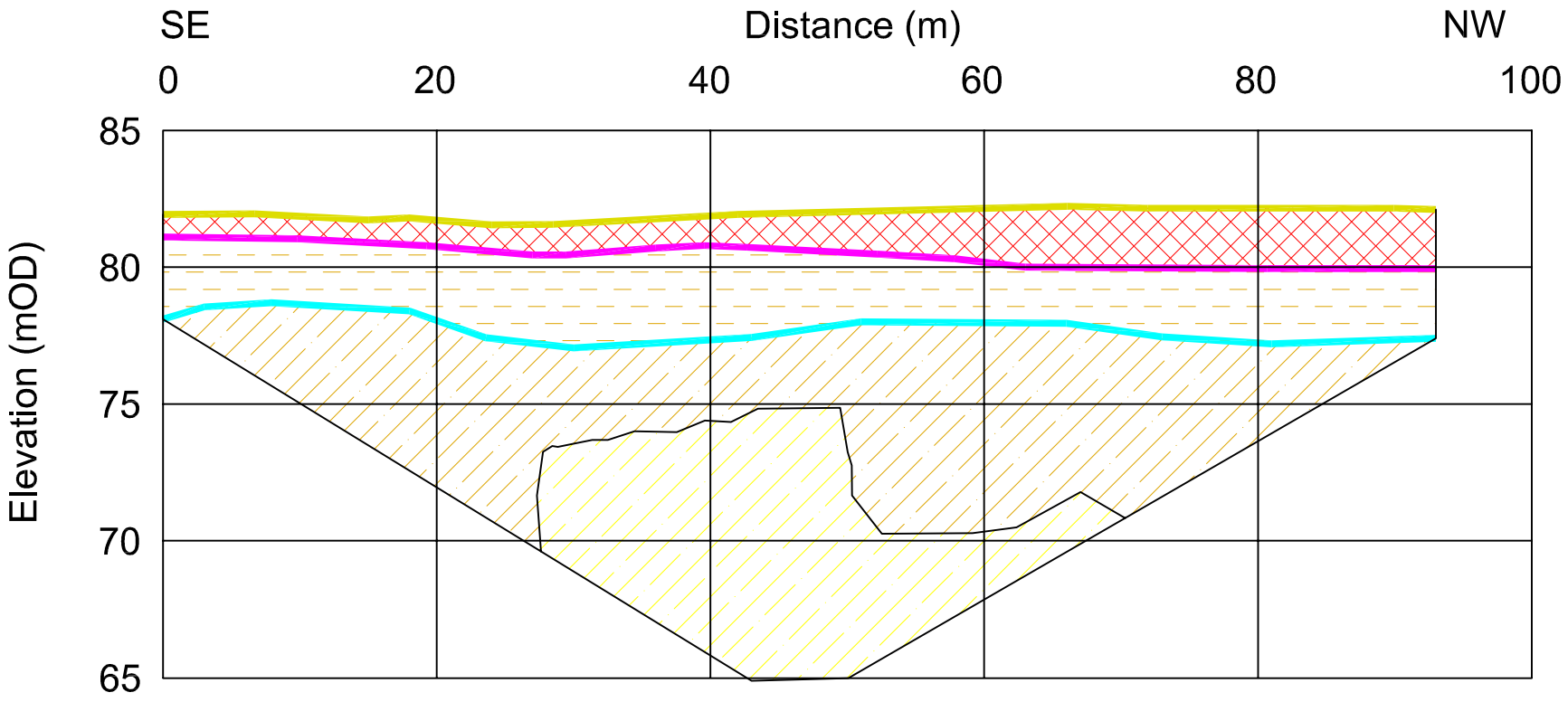
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

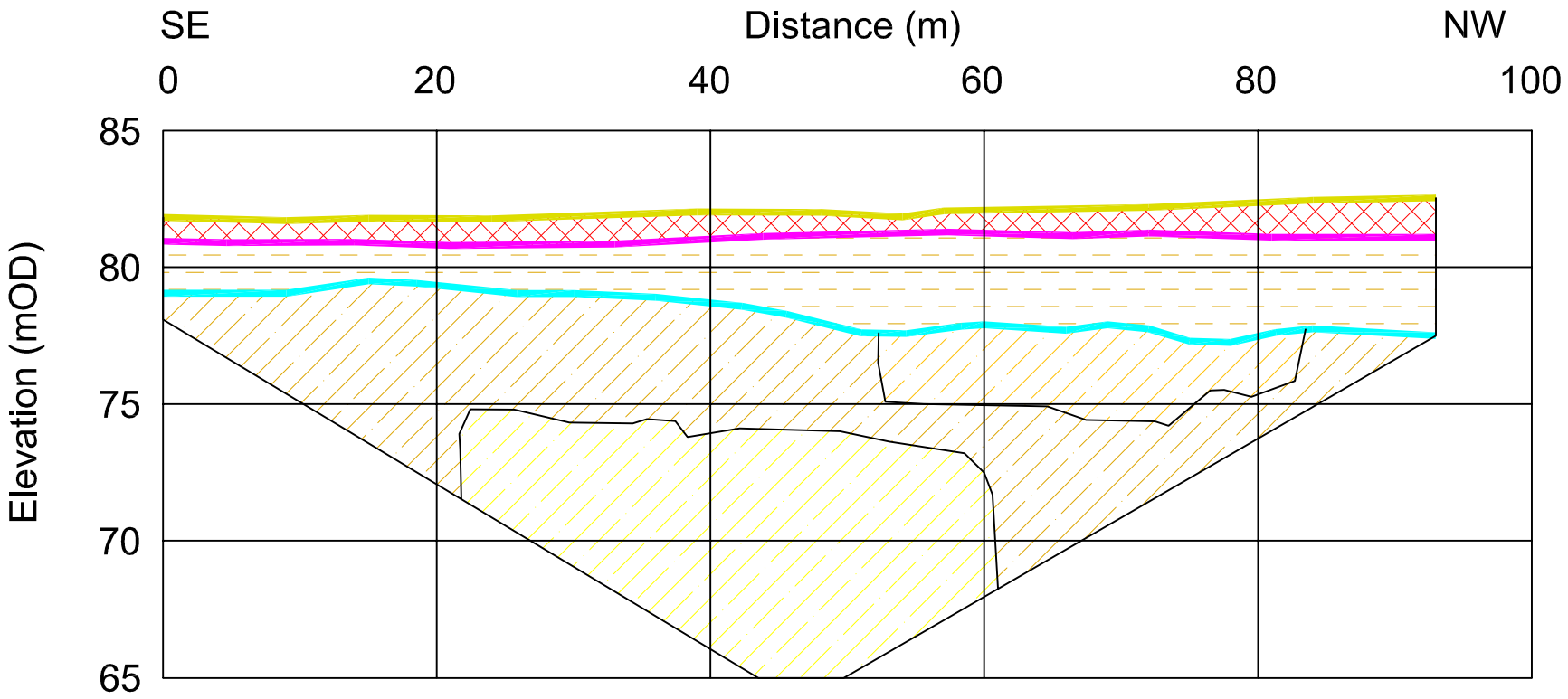
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

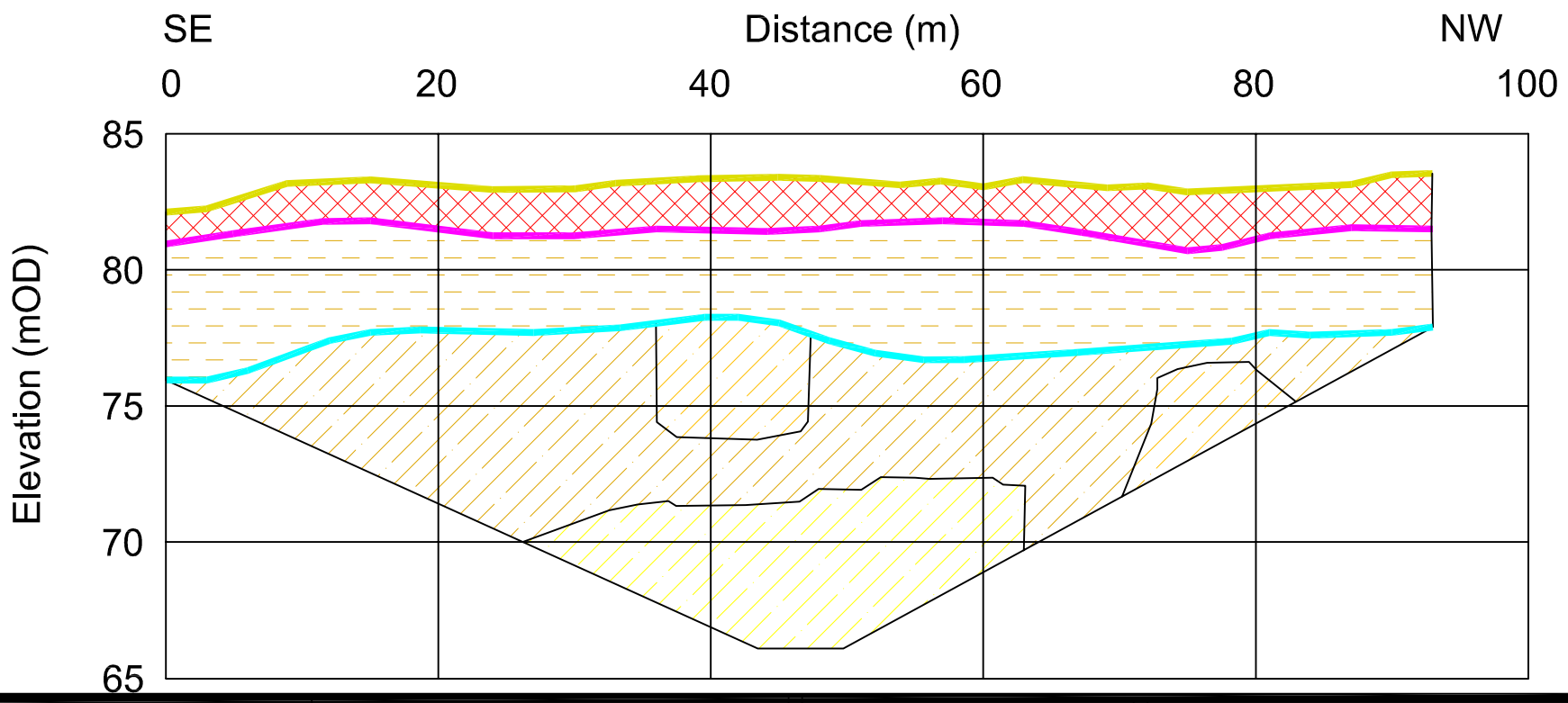
2D-Resistivity Prof. R56 and Seismic Refraction Prof. S56 Interpretation



2D-Resistivity Prof. R57 and Seismic Refraction Prof. S57Interpretation



2D-Resistivity Prof. R58 and Seismic Refraction Prof. S58 Interpretation



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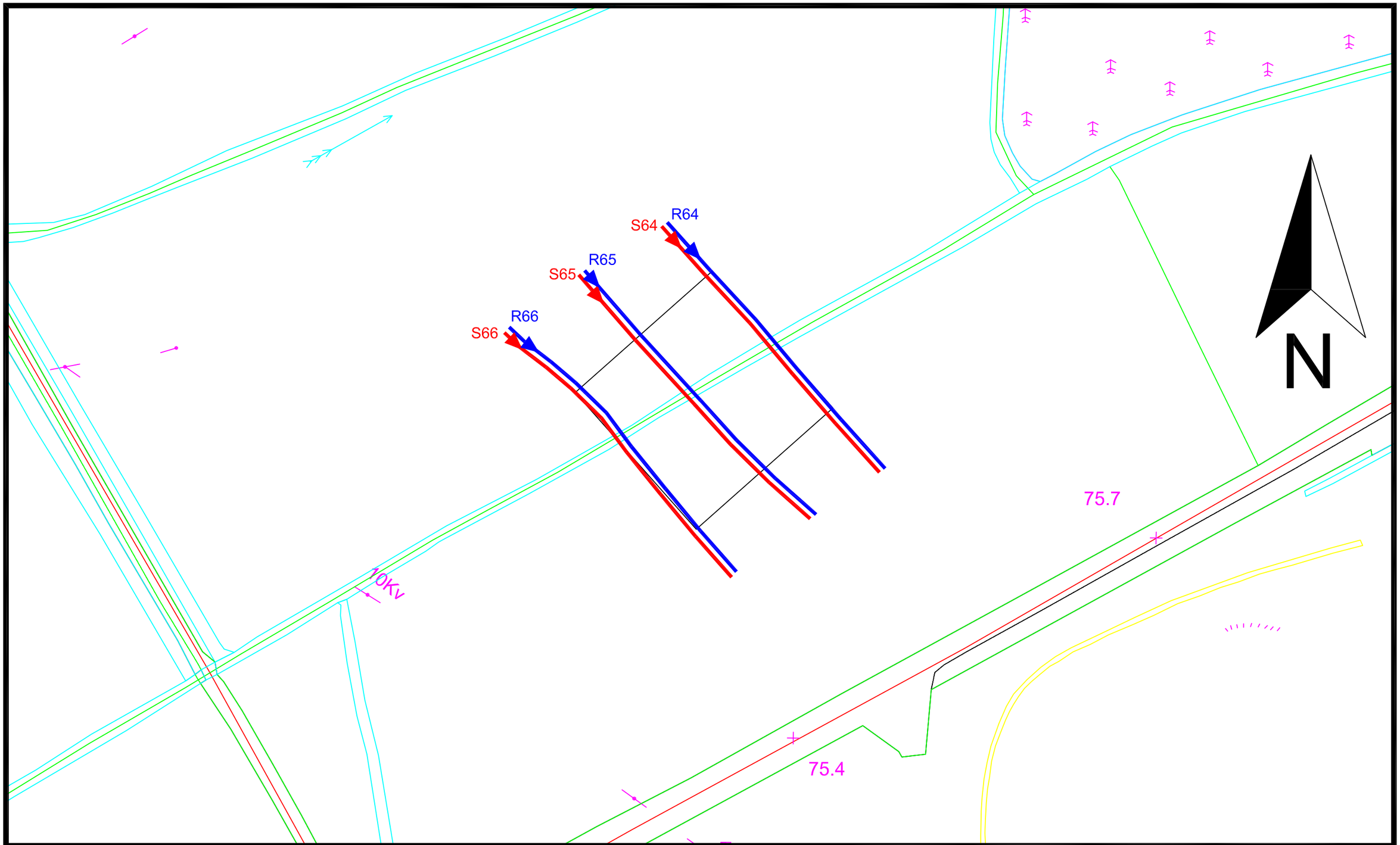
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 18b: Interpretation of of Geophysical Survey CH138350

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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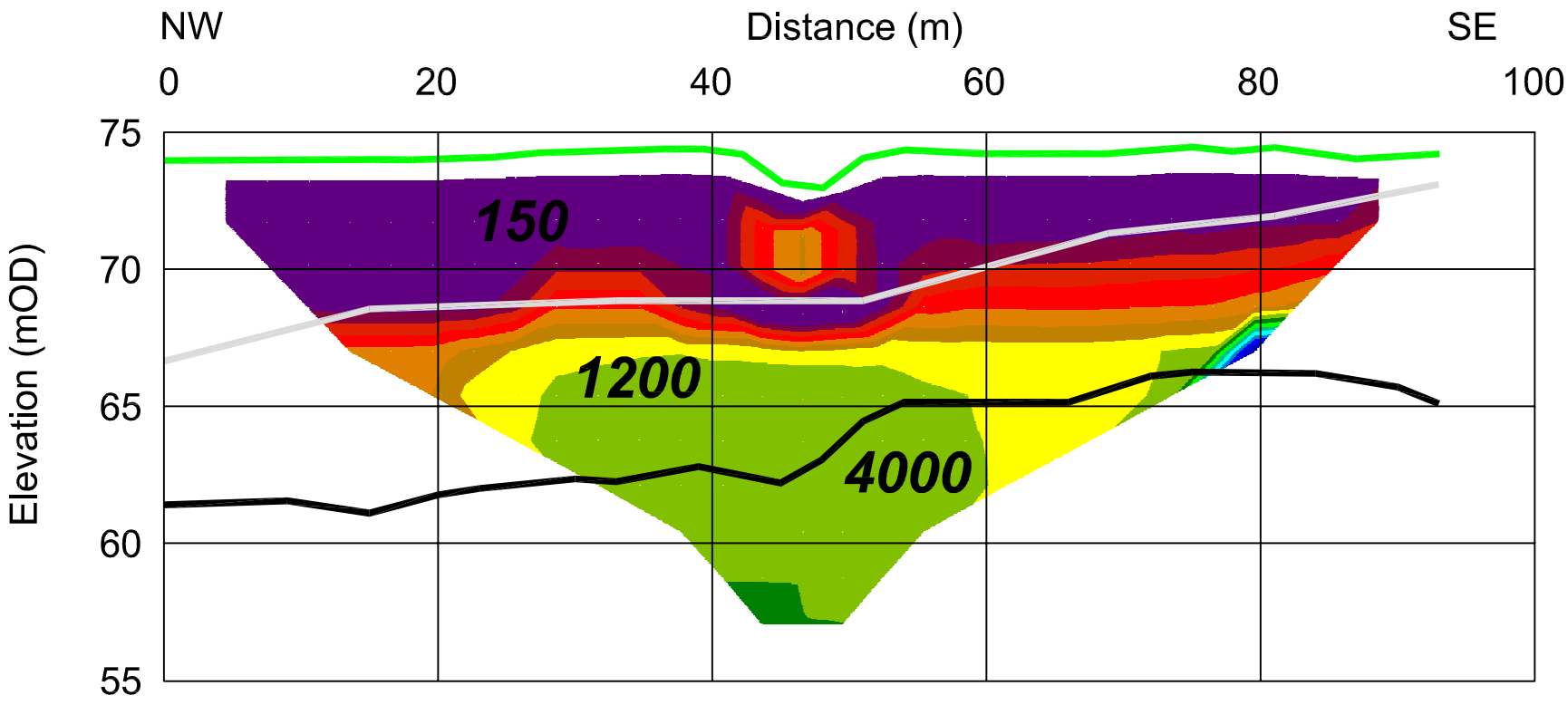
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 19: Geophysical Survey Location Map CH146500

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

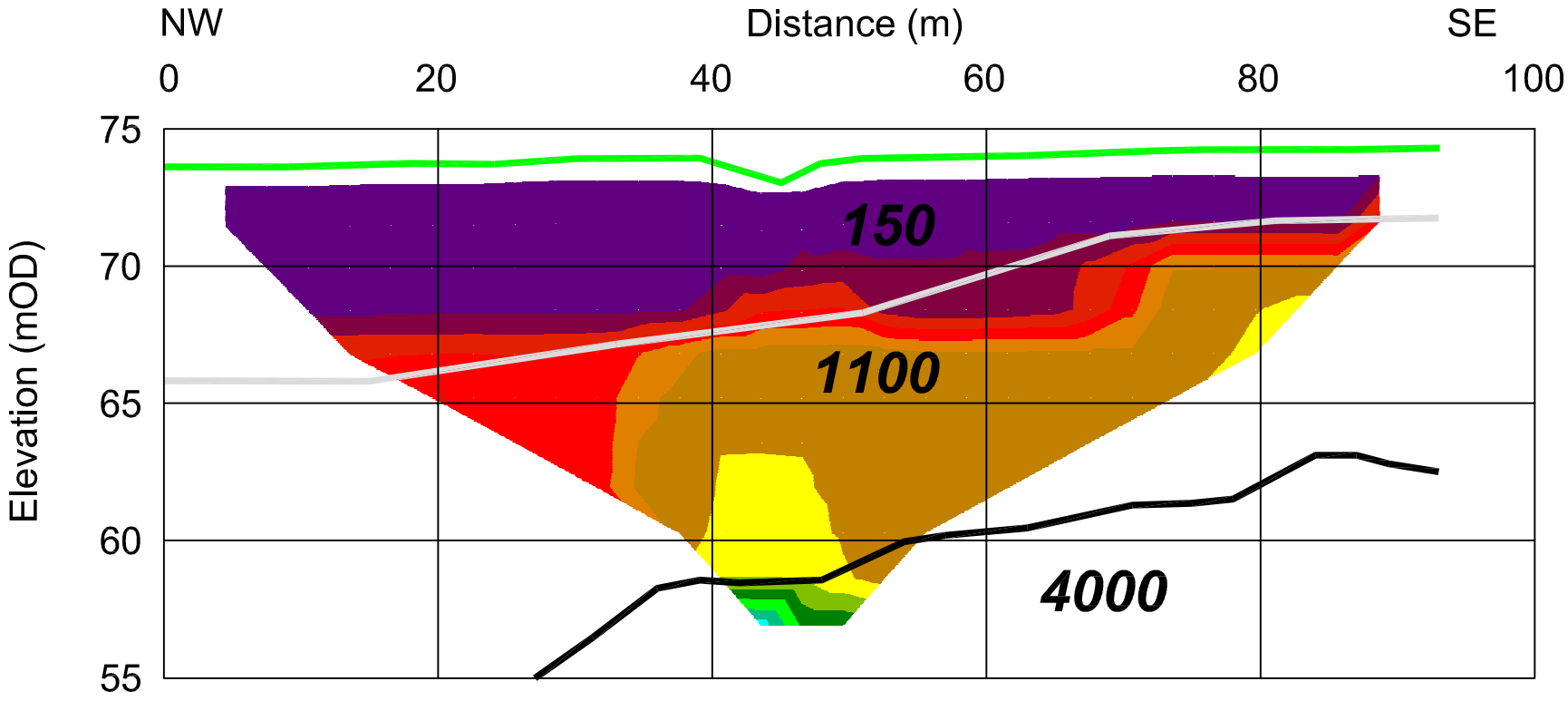
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

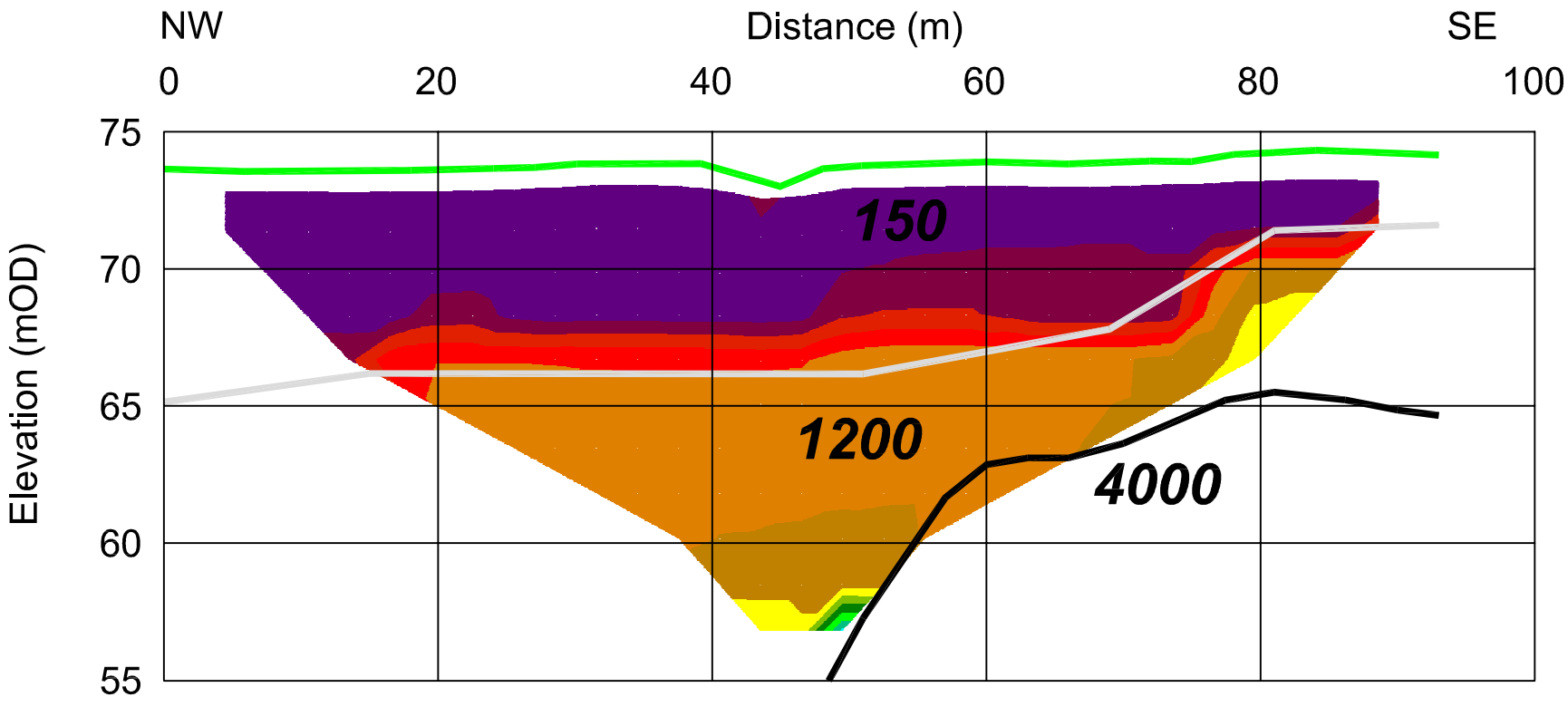
2D-Resistivity Profile R64 and Seismic Refraction Profile S64 Model



2D-Resistivity Profile R65 and Seismic Refraction Profile S65 Model



2D-Resistivity Profile R66 and Seismic Refraction Profile S66 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 19a: Models of of Geophysical Survey CH136500

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

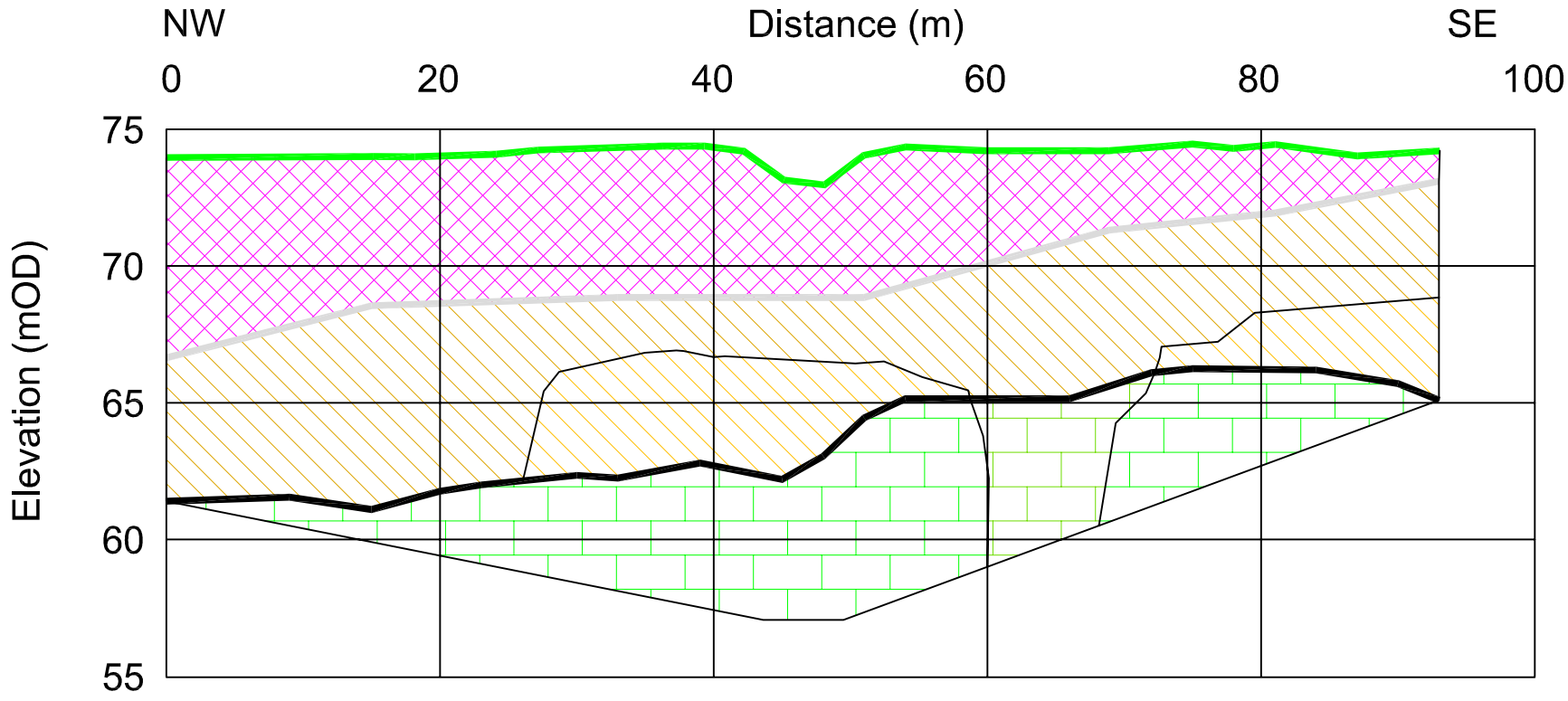
LEGEND: Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

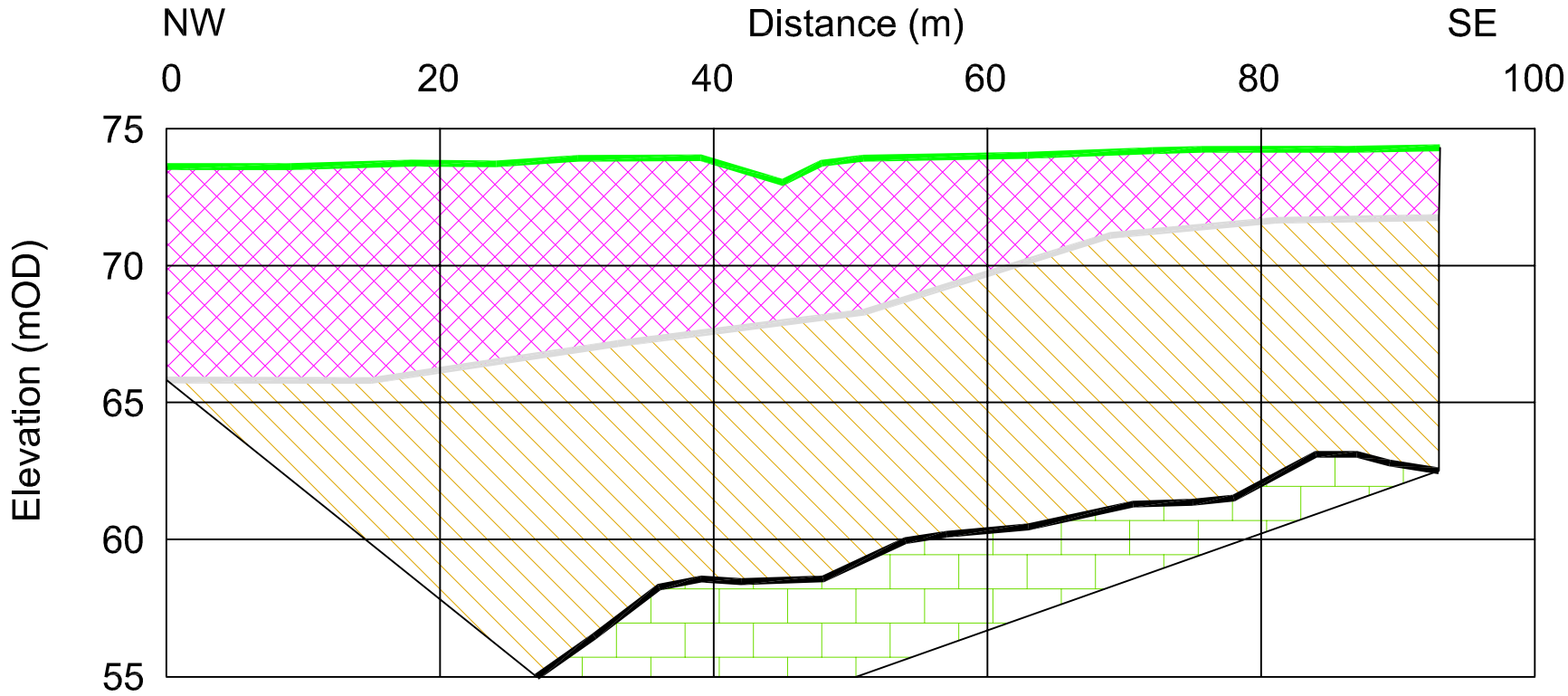
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

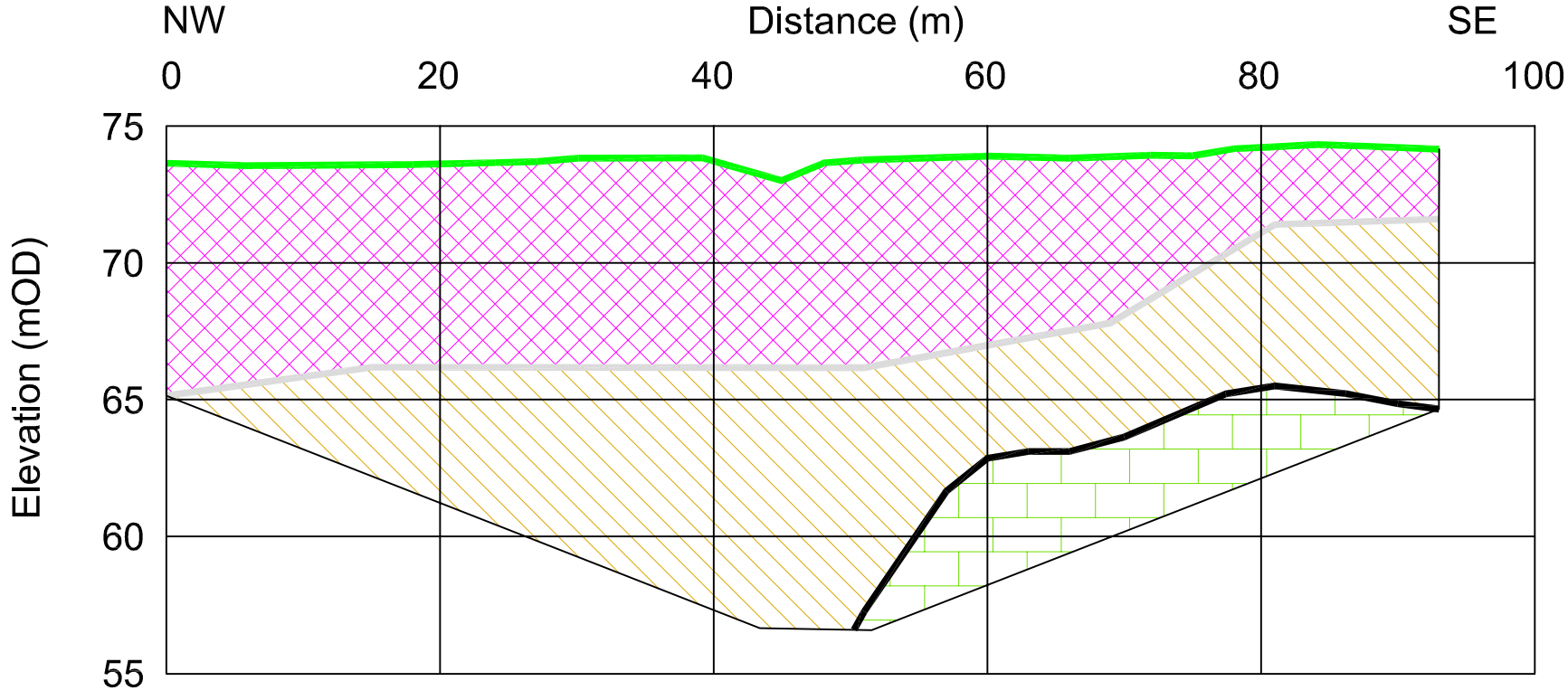
2D-Resistivity Prof. R64 and Seismic Refraction Prof. S64 Interpretation



2D-Resistivity Prof. R65 and Seismic Refraction Prof. S65 Interpretation



2D-Resistivity Prof. R66 and Seismic Refraction Prof. S66 Interpretation



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 19b: Interpretation of of Geophysical Survey CH136500

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone

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S63 R63 S62 R62 S61 R61

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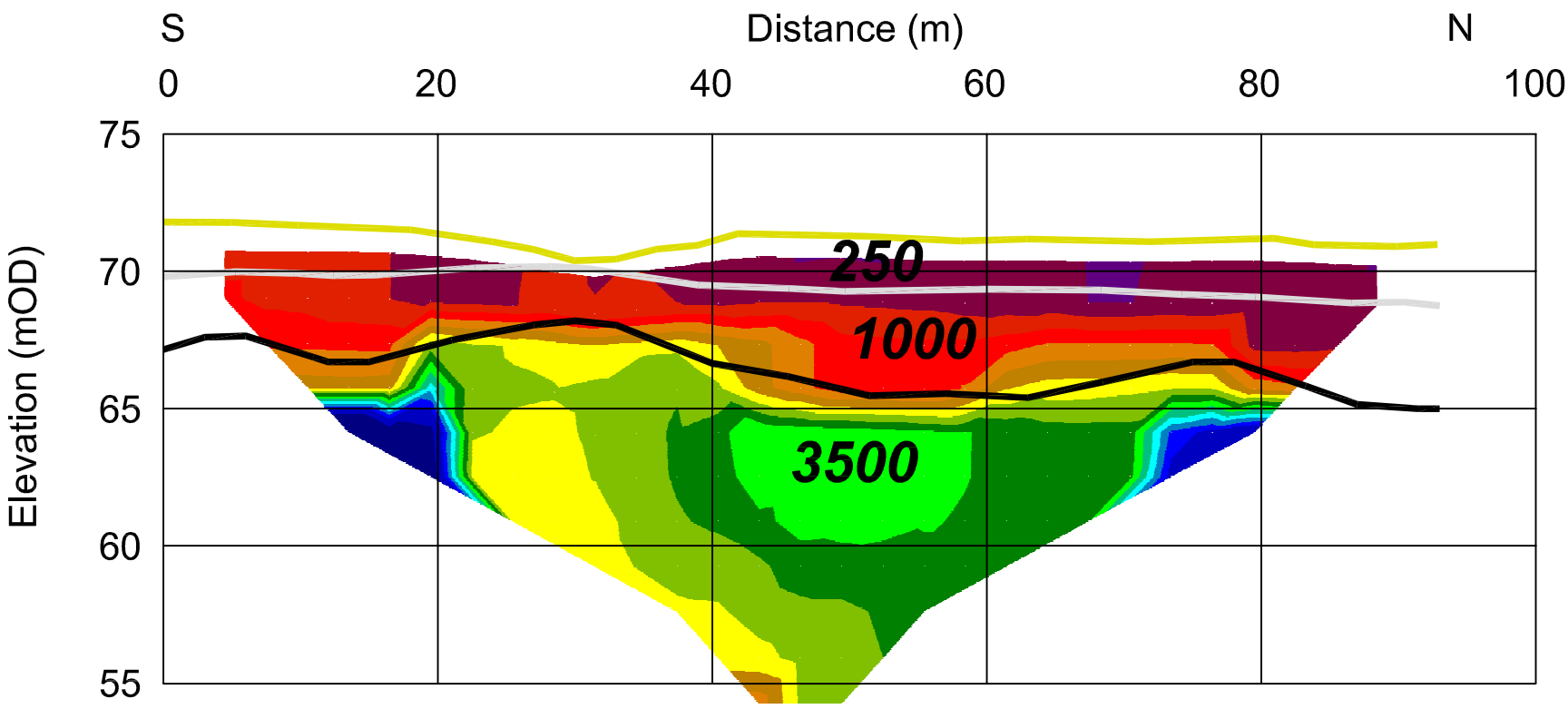
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 20: Geophysical Survey Location Map CH148700

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

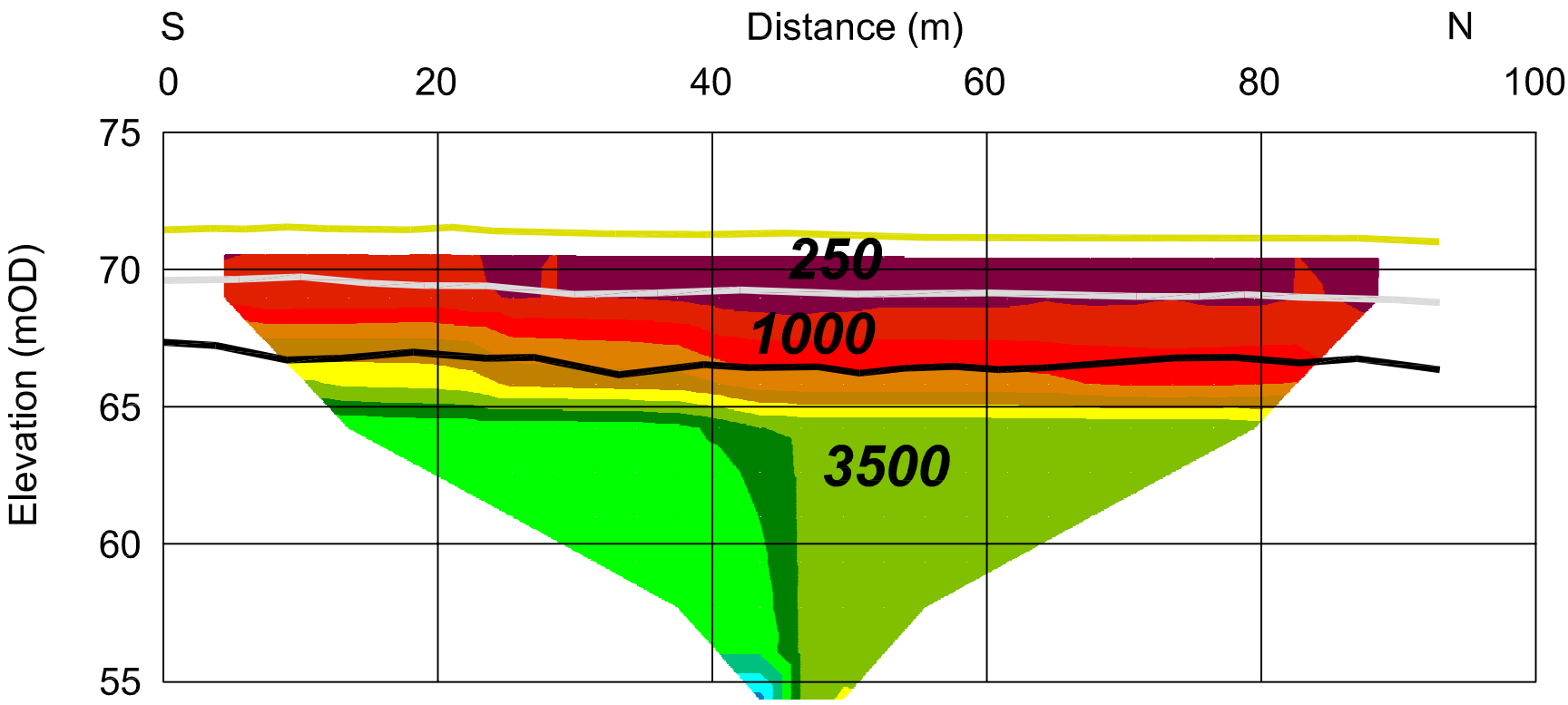
LEGEND:

- R2 — 2D-Resistivity Profile
- S1 — Seismic Refraction Profile
- Proposed Borehole

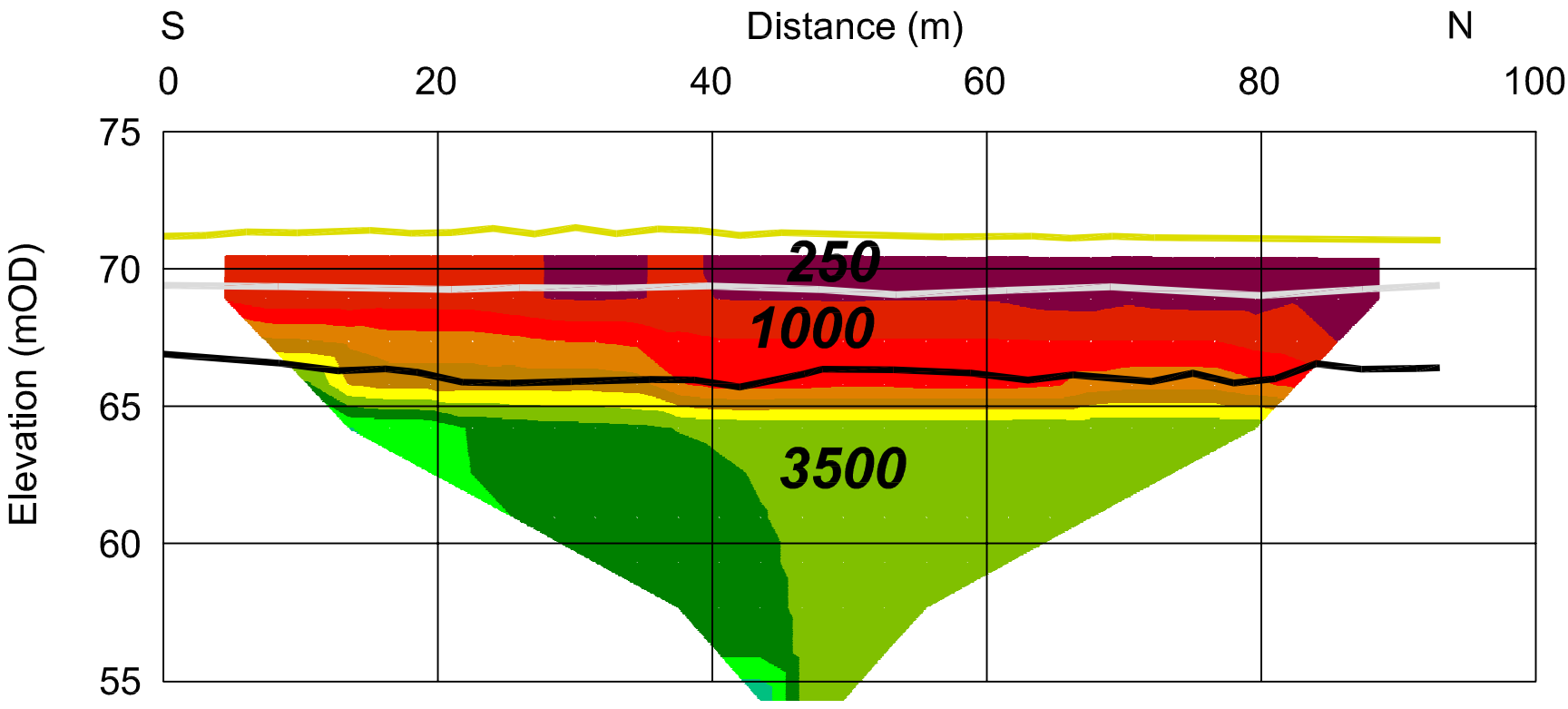
2D-Resistivity Profile R61 and Seismic Refraction Profile S61 Model



2D-Resistivity Profile R62 and Seismic Refraction Profile S62 Model



2D-Resistivity Profile R63 and Seismic Refraction Profile S63 Model



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Web: www.mgx.ie

CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 20a: Models of of Geophysical Survey CH148700

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

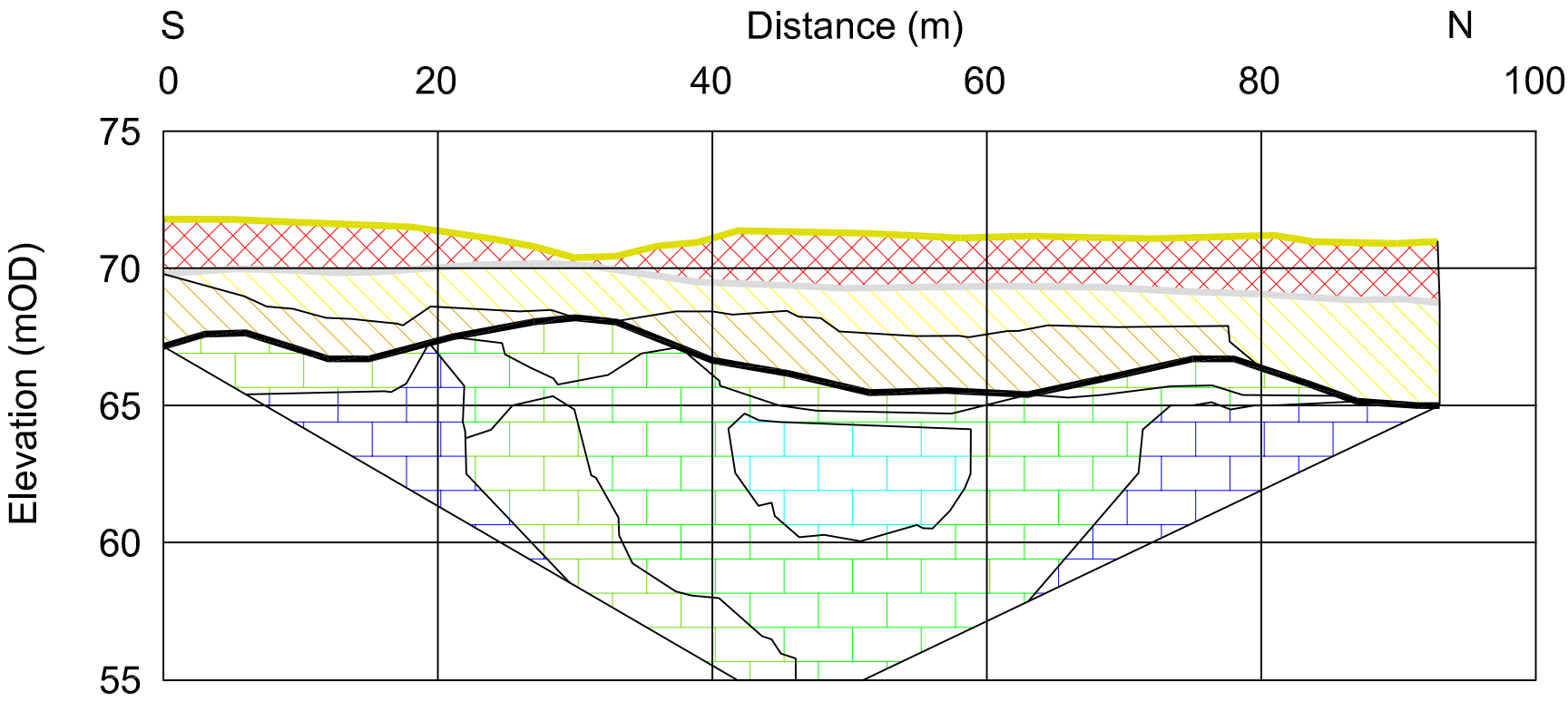
LEGEND: Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

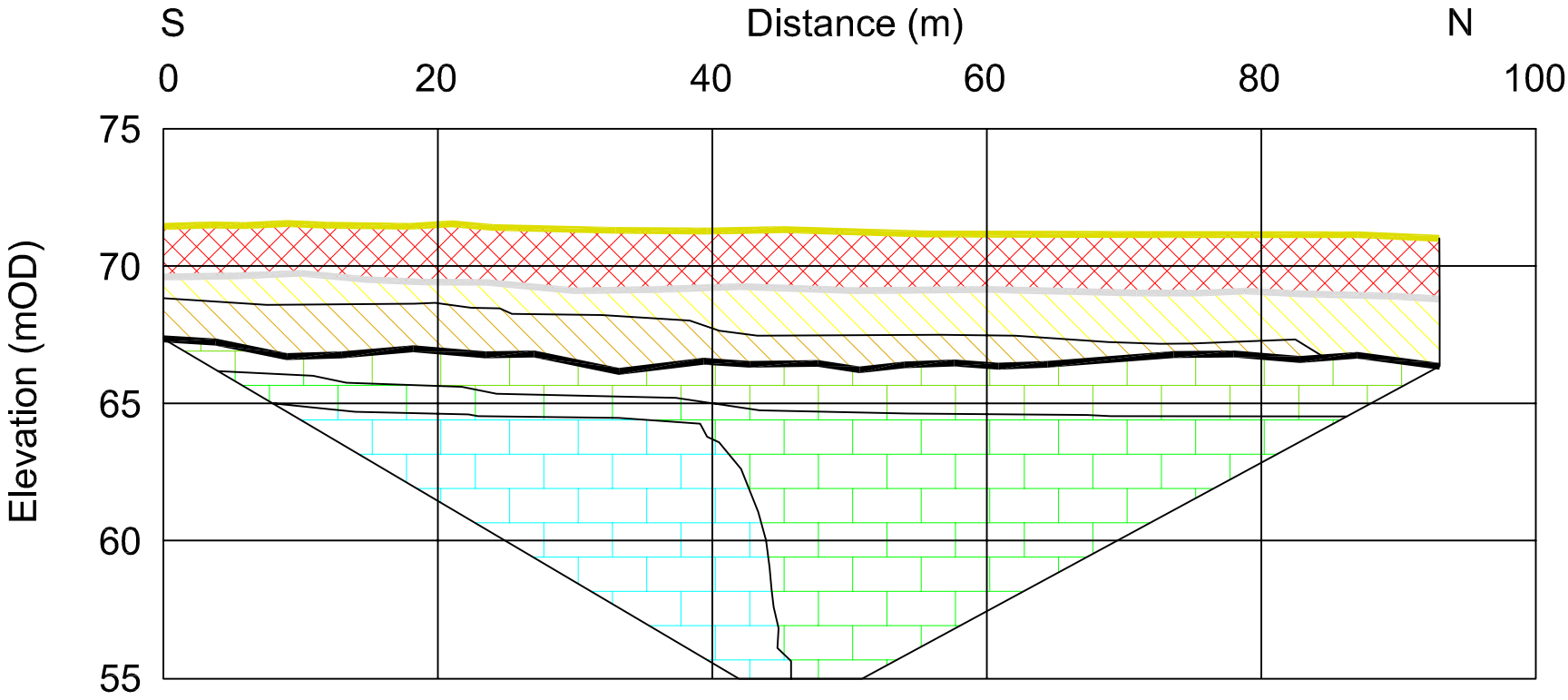
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

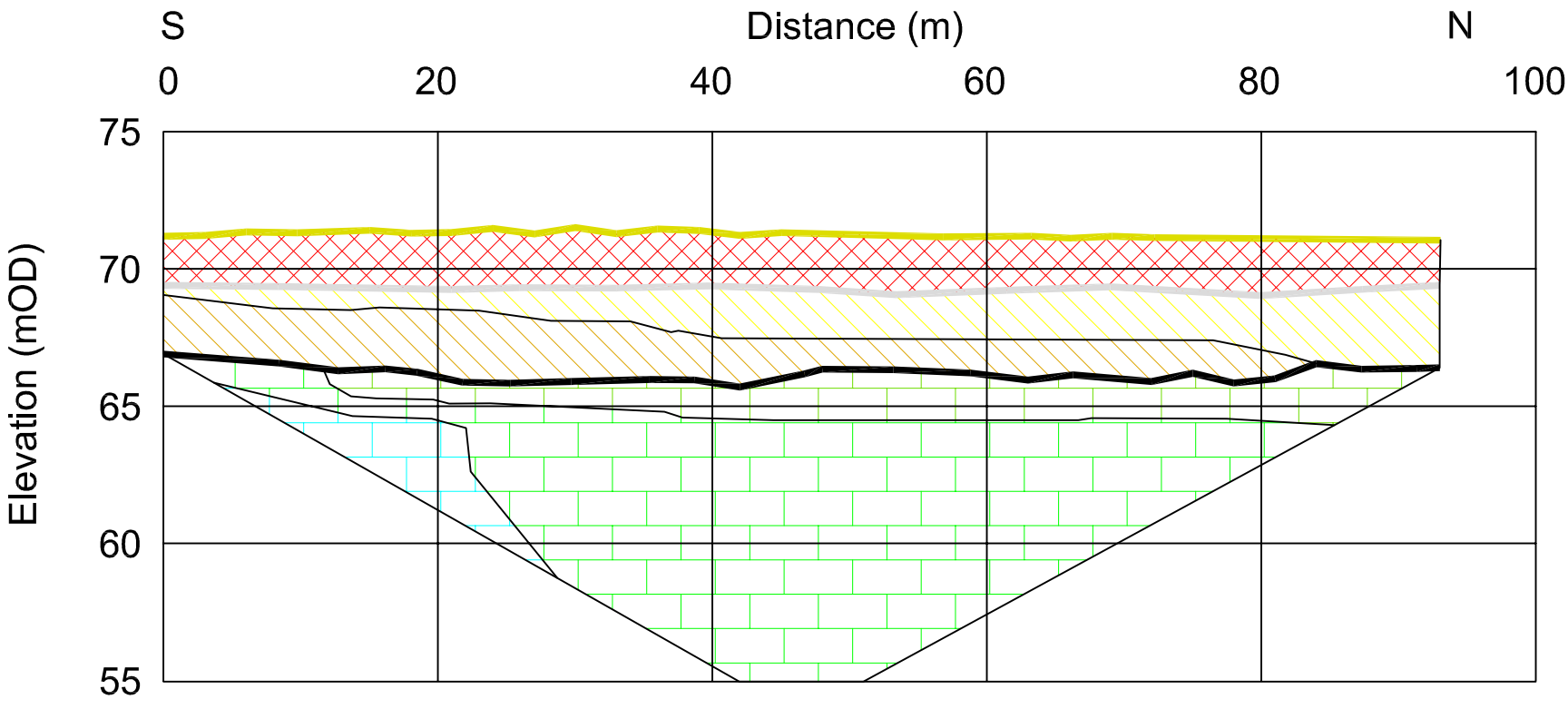
2D-Resistivity Prof. R61 and Seismic Refraction Prof. S61 Interpretation



2D-Resistivity Prof. R62 and Seismic Refraction Prof. S62 Interpretation



2D-Resistivity Prof. R63 and Seismic Refraction Prof. S63 Interpretation



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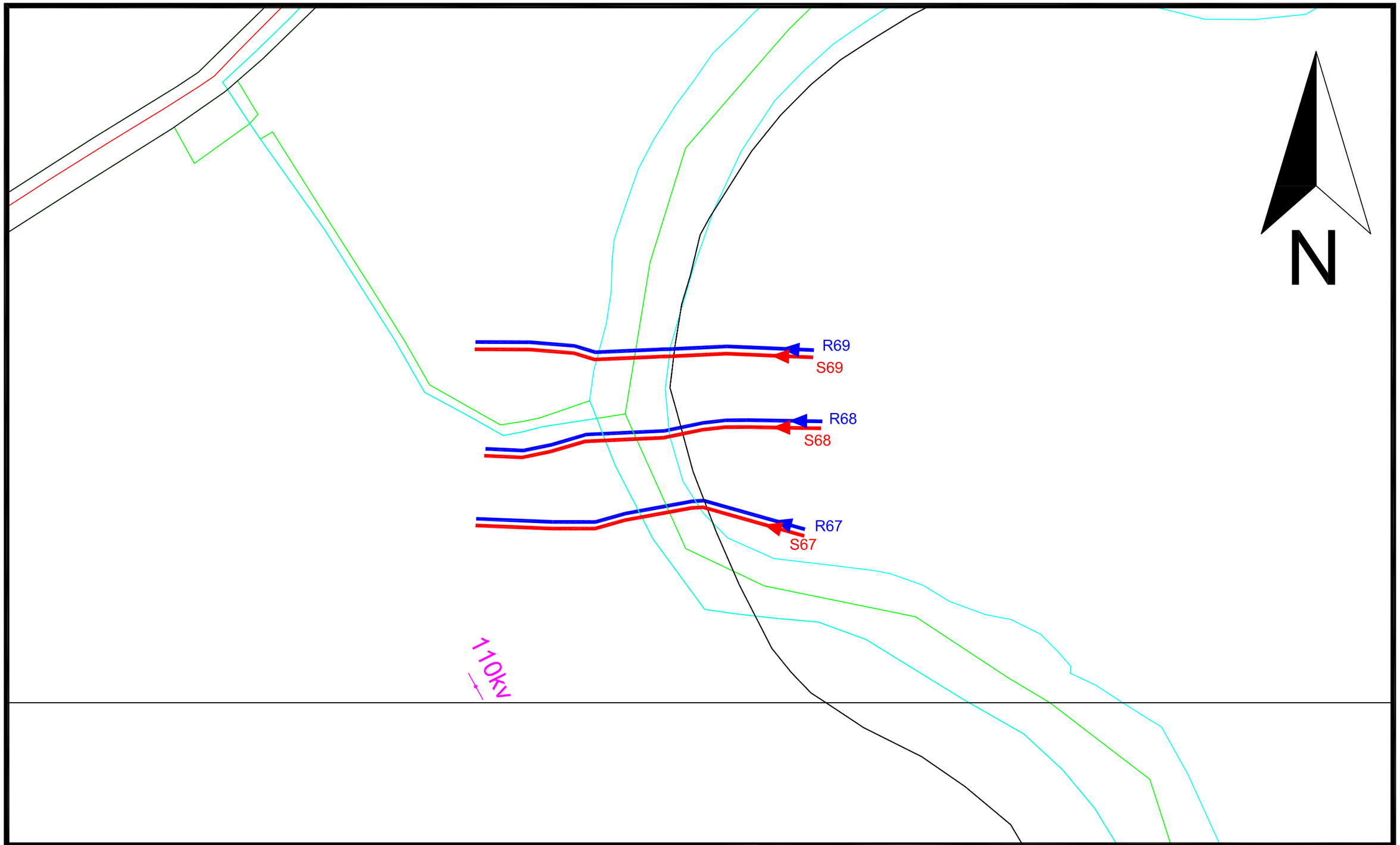
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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 20b: Interpretation of of Geophysical Survey CH148700

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND; Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone



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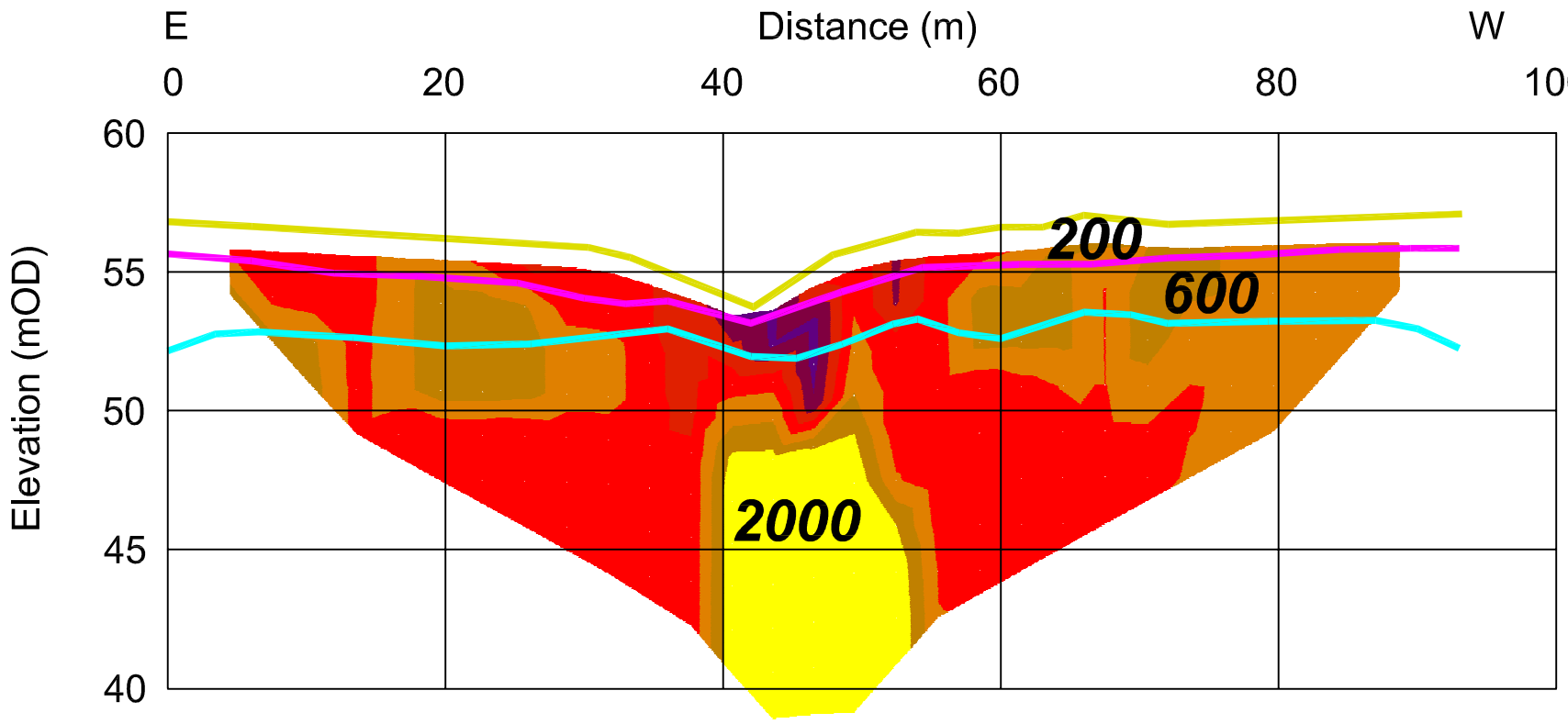
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 21: Geophysical Survey Location Map CH163900

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

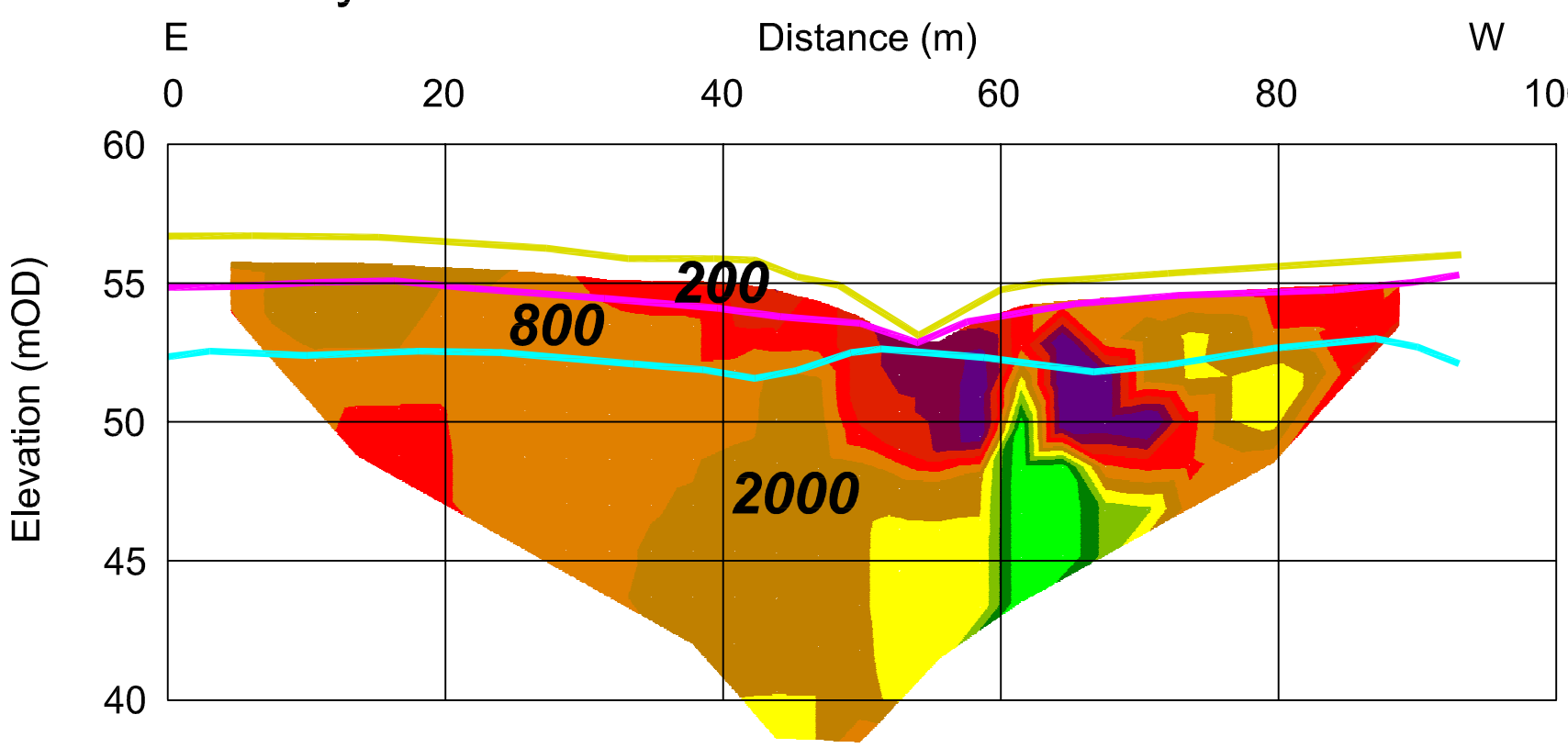
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

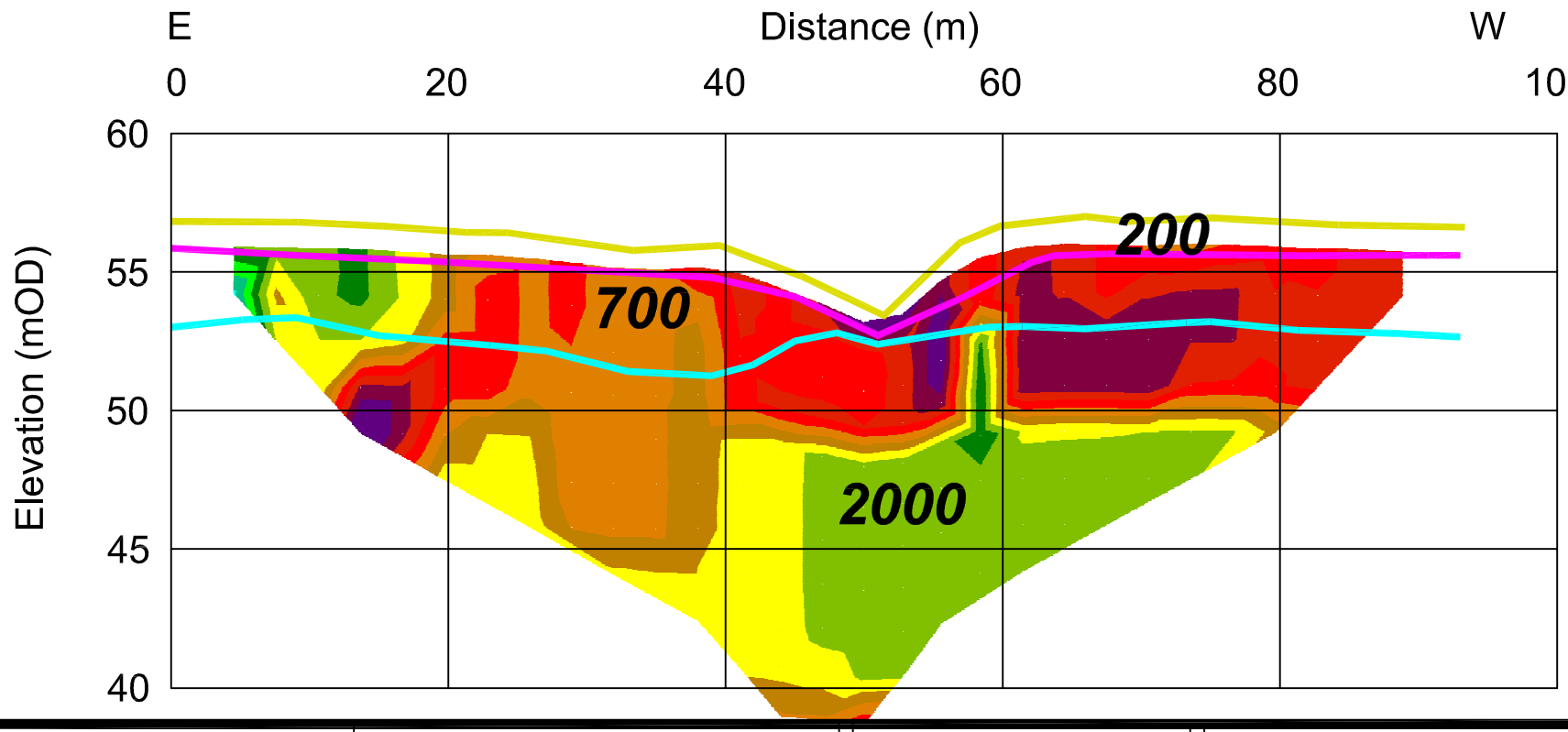
2D-Resistivity Profile R67 and Seismic Refraction Profile S67 Model



2D-Resistivity Profile R68 and Seismic Refraction Profile S68 Model



2D-Resistivity Profile R69 and Seismic Refraction Profile S69 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 21a: Models of of Geophysical Survey CH163900

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

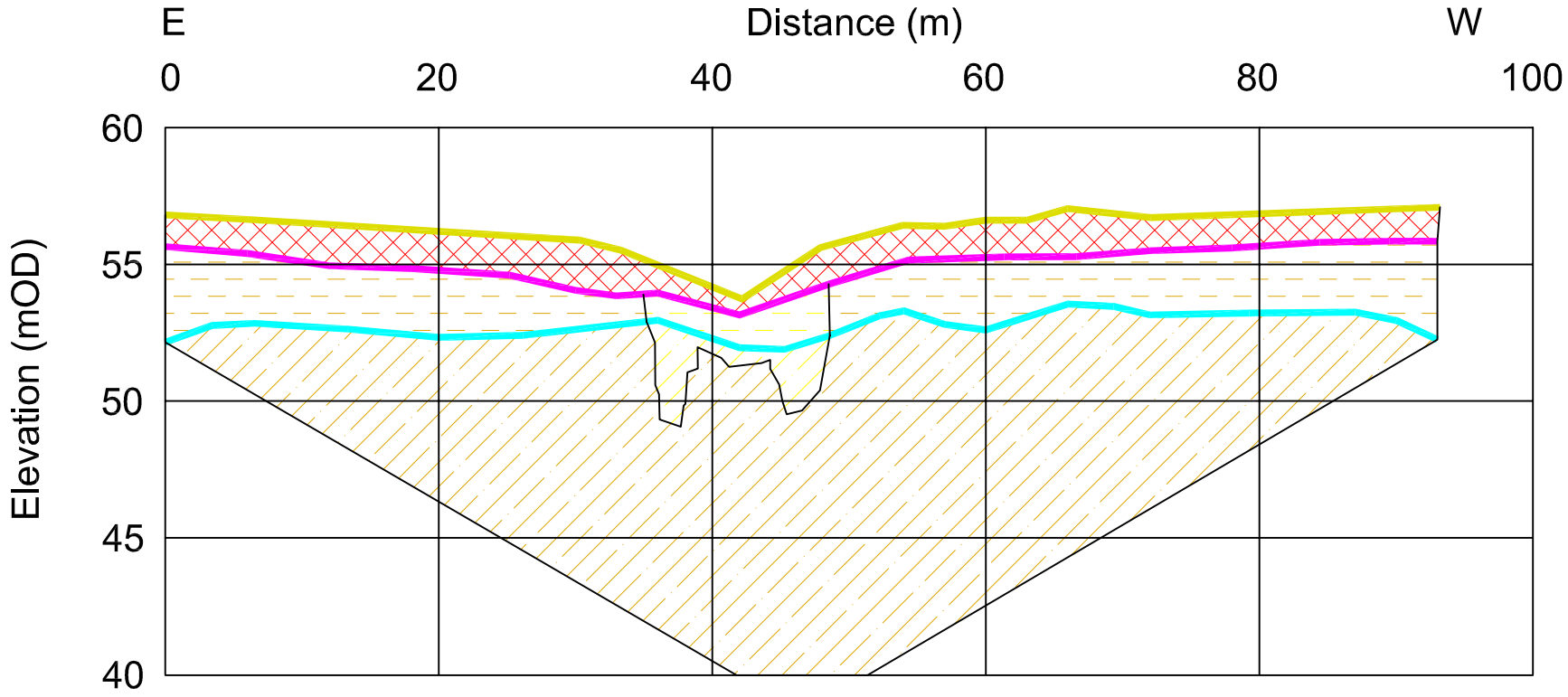
LEGEND: Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

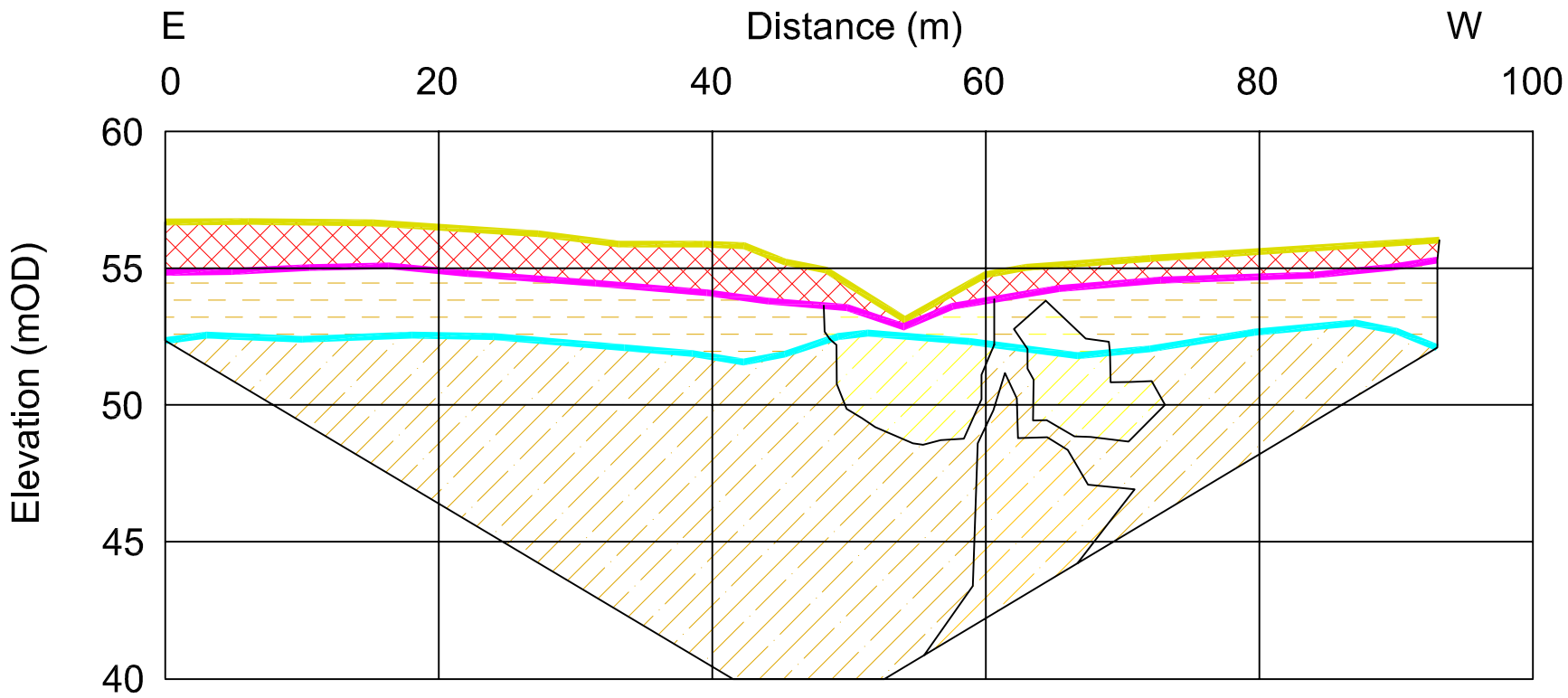
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

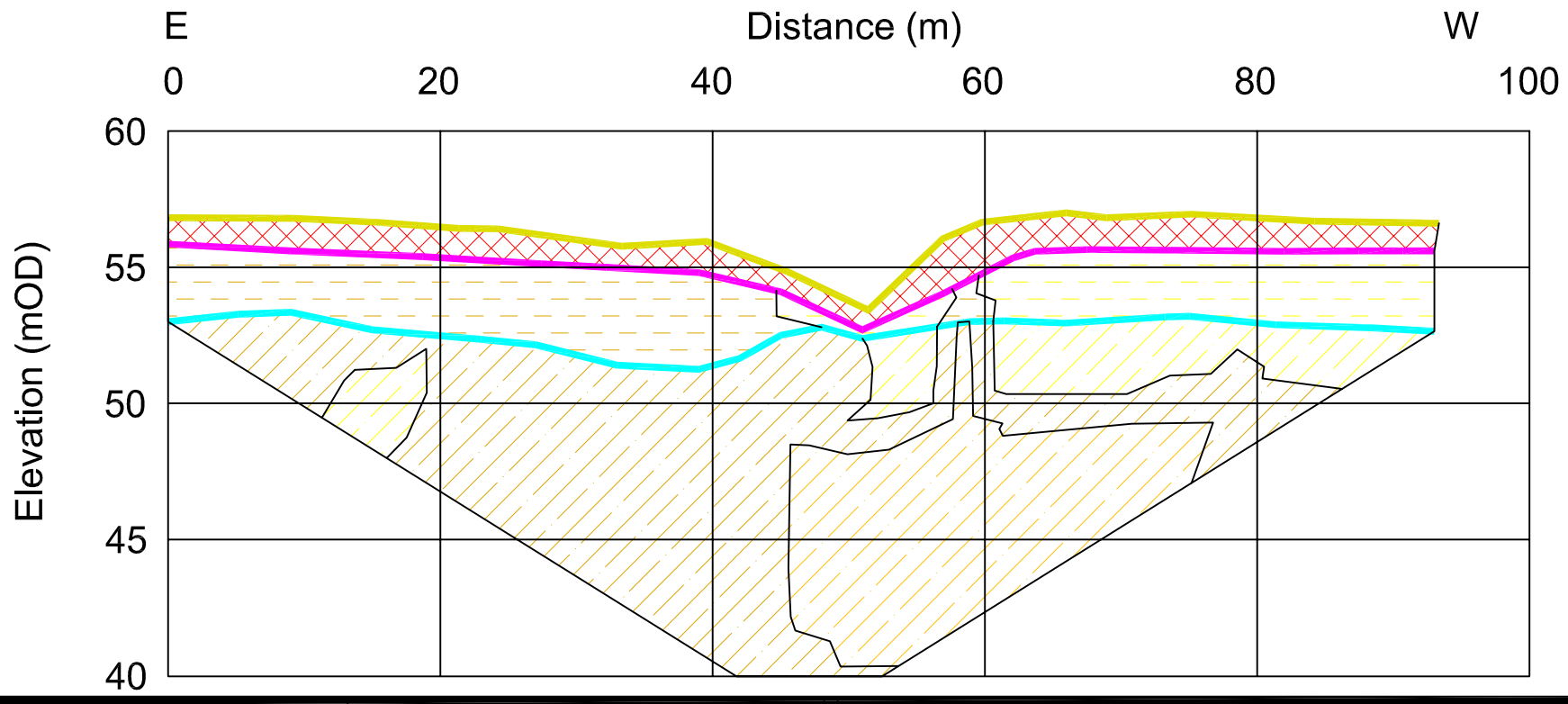
2D-Resistivity Prof. R67 and Seismic Refraction Prof. S67 Interpretation



2D-Resistivity Prof. R68 and Seismic Refraction Prof. S68 Interpretation



2D-Resistivity Prof. R69 and Seismic Refraction Prof. S69 Interpretation



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 21b: Interpretation of of Geophysical Survey CH163900

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone

N

Aquaduct

Grand Canal

R70

S70

R71

S71

m FF

UNDND

Minerex
Geophysics Limited

Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Fax. (01) 6510033
Email: info@mgx.ie
Web: www.mgx.ie

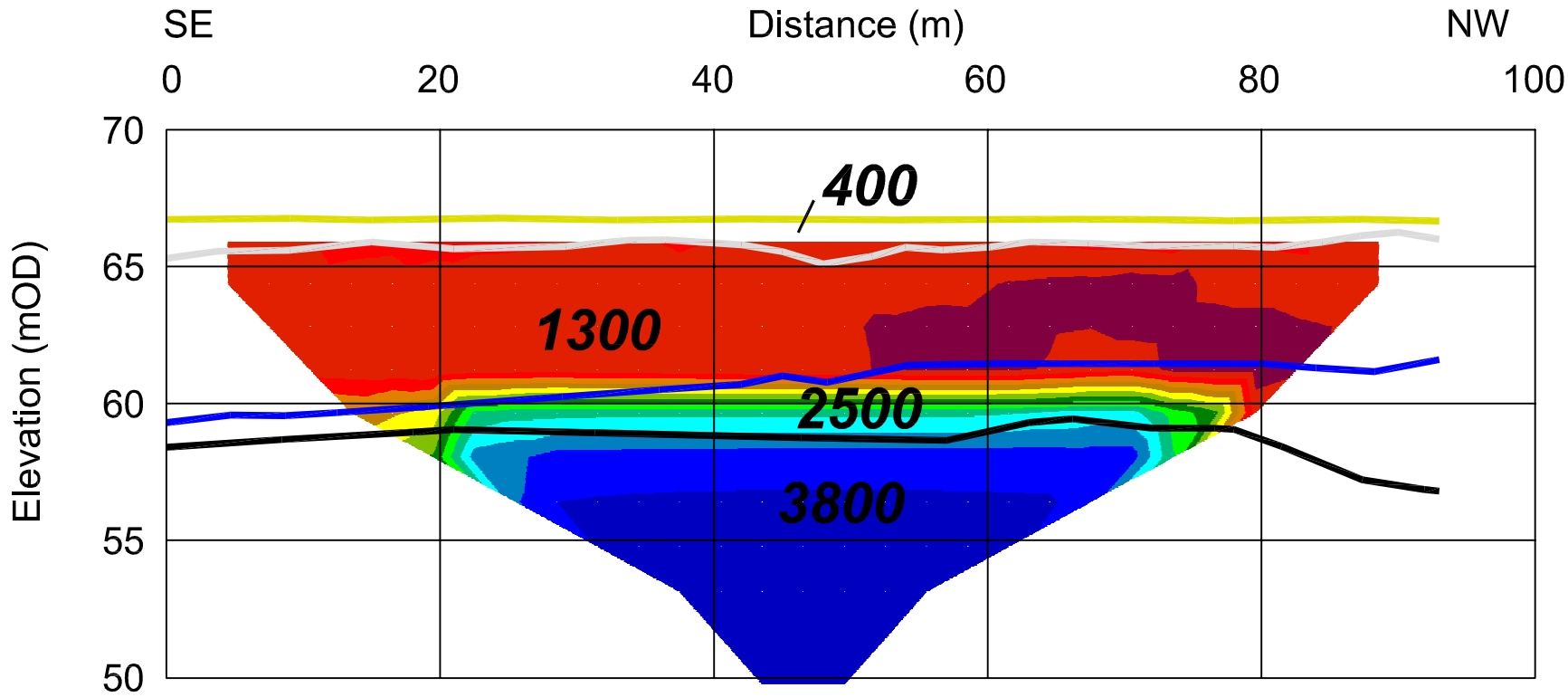
CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Map 22: Geophysical Survey Location Map CH168300

SCALE:	1:1000 @ A3
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

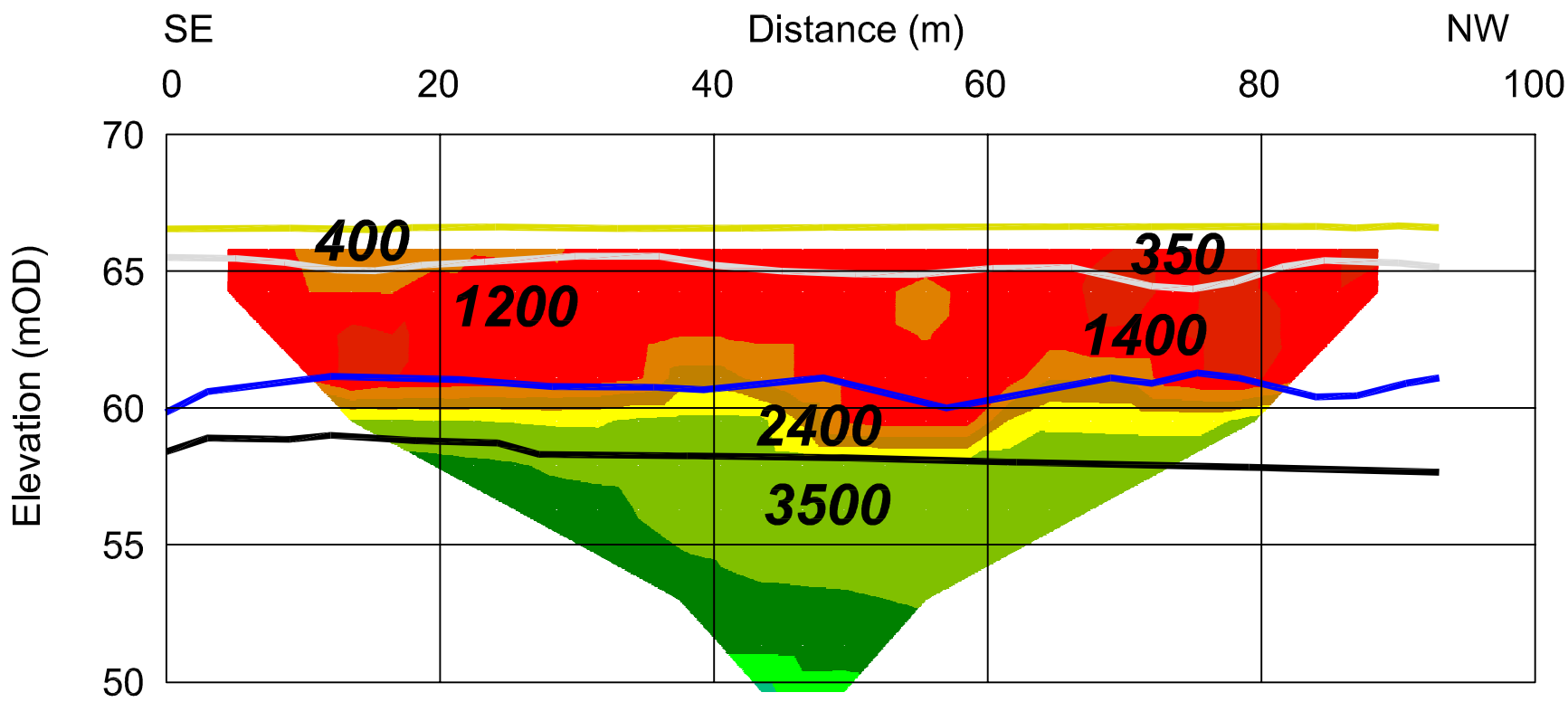
LEGEND:

R2	2D-Resistivity Profile
S1	Seismic Refraction Profile
	Proposed Borehole

2D-Resistivity Profile R70 and Seismic Refraction Profile S70 Model



2D-Resistivity Profile R71 and Seismic Refraction Profile S71 Model



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 22a: Models of of Geophysical Survey CH168300

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	18/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND:

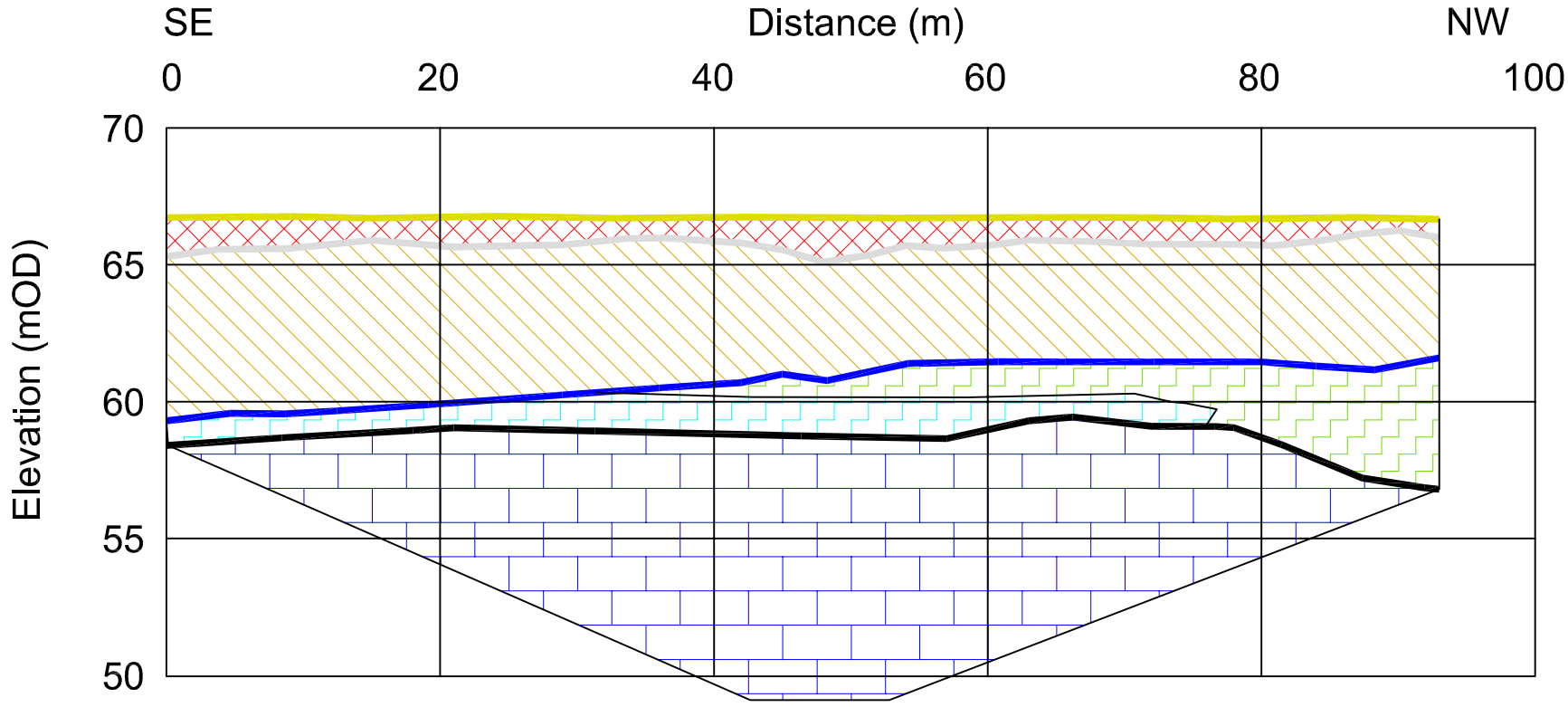
Layers from Seismic Refraction Model:

- Ground Surface/Top of Layer 1 (<150 m/s)
- Ground Surface/Top of Layer 2 (200 - 400 m/s)
- Top of Layer 3 (500 - 900 m/s)
- Top of Layer 4 (1000 - 1500 m/s)
- Top of Layer 5 (1600 - 2000 m/s)
- Top of Layer 6 (2100-2900 m/s)
- Top of Layer 7 (>3000 m/s)

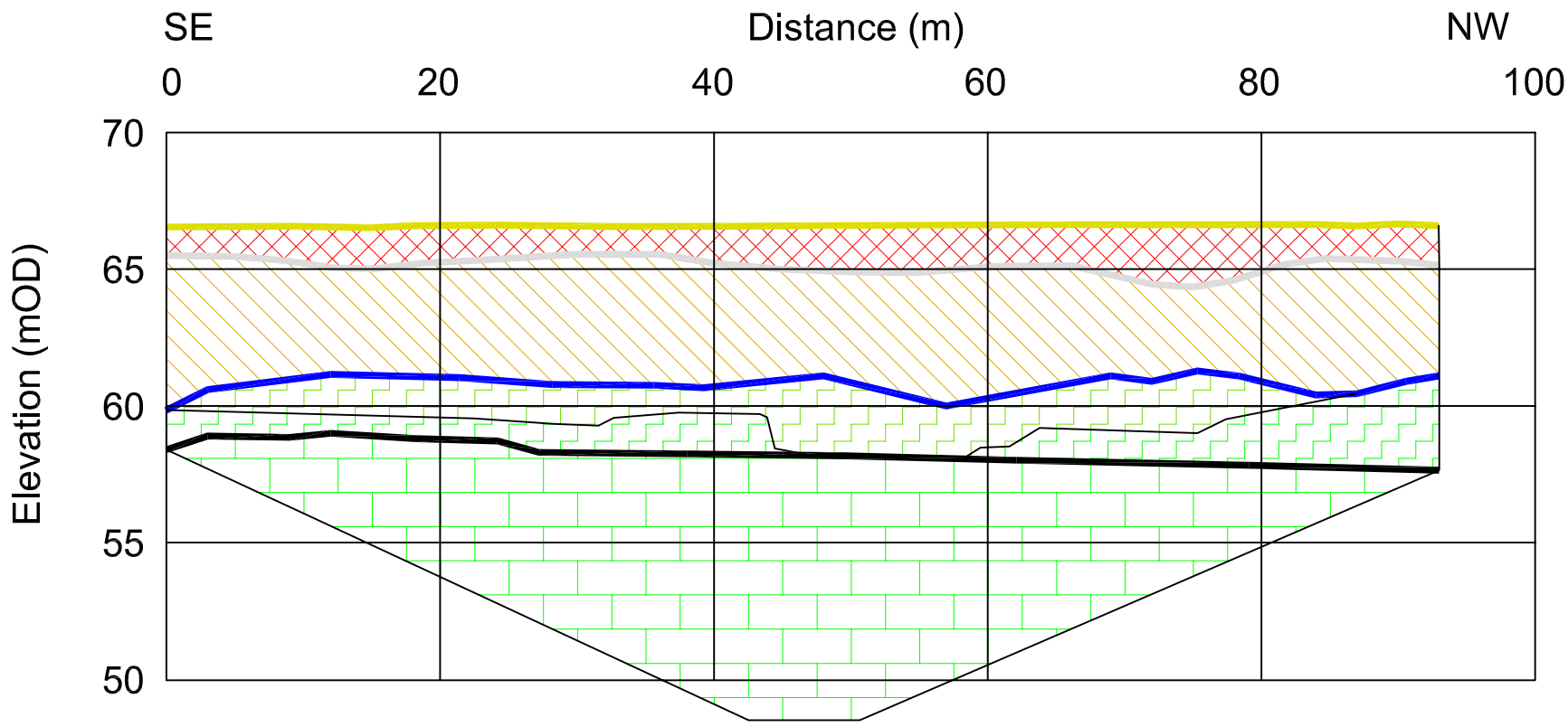
Resistivities (Ohmm) for 2D-Resistivity Model

31.3 62.5 125 250 500 1000 2000 4000

2D-Resistivity Prof. R70 and Seismic Refraction Prof. S70 Interpretation



2D-Resistivity Prof. R71 and Seismic Refraction Prof. S71 Interpretation



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CLIENT	Irish Drilling Ltd. Irish Water
PROJECT	Water Supply Project Geophysical Survey
TITLE	Figure 22b: Interpretation of of Geophysical Survey CH168300

SCALE:	1:500 @ A3, VE x 2
PROJECT:	6209
DRAWN:	JC
DATE:	19/07/2017
MGX FILE:	6209b_MapsFigs.dwg
STATUS:	Draft

LEGEND: Interpretation of Resistivities and Seismic Velocities:

- 1 Peat
- 2 Soft or loose Topsoil
- 3A Firm Clay
- 3B Firm sandy gravelly Clay or Silt
- 4A Stiff Clay
- 4B Stiff sandy gravelly Clay or Silt
- 4C Dense clayey silty Sand or Gravel
- 4D Dense Sand or Gravel
- 5A Very stiff Clay or poor very weathered Mudstone or Shale or infilled Limestone
- 5B Very stiff sandy gravelly Clay or Silt or poor very weathered Mudstone or Shale or infilled Limestone
- 5C Very dense clayey silty Sand or Gravel or poor very weathered Shale or Limestone
- 6A Fair weathered Mudstone or Shale or very infilled Limestone or hard Clay
- 6B Fair weathered Mudstone or Shale or very Infilled Limestone or very stiff sandy gravelly Clay or Silt
- 6C Fair weathered Shale or infilled Limestone or very dense clayey silty Sand or gravel
- 6D Fair weathered Shale or Limestone or very dense Sand or Gravel
- 7B Good Mudstone, Shale or very Infilled Limestone
- 7C Good Shale or infilled Limestone
- 7D Good Shale or Limestone
- 7E Good clean Limestone

IRISH DRILLING LTD. Loughrea Co. Galway Tel: (091) 841274 Fax: (091) 847687	Contract: **WSP, Midlands and Eastern Region** Date: 20/02/2018 Sheet No. Tested by: DOR Checked: RK

Water Levels in Standpipes

	Date							
Boreholes	**22/11/2018**		**11/12/2017**		**24/01/2018**	**25/01/2018**	**31/01/2018**	**Remarks**
BH 05	7.93m		7.89m				6.44m**	50mm standpipe
BH 45	0.90m		0.92m		0.46m**			50mm standpipe
BH 46	0.90m		0.90m		0.31m**			50mm standpipe
BH 49	0.16m		0.12m				0.10m**	50mm standpipe
BH 191	1.80m		1.75m			0.22m**		50mm standpipe
BH 192	1.80m		1.76m			0.56m**		50mm standpipe
BH 224	6.38m		6.40m		5.22m**			50mm standpipe
BH 225	4.73m		4.65m		4.06m**			50mm standpipe
BH 231	4.72m		4.66m		3.77m**			50mm standpipe

Remarks:

All readings record depth from ground level to top of water level.

****Readings taken prior to installation of data loggers.**

| | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH004	2.50		D	8	23/06/17	AQ32																																										04/10/2017	
BH004	3.00	3.50	B	10	23/06/17	AQ32					1																																					04/10/2017	02/01/2018
BH004	3.00	3.50	B	10							tested																																					15/01/2018	
BH004	3.50		D	11	23/06/17	AQ32																																										04/10/2017	
BH004	4.00	4.50	B	13	23/06/17	AQ32																																										04/10/2017	
BH004	4.50		D	14	23/06/17	AQ32																																										04/10/2017	
BH004	5.00	5.50	B	16	23/06/17	AQ32																																										04/10/2017	
BH004	5.50		D	17	23/06/17	AQ32																																										04/10/2017	
BH005	0.00	1.00	B	1	22/06/17	AQ32																																										04/10/2017	
BH005	1.00		D	2	22/06/17	AQ32																																										04/10/2017	
BH005	1.00	1.50	B	4	22/06/17	AQ32																																										04/10/2017	
BH005	1.50		D	5	22/06/17	AQ32																																										04/10/2017	
BH005	2.00	2.50	B	7	22/06/17	AQ32					1	1																																				04/10/2017	02/01/2018
BH005	2.00	2.50	B	7							tested	tested																																				15/01/2018	
BH005	2.50		D	8	22/06/17	AQ32																																										04/10/2017	
BH005	3.00	3.50	B	10	22/06/17	AQ32																																										04/10/2017	
BH005	3.50		D	11	22/06/17	AQ32																																										04/10/2017	
BH005	4.00	4.50	B	13	22/06/17	AQ32																																										04/10/2017	
BH005	4.50		D	14	22/06/17	AQ32																																										04/10/2017	
BH005	5.00	5.50	B	16	22/06/17	AQ32																																										04/10/2017	
BH005	5.50		D	17	22/06/17	AQ32																																										04/10/2017	
BH006	0.00	1.00	B	1	12/07/17	AQ42																																										04/10/2017	
BH006	1.00		D	2	12/07/17	AQ42																																										04/10/2017	
BH006	1.00	1.50	B	4	12/07/17	AQ42																																										04/10/2017	
BH006	1.50		D	5	12/07/17	AQ42																																										04/10/2017	
BH006	2.00	2.50	B	7	12/07/17	AQ42					1																																					04/10/2017	02/01/2018
BH006	2.00	2.50	B	7							tested																																					15/01/2018	
BH006	2.50		D	8	12/07/17	AQ42																																										04/10/2017	
BH006	3.00	3.50	B	10	12/07/17	AQ42																																										04/10/2017	
BH006	3.50		D	11	12/07/17	AQ42																																										04/10/2017	
BH007	0.00	1.00	B	1	26/06/17	AQ32																																										04/10/2017	
BH007	1.00		D	2	26/06/17	AQ32																																										04/10/2017	
BH007	1.00	1.50	B	4	26/06/17	AQ32																																										04/10/2017	
BH007	1.50		D	5	26/06/17	AQ32																																										04/10/2017	
BH007	2.00	2.50	B	7	26/06/17	AQ32					1																																					04/10/2017	02/01/2018
BH007	2.00	2.50	B	7							tested																																					15/01/2018	
BH007	2.50		D	8	26/06/17	AQ32																																										04/10/2017	
BH007	3.00	3.50	B	10	26/06/17	AQ32																																										04/10/2017	
BH007	3.50		D	11	26/06/17	AQ32																																										04/10/2017	
BH007	4.00	4.50	B	13	26/06/17	AQ32																																										04/10/2017	
BH007	4.50		D	14	26/06/17	AQ32																																										04/10/2017	
BH010	0.00	1.00	B	1	05/07/17	AQ35																																										07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH010	1.00		D	2	05/07/17	AQ35																																										07/11/2017	
BH010	1.00	1.50	B	4	05/07/17	AQ35																																										07/11/2017	
BH010	1.50		D	5	05/07/17	AQ35																																										07/11/2017	
BH010	1.50		D	5	05/07/17	AQ35																																										15/01/2018	
BH010	2.00	2.20	B	7	05/07/17	AQ35																																										07/11/2017	
BH010	2.00	2.20	B	7	05/07/17	AQ35																																										15/01/2018	
BH010	2.20		D	8	05/07/17	AQ35																																										07/11/2017	
BH011	0.00	1.00	B	1	16/08/17	AQ54																																										07/11/2017	
BH011	1.00		D	2	16/08/17	AQ54																																										07/11/2017	
BH011	1.00	1.50	B	4	16/08/17	AQ54																																										07/11/2017	
BH011	1.50		D	5	16/08/17	AQ54																																										07/11/2017	
BH011	2.00	2.50	B	7	16/08/17	AQ54																																										07/11/2017	
BH011	2.00	2.50	B	7	16/08/17	AQ54																																										15/01/2018	
BH011	2.50		D	8	16/08/17	AQ54																																										07/11/2017	
BH011	3.00	3.50	B	10	16/08/17	AQ54																																										07/11/2017	
BH011	3.00	3.50	B	10	16/08/17	AQ54																																										15/01/2018	
BH011	3.50		D	11	16/08/17	AQ54																																										07/11/2017	
BH012	0.00	1.00	B	1	24/10/17																																									1			15/01/2018	
BH012	0.00	1.00	B	1	24/10/17	AQ79																																												
BH012	1.00		D	2	24/10/17																																												15/01/2018	
BH012	1.00		D	2	24/10/17	AQ79																																												
BH014	0.00	1.00	B	1	28/08/17	AQ59																																											07/11/2017	
BH014	1.00		D	2	28/08/17	AQ59																																										07/11/2017	
BH014	1.00	1.50	B	4	28/08/17	AQ59																																										07/11/2017	
BH014	1.50		D	5	28/08/17	AQ59																																										07/11/2017	
BH014	2.00	2.50	B	7	28/08/17	AQ59					1																																					07/11/2017	02/01/2018
BH014	2.00	2.50	B	7	28/08/17	AQ59					tested																																					15/01/2018	
BH014	2.50		D	8	28/08/17	AQ59																																										07/11/2017	
BH015	0.00	1.00	B	1	25/08/17	AQ57																																										07/11/2017	
BH015	1.00		D	2	25/08/17	AQ57																																										07/11/2017	
BH015	1.00	1.50	B	4	25/08/17	AQ57																																										07/11/2017	
BH015	1.50		D	5	25/08/17	AQ57																																										07/11/2017	
BH015	2.00	2.50	B	7	25/08/17	AQ57																																										07/11/2017	
BH015	2.00	2.50	B	7	25/08/17	AQ57																																										15/01/2018	
BH015	2.50		D	8	25/08/17	AQ57																																										07/11/2017	
BH015	3.00	3.50	B	10	25/08/17	AQ57																																										07/11/2017	
BH015	3.00	3.50	B	10	25/08/17	AQ57																																										15/01/2018	
BH015	3.50		D	11	25/08/17	AQ57																																										07/11/2017	
BH015	4.00	4.50	B	13	25/08/17	AQ57																																										07/11/2017	
BH015	4.00	4.50	B	13	25/08/17	AQ57																																										15/01/2018	
BH015	4.50		D	14	25/08/17	AQ57																																										07/11/2017	

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Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility					Strength (Total)								Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter Test	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH020	1.00		D	2	08/08/17	AQ48																																											07/11/2017	
BH020	1.00	1.50	B	4	08/08/17	AQ48																																											07/11/2017	
BH020	1.50		D	5	08/08/17	AQ48																																											07/11/2017	
BH020	2.00	2.50	B	7	08/08/17	AQ48																																											07/11/2017	
BH020	2.00	2.50	B	7	08/08/17	AQ48																																											15/01/2018	
BH020	2.50		D	8	08/08/17	AQ48																																											07/11/2017	
BH020	3.00	3.50	B	10	08/08/17	AQ48																																											07/11/2017	
BH020	3.00	3.50	B	10	08/08/17	AQ48																																											15/01/2018	
BH020	3.50		D	11	08/08/17	AQ48																																											07/11/2017	
BH020	4.00	4.50	B	13	08/08/17	AQ48					1																																					07/11/2017	02/01/2018
BH020	4.00	4.50	B	13	08/08/17	AQ48					tested																																					15/01/2018	
BH020	4.50		D	14	08/08/17	AQ48																																											07/11/2017	
BH021	0.00	1.00	B	1	11/08/17	AQ48																																											07/11/2017	
BH021	1.00		D	2	11/08/17	AQ48																																											07/11/2017	
BH021	1.00	1.50	B	4	11/08/17	AQ48																																											07/11/2017	
BH021	1.50		D	5	11/08/17	AQ48																																											07/11/2017	
BH021	2.00	2.50	B	7	11/08/17	AQ48																																											07/11/2017	
BH021	2.00	2.50	B	7	11/08/17	AQ48																																											15/01/2018	
BH021	2.50		D	8	11/08/17	AQ48																																											07/11/2017	
BH021	3.00	3.50	B	10	11/08/17	AQ48																																											07/11/2017	
BH021	3.00	3.50	B	10	11/08/17	AQ48																																											15/01/2018	
BH021	3.50		D	11	11/08/17	AQ48																																											07/11/2017	
BH022	0.00	1.00	B	1	24/07/17	AQ44																																											07/11/2017	
BH022	1.00		D	2	24/07/17	AQ44																																											07/11/2017	
BH022	1.00	1.50	B	4	24/07/17	AQ44																																											07/11/2017	
BH022	1.50		D	5	24/07/17	AQ44																																											07/11/2017	
BH022	2.00	2.50	B	7	24/07/17	AQ44																																											07/11/2017	
BH022	2.00	2.50	B	7	24/07/17	AQ44																																											15/01/2018	
BH022	2.50		D	8	24/07/17	AQ44																																											07/11/2017	
BH022	3.00	3.50	B	10	24/07/17	AQ44					1																																					07/11/2017	02/01/2018
BH022	3.00	3.50	B	10	24/07/17	AQ44					tested																																					15/01/2018	
BH022	3.50		D	11	24/07/17	AQ44																																											07/11/2017	
BH022	4.00	4.50	B	13	24/07/17	AQ44																																											07/11/2017	
BH022	4.00	4.50	B	13	24/07/17	AQ44																																											15/01/2018	
BH022	4.50		D	14	24/07/17	AQ44																																												07/11/2017	
BH022	5.00	5.50	B	16	24/07/17	AQ44																																												07/11/2017	
BH022	5.00	5.50	B	16	24/07/17	AQ44																																												15/01/2018	
BH022	5.50		D	17	24/07/17	AQ44																																												07/11/2017	
BH022	6.50	7.00	B	19	24/07/17	AQ44																																												07/11/2017	
BH022	6.50	7.00	B	19	24/07/17	AQ44																																												15/01/2018	
BH022	7.00		D	20	24/07/17	AQ44																																												07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other										
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH023	0.00	1.00	B	1	24/07/17	AQ44																																										07/11/2017	
BH023	1.00		D	2	24/07/17	AQ44																																										07/11/2017	
BH023	1.00	1.50	B	4	24/07/17	AQ44																																										07/11/2017	
BH023	1.50		D	5	24/07/17	AQ44																																										07/11/2017	
BH023	2.00	2.50	B	7	24/07/17	AQ44																																										07/11/2017	
BH023	2.00	2.50	B	7	24/07/17	AQ44																																										15/01/2018	
BH023	2.50		D	8	24/07/17	AQ44																																										07/11/2017	
BH023	3.00	3.50	B	10	24/07/17	AQ44					1																																				07/11/2017	02/01/2018
BH023	3.00	3.50	B	10	24/07/17	AQ44					tested																																				15/01/2018	
BH023	3.50		D	11	24/07/17	AQ44																																										07/11/2017	
BH023	4.00	4.50	B	13	24/07/17	AQ44					1																																				07/11/2017	02/01/2018
BH023	4.00	4.50	B	13	24/07/17	AQ44					tested																																				15/01/2018	
BH023	4.50		D	14	24/07/17	AQ44																																										07/11/2017	
BH023	5.00	5.50	B	16	24/07/17	AQ44																																										07/11/2017	
BH023	5.00	5.50	B	16	24/07/17	AQ44																																										15/01/2018	
BH023	5.50		D	17	24/07/17	AQ44																																										07/11/2017	
BH024	0.00	1.00	B	1	25/07/17	AQ44																																										07/11/2017	
BH024	1.00		D	2	25/07/17	AQ44																																										07/11/2017	
BH024	1.00	1.50	B	4	25/07/17	AQ44																																										07/11/2017	
BH024	1.50		D	5	25/07/17	AQ44																																										07/11/2017	
BH024	2.00	2.50	B	7	25/07/17	AQ44																																										07/11/2017	
BH024	2.00	2.50	B	7	25/07/17	AQ44																																										15/01/2018	
BH024	2.50		D	8	25/07/17	AQ44																																										07/11/2017	
BH024	3.00	3.50	B	10	25/07/17	AQ44																																										07/11/2017	
BH024	3.00	3.50	B	10	25/07/17	AQ44																																										15/01/2018	
BH024	3.50		D	11	25/07/17	AQ44																																										07/11/2017	
BH025	0.00	1.00	B	1	02/08/17	AQ46																																										07/11/2017	
BH025	1.00		D	2	02/08/17	AQ46																																										07/11/2017	
BH025	1.00	1.50	B	4	02/08/17	AQ46																																										07/11/2017	
BH025	1.50		D	5	02/08/17	AQ46																																										07/11/2017	
BH025	2.00	2.50	B	7	02/08/17	AQ46																																										07/11/2017	
BH025	2.00	2.50	B	7	02/08/17	AQ46																																										15/01/2018	
BH025	2.50		D	8	02/08/17	AQ46																																										07/11/2017	
BH025	3.00	3.50	B	10	02/08/17	AQ46																																										07/11/2017	
BH025	3.00	3.50	B	10	02/08/17	AQ46																																										15/01/2018	
BH025	3.50		D	11	02/08/17	AQ46																																										07/11/2017	
BH027	0.00	1.00	B	1	16/10/17	AQ78																																										15/01/2018	
BH027	1.00		D	2	16/10/17	AQ78																																										15/01/2018	
BH027	1.00	1.50	B	4	16/10/17	AQ78																																										15/01/2018	
BH027	1.50		D	5	16/10/17	AQ78																																										15/01/2018	
BH027	2.00	2.50	B	7	16/10/17	AQ78					1																			1																1		15/01/2018	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | Compressibility | | | | Strength (Total) | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH031	4.50		D	14	12/10/17	AQ75																																										15/01/2018	
BH031	5.00	5.50	B	16	12/10/17	AQ75		1																						1																		15/01/2018	
BH031	5.50		D	17	12/10/17	AQ75																																										15/01/2018	
BH032	0.00	1.00	B	1	10/10/17	AQ75																																										15/01/2018	
BH032	1.00		D	2	10/10/17	AQ75																																										15/01/2018	
BH032	1.00	1.50	B	4	10/10/17	AQ75																																								1		15/01/2018	
BH032	1.50		D	5	10/10/17	AQ75																																										15/01/2018	
BH032	2.00	2.50	B	7	10/10/17	AQ75					1																			1																		15/01/2018	
BH032	2.50		D	8	10/10/17	AQ75																																										15/01/2018	
BH033	0.00	1.00	B	1	19/09/17	AQ77																																											
BH033	1.00		D	2	19/09/17	AQ77																																										
BH033	1.00	1.50	B	4	19/09/17	AQ77																																										
BH033	2.00		D	5	19/09/17	AQ77																																										
BH033	2.00	2.50	B	7	19/09/17	AQ77																																										
BH033	3.00		D	8	19/09/17	AQ77																																										
BH038	0.00	1.00	B	1	26/09/17	AQ66																																										
BH038	1.00		D	2	26/09/17	AQ66																																										
BH038	1.00	1.50	B	4	26/09/17	AQ66																																										
BH038	1.50		D	5	26/09/17	AQ66																																										
BH038	1.80		B	6	26/09/17	AQ66																																										
BH038	1.80		D	7	26/09/17	AQ66																																										
BH039	0.00	1.00	B	1	27/09/17	AQ66																																										
BH039	1.00		D	2	27/09/17	AQ66																																										
BH039	1.00	1.50	B	4	27/09/17	AQ66																																										
BH039	1.50		D	5	27/09/17	AQ66																																										
BH039	2.00	2.50	B	7	27/09/17	AQ66																																										
BH039	2.50		D	8	27/09/17	AQ66																																										
BH040	0.00	1.00	B	1	08/09/17	AQ62																																										07/11/2017	
BH040	1.00		D	2	08/09/17	AQ62																																										07/11/2017	
BH040	1.00	1.50	B	4	08/09/17	AQ62																																										07/11/2017	
BH040	1.50		D	5	08/09/17	AQ62																																										07/11/2017	
BH045	0.00	1.00	B	1	14/08/17	AQ54																																										07/11/2017	
BH045	1.00		D	2	14/08/17	AQ54																																										07/11/2017	
BH045	1.00	1.30	B	4	14/08/17	AQ54																																										07/11/2017	
BH045	1.30		D	5	14/08/17	AQ54																																										07/11/2017	
BH046	0.00	1.00	B	1	18/07/17	AQ42																																										04/10/2017	
BH046	1.00		D	2	18/07/17	AQ42																																										04/10/2017	
BH046	1.00	1.50	B	4	18/07/17	AQ42																																										04/10/2017	
BH046	1.50		D	5	18/07/17	AQ42																																										04/10/2017	
BH046	2.00	2.50	B	7	18/07/17	AQ42																																										04/10/2017	
BH046	2.50		D	8	18/07/17	AQ42																																										04/10/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other												
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH046	2.60		W	9	18/07/17	AQ42																																												04/10/2017	
BH046	3.00	3.50	B	10	18/07/17	AQ42					1																																							04/10/2017	02/01/2018
BH046	3.00	3.50	B	11	18/07/17	AQ42																																												04/10/2017	
BH046	3.50		D	12	18/07/17	AQ42																																												04/10/2017	
BH046	4.00	4.50	B	14	18/07/17	AQ42																																												04/10/2017	
BH046	4.50		D	15	18/07/17	AQ42																																												04/10/2017	
BH046	5.00	5.50	B	17	18/07/17	AQ42																																												04/10/2017	
BH046	5.50		D	18	18/07/17	AQ42																																												04/10/2017	
BH046	6.50	7.00	B	19	18/07/17	AQ42																																												04/10/2017	
BH046	7.00		D	20	18/07/17	AQ42																																												04/10/2017	
BH046	8.00	8.50	B	22	18/07/17	AQ42																																												04/10/2017	
BH046	8.50		D	23	18/07/17	AQ42																																												04/10/2017	
BH048	0.00	1.00	B	1	27/06/17	AQ32																																												04/10/2017	
BH048	1.00		D	2	27/06/17	AQ32																																												04/10/2017	
BH048	1.00	1.50	B	4	27/06/17	AQ32																																												04/10/2017	
BH048	1.50		D	5	27/06/17	AQ32																																												04/10/2017	
BH048	2.00	2.50	B	7	27/06/17	AQ32																																												04/10/2017	
BH048	2.50		D	8	27/06/17	AQ32																																												04/10/2017	
BH048	3.00	3.50	B	10	27/06/17	AQ32					1																																							04/10/2017	02/01/2018
BH048	3.00	3.50	B	10							tested																																							15/01/2018	
BH048	3.50		D	11	27/06/17	AQ32																																												04/10/2017	
BH048	4.00	4.50	B	13	27/06/17	AQ32																																												04/10/2017	
BH048	4.50		D	14	27/06/17	AQ32																																												04/10/2017	
BH048	5.00	5.50	B	16	27/06/17	AQ32																																												04/10/2017	
BH048	5.50		D	17	27/06/17	AQ32																																												04/10/2017	
BH048	6.50	7.00	B	19	27/06/17	AQ32																																												04/10/2017	
BH048	7.00		D	20	27/06/17	AQ32																																												04/10/2017	
BH048	8.00	8.50	B	22	27/06/17	AQ32																																												04/10/2017	
BH048	8.50		D	23	27/06/17	AQ32																																												04/10/2017	
BH049	0.00	1.00	B	1	22/06/17	AQ32																																												04/10/2017	
BH049	1.00		D	2	22/06/17	AQ32																																												04/10/2017	
BH049	1.00	1.50	B	4	22/06/17	AQ32																																												04/10/2017	
BH049	1.50		D	5	22/06/17	AQ32																																												04/10/2017	
BH049	2.00	2.50	B	7	22/06/17	AQ32					1																																							04/10/2017	02/01/2018
BH049	2.00	2.50	B	7							tested																																							15/01/2018	
BH049	2.50		D	8	22/06/17	AQ32																																												04/10/2017	
BH049	3.00	3.50	B	10	22/06/17	AQ32																																												04/10/2017	
BH049	3.50		D	11	22/06/17	AQ32																																												04/10/2017	
BH050	0.00	1.00	B	1	21/06/17	AQ32																																												04/10/2017	
BH050	1.00		D	2	21/06/17	AQ32																																												04/10/2017	
BH050	1.00	1.50	B	4	21/06/17	AQ32																																												04/10/2017	
BH050	1.50		D	5	21/06/17	AQ32																																												04/10/2017	
BH050	2.00	2.50	B	7	21/06/17	AQ32					1																																							04/10/2017	02/01/2018

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility					Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other															
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density														

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Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility					Strength (Total)								Shear Stregth (Effective Stress)			Rock		Other												
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH059	2.00	2.50	B	7							tested																																					15/01/2018	
BH059	2.50		D	8	19/06/17	AQ26																																											04/10/2017	
BH060	0.00	1.00	B	1	04/07/17	AQ35																																											04/10/2017	
BH060	1.00		D	2	04/07/17	AQ35																																											04/10/2017	
BH060	1.00	1.50	B	4	04/07/17	AQ35																																											04/10/2017	
BH060	1.50		D	5	04/07/17	AQ35																																											04/10/2017	
BH060	2.00	2.50	B	7	04/07/17	AQ35																																											04/10/2017	
BH060	2.50		D	8	04/07/17	AQ35																																											04/10/2017	
BH061	0.00	1.00	B	1	09/06/17	AQ25																																											04/10/2017	
BH061	1.00		D	2	09/06/17	AQ25																																											04/10/2017	
BH061	1.00	1.50	B	4	09/06/17	AQ25																																											04/10/2017	
BH061	1.50		D	5	09/06/17	AQ25																																											04/10/2017	
BH061	2.00	2.50	B	7	09/06/17	AQ25					1																																						04/10/2017	02/01/2018
BH061	2.00	2.50	B	7							tested																																						15/01/2018	
BH061	2.50		D	8	09/06/17	AQ25																																											04/10/2017	
BH061	3.00	3.50	B	10	09/06/17	AQ25																																											04/10/2017	
BH061	3.50		D	11	09/06/17	AQ25																																											04/10/2017	
BH061	4.00	4.50	B	13	09/06/17	AQ25																																											04/10/2017	
BH061	4.50		D	14	09/06/17	AQ25																																											04/10/2017	
BH061	5.00	5.50	B	16	09/06/17	AQ25																																											04/10/2017	
BH061	5.50		D	17	09/06/17	AQ25																																											04/10/2017	
BH067	0.00	1.00	B	1	15/08/17	AQ54																																											07/11/2017	
BH067	1.00		D	2	15/08/17	AQ54																																											07/11/2017	
BH067	1.00	1.50	B	4	15/08/17	AQ54																																											07/11/2017	
BH067	1.50		D	5	15/08/17	AQ54																																											07/11/2017	
BH067	2.00	2.50	B	7	15/08/17	AQ54																																											07/11/2017	
BH067	2.00	2.50	B	7	15/08/17	AQ54																																											15/01/2018	
BH067	2.50		D	8	15/08/17	AQ54																																											07/11/2017	
BH068	0.00	1.00	B	1	15/08/17	AQ54																																											07/11/2017	
BH068	1.00		D	2	15/08/17	AQ54																																											07/11/2017	
BH068	1.00	1.50	B	4	15/08/17	AQ54																																											07/11/2017	
BH068	1.50		D	5	15/08/17	AQ54																																											07/11/2017	
BH068	2.00	2.50	B	7	15/08/17	AQ54																																											07/11/2017	
BH068	2.00	2.50	B	7	15/08/17	AQ54																																											15/01/2018	
BH068	2.50		D	8	15/08/17	AQ54																																											07/11/2017	
BH068	3.00	3.50	B	10	15/08/17	AQ54																																											07/11/2017	
BH068	3.00	3.50	B	10	15/08/17	AQ54																																											15/01/2018	
BH068	3.50		D	11	15/08/17	AQ54																																											07/11/2017	
BH069	0.00	1.00	B	1	05/07/17	AQ35																																											07/11/2017	
BH069	1.00		D	2	05/07/17	AQ35																																											07/11/2017	
BH069	1.00	1.50	B	4	05/07/17	AQ35																																											07/11/2017	
BH069	1.50		D	5	05/07/17	AQ35																																											07/11/2017	

