

A46 Newark Bypass

TR010065/APP/6.3

6.3 Environmental Statement

Appendix 9.2 Contaminated Land Risk Assessment

Part 2

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and
Procedure) Regulations 2009

Volume 6

April 2024

Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms
and Procedure) Regulations 2009**

A46 Newark Bypass

Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT

APPENDIX 9.2 CONTAMINATED LAND RISK ASSESSMENT

PART 2

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010065
Application Document Reference	TR010065/APP/6.3
Author:	A46 Newark Bypass Project Team, National Highways

Version	Date	Status of Version
Rev 1	April 2024	DCO Application

Contents

Appendix D: Factual reports



Project Name: A46

Project No: 221209



Date: 16/1/23

Box No:

Borehole No: S3BH15

Depth (M) From: 16.50 to 18.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 16/1/23

Box No:

Borehole No: S3BH15

Depth (M):
From: 18.0 To: 19.5

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 16/1/23

Box No:

Borehole No: S3BH15

Depth (M) From: 19.50 To: 21.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 16/1/23

Box No:

Borehole No: S3B415

Depth (M)
From: 21.0 To: 22.50





Project Name: A46

Project No: 221209



Date: 16/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From: 22.50 To: 24.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 7/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From 24.0 To 25.50





Project Name: A46

Project No: 221209



Date: 7/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From: 25.50 To: 27.0





Project Name: A46

Project No: 221209



Date: 17/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From: 27.0 To: 28.50





Project Name: A46

Project No: 221209



Date: 18/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From: 28.50 To: 30.0





Project Name: A46

Project No: 221209



Date: 19/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From 30.00 To 31.50





Project Name: A46

Project No: 221209



Date: 19/1/23

Box No:

Borehole No: S3BH15

Depth (M)
From: 31.50 To: 33.0





Project Name: A46

Project No: G221209



Date: 6/1/23

Box No:

Borehole No: S3W501

Depth (M)

From: 1 To: 2





Date: 6/1/23

Project Name: A46

Box No:

Project No: G221209

Borehole No: 53 W501

Depth (M) From: 2 To: 3





Project Name: A46

Project No: 221209



Date: 31/11/22

Box No:

Borehole No: RCWS01

Depth (M)
From: 1.20 To: 2.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 31/1/22

Box No:

Borehole No: RCWS01

Depth (M)
From: 2.0 To: 3.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 31/1/23

Box No:

Borehole No: RCWS01

Depth (M)
From: 3.0 To: 4.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46

Project No: 221209



Date: 31/11/23

Box No:

Borehole No: RCWS01

Depth (M) From: 4.0 To: 5.0

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46 NETWORK BYPASS

Project No: 4221209



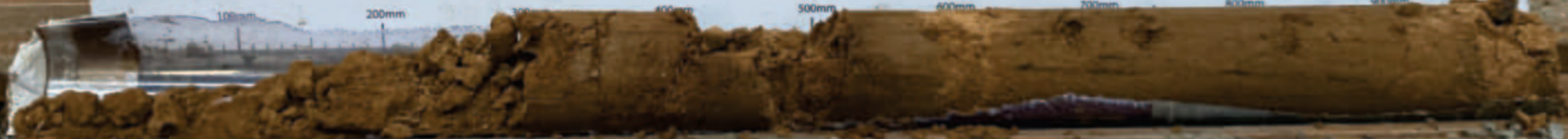
Date: 28/11/22

Box No:

Borehole No: S3WS04

Depth (M)

From: 1.20m To: 2.00m





Project Name: A46 NETWORK BYPASS

Project No: 4221209



Date: 28/11/22

Box No:

Borehole No: S3WS04

Depth (M)

From: 300m To: 400m





Project Name: A46 NETWORK BYPASS

Project No: 4221209



Date: 25/11/22

Box No:

Borehole No: S3 WS04

Depth (M)
From: 4.00m To: 5.00m

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46 NETWORK BYPASS

Project No: 4221209



Date: 26/11/22

Box No:

Borehole No: S3WS05

Depth (M)
From: 1.00m To: 2.00m

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm





Project Name: A46 NETWORK BYPASS

Project No: 4221209



Date: 28/11/22

Box No:

Borehole No: S3WS05

Depth (M)
From: 2.00m To: 3.00m





Project Name: A46 Network BYPASS

Project No: 4221209



Date: 28/11/22

Box No:

Borehole No: S3WS05

Depth (M)

From: 3.00m To: 4.00m

400mm

500mm

600mm

700mm

800mm

900mm





Project Name:

A46 NETWORK BYPASS

Project No:

4221209



Date:

28/11/22

Box No:

Borehole No:

S3WS05

Depth (M)

From: 4.00m To: 5.00m

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm

02 03 04 05 06 07 08 09



Project Name: A46

Project No: G22-1209



Date: 5/1/23

Box No:

Borehole No: 53 W507

Depth (M) From: 1.2 To: 2





Project Name: A46

Project No: G22-1269



Date: 5/1/23

Box No:

Borehole No: 53 W507

Depth (M)

From: 2 To: 3

100mm 200mm 300mm 400mm 500mm 600mm 700mm 800mm 900mm

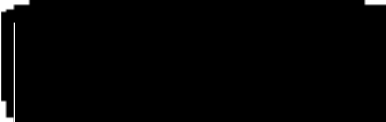
00 01 02 03 04 05 06 07 08 09 10



Appendix E: Environmental Laboratory Results



Amended Report

Report No.:	22-41580-4	Date of Re-Issue:	01-Mar-2023
Initial Date of Issue:	11-Nov-2022		
Client	Strata Geotechnics Limited		
Client Address:	Summit Close Kirkby in Ashfield Nottinghamshire NG17 8GJ		
Contact(s):	LABS		
Project	221209 A46 By Pass		
Quotation No.:		Date Received:	31-Oct-2022
Order No.:		Date Instructed:	02-Nov-2022
No. of Samples:	5		
Turnaround (Wkdays):	5	Results Due:	08-Nov-2022
Date Approved:	11-Nov-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: 221209 A46 By Pass

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-41580	22-41580		
Quotation No.:		Chemtest Sample ID.:		1535205	1535207		
		Client Sample ID.:		ES2	ES4		
		Sample Location:		S3BH11	S3BH11		
		Sample Type:		SOIL	SOIL		
		Top Depth (m):		0.50	2.50		
		Date Sampled:		20-Oct-2022	20-Oct-2022		
Determinand	Accred.	SOP	Type	Units	LOD		
pH	U	1010	2:1		N/A	7.6	7.3
Chloride	U	1220	2:1	mg/l	1.0	1.3	13
Fluoride	U	1220	2:1	mg/l	0.050	0.27	0.13
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	< 0.050	< 0.050
Sulphate	U	1220	2:1	mg/l	1.0	< 1.0	34
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	4.9	13
Magnesium	U	1455	2:1	mg/l	0.20	0.65	2.5
Hardness as Ca	U	1415	2:1	mg/l	6	< 6	17
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	2.5	< 0.20
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	< 10	< 10
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	12	34
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	3.4	< 0.50
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	4.1	< 0.50
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	9.5	4.2
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	2.3	0.79
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	2.5	< 0.50
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	0.88	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	1.4	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	0.71	0.54
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	2.9	< 0.50
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	5.7	4.0
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	1100	47
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20
Dissolved Organic Carbon	U	1610	2:1	mg/l	2.0	4.8	2.9
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030

Results - Soil

Project: 221209 A46 By Pass

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-41580	22-41580	
Quotation No.:		Chemtest Sample ID.:		1535205	1535207	
		Client Sample ID.:		ES2	ES4	
		Sample Location:		S3BH11	S3BH11	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.50	2.50	
		Date Sampled:		20-Oct-2022	20-Oct-2022	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	5.9	3.6
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand
pH	M	2010		4.0	6.9	8.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010
Total Sulphur	M	2175	%	0.010	0.023	0.040
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Iron (Total)	N	2430	mg/kg	100	20000	4800
Arsenic	M	2455	mg/kg	0.5	21	2.8
Barium	M	2455	mg/kg	0	13	26
Beryllium	U	2455	mg/kg	0.5	< 0.5	< 0.5
Cadmium	M	2455	mg/kg	0.10	< 0.10	0.11
Chromium	M	2455	mg/kg	0.5	19	4.5
Manganese	M	2455	mg/kg	1.0	400	57
Molybdenum	M	2455	mg/kg	0.5	< 0.5	< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	20	3.8
Mercury	M	2455	mg/kg	0.05	< 0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	19	4.6
Lead	M	2455	mg/kg	0.50	22	3.4
Selenium	M	2455	mg/kg	0.25	0.46	< 0.25
Vanadium	U	2455	mg/kg	0.5	15	5.9
Zinc	M	2455	mg/kg	0.50	57	15
Chromium (Trivalent)	N	2490	mg/kg	1.0	19	4.5
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
LOI	M	2610	%	0.10	3.0	0.74
Fraction of Organic Carbon	M	2625		0.0010	0.0086	0.0028
Total Organic Carbon	M	2625	%	0.20	0.86	0.28
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: 221209 A46 By Pass

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-41580	22-41580	
Quotation No.:		Chemtest Sample ID.:		1535205	1535207	
		Client Sample ID.:		ES2	ES4	
		Sample Location:		S3BH11	S3BH11	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.50	2.50	
		Date Sampled:		20-Oct-2022	20-Oct-2022	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: 221209 A46 By Pass

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-41580	22-41580	
Quotation No.:		Chemtest Sample ID.:		1535205	1535207	
		Client Sample ID.:		ES2	ES4	
		Sample Location:		S3BH11	S3BH11	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.50	2.50	
		Date Sampled:		20-Oct-2022	20-Oct-2022	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: 221209 A46 By Pass

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-41580	22-41580	
Quotation No.:		Chemtest Sample ID.:		1535205	1535207	
		Client Sample ID.:		ES2	ES4	
		Sample Location:		S3BH11	S3BH11	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.50	2.50	
		Date Sampled:		20-Oct-2022	20-Oct-2022	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020	< 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com

Final Report

Report No.: 22-44245-1

Initial Date of Issue: 02-Dec-2022

Client: Strata Geotechnics Limited

Client Address: Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Contact(s): LABS
Andy Johnston
Izaak Lovatt

Project: A46 221209

Quotation No.: Q20-22479

Date Received: 18-Nov-2022

Order No.:


Date Instructed: 18-Nov-2022

No. of Samples: 1

Turnaround (Wkdays): 10

Results Due: 01-Dec-2022

Date Approved: 02-Dec-2022

Approved By:


Details: Stuart Henderson, Technical
Manager

Results - Leachate

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.: 22-44245				
Quotation No.: Q20-22479		Chemtest Sample ID.: 1547855				
Order No.:		Client Sample Ref.: ES				
		Sample Location: S3BH02				
		Sample Type: SOIL				
		Top Depth (m): 0.5				
		Bottom Depth (m): 0.7				
		Date Sampled: 31-Oct-2022				
Determinand	Accred.	SOP	Type	Units	LOD	
pH	U	1010	2:1		N/A	8.5
Chloride	U	1220	2:1	mg/l	1.0	9.5
Fluoride	U	1220	2:1	mg/l	0.050	0.34
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.12
Sulphate	U	1220	2:1	mg/l	1.0	11
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	15
Magnesium	U	1455	2:1	mg/l	0.20	2.4
Hardness as Ca	U	1415	2:1	mg/l	6	19
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	0.51
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	38
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	14
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	0.57
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	2.7
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	6.7
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	0.71
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	1.6
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	0.67
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	3.0
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	260
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20
Dissolved Organic Carbon	U	1610	2:1	mg/l	2.0	9.9
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44245	
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547855	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3BH02	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.7	
		Date Sampled:		31-Oct-2022	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	8.8
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones and Roots
Soil Texture	N	2040		N/A	Sand
pH	U	2010		4.0	6.7
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.49
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010
Total Sulphur	U	2175	%	0.010	0.036
Cyanide (Free)	U	2300	mg/kg	0.50	[B] < 0.50
Iron (Total)	N	2430	mg/kg	100	6900
Arsenic	U	2455	mg/kg	0.5	2.9
Barium	U	2455	mg/kg	0	26
Beryllium	U	2455	mg/kg	0.5	< 0.5
Cadmium	U	2455	mg/kg	0.10	0.14
Chromium	U	2455	mg/kg	0.5	6.7
Manganese	U	2455	mg/kg	1.0	150
Molybdenum	U	2455	mg/kg	0.5	0.5
Antimony	N	2455	mg/kg	2.0	< 2.0
Copper	U	2455	mg/kg	0.50	6.7
Mercury	U	2455	mg/kg	0.05	< 0.05
Nickel	U	2455	mg/kg	0.50	6.9
Lead	U	2455	mg/kg	0.50	13
Selenium	U	2455	mg/kg	0.25	< 0.25
Vanadium	U	2455	mg/kg	0.5	9.1
Zinc	U	2455	mg/kg	0.50	24
Chromium (Trivalent)	N	2490	mg/kg	1.0	6.7
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
LOI	U	2610	%	0.10	1.6
Fraction of Organic Carbon	U	2625		0.0010	0.0032
Total Organic Carbon	U	2625	%	0.20	0.32
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44245	
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547855	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3BH02	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.7	
		Date Sampled:		31-Oct-2022	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] < 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	0.39
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0
Chloromethane	U	2760	µg/kg	1.0	[B] < 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	[B] < 1.0
Bromomethane	U	2760	µg/kg	20	[B] < 20

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44245	
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547855	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3BH02	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.7	
		Date Sampled:		31-Oct-2022	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	[B] < 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0
Trichloromethane	U	2760	µg/kg	1.0	[B] < 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	[B] < 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0
Benzene	U	2760	µg/kg	1.0	[B] < 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	[B] < 2.0
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	[B] < 1.0
Dibromomethane	U	2760	µg/kg	1.0	[B] < 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	[B] < 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10
Toluene	U	2760	µg/kg	1.0	[B] 1.1
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	[B] < 10
Tetrachloroethene	U	2760	µg/kg	1.0	[B] < 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	[B] < 5.0
Chlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	[B] < 2.0
Ethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[B] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[B] < 1.0
Styrene	U	2760	µg/kg	1.0	[B] < 1.0
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
Bromobenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44245	
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547855	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3BH02	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.7	
		Date Sampled:		31-Oct-2022	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[B] < 1.0
Resorcinol	U	2920	mg/kg	0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1547855	ES		S3BH02	31-Oct-2022	B	Amber Glass 250ml
1547855	ES		S3BH02	31-Oct-2022	B	Amber Glass 60ml
1547855	ES		S3BH02	31-Oct-2022	B	Plastic Tub 1000g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt


Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Amended Report

Report No.:	22-44477-2	Date of Re-Issue:	01-Mar-2023
Initial Date of Issue:	14-Dec-2022		
Client	Strata Geotechnics Limited		
Client Address:	Summit Close Kirkby in Ashfield Nottinghamshire NG17 8GJ		
Contact(s):	LABS David Ashton Izaak Lovatt		
Project	A46		
Quotation No.:		Date Received:	18-Nov-2022
Order No.:	221209	Date Instructed:	21-Nov-2022
No. of Samples:	2		
Turnaround (Wkdays):	10	Results Due:	02-Dec-2022
Date Approved:	14-Dec-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: A46

Client: Strata Geotechnics Limited		Chemtest Job No.: 22-44477				
Quotation No.:		Chemtest Sample ID.: 1548904				
Order No.: 221209		Client Sample Ref.: ES2				
		Sample Location: S3BH8				
		Sample Type: SOIL				
		Top Depth (m): 0.5				
		Date Sampled: 08-Nov-2022				
Determinand	Accred.	SOP	Type	Units	LOD	
pH	U	1010	2:1		N/A	8.2
Chloride	U	1220	2:1	mg/l	1.0	2.6
Fluoride	U	1220	2:1	mg/l	0.050	0.81
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.20
Sulphate	U	1220	2:1	mg/l	1.0	22
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	16
Magnesium	U	1455	2:1	mg/l	0.20	4.0
Hardness as Ca	U	1415	2:1	mg/l	6	22
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	2.9
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	27
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	19
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	0.78
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	4.9
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	4.2
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	2.4
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	1.2
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	1.4
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	0.79
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	0.92
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	2.2
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	9.6
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	430
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20
Dissolved Organic Carbon	U	1610	2:1	mg/l	2.0	14
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030

Results - Soil

Project: A46

Client: Strata Geotechnics Limited	Chemtest Job No.:				22-44477
Quotation No.:	Chemtest Sample ID.:				1548904
Order No.: 221209	Client Sample Ref.:				ES2
	Sample Location:				S3BH8
	Sample Type:				SOIL
	Top Depth (m):				0.5
	Date Sampled:				08-Nov-2022
	Asbestos Lab:				DURHAM
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	12
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones, Roots and Wood
Soil Texture	N	2040		N/A	Sand
pH	M	2010		4.0	7.8
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.86
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.014
Total Sulphur	M	2175	%	0.010	0.036
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50
Iron (Total)	N	2430	mg/kg	100	19000
Arsenic	M	2455	mg/kg	0.5	9.4
Barium	M	2455	mg/kg	0	130
Beryllium	U	2455	mg/kg	0.5	1.0
Cadmium	M	2455	mg/kg	0.10	0.49
Chromium	M	2455	mg/kg	0.5	28
Manganese	M	2455	mg/kg	1.0	630
Molybdenum	M	2455	mg/kg	0.5	1.4
Antimony	N	2455	mg/kg	2.0	< 2.0
Copper	M	2455	mg/kg	0.50	31
Mercury	M	2455	mg/kg	0.05	0.14
Nickel	M	2455	mg/kg	0.50	22
Lead	M	2455	mg/kg	0.50	77
Selenium	M	2455	mg/kg	0.25	1.1
Vanadium	U	2455	mg/kg	0.5	27
Zinc	M	2455	mg/kg	0.50	110
Chromium (Trivalent)	N	2490	mg/kg	1.0	28
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
LOI	M	2610	%	0.10	5.2
Fraction of Organic Carbon	M	2625		0.0010	0.029
Total Organic Carbon	M	2625	%	0.20	2.9
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0

Results - Soil

Project: A46

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44477	
Quotation No.:		Chemtest Sample ID.:		1548904	
Order No.: 221209		Client Sample Ref.:		ES2	
		Sample Location:		S3BH8	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Date Sampled:		08-Nov-2022	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	1.5
Anthracene	M	2700	mg/kg	0.10	0.61
Fluoranthene	M	2700	mg/kg	0.10	1.0
Pyrene	M	2700	mg/kg	0.10	0.97
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.48
Chrysene	M	2700	mg/kg	0.10	0.48
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	5.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: A46

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44477	
Quotation No.:		Chemtest Sample ID.:		1548904	
Order No.: 221209		Client Sample Ref.:		ES2	
		Sample Location:		S3BH8	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Date Sampled:		08-Nov-2022	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: A46

Client: Strata Geotechnics Limited	Chemtest Job No.:		22-44477		
Quotation No.:	Chemtest Sample ID.:		1548904		
Order No.: 221209	Client Sample Ref.:		ES2		
	Sample Location:		S3BH8		
	Sample Type:		SOIL		
	Top Depth (m):		0.5		
	Date Sampled:		08-Nov-2022		
	Asbestos Lab:		DURHAM		
Determinand	Accred.	SOP	Units	LOD	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Amended Report

Report No.:	22-44215-2	Date of Re-Issue:	24-Jan-2023
Initial Date of Issue:	08-Dec-2022		
Client	Strata Geotechnics Limited		
Client Address:	Summit Close Kirkby in Ashfield Nottinghamshire NG17 8GJ		
Contact(s):	LABS David Ashton Izaak Lovatt		
Project	A46 221209		
Quotation No.:	Q20-22479	Date Received:	18-Nov-2022
Order No.:		Date Instructed:	21-Nov-2022
No. of Samples:	2		
Turnaround (Wkdays):	10	Results Due:	02-Dec-2022
Date Approved:	08-Dec-2022		
Approved By:			
Details:	Stuart Henderson, Technical Manager		

Results - Leachate

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44215	22-44215		
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547763	1547764		
Order No.:		Client Sample Ref.:		ES	ES		
		Sample Location:		S3BH01	S3BH01		
		Sample Type:		SOIL	SOIL		
		Top Depth (m):		0.5	1.0		
		Date Sampled:		14-Nov-2022	14-Nov-2022		
Determinand	Accred.	SOP	Type	Units	LOD		
pH	U	1010	2:1		N/A	8.1	8.1
Chloride	U	1220	2:1	mg/l	1.0	7.2	36
Fluoride	U	1220	2:1	mg/l	0.050	0.38	0.62
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.075	0.073
Sulphate	U	1220	2:1	mg/l	1.0	11	13
Cyanide (Total)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Cyanide (Complex)	U	1300	2:1	mg/l	0.050	< 0.050	< 0.050
Calcium	U	1455	2:1	mg/l	2.00	5.1	< 2.0
Magnesium	U	1455	2:1	mg/l	0.20	1.8	0.49
Hardness as Ca	U	1415	2:1	mg/l	6	8	< 6
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	2.5	1.2
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	37	24
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	48	15
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	8.7	2.7
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	5.3	2.0
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	74	22
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	0.71	2.5
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	5.7	2.2
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	5.5	1.2
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	11	2.6
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	28	9.4
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	1900	2200
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20
Dissolved Organic Carbon	U	1610	2:1	mg/l	2.0	29	75
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44215	22-44215	
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547763	1547764	
Order No.:		Client Sample Ref.:		ES	ES	
		Sample Location:		S3BH01	S3BH01	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	1.0	
		Date Sampled:		14-Nov-2022	14-Nov-2022	
		Asbestos Lab:		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	11	15
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Clay
pH	M	2010		4.0	6.9	7.8
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010
Total Sulphur	M	2175	%	0.010	< 0.010	< 0.010
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Iron (Total)	N	2430	mg/kg	100	18000	16000
Arsenic	M	2455	mg/kg	0.5	6.1	5.3
Barium	M	2455	mg/kg	0	91	66
Beryllium	U	2455	mg/kg	0.5	0.5	< 0.5
Cadmium	M	2455	mg/kg	0.10	0.28	0.27
Chromium	M	2455	mg/kg	0.5	16	11
Manganese	M	2455	mg/kg	1.0	490	220
Molybdenum	M	2455	mg/kg	0.5	0.8	0.7
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	11	9.4
Mercury	M	2455	mg/kg	0.05	< 0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	13	13
Lead	M	2455	mg/kg	0.50	23	12
Selenium	M	2455	mg/kg	0.25	0.46	0.31
Vanadium	U	2455	mg/kg	0.5	21	17
Zinc	M	2455	mg/kg	0.50	51	43
Chromium (Trivalent)	N	2490	mg/kg	1.0	16	11
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
LOI	M	2610	%	0.10	2.4	1.1
Fraction of Organic Carbon	M	2625		0.0010	0.032	0.0010
Total Organic Carbon	M	2625	%	0.20	3.2	< 0.20
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44215	22-44215
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547763	1547764
Order No.:		Client Sample Ref.:		ES	ES
		Sample Location:		S3BH01	S3BH01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.5	1.0
		Date Sampled:		14-Nov-2022	14-Nov-2022
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-44215	22-44215
Quotation No.: Q20-22479		Chemtest Sample ID.:		1547763	1547764
Order No.:		Client Sample Ref.:		ES	ES
		Sample Location:		S3BH01	S3BH01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.5	1.0
		Date Sampled:		14-Nov-2022	14-Nov-2022
		Asbestos Lab:		COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited	Chemtest Job No.:		22-44215	22-44215		
Quotation No.: Q20-22479	Chemtest Sample ID.:		1547763	1547764		
Order No.:	Client Sample Ref.:		ES	ES		
	Sample Location:		S3BH01	S3BH01		
	Sample Type:		SOIL	SOIL		
	Top Depth (m):		0.5	1.0		
	Date Sampled:		14-Nov-2022	14-Nov-2022		
	Asbestos Lab:		COVENTRY	COVENTRY		
Determinand	Accred.	SOP	Units	LOD		
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020	< 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Amended Report

Report No.: 22-45162-2

Initial Date of Issue: 11-Jan-2023 **Date of Re-Issue:** 01-Mar-2023

Client: Strata Geotechnics Limited

Client Address: Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Contact(s): LABS
David Ashton
Izaak Lovatt

Project: A46 221209


Quotation No.: Q22-28220 **Date Received:** 24-Nov-2022

Order No.: **Date Instructed:** 22-Dec-2022

No. of Samples: 4

Turnaround (Wkdays): 6 **Results Due:** 05-Jan-2023

Date Approved: 11-Jan-2023

Approved By:


Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.: 22-45162				
Quotation No.: Q22-28220		Chemtest Sample ID.: 1551601				
Order No.:		Client Sample Ref.: ES				
		Sample Location: S3BH06				
		Sample Type: SOIL				
		Top Depth (m): 1.2				
		Date Sampled: 21-Nov-2022				
Determinand	Accred.	SOP	Type	Units	LOD	
pH	U	1010	2:1		N/A	6.3
Chloride	U	1220	2:1	mg/l	1.0	4.5
Fluoride	U	1220	2:1	mg/l	0.050	0.20
Ammonia (Free) as N	N	1220	2:1	mg/l	0.050	< 0.050
Sulphate	U	1220	2:1	mg/l	1.0	20
Cyanide (Total) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050
Cyanide (Free) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050
Cyanide (Complex) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050
Calcium	U	1455	2:1	mg/l	2.00	7.4
Magnesium	U	1455	2:1	mg/l	0.20	1.2
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	1.0
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	23
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	43
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	0.86
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	2.7
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	3.6
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.1
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	2.6
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	150
Chromium (Trivalent)	N	1490	2:1	µg/l	20	[B] < 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	[B] < 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45162	22-45162	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551599	1551601	
Order No.:		Client Sample Ref.:		ES	ES	
		Sample Location:		S3BH06	S3BH06	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.2	1.2	
		Date Sampled:		21-Nov-2022	21-Nov-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	25	18
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand
pH	M	2010		4.0	[B] 8.2	[B] 8.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	[B] 1.5	[B] 1.9
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	[B] 0.018	[B] 0.029
Total Sulphur	M	2175	%	0.010	[B] 0.26	[B] 0.51
Cyanide (Free)	M	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50
Iron (Total)	N	2430	mg/kg	100	[B] 37000	[B] 16000
Arsenic	M	2455	mg/kg	0.5	97	42
Barium	M	2455	mg/kg	0	370	190
Beryllium	U	2455	mg/kg	0.5	11	3.9
Cadmium	M	2455	mg/kg	0.10	0.44	0.23
Chromium	M	2455	mg/kg	0.5	18	8.4
Manganese	M	2455	mg/kg	1.0	2200	770
Molybdenum	M	2455	mg/kg	0.5	8.7	3.0
Antimony	N	2455	mg/kg	2.0	4.7	2.1
Copper	M	2455	mg/kg	0.50	120	42
Mercury	M	2455	mg/kg	0.05	1.6	1.1
Nickel	M	2455	mg/kg	0.50	71	27
Lead	M	2455	mg/kg	0.50	140	70
Selenium	M	2455	mg/kg	0.25	2.7	1.1
Vanadium	U	2455	mg/kg	0.5	76	30
Zinc	M	2455	mg/kg	0.50	110	51
Chromium (Trivalent)	N	2490	mg/kg	1.0	18	8.4
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Fraction of Organic Carbon	M	2625		0.0010	[B] 0.19	[B] 0.14
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] < 1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45162	22-45162
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551599	1551601
Order No.:		Client Sample Ref.:		ES	ES
		Sample Location:		S3BH06	S3BH06
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.2	1.2
		Date Sampled:		21-Nov-2022	21-Nov-2022
		Asbestos Lab:		NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] 130
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] 640
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] 780
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] 780
Naphthalene	M	2700	mg/kg	0.10	[B] < 0.10
Acenaphthylene	M	2700	mg/kg	0.10	[B] < 0.10
Acenaphthene	M	2700	mg/kg	0.10	[B] < 0.10
Fluorene	M	2700	mg/kg	0.10	[B] < 0.10
Phenanthrene	M	2700	mg/kg	0.10	[B] 1.1
Anthracene	M	2700	mg/kg	0.10	[B] 0.84
Fluoranthene	M	2700	mg/kg	0.10	[B] 6.1
Pyrene	M	2700	mg/kg	0.10	[B] 5.5
Benzo[a]anthracene	M	2700	mg/kg	0.10	[B] 4.3
Chrysene	M	2700	mg/kg	0.10	[B] 4.1
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	[B] 5.3
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	[B] 2.1
Benzo[a]pyrene	M	2700	mg/kg	0.10	[B] 4.7
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	[B] 3.3
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	[B] 0.94
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	[B] 2.9
Total Of 16 PAH's	M	2700	mg/kg	2.0	[B] 41
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0
Chloromethane	M	2760	µg/kg	1.0	[B] < 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	[B] < 1.0
Bromomethane	M	2760	µg/kg	20	[B] < 20
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45162	22-45162	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551599	1551601	
Order No.:		Client Sample Ref.:		ES	ES	
		Sample Location:		S3BH06	S3BH06	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.2	1.2	
		Date Sampled:		21-Nov-2022	21-Nov-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD		
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0	[B] < 5.0
Trichloromethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Benzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Dibromomethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	[B] < 5.0	[B] < 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	[B] < 10
Toluene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	[B] < 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	[B] < 10	[B] < 10
Tetrachloroethene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10	[B] < 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	[B] < 5.0	[B] < 5.0
Chlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0
Ethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
o-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Styrene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Bromobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50	[B] < 50
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45162	22-45162	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551599	1551601	
Order No.:		Client Sample Ref.:		ES	ES	
		Sample Location:		S3BH06	S3BH06	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.2	1.2	
		Date Sampled:		21-Nov-2022	21-Nov-2022	
		Asbestos Lab:		NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD		
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50	[B] < 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020	< 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10