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Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other												
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuresuretes	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH082	4.50		D	15	17/08/17	AQ54																																											07/11/2017	
BH082	5.00	5.50	B	17	17/08/17	AQ54																																											07/11/2017	
BH082	5.00	5.50	B	17	17/08/17	AQ54																																											15/01/2018	
BH082	5.50		D	18	17/08/17	AQ54																																											07/11/2017	
BH083	0.00	1.00	B	1	22/08/17	AQ57																																											07/11/2017	
BH083	1.00		D	2	22/08/17	AQ57																																											07/11/2017	
BH083	1.00	1.50	B	4	22/08/17	AQ57																																											07/11/2017	
BH083	1.50		D	5	22/08/17	AQ57																																											07/11/2017	
BH083	2.00	2.50	B	7	22/08/17	AQ57					1																																						07/11/2017	02/01/2018
BH083	2.00	2.50	B	7	22/08/17	AQ57					tested																																						15/01/2018	
BH083	2.50		D	8	22/08/17	AQ57																																											07/11/2017	
BH083	3.00	3.50	B	10	22/08/17	AQ57																																											07/11/2017	
BH083	3.00	3.50	B	10	22/08/17	AQ57																																											15/01/2018	
BH083	3.50		D	11	22/08/17	AQ57																																											07/11/2017	
BH083	4.00	4.50	B	13	22/08/17	AQ57					1																																						07/11/2017	02/01/2018
BH083	4.00	4.50	B	13	22/08/17	AQ57					tested																																						15/01/2018	
BH083	4.50		D	14	22/08/17	AQ57																																											07/11/2017	
BH084	0.00	1.00	B	1	23/08/17	AQ57																																											07/11/2017	
BH084	1.00		D	2	23/08/17	AQ57																																											07/11/2017	
BH084	1.00	1.50	B	4	23/08/17	AQ57																																											07/11/2017	
BH084	1.50		D	5	23/08/17	AQ57																																											07/11/2017	
BH084	2.00	2.50	B	7	23/08/17	AQ57																																											07/11/2017	
BH084	2.00	2.50	B	7	23/08/17	AQ57																																											15/01/2018	
BH084	2.50		D	8	23/08/17	AQ57																																											07/11/2017	
BH084	3.00	3.50	B	10	23/08/17	AQ57																																											07/11/2017	
BH084	3.00	3.50	B	10	23/08/17	AQ57																																											15/01/2018	
BH084	3.50		D	11	23/08/17	AQ57																																											07/11/2017	
BH084	4.00	4.50	B	13	24/08/17	AQ57																																											07/11/2017	
BH084	4.00	4.50	B	13	24/08/17	AQ57																																											15/01/2018	
BH084	4.50		D	14	24/08/17	AQ57																																											07/11/2017	
BH085	0.00	1.00	B	1	24/08/17	AQ57																																											07/11/2017	
BH085	1.00		D	2	24/08/17	AQ57																																											07/11/2017	
BH085	1.00	1.50	B	4	24/08/17	AQ57																																											07/11/2017	
BH085	1.50		D	5	24/08/17	AQ57																																											07/11/2017	
BH086	0.00	1.00	B	1	28/08/17	AQ59																																											07/11/2017	
BH086	1.00		D	2	28/08/17	AQ59																																											07/11/2017	
BH086	1.00	1.50	B	4	28/08/17	AQ59																																											07/11/2017	
BH086	1.50		D	5	28/08/17	AQ59																																											07/11/2017	
BH086	2.00	2.50	B	7	28/08/17	AQ59																																											07/11/2017	
BH086	2.00	2.50	B	7	28/08/17	AQ59																																											15/01/2018	
BH086	2.50		D	8	28/08/17	AQ59																																											07/11/2017	
BH086	3.00	3.50	B	10	28/08/17	AQ59																																											07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility					Strength (Total)								Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH086	3.00	3.50	B	10	28/08/17	AQ59																																											15/01/2018	
BH086	3.50		D	11	28/08/17	AQ59																																											07/11/2017	
BH087	0.00	1.00	B	1	30/08/17	AQ59																																											07/11/2017	
BH087	1.00		D	2	30/08/17	AQ59																																											07/11/2017	
BH087	1.00	1.50	B	4	30/08/17	AQ59																																											07/11/2017	
BH087	1.50		D	5	30/08/17	AQ59																																											07/11/2017	
BH087	2.00	2.50	B	7	30/08/17	AQ59																																											07/11/2017	
BH087	2.00	2.50	B	7	30/08/17	AQ59																																											15/01/2018	
BH087	2.50		D	8	30/08/17	AQ59																																											07/11/2017	
BH087	3.00	3.50	B	10	30/08/17	AQ59																																											07/11/2017	
BH087	3.00	3.50	B	10	30/08/17	AQ59																																											15/01/2018	
BH087	3.50		D	11	30/08/17	AQ59																																											07/11/2017	
BH088	0.00	1.00	B	1	30/08/17	AQ59																																											07/11/2017	
BH088	1.00		D	2	30/08/17	AQ59																																											07/11/2017	
BH088	1.00	1.50	B	4	30/08/17	AQ59																																											07/11/2017	
BH088	1.50		D	5	30/08/17	AQ59																																											07/11/2017	
BH089	0.00	1.00	B	1	29/08/17	AQ59																																											07/11/2017	
BH089	1.00		D	2	29/08/17	AQ59																																											07/11/2017	
BH089	1.00	1.30	B	4	29/08/17	AQ59																																											07/11/2017	
BH089	1.30		D	5	29/08/17	AQ59																																											07/11/2017	
BH090	0.00	1.00	B	1	29/08/17	AQ59																																											07/11/2017	
BH090	1.00		D	2	29/08/17	AQ59																																											07/11/2017	
BH090	1.00	1.50	B	4	29/08/17	AQ59																																											07/11/2017	
BH090	1.50		D	5	29/08/17	AQ59																																											07/11/2017	
BH091	0.00	1.00	B	1	30/08/17	AQ59																																											07/11/2017	
BH091	1.00		D	2	30/08/17	AQ59																																											07/11/2017	
BH091	1.00	1.50	B	4	30/08/17	AQ59																																											07/11/2017	
BH091	1.50		D	5	30/08/17	AQ59																																											07/11/2017	
BH092	0.00	1.00	B	1	01/09/17	AQ59																																											07/11/2017	
BH092	1.00		D	2	01/09/17	AQ59																																											07/11/2017	
BH092	1.00	1.50	B	4	01/09/17	AQ59																																											07/11/2017	
BH092	1.50		D	5	01/09/17	AQ59																																											07/11/2017	
BH092	2.00	2.50	B	7	01/09/17	AQ59																																											15/01/2018	
BH092	2.50		D	8	01/09/17	AQ59																																											07/11/2017	
BH092	3.00	3.50	B	10	01/09/17	AQ59																																											15/01/2018	
BH092	3.50		D	11	01/09/17	AQ59																																											07/11/2017	
BH092	4.00	4.50	B	13	01/09/17	AQ59																																											15/01/2018	
BH092	4.50		D	14	01/09/17	AQ59																																											07/11/2017	
BH092	5.00	5.50	B	16	01/09/17	AQ59																																											15/01/2018	
BH092	5.50		D	17	01/09/17	AQ59																																											07/11/2017	
BH092	6.00	6.50	B	19	01/09/17	AQ59																																											15/01/2018	
BH092	6.50		D	20	01/09/17	AQ59																																											07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility					Strength (Total)								Shear Stregth (Effective Stress)			Rock		Other																
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuresure	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH093	0.00	1.00	B	1	05/09/17	AQ62																																												07/11/2017	
BH093	1.00		D	2	05/09/17	AQ62																																												07/11/2017	
BH093	1.00	1.50	B	4	05/09/17	AQ62																																												07/11/2017	
BH093	1.50		D	5	05/09/17	AQ62																																												07/11/2017	
BH093	2.00	2.50	B	7	05/09/17	AQ62																																												15/01/2018	
BH093	2.50		D	8	05/09/17	AQ62																																												07/11/2017	
BH093	3.00	3.50	B	10	05/09/17	AQ62																																												15/01/2018	
BH093	3.50		D	11	05/09/17	AQ62																																												07/11/2017	
BH093	4.00	4.50	B	13	05/09/17	AQ62																																												15/01/2018	
BH093	4.50		D	14	05/09/17	AQ62																																												07/11/2017	
BH095	0.00	1.00	B	1	31/08/17	AQ59																																												07/11/2017	
BH095	1.00		D	2	31/08/17	AQ59																																												07/11/2017	
BH095	1.00	1.50	B	4	31/08/17	AQ59																																												07/11/2017	
BH095	1.50		D	5	31/08/17	AQ59																																												07/11/2017	
BH095	2.00	2.50	B	7	31/08/17	AQ59																																												15/01/2018	
BH095	2.50		D	8	31/08/17	AQ59																																												07/11/2017	
BH095	3.00	3.50	B	10	31/08/17	AQ59																																												15/01/2018	
BH095	3.50		D	11	31/08/17	AQ59																																												07/11/2017	
BH096	0.00	1.00	B	1	04/09/17	AQ62																																												07/11/2017	
BH096	1.00		D	2	04/09/17	AQ62																																												07/11/2017	
BH096	1.00	1.50	B	4	04/09/17	AQ62																																												07/11/2017	
BH096	1.50		D	5	04/09/17	AQ62																																												07/11/2017	
BH097	0.00	1.00	B	1	20/10/17	AQ78																																												15/01/2018	
BH097	1.00		D	2	20/10/17	AQ78																																												15/01/2018	
BH097	1.00	1.50	B	4	20/10/17	AQ78																																												15/01/2018	
BH097	1.50		D	5	20/10/17	AQ78																																												15/01/2018	
BH098	0.00	1.00	B	1	20/10/17	AQ78																																												15/01/2018	
BH098	1.00		D	2	20/10/17	AQ78																																												15/01/2018	
BH098	1.00	1.50	B	4	20/10/17	AQ78																																										1		15/01/2018	
BH098	1.50		D	5	20/10/17	AQ78																																												15/01/2018	
BH100	0.00	1.00	B	1	06/09/17	AQ62																																												07/11/2017	
BH100	1.00		D	2	06/09/17	AQ62																																												07/11/2017	
BH100	1.00	1.50	B	4	06/09/17	AQ62																																												07/11/2017	
BH100	1.50		D	5	06/09/17	AQ62																																												07/11/2017	
BH100	2.00	2.50	B	7	06/09/17	AQ62																																												15/01/2018	
BH100	2.50		D	8	06/09/17	AQ62																																												07/11/2017	
BH100	3.00	3.50	B	10	06/09/17	AQ62					1																																						07/11/2017	02/01/2018
BH100	3.00	3.50	B	10	06/09/17	AQ62					tested																																						15/01/2018	
BH100	3.50		D	11	06/09/17	AQ62																																												07/11/2017	
BH100	4.00	4.50	B	13	06/09/17	AQ62																																												15/01/2018	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other										
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter Test	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH100	4.50		D	14	06/09/17	AQ62																																										07/11/2017	
BH100	5.00	5.50	B	16	06/09/17	AQ62																																										15/01/2018	
BH100	5.50		D	17	06/09/17	AQ62																																									07/11/2017	
BH100	6.00	6.50	B	19	06/09/17	AQ62																																									15/01/2018	
BH100	6.50		D	20	06/09/17	AQ62																																									07/11/2017	
BH103	0.00	1.00	B	1	09/08/17	AQ48																																									07/11/2017	
BH103	1.00		D	2	09/08/17	AQ48																																									07/11/2017	
BH103	1.00	1.50	B	4	09/08/17	AQ48																																									07/11/2017	
BH103	1.50		D	5	09/08/17	AQ48																																									07/11/2017	
BH103	2.00	2.50	B	7	09/08/17	AQ48																																									07/11/2017	
BH103	2.00	2.50	B	7	09/08/17	AQ48																																									15/01/2018	
BH103	2.50		D	8	09/08/17	AQ48																																									07/11/2017	
BH103	3.00	3.30	B	10	09/08/17	AQ48																																									15/01/2018	
BH103	3.30		D	11	09/08/17	AQ48																																									07/11/2017	
BH104	0.00	1.00	B	1	09/08/17	AQ48																																									07/11/2017	
BH104	1.00		D	2	09/08/17	AQ48																																									07/11/2017	
BH104	1.00	1.50	B	4	09/08/17	AQ48																																									07/11/2017	
BH104	1.50		D	5	09/08/17	AQ48																																									07/11/2017	
BH104	2.00	2.50	B	7	09/08/17	AQ48																																									07/11/2017	
BH104	2.00	2.50	B	7	09/08/17	AQ48																																									15/01/2018	
BH104	2.50		D	8	09/08/17	AQ48																																									07/11/2017	
BH105	0.00	1.00	B	1	04/08/17	AQ48																																									07/11/2017	
BH105	1.00		D	2	04/08/17	AQ48																																									07/11/2017	
BH105	1.00	1.50	B	4	04/08/17	AQ48																																									07/11/2017	
BH105	1.50		D	5	04/08/17	AQ48																																									07/11/2017	
BH105	2.00	2.50	B	7	04/08/17	AQ48																																									15/01/2018	
BH105	2.50		D	8	08/08/17	AQ48																																									07/11/2017	
BH106	0.00	1.00	B	1	08/08/17	AQ48																																									07/11/2017	
BH106	1.00		D	2	08/08/17	AQ48																																									07/11/2017	
BH106	1.00	1.50	B	4	08/08/17	AQ48																																									07/11/2017	
BH106	1.50		D	5	08/08/17	AQ48																																									07/11/2017	
BH107	0.00	1.00	B	1	04/08/17	AQ46																																									07/11/2017	
BH107	1.00		D	2	04/08/17	AQ46																																									07/11/2017	
BH107	1.00	1.50	B	4	04/08/17	AQ46																																									07/11/2017	
BH107	1.50		D	5	04/08/17	AQ46																																									07/11/2017	
BH107	2.00	2.50	B	7	04/08/17	AQ46																																									15/01/2018	
BH107	2.50		D	8	04/08/17	AQ46																																									07/11/2017	
BH107	3.00	3.50	B	10	04/08/17	AQ46																																									15/01/2018	
BH107	3.50		D	11	04/08/17	AQ46																																									07/11/2017	
BH107	4.00	4.50	B	13	04/08/17	AQ46																																									07/11/2017	
BH107	4.00	4.50	B	13	04/08/17	AQ46																																									15/01/2018	

Project ID	2017T101	Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands	Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5	Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuresuretes	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH107	4.50		D	14	04/08/17	AQ46																																											07/11/2017	
BH110	0.00	1.00	B	1	03/08/17	AQ46																																											07/11/2017	
BH110	1.00		D	2	03/08/17	AQ46																																											07/11/2017	
BH110	1.00	1.50	B	4	03/08/17	AQ46																																											07/11/2017	
BH110	1.50		D	5	03/08/17	AQ46																																											07/11/2017	
BH110	2.00	2.50	B	7	03/08/17	AQ46					1																																					07/11/2017	02/01/2018
BH110	2.00	2.50	B	7	03/08/17	AQ46					tested																																					15/01/2018	
BH110	2.50		D	8	03/08/17	AQ46																																											07/11/2017	
BH110	3.00	3.50	B	10	03/08/17	AQ46																																											15/01/2018	
BH110	3.50		D	11	03/08/17	AQ46																																											07/11/2017	
BH110	4.00	4.50	B	13	03/08/17	AQ46																																											15/01/2018	
BH110	4.50		D	14	03/08/17	AQ46																																											07/11/2017	
BH110	5.00	5.50	B	16	03/08/17	AQ46																																											15/01/2018	
BH110	5.50		D	17	03/08/17	AQ46																																											07/11/2017	
BH110	6.50	7.00	B	19	03/08/17	AQ46																																											15/01/2018	
BH110	7.00		D	20	03/08/17	AQ46																																											07/11/2017	
BH110	8.00	8.50	B	22	03/08/17	AQ46																																											15/01/2018	
BH110	8.50		D	23	03/08/17	AQ46																																											07/11/2017	
BH110	9.50	10.00	B	25	03/08/17	AQ46																																											15/01/2018	
BH110	10.00		D	26	03/08/17	AQ46																																											07/11/2017	
BH111	0.00	1.00	B	1	02/08/17	AQ46																																											07/11/2017	
BH111	1.00		D	2	02/08/17	AQ46																																											07/11/2017	
BH111	1.00	1.50	B	4	02/08/17	AQ46																																											07/11/2017	
BH111	1.50		D	5	02/08/17	AQ46																																											07/11/2017	
BH117	0.00	1.00	B	1	25/07/17	AQ44																																											07/11/2017	
BH117	1.00		D	2	25/07/17	AQ44																																											07/11/2017	
BH117	1.00	1.50	B	4	25/07/17	AQ44																																											07/11/2017	
BH117	1.50		D	5	25/07/17	AQ44																																											07/11/2017	
BH117	2.00	2.50	B	7	25/07/17	AQ44																																											15/01/2018	
BH117	2.50		D	8	25/07/17	AQ44																																											07/11/2017	
BH117	3.00	3.50	B	10	25/07/17	AQ44																																											15/01/2018	
BH117	3.50		D	11	25/07/17	AQ44																																											07/11/2017	
BH117	4.00	4.50	B	13	25/07/17	AQ44																																											15/01/2018	
BH117	4.50		D	14	25/07/17	AQ44																																											07/11/2017	
BH118	0.00	1.00	B	1	26/07/17	AQ44																																											07/11/2017	
BH118	1.00		D	2	26/07/17	AQ44																																											07/11/2017	
BH118	1.00	1.50	B	4	26/07/17	AQ44																																											07/11/2017	
BH118	1.50		D	5	26/07/17	AQ44																																											07/11/2017	
BH118	2.00	2.50	B	7	26/07/17	AQ44																																											15/01/2018	
BH118	2.50		D	8	26/07/17	AQ44																																											07/11/2017	
BH118	3.00	3.50	B	10	26/07/17	AQ44																																											15/01/2018	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other										
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH118	3.50		D	11	26/07/17	AQ44																																										07/11/2017	
BH119	0.00	1.00	B	1	25/07/17	AQ44																																										07/11/2017	
BH119	1.00		D	2	25/07/17	AQ44																																										07/11/2017	
BH119	1.00	1.50	B	4	25/07/17	AQ44																																										07/11/2017	
BH119	1.50		D	5	25/07/17	AQ44																																										07/11/2017	
BH119	2.00	2.50	B	7	25/07/17	AQ44					1																																					07/11/2017	02/01/2018
BH119	2.00	2.50	B	7	25/07/17	AQ44					tested																																					15/01/2018	
BH119	2.50		D	8	25/07/17	AQ44																																										07/11/2017	
BH119	3.00	3.50	B	10	25/07/17	AQ44					1																																					07/11/2017	02/01/2018
BH119	3.00	3.50	B	10	25/07/17	AQ44					tested																																					15/01/2018	
BH119	3.50		D	11	25/07/17	AQ44																																										07/11/2017	
BH120	0.00	1.00	B	1	14/08/17	AQ54																																										07/11/2017	
BH120	1.00		D	2	14/08/17	AQ54																																										07/11/2017	
BH120	1.00	1.50	B	4	14/08/17	AQ54																																										07/11/2017	
BH120	1.50		D	5	14/08/17	AQ54																																										07/11/2017	
BH121	0.00	1.00	B	1	19/07/17	AQ42																																										07/11/2017	
BH121	1.00		D	2	19/07/17	AQ42																																										07/11/2017	
BH121	1.00	1.50	B	4	19/07/17	AQ42																																										07/11/2017	
BH121	1.50		D	5	19/07/17	AQ42																																										07/11/2017	
BH121	2.00	2.50	B	7	19/07/17	AQ42																																										07/11/2017	
BH121	2.00	2.50	B	7	19/07/17	AQ42																																										15/01/2018	
BH121	2.50		D	8	19/07/17	AQ42																																										07/11/2017	
BH121	3.00	3.50	B	10	19/07/17	AQ42					1																																					07/11/2017	02/01/2018
BH121	3.00	3.50	B	10	19/07/17	AQ42					tested																																					15/01/2018	
BH121	3.50		D	11	19/07/17	AQ42																																										07/11/2017	
BH121	4.00	4.50	B	13	19/07/17	AQ42					1																																					07/11/2017	02/01/2018
BH121	4.00	4.50	B	13	19/07/17	AQ42					tested																																					15/01/2018	
BH121	4.50		D	14	19/07/17	AQ42																																										07/11/2017	
BH121	5.00	5.50	B	16	19/07/17	AQ42																																										07/11/2017	
BH121	5.00	5.50	B	16	19/07/17	AQ42																																										15/01/2018	
BH121	5.50		D	17	19/07/17	AQ42																																										07/11/2017	
BH121	6.50	7.00	B	19	19/07/17	AQ42																																										07/11/2017	
BH121	6.50	7.00	B	19	19/07/17	AQ42																																										15/01/2018	
BH121	7.00		D	20	19/07/17	AQ42																																										07/11/2017	
BH121	7.00		W	21	19/07/17	AQ42																																										07/11/2017	
BH121	8.00	8.50	B	23	19/07/17	AQ42																																										07/11/2017	
BH121	8.00	8.50	B	23	19/07/17	AQ42																																										15/01/2018	
BH121	8.50		D	24	19/07/17	AQ42																																										07/11/2017	
BH122	0.00	1.00	B	1	19/07/17	AQ42																																										07/11/2017	
BH122	1.00		D	2	19/07/17	AQ42																																										07/11/2017	
BH122	1.00	1.50	B	4	19/07/17	AQ42																																										07/11/2017	
BH122	1.50		D	5	19/07/17	AQ42																																										07/11/2017	

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Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other										
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH122	2.00	2.50	B	7	19/07/17	AQ42																																									07/11/2017	
BH122	2.00	2.50	B	7	19/07/17	AQ42																																									15/01/2018	
BH122	2.50		D	8	19/07/17	AQ42																																									07/11/2017	
BH122	3.00	3.50	B	10	19/07/17	AQ42																																									15/01/2018	
BH122	3.50		D	11	19/07/17	AQ42																																									07/11/2017	
BH122	4.00	4.50	B	13	19/07/17	AQ42																																									15/01/2018	
BH122	4.50		D	14	19/07/17	AQ42																																									07/11/2017	
BH122	5.00		W	15	19/07/17	AQ42																																									07/11/2017	
BH122	5.00	5.50	B	17	19/07/17	AQ42																																									15/01/2018	
BH122	5.50		D	18	19/07/17	AQ42																																									07/11/2017	
BH122	6.50	7.00	B	20	19/07/17	AQ42																																									15/01/2018	
BH122	7.00		D	21	19/07/17	AQ42																																									07/11/2017	
BH123	0.00	1.00	B	1	19/10/17	AQ78																																									15/01/2018	
BH123	1.00		D	2	19/10/17	AQ78																																									15/01/2018	
BH123	1.00	1.50	B	4	19/10/17	AQ78																																									15/01/2018	
BH123	1.50		D	5	19/10/17	AQ78																																									15/01/2018	
BH123	2.00	2.50	B	7	19/10/17	AQ78					1																			1																	15/01/2018	
BH123	2.50		D	8	19/10/17	AQ78																																									15/01/2018	
BH123	3.00	3.50	B	10	19/10/17	AQ78					1																			1																	15/01/2018	
BH123	3.50		D	11	19/10/17	AQ78																																									15/01/2018	
BH123	4.00	4.50	B	13	19/10/17	AQ78		1																						1																	15/01/2018	
BH123	4.50		D	14	19/10/17	AQ78																																									15/01/2018	
BH123	5.00	5.50	B	16	19/10/17	AQ78	1				1																			1																	15/01/2018	
BH123	5.50		D	17	19/10/17	AQ78																																									15/01/2018	
BH123	6.00	6.50	B	19	19/10/17	AQ78					1																			1																	15/01/2018	
BH123	6.50		D	20	19/10/17	AQ78																																									15/01/2018	
BH124	0.00	1.00	B	1	01/08/17	AQ46																																									07/11/2017	
BH124	1.00		D	2	01/08/17	AQ46																																									07/11/2017	
BH124	1.00	1.50	B	4	01/08/17	AQ46																																									07/11/2017	
BH124	1.50		D	5	01/08/17	AQ46																																									07/11/2017	
BH124	2.00	2.50	B	7	01/08/17	AQ46																																									15/01/2018	
BH124	2.50		D	8	01/08/17	AQ46																																									07/11/2017	
BH124	3.00	3.50	B	10	01/08/17	AQ46																																									15/01/2018	
BH124	3.50		D	11	01/08/17	AQ46																																									07/11/2017	
BH124	4.00	4.50	B	13	01/08/17	AQ46																																									15/01/2018	
BH124	4.50		D	14	01/08/17	AQ46																																									07/11/2017	
BH124	5.00	5.50	B	16	01/08/17	AQ46																																									15/01/2018	
BH124	5.50		D	17	01/08/17	AQ46																																									07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | | Compressibility | | | | Strength (Total) | | | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH159	3.00		D	8	06/10/17	AQ72																																											15/01/2018	
BH159	3.00	3.50	B	10	06/10/17	AQ72					1																			1																			15/01/2018	
BH159	3.50		D	11	06/10/17	AQ72																																											15/01/2018	
BH159	4.00		B	13	06/10/17	AQ72																																											15/01/2018	
BH159	4.50		D	14	06/10/17	AQ72																																											15/01/2018	
BH159	5.00		B	16	06/10/17	AQ72																																									1			15/01/2018	
BH159	5.50		D	17	06/10/17	AQ72																																											15/01/2018	
BH160	0.00	1.00	B	1	05/10/17	AQ72																																											15/01/2018	
BH160	1.00		D	2	05/10/17	AQ72																																											15/01/2018	
BH160	1.00	1.50	B	4	05/10/17	AQ72																																											15/01/2018	
BH160	1.50		D	5	05/10/17	AQ72																																											15/01/2018	
BH160	2.00	2.50	B	7	05/10/17	AQ72					1																			1																			15/01/2018	
BH160	3.00		D	8	05/10/17	AQ72																																											15/01/2018	
BH160	3.00	3.50	B	10	05/10/17	AQ72	1	1																						1																			15/01/2018	
BH160	3.50		D	11	05/10/17	AQ72																																											15/01/2018	
BH162	0.00	1.00	B	1	05/10/17	AQ72																																											15/01/2018	
BH162	1.00		D	2	05/10/17	AQ72																																											15/01/2018	
BH162	1.00	1.50	B	4	05/10/17	AQ72																																									1			15/01/2018	
BH162	1.50		D	5	05/10/17	AQ72																																											15/01/2018	
BH162	2.00	2.50	B	7	05/10/17	AQ72					1																			1																			15/01/2018	
BH162	2.50		D	8	05/10/17	AQ72																																											15/01/2018	
BH169	0.00	1.00	B	1	28/09/17	AQ72																																												
BH169	1.00		D	2	28/09/17	AQ72																																											
BH172	0.00	1.00	B	1	29/06/17	AQ33																																											04/10/2017	
BH172	1.00		D	2	29/06/17	AQ33																																											04/10/2017	
BH172	1.00	1.50	B	4	29/06/17	AQ33																																											04/10/2017	
BH172	1.50		D	5	29/06/17	AQ33																																											04/10/2017	
BH172	2.00	2.50	B	7	29/06/17	AQ33		1			1							1								1																					als 171212-78	04/10/2017	02/01/2018
BH172	2.00	2.50	B	7			tested				tested						tested							tested																						15/01/2018	
BH172	2.50		D	8	29/06/17	AQ33																																										04/10/2017	
BH172	3.00	3.50	B	10	29/06/17	AQ33		1										1								1																					als 171212-78	04/10/2017	02/01/2018
BH172	3.00	3.50	B	10			tested										tested							tested																						15/01/2018	
BH172	3.50		D	11	29/06/17	AQ33																																										04/10/2017	
BH172	4.00	4.50	B	13	29/06/17	AQ33		1			1																																					04/10/2017	02/01/2018
BH172	4.00	4.50	B	13			tested				tested																																					15/01/2018	
BH172	4.50		D	14	29/06/17	AQ33																																										04/10/2017	
BH172	5.00	5.50	B	16	29/06/17	AQ33																																										04/10/2017	
BH172	5.50		D	17	29/06/17	AQ33																																										04/10/2017	

Project ID	2017T101		Client	Irish Water	Remarks		Turnaround	
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54				
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55				

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH172	6.50	7.00	B	19	29/06/17	AQ33																																											04/10/2017	
BH172	7.00		D	20	29/06/17	AQ33																																												04/10/2017	
BH172	8.00	8.50	B	22	29/06/17	AQ33																																												04/10/2017	
BH172	8.50		D	23	29/06/17	AQ33																																												04/10/2017	
BH172	10.00	10.50	B	25	29/06/17	AQ33																																												04/10/2017	
BH172	10.00		D	26	29/06/17	AQ33																																												04/10/2017	
BH172	11.00	11.50	B	28	29/06/17	AQ33																																												04/10/2017	
BH172	11.50		D	29	29/06/17	AQ33																																												04/10/2017	
BH172	12.50	13.00	B	31	29/06/17	AQ33																																												04/10/2017	
BH172	13.00		D	32	29/06/17	AQ33																																												04/10/2017	
BH172	14.00	14.50	B	34	29/06/17	AQ33																																												04/10/2017	
BH172	14.50		D	35	29/06/17	AQ33																																												04/10/2017	
BH172	15.50	16.00	B	37	29/06/17	AQ33																																												04/10/2017	
BH172	16.00		D	38	29/06/17	AQ33																																												04/10/2017	
BH173	0.00	1.00	B	1	30/06/17	AQ33		1			1	1																																						04/10/2017	02/01/2018
BH173	0.00	1.00	B	1				tested			tested	ested																																						15/01/2018	
BH173	1.00		D	2	30/06/17	AQ33																																												04/10/2017	
BH173	1.00	1.50	B	4	30/06/17	AQ33		1																																										04/10/2017	02/01/2018
BH173	1.00	1.50	B	4				tested																																										15/01/2018	
BH173	1.50		D	5	30/06/17	AQ33					1																																							04/10/2017	02/01/2018
BH173	1.50		D	5							tested																																							15/01/2018	
BH173	2.00	2.50	B	7	30/06/17	AQ33	1				1							1							1																								als 171212-78	04/10/2017	02/01/2018
BH173	2.00	2.50	B	7			tested				tested							tested							tested																									15/01/2018	
BH173	2.50		D	8	30/06/17	AQ33																																												04/10/2017	
BH173	2.50		D	8																																													15/01/2018	
BH173	3.00	3.50	B	10	30/06/17	AQ33					1							1							1																								als 171212-78	04/10/2017	02/01/2018
BH173	3.00	3.50	B	10							tested							tested							tested																									15/01/2018	
BH173	3.50		D	11	30/06/17	AQ33																																												04/10/2017	
BH173	4.00	4.50	B	13	30/06/17	AQ33																																												04/10/2017	
BH173	4.50		D	14	30/06/17	AQ33																																												04/10/2017	
BH173	5.00	5.50	B	16	30/06/17	AQ33					1																																							04/10/2017	02/01/2018
BH173	5.00	5.50	B	16							tested																																							15/01/2018	
BH173	5.50		D	17	30/06/17	AQ33																																												04/10/2017	
BH173	6.50	7.00	B	19	30/06/17	AQ33																																												04/10/2017	
BH173	7.00		D	20	30/06/17	AQ33																																												04/10/2017	
BH173	8.00	8.50	B	22	30/06/17	AQ33					1																																							04/10/2017	02/01/2018
BH173	8.00	8.50	B	22							tested																																							15/01/2018	
BH173	8.50		D	23	30/06/17	AQ33																																												04/10/2017	
BH178	0.00	1.00	B	1	16/08/17	AQ54																																												07/11/2017	
BH178	1.00		D	2	16/08/17	AQ54																																												07/11/2017	
BH178	1.00	1.50	B	4	16/08/17	AQ54																																												07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | Compressibility | | | | | Strength (Total) | | | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

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Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | | Compressibility | | | | | Strength (Total) | | | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | Compressibility | | | | Strength (Total) | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | Compressibility | | | | | Strength (Total) | | | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | Compressibility | | | | | Strength (Total) | | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | |

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other													
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH221	3.50		D	11	02/10/17	AQ77																																										15/01/2018	
BH221	4.00	4.50	B	13	02/10/17	AQ77	1	1																					1								1										NMTL 5.2.18	15/01/2018	
BH221	4.50		D	14	02/10/17	AQ77																										1															NMTL 5.2.18	15/01/2018	
BH222	0.00	1.00	B	1	25/09/17	AQ66																																										
BH222	1.00		D	2	25/09/17	AQ66																																									
BH222	1.00	1.50	B	4	25/09/17	AQ66																																									
BH222	1.50		D	5	25/09/17	AQ66																																									
BH222	2.00	2.50	B	7	25/09/17	AQ66																																									
BH222	2.50		D	8	25/09/17	AQ66																																									
BH222	3.00	3.50	B	10	25/09/17	AQ66																																									
BH222	3.50		D	11	25/09/17	AQ66																																									
BH222	3.80		B	12	25/09/17	AQ66																																									
BH222	3.80		D	13	25/09/17	AQ66																																									
BH223	0.00	1.00	B	1	03/10/17	AQ77																																								1			15/01/2018	
BH223	1.00		D	2	03/10/17	AQ77																																											15/01/2018	
BH223	1.00	1.50	B	4	03/10/17	AQ77																																								1			15/01/2018	
BH223	1.50		D	5	03/10/17	AQ77																																											15/01/2018	
BH223	2.00	2.50	B	7	03/10/17	AQ77					1	1																	1																			15/01/2018	
BH223	2.50		D	8	03/10/17	AQ77																																											15/01/2018	
BH224	0.00	1.00	B	1	18/07/17	AQ42																																											04/10/2017	
BH224	1.00		D	2	18/07/17	AQ42																																											04/10/2017	
BH224	1.00	1.50	B	4	18/07/17	AQ42																																											04/10/2017	
BH224	1.50		D	5	18/07/17	AQ42																																											04/10/2017	
BH224	2.00	2.50	B	7	18/07/17	AQ42	1				1	1																																					04/10/2017	02/01/2018
BH224	2.50		D	8	18/07/17	AQ42																																											04/10/2017	
BH224	3.00	3.40	B	10	18/07/17	AQ42					1																																						04/10/2017	02/01/2018
BH224	3.40		D	11	18/07/17	AQ42																																											04/10/2017	
BH224	4.00	4.50	B	13	18/07/17	AQ42																																											04/10/2017	
BH224	4.50		D	14	18/07/17	AQ42																																											04/10/2017	
BH224	5.00	5.50	B	16	18/07/17	AQ42																																											04/10/2017	
BH224	5.50		D	17	18/07/17	AQ42																																											04/10/2017	
BH224	6.50	7.00	B	19	18/07/17	AQ42																																											04/10/2017	
BH224	7.00		D	20	18/07/17	AQ42																																											04/10/2017	
BH225	0.00	1.00	B	1	01/08/17	AQ46																																											07/11/2017	
BH225	1.00		D	2	01/08/17	AQ46																																											07/11/2017	
BH225	1.00	1.50	B	4	01/08/17	AQ46																																											07/11/2017	
BH225	1.50		D	5	01/08/17	AQ46																																											07/11/2017	
BH225	2.00	2.50	B	7	01/08/17	AQ46					1																																					07/11/2017	02/01/2018
BH225	2.00	2.50	B	7	01/08/17	AQ46					tested																																					15/01/2018	
BH225	2.50		D	8	01/08/17	AQ46																																											07/11/2017	
BH225	3.00	3.50	B	10	01/08/17	AQ46																																											07/11/2017	

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other										
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH225	3.00	3.50	B	10	01/08/17	AQ46																																										15/01/2018	
BH225	3.50		D	11	01/08/17	AQ46																																											07/11/2017	
BH225	4.00	4.50	B	13	01/08/17	AQ46																																											07/11/2017	
BH225	4.00	4.50	B	13	01/08/17	AQ46																																											15/01/2018	
BH225	4.50		D	14	01/08/17	AQ46																																											07/11/2017	
BH225	5.00	5.50	B	16	01/08/17	AQ46																																											07/11/2017	
BH225	5.00	5.50	B	16	01/08/17	AQ46																																											15/01/2018	
BH225	5.50		D	17	01/08/17	AQ46																																											07/11/2017	
BH225	6.50	7.00	B	19	01/08/17	AQ46																																											07/11/2017	
BH225	6.50	7.00	B	19	01/08/17	AQ46																																											15/01/2018	
BH225	7.00		D	20	01/08/17	AQ46																																											07/11/2017	
BH226	0.00	1.00	B	1	28/09/17	AQ72																																											
BH226	1.00		D	2	28/09/17	AQ72																																										
BH226	1.00	1.50	B	4	28/09/17	AQ72																																										
BH226	1.50		D	5	28/09/17	AQ72																																										
BH226	1.80		D	7	28/09/17	AQ72																																										
BH227	0.00	1.00	B	1	03/10/17	AQ77																																										09/01/2018	
BH227	0.00	1.00	B	1	03/10/17	AQ77																																										15/01/2018	
BH227	1.00		D	2	03/10/17	AQ77																																										09/01/2018	
BH227	1.00		D	2	03/10/17	AQ77																																										15/01/2018	
BH227	1.00	1.50	B	4	03/10/17	AQ77	1		1																																						09/01/2018	
BH227	1.00	1.50	B	4	03/10/17	AQ77	ested		tested																																						15/01/2018	
BH227	1.50		D	5	03/10/17	AQ77																																										09/01/2018	
BH227	1.50		D	5	03/10/17	AQ77																																										15/01/2018	
BH227	2.00	2.50	B	7	03/10/17	AQ77	1		1																																						09/01/2018	
BH227	2.00	2.50	B	7	03/10/17	AQ77	ested		tested																																						15/01/2018	
BH227	2.50		D	8	03/10/17	AQ77																																										09/01/2018	
BH227	2.50		D	8	03/10/17	AQ77																																										15/01/2018	
BH228	0.00	1.00	B	1	27/09/17	AQ66																																											
BH228	1.00		D	2	27/09/17	AQ66																																										
BH228	1.00	1.50	B	4	27/09/17	AQ66																																										
BH228	1.50		D	5	27/09/17	AQ66																																										
BH229	0.00	1.00	B	1	27/09/17	AQ66																																										
BH229	1.00		D	2	27/09/17	AQ66																																										
BH229	1.00	1.50	B	4	27/09/17	AQ66																																										
BH229	1.50		D	5	27/09/17	AQ66																																										
BH230	0.00	1.00	B	1	28/09/17	AQ66																																										
BH230	1.00		D	2	28/09/17	AQ66																																										
BH230	1.00	1.50	B	4	28/09/17	AQ66																																										
BH230	1.50		D	5	28/09/17	AQ66																																										
BH230	2.00	2.50	B	7	28/09/17	AQ66																																										
BH230	2.50		D	8	28/09/17	AQ66																																										

Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock		Other										
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
BH231	0.00	1.00	B	1	17/07/17	AQ42																																										07/11/2017	
BH231	1.00		D	2	17/07/17	AQ42																																										07/11/2017	
BH231	1.00	1.50	B	4	17/07/17	AQ42																																										07/11/2017	
BH231	1.50		D	5	17/07/17	AQ42																																										07/11/2017	
BH231	2.00	2.50	B	7	17/07/17	AQ42																																										07/11/2017	
BH231	2.00	2.50	B	7	17/07/17	AQ42																																										15/01/2018	
BH231	2.50		D	8	17/07/17	AQ42																																										07/11/2017	
BH231	3.00	3.50	B	10	17/07/17	AQ42					1																																				07/11/2017	02/01/2018
BH231	3.00	3.50	B	10	17/07/17	AQ42					tested																																				15/01/2018	
BH231	3.50		D	11	17/07/17	AQ42																																										07/11/2017	
BH231	4.00	4.50	B	13	17/07/17	AQ42																																										07/11/2017	
BH231	4.00	4.50	B	13	17/07/17	AQ42																																										15/01/2018	
BH231	4.50		D	14	17/07/17	AQ42																																										07/11/2017	
BH231	5.00		W	15	17/07/17	AQ42																																										07/11/2017	
BH231	5.00	5.50	B	17	17/07/17	AQ42																																										07/11/2017	
BH231	5.00	5.50	B	17	17/07/17	AQ42																																										15/01/2018	
BH231	5.50		D	18	17/07/17	AQ42																																										07/11/2017	
BH231	6.50	7.00	B	20	17/07/17	AQ42																																										07/11/2017	
BH231	6.50	7.00	B	20	17/07/17	AQ42																																										15/01/2018	
BH231	7.00		D	21	17/07/17	AQ42																																										07/11/2017	
RC001	0.00	13.00	C		14/07/17																																											
RC001	13.00	14.60	C		17/07/17																																											
RC001	14.60	16.10	C		17/07/17																																											
RC001	16.10	17.60	C		17/07/17																																											
RC001	17.60	19.10	C		17/07/17																																											
RC001	19.10	20.60	C		17/07/17																																											
RC004	0.00	5.50	C		19/07/17																																											
RC004	5.50	7.10	C		20/07/17																																											
RC004	7.10	8.60	C		20/07/17																																											
RC004	8.60	10.10	C		20/07/17																																											
RC005	0.00	5.50	C		18/07/17																																											
RC005	5.50	7.10	C		19/07/17																																											
RC005	7.10	8.60	C		19/07/17																																											
RC005	8.60	10.10	C		19/07/17																																											
RC006	0.00	4.00	C		21/07/17																																											04/10/2017	
RC006	4.00	5.60	C		21/07/17																																											04/10/2017	
RC006	5.60	7.10	C		21/07/17																																											04/10/2017	
rc006	6.50				21/07/17																																									1		04/10/2017	
RC006	7.10	8.60	C		21/07/17																																											04/10/2017	
RC006	8.60	10.10	C		21/07/17																																											04/10/2017	
RC007	0.00	5.00	C		10/07/17																																											04/10/2017	
RC007	5.00	5.60	C		10/07/17																																											04/10/2017	

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Project ID	2017T101	Client	Irish Water	Remarks		Turnaround	
Project Name	WSP Eastern and Midlands	Due Date	09/11/2017 12:54				
Schedule ID	2017T101_5	Scheduled Date	09/11/2017 12:55				

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock	Other									
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
RC039	5.60	7.10	C		29/09/17																																			1								15/01/2018	
RC039	5.60	7.10	C		29/09/17																																											
RC039	7.10	8.60	C		29/09/17																																			1								15/01/2018	
RC039	7.10	8.60	C		29/09/17																																											
RC039	8.60	10.10	C		29/09/17																																			1								15/01/2018	
RC039	8.60	10.10	C		29/09/17																																											
RC045	0.00	1.40	C		18/08/17																																											07/11/2017	
RC045	1.40	2.60	C		18/08/17																																											07/11/2017	
RC045	2.60	4.10	C		18/08/17																																											07/11/2017	
RC045	4.10	5.60	C		18/08/17																																											07/11/2017	
RC045	5.00		EW		23/08/17																																								1			als 170826-86		02/01/2018
RC045	5.60	7.10	C		18/08/17																																											07/11/2017	
RC045	7.10	8.60	C		18/08/17																																											07/11/2017	
RC045	8.60	10.10	C		18/08/17																																											07/11/2017	
RC046	0.00	5.60	C		25/07/17																																											04/10/2017	
RC046	4.00		EW		23/08/17																																								1			ALS 170826-86		02/01/2018
RC046	5.60	7.10	C		27/07/17																																											04/10/2017	
RC046	7.10	8.60	C		27/07/17																																											04/10/2017	
RC046	8.60	10.10	C		27/07/17																																								1					04/10/2017	02/01/2018
rc046	9.00				27/07/17																																								*					04/10/2017	
RC061	3.00	4.10	C	3.8-4.1	06/07/17						1																																					07/11/2017	02/01/2018
RC061	0.00	3.00	C		05/07/17																																											07/11/2017	
RC061	3.00	4.10	C								tested																																					15/01/2018	
RC061	4.10	5.60	C		05/07/17																																											07/11/2017	
RC061	4.10	5.60	C		06/07/17																																											07/11/2017	
RC061	5.60	7.10	C		05/07/17																																											07/11/2017	
RC061	5.60	7.10	C		06/07/17																																											07/11/2017	
RC061	7.10	8.60	C		05/07/17																																											07/11/2017	
RC061	8.60	10.10	C		05/07/17																																											07/11/2017	
RC061	10.10	11.60	C		06/07/17																																								1					07/11/2017	02/01/2018
RC061	10.10	11.60	C		06/07/17																																												07/11/2017	
rc061	11.00				06/07/17																																								*					04/10/2017	
RC061	11.60	13.10	C		06/07/17																																												04/10/2017	
RC061	11.60	13.10	C		06/07/17																																												04/10/2017	
RC061	13.10	14.60	C		06/07/17																																												04/10/2017	
RC061	14.60	15.00	C		06/07/17																																												04/10/2017	
RC067	0.00	2.10	C		11/09/17																																												07/11/2017	
RC067	2.10	3.60	C		11/09/17																																												07/11/2017	
RC067	3.60	5.10	C		11/09/17																																												07/11/2017	
RC067	5.10	6.60	C		11/09/17																																												07/11/2017	
RC067	6.60	8.10	C		11/09/17																																												07/11/2017	
RC067	8.10	9.60	C		11/09/17																																												07/11/2017	

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Project ID	2017T101		Client	Irish Water	Remarks	Turnaround
Project Name	WSP Eastern and Midlands		Due Date	09/11/2017 12:54		
Schedule ID	2017T101_5		Scheduled Date	09/11/2017 12:55		

| Sample Details | | | | | | | Classification | | | | | | | Chemical / Concrete | | | | | | | | | Compaction | | | | | Compressibility | | | | | Strength (Total) | | | | | | | | Shear Stregth (Effective Stress) | | | Rock | | Other | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---

Project ID	2017T101
Project Name	WSP Eastern and Midlands
Schedule ID	2017T101_5
Client	Irish Water
Due Date	09/11/2017 12:54
Scheduled Date	09/11/2017 12:55
Remarks	
Turnaround	

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)							Shear Stregth (Effective Stress)			Rock		Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
RC191	4.10	5.60	C		20/06/17																																				1								04/10/2017	
RC191	5.60	7.10	C		20/06/17																																												04/10/2017	
RC191	5.60	7.10	C																																						tested								15/01/2018	
RC191	7.10	8.60	C		20/06/17																																												04/10/2017	
RC191	8.60	10.10	C		20/06/17																																				1									04/10/2017	02/01/2018
rc191	9.00				20/06/17																																				*									04/10/2017	
RC192	0.00	1.20	C		14/06/17																																												04/10/2017	
RC192	1.20	2.60	C		14/06/17																																												04/10/2017	
RC192	2.60	4.10	C		15/06/17						0*																																1								04/10/2017	02/01/2018
RC192	2.60	4.10	C								tested																																							15/01/2018	
rc192	4.00				15/06/17																																						0*								04/10/2017	
RC192	4.10	5.60	C																																											1			15/01/2018	
RC192	4.10	5.60	C		15/06/17																																							1	1						07/11/2017	
RC192	5.60	7.10	C		15/06/17																																												07/11/2017	
RC192	7.10	8.60	C		15/06/17																																												07/11/2017	
RC192	8.60	10.10	C		15/06/17																																												07/11/2017	
RC196	0.00	1.70	C		06/09/17																																												07/11/2017	
RC196	1.70	2.10	C		06/09/17																																												07/11/2017	
RC196	2.10	3.60	C		06/09/17																																												07/11/2017	
RC196	3.60	5.10	C		06/09/17																																												07/11/2017	
RC196	5.10	6.60	C		06/09/17																																												07/11/2017	
RC196	6.60	8.10	C		06/09/17																																												07/11/2017	
RC196	8.10	9.60	C		06/09/17																																												07/11/2017	
RC196	9.60	10.00	C		06/09/17																																												07/11/2017	
RC197	0.00	2.00	C		05/09/17																																													07/11/2017	
RC197	2.00	3.60	C		05/09/17																																							0*							* no suitable sample for UCS	07/11/2017	
RC197	3.60	5.10	C		05/09/17																																							1							UCS moved to here	07/11/2017	02/01/2018
RC197	5.10	6.60	C		05/09/17																																													07/11/2017	
RC197	6.60	8.10	C		05/09/17																																													07/11/2017	
RC197	8.10	9.60	C		05/09/17																																													07/11/2017	
RC197	9.60	11.10	C		05/09/17																																													07/11/2017	
RC207	0.00	4.00	C		26/10/17																																														
RC207	4.00	5.50	C		26/10/17																																														
RC207	5.50	7.00	C		26/10/17																																														
RC207	7.00	8.50	C		26/10/17																																														
RC207	8.50	10.00	C		26/10/17																																														
RC208	0.00	5.60	C		25/09/17																																													07/11/2017	
RC208	5.60	7.10	C		25/09/17																																													07/11/2017	
RC208	7.10	8.60	C		25/09/17																																													07/11/2017	02/01/2018
RC208	8.60	10.10	C		25/09/17																																													07/11/2017	
RC219	0.00	7.10	C		06/10/17																																							0*							*unsuitable	15/01/2018	
RC219	0.00	7.10	C		06/10/17																																														
RC219	7.10	8.60	C		06/10/17																																							0*							*unsuitable	15/01/2018	

Project ID	2017T101	Client	Irish Water	Remarks		Turnaround	
Project Name	WSP Eastern and Midlands	Due Date	09/11/2017 12:54				
Schedule ID	2017T101_5	Scheduled Date	09/11/2017 12:55				

Sample Details							Classification						Chemical / Concrete									Compaction					Compressibility				Strength (Total)						Shear Stregth (Effective Stress)			Rock	Other											
Location	Depth (m)	Base Depth	Sample Type	Sample Ref	Date Sampled	Storage	Moisture Content	Atterberg 4 Point	Particle Density by Gas Jar	Particle Density by Small Pyknometer	Particle Size Distribution	Hydrometer	Organic Content	Loss On Ignition	Sulphate Total	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	Pressuremeter	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	Consolidated Drained Triaxial Test	Consolidated Undrained Triaxial Test	Consolidated Undrained Triaxial Multis	Rock Uniaxial compression	Point Load	Calcium Carbonate % , BS EN196-2	Petrograph analysis	Water Suite	Soil Suite	Bulk and Dry Density			SCHEDULE DATE	REPORT DATE
RC219	7.10	8.60	C		06/10/17																																												
RC219	8.60	10.10	C		06/10/17																																			0*								*unsuitable	15/01/2018	
RC219	8.60	10.10	C		06/10/17																																												
RC223	0.00	2.00	C		09/10/17																																												
RC223	2.00	2.60	C		09/10/17																																												
RC223	2.60	4.10	C		09/10/17																																												
RC223	4.10	5.60	C		09/10/17																																												
RC223	5.60	7.10	C		09/10/17																																												
RC223	7.10	8.60	C		09/10/17																																												
RC223	8.60	10.10	C		09/10/17																																												
RC224	0.00	7.00	C		27/07/17																																											04/10/2017	
RC224	7.00	8.60	C		28/07/17																																										04/10/2017	
rc224	8.50				28/07/17																																					1							04/10/2017	02/01/2018
RC224	8.60	10.10	C		28/07/17																																											04/10/2017	
RC225	0.00	7.50	C		01/08/17																																											07/11/2017	
RC225	7.50	8.60	C		01/08/17																																											07/11/2017	
RC225	8.60	10.10	C		01/08/17																																											07/11/2017	
RC226	0.00	1.50	C		04/10/17																																												
RC226	1.50	2.60	C		04/10/17																																												
RC226	2.60	4.10	C		04/10/17																																												
RC226	4.10	5.60	C		04/10/17																																												
RC226	5.60	7.10	C		04/10/17																																												
RC226	7.10	8.60	C		04/10/17																																												
RC226	8.60	10.10	C		05/10/17																																												
RC227	0.00	1.80	C		05/10/17																																												
RC227	1.80	2.60	C		05/10/17																																												
RC227	2.60	4.10	C		05/10/17																																												
RC227	4.10	5.60	C		05/10/17																																												
RC227	5.60	7.10	C		05/10/17																																												
RC227	7.10	8.60	C		05/10/17																																												
RC227	8.60	10.10	C		05/10/17																																												
RC229	7.10	8.60	C	8.47	28/09/17																																					1							ucs moved to here	07/11/2017	02/01/2018
RC229	0.00	2.00	C		28/09/17																																												07/11/2017	
RC229	2.00	2.60	C		28/09/17																																					0*							for UCS	07/11/2017	
RC229	2.60	4.10	C		28/09/17																																												07/11/2017	
RC229	4.10	5.60	C		28/09/17																																												07/11/2017	
RC229	5.60	7.10	C		28/09/17																																												07/11/2017	
RC229	8.60	10.10	C		28/09/17																																												07/11/2017	
RC229																																																	07/11/2017	
RC231	0.00	7.00	C		31/07/17																																												07/11/2017	
RC231	7.00	8.60	C		31/07/17																																					0*		1					for UCS	07/11/2017	
RC231	7.00		EW		23/08/17																																								1				ALS 170826-86		02/01/2018
RC231	8.60	10.10	C		31/07/17																																					1							UCS moved to here	07/11/2017	02/01/2018

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Summary of Laboratory Vane Test Results

Project No.	Project Name
2017T101	WSP Eastern and Midlands

Hole No.	Sample				Soil Description at test horizon	Moisture Content	Vane shear strength		Sensitivity	Remarks
	Ref	Top	Base	Type		%	Undisturbed kPa	Remoulded kPa		
BH018	7	2.00	2.50	B		434	1.8	1.2	1.5	
BH018	10	3.00	3.50	B		310	3.1	1.1	2.9	
BH018	13	4.00	4.50	B		20	1.4	0.9	1.6	
BH018	16	5.00	5.50	B		16	1.7	1.3	1.3	
BH018	19	6.00	6.50	B		18	3.6	2	1.8	
BH019	7	2.00	2.50	B		22	5.7	3.9	1.5	
BH019	10	3.00	3.50	B		159	5.2	3.2	1.6	
BH027	7	2.00	2.50	B		595	5.6	4.1	1.3	
BH027	10	3.00	3.50	B		866	4.3	2	2.1	
BH027	13	4.00	4.50	B		774	2.2	1.2	1.8	
BH027	16	5.00	5.50	B		56	8	4.8	1.6	
BH027	19	6.00	6.50	B		19	17	15	1.2	
BH030	6	1.70	2.50	B		45	11	7.1	1.5	
BH030	9	2.00	2.50	B		21	22	12	1.8	
BH030	12	3.00	3.50	B		25	27	15	1.8	
BH030	15	4.00	4.50	B		20	11	5.5	2.0	
BH030	18	5.00	5.50	B		20	15	7.5	2.0	
BH030	21	6.50	7.00	B		21	12	4.7	2.5	
BH030	24	7.00	7.50	B		12	4.3	2.5	1.7	
BH031	7	2.00	2.50	B		24	19	6.6	2.8	
BH031	10	3.00	3.50	B		27	23	20	1.2	
BH031	13	4.00	4.50	B		11	11	4.1	2.7	
BH031	16	5.00	5.50	B		12	9.9	4	2.4	
BH032	7	2.00	2.50	B		12	19	8.3	2.3	
BH054	7	2.00	2.50	B		14	10	4	2.5	
BH054	10	3.00	3.50	B		16	14	12	1.2	

Notes	Date Printed	Approved By	Table
Tests performed in accordance with BS 1377:Part 7:clause 3 using 12.7mm x 12.7mm vane Tests carried out in nominally 100mm diameter tube unless noted otherwise Shear strengths are average of at least 3 tests unless noted otherwise	22/02/2018		1 sheet 1

Summary of Laboratory Vane Test Results

Project No.	Project Name
2017T101	WSP Eastern and Midlands

Hole No.	Sample				Soil Description at test horizon	Moisture Content	Vane shear strength		Sensitivity	Remarks
	Ref	Top	Base	Type		%	Undisturbed kPa	Remoulded kPa		
BH123	7	2.00	2.50	B		19	12	5.8	2.1	
BH123	10	3.00	3.50	B		14	12	10	1.2	
BH123	13	4.00	4.50	B		13	12	9.6	1.3	
BH123	16	5.00	5.50	B		14	3.7	5.7	0.7	
BH123	19	6.00	6.50	B		13	14	7	2.0	
BH159	7	2.00	2.50	B		17	12	9.3	1.3	
BH159	10	3.00	3.50	B		16	17	9.6	1.8	
BH160	7	2.00	2.50	B		12	5.1	3.5	1.5	
BH160	10	3.00	3.50	B		16	11	7.2	1.6	
BH162	7	2.00	2.50	B		29	19	17	1.1	
BH183	7	2.00	2.50	B		20	34	24	1.5	
BH183	10	3.00	3.50	B		17	22	9.3	2.3	
BH203	7	2.00	2.50	B		11	15	9	1.7	
BH207	7	2.00	2.50	B		52	5.3	4.8	1.1	
BH207	10	3.00	3.50	B		12	15	6.3	2.4	
BH207	13	4.00	4.30	B		12	11	8.6	1.3	
BH211	7	2.00	2.50	B		17	15	14	1.1	
BH211	10	3.00	3.50	B		20	15	11	1.4	
BH211	13	4.00	4.50	B		17	13	5.2	2.5	
BH214	7	2.00	2.50	B		14	14	10	1.3	
BH214	10	3.00	3.50	B		17	18	5.6	3.1	
BH214	13	4.00	4.30	B		14	18	14	1.3	
BH215	7	2.00	2.50	B		12	10	5.5	1.9	
BH215	10	3.00	3.50	B		15	18	7.2	2.5	
BH215	13	4.00	4.50	B		14	23	19	1.2	
BH215	16	5.00	5.50	B		11	8.5	11	0.8	

Notes	Date Printed	Approved By	Table
Tests performed in accordance with BS 1377:Part 7:clause 3 using 12.7mm x 12.7mm vane Tests carried out in nominally 100mm diameter tube unless noted otherwise Shear strengths are average of at least 3 tests unless noted otherwise	22/02/2018		1 sheet 2

Summary of Laboratory Vane Test Results

Project No.	Project Name
2017T101	WSP Eastern and Midlands

Hole No.	Sample				Soil Description at test horizon	Moisture Content	Vane shear strength		Sensitivity	Remarks
	Ref	Top	Base	Type		%	Undisturbed kPa	Remoulded kPa		
BH215	19	6.00	6.50	B		12	7.7	10	0.8	
BH219	7	2.00	2.50	B		15	5.8	4.3	1.4	
BH219	10	3.00	3.50	B		15	5.7	3	1.9	
BH219	13	4.00	4.50	B		20	23	17	1.4	
BH219	16	5.00	5.50	B		20	18	17	1.1	
BH219	19	6.00	6.50	B		17	19	15	1.3	
BH220	7	2.00	2.50	B		9.8	4.3	3	1.5	
BH220	10	3.00	3.50	B		8.2	2.5	3.6	0.7	
BH220	13	4.00	4.50	B		23	13	12	1.1	
BH220	16	5.00	5.50	B		23	17	16	1.1	
BH220	19	6.00	6.50	B		22	20	15	1.4	
BH220	22	7.00	7.50	B		13	1.9	3	0.6	
BH221	7	2.00	2.50	B		42	8.5	3.9	2.2	
BH221	10	3.00	3.50	B		15	15	11	1.3	

Notes	Date Printed	Approved By	Table
Tests performed in accordance with BS 1377:Part 7:clause 3 using 12.7mm x 12.7mm vane Tests carried out in nominally 100mm diameter tube unless noted otherwise Shear strengths are average of at least 3 tests unless noted otherwise	22/02/2018		1 sheet 3

Summary of Classification Test Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH001	4	1.00	1.50	B		Grey very silty very sandy GRAVEL.								2.49-gj	
BH001	5	1.50		D		Grey slightly sandy gravelly SILT / CLAY.				47					
BH001	7	2.00	2.50	B		Pinkish-brown slightly gravelly slightly sandy SILT / CLAY.			28.0	86					
BH001	10	3.00	3.50	B		Grey-brown slightly gravelly slightly sandy SILT / CLAY.				79					
BH001	13	4.00	4.50	B		Grey slightly sandy SILT.								2.64-gj	
BH001	19	6.50	7.00	B		Grey-brown sandy SILT.								2.63-gj	
BH001	28	11.00	11.50	B		Grey-brown slightly sandy gravelly SILT.								2.66-gj	
BH004	4	1.00	1.50	B		Orange-brown slightly gravelly sandy SILT / CLAY.				75					
BH004	5	1.50		D		Orange-brown slightly gravelly sandy SILT / CLAY.									
BH004	7	2.00	2.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.			20.0	87					
BH004	10	3.00	3.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				88					
BH005	7	2.00	2.50	B		Brown slightly gravelly sandy SILT / CLAY.				69					
BH006	7	2.00	2.50	B		Grey gravelly very silty fine and medium SAND.				74					
BH007	7	2.00	2.50	B		Grey very silty very gravelly medium SAND.				62					
BH010	1	0.00	1.00	B		Orange-brown slightly gravlely slightly sandy SILT / CLAY.				57					
BH012	1	0.00	1.00	B		Dark brown Topsoil, very sandy very silty Gravel.	1.59	1.10							
BH014	7	2.00	2.50	B		Brown very silty very sandy GRAVEL.				49					
BH018	7	2.00	2.50	B		Black slightly gravelly slightly sandy PEAT.			363.0	82					
BH018	10	3.00	3.50	B		Black silty (peaty) SAND and GRAVEL.	1.04	0.26		33					
BH018	13	4.00	4.50	B		Grey slightly silty very sandy medium GRAVEL.			27.0	33					NP
BH018	16	5.00	5.50	B		Grey slightly silty very sandy medium GRAVEL.				9					
BH018	19	6.00	6.50	B		Grey slightly silty sandy medium and coarse GRAVEL.				7					
BH019	1	0.00	1.00	B		Grey-brown very sity SAND and GRAVEL.	1.53	1.42							
BH019	7	2.00	2.50	B		Mottled brown silty very sandy medium GRAVEL.				35					
BH019	10	3.00	3.50	B		Black slightly gravelly sandy SILT / PEAT.				71					
BH019	13	4.00		B		Dark grey slightly gravelly sandy SILT.	1.55	1.01							

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key

Density test: Linear measurement unless : wd - water displacement; wi - immersion in water

Liquid Limit: 4pt cone unless : 1pt - single point test; NP - Non Plastic

Particle density: sp - small pyknometer; gj - gas jar

Date Printed: 22/02/2018

Approved By:

Table 1

sheet 1

Summary of Classification Test Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH020	13	4.00	4.50	B		Dark grey very silty very sandy coarse GRAVEL.				32					
BH022	10	3.00	3.50	B		Grey-brown silty very gravelly coarse SAND.				31					
BH023	10	3.00	3.50	B		Grey very silty SAND and GRAVEL.				56					
BH023	13	4.00	4.50	B		Grey slightly gravelly sandy SILT / CLAY.				65					
BH027	7	2.00	2.50	B		Black slightly sandy SILT / PEAT.	0.90	0.11		97					
BH027	10	3.00	3.50	B		Black slightly sandy SILT / PEAT.			649.0	90					
BH027	13	4.00	4.50	B		Black slightly sandy SILT / PEAT.			776.0	86	612	515	97		ME
BH027	16	5.00	5.50	B		Grey slightly sandy SILT / CLAY.				99					
BH027	19	6.00	6.50	B		Grey sandy SILT / CLAY.				99	27	18	9		CL
BH030	1	0.00	1.00	B		Black PEAT.	0.98	0.26							
BH030	6	1.70	2.50	B		Grey slightly sandy SILT / CLAY.				100					
BH030	9	2.00	2.50	B		Grey slightly sandy SILT / CLAY.				100					
BH030	12	3.00	3.50	B		Grey slightly sandy SILT / CLAY.			24.0	100					
BH030	15	4.00	4.50	B		Grey slightly sandy SILT / CLAY.				95					
BH030	18	5.00	5.50	B		Grey sandy SILT / CLAY.	1.96	1.70		96	23	17	6		
BH030	21	6.50	7.00	B		Grey slightly gravelly slightly sandy SILT / CLAY.			18.0	80					
BH030	24	7.00	7.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				54					
BH031	7	2.00	2.50	B		Grey slightly sandy SILT / CLAY.	1.85	1.49		99					
BH031	10	3.00	3.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				90					
BH031	13	4.00	4.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.			11.0	58					
BH031	16	5.00	5.50	B		Grey slightly gsandy gravelly SILT / CLAY.				60	22	15	7		
BH032	4	1.00	1.50	B		Grey-brown slightly sandy gravelly SILT / CLAY.	2.14	1.92							
BH032	7	2.00	2.50	B		Grey-brown slightly sandy gravelly SILT / CLAY.				53					
BH046	10	3.00	3.50	B		Grey silty sandy medium and coarse GRAVEL.				9					
BH048	10	3.00	3.50	B		Brown silty very sandy medium GRAVEL.				37					
BH049	7	2.00	2.50	B		Brown very gravelly very silty SAND.				61					

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key

Density test
Linear measurement unless :
wd - water displacement
wi - immersion in water

Liquid Limit
4pt cone unless :
1pt - single point test
NP - Non Plastic

Particle density
sp - small pyknometer
gj - gas jar

Date Printed: 22/02/2018

Approved By:

Table 1

sheet 2

Summary of Classification Test Results

Project No.	Project Name
2017T101	WSP Eastern and Midlands

Hole No.	Sample					Soil Description	Density		*w*	Passing 425µm	LL	PL	PI	Particle density	Remarks
	Ref	Top	Base	Type			bulk	dry							
							Mg/m3		%	%	%	%	%	Mg/m3	
BH050	7	2.00	2.50	B		Grey silty SAND and GRAVEL.				45					
BH052	7	2.00	2.50	B		Grey very gravelly very silty SAND.				65					
BH053	7	2.00	2.50	B		Red-brown slightly gravelly sandy SILT / CLAY.				65					
BH054	7	2.00	2.50	B		Grey slightly gravelly sandy SILT / CLAY.			893.0	61					
BH054	10	3.00	3.50	B		Grey slightly gravelly sandy SILT / CLAY.	1.99	1.70		58					
BH055	7	2.00	2.50	B		Red-brown very silty very gravelly SAND.				51					
BH057	7	2.00	2.50	B		Grey-brown slightly gravelly slightly sandy SILT / CLAY.				58					
BH057	10	3.00	3.50	B		Grey-brown slightly sandy slightly gravelly SILT / CLAY.				55					
BH059	7	2.00	2.50	B		Brown very silty very sandy GRAVEL.				52					
BH061	7	2.00	2.50	B		Brown very silty GRAVEL and SAND.				59					
BH070	10	3.00	3.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				59					
BH071	10	3.00	3.40	B		Olive-brown slightly sandy gravelly SILT / CLAY.				55					
BH083	7	2.00	2.50	B		Blue-black very silty SAND and GRAVEL.				47					
BH083	13	4.00	4.50	B		Grey-brown silty very sandy medium GRAVEL.				23					
BH098	4	1.00	1.50	B		Grey slightly sandy SILT / CLAY.	2.05	1.77							
BH100	10	3.00	3.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				61					
BH110	7	2.00	2.50	B		Grey slightly gravelly sandy SILT / CLAY.				62					
BH119	7	2.00	2.50	B		Grey-brown slightly sandy slightly gravelly SILT / CLAY.				56					
BH119	10	3.00	3.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				65					
BH121	10	3.00	3.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				96					
BH121	13	4.00	4.50	B		Grey slightly sandy SILT / CLAY.				99					
BH123	7	2.00	2.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				63					
BH123	10	3.00	3.50	B		Brown slightly sandy slightly gravelly SILT / CLAY.				62					
BH123	13	4.00	4.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				80	20	14	6		CL
BH123	16	5.00	5.50	B		Light brown slightly gravelly slightly sandy SILT / CLAY.	2.06	1.79	15.0	73					
BH123	19	6.00	6.50	B		Light brown slightly gravelly slightly sandy SILT / CLAY.				67					

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key			Date Printed	Approved By	Table
Density test	Liquid Limit	Particle density			1
Linear measurement unless :	4pt cone unless :	sp - small pyknometer	22/02/2018		
wd - water displacement	1pt - single point test	gj - gas jar			sheet
wi - immersion in water	NP - Non Plastic				3

Summary of Classification Test Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH138	4	1.00	1.50	B		Brown slightly gravelly sandy SILT / CLAY.				67					
BH138	5	1.50		D		Brown very silty very sandy coarse GRAVEL.				52					
BH138	7	2.00	2.50	B		Brown slightly gravelly sandy SILT / CLAY.			15.0	68					
BH138	10	3.00	3.50	B		Brown slightly gravelly sandy SILT / CLAY.			15.0	73					
BH138	13	4.00	4.50	B		Brown slightly gravelly sandy SILT / CLAY.				63					
BH138	16	5.00	5.50	B		Brown very gravelly very silty fine and medium SAND.				63					
BH159	1	0.00	1.00	B		Brown slightly sandy gravelly SILT.	2.08	1.85							
BH159	7	2.00	2.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				74					
BH159	10	3.00	3.50	B		Brown slightly sandy slightly gravelly SILT / CLAY.				65					
BH159	16	5.00		B		Brown slightly sandy gravelly SILT / CLAY.	1.67	1.42							
BH160	7	2.00	2.50	B		Brown slightly sandy gravelly SILT / CLAY.				53					
BH160	10	3.00	3.50	B		Brown slightly sandy gravelly SILT / CLAY.			17.0	50	34	23	11		ML
BH162	4	1.00	1.50	B		Grey slightly gravelly sandy SILT / CLAY.	1.87	1.49							
BH162	7	2.00	2.50	B		Light grey slightly gravelly slightly sandy SILT / CLAY.				86					
BH172	7	2.00	2.50	B		Orange-brown slightly gravelly slightly sandy SILT / CLAY.			17.0	73	32	19	13		CL
BH172	10	3.00	3.50	B		Brown slightly sandy SILT / CLAY.			24.0	79	31	20	11		CL
BH172	13	4.00	4.50	B		Brown slightl ygravelly slightly sandy SILT / CLAY.			20.0	66	27	17	10		CL
BH173	1	0.00	1.00	B		Grey slightly gravelly sandy SILT / CLAY.			15.0	70	23	16	7		CL
BH173	4	1.00	1.50	B		Grey slightly gravelly sandy SILT / CLAY.			13.0	66	26	17	9		CL
BH173	5	1.50		D		Grey slightly gravelly sandy SILT / CLAY.				66					
BH173	7	2.00	2.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.			12.0	65					
BH173	10	3.00	3.50	B		Gry slightly gravelly sandy SILT / CLAY.				67					
BH173	16	5.00	5.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				64					
BH173	22	8.00	8.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				92					
BH178	13	4.00	4.50	B		Grey very silty SAND and GRAVEL.				52					
BH179	4	1.00	1.50	B		Brown slightly gravelly sandy SILT / CLAY.				75					

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key

Density test: wd - water displacement; wi - immersion in water

Linear measurement unless : 4pt cone unless : Liquid Limit; 1pt - single point test; NP - Non Plastic

Particle density: sp - small pyknometer; gj - gas jar

Date Printed: 22/02/2018

Approved By:

Table 1

sheet 4

Summary of Classification Test Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH179	7	2.00	2.50	B		Grey very silty very gravelly SAND.				44					
BH183	7	2.00	2.50	B		Orange-brown slightly gravelly slightly sandy SILT / CLAY.				86					
BH183	10	3.00	3.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.	2.08	1.74		84					
BH188	4	1.00	1.20	B		Grey slightly gravelly sandy SILT / CLAY.				84					
BH190	1	0.00	1.00	B		Brown very silty SAND and GRAVEL.				53					
BH190	4	1.00	1.50	B		Yellow-brown slightly sandy gravelly SILT / CLAY.				54					
BH190	7	2.00	2.40	B		Yellow-brown slightly sandy gravelly SILT / CLAY.			18.0	48					
BH191	1	0.00	1.00	B		Yellow-brown slightly gravelly slightly sandy SILT / CLAY.				61					
BH191	4	1.00	1.50	B		Grey very silty SAND and GRAVEL.				48					
BH192	1	0.00	1.00	B		Yellow-brown slightly gravelly sandy SILT / CLAY.				64					
BH192	4	1.00	1.20	B		Yellow-brown slightly gravelly sandy SILT / CLAY. Sand is predominantly fine.				75					
BH195	7	2.00	2.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				55					
BH199	7	2.00	2.50	B		Brown slightly sandy slightly gravelly SILT / CLAY.				53					
BH202	13	4.00	4.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				61					
BH203	7	2.00	2.50	B		Grey slightly sandy slightly gravelly SILT / CLAY.				56					
BH205	7	2.00	2.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				59					
BH207	7	2.00	2.50	B		Mottled grey and black slightly gravelly slightly sandy SILT / CLAY.	1.53	1.01	55.0	90					
BH207	10	3.00	3.50	B		Grey very sandy very silty medium and coarse GRAVEL.				47					
BH207	13	4.00	4.30	B		Grey slightly gravelly slightly sandy SILT / CLAY.			12.0	56	21	13	8		CL
BH211	7	2.00	2.50	B		Brown slightly sandy gravelly SILT / CLAY.	1.98	1.65		86					
BH211	10	3.00	3.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.			18.0	73					
BH211	13	4.00	4.50	B		Greyish-brown slightly gravelly slightly sandy SILT / CLAY.				79					
BH214	4	1.00	1.50	B		Grey slightly sandy SILT / CLAY.	2.01	1.74							
BH214	7	2.00	2.50	B		Dark grey slightly sandy slightly gravelly SILT / CLAY.				53					
BH214	10	3.00	3.50	B		Dark grey very sandy very silty GRAVEL.				46					
BH214	13	4.00	4.30	B		Dark grey slightly sandy gravelly SILT / CLAY.			11.0	49	23	15	8		CL

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key

Density test
Linear measurement unless :
wd - water displacement
wi - immersion in water

Liquid Limit
4pt cone unless :
1pt - single point test
NP - Non Plastic

Particle density
sp - small pyknometer
gj - gas jar

Date Printed: 22/02/2018

Approved By:

Table 1

sheet 5

Summary of Classification Test Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH215	7	2.00	2.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.				59					
BH215	10	3.00	3.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.	1.93	1.72		60					
BH215	13	4.00	4.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.				56					
BH215	16	5.00	5.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.				57					
BH215	19	6.00	6.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.			12.0	58	23	15	8		CL
BH219	4	1.00	1.50	B		Grey-brown very silty very gravelly SAND.	1.76	1.32							
BH219	7	2.00	2.50	B		Grey-brown silty SAND and GRAVEL.				43					
BH219	10	3.00	3.50	B		Brown silty SAND and GRAVEL.				39					
BH219	13	4.00	4.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.				95					
BH219	16	5.00	5.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.			21.0	95					
BH219	19	6.00	6.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.	2.01	1.67		98					
BH220	7	2.00	2.50	B		Brown silty very gravelly coarse SAND.				20					
BH220	10	3.00	3.50	B		Brown silty very gravelly coarse SAND.	1.55	1.42		17					
BH220	13	4.00	4.50	B		Dark grey slightly gravelly slightly sandy SILT / CLAY.			23.0	68					
BH220	16	5.00	5.50	B		Dark grey sandy SILT. Sand is fine.				98	29	19	10		CL
BH220	19	6.00	6.50	B		Grey slightly gravelly slightly sandy SILT / CLAY.				96					
BH221	4	1.00	1.50	B		Brown slightly gravelly sandy SILT / CLAY.	1.61	1.15							
BH221	7	2.00	2.50	B		Brown slightly gravelly sandy SILT / CLAY.				60					
BH221	10	3.00	3.50	B		Brown silty very sandy medium GRAVEL.				18					
BH223	1	0.00	1.00	B		Dark grey very silty very sandy fine GRAVEL.	1.61	1.33							
BH223	4	1.00	1.50	B		Dark grey very silty very sandy fine GRAVEL.	1.82	1.50							
BH223	7	2.00	2.50	B		Dark grey very sandy very silty GRAVEL.				38					
BH224	7	2.00	2.50	B		Brown slightly gravelly sandy SILT / CLAY.			17.0	71					
BH224	10	3.00	3.50	B		Brown slightly gravelly slightly sandy SILT / CLAY.				60					
BH225	7	2.00	2.50	B		Grey slightly sandy slightly gravelly SILT / CLAY.				63					
BH227	4	1.00	1.50	B		Grey slightly gravelly sandy SILT.			14.0					2.62-gj	

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key

Density test
Linear measurement unless :
wd - water displacement
wi - immersion in water

Liquid Limit
4pt cone unless :
1pt - single point test
NP - Non Plastic

Particle density
sp - small pyknometer
gj - gas jar

Date Printed: 22/02/2018

Approved By:

Table 1

Summary of Classification Test Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Hole No.	Sample Ref	Top	Base	Type		Soil Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH227	7	2.00	2.50	B		Grey slightly gravelly sandy SILT / CLAY.			14.0					2.63-gj	
BH231	10	3.00	3.50	B		Brown very gravelly very silty SAND.				55					
RC061		3.00	4.10	C		Brown slightly sandy slightly gravelly SILT / CLAY.				58					
RC192		4.10	5.60	C		Limestone	2.64	2.64							
TP003	2	1.70	2.00	B		Brown very silty very sandy fine and medium GRAVEL.			5.9					2.67-gj	
TP004	1	0.80	1.30	B		Brown silty sandy medium and coarse angular GRAVEL.			12.0					2.68-gj	
TP009	2	1.80	2.20	B		Brown slightly sandy gravelly SILT / CLAY.			14.0					2.65-gj	

All tests performed in accordance with BS1377:1990 unless specified otherwise

Key

Density test: Linear measurement unless : wd - water displacement; wi - immersion in water

Liquid Limit: 4pt cone unless : 1pt - single point test; NP - Non Plastic

Particle density: sp - small pyknometer; gj - gas jar

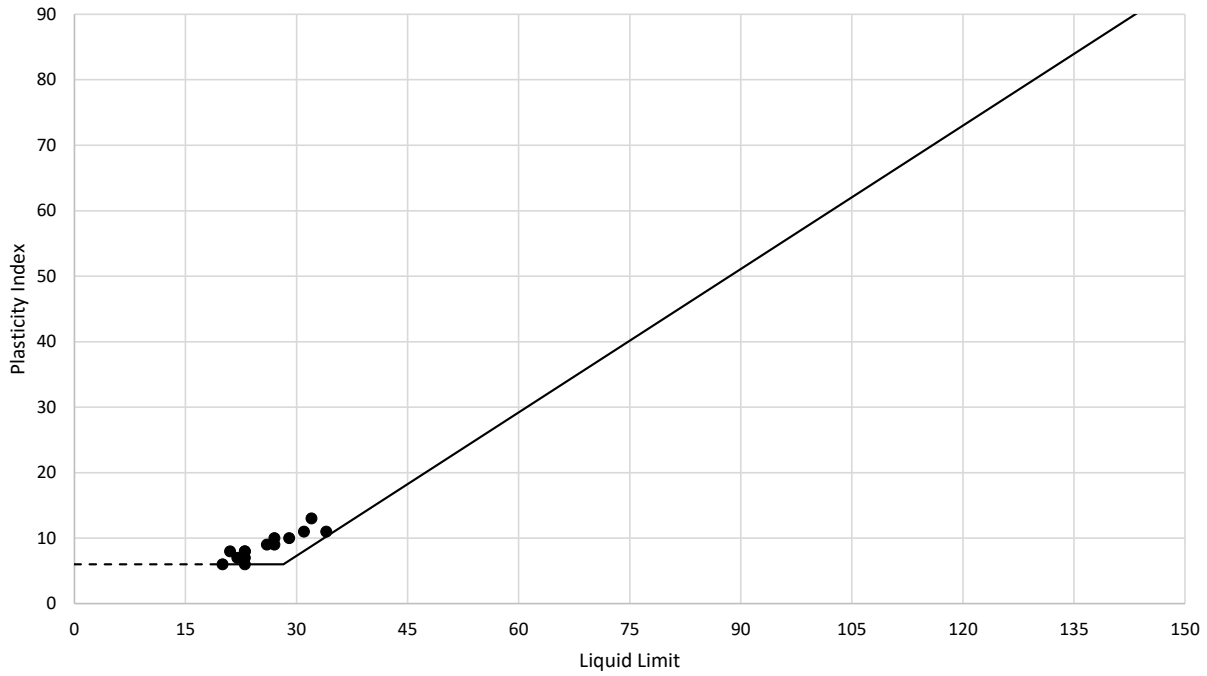
Date Printed: 22/02/2018

Approved By:

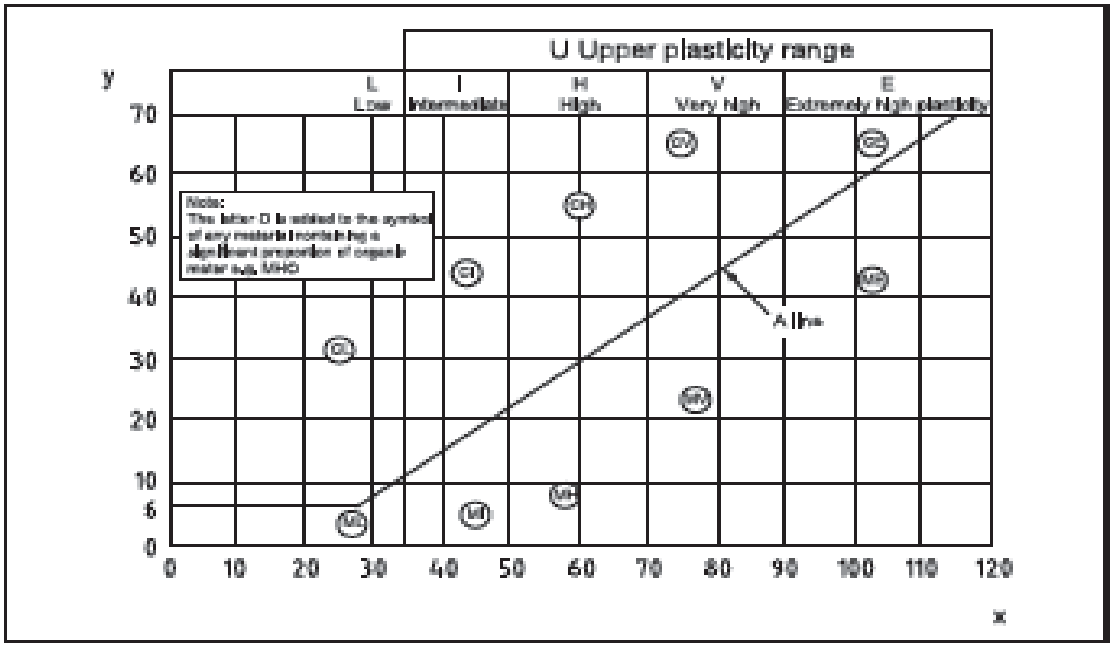
Table 1

sheet 7

	Plasticity (A-Line) Chart		Project Number
	Project Name:	WSP Eastern and Midlands	
	Location:		2017T101



Plasticity chart



National Materials Testing Laboratory Ltd.

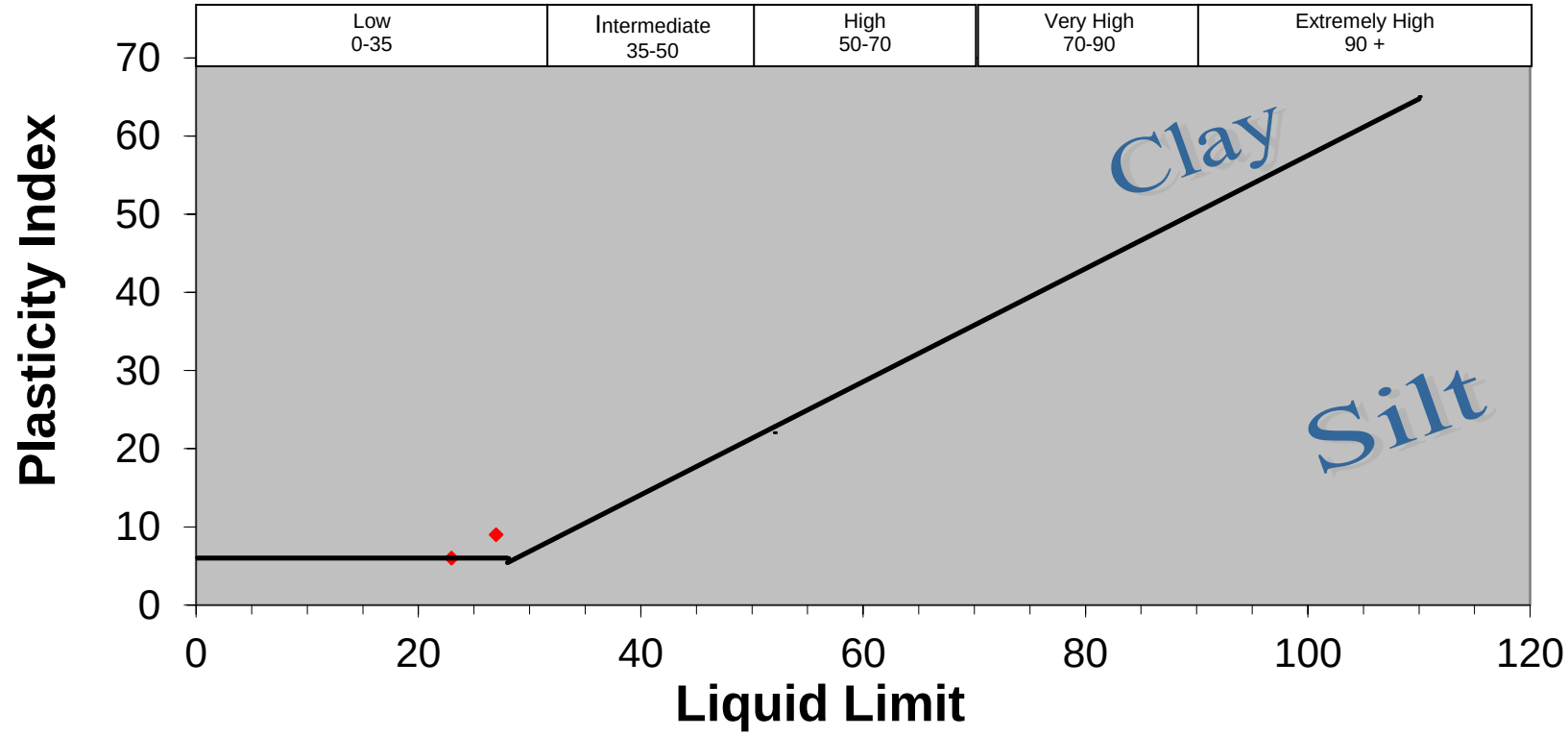
SUMMARY OF TEST RESULTS

				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
BH219	7.0-7.50	B22	16.2		100.0	23	17	6					39,36,40,38,39	
BH220	7.0-7.50	B22	24.9										19,18,19,17,18	
BH221	4.0-4.50	B13	16.0		54.9	27	18	9					8,6,8,10,6	

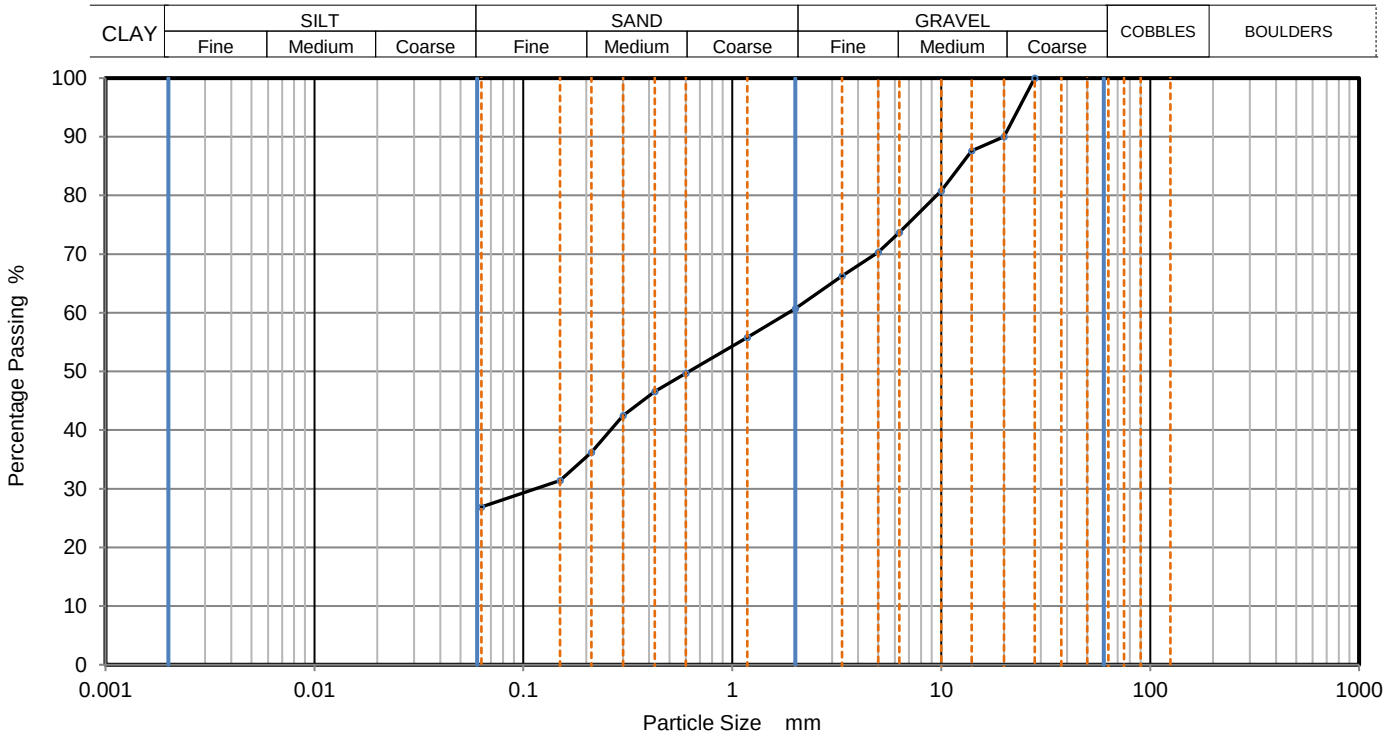
NMTL	Notes :	Job ref No.	NMTL 2439	Table
	1. All BS tests carried out using preferred (definitive) method unless otherwise stated.	Location	WSP Eastern and Midlands	

NMTL LTD
Unit 18c, Tullow Industrial Estate
Tullow
County Carlow
Tel: 00353 59 9180822
Mob: 00353 872575508
billachana@eircom.net

Contract:	**WSP Eastern and Midlands**		
Client:	**Irish Drilling Ltd**		
Engineer:	**N/A**		
Date:	**21/02/2018**		
Tested By:	**Tzr**	**Checked:**	**Bc**
Job ref No.	**NMTL 2439**		



IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH001
Site Name	WSP Eastern and Midlands			Sample No.	5
Soil Description	Grey slightly sandy gravelly SILT / CLAY.			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	D
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911279



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	90		
14	88		
10	81		
6.3	74		
5	70		
3.35	66		
2	61		
1.18	56		
0.6	50		
0.425	47		
0.3	43		
0.212	36		
0.15	31		
0.063	27		

Dry Mass of sample, g	987

Sample Proportions	% dry mass
Very coarse	0
Gravel	39
Sand	34
Fines <0.063mm	27

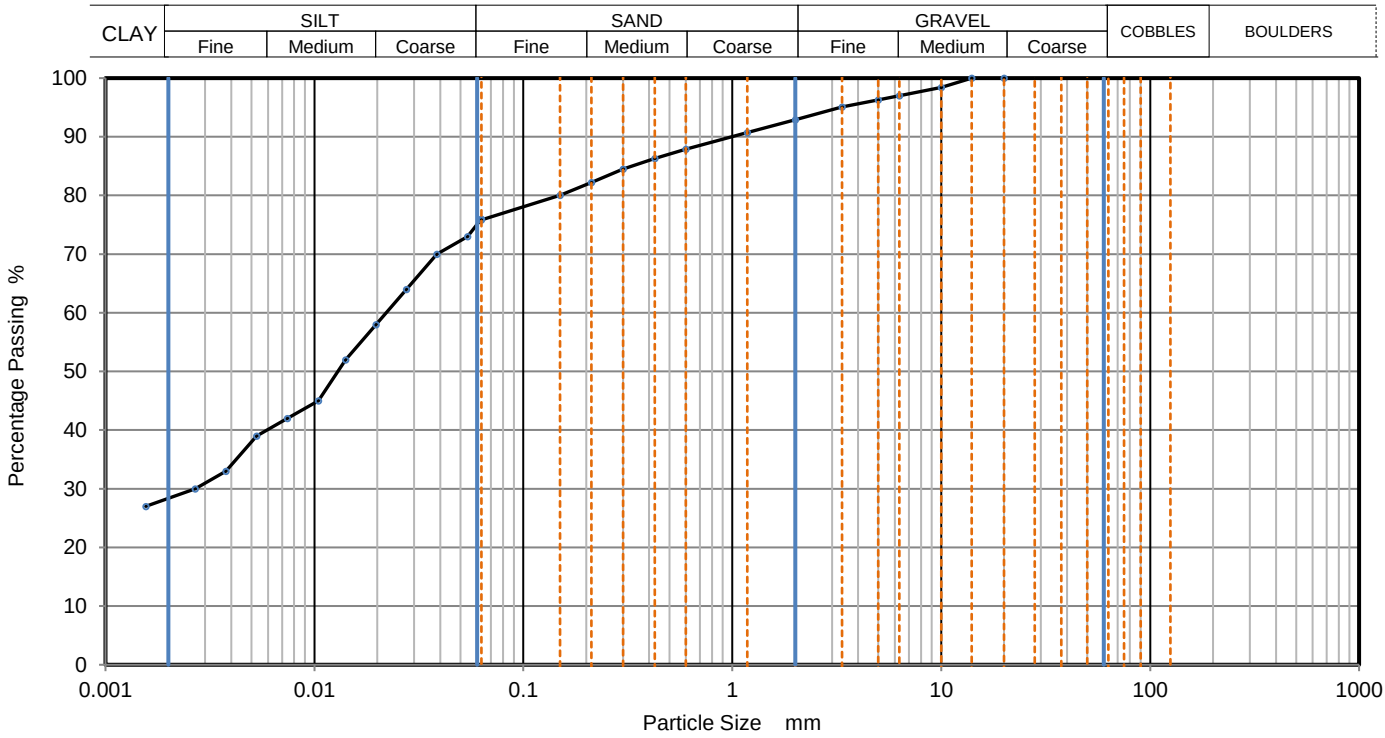
Grading Analysis		
D100	mm	28
D60	mm	1.86
D30	mm	0.115
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH001
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Pinkish-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL120170911281



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	76
		0.0541	73
		0.0385	70
		0.0276	64
		0.0197	58
		0.0141	52
		0.0104	45
20	100	0.0074	42
14	100	0.0053	39
10	98	0.0038	33
6.3	97	0.0027	30
5	96	0.0016	27
3.35	95		
2	93		
1.18	91		
0.6	88	Particle density (assumed)	
0.425	86	2.65	Mg/m3
0.3	85		
0.212	82		
0.15	80		
0.063	76		

Dry Mass of sample, g: 1066

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	17
Silt	47
Clay	29

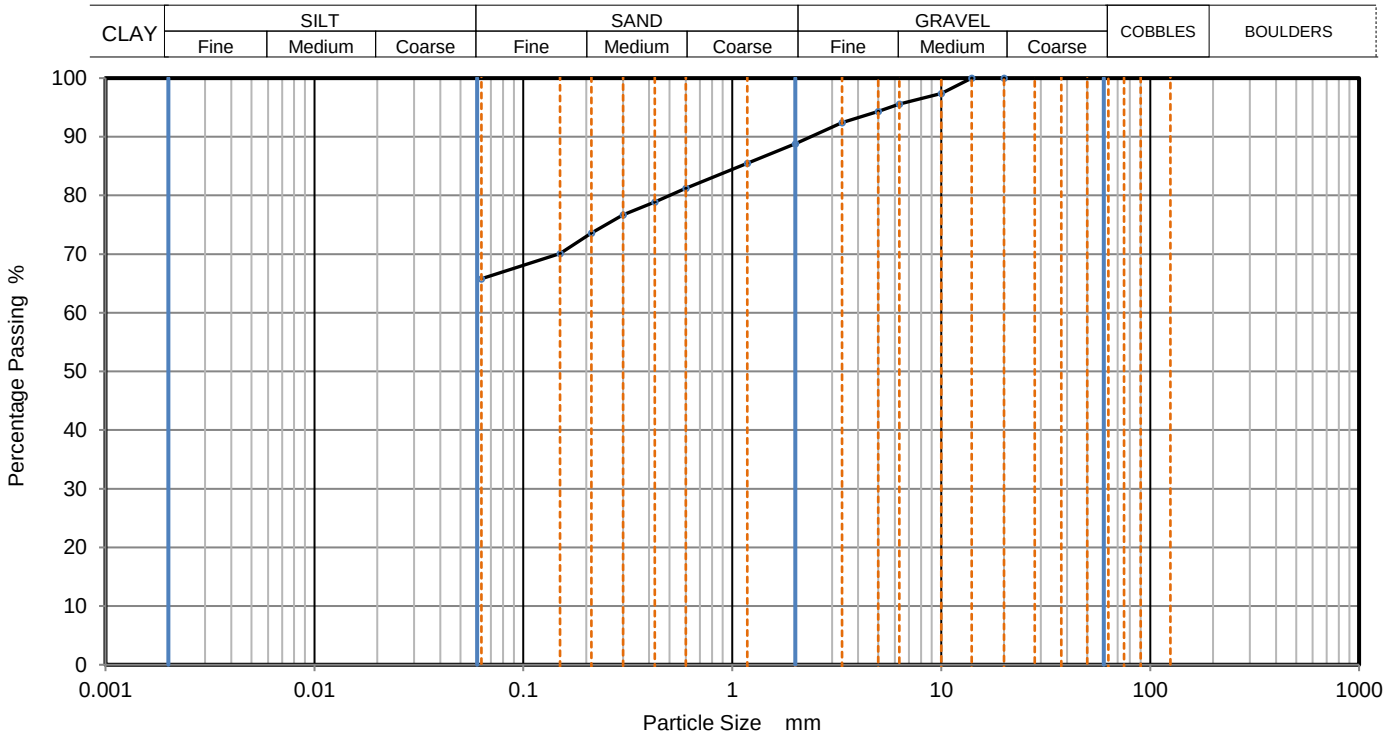
Grading Analysis		
D100	mm	
D60	mm	0.0225
D30	mm	0.00253
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH001
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911284



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	100		
10	97		
6.3	96		
5	94		
3.35	92		
2	89		
1.18	86		
0.6	81		
0.425	79		
0.3	77		
0.212	74		
0.15	70		
0.063	66		

Dry Mass of sample, g	1054

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	23
Fines <0.063mm	66

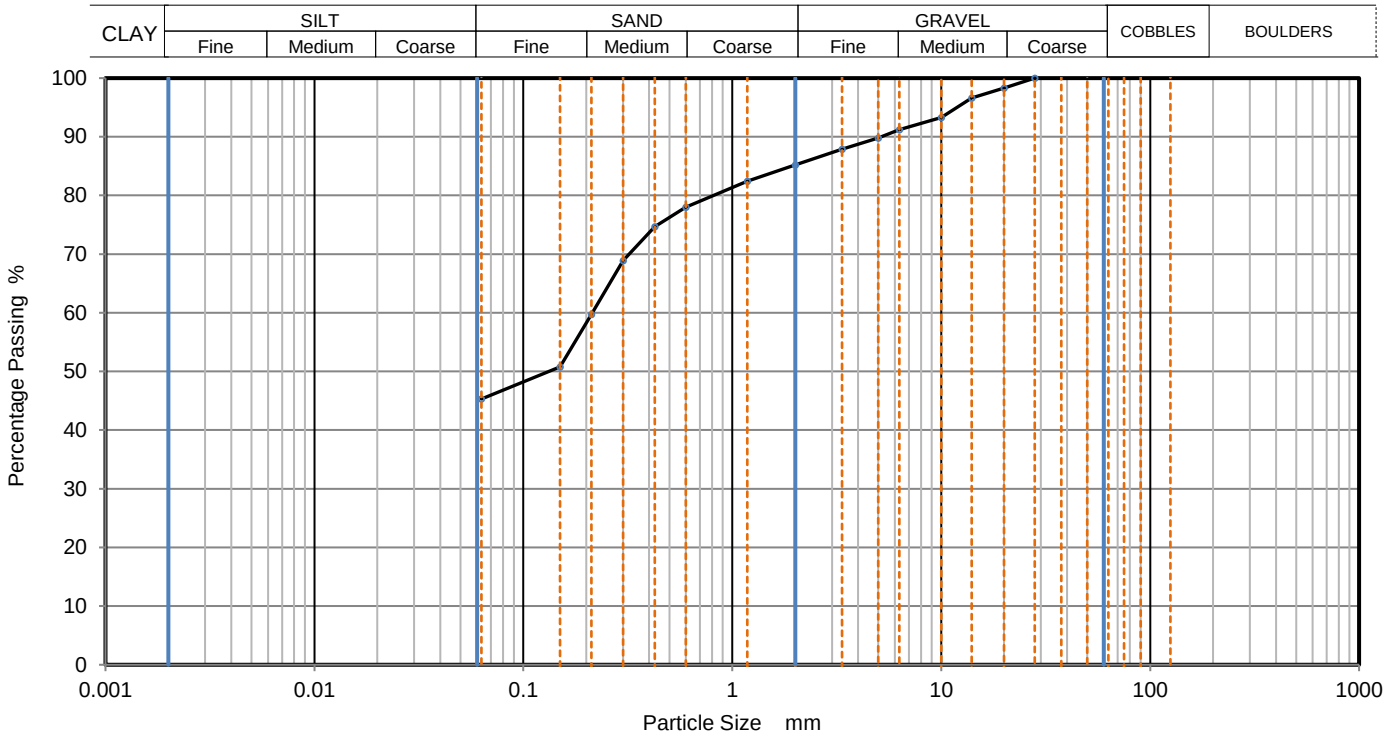
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH004
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Orange-brown slightly gravelly sandy SILT / CLAY.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911311



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	97		
10	93		
6.3	91		
5	90		
3.35	88		
2	85		
1.18	82		
0.6	78		
0.425	75		
0.3	69		
0.212	60		
0.15	51		
0.063	45		

Dry Mass of sample, g: 1092

Sample Proportions	% dry mass
Very coarse	0
Gravel	15
Sand	40
Fines <0.063mm	45

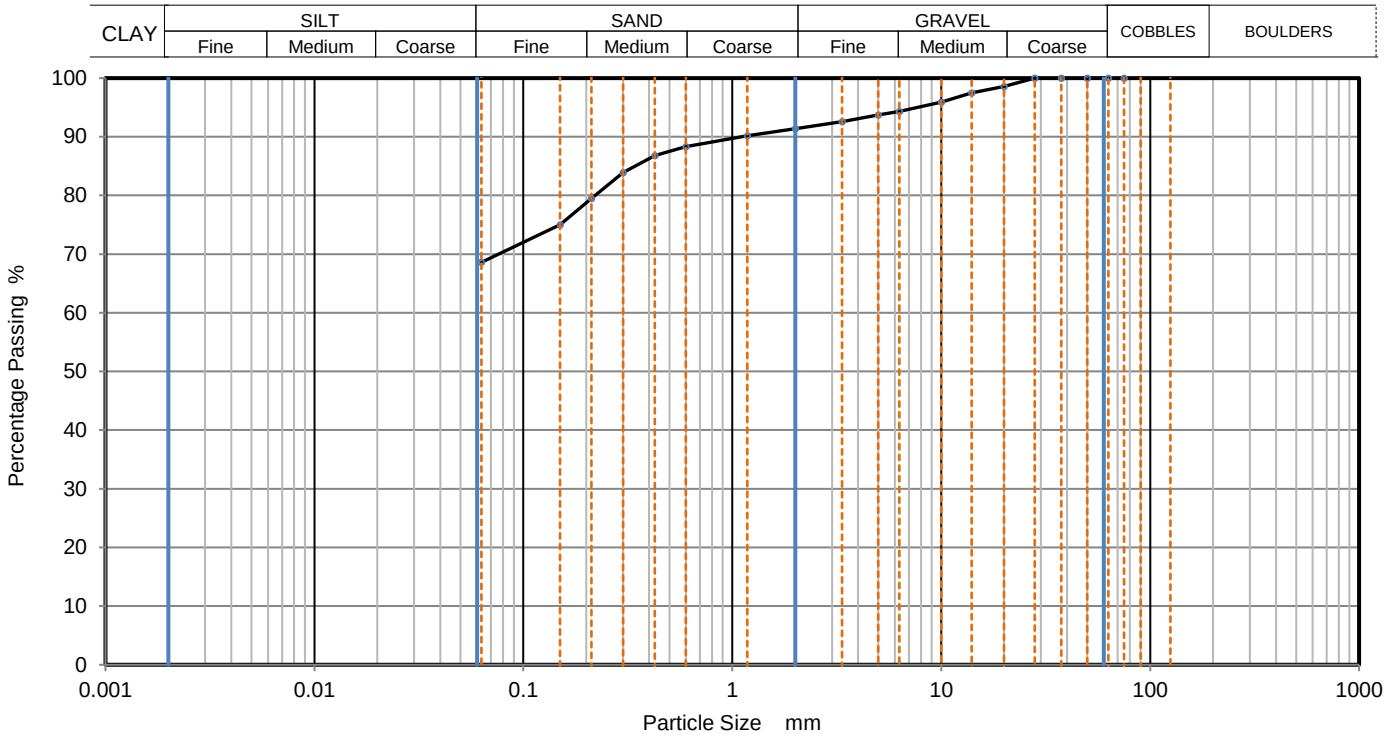
Grading Analysis		
D100	mm	28
D60	mm	0.214
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH004
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911314



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	98		
10	96		
6.3	94		
5	94		
3.35	93		
2	91		
1.18	90		
0.6	88		
0.425	87		
0.3	84		
0.212	80		
0.15	75		
0.063	69		

Dry Mass of sample, g	1019

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	23
Fines <0.063mm	69

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

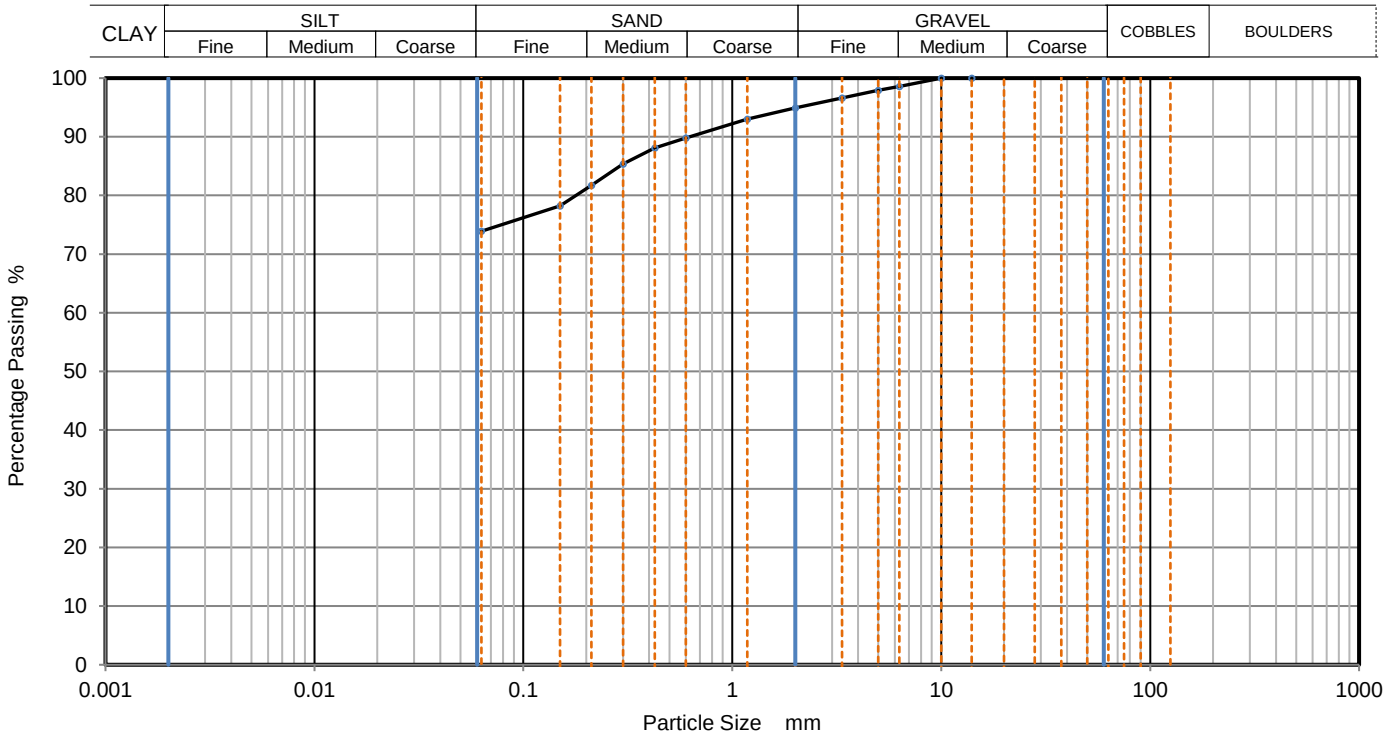
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH004
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911317



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	99		
5	98		
3.35	97		
2	95		
1.18	93		
0.6	90		
0.425	88		
0.3	85		
0.212	82		
0.15	78		
0.063	74		

Dry Mass of sample, g: 750

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	21
Fines <0.063mm	74

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

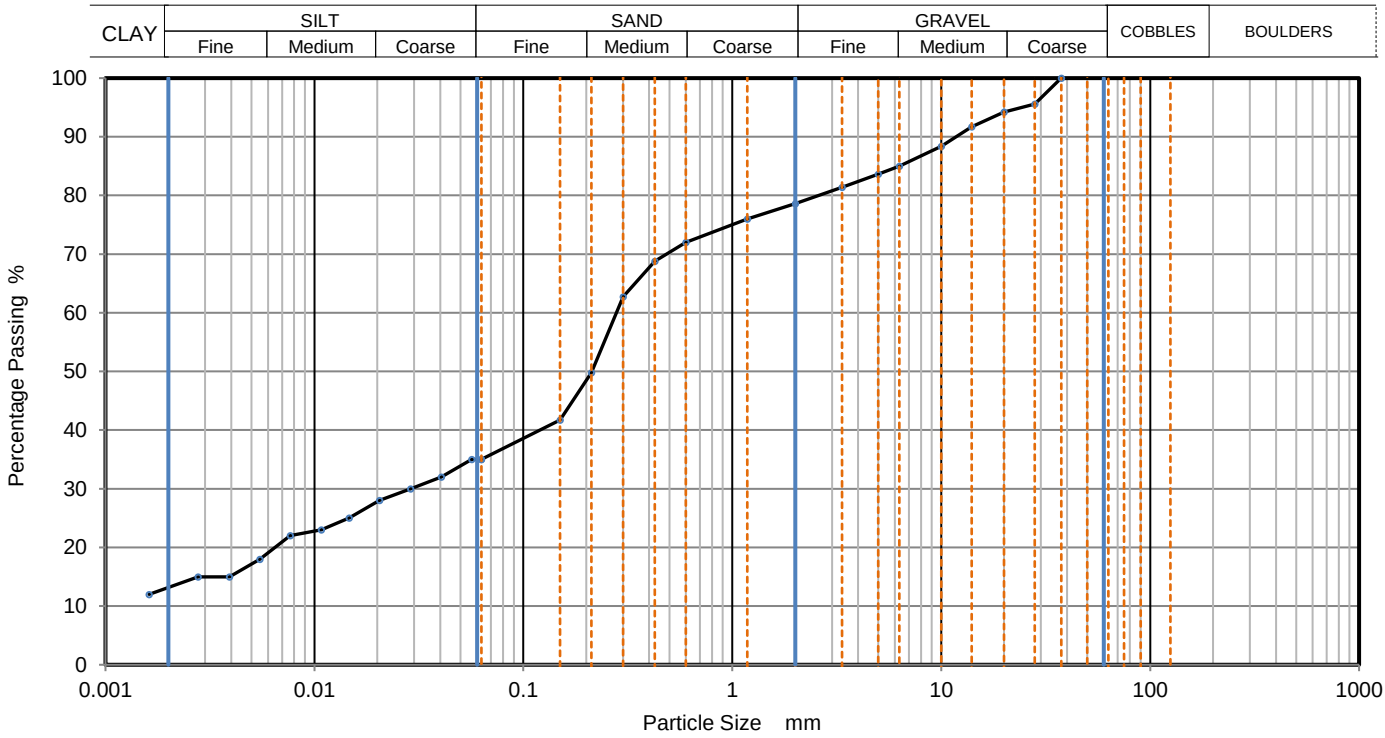
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH005
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL120170911332



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	35
		0.0566	35
		0.0405	32
		0.0288	30
		0.0205	28
37.5	100	0.0147	25
28	96	0.0108	23
20	94	0.0077	22
14	92	0.0055	18
10	88	0.0039	15
6.3	85	0.0028	15
5	84	0.0016	12
3.35	81		
2	79		
1.18	76		
0.6	72	Particle density (assumed)	
0.425	69	2.65	Mg/m3
0.3	63		
0.212	50		
0.15	42		
0.063	35		

Dry Mass of sample, g: 1224

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	44
Silt	22
Clay	13

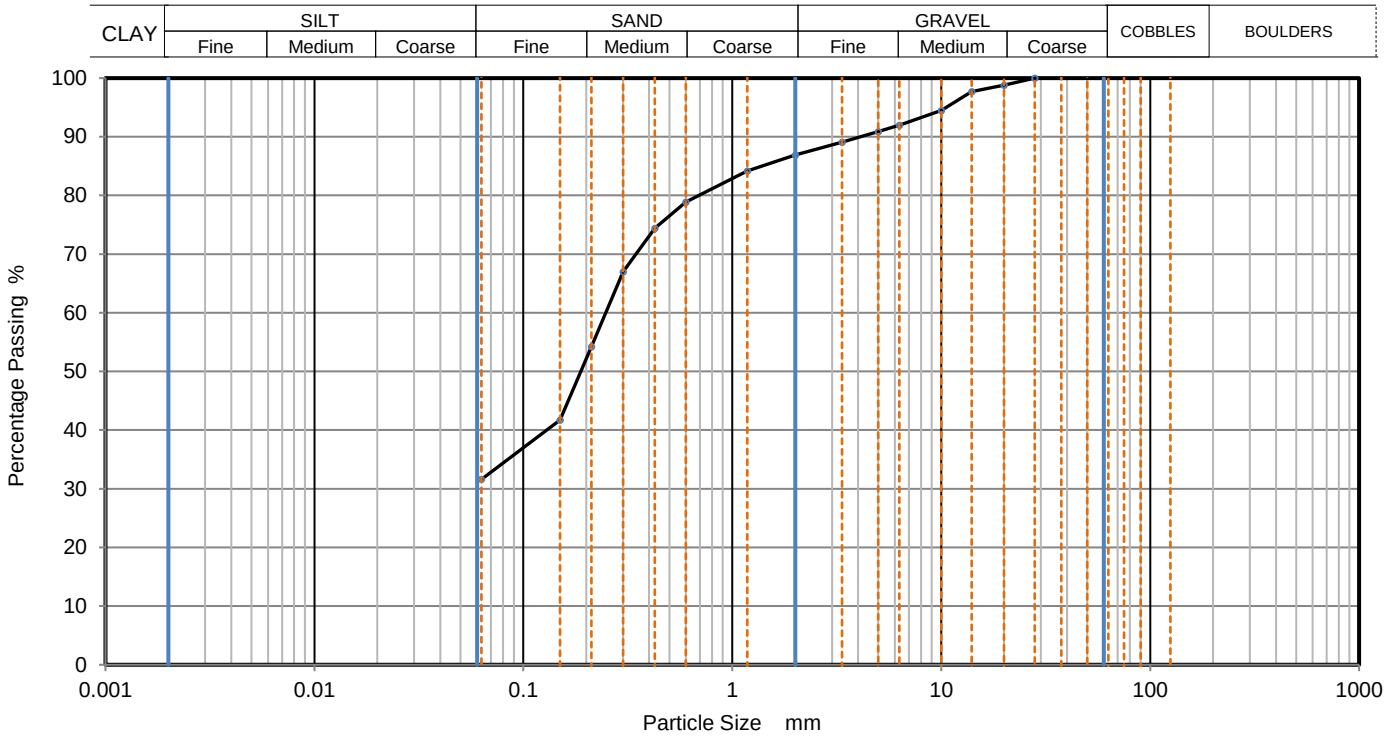
Grading Analysis		
D100	mm	37.5
D60	mm	0.279
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH006
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey gravelly very silty fine and medium SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911350



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	99		
14	98		
10	95		
6.3	92		
5	91		
3.35	89		
2	87		
1.18	84		
0.6	79		
0.425	74		
0.3	67		
0.212	54		
0.15	42		
0.063	32		

Dry Mass of sample, g	816

Sample Proportions	% dry mass
Very coarse	0
Gravel	13
Sand	55
Fines <0.063mm	32

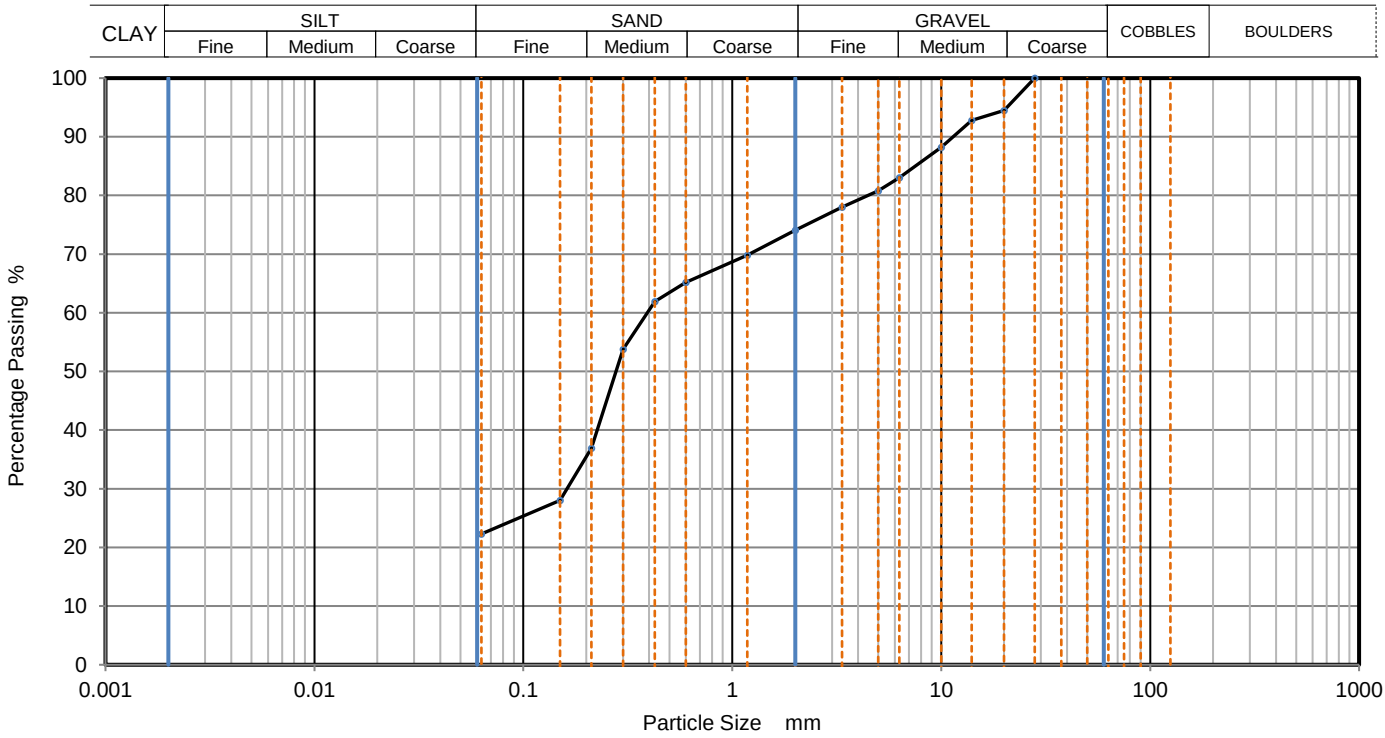
Grading Analysis		
D100	mm	28
D60	mm	0.248
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH007
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey very silty very gravelly medium SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911362



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	93		
10	88		
6.3	83		
5	81		
3.35	78		
2	74		
1.18	70		
0.6	65		
0.425	62		
0.3	54		
0.212	37		
0.15	28		
0.063	22		

Dry Mass of sample, g	1518

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	52
Fines <0.063mm	22

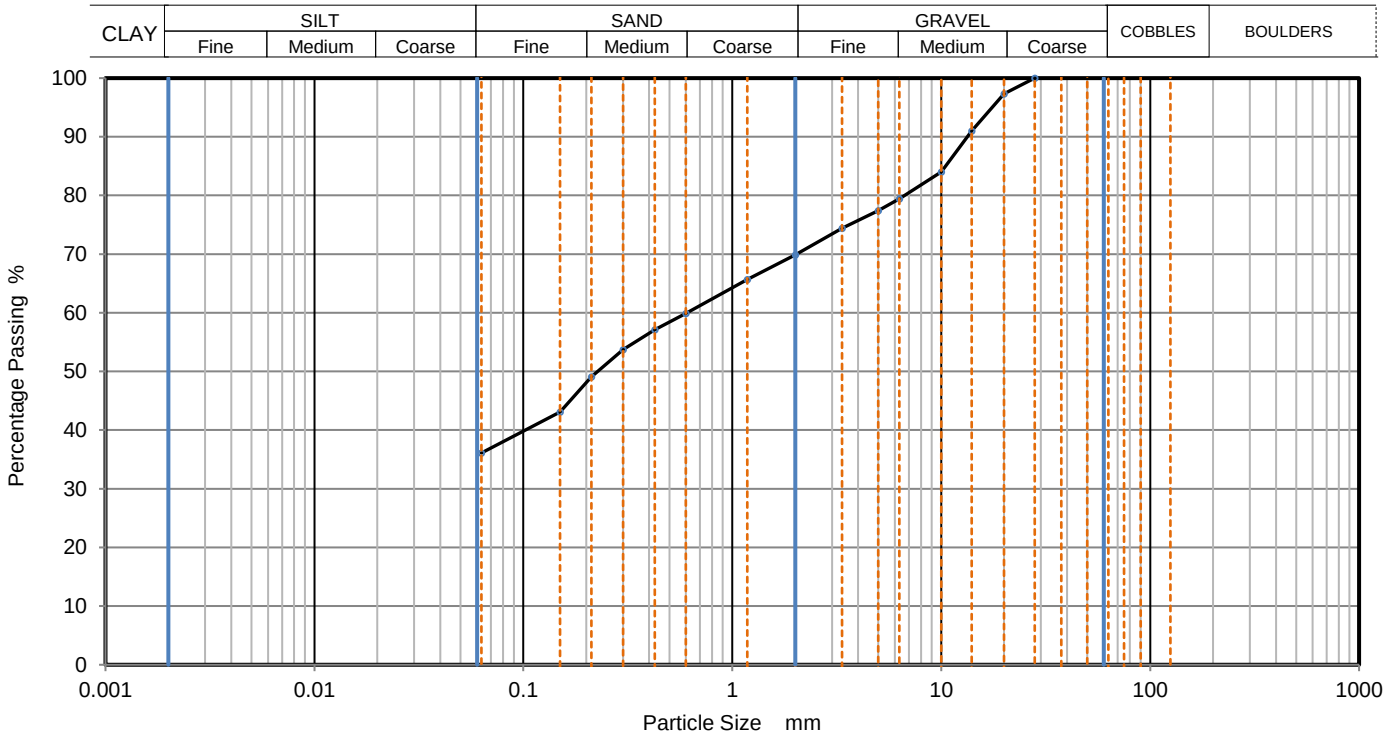
Grading Analysis		
D100	mm	28
D60	mm	0.392
D30	mm	0.162
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH010
Site Name	WSP Eastern and Midlands			Sample No.	1
Soil Description	Orange-brown slightly gravlely slightly sandy SILT / CLAY.			Depth, m	0.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911371



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	91		
10	84		
6.3	79		
5	77		
3.35	74		
2	70		
1.18	66		
0.6	60		
0.425	57		
0.3	54		
0.212	49		
0.15	43		
0.063	36		

Dry Mass of sample, g: 1302

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	34
Fines <0.063mm	36

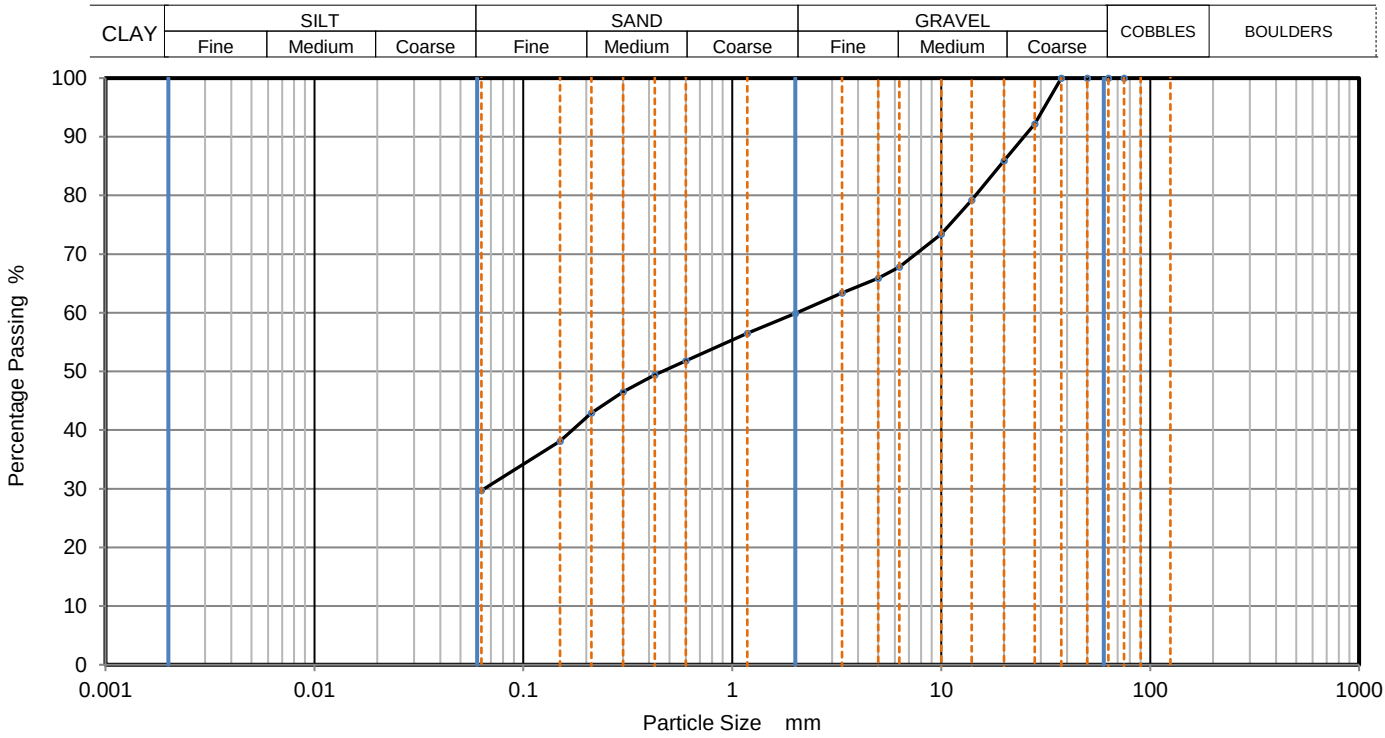
Grading Analysis		
D100	mm	28
D60	mm	0.609
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH014
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown very silty very sandy GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709146



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	92		
20	86		
14	79		
10	73		
6.3	68		
5	66		
3.35	63		
2	60		
1.18	57		
0.6	52		
0.425	49		
0.3	47		
0.212	43		
0.15	38		
0.063	30		

Dry Mass of sample, g	1058

Sample Proportions	% dry mass
Very coarse	0
Gravel	40
Sand	30
Fines <0.063mm	30

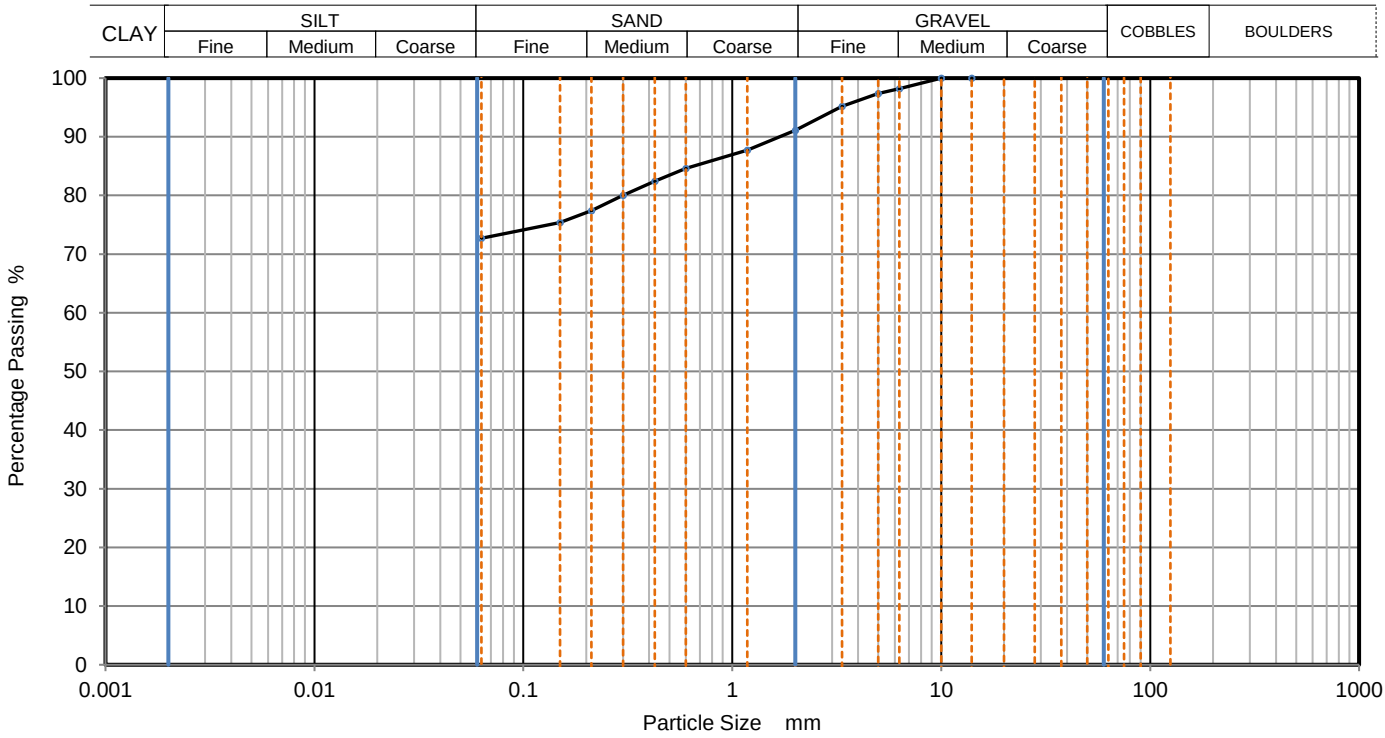
Grading Analysis		
D100	mm	
D60	mm	2.02
D30	mm	0.065
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH018
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Black slightly gravelly slightly sandy PEAT.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017111588