Results - 2 Stage WAC

Project: A46 221209

Chemtest Job No: 22-45162							Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 1551601							Limits		
Sample Ref: ES							Inert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous Landfill	Hazardous Waste Landfill
Sample ID:									
Sample Location: S3BH06									
Top Depth(m): 1.2									
Bottom Depth(m):									
Sampling Date: 21-Nov-2022									
Determinand	SOP	Accred.	Units						
Total Organic Carbon							3	5	6
Loss on Ignition							--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic							0.5	2	25
Barium							20	100	300
Cadmium							0.04	1	5
Chromium							0.5	10	70
Copper							2	50	100
Mercury							0.01	0.2	2
Molybdenum							0.5	10	30
Nickel							0.4	10	40
Lead							0.5	10	50
Antimony							0.06	0.7	5
Selenium							0.1	0.5	7
Zinc							4	50	200
Chloride							800	15000	25000
Fluoride							10	150	500
Sulphate							1000	20000	50000
Total Dissolved Solids							4000	60000	100000
Phenol Index							1	-	-
Dissolved Organic Carbon							500	800	1000

Solid Information	
Dry mass of test portion/kg	
Moisture (%)	

Leachate Test Information	
Leachant volume 1st extract/l	
Leachant volume 2nd extract/l	
Eluant recovered from 1st extract/l	

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1551599	ES		S3BH06	21-Nov-2022	B	Amber Glass 250ml
1551599	ES		S3BH06	21-Nov-2022	B	Amber Glass 60ml
1551599	ES		S3BH06	21-Nov-2022	B	Plastic Tub 1000g
1551601	ES		S3BH06	21-Nov-2022	B	Amber Glass 250ml
1551601	ES		S3BH06	21-Nov-2022	B	Amber Glass 60ml
1551601	ES		S3BH06	21-Nov-2022	B	Plastic Tub 1000g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Amended Report

Report No.: 22-45164-2

Initial Date of Issue: 12-Jan-2023 **Date of Re-Issue:** 01-Mar-2023

Client: Strata Geotechnics Limited

Client Address: Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Contact(s): LABS
David Ashton
Izaak Lovatt

Project: A46 221209

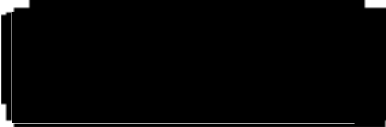
Quotation No.: Q22-28220 **Date Received:** 24-Nov-2022

Order No.: **Date Instructed:** 22-Dec-2022

No. of Samples: 1

Turnaround (Wkdays): 6 **Results Due:** 05-Jan-2023

Date Approved: 12-Jan-2023

Approved By:


Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:					22-45164
Quotation No.: Q22-28220		Chemtest Sample ID.:					1551607
Order No.:		Client Sample Ref.:					ES
		Sample Location:					S3WS4
		Sample Type:					SOIL
		Top Depth (m):					0.5
		Bottom Depth (m):					0.5
		Date Sampled:					21-Nov-2022
Determinand	Accred.	SOP	Type	Units	LOD		
pH	U	1010	2:1		N/A	6.7	
Chloride	U	1220	2:1	mg/l	1.0	3.8	
Fluoride	U	1220	2:1	mg/l	0.050	0.16	
Ammonia (Free) as N	N	1220	2:1	mg/l	0.050	< 0.050	
Sulphate	U	1220	2:1	mg/l	1.0	15	
Cyanide (Total) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	
Cyanide (Free) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	
Cyanide (Complex) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	
Calcium	U	1455	2:1	mg/l	2.00	21	
Magnesium	U	1455	2:1	mg/l	0.20	3.4	
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	1.9	
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	42	
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	28	
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	7.6	
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	< 0.05	
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	6.4	
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	0.74	
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	2.5	
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	0.55	
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.5	
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	0.75	
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	15	
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	230	
Chromium (Trivalent)	N	1490	2:1	µg/l	20	[B] < 20	
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	[B] < 20	
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050	
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050	
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050	
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050	
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050	
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050	
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45164	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551607	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3WS4	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.5	
		Date Sampled:		21-Nov-2022	
		Asbestos Lab:		NEW-ASB	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	12
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Sand
pH	M	2010		4.0	[B] 6.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	[B] < 0.40
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	[B] < 0.010
Total Sulphur	M	2175	%	0.010	[B] 0.042
Cyanide (Free)	M	2300	mg/kg	0.50	[B] < 0.50
Iron (Total)	N	2430	mg/kg	100	[B] 18000
Arsenic	M	2455	mg/kg	0.5	5.7
Barium	M	2455	mg/kg	0	75
Beryllium	U	2455	mg/kg	0.5	< 0.5
Cadmium	M	2455	mg/kg	0.10	0.35
Chromium	M	2455	mg/kg	0.5	13
Manganese	M	2455	mg/kg	1.0	610
Molybdenum	M	2455	mg/kg	0.5	1.3
Antimony	N	2455	mg/kg	2.0	< 2.0
Copper	M	2455	mg/kg	0.50	13
Mercury	M	2455	mg/kg	0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	12
Lead	M	2455	mg/kg	0.50	34
Selenium	M	2455	mg/kg	0.25	0.67
Vanadium	U	2455	mg/kg	0.5	16
Zinc	M	2455	mg/kg	0.50	70
Chromium (Trivalent)	N	2490	mg/kg	1.0	13
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Fraction of Organic Carbon	M	2625		0.0010	[B] 0.016
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45164	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551607	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3WS4	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.5	
		Date Sampled:		21-Nov-2022	
		Asbestos Lab:		NEW-ASB	
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	[B] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[B] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[B] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[B] < 10
Naphthalene	M	2700	mg/kg	0.10	[B] < 0.10
Acenaphthylene	M	2700	mg/kg	0.10	[B] < 0.10
Acenaphthene	M	2700	mg/kg	0.10	[B] < 0.10
Fluorene	M	2700	mg/kg	0.10	[B] < 0.10
Phenanthrene	M	2700	mg/kg	0.10	[B] < 0.10
Anthracene	M	2700	mg/kg	0.10	[B] < 0.10
Fluoranthene	M	2700	mg/kg	0.10	[B] < 0.10
Pyrene	M	2700	mg/kg	0.10	[B] < 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	[B] < 0.10
Chrysene	M	2700	mg/kg	0.10	[B] < 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	[B] < 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	[B] < 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	[B] < 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	[B] < 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	[B] < 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	[B] < 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	[B] < 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0
Chloromethane	M	2760	µg/kg	1.0	[B] < 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	[B] < 1.0
Bromomethane	M	2760	µg/kg	20	[B] < 20
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited		Chemtest Job No.:		22-45164	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1551607	
Order No.:		Client Sample Ref.:		ES	
		Sample Location:		S3WS4	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Bottom Depth (m):		0.5	
		Date Sampled:		21-Nov-2022	
		Asbestos Lab:		NEW-ASB	
Determinand	Accred.	SOP	Units	LOD	
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	[B] < 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0
Trichloromethane	M	2760	µg/kg	1.0	[B] < 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	[B] < 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	[B] < 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0
Benzene	M	2760	µg/kg	1.0	[B] < 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	[B] < 2.0
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	[B] < 1.0
Dibromomethane	M	2760	µg/kg	1.0	[B] < 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	[B] < 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10
Toluene	M	2760	µg/kg	1.0	[B] < 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	[B] < 10
Tetrachloroethene	M	2760	µg/kg	1.0	[B] < 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	[B] < 5.0
Chlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	[B] < 2.0
Ethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[B] < 1.0
o-Xylene	M	2760	µg/kg	1.0	[B] < 1.0
Styrene	M	2760	µg/kg	1.0	[B] < 1.0
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	[B] < 1.0
Bromobenzene	M	2760	µg/kg	1.0	[B] < 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	[B] < 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0

Results - Soil

Project: A46 221209

Client: Strata Geotechnics Limited	Chemtest Job No.:		22-45164		
Quotation No.: Q22-28220	Chemtest Sample ID.:		1551607		
Order No.:	Client Sample Ref.:		ES		
	Sample Location:		S3WS4		
	Sample Type:		SOIL		
	Top Depth (m):		0.5		
	Bottom Depth (m):		0.5		
	Date Sampled:		21-Nov-2022		
	Asbestos Lab:		NEW-ASB		
Determinand	Accred.	SOP	Units	LOD	
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[B] < 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10

Results - 2 Stage WAC

Project: A46 221209

Chemtest Job No: 22-45164							Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 1551607							Limits		
Sample Ref: ES							Inert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous Landfill	Hazardous Waste Landfill
Sample ID:									
Sample Location: S3WS4									
Top Depth(m): 0.5									
Bottom Depth(m): 0.5									
Sampling Date: 21-Nov-2022									
Determinand	SOP	Accred.	Units						
Total Organic Carbon							3	5	6
Loss on Ignition							--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic							0.5	2	25
Barium							20	100	300
Cadmium							0.04	1	5
Chromium							0.5	10	70
Copper							2	50	100
Mercury							0.01	0.2	2
Molybdenum							0.5	10	30
Nickel							0.4	10	40
Lead							0.5	10	50
Antimony							0.06	0.7	5
Selenium							0.1	0.5	7
Zinc							4	50	200
Chloride							800	15000	25000
Fluoride							10	150	500
Sulphate							1000	20000	50000
Total Dissolved Solids							4000	60000	100000
Phenol Index							1	-	-
Dissolved Organic Carbon							500	800	1000

Solid Information	
Dry mass of test portion/kg	
Moisture (%)	

Leachate Test Information	
Leachant volume 1st extract/l	
Leachant volume 2nd extract/l	
Eluant recovered from 1st extract/l	

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1551607	ES		S3WS4	21-Nov-2022	B	Amber Glass 250ml
1551607	ES		S3WS4	21-Nov-2022	B	Amber Glass 60ml
1551607	ES		S3WS4	21-Nov-2022	B	Plastic Tub 1000g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



Final Report

Report No.: 23-01755-1

Initial Date of Issue: 02-Feb-2023

Client: Strata Geotechnics Limited

Client Address: Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Contact(s): LABS

Project: G221209 A46 Newark

Quotation No.: **Date Received:** 20-Jan-2023

Order No.: **Date Instructed:** 20-Jan-2023

No. of Samples: 10

Turnaround (Wkdays): 5 **Results Due:** 26-Jan-2023

Date Approved: 02-Feb-2023

Approved By:


Details: Stuart Henderson, Technical Manager

Results - Leachate

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:													
Quotation No.:		Chemtest Sample ID.:		23-01755		23-01755		23-01755		23-01755		23-01755		23-01755	
		Sample Location:		S3BH05		S3BH05		S3BH05		S3BH05		S3WS07		S3WS01	
		Sample Type:		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		Top Depth (m):		1.5		1.65		2.5		3.2		0.5		0.5	
		Date Sampled:		05-Jan-2023		05-Jan-2023		05-Jan-2023		05-Jan-2023		05-Jan-2023		06-Jan-2023	
Determinand	Accred.	SOP	Type	Units	LOD										
pH	U	1010	2:1		N/A	9.0	8.5	8.2	7.8	8.3	8.1				
Chloride	U	1220	2:1	mg/l	1.0	< 1.0	2.5	3.6	30	< 1.0	1.2				
Fluoride	U	1220	2:1	mg/l	0.050	0.45	1.0	0.91	0.58	0.43	0.36				
Ammoniacal Nitrogen	U	1220	2:1	mg/l	0.050	0.058	< 0.050	0.052	2.6	0.067	0.060				
Sulphate	U	1220	2:1	mg/l	1.0	23	88	97	260	4.4	19				
Cyanide (Total) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	0.0060	< 0.0050	< 0.0050	< 0.0050	< 0.0050				
Cyanide (Free) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	0.0060	< 0.0050	< 0.0050	< 0.0050	< 0.0050				
Cyanide (Complex) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050				
Calcium	U	1455	2:1	mg/l	2.00	78	190	180	330	2.3	5.3				
Magnesium	U	1455	2:1	mg/l	0.20	10	20	13	53	0.68	1.8				
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	9.2	69	0.25	6.2	< 0.20	< 0.20				
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	23	23	51	180	< 10	< 10				
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	12	19	47	25	< 5.0	< 5.0				
Beryllium (Dissolved)	U	1455	2:1	µg/l	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0				
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11				
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	1.8	2.0	0.62	27	< 0.50	< 0.50				
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	160	< 0.50	< 0.50				
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	10	7.6	1.6	0.39	< 0.20	< 0.20				
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	2.3	< 0.50	< 0.50				
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50	0.56	< 0.50	< 0.50	< 0.50	< 0.50				
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	1.6	10	0.74	< 0.50	< 0.50	< 0.50				
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.3	4.3	1.1	2.0	< 0.50	< 0.50				
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	2.9	1.3	< 0.50	< 0.50	< 0.50	< 0.50				
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	2.6	3.7	3.1	4.5	3.9	3.5				
Iridium (Dissolved)	N	1450	2:1	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10				
Mercury Low Level	U	1460	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010				
Low-Level Chromium (Hexavalent)	N	1495	2:1	µg/l	0.10	0.50	0.34	< 0.10	< 0.10	< 0.10	< 0.10				
Chromium (Trivalent) LL	N	1450	2:1	µg/l	1	< 1	< 1	< 1	< 1	< 1	< 1				
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030				

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01755	23-01755	23-01755	23-01755	23-01755	23-01755	23-01755	23-01755	23-01755
Quotation No.:		Chemtest Sample ID.:		1576884	1576885	1576886	1576887	1576888	1576889	1576890	1576892	1576892
		Sample Location:		S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.5	1	1.5	1.65	2.5	2.9	3.2	4.9	4.9
		Date Sampled:		05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	14	12	12	32	22	55	26	5.4
Soil Colour	N	2040		N/A	Black	Brown	Brown	Brown	Brown	Black	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	30% Stones	Stones	Stones and Roots	Stones	40% Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Clay	Clay	Clay	Sand
pH	M	2010		4.0	8.2	8.3	8.4	8.2	8.1	7.3	7.6	8.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	4.2	3.8	3.2	3.7	3.9	2.1	4.9	4.3
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.36	0.093	0.064	0.13	1.1	0.50	0.70	0.20
Total Sulphur	M	2175	%	0.010	0.16	0.11	0.26	0.39	0.65	1.5	0.27	0.014
Cyanide (Free)	M	2300	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Iron (Total)	N	2430	mg/kg	100	24000	30000	28000	9700	72000	25000	27000	20000
Arsenic	M	2455	mg/kg	0.5	59	67	74	260	380	840	29	9.9
Barium	M	2455	mg/kg	0	290	330	380	120	300	260	260	40
Beryllium	U	2455	mg/kg	0.5	5.0	6.2	7.2	1.1	5.0	1.3	1.1	< 0.5
Cadmium	M	2455	mg/kg	0.10	0.50	0.65	0.34	0.61	0.30	0.98	1.7	0.18
Chromium	M	2455	mg/kg	0.5	29	43	20	9.4	26	27	22	7.9
Manganese	M	2455	mg/kg	1.0	1700	1600	1300	500	1600	210	130	130
Molybdenum	M	2455	mg/kg	0.5	5.5	6.2	11	1.5	13	5.9	0.8	1.3
Antimony	N	2455	mg/kg	2.0	3.4	3.4	4.3	9.4	5.1	5.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	79	110	110	37	120	110	20	6.8
Mercury	M	2455	mg/kg	0.05	0.16	0.21	0.23	9.2	0.38	0.75	< 0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	34	40	40	9.4	36	30	27	8.8
Lead	M	2455	mg/kg	0.50	98	130	220	430	41	160	28	6.4
Selenium	M	2455	mg/kg	0.25	1.9	2.1	1.8	1.5	2.4	3.7	2.0	0.79
Vanadium	U	2455	mg/kg	0.5	61	78	87	17	110	42	31	13
Zinc	M	2455	mg/kg	0.50	110	130	91	140	130	200	200	47
Chromium (Trivalent)	N	2490	mg/kg	1.0	29	43	20	9.4	26	27	22	7.9
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C6-C7	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C7-C8	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Aliphatic VPH >C8-C10	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Total Aliphatic VPH >C5-C10	M	2780	mg/kg	0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] 20	[B] 3.6	[B] 2.7
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	[B] 1.5	[B] 1.8	[B] 1.8	[B] 2.9	[B] 1.3	[B] 1.9	[B] 170	[B] 27
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	[B] < 2.0	[B] 2.3	[B] 3.4	[B] < 2.0	[B] 2.9	[B] 170	[B] 32	[B] < 2.0

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:										
Quotation No.:		Chemtest Sample ID.:										
		Sample Location:										
		Sample Type:										
		Top Depth (m):										
		Date Sampled:										
		Asbestos Lab:										
Determinand	Accred.	SOP	Units	LOD								
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	[B] < 3.0	[B] < 3.0	[B] 3.4	[B] < 3.0	[B] < 3.0	[B] 58	[B] 12	[B] 3.2
Aliphatic EPH >C35-C40	N	2690	mg/kg	1.00	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 1.3	[B] 1.1	[B] < 1.0
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	[B] 7.1	[B] 8.0	[B] 11	[B] 6.4	[B] 8.0	[B] 420	[B] 75	[B] 14
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	[B] < 10	[B] < 10	[B] 11	[B] < 10	[B] < 10	[B] 420	[B] 76	[B] 14
Aromatic VPH >C5-C7	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Aromatic VPH >C7-C8	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Aromatic VPH >C8-C10	M	2780	mg/kg	0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05	[B] < 0.05
Total Aromatic VPH >C5-C10	M	2780	mg/kg	0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25	[B] < 0.25
Aromatic EPH >C10-C12	M	2690	mg/kg	1.00	[B] < 1.0	[B] < 1.0	[B] 1.0	[B] < 1.0	[B] 1.0	[B] 250	[B] 19	[B] 1.3
Aromatic EPH >C12-C16	M	2690	mg/kg	1.00	[B] 1.4	[B] 1.6	[B] 3.3	[B] 2.1	[B] 2.5	[B] 4600	[B] 680	[B] 6.7
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	[B] 5.3	[B] 7.5	[B] 3.8	[B] 3.4	[B] 3.6	[B] 2000	[B] 340	[B] 6.3
Aromatic EPH >C21-C35	M	2690	mg/kg	2.00	[B] 4.5	[B] 23	[B] 5.5	[B] 5.8	[B] 3.3	[B] 100	[B] 8.8	[B] < 2.0
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	[B] < 1.0	[B] 1.9	[B] 1.2	[B] 1.2	[B] 1.0	[B] 4.1	[B] 1.9	[B] < 1.0
Total Aromatic EPH >C10-C35	M	2690	mg/kg	5.00	[B] 12	[B] 33	[B] 14	[B] 12	[B] 10	[B] 7000	[B] 1000	[B] 16
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	[B] 12	[B] 35	[B] 15	[B] 13	[B] 11	[B] 7000	[B] 1000	[B] 16
Total VPH >C5-C10	M	2780	mg/kg	0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50	[B] < 0.50
Total EPH >C10-C35	M	2690	mg/kg	10.00	[B] 19	[B] 41	[B] 24	[B] 19	[B] 18	[B] 7400	[B] 1100	[B] 30
Total EPH >C10-C40	N	2690	mg/kg	10.00	[B] 12	[B] 35	[B] 26	[B] 13	[B] 11	[B] 7400	[B] 1100	[B] 30
Fraction of Organic Carbon	M	2625		0.0010	0.13	0.13	0.12	0.28	0.078	0.17	0.0054	< 0.0010
Naphthalene	M	2700	mg/kg	0.10	< 0.10	0.73	0.19	12	1.9	12	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	0.24	0.27	10	0.36	57	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	0.18	0.14	1.3	0.48	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	0.20	0.33	2.3	0.51	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	0.97	0.61	18	1.1	170	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	0.23	< 0.10	11	0.41	63	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	1.5	1.5	1.0	80	0.86	13	6.1	0.54
Pyrene	M	2700	mg/kg	0.10	1.7	1.7	0.97	88	1.1	36	4.2	0.53
Benzo[a]anthracene	M	2700	mg/kg	0.10	0.81	0.83	0.58	64	0.84	0.48	0.49	< 0.10
Chrysene	M	2700	mg/kg	0.10	1.3	1.2	1.0	11	3.5	17	0.76	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	1.3	1.1	94	0.65	3.7	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.64	0.43	36	3.5	6.4	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	0.91	0.68	78	0.82	4.1	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	0.65	0.49	54	0.90	2.2	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	0.40	0.35	14	2.1	2.1	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	0.69	0.59	47	3.7	5.1	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	5.3	12	8.7	620	23	390	12	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Chloromethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited	Chemtest Job No.:		23-01755	23-01755	23-01755	23-01755	23-01755	23-01755	23-01755	23-01755	23-01755
Quotation No.:	Chemtest Sample ID.:		1576884	1576885	1576886	1576887	1576888	1576889	1576890	1576892	
	Sample Location:		S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05	S3BH05
	Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):		0.5	1	1.5	1.65	2.5	2.9	3.2	4.9	
	Date Sampled:		05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023	05-Jan-2023
	Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD							
Bromomethane	M	2760	µg/kg	20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Trichloromethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Benzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Dibromomethane	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10
Toluene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10
Tetrachloroethene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Chlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0
Ethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
o-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 2.3	[B] < 1.0	[B] < 1.0
Styrene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Bromobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 6.7	[B] < 1.0

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.: 23-01755										
Quotation No.:		Chemtest Sample ID.:										
		Sample Location:										
		Sample Type:										
		Top Depth (m):										
		Date Sampled:										
		Asbestos Lab:										
Determinand	Accred.	SOP	Units	LOD								
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 12	[B] 12	[B] < 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] 5.3	[B] < 1.0	[B] < 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50	[B] < 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0	[B] < 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0	[B] < 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.60	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.60	< 0.10

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01755	23-01755	
Quotation No.:		Chemtest Sample ID.:		1576894	1576898	
		Sample Location:		S3WS07	S3WS01	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	0.5	
		Date Sampled:		05-Jan-2023	06-Jan-2023	
		Asbestos Lab:		NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	19	20
Soil Colour	N	2040		N/A	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Clay	Sand
pH	M	2010		4.0	7.6	7.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	4.1	4.2
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.038	0.084
Total Sulphur	M	2175	%	0.010	0.015	0.020
Cyanide (Free)	M	2300	mg/kg	0.50	[B] < 0.50	< 0.50
Iron (Total)	N	2430	mg/kg	100	40000	36000
Arsenic	M	2455	mg/kg	0.5	25	17
Barium	M	2455	mg/kg	0	470	390
Beryllium	U	2455	mg/kg	0.5	1.7	1.3
Cadmium	M	2455	mg/kg	0.10	4.8	2.5
Chromium	M	2455	mg/kg	0.5	38	30
Manganese	M	2455	mg/kg	1.0	4500	2000
Molybdenum	M	2455	mg/kg	0.5	2.9	1.8
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	32	23
Mercury	M	2455	mg/kg	0.05	0.05	< 0.05
Nickel	M	2455	mg/kg	0.50	65	35
Lead	M	2455	mg/kg	0.50	48	110
Selenium	M	2455	mg/kg	0.25	2.9	2.0
Vanadium	U	2455	mg/kg	0.5	60	37
Zinc	M	2455	mg/kg	0.50	280	220
Chromium (Trivalent)	N	2490	mg/kg	1.0	38	30
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Aliphatic VPH >C6-C7	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Aliphatic VPH >C7-C8	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Aliphatic VPH >C8-C10	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Total Aliphatic VPH >C5-C10	M	2780	mg/kg	0.25	[B] < 0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	[B] < 2.0	< 2.0
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	[B] 1.4	1.2
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	[B] < 2.0	< 2.0

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01755	23-01755	
Quotation No.:		Chemtest Sample ID.:		1576894	1576898	
		Sample Location:		S3WS07	S3WS01	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	0.5	
		Date Sampled:		05-Jan-2023	06-Jan-2023	
		Asbestos Lab:		NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD		
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	[B] < 3.0	< 3.0
Aliphatic EPH >C35-C40	N	2690	mg/kg	1.00	[B] < 1.0	< 1.0
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	[B] 5.8	5.9
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	[B] < 10	< 10
Aromatic VPH >C5-C7	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Aromatic VPH >C7-C8	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Aromatic VPH >C8-C10	M	2780	mg/kg	0.05	[B] < 0.05	< 0.05
Total Aromatic VPH >C5-C10	M	2780	mg/kg	0.25	[B] < 0.25	< 0.25
Aromatic EPH >C10-C12	M	2690	mg/kg	1.00	[B] < 1.0	< 1.0
Aromatic EPH >C12-C16	M	2690	mg/kg	1.00	[B] 1.5	1.5
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	[B] 2.3	2.1
Aromatic EPH >C21-C35	M	2690	mg/kg	2.00	[B] 4.0	5.0
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	[B] 1.5	< 1.0
Total Aromatic EPH >C10-C35	M	2690	mg/kg	5.00	[B] 8.5	8.9
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	[B] < 10	< 10
Total VPH >C5-C10	M	2780	mg/kg	0.50	[B] < 0.50	< 0.50
Total EPH >C10-C35	M	2690	mg/kg	10.00	[B] 14	15
Total EPH >C10-C40	N	2690	mg/kg	10.00	[B] < 10	< 10
Fraction of Organic Carbon	M	2625		0.0010	0.019	0.013
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	0.19
Pyrene	M	2700	mg/kg	0.10	< 0.10	0.16
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01755	23-01755	
Quotation No.:		Chemtest Sample ID.:		1576894	1576898	
		Sample Location:		S3WS07	S3WS01	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		0.5	0.5	
		Date Sampled:		05-Jan-2023	06-Jan-2023	
		Asbestos Lab:		NEW-ASB	NEW-ASB	
Determinand	Accred.	SOP	Units	LOD		
Bromomethane	M	2760	µg/kg	20	[B] < 20	< 20
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	[B] < 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	< 10
Toluene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	[B] < 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	[B] < 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0	< 1.0

Results - Soil

Project: G221209 A46 Newark

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01755	23-01755
Quotation No.:		Chemtest Sample ID.:		1576894	1576898
		Sample Location:		S3WS07	S3WS01
		Sample Type:		SOIL	SOIL
		Top Depth (m):		0.5	0.5
		Date Sampled:		05-Jan-2023	06-Jan-2023
		Asbestos Lab:		NEW-ASB	NEW-ASB
Determinand	Accred.	SOP	Units	LOD	
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0 < 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0 < 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50 < 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0 < 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Resorcinol	M	2920	mg/kg	0.020	< 0.020 < 0.020
Phenol	M	2920	mg/kg	0.020	< 0.020 < 0.020
Cresols	M	2920	mg/kg	0.020	< 0.020 < 0.020
Xylenols	M	2920	mg/kg	0.020	< 0.020 < 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020 < 0.020
Trimethylphenols	M	2920	mg/kg	0.020	< 0.020 < 0.020
Total Phenols	M	2920	mg/kg	0.10	< 0.10 < 0.10

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1576884			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576884			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576884			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576885			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576885			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576885			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576886			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576886			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576886			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576887			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576887			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576887			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576888			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576888			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576888			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576889			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576889			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576889			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576890			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576890			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576890			S3BH05	05-Jan-2023	B	Plastic Tub 500g
1576892			S3BH05	05-Jan-2023	B	Amber Glass 250ml
1576892			S3BH05	05-Jan-2023	B	Amber Glass 60ml
1576892			S3BH05	05-Jan-2023	B	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1576894			S3WS07	05-Jan-2023	B	Amber Glass 250ml
1576894			S3WS07	05-Jan-2023	B	Amber Glass 60ml
1576894			S3WS07	05-Jan-2023	B	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1460	Mercury low-level in Waters by AFS	Mercury	Atomic Fluorescence Spectrometry, with collimated UV source, wavelength 253.7 nm.
1495	Low Level Hexavalent Chromium in Waters	Chromium [VI]	Colorimetric determination of hexavalent chromium expressed as Cr (VI) µg/l in water, using Ion Chromatography and UV-visible spectrophotometry.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection

Test Methods

SOP	Title	Parameters included	Method summary
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2780	VPH A/A Split	Aliphatics: >C5-C6, >C6-C7,>C7-C8,>C8-C10 Aromatics: >C5-C7,>C7-C8,>C8-C10	Water extraction / Headspace GCxGC FID detection
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



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Analytical Report Number : 23-13758

Replaces Analytical Report Number: 23-13758, issue no. 6
Client references/information amended.