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	98		
5	97		
3.35	95		
2	91		
1.18	88		
0.6	85		
0.425	82		
0.3	80		
0.212	77		
0.15	75		
0.063	73		

Dry Mass of sample, g	51

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	18
Fines <0.063mm	73

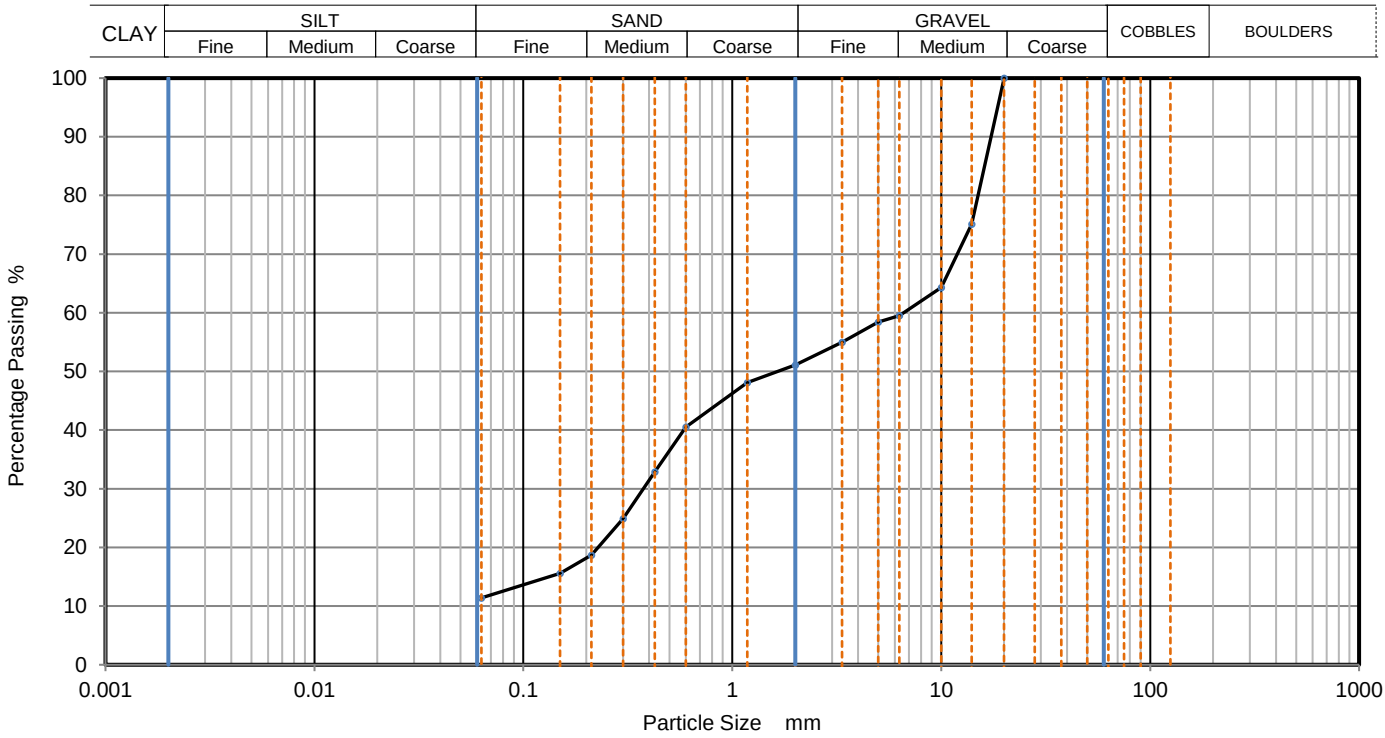
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH018
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Black silty (peaty) SAND and GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017111591



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	75		
10	64		
6.3	60		
5	58		
3.35	55		
2	51		
1.18	48		
0.6	41		
0.425	33		
0.3	25		
0.212	19		
0.15	16		
0.063	11		

Dry Mass of sample, g	83

Sample Proportions	% dry mass
Very coarse	0
Gravel	49
Sand	40
Fines <0.063mm	11

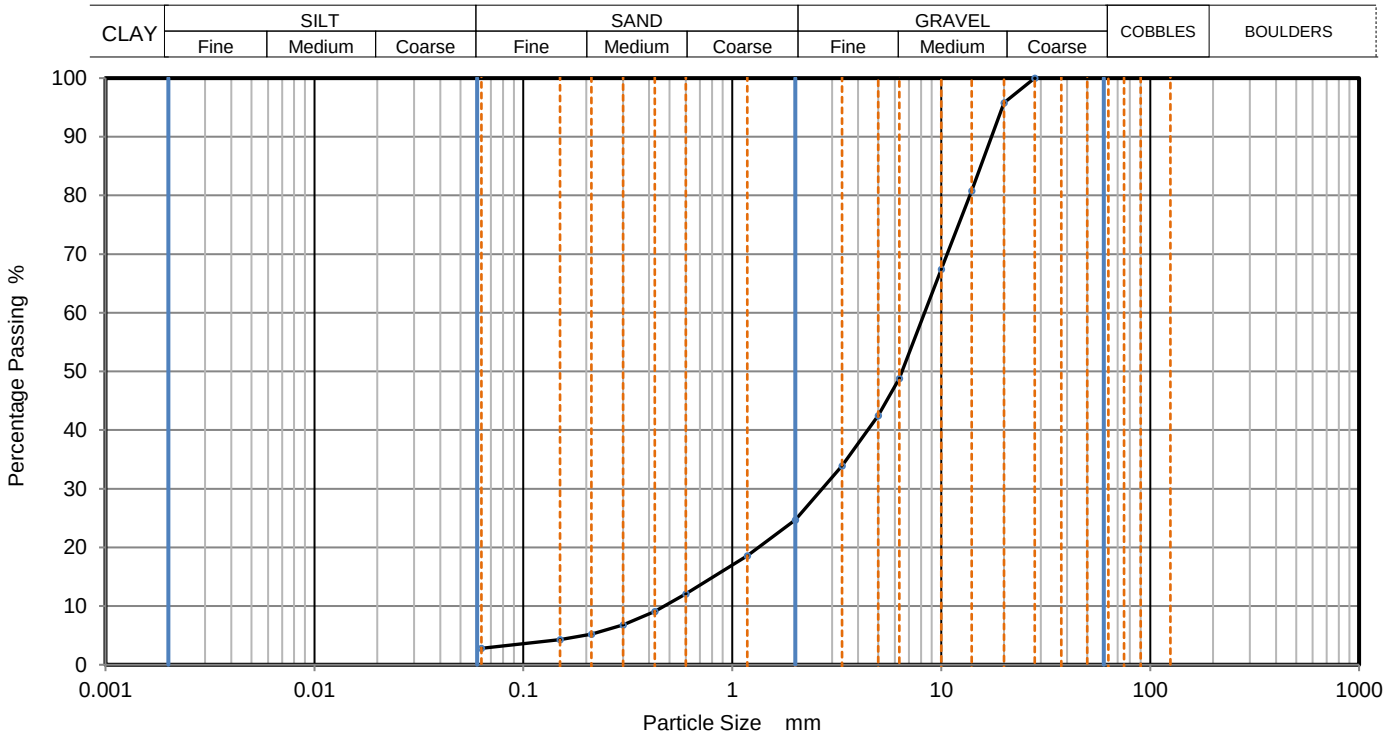
Grading Analysis		
D100	mm	20
D60	mm	6.61
D30	mm	0.375
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH018
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Grey slightly silty very sandy medium GRAVEL.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017111597



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	96		
14	81		
10	67		
6.3	49		
5	43		
3.35	34		
2	25		
1.18	19		
0.6	12		
0.425	9		
0.3	7		
0.212	5		
0.15	4		
0.063	3		

Dry Mass of sample, g: 798

Sample Proportions	% dry mass
Very coarse	0
Gravel	75
Sand	22
Fines <0.063mm	3

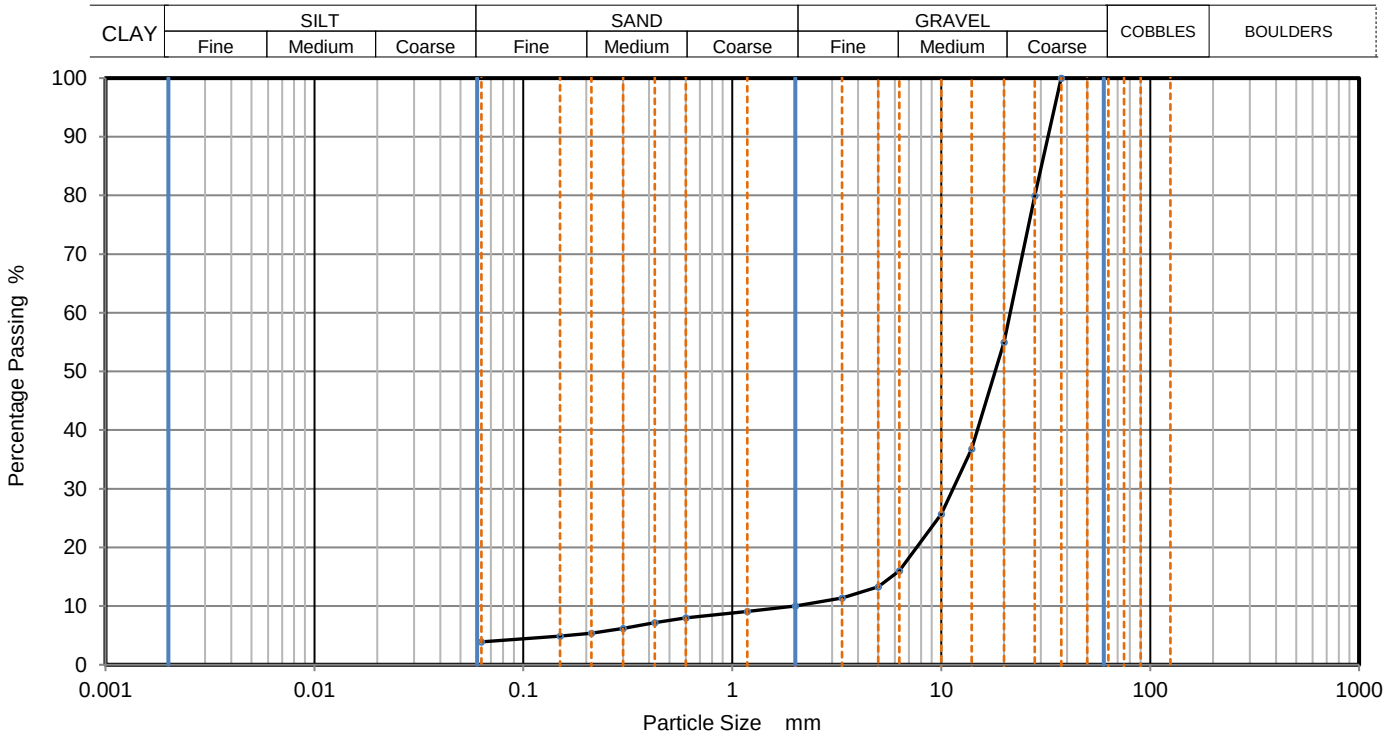
Grading Analysis		
D100	mm	28
D60	mm	8.32
D30	mm	2.69
D10	mm	0.47
Uniformity Coefficient		18
Curvature Coefficient		1.8

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH018
Site Name	WSP Eastern and Midlands			Sample No.	19
Soil Description	Grey slightly silty sandy medium and coarse GRAVEL.			Depth, m	6.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115100



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	80		
20	55		
14	37		
10	26		
6.3	16		
5	13		
3.35	11		
2	10		
1.18	9		
0.6	8		
0.425	7		
0.3	6		
0.212	5		
0.15	5		
0.063	4		

Dry Mass of sample, g	948

Sample Proportions	% dry mass
Very coarse	0
Gravel	90
Sand	6
Fines <0.063mm	4

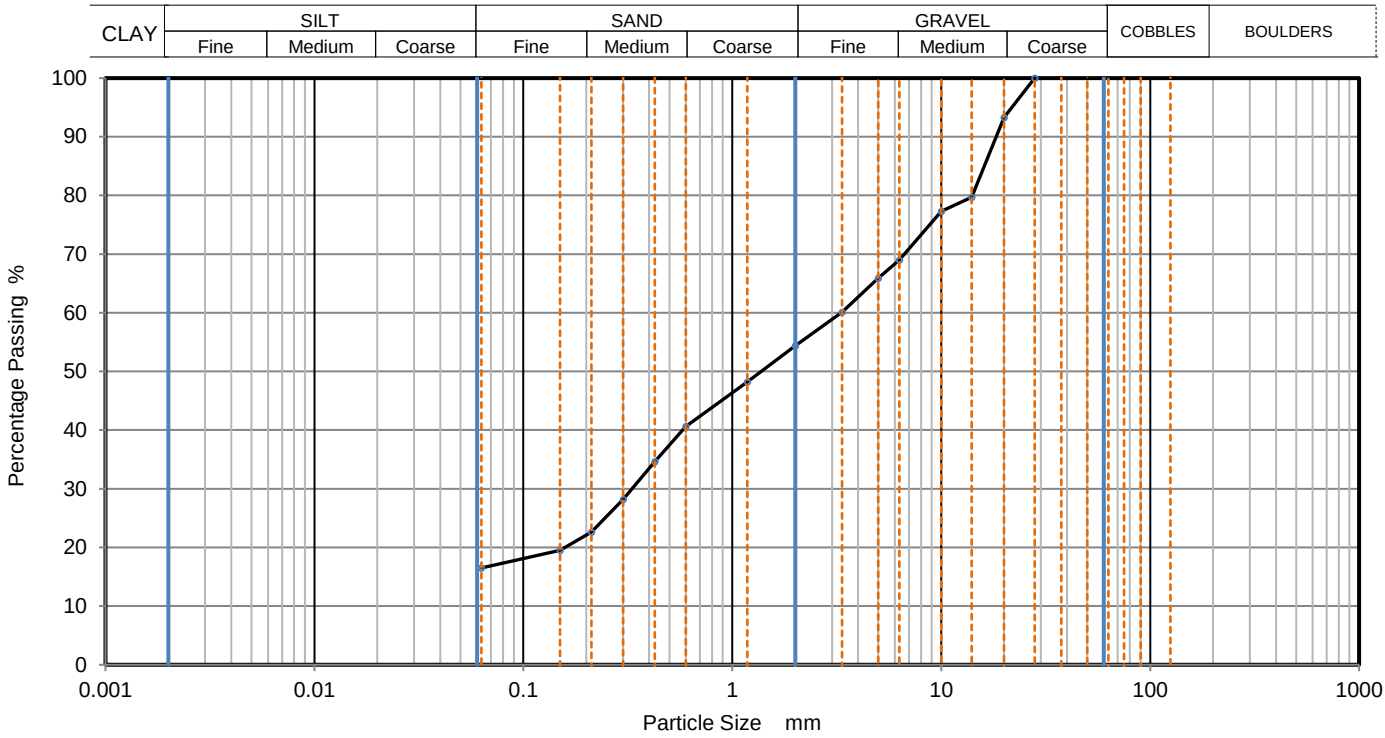
Grading Analysis		
D100	mm	37.5
D60	mm	21.4
D30	mm	11.4
D10	mm	2
Uniformity Coefficient		11
Curvature Coefficient		3

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH019
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Mottled brown silty very sandy medium GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115109



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	93		
14	80		
10	77		
6.3	69		
5	66		
3.35	60		
2	54		
1.18	48		
0.6	41		
0.425	35		
0.3	28		
0.212	23		
0.15	20		
0.063	17		

Dry Mass of sample, g	493

Sample Proportions	% dry mass
Very coarse	0
Gravel	46
Sand	38
Fines <0.063mm	17

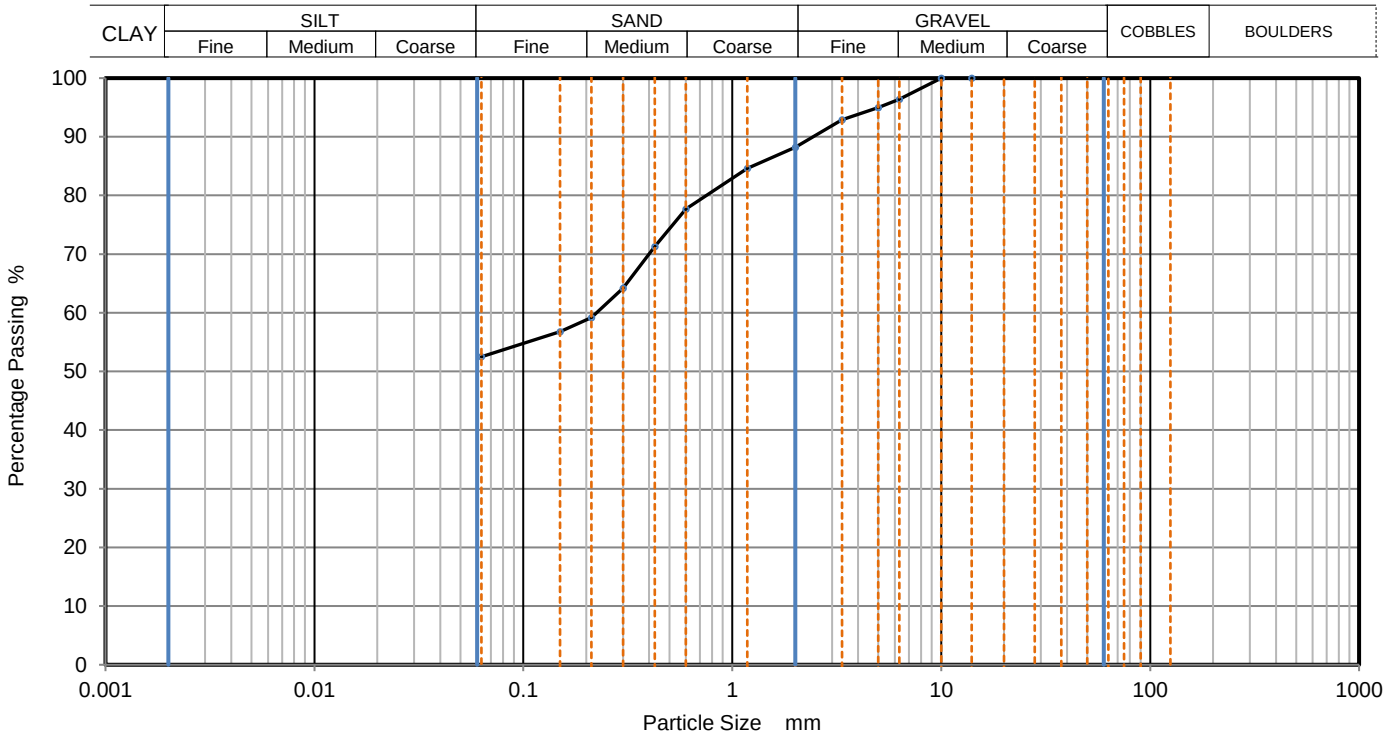
Grading Analysis		
D100	mm	28
D60	mm	3.32
D30	mm	0.331
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH019
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Black slightly gravelly sandy SILT / PEAT.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115112



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	96		
5	95		
3.35	93		
2	88		
1.18	85		
0.6	78		
0.425	71		
0.3	64		
0.212	59		
0.15	57		
0.063	53		

Dry Mass of sample, g	81

Sample Proportions	% dry mass
Very coarse	0
Gravel	12
Sand	36
Fines <0.063mm	53

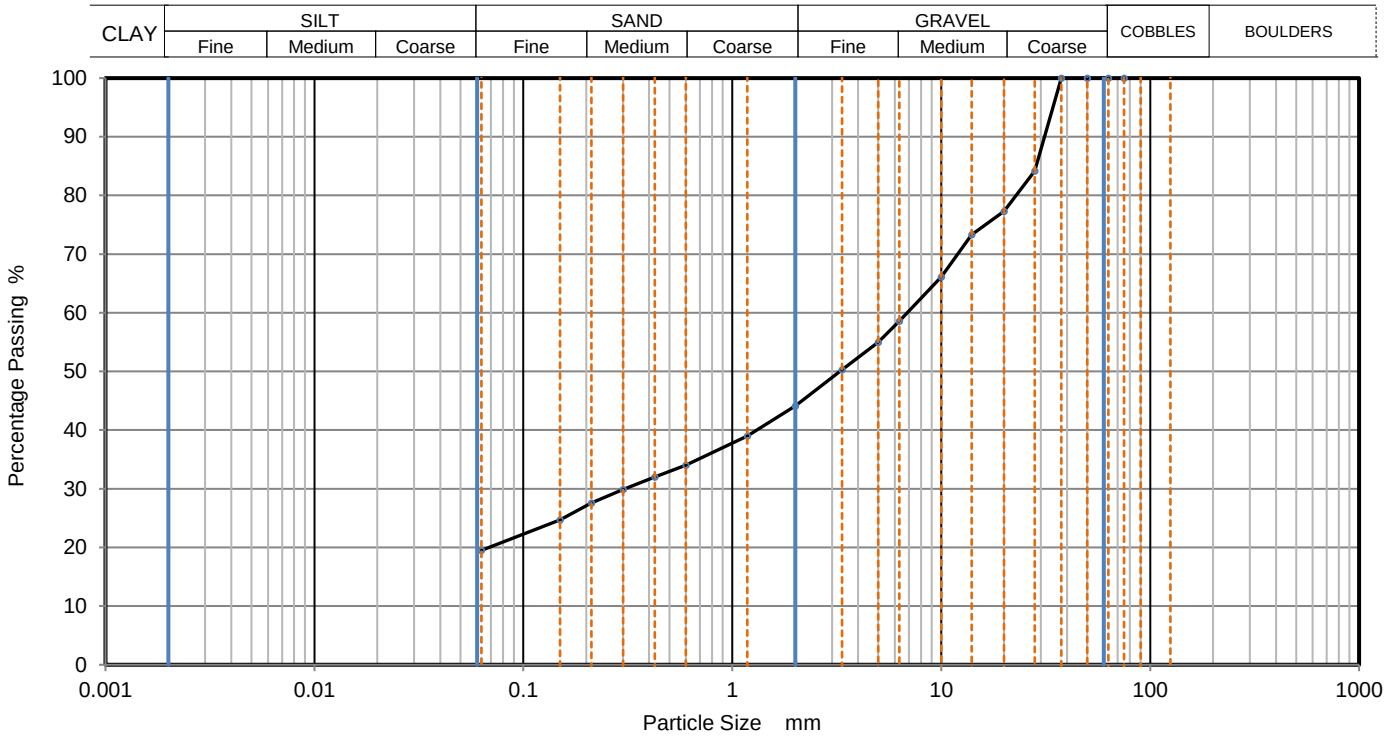
Grading Analysis		
D100	mm	
D60	mm	0.224
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH020
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Dark grey very silty very sandy coarse GRAVEL.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911404



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	84		
20	77		
14	73		
10	66		
6.3	59		
5	55		
3.35	50		
2	44		
1.18	39		
0.6	34		
0.425	32		
0.3	30		
0.212	28		
0.15	25		
0.063	20		

Dry Mass of sample, g	1032

Sample Proportions	% dry mass
Very coarse	0
Gravel	56
Sand	25
Fines <0.063mm	20

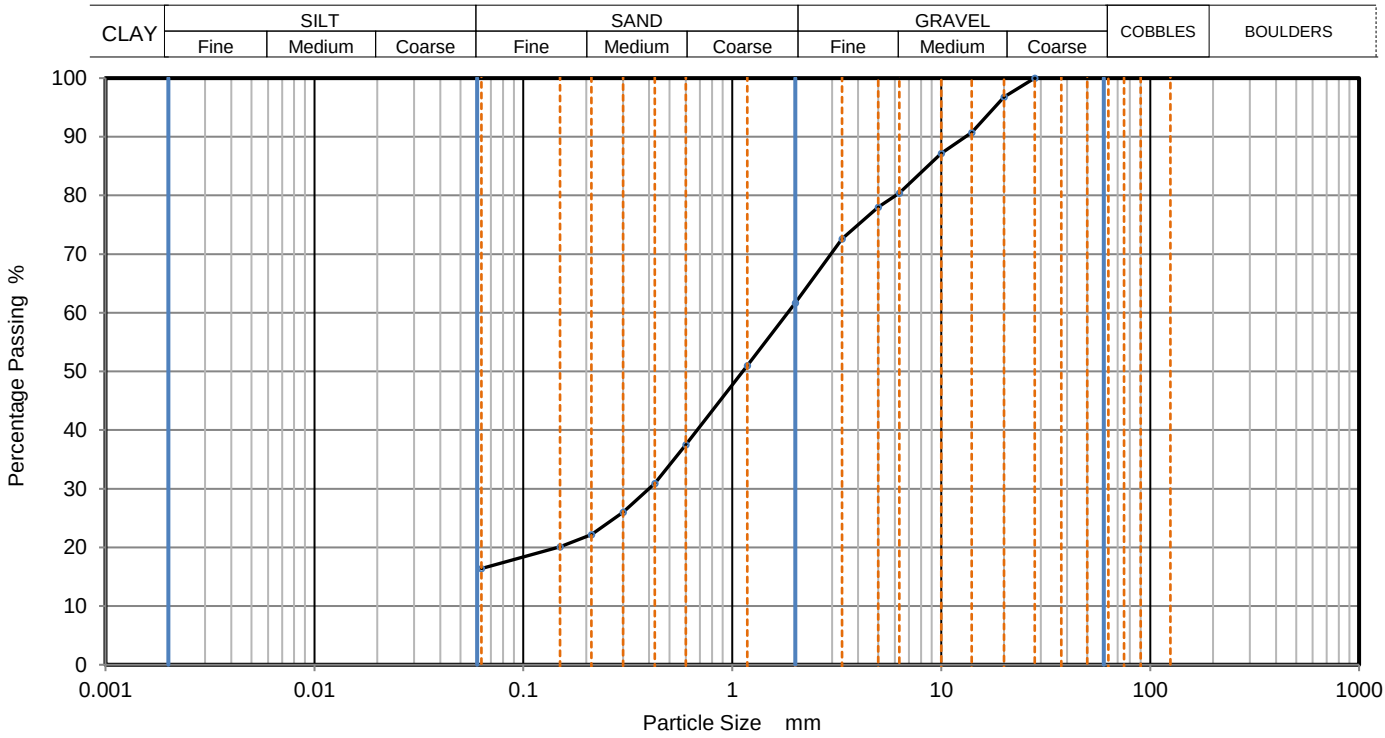
Grading Analysis		
D100	mm	
D60	mm	6.86
D30	mm	0.305
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH022
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey-brown silty very gravelly coarse SAND.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911428



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	91		
10	87		
6.3	80		
5	78		
3.35	73		
2	62		
1.18	51		
0.6	38		
0.425	31		
0.3	26		
0.212	22		
0.15	20		
0.063	16		

Dry Mass of sample, g: 1117

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	45
Fines <0.063mm	16

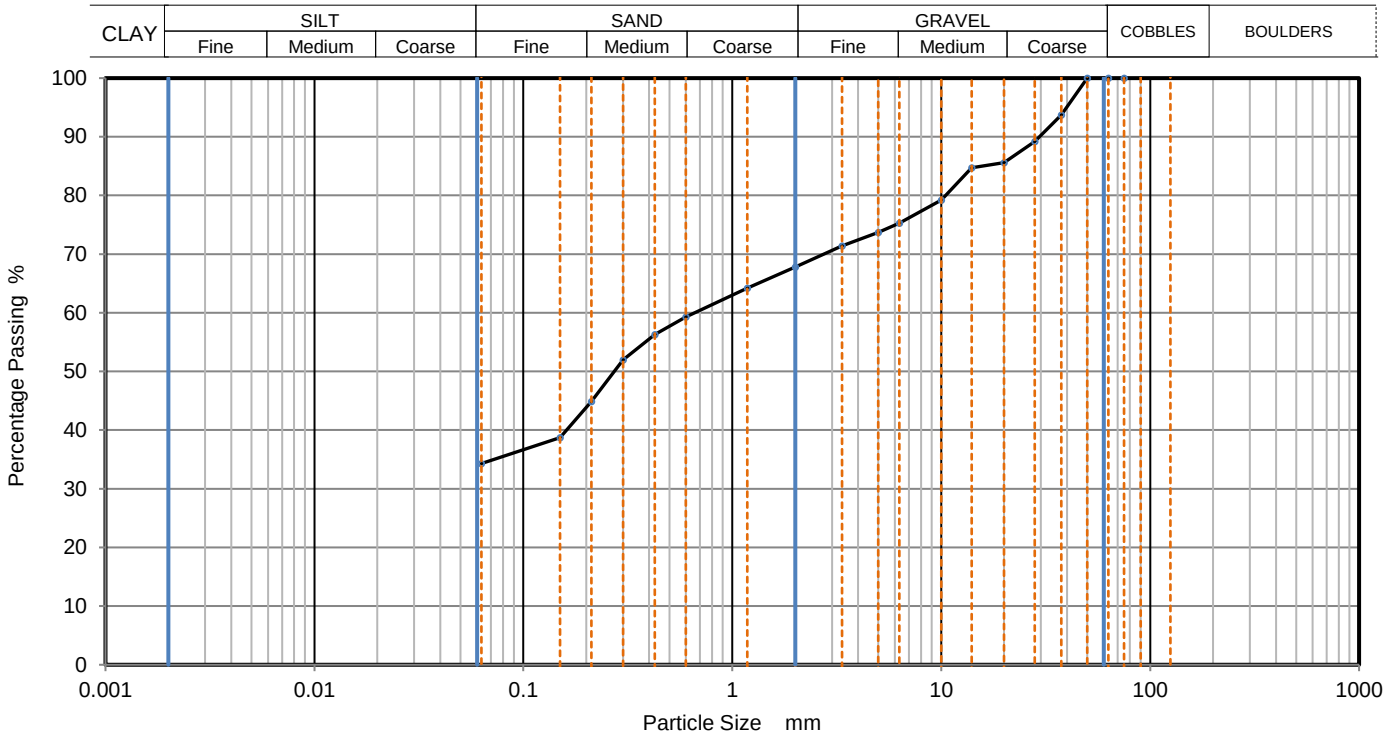
Grading Analysis		
D100	mm	28
D60	mm	1.84
D30	mm	0.398
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH023
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey very silty SAND and GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911449



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	94		
28	89		
20	86		
14	85		
10	79		
6.3	75		
5	74		
3.35	71		
2	68		
1.18	64		
0.6	59		
0.425	56		
0.3	52		
0.212	45		
0.15	39		
0.063	34		

Dry Mass of sample, g: 1569

Sample Proportions	% dry mass
Very coarse	0
Gravel	32
Sand	34
Fines <0.063mm	34

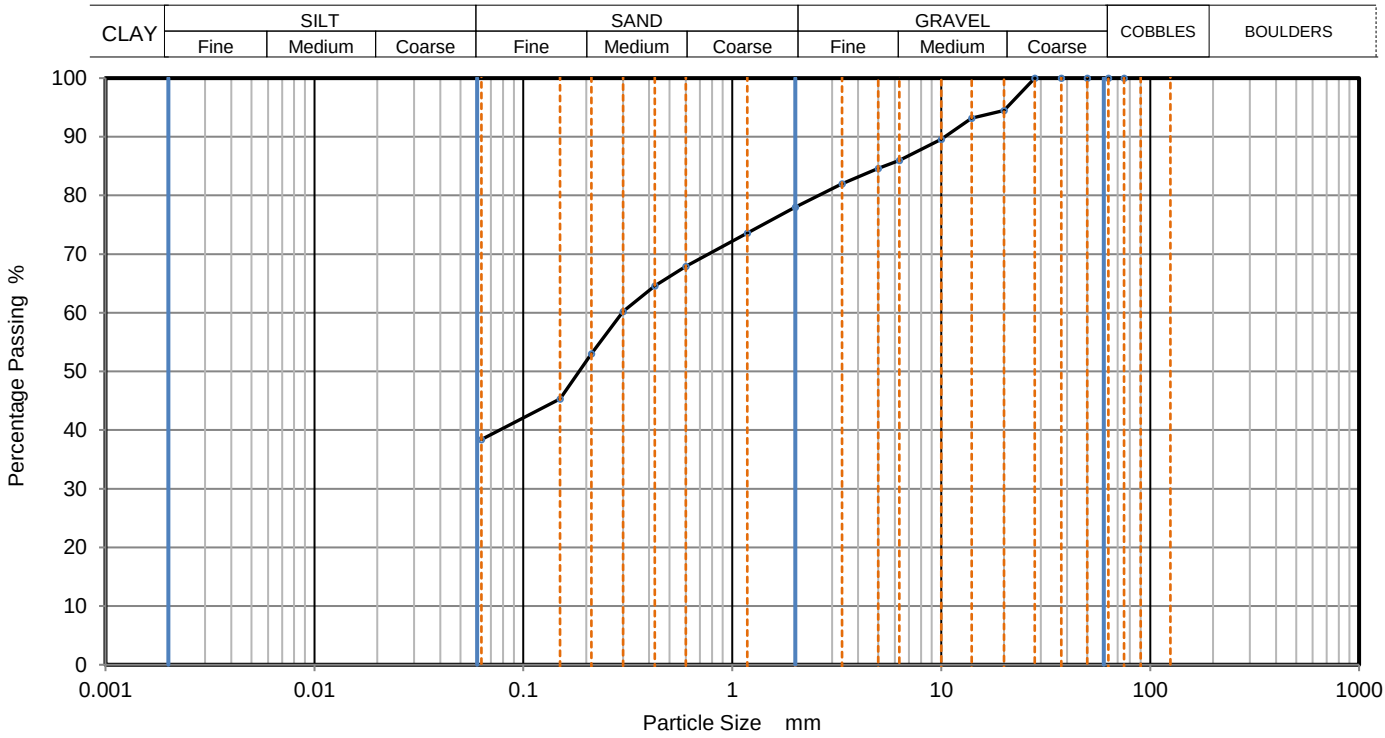
Grading Analysis		
D100	mm	
D60	mm	0.659
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH023
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Grey slightly gravelly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911452



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	95		
14	93		
10	90		
6.3	86		
5	85		
3.35	82		
2	78		
1.18	74		
0.6	68		
0.425	65		
0.3	60		
0.212	53		
0.15	45		
0.063	38		

Dry Mass of sample, g	1116

Sample Proportions	% dry mass
Very coarse	0
Gravel	22
Sand	40
Fines <0.063mm	38

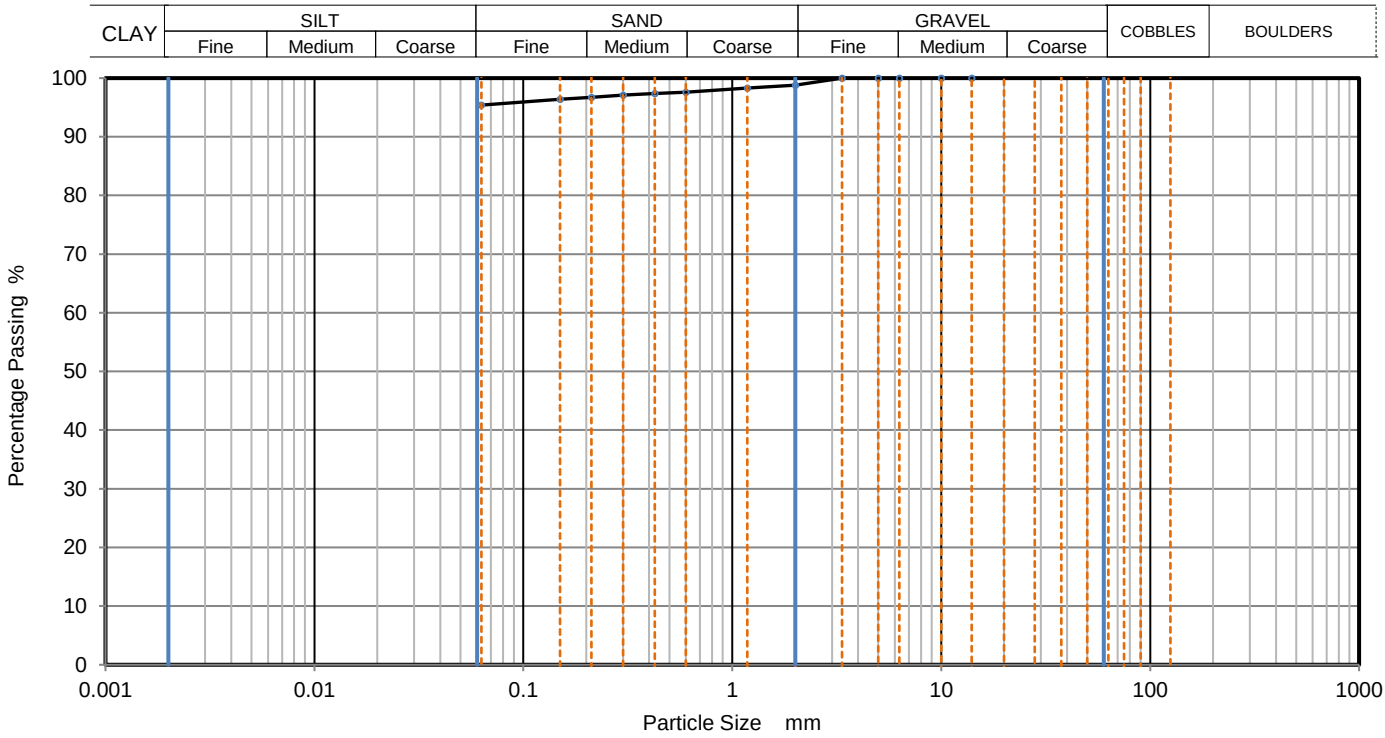
Grading Analysis		
D100	mm	
D60	mm	0.298
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH027
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Black slightly sandy SILT / PEAT.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115127



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	98		
0.6	98		
0.425	97		
0.3	97		
0.212	97		
0.15	96		
0.063	95		

Dry Mass of sample, g	72

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	3
Fines <0.063mm	95

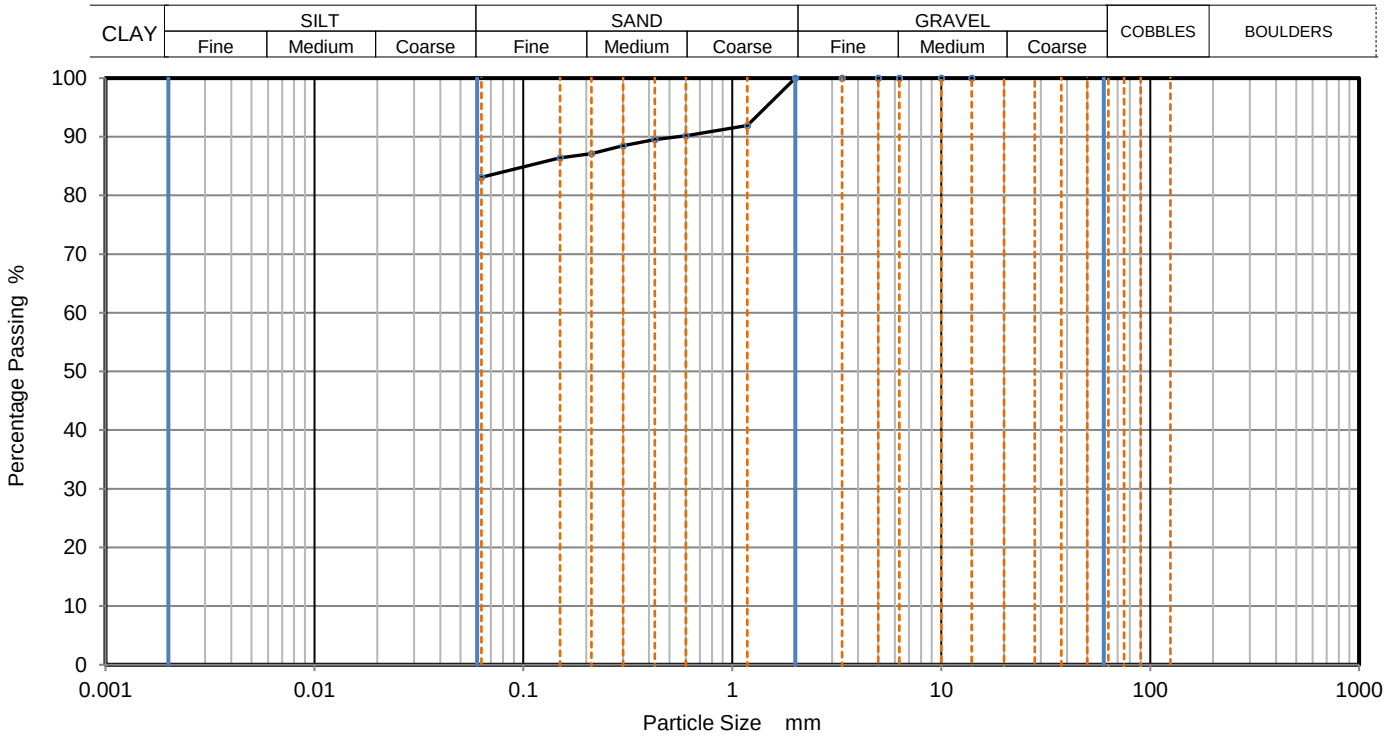
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH027
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Black slightly sandy SILT / PEAT.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115130



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	92		
0.6	90		
0.425	90		
0.3	89		
0.212	87		
0.15	86		
0.063	83		

Dry Mass of sample, g	30

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	17
Fines <0.063mm	83

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

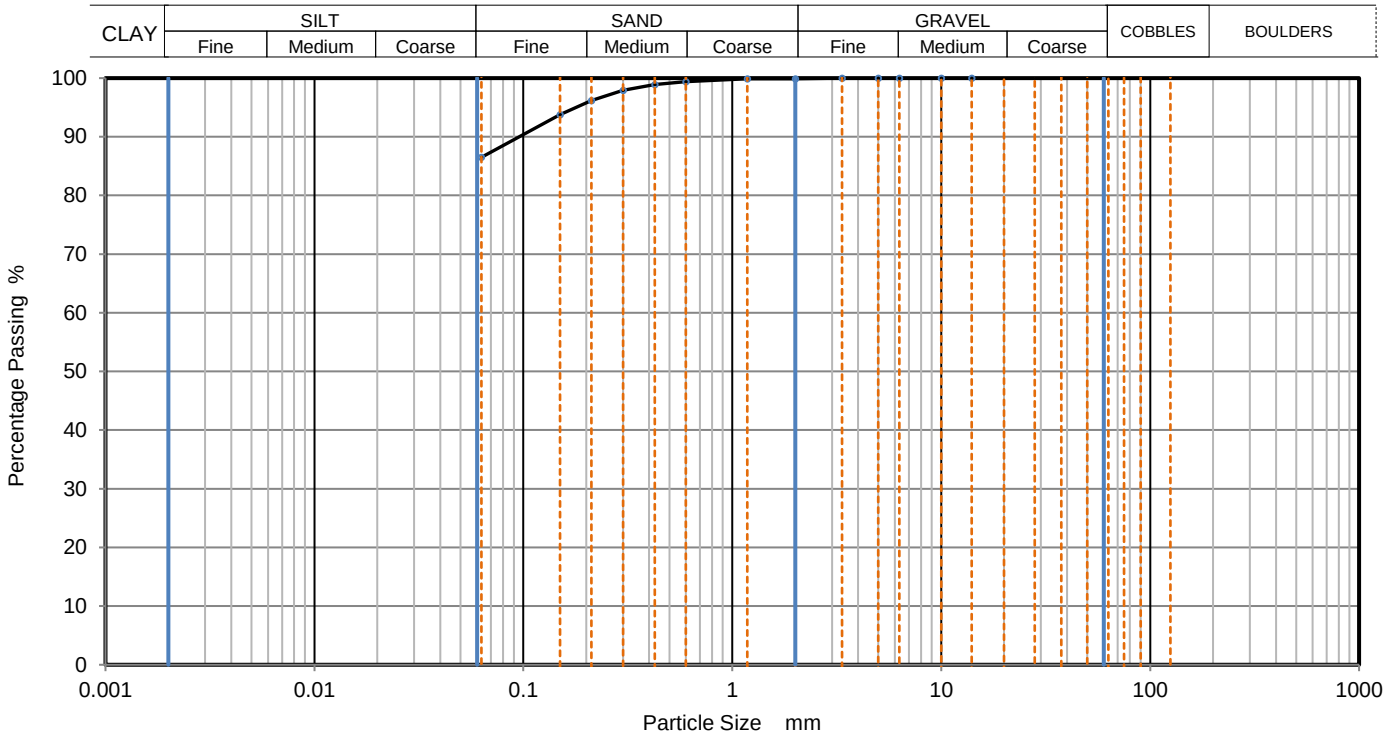
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH027
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115136



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	99		
0.3	98		
0.212	96		
0.15	94		
0.063	87		

Dry Mass of sample, g: 236

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	13
Fines <0.063mm	86

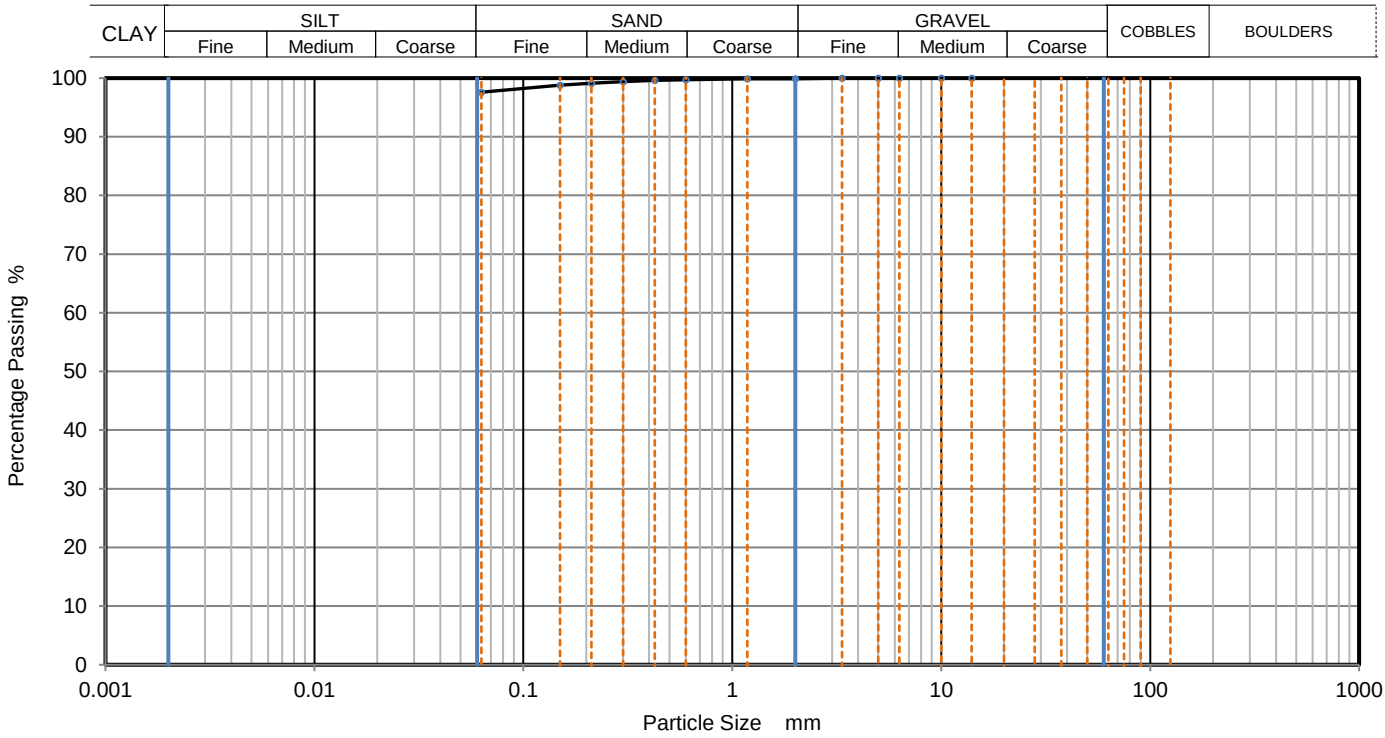
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH030
Site Name	WSP Eastern and Midlands			Sample No.	6
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	1.70
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201710205



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	99		
0.15	99		
0.063	98		

Dry Mass of sample, g	513

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	2
Fines <0.063mm	98

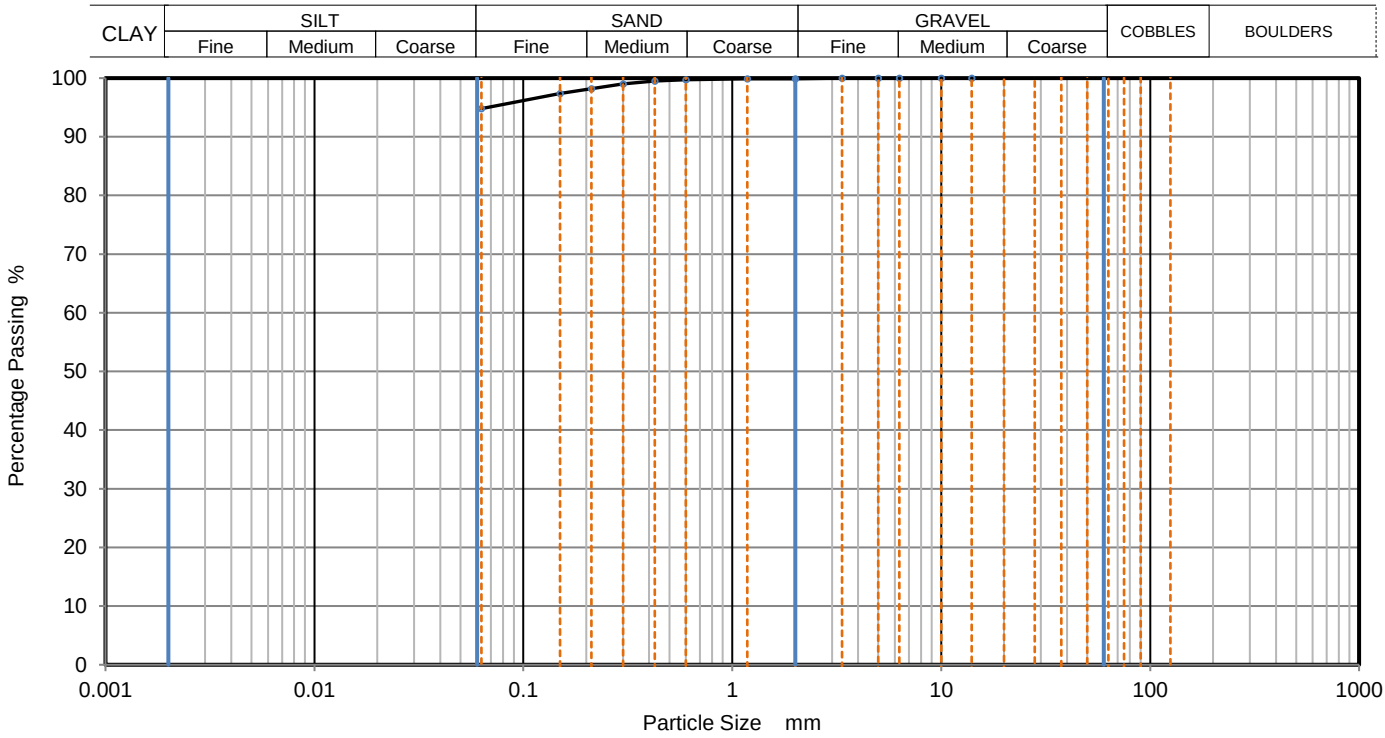
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH030
Site Name	WSP Eastern and Midlands			Sample No.	9
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201710208



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	99		
0.212	98		
0.15	97		
0.063	95		

Dry Mass of sample, g	700

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	5
Fines <0.063mm	95

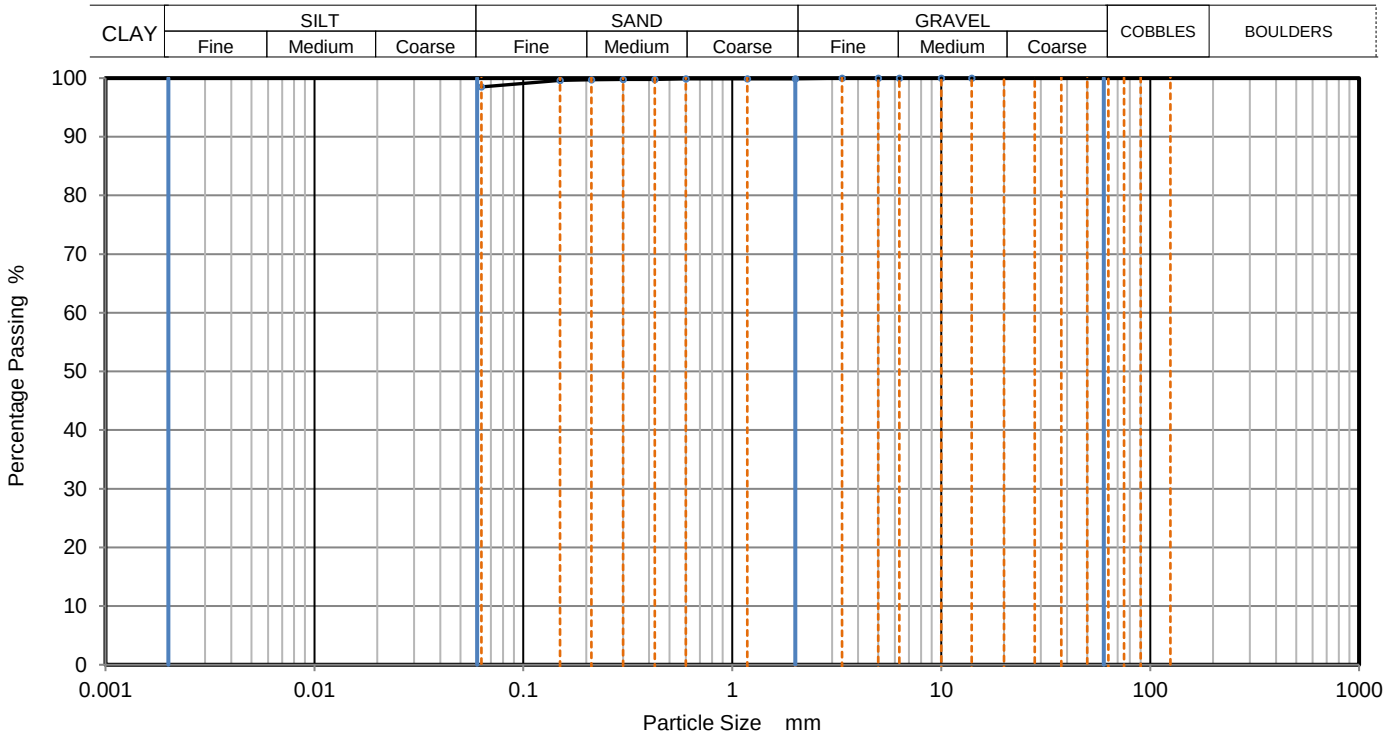
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH030
Site Name	WSP Eastern and Midlands			Sample No.	12
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102011



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	100		
0.063	99		

Dry Mass of sample, g	862

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	1
Fines <0.063mm	98

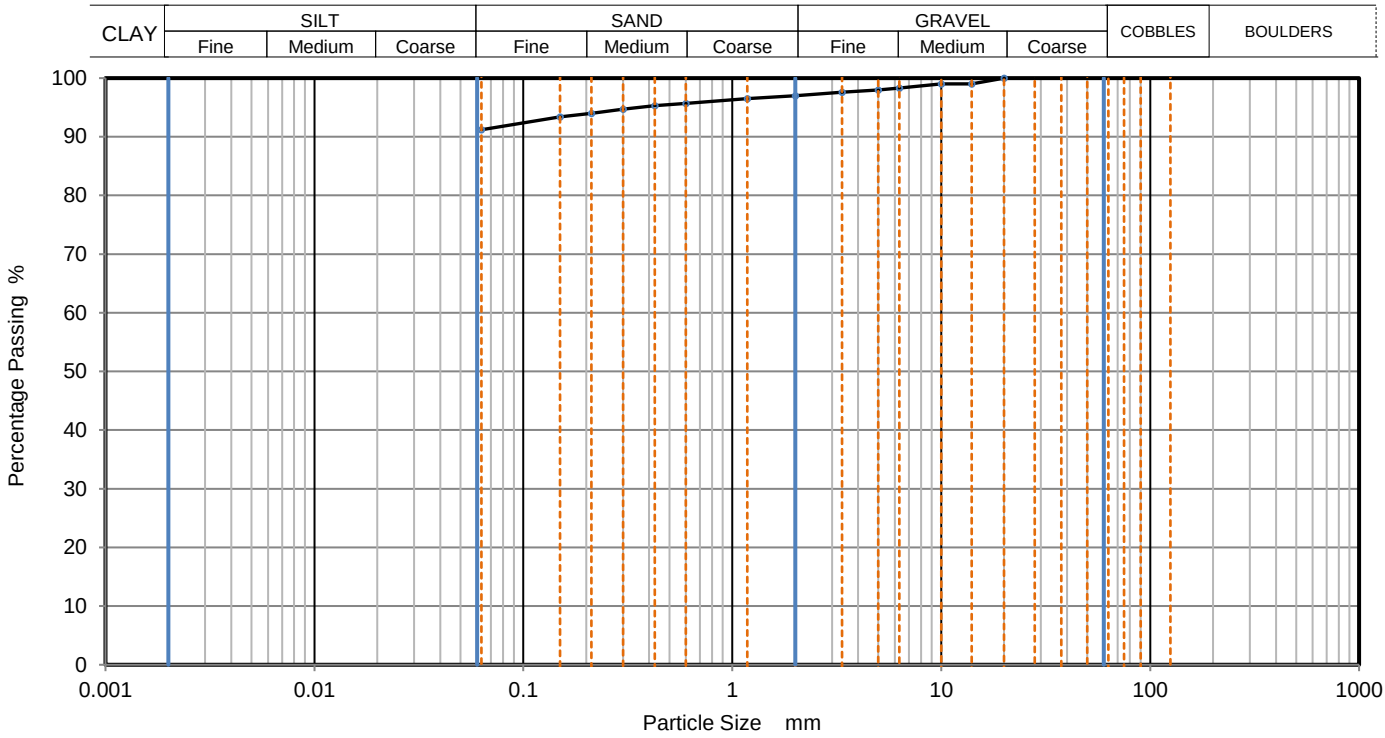
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH030
Site Name	WSP Eastern and Midlands			Sample No.	15
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102014



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	99		
10	99		
6.3	98		
5	98		
3.35	98		
2	97		
1.18	97		
0.6	96		
0.425	95		
0.3	95		
0.212	94		
0.15	93		
0.063	91		

Dry Mass of sample, g	1079

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	6
Fines <0.063mm	91

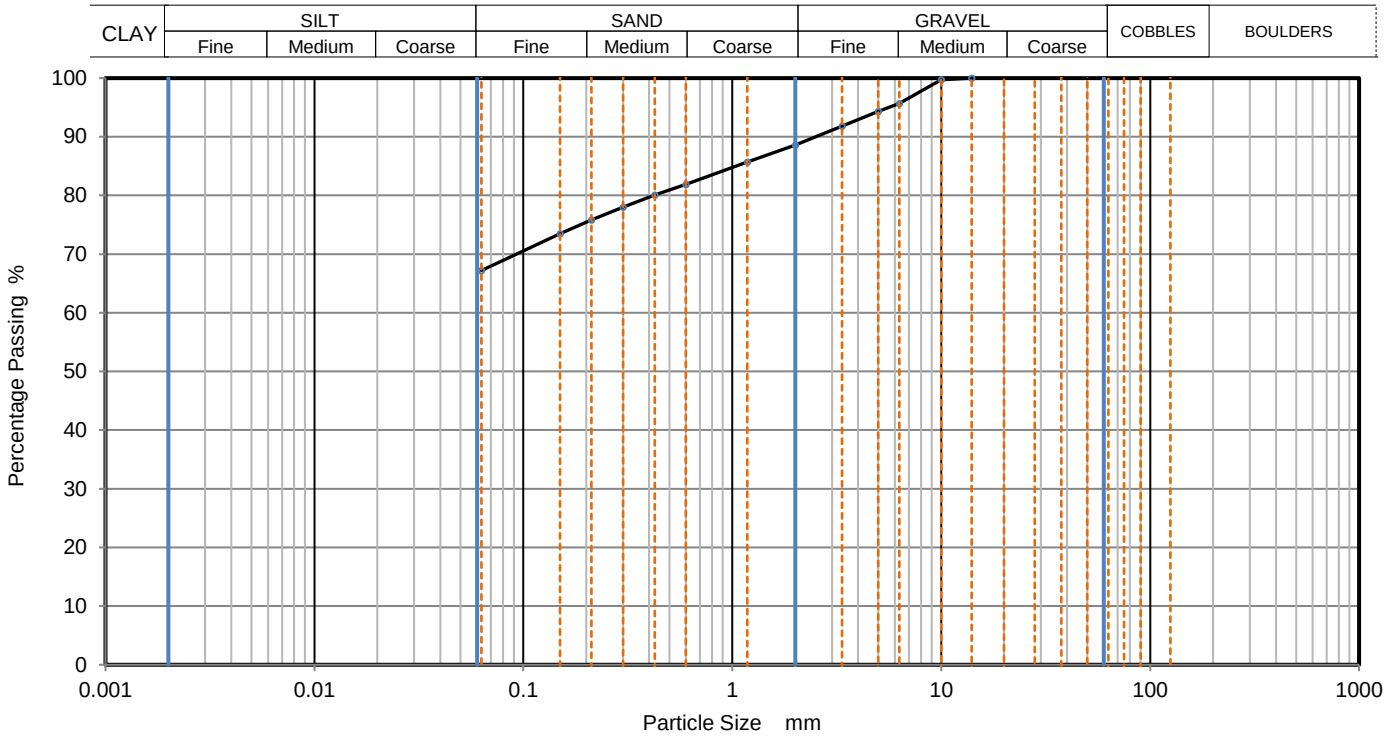
Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH030
Site Name	WSP Eastern and Midlands			Sample No.	21
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	6.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102020



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	96		
5	94		
3.35	92		
2	89		
1.18	86		
0.6	82		
0.425	80		
0.3	78		
0.212	76		
0.15	74		
0.063	67		

Dry Mass of sample, g	982

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	21
Fines <0.063mm	67

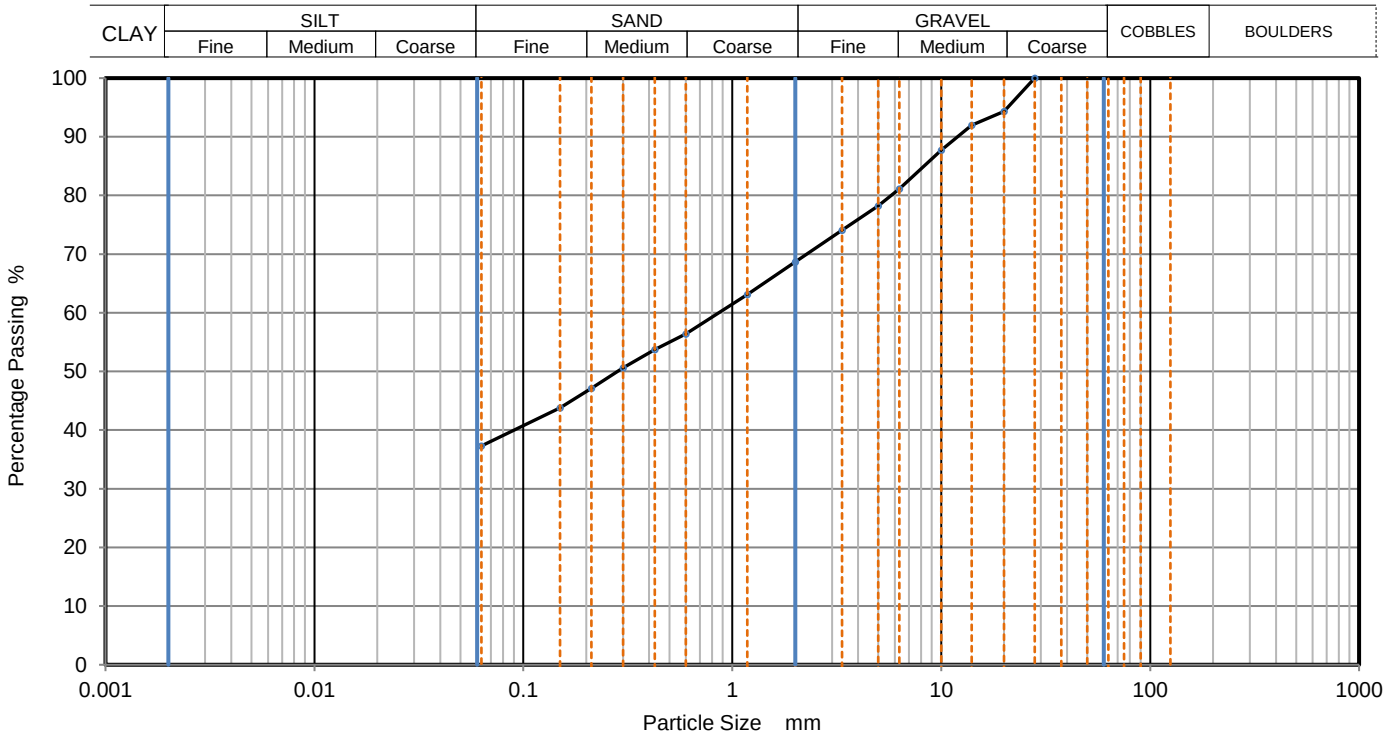
Grading Analysis		
D100	mm	14
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH030
Site Name	WSP Eastern and Midlands			Sample No.	24
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	7.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102023



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	94		
14	92		
10	88		
6.3	81		
5	78		
3.35	74		
2	69		
1.18	63		
0.6	56		
0.425	54		
0.3	51		
0.212	47		
0.15	44		
0.063	37		

Dry Mass of sample, g	652

Sample Proportions	% dry mass
Very coarse	0
Gravel	31
Sand	31
Fines <0.063mm	37

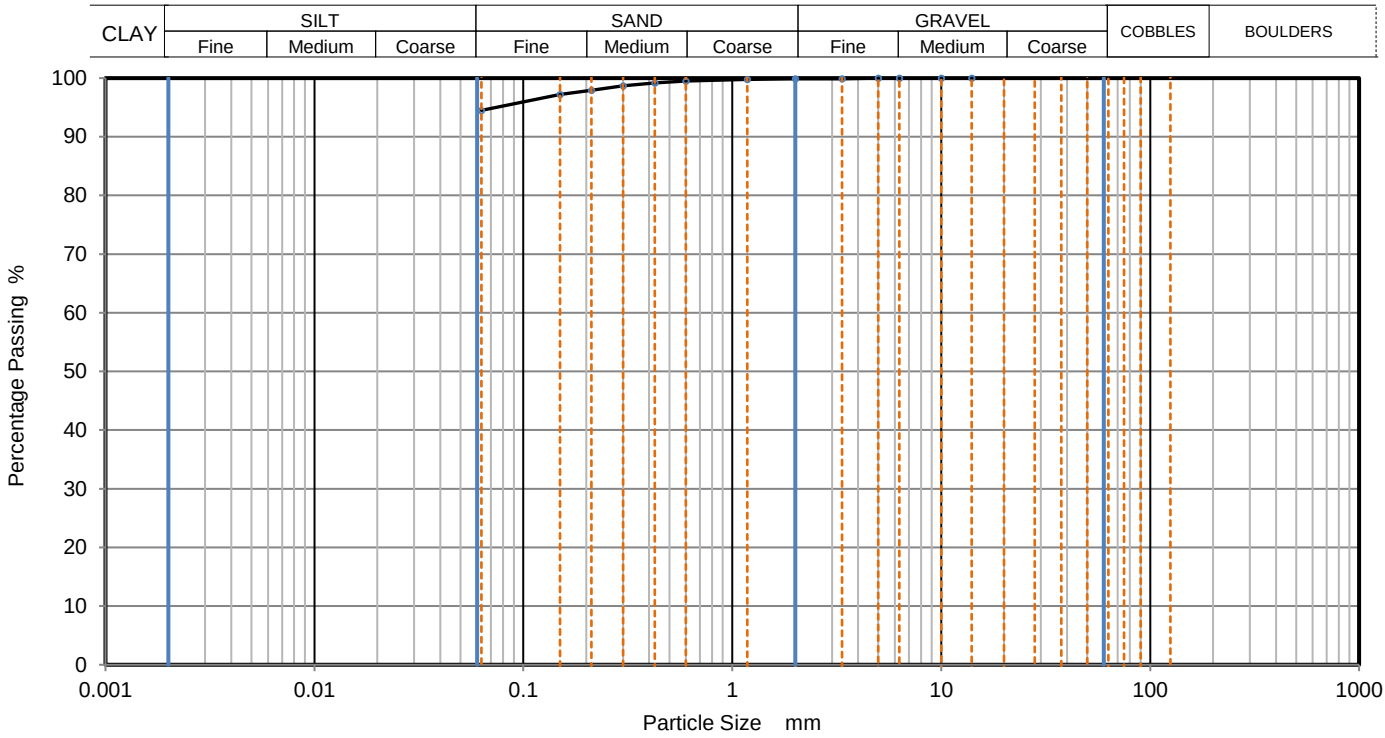
Grading Analysis		
D100	mm	28
D60	mm	0.861
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH031
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102032



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	99		
0.3	99		
0.212	98		
0.15	97		
0.063	95		

Dry Mass of sample, g: 977

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	5
Fines <0.063mm	95

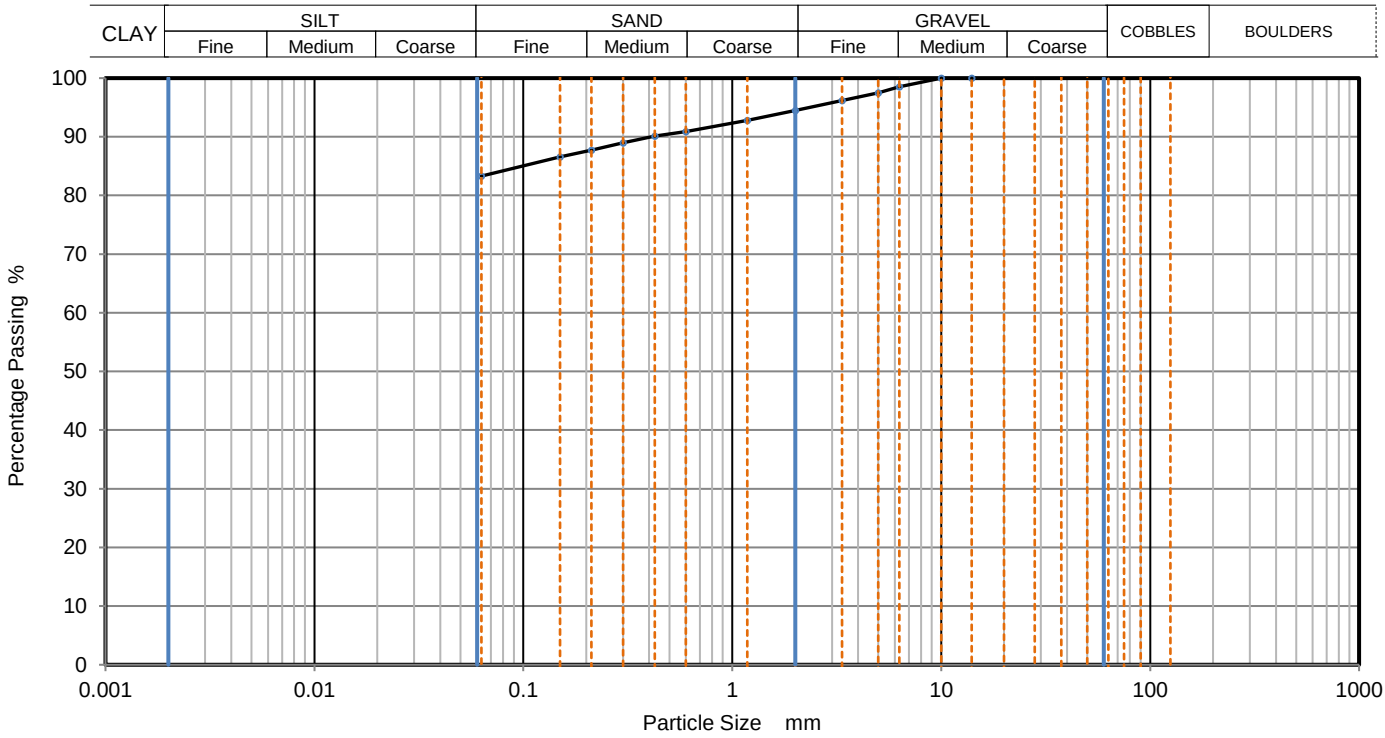
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH031
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102035



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	99		
5	98		
3.35	96		
2	95		
1.18	93		
0.6	91		
0.425	90		
0.3	89		
0.212	88		
0.15	87		
0.063	83		

Dry Mass of sample, g	786

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	11
Fines <0.063mm	83

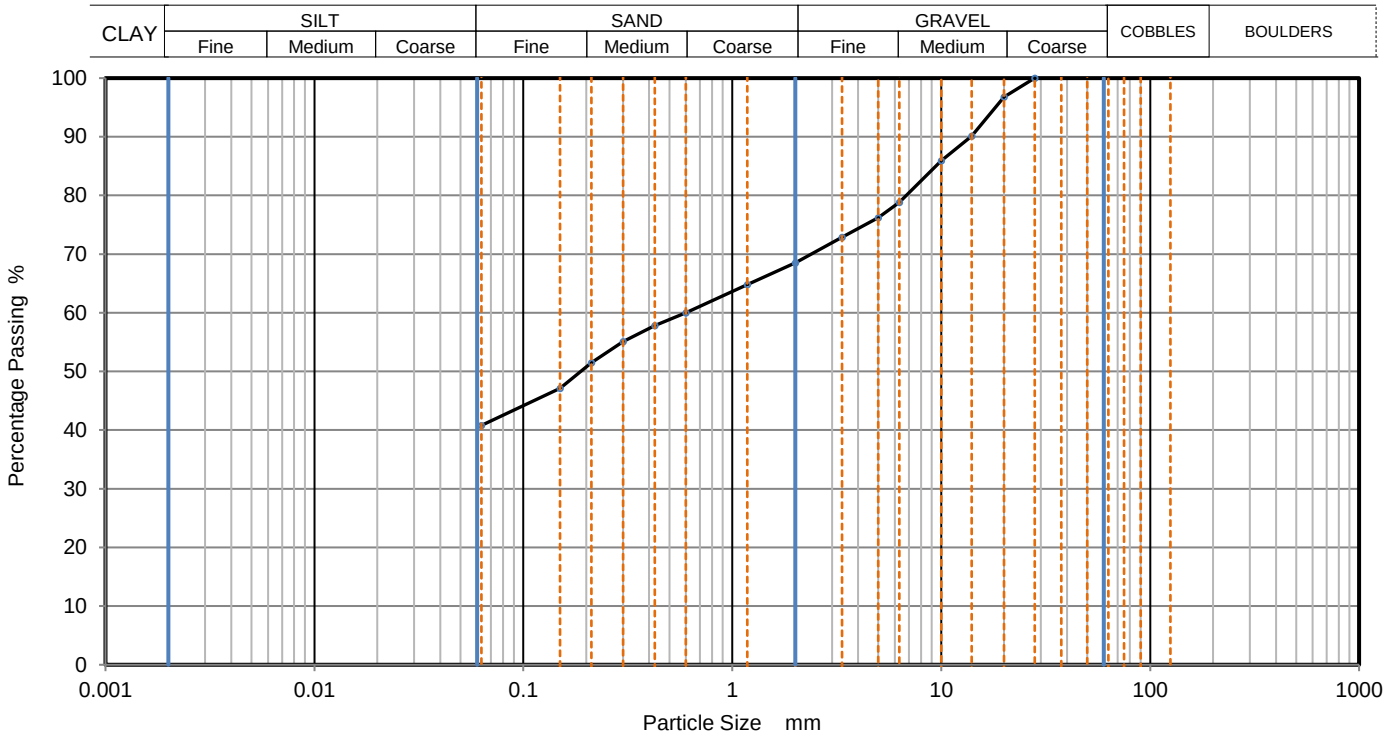
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH031
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102038



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	90		
10	86		
6.3	79		
5	76		
3.35	73		
2	69		
1.18	65		
0.6	60		
0.425	58		
0.3	55		
0.212	52		
0.15	47		
0.063	41		

Dry Mass of sample, g	1173

Sample Proportions	% dry mass
Very coarse	0
Gravel	32
Sand	28
Fines <0.063mm	41

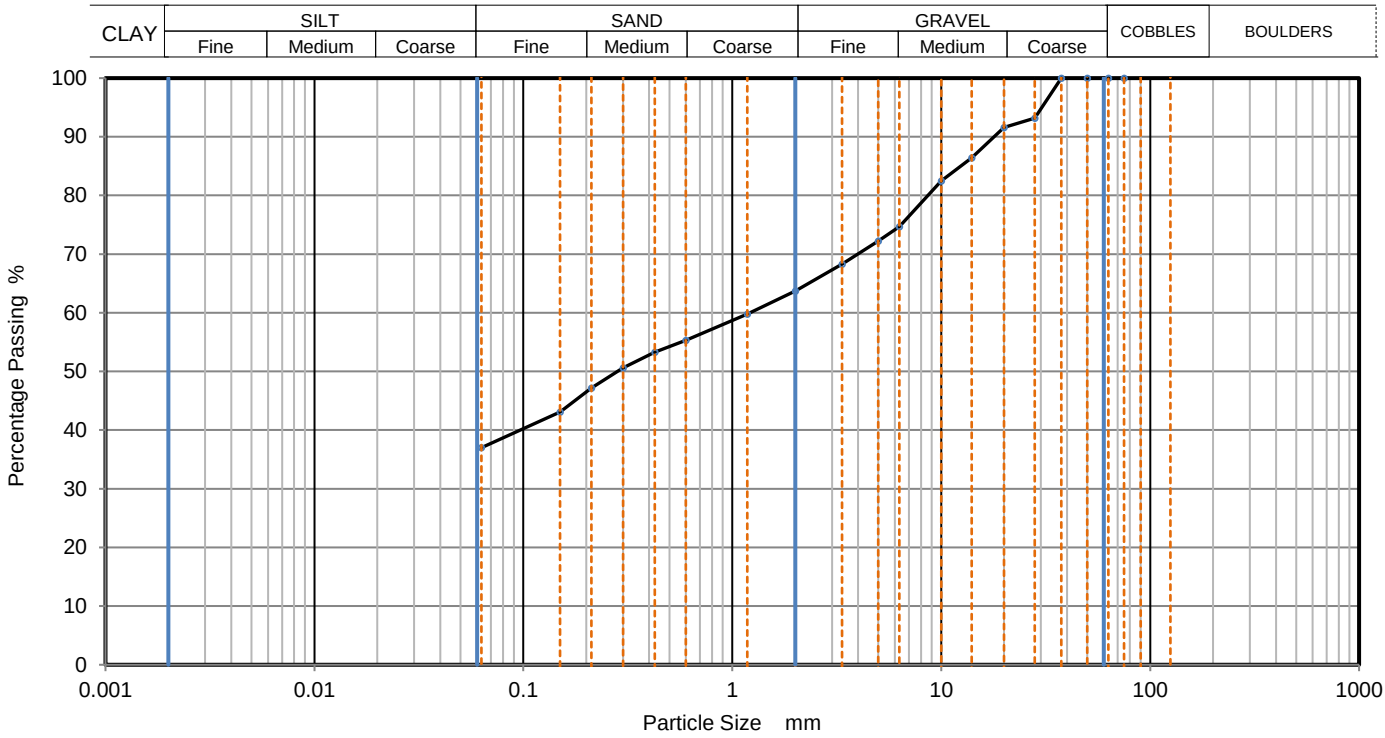
Grading Analysis		
D100	mm	28
D60	mm	0.603
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH032
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey-brown slightly sandy gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102050



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	92		
14	86		
10	83		
6.3	75		
5	72		
3.35	68		
2	64		
1.18	60		
0.6	55		
0.425	53		
0.3	51		
0.212	47		
0.15	43		
0.063	37		

Dry Mass of sample, g	1001

Sample Proportions	% dry mass
Very coarse	0
Gravel	36
Sand	27
Fines <0.063mm	37

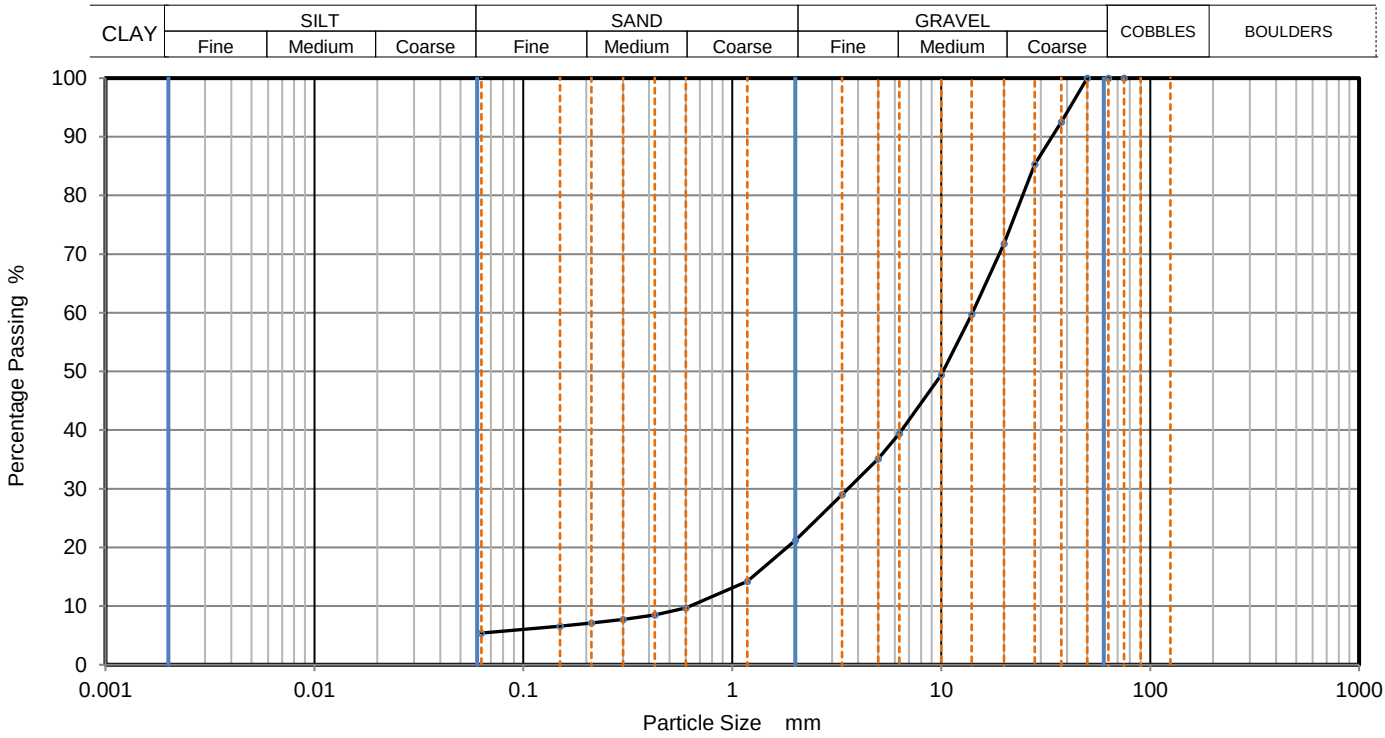
Grading Analysis		
D100	mm	
D60	mm	1.21
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH046
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey silty sandy medium and coarse GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201710100



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	93		
28	85		
20	72		
14	60		
10	49		
6.3	39		
5	35		
3.35	29		
2	21		
1.18	14		
0.6	10		
0.425	9		
0.3	8		
0.212	7		
0.15	7		
0.063	5		

Dry Mass of sample, g: 1457

Sample Proportions	% dry mass
Very coarse	0
Gravel	79
Sand	16
Fines <0.063mm	5

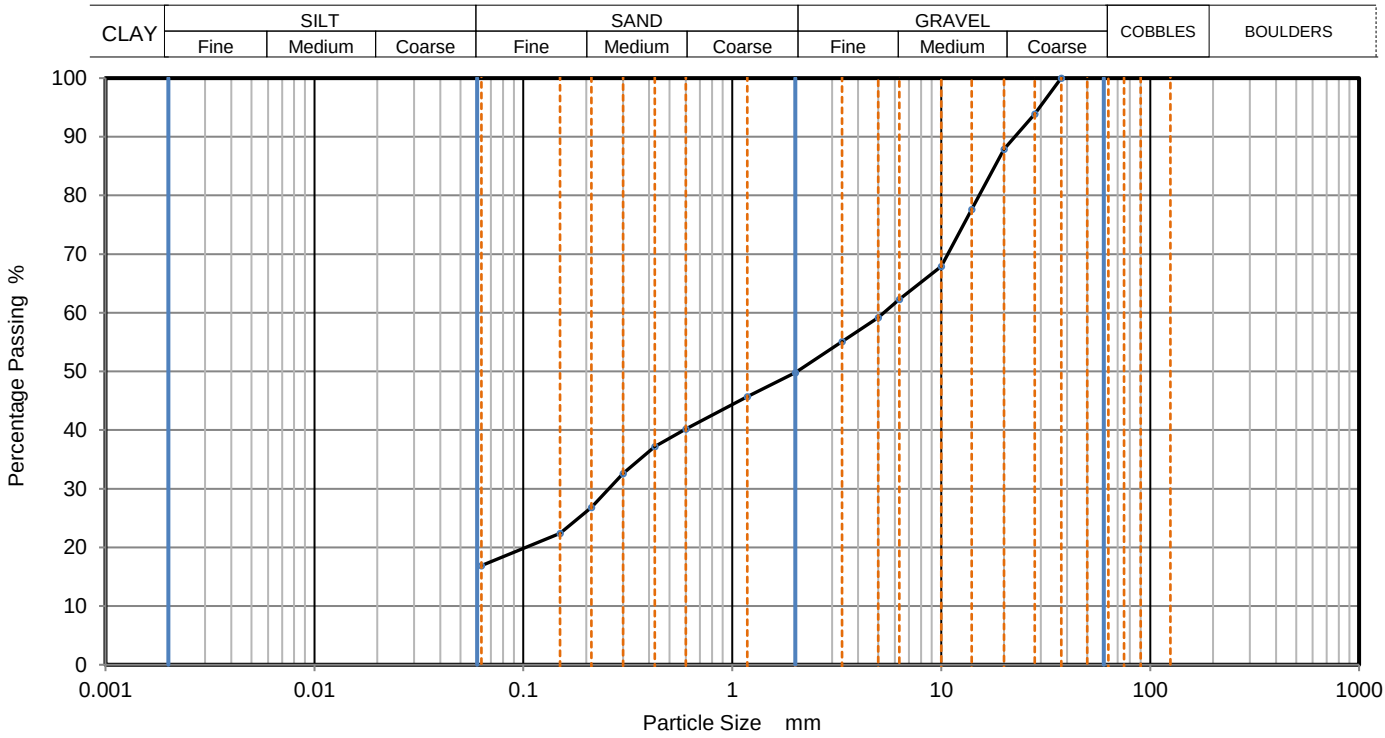
Grading Analysis		
D100	mm	
D60	mm	14.1
D30	mm	3.57
D10	mm	0.628
Uniformity Coefficient		22
Curvature Coefficient		1.4

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH048
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown silty very sandy medium GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911516



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	94		
20	88		
14	78		
10	68		
6.3	62		
5	59		
3.35	55		
2	50		
1.18	46		
0.6	40		
0.425	37		
0.3	33		
0.212	27		
0.15	22		
0.063	17		

Dry Mass of sample, g	874

Sample Proportions	% dry mass
Very coarse	0
Gravel	50
Sand	33
Fines <0.063mm	17

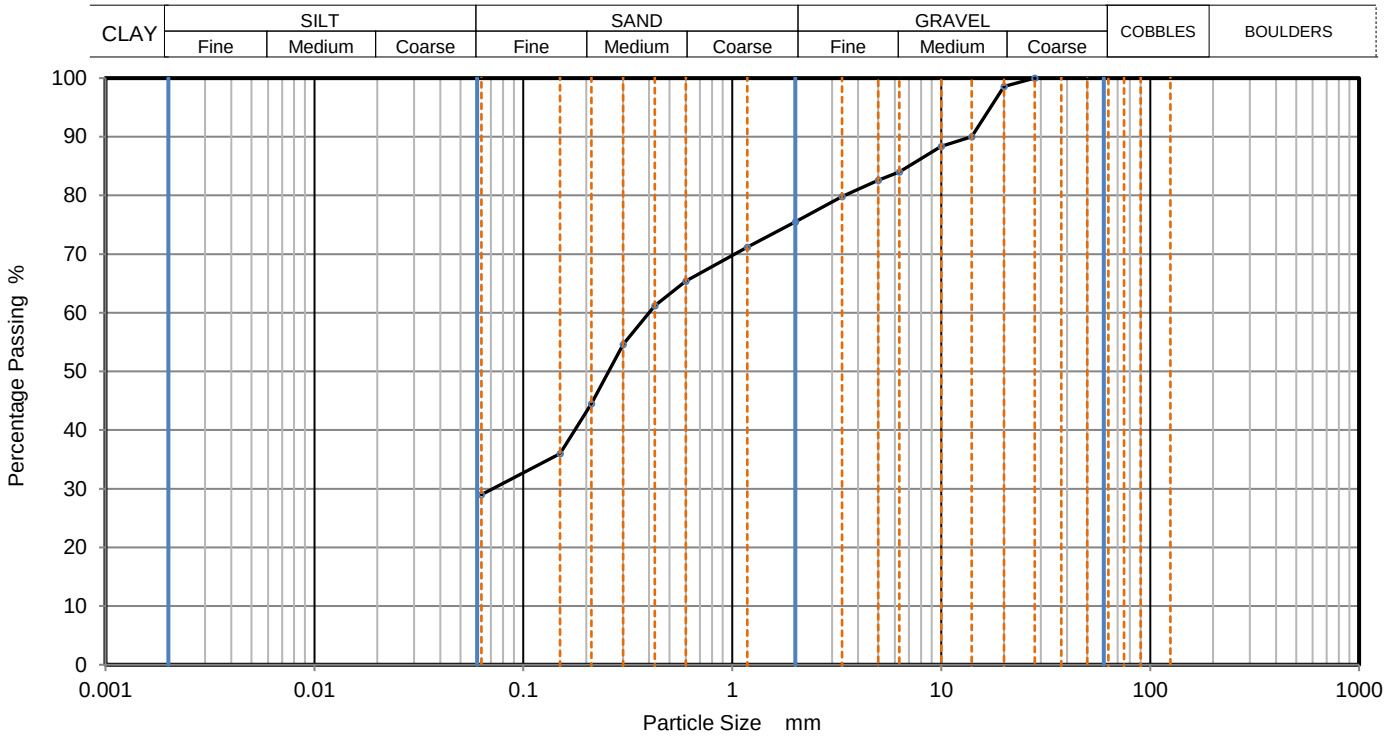
Grading Analysis		
D100	mm	37.5
D60	mm	5.29
D30	mm	0.257
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH049
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown very gravelly very silty SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911537



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	99		
14	90		
10	88		
6.3	84		
5	83		
3.35	80		
2	76		
1.18	71		
0.6	65		
0.425	61		
0.3	55		
0.212	45		
0.15	36		
0.063	29		

Dry Mass of sample, g	1106

Sample Proportions	% dry mass
Very coarse	0
Gravel	25
Sand	47
Fines <0.063mm	29

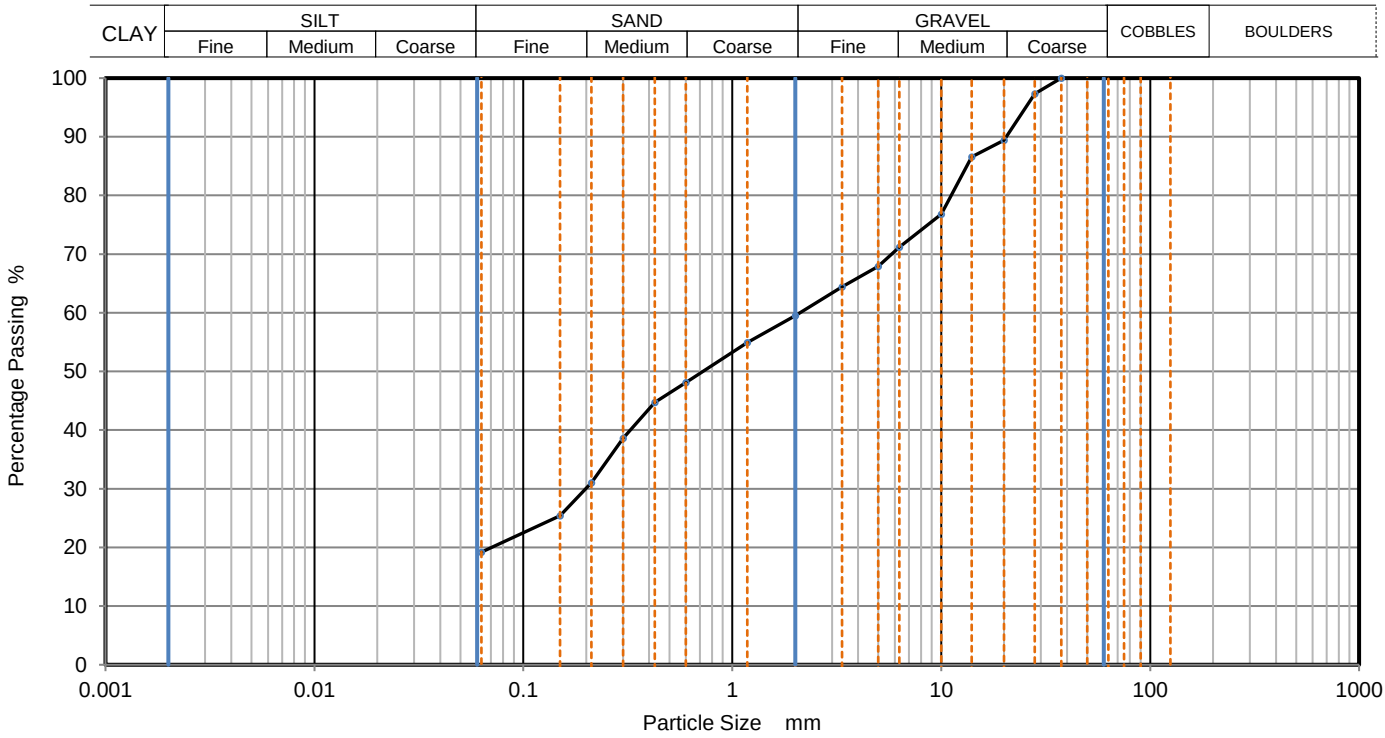
Grading Analysis		
D100	mm	28
D60	mm	0.398
D30	mm	0.0709
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH050
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey silty SAND and GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911549



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	97		
20	89		
14	87		
10	77		
6.3	71		
5	68		
3.35	64		
2	60		
1.18	55		
0.6	48		
0.425	45		
0.3	39		
0.212	31		
0.15	25		
0.063	19		

Dry Mass of sample, g: 1137

Sample Proportions	% dry mass
Very coarse	0
Gravel	41
Sand	40
Fines <0.063mm	19

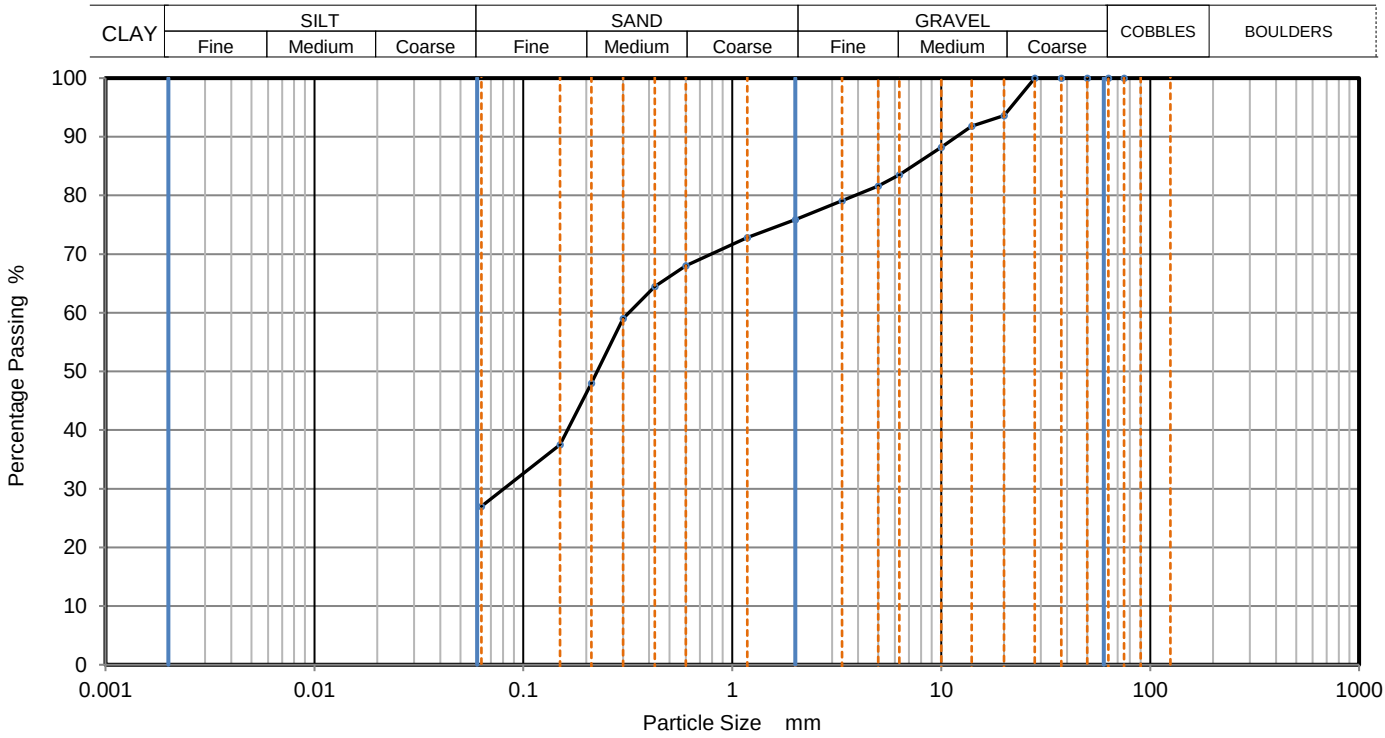
Grading Analysis		
D100	mm	37.5
D60	mm	2.1
D30	mm	0.199
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH052
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey very gravelly very silty SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911587



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	94		
14	92		
10	88		
6.3	84		
5	82		
3.35	79		
2	76		
1.18	73		
0.6	68		
0.425	65		
0.3	59		
0.212	48		
0.15	38		
0.063	27		

Dry Mass of sample, g	1064

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	49
Fines <0.063mm	27

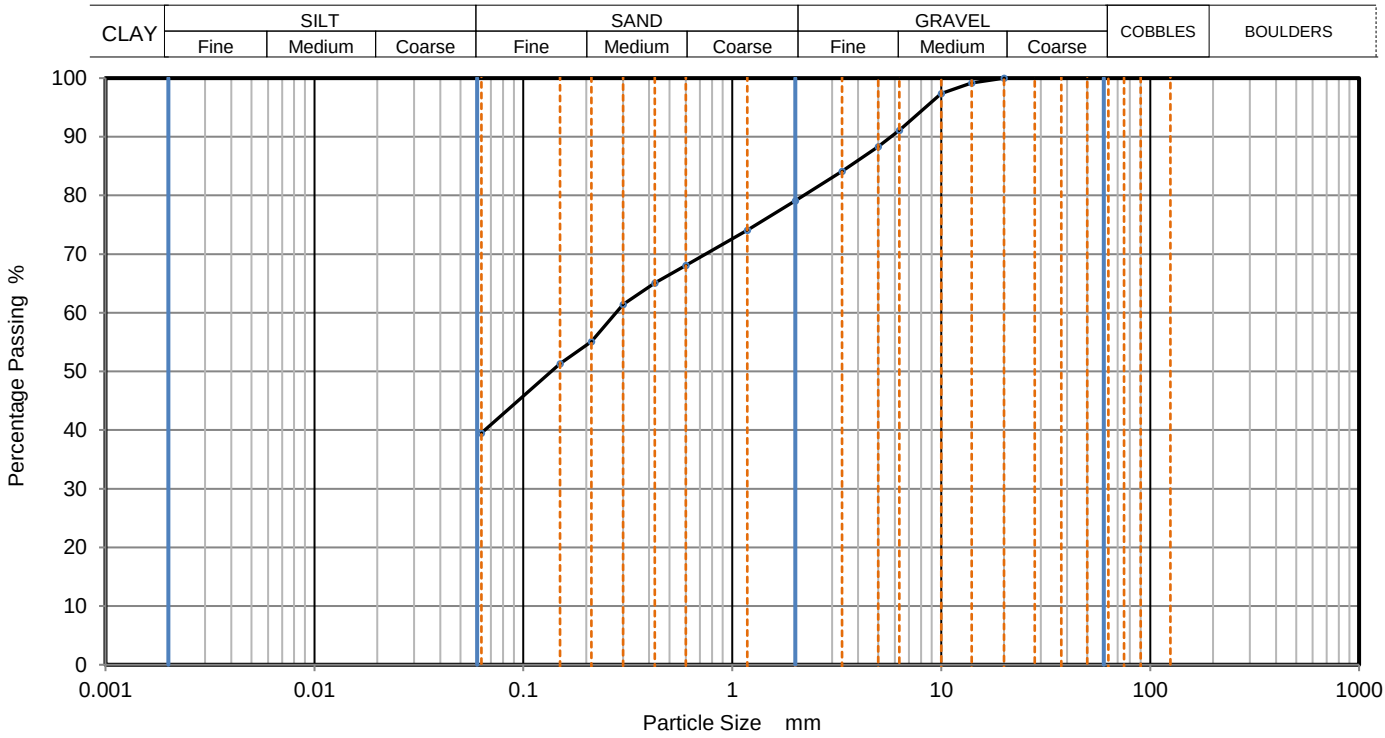
Grading Analysis		
D100	mm	
D60	mm	0.32
D30	mm	0.0805
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH053
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Red-brown slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911598



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	99		
10	97		
6.3	91		
5	88		
3.35	84		
2	79		
1.18	74		
0.6	68		
0.425	65		
0.3	61		
0.212	55		
0.15	51		
0.063	40		

Dry Mass of sample, g: 1126

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	40
Fines <0.063mm	40

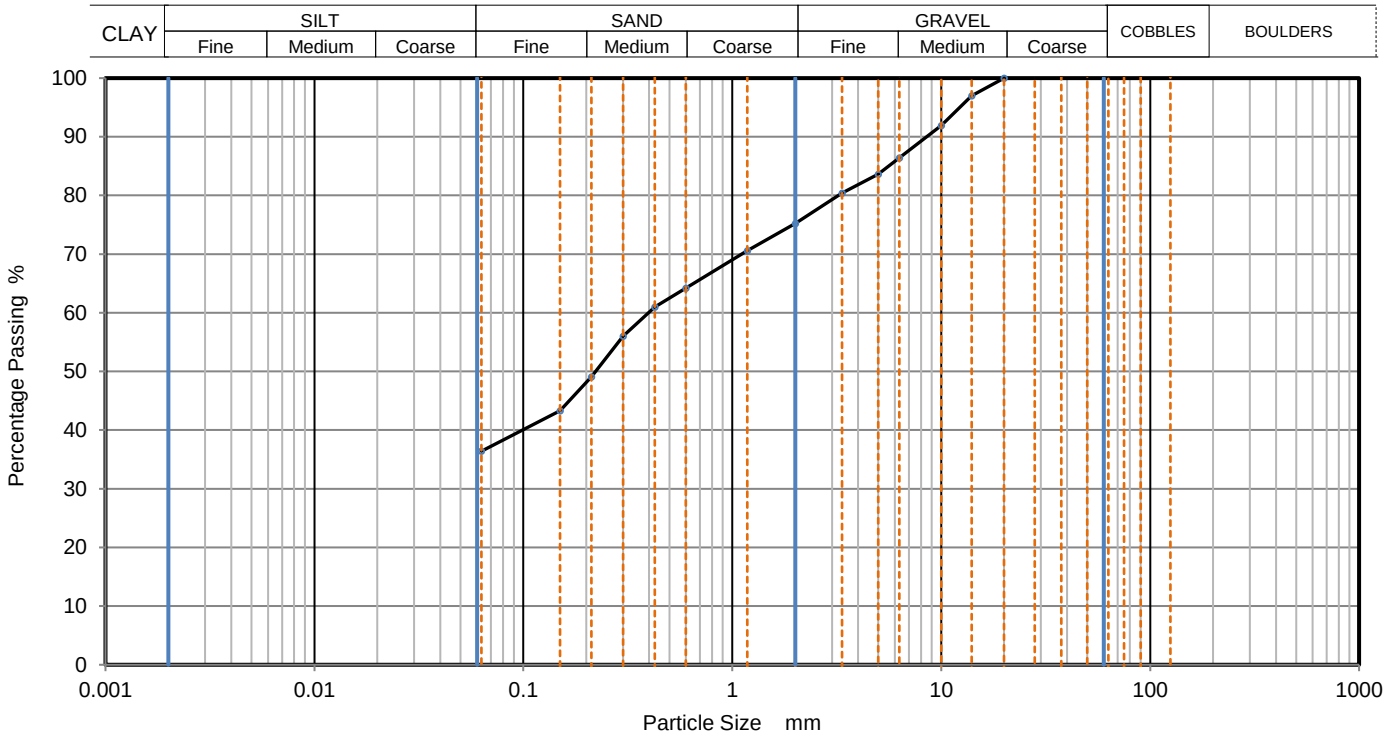
Grading Analysis		
D100	mm	20
D60	mm	0.278
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH054
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115148



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	97		
10	92		
6.3	86		
5	84		
3.35	80		
2	75		
1.18	71		
0.6	64		
0.425	61		
0.3	56		
0.212	49		
0.15	43		
0.063	36		

Dry Mass of sample, g: 1136

Sample Proportions	% dry mass
Very coarse	0
Gravel	25
Sand	39
Fines <0.063mm	36

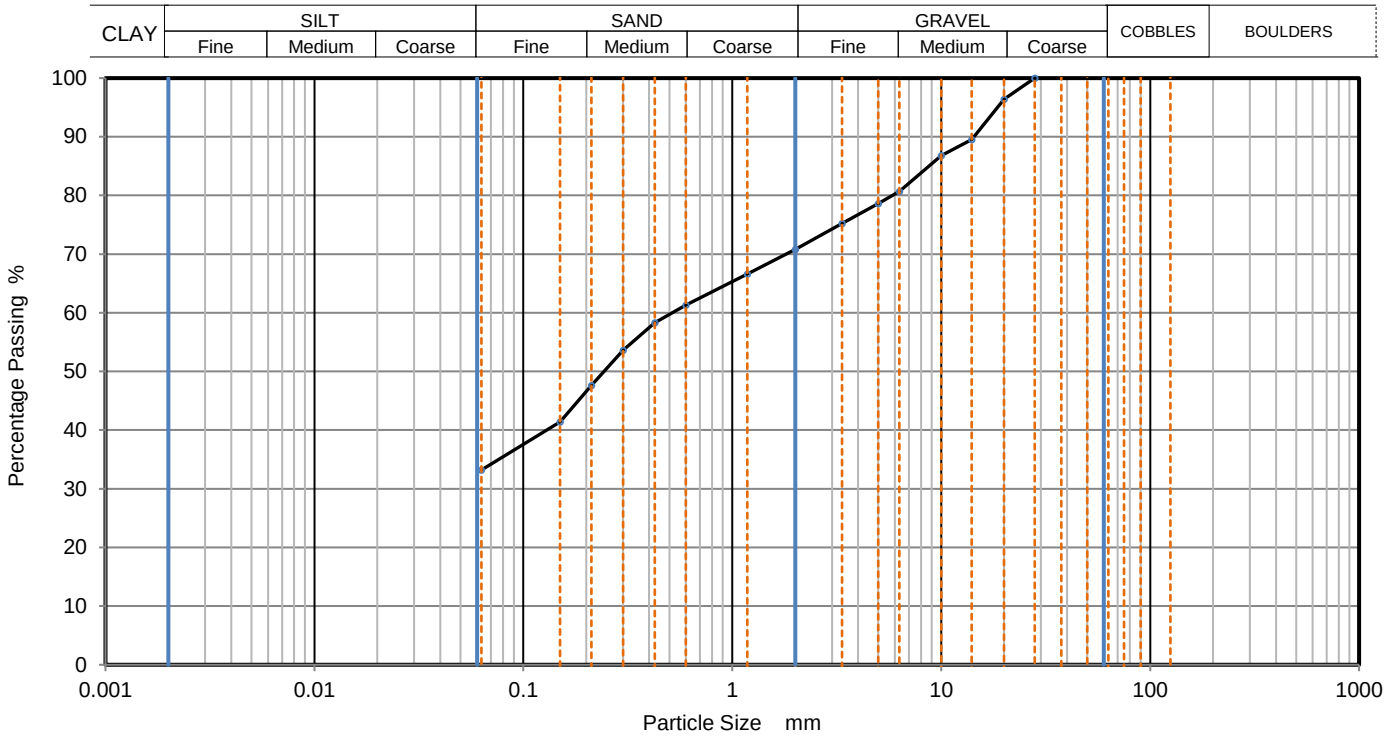
Grading Analysis		
D100	mm	20
D60	mm	0.396
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH054
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey slightly gravelly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115151



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	96		
14	90		
10	87		
6.3	81		
5	79		
3.35	75		
2	71		
1.18	67		
0.6	61		
0.425	58		
0.3	54		
0.212	48		
0.15	41		
0.063	33		

Dry Mass of sample, g: 1233

Sample Proportions	% dry mass
Very coarse	0
Gravel	29
Sand	38
Fines <0.063mm	33

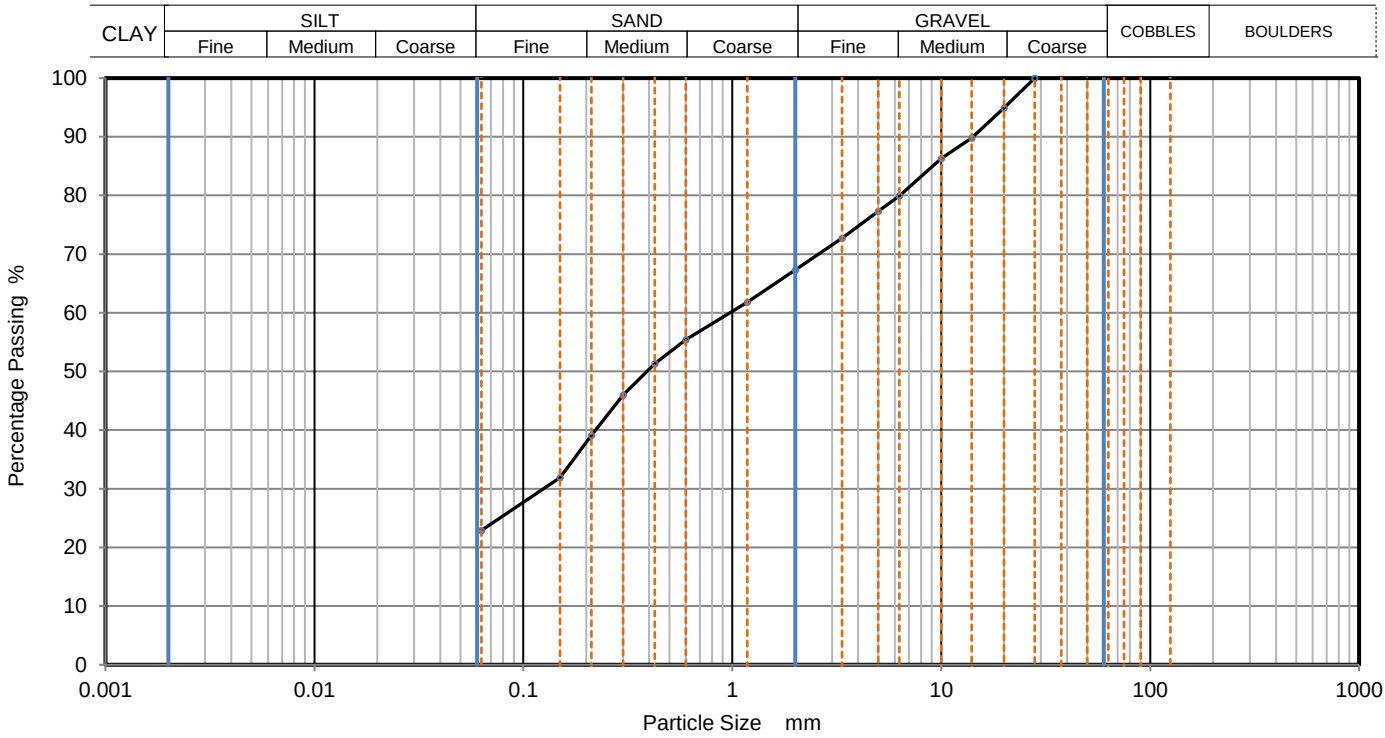
Grading Analysis		
D100	mm	28
D60	mm	0.516
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH055
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Red-brown very silty very gravelly SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911619



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	90		
10	86		
6.3	80		
5	77		
3.35	73		
2	67		
1.18	62		
0.6	55		
0.425	51		
0.3	46		
0.212	39		
0.15	32		
0.063	23		

Dry Mass of sample, g: 1261

Sample Proportions	% dry mass
Very coarse	0
Gravel	33
Sand	44
Fines <0.063mm	23

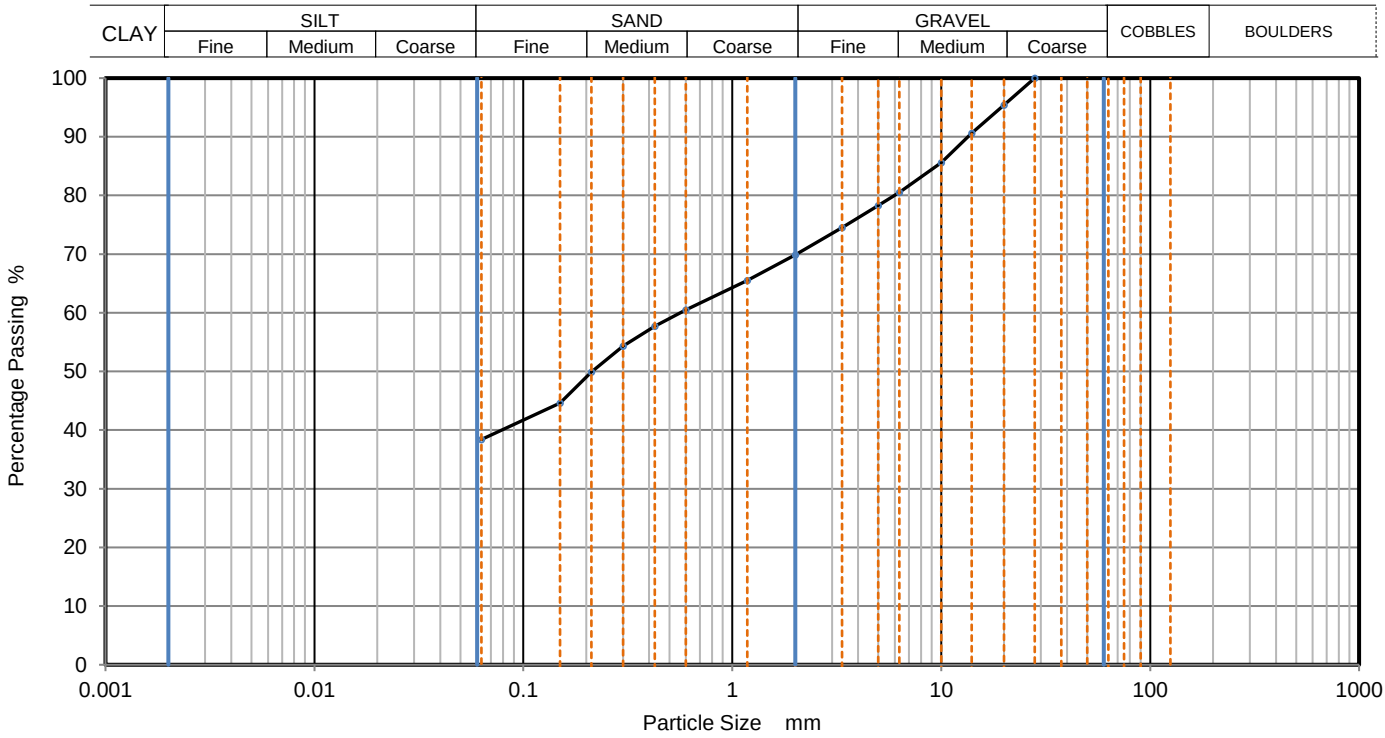
Grading Analysis		
D100	mm	28
D60	mm	0.979
D30	mm	0.125
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH057
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911637



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	91		
10	86		
6.3	81		
5	78		
3.35	75		
2	70		
1.18	66		
0.6	61		
0.425	58		
0.3	54		
0.212	50		
0.15	45		
0.063	38		

Dry Mass of sample, g: 1292

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	32
Fines <0.063mm	38

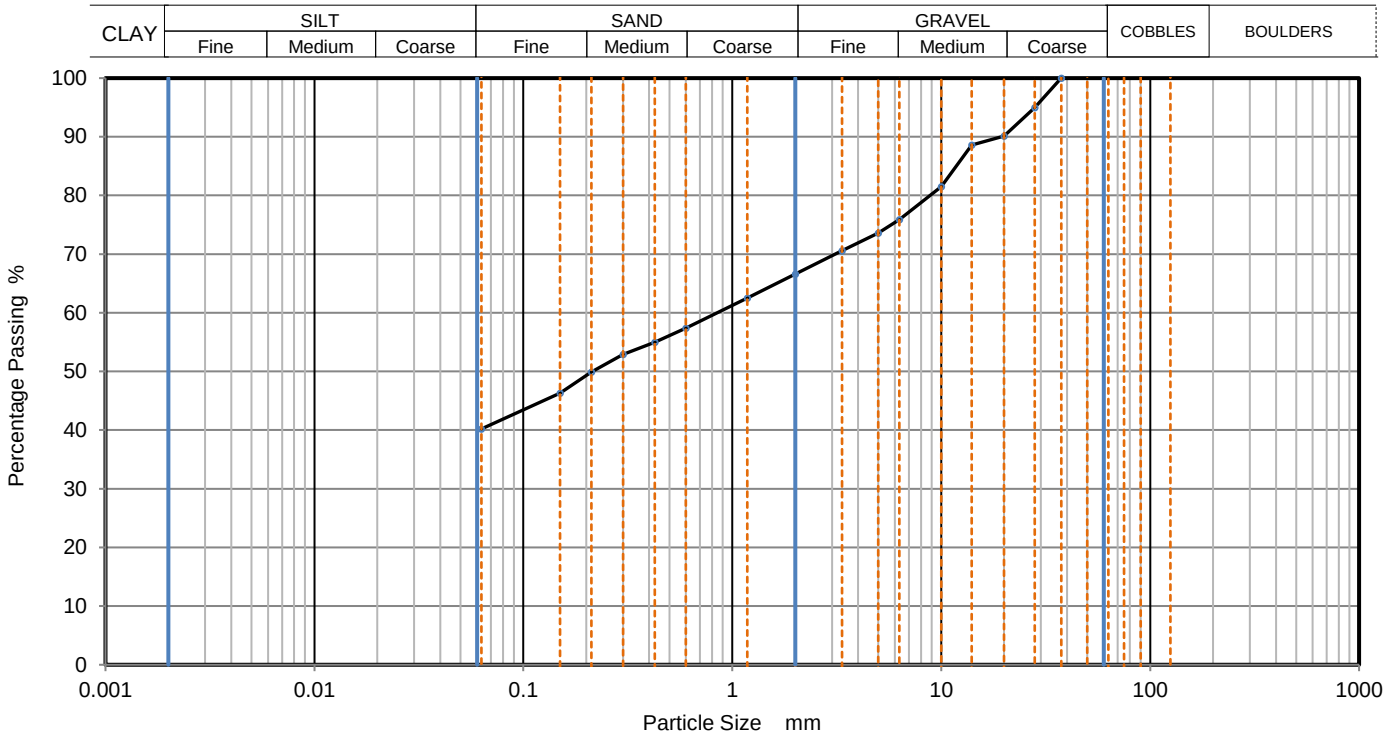
Grading Analysis		
D100	mm	28
D60	mm	0.567
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH057
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey-brown slightly sandy slightly gravelly SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911640



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	95		
20	90		
14	89		
10	82		
6.3	76		
5	74		
3.35	71		
2	67		
1.18	63		
0.6	57		
0.425	55		
0.3	53		
0.212	50		
0.15	46		
0.063	40		

Dry Mass of sample, g: 1261

Sample Proportions	% dry mass
Very coarse	0
Gravel	33
Sand	26
Fines <0.063mm	40

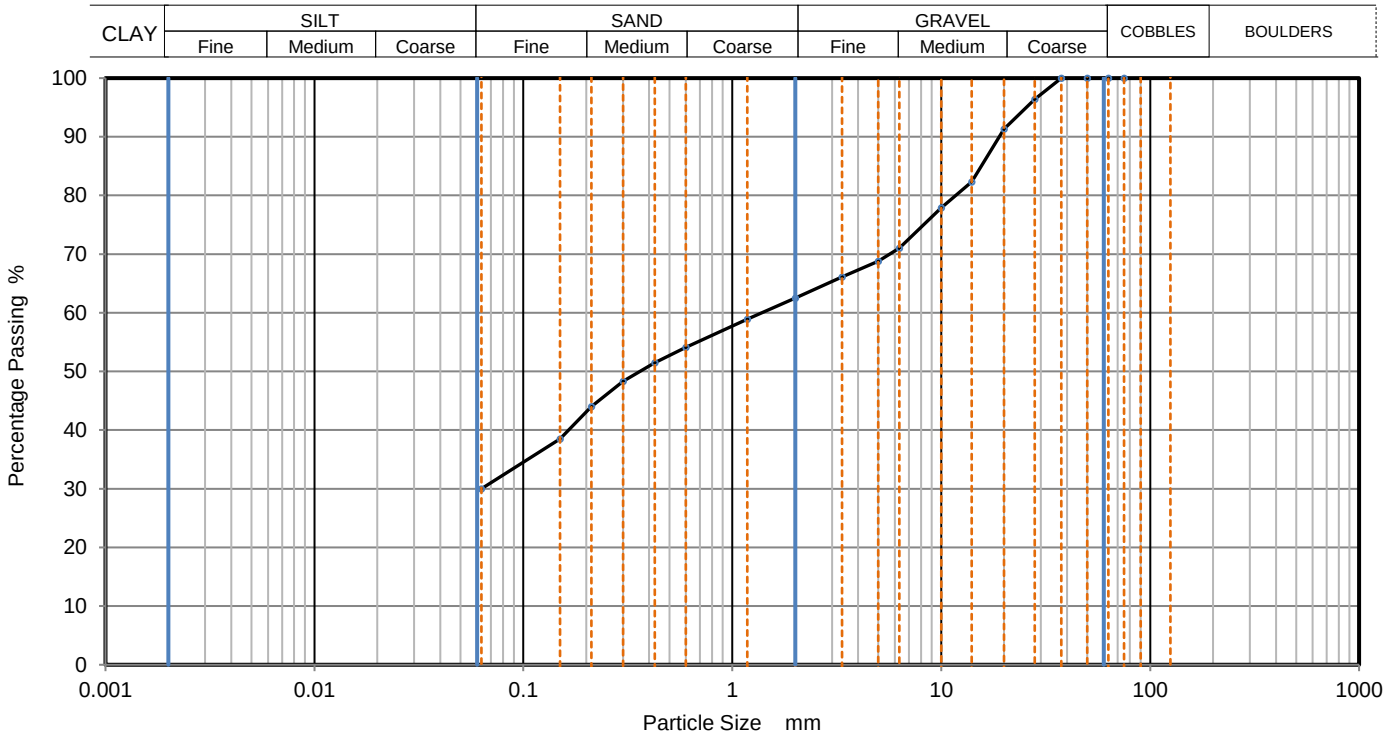
Grading Analysis		
D100	mm	37.5
D60	mm	0.846
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH059
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown very silty very sandy GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911649



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	91		
14	82		
10	78		
6.3	71		
5	69		
3.35	66		
2	63		
1.18	59		
0.6	54		
0.425	52		
0.3	48		
0.212	44		
0.15	39		
0.063	30		

Dry Mass of sample, g	962

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	33
Fines <0.063mm	30

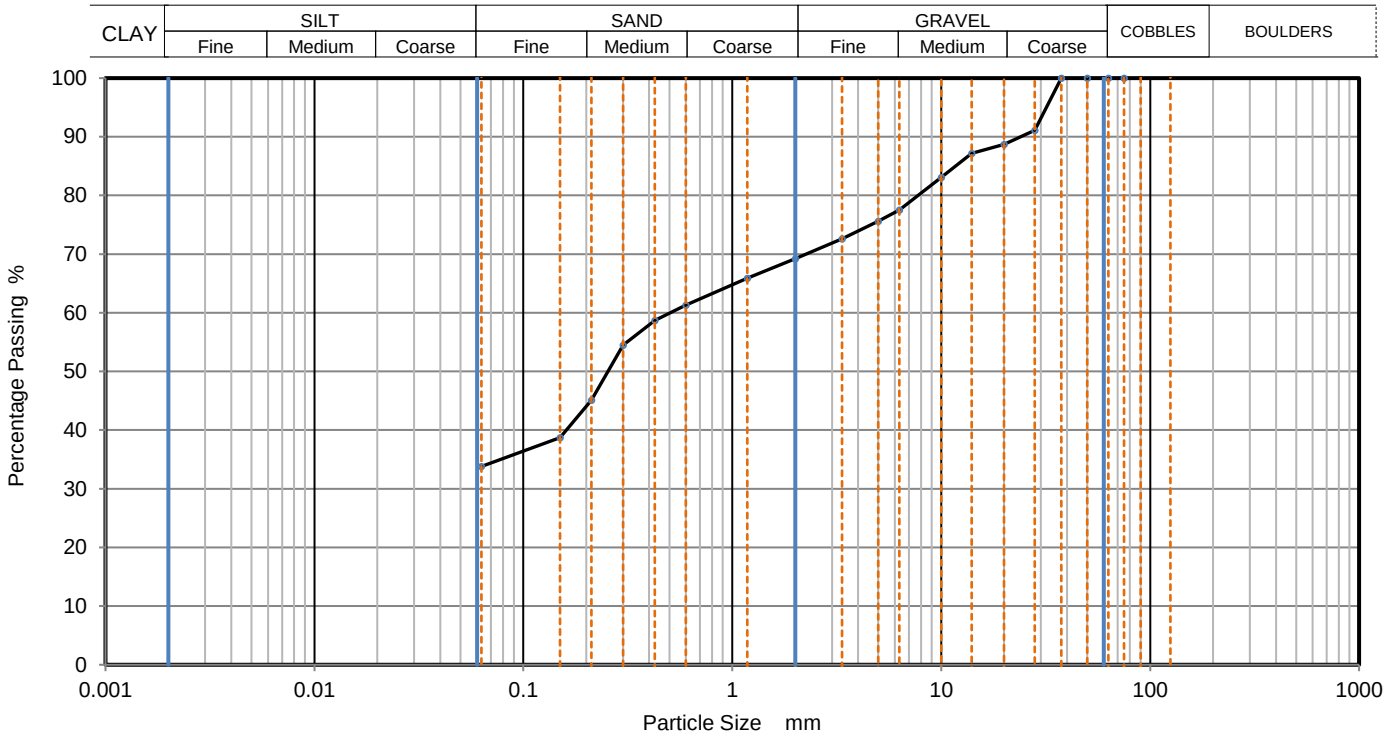
Grading Analysis		
D100	mm	
D60	mm	1.39
D30	mm	0.0631
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH061
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown very silty GRAVEL and SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911667