Project / Site name:	A46 Newark	Samples received on:	23/01/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	25/01/2023
Your order number:		Analysis completed by:	23/02/2023
Report Issue Number:	7	Report issued on:	07/03/2023
Samples Analysed:	7 leachate samples - 7 soil samples		

Signed: [REDACTED]

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-13758

Project / Site name: A46 Newark

Lab Sample Number	2564314				2564315		2564316		2564317		2564318	
Sample Reference	S3BH15				S3BH08B		S3BH08B		S3TP21		S3TP23	
Sample Number	S3				S3		S3		S3		S3	
Depth (m)	0.5				0.20		1.40		0.50		0.50	
Date Sampled	11/02/2023				12/01/2023		12/01/2023		18/01/2023		12/01/2023	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	75	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	28	
Moisture Content	%	0.01	NONE	3.2	21	13	14	14	14	14	6.2	
Total mass of sample received	kg	0.001	NONE	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SZS	SZS	SZS	SZS	SZS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	6.3	7.2	7.9	8.2
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	35	21	60	47	16
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018	0.01	0.03	0.024	0.0079
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	17.5	10.4	30	23.5	7.9
Total Sulphur	%	0.005	MCERTS	0.008	0.048	0.014	0.009	0.009
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0039	0.029	0.0043	0.0021	0.0027

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.06	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.16	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.31	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.16	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.22	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.2	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.15	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	1.64	< 0.80	< 0.80	< 0.80

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Project / Site name: A46 Newark

Lab Sample Number	2564314	2564315	2564316	2564317	2564318
Sample Reference	S3BH15	S3BH08B	S3BH08B	S3TP21	S3TP23
Sample Number	S3	S3	S3	S3	S3
Depth (m)	0.5	0.20	1.40	0.50	0.50
Date Sampled	11/02/2023	12/01/2023	12/01/2023	18/01/2023	12/01/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Element	Unit	Limit	MCERTS	2564314	2564315	2564316	2564317	2564318
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	4.2	2.4	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.6	16	8.9	4.4	6.7
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	240	210	120	59
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.33	1.3	0.94	1.2	0.54
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	2	1.3	0.5	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	1	1	< 0.2	0.3
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	7.7	130	25	33	11
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8	130	25	33	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	42	16	12	15
Iron (aqua regia extractable)	mg/kg	40	MCERTS	24000	38000	32000	37000	22000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	16	96	64	9.1	15
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	900	820	1100	750	1300
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1	1.8	0.84	0.29	1.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	23	28	39	32
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	15	35	70	130	18
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	35	140	110	62	60

Monoaromatics & Oxygenates

Compound	Unit	Limit	MCERTS	2564314	2564315	2564316	2564317	2564318
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	Unit	Limit	MCERTS	2564314	2564315	2564316	2564317	2564318
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	Unit	Limit	MCERTS	2564314	2564315	2564316	2564317	2564318
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	2.4	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	17	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	23	< 10	< 10	< 10

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Lab Sample Number	2564314	2564315	2564316	2564317	2564318
Sample Reference	S3BH15	S3BH08B	S3BH08B	S3TP21	S3TP23
Sample Number	S3	S3	S3	S3	S3
Depth (m)	0.5	0.20	1.40	0.50	0.50
Date Sampled	11/02/2023	12/01/2023	12/01/2023	18/01/2023	12/01/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

VOCs

Compound	Units	Limit of detection	Accreditation Status	2564314	2564315	2564316	2564317	2564318
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Lab Sample Number				2564314	2564315	2564316	2564317	2564318
Sample Reference				S3BH15	S3BH08B	S3BH08B	S3TP21	S3TP23
Sample Number				S3	S3	S3	S3	S3
Depth (m)				0.5	0.20	1.40	0.50	0.50
Date Sampled				11/02/2023	12/01/2023	12/01/2023	18/01/2023	12/01/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Lab Sample Number				2564319	2564320
Sample Reference				S3TP24	S3TP24
Sample Number				S3	S3
Depth (m)				0.20	2.00
Date Sampled				13/01/2023	13/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	9.5	14
Total mass of sample received	kg	0.001	NONE	0.9	0.9

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SZS	SZS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.8	7.9
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	16	13
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0082	0.0065
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	8.2	6.5
Total Sulphur	%	0.005	MCERTS	0.019	0.006
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.011	0.0023

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.13	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.12	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.09	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.07	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80
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Project / Site name: A46 Newark

Lab Sample Number				2564319	2564320
Sample Reference				S3TP24	S3TP24
Sample Number				S3	S3
Depth (m)				0.20	2.00
Date Sampled				13/01/2023	13/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Heavy Metals / Metalloids					
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.4	3.4
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.3	18
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	160
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.71	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.2	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	16	32
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	32
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22	17
Iron (aqua regia extractable)	mg/kg	40	MCERTS	25000	39000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	42	10
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1200	720
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.2	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	23	58
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	74	54

Monoaromatics & Oxygenates

Compound	Units	Limit of detection	Accreditation Status		
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status		
TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	< 10	< 10

Parameter	Units	Limit of detection	Accreditation Status		
TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	< 10	< 10

Analytical Report Number: 23-13758

Project / Site name: A46 Newark

Lab Sample Number				2564319	2564320
Sample Reference				S3TP24	S3TP24
Sample Number				S3	S3
Depth (m)				0.20	2.00
Date Sampled				13/01/2023	13/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
VOCs					
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0



Analytical Report Number: 23-13758

Project / Site name: A46 Newark

Lab Sample Number				2564319	2564320
Sample Reference				S3TP24	S3TP24
Sample Number				S3	S3
Depth (m)				0.20	2.00
Date Sampled				13/01/2023	13/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number: 23-13758

Project / Site name: A46 Newark

Lab Sample Number	2564321	2564322	2564323	2564324	2564325
Sample Reference	S3BH15	S3BH08B	S3BH08B	S3TP21	S3TP23
Sample Number	S3	S3	S3	S3	S3
Depth (m)	0.50	0.20	1.40	0.50	0.50
Date Sampled	09/01/2023	12/01/2023	12/01/2023	18/02/2003	12/01/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.7	7.5	7.5	7.6	7.2
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide (Low Level)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1	< 1	< 1
Sulphate as SO ₄	mg/l	0.1	ISO 17025	2	5.9	7.7	14.2	1.1
Chloride	mg/l	0.15	ISO 17025	4.4	12	4.2	20	1.9
Fluoride	µg/l	50	ISO 17025	960	720	520	760	220
Ammoniacal Nitrogen as N	µg/l	15	NONE	25	< 15	20	< 15	25

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	1.4	< 1.0	2.3	< 1.0	1.8
Barium (dissolved)	µg/l	0.05	ISO 17025	52	54	46	11	3.7
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	16	35	34	14	19
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	7	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	3	4.9	7	< 0.4	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	16	34	8.2	2.6	12
Iron (dissolved)	mg/l	0.004	ISO 17025	2.4	0.86	2.4	0.006	0.036
Lead (dissolved)	µg/l	1	ISO 17025	1.3	2.3	3.8	< 1.0	< 1.0
Manganese (dissolved)	µg/l	0.06	ISO 17025	140	51	64	41	16
Mercury - CV-AFS	µg/l	0.007	ISO 17025	< 0.0070	0.0115	< 0.0070	< 0.0070	0.0146
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	1.8	4.2	< 0.4	< 0.4	< 0.4
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.6	3	2.6	< 0.3	0.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	2.5	3.7	3.5	< 1.7	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	16	18	26	3.3	4.2

Calcium (dissolved)	mg/l	0.012	ISO 17025	11	13	7.4	13	1.3
Magnesium (dissolved)	mg/l	0.005	ISO 17025	2.2	3.1	3.1	5.2	0.29

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number: 23-13758

Project / Site name: A46 Newark

Lab Sample Number				2564326	2564327
Sample Reference				S3TP24	S3TP24
Sample Number				S3	S3
Depth (m)				0.20	2.00
Date Sampled				13/01/2023	13/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

	pH Units	N/A	ISO 17025	7	7.3
pH (automated)	µg/l	1	ISO 17025	< 1.0	< 1.0
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0
Complex Cyanide (Low Level)	µg/l	1	ISO 17025	< 1	< 1
Free Cyanide (Low Level 1 µg/l)	µg/l	0.1	ISO 17025	0.7	3.5
Sulphate as SO ₄	mg/l	0.15	ISO 17025	0.91	1.3
Chloride	µg/l	50	ISO 17025	680	300
Fluoride	µg/l	15	NONE	17	< 15
Ammoniacal Nitrogen as N					

Phenols by HPLC

	µg/l	0.5	NONE	< 0.5	< 0.5
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	5.8	14
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	22	15
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.5	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	14	3.2
Iron (dissolved)	mg/l	0.004	ISO 17025	0.26	0.013
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0
Manganese (dissolved)	µg/l	0.06	ISO 17025	25	31
Mercury - CV-AFS	µg/l	0.007	ISO 17025	0.0159	< 0.0070
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.7
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.1	0.7
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.4	2.3

Calcium (dissolved)	mg/l	0.012	ISO 17025	2.2	9.3
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.7	2.4

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-13758

Project / Site name: A46 Newark

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2564314	S3BH15	S3	0.5	Brown sand with gravel and stones.
2564315	S3BH08B	S3	0.2	Brown loam and sand with gravel and vegetation.
2564316	S3BH08B	S3	1.4	Brown clay and sand with gravel.
2564317	S3TP21	S3	0.5	Brown clay with gravel.
2564318	S3TP23	S3	0.5	Brown sand with gravel and stones.
2564319	S3TP24	S3	0.2	Brown sand with gravel.
2564320	S3TP24	S3	2	Brown clay and sand with gravel.

Analytical Report Number : 23-13758

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Phenols, speciated, in soil, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex cyanide (Low level) in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS

Analytical Report Number : 23-13758

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil™	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Mercury Low Level in leachate	Mercury in leachate by CV-AFS,	In-house method based on USEPA method 1631	L085-PL	W	ISO 17025

Analytical Report Number : 23-13758

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-13758

Project / Site name: A46 Newark

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
S3BH08B	S3	S	2564315	c	Free cyanide in soil	L080-PL	c
S3BH08B	S3	S	2564316	c	Free cyanide in soil	L080-PL	c
S3TP23	S3	S	2564318	c	Free cyanide in soil	L080-PL	c
S3TP24	S3	S	2564319	c	Free cyanide in soil	L080-PL	c
S3TP24	S3	S	2564320	c	Free cyanide in soil	L080-PL	c

Final Report

Report No.: 23-01374-1

Initial Date of Issue: 02-Feb-2023

Client: Strata Geotechnics Limited

Client Address: Summit Close
Kirkby in Ashfield
Nottinghamshire
NG17 8GJ

Contact(s): David Ashton
Izaak Lovatt

Project: 221209 A46

Quotation No.: Q22-28220

Date Received: 18-Jan-2023

Order No.:

Date Instructed: 26-Jan-2023

No. of Samples: 1

Turnaround (Wkdays): 5

Results Due: 01-Feb-2023

Date Approved: 02-Feb-2023

Approved By:


Details: Stuart Henderson, Technical
Manager

Results - Leachate

Project: 221209 A46

Client: Strata Geotechnics Limited		Chemtest Job No.: 23-01374				
Quotation No.: Q22-28220		Chemtest Sample ID.: 1575435				
		Sample Location: S3BH15				
		Sample Type: SOIL				
		Top Depth (m): 6.90				
		Bottom Depth (m): 7.40				
		Date Sampled: 12-Jan-2023				
Determinand	Accred.	SOP	Type	Units	LOD	
pH	U	1010	2:1		N/A	7.8
Chloride	U	1220	2:1	mg/l	1.0	55
Fluoride	U	1220	2:1	mg/l	0.050	0.25
Ammonia (Free) as N	N	1220	2:1	mg/l	0.050	< 0.050
Sulphate	U	1220	2:1	mg/l	1.0	1500
Cyanide (Total) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050
Cyanide (Free) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050
Cyanide (Complex) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050
Calcium	U	1455	2:1	mg/l	2.00	2400
Magnesium	U	1455	2:1	mg/l	0.20	26
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	150
Boron (Dissolved)	U	1455	2:1	µg/l	10.0	1900
Barium (Dissolved)	U	1455	2:1	µg/l	5.00	40
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	0.57
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	0.10
Manganese (Dissolved)	U	1455	2:1	µg/l	0.50	5.3
Molybdenum (Dissolved)	U	1455	2:1	µg/l	0.20	430
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	< 0.50
Antimony (Dissolved)	U	1455	2:1	µg/l	0.50	21
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	25
Vanadium (Dissolved)	U	1455	2:1	µg/l	0.50	120
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	< 2.5
Iron (Dissolved)	N	1455	2:1	µg/l	5.0	< 5.0
Chromium (Trivalent)	N	1490	2:1	µg/l	20	< 20
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20
Resorcinol	U	1920	2:1	mg/l	0.0050	< 0.0050
Phenol	U	1920	2:1	mg/l	0.0050	< 0.0050
Cresols	U	1920	2:1	mg/l	0.0050	< 0.0050
Xylenols	U	1920	2:1	mg/l	0.0050	< 0.0050
1-Naphthol	N	1920	2:1	mg/l	0.0050	< 0.0050
Trimethylphenols	U	1920	2:1	mg/l	0.0050	< 0.0050
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030

Results - Soil

Project: 221209 A46

Client: Strata Geotechnics Limited	Chemtest Job No.:		23-01374		
Quotation No.: Q22-28220	Chemtest Sample ID.:		1575435		
	Sample Location:		S3BH15		
	Sample Type:		SOIL		
	Top Depth (m):		6.90		
	Bottom Depth (m):		7.40		
	Date Sampled:		12-Jan-2023		
	Asbestos Lab:		COVENTRY		
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
Moisture	N	2030	%	0.020	19
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	None
Soil Texture	N	2040		N/A	Sand
pH	U	2010		4.0	8.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	13
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	1.5
Total Sulphur	U	2175	%	0.010	0.25
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50
Iron (Total)	N	2430	mg/kg	100	23000
Arsenic	U	2455	mg/kg	0.5	150
Barium	U	2455	mg/kg	0	340
Beryllium	U	2455	mg/kg	0.5	3.7
Cadmium	U	2455	mg/kg	0.10	0.37
Chromium	U	2455	mg/kg	0.5	71
Manganese	U	2455	mg/kg	1.0	340
Molybdenum	U	2455	mg/kg	0.5	9.6
Antimony	N	2455	mg/kg	2.0	6.3
Copper	U	2455	mg/kg	0.50	98
Mercury	U	2455	mg/kg	0.05	0.23
Nickel	U	2455	mg/kg	0.50	62
Lead	U	2455	mg/kg	0.50	59
Selenium	U	2455	mg/kg	0.25	4.7
Vanadium	U	2455	mg/kg	0.5	140
Zinc	U	2455	mg/kg	0.50	69
Chromium (Trivalent)	N	2490	mg/kg	1.0	71
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Fraction of Organic Carbon	U	2625		0.0010	0.033
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0

Results - Soil

Project: 221209 A46

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01374	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1575435	
		Sample Location:		S3BH15	
		Sample Type:		SOIL	
		Top Depth (m):		6.90	
		Bottom Depth (m):		7.40	
		Date Sampled:		12-Jan-2023	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: 221209 A46

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01374	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1575435	
		Sample Location:		S3BH15	
		Sample Type:		SOIL	
		Top Depth (m):		6.90	
		Bottom Depth (m):		7.40	
		Date Sampled:		12-Jan-2023	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: 221209 A46

Client: Strata Geotechnics Limited		Chemtest Job No.:		23-01374	
Quotation No.: Q22-28220		Chemtest Sample ID.:		1575435	
		Sample Location:		S3BH15	
		Sample Type:		SOIL	
		Top Depth (m):		6.90	
		Bottom Depth (m):		7.40	
		Date Sampled:		12-Jan-2023	
		Asbestos Lab:		COVENTRY	
Determinand	Accred.	SOP	Units	LOD	
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	N	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0
Resorcinol	U	2920	mg/kg	0.020	< 0.020
Phenol	U	2920	mg/kg	0.020	< 0.020
Cresols	U	2920	mg/kg	0.020	< 0.020
Xylenols	U	2920	mg/kg	0.020	< 0.020
1-Naphthol	N	2920	mg/kg	0.020	< 0.020
Trimethylphenols	U	2920	mg/kg	0.020	< 0.020
Total Phenols	U	2920	mg/kg	0.10	< 0.10

Results - 2 Stage WAC

Project: 221209 A46

Chemtest Job No: 23-01374 Chemtest Sample ID: 1575435 Sample Ref: Sample ID: Sample Location: S3BH15 Top Depth(m): 6.90 Bottom Depth(m): 7.40 Sampling Date: 12-Jan-2023							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non- reactive hazardous waste in non- hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon							3	5	6
Loss on Ignition							--	--	10
Total BTEX							6	--	--
Total PCBs (7 congeners)							1	--	--
TPH Total WAC (Mineral Oil)							500	--	--
Total (of 17) PAHs							100	--	--
pH							--	>6	--
Acid Neutralisation Capacity							--	To evaluate	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic							0.5	2	25
Barium							20	100	300
Cadmium							0.04	1	5
Chromium							0.5	10	70
Copper							2	50	100
Mercury							0.01	0.2	2
Molybdenum							0.5	10	30
Nickel							0.4	10	40
Lead							0.5	10	50
Antimony							0.06	0.7	5
Selenium							0.1	0.5	7
Zinc							4	50	200
Chloride							800	15000	25000
Fluoride							10	150	500
Sulphate							1000	20000	50000
Total Dissolved Solids							4000	60000	100000
Phenol Index							1	-	-
Dissolved Organic Carbon							500	800	1000

Solid Information	
Dry mass of test portion/kg	
Moisture (%)	

Leachate Test Information	
Leachant volume 1st extract/l	
Leachant volume 2nd extract/l	
Eluant recovered from 1st extract/l	

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8,>C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35- C44Aromatics: >C5-C7, >C7-C8, >C8- C10, >C10-C12, >C12-C16, >C16- C21, >C21- C35, >C35- C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)

Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com



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Environmental Science

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Analytical Report Number : 23-14345

Replaces Analytical Report Number: 23-14345, issue no. 2
Client references/information amended.

Project / Site name:	A46 Newark	Samples received on:	26/01/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	27/01/2023
Your order number:		Analysis completed by:	02/02/2023
Report Issue Number:	3	Report issued on:	07/03/2023
Samples Analysed:	4 water samples		

Signed: [REDACTED]

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



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Environmental Science

Analytical Report Number: 23-14345

Project / Site name: A46 Newark

Lab Sample Number	2567092	2567093	2567094	2567095
Sample Reference	S3WS07	S3WS06	S3WS01	S3WS05
Sample Number	S3	S3	S3	S3
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	25/01/2023	25/01/2023	25/01/2023	25/01/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (L005B)	pH Units	N/A	ISO 17025	7.4	6.6	7.1	6.9
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Sulphate as SO4	mg/l	0.045	ISO 17025	740	214	285	46
Total Sulphur	µg/l	15	NONE	250000	71000	95000	15000
Chloride	mg/l	0.15	ISO 17025	130	45	63	14
Fluoride	mg/l	0.05	ISO 17025	0.2	0.053	0.25	0.14
Ammoniacal Nitrogen as N	mg/l	0.015	ISO 17025	0.034	0.023	0.02	0.029
Nitrate as N	mg/l	0.01	ISO 17025	12.7	23.5	0.92	23.2
Nitrate as NO3	mg/l	0.05	ISO 17025	56.3	104	4.05	103
Alkalinity as CaCO3 (titration)	mg/l	3	NONE	200	32	170	380
Total Dissolved Solids (Gravimetric) (L004B)	mg/l	4	ISO 17025	1500	540	550	270

Hardness - Total	mgCaCO3/l	1	ISO 17025	1300	349	558	272
Bicarbonate as HCO3 (titration)	mg/l	10	NONE	250	39	210	470

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16
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Environmental Science

Analytical Report Number: 23-14345

Project / Site name: A46 Newark

Lab Sample Number				2567092	2567093	2567094	2567095
Sample Reference				S3WS07	S3WS06	S3WS01	S3WS05
Sample Number				S3	S3	S3	S3
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				25/01/2023	25/01/2023	25/01/2023	25/01/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	170	62	180	57
Calcium (dissolved)	mg/l	0.012	ISO 17025	410	110	170	88
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.004	0.034	< 0.004	0.076
Magnesium (dissolved)	mg/l	0.005	ISO 17025	67	21	34	12
Molybdenum (dissolved)	mg/l	0.00005	ISO 17025	0.0013	0.0013	0.0022	0.0017
Sodium (dissolved)	mg/l	0.01	ISO 17025	76	45	48	16

Antimony (dissolved)	mg/l	0.0004	ISO 17025	0.0005	0.0004	< 0.0004	0.0008
Arsenic (dissolved)	mg/l	0.00015	ISO 17025	0.0024	0.0006	< 0.0002	0.0004
Barium (dissolved)	mg/l	0.00006	ISO 17025	0.054	0.1	0.099	0.07
Beryllium (dissolved)	mg/l	0.0001	ISO 17025	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Boron (dissolved)	mg/l	0.01	ISO 17025	0.17	0.06	0.18	0.06
Cadmium (dissolved)	mg/l	0.00002	ISO 17025	0.0001	0.0003	0.0002	0.00004
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.5	0.2	0.6
Copper (dissolved)	mg/l	0.0005	ISO 17025	0.001	0.011	0.001	0.0025
Lead (dissolved)	mg/l	0.0002	ISO 17025	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Manganese (dissolved)	mg/l	0.00005	ISO 17025	0.18	0.03	0.028	0.0057
Mercury (dissolved)	mg/l	0.00005	ISO 17025	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Nickel (dissolved)	mg/l	0.0005	ISO 17025	0.0026	0.0082	0.0024	0.0033
Selenium (dissolved)	mg/l	0.0006	ISO 17025	0.0026	0.0013	0.0033	0.0007
Vanadium (dissolved)	mg/l	0.0002	ISO 17025	0.0016	0.0002	< 0.0002	0.0004
Zinc (dissolved)	mg/l	0.0005	ISO 17025	0.0016	0.0065	0.0044	0.004

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_1D_AL_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35 EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_1D_AR_MS	µg/l	10	NONE	< 10	< 10	< 10	< 10



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Environmental Science

Analytical Report Number: 23-14345

Project / Site name: A46 Newark

Lab Sample Number	2567092	2567093	2567094	2567095
Sample Reference	S3WS07	S3WS06	S3WS01	S3WS05
Sample Number	S3	S3	S3	S3
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	25/01/2023	25/01/2023	25/01/2023	25/01/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

VOCs

Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	2567092	2567093	2567094	2567095
Chloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	10	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
2,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Trichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	9.7	< 3.0	< 3.0	< 3.0
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Trichloroethene	µg/l	3	ISO 17025	9.6	< 3.0	< 3.0	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
p & m-Xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Tribromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
o-Xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0



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Environmental Science

Analytical Report Number: 23-14345

Project / Site name: A46 Newark

Lab Sample Number				2567092	2567093	2567094	2567095
Sample Reference				S3WS07	S3WS06	S3WS01	S3WS05
Sample Number				S3	S3	S3	S3
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				25/01/2023	25/01/2023	25/01/2023	25/01/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



4041



Environmental Science

Analytical Report Number : 23-14345

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Alkalinity in Water (by titration)	Determination of Alkalinity by titration (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L025-PL	W	NONE
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025



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Environmental Science

Analytical Report Number : 23-14345

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode.. Accredited matrices: SW, PW, GW	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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Analytical Report Number : 23-16156

Project / Site name:	A46 Newark	Samples received on:	03/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	03/02/2023
Your order number:	VE292904	Analysis completed by:	14/02/2023
Report Issue Number:	1	Report issued on:	14/02/2023
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed: [REDACTED]

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-16156
Project / Site name: A46 Newark

Lab Sample Number	2576626	2576627			
Sample Reference	TP34	TP29			
Sample Number	None Supplied	None Supplied			
Depth (m)	0.20	0.50			
Date Sampled	31/01/2023	30/01/2023			
Time Taken	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	20
Total mass of sample received	kg	0.001	NONE	1.4	1.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SPU	SPU

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.4
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	58	100
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.029	0.05
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	28.9	50.4
Total Sulphur	mg/kg	50	MCERTS	380	260
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.023	0.01

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80
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Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	3.1	2.5
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	10
Barium (aqua regia extractable)	mg/kg	1	MCERTS	350	250
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.7	1
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.8	0.7
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	31	23
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	32	14
Iron (aqua regia extractable)	mg/kg	40	MCERTS	28000	28000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	68
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1300	640

Analytical Report Number: 23-16156
Project / Site name: A46 Newark

Lab Sample Number				2576626	2576627
Sample Reference				TP34	TP29
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.6	1.2
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	35
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	200	140

Monoaromatics & Oxygenates

	µg/kg	5	MCERTS	< 5.0*	< 5.0*
Benzene	µg/kg	5	MCERTS	< 5.0*	< 5.0*
Toluene	µg/kg	5	MCERTS	< 5.0*	< 5.0*
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	NONE	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Data reported unsuitable due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and therefore may be unreliable.

Analytical Report Number: 23-16156
Project / Site name: A46 Newark

Lab Sample Number				2576628	2576629
Sample Reference				TP34	TP29
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	6.6	6
Total Cyanide	mg/l	0.01	ISO 17025	< 0.01	< 0.01
Complex Cyanide	mg/l	0.01	ISO 17025	< 0.01	< 0.01
Free Cyanide	mg/l	0.01	ISO 17025	< 0.01	< 0.01
Free Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010
Sulphate as SO ₄	mg/l	0.1	ISO 17025	4.3	8.5
Chloride	mg/l	0.15	ISO 17025	0.15	0.28
Fluoride	mg/l	0.05	ISO 17025	0.34	0.56
Ammoniacal Nitrogen as N	mg/l	0.015	NONE	0.081	0.1

Speciated PAHs

Naphthalene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Acenaphthylene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Acenaphthene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Fluorene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Phenanthrene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Anthracene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Fluoranthene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Pyrene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Benzo(a)anthracene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Chrysene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Benzo(k)fluoranthene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Benzo(a)pyrene	mg/l	0.00001	ISO 17025	< 0.00001	< 0.00001
Indeno(1,2,3-cd)pyrene	mg/l	0.00001	NONE	< 0.00001	< 0.00001
Dibenz(a,h)anthracene	mg/l	0.00001	NONE	< 0.00001	< 0.00001
Benzo(ghi)perylene	mg/l	0.00001	NONE	< 0.00001	< 0.00001

Total PAH

Total EPA-16 PAHs	mg/l	0.0002	NONE	< 0.0002	< 0.0002
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Heavy Metals / Metalloids

Antimony (dissolved)	mg/l	0.0017	ISO 17025	< 0.0017	< 0.0017
Arsenic (dissolved)	mg/l	0.001	ISO 17025	< 0.001	< 0.001
Barium (dissolved)	mg/l	0.00005	ISO 17025	0.039	0.045
Beryllium (dissolved)	mg/l	0.0002	ISO 17025	< 0.0002	< 0.0002
Boron (dissolved)	mg/l	0.01	ISO 17025	0.023	0.013
Cadmium (dissolved)	mg/l	0.00008	ISO 17025	< 0.00008	< 0.00008
Chromium (hexavalent)	mg/l	0.005	ISO 17025	< 0.005	< 0.005
Chromium (III)	mg/l	0.005	NONE	< 0.005	< 0.005
Chromium (dissolved)	mg/l	0.0004	ISO 17025	0.0049	0.0043
Copper (dissolved)	mg/l	0.0007	ISO 17025	0.036	0.024
Iron (dissolved)	mg/l	0.004	ISO 17025	1.8	2.1
Lead (dissolved)	mg/l	0.001	ISO 17025	0.0053	0.0034
Manganese (dissolved)	mg/l	0.00006	ISO 17025	0.030	0.022
Mercury (dissolved)	mg/l	0.0005	ISO 17025	< 0.0005	< 0.0005
Molybdenum (dissolved)	mg/l	0.0004	ISO 17025	< 0.0004	< 0.0004
Nickel (dissolved)	mg/l	0.0003	ISO 17025	0.0039	0.0035
Selenium (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004
Vanadium (dissolved)	mg/l	0.0017	ISO 17025	0.0031	0.0040
Zinc (dissolved)	mg/l	0.0004	ISO 17025	0.026	0.025



Analytical Report Number: 23-16156
 Project / Site name: A46 Newark

Lab Sample Number				2576628	2576629
Sample Reference				TP34	TP29
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Calcium (dissolved)	mg/l	0.012	ISO 17025	2.4	3.4
Magnesium (dissolved)	mg/l	0.005	ISO 17025	1.1	1.4

Petroleum Hydrocarbons					
TPH1 (C10 - C40) <small>EH_ID_TOTAL_MS</small>	mg/l	0.01	NONE	< 0.01	< 0.01

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-16156
Project / Site name: A46 Newark

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2576626	TP34	None Supplied	0.2	Brown clay with gravel.
2576627	TP29	None Supplied	0.5	Brown clay with gravel.

Analytical Report Number : 23-16156

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L0338-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS

Analytical Report Number : 23-16156

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C

Analytical Report Number : 23-16156
 Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-16156

Project / Site name: A46 Newark

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP29	None Supplied	S	2576627	c	Free cyanide in soil	L080-PL	c



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Analytical Report Number : 23-16156

Replaces Analytical Report Number: 23-16156, issue no. 2
Client references/information amended.