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	91		
20	89		
14	87		
10	83		
6.3	78		
5	76		
3.35	73		
2	69		
1.18	66		
0.6	61		
0.425	59		
0.3	55		
0.212	45		
0.15	39		
0.063	34		

Dry Mass of sample, g	1275

Sample Proportions	% dry mass
Very coarse	0
Gravel	31
Sand	35
Fines <0.063mm	34

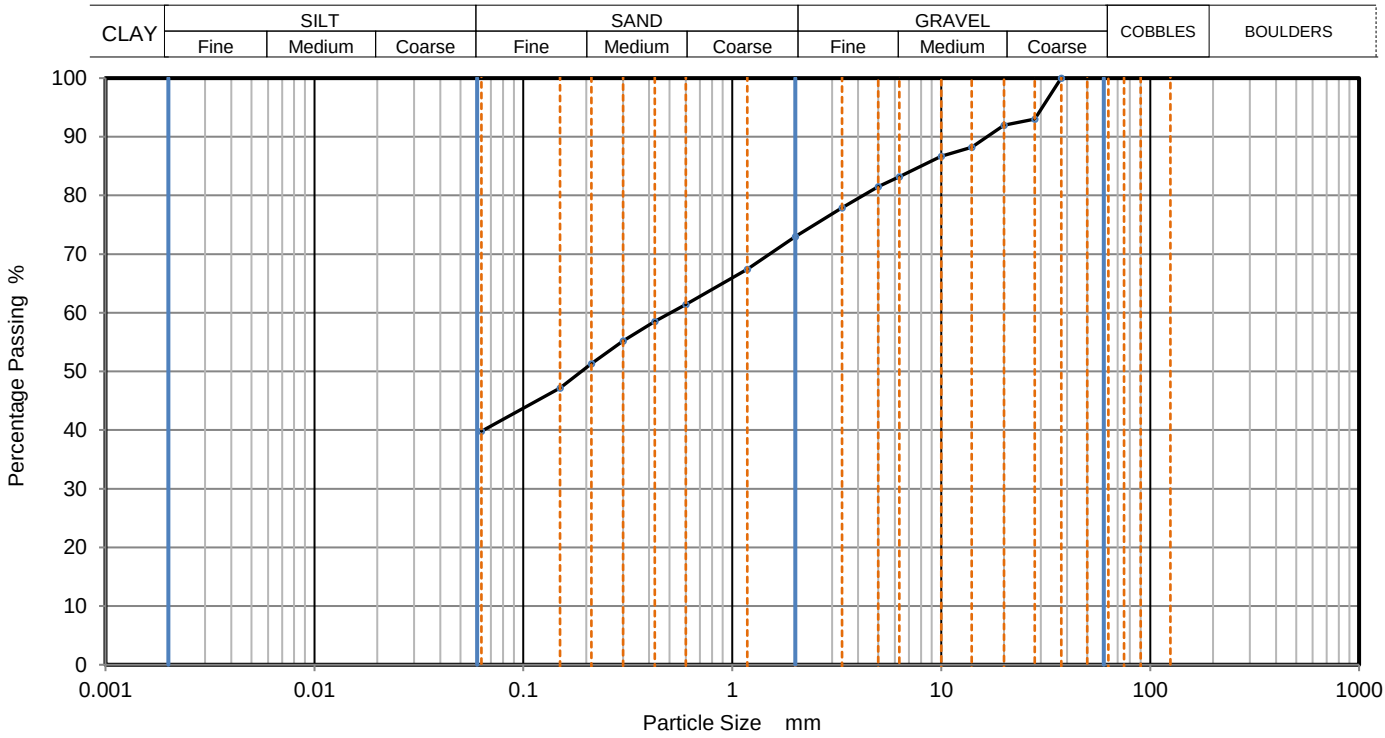
Grading Analysis		
D100	mm	
D60	mm	0.504
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH070
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911727



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	93		
20	92		
14	88		
10	87		
6.3	83		
5	82		
3.35	78		
2	73		
1.18	67		
0.6	61		
0.425	59		
0.3	55		
0.212	51		
0.15	47		
0.063	40		

Dry Mass of sample, g	1349

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	33
Fines <0.063mm	40

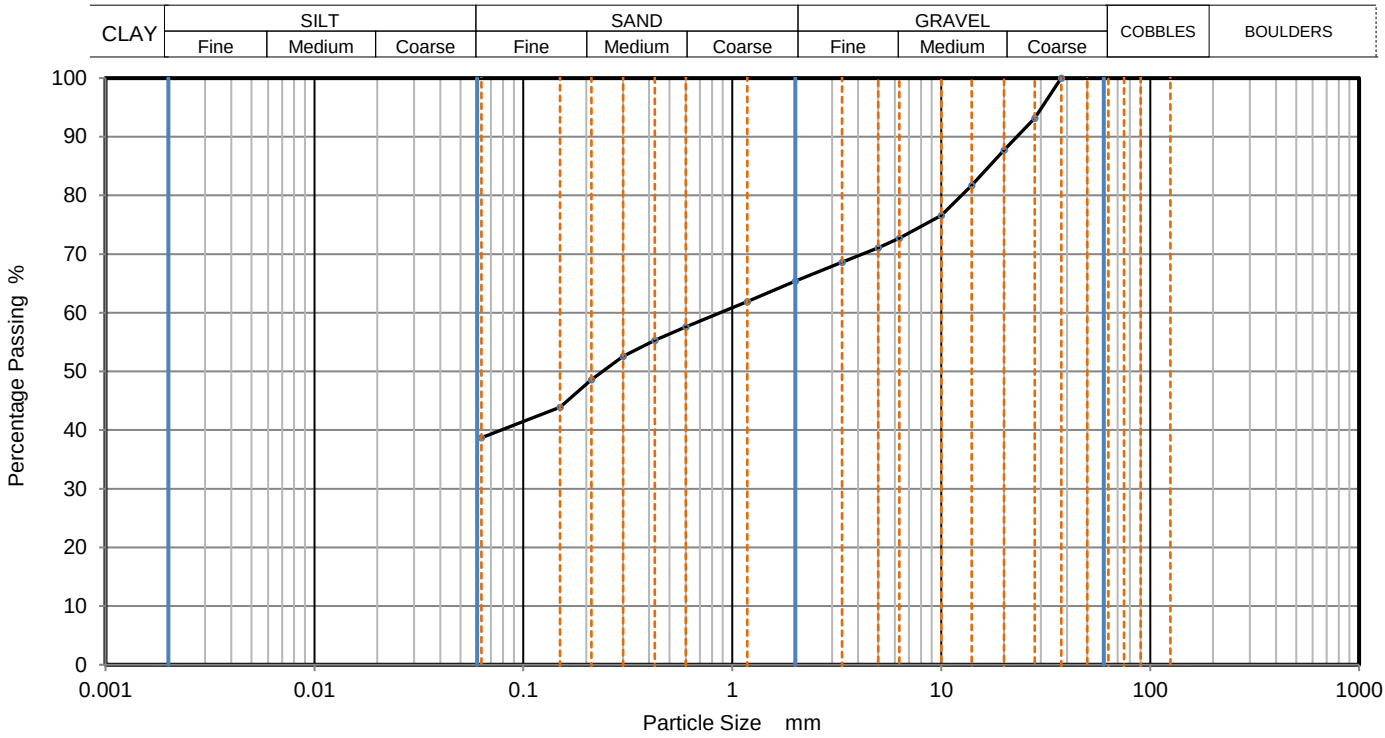
Grading Analysis		
D100	mm	37.5
D60	mm	0.509
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH071
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Olive-brown slightly sandy gravelly SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911739



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	93		
20	88		
14	82		
10	77		
6.3	73		
5	71		
3.35	69		
2	65		
1.18	62		
0.6	58		
0.425	55		
0.3	53		
0.212	49		
0.15	44		
0.063	39		

Dry Mass of sample, g: 1441

Sample Proportions	% dry mass
Very coarse	0
Gravel	35
Sand	27
Fines <0.063mm	39

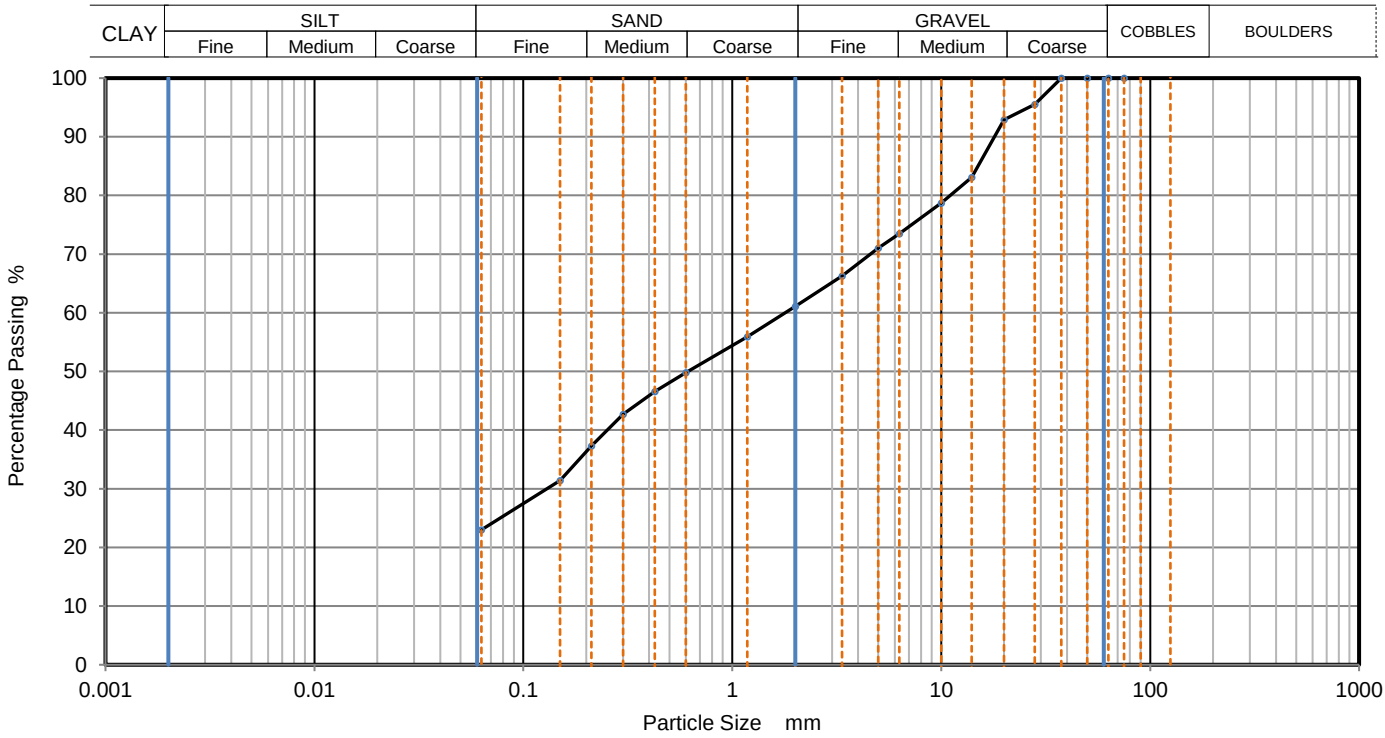
Grading Analysis		
D100	mm	37.5
D60	mm	0.874
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH083
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Blue-black very silty SAND and GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017091458



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	93		
14	83		
10	79		
6.3	74		
5	71		
3.35	66		
2	61		
1.18	56		
0.6	50		
0.425	47		
0.3	43		
0.212	37		
0.15	31		
0.063	23		

Dry Mass of sample, g: 913

Sample Proportions	% dry mass
Very coarse	0
Gravel	39
Sand	38
Fines <0.063mm	23

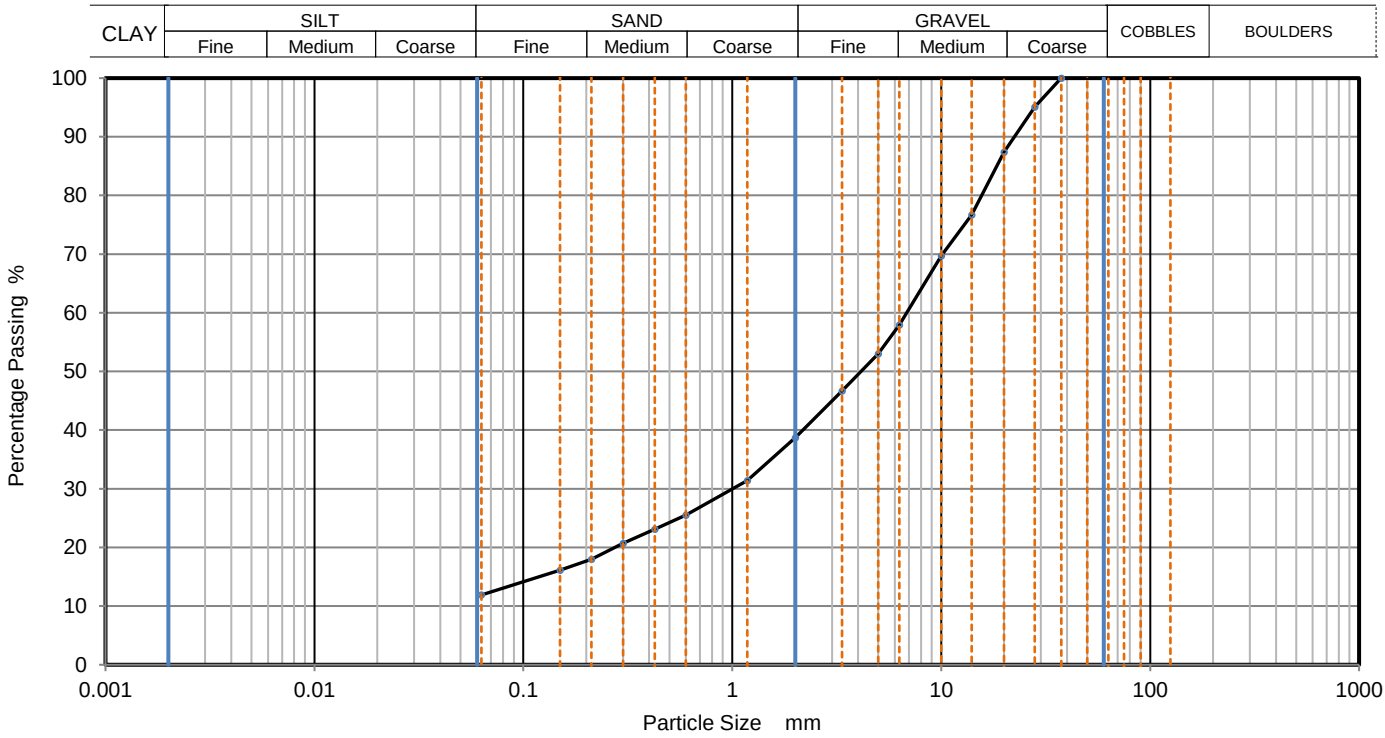
Grading Analysis		
D100	mm	
D60	mm	1.79
D30	mm	0.13
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH083
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Grey-brown silty very sandy medium GRAVEL.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017091464



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	95		
20	87		
14	77		
10	70		
6.3	58		
5	53		
3.35	47		
2	39		
1.18	31		
0.6	26		
0.425	23		
0.3	21		
0.212	18		
0.15	16		
0.063	12		

Dry Mass of sample, g	935

Sample Proportions	% dry mass
Very coarse	0
Gravel	61
Sand	27
Fines <0.063mm	12

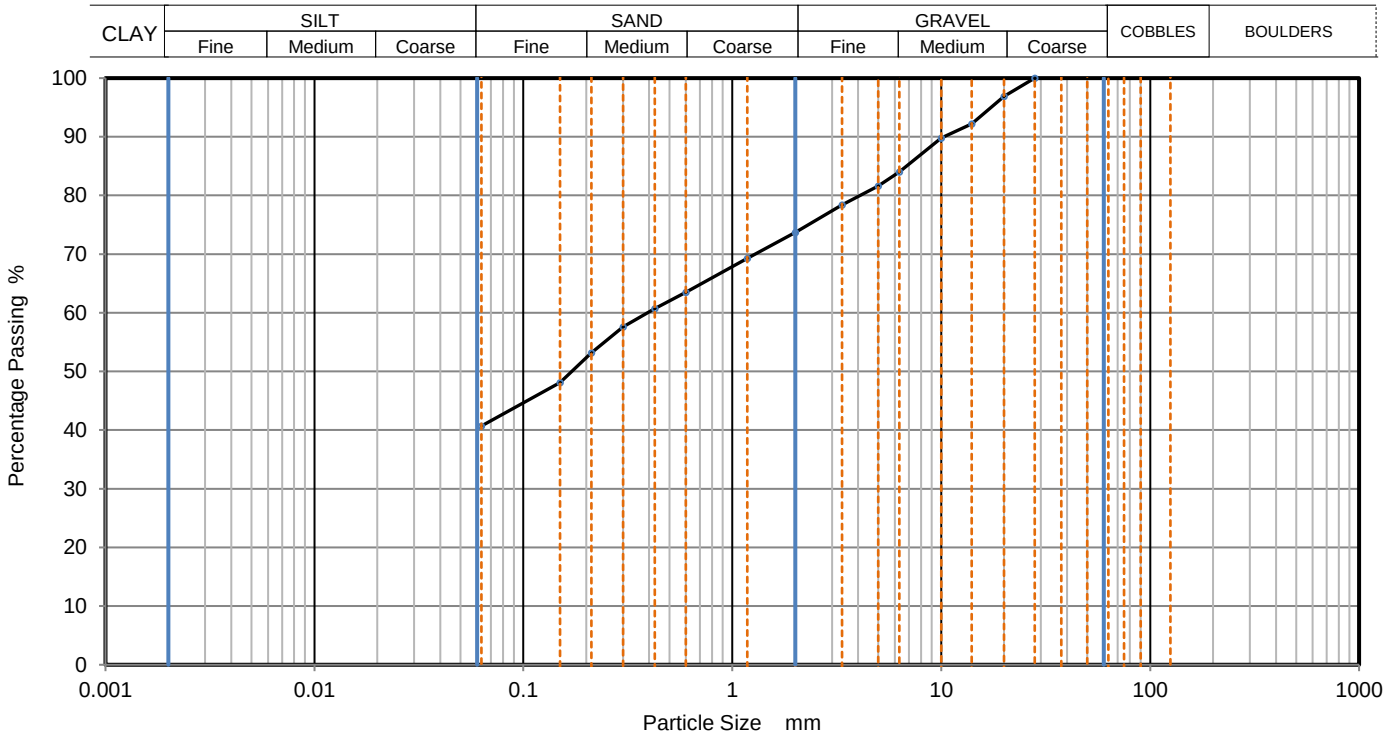
Grading Analysis		
D100	mm	37.5
D60	mm	6.83
D30	mm	1.01
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH100
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017100565



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	92		
10	90		
6.3	84		
5	82		
3.35	78		
2	74		
1.18	69		
0.6	64		
0.425	61		
0.3	58		
0.212	53		
0.15	48		
0.063	41		

Dry Mass of sample, g: 1515

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	33
Fines <0.063mm	41

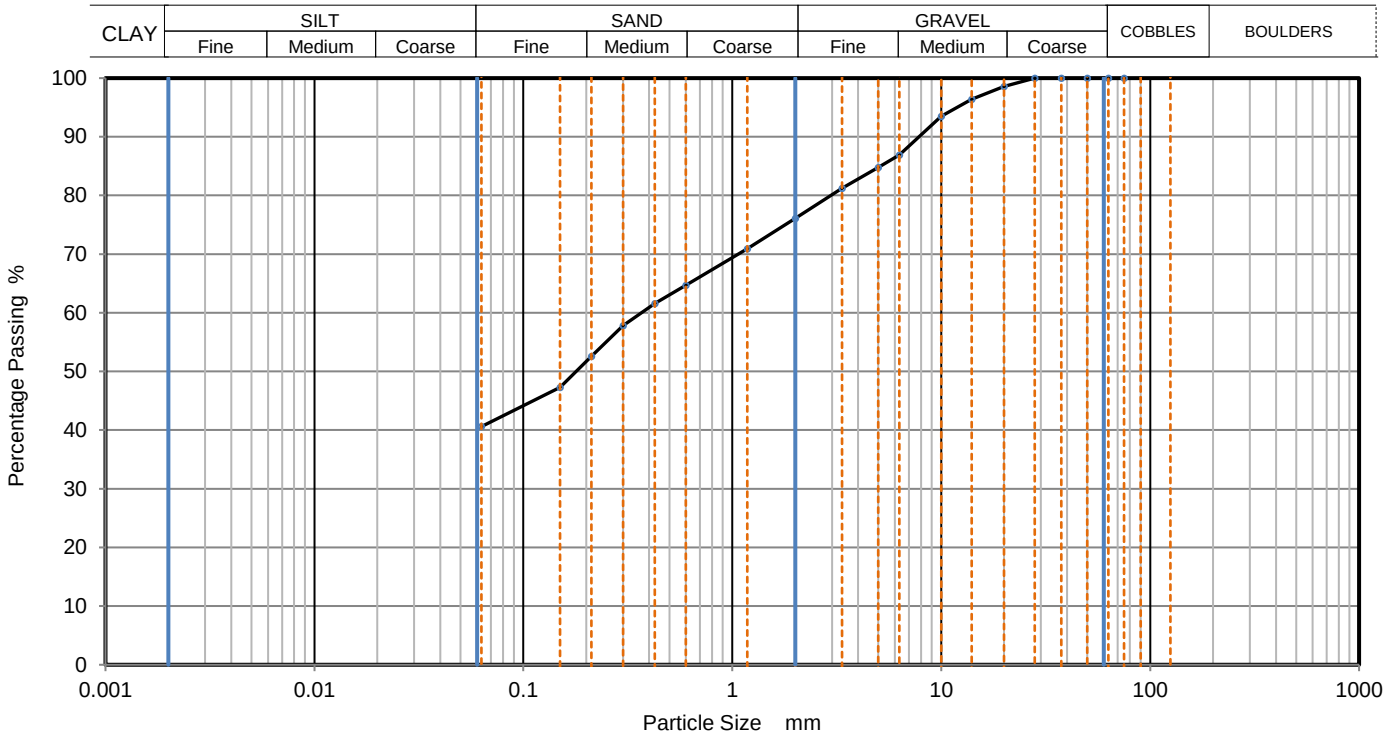
Grading Analysis		
D100	mm	28
D60	mm	0.393
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH110
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911805



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	96		
10	94		
6.3	87		
5	85		
3.35	81		
2	76		
1.18	71		
0.6	65		
0.425	62		
0.3	58		
0.212	53		
0.15	47		
0.063	41		

Dry Mass of sample, g: 1230

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	36
Fines <0.063mm	41

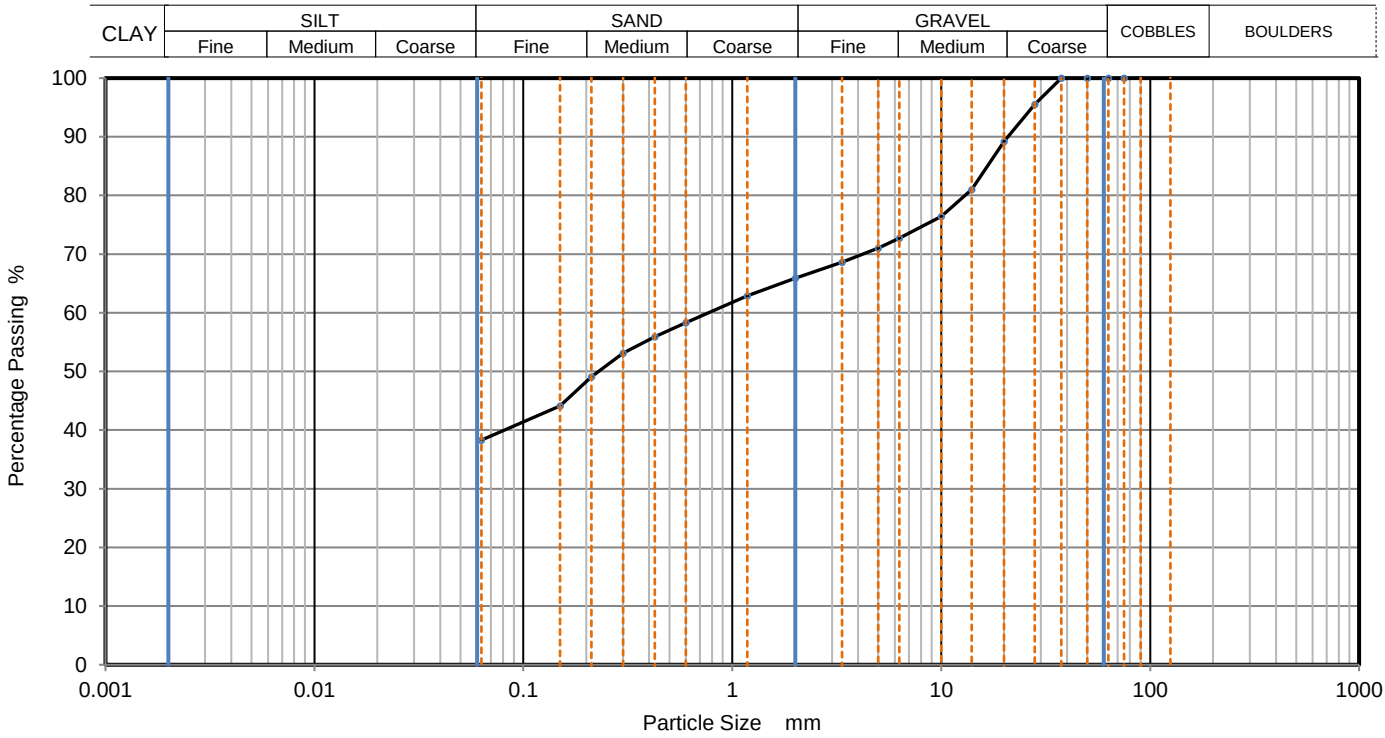
Grading Analysis		
D100	mm	
D60	mm	0.367
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH119
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey-brown slightly sandy slightly gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911865



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	96		
20	89		
14	81		
10	76		
6.3	73		
5	71		
3.35	69		
2	66		
1.18	63		
0.6	58		
0.425	56		
0.3	53		
0.212	49		
0.15	44		
0.063	38		

Dry Mass of sample, g: 1111

Sample Proportions	% dry mass
Very coarse	0
Gravel	34
Sand	28
Fines <0.063mm	38

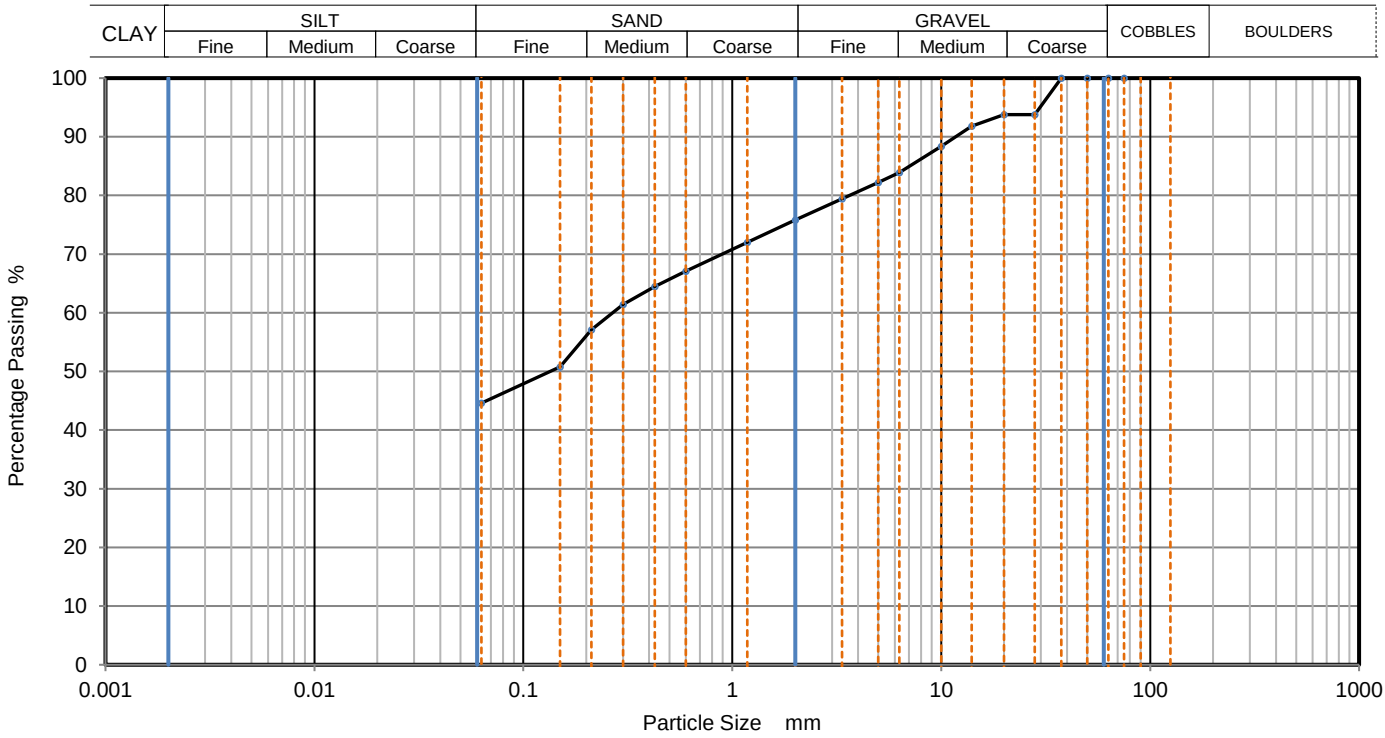
Grading Analysis		
D100	mm	
D60	mm	0.773
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH119
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911868



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	94		
20	94		
14	92		
10	88		
6.3	84		
5	82		
3.35	79		
2	76		
1.18	72		
0.6	67		
0.425	65		
0.3	61		
0.212	57		
0.15	51		
0.063	45		

Dry Mass of sample, g	1358

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	31
Fines <0.063mm	45

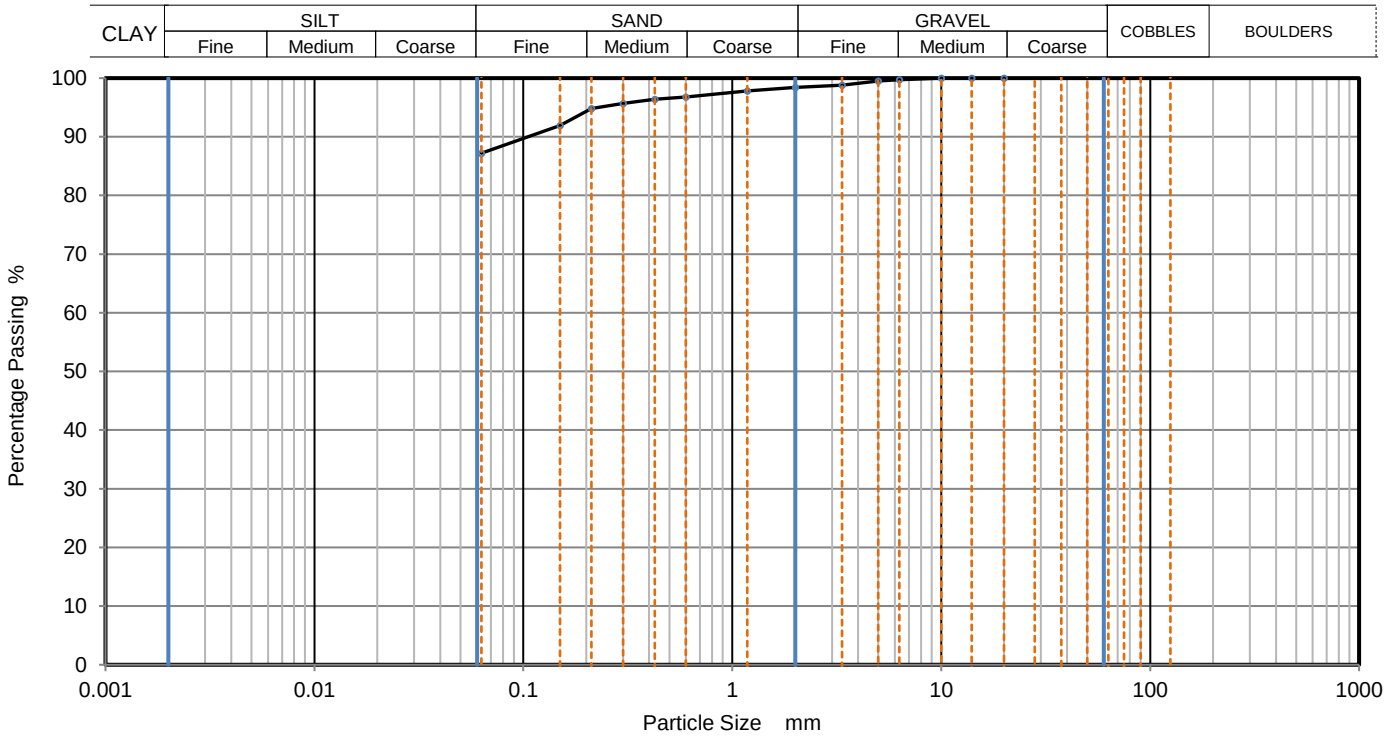
Grading Analysis		
D100	mm	
D60	mm	0.267
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH121
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911886



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	98		
1.18	98		
0.6	97		
0.425	96		
0.3	96		
0.212	95		
0.15	92		
0.063	87		

Dry Mass of sample, g: 863

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	11
Fines <0.063mm	87

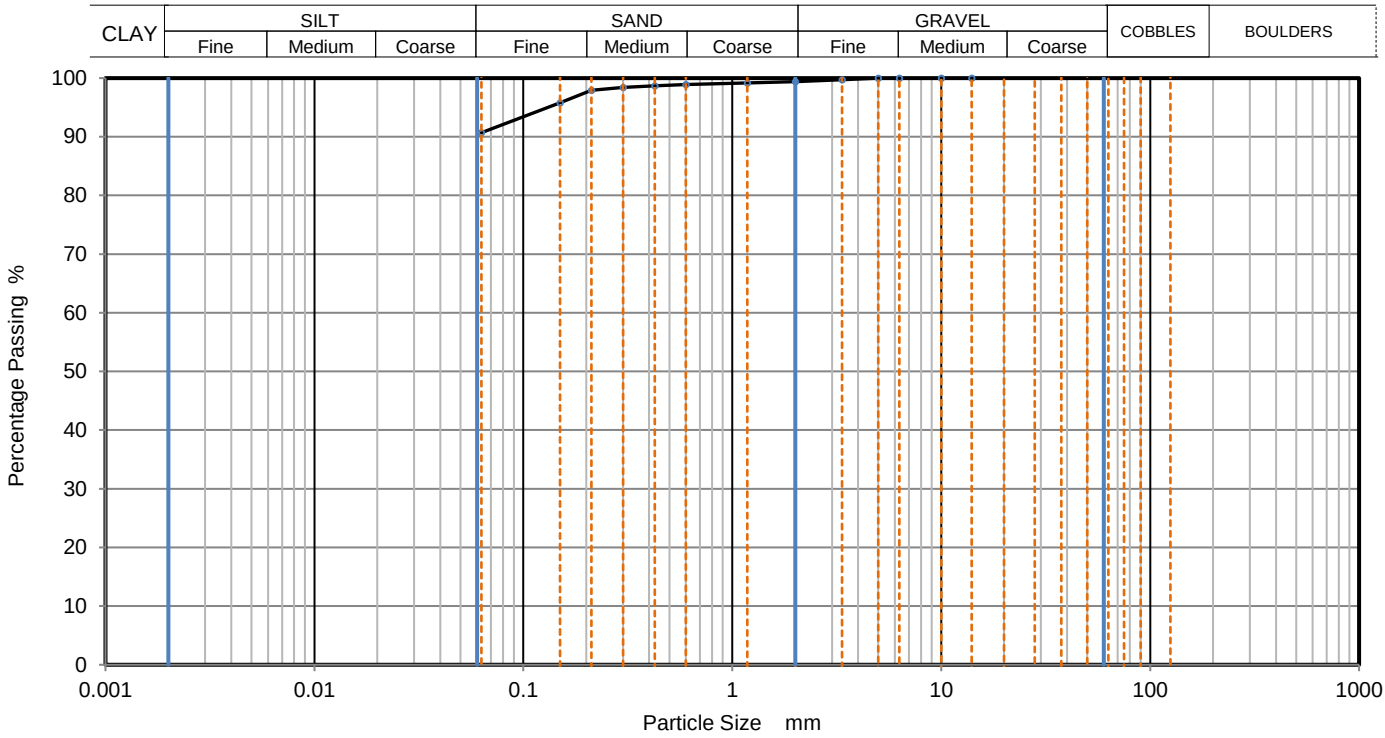
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH121
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Grey slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911889



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	98		
0.212	98		
0.15	96		
0.063	91		

Dry Mass of sample, g	859

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	9
Fines <0.063mm	91

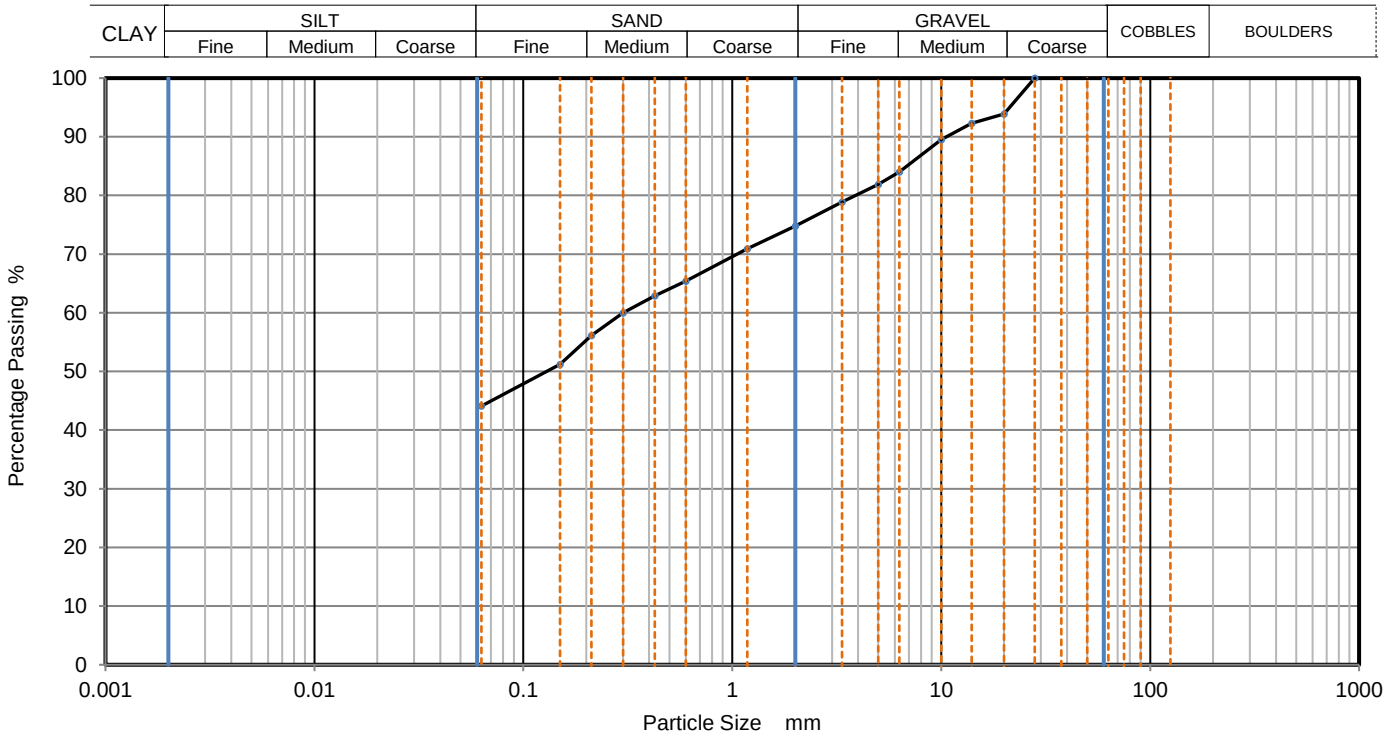
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH123
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115172



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	94		
14	92		
10	90		
6.3	84		
5	82		
3.35	79		
2	75		
1.18	71		
0.6	65		
0.425	63		
0.3	60		
0.212	56		
0.15	51		
0.063	44		

Dry Mass of sample, g	635

Sample Proportions	% dry mass
Very coarse	0
Gravel	25
Sand	31
Fines <0.063mm	44

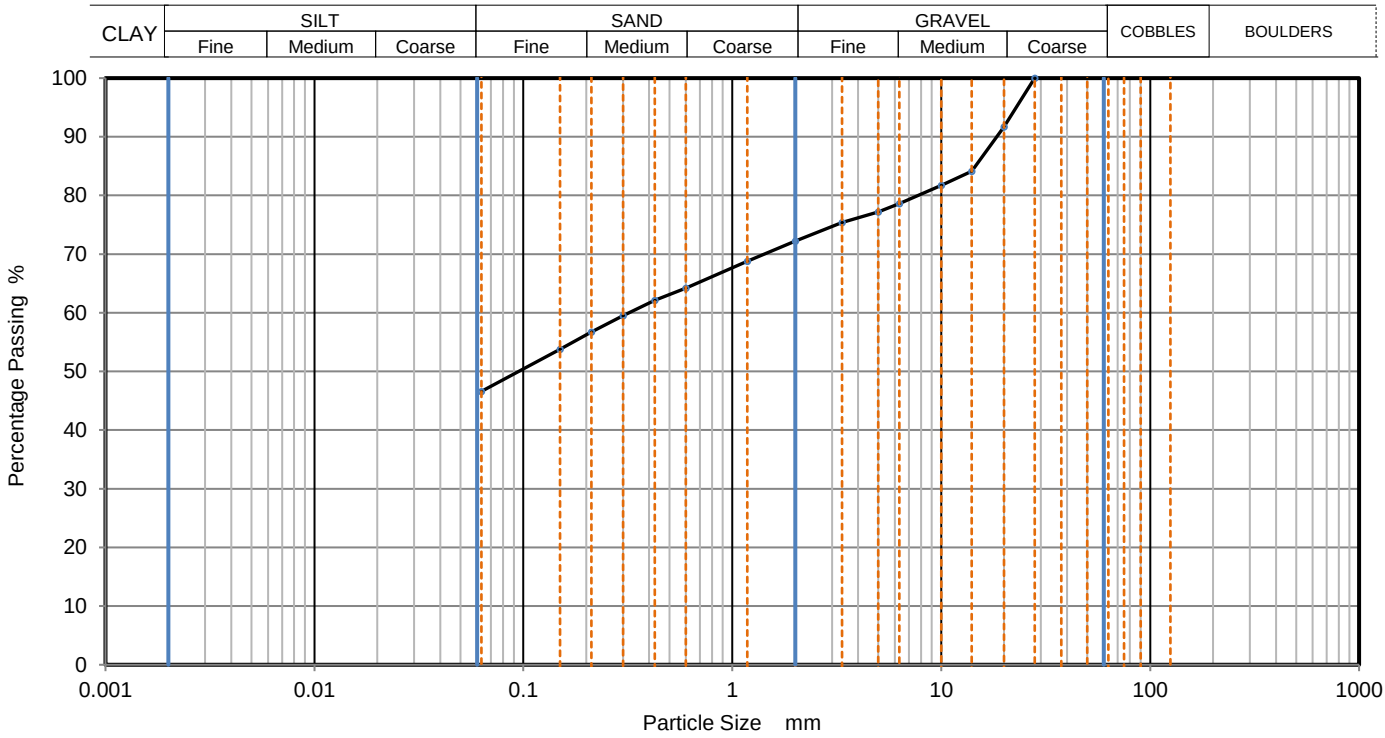
Grading Analysis		
D100	mm	28
D60	mm	0.3
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH123
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly sandy slightly gravelly SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115175



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	92		
14	84		
10	82		
6.3	79		
5	77		
3.35	75		
2	72		
1.18	69		
0.6	64		
0.425	62		
0.3	60		
0.212	57		
0.15	54		
0.063	47		

Dry Mass of sample, g	578

Sample Proportions	% dry mass
Very coarse	0
Gravel	28
Sand	26
Fines <0.063mm	47

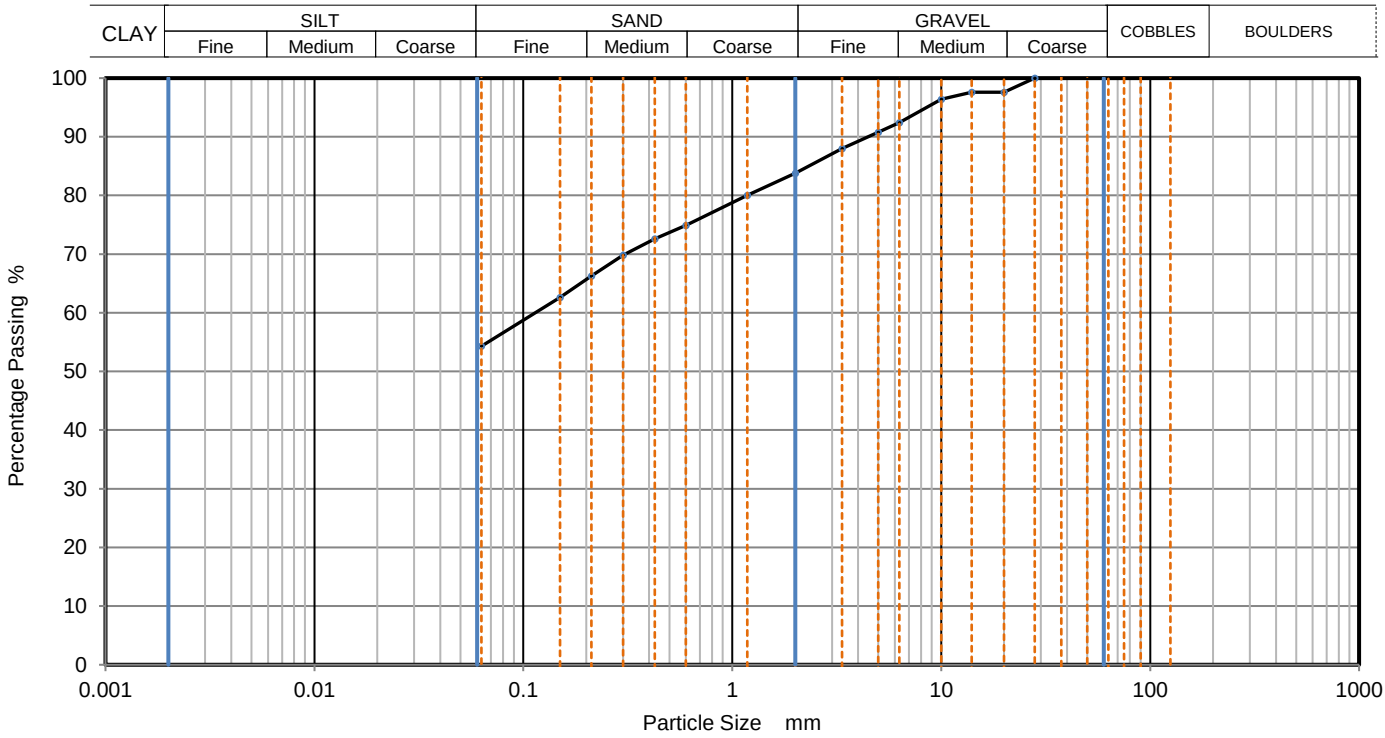
Grading Analysis		
D100	mm	28
D60	mm	0.321
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH123
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Light brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115181



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	98		
10	96		
6.3	92		
5	91		
3.35	88		
2	84		
1.18	80		
0.6	75		
0.425	73		
0.3	70		
0.212	66		
0.15	63		
0.063	54		

Dry Mass of sample, g	1164

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	30
Fines <0.063mm	54

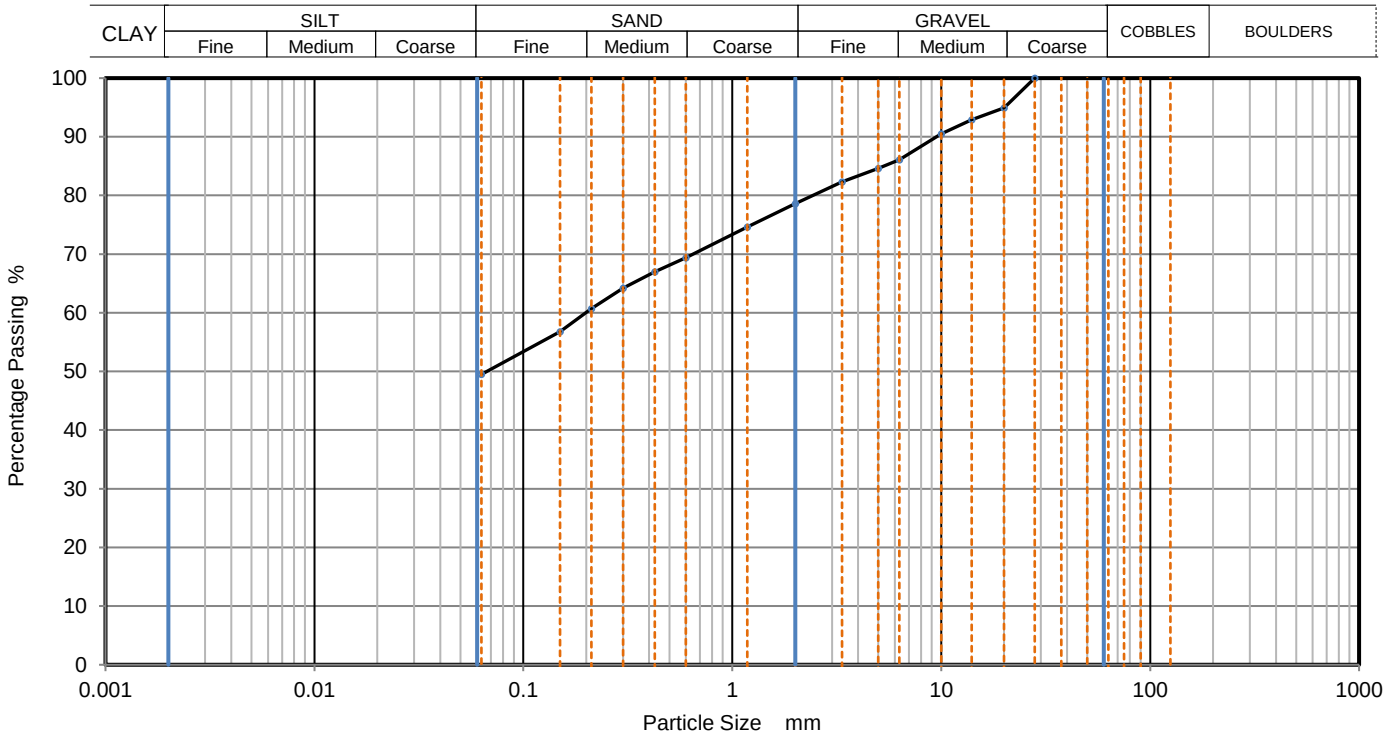
Grading Analysis		
D100	mm	28
D60	mm	0.114
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH123
Site Name	WSP Eastern and Midlands			Sample No.	19
Soil Description	Light brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	6.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115184



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	93		
10	91		
6.3	86		
5	85		
3.35	82		
2	79		
1.18	75		
0.6	69		
0.425	67		
0.3	64		
0.212	61		
0.15	57		
0.063	50		

Dry Mass of sample, g: 946

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	29
Fines <0.063mm	49

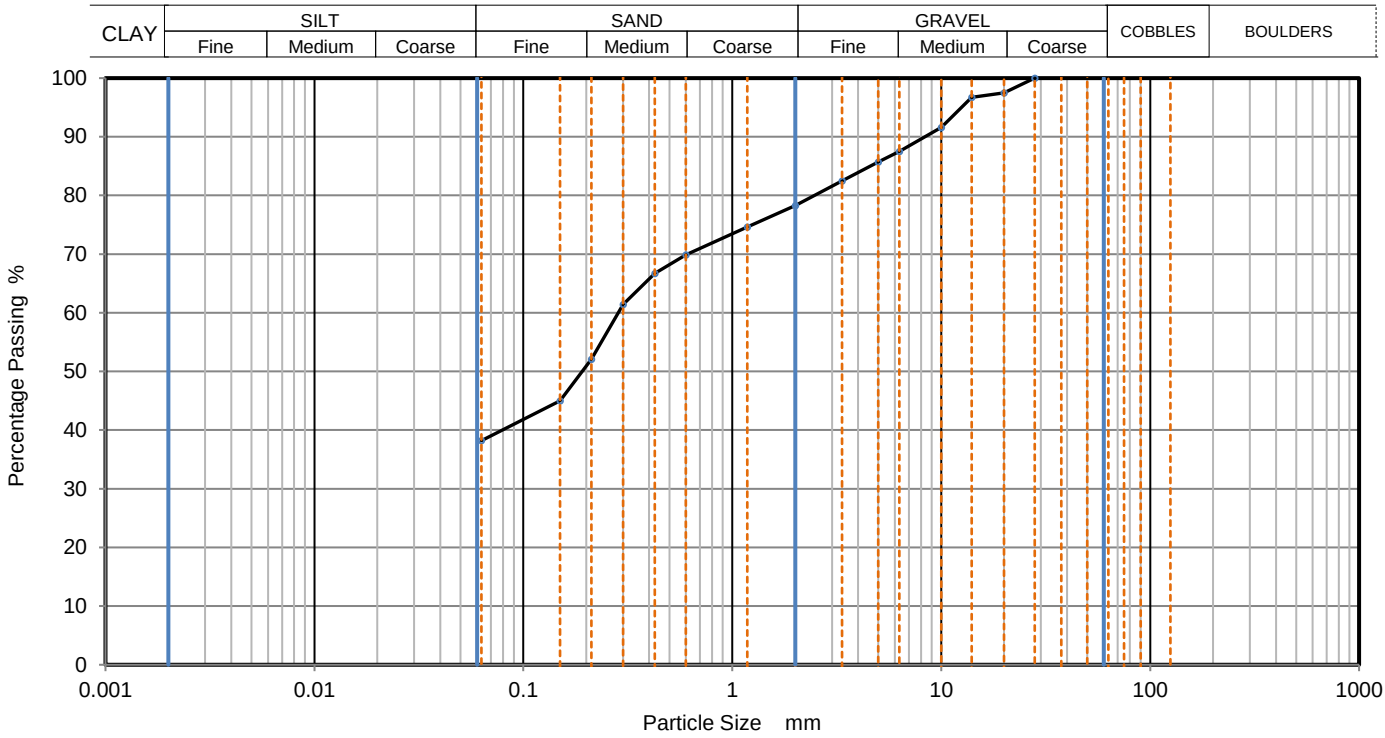
Grading Analysis		
D100	mm	28
D60	mm	0.199
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911945



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	97		
10	92		
6.3	88		
5	86		
3.35	83		
2	78		
1.18	75		
0.6	70		
0.425	67		
0.3	61		
0.212	52		
0.15	45		
0.063	38		

Dry Mass of sample, g	930

Sample Proportions	% dry mass
Very coarse	0
Gravel	22
Sand	40
Fines <0.063mm	38

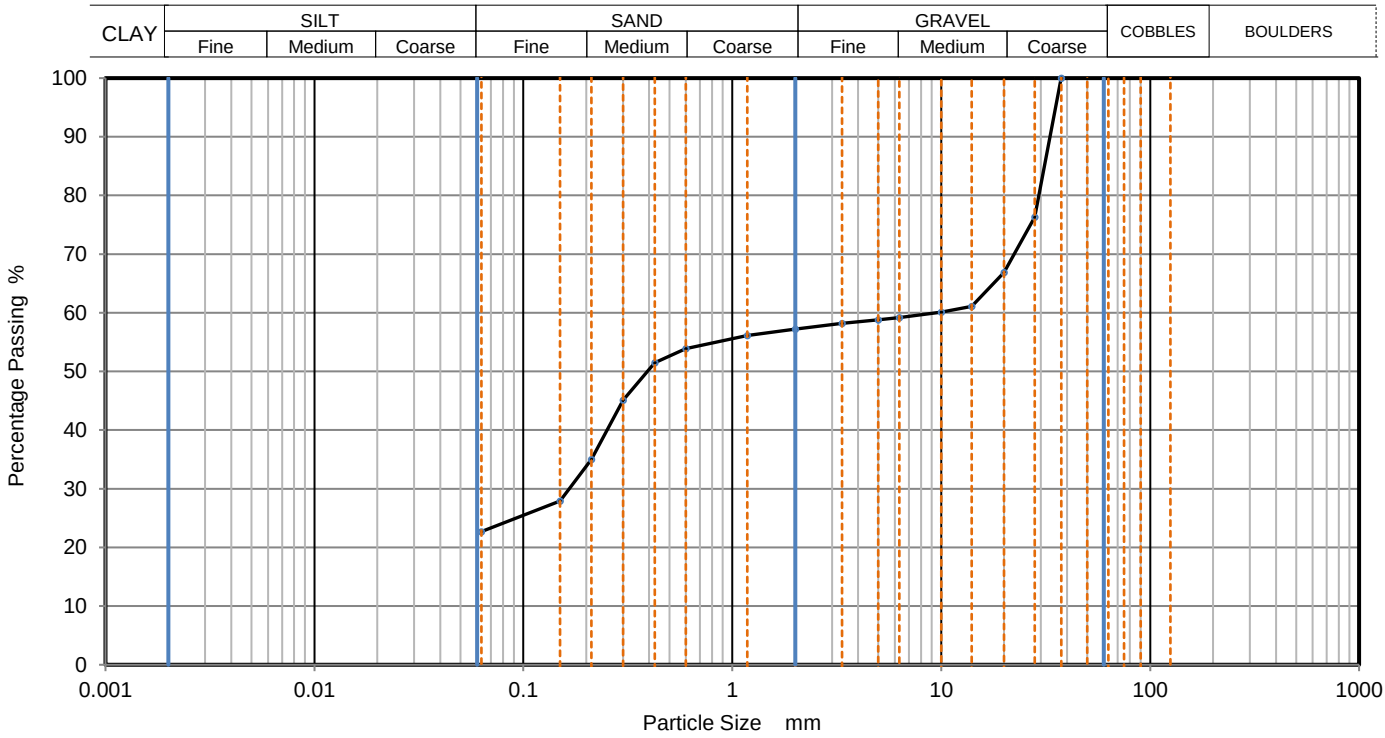
Grading Analysis		
D100	mm	28
D60	mm	0.285
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	5
Soil Description	Brown very silty very sandy coarse GRAVEL.			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	D
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911946



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	76		
20	67		
14	61		
10	60		
6.3	59		
5	59		
3.35	58		
2	57		
1.18	56		
0.6	54		
0.425	52		
0.3	45		
0.212	35		
0.15	28		
0.063	23		

Dry Mass of sample, g: 756

Sample Proportions	% dry mass
Very coarse	0
Gravel	43
Sand	35
Fines <0.063mm	23

Grading Analysis		
D100	mm	37.5
D60	mm	9.62
D30	mm	0.166
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

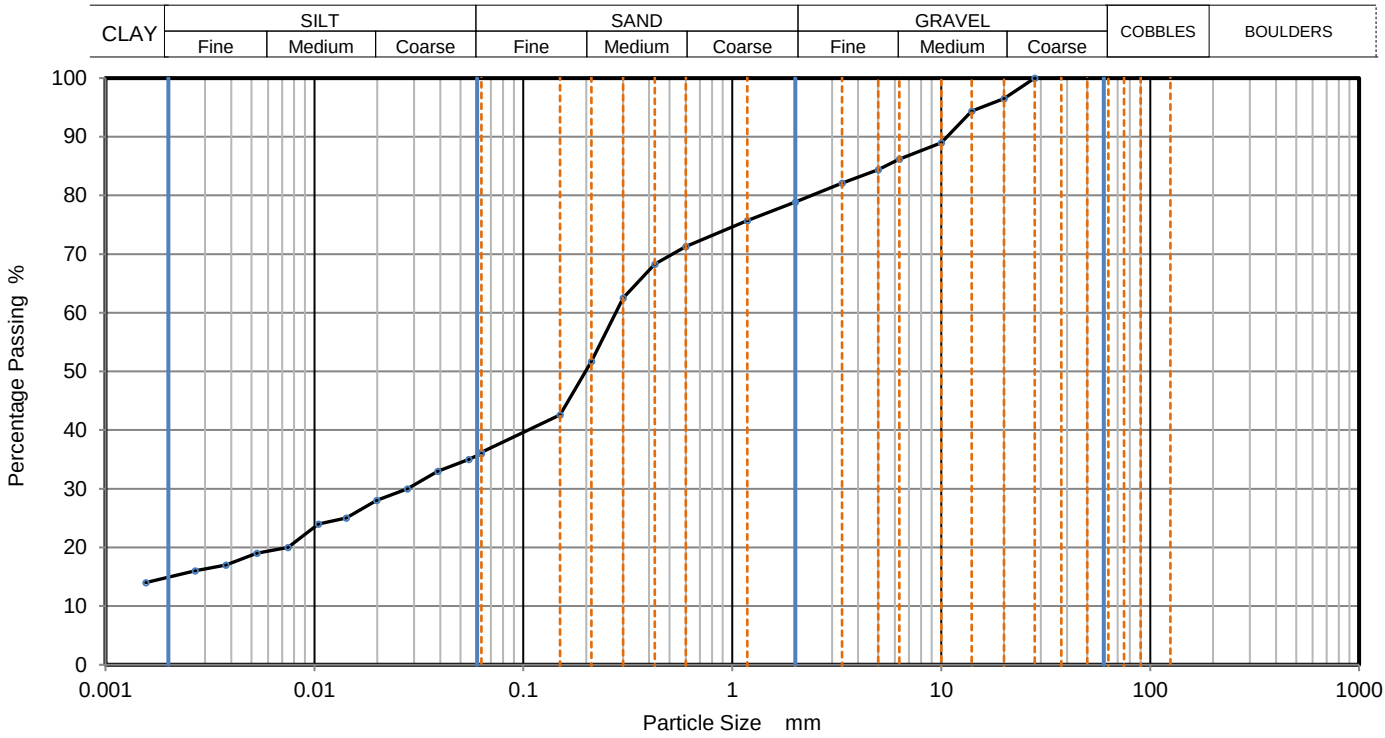
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL120170911948



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	36
		0.0548	35
		0.0390	33
		0.0279	30
		0.0198	28
		0.0142	25
28	100	0.0104	24
20	97	0.0075	20
14	94	0.0053	19
10	89	0.0038	17
6.3	86	0.0027	16
5	84	0.0016	14
3.35	82		
2	79		
1.18	76		
0.6	71	Particle density (assumed)	
0.425	68	2.65	Mg/m3
0.3	63		
0.212	52		
0.15	43		
0.063	36		

Dry Mass of sample, g: 1352

Sample Proportions	% dry mass
Very coarse	0
Gravel	21
Sand	43
Silt	21
Clay	15

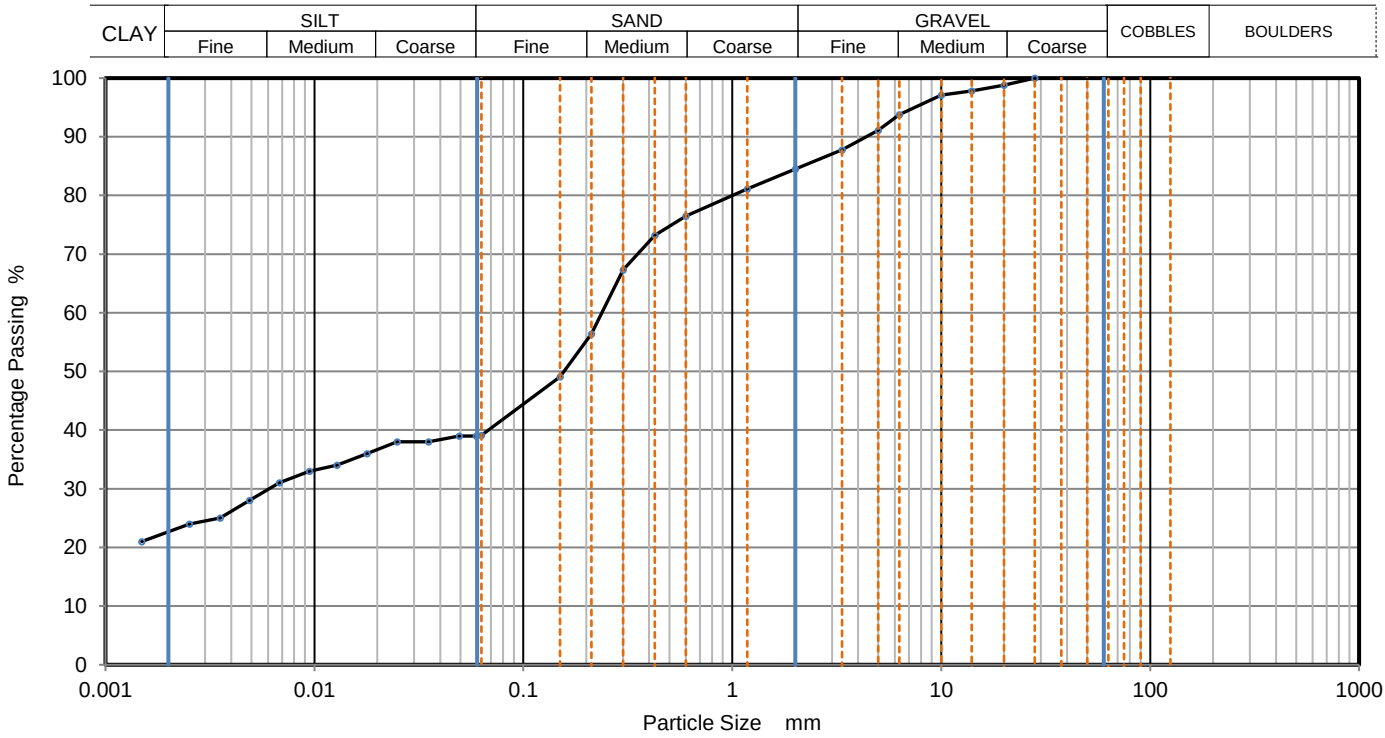
Grading Analysis		
D100	mm	28
D60	mm	0.277
D30	mm	0.0282
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL120170911951



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0594	39
		0.0493	39
		0.0352	38
		0.0249	38
		0.0179	36
		0.0128	34
28	100	0.0094	33
20	99	0.0068	31
14	98	0.0049	28
10	97	0.0035	25
6.3	94	0.0025	24
5	91	0.0015	21
3.35	88		
2	85		
1.18	81		
0.6	77	Particle density (assumed)	
0.425	73	2.65	Mg/m3
0.3	67		
0.212	56		
0.15	49		
0.063	39		

Dry Mass of sample, g: 1319

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	45
Silt	16
Clay	23

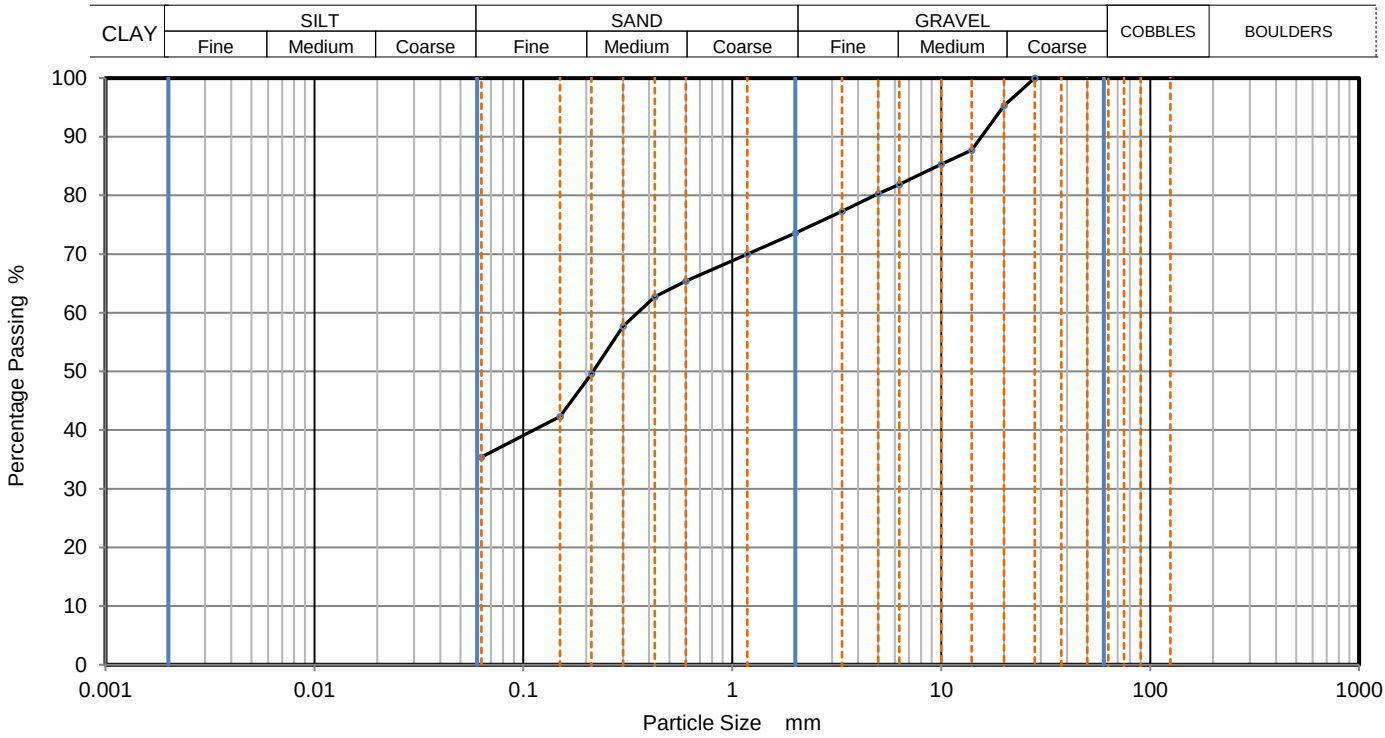
Grading Analysis		
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D60	mm	0.238
D30	mm	0.00588
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911954



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	88		
10	85		
6.3	82		
5	80		
3.35	77		
2	74		
1.18	70		
0.6	65		
0.425	63		
0.3	58		
0.212	50		
0.15	42		
0.063	35		

Dry Mass of sample, g: 1253

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	38
Fines <0.063mm	35

Grading Analysis		
D100	mm	28
D60	mm	0.352
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

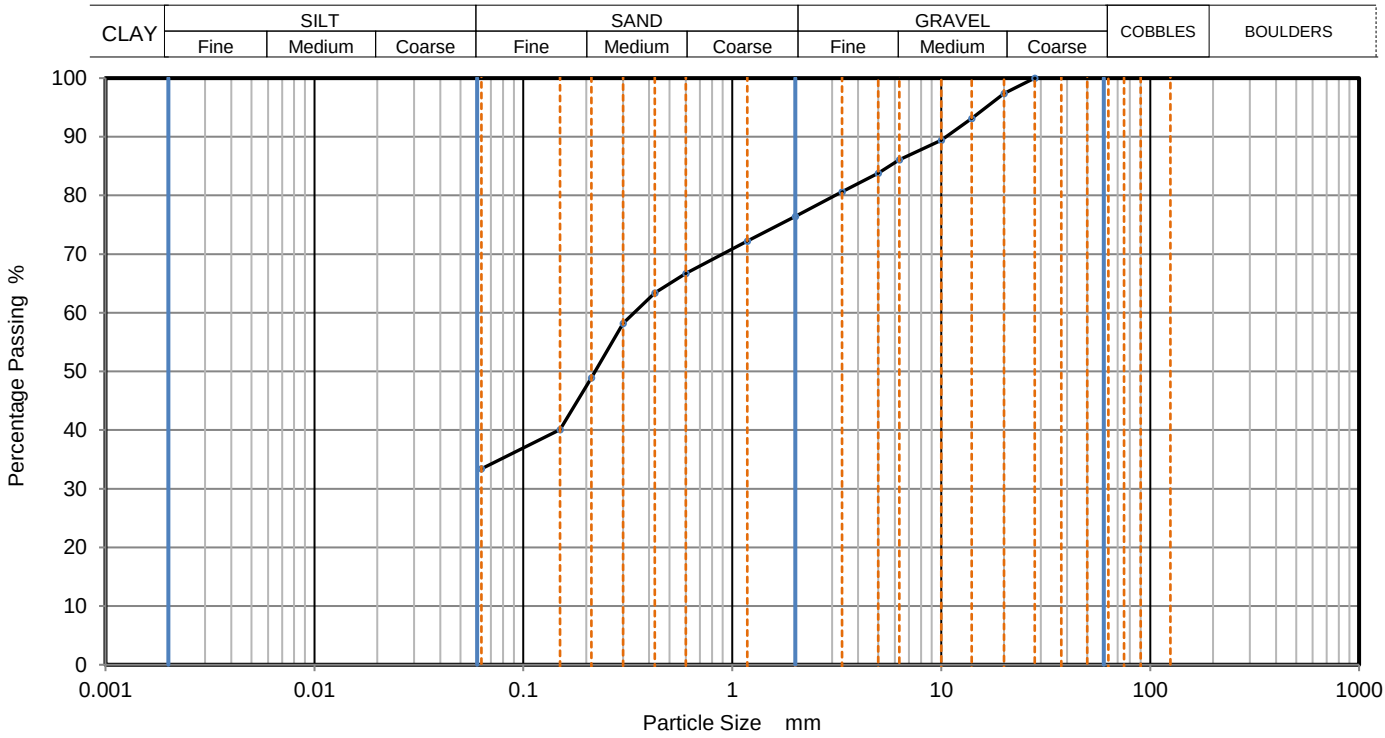
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Brown very gravelly very silty fine and medium SAND.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911957



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	93		
10	89		
6.3	86		
5	84		
3.35	81		
2	76		
1.18	72		
0.6	67		
0.425	63		
0.3	58		
0.212	49		
0.15	40		
0.063	33		

Dry Mass of sample, g: 1706

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	43
Fines <0.063mm	33

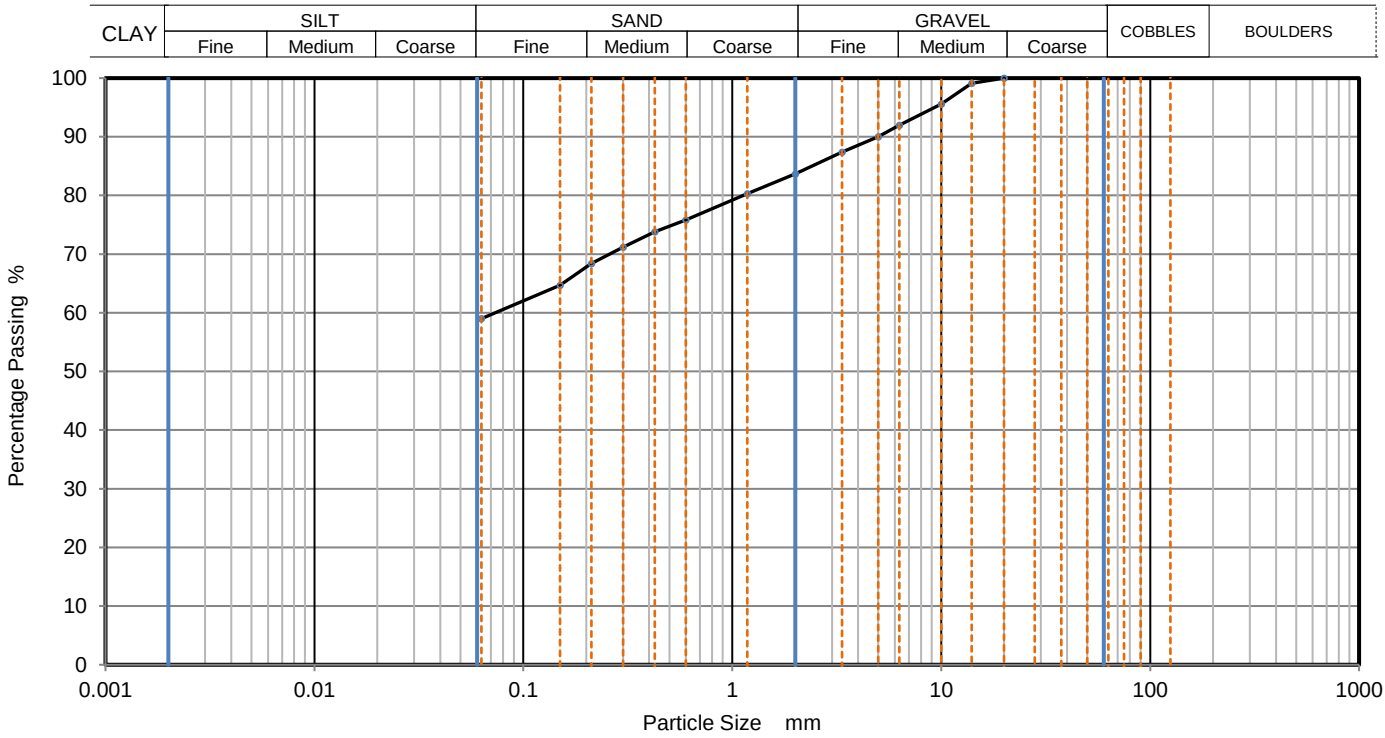
Grading Analysis		
D100	mm	28
D60	mm	0.339
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH159
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102065



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	99		
10	96		
6.3	92		
5	90		
3.35	87		
2	84		
1.18	80		
0.6	76		
0.425	74		
0.3	71		
0.212	68		
0.15	65		
0.063	59		

Dry Mass of sample, g	1116

Sample Proportions	% dry mass
Very coarse	0
Gravel	16
Sand	25
Fines <0.063mm	59

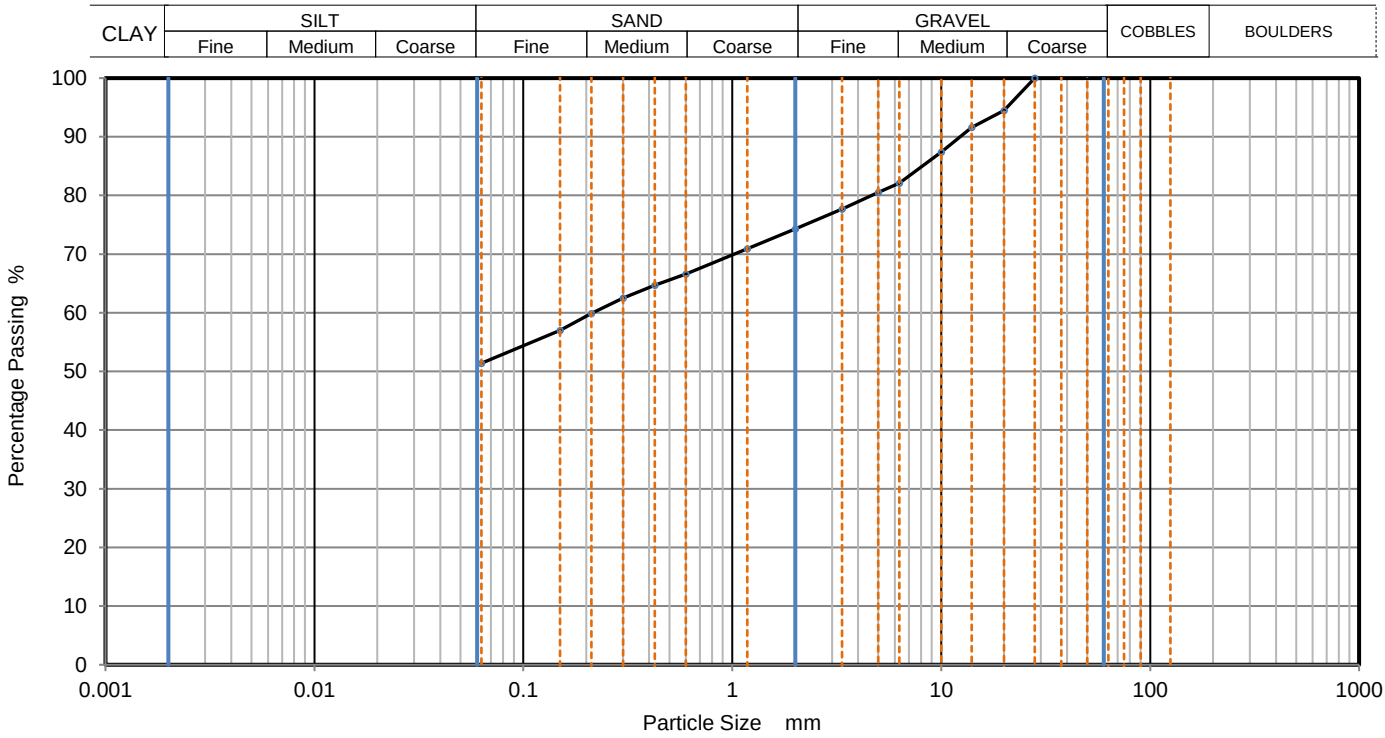
Grading Analysis		
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D60	mm	0.0737
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH159
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly sandy slightly gravelly SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102068



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	92		
10	87		
6.3	82		
5	81		
3.35	78		
2	74		
1.18	71		
0.6	67		
0.425	65		
0.3	63		
0.212	60		
0.15	57		
0.063	51		

Dry Mass of sample, g: 899

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	23
Fines <0.063mm	51

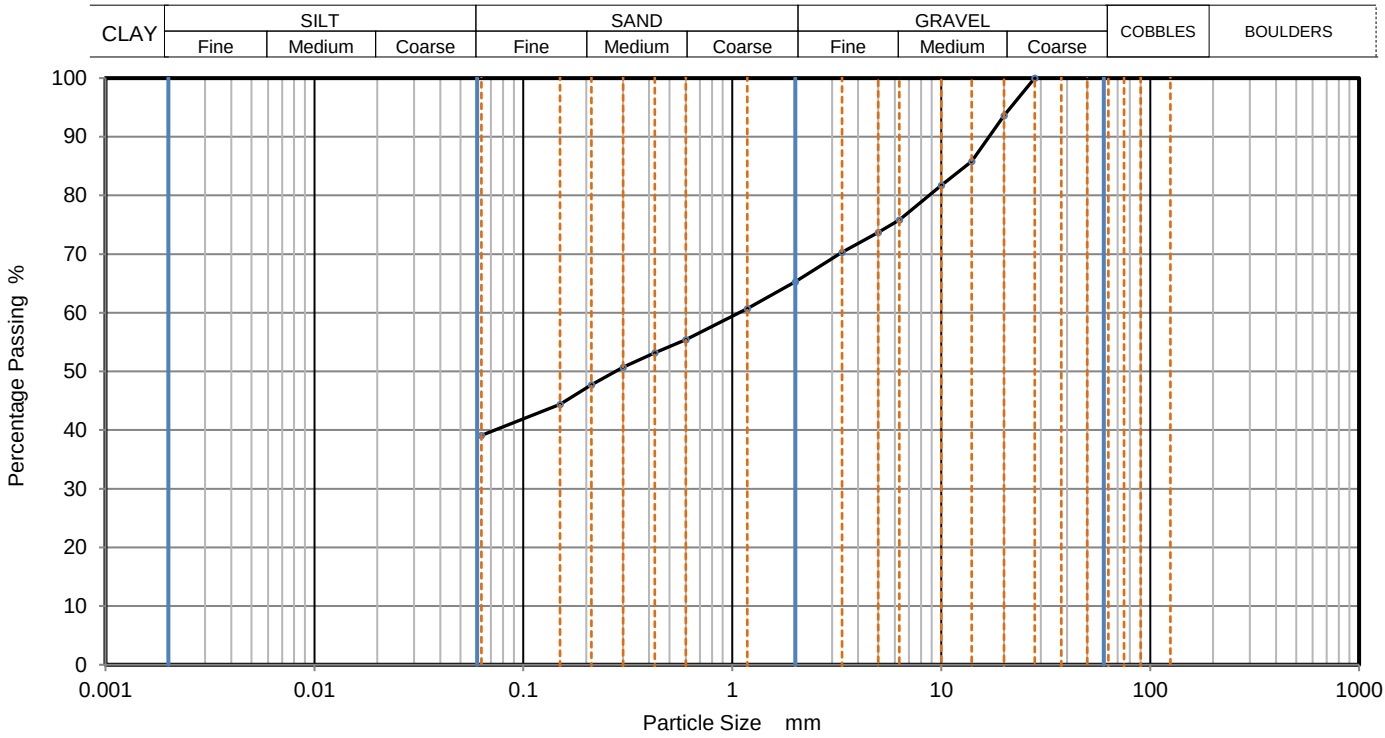
Grading Analysis		
D100	mm	28
D60	mm	0.214
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH160
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly sandy gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102083



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	94		
14	86		
10	82		
6.3	76		
5	74		
3.35	70		
2	65		
1.18	61		
0.6	55		
0.425	53		
0.3	51		
0.212	48		
0.15	44		
0.063	39		

Dry Mass of sample, g: 1093

Sample Proportions	% dry mass
Very coarse	0
Gravel	35
Sand	26
Fines <0.063mm	39

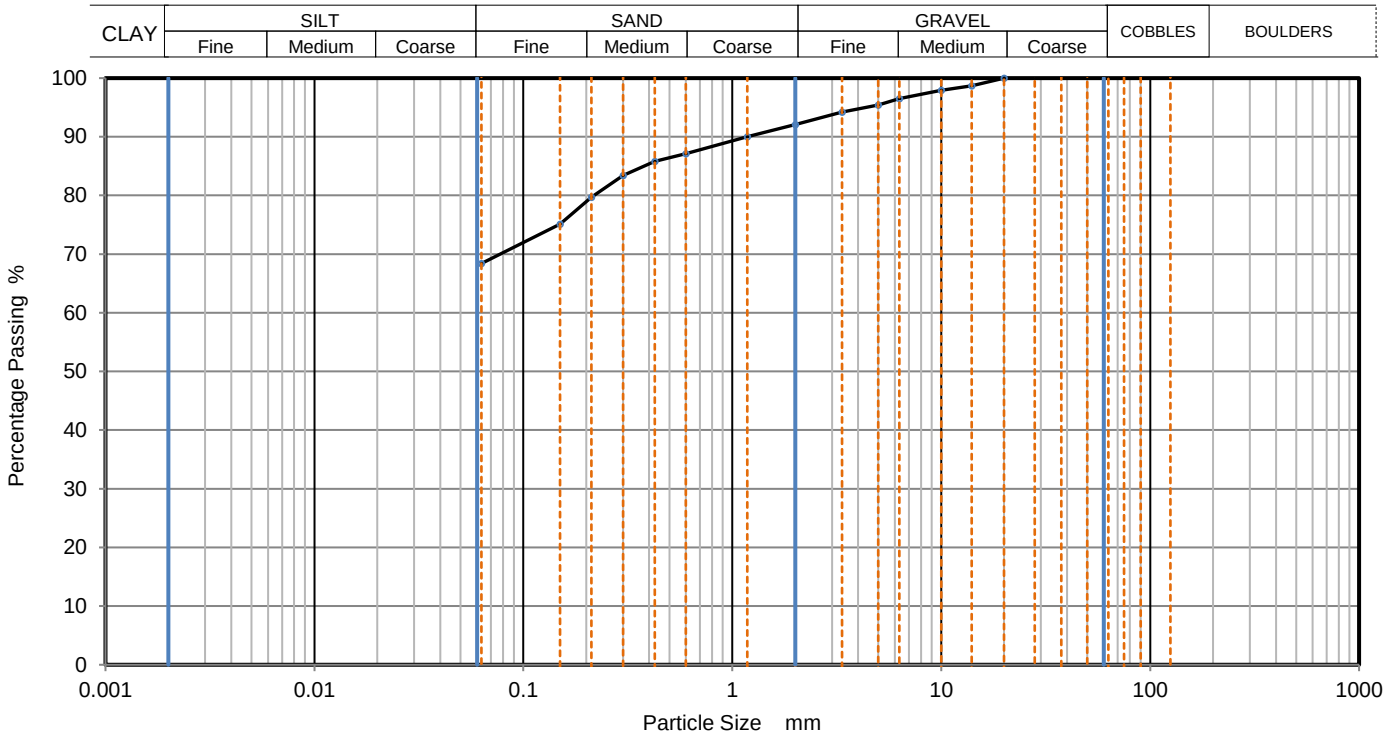
Grading Analysis		
D100	mm	28
D60	mm	1.07
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH162
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Light grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL12017102095



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	99		
10	98		
6.3	97		
5	95		
3.35	94		
2	92		
1.18	90		
0.6	87		
0.425	86		
0.3	83		
0.212	80		
0.15	75		
0.063	68		

Dry Mass of sample, g	815

Sample Proportions	% dry mass
Very coarse	0
Gravel	8
Sand	24
Fines <0.063mm	68

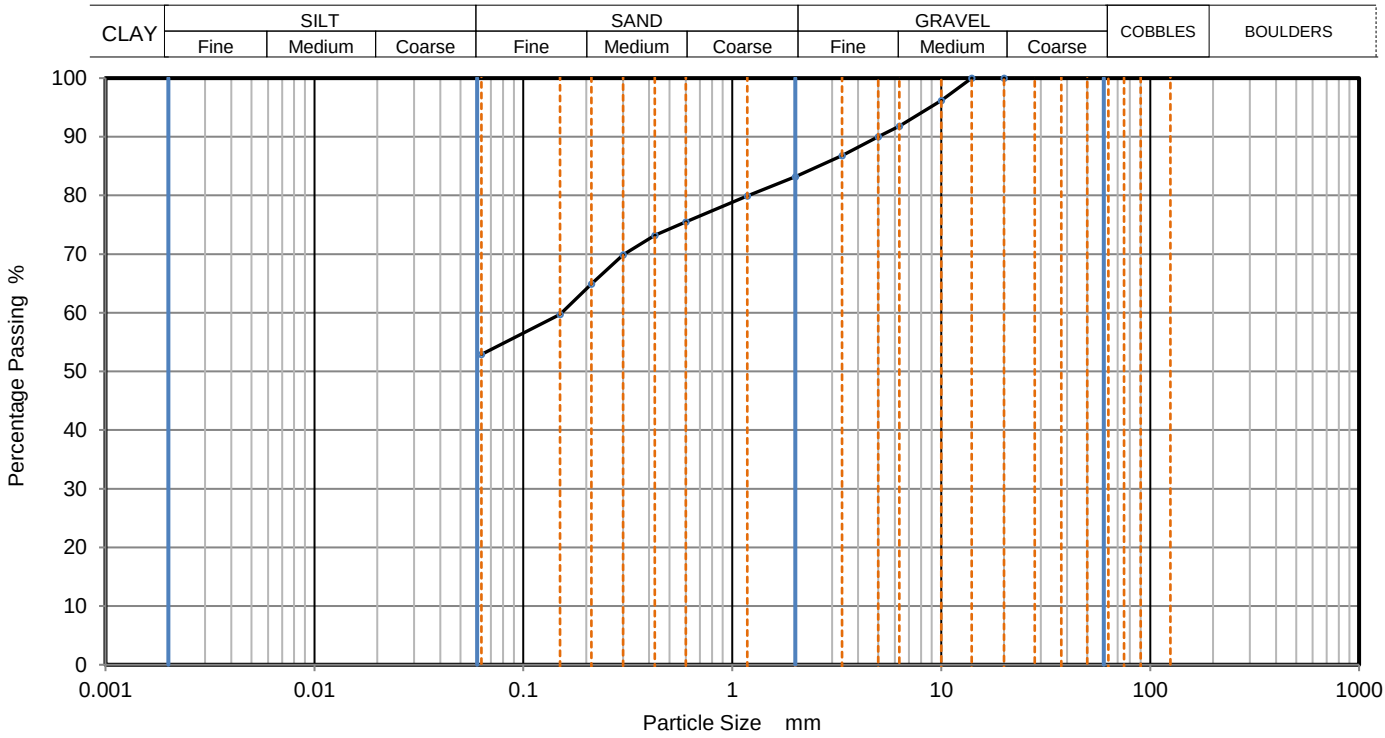
Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH172
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Orange-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911966



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	100		
10	96		
6.3	92		
5	90		
3.35	87		
2	83		
1.18	80		
0.6	76		
0.425	73		
0.3	70		
0.212	65		
0.15	60		
0.063	53		

Dry Mass of sample, g: 948

Sample Proportions	% dry mass
Very coarse	0
Gravel	17
Sand	30
Fines <0.063mm	53

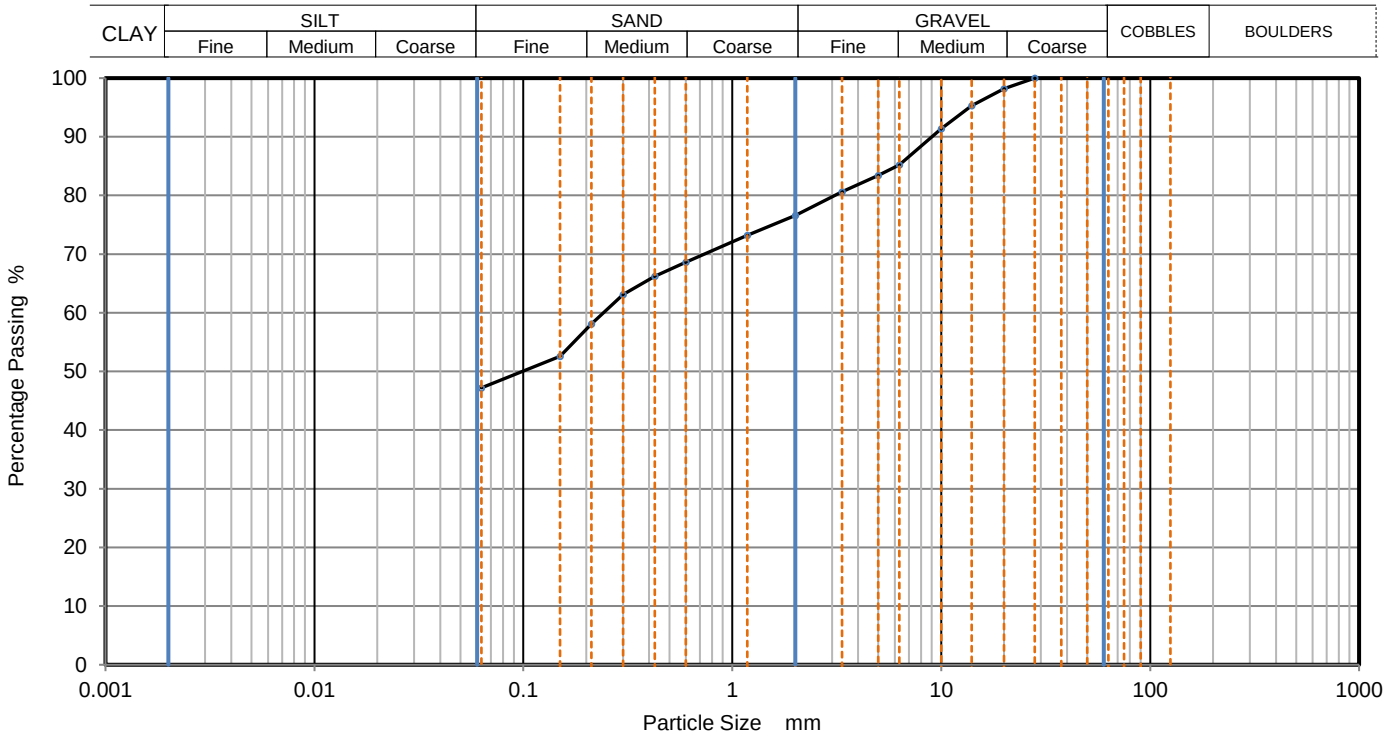
Grading Analysis		
D100	mm	
D60	mm	0.153
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH172
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Brown slightl ygravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911972



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	95		
10	91		
6.3	85		
5	83		
3.35	81		
2	77		
1.18	73		
0.6	69		
0.425	66		
0.3	63		
0.212	58		
0.15	53		
0.063	47		

Dry Mass of sample, g: 1027

Sample Proportions	% dry mass
Very coarse	0
Gravel	23
Sand	29
Fines <0.063mm	47

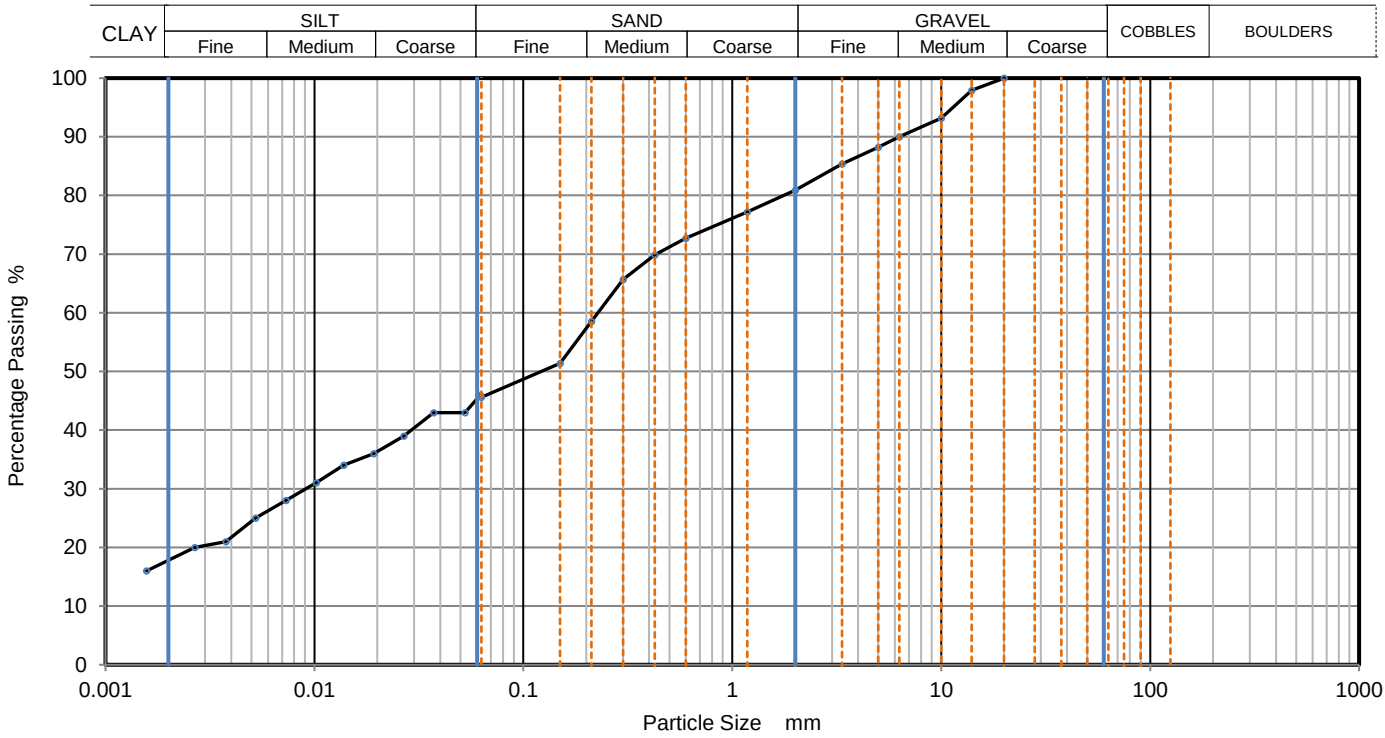
Grading Analysis		
D100	mm	28
D60	mm	0.242
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands			Sample No.	1
Soil Description	Grey slightly gravelly sandy SILT / CLAY.			Depth, m	0.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL120170911999



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0623	46
		0.0525	43
		0.0371	43
		0.0268	39
		0.0192	36
		0.0138	34
		0.0102	31
20	100	0.0073	28
14	98	0.0052	25
10	93	0.0038	21
6.3	90	0.0027	20
5	88	0.0016	16
3.35	85		
2	81		
1.18	77		
0.6	73	Particle density (assumed)	
0.425	70	2.65	Mg/m3
0.3	66		
0.212	59		
0.15	51		
0.063	46		

Dry Mass of sample, g: 1193

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	35
Silt	28
Clay	18

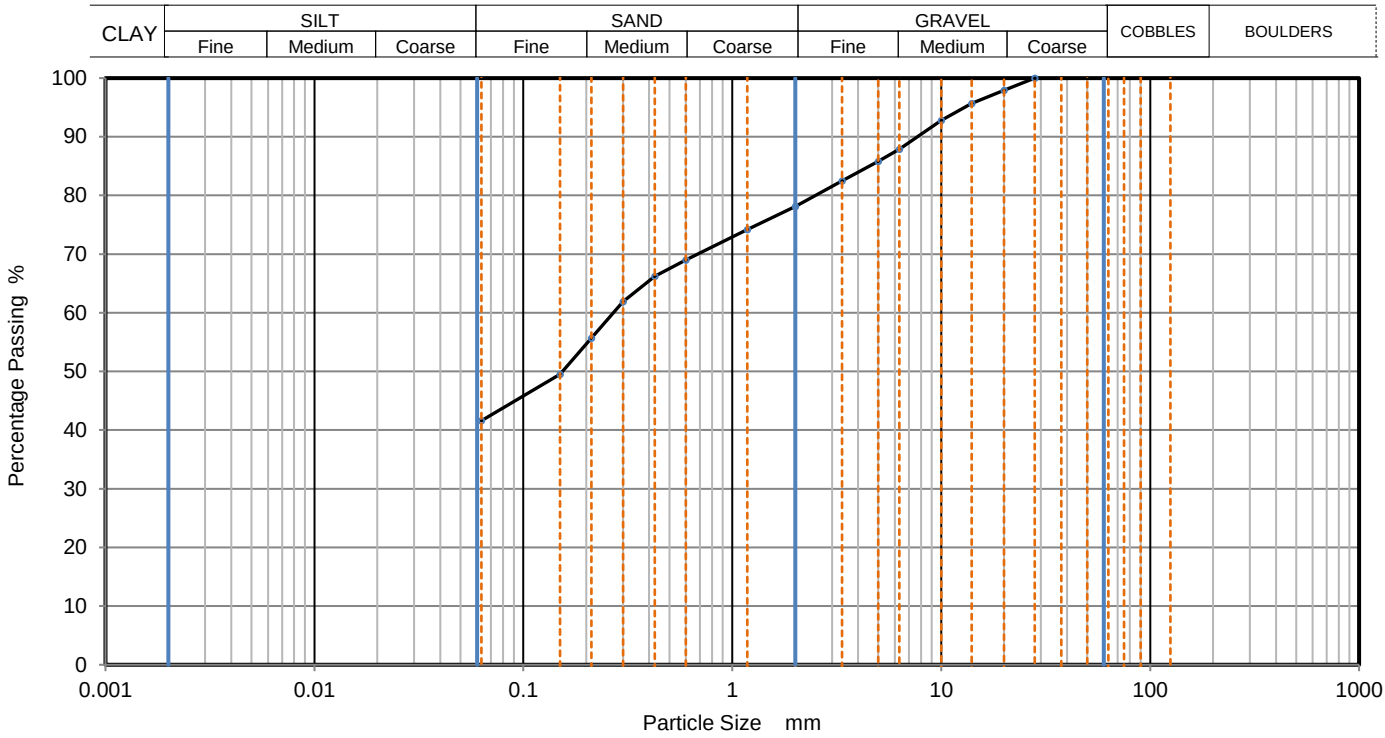
Grading Analysis		
D100	mm	20
D60	mm	0.228
D30	mm	0.00918
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**	Job Ref	**2017T101**
		Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands	Sample No.	5
Soil Description	Grey slightly gravelly sandy SILT / CLAY.	Depth, m	1.50
Specimen Reference	Specimen Depth: m	Sample Type	D
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	IDL1201709111003



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	96		
10	93		
6.3	88		
5	86		
3.35	83		
2	78		
1.18	74		
0.6	69		
0.425	66		
0.3	62		
0.212	56		
0.15	50		
0.063	42		

Dry Mass of sample, g: 1252

Sample Proportions	% dry mass
Very coarse	0
Gravel	22
Sand	36
Fines <0.063mm	42

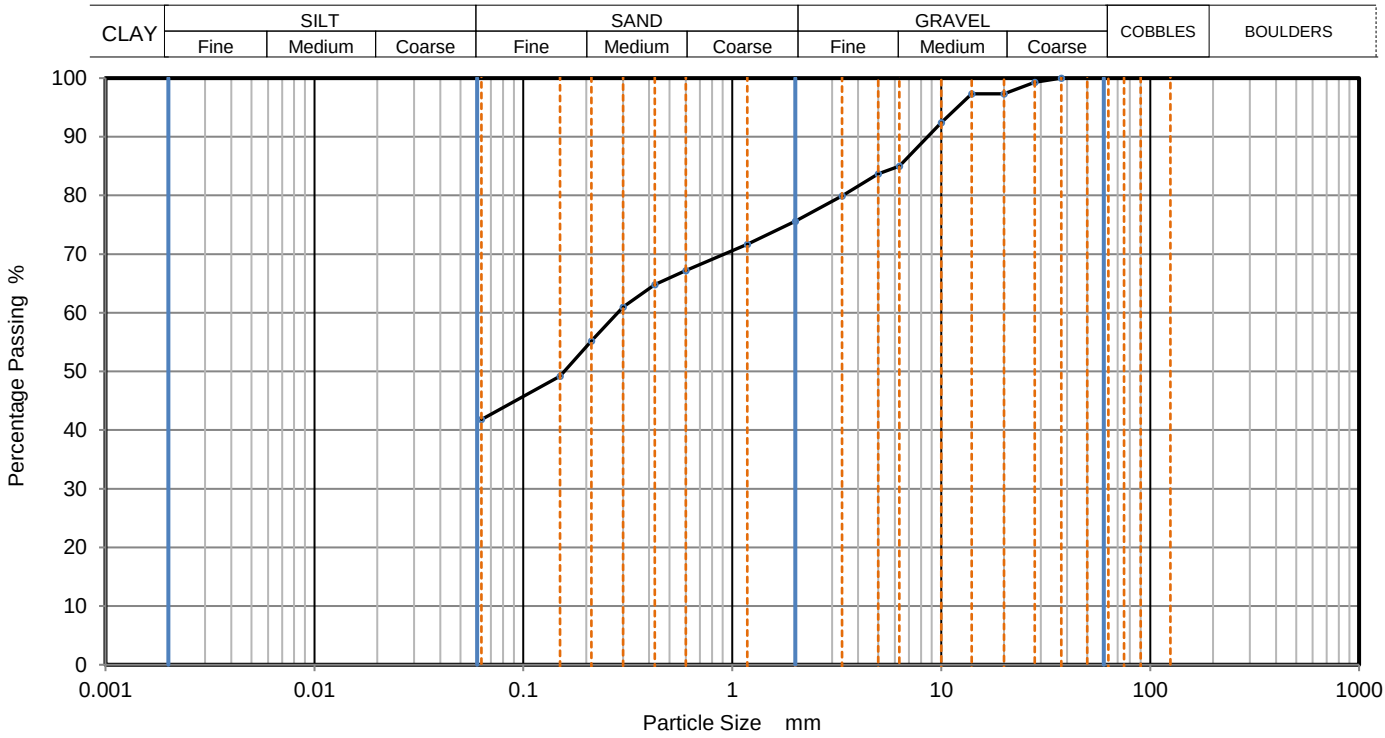
Grading Analysis		
D100	mm	28
D60	mm	0.27
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111005



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	99		
20	97		
14	97		
10	92		
6.3	85		
5	84		
3.35	80		
2	76		
1.18	72		
0.6	67		
0.425	65		
0.3	61		
0.212	55		
0.15	49		
0.063	42		

Dry Mass of sample, g: 1379

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	34
Fines <0.063mm	42

Grading Analysis		
D100	mm	37.5
D60	mm	0.282
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

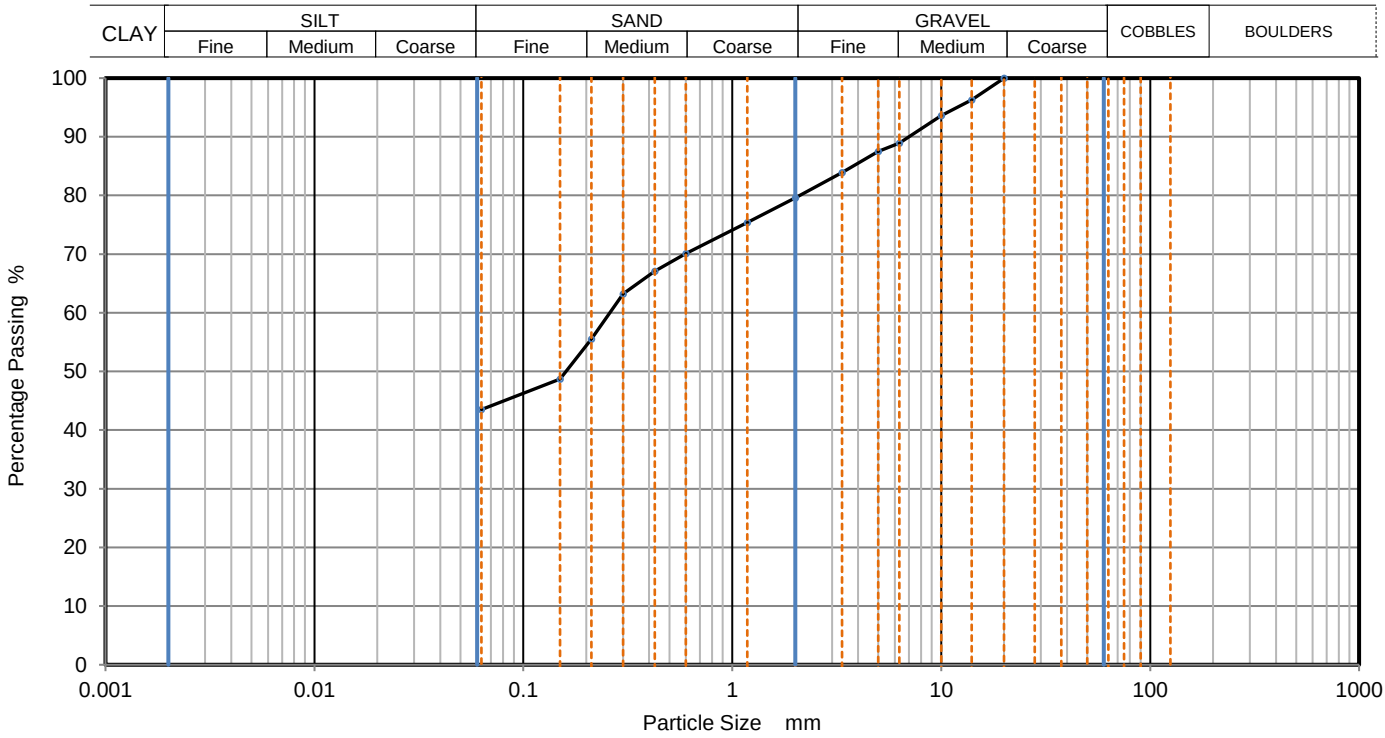
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PARTICLE SIZE DISTRIBUTION

Job Ref	2017T101		
Borehole/Pit No.	BH173		
Site Name	WSP Eastern and Midlands	Sample No.	10
Soil Description	Gry slightly gravelly sandy SILT / CLAY.	Depth, m	3.00
Specimen Reference		Specimen Depth	m
Sample Type	B		
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	IDL1201709111008



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	96		
10	94		
6.3	89		
5	88		
3.35	84		
2	80		
1.18	75		
0.6	70		
0.425	67		
0.3	63		
0.212	56		
0.15	49		
0.063	44		

Dry Mass of sample, g: 1153

Sample Proportions	% dry mass
Very coarse	0
Gravel	20
Sand	36
Fines <0.063mm	43

Grading Analysis		
D100	mm	20
D60	mm	0.26
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

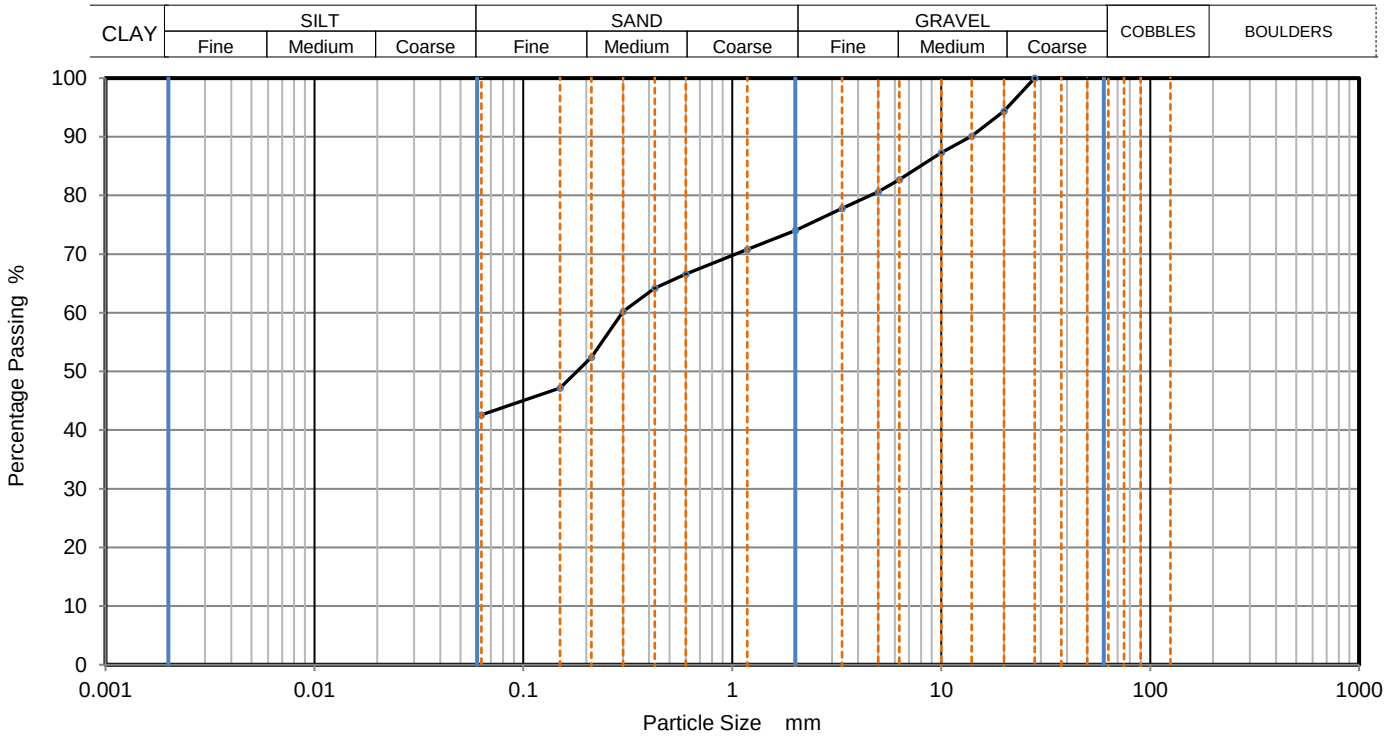
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111014



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	94		
14	90		
10	87		
6.3	83		
5	81		
3.35	78		
2	74		
1.18	71		
0.6	67		
0.425	64		
0.3	60		
0.212	52		
0.15	47		
0.063	43		

Dry Mass of sample, g: 1186

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	31
Fines <0.063mm	43

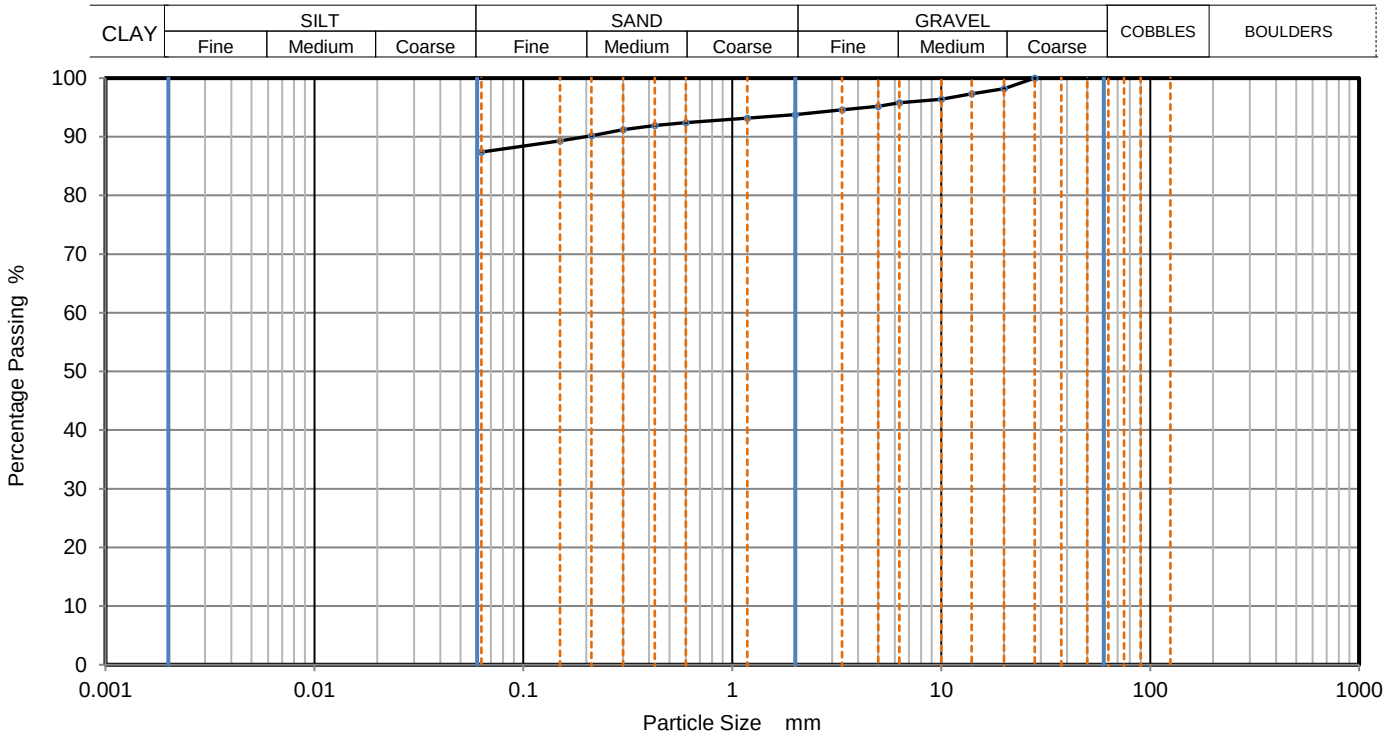
Grading Analysis		
D100	mm	28
D60	mm	0.297
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands			Sample No.	22
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	8.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111020



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	97		
10	96		
6.3	96		
5	95		
3.35	95		
2	94		
1.18	93		
0.6	92		
0.425	92		
0.3	91		
0.212	90		
0.15	89		
0.063	87		

Dry Mass of sample, g: 1124

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	6
Fines <0.063mm	87

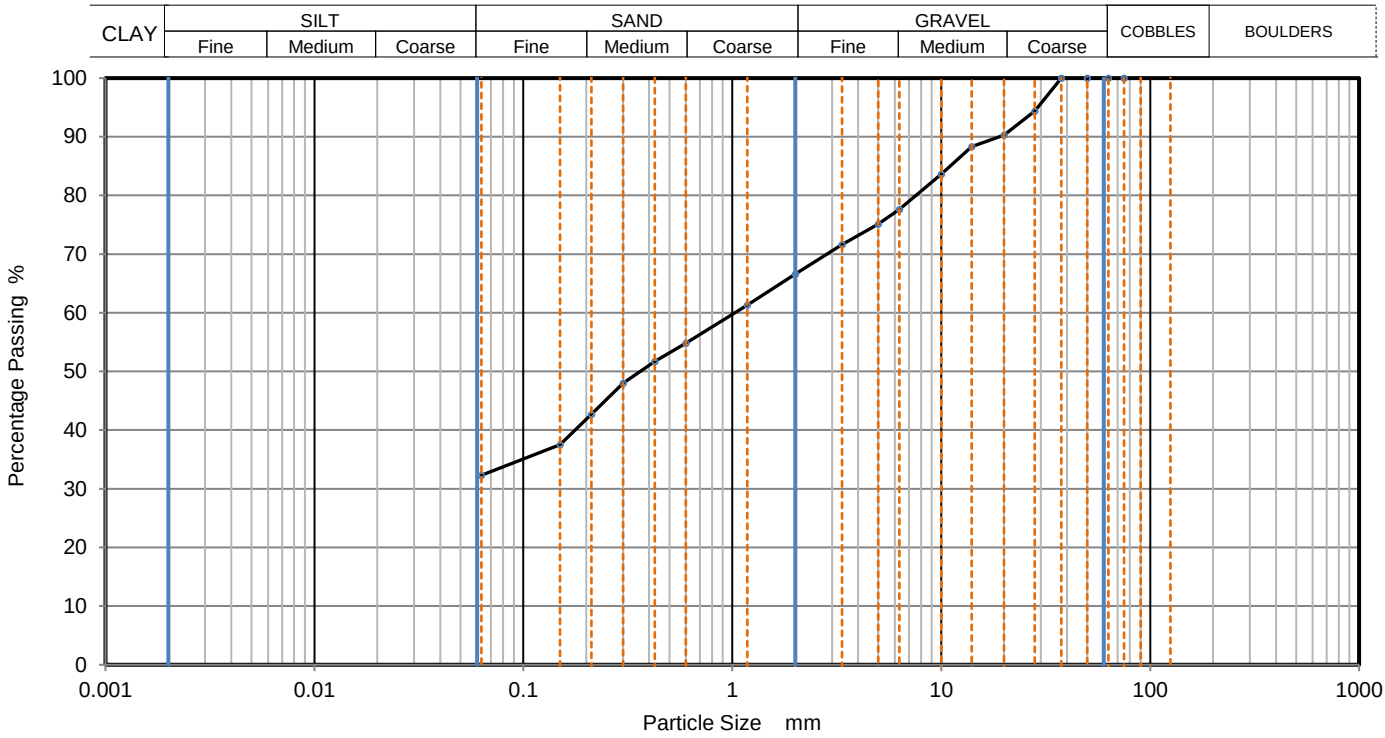
Grading Analysis		
D100	mm	28
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH178
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Grey very silty SAND and GRAVEL.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111035



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	94		
20	90		
14	88		
10	84		
6.3	78		
5	75		
3.35	72		
2	67		
1.18	61		
0.6	55		
0.425	52		
0.3	48		
0.212	43		
0.15	38		
0.063	32		

Dry Mass of sample, g	1638

Sample Proportions	% dry mass
Very coarse	0
Gravel	33
Sand	34
Fines <0.063mm	32

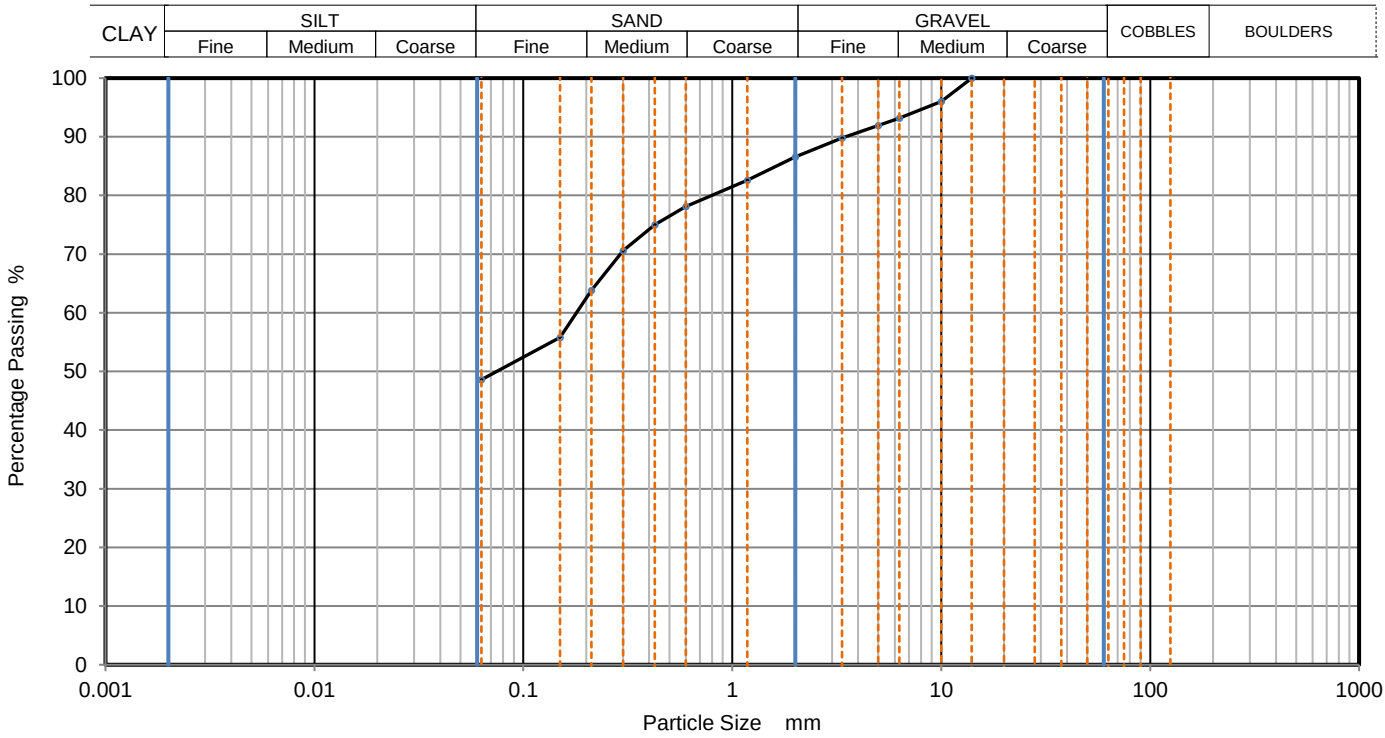
Grading Analysis		
D100	mm	
D60	mm	1.03
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH179
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170914139



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	96		
6.3	93		
5	92		
3.35	90		
2	87		
1.18	83		
0.6	78		
0.425	75		
0.3	71		
0.212	64		
0.15	56		
0.063	49		

Dry Mass of sample, g: 924

Sample Proportions	% dry mass
Very coarse	0
Gravel	13
Sand	38
Fines <0.063mm	49

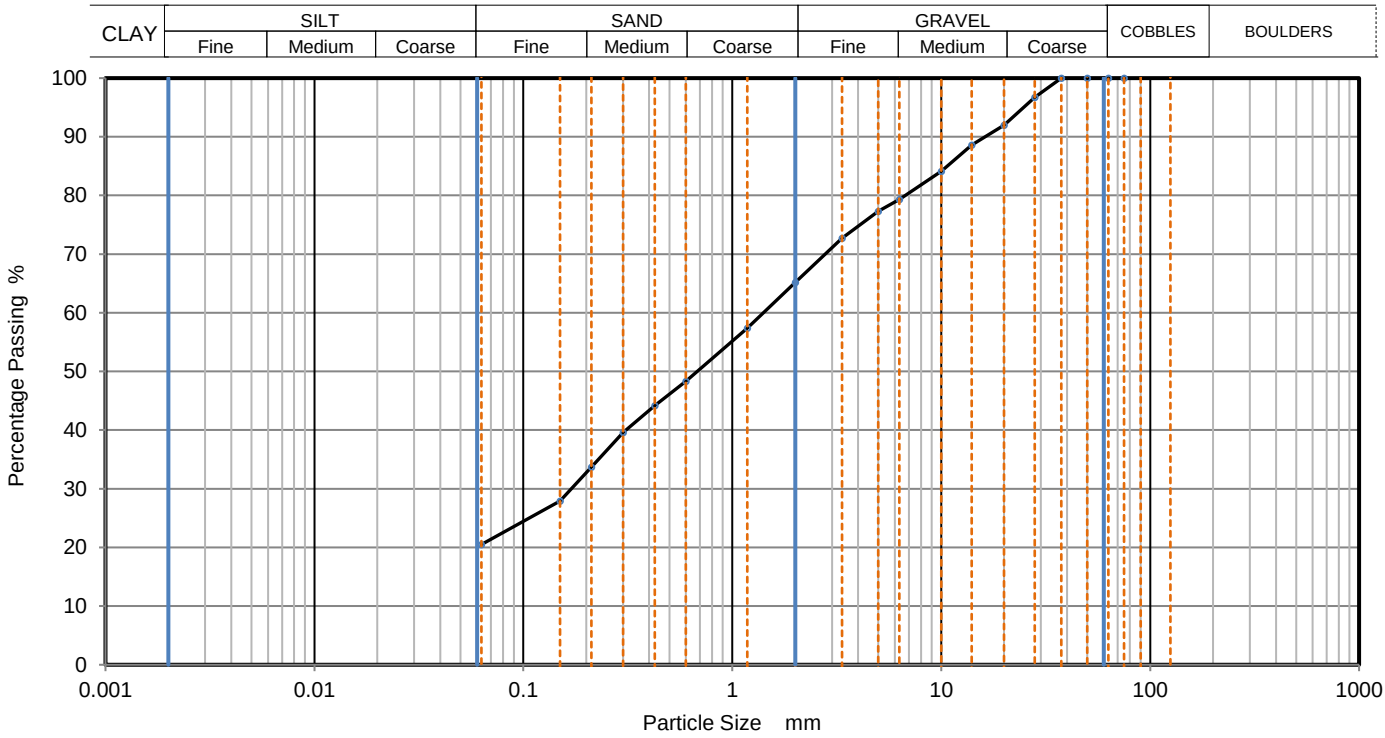
Grading Analysis		
D100	mm	14
D60	mm	0.18
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH179
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey very silty very gravelly SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170914142



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	97		
20	92		
14	89		
10	84		
6.3	79		
5	77		
3.35	73		
2	65		
1.18	57		
0.6	48		
0.425	44		
0.3	40		
0.212	34		
0.15	28		
0.063	21		

Dry Mass of sample, g	1534

Sample Proportions	% dry mass
Very coarse	0
Gravel	35
Sand	45
Fines <0.063mm	21

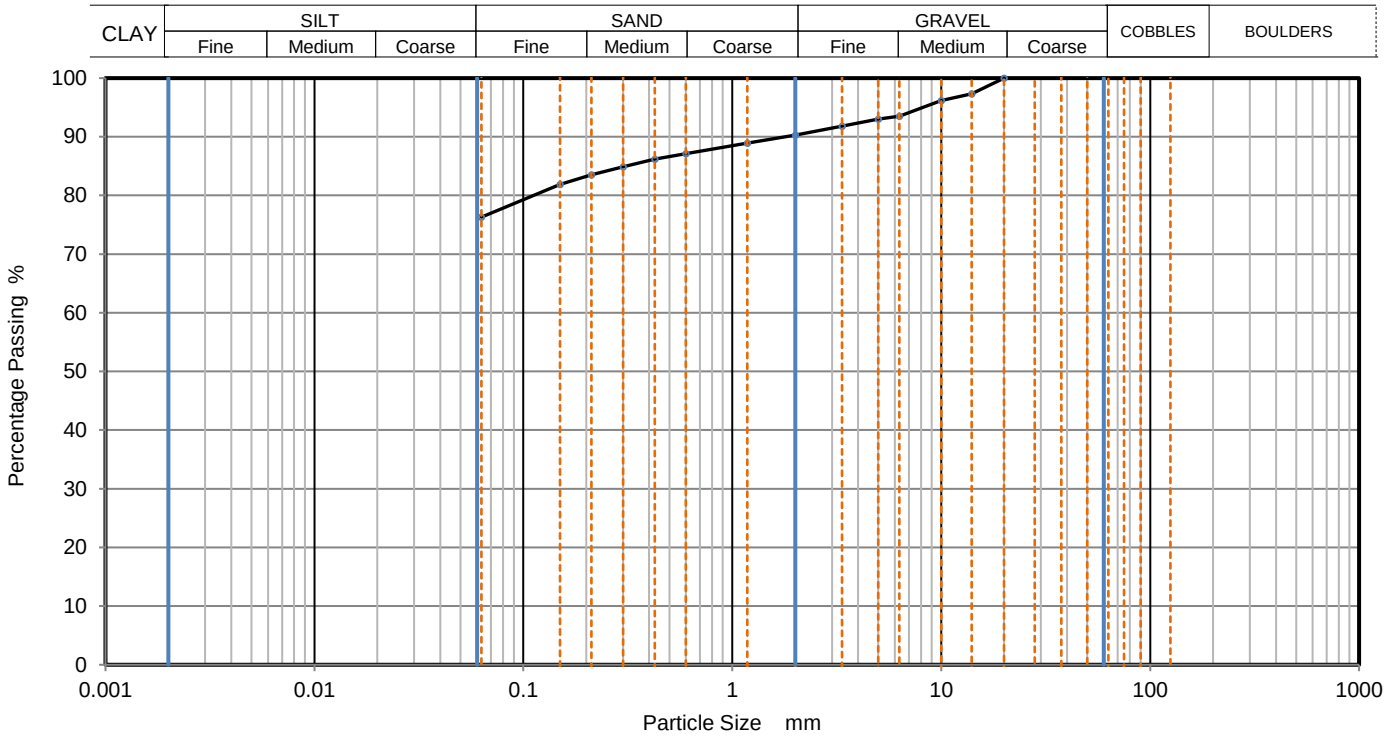
Grading Analysis		
D100	mm	
D60	mm	1.4
D30	mm	0.17
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH183
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Orange-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020104



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	97		
10	96		
6.3	94		
5	93		
3.35	92		
2	90		
1.18	89		
0.6	87		
0.425	86		
0.3	85		
0.212	84		
0.15	82		
0.063	76		

Dry Mass of sample, g	779

Sample Proportions	% dry mass
Very coarse	0
Gravel	10
Sand	14
Fines <0.063mm	76

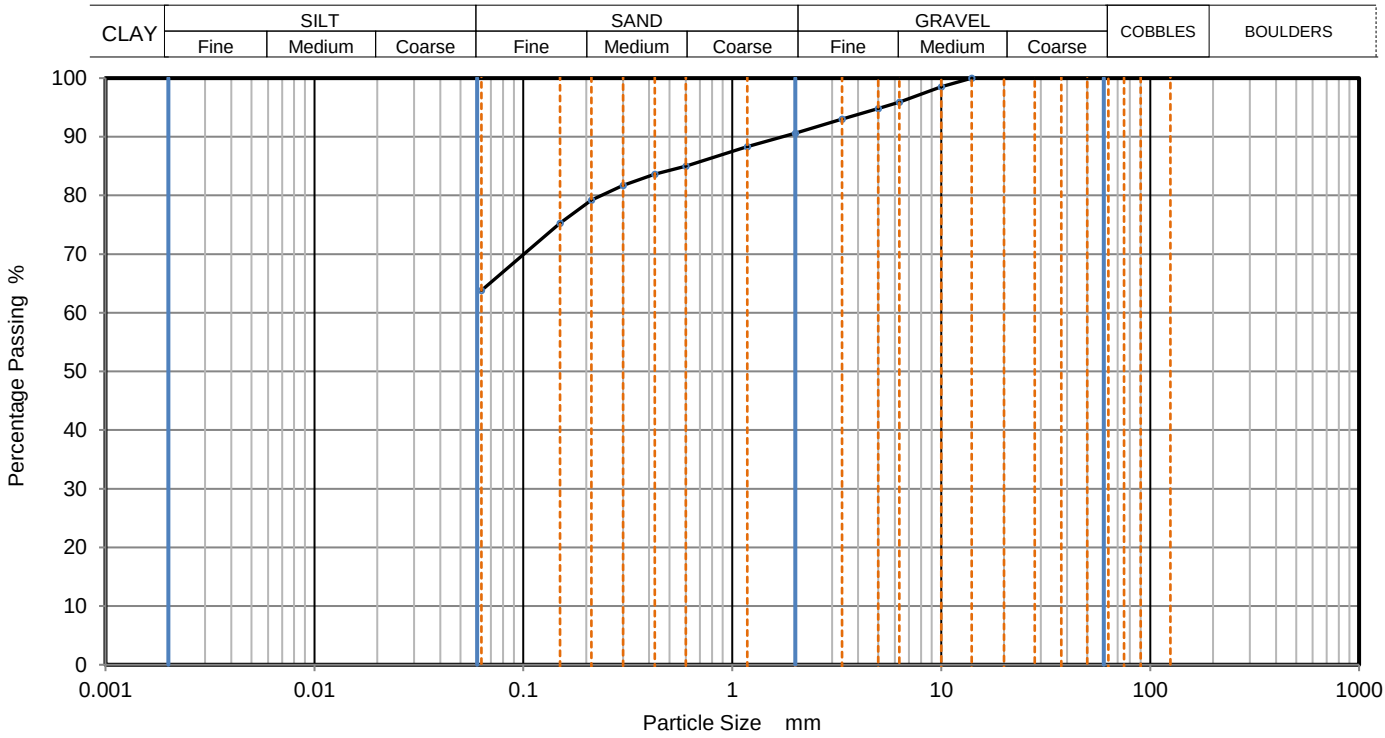
Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH183
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020107



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	99		
6.3	96		
5	95		
3.35	93		
2	91		
1.18	88		
0.6	85		
0.425	84		
0.3	82		
0.212	79		
0.15	75		
0.063	64		

Dry Mass of sample, g: 973

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	27
Fines <0.063mm	64

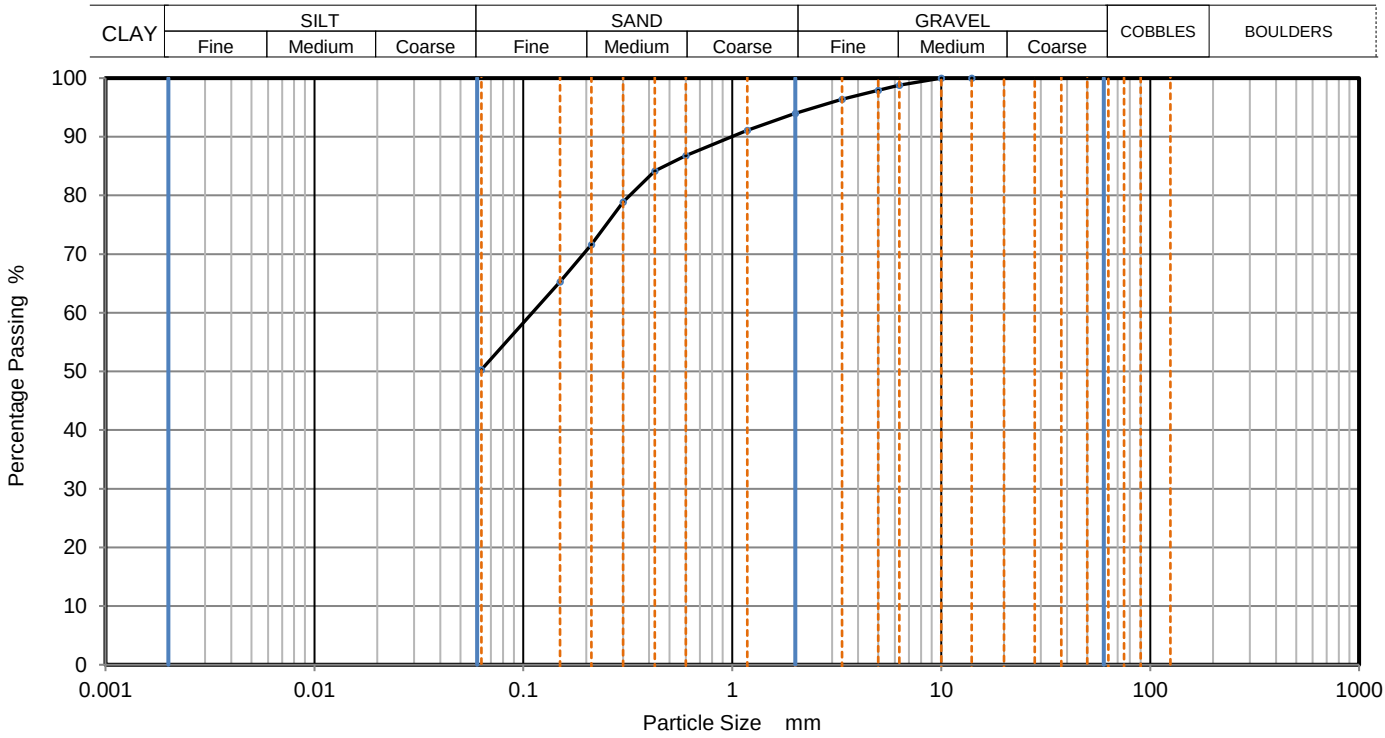
Grading Analysis		
D100	mm	14
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH188
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Grey slightly gravelly sandy SILT / CLAY.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111045



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	99		
5	98		
3.35	96		
2	94		
1.18	91		
0.6	87		
0.425	84		
0.3	79		
0.212	72		
0.15	65		
0.063	50		

Dry Mass of sample, g: 787

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	44
Fines <0.063mm	50

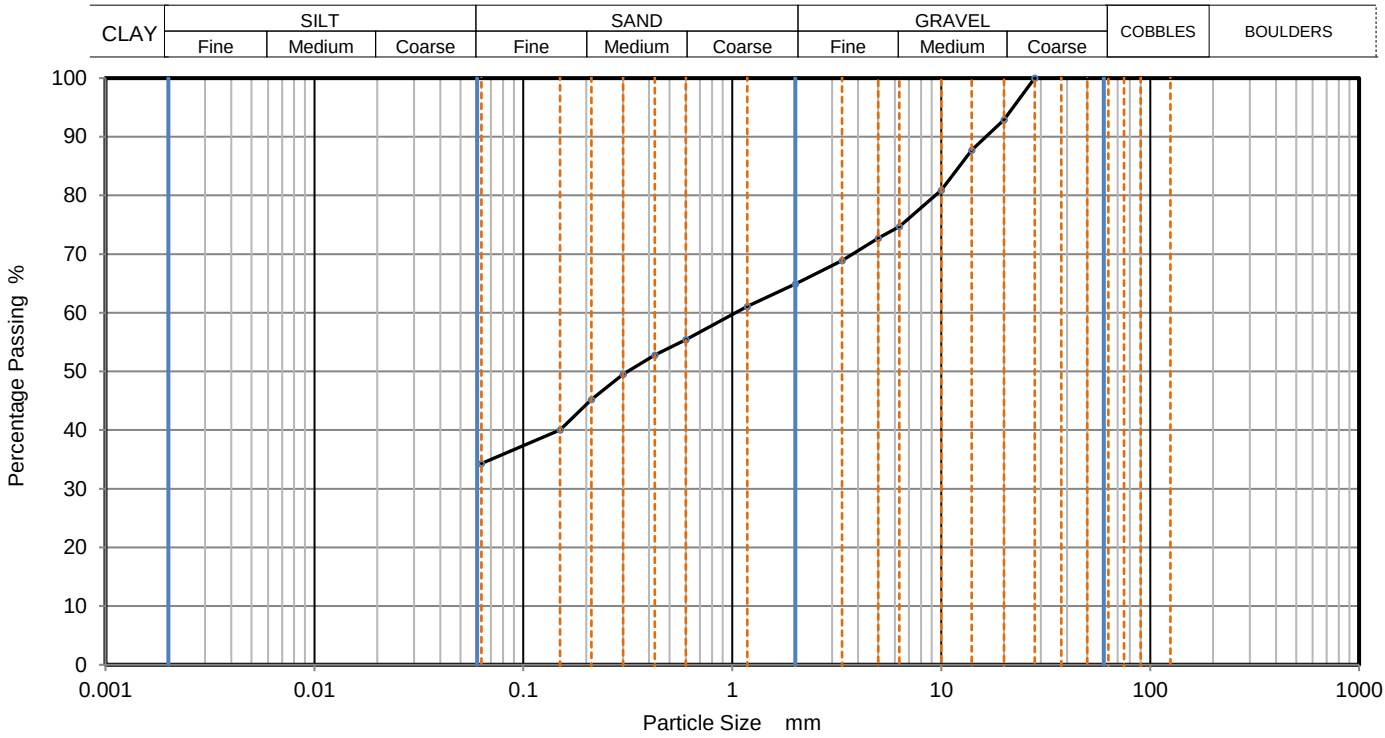
Grading Analysis		
D100	mm	
D60	mm	0.11
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH190
Site Name	WSP Eastern and Midlands			Sample No.	1
Soil Description	Brown very silty SAND and GRAVEL.			Depth, m	0.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111054



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	93		
14	88		
10	81		
6.3	75		
5	73		
3.35	69		
2	65		
1.18	61		
0.6	55		
0.425	53		
0.3	50		
0.212	45		
0.15	40		
0.063	34		

Dry Mass of sample, g: 1071

Sample Proportions	% dry mass
Very coarse	0
Gravel	35
Sand	31
Fines <0.063mm	34

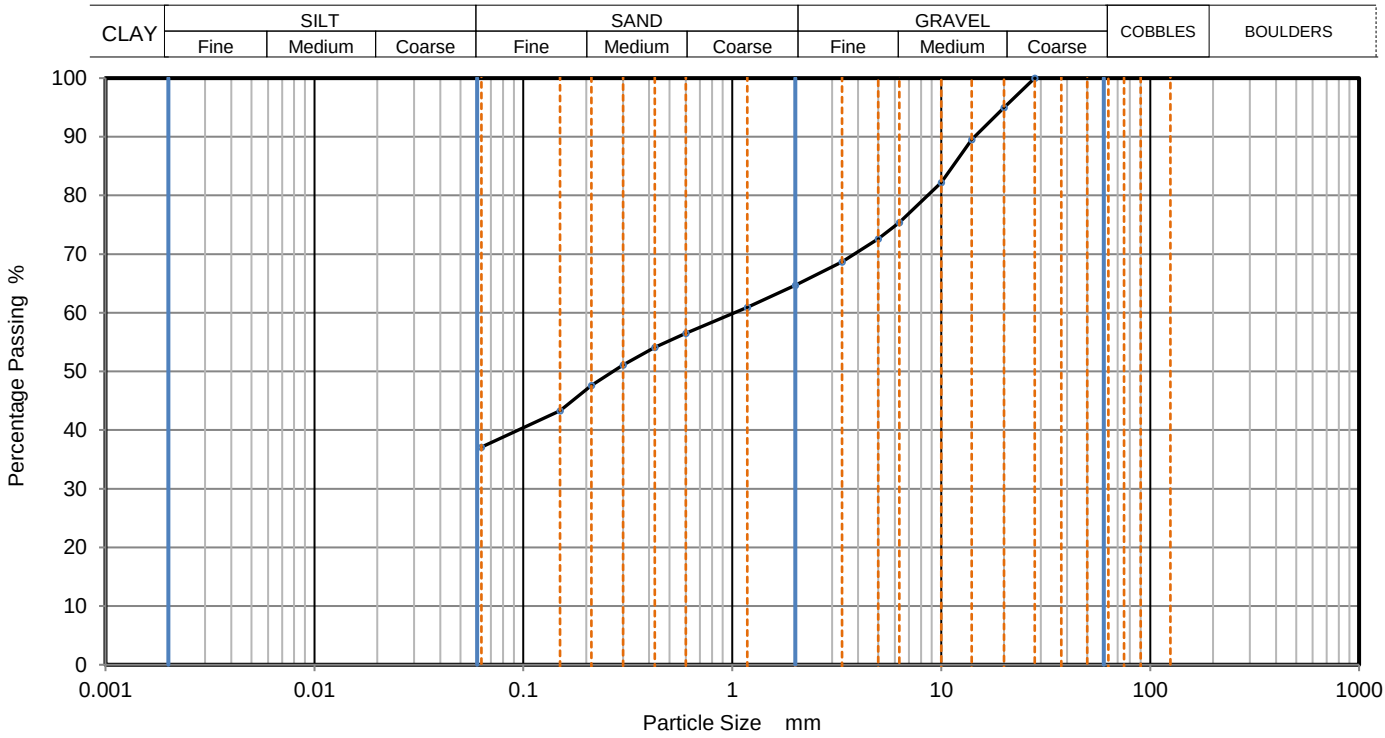
Grading Analysis		
D100	mm	28
D60	mm	1.03
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH190
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Yellow-brown slightly sandy gravelly SILT / CLAY.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111057



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	90		
10	82		
6.3	75		
5	73		
3.35	69		
2	65		
1.18	61		
0.6	57		
0.425	54		
0.3	51		
0.212	48		
0.15	43		
0.063	37		

Dry Mass of sample, g: 1040

Sample Proportions	% dry mass
Very coarse	0
Gravel	35
Sand	28
Fines <0.063mm	37

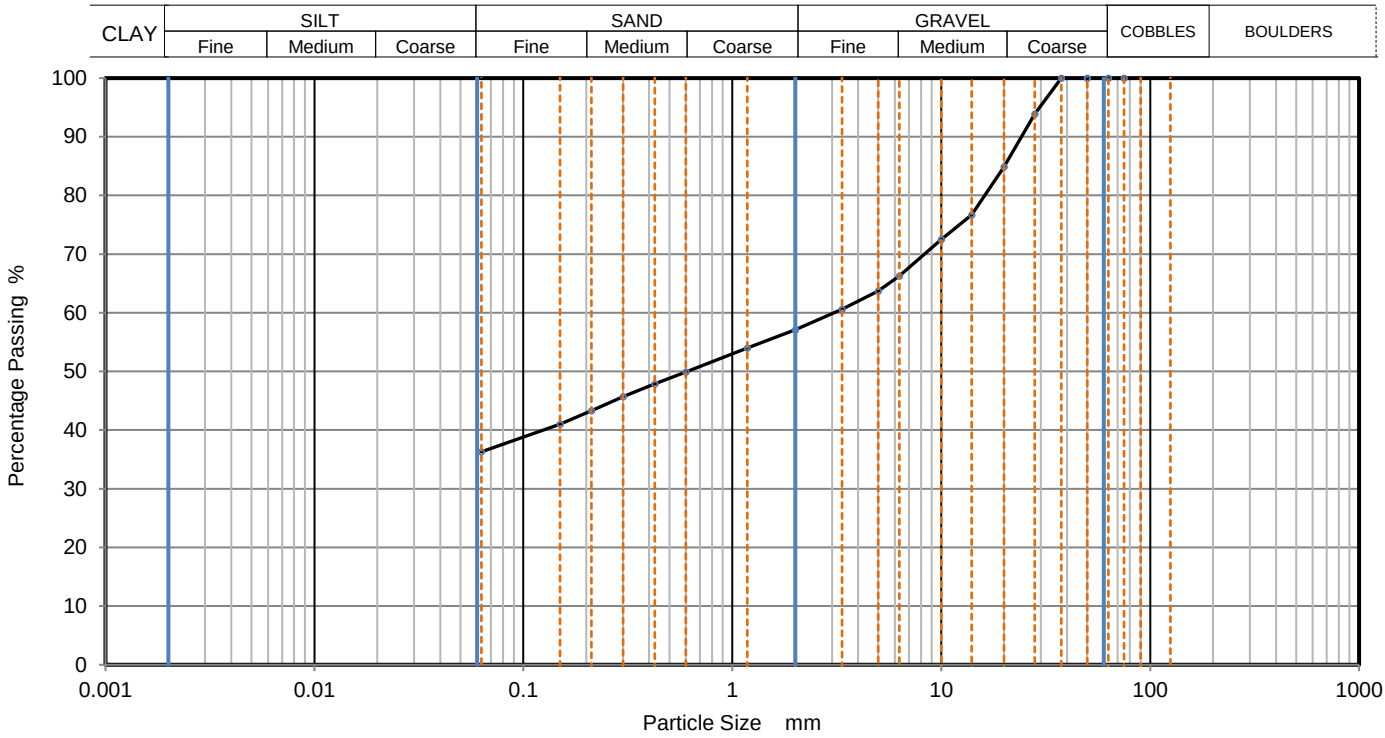
Grading Analysis		
D100	mm	28
D60	mm	1.03
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH190
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Yellow-brown slightly sandy gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111060



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	94		
20	85		
14	77		
10	73		
6.3	66		
5	64		
3.35	61		
2	57		
1.18	54		
0.6	50		
0.425	48		
0.3	46		
0.212	43		
0.15	41		
0.063	36		

Dry Mass of sample, g	872

Sample Proportions	% dry mass
Very coarse	0
Gravel	43
Sand	21
Fines <0.063mm	36

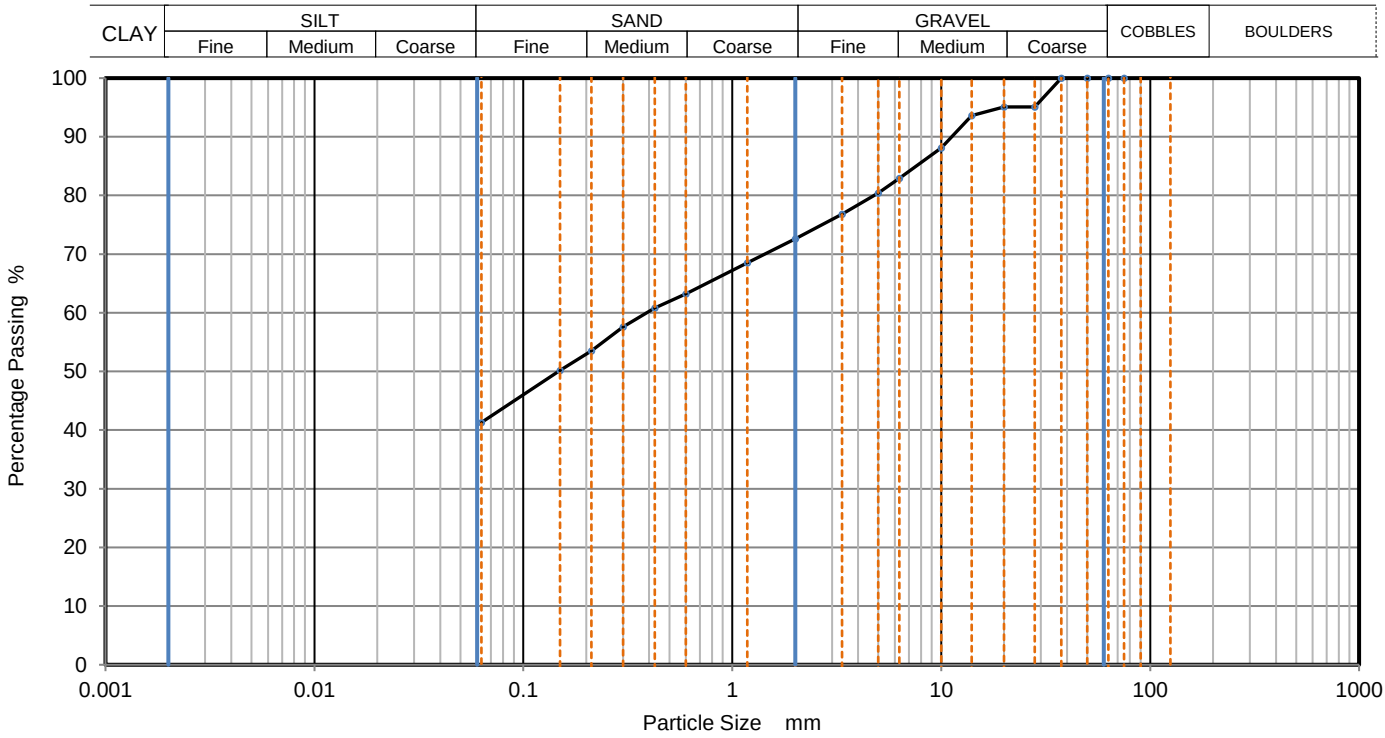
Grading Analysis		
D100	mm	
D60	mm	3.05
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH191
Site Name	WSP Eastern and Midlands			Sample No.	1
Soil Description	Yellow-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	0.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111063



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	95		
14	94		
10	88		
6.3	83		
5	80		
3.35	77		
2	73		
1.18	69		
0.6	63		
0.425	61		
0.3	58		
0.212	54		
0.15	50		
0.063	41		

Dry Mass of sample, g	1134

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	31
Fines <0.063mm	41

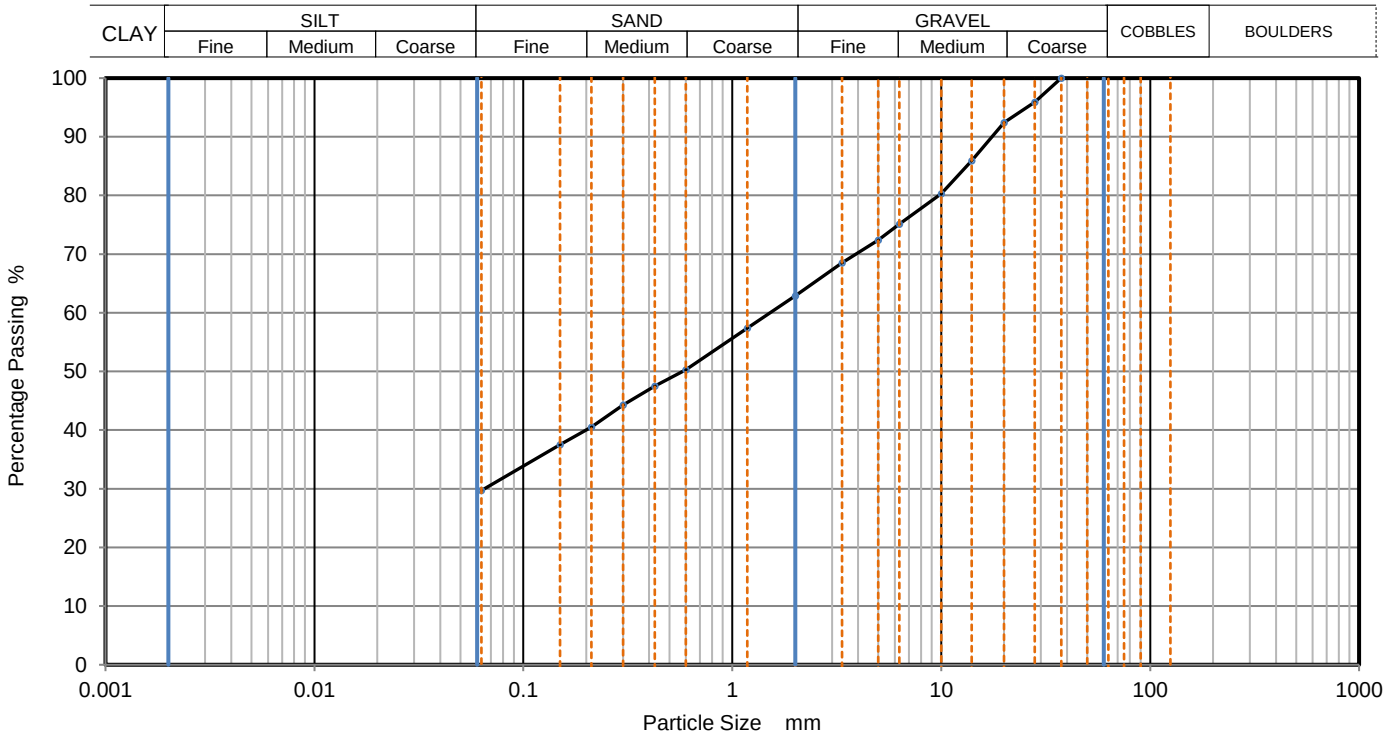
Grading Analysis		
D100	mm	
D60	mm	0.388
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH191
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Grey very silty SAND and GRAVEL.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111066



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	96		
20	92		
14	86		
10	80		
6.3	75		
5	72		
3.35	69		
2	63		
1.18	57		
0.6	50		
0.425	48		
0.3	44		
0.212	41		
0.15	38		
0.063	30		

Dry Mass of sample, g	1183

Sample Proportions	% dry mass
Very coarse	0
Gravel	37
Sand	33
Fines <0.063mm	30

Grading Analysis		
D100	mm	37.5
D60	mm	1.51
D30	mm	0.0649
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

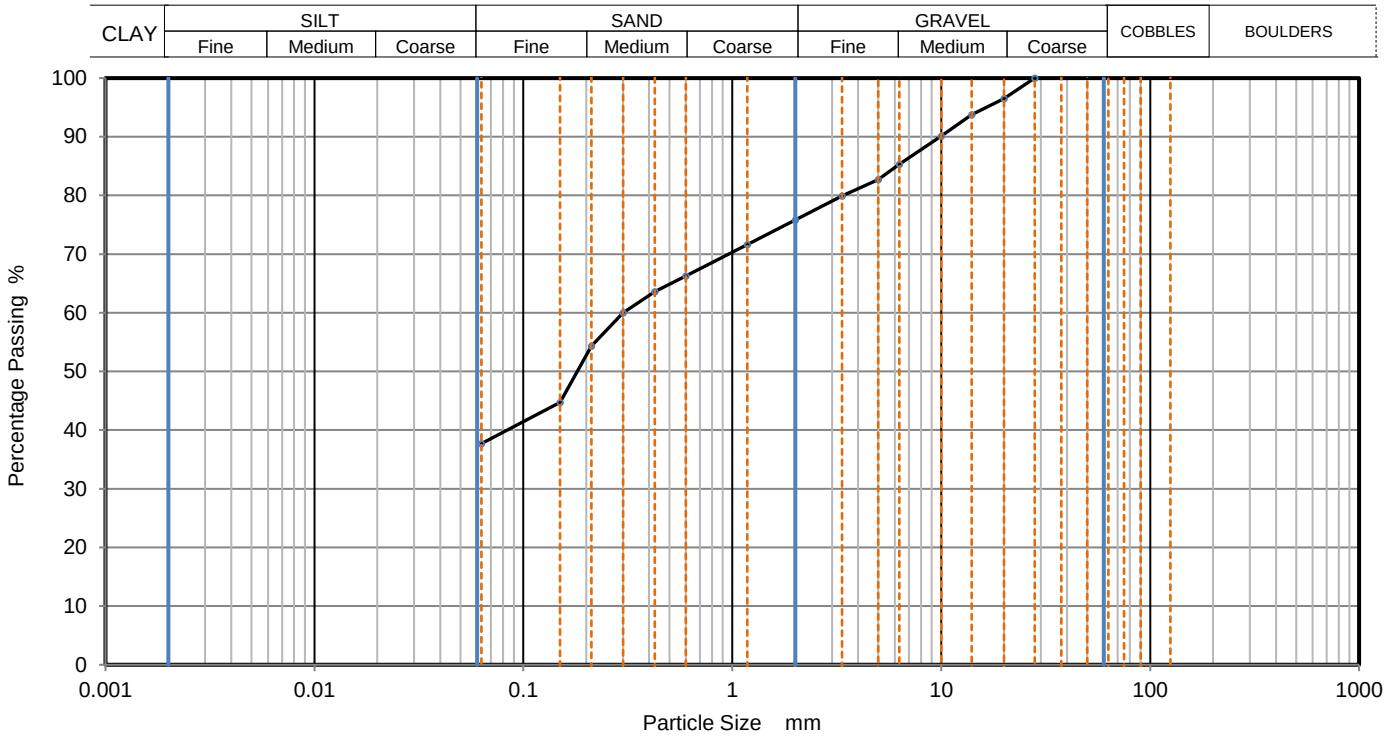
Remarks

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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH192
Site Name	WSP Eastern and Midlands			Sample No.	1
Soil Description	Yellow-brown slightly gravelly sandy SILT / CLAY.			Depth, m	0.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111069



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	94		
10	90		
6.3	85		
5	83		
3.35	80		
2	76		
1.18	72		
0.6	66		
0.425	64		
0.3	60		
0.212	54		
0.15	45		
0.063	38		

Dry Mass of sample, g: 1013

Sample Proportions	% dry mass
Very coarse	0
Gravel	24
Sand	38
Fines <0.063mm	38

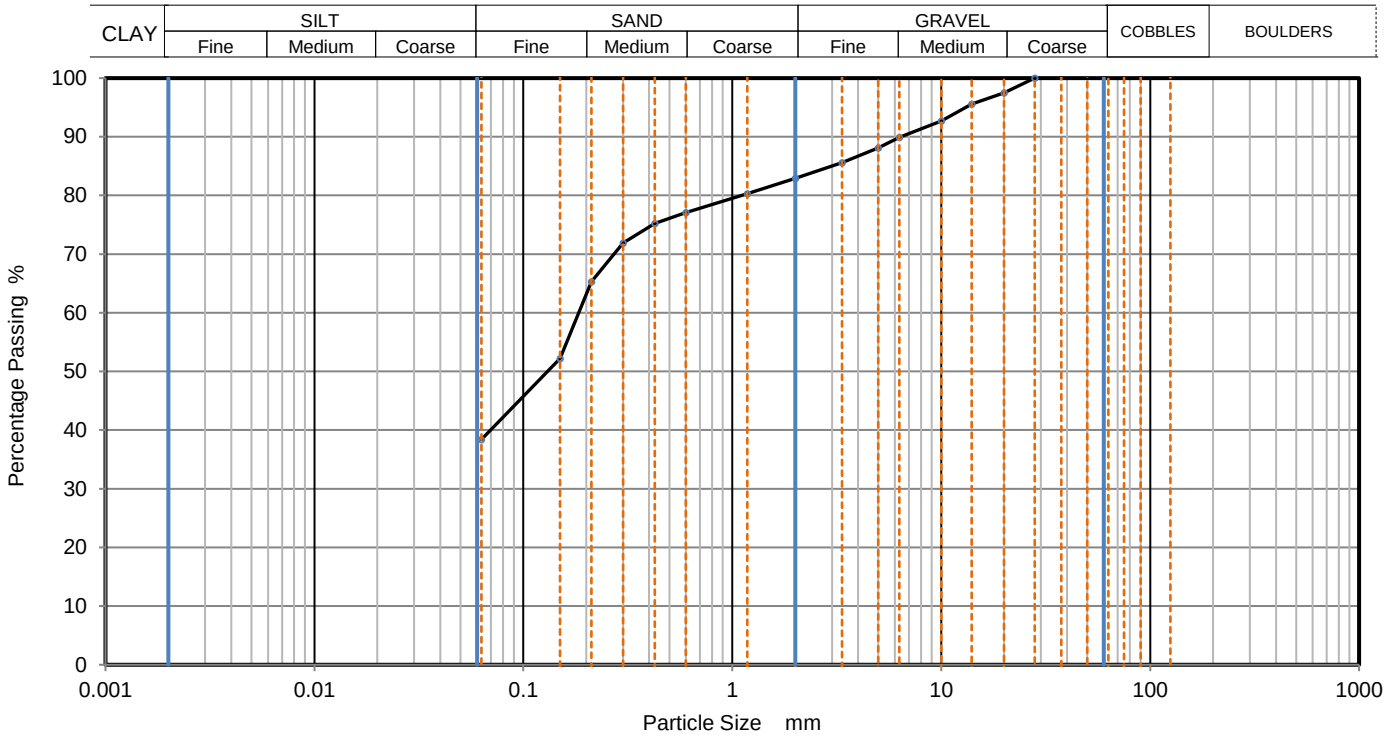
Grading Analysis		
D100	mm	28
D60	mm	0.301
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH192
Site Name	WSP Eastern and Midlands			Sample No.	4
Soil Description	Yellow-brown slightly gravelly sandy SILT / CLAY. Sand is predominantly fine.			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111072



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	96		
10	93		
6.3	90		
5	88		
3.35	86		
2	83		
1.18	80		
0.6	77		
0.425	75		
0.3	72		
0.212	65		
0.15	52		
0.063	38		

Dry Mass of sample, g: 881

Sample Proportions	% dry mass
Very coarse	0
Gravel	17
Sand	45
Fines <0.063mm	38

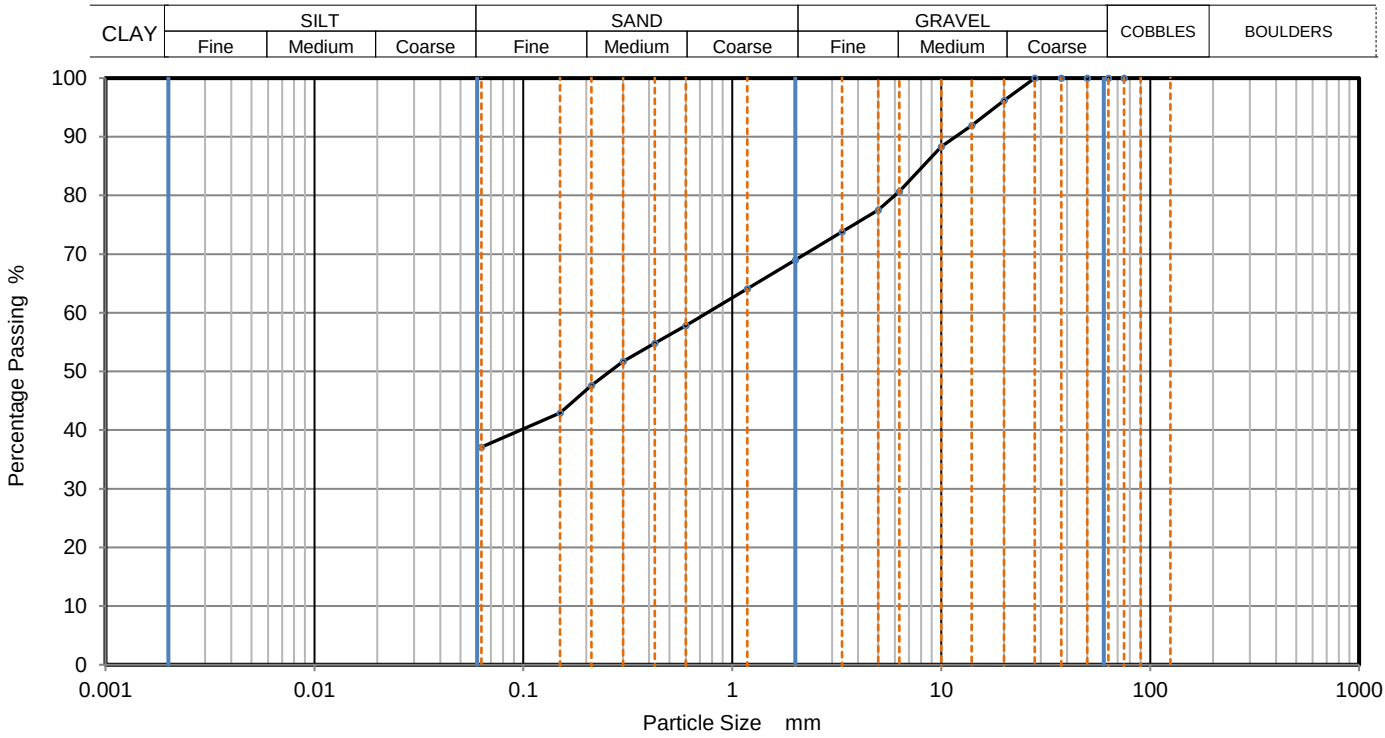
Grading Analysis		
D100	mm	28
D60	mm	0.184
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**	Job Ref	**2017T101**
		Borehole/Pit No.	BH195
Site Name	WSP Eastern and Midlands	Sample No.	7
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.	Depth, m	2.00
Specimen Reference	Specimen Depth: m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2	KeyLAB ID	IDL1201709111086



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	92		
10	88		
6.3	81		
5	78		
3.35	74		
2	69		
1.18	64		
0.6	58		
0.425	55		
0.3	52		
0.212	48		
0.15	43		
0.063	37		

Dry Mass of sample, g: 1457

Sample Proportions	% dry mass
Very coarse	0
Gravel	31
Sand	32
Fines <0.063mm	37

Grading Analysis		
D100	mm	
D60	mm	0.761
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

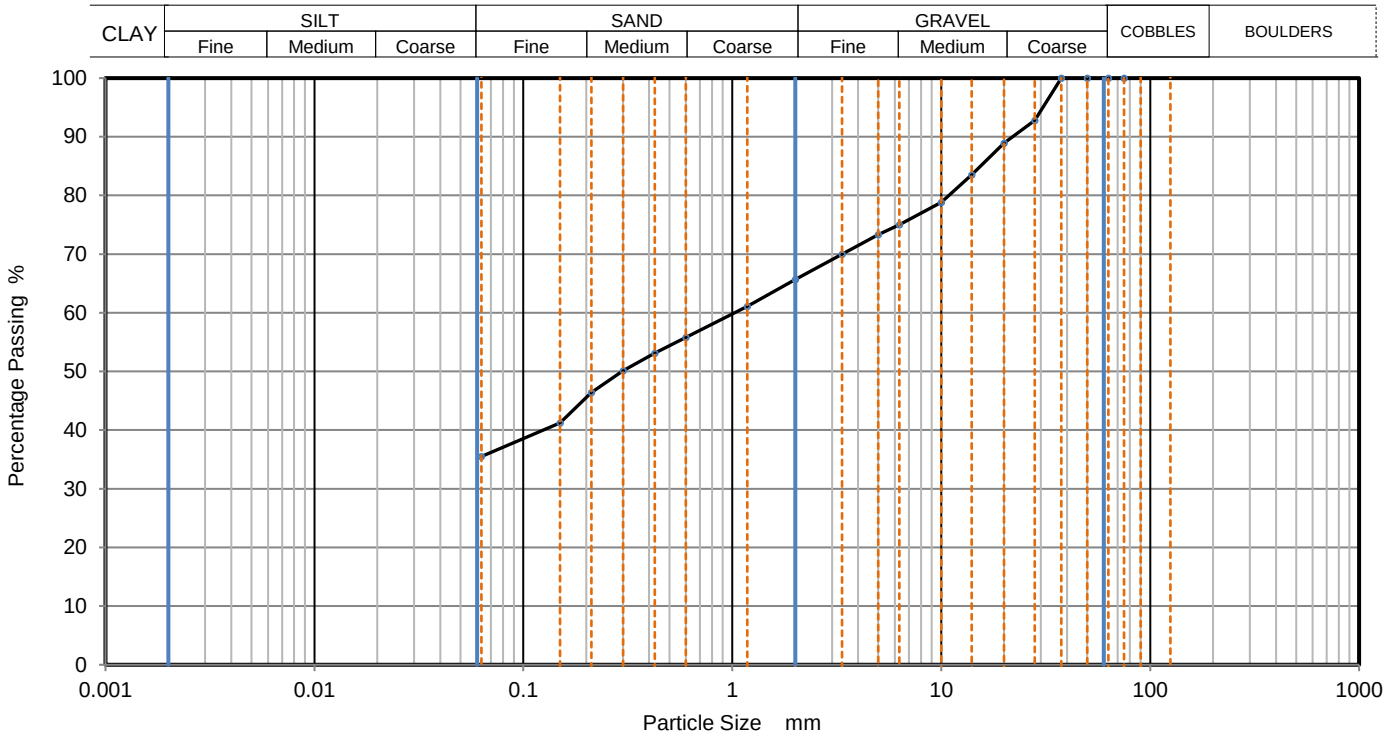
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH199
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly sandy slightly gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170914163



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	93		
20	89		
14	84		
10	79		
6.3	75		
5	73		
3.35	70		
2	66		
1.18	61		
0.6	56		
0.425	53		
0.3	50		
0.212	46		
0.15	41		
0.063	36		

Dry Mass of sample, g: 1145

Sample Proportions	% dry mass
Very coarse	0
Gravel	34
Sand	30
Fines <0.063mm	36

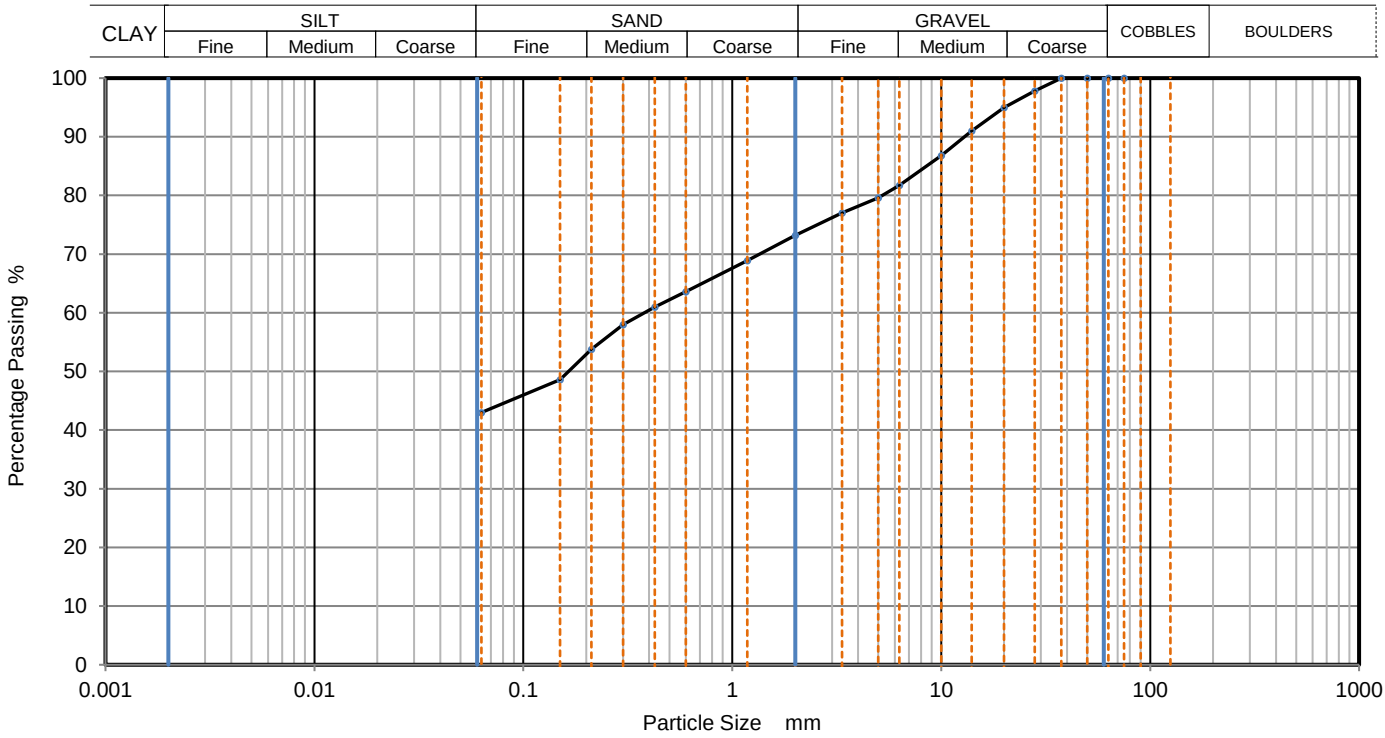
Grading Analysis		
D100	mm	
D60	mm	1.03
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH202
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170914178



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	98		
20	95		
14	91		
10	87		
6.3	82		
5	80		
3.35	77		
2	73		
1.18	69		
0.6	64		
0.425	61		
0.3	58		
0.212	54		
0.15	49		
0.063	43		

Dry Mass of sample, g: 1494

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	30
Fines <0.063mm	43

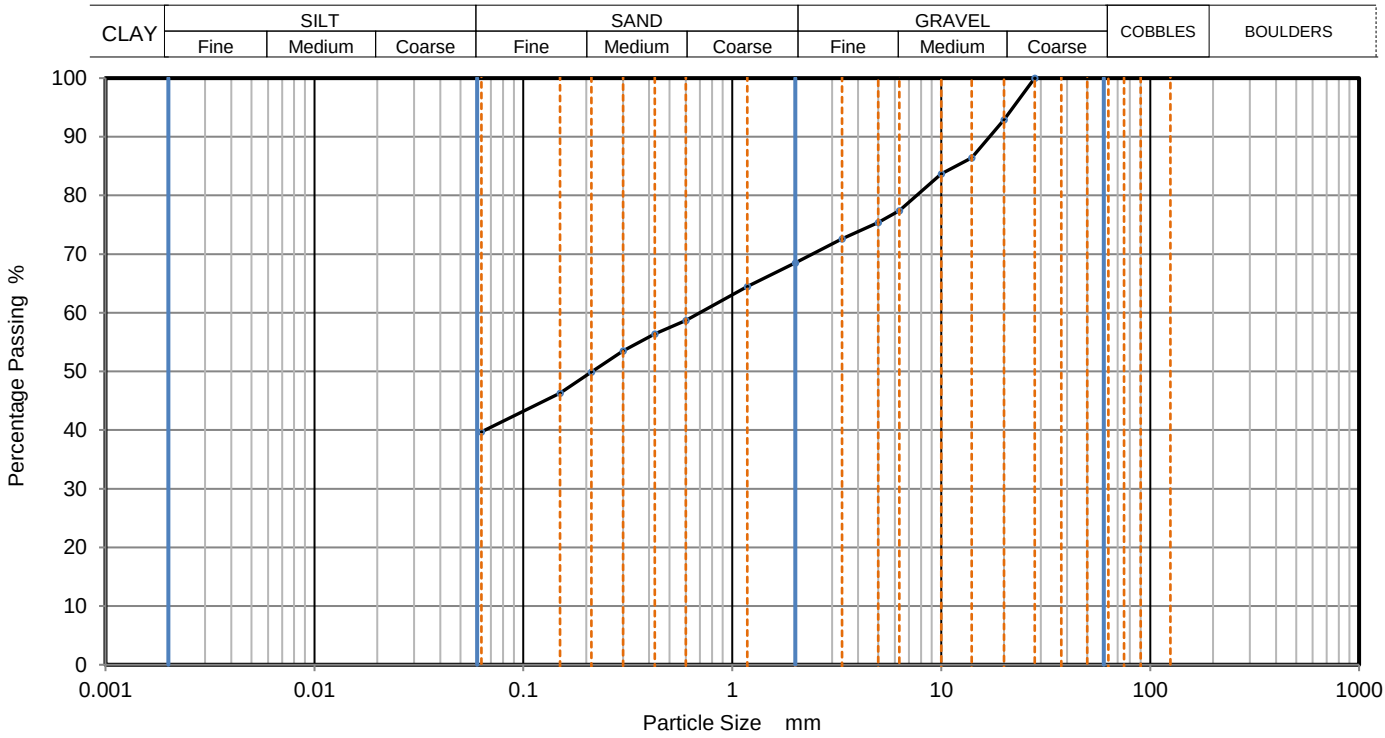
Grading Analysis		
D100	mm	
D60	mm	0.38
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH203
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly sandy slightly gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171115193



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	93		
14	86		
10	84		
6.3	77		
5	75		
3.35	73		
2	69		
1.18	65		
0.6	59		
0.425	56		
0.3	54		
0.212	50		
0.15	46		
0.063	40		

Dry Mass of sample, g: 1001

Sample Proportions	% dry mass
Very coarse	0
Gravel	32
Sand	29
Fines <0.063mm	40

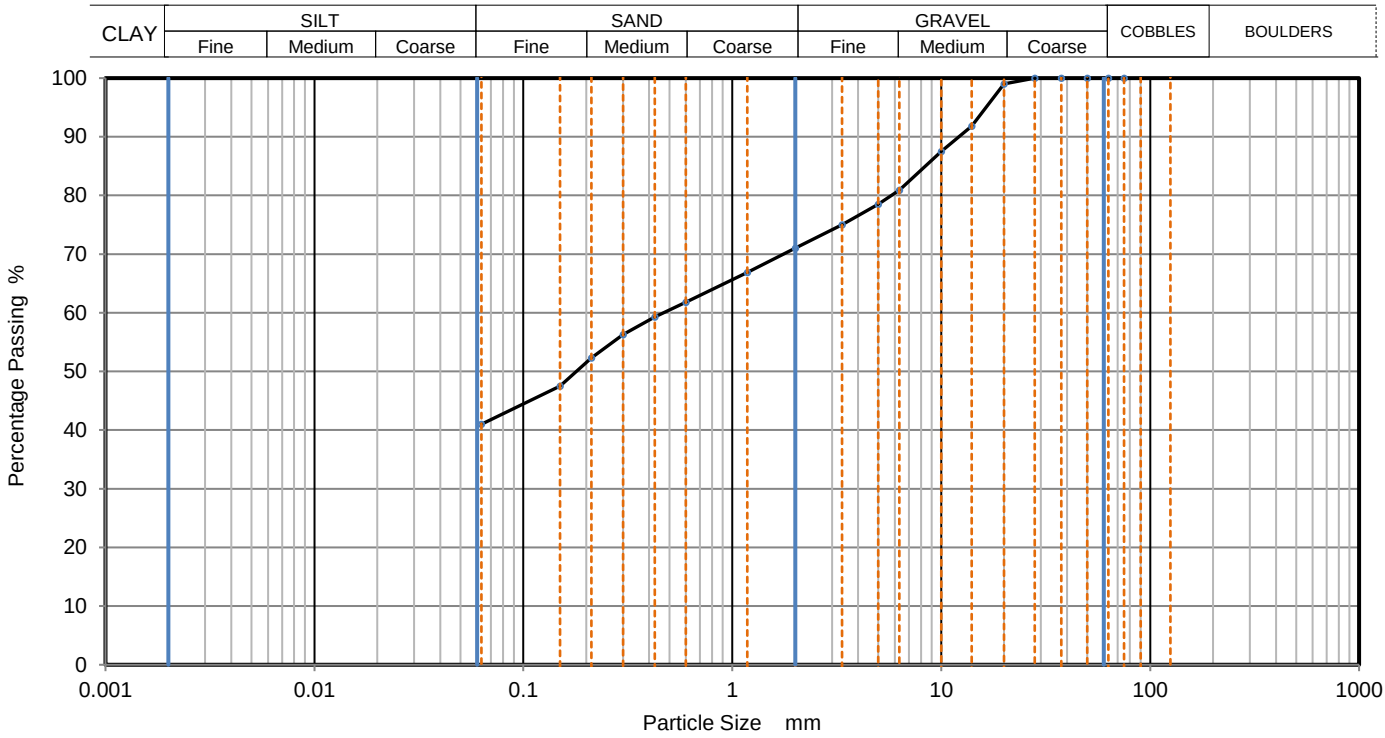
Grading Analysis		
D100	mm	28
D60	mm	0.695
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH205
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111110



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	99		
14	92		
10	88		
6.3	81		
5	79		
3.35	75		
2	71		
1.18	67		
0.6	62		
0.425	59		
0.3	56		
0.212	52		
0.15	48		
0.063	41		

Dry Mass of sample, g	1268

Sample Proportions	% dry mass
Very coarse	0
Gravel	29
Sand	30
Fines <0.063mm	41

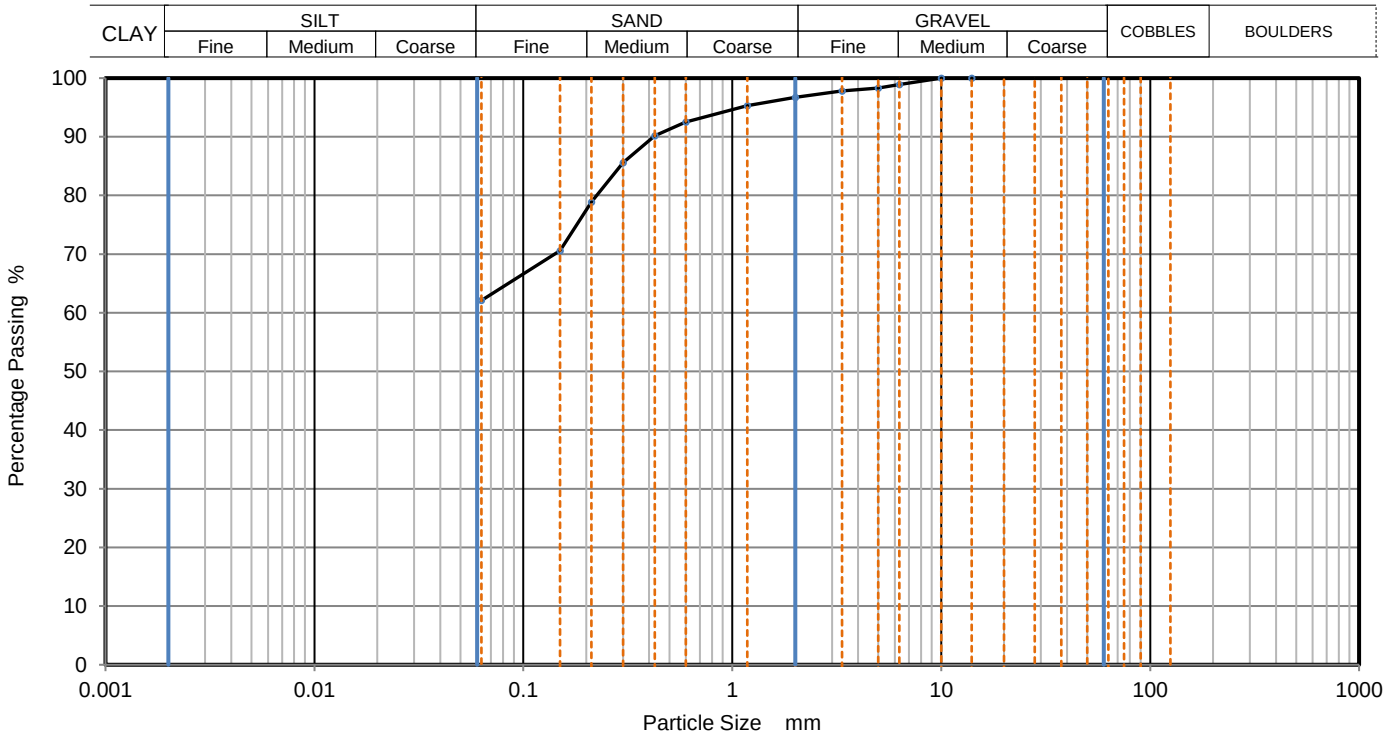
Grading Analysis		
D100	mm	
D60	mm	0.471
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH207
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Mottled grey and black slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020116



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	99		
5	98		
3.35	98		
2	97		
1.18	95		
0.6	93		
0.425	90		
0.3	86		
0.212	79		
0.15	71		
0.063	62		

Dry Mass of sample, g: 463

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	35
Fines <0.063mm	62

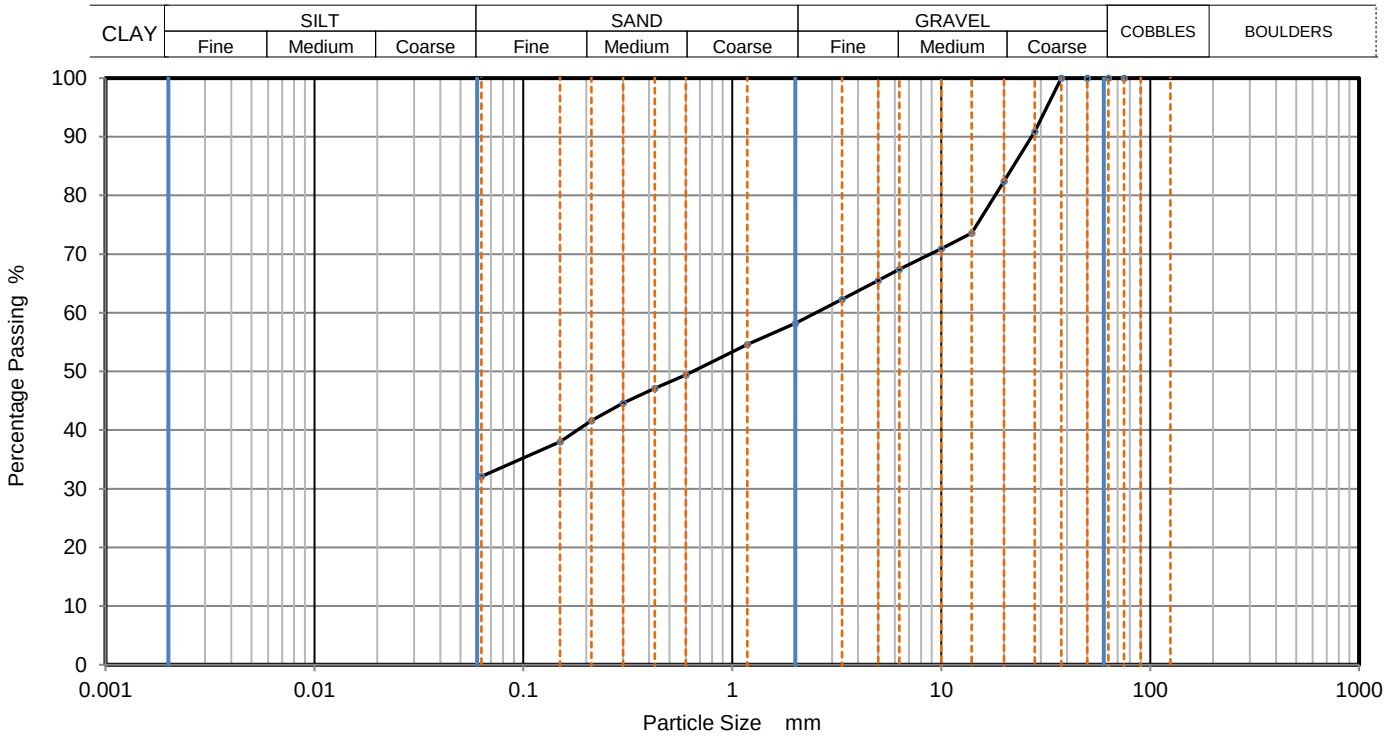
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH207
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey very sandy very silty medium and coarse GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020119



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	91		
20	82		
14	74		
10	71		
6.3	67		
5	66		
3.35	62		
2	58		
1.18	55		
0.6	49		
0.425	47		
0.3	45		
0.212	42		
0.15	38		
0.063	32		

Dry Mass of sample, g	1083

Sample Proportions	% dry mass
Very coarse	0
Gravel	42
Sand	26
Fines <0.063mm	32

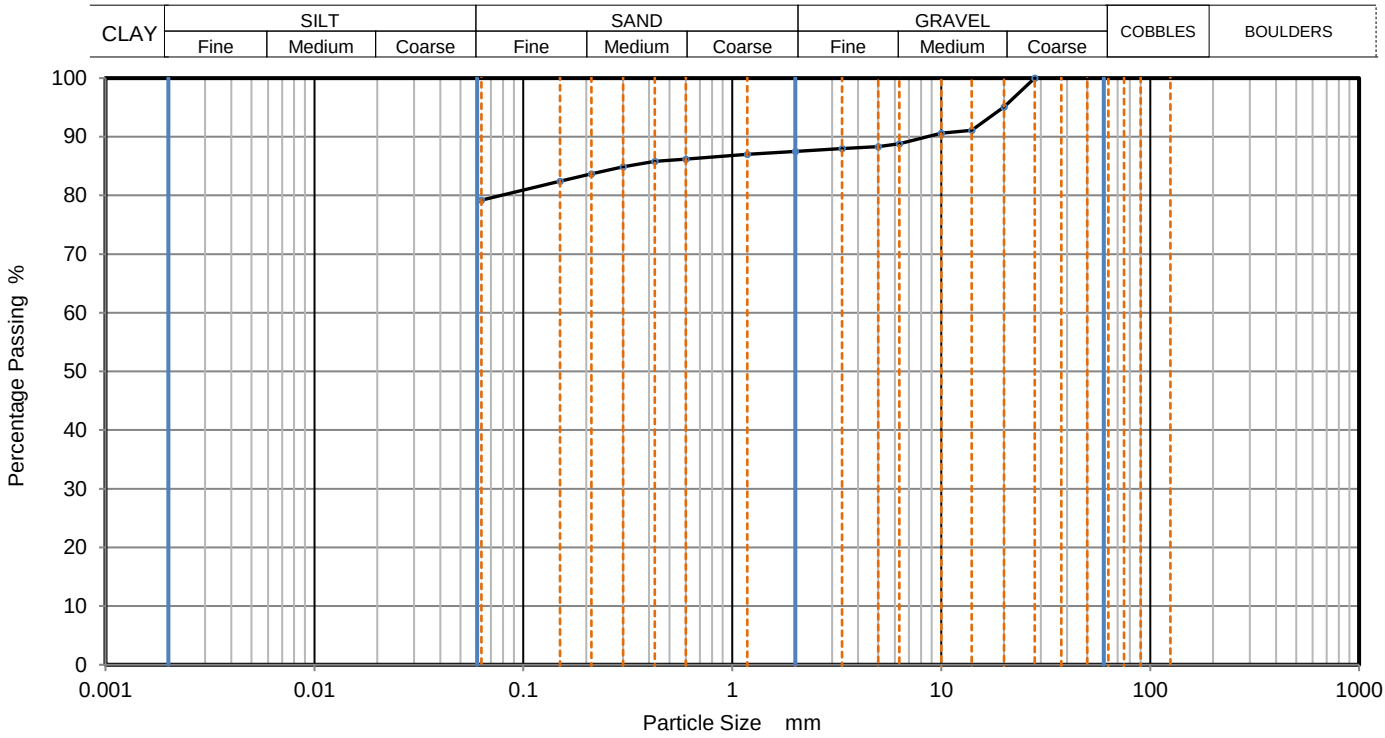
Grading Analysis		
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D60	mm	2.52
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH211
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly sandy gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020130



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	91		
10	91		
6.3	89		
5	88		
3.35	88		
2	88		
1.18	87		
0.6	86		
0.425	86		
0.3	85		
0.212	84		
0.15	82		
0.063	79		

Dry Mass of sample, g: 631

Sample Proportions	% dry mass
Very coarse	0
Gravel	13
Sand	8
Fines <0.063mm	79

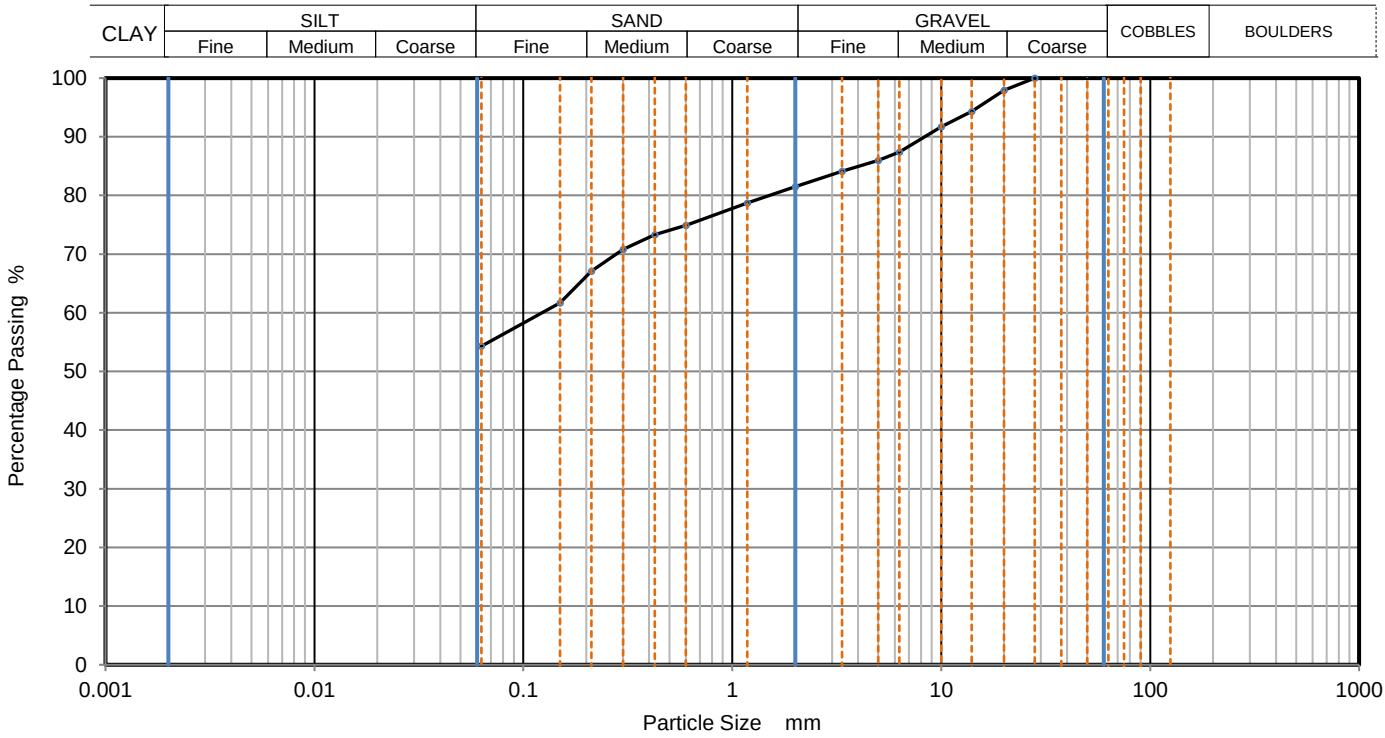
Grading Analysis		
D100	mm	28
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH211
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020133



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	94		
10	92		
6.3	87		
5	86		
3.35	84		
2	82		
1.18	79		
0.6	75		
0.425	73		
0.3	71		
0.212	67		
0.15	62		
0.063	54		

Dry Mass of sample, g	878

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	27
Fines <0.063mm	54

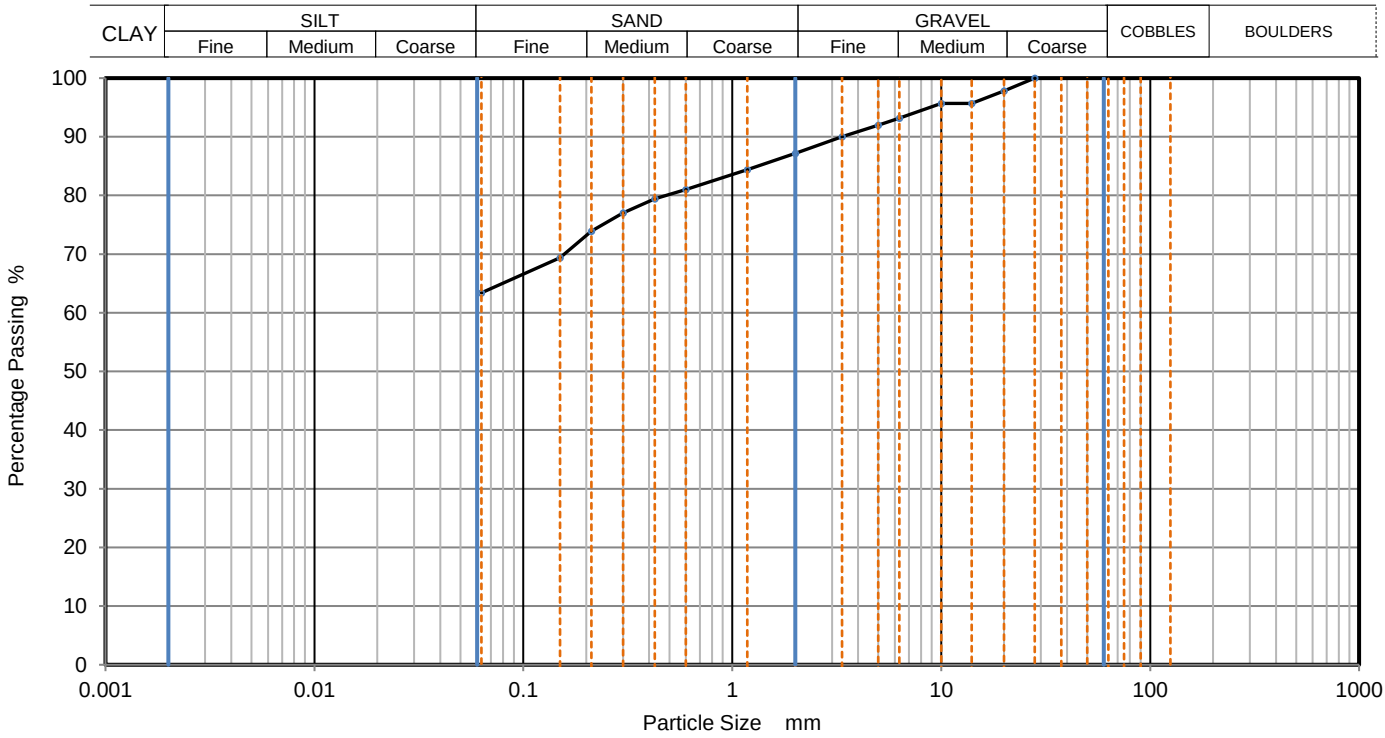
Grading Analysis		
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D60	mm	0.123
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH211
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Greyish-brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020136



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	98		
14	96		
10	96		
6.3	93		
5	92		
3.35	90		
2	87		
1.18	84		
0.6	81		
0.425	79		
0.3	77		
0.212	74		
0.15	69		
0.063	63		

Dry Mass of sample, g	969

Sample Proportions	% dry mass
Very coarse	0
Gravel	13
Sand	24
Fines <0.063mm	63

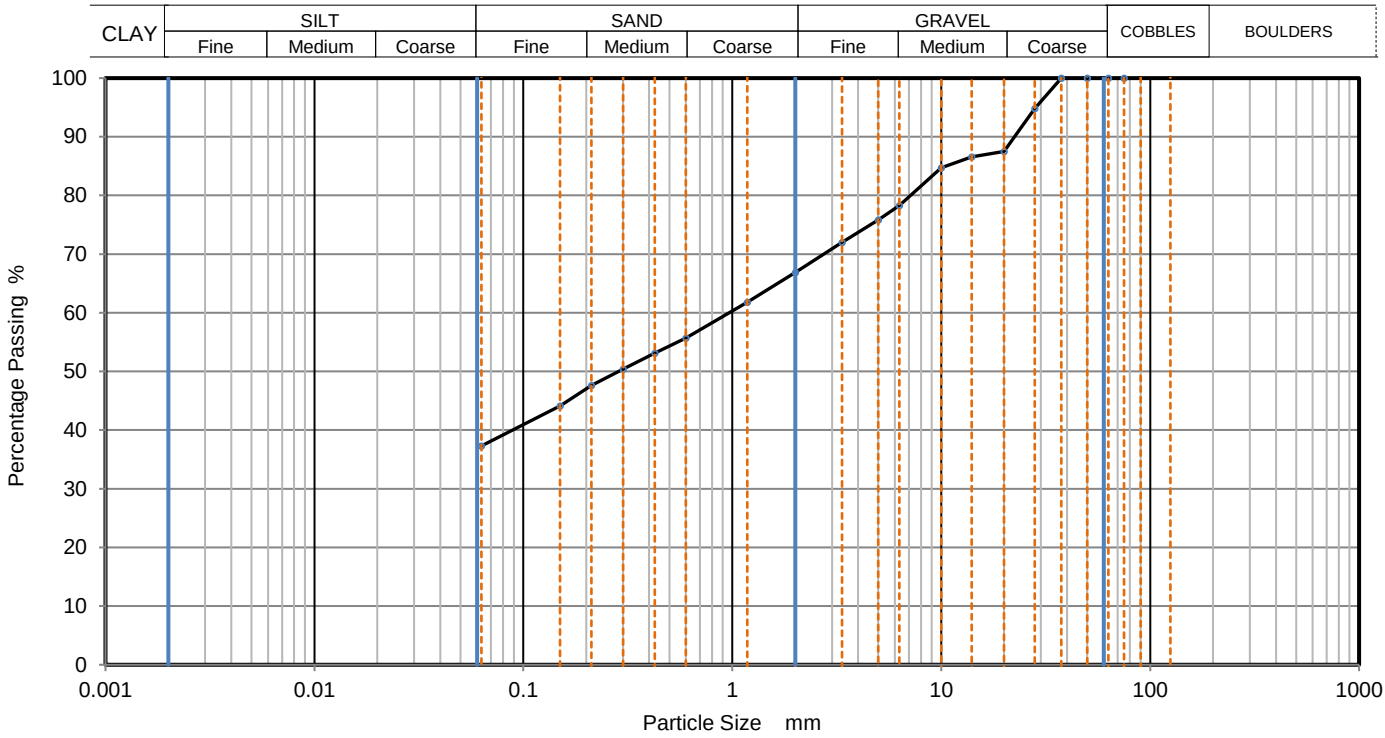
Grading Analysis		
D100	mm	28
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH214
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Dark grey slightly sandy slightly gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020145



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	88		
14	87		
10	85		
6.3	78		
5	76		
3.35	72		
2	67		
1.18	62		
0.6	56		
0.425	53		
0.3	50		
0.212	48		
0.15	44		
0.063	37		

Dry Mass of sample, g	1500

Sample Proportions	% dry mass
Very coarse	0
Gravel	33
Sand	30
Fines <0.063mm	37

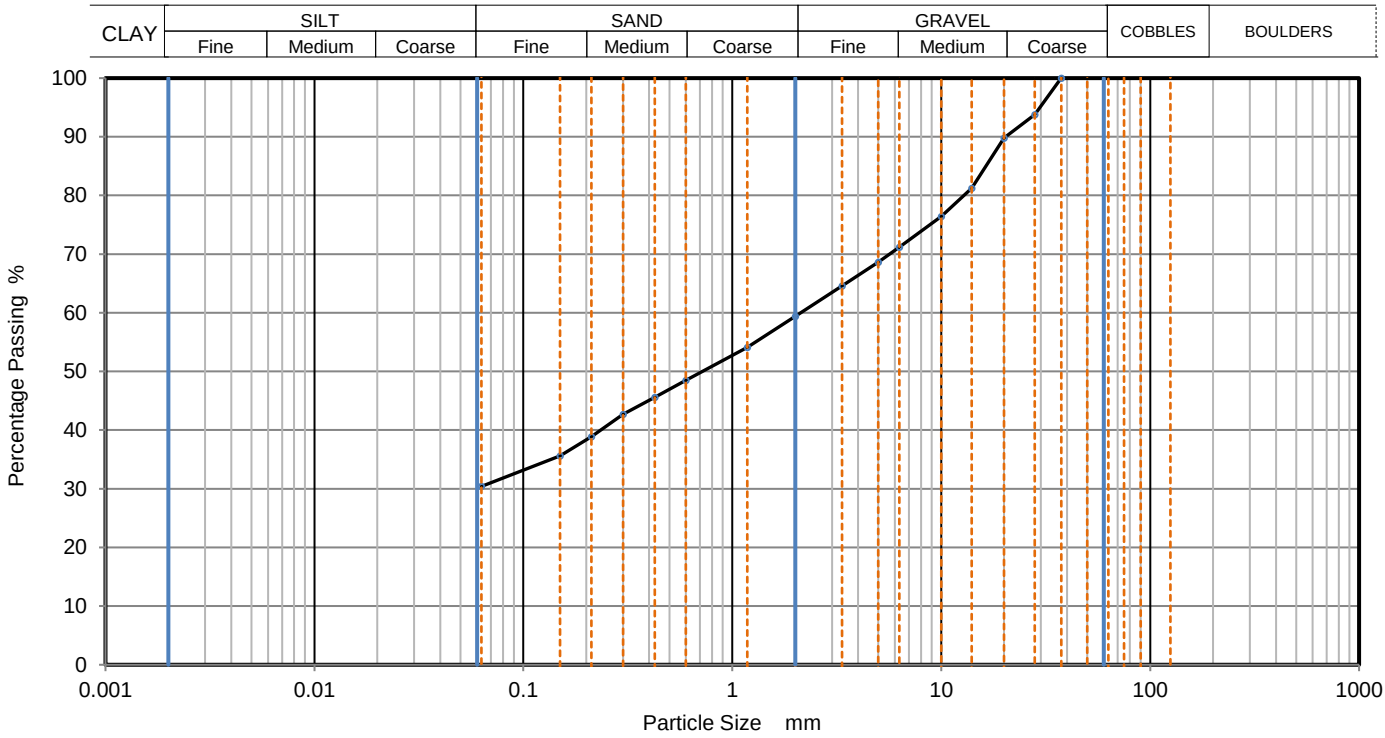
Grading Analysis		
D100	mm	
D60	mm	0.968
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH214
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Dark grey very sandy very silty GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020148



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	94		
20	90		
14	81		
10	76		
6.3	71		
5	69		
3.35	65		
2	59		
1.18	54		
0.6	49		
0.425	46		
0.3	43		
0.212	39		
0.15	36		
0.063	30		

Dry Mass of sample, g	1417

Sample Proportions	% dry mass
Very coarse	0
Gravel	41
Sand	29
Fines <0.063mm	30

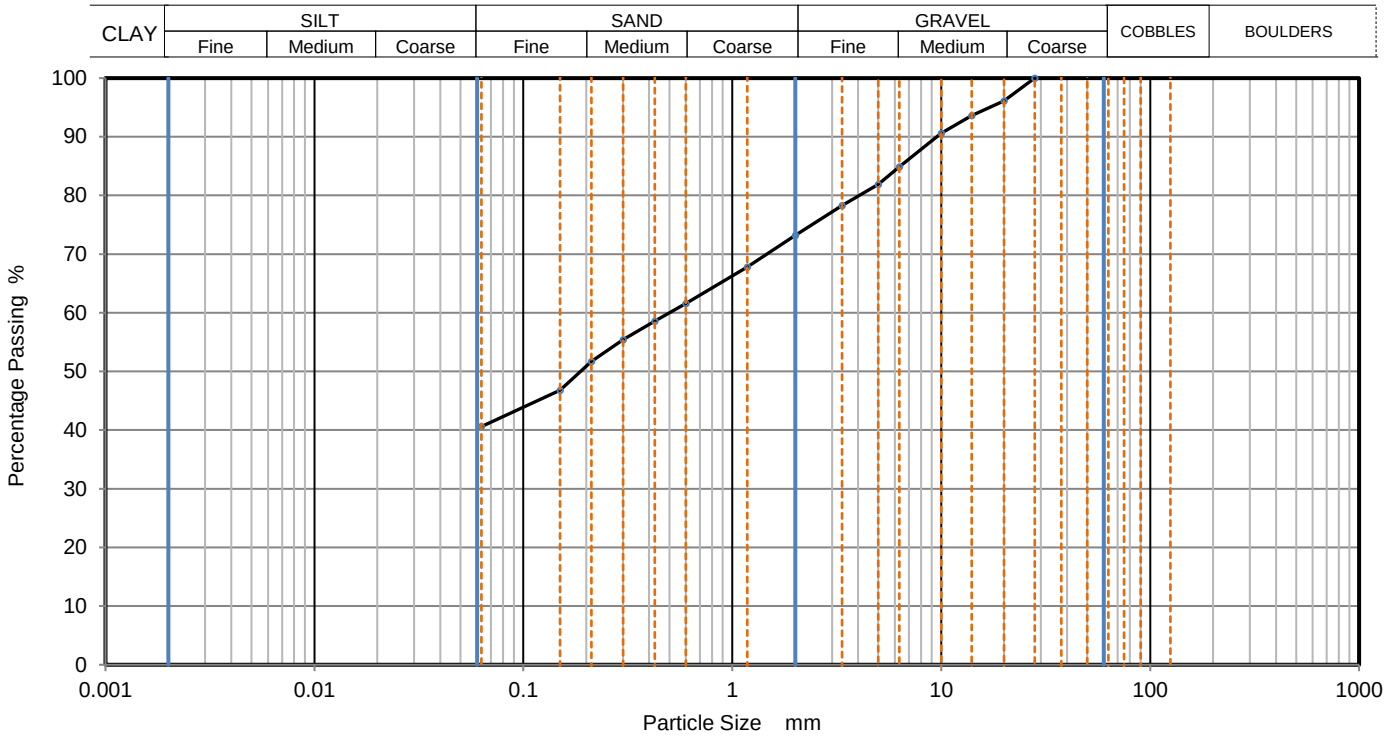
Grading Analysis		
D100	mm	37.5
D60	mm	2.12
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH215
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020159



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	96		
14	94		
10	91		
6.3	85		
5	82		
3.35	78		
2	73		
1.18	68		
0.6	62		
0.425	59		
0.3	55		
0.212	52		
0.15	47		
0.063	41		

Dry Mass of sample, g: 1134

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	33
Fines <0.063mm	41

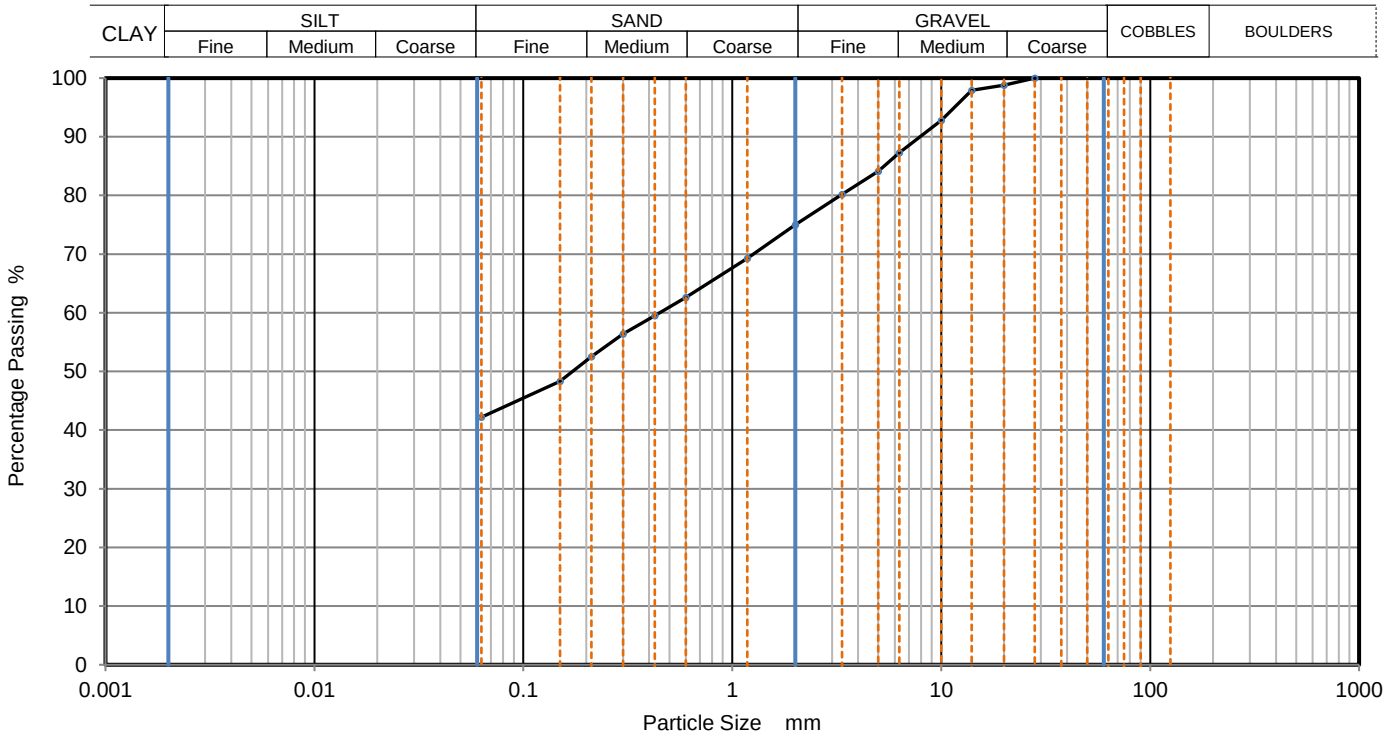
Grading Analysis		
D100	mm	28
D60	mm	0.497
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH215
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020162



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	99		
14	98		
10	93		
6.3	87		
5	84		
3.35	80		
2	75		
1.18	69		
0.6	63		
0.425	60		
0.3	56		
0.212	53		
0.15	48		
0.063	42		

Dry Mass of sample, g: 1279

Sample Proportions	% dry mass
Very coarse	0
Gravel	25
Sand	33
Fines <0.063mm	42

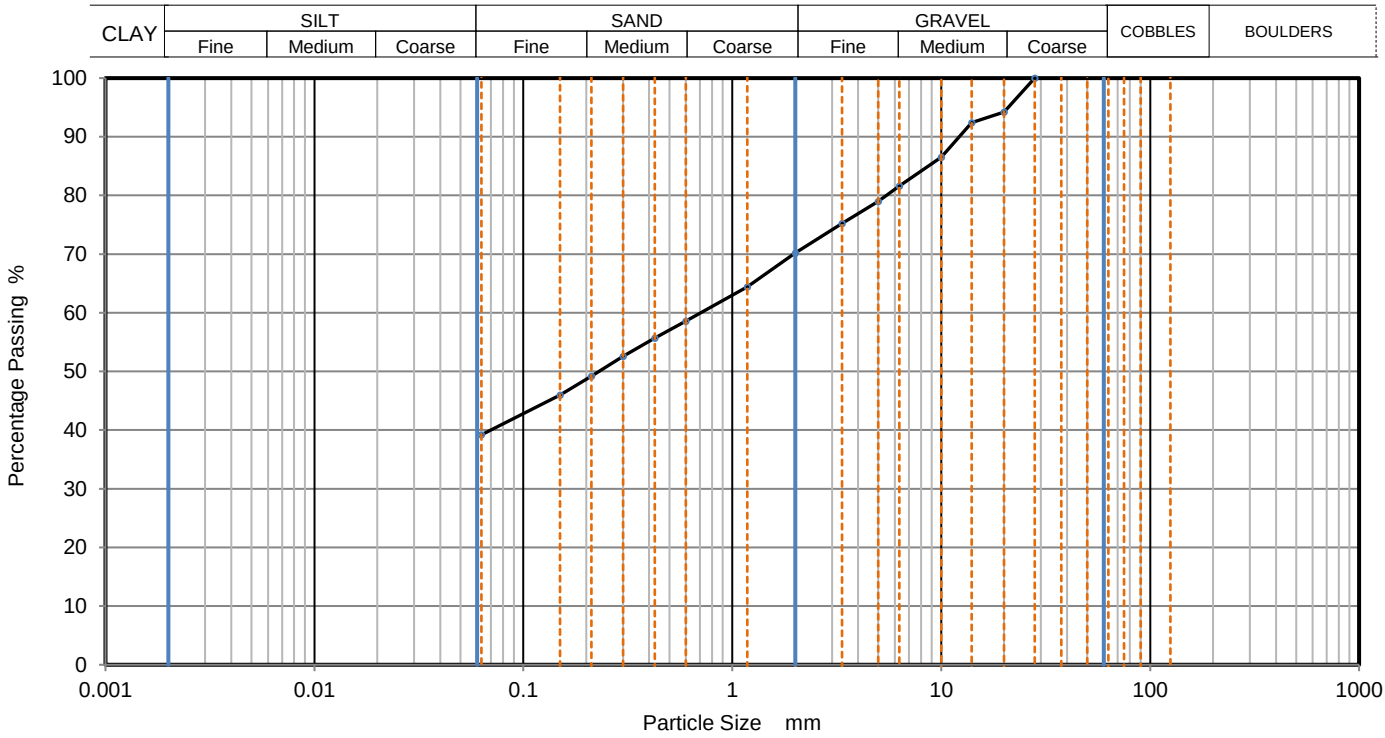
Grading Analysis		
D100	mm	28
D60	mm	0.449
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH215
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020165



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	94		
14	92		
10	87		
6.3	82		
5	79		
3.35	75		
2	70		
1.18	64		
0.6	59		
0.425	56		
0.3	53		
0.212	49		
0.15	46		
0.063	39		

Dry Mass of sample, g: 1127

Sample Proportions	% dry mass
Very coarse	0
Gravel	30
Sand	31
Fines <0.063mm	39

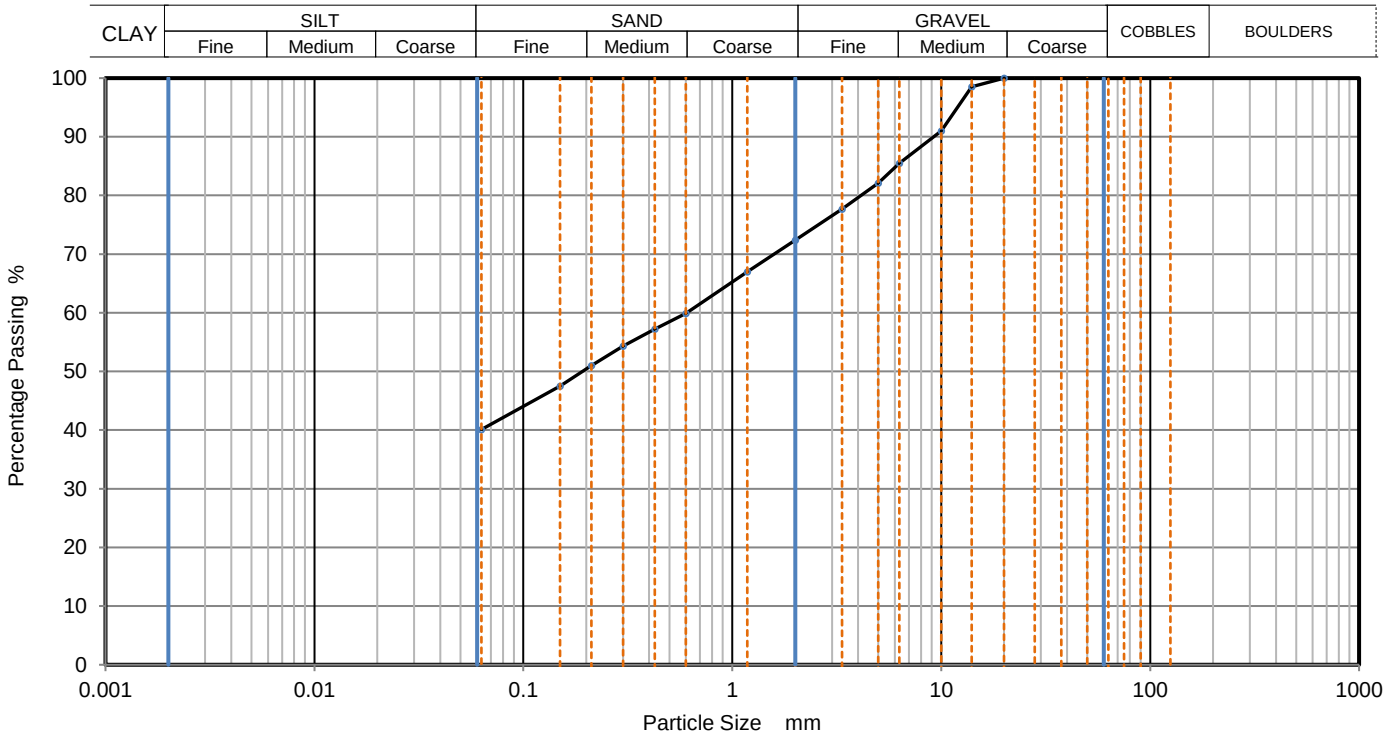
Grading Analysis		
D100	mm	28
D60	mm	0.709
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH215
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020168



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	99		
10	91		
6.3	86		
5	82		
3.35	78		
2	72		
1.18	67		
0.6	60		
0.425	57		
0.3	54		
0.212	51		
0.15	48		
0.063	40		

Dry Mass of sample, g: 953

Sample Proportions	% dry mass
Very coarse	0
Gravel	28
Sand	32
Fines <0.063mm	40

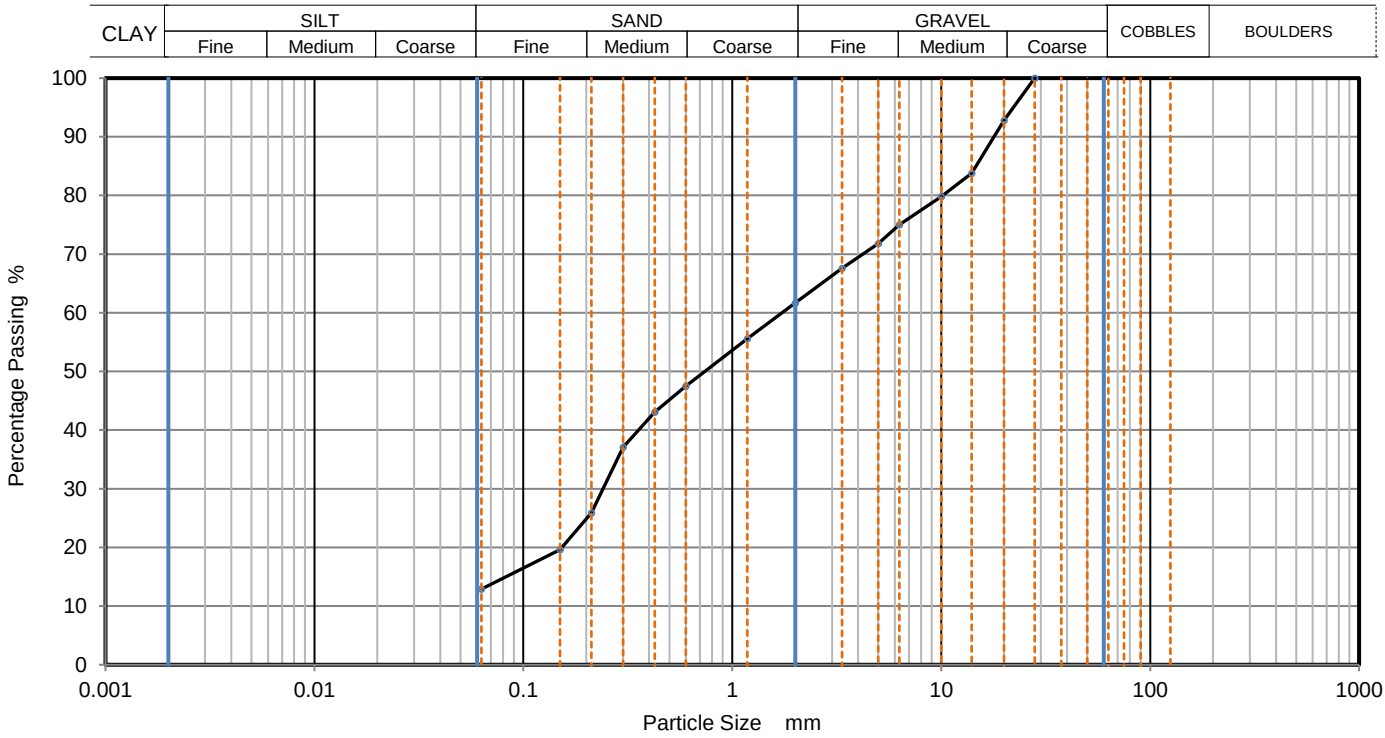
Grading Analysis		
D100	mm	20
D60	mm	0.603
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH219
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey-brown silty SAND and GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020180



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	93		
14	84		
10	80		
6.3	75		
5	72		
3.35	68		
2	62		
1.18	56		
0.6	48		
0.425	43		
0.3	37		
0.212	26		
0.15	20		
0.063	13		

Dry Mass of sample, g	1120

Sample Proportions	% dry mass
Very coarse	0
Gravel	38
Sand	49
Fines <0.063mm	13

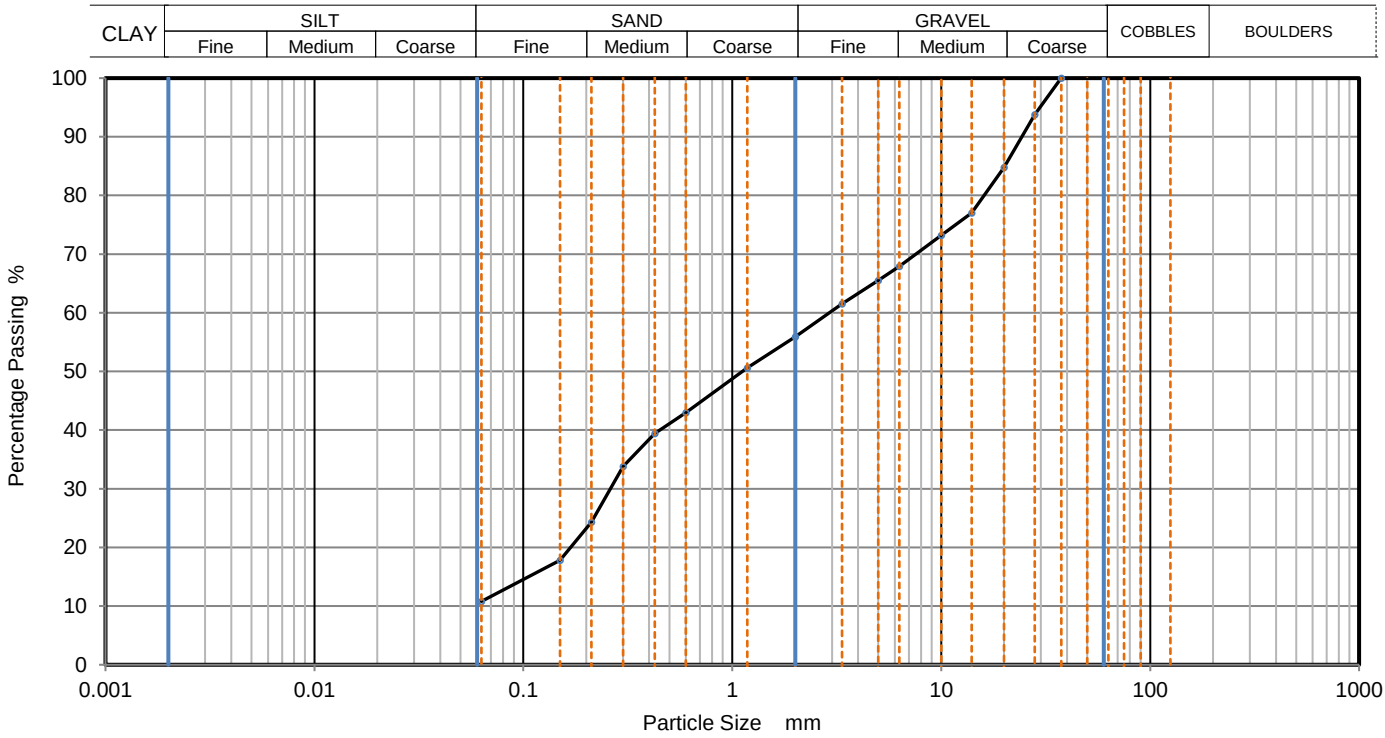
Grading Analysis		
D100	mm	28
D60	mm	1.73
D30	mm	0.241
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH219
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown silty SAND and GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020183



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	94		
20	85		
14	77		
10	73		
6.3	68		
5	66		
3.35	62		
2	56		
1.18	51		
0.6	43		
0.425	39		
0.3	34		
0.212	24		
0.15	18		
0.063	11		

Dry Mass of sample, g	875

Sample Proportions	% dry mass
Very coarse	0
Gravel	44
Sand	45
Fines <0.063mm	11

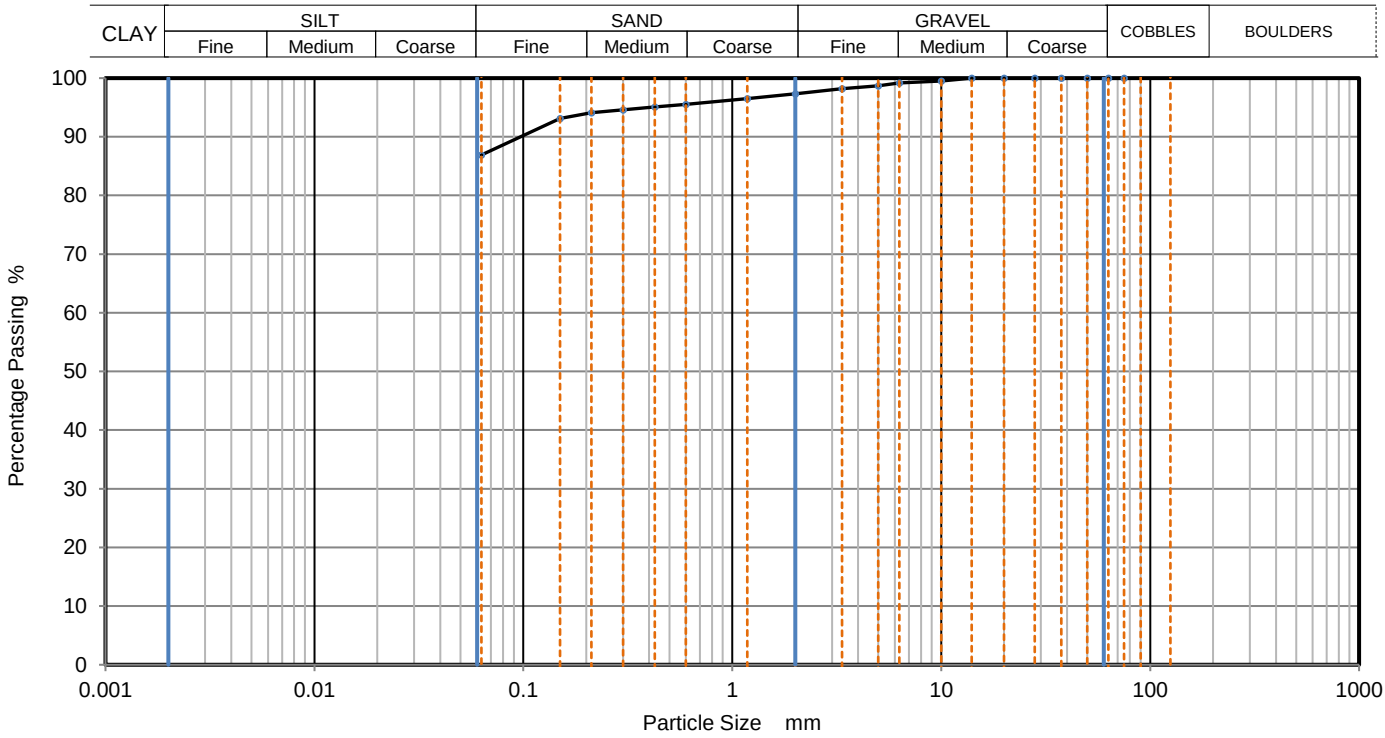
Grading Analysis		
D100	mm	37.5
D60	mm	2.92
D30	mm	0.261
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH219
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020186



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	99		
3.35	98		
2	97		
1.18	97		
0.6	96		
0.425	95		
0.3	95		
0.212	94		
0.15	93		
0.063	87		

Dry Mass of sample, g: 804

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	10
Fines <0.063mm	87

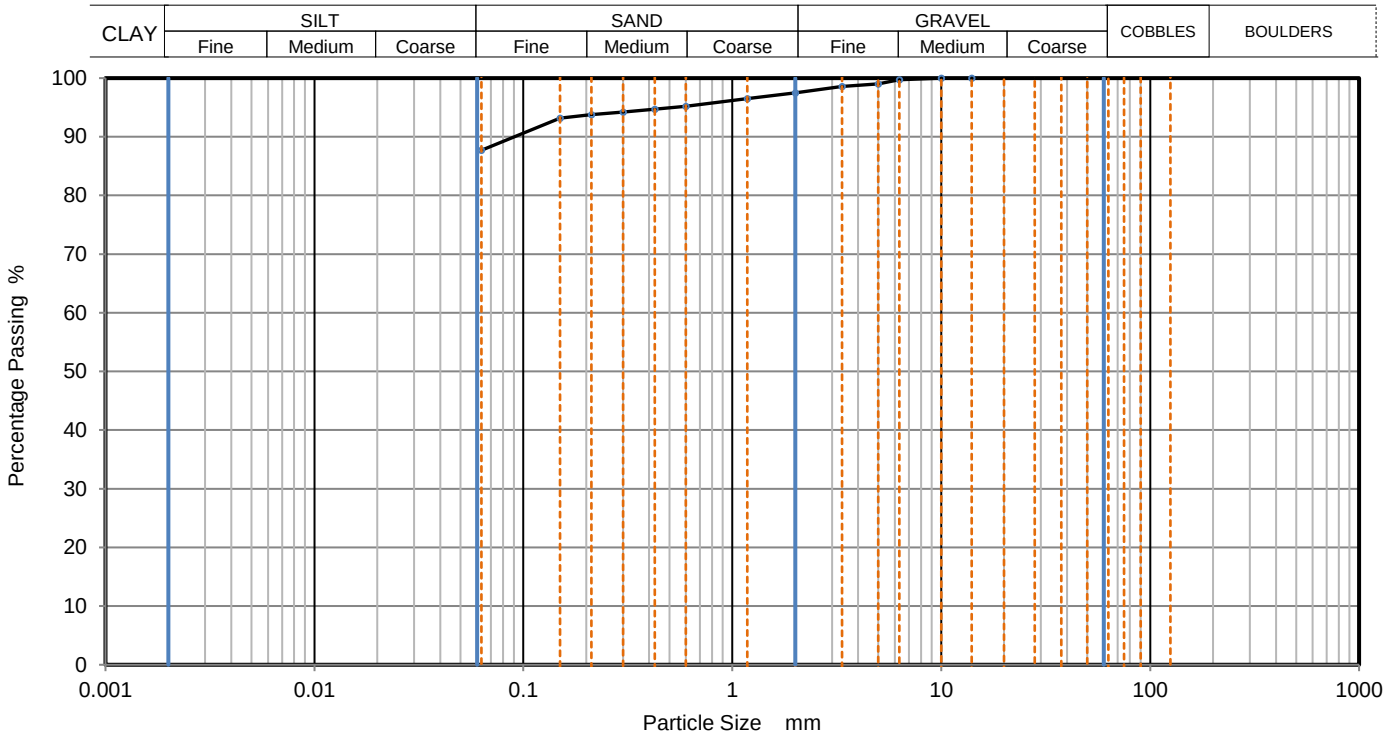
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH219
Site Name	WSP Eastern and Midlands			Sample No.	16
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	5.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020189



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	98		
1.18	97		
0.6	95		
0.425	95		
0.3	94		
0.212	94		
0.15	93		
0.063	88		

Dry Mass of sample, g	732

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	10
Fines <0.063mm	88

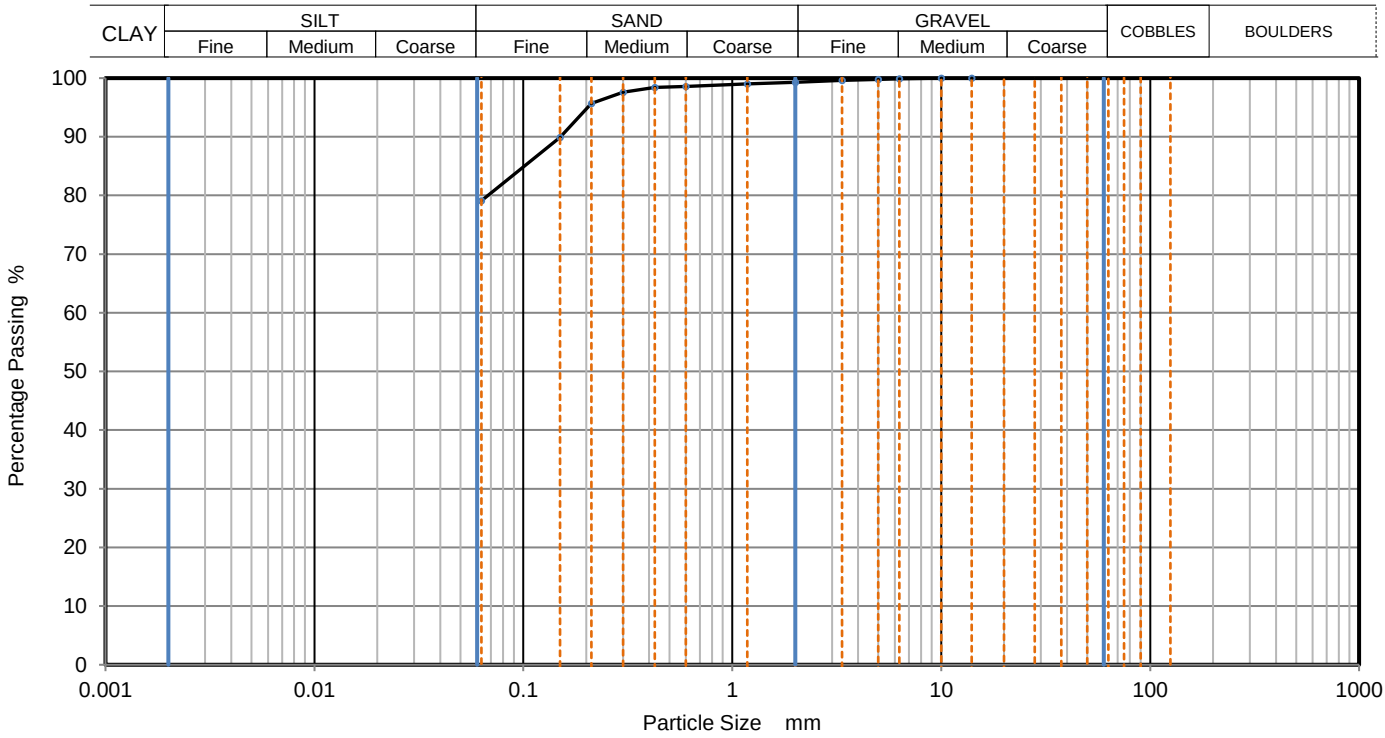
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH219
Site Name	WSP Eastern and Midlands			Sample No.	19
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	6.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020192



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	98		
0.3	98		
0.212	96		
0.15	90		
0.063	79		

Dry Mass of sample, g	686

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	20
Fines <0.063mm	79

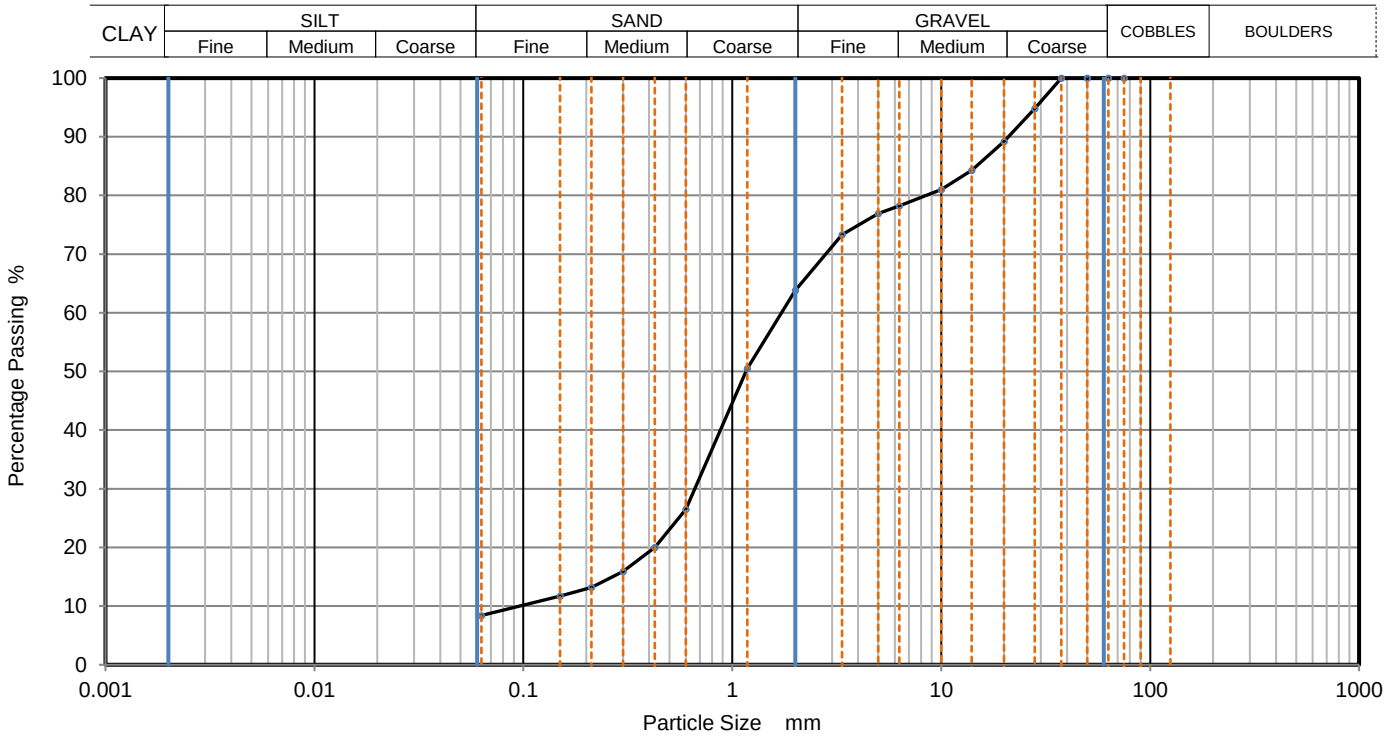
Grading Analysis		
D100	mm	
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH220
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown silty very gravelly coarse SAND.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020204



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	95		
20	89		
14	84		
10	81		
6.3	78		
5	77		
3.35	73		
2	64		
1.18	51		
0.6	27		
0.425	20		
0.3	16		
0.212	13		
0.15	12		
0.063	8		

Dry Mass of sample, g	882

Sample Proportions	% dry mass
Very coarse	0
Gravel	36
Sand	55
Fines <0.063mm	8

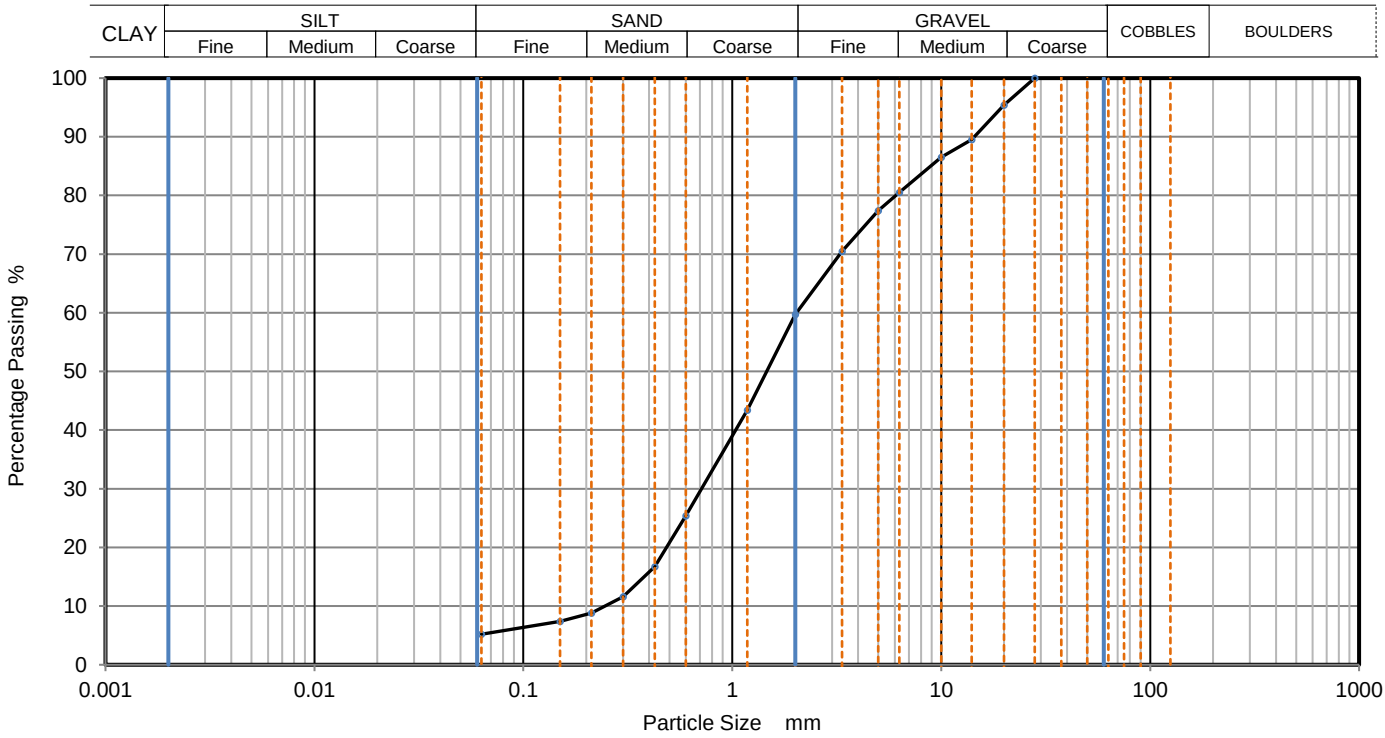
Grading Analysis		
D100	mm	
D60	mm	1.72
D30	mm	0.661
D10	mm	0.0966
Uniformity Coefficient		18
Curvature Coefficient		2.6

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH220
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown silty very gravelly coarse SAND.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020207



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	95		
14	90		
10	87		
6.3	81		
5	77		
3.35	71		
2	60		
1.18	43		
0.6	25		
0.425	17		
0.3	12		
0.212	9		
0.15	7		
0.063	5		

Dry Mass of sample, g	886

Sample Proportions	% dry mass
Very coarse	0
Gravel	40
Sand	55
Fines <0.063mm	5

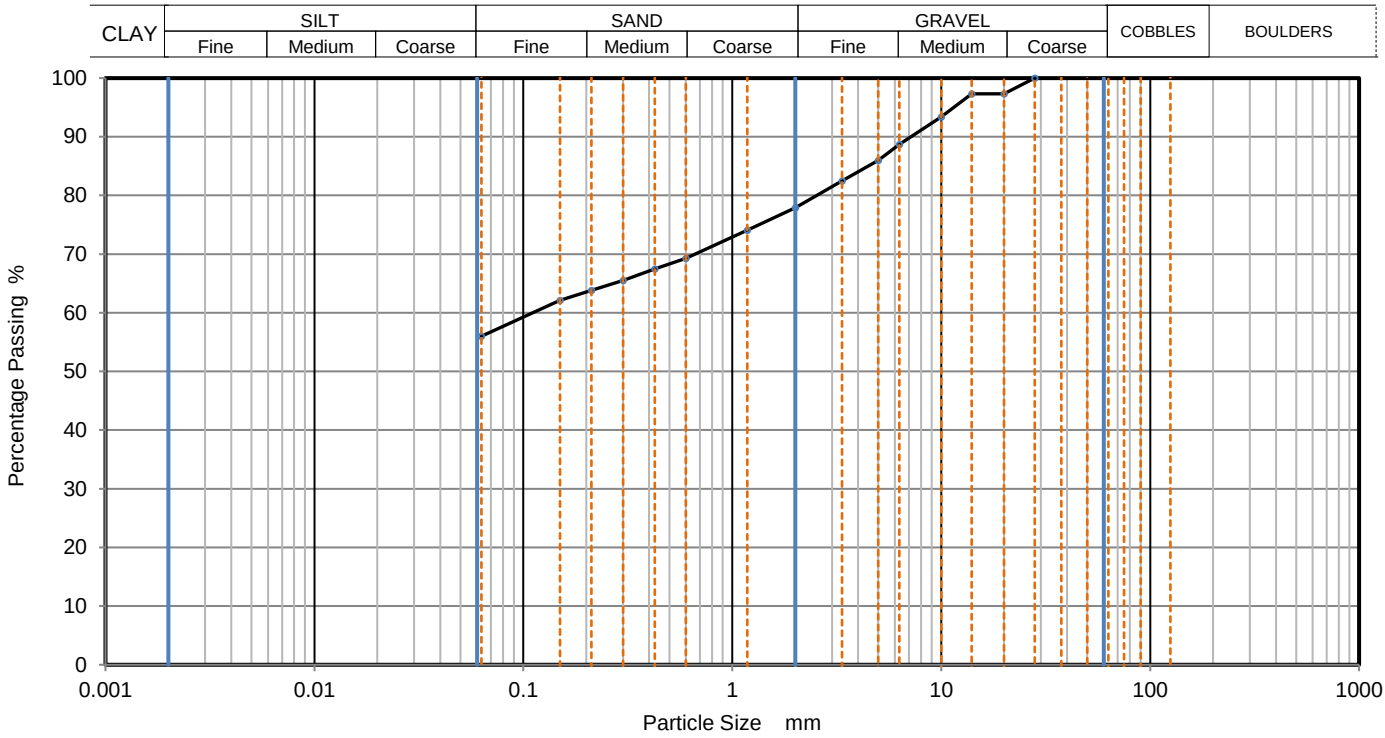
Grading Analysis		
D100	mm	28
D60	mm	2.03
D30	mm	0.714
D10	mm	0.246
Uniformity Coefficient		8.2
Curvature Coefficient		1