Project / Site name:	A46 Newark	Samples received on:	03/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	03/02/2023
Your order number:	VE292904	Analysis completed by:	23/02/2023
Report Issue Number:	3	Report issued on:	07/03/2023
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed: [REDACTED]

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-16156

Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number				2576626	2576627
Sample Reference				S3TP34	S3TP29
Sample Number				S3	S3
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	20
Total mass of sample received	kg	0.001	NONE	1.4	1.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SPU	SPU

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.4
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	58	100
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.029	0.05
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	28.9	50.4
Total Sulphur	mg/kg	50	MCERTS	380	260
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.023	0.01

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80
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Analytical Report Number: 23-16156

Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number				2576626	2576627
Sample Reference				S3TP34	S3TP29
Sample Number				S3	S3
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Element	Units	Limit of detection	Accreditation Status	2576626	2576627
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	3.1	2.5
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	10
Barium (aqua regia extractable)	mg/kg	1	MCERTS	350	250
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.7	1
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.8	0.7
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	31	23
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32	23
Copper (aqua regia extractable)	mg/kg	1	MCERTS	32	14
Iron (aqua regia extractable)	mg/kg	40	MCERTS	28000	28000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	68
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1300	640
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.6	1.2
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	35
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	200	140

Monoaromatics & Oxygenates

Compound	Units	Limit of detection	Accreditation Status	2576626	2576627
Benzene	µg/kg	5	NONE	< 5.0*	< 5.0*
Toluene	µg/kg	5	NONE	< 5.0*	< 5.0*
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	2576626	2576627
TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	NONE	< 10	< 10

Parameter	Units	Limit of detection	Accreditation Status	2576626	2576627
TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.001	NONE	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

*Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and therefore may be unreliable.



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Environmental Science

Analytical Report Number: 23-16156

Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number				2576628	2576629
Sample Reference				S3TP34	S3TP29
Sample Number				S3	S3
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	6.6	6
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10
Free Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010
Sulphate as SO ₄	mg/l	0.1	ISO 17025	4.3	8.5
Chloride	mg/l	0.15	ISO 17025	0.15	0.28
Fluoride	µg/l	50	ISO 17025	340	560
Ammoniacal Nitrogen as N	µg/l	15	NONE	81	100

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2
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4041



Environmental Science

Analytical Report Number: 23-16156

Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number				2576628	2576629
Sample Reference				S3TP34	S3TP29
Sample Number				S3	S3
Depth (m)				0.20	0.50
Date Sampled				31/01/2023	30/01/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	39	45
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	23	13
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	4.9	4.3
Copper (dissolved)	µg/l	0.7	ISO 17025	36	24
Iron (dissolved)	mg/l	0.004	ISO 17025	1.8	2.1
Lead (dissolved)	µg/l	1	ISO 17025	5.3	3.4
Manganese (dissolved)	µg/l	0.06	ISO 17025	30	22
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.9	3.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	3.1	4
Zinc (dissolved)	µg/l	0.4	ISO 17025	26	25

Calcium (dissolved)	mg/l	0.012	ISO 17025	2.4	3.4
Magnesium (dissolved)	mg/l	0.005	ISO 17025	1.1	1.4

Petroleum Hydrocarbons

TPH1 (C10 - C40) <small>EH_ID_TOTAL_MS</small>	µg/l	10	NONE	< 10	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-16156
Project / Site name: A46 Newark

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2576626	S3TP34	S3	0.2	Brown clay with gravel.
2576627	S3TP29	S3	0.5	Brown clay with gravel.

Analytical Report Number : 23-16156

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as received, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS

Analytical Report Number : 23-16156

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil™	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

Analytical Report Number : 23-16156

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Environmental Science

Analytical Report Number : 23-16156

Project / Site name: A46 Newark

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
S3TP29	S3	S	2576627	c	Free cyanide in soil	L080-PL	c



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Analytical Report Number : 23-16221

Replaces Analytical Report Number: 23-16221, issue no. 1

Project / Site name:	A46 Newark	Samples received on:	06/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	07/02/2023
Your order number:	VE292904	Analysis completed by:	17/02/2023
Report Issue Number:	2	Report issued on:	02/03/2023
Samples Analysed:	11 leachate samples - 19 soil samples		

Signed: [REDACTED]
Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-16221
 Project / Site name: A46 Newark
 Your Order No: VE292904

Lab Sample Number	2577052	2577053	2577054	2577055	2577056			
Sample Reference	S3BH14R	S3BH14R	S3BH14R	S3BH09R	S3BH02R			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.20	0.50	1.00	1.00	0.50			
Date Sampled	09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	69	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	8.2	5	16	8.6
Total mass of sample received	kg	0.001	NONE	1.1	1.1	1.3	1.1	1.1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SZS	SZS	SZS	SZS	SZS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.5	7.3	7	7.3
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	140	140	67	98	14
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.072	0.072	0.033	0.049	0.0072
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	71.6	72.1	33.4	48.9	7.2
Total Sulphur	%	0.005	MCERTS	0.034	0.018	0.01	0.034	0.009
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.025	0.0084	0.0032	0.02	0.0053

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.06	< 0.05	< 0.05	0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.16	< 0.05	< 0.05	0.09	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.14	< 0.05	< 0.05	0.08	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.08	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.09	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.1	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.06	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.11	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	0.85	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 23-16221
 Project / Site name: A46 Newark
 Your Order No: VE292904

Lab Sample Number	2577052	2577053	2577054	2577055	2577056
Sample Reference	S3BH14R	S3BH14R	S3BH14R	S3BH09R	S3BH02R
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20	0.50	1.00	1.00	0.50
Date Sampled	09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Element	Unit	Limit	Standard	2577052	2577053	2577054	2577055	2577056
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.1	2.7	< 1.0	2.4	1.5
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.4	8.4	7.1	12	4.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	99	53	310	45
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.81	0.57	0.41	1.1	0.36
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	0.7	0.3	1	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.5	0.3	1.7	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	20	12	9.1	26	8.6
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	12	9.1	26	8.6
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	10	7.1	20	7.4
Iron (aqua regia extractable)	mg/kg	40	MCERTS	23000	24000	21000	33000	13000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	40	47	23	150	17
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	920	860	410	1300	530
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.91	0.96	0.72	1.2	0.62
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	14	13	30	9.5
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	24	19	16	35	14
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	87	62	39	170	32

Monoaromatics & Oxygenates

Compound	Unit	Limit	Standard	2577052	2577053	2577054	2577055	2577056
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

Parameter	Unit	Limit	Standard	2577052	2577053	2577054	2577055	2577056
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

Parameter	Unit	Limit	Standard	2577052	2577053	2577054	2577055	2577056
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

Analytical Report Number: 23-16221
 Project / Site name: A46 Newark
 Your Order No: VE292904

Lab Sample Number	2577052	2577053	2577054	2577055	2577056
Sample Reference	S3BH14R	S3BH14R	S3BH14R	S3BH09R	S3BH02R
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20	0.50	1.00	1.00	0.50
Date Sampled	09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

VOCs

Compound	Units	Limit of detection	Accreditation Status	2577052	2577053	2577054	2577055	2577056
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Lab Sample Number				2577052	2577053	2577054	2577055	2577056
Sample Reference				S3BH14R	S3BH14R	S3BH14R	S3BH09R	S3BH02R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	1.00	1.00	0.50
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
				Butylbenzene	µg/kg	5	NONE	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Lab Sample Number	2577057	2577058	2577059	2577060	2577061			
Sample Reference	S3BH07R	S3BH07R	S3BH07R	S3BH07R	S3BH06R			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.80	1.20	2.00	3.30	0.20			
Date Sampled	09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	48	< 0.1
Moisture Content	%	0.01	NONE	22	19	19	6.3	14
Total mass of sample received	kg	0.001	NONE	1.1	1.1	1.1	1	1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SZS	SZS	SZS	SZS	SZS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	7.6	7.5	8.1	8.2
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	88	87	61	52	96
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.044	0.044	0.03	0.026	0.048
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	44.1	43.7	30.4	25.8	48.1
Total Sulphur	%	0.005	MCERTS	0.013	0.016	0.012	0.008	0.076
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0042	0.0055	0.004	0.0031	0.052

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.91
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.6
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.26
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.93
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.05	11
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	6
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.09	24
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.13	22
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	13
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	9.7
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	11
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	4.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	8.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	4.5
Dibenzo(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	1.2
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	4.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	< 0.80	123
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 Project / Site name: A46 Newark
 Your Order No: VE292904

Lab Sample Number				2577057	2577058	2577059	2577060	2577061
Sample Reference				S3BH07R	S3BH07R	S3BH07R	S3BH07R	S3BH06R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	1.20	2.00	3.30	0.20
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.3	< 1.0	< 1.0	< 1.0	13
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.4	7.7	8.3	6.8	49
Barium (aqua regia extractable)	mg/kg	1	MCERTS	220	290	220	120	300
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.8	0.9	0.68	0.29	5.8
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.5	0.3	0.4	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.3	1.5	1.3	0.4	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	17	18	14	7.3	31
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	18	14	7.6	31
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	12	8.6	5.7	96
Iron (aqua regia extractable)	mg/kg	40	MCERTS	24000	29000	24000	15000	36000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	23	16	16	140
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	160	190	190	220	1500
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	0.5
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.78	0.78	0.74	0.52	4.8
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	26	20	9.7	40
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25	28	22	11	57
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	160	120	100	130

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	26
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	35

TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	8.9
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	85
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	150
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	240

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Lab Sample Number	2577057				2577058				2577059				2577060				2577061			
Sample Reference	S3BH07R				S3BH07R				S3BH07R				S3BH07R				S3BH06R			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.80				1.20				2.00				3.30				0.20			
Date Sampled	09/02/2023				09/02/2023				09/02/2023				09/02/2023				09/02/2023			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

VOCs

Compound	Units	Limit of detection	Accreditation Status	2577057	2577058	2577059	2577060	2577061
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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 Project / Site name: A46 Newark
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Lab Sample Number				2577057	2577058	2577059	2577060	2577061
Sample Reference				S3BH07R	S3BH07R	S3BH07R	S3BH07R	S3BH06R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	1.20	2.00	3.30	0.20
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
				Butylbenzene	µg/kg	5	NONE	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Lab Sample Number	2577062	2577063	2577064	2577065	2577066			
Sample Reference	S3BH06R	S3BH06R	S3BH05R	S3BH05R	S3BH05R			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	1.20	3.00	0.50	1.00	1.50			
Date Sampled	09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	46	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	11	18	19	20	17
Total mass of sample received	kg	0.001	NONE	1	1.1	1.1	1.1	1.1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	ASE	ASE	ASE	ASE	ASE

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	6.6	7.5	7.5	7.5
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	17	20	12
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	150	910	3000	3000	3300
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.077	0.45	1.5	1.5	1.6
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	76.9	454	1520	1510	1640
Total Sulphur	%	0.005	MCERTS	0.053	0.066	0.382	0.3	0.419
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.035	0.0057	0.062	0.07	0.057

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	1.4	0.95	1
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30	5.7	2.4	3.2
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	1.4	0.56	0.52
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3	8.5	4	4.7
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.62	< 0.05	6	6.8	8.2
Acenaphthylene	mg/kg	0.05	MCERTS	0.41	< 0.05	0.38	0.88	0.85
Acenaphthene	mg/kg	0.05	MCERTS	0.11	0.09	1.8	4.6	3.4
Fluorene	mg/kg	0.05	MCERTS	0.33	0.05	3.8	10	7.5
Phenanthrene	mg/kg	0.05	MCERTS	4.9	0.19	25	46	46
Anthracene	mg/kg	0.05	MCERTS	1.6	0.07	11	20	19
Fluoranthene	mg/kg	0.05	MCERTS	10	0.1	9.9	18	20
Pyrene	mg/kg	0.05	MCERTS	9	0.16	10	18	19
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.7	< 0.05	5.3	9.7	9.7
Chrysene	mg/kg	0.05	MCERTS	3.3	< 0.05	4.3	8.5	8.2
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	3.1	< 0.05	2.7	5.7	5.5
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.2	< 0.05	1.4	1.6	1.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.8	< 0.05	2.6	4.8	4.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1	< 0.05	0.99	2.5	2.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.27	< 0.05	0.35	0.61	0.74
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1	< 0.05	1	1.9	2.1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	42.5	< 0.80	86.2	159	158
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 Project / Site name: A46 Newark
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Lab Sample Number				2577062	2577063	2577064	2577065	2577066
Sample Reference				S3BH06R	S3BH06R	S3BH05R	S3BH05R	S3BH05R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	3.00	0.50	1.00	1.50
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	9.9	1.8	9.3	8.2	7.5
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	38	18	370	290	300
Barium (aqua regia extractable)	mg/kg	1	MCERTS	200	240	310	290	250
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	4.3	0.89	6	5.6	4.8
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	1	2.1	1.4	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.5	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	24	18	26	29	26
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	25	18	26	29	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	73	13	93	81	83
Iron (aqua regia extractable)	mg/kg	40	MCERTS	27000	23000	36000	41000	37000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	77	22	140	100	130
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1200	120	1500	1600	1400
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.8	0.4	0.8
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	3.5	1.1	4.9	4.7	6.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	27	45	62	38
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	29	59	66	54
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	84	180	230	190	170

Monoaromatics & Oxygenates

Parameter	Units	Limit of detection	Accreditation Status	2577062	2577063	2577064	2577065	2577066
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	2577062	2577063	2577064	2577065	2577066
TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	9	15	17
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	39	62	59
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	11	< 8.0	130	190	160
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	NONE	18	< 10	170	270	240

Parameter	Units	Limit of detection	Accreditation Status	2577062	2577063	2577064	2577065	2577066
TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	9.8	8.1	7.8
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	4	< 2.0	110	110	100
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	36	< 10	560	540	490
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	43	< 10	680	540	550
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	NONE	83	< 10	1400	1200	1200

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 Project / Site name: A46 Newark
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Lab Sample Number	2577062				2577063				2577064				2577065				2577066			
Sample Reference	S3BH06R				S3BH06R				S3BH05R				S3BH05R				S3BH05R			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	1.20				3.00				0.50				1.00				1.50			
Date Sampled	09/02/2023				09/02/2023				09/02/2023				09/02/2023				09/02/2023			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

VOCs

Compound	Units	Limit of detection	Accreditation Status	2577062	2577063	2577064	2577065	2577066
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

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Lab Sample Number				2577062	2577063	2577064	2577065	2577066
Sample Reference				S3BH06R	S3BH06R	S3BH05R	S3BH05R	S3BH05R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	3.00	0.50	1.00	1.50
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
				Butylbenzene	µg/kg	5	NONE	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Lab Sample Number	2577067	2577068	2577069	2577070			
Sample Reference	S3BH05R	S3BH05R	S3BH05R	S3WS07R			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	1.65	2.50	3.20	0.50			
Date Sampled	09/02/2023	09/02/2023	09/02/2023	09/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	20	20	18
Total mass of sample received	kg	0.001	NONE	1.1	1.1	1.1	1.1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	ASE	ASE	ASE	ASE

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	7.5	6	7.2
Free Cyanide	mg/kg	1	MCERTS	25	180	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	2700	3000	640	20
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	1.3	1.5	0.32	0.0099
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	1350	1500	318	9.9
Total Sulphur	%	0.005	MCERTS	6.24	1.12	0.058	0.032
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.006	0.024	0.0044	0.013

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.39	2.5	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.27	3.2	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.16	1	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.24	1.8	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.8	14	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.84	5.3	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	3.2	26	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	3.1	24	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2	18	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	2	14	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.2	24	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.99	6.6	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.8	17	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.91	11	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.29	2.8	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.9	11	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	21	181	< 0.80	< 0.80
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Analytical Report Number: 23-16221
 Project / Site name: A46 Newark
 Your Order No: VE292904