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH220
Site Name	WSP Eastern and Midlands			Sample No.	13
Soil Description	Dark grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020210



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
28	100		
20	97		
14	97		
10	93		
6.3	89		
5	86		
3.35	83		
2	78		
1.18	74		
0.6	69		
0.425	68		
0.3	66		
0.212	64		
0.15	62		
0.063	56		

Dry Mass of sample, g	753

Sample Proportions	% dry mass
Very coarse	0
Gravel	22
Sand	22
Fines <0.063mm	56

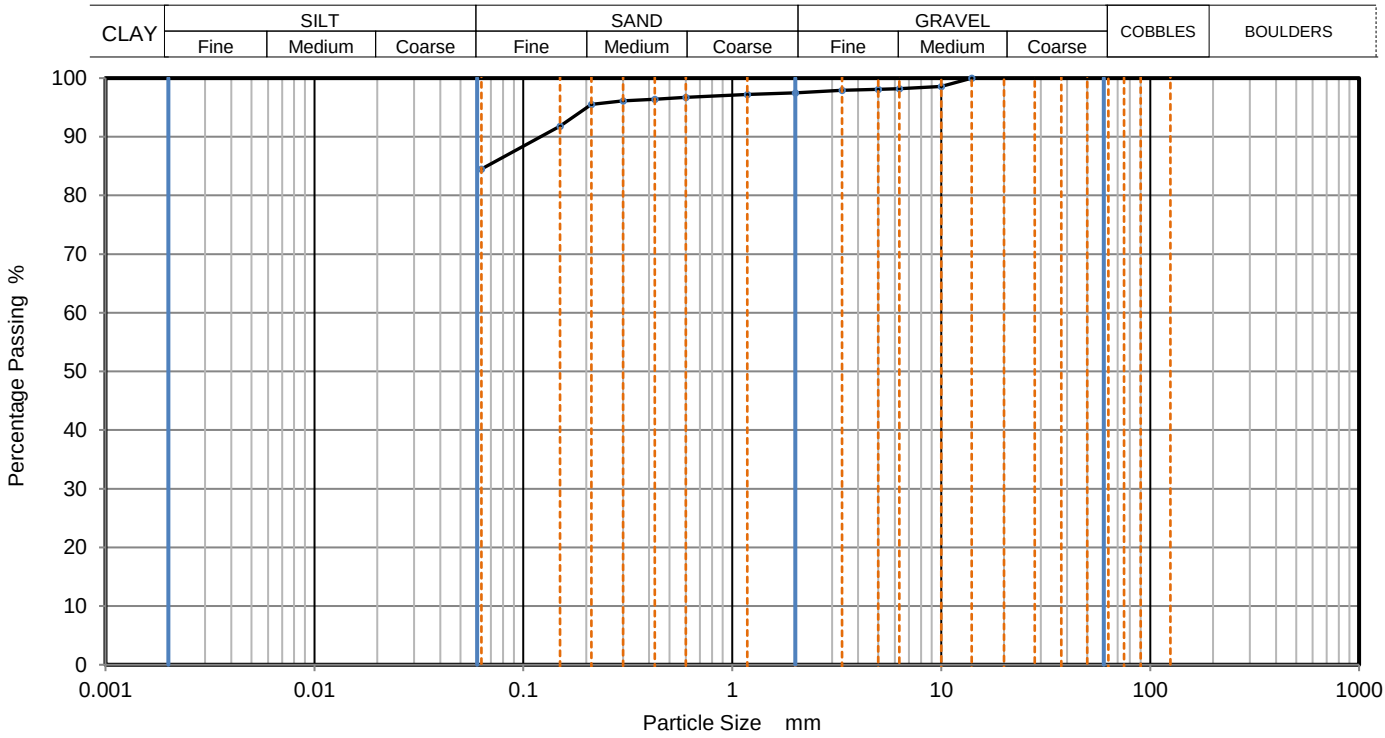
Grading Analysis		
D100	mm	28
D60	mm	0.111
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH220
Site Name	WSP Eastern and Midlands			Sample No.	19
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth, m	6.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020216



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
14	100		
10	99		
6.3	98		
5	98		
3.35	98		
2	98		
1.18	97		
0.6	97		
0.425	96		
0.3	96		
0.212	96		
0.15	92		
0.063	85		

Dry Mass of sample, g	683

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	13
Fines <0.063mm	85

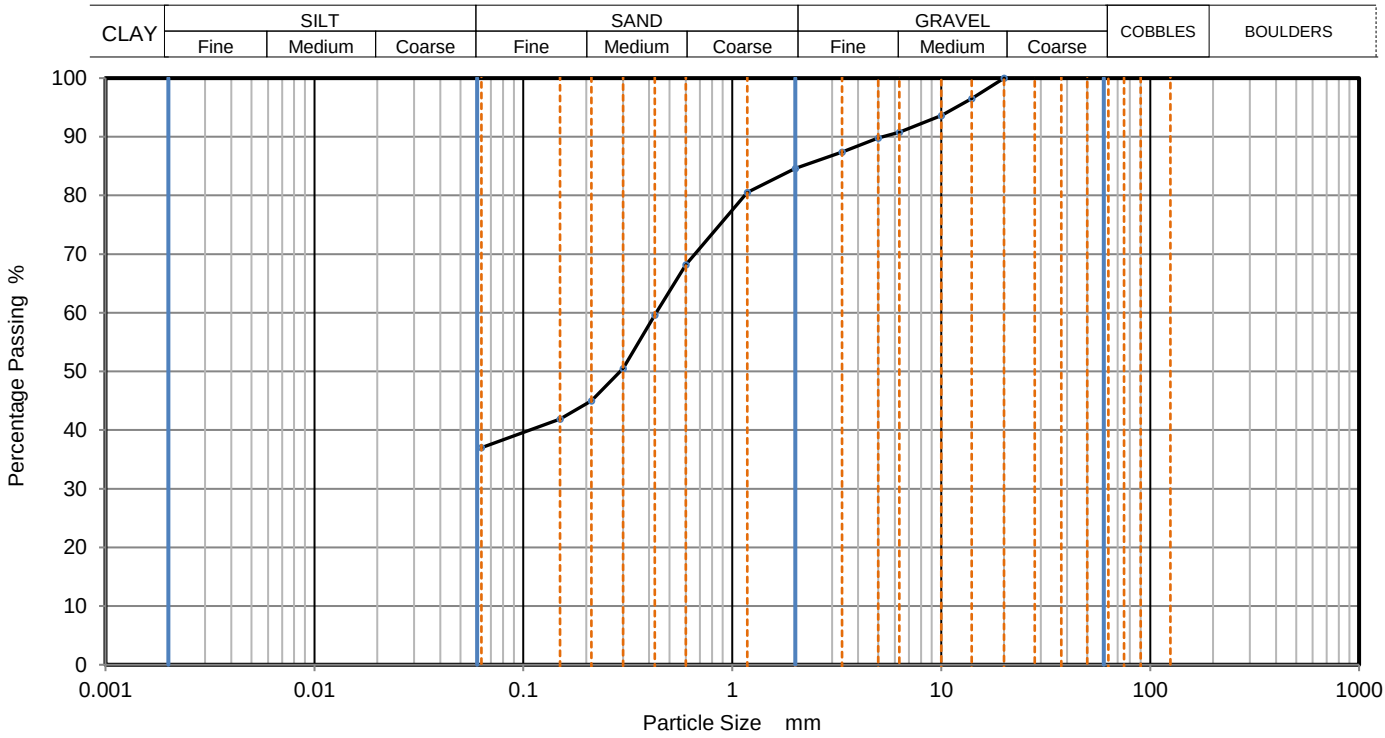
Grading Analysis		
D100	mm	14
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH221
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020231



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	97		
10	94		
6.3	91		
5	90		
3.35	87		
2	85		
1.18	81		
0.6	68		
0.425	60		
0.3	51		
0.212	45		
0.15	42		
0.063	37		

Dry Mass of sample, g	772

Sample Proportions	% dry mass
Very coarse	0
Gravel	15
Sand	48
Fines <0.063mm	37

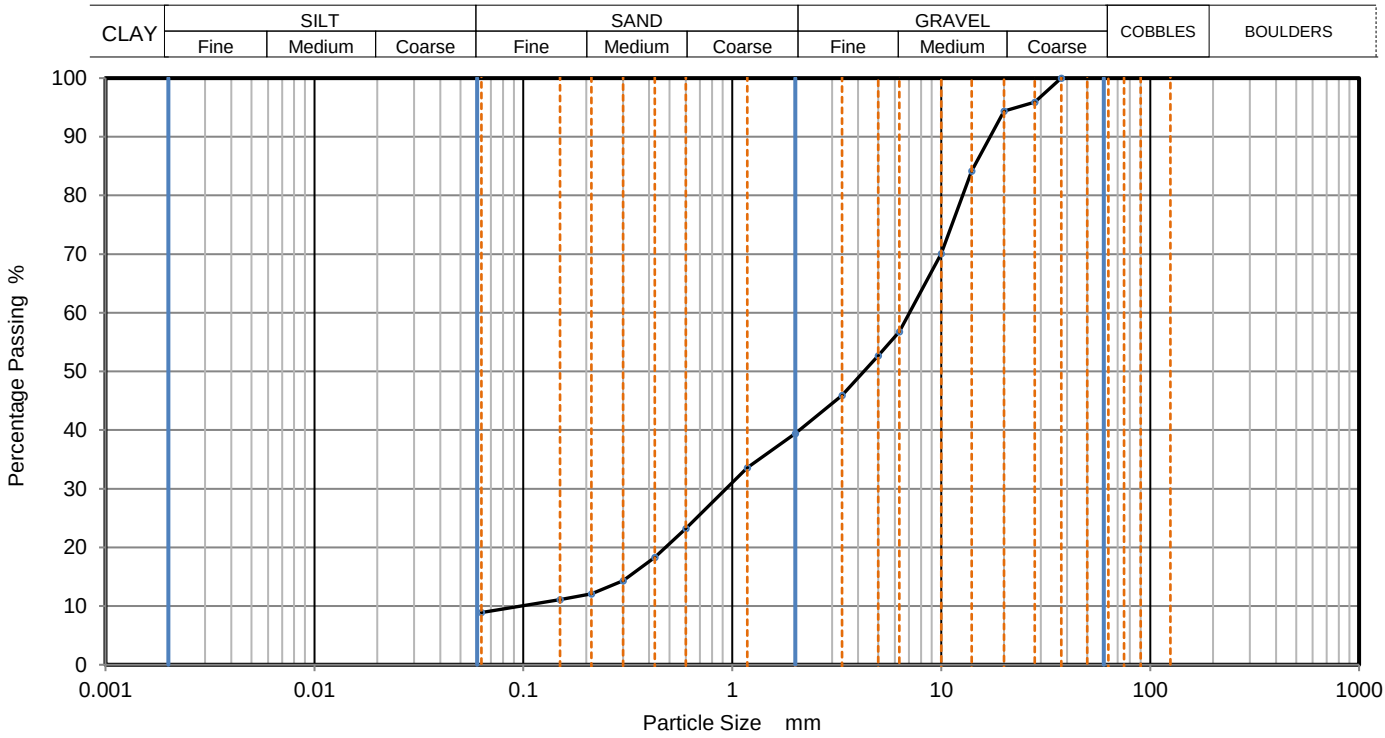
Grading Analysis		
D100	mm	20
D60	mm	0.432
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH221
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown silty very sandy medium GRAVEL.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120171020234



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	96		
20	94		
14	84		
10	70		
6.3	57		
5	53		
3.35	46		
2	39		
1.18	34		
0.6	23		
0.425	18		
0.3	14		
0.212	12		
0.15	11		
0.063	9		

Dry Mass of sample, g: 957

Sample Proportions	% dry mass
Very coarse	0
Gravel	61
Sand	31
Fines <0.063mm	9

Grading Analysis		
D100	mm	37.5
D60	mm	7.03
D30	mm	0.934
D10	mm	0.0981
Uniformity Coefficient		72
Curvature Coefficient		1.3

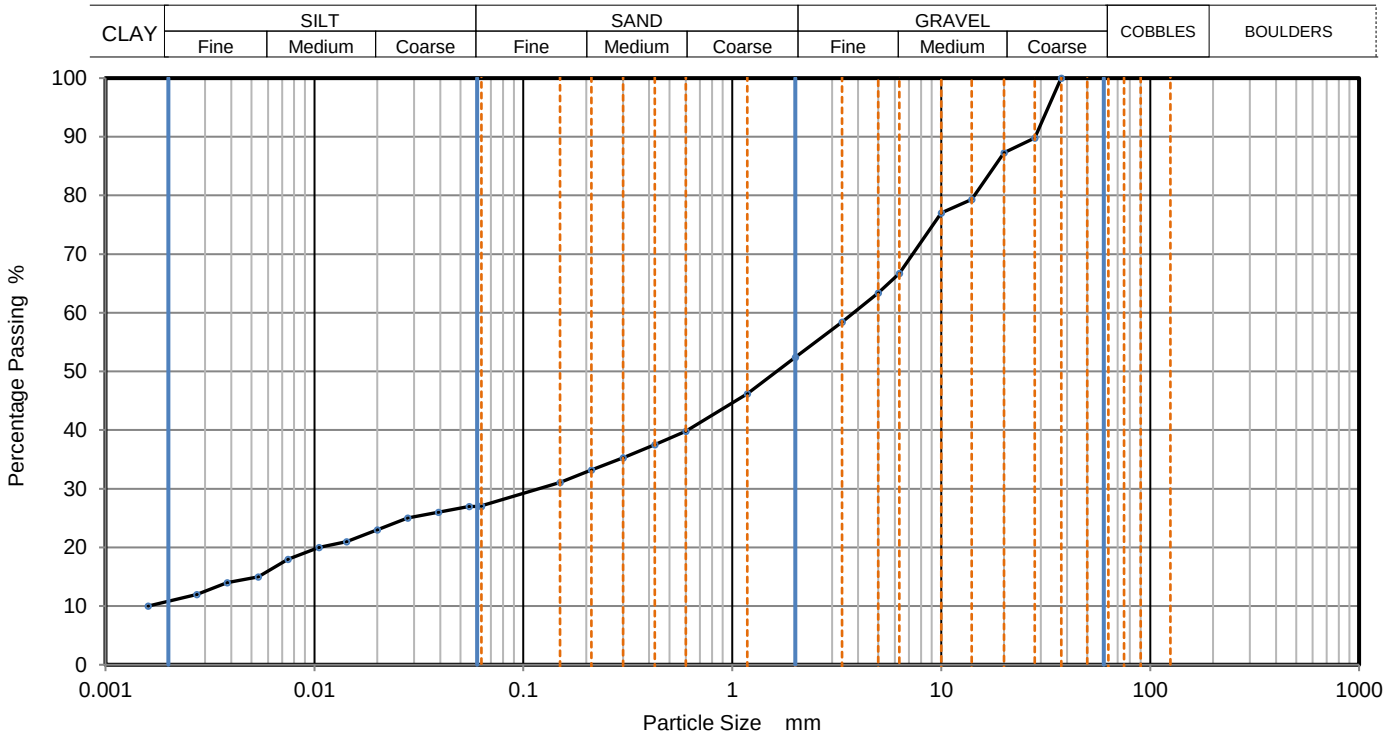
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH223
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Dark grey very sandy very silty GRAVEL.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL120171020246



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	27
		0.0551	27
		0.0392	26
		0.0279	25
		0.0200	23
37.5	100	0.0143	21
28	90	0.0105	20
20	87	0.0075	18
14	79	0.0054	15
10	77	0.0038	14
6.3	67	0.0027	12
5	63	0.0016	10
3.35	58		
2	52		
1.18	46		
0.6	40	Particle density (assumed)	
0.425	38	2.65	Mg/m3
0.3	35		
0.212	33		
0.15	31		
0.063	27		

Dry Mass of sample, g: 1178

Sample Proportions	% dry mass
Very coarse	0
Gravel	48
Sand	25
Silt	16
Clay	11

Grading Analysis		
D100	mm	37.5
D60	mm	3.8
D30	mm	0.118
D10	mm	0.0017
Uniformity Coefficient		2200
Curvature Coefficient		2.2

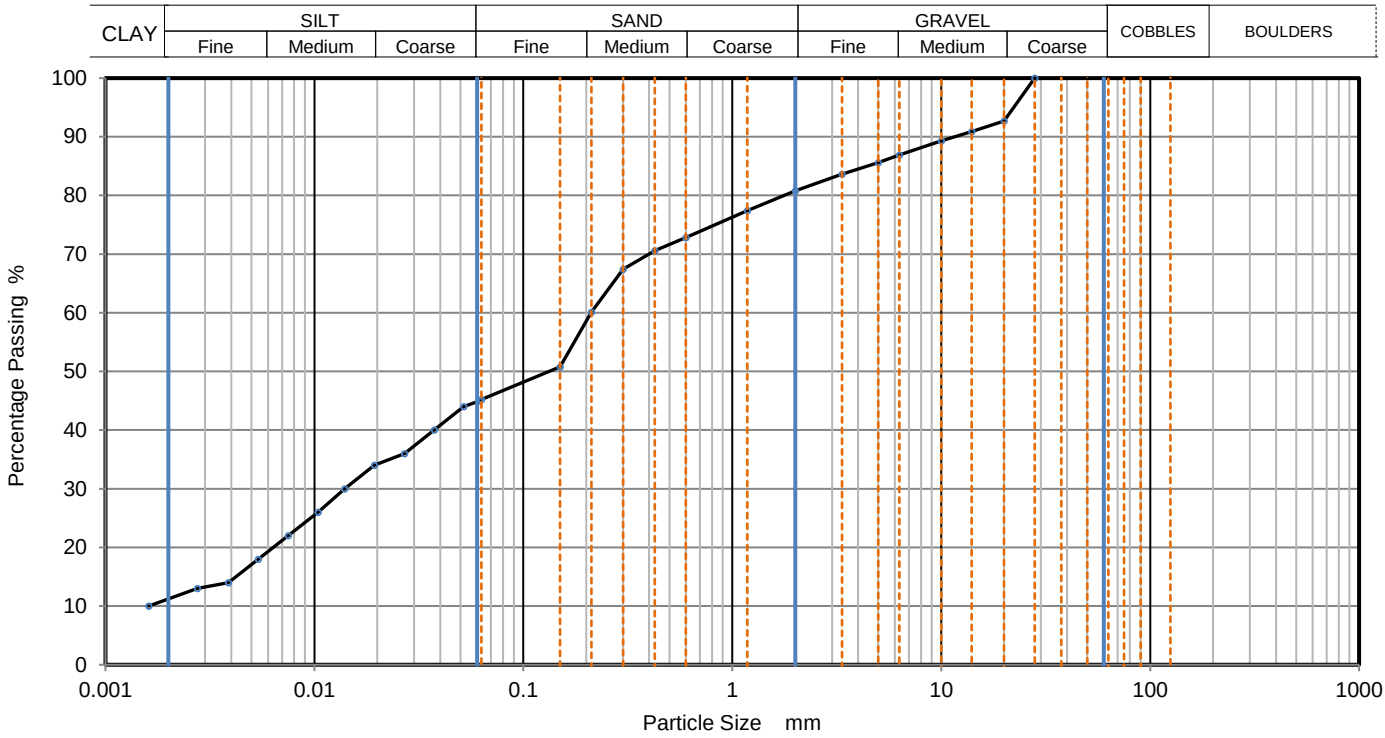
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PARTICLE SIZE DISTRIBUTION

				Job Ref	**2017T101**
				Borehole/Pit No.	BH224
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clauses 9.2 and 9.5			KeyLAB ID	IDL1201709111122



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0618	45
		0.0517	44
		0.0374	40
		0.0270	36
		0.0194	34
		0.0140	30
28	100	0.0104	26
20	93	0.0075	22
14	91	0.0054	18
10	89	0.0039	14
6.3	87	0.0028	13
5	86	0.0016	10
3.35	84		
2	81		
1.18	77		
0.6	73	Particle density (assumed)	
0.425	71	2.65	Mg/m3
0.3	67		
0.212	60		
0.15	51		
0.063	45		

Dry Mass of sample, g: 1027

Sample Proportions	% dry mass
Very coarse	0
Gravel	19
Sand	36
Silt	34
Clay	11

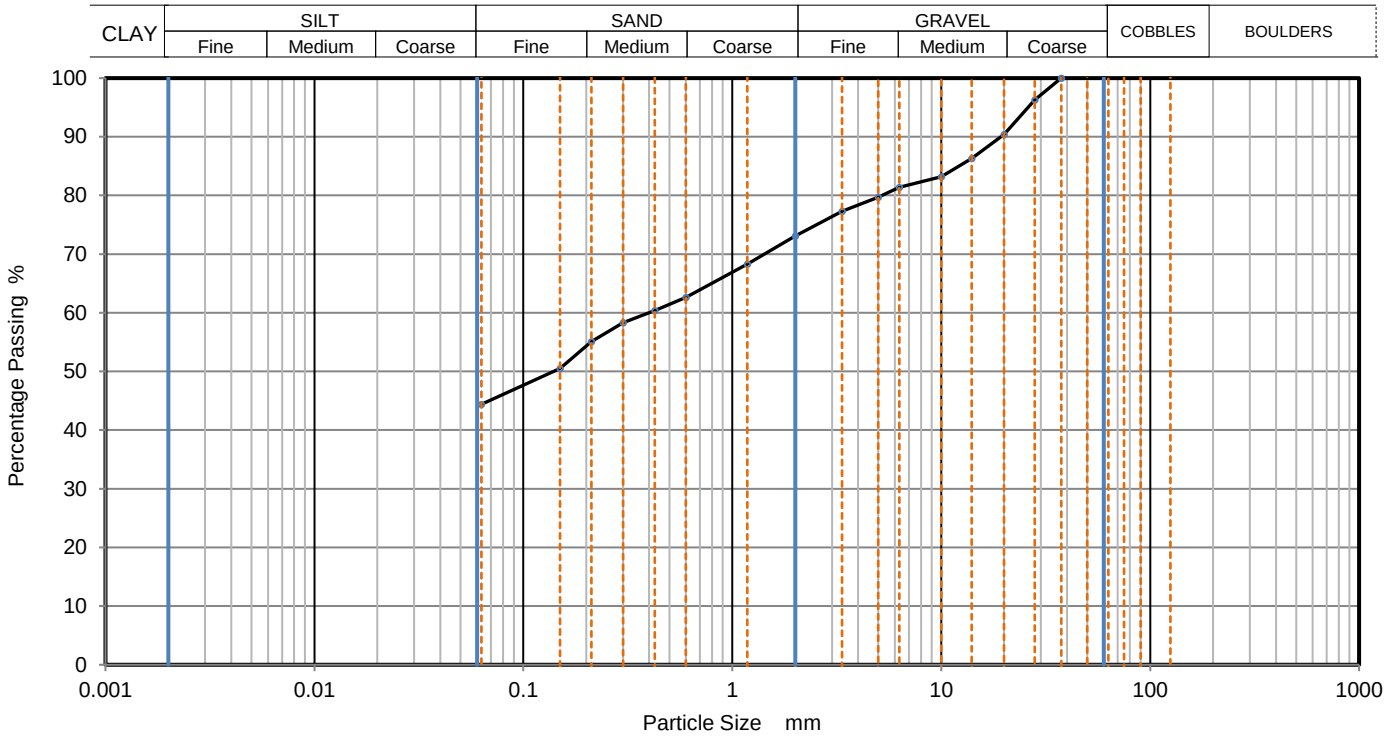
Grading Analysis		
D100	mm	28
D60	mm	0.211
D30	mm	0.0143
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH224
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly gravelly slightly sandy SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111125



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	96		
20	90		
14	86		
10	83		
6.3	81		
5	80		
3.35	77		
2	73		
1.18	68		
0.6	63		
0.425	60		
0.3	58		
0.212	55		
0.15	51		
0.063	44		

Dry Mass of sample, g: 985

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	29
Fines <0.063mm	44

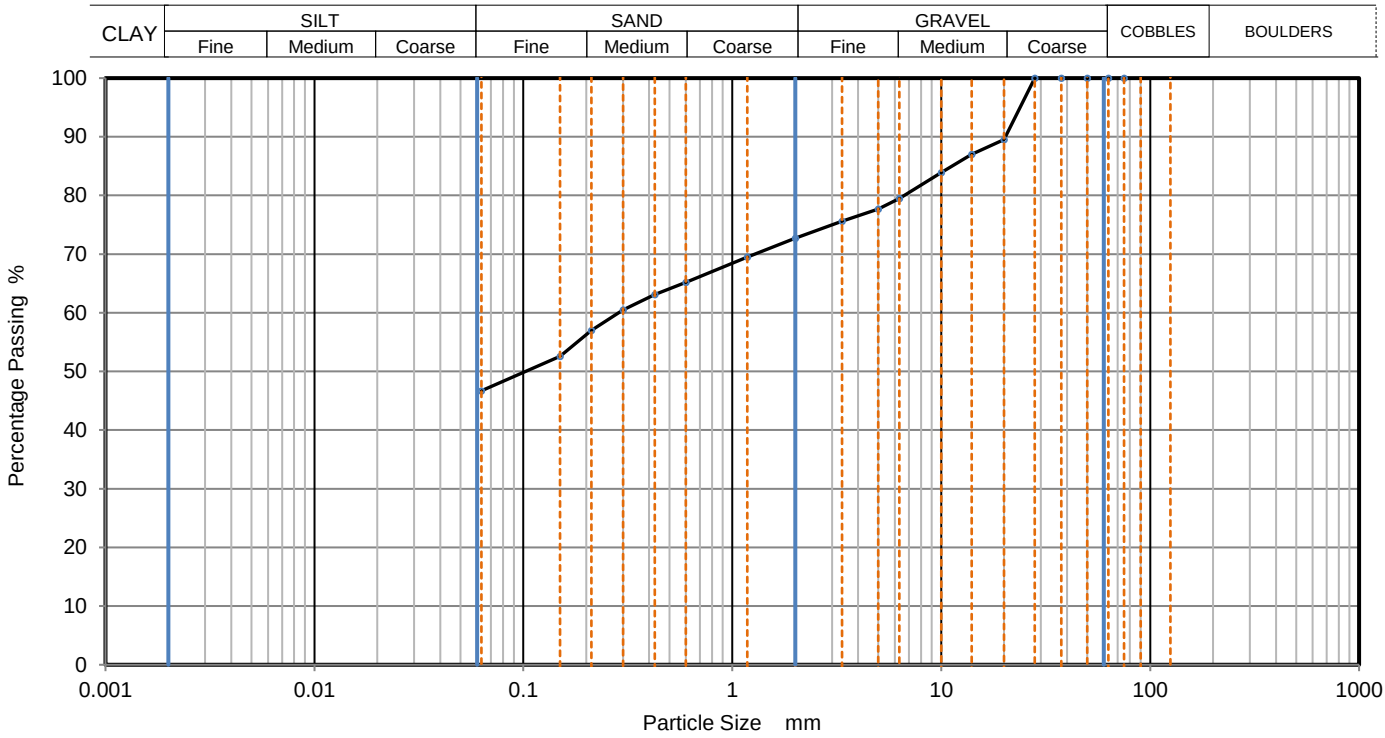
Grading Analysis		
D100	mm	37.5
D60	mm	0.396
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH225
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly sandy slightly gravelly SILT / CLAY.			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111143



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	90		
14	87		
10	84		
6.3	80		
5	78		
3.35	76		
2	73		
1.18	70		
0.6	65		
0.425	63		
0.3	61		
0.212	57		
0.15	53		
0.063	47		

Dry Mass of sample, g	1034

Sample Proportions	% dry mass
Very coarse	0
Gravel	27
Sand	26
Fines <0.063mm	47

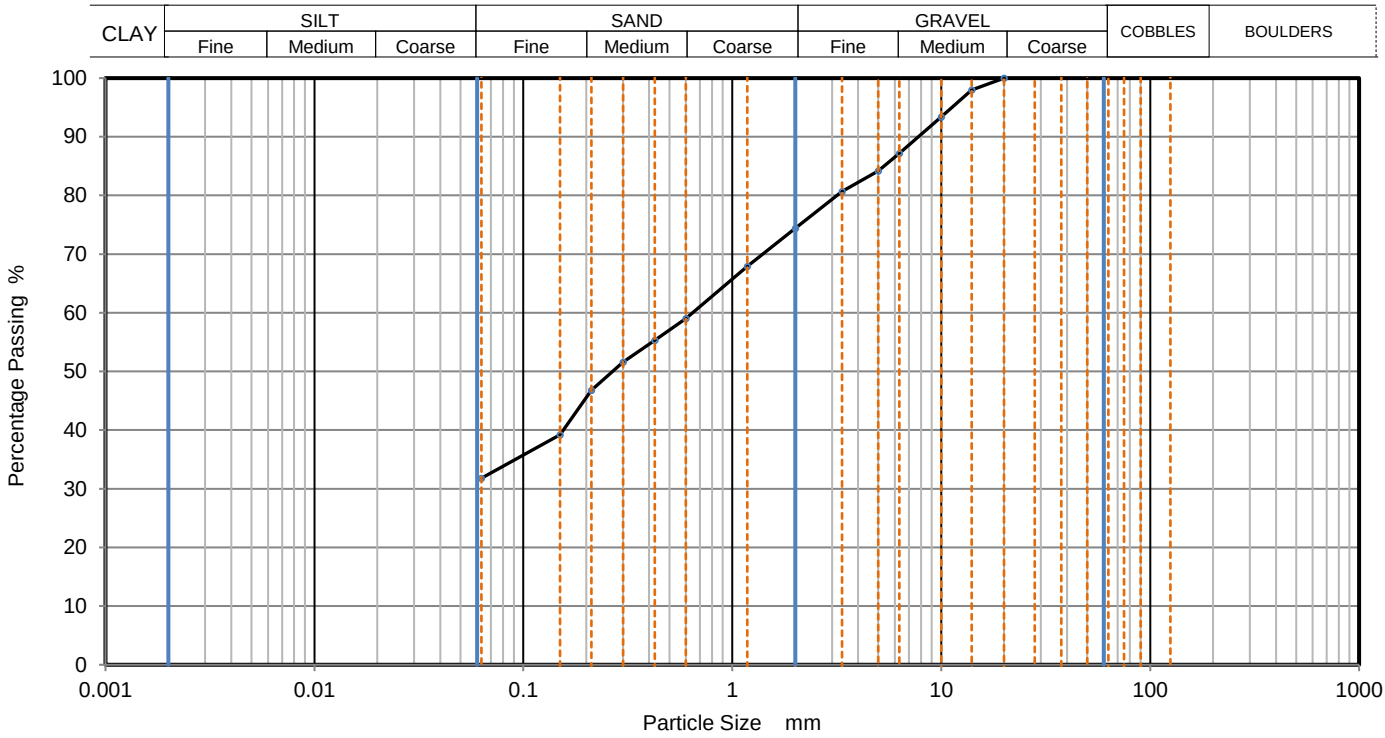
Grading Analysis		
D100	mm	
D60	mm	0.286
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	BH231
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown very gravelly very silty SAND.			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL1201709111167



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
20	100		
14	98		
10	93		
6.3	87		
5	84		
3.35	81		
2	74		
1.18	68		
0.6	59		
0.425	55		
0.3	52		
0.212	47		
0.15	39		
0.063	32		

Dry Mass of sample, g: 1106

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	43
Fines <0.063mm	32

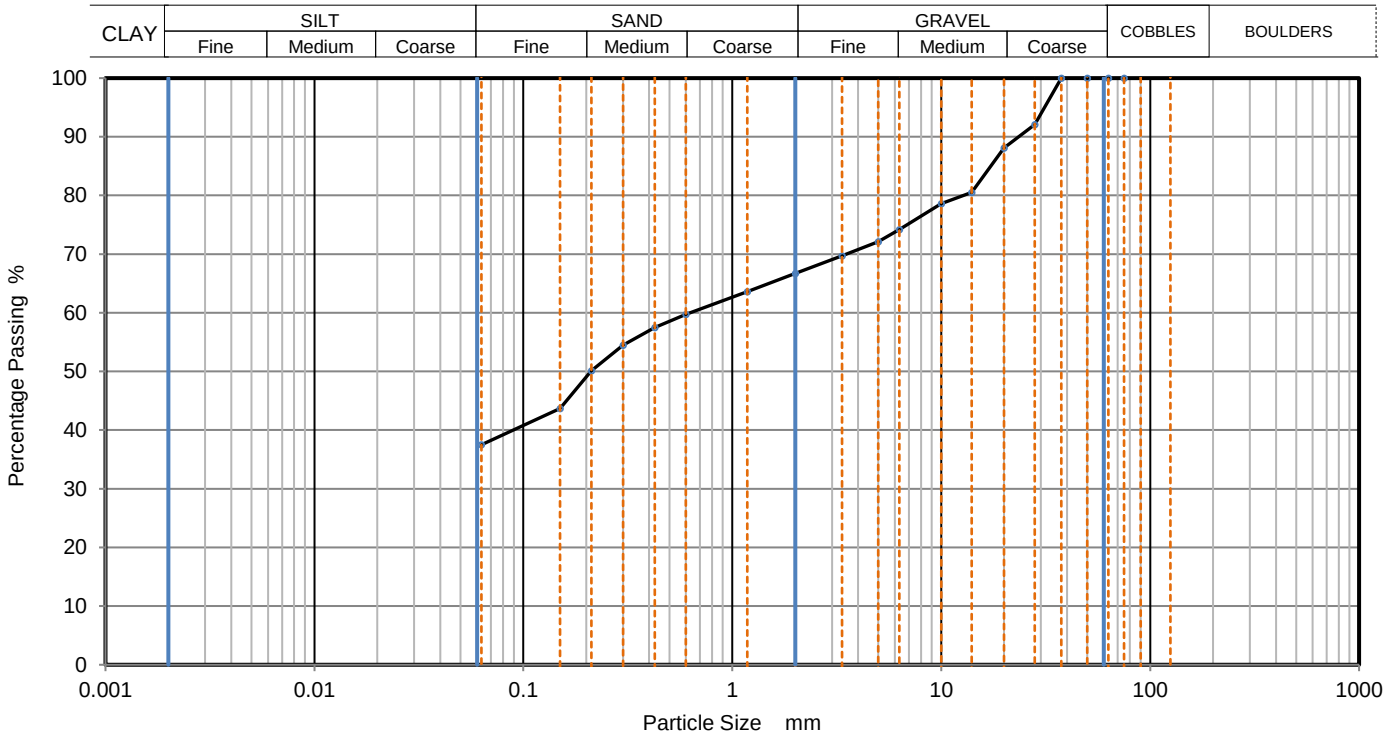
Grading Analysis		
D100	mm	20
D60	mm	0.647
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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IRISH DRILLING LIMITED	**PARTICLE SIZE DISTRIBUTION**			Job Ref	**2017T101**
				Borehole/Pit No.	RC061
Site Name	WSP Eastern and Midlands			Sample No.	
Soil Description	Brown slightly sandy slightly gravelly SILT / CLAY.			Depth, m	3.00
Specimen Reference		Specimen Depth	3.5-4.1 m	Sample Type	C
Test Method	BS1377:Part 2:1990, clause 9.2			KeyLAB ID	IDL120170911105



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	92		
20	88		
14	81		
10	79		
6.3	74		
5	72		
3.35	70		
2	67		
1.18	64		
0.6	60		
0.425	58		
0.3	55		
0.212	50		
0.15	44		
0.063	38		

Dry Mass of sample, g: 3119

Sample Proportions	% dry mass
Very coarse	0
Gravel	33
Sand	29
Fines <0.063mm	37

Grading Analysis		
D100	mm	
D60	mm	0.629
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

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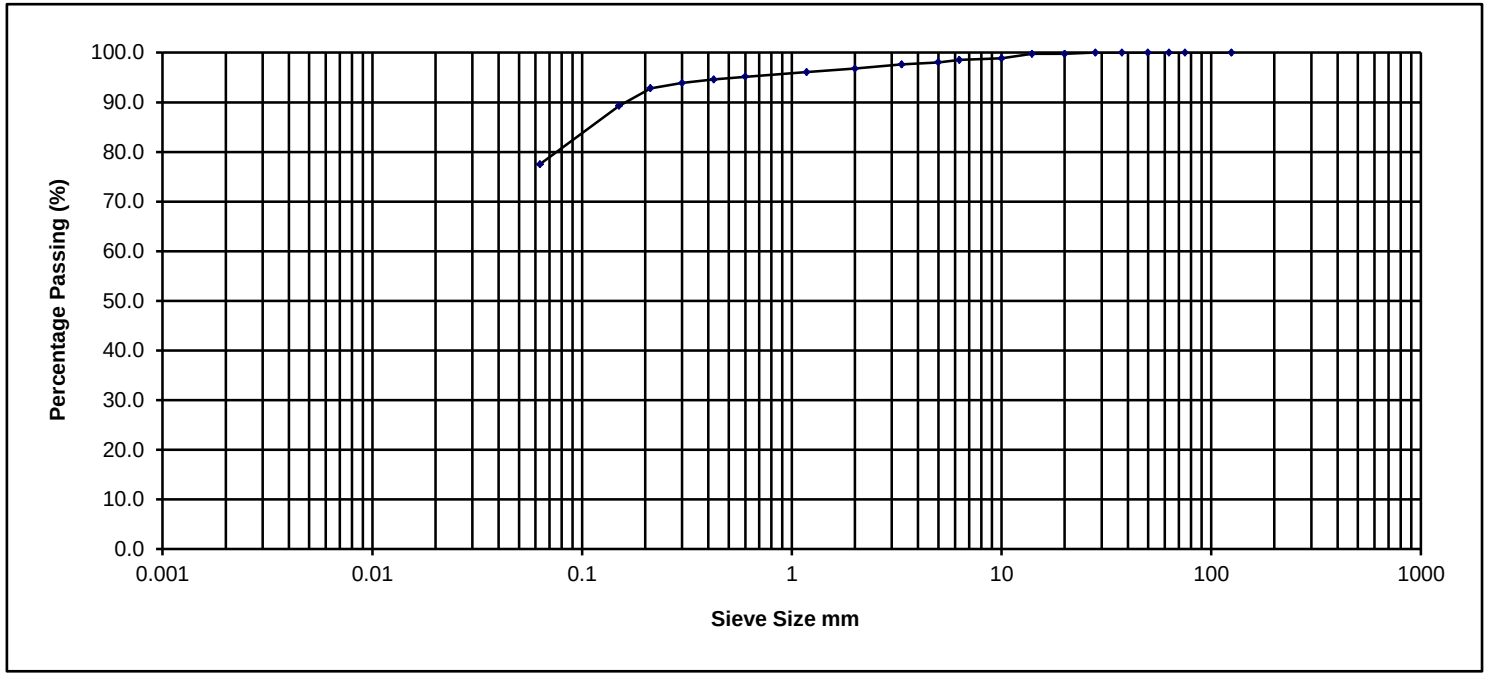
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NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

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	99.8
14.000	99.8
10.000	98.9
6.300	98.5
5.000	98.0
3.350	97.6
2.000	96.8
1.180	96.1
0.600	95.1
0.425	94.6
0.300	93.9
0.212	92.8
0.150	89.3
0.063	77.5



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		silt			Sand			Gravel			
		77.5			19.3			3.2		0.0	0.0

Sample Description Dark brown slightly gravelly slightly sandy SILT/CLAY.

Project WSP Eastern & Midlands

Operator	Tzr	Checked	Nc	Approved	Bc	Date sample tested	08/02/2018

Project No.	NMTL 2439
BH/TP No.	BH220
Sample No.	B22
Depth	7.0-7.50m

NM TL Ltd

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:	04 July 2017
Customer:	D_DRILL_LGA
Sample Delivery Group (SDG):	170624-65
Your Reference:	17T101
Location:	WSP
Report No:	414842

We received 1 sample on Saturday June 24, 2017 and 1 of these samples were scheduled for analysis which was completed on Tuesday July 04, 2017. 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 (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:



Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
15740238	BH51	B1	0.00 - 1.00	20/06/2017

Maximum Sample/Coolbox Temperature (°C) : **18.6**

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			15740238	
Customer Sample Reference			BH51	
AGS Reference			B1	
Depth (m)			0.00 - 1.00	
Container			250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S
Alkali Metals by iCap-OES (Soil)	All	NDPs: 0 Tests: 1	X	
Alkalinity as CaCO3	All	NDPs: 0 Tests: 1	X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 1	X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1	X	
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 1	X	
Metals in solid samples by OES	All	NDPs: 0 Tests: 1	X	
pH	All	NDPs: 0 Tests: 1	X	
Sample description	All	NDPs: 0 Tests: 1	X	
VOC MS (S)	All	NDPs: 0 Tests: 1		X

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
15740238	BH51	0.00 - 1.00	Light Brown	Sandy Clay Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH51
			Depth (m)	0.00 - 1.00
			Sample Type	Soil/Solid (S)
			Date Sampled	20/06/2017
			Sample Time	.
			Date Received	24/06/2017
			SDG Ref	170624-65
			Lab Sample No.(s)	15740238
			AGS Reference	B1
Moisture Content Ratio (% of as received sample)	%	PM024		11
pH	1 pH Units	TM133		7.45 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #
Antimony	<0.6 mg/kg	TM181		1.54 #
Arsenic	<0.6 mg/kg	TM181		9.42 M
Barium	<0.6 mg/kg	TM181		134 #
Cadmium	<0.02 mg/kg	TM181		0.311 M
Copper	<1.4 mg/kg	TM181		26.8 M
Iron	<1000 mg/kg	TM181		28100 #
Lead	<0.7 mg/kg	TM181		51.4 M
Manganese	<0.13 mg/kg	TM181		895 M
Mercury	<0.14 mg/kg	TM181		0.273 M
Nickel	<0.2 mg/kg	TM181		37.3 M
Zinc	<1.9 mg/kg	TM181		74.4 M
Calcium	<21 mg/kg	TM224		1060
Sodium	<7 mg/kg	TM224		69.1
Potassium	<16 mg/kg	TM224		1760
Conductivity @ 20 deg.C	<0.014 mS/cm	TM234		2.01
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		<0.004 M
Chloride (soluble)	<5 mg/kg	TM243		6.18 M

Validated

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Customer Sample Ref.	BH51							
Depth (m)	0.00 - 1.00							
Sample Type	Soil/Solid (S)							
Date Sampled	20/06/2017							
Sample Time	.							
Date Received	24/06/2017							
SDG Ref	170624-65							
Lab Sample No.(s)	15740238							
AGS Reference	B1							
Component	**LOD/Units**	**Method**						
Toluene-d8**	%	TM116	97.6					
Benzene	<9 µg/kg	TM116	<9 M					
Toluene	<7 µg/kg	TM116	<7 M					
Ethylbenzene	<4 µg/kg	TM116	<4 M					
p/m-Xylene	<10 µg/kg	TM116	<10 #					
o-Xylene	<10 µg/kg	TM116	<10 M					

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		
TM224	US EPA Method 6010B	Determination of Alkaline Metals by iCap 6500 Duo ICP-OES		
TM230	Methods 2320B and 4500-CO2 D, AWWA/APHA 19th Edition, 1995.	Determination of Alkalinity in Aqueous Sludge and Soil extracts		
TM234	The measurement of Electrical Conductivity and the Laboratory Determination of the pH value of Natural, Treated and Waste Waters. HMSO, 1978. ISBN 011 751428 4.	Determination of Electrical Conductivity of Soils Extracted with Calcium Sulphate		
TM243		Mixed Anions In Soils By Kone		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170624-65	**Client Reference:**	17T101	**Report Number:**	414842
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	15740238
Customer Sample Ref.	BH51
AGS Ref.	B1
Depth	0.00 - 1.00
Type	Soil/Solid (S)
Alkali Metals by iCap-OES (Soil)	04-Jul-2017
Alkalinity as CaCO3	04-Jul-2017
Anions by Kone (soil)	30-Jun-2017
Conductivity (at 20 deg.C)	04-Jul-2017
Hexavalent Chromium (s)	29-Jun-2017
Metals in solid samples by OES	03-Jul-2017
pH	03-Jul-2017
Sample description	26-Jun-2017
VOC MS (S)	30-Jun-2017

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 (2005), 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.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

21. 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.

22. 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.

23. 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.

24. **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.

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	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.

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.

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Website: www.alsenvironmental.co.uk

Irish Drilling Limited
Old Galway Road
Loughrea
Co. Galway

Attention: Dympna Darcy

CERTIFICATE OF ANALYSIS

Date:	06 September 2017
Customer:	D_DRILL_LGA
Sample Delivery Group (SDG):	170826-86
Your Reference:	17T101
Location:	WSP
Report No:	423139

We received 3 samples on Saturday August 26, 2017 and 3 of these samples were scheduled for analysis which was completed on Wednesday September 06, 2017. 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 (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:



Sonia McWhan
Operations Manager

1291

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	170826-86	**Client Reference:**	17T101	**Report Number:**	423139
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16082456	RC45	EW1	5.00 - 5.00	23/08/2017
16082463	RC46	EW1	4.00 - 4.00	23/08/2017
16082470	RC231	EW1	7.00 - 7.00	23/08/2017

Maximum Sample/Coolbox Temperature (°C) : **18**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	170826-86	**Client Reference:**	17T101	**Report Number:**	423139
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16082456				16082463				16082470				
Customer Sample Reference			RC45				RC46				RC231				
AGS Reference			EW1				EW1				EW1				
Depth (m)			5.00 - 5.00				4.00 - 4.00				7.00 - 7.00				
Container			0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)	0.5l glass bottle (ALE227)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)	
Sample Type			GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3		X				X				X			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 3			X				X				X		
Anions by Kone (w)	All	NDPs: 0 Tests: 3		X				X				X			
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 3		X				X				X			
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3	X				X				X				
Fluoride	All	NDPs: 0 Tests: 3		X				X				X			
Mercury Dissolved	All	NDPs: 0 Tests: 3	X				X				X				
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 3	X				X				X				
Nitrite by Kone (w)	All	NDPs: 0 Tests: 3				X				X				X	
PCB Congeners - Aqueous (W)	All	NDPs: 0 Tests: 3	X				X				X				
pH Value	All	NDPs: 0 Tests: 3		X				X				X			
Silica	All	NDPs: 0 Tests: 3		X				X				X			
Total Metals by ICP-MS	All	NDPs: 0 Tests: 3		X				X				X			
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 3	X				X				X				

Validated

CERTIFICATE OF ANALYSIS

SDG:	170826-86	**Client Reference:**	17T101	**Report Number:**	423139
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	RC45	RC46	RC231			
			Depth (m)	5.00 - 5.00	4.00 - 4.00	7.00 - 7.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	23/08/2017	23/08/2017	23/08/2017			
			Sample Time	.	.	.			
			Date Received	26/08/2017	26/08/2017	26/08/2017			
			SDG Ref	170826-86	170826-86	170826-86			
			Lab Sample No.(s)	16082456	16082463	16082470			
			AGS Reference	EW1	EW1	EW1			
Alkalinity, Total as CaCO3	<2 mg/l	TM043		230 #	380 #	335 #			
Silica	<0.5 mg/l	TM044		6.6	8.1	<0.5			
Organic Carbon, Total	<3 mg/l	TM090		6.23 #	<3 #	16.8 #			
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099		0.903 #	<0.3 #	0.409 #			
Fluoride	<0.5 mg/l	TM104		0.525 #	<0.5 #	<0.5 #			
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		0.36 #	0.664 #	0.571 #			
Aluminium (diss.filt)	<2 µg/l	TM152		36 #	<2 #	<2 #			
Antimony (diss.filt)	<0.1 µg/l	TM152		2.6	<0.1	0.189			
Arsenic (diss.filt)	<0.5 µg/l	TM152		1.07 #	0.774 #	1.56 #			
Barium (diss.filt)	<0.2 µg/l	TM152		27.3 #	62.8 #	319 #			
Boron (diss.filt)	<5 µg/l	TM152		84.1 #	26.4 #	30.3 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #	0.173 #			
Chromium (diss.filt)	<1 µg/l	TM152		4.52 #	1.85 #	<1 #			
Cobalt (diss.filt)	<0.15 µg/l	TM152		0.171 #	0.209 #	4.96 #			
Copper (diss.filt)	<0.3 µg/l	TM152		2.87 #	0.709 #	5.29 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #	<0.2 #			
Manganese (diss.filt)	<1 µg/l	TM152		32.9 #	26.7 #	2070 #			
Molybdenum (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #	<0.5 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		4.43 #	1.61 #	28.8 #			
Zinc (diss.filt)	<1 µg/l	TM152		144 #	11.4 #	500 #			
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #	<0.01 #			
Nitrite as NO2	<0.05 mg/l	TM184		0.325 #	<0.05 #	0.052 #			
Sulphate	<2 mg/l	TM184		10.7 #	17.4 #	18.6 #			
Chloride	<2 mg/l	TM184		13.8 #	26 #	25.5 #			
Nitrate as NO3	<0.3 mg/l	TM184		6.2	23.1	<0.3			
Nitrate as N	<0.0677 mg/l	TM184		1.4	5.21	<0.0677			
Phosphorus (tot.unfilt)	<20 µg/l	TM191		<20	<20	<20			
PCB congener 28	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			
PCB congener 52	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			
PCB congener 101	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			
PCB congener 118	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			
PCB congener 138	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			
PCB congener 153	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			

Validated

CERTIFICATE OF ANALYSIS

SDG:	170826-86	**Client Reference:**	17T101	**Report Number:**	423139
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	RC45	RC46	RC231			
			Depth (m)	5.00 - 5.00	4.00 - 4.00	7.00 - 7.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	23/08/2017	23/08/2017	23/08/2017			
			Sample Time	-	-	-			
			Date Received	26/08/2017	26/08/2017	26/08/2017			
			SDG Ref	170826-86	170826-86	170826-86			
			Lab Sample No.(s)	16082456	16082463	16082470			
			AGS Reference	EW1	EW1	EW1			
PCB congener 180	<0.015 µg/l	TM197		<0.015	<0.015	<0.015			
Sum of detected EC7 PCB's	<0.105 µg/l	TM197		<0.105	<0.105	<0.105			
Calcium (diss.filt)	<0.012 mg/l	TM228		64	140	112			
Sodium (diss.filt)	<0.076 mg/l	TM228		8.72	12.7	9.4			
Magnesium (diss.filt)	<0.036 mg/l	TM228		7.24	11.5	12.5			
Potassium (diss.filt)	<1 mg/l	TM228		15.7	3.19	1.73			
Iron (diss.filt)	<0.019 mg/l	TM228		<0.019	<0.019	<0.019			
pH	<1 pH Units	TM256		8.12 #	7.55 #	7.84 #			

CERTIFICATE OF ANALYSIS

SDG:	170826-86	**Client Reference:**	17T101	**Report Number:**	423139
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM044	MEWAM Phosphorous and silica in waters, effluent and sludges HMSO 1992	Determination of silica in water using the Palintest test kit		
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
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		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
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		
TM191	Standard Methods for the examination of waters and wastewaters 16th Edition, ALPHA, Washington DC, USA. ISBN 0-87553-131-8.	Determination of Unfiltered Metals in Water Matrices by ICP-MS		
TM197	Modified: US EPA Method 8082.EA Method 174 and 5109631	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Waters		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. 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

SDG:	170826-86	**Client Reference:**	17T101	**Report Number:**	423139
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16082456	16082463	16082470
Customer Sample Ref.	RC45	RC46	RC231
AGS Ref.	EW1	EW1	EW1
Depth	5.00 - 5.00	4.00 - 4.00	7.00 - 7.00
Type	Ground Water	Ground Water	Ground Water
Alkalinity as CaCO3	04-Sep-2017	04-Sep-2017	04-Sep-2017
Ammoniacal Nitrogen	29-Aug-2017	29-Aug-2017	29-Aug-2017
Anions by Kone (w)	05-Sep-2017	06-Sep-2017	05-Sep-2017
Conductivity (at 20 deg.C)	01-Sep-2017	01-Sep-2017	01-Sep-2017
Dissolved Metals by ICP-MS	05-Sep-2017	05-Sep-2017	05-Sep-2017
Fluoride	31-Aug-2017	31-Aug-2017	31-Aug-2017
Mercury Dissolved	04-Sep-2017	04-Sep-2017	04-Sep-2017
Metals by iCap-OES Dissolved (W)	05-Sep-2017	05-Sep-2017	05-Sep-2017
Nitrite by Kone (w)	30-Aug-2017	31-Aug-2017	31-Aug-2017
PCB Congeners - Aqueous (W)	01-Sep-2017	01-Sep-2017	01-Sep-2017
pH Value	30-Aug-2017	30-Aug-2017	30-Aug-2017
Silica	29-Aug-2017	29-Aug-2017	29-Aug-2017
Total Metals by ICP-MS	30-Aug-2017	30-Aug-2017	30-Aug-2017
Total Organic and Inorganic Carbon	31-Aug-2017	31-Aug-2017	31-Aug-2017

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 (2005), 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.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

21. 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.

22. 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.

23. 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.

24. **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.

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	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.

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:	19 December 2017
Customer:	D_DRILL_LGA
Sample Delivery Group (SDG):	171212-78
Your Reference:	17T101
Location:	WSP
Report No:	437355

We received 6 samples on Tuesday December 12, 2017 and 6 of these samples were scheduled for analysis which was completed on Tuesday December 19, 2017. 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 (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:



Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	171212-78	**Client Reference:**	17T101	**Report Number:**	437355
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16741383	BH138	B7	2.00 - 2.50	03/07/2017
16741385	BH138	B10	3.00 - 3.50	03/07/2017
16741387	BH172	B7	2.00 - 2.50	29/06/2017
16741390	BH172	B10	3.00 - 3.50	29/06/2017
16741395	BH173	B7	2.00 - 2.50	30/06/2017
16741398	BH173	B10	3.00 - 3.50	30/06/2017

Maximum Sample/Coolbox Temperature (°C) : **0**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	171212-78	**Client Reference:**	17T101	**Report Number:**	437355
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16741383	16741385	16741387	16741390	16741395	16741398
Customer Sample Reference			BH138	BH138	BH172	BH172	BH173	BH173
AGS Reference			B7	B10	B7	B10	B7	B10
Depth (m)			2.00 - 2.50	3.00 - 3.50	2.00 - 2.50	3.00 - 3.50	2.00 - 2.50	3.00 - 3.50
Container			400g Tub (ALE214)	400g Tub (ALE214)	400g Tub (ALE214)	400g Tub (ALE214)	400g Tub (ALE214)	400g Tub (ALE214)
Sample Type			S	S	S	S	S	S
pH	All	NDPs: 0 Tests: 6	X	X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 6	X	X	X	X	X	X

CERTIFICATE OF ANALYSIS

SDG:	171212-78	**Client Reference:**	17T101	**Report Number:**	437355
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16741383	BH138	2.00 - 2.50	Light Brown	Sandy Loam	Vegetation	Stones
16741385	BH138	3.00 - 3.50	Dark Brown	Sandy Loam	Vegetation	Stones
16741387	BH172	2.00 - 2.50	Light Brown	Sandy Loam	Stones	Vegetation
16741390	BH172	3.00 - 3.50	Light Brown	Sandy Loam	Stones	Vegetation
16741395	BH173	2.00 - 2.50	Light Brown	Sandy Clay Loam	Stones	Vegetation
16741398	BH173	3.00 - 3.50	Light Brown	Sandy Clay Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	171212-78	**Client Reference:**	17T101	**Report Number:**	437355
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH138	BH138	BH172	BH172	BH173	BH173
			Depth (m)	2.00 - 2.50	3.00 - 3.50	2.00 - 2.50	3.00 - 3.50	2.00 - 2.50	3.00 - 3.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	03/07/2017	03/07/2017	29/06/2017	29/06/2017	30/06/2017	30/06/2017
			Sample Time	.	.	.	.	.	.
			Date Received	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017
			SDG Ref	171212-78	171212-78	171212-78	171212-78	171212-78	171212-78
			Lab Sample No.(s)	16741383	16741385	16741387	16741390	16741395	16741398
			AGS Reference	B7	B10	B7	B10	B7	B10
Moisture Content Ratio (% of as received sample)	%	PM024		13	12	15	14	9.5	9.2
pH	1 pH Units	TM133		7.37 @ M	7.26 @ M	8.12 @ M	8.66 @ M	8.48 @ M	8.81 @ M

CERTIFICATE OF ANALYSIS

SDG:	171212-78	**Client Reference:**	17T101	**Report Number:**	437355
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter

NA = not applicable.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	171212-78	**Client Reference:**	17T101	**Report Number:**	437355
Location:	WSP	**Order Number:**	4894	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16741383	16741385	16741387	16741390	16741395	16741398
Customer Sample Ref.	BH138	BH138	BH172	BH172	BH173	BH173
AGS Ref.	B7	B10	B7	B10	B7	B10
Depth	2.00 - 2.50	3.00 - 3.50	2.00 - 2.50	3.00 - 3.50	2.00 - 2.50	3.00 - 3.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
pH	18-Dec-2017	18-Dec-2017	18-Dec-2017	18-Dec-2017	18-Dec-2017	19-Dec-2017
Sample description	12-Dec-2017	12-Dec-2017	12-Dec-2017	12-Dec-2017	12-Dec-2017	12-Dec-2017

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 (2005), 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.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **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%, they are generally wider for volatiles analysis, 50-150%. 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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. 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.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

21. 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.

22. 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.

23. 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.

24. **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.

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	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.

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
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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:	09 February 2018
Customer:	D_DRILL_LGA
Sample Delivery Group (SDG):	180206-48
Your Reference:	17T101
Location:	WSP
Report No:	443718

We received 7 samples on Tuesday February 06, 2018 and 7 of these samples were scheduled for analysis which was completed on Friday February 09, 2018. 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 (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:



Sonia McWhan
Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16998129	BH030	B12	3.00 - 3.50	12/10/2017
16998132	BH030	B15	4.00 - 4.50	12/10/2017
16998134	BH031	B10	3.00 - 3.50	12/10/2017
16998136	BH207	B13	4.00 - 4.30	11/10/2017
16998138	BH220	B13	4.00 - 4.50	02/10/2017
16998141	BH220	B22	7.00 - 7.50	02/10/2017
16998143	BH221	B10	3.00 - 3.50	02/10/2017

Maximum Sample/Coolbox Temperature (°C) : **2.8**

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			16998129	16998132	16998134	16998136	16998138	16998141	16998143
Customer Sample Reference			BH030	BH030	BH031	BH207	BH220	BH220	BH221
AGS Reference			B12	B15	B10	B13	B13	B22	B10
Depth (m)			3.00 - 3.50	4.00 - 4.50	3.00 - 3.50	4.00 - 4.30	4.00 - 4.50	7.00 - 7.50	3.00 - 3.50
Container			1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB
Sample Type			S	S	S	S	S	S	S
Sample description	All	NDPs: 0 Tests: 7	X	X	X	X	X	X	X
Total Organic Carbon	All	NDPs: 0 Tests: 7	X	X	X	X	X	X	X

CERTIFICATE OF ANALYSIS

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16998129	BH030	3.00 - 3.50	Grey	Silty Clay	Vegetation	None
16998132	BH030	4.00 - 4.50	Grey	Silty Clay Loam	Stones	Vegetation
16998134	BH031	3.00 - 3.50	Dark Brown	Silty Clay Loam	Stones	Vegetation
16998136	BH207	4.00 - 4.30	Grey	Sandy Loam	Stones	None
16998138	BH220	4.00 - 4.50	Dark Brown	Sandy Clay	Stones	None
16998141	BH220	7.00 - 7.50	Dark Brown	Silty Clay	Stones	None
16998143	BH221	3.00 - 3.50	Dark Brown	Stone/Soil	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Validated

CERTIFICATE OF ANALYSIS

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH030	BH030	BH031	BH207	BH220	BH220
			Depth (m)	3.00 - 3.50	4.00 - 4.50	3.00 - 3.50	4.00 - 4.30	4.00 - 4.50	7.00 - 7.50
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	12/10/2017	12/10/2017	12/10/2017	11/10/2017	02/10/2017	02/10/2017
			Sample Time	.	.	.	.	.	.
			Date Received	06/02/2018	06/02/2018	06/02/2018	06/02/2018	06/02/2018	06/02/2018
			SDG Ref	180206-48	180206-48	180206-48	180206-48	180206-48	180206-48
			Lab Sample No.(s)	16998129	16998132	16998134	16998136	16998138	16998141
			AGS Reference	B12	B15	B10	B13	B13	B22
Moisture Content Ratio (% of as received sample)	%	PM024		13	9	9.1	5	11	12
Soil Organic Matter (SOM)	<0.35 %	TM132		1.17 @ #	0.371 @ #	0.628 @ #	0.467 @ #	0.655 @ #	1.15 @ #

Validated

CERTIFICATE OF ANALYSIS

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	
			Depth (m)	3.00 - 3.50
			Sample Type	Soil/Solid (S)
			Date Sampled	02/10/2017
			Sample Time	.
			Date Received	06/02/2018
			SDG Ref	180206-48
			Lab Sample No.(s)	16998143
			AGS Reference	B10
Moisture Content Ratio (% of as received sample)	%	PM024	1.3	
Soil Organic Matter (SOM)	<0.35 %	TM132	<0.35 @ #	

CERTIFICATE OF ANALYSIS

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM132	In - house Method	ELTRA CS800 Operators Guide

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

SDG:	180206-48	**Client Reference:**	17T101	**Report Number:**	443718
Location:	WSP	**Order Number:**	5485	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	16998129	16998132	16998134	16998136	16998138	16998141	16998143
Customer Sample Ref.	BH030	BH030	BH031	BH207	BH220	BH220	BH221
AGS Ref.	B12	B15	B10	B13	B13	B22	B10
Depth	3.00 - 3.50	4.00 - 4.50	3.00 - 3.50	4.00 - 4.30	4.00 - 4.50	7.00 - 7.50	3.00 - 3.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Sample description	06-Feb-2018	06-Feb-2018	06-Feb-2018	06-Feb-2018	06-Feb-2018	06-Feb-2018	06-Feb-2018
Total Organic Carbon	09-Feb-2018	09-Feb-2018	09-Feb-2018	09-Feb-2018	09-Feb-2018	09-Feb-2018	09-Feb-2018

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 (2005), 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.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

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15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

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21. 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.

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24. **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.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

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Asbestos Type	Common Name
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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.

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.

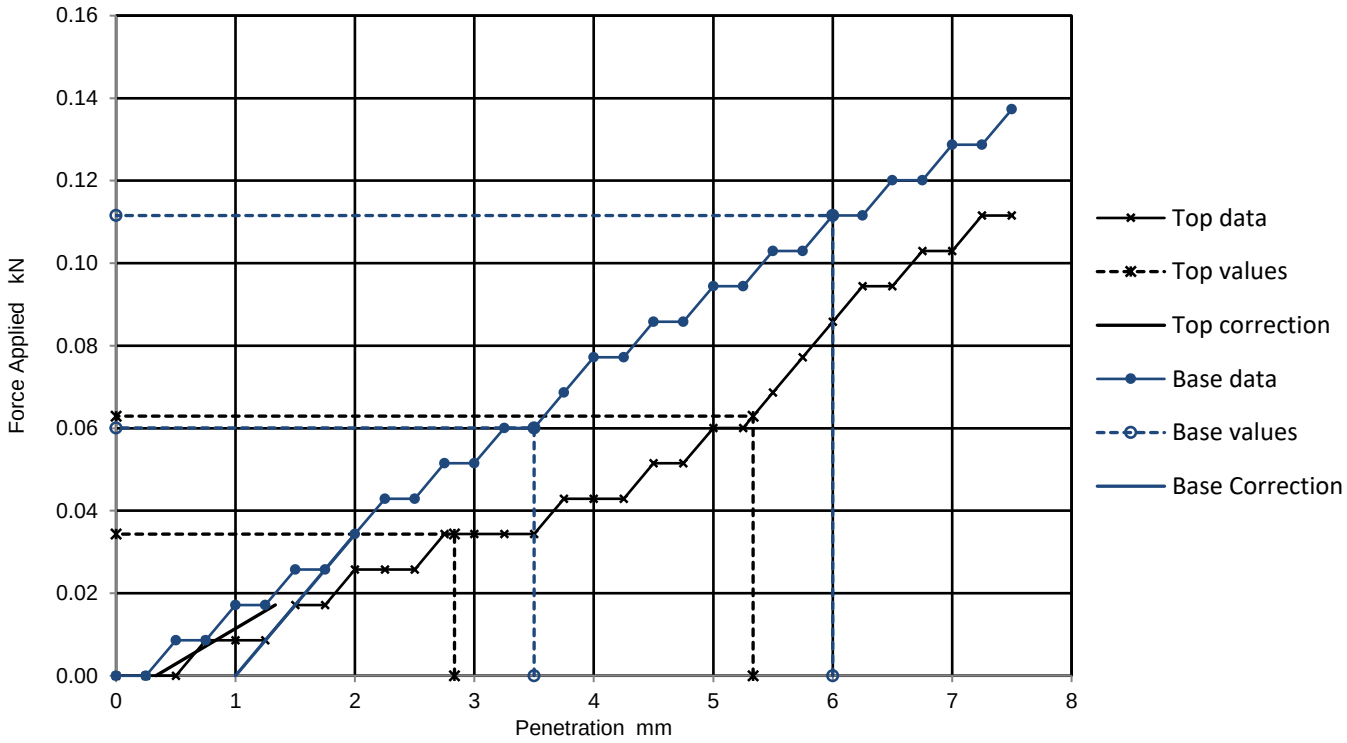
California Bearing Ratio (CBR)

				Job Ref	2017T101
				Borehole/Pit No.	BH001
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Pinkish-brown slightly gravelly slightly sandy SILT / CLAY.			Depth m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL120170911281
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed			%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.18	Mg/m3	Surcharge applied	2	kg
	Dry density	1.69	Mg/m3		1	kPa
	Moisture content	28.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP	Yes	0.3	0.3	0.3		27.3
BASE	Yes	0.5	0.6	0.6		28.9

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	1

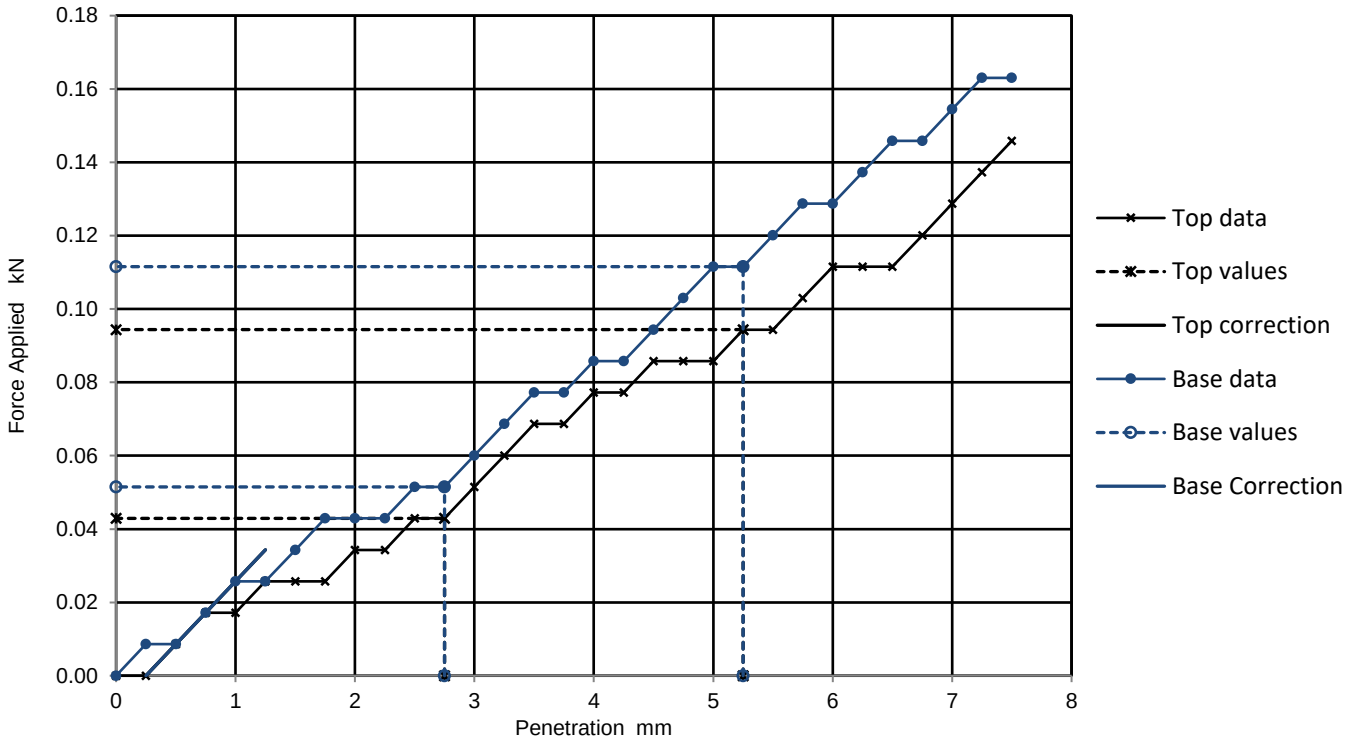
Lab Sheet Reference :

IRISH DRILLING LIMITED	**California Bearing Ratio (CBR)**			Job Ref	2017T101
				Borehole/Pit No.	BH001
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Grey-brown slightly gravelly slightly sandy SILT / CLAY.			Depth m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL120170911284
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed			%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.17	Mg/m3	Surcharge applied	2	kg
	Dry density	1.71	Mg/m3		1	kPa
	Moisture content	26.6	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP	Yes	0.3	0.5	0.5	0.5	24.1
BASE	Yes	0.4	0.6	0.6		26.6

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	2

Lab Sheet Reference :

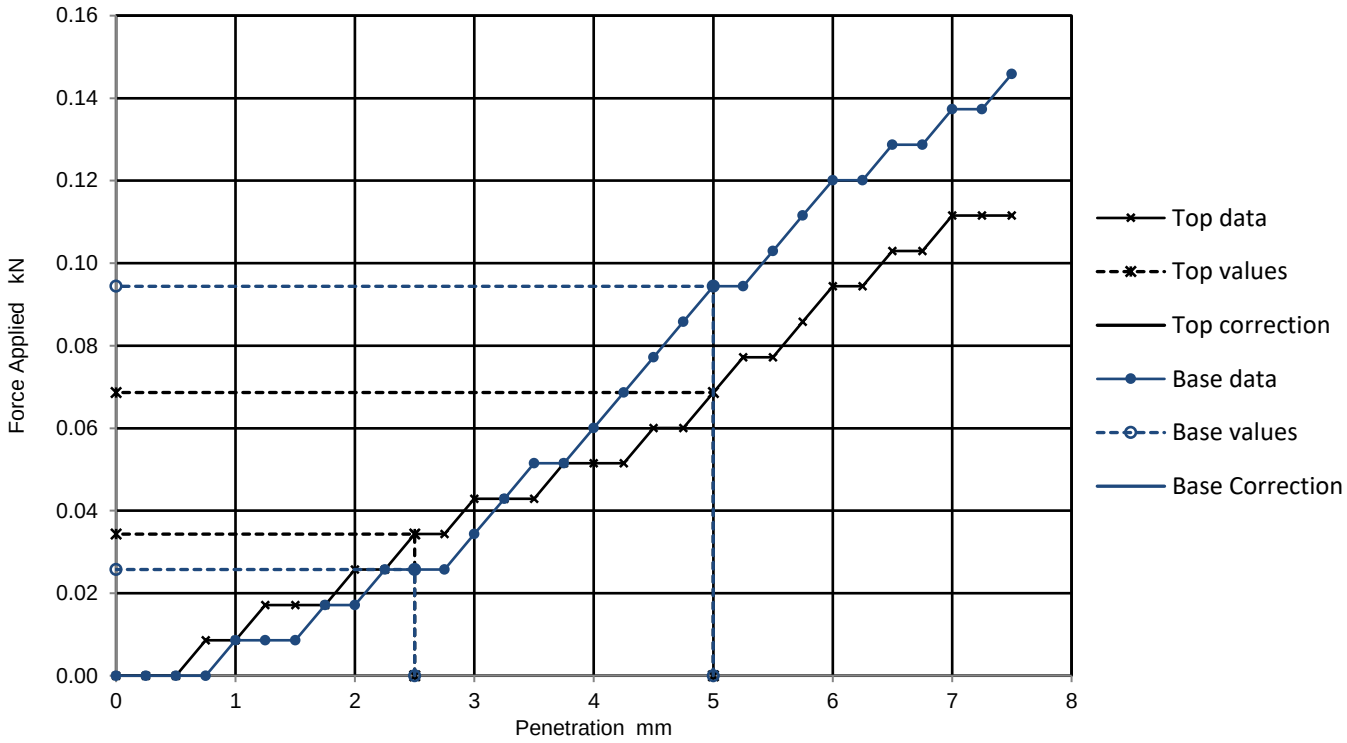
IRISH DRILLING LIMITED	**California Bearing Ratio (CBR)**			Job Ref	2017T101
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL120170911948
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
		Amount of swell recorded	mm
Material retained on 20mm sieve removed	%	Dry density after soaking	Mg/m3

Initial Specimen details	Bulk density	2.18	Mg/m3	Surcharge applied	2	kg
	Dry density	1.84	Mg/m3		1	kPa
	Moisture content	18.3	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		0.3	0.3	0.3		18.3
BASE		0.2	0.5	0.5		16.6

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	3

Lab Sheet Reference :

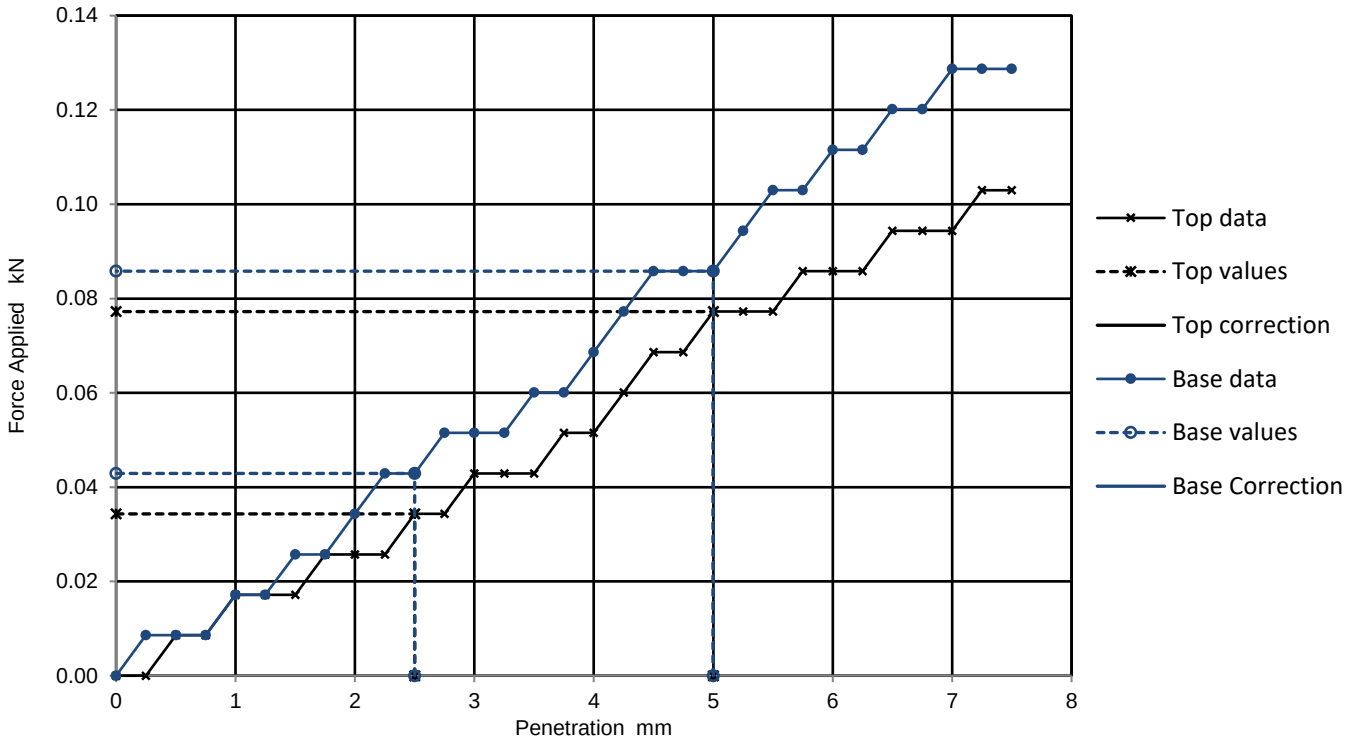
California Bearing Ratio (CBR)

				Job Ref	2017T101
				Borehole/Pit No.	BH138
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly gravelly sandy SILT / CLAY.			Depth m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL120170911951
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed			%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.20	Mg/m3	Surcharge applied	2	kg
	Dry density	1.92	Mg/m3		1	kPa
	Moisture content	14.6	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		0.3	0.4	0.4	0.4	14.3
BASE		0.3	0.4	0.4		14.6

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	4

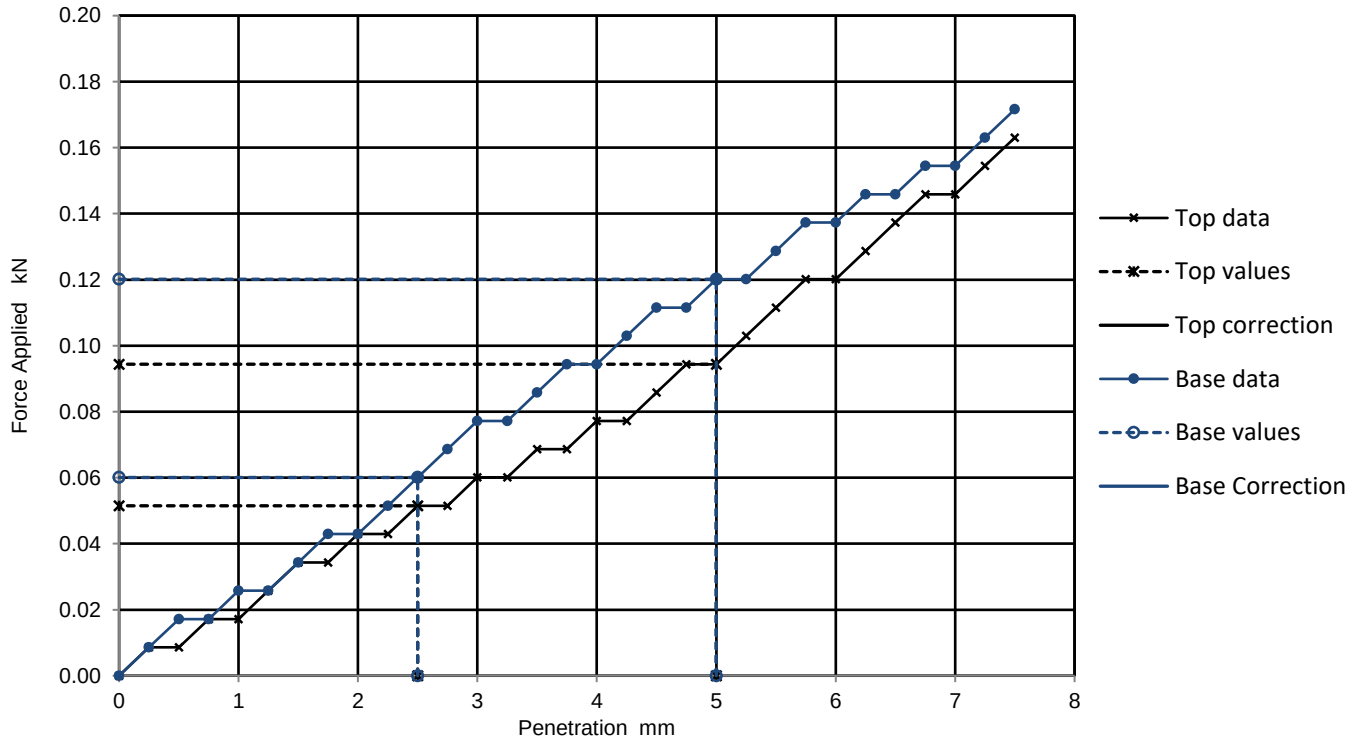
Lab Sheet Reference :

IRISH DRILLING LIMITED	**California Bearing Ratio (CBR)**			Job Ref	2017T101
				Borehole/Pit No.	BH172
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Orange-brown slightly gravelly slightly sandy SILT / CLAY.			Depth m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL120170911966
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked	
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking		days
				Time to surface		days
				Amount of swell recorded		mm
Material retained on 20mm sieve removed			%	Dry density after soaking		Mg/m3
Initial Specimen details	Bulk density	2.16	Mg/m3	Surcharge applied	2	kg
	Dry density	1.85	Mg/m3		1	kPa
	Moisture content	16.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		0.4	0.5	0.5		16.9
BASE		0.5	0.6	0.6		16.6

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	5

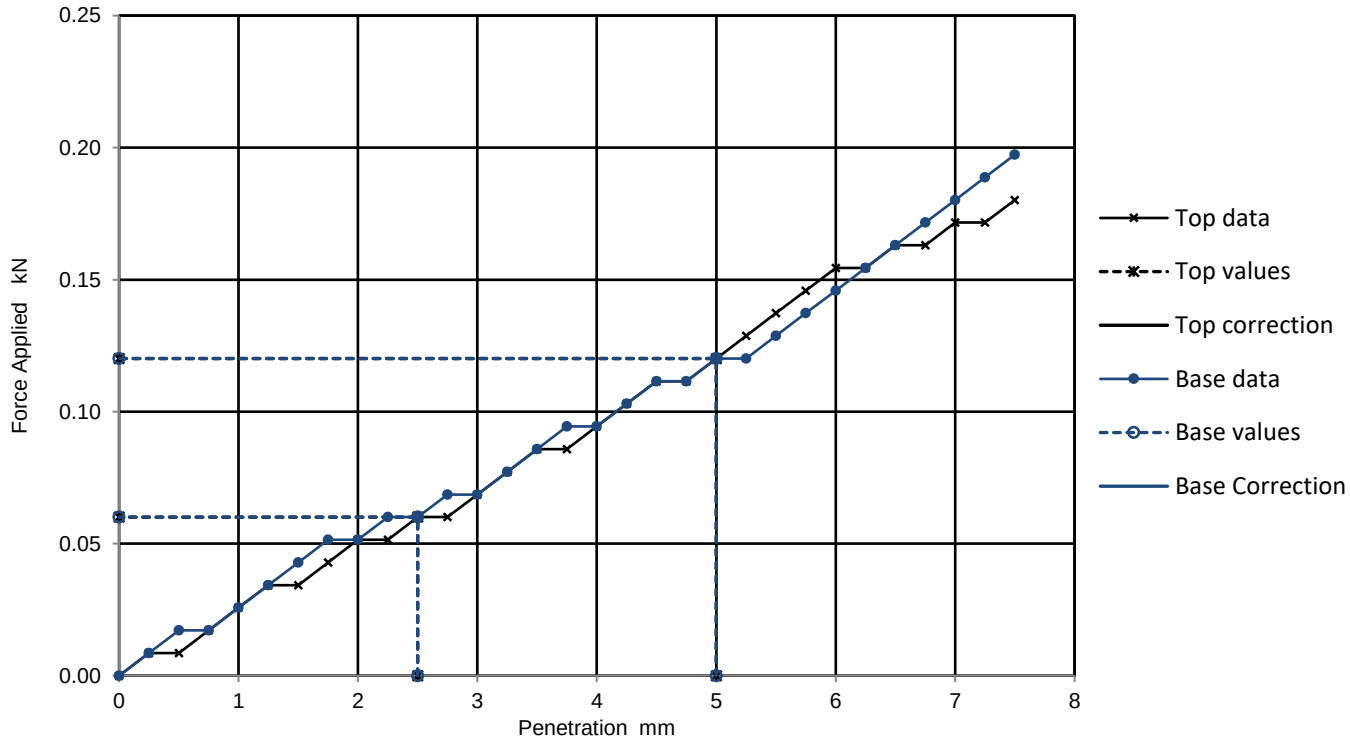
Lab Sheet Reference :

IRISH DRILLING LIMITED	**California Bearing Ratio (CBR)**			Job Ref	2017T101
				Borehole/Pit No.	BH172
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Brown slightly sandy SILT / CLAY.			Depth m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL120170911969
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking	days
				Time to surface	days
				Amount of swell recorded	mm
Material retained on 20mm sieve removed			%	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	2.18	Mg/m3	Surcharge applied	kg
	Dry density	1.81	Mg/m3		kPa
	Moisture content	20.2	%		

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		0.5	0.6	0.6	0.6	18.0
BASE		0.5	0.6	0.6		20.2

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	6

Lab Sheet Reference :

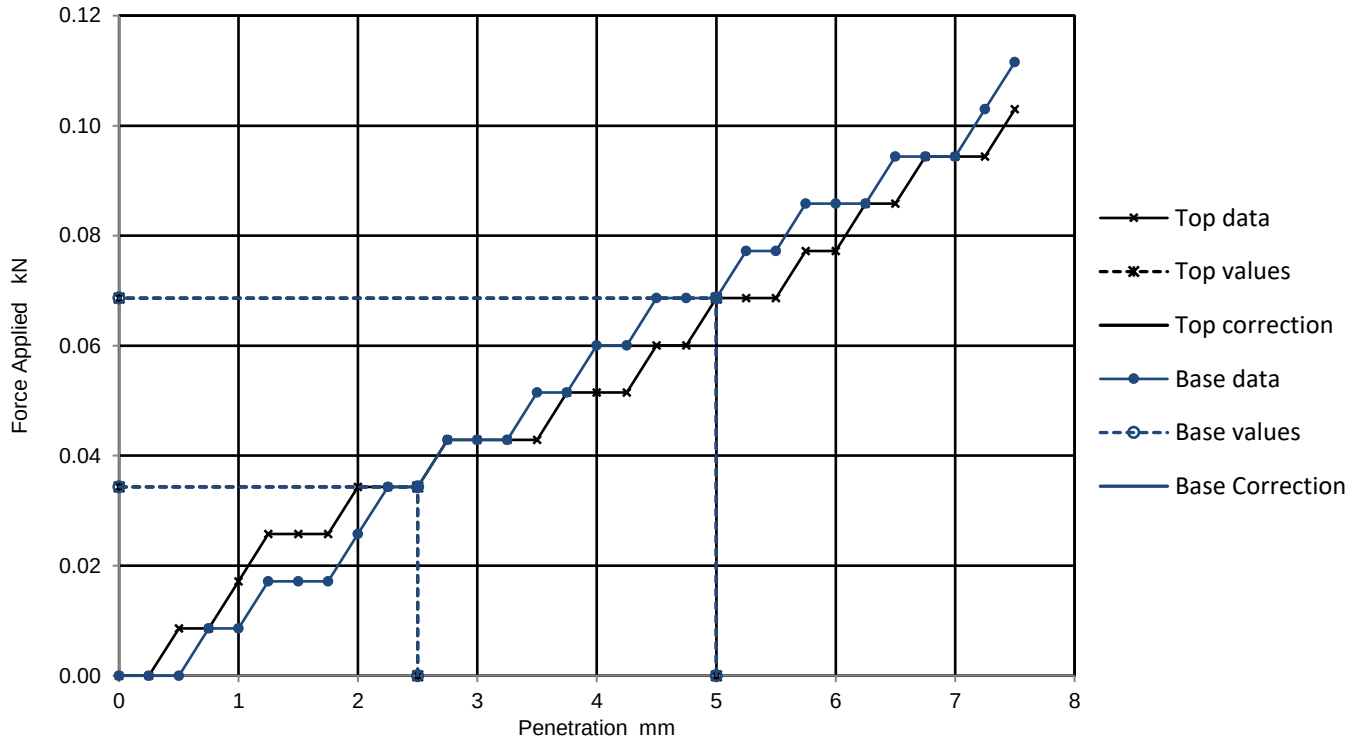
California Bearing Ratio (CBR)

				Job Ref	2017T101
				Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands			Sample No.	7
Soil Description	Grey slightly gravelly slightly sandy SILT / CLAY.			Depth m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL1201709111005
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED			Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer			Period of soaking	days
				Time to surface	days
				Amount of swell recorded	mm
Material retained on 20mm sieve removed			%	Dry density after soaking	Mg/m3
Initial Specimen details	Bulk density	2.29	Mg/m3	Surcharge applied	kg
	Dry density	2.05	Mg/m3		kPa
	Moisture content	11.9	%		

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, % 2.5mm	5mm	Highest	Average	Moisture Content %
TOP		0.3	0.3	0.3	0.3	11.9
BASE		0.3	0.3	0.3		11.5

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	7

Lab Sheet Reference :

California Bearing Ratio (CBR)

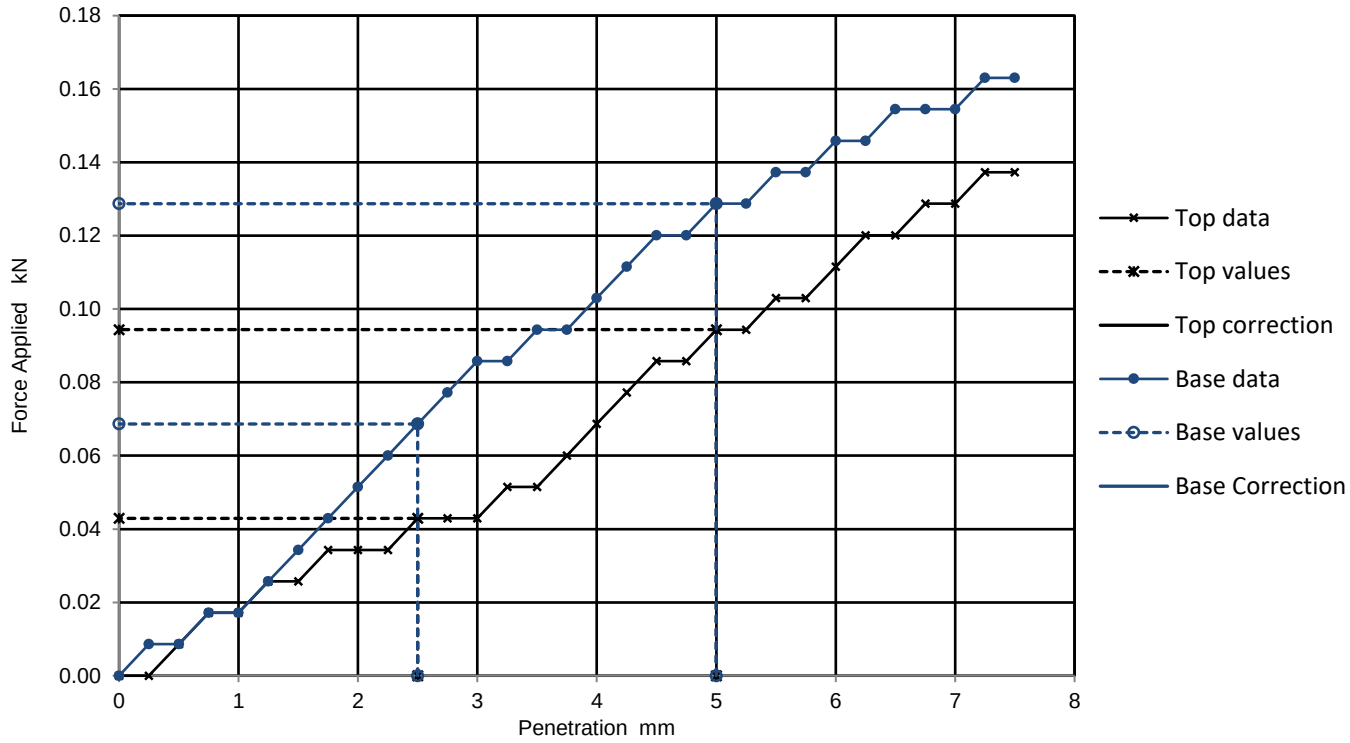
				Job Ref	2017T101
				Borehole/Pit No.	BH173
Site Name	WSP Eastern and Midlands			Sample No.	10
Soil Description	Gry slightly gravelly sandy SILT / CLAY.			Depth m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	IDL1201709111008
Test Method	BS1377 : Part 4 : 1990, clause 7			CBR Test Number	1

Specimen Preparation

Condition	REMOULDED	Soaking details	Not soaked
Details	Recompacted with specified standard effort using 2.5kg rammer	Period of soaking	days
		Time to surface	days
		Amount of swell recorded	mm
Material retained on 20mm sieve removed	%	Dry density after soaking	Mg/m3

Initial Specimen details	Bulk density	2.26	Mg/m3	Surcharge applied	2	kg
	Dry density	2.04	Mg/m3		1	kPa
	Moisture content	10.9	%			

Force v Penetration Plots



Results

	Curve correction applied	CBR Values, %				Moisture Content %
		2.5mm	5mm	Highest	Average	
TOP		0.3	0.5	0.5		47.3
BASE		0.5	0.6	0.6		26.3

General remarks	Test specific remarks	Approved

Fig No.	1
Sheet No	8

Lab Sheet Reference :

National Materials Testing Laboratory Ltd
Unit 18C Tullow Industrial Estate
Tel.: 059 9180822

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 Eastern and Midlands**
Address:	**Loughrea** **Galway** **County Galway**	Site Address:	**N/A**

Sample No.:	**BH018**	Depth:	**4.50m**	File Reference:	**NMTL 2439**

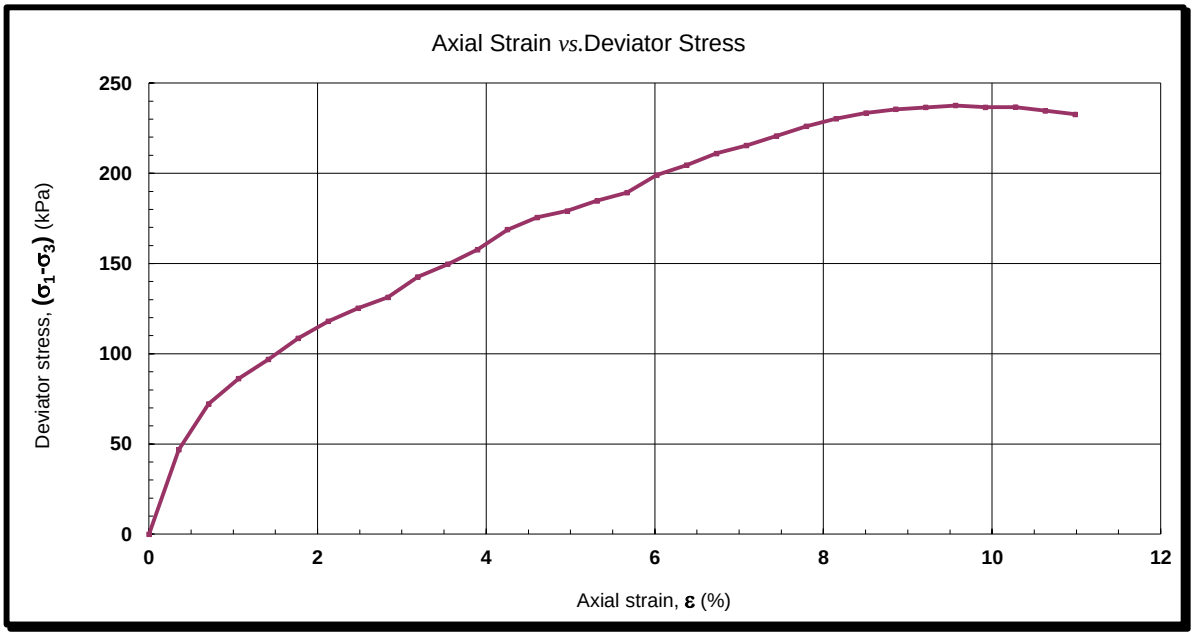
Sample Description:	**Dark grey silty gravelly SAND.**		
Location:	**WSP Eastern and Midlands**	Date Sampled:	**N/A**
Sample Type:	**B**	Sampled by:	**Irish Drilling Ltd**
Client Sample Ref.:	**BH018-D14-4.50m**	Sampling Cert. Recd.:	**No**
Source / Supplier:	**IDL**	Date Received:	**06 February 2018**
Specification:	**BS 1377: Part 7: 1990 Clause 8**	Date Tested:	**19 February 2018**

Specimen

Length:	**141.1**	mm	Diameter:	**70.2**	mm
Area:	**3867.2**	mm^2	Volume:	**545.7**	cm^3
Mass:	**1195.8**	g			
Moisture content:	**16.2**	%			
Bulk density:	**2.19**	$Mg\ m^{-3}$			
Dry density:	**1.89**	$Mg\ m^{-3}$			
Preparation Method:	**BS 1377: Part 1: 1990 Clause 8 .3.1**				

Test

Membrane type:	**Latex**	
Membrane thickness:	**0.3**	mm
Membrane correction:	**1.34**	
Sample state:	**Disturbed**	
Number of stages:	**Single**	
Rate of strain:	**1.0**	$\%\ min^{-1}$
Cell pressure: σ_3	**90**	kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1-\sigma_3)_f$	**237.6**	**kPa**
Strain at Failure:	ε	**9.57**	**%**
Maximum Cohesion / Shear Strength:	C_u	**119**	**kPa**
Type of Failure:		**Plastic**	

Signed

For NMTL Ltd

Authorised Signatories
- ☐ N Chana
- ☐ B Chana

21 February 2018

Remarks: Remoulded with 2.5 Kg Rammer at natural moisture content

Original to: **Client Rep.**
Copy 1 to: **File copy**

National Materials Testing Laboratory Ltd
Unit 18C Tullow Industrial Estate
Tel.: 059 9180822

Certificate of Test

Determination of the Undrained Shear Strength in Triaxial Compression

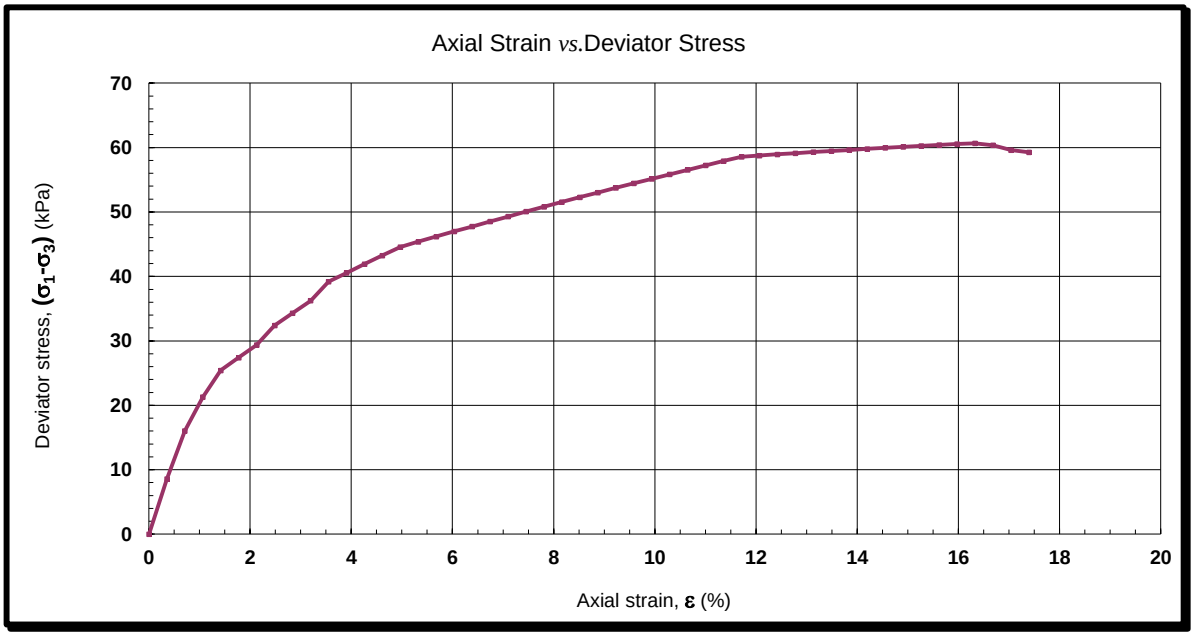
BS 1377 : Part 7 : 1990 Clause 8

Client Name:	**Irish Drilling Limited**	Contract:	**WSP Eastern and Midlands**
Address:	**Loughrea** **Galway** **County Galway**	Site Address:	**N/A**

Sample No.:	**BH031**	Depth:	**3.50m**	File Reference:	**NMTL 2439**

Sample Description:	**Grey slightly sandy slightly gravelly silty CLAY.**		
Location:	**WSP Eastern and Midlands**	Date Sampled:	**N/A**
Sample Type:	**B**	Sampled by:	**Irish Drilling Ltd**
Client Sample Ref.:	**BH031-D11-3.50m**	Sampling Cert. Recd.:	**No**
Source / Supplier:	**IDL**	Date Received:	**06 February 2018**
Specification:	**BS 1377: Part 7: 1990 Clause 8**	Date Tested:	**19 February 2018**

Specimen						**Test**		
Length:	**140.9**	mm	Diameter:	**71.4**	mm	Membrane type:	**Latex**	
Area:	**3999.4**	mm^2	Volume:	**563.4**	cm^3	Membrane thickness:	**0.3**	mm
Mass:	**1275.7**	g				Membrane correction:	**2.29**	
Moisture content:	**11.8**	%				Sample state:	**Disturbed**	
Bulk density:	**2.26**	$Mg\ m^{-3}$				Number of stages:	**Single**	
Dry density:	**2.02**	$Mg\ m^{-3}$				Rate of strain:	**1.0**	$\%\ min^{-1}$
Preparation Method:	**BS 1377: Part 1: 1990 Clause 8 .3.1**					Cell pressure: σ_3	**70**	kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1-\sigma_3)_f$	**60.7**	**kPa**
Strain at Failure:	ε	**16.33**	**%**
Maximum Cohesion / Shear Strength:	C_u	**30**	**kPa**
Type of Failure:		**Plastic**	

Signed

For NMTL Ltd

Authorised Signatories
- ☐ N Chana
- ☐ B Chana

21 February 2018

Remarks: Remoulded with 2.5 Kg Rammer at natural moisture content

Original to: **Client Rep.**
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National Materials Testing Laboratory Ltd
Unit 18C Tullow Industrial Estate
Tel.: 059 9180822

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 Eastern and Midlands**
Address:	**Loughrea** **Galway** **County Galway**	Site Address:	**N/A**

Sample No.:	**BH219**	Depth:	**6.50m**	File Reference:	**NMTL 2439**

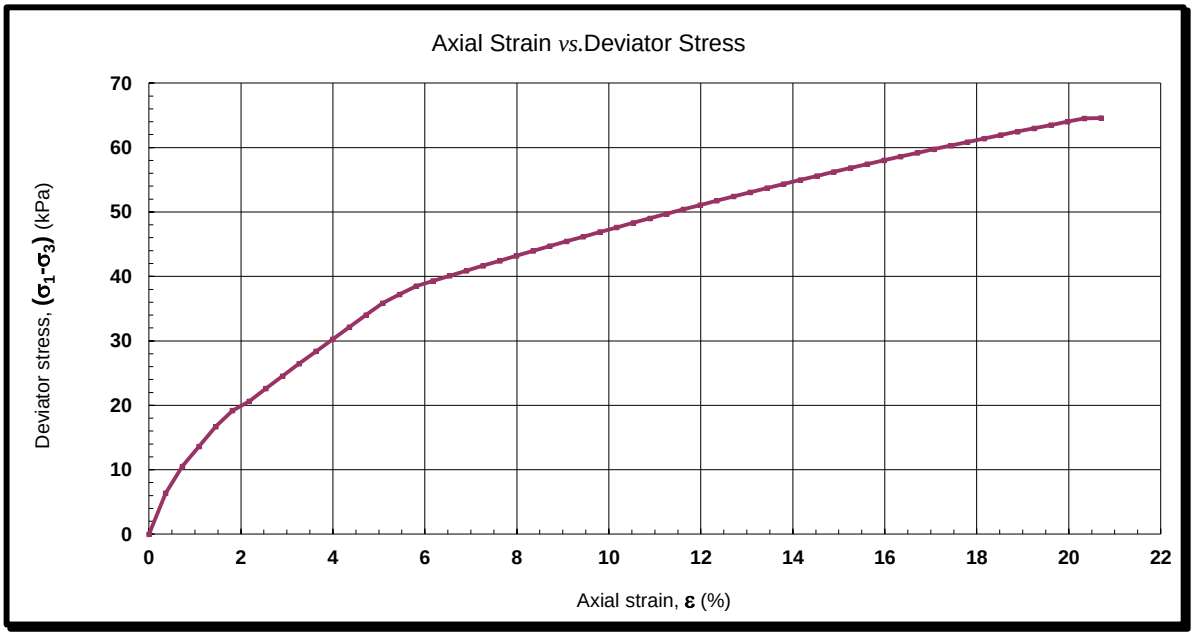
Sample Description:	**Grey slightly sandy silty CLAY.**		
Location:	**WSP Eastern and Midlands**	Date Sampled:	**N/A**
Sample Type:	**B**	Sampled by:	**Irish Drilling Ltd**
Client Sample Ref.:	**BH219-D20-6.50m**	Sampling Cert. Recd.:	**No**
Source / Supplier:	**IDL**	Date Received:	**06 February 2018**
Specification:	**BS 1377: Part 7: 1990 Clause 8**	Date Tested:	**19 February 2018**

Specimen

Length:	**137.7**	mm	Diameter:	**71.8**	mm
Area:	**4045.5**	mm^2	Volume:	**556.9**	cm^3
Mass:	**1161.6**	g			
Moisture content:	**18.9**	%			
Bulk density:	**2.09**	$Mg\ m^{-3}$			
Dry density:	**1.75**	$Mg\ m^{-3}$			
Preparation Method:	**BS 1377: Part 1: 1990 Clause 8 .3.1**				

Test

Membrane type:	**Latex**	
Membrane thickness:	**0.3**	mm
Membrane correction:	**2.90**	
Sample state:	**Disturbed**	
Number of stages:	**Single**	
Rate of strain:	**1.0**	$\%\ min^{-1}$
Cell pressure: σ_3	**130**	kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1-\sigma_3)_f$	**64.6**	**kPa**
Strain at Failure:	ε	**20.70**	**%**
Maximum Cohesion / Shear Strength:	C_u	**32**	**kPa**
Type of Failure:		**Plastic**	

Signed

For NMTL Ltd

Authorised Signatories
☐ N Chana
☐ B Chana

21 February 2018

Remarks: Remoulded with 2.5 Kg Rammer at natural moisture content

Original to: **Client Rep.**
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Unit 18C Tullow Industrial Estate
Tel.: 059 9180822

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 Eastern and Midlands**
Address:	**Loughrea** **Galway** **County Galway**	Site Address:	**N/A**

Sample No.:	**BH220**	Depth:	**8.00m**	File Reference:	**NMTL 2439**

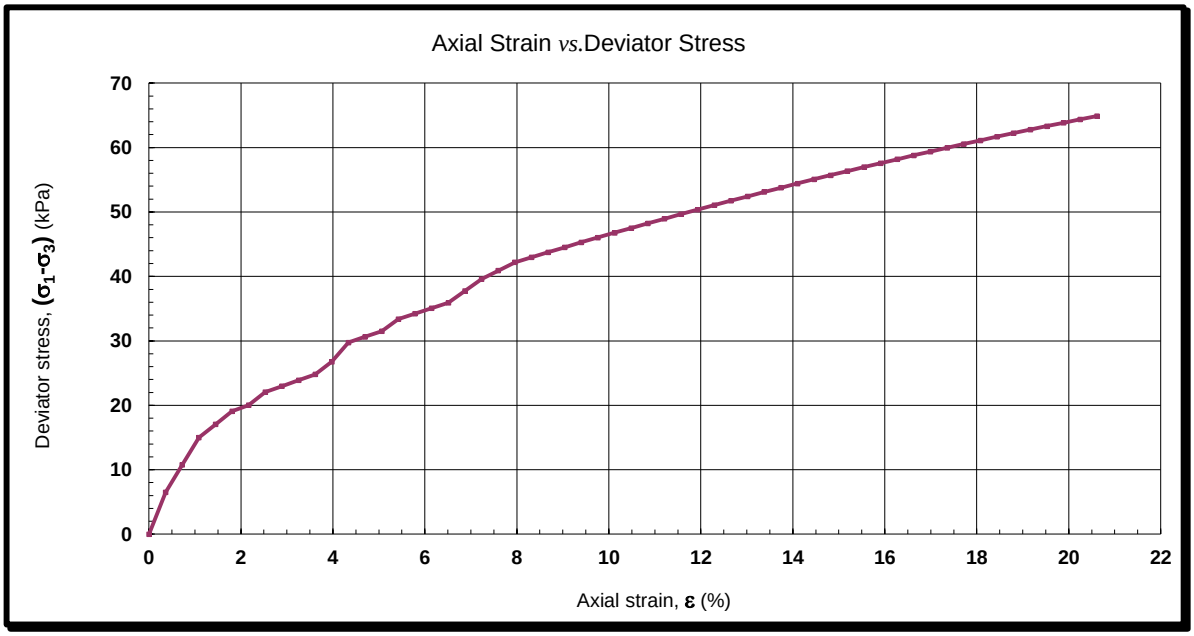
Sample Description:	**Grey slightly sandy silty CLAY.**		
Location:	**WSP Eastern and Midlands**	Date Sampled:	**N/A**
Sample Type:	**B**	Sampled by:	**Irish Drilling Ltd**
Client Sample Ref.:	**BH220-B25-8.00m**	Sampling Cert. Recd.:	**No**
Source / Supplier:	**IDL**	Date Received:	**06 February 2018**
Specification:	**BS 1377: Part 7: 1990 Clause 8**	Date Tested:	**19 February 2018**

Specimen

Length:	**138.3**	mm	Diameter:	**71.0**	mm
Area:	**3957.0**	mm^2	Volume:	**547.2**	cm^3
Mass:	**1176.9**	g			
Moisture content:	**19.6**	%			
Bulk density:	**2.15**	$Mg\ m^{-3}$			
Dry density:	**1.80**	$Mg\ m^{-3}$			
Preparation Method:	**BS 1377: Part 1: 1990 Clause 8 .3.1**				

Test

Membrane type:	**Latex**	
Membrane thickness:	**0.3**	mm
Membrane correction:	**2.89**	
Sample state:	**Disturbed**	
Number of stages:	**Single**	
Rate of strain:	**1.0**	$\%\ min^{-1}$
Cell pressure: σ_3	**160**	kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1-\sigma_3)_f$	**64.9**	**kPa**
Strain at Failure:	ε	**20.61**	**%**
Maximum Cohesion / Shear Strength:	C_u	**32**	**kPa**
Type of Failure:		**Plastic**	

Signed

For NMTL Ltd

Authorised Signatories
☐ N Chana
☐ B Chana

21 February 2018

Remarks: Remoulded with 2.5 Kg Rammer at natural moisture content

Original to: **Client Rep.**
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National Materials Testing Laboratory Ltd
Unit 18C Tullow Industrial Estate
Tel.: 059 9180822

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 Eastern and Midlands**
Address:	**Loughrea** **Galway** **County Galway**	Site Address:	**N/A**

Sample No.:	**BH221**	Depth:	**4.50m**	File Reference:	**NMTL 2439**

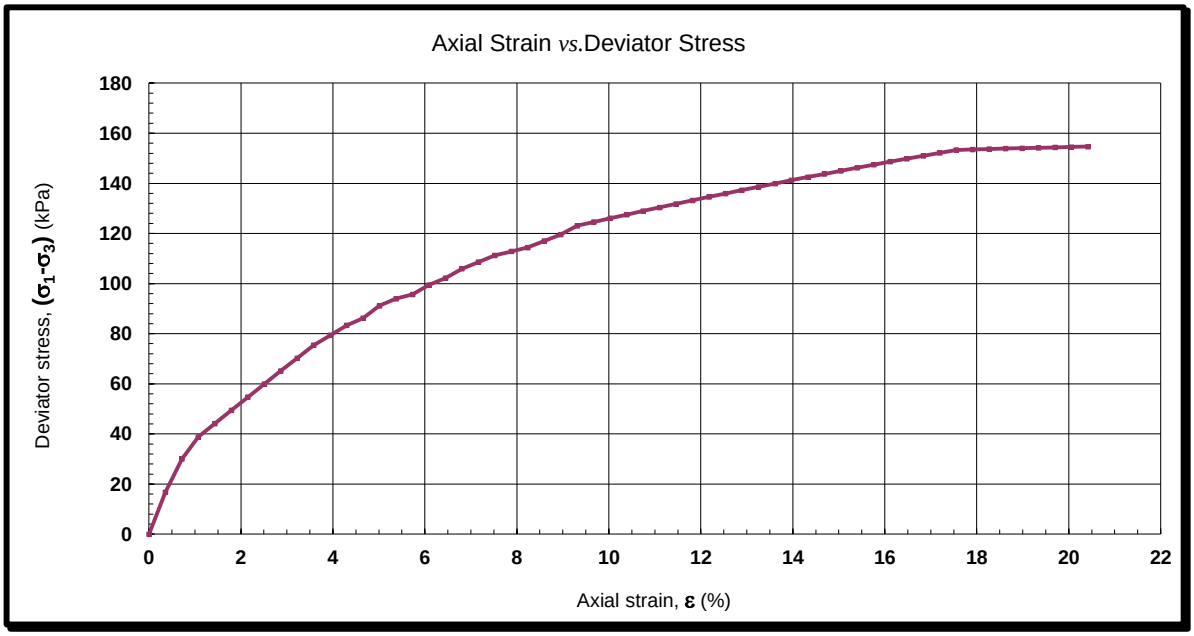
Sample Description:	**Grey slightly sandy silty CLAY.**		
Location:	**WSP Eastern and Midlands**	Date Sampled:	**N/A**
Sample Type:	**B**	Sampled by:	**Irish Drilling Ltd**
Client Sample Ref.:	**BH221-D14-4.50m**	Sampling Cert. Recd.:	**No**
Source / Supplier:	**IDL**	Date Received:	**06 February 2018**
Specification:	**BS 1377: Part 7: 1990 Clause 8**	Date Tested:	**19 February 2018**

Specimen

Length:	**139.6**	mm	Diameter:	**70.0**	mm
Area:	**3850.7**	mm^2	Volume:	**537.5**	cm^3
Mass:	**1194.4**	g			
Moisture content:	**15.8**	%			
Bulk density:	**2.22**	$Mg\ m^{-3}$			
Dry density:	**1.92**	$Mg\ m^{-3}$			
Preparation Method:	**BS 1377: Part 1: 1990 Clause 8 .3.1**				

Test

Membrane type:	**Latex**	
Membrane thickness:	**0.3**	mm
Membrane correction:	**2.86**	
Sample state:	**Disturbed**	
Number of stages:	**Single**	
Rate of strain:	**1.0**	$\%\ min^{-1}$
Cell pressure: σ_3	**90**	kPa



Maximum Corrected Deviator Stress at Failure:	$(\sigma_1-\sigma_3)_f$	**154.6**	**kPa**
Strain at Failure:	ε	**20.42**	**%**
Maximum Cohesion / Shear Strength:	C_u	**77**	**kPa**
Type of Failure:		**Plastic**	

Signed

For NMTL Ltd

Authorised Signatories
☐ N Chana
☐ B Chana

21 February 2018

Remarks: Remoulded with 2.5 Kg Rammer at natural moisture content

Original to: **Client Rep.**
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SUMMARY OF TEST RESULTS

		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.07	2.13
Specimen Length	mm	204.00	Dry Density	Mg/m3	1.73	1.84
Specimen Diameter	mm	101.70	Moisture	%	19.19	15.98
Area	mm2	8123.29	Saturation	%	96.41	96.06
Volume	cc	1657.15	Sg(Assumed)	2.65		

Saturation Stage

Test Stage	Cell Pressure (kPa)	Pore Pressure Parameter 'B' Base
0	0	0
1	50	0.86
2	100	0.97
3	200	0.98
4	300	0.98
5	370	1.00
6		

Isotropic Consolidation Stage

		Stage 1	Stage 2	Stage 3
Cell Pressure	kPa	370	440	580
Pore Pressure	kPa	365.5	427.4	541.8
Back Pressure	kPa	300	300	300
Drainage Method		One End & Radial Boundary		
t100 (min)		198.8	144.0	139.2
Coef. Of Consolidation Cv	m2/year	1.056	1.458	1.508
Coef. Of Compressibility Mv	m2/MN	0.525	0.098	0.045
Permeability K	m/Sec	1.72E-10	4.44E-11	2.02E-11

Specimen After Test



At Peak Stress Ratio

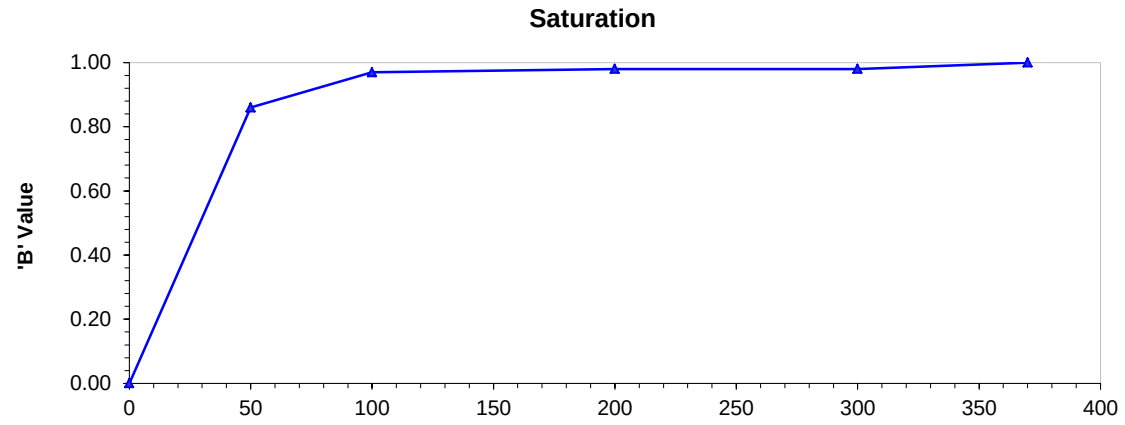
	Stage 1	Stage 2	Stage 3
Deviator Stress (kPa)	152.2	361.8	787.6
External Axial Strain (%)	2.83	4.19	6.40
Shear Stress (kPa)	76.1	180.88	393.8
Peak Stress Ratio	3.92	4.20	4.16
Pore Water Pressure (kPa)	17.9	27	30.4
Radial Effective Stress (kPa)	52.1	113	249.6
Axial Effective Stress (kPa)	204.3	474.8	1037.2
Effective angle of friction (Degrees)	37.6°		
Cohesion c' (kPa)	0.8		
Rate of strain mm/min	0.0067		
Sample Description	**Grey slightly sandy silty CLAY**		
	Plastic Failure.		

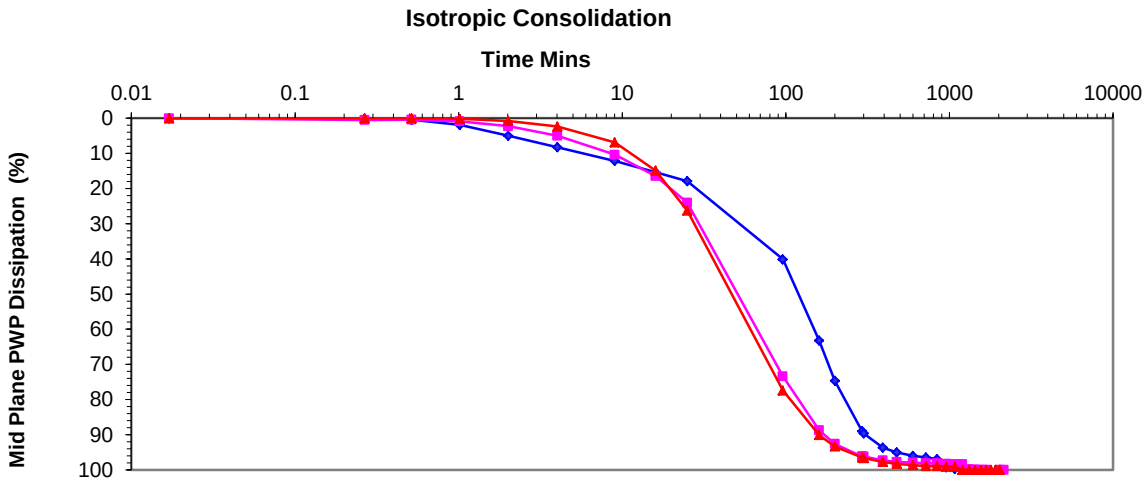
NM TL Ltd

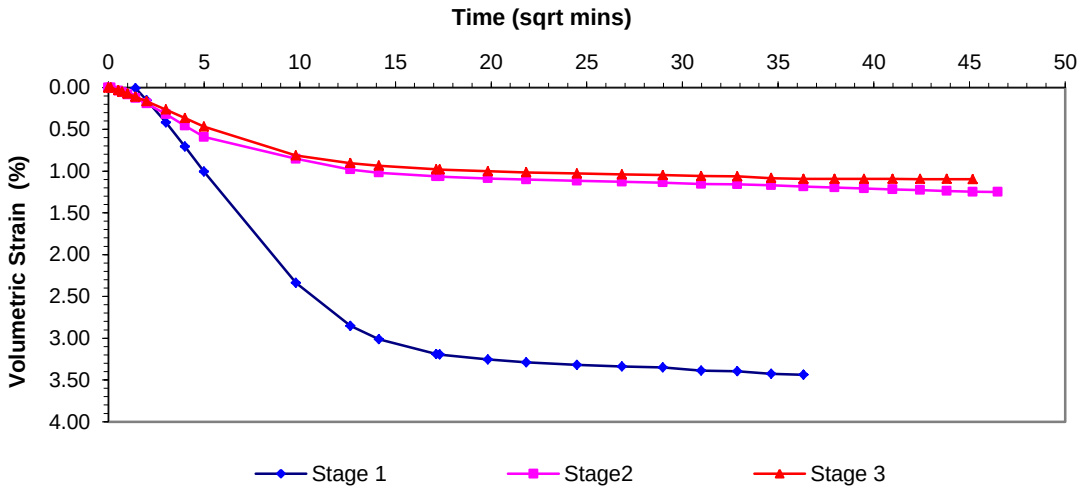
Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8

Project: WSP Eastern and Midlands

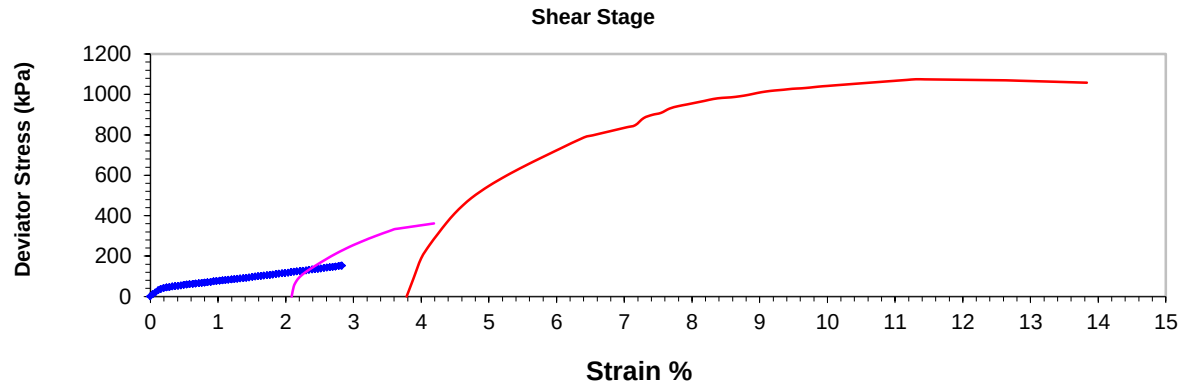
Project No.	NMTL-2439
Borehole No.	BH219
Sample No.	B22
Depth.	7.00m

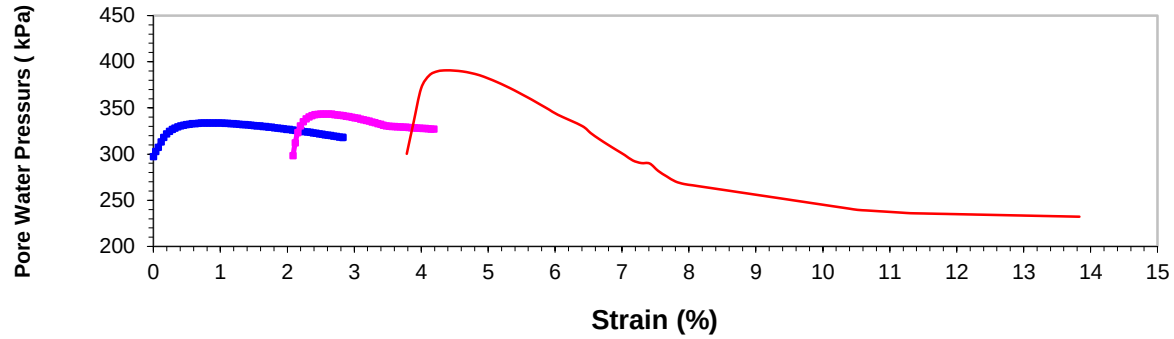


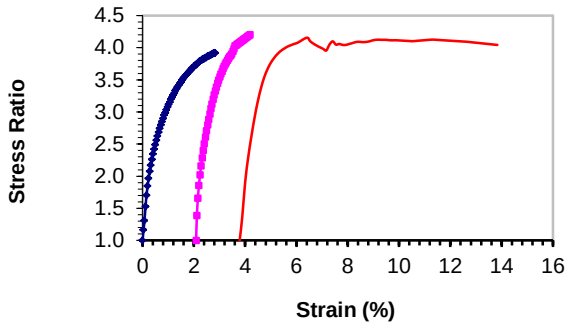


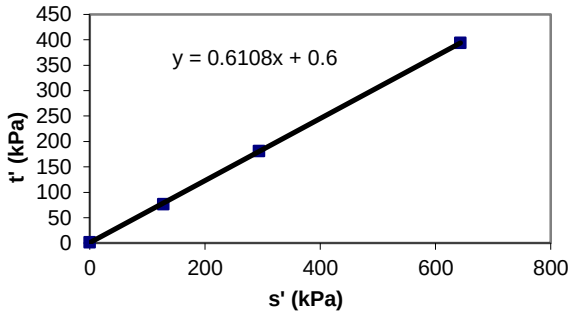


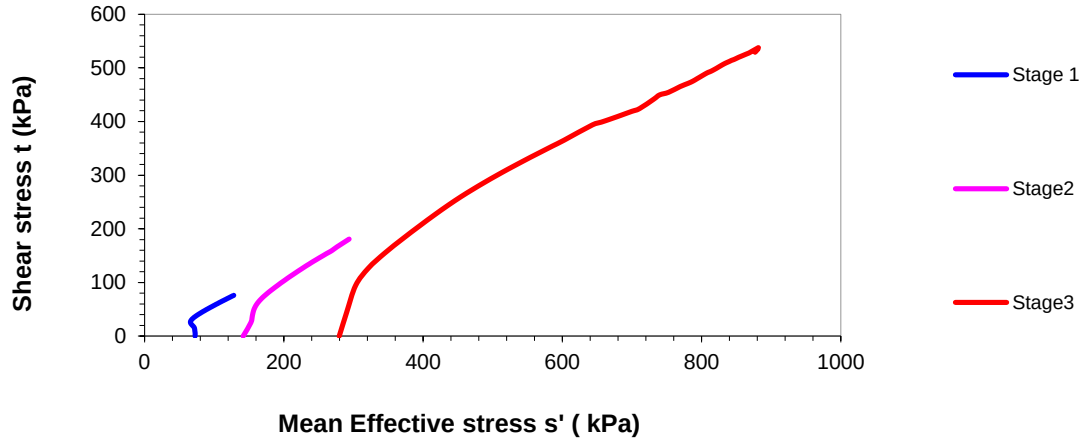
NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No BH219
	Project: WSP Eastern and Midlands	Sample No. B22
		Depth. 7.00m











NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No. BH219
	Project: WSP Eastern and Midlands	Sample No. B22
		Depth. 7.00m

SPECIMEN AFTER TEST





Soil Description

Grey slightly sandy silty CLAY

NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No.	NMTL-2439
		Borehole No.	BH219
	Project: WSP Eastern and Midlands	Sample No.	B22
		Depth.	7.00m

SUMMARY OF TEST RESULTS

		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	1.99	2.08
Specimen Length	mm	204.00	Dry Density	Mg/m3	1.64	1.77
Specimen Diameter	mm	101.36	Moisture	%	21.72	17.71
Area	mm2	8069.06	Saturation	%	92.82	93.75
Volume	cc	1646.09	Sg(Assumed)	2.65		

Saturation Stage

Test Stage	Cell Pressure (kPa)	Pore Pressure Parameter 'B' Base
0	0	0
1	50	0.84
2	100	0.94
3	200	0.97
4	300	1.00
5	370	0.99
6		

Isotropic Consolidation Stage

		Stage 1	Stage 2	Stage 3
Cell Pressure	kPa	370	440	580
Pore Pressure	kPa	361.3	421.6	538.6
Back Pressure	kPa	300	300	300
Drainage Method		One End & Radial Boundary		
t100 (min)		121.0	141.6	240.3
Coef. Of Consolidation Cv	m2/year	1.736	1.483	0.874
Coef. Of Compressibility Mv	m2/MN	0.579	0.162	0.090
Permeability K	m/Sec	3.11E-10	7.43E-11	2.43E-11

Specimen After Test



At Peak Stress Ratio

	Stage 1	Stage 2	Stage 3
Deviator Stress (kPa)	85.0	214.3	488.6
External Axial Strain (%)	2.84	5.27	8.51
Shear Stress (kPa)	42.5	107.17	244.3
Peak Stress Ratio	3.57	3.77	3.87
Pore Water Pressure (kPa)	36.9	62.7	109.9
Radial Effective Stress (kPa)	33.1	77.3	170.1
Axial Effective Stress (kPa)	118.1	291.6	658.7
Effective angle of friction (Degrees)	35.8°		
Cohesion c' (kPa)	0.7		
Rate of strain mm/min	0.0067		

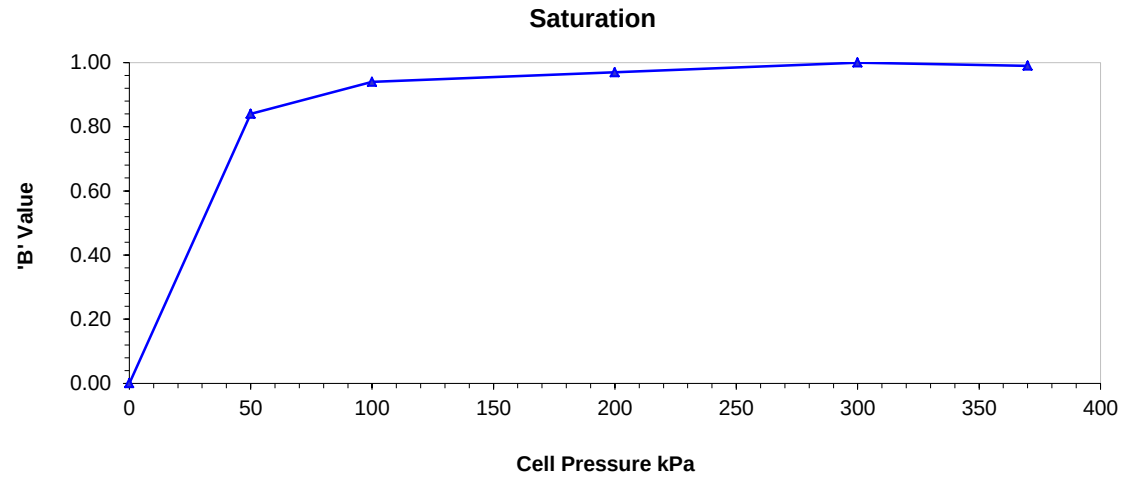
Sample Description: **Grey slightly sandy silty CLAY, with trace of medium gravel. Plastic Failure.**

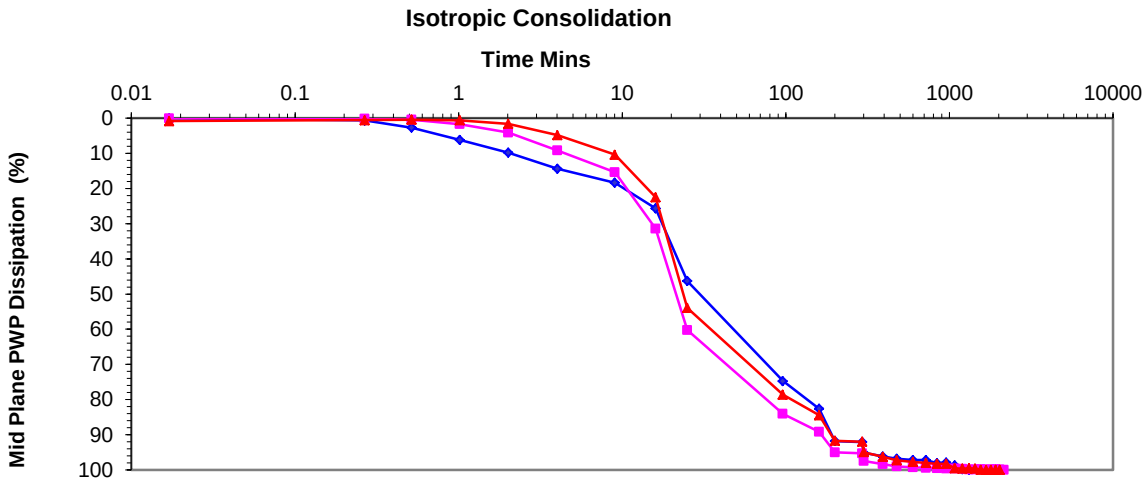
NM TL Ltd

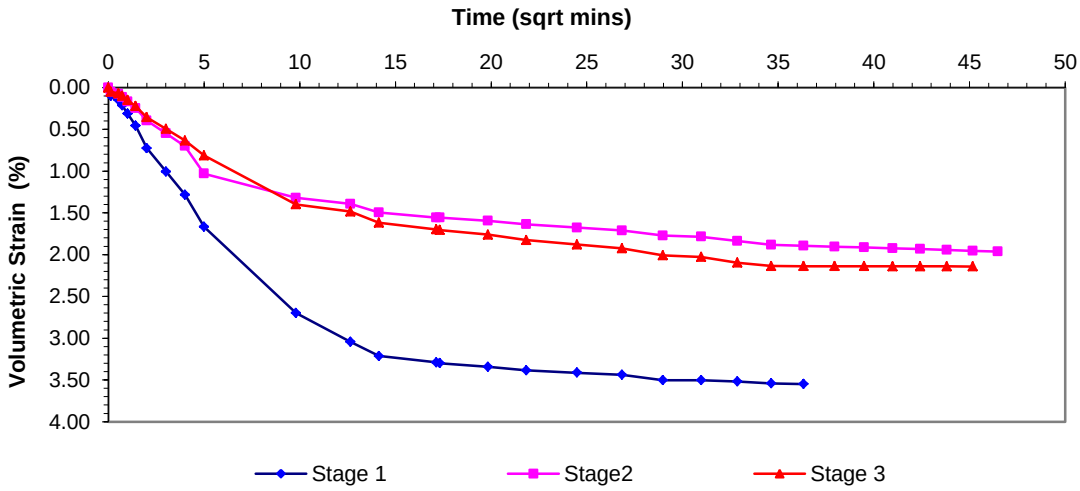
Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8

Project: WSP Eastern and Midlands

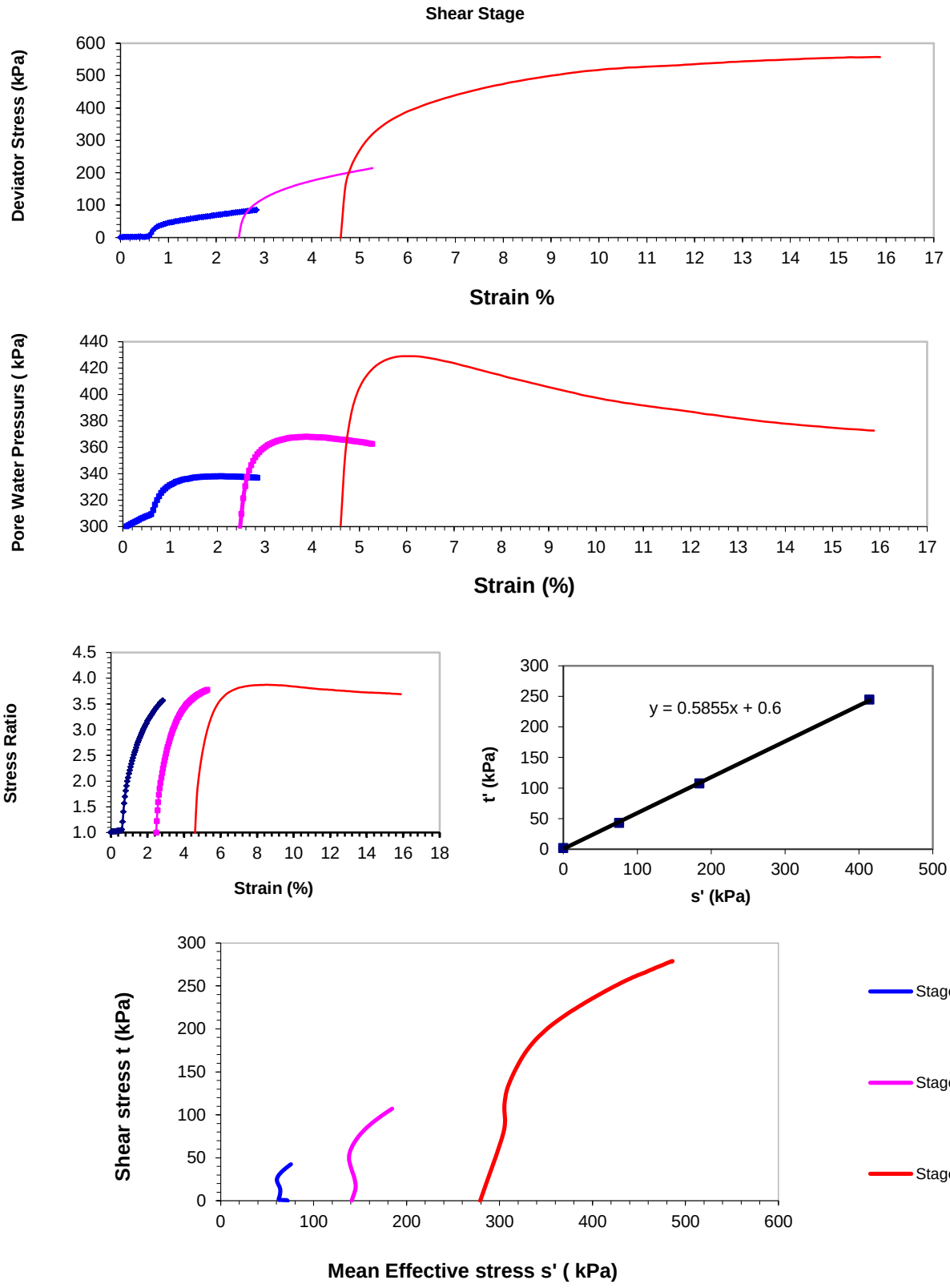
Project No.	NMTL-2439
Borehole No.	BH220
Sample No.	B22
Depth.	7.00m







NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No BH220
	Project: WSP Eastern and Midlands	Sample No. B22
		Depth. 7.00m



NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
	Project: WSP Eastern and Midlands	Borehole No. BH220
		Sample No. B22
		Depth. 7.00m

SPECIMEN AFTER TEST





Soil Description

Grey slightly sandy silty CLAY, with trace of medium gravel.

NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No. BH220
	Project: WSP Eastern and Midlands	Sample No. B22
		Depth. 7.00m

SUMMARY OF TEST RESULTS

		Initial			Initial	Final
Hall Effect Gauge length	mm	n/a	Bulk Density	Mg/m3	2.12	2.18
Specimen Length	mm	204.00	Dry Density	Mg/m3	1.82	1.90
Specimen Diameter	mm	101.60	Moisture	%	16.78	14.56
Area	mm2	8107.32	Saturation	%	97.14	97.96
Volume	cc	1653.89	Sg(Assumed)	2.65		

Saturation Stage

Test Stage	Cell Pressure (kPa)	Pore Pressure Parameter 'B' Base
0	0	0
1	50	0.87
2	100	0.95
3	200	0.98
4	300	0.98
5	340	0.99
6		

Isotropic Consolidation Stage

		Stage 1	Stage 2	Stage 3
Cell Pressure	kPa	340	380	460
Pore Pressure	kPa	333.5	376.4	442.6
Back Pressure	kPa	300	300	300
Drainage Method		One End & Radial Boundary		
t100 (min)		272.3	224.4	169.0
Coef. Of Consolidation Cv	m2/year	0.771	0.936	1.243
Coef. Of Compressibility Mv	m2/MN	0.958	0.318	0.086
Permeability K	m/Sec	2.29E-10	9.23E-11	3.30E-11

Specimen After Test



At Peak Stress Ratio

	Stage 1	Stage 2	Stage 3
Deviator Stress (kPa)	46.7	219.8	452.7
External Axial Strain (%)	2.28	4.69	6.17
Shear Stress (kPa)	23.3	109.92	226.4
Peak Stress Ratio	4.09	4.46	4.35
Pore Water Pressure (kPa)	24.9	16.4	24.8
Radial Effective Stress (kPa)	15.1	63.6	135.2
Axial Effective Stress (kPa)	61.8	283.4	587.9
Effective angle of friction (Degrees)	38.7°		
Cohesion c' (kPa)	0.7		
Rate of strain mm/min	0.0067		

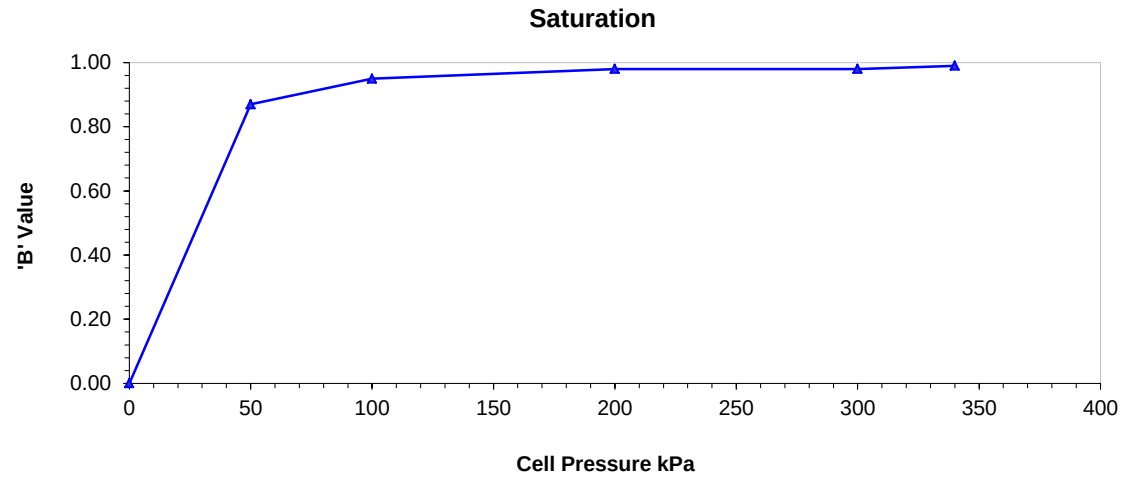
Sample Description **Grey/brown slightly sandy slighyly gravelly silty CLAY. Plastic Failure.**

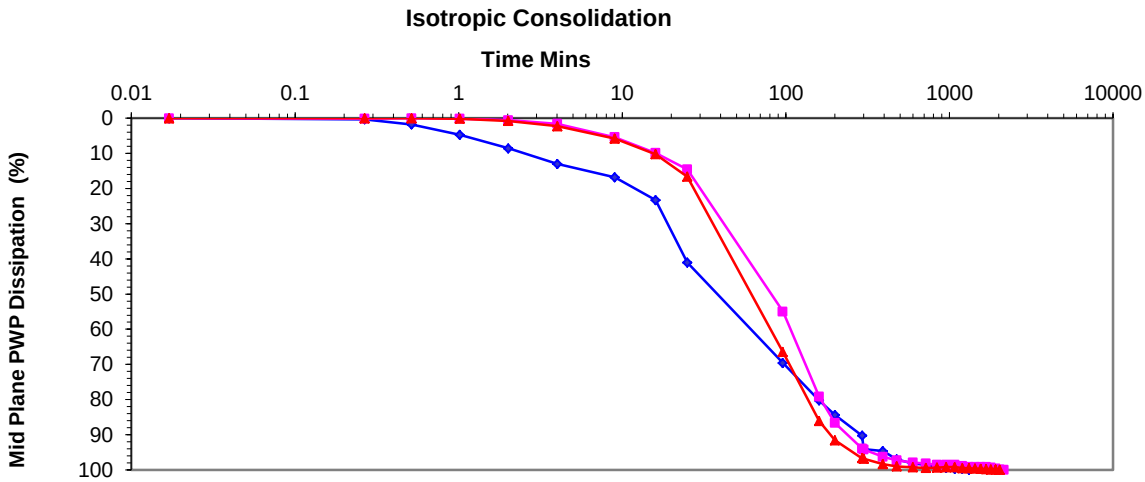
NM TL Ltd

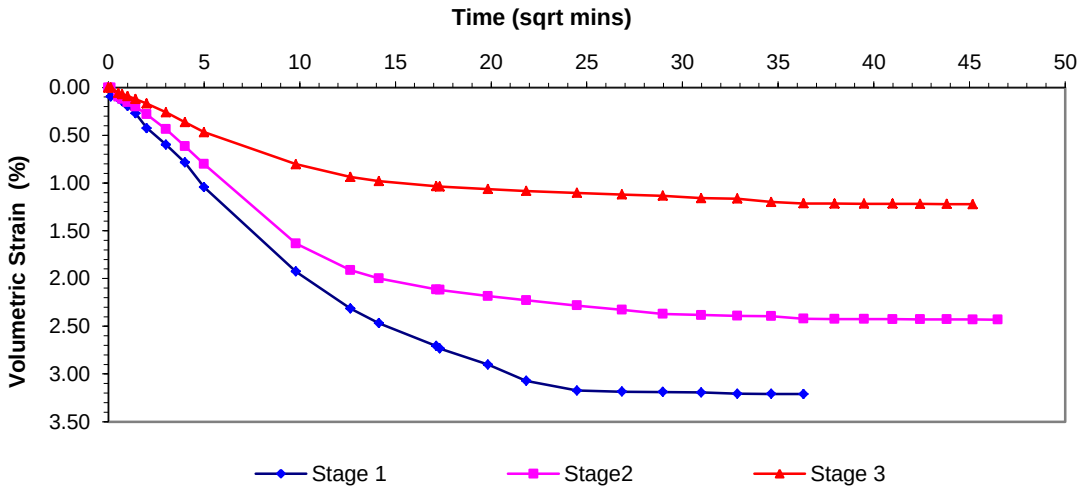
Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8

Project: WSP Eastern and Midlands

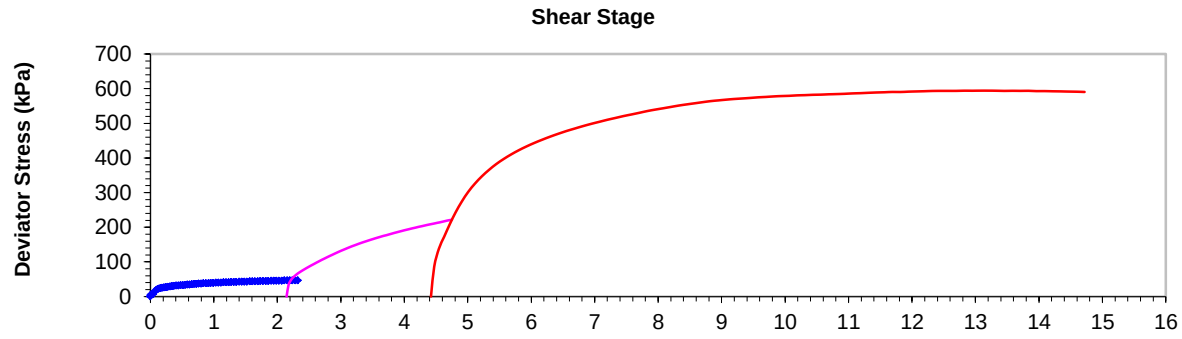
Project No.	NMTL-2439
Borehole No.	BH221
Sample No.	B13
Depth.	4.00m

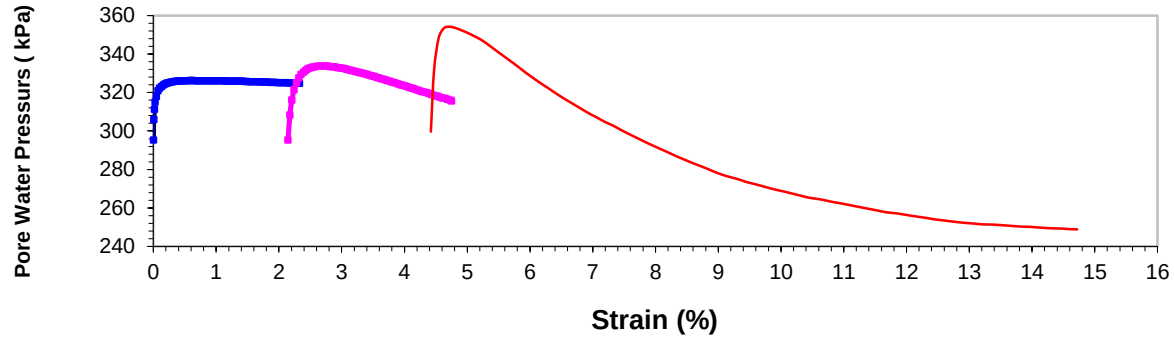


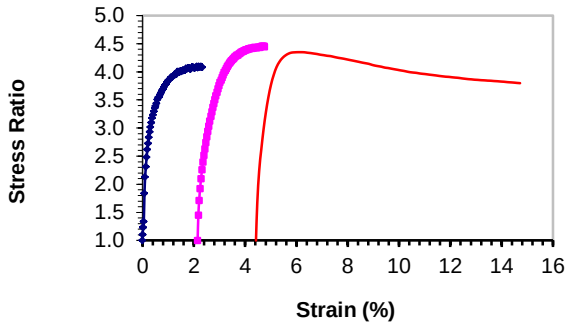


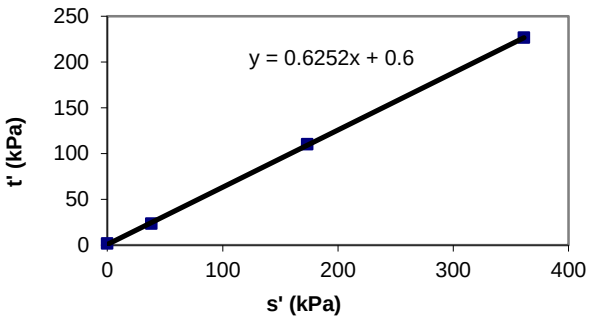


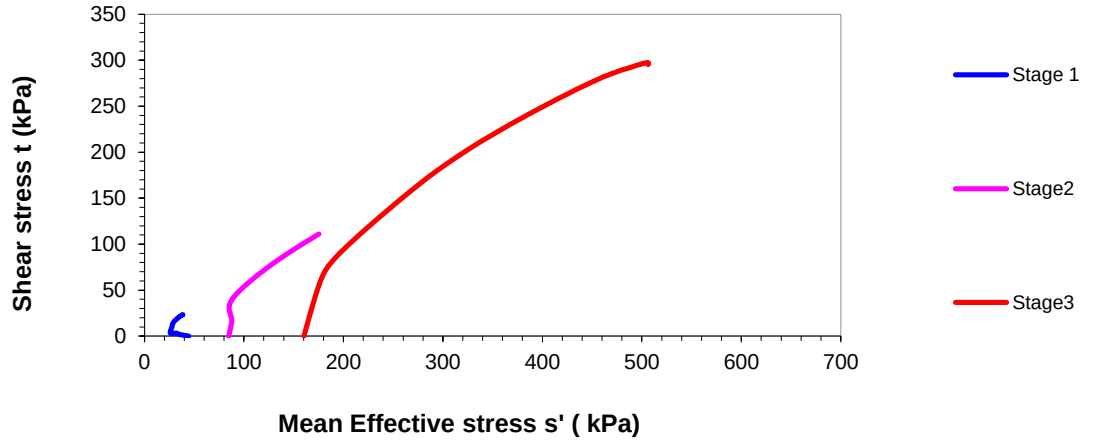
NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No BH221
	Project: WSP Eastern and Midlands	Sample No. B13
		Depth. 4.00m











NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No. BH221
	Project: WSP Eastern and Midlands	Sample No. B13
		Depth. 4.00m

SPECIMEN AFTER TEST





Soil Description

Grey/brown slightly sandy slighyly gravelly silty CLAY.

NM TL Ltd	**Consolidated Undrained MultistageTriaxial test with PWP measurement.Tested in accordance with BS:1377 Part 8**	Project No. NMTL-2439
		Borehole No. BH221
	Project: WSP Eastern and Midlands	Sample No. B13
		Depth. 4.00m

IDL

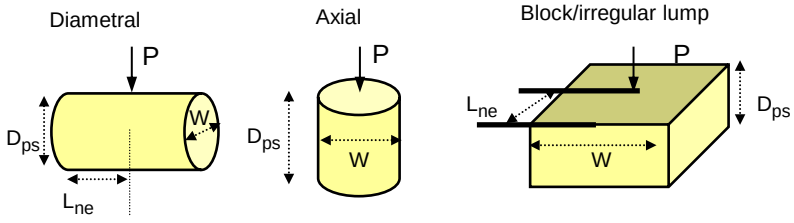
Point Load Strength Index Tests
Summary of Results

Project No.: 2017T101

Project Name: WSP Eastern and Midlands

Borehole No.	Sample			Specimen		Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks (including water content if measured)
	Top Depth	Base Depth	Type	Ref	Depth		Type (D, A, I, B)	Direction (L, P or U)		Lne	W	Dps	Dps'			Is	Is(50)	
	m	m		m	m					mm	mm	mm	mm	kN	mm	MPa	MPa	
RC006	5.60	7.1	C	6.4	6.66		D	U	YES		84.4		84.4	46.0	84.4	6.5	8.2	VS
RC007	7.10	8.6	C	8.4	8.52		D	U	YES		84.6		84.6	12.6	84.6	1.8	2.2	S
RC024	9.00	10.5	C	9.8	10.00		D	U	YES		84.1		84.1	30.3	84.1	4.3	5.4	VS
RC039	2.60	4.1	C	3.84	4.00		D	L	YES		84.8		84.8	14.4	84.8	2.0	2.5	S
RC039	4.10	5.6	C	4.92	5.06		D	L	YES		84.8		84.8	14.5	84.8	2.0	2.6	S
RC039	5.60	7.1	C	6.2	6.40		D	L	YES		84.8		84.8	17.3	84.8	2.4	3.0	S
RC039	7.10	8.6	C	7.6	7.75		D	L	YES		84.8		84.8	19.3	84.8	2.7	3.4	S
RC039	8.60	10.1	C	9.5	9.76		D	L	YES		84.8		84.8	20.4	84.8	2.8	3.6	S
RC046	8.60	10.1	C	9	9.25		D	U	YES		84.4		84.4	26.0	84.4	3.6	4.6	VS
RC061	10.10	11.6	C	11	11.24		D	U	YES		84.3		84.3	32.0	84.3	4.5	5.7	VS
RC138	11.10	12.6	C	16	16.15		D	U	YES		84.4		84.4	33.0	84.4	4.6	5.9	VS
RC172	17.60	19.1	C	18.8	19.10		D	U	YES		84.5		84.5	25.0	84.5	3.5	4.4	VS
RC173	10.10	11.6	C	11.5	11.62		D	U	YES		84.5		84.5	18.0	84.5	2.5	3.2	S
RC188	0.80	2.6	C	2.38	2.52		D	U	YES		84.4		84.4	14.0	84.4	2.0	2.5	S
RC191	8.60	10.1	C	9	9.25		D	U	YES		101.4		101.4	49.0	101.4	4.8	6.6	VS
RC192	2.60	4.1	C	4	4.10		D	U	YES		101.4		101.4	48.0	101.4	4.7	6.4	VS
RC208	7.10	8.6	C	7.36	7.52		D	U	YES		84.6		84.6	14.9	84.6	2.1	2.6	S
RC224	7.00	8.6	C	8.4	8.55		D	U	YES		84.4		84.4	34.0	84.4	4.8	6.0	VS

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise
Detailed legend for test and dimensions, based on ISRM, is shown above.
Size factor, F = (De/50)0.45 for all tests.

Date Printed: 22/02/2018

Approved By:

Table 1 sheet 1

IDL

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project No.	Project Name
2017T101	WSP Eastern and Midlands

Hole No.	Sample				Specimen Depth (m)	Specimen Dimensions2			Bulk Density2	Water Content 1	Uniaxial Compression3				Remarks
	Ref	Top	Base	Type		Dia. mm	Length mm	H/D	Mg/m3	%	Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
RC015		10.00	11.60	C	10.2-10.47	84.4	208.8	2.5	2.69		as received	0.3347	AC	75.3	Strong
RC119		8.00	10.50	C	9.9-10.25	84.5	188.9	2.2	2.66		as received	0.2650	AC	80.0	Strong
RC120		4.10	5.60	C	4.26-4.55	84.5	189.1	2.2	2.71		as received	0.1852	MS	40.6	Medium Strong
RC197		3.60	5.10	C	4.0-4.3	84.6	211.4	2.5	2.68		as received	0.2892	AC	76.3	Strong
RC229		7.10	8.60	C	8.23-8.47	84.7	174.2	2.1	2.69		as received	0.2192	AC	70.4	Strong
RC231		8.60	10.10	C	9.0-9.3	84.5	185.5	2.2	2.72		as received	0.2875	AC	136.0	Very Strong

Notes

1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification	Date Printed	Approved By	Table
International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007	22/02/2018		1
			sheet 1

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 11 January 2018
Test Report Ref: STR 571089

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC010 3.6-5.1m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**10/01/2018**
Sampling Location:	**Core Depth 3.6-5.1m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**35.12**	33.86% - 36.38%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**79.81**	76.94% - 82.68%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 11 January 2018
Test Report Ref: STR 571090

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC014 5.6-7.1m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**10/01/2018**
Sampling Location:	**Core Depth 5.6-7.1m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**35.17**	33.9% - 36.44%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**79.92**	77.04% - 82.8%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

celtest
INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 15 January 2018
Test Report Ref: STR 571091

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC082 7.1-8.6m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**12/01/2018**
Sampling Location:	**Core Depth 7.1-8.6m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**15.54**	14.98% - 16.1%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**28.50**	27.47% - 29.53%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 11 January 2018
Test Report Ref: STR 571092

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC119 7.5-8.0m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**10/01/2018**
Sampling Location:	**Core Depth 7.5-8.0m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**31.76**	30.62% - 32.9%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**72.17**	69.57% - 74.77%

Comments	Report checked and approved by:
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2	N. Hughes Neil Hughes Aggregate Team Coordinator

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 11 January 2018
Test Report Ref: STR 571093

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC120 0.0-1.5m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**10/01/2018**
Sampling Location:	**Core Depth 0.0-1.5m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**21.52**	20.75% - 22.29%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**48.91**	47.15% - 50.67%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 15 January 2018
Test Report Ref: STR 571094

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC208 7.1-8.6m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**12/01/2018**
Sampling Location:	**Core Depth 7.1-8.6m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**42.94**	41.39% - 44.49%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**97.59**	94.08% - 101.1%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 15 January 2018
Test Report Ref: STR 571095

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC231 7.0-8.6m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**12/01/2018**
Sampling Location:	**Core Depth 7.0-8.6m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**23.01**	22.18% - 23.84%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**52.30**	50.42% - 54.18%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 15 January 2018
Test Report Ref: STR 571096

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC191 5.6-7.1m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**12/01/2018**
Sampling Location:	**Core Depth 7.0-8.6m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**19.72**	19.01% - 20.43%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**44.83**	43.22% - 46.44%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 15 January 2018
Test Report Ref: STR 571097

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC192 4.1-5.6m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**12/01/2018**
Sampling Location:	**Core Depth 4.1-5.6m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**36.15**	34.85% - 37.45%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**82.17**	79.21% - 85.13%

Comments	Report checked and approved by:
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2	N. Hughes Neil Hughes Aggregate Team Coordinator

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INDEPENDENT MATERIALS TESTING I DIAMOND DRILLING & SAWING

Irish Drilling Limited
Loughrea
Co. Galway
Ireland
IE6399801R

Date: 15 January 2018
Test Report Ref: STR 571099

Order No: 5478

Contract: WSP 2017T101

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Carbon Dioxide content of aggregate sample in accordance with
BS EN 196 : Part 2 : 2013 : Clause 4.3.19 (Reference method)

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S70287**
Client Ref. No:	**RC067 3.0-4.1m**
Date and Time of Sampling:	**Unknown**
Date of Receipt at Lab:	**18/12/2017**
Date of Start of Test:	**12/01/2018**
Sampling Location:	**Core Depth 3.0-4.1m**
Name of Source:	**Unknown**
Method of Sampling:	**Unknown**
Sampled By:	**Client**
Material Description:	**Core**
Target Specification:	**N/A**

RESULTS:

		Results	95% Confidence limit*
Carbon Dioxide (CO_2)	**(%)**	**37.34**	36% - 38.68%
Calcium Carbonate Equivalent ($CaCO_3$)	**(%)**	**84.85**	81.8% - 87.9%

Comments
The Calcium Carbonate Equivalent is calculated in accordance with BRE Special Digest 1: Appendix 3. *95% Confidence limit is the expanded uncertainty which is the combined uncertainty standard multiplied by a factor (k) of 2

Report checked and approved by:
N. Hughes
Neil Hughes
Aggregate Team Coordinator

Irish Drilling Ltd.

Petrographic Report

on

Sample RC 192 (4.1m-5.6m)

WSP - 2017T101

Geofluids Research Group

Earth and Ocean Sciences

National University of Ireland, Galway

January 2018



Dr. Jon Hunt EurGeol PGeo

Professor (Emeritus) Martin Feely BSc., MSc., PhD.

NUI Galway
OÉ Gaillimh

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1. Introduction

The Geofluids Research Group at NUI Galway (GRG) was requested by Irish Drilling Ltd. to conduct a petrographic analysis of a drill core sample RC 192 (4.1m, 5.6m) for engineering purposes following closely the procedure and terminology laid out in BS EN 932: 1997 (Tests for General Properties of Aggregates). The sample was received by GRG on 18/12/2017. The sample was subsequently photographed (Figure 1) and described at the Geofluids Research Laboratory. A thin section of the sample, ~30µm thick, was prepared by ALS Oil and Gas, Guildford, United Kingdom (Figure 1). The thin section was then examined using transmitted light microscopy using a Nikon Eclipse E200 polarising light microscope at the Geofluids Research Laboratory. The results are presented below.

2. Hand Specimen Petrography

The hand specimen was photographed, weighed, measured and described in terms of its mineralogy, structure and texture (Figure 1; Table 1). In addition, the hand specimen was assessed for the presence of **clay minerals, pyrite, carbonate and gypsum** as potentially deleterious minerals when using this material as a crushed rock aggregate. Carbonate (present as calcite bioclasts) makes up the majority of the hand specimen. Clay minerals are present in small amounts as lime mud (<10%). A minor amount of pyrite (<1%) was observed in the sample and it occurs as very fine grained isolated cubes. Gypsum was not observed in the hand specimen. The sample comprises a dark grey, fine-grained **LIMESTONE**.



Figure 1. RC 192 (4.1m – 5.6m) – hand specimen and thin section. Dimensions of the thin section slide are 25mm X 75mm.

Table 1. Hand specimen properties of RC 192 (4.1m to 5.6m).

Sample Number	**RC 192**
Provider	Irish Drilling Ltd.
Type	Split Core (dry)
Weight	0.30kg
Dimensions	Multiple core chips (mean longest dimension: 90mm)
Depth	4.1m to 5.6m
Appearance	Dry, unweathered
Effervescence with dilute Hydrochloric Acid	Vigorous
Joints/fractures	Occasional calcite-filled veinlets
Texture	Packstone (grain supported and containing lime mud; after Dunham, 1962)
Strength	Very strong (when held in hand rock can be broken by heavy hammer blows) – BS 5930:2015.

3. Thin Section Petrography

The petrographic assessment of the samples from RC 192 (4.1m to 5.6m) follows closely that of ISRM suggested methods, BS EN 932-3:1997. In order to discriminate calcite from dolomite the thin section was stained using sodium alizarin sulphonate and hydrochloric acid. This staining technique turns calcite to a red-brown colour while dolomite is unaffected.

The lithology is classified as a **LIMESTONE.** The sample comprises calcite, lime mud and occasional quartz. Pyrite occurs as a minor component. A petrographic description of the occurrence of each of these minerals in thin section is provided in Table 2. Estimated modal abundances (visually estimated volume % of each mineral), average grain size and origin (primary and/or secondary) are presented in Table 3. Finally a series of photomicrographs are presented to highlight some of the features identified (Figure 2).

Table 2. Thin section petrography for RC 192 (4.1m to 5.6m).

Mineral	Petrography
Carbonate	Carbonate occurs as mostly bioclastic material (fossil fragments) of varying size fractions (<0.01mm to 7mm; mean = 100µm). Bioclastic material comprises fragments of gastropods, bivalves, formanifera.
Lime mud	Appears as opaque very fine grained material that occurs frequently between calcite grains and occasionally as infill along microfractures. It is irregularly distributed throughout the thin section (the majority of the lithology is grain supported).
Quartz	Fine to very fine-grained, angular to sub-angular detrital grains, the majority of which display straight extinction. Occurs as isolated, randomly distributed grains.
Pyrite	Minor occurrence as isolated, randomly distributed cubes (<0.05mm). No oxidised pyrite observed.

Table 3. Mineral volume percentages, grain size and origin for RC 192 (4.1m to 5.6m)

Mineral	Estimated volume %	Crystal/grain size	Origin
Calcite	90	<7mm	Primary and secondary
Lime mud	<10	<0.001mm	Primary and secondary
Quartz	<1	<0.01mm	Secondary
Pyrite	<1	<0.05mm	Primary?

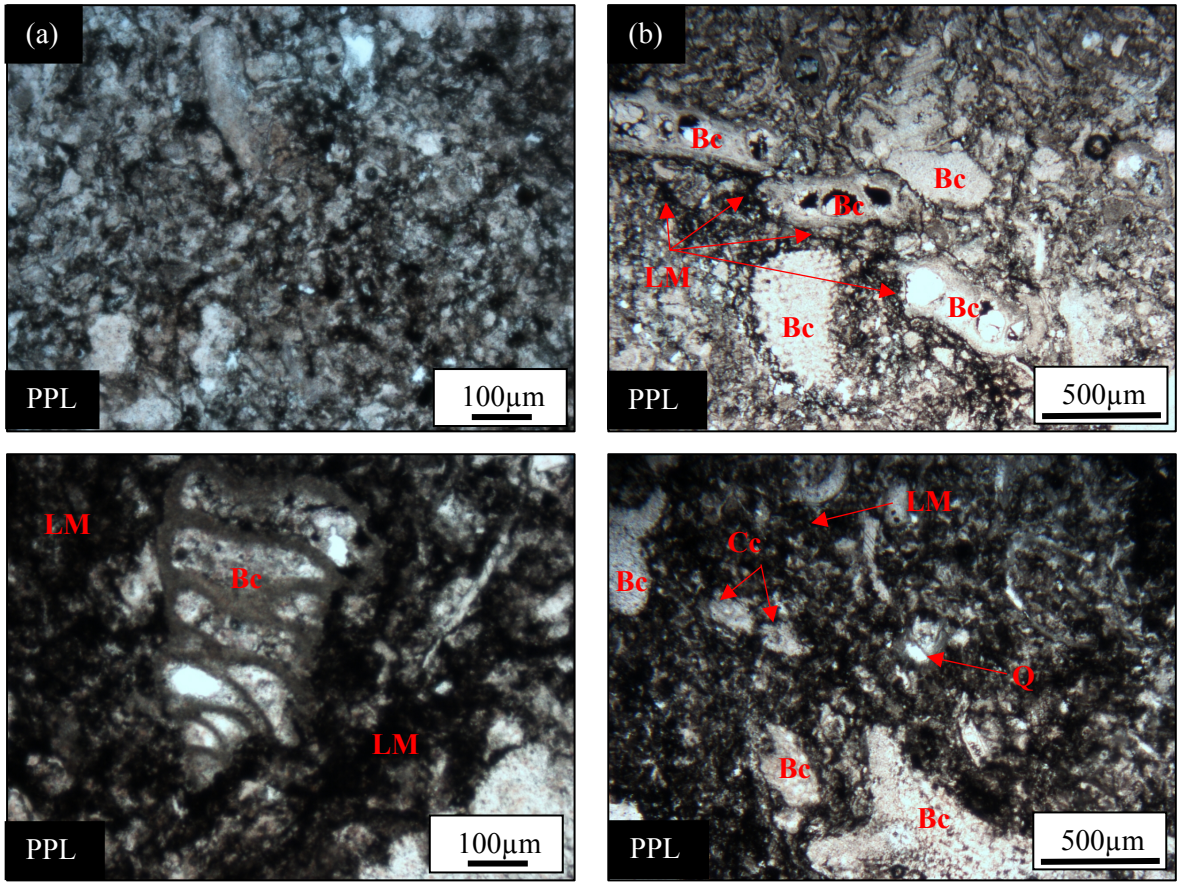
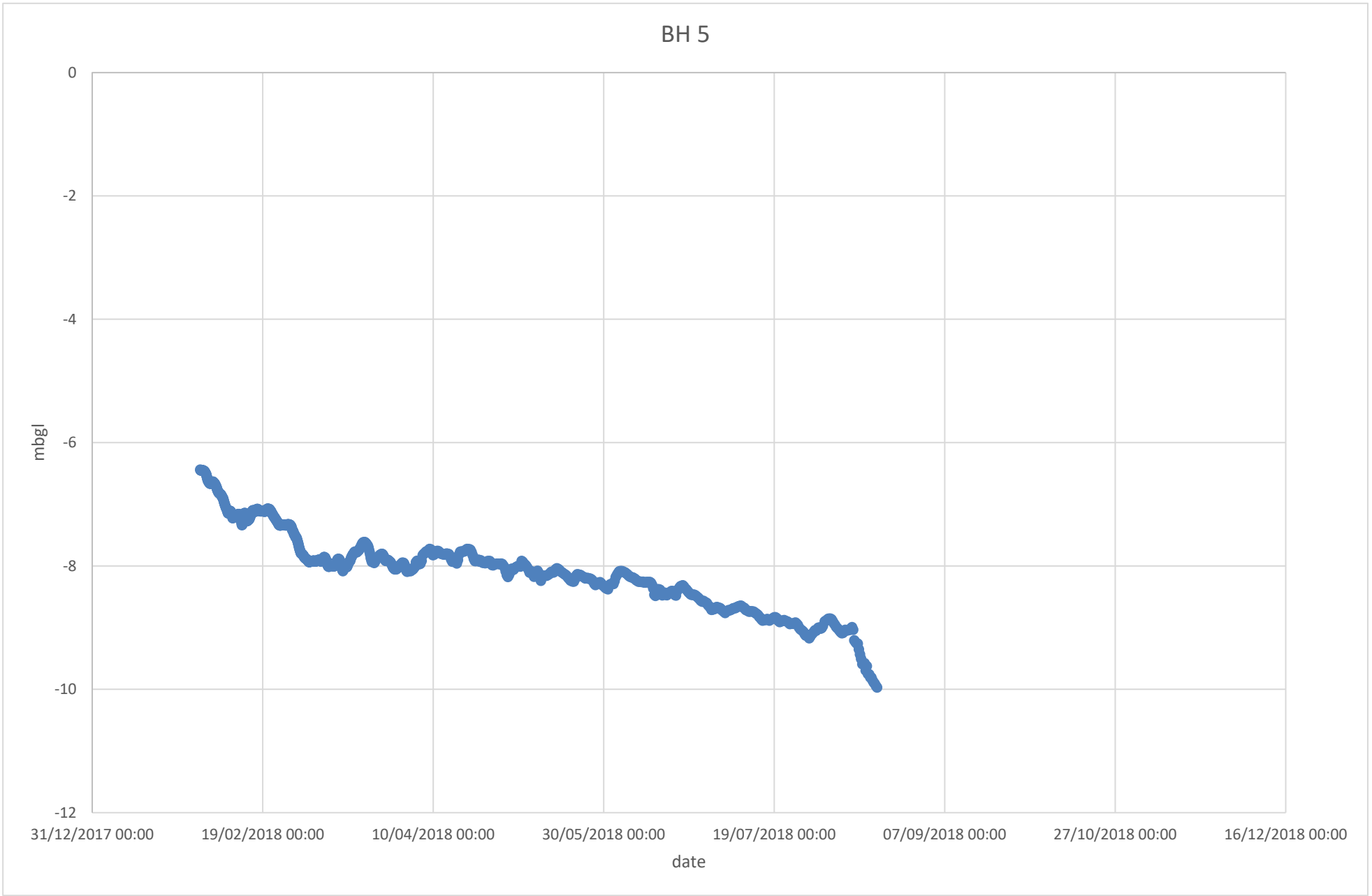
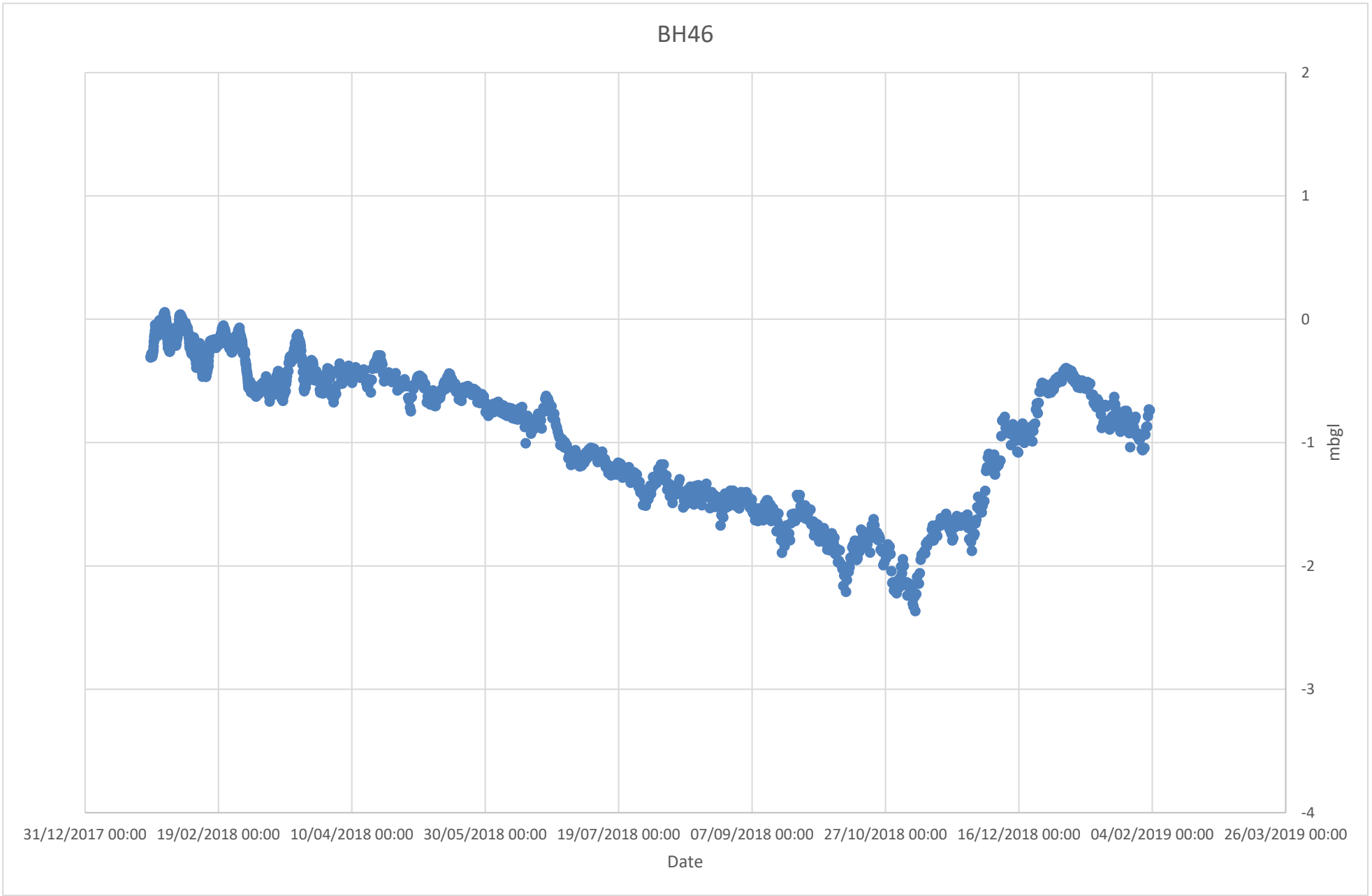


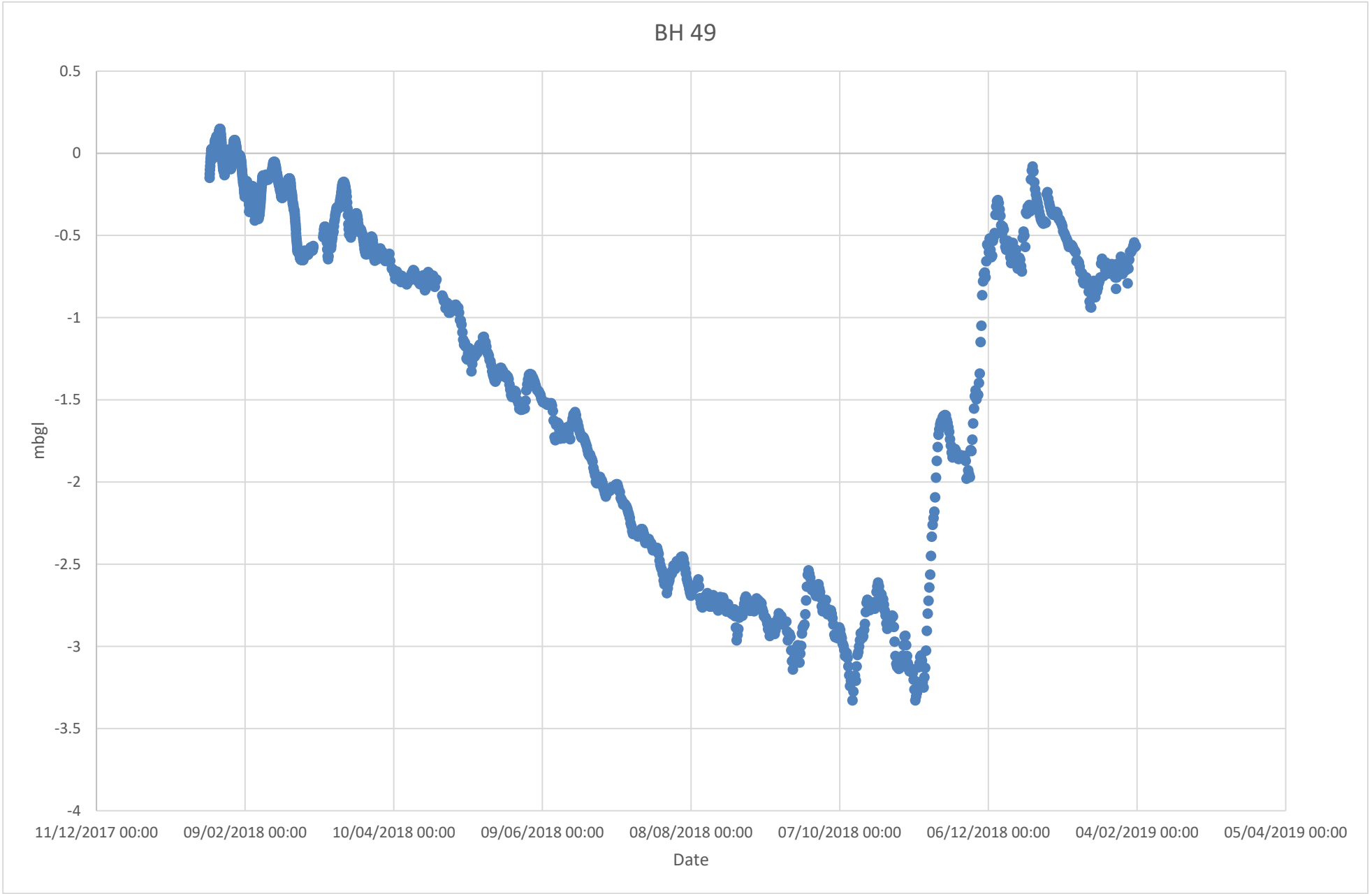
Figure 2. Photomicrographs of sample RC 192 (4.1m-5.6m).

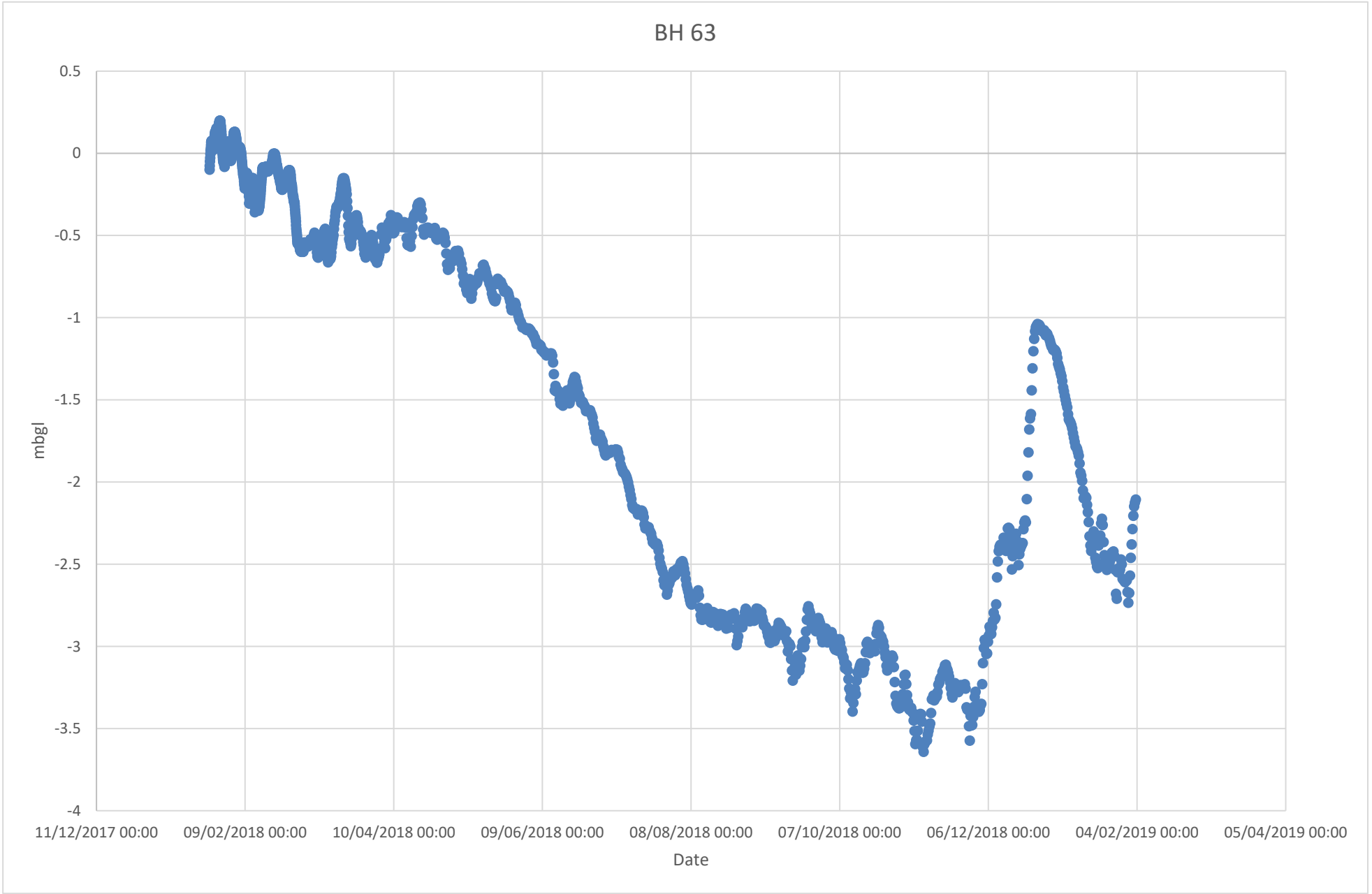
Cc: calcite, **LM**: lime mud, **Bc**: bioclast, **Q:** quartz, **PPL**: plane polarised light.

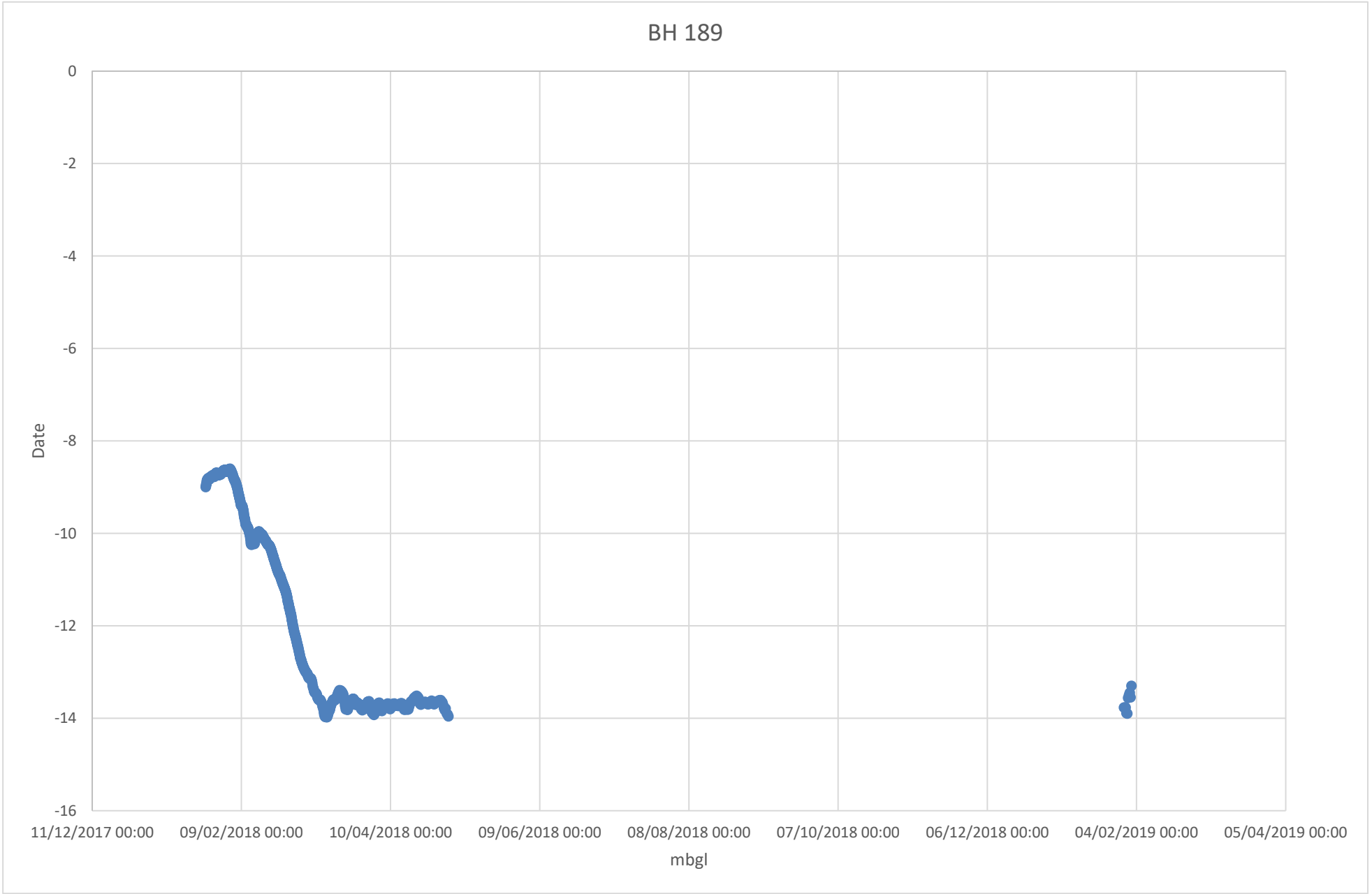
(a) Typical view under plane polarised light showing the limestone to be bioclast supported and almost entirely (~90%) calcite. (b) Bioclasts with lime mud concentrated along boundaries of a series of large bioclasts. (c) A single bioclast identifiable as a fossil gastropod. (d) Multiple fossil fragments (bioclasts) with lime mud and occasional quartz.

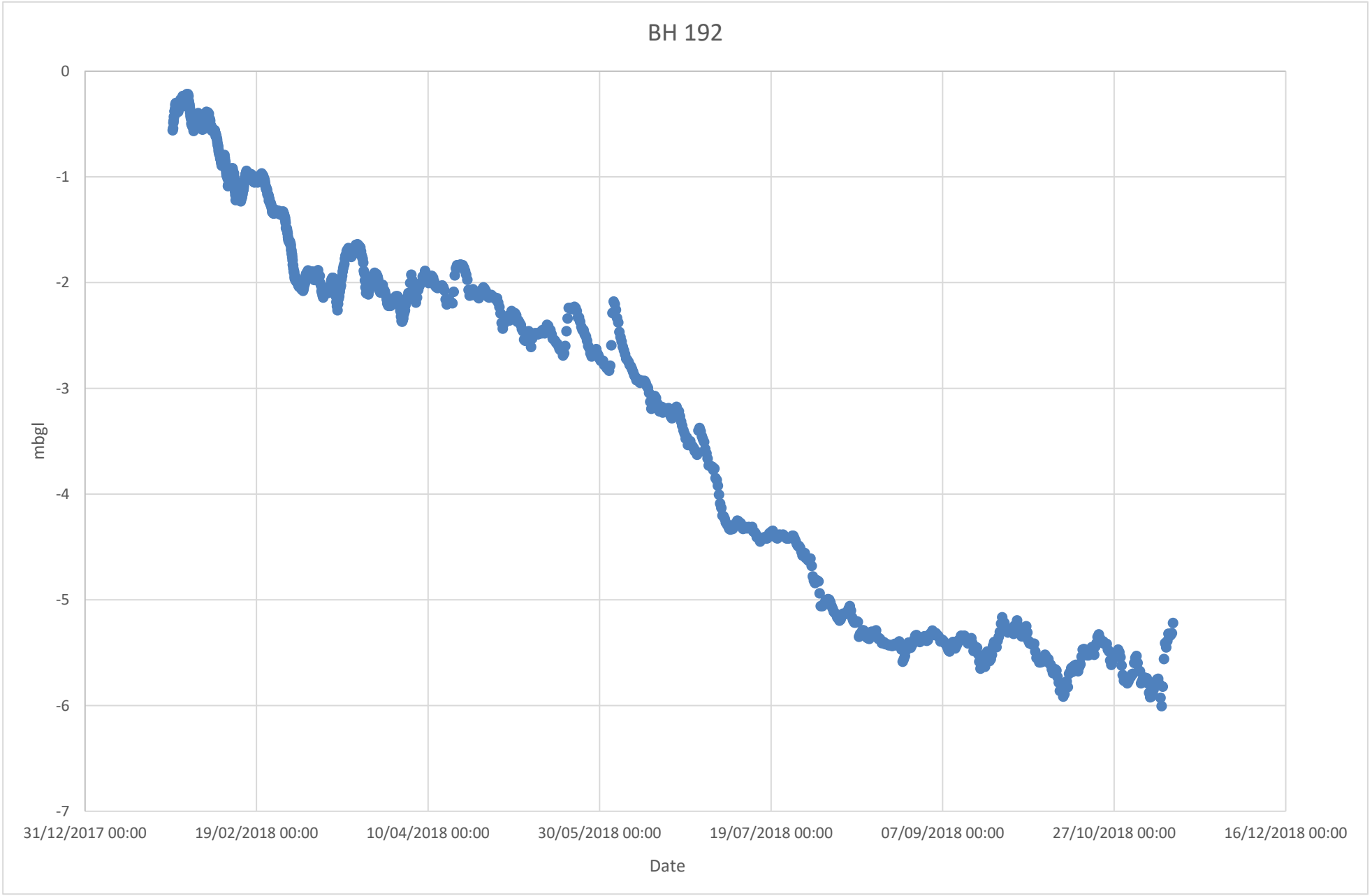

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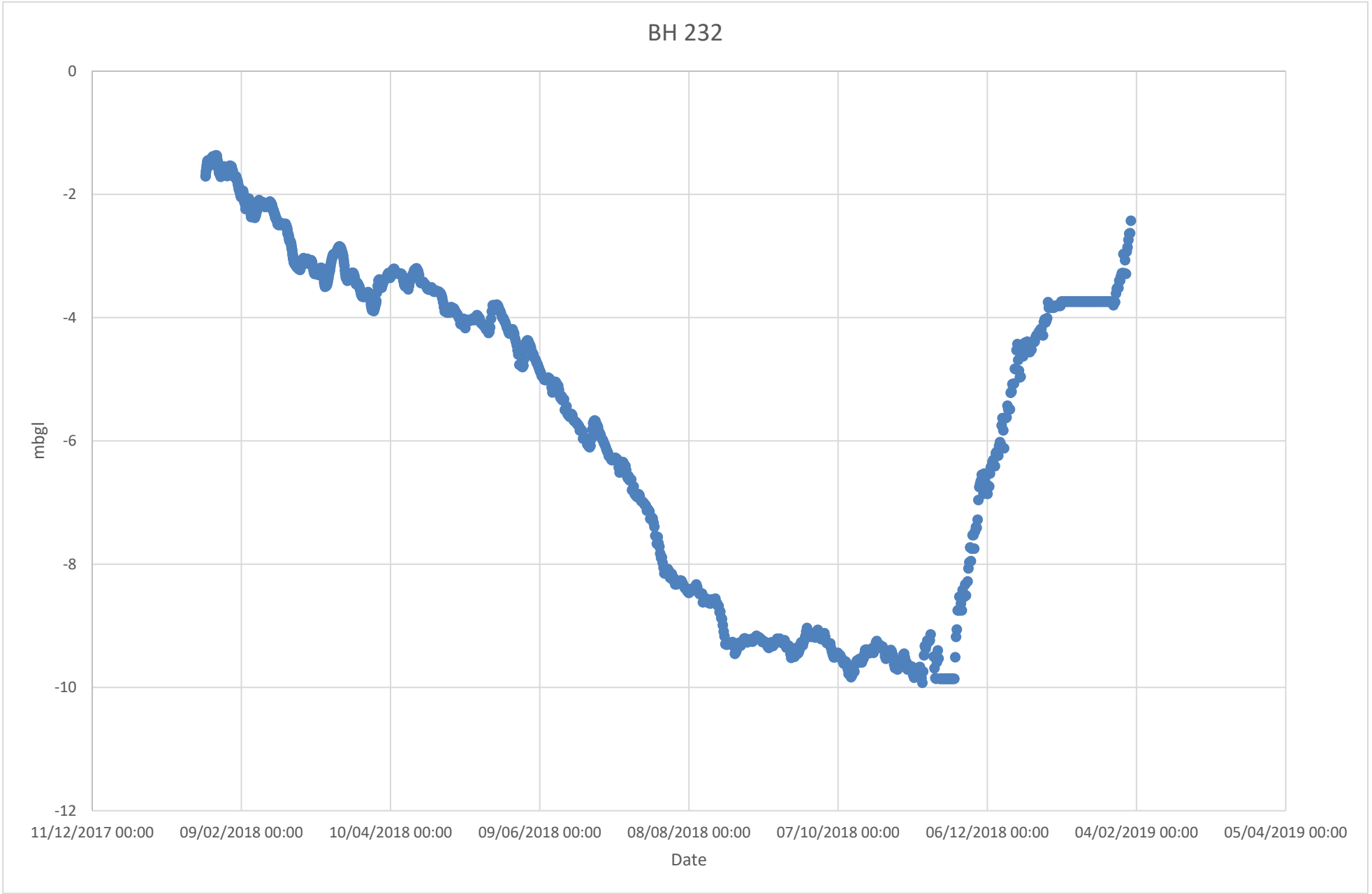

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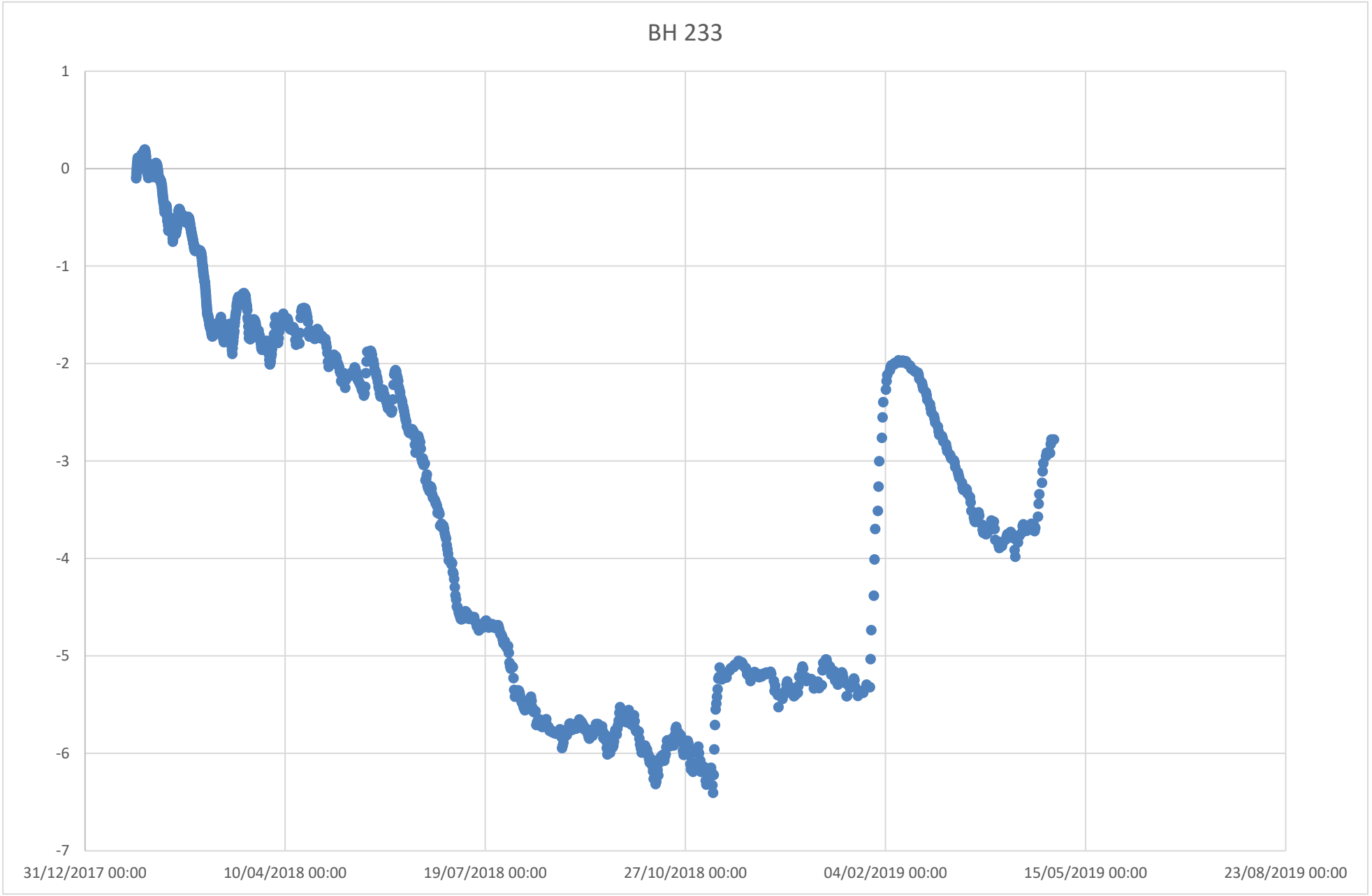

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Figure 1 2017T101_\WSP GI Contract\WSP TP Pics\TP 03.JPG



Figure 3 2017T101_\WSP GI Contract\WSP TP Pics\TP 07.JPG



Figure 2 2017T101_\WSP GI Contract\WSP TP Pics\TP 04.JPG



Figure 4 2017T101_\WSP GI Contract\WSP TP Pics\TP 09.JPG



Figure 5 2017T101_\WSP GI Contract\WSP TP Pics\TP 03.JPG



Figure 7 2017T101_\WSP GI Contract\WSP TP Pics\TP 07.JPG



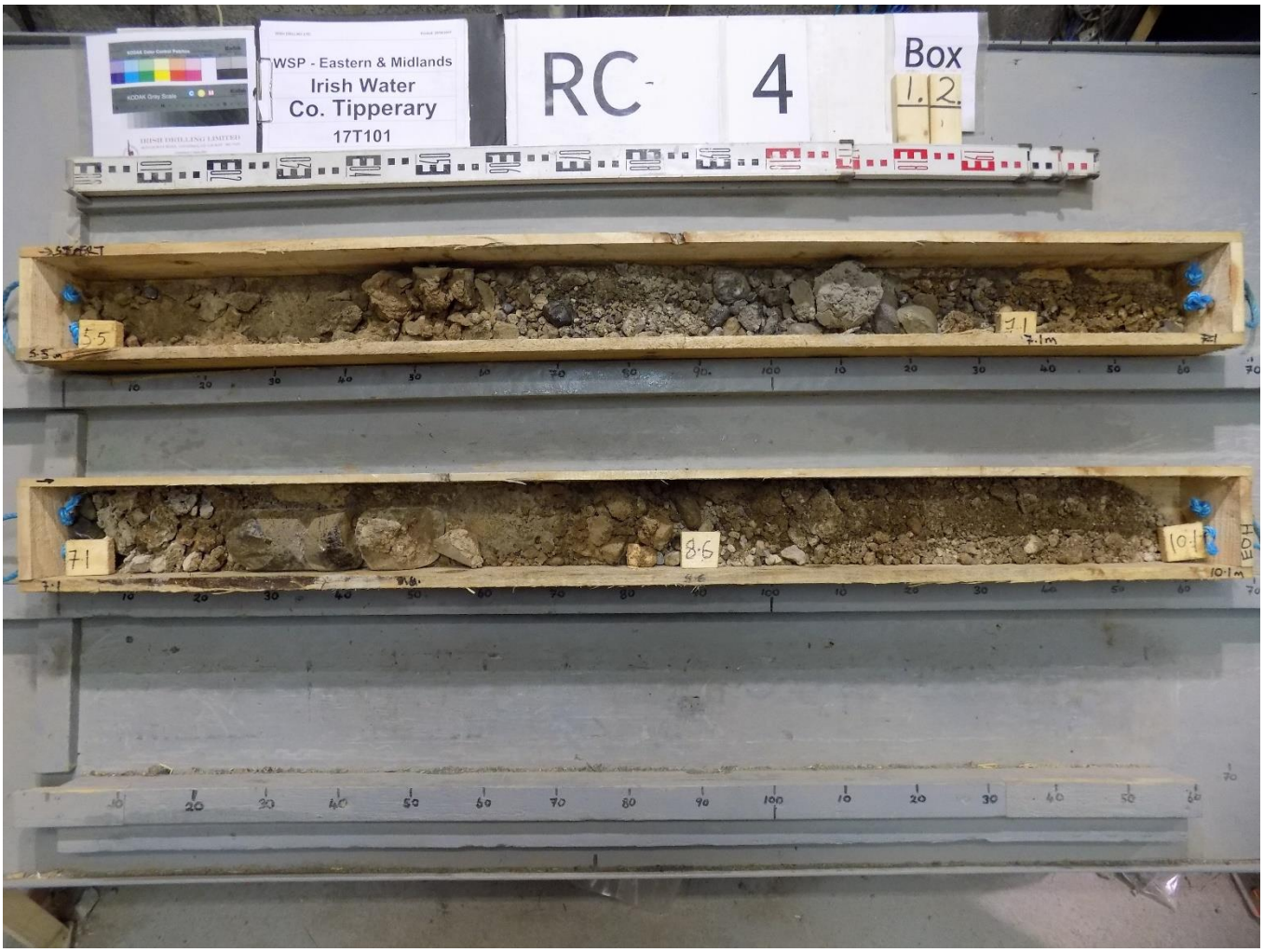
Figure 6 2017T101_\WSP GI Contract\WSP TP Pics\TP 04.JPG



Figure 8 2017T101_\WSP GI Contract\WSP TP Pics\TP 09.JPG


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 0 1
Box
1.2.

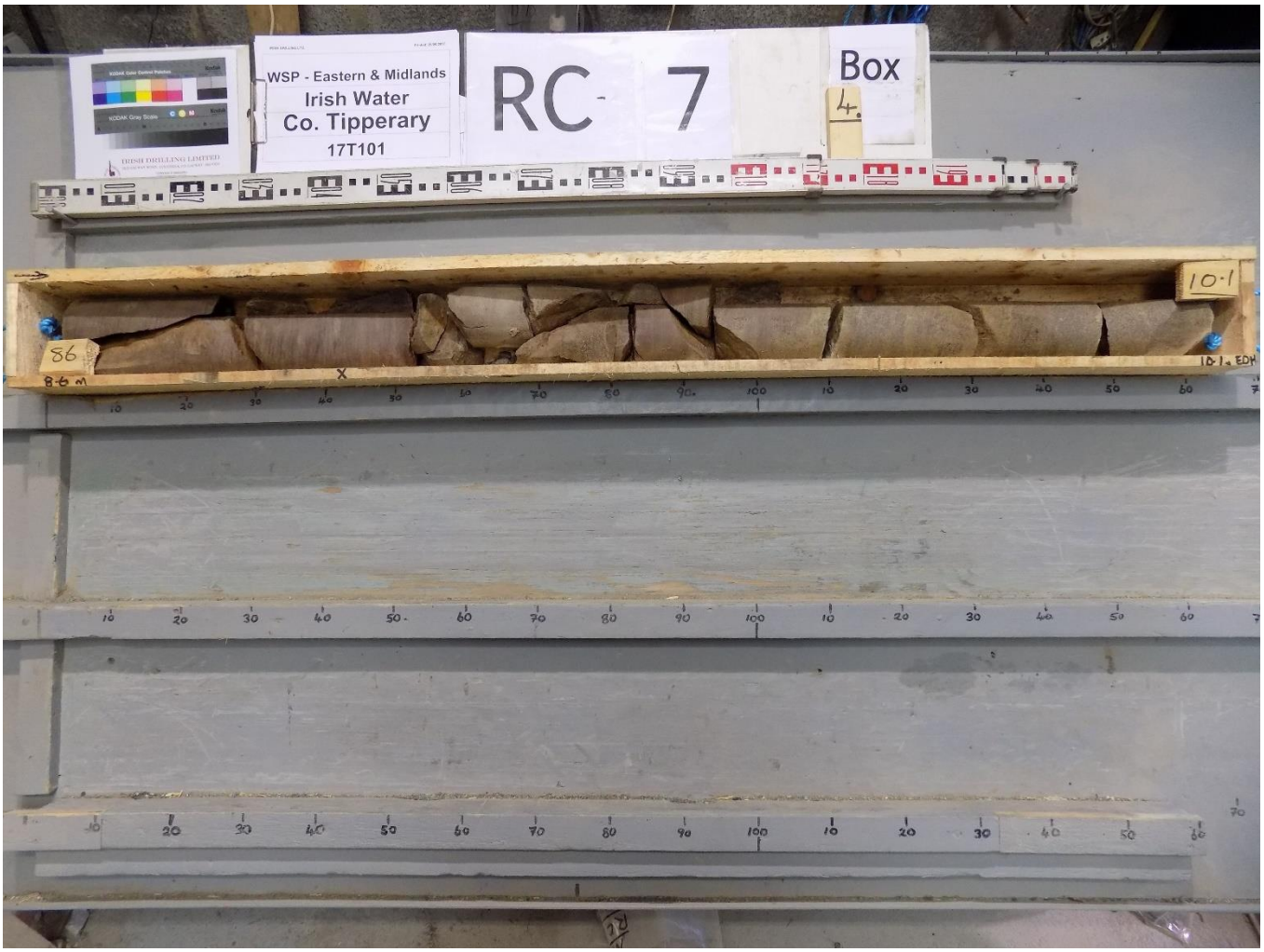

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 0 1
Box
3.4.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 4
Box
1.
2.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 6
Box
1.
2.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 6
Box
3.
4.
3.6
8.6
10.1

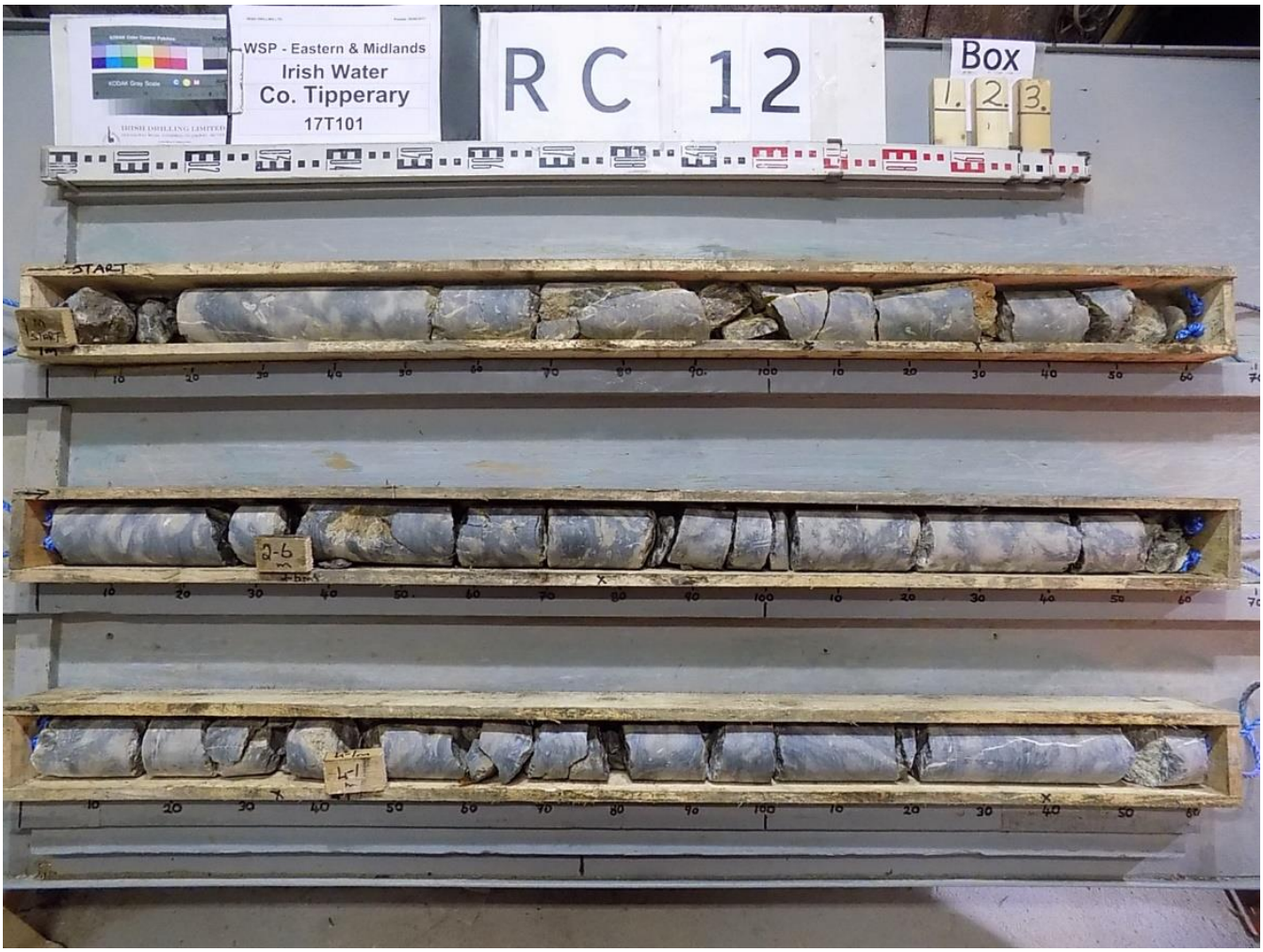

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 7
Box
1.
2.
3.
START.
5.0
5.6
7.1
8.6

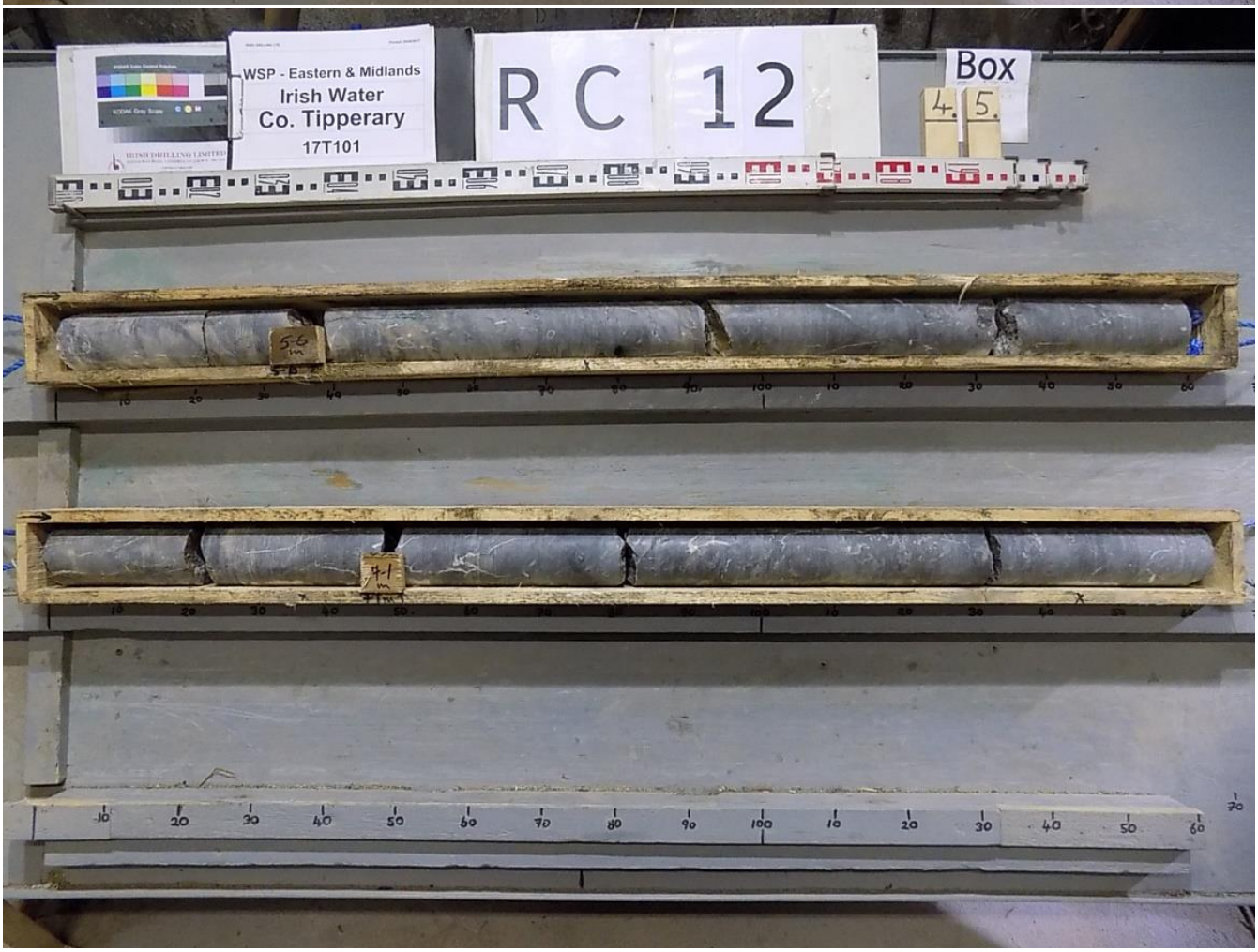

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 7
Box
4.
10.1
8.6 m

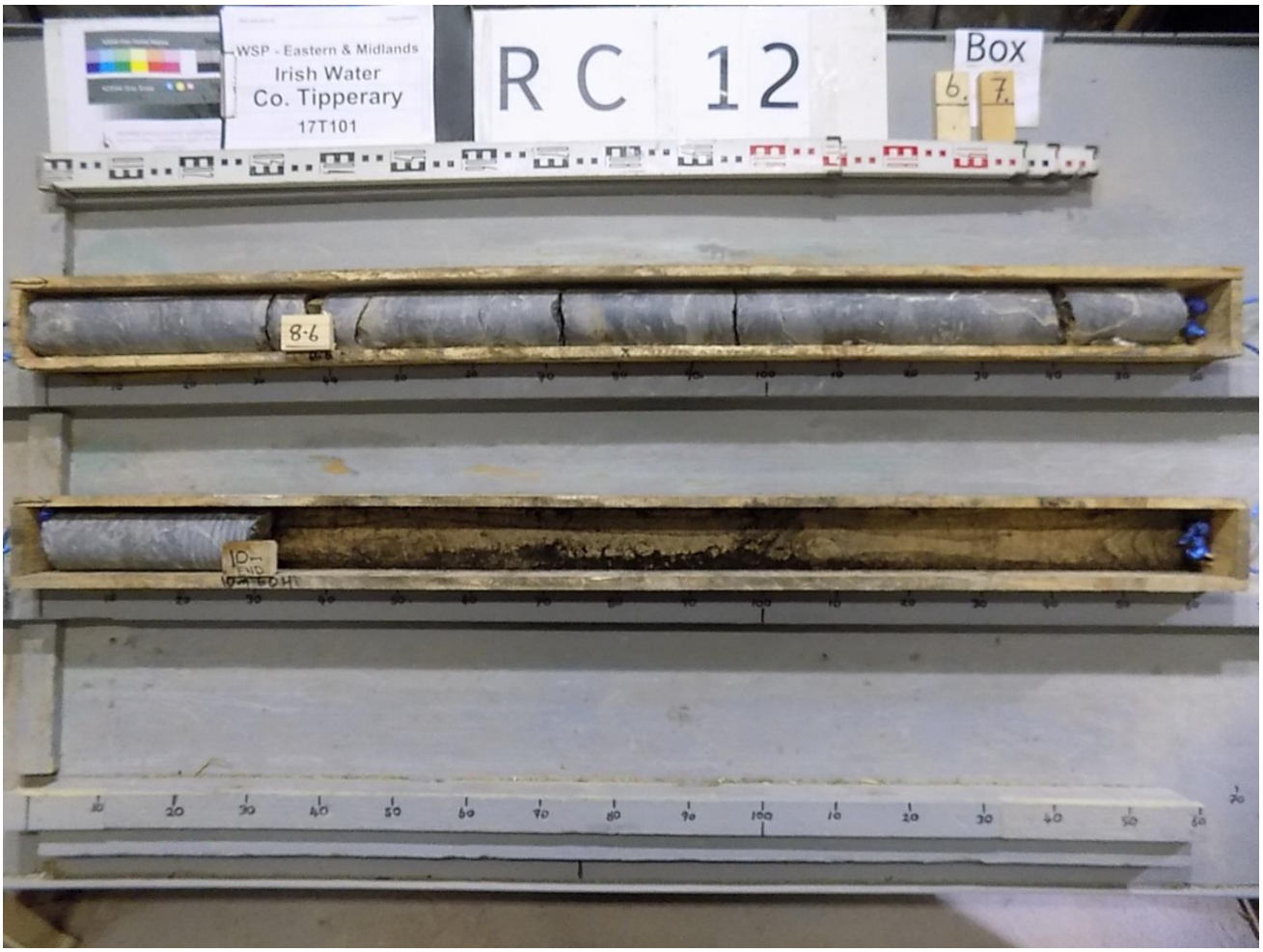

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 10
Box
1.
2.
3.
START
3
3.6
5.1
6.6
8.6m


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 10
Box
4.
5.
9.6
11.1
11.1 m EOH

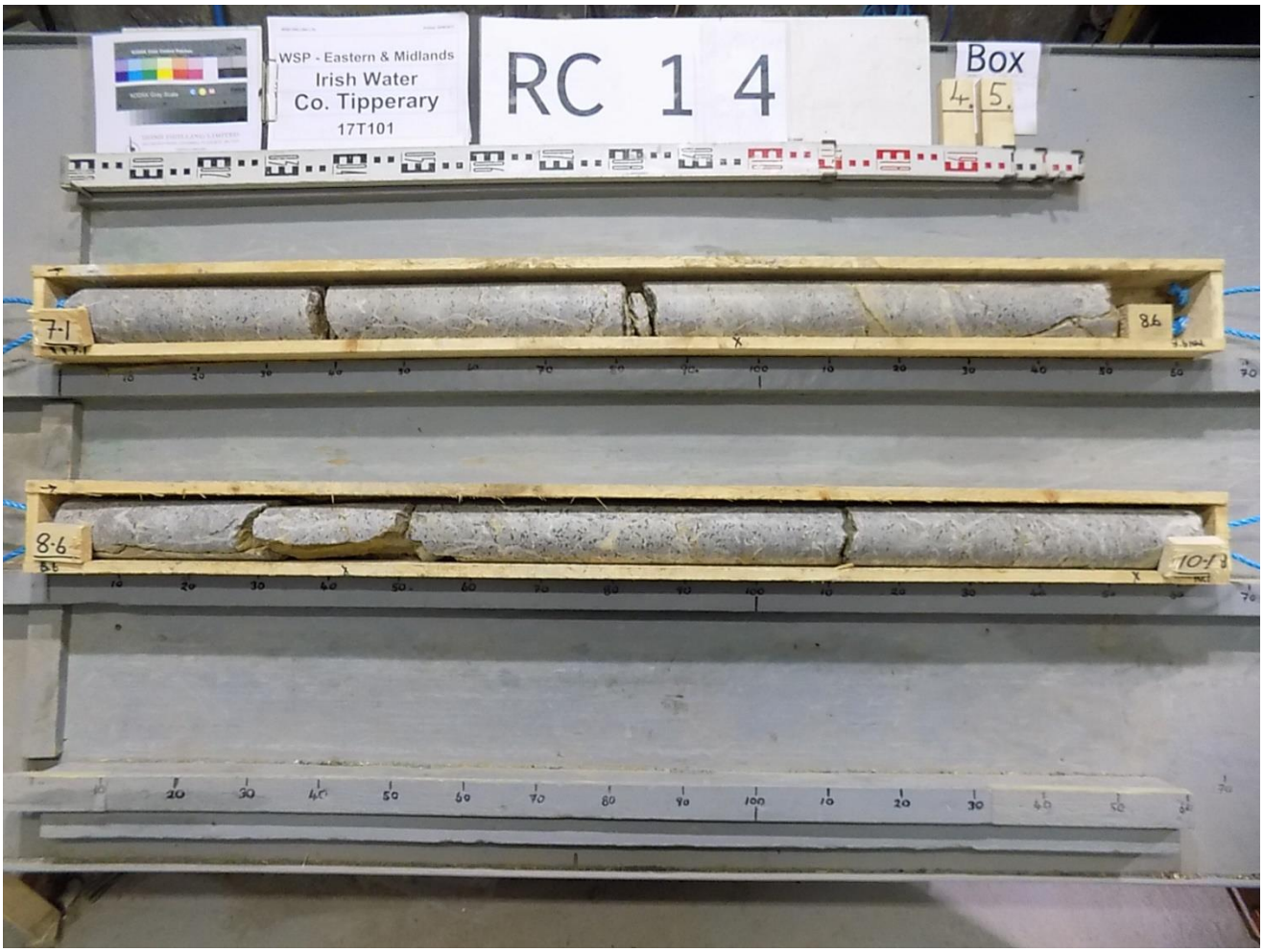

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 11
Box
1.
2.
3.
START
4
5.1
6.6
8.1
9.6
10.0
10m EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 12
Box
1. 2. 3.
START

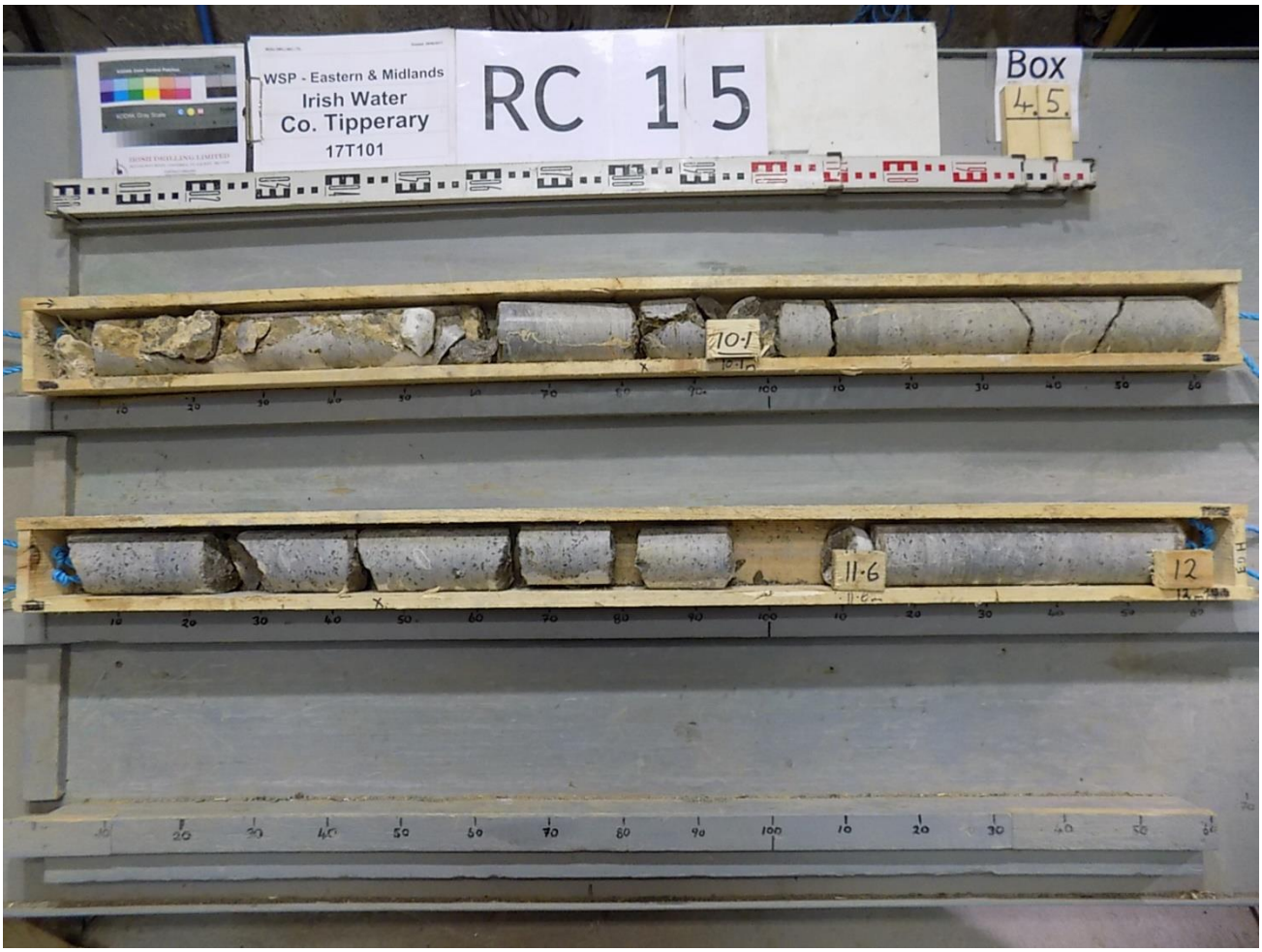

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 12
Box
4. 5.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 12
Box
6.
7.
8.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 4
Box
1.
2.
3.
4.1
5.6
7-1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 4
Box
4.
5.
7.1
8.6
8.6
10.13


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 5
Box
1.
2.
3.
2.6
4.1
4.1
5.6
7.1
8.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 15
Box
4.5.
10.1
11.6
12

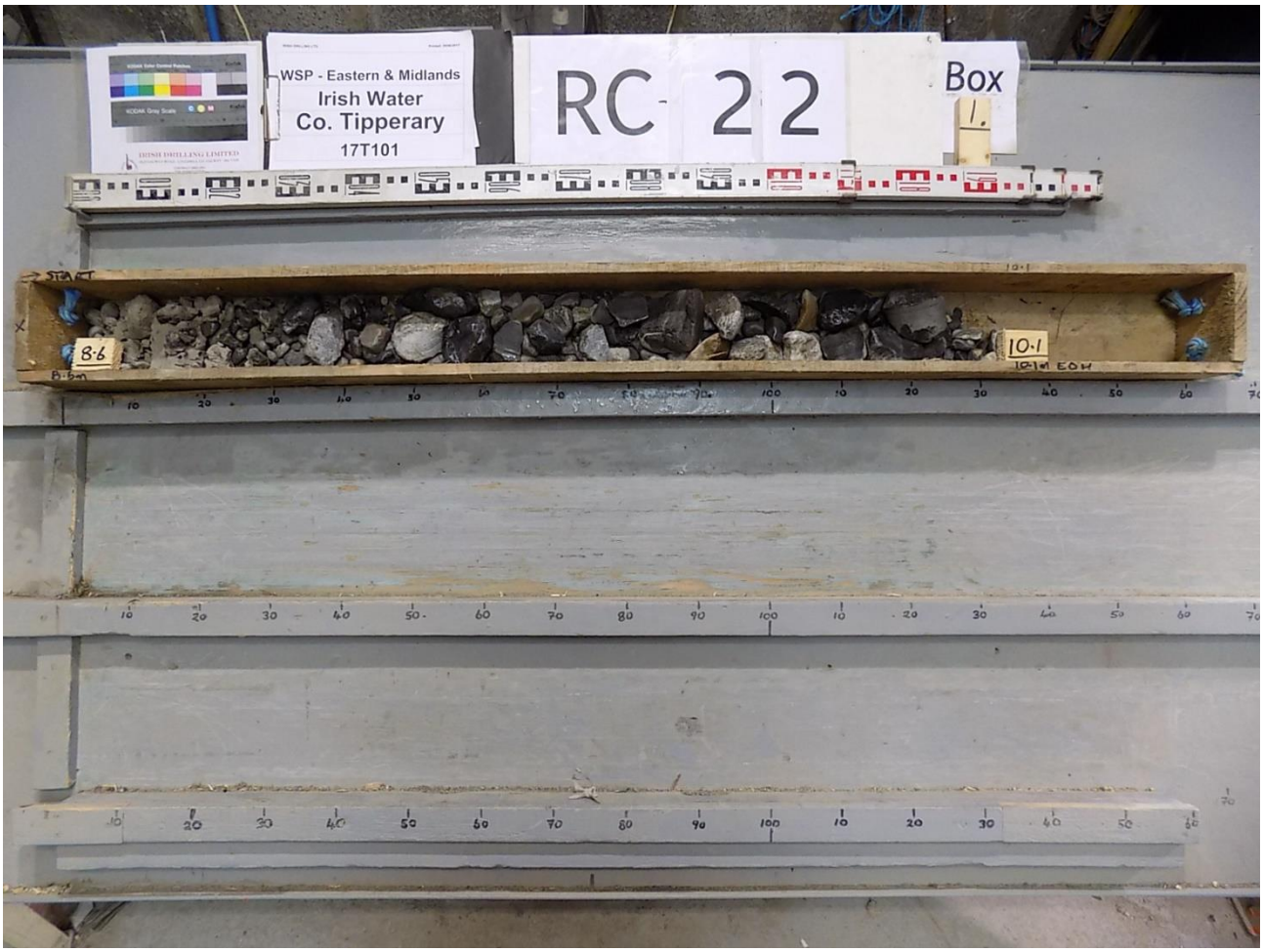

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 17
Box
1.2.3.
START
4.6
5.6
7.1
8.6
10.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 17
Box
4.
5.
11.6
13.1m End


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 17
Box
1.
2.
3.6
5.1
6.6
7.1
8.6
10
END

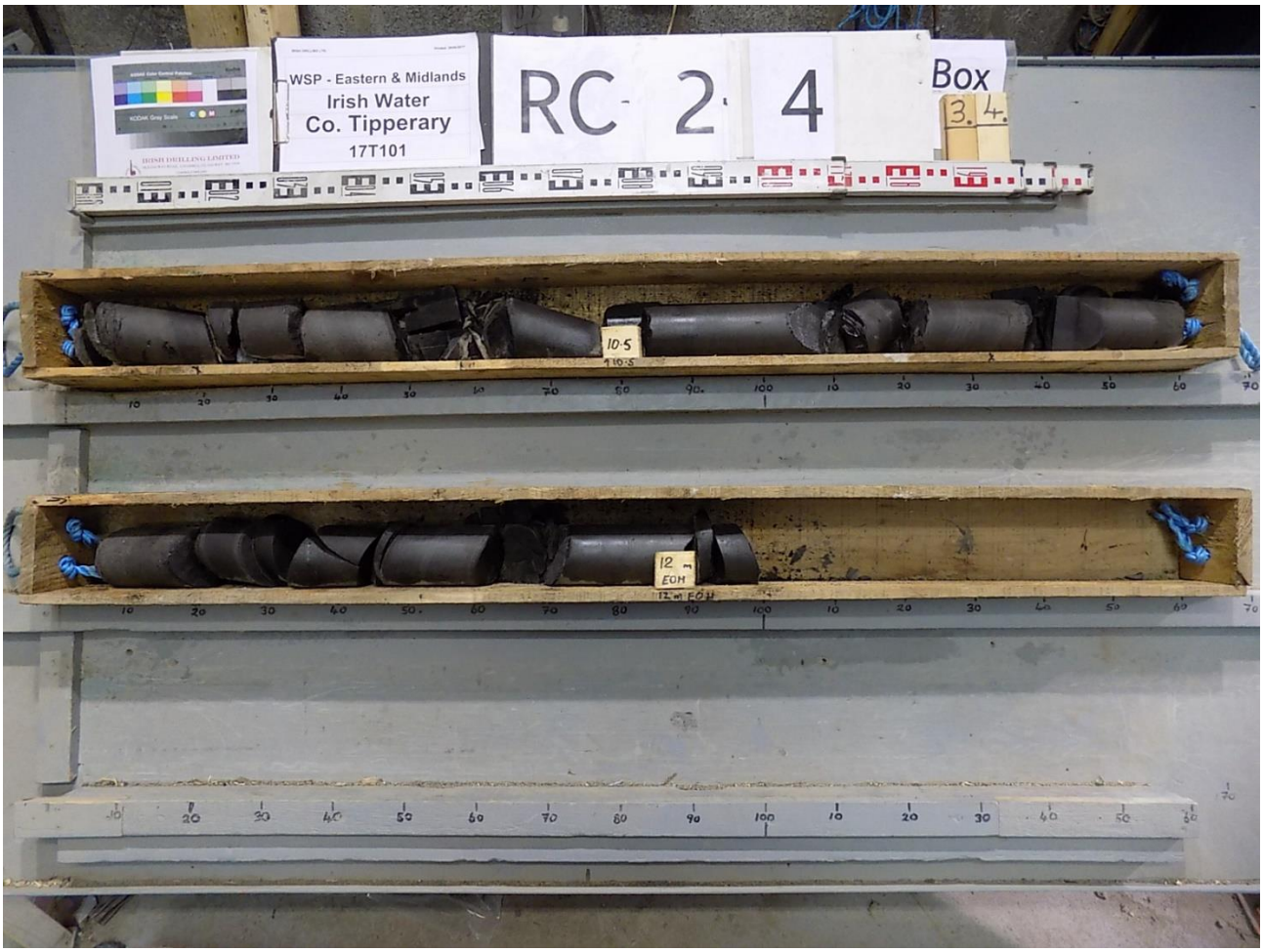

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 2 0
Box
1.
2.
3.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 2 1
Box
1.
2.

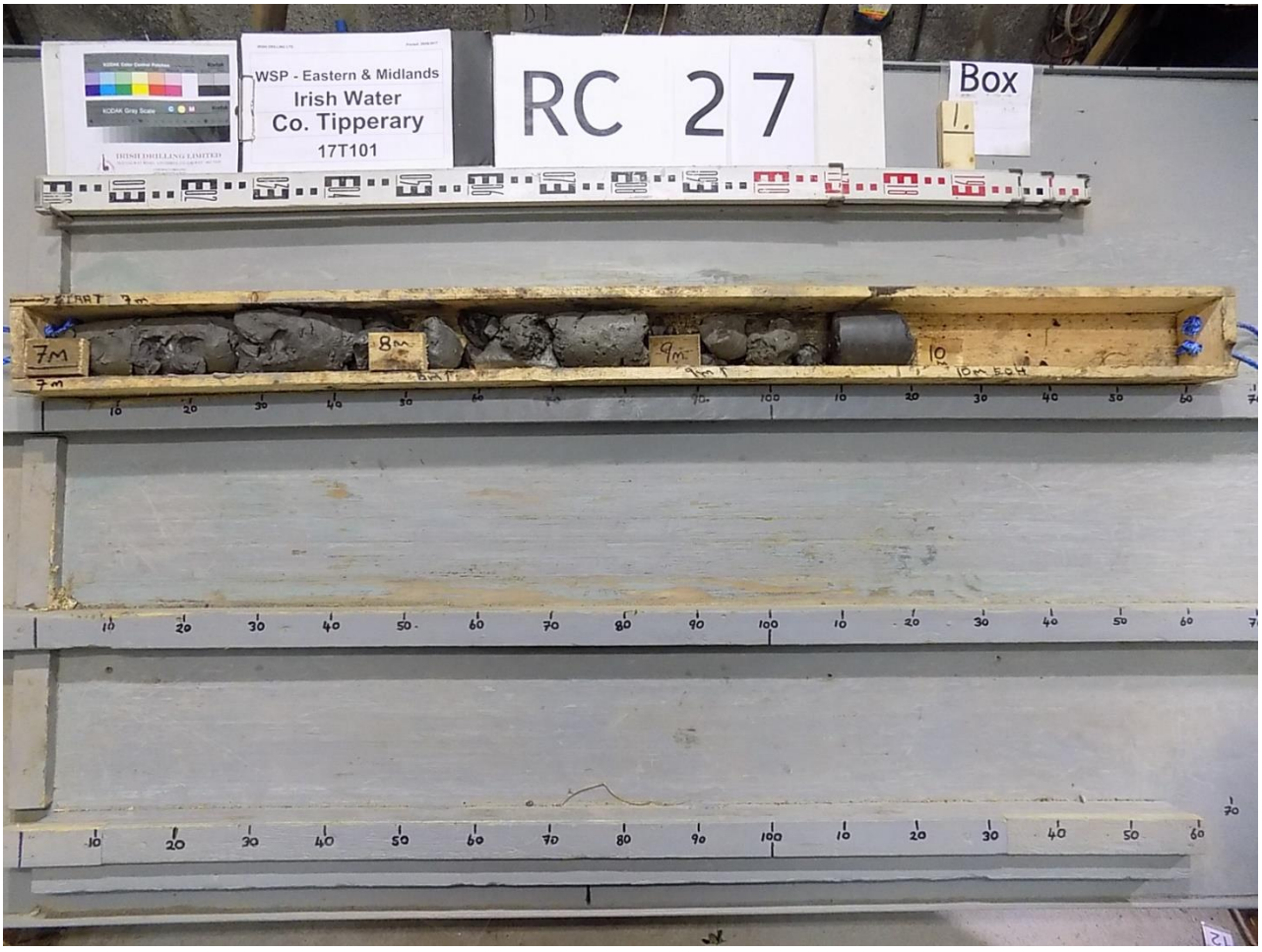

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 22
Box
1.
8.6
10.1
10.1m EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 23
Box
1.2.3.
5.5m
7.1m
8.6
8.6
10.1
10.1m EOH

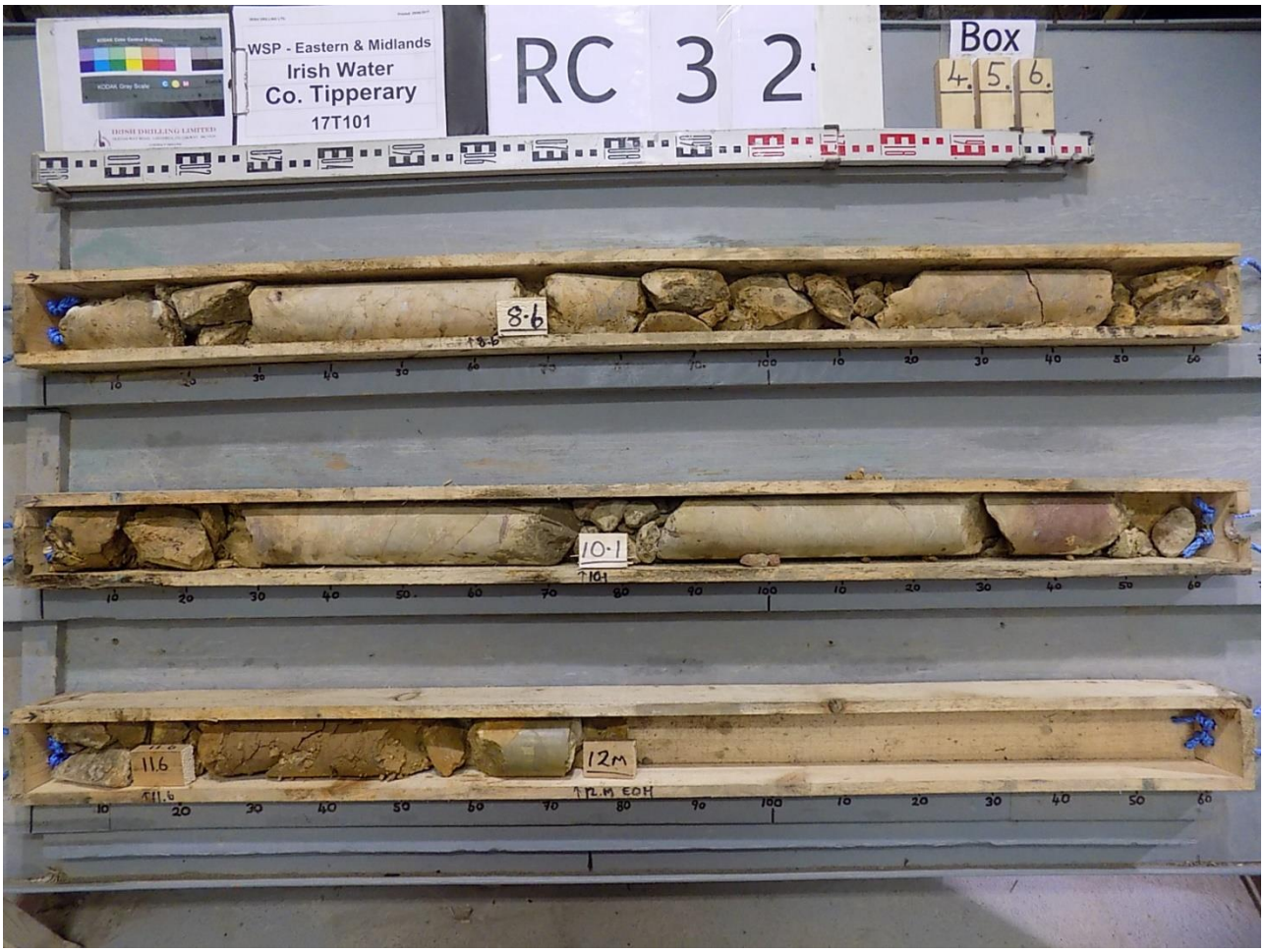

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 2 4
Box
1. 2.
3M
4.1
5.6
7.1
8.6
9m


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 2 4
Box
3. 4.
10.5
12 m
EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 25
Box
1.
2.
3.

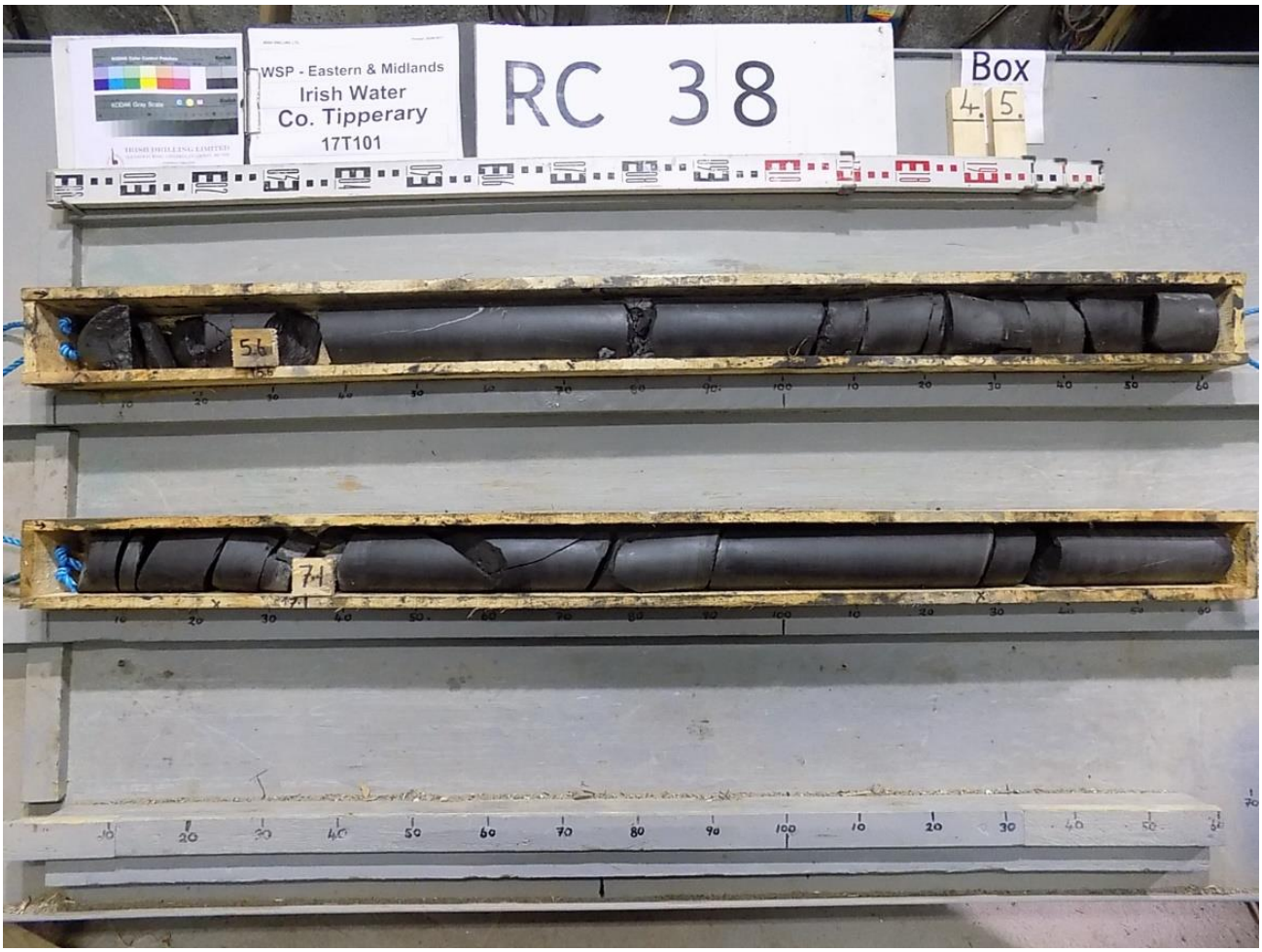

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 27
Box
1.

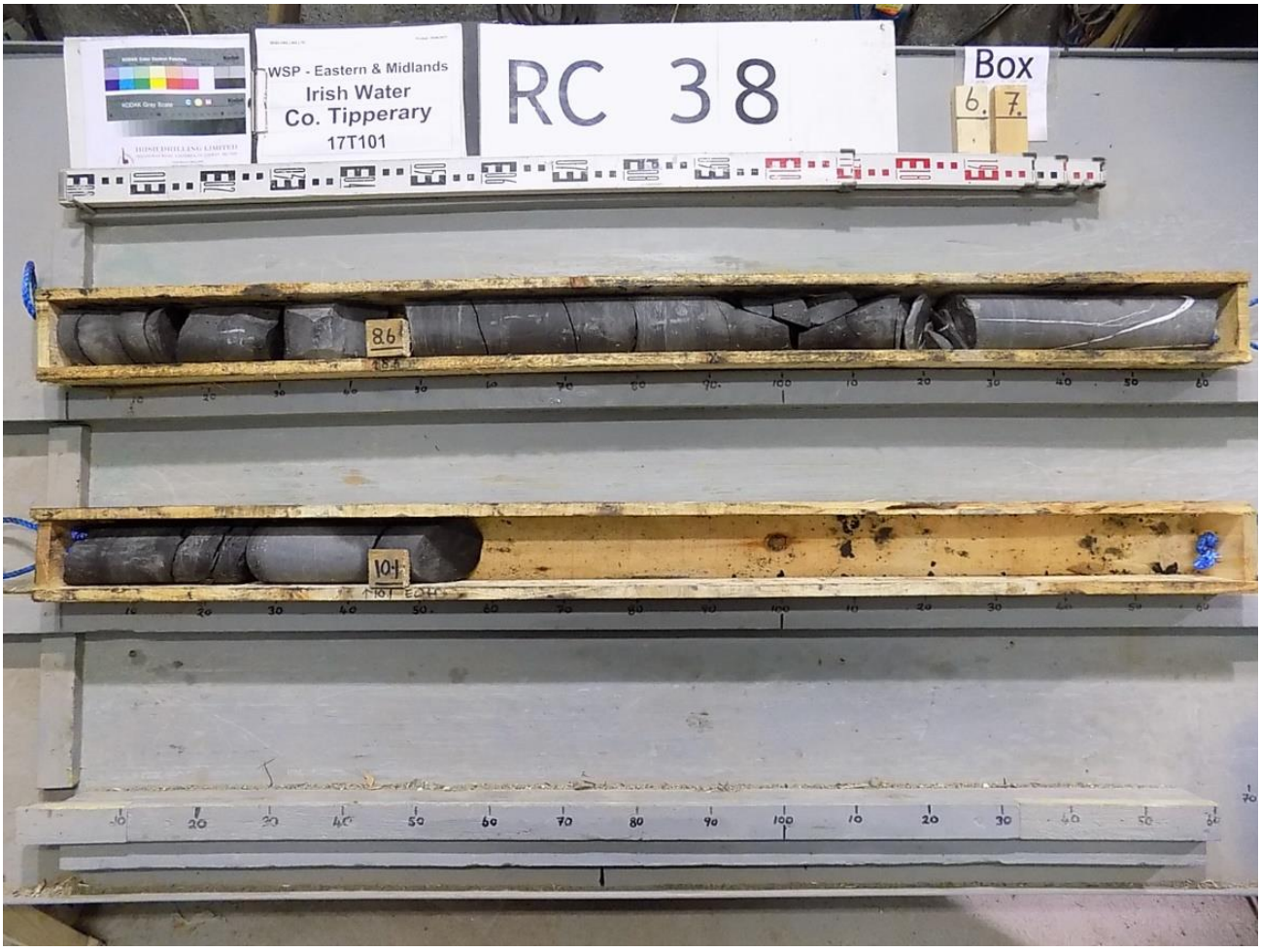

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 3 2
Box
1. 2. 3.
4.1
5.6
7.1

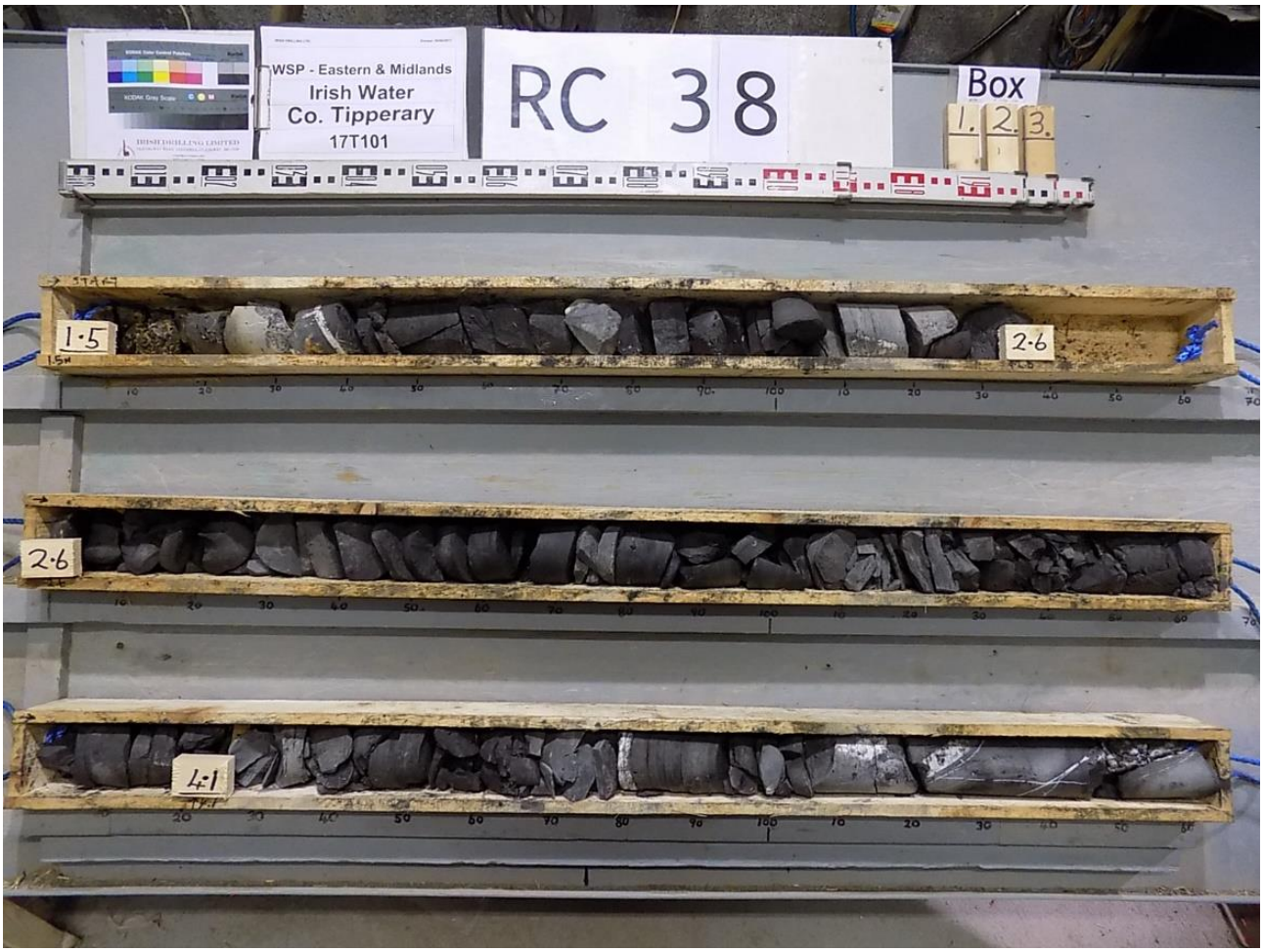

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 3 2
Box
4. 5. 6.
8.6
10.1
11.6
12m
12.M EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 3 3
Box
1. 2. 3.
START
30
4.1
5.6
7.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 3 3
Box
4. 5.
8.6
10.1
EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 38
Box
4.
5.
56
71

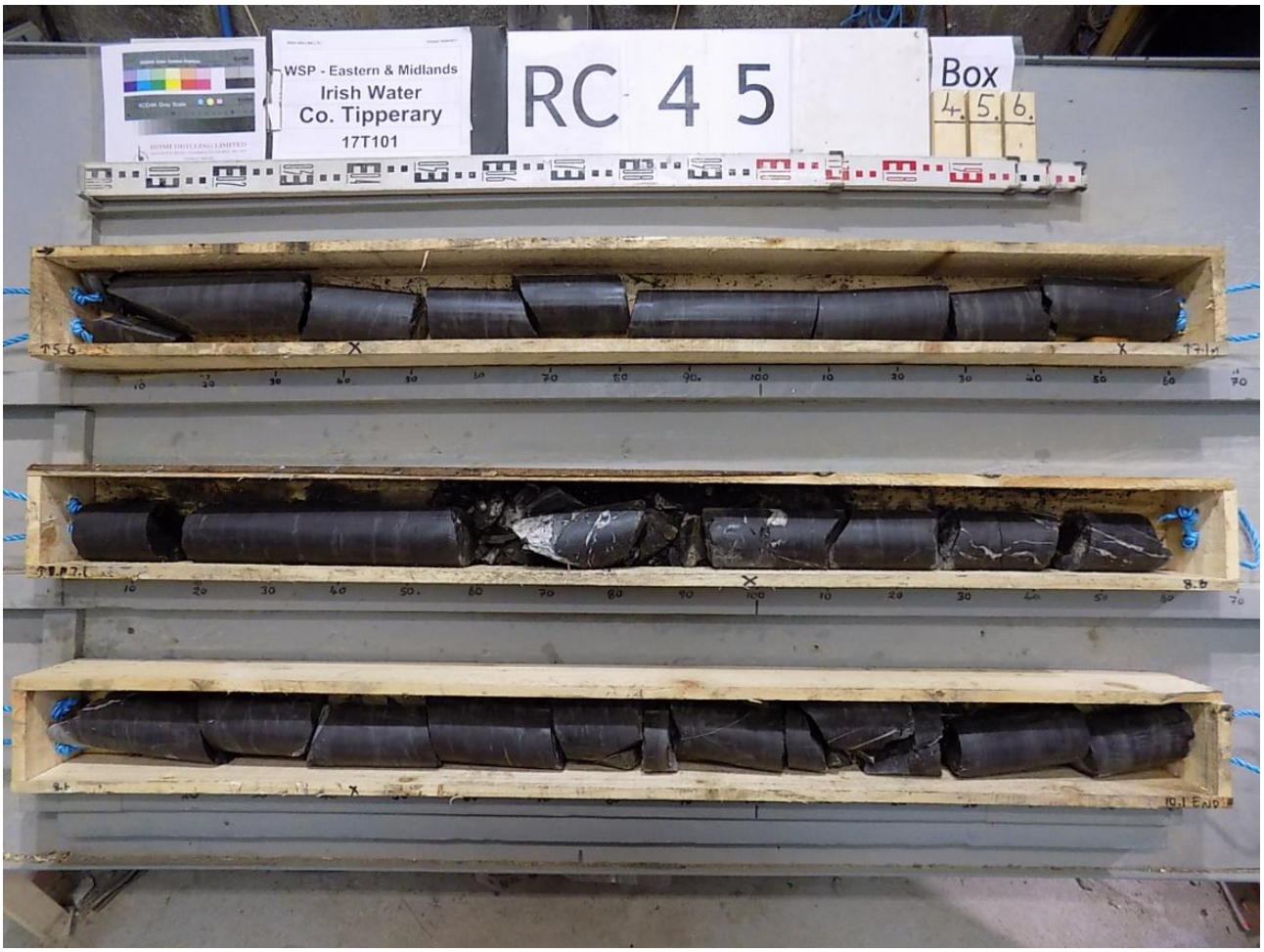

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 38
Box
6.
7.
86
104


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 38
Box
1. 2. 3.
START
1·5
2·6
2·6
4·1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 39
Box
1. 2. 3.
START
2·6
4·1
5·6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 3 9
Box
4. 5. 6.
7·1
8·6
10·1
10·1 EOH

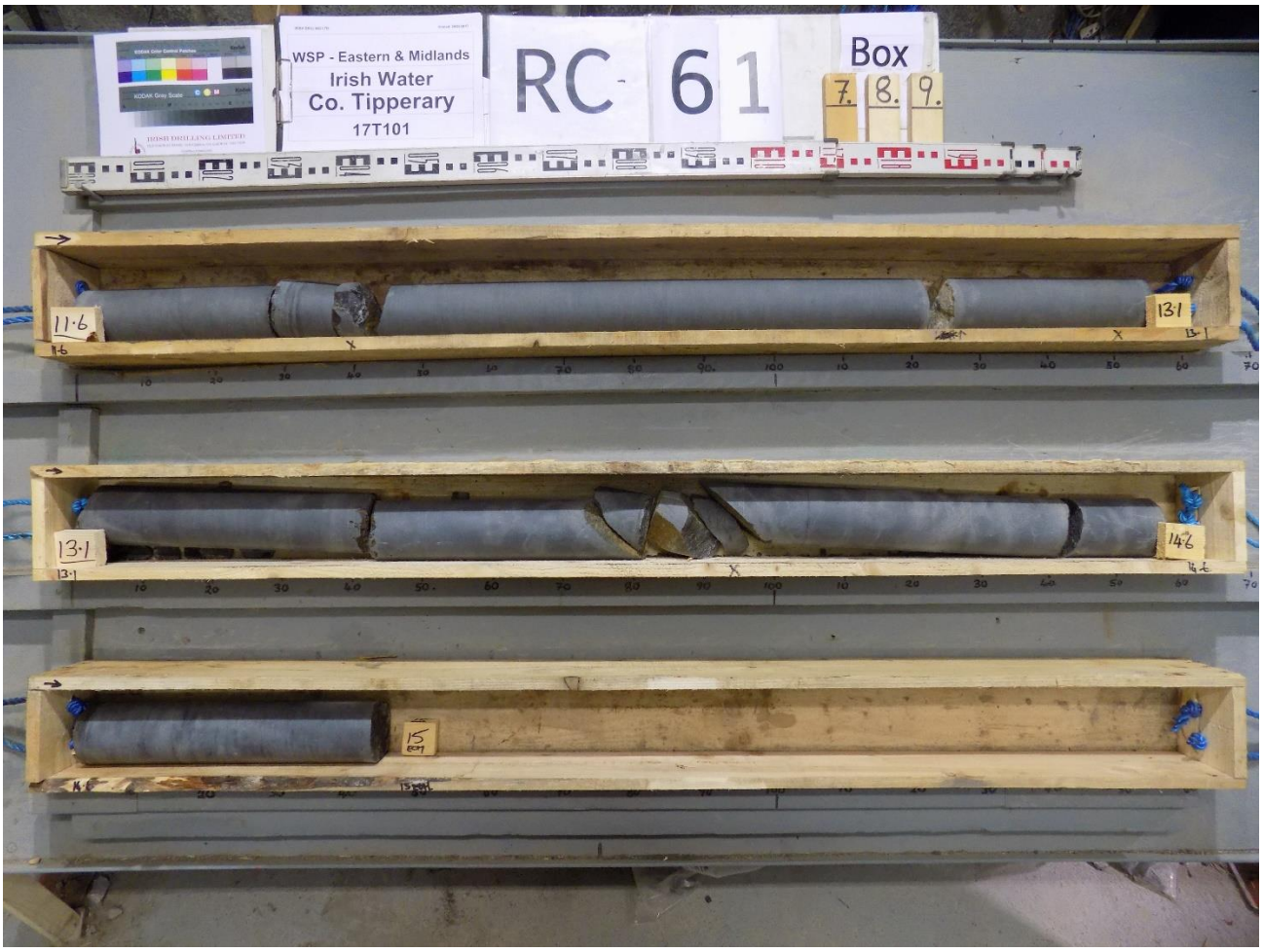

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 4 5
Box
1. 2. 3.
START
1·4
2·6
2·6
4·1
4·1
5·6

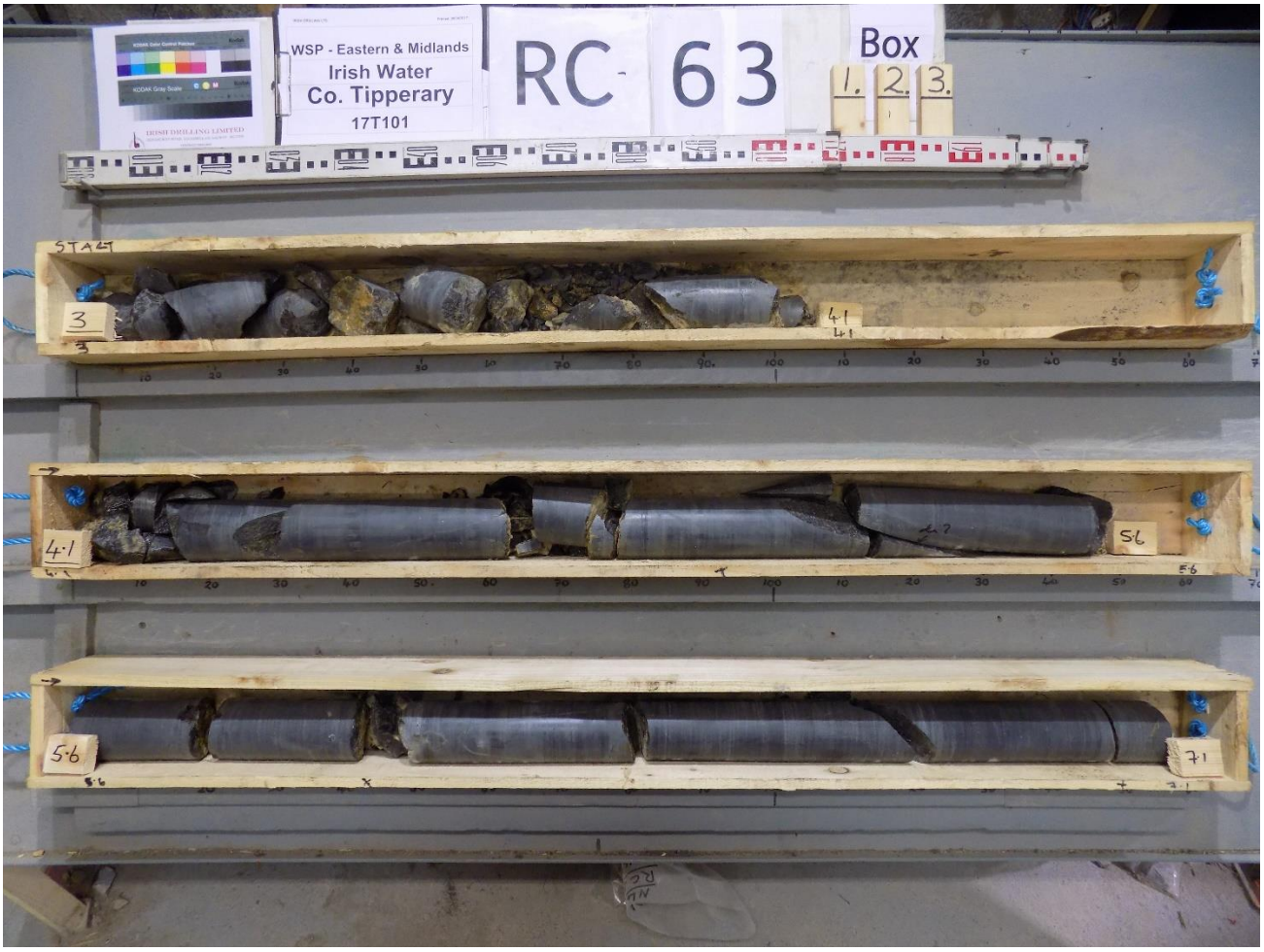

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 4 5
Box
4. 5. 6.

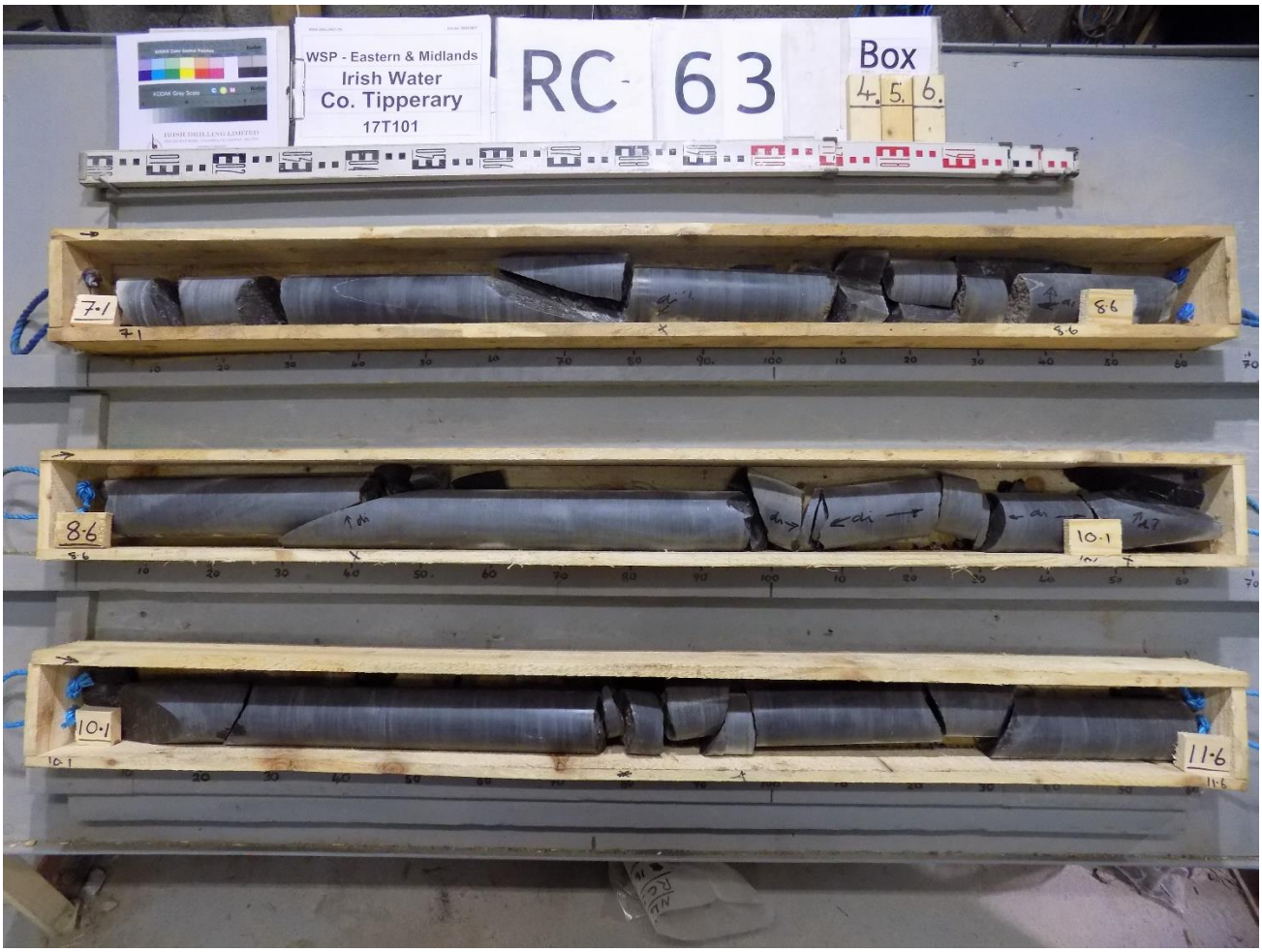

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 4 6
Box
1. 2. 3.

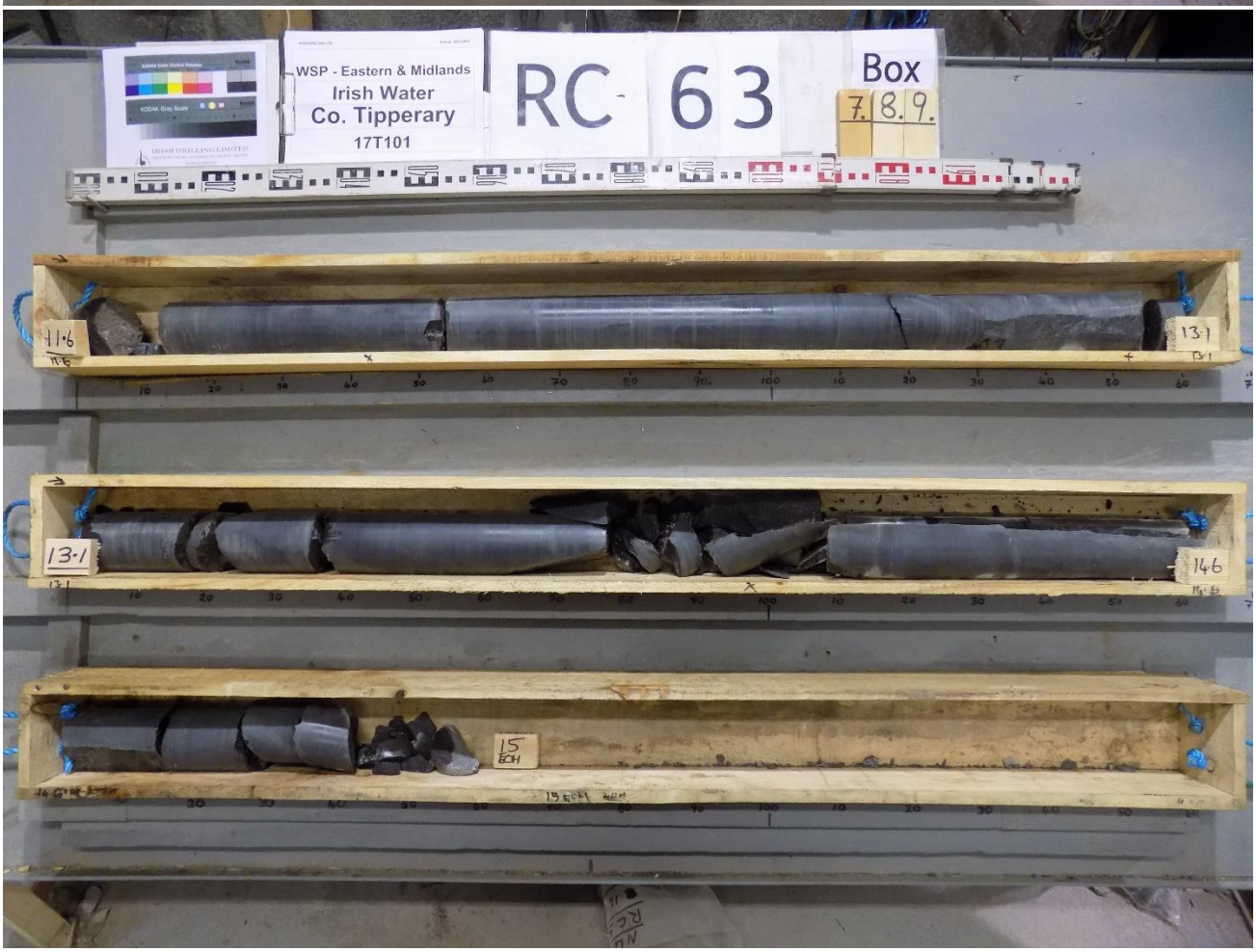

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC - 61
Box
1. 2. 3.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC - 61
Box
4. 5. 6.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 61
Box
7. 8. 9.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 63
Box
1. 2. 3.

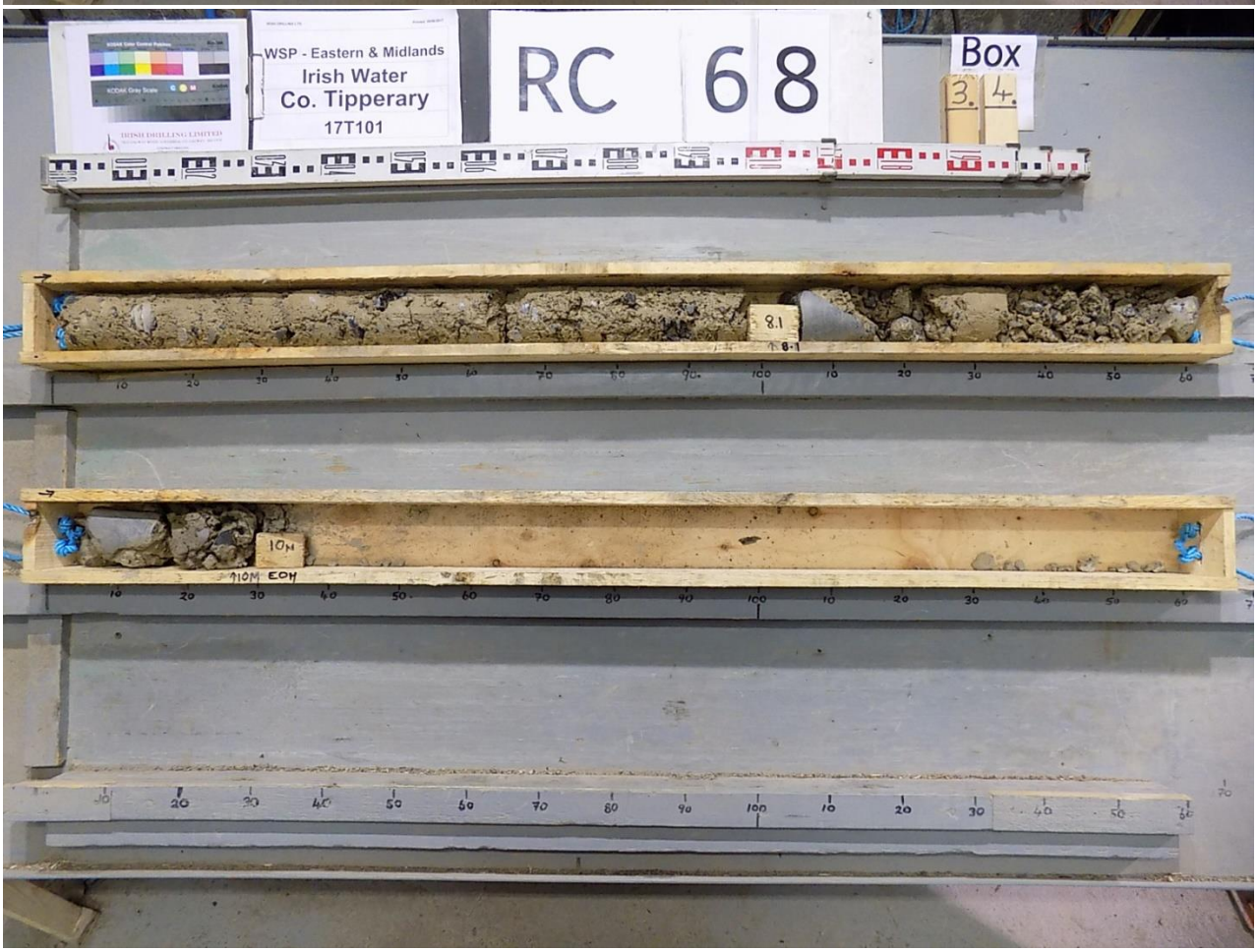

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 63
Box
4. 5. 6.
7.1
8.6
8.6
10.1
10.1
11.6

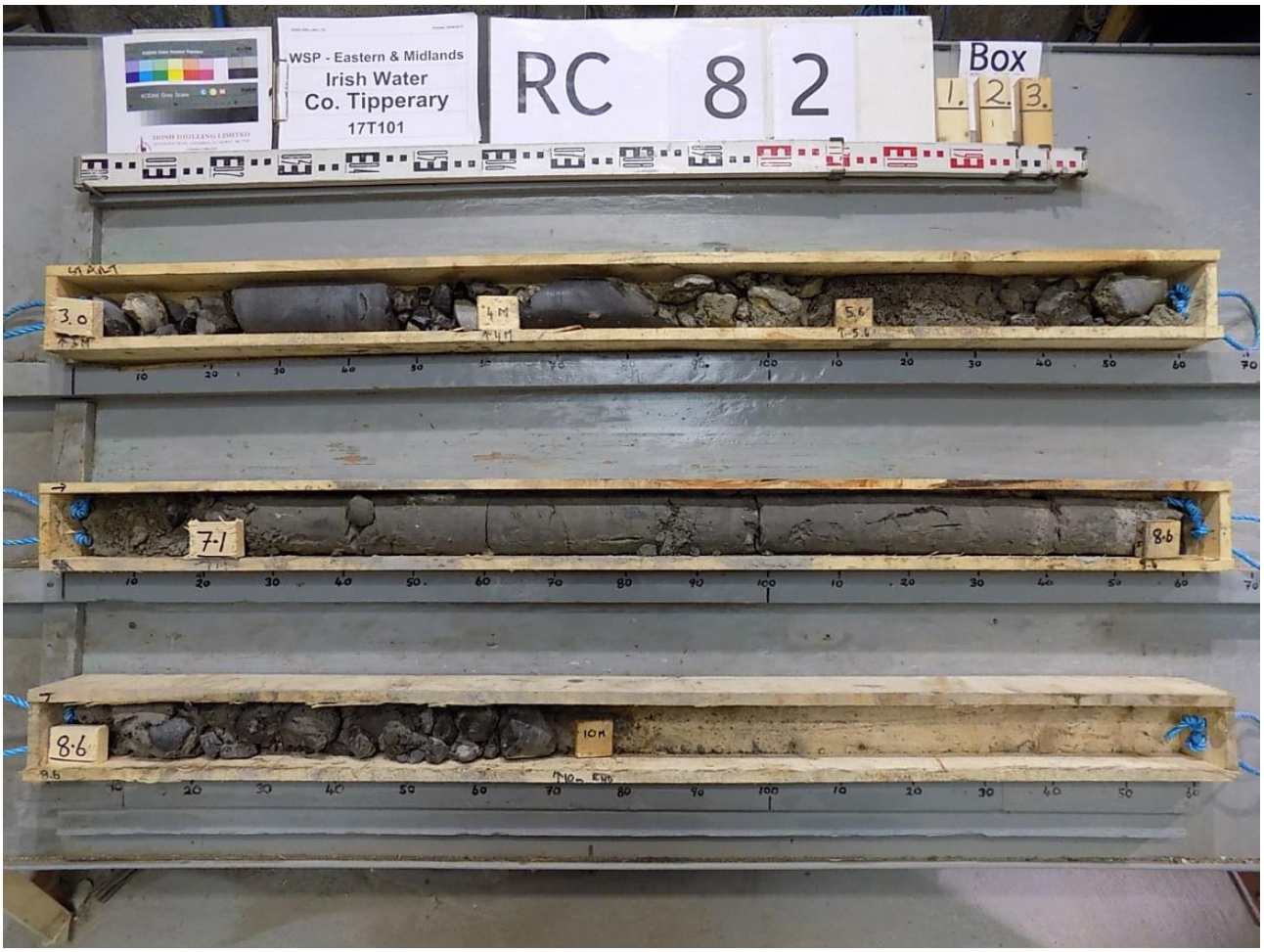

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 63
Box
7. 8. 9.
11.6
13.1
13.1
14.6
15
EOH

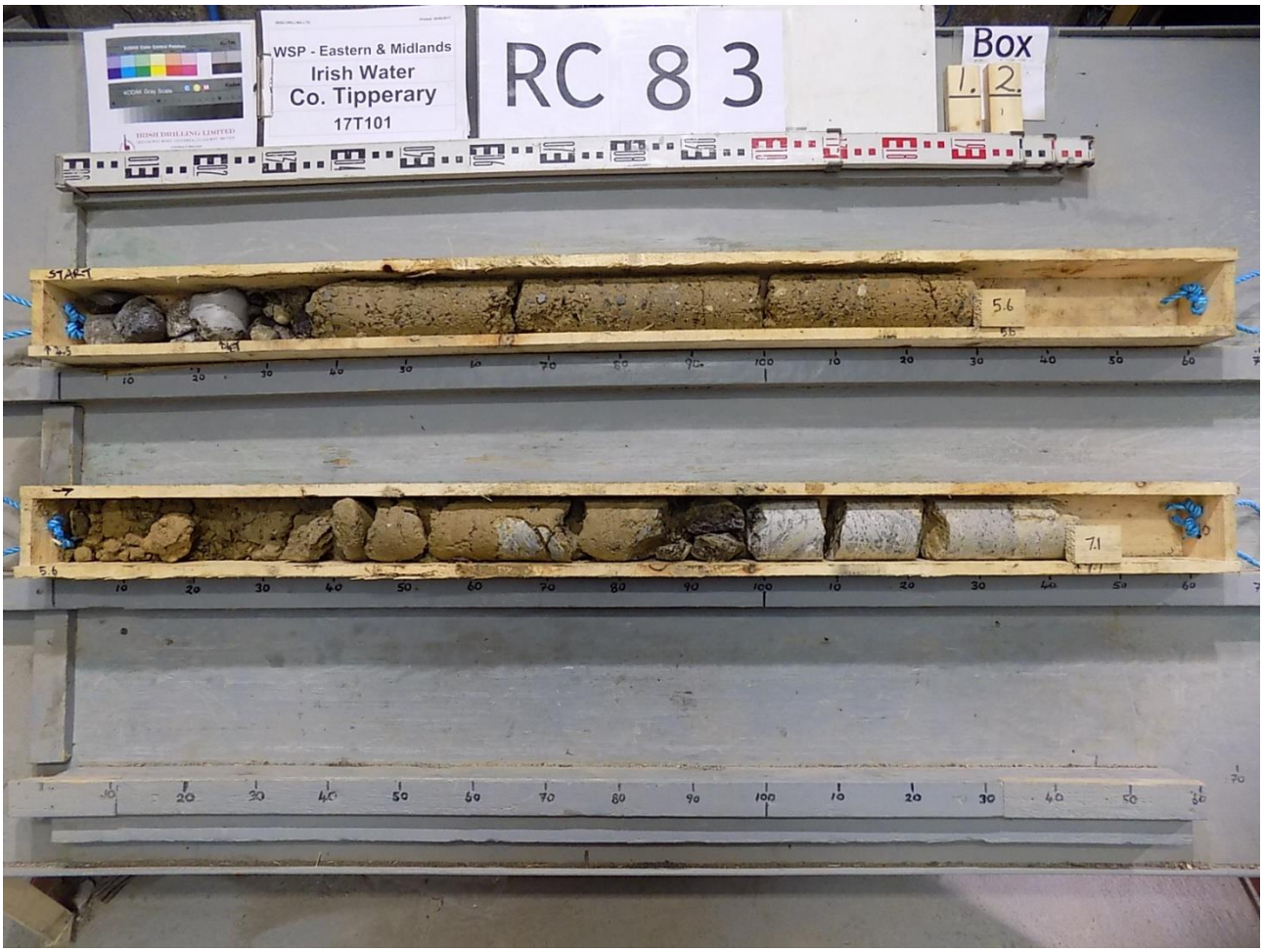

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 67
Box
1. 2. 3.
START
2-1
3.6
3·6
5·1
5·1
6.6

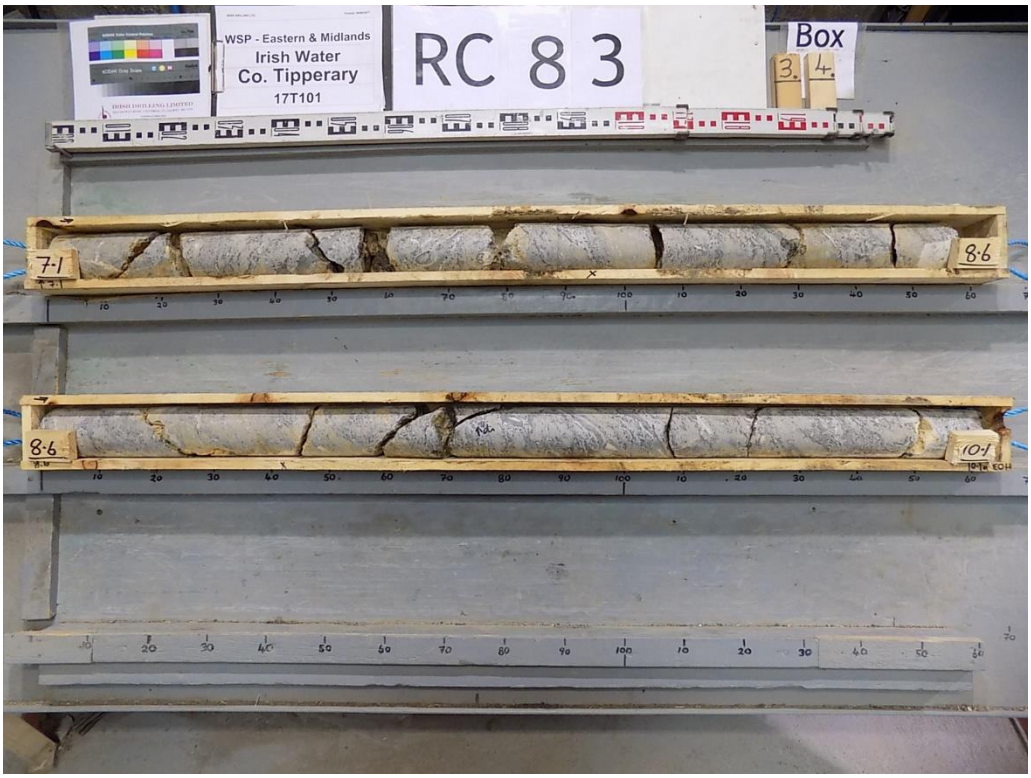

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 67
Box
4. 5. 6.
6·6
8·1
8·1
9.6
9·6
10
10m EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 68
Box
1. 2.
START
5.1
6.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 68
Box
3. 4.
8.1
10M
10M EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 8 2
Box
1. 2. 3.

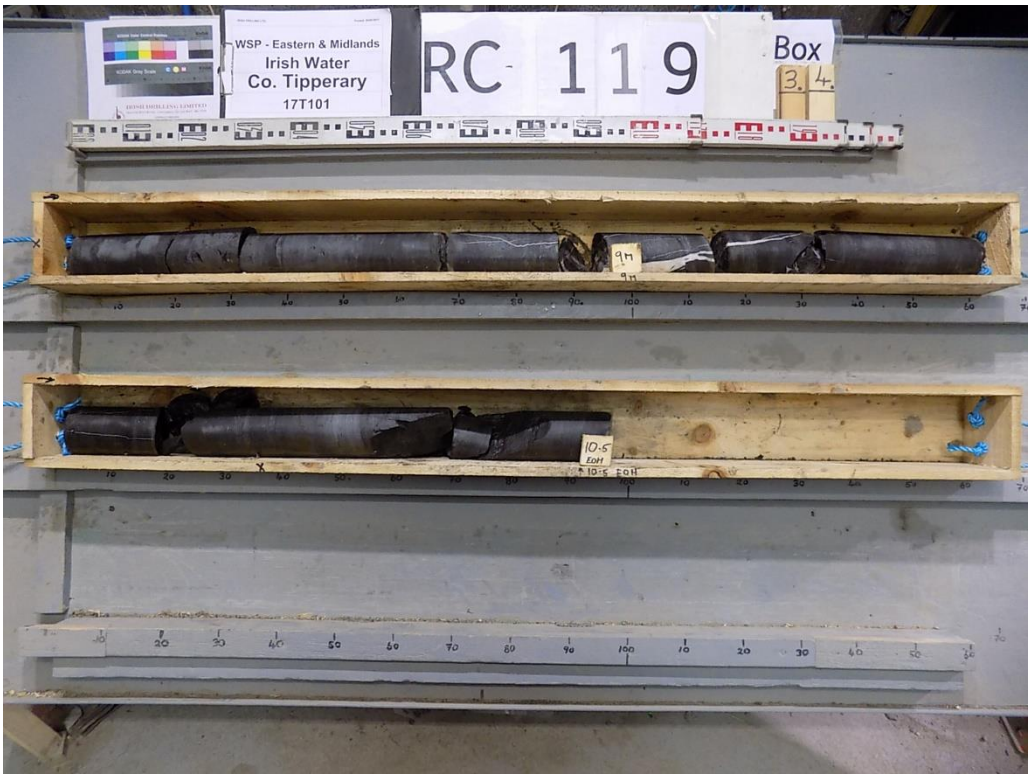

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 8 3
Box
1. 2.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 8 3
Box
3.
4.
7·1
8·6
8·6
10·1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 1 8
Box
1.
2.
3·0
4·1
5·6
7·1

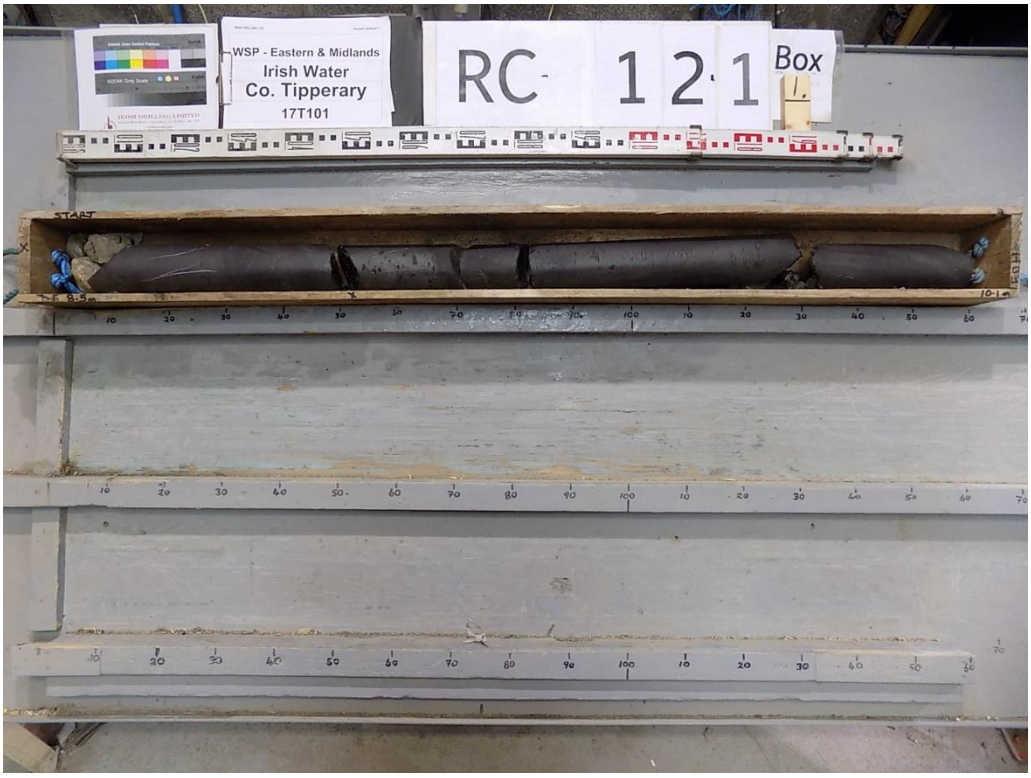

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 118
Box
3.4
8.6
10.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 119
Box
1.2
3.0
4.5
7.5


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 119
Box
3.
4.

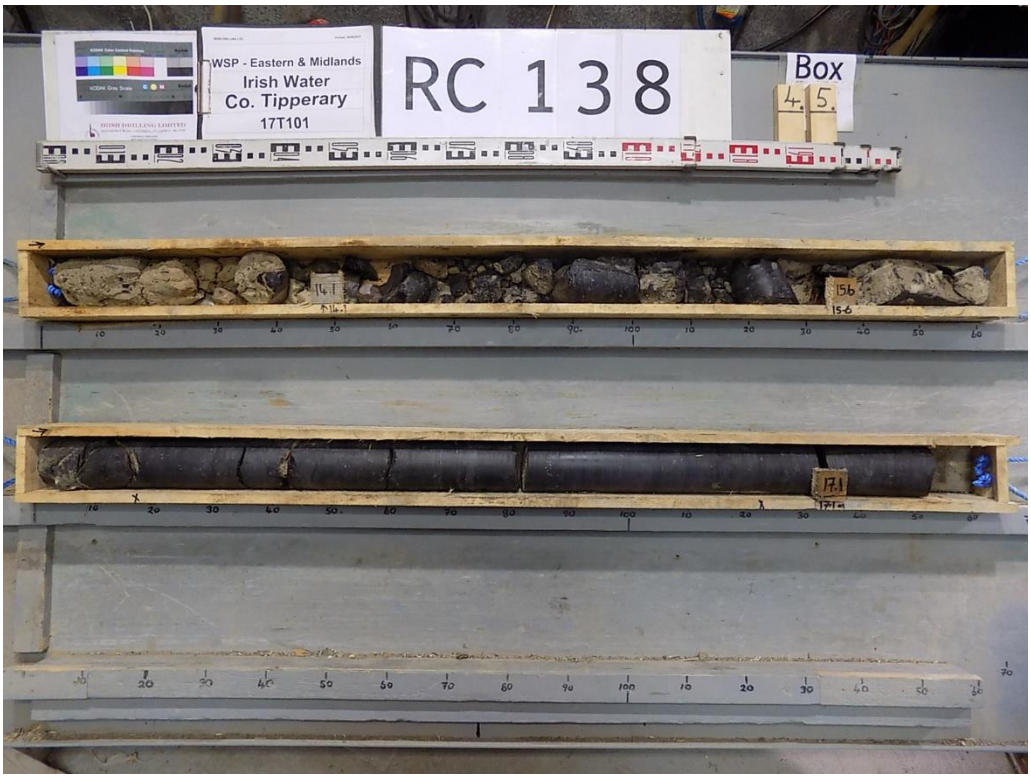

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 120
Box
1.
2.
3.

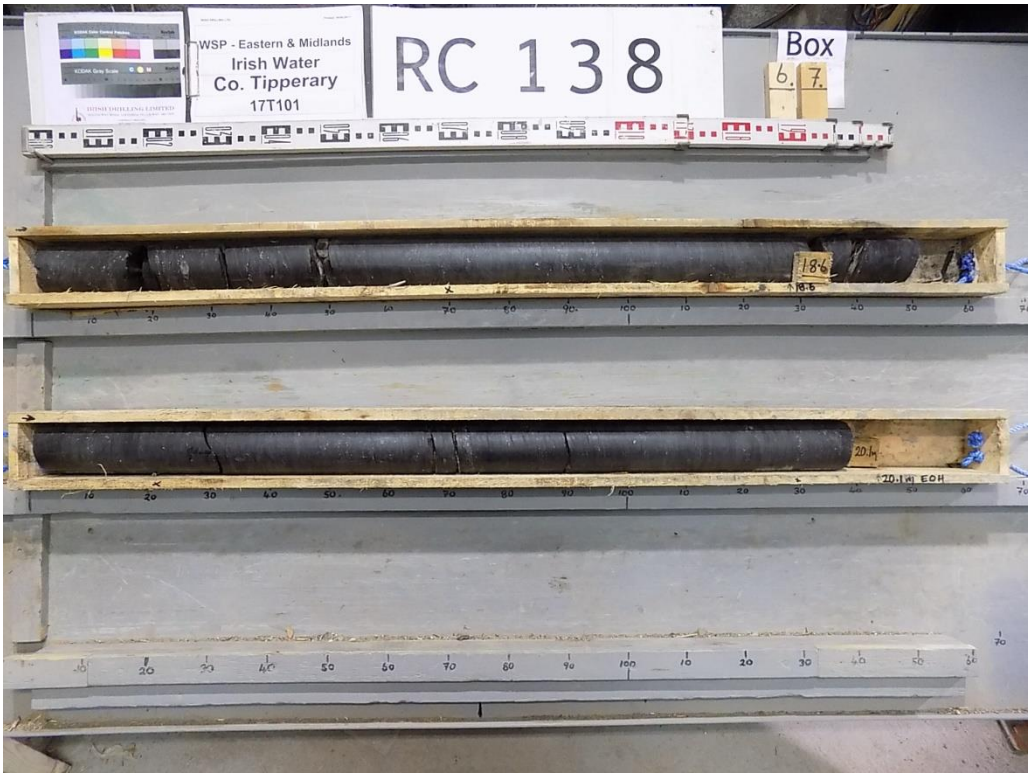

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 120
Box
4.5.6.
5.6
7.1
7.1
8.6
8.6
10.1m
EOH

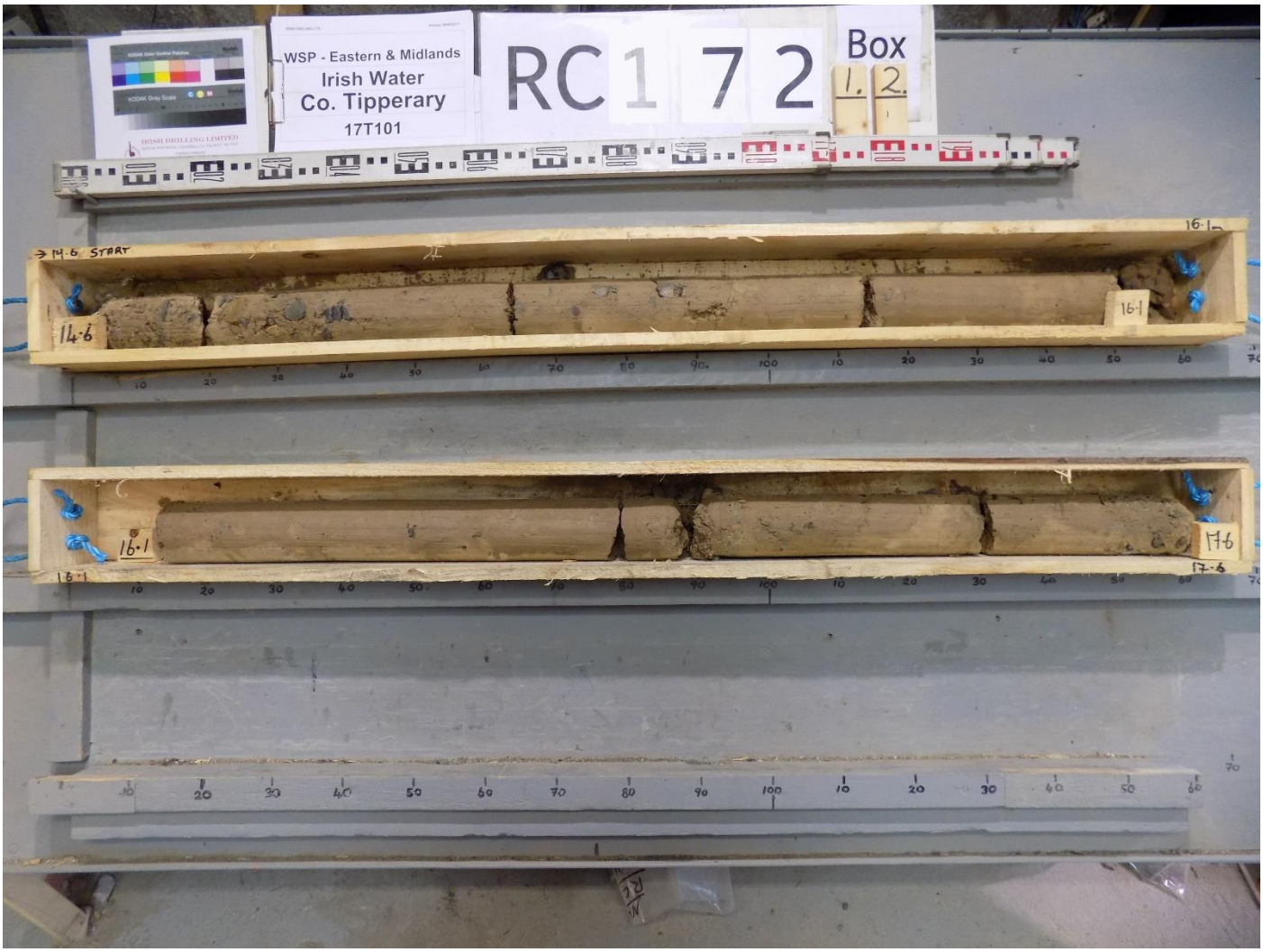

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 121
Box
1.
START

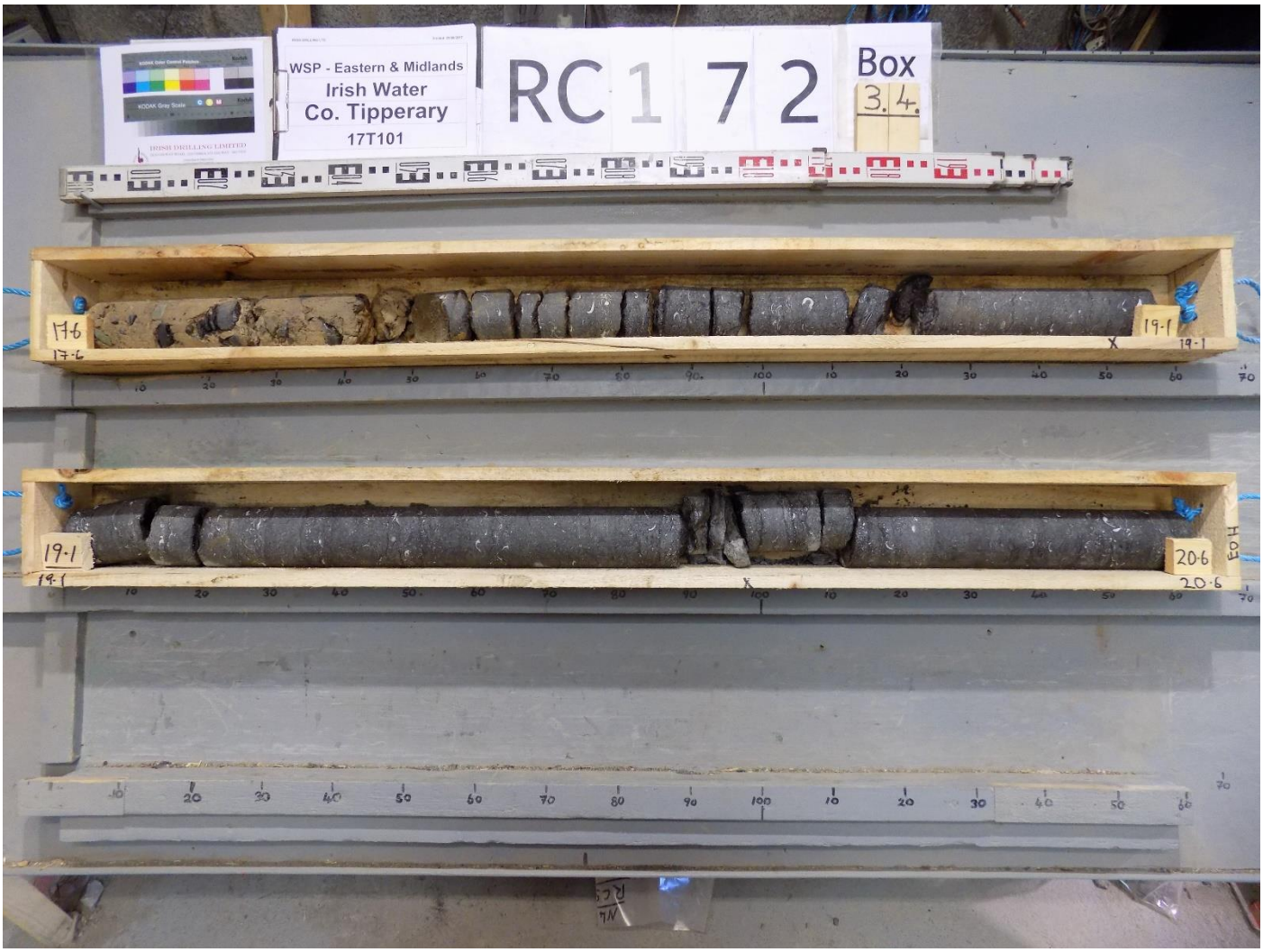

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 122
Box
1.
7.1
8.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 138
Box
1. 2. 3.
6.6
8.1
9.6
11.1
12.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 138
Box
4.
5.

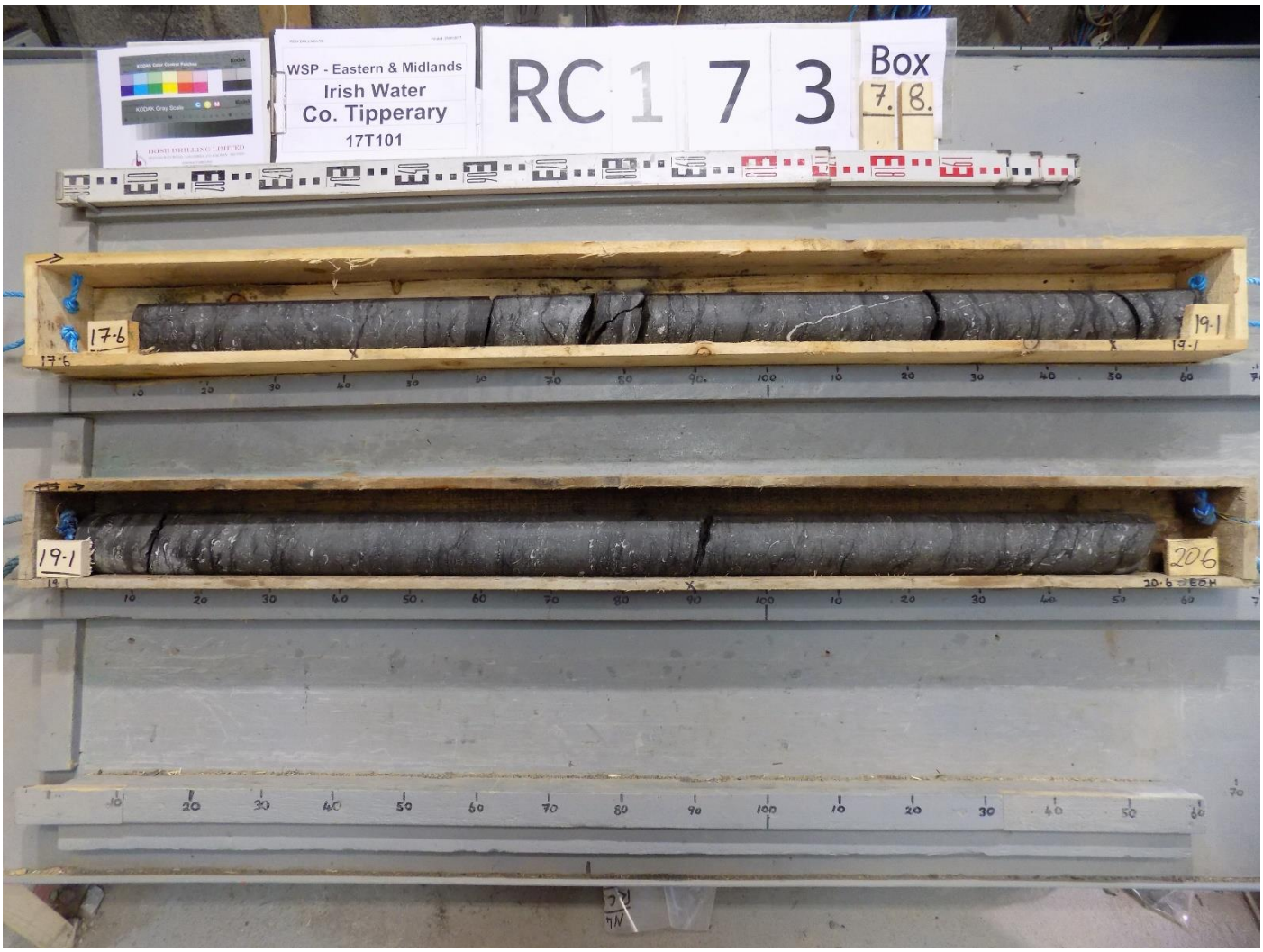

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 138
Box
6.
7.

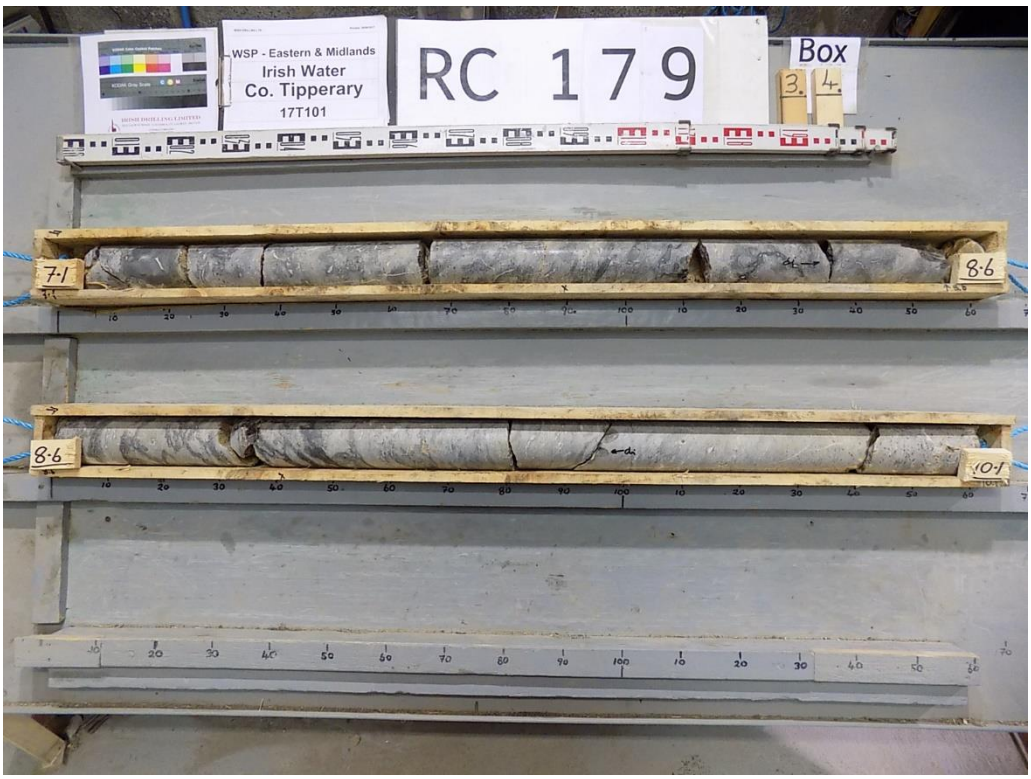

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 7 2
Box
1.
2.
14.6 START
14.6
16.1
16.1
16.1
17.6
17.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 7 2
Box
3.4.
17.6
19.1
19.1
20.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 7 3
Box
1. 2. 3.
86
10·1
10·1
11·6
11·6
13·1

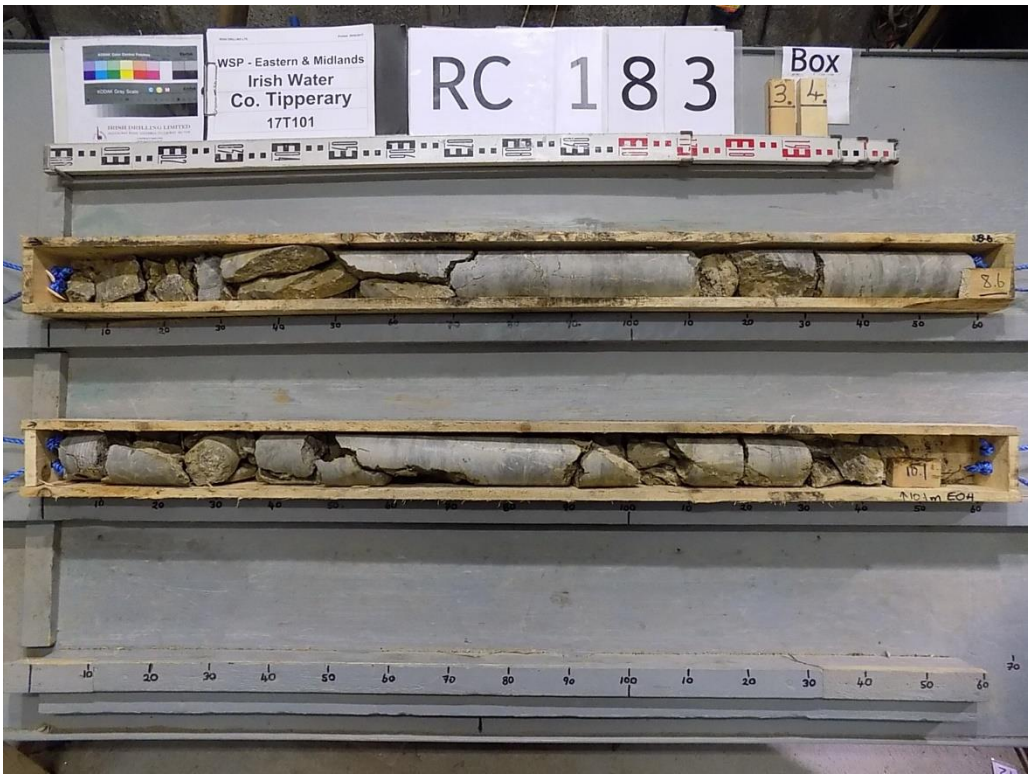

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 7 3
Box
4. 5. 6.
13-1
14-6
14-6
14-6
16-1
16-1
16-1
17-6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 7 3
Box
7.
8.
17.6
19.1
19.1
20.6

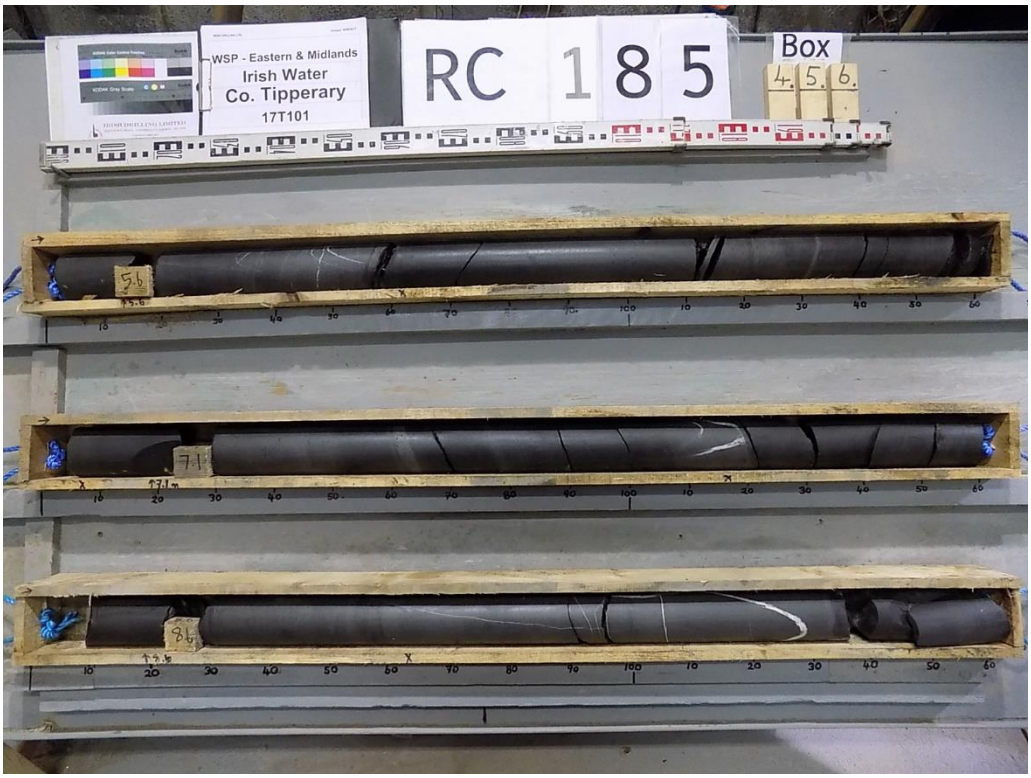

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 1 7 9
Box
3.
4.
7.1
8.6
8.6
10.1

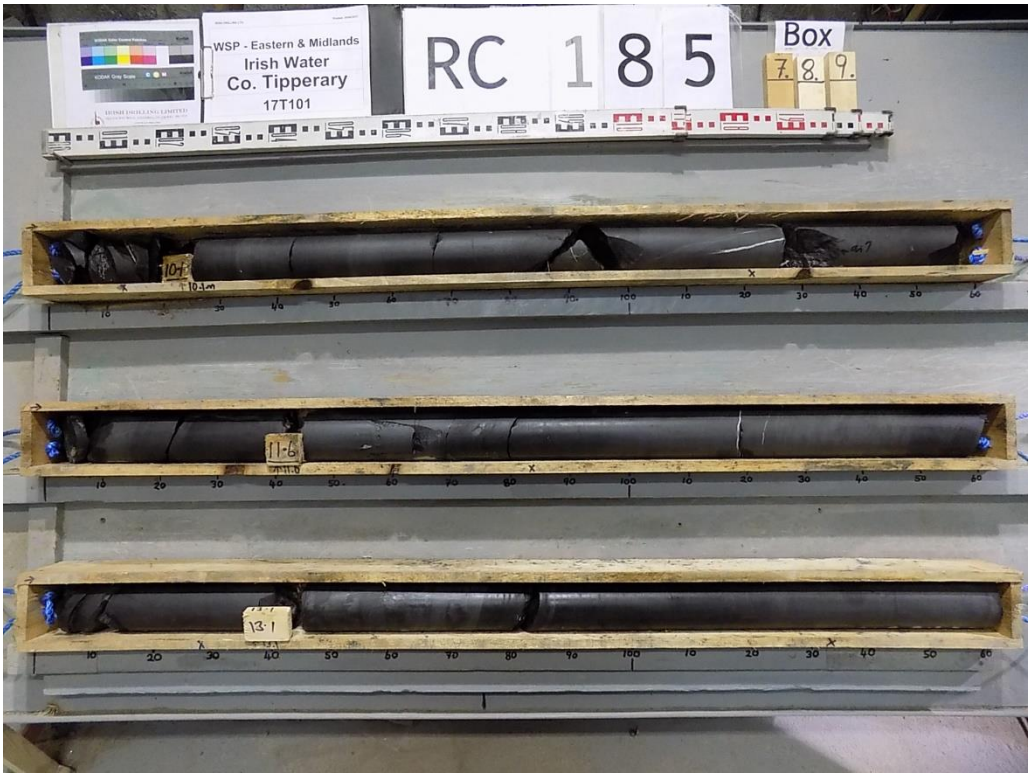

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 179
Box
1. 2.
4-1
5-6
7-1

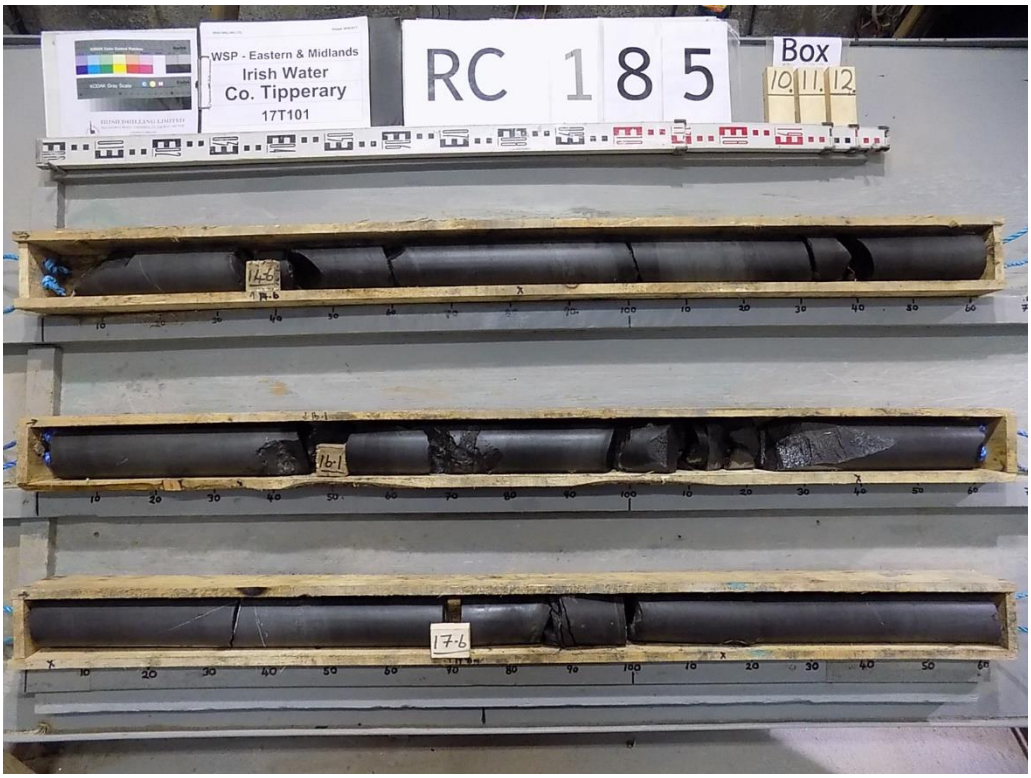

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 183
Box
1. 2.
4-1
5-6
7-1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 183
Box
3.
4.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 185
Box
1.
2.
3.

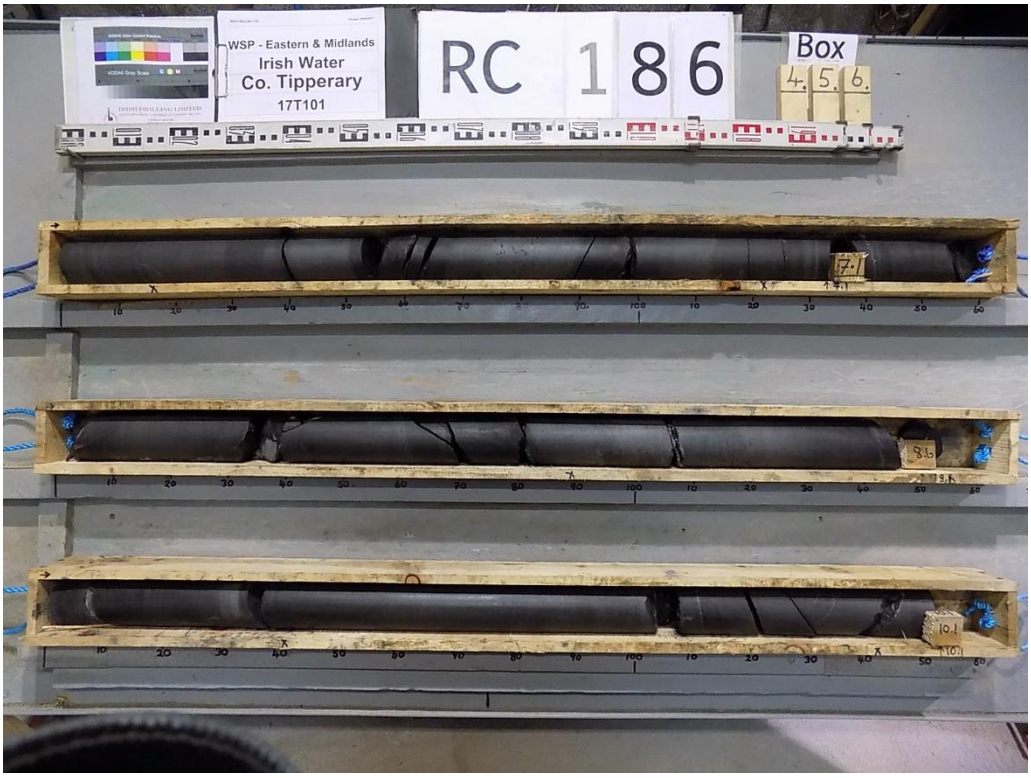

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 185
Box
4. 5. 6.

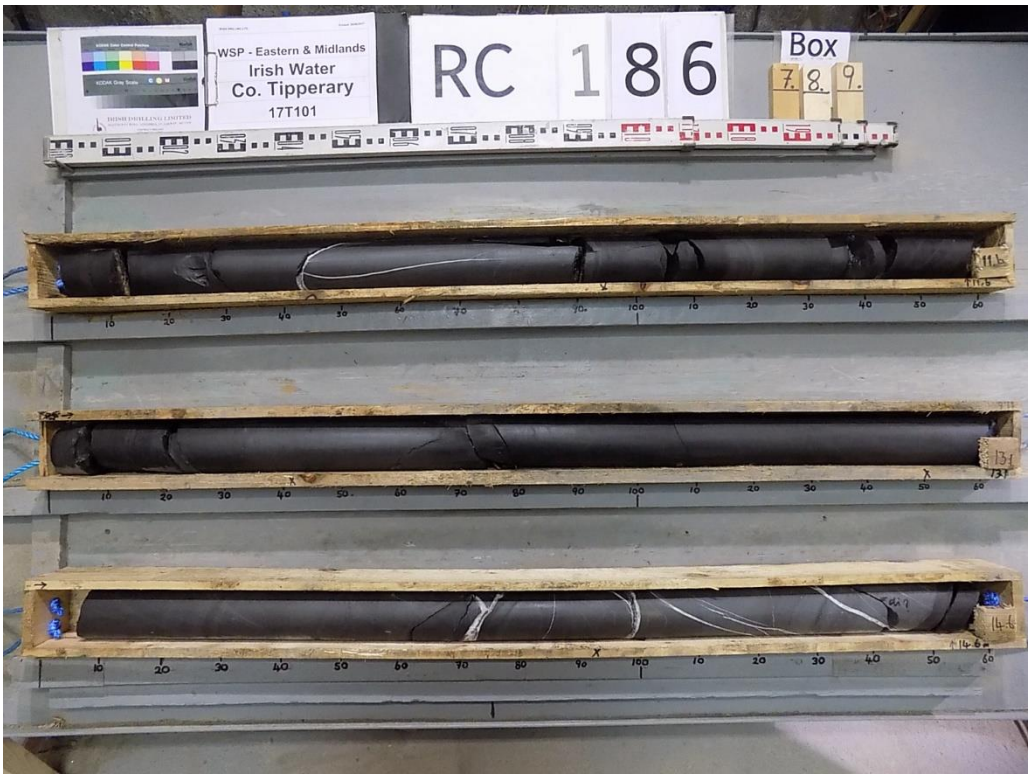

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 185
Box
7. 8. 9.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 185
Box
10.11.12
16.6
16.1
17.6

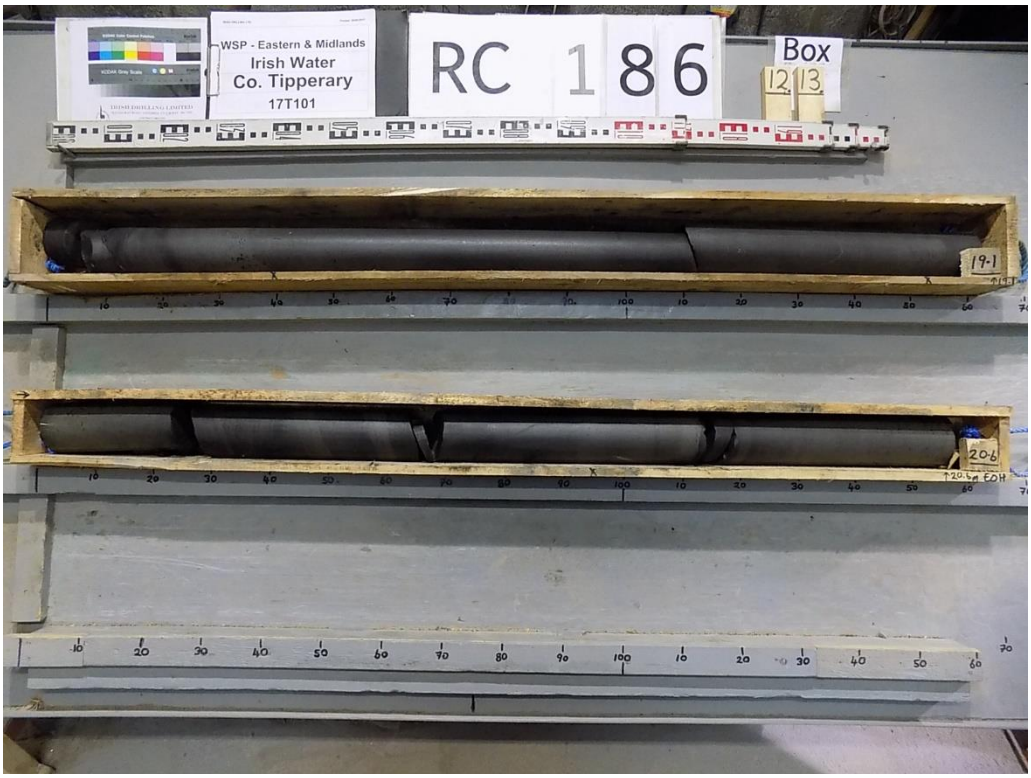

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 185
Box
13.14
19.1
20.6
20.6m EOH

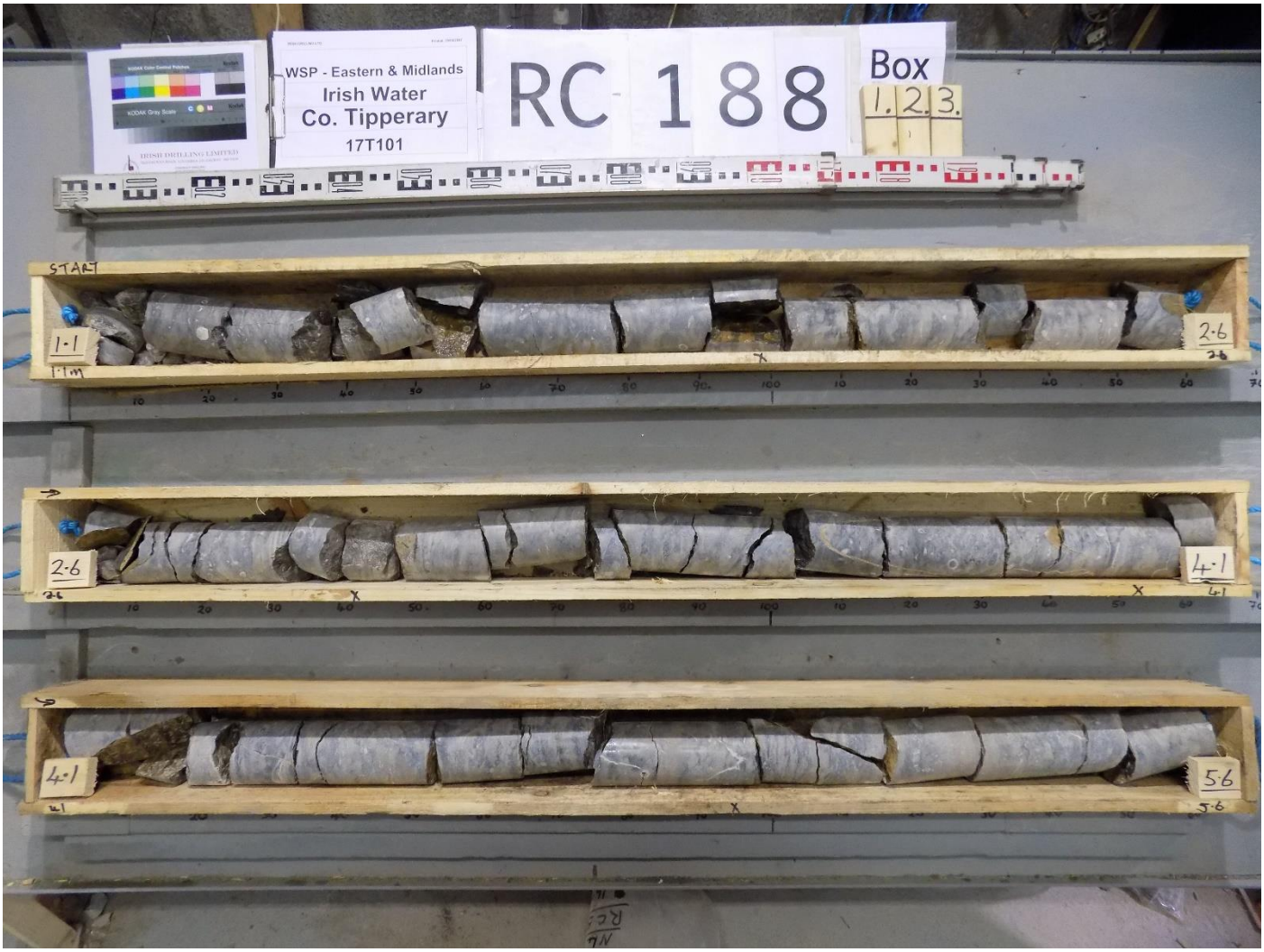

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 186
Box
1. 2. 3.

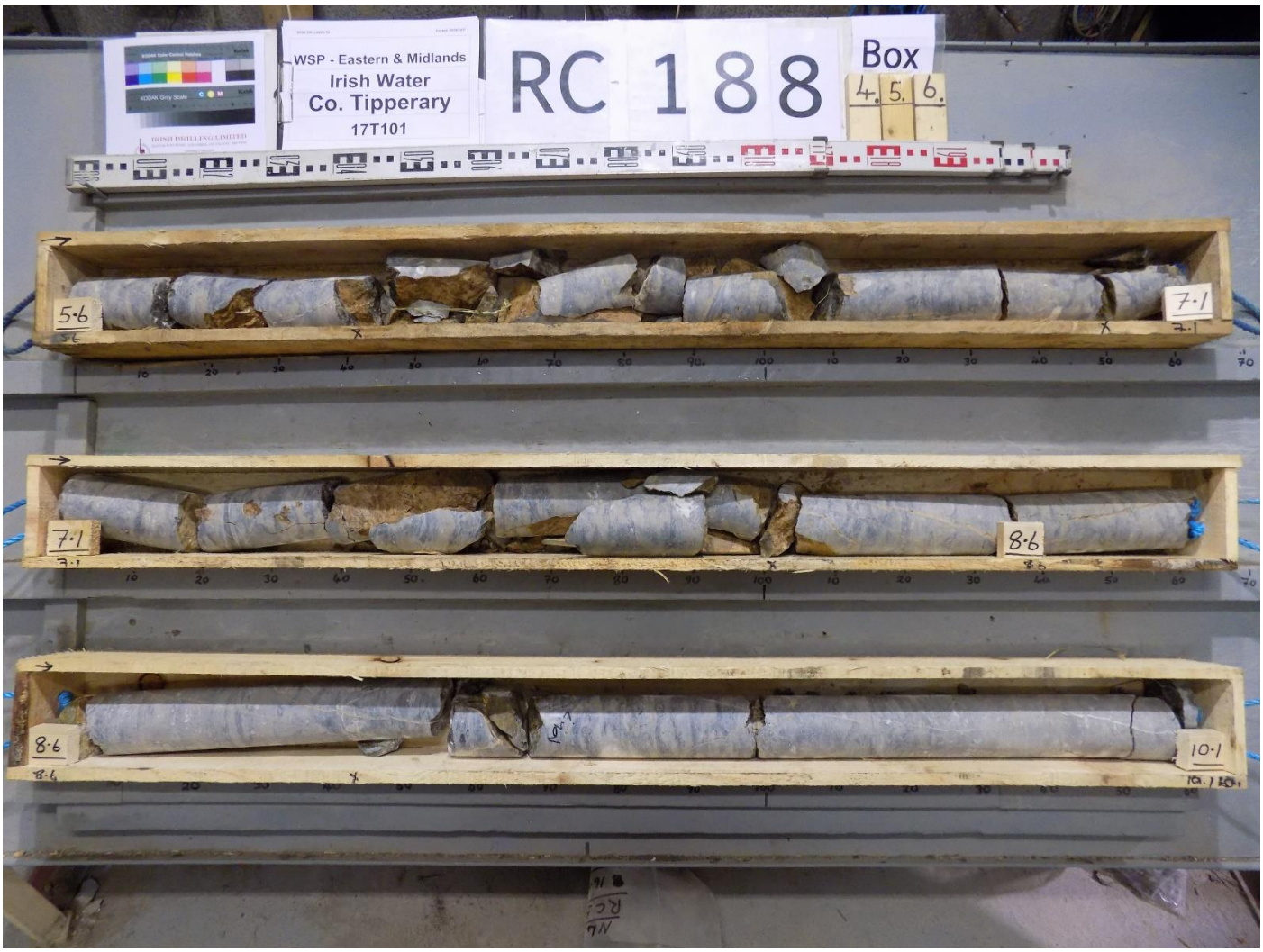

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 186
Box
4. 5. 6.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 186
Box
7. 8. 9.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 186
Box
10. 11.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 186
Box
12 13
19-1
20-6
20.6m EOH

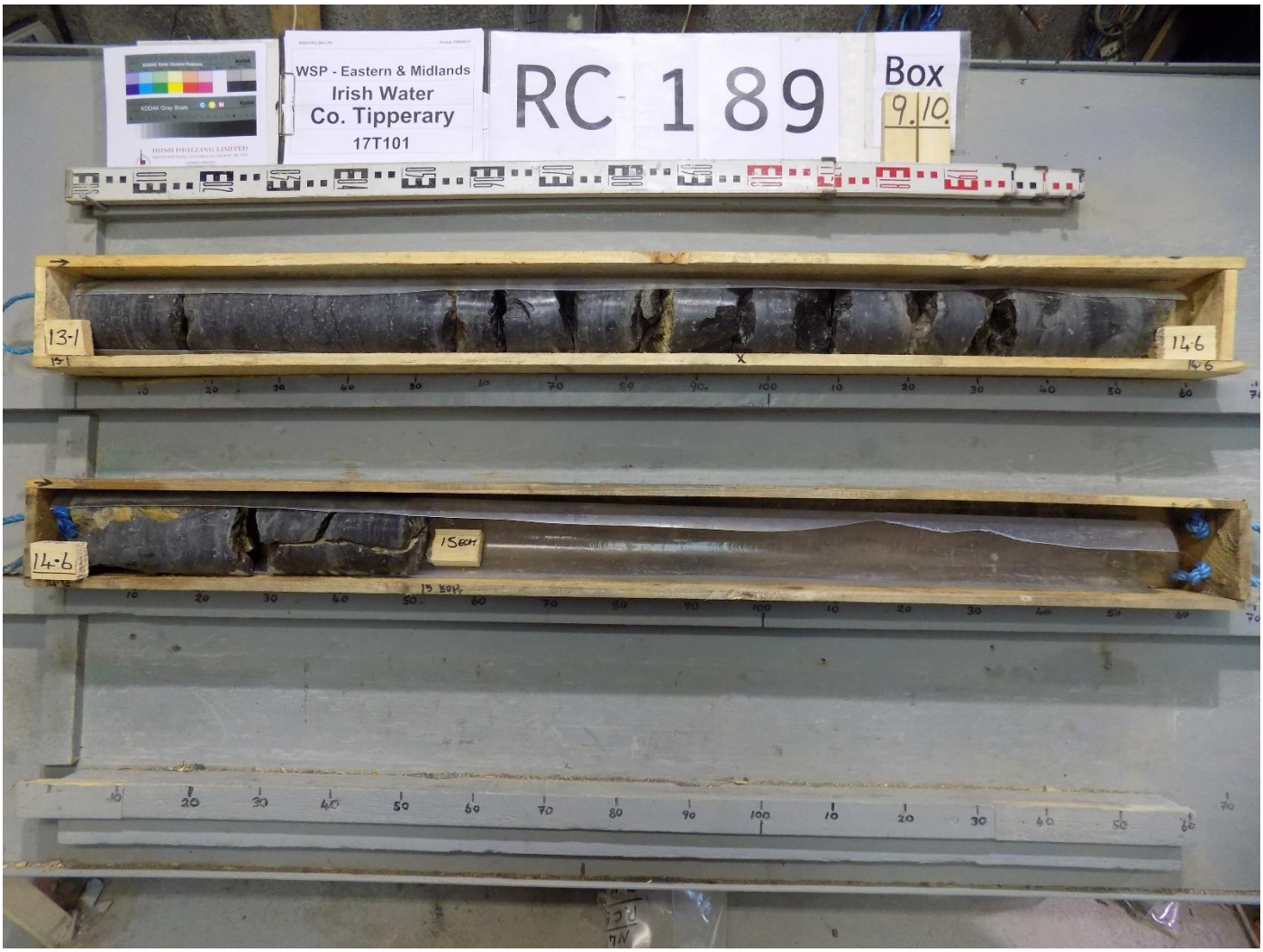

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 188
Box
1 2 3
START
1-1
2-6
2-6
4-1
4-1
5-6

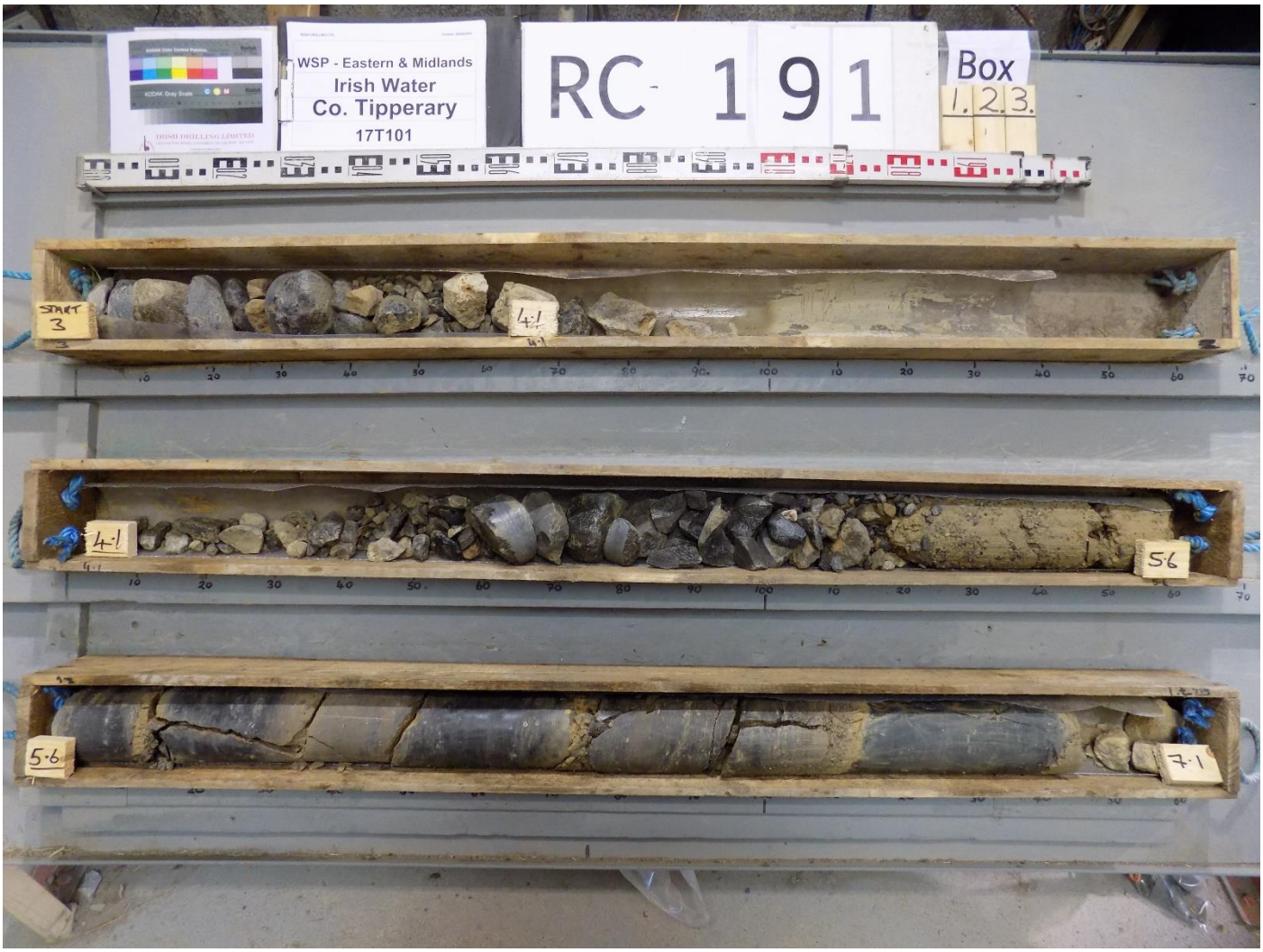

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 188
Box
4. 5. 6.
5·6
7·1
7·1
8·6
8·6
10·1

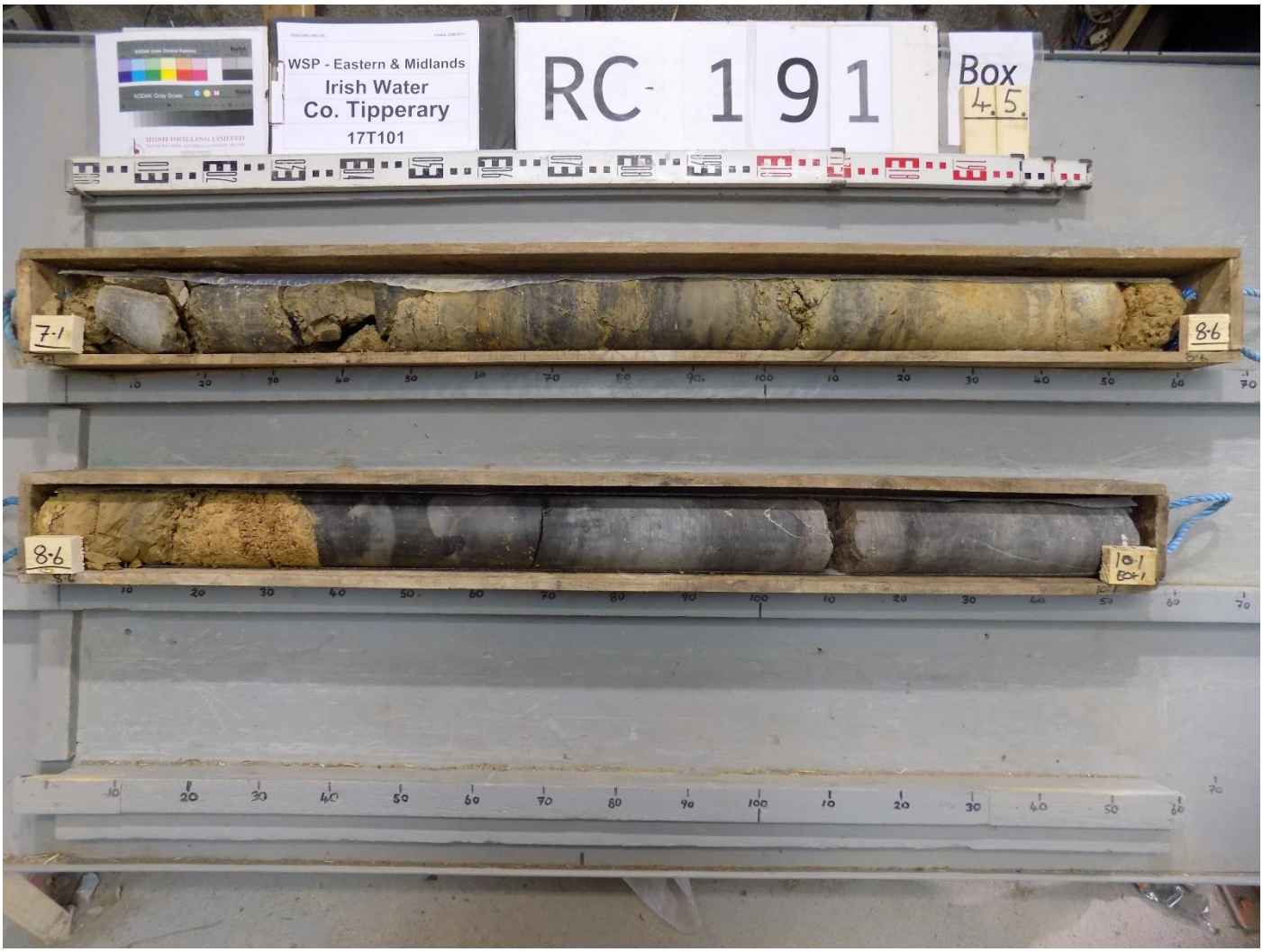

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 189
Box
1.2.3.
START
1.5
2.6
4.1
5.6

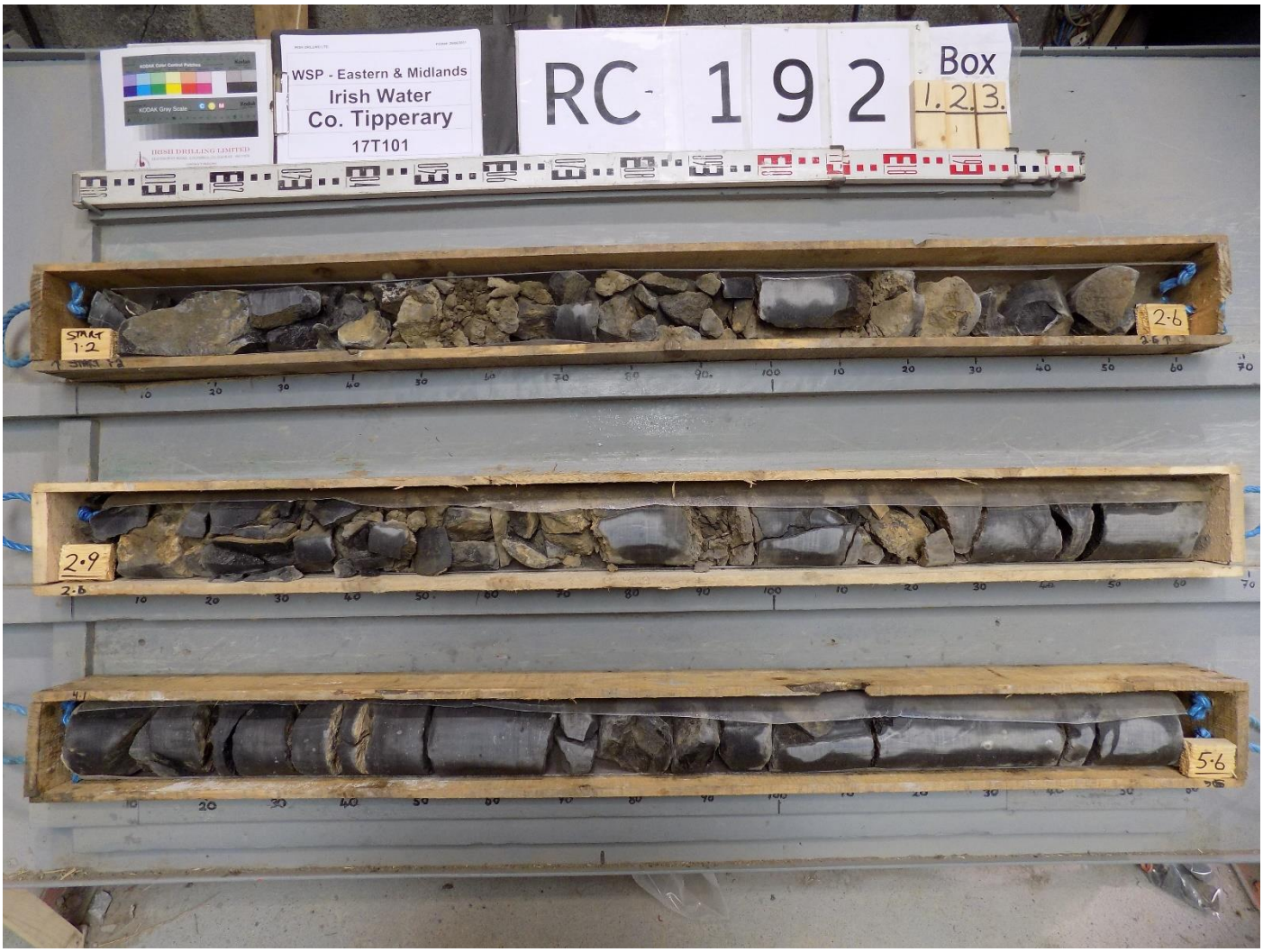

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 189
Box
4. 5. 6.
5.6
7.1
7.1
8.6
8.6
10.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 189
Box
7.8.
10·1
11·6
11·6
13·1

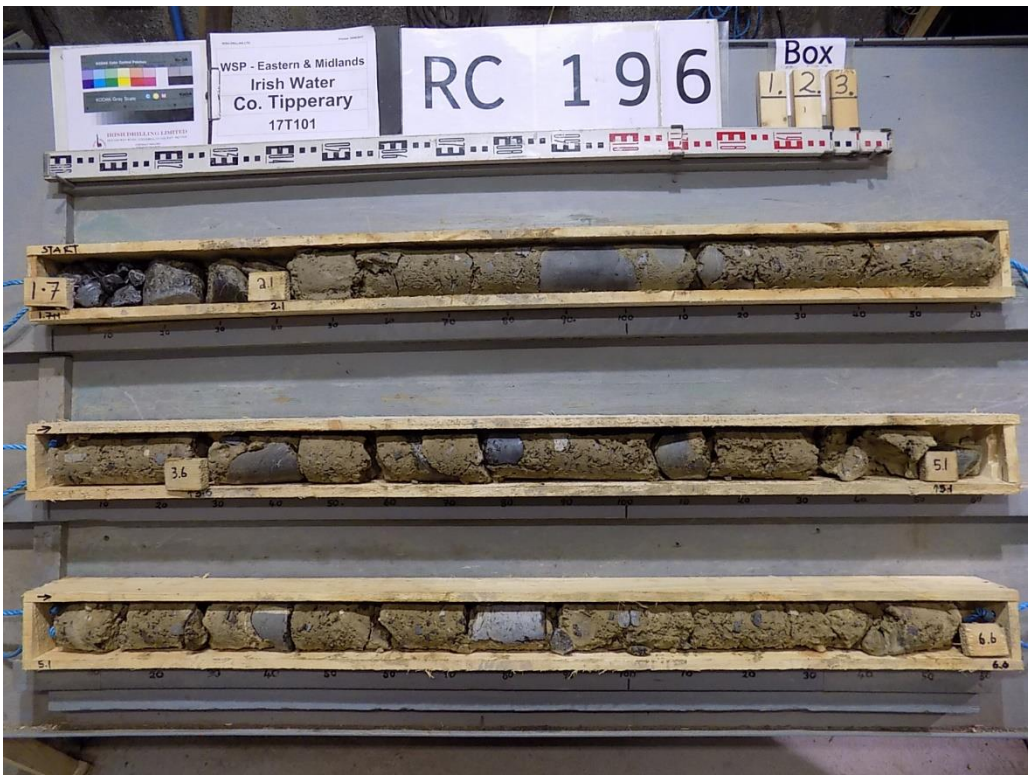

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 189
Box
9.10
13-1
14.6
14.6
15 BOX


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC- 191
Box
1.2.3.
START
3
4.1
4.1
5.6
5.6
7.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC- 191
Box
4.5
7.1
8.6
8.6
10.1

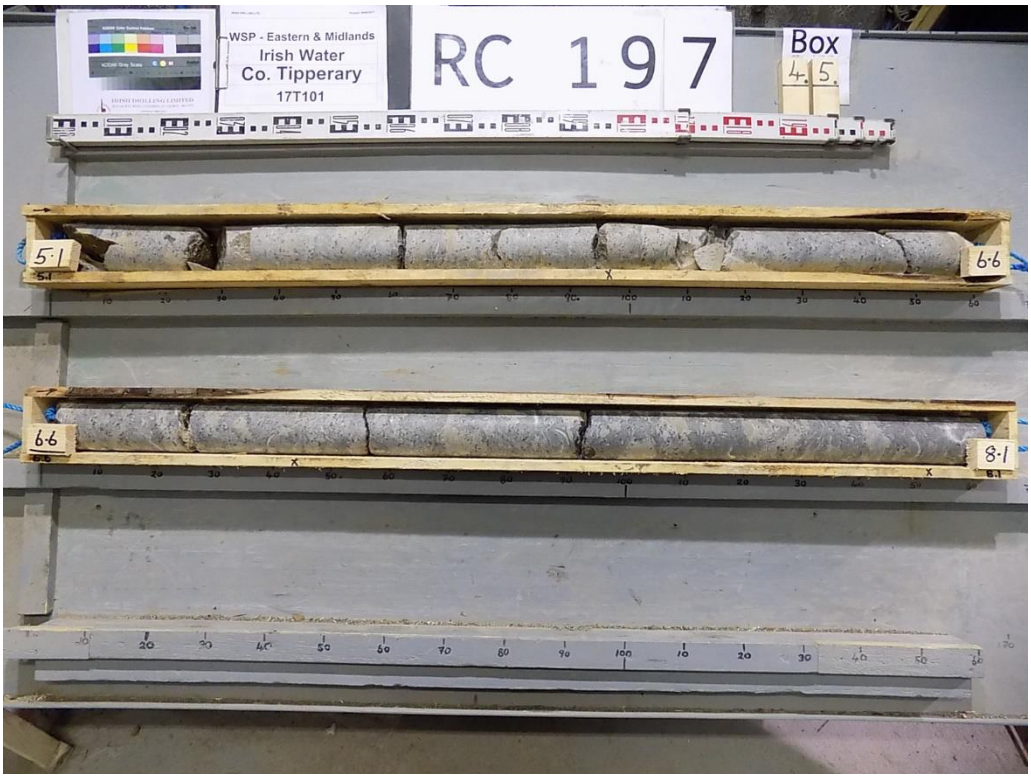

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 192
Box
1.2.3.
START 1.2
2.6
2.9
5.6

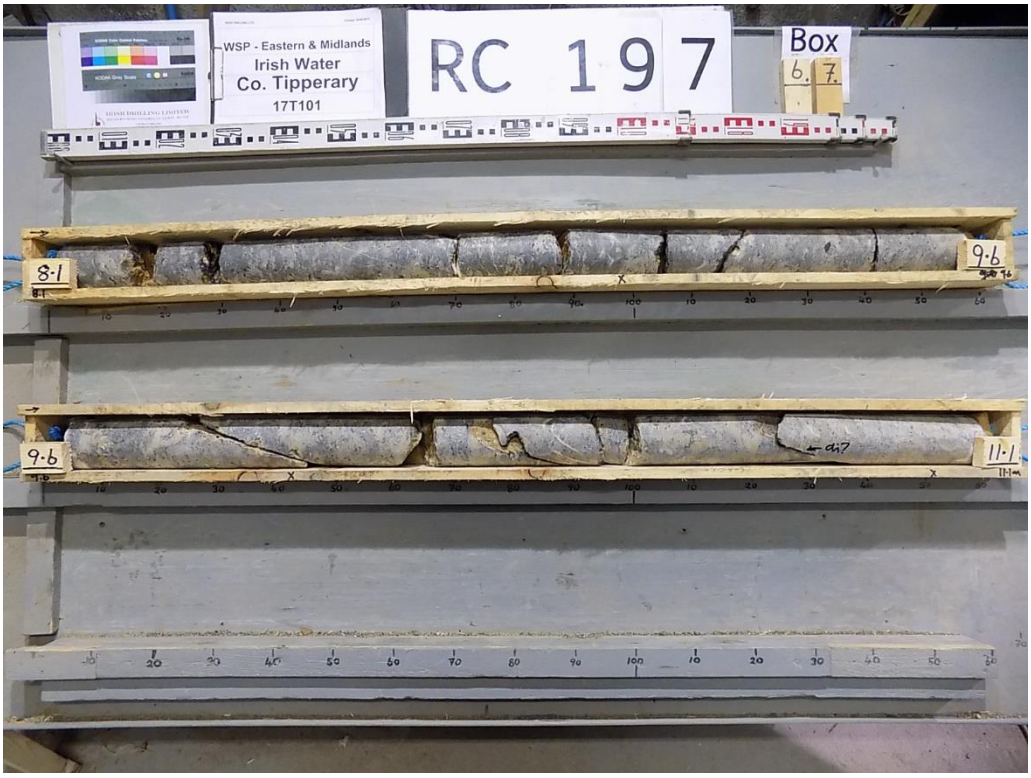

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 192
Box
4. 5. 6.
5·6
7·1
7·1
8·6
8·6
10·1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 196
Box
1. 2. 3.
1·7
3.6
5.1
6.6

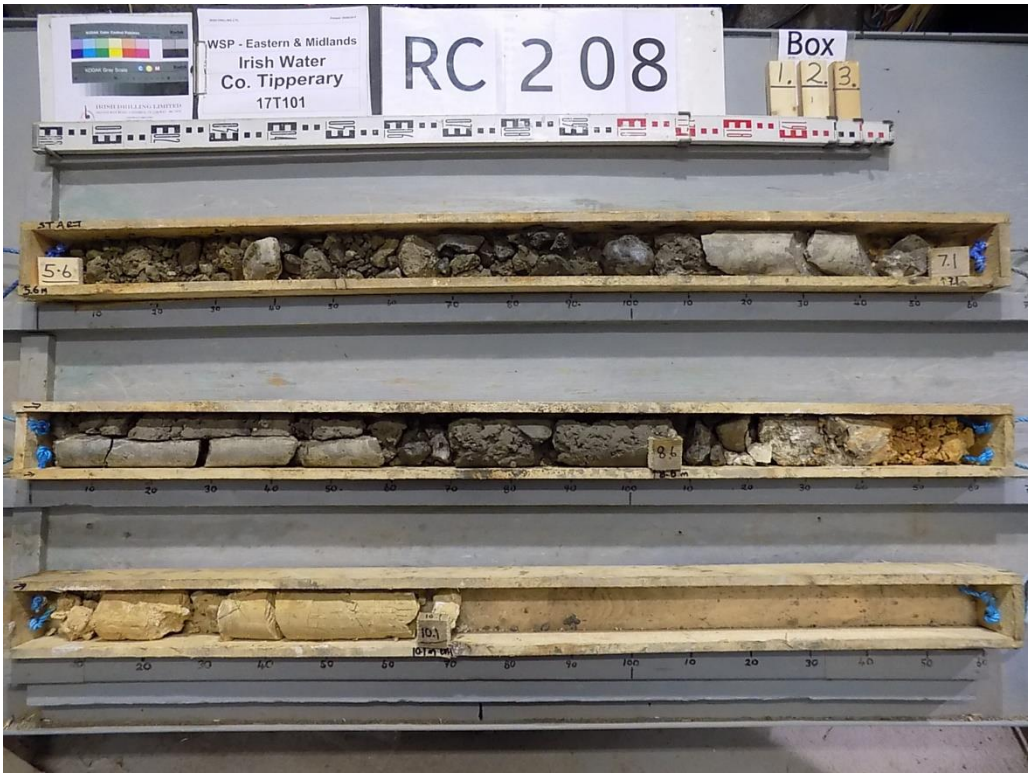

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 196
Box
4.
5.

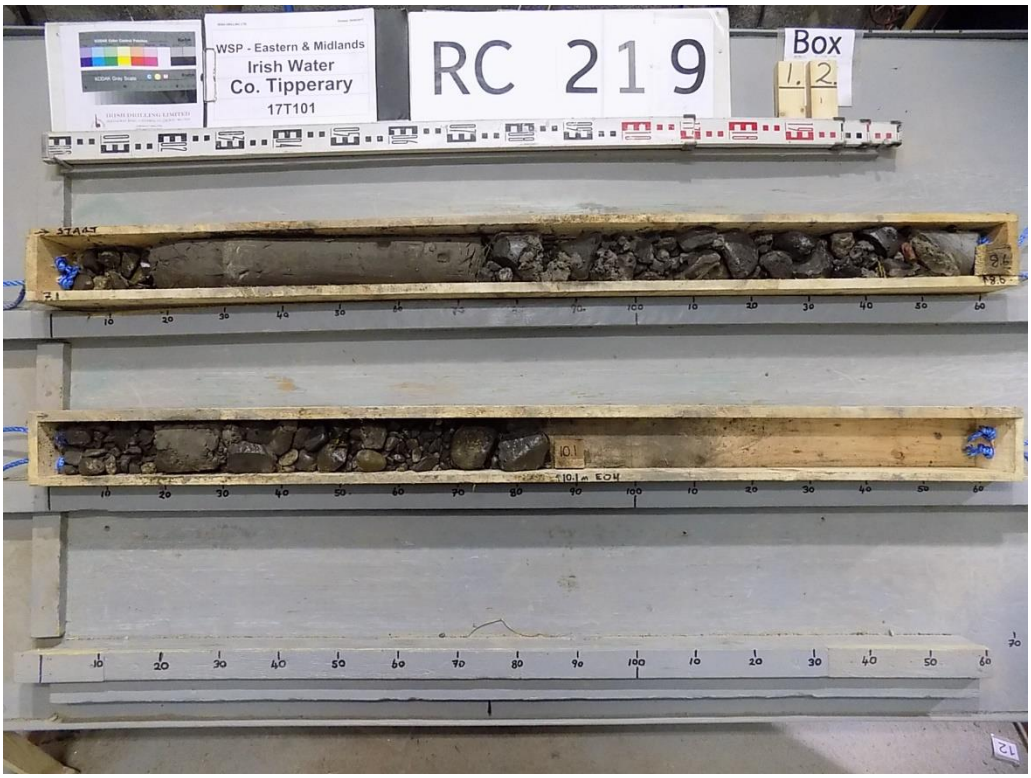

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 197
Box
1.
2.
3.
START


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 197
Box
4.5
5.1
6.6
6.6
8.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 197
Box
6.7
8.1
9.6
9.6
11.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 207
Box
1.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 208
Box
1. 2. 3.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 219
Box
1. 2.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 223
Box
1. 2. 3.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 223
Box
4.5.6.
7.1
8.6
10.1

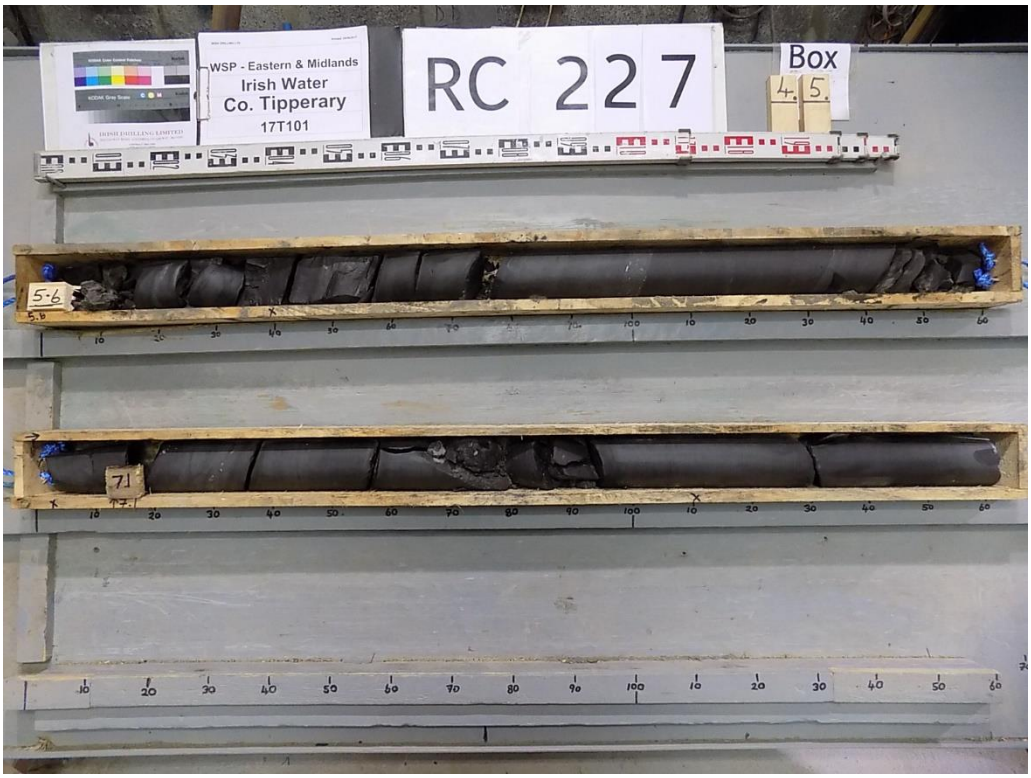

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 224
Box
1.2.
7M
8.6
8.6
10.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 225
Box
1.2.
7.5
8.6
10.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 226
Box
1.2.3.
1.5


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 226
Box
4. 5. 6.
7.1
8.6
10.1
EOH


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 227
Box
1. 2. 3.
START
2.6
4.1
5.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 227
Box
4.5
5.6
7.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 227
Box
6.7
8.6
10.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 229
Box
1. 2. 3.
START


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 229
Box
4. 5. 6.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 2 31
Box
1.2.
START
7
8.6
10.1

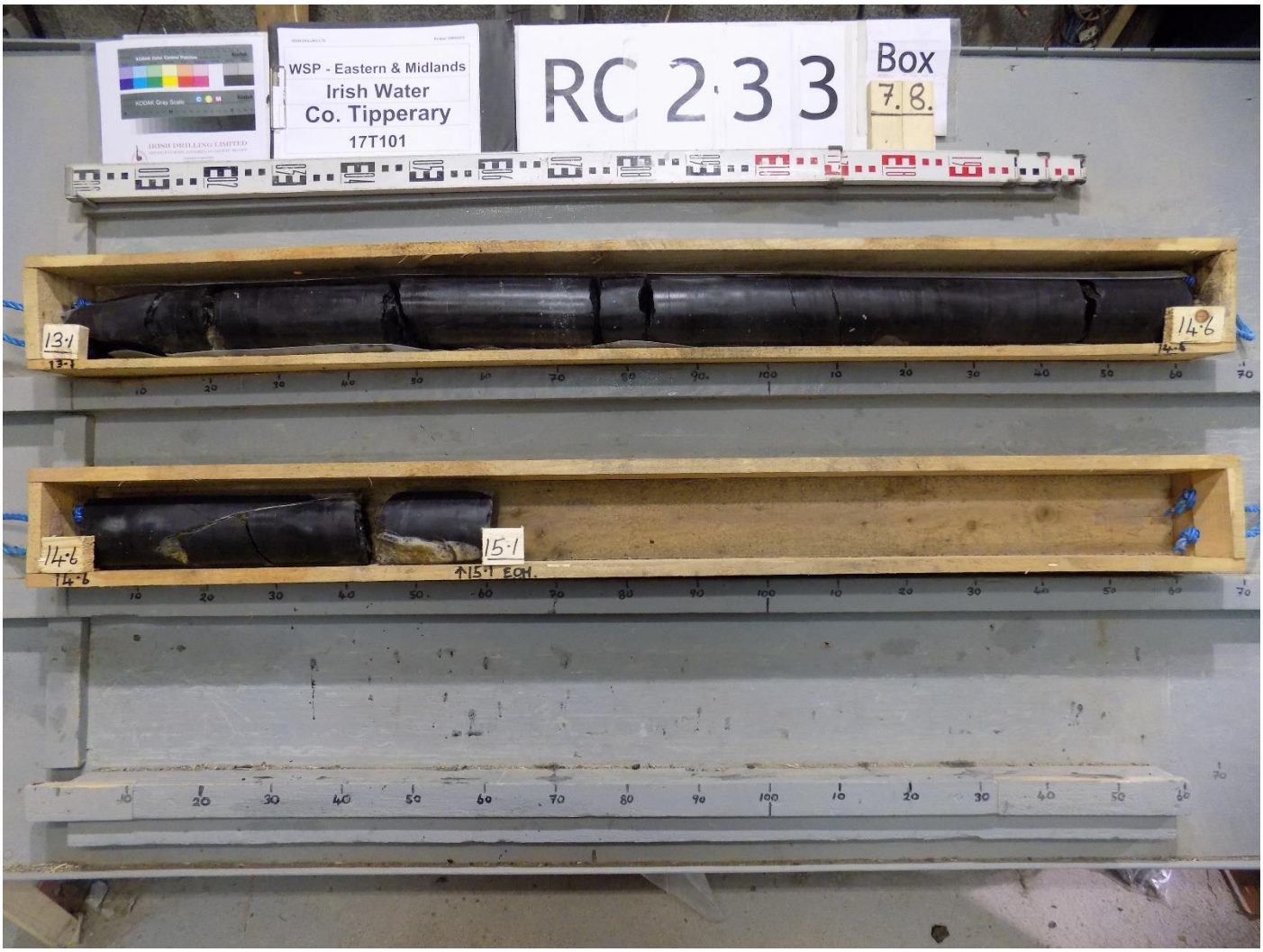

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 232
Box
1.2.3.
4.1
4.1
5.6
5.6
7.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 232
Box
4.5.6.
7.1
8.6
8.6
10.1
10.1
11.6

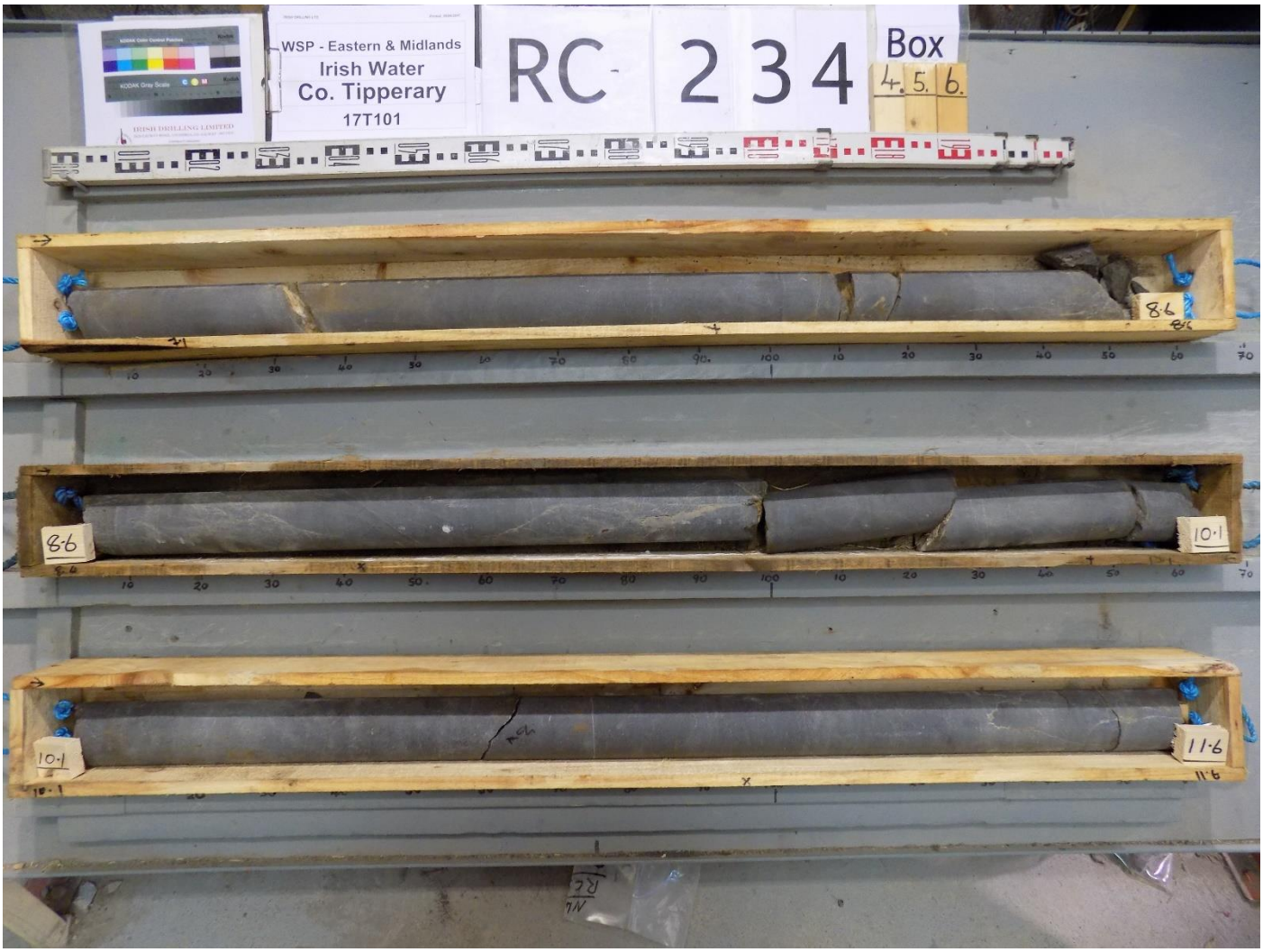

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 232
Box
7.8.9.
11.6
13.1
12.1
14.6
15m
F.O.H
14.6

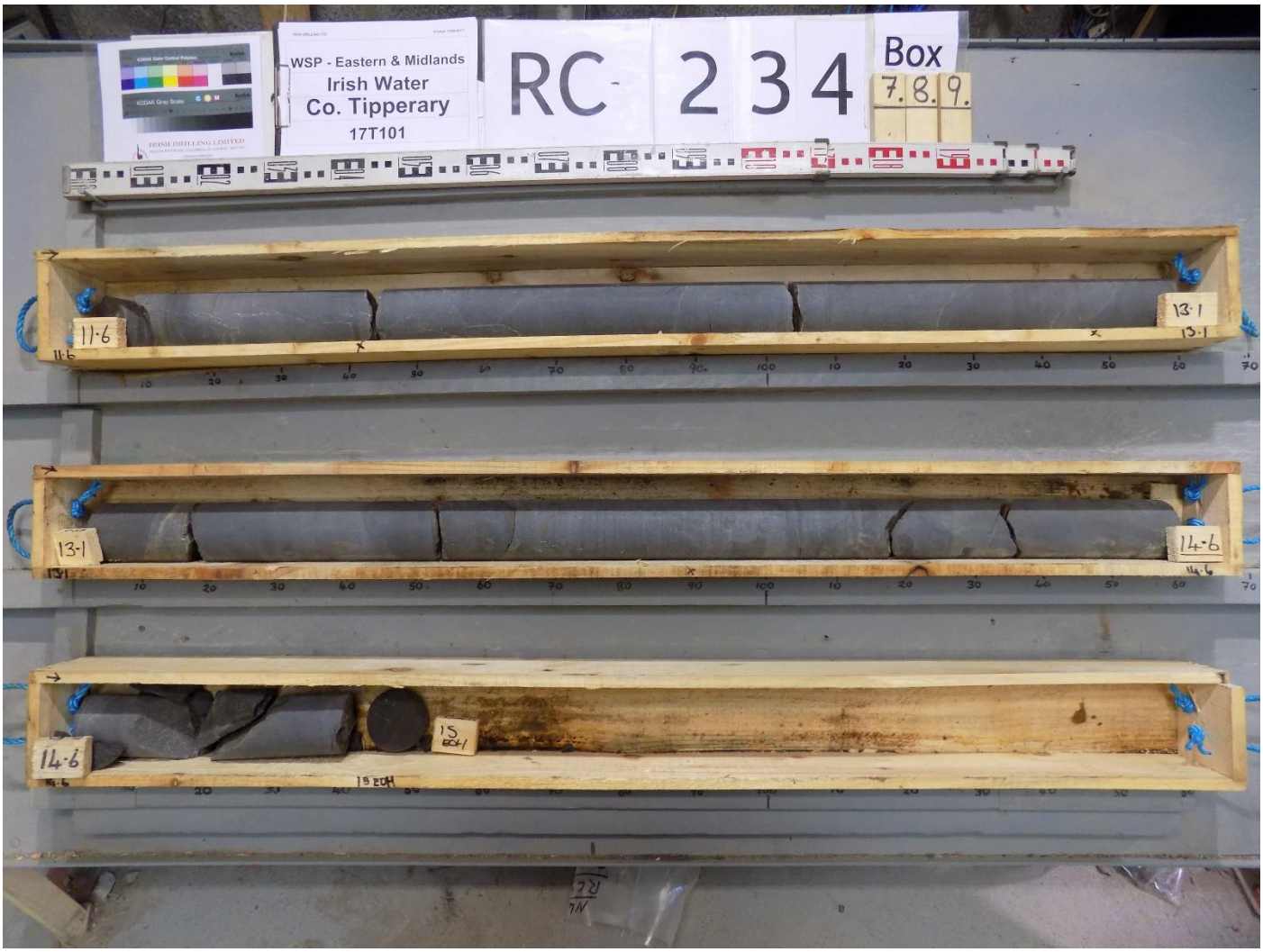

WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 233
Box
1.2.3.
56
5·6
7·1
8·6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 2 3 3
Box
4.5.6.
8.6
10.1
10.1
11.6
11.6
13.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 233
Box
7.8.
13.1
14.6
14.6
15.1
15.1 EOH.


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 234
Box
1.2.3.
4.1
5.6
5.6
7.1


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 234
Box
4. 5. 6.
8.6
8.6
10.1
10.1
11.6


WSP - Eastern & Midlands
Irish Water
Co. Tipperary
17T101
RC 234
Box
7.8.9.
11.6
13.1
13.1
14.6
14.6
14.6