Lab Sample Number	2577067			2577068		2577069		2577070	
Sample Reference	S3BH05R			S3BH05R		S3BH05R		S3WS07R	
Sample Number	None Supplied			None Supplied		None Supplied		None Supplied	
Depth (m)	1.65			2.50		3.20		0.50	
Date Sampled	09/02/2023			09/02/2023		09/02/2023		09/02/2023	
Time Taken	None Supplied			None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status						
Heavy Metals / Metalloids									
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	12	12	2.4	4.9		
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	170	510	21	25		
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	240	280	420		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.74	5.4	1	1.9		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.6	0.5	0.3		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	1.6	2.3		
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2		
Chromium (III)	mg/kg	1	NONE	5.4	21	19	42		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	5.4	21	19	42		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23	120	17	31		
Iron (aqua regia extractable)	mg/kg	40	MCERTS	19000	68000	23000	50000		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	52	250	24	83		
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	200	1700	110	2400		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	3.7	< 0.3	< 0.3		
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.1	6.2	0.86	2.4		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	6.6	42	28	47		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	14	73	30	70		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	39	460	180	270		

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0		
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0		
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0		
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0		
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	2.5	< 2.0	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	9.2	< 8.0	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0		
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	16	< 10	< 10		

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	2.1	< 2.0	< 2.0	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	13	< 10	< 10	< 10		
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	28	< 10	< 10	< 10		
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	43	< 10	< 10	< 10		

Analytical Report Number: 23-16221
 Project / Site name: A46 Newark
 Your Order No: VE292904

Lab Sample Number	2577067			2577068			2577069			2577070		
Sample Reference	S3BH05R			S3BH05R			S3BH05R			S3WS07R		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	1.65			2.50			3.20			0.50		
Date Sampled	09/02/2023			09/02/2023			09/02/2023			09/02/2023		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									

VOCs

Compound	Units	Limit of detection	Accreditation Status	2577067	2577068	2577069	2577070
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0

Analytical Report Number: 23-16221
Project / Site name: A46 Newark
Your Order No: VE292904

Lab Sample Number				2577067	2577068	2577069	2577070
Sample Reference				S3BH05R	S3BH05R	S3BH05R	S3WS07R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.65	2.50	3.20	0.50
Date Sampled				09/02/2023	09/02/2023	09/02/2023	09/02/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
				Butylbenzene	µg/kg	5	NONE
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Analytical Report Number: 23-16221
Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number	2577071		2577072		2577073		2577074		2577075	
Sample Reference	S3BH14R		S3BH14R		S3BH09R		S3BH02R		S3BH07R	
Sample Number	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.20		1.00		1.00		0.50		2.00	
Date Sampled	09/02/2023		09/02/2023		09/02/2023		09/02/2023		09/02/2023	
Time Taken	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status							

General Inorganics

Parameter	Units	N/A	ISO 17025	2577071	2577072	2577073	2577074	2577075
pH (automated)	pH Units	N/A	ISO 17025	6.6	6.4	6	6.2	6.4
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	1.8	1.7	< 1.0	< 1.0	< 1.0
Complex Cyanide (Low Level)	µg/l	1	ISO 17025	1.8	1.7	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1	< 1	< 1
Sulphate as SO ₄	mg/l	0.1	ISO 17025	11.3	33.8	36.5	1.6	16.9
Chloride	mg/l	0.15	ISO 17025	0.6	1.4	5	0.25	220
Fluoride	µg/l	50	ISO 17025	340	280	610	710	340
Ammoniacal Nitrogen as N	µg/l	15	NONE	18	36	32	18	21

Phenols by HPLC

Parameter	Units	N/A	ISO 17025	2577071	2577072	2577073	2577074	2577075
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Parameter	Units	N/A	ISO 17025	2577071	2577072	2577073	2577074	2577075
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5

Heavy Metals / Metalloids

Parameter	Units	N/A	ISO 17025	2577071	2577072	2577073	2577074	2577075
Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	1.9	1.2	1.4	< 1.0	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	23	36	56	14	95
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	27	22	43	22	28
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	0.09	< 0.08	0.22
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	2.5	2.9	2.4	3	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	42	30	45	30	20
Iron (dissolved)	mg/l	0.004	ISO 17025	1.2	1.7	1.2	1.4	0.091
Lead (dissolved)	µg/l	1	ISO 17025	4.7	3.9	2.4	2.1	< 1.0
Manganese (dissolved)	µg/l	0.06	ISO 17025	24	34	18	28	5.9
Mercury - CV-AFS	µg/l	0.007	ISO 17025	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	1.6	2.8	0.6	1.6	0.6
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.9	2.8	2.6	2.3	0.7
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	7.3	5.3	3.4	2.9	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	18	29	30	15	16
Calcium (dissolved)	mg/l	0.012	ISO 17025	7.9	13	11	1.1	12
Magnesium (dissolved)	mg/l	0.005	ISO 17025	2.6	2.5	2.5	0.46	4.2

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-16221
Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number	2577076				2577077				2577078				2577079				2577080			
Sample Reference	S3BH06R				S3BH05R				S3BH05R				S3BH05R				S3BH05R			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	1.20				1.50				1.65				2.50				3.20			
Date Sampled	09/02/2023				09/02/2023				09/02/2023				09/02/2023				09/02/2023			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status																	

General Inorganics

Parameter	Units	N/A	ISO 17025	2577076	2577077	2577078	2577079	2577080
pH (automated)	pH Units	N/A	ISO 17025	7.6	7.6	7.5	7.6	5.2
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	6.9	110	220	830	52
Complex Cyanide (Low Level)	µg/l	1	ISO 17025	6.9	110	220	750	52
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	4	5	78	< 1
Sulphate as SO ₄	mg/l	0.1	ISO 17025	16.1	412	754	631	215
Chloride	mg/l	0.15	ISO 17025	1.3	3.8	2.3	3.6	14
Fluoride	µg/l	50	ISO 17025	600	680	840	1000	530
Ammoniacal Nitrogen as N	µg/l	15	NONE	25	31	360	110	840

Phenols by HPLC

Parameter	Units	N/A	ISO 17025	2577076	2577077	2577078	2577079	2577080
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Parameter	Units	N/A	ISO 17025	2577076	2577077	2577078	2577079	2577080
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5

Heavy Metals / Metalloids

Parameter	Units	N/A	ISO 17025	2577076	2577077	2577078	2577079	2577080
Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	21	47	9.6	4.1	17
Barium (dissolved)	µg/l	0.05	ISO 17025	20	45	32	24	40
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Boron (dissolved)	µg/l	10	ISO 17025	49	93	100	140	200
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	0.09	< 0.08	0.11	0.24
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	1	< 0.4	< 0.4	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	22	15	14	13	23
Iron (dissolved)	mg/l	0.004	ISO 17025	0.18	0.05	0.083	0.21	0.33
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	1.9	1.1
Manganese (dissolved)	µg/l	0.06	ISO 17025	8	5.3	9.9	82	150
Mercury - CV-AFS	µg/l	0.007	ISO 17025	0.0173	0.0081	< 0.0070	0.0119	< 0.0070
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	2.7	5.6	6.7	5.9	0.4
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.3	1	2.4	2.2	26
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	6.2	< 1.7	< 1.7	3	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	11	12	15	12	51
Calcium (dissolved)	mg/l	0.012	ISO 17025	22	200	340	310	69
Magnesium (dissolved)	mg/l	0.005	ISO 17025	3.3	13	11	11	7

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Analytical Report Number: 23-16221
Project / Site name: A46 Newark

Your Order No: VE292904

Lab Sample Number				2577081
Sample Reference				S3WS07R
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				09/02/2023
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	6
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Complex Cyanide (Low Level)	µg/l	1	ISO 17025	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1
Sulphate as SO ₄	mg/l	0.1	ISO 17025	2.8
Chloride	mg/l	0.15	ISO 17025	0.38
Fluoride	µg/l	50	ISO 17025	600
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	5.3
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	59
Cadmium (dissolved)	µg/l	0.08	ISO 17025	0.1
Chromium (hexavalent)	µg/l	5	ISO 17025	U/S
Chromium (III)	µg/l	5	NONE	U/S
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	14
Iron (dissolved)	mg/l	0.004	ISO 17025	0.1
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0
Manganese (dissolved)	µg/l	0.06	ISO 17025	3.9
Mercury - CV-AFS	µg/l	0.007	ISO 17025	< 0.0070
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	1.1
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.9
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.1

Calcium (dissolved)	mg/l	0.012	ISO 17025	2
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.64

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-16221
Project / Site name: A46 Newark

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2577052	S3BH14R	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2577053	S3BH14R	None Supplied	0.5	Brown loam and clay with gravel and vegetation.
2577054	S3BH14R	None Supplied	1	Brown loam and clay with gravel and vegetation.
2577055	S3BH09R	None Supplied	1	Brown loam and clay with gravel and vegetation.
2577056	S3BH02R	None Supplied	0.5	Brown sand with gravel.
2577057	S3BH07R	None Supplied	0.8	Brown clay and sand with gravel.
2577058	S3BH07R	None Supplied	1.2	Brown clay and sand with gravel.
2577059	S3BH07R	None Supplied	2	Brown clay and sand with gravel.
2577060	S3BH07R	None Supplied	3.3	Brown gravelly sand with stones.
2577061	S3BH06R	None Supplied	0.2	Brown clay and sand with gravel.
2577062	S3BH06R	None Supplied	1.2	Brown loam and sand with stones and vegetation.
2577063	S3BH06R	None Supplied	3	Brown clay and sand with gravel.
2577064	S3BH05R	None Supplied	0.5	Brown loam and sand with gravel and vegetation.
2577065	S3BH05R	None Supplied	1	Brown loam and sand with gravel and vegetation.
2577066	S3BH05R	None Supplied	1.5	Brown sand with gravel and vegetation.
2577067	S3BH05R	None Supplied	1.65	Brown clay with gravel and brick.
2577068	S3BH05R	None Supplied	2.5	Brown loam and sand with gravel and vegetation.
2577069	S3BH05R	None Supplied	3.2	Brown clay and sand with gravel.
2577070	S3WS07R	None Supplied	0.5	Brown clay and sand with gravel.

Analytical Report Number : 23-16221
Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as received, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Phenols, speciated, in soil, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex cyanide (Low level) in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS

Analytical Report Number : 23-16221
Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Mercury Low Level in leachate	Mercury in leachate by CV-AFS,	In-house method based on USEPA method 1631	L085-PL	W	ISO 17025

Analytical Report Number : 23-16221
 Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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Analytical Report Number : 23-16223

Project / Site name:	A46 Newark	Samples received on:	06/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	07/02/2023
Your order number:	VE292904	Analysis completed by:	16/02/2023
Report Issue Number:	1	Report issued on:	16/02/2023
Samples Analysed:	2 10:1 WAC Samples		

Signed: 

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



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Environmental Science

i2 Analytical7 Woodshots Meadow
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email:reception@i2analytical.com**Waste Acceptance Criteria Analytical Results**

Report No:	23-16223					
				Client: VAN ELLE		
Location	A46 Newark					
Lab Reference (Sample Number)	2577095 / 2577096			Landfill Waste Acceptance Criteria		
Sampling Date	09/02/2023			Limits		
Sample ID	S3BH07R			Inert Waste Landfill	Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landfill
Depth (m)	1.20					
Solid Waste Analysis						
TOC (%)**	0.5			3%	5%	6%
Loss on Ignition (%) **	2.1			--	--	10%
BTEX (µg/kg) **	< 5.0			6000	--	--
Sum of PCBs (mg/kg) **	< 0.007			1	--	--
Mineral Oil (mg/kg) <small>EH, ID, CU, AL</small>	< 10			500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85			100	--	--
pH (units)**	7.5			--	>6	--
Acid Neutralisation Capacity (mmol / kg)	1.7			--	To be evaluated	To be evaluated
Eluate Analysis						
	10:1			10:1	Limit values for compliance leaching test	
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)	
Arsenic *	< 0.0010			< 0.0100	0.5	2
Barium *	0.0128			0.101	20	100
Cadmium *	< 0.0001			< 0.0008	0.04	1
Chromium *	< 0.0004			< 0.0040	0.5	10
Copper *	0.0079			0.062	2	50
Mercury *	< 0.0005			< 0.0050	0.01	0.2
Molybdenum *	0.0028			0.0220	0.5	10
Nickel *	0.0007			0.0058	0.4	10
Lead *	< 0.0010			< 0.010	0.5	10
Antimony *	< 0.0017			< 0.017	0.06	0.7
Selenium *	< 0.0040			< 0.040	0.1	0.5
Zinc *	0.0054			0.043	4	50
Chloride *	40			320	800	15000
Fluoride*	0.57			4.5	10	150
Sulphate *	13			110	1000	20000
TDS*	140			1100	4000	60000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-
DOC	14.9			118	500	800
Leach Test Information						
Stone Content (%)	< 0.1					
Sample Mass (kg)	1.1					
Dry Matter (%)	81					
Moisture (%)	19					
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)						
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited						

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



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Environmental Science

i2 Analytical7 Woodshots Meadow
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email:reception@i2analytical.com**Waste Acceptance Criteria Analytical Results**

Report No:	23-16223					
				Client: VAN ELLE		
Location	A46 Newark					
Lab Reference (Sample Number)	2577097 / 2577098			Landfill Waste Acceptance Criteria		
Sampling Date	09/02/2023			Limits		
Sample ID	S3BH05R			Inert Waste Landfill	Stable Non- reactive HAZARDOUS waste in non- hazardous Landfill	Hazardous Waste Landfill
Depth (m)	1.50					
Solid Waste Analysis						
TOC (%)**	5.7			3%	5%	6%
Loss on Ignition (%) **	13.0			--	--	10%
BTEX (µg/kg) **	< 5.0			6000	--	--
Sum of PCBs (mg/kg) **	< 0.007			1	--	--
Mineral Oil (mg/kg) ^{EH, ID, CU, AL}	260			500	--	--
Total PAH (WAC-17) (mg/kg)	161			100	--	--
pH (units)**	7.2			--	>6	--
Acid Neutralisation Capacity (mmol / kg)	1.0			--	To be evaluated	To be evaluated
Eluate Analysis						
	10:1			10:1	Limit values for compliance leaching test	
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg		using BS EN 12457-2 at L/S 10 l/kg (mg/kg)	
Arsenic *	0.0454		0.380	0.5	2	25
Barium *	0.0301		0.252	20	100	300
Cadmium *	< 0.0001		< 0.0008	0.04	1	5
Chromium *	< 0.0004		< 0.0040	0.5	10	70
Copper *	0.011		0.094	2	50	100
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2
Molybdenum *	0.0056		0.0467	0.5	10	30
Nickel *	0.0008		0.0070	0.4	10	40
Lead *	0.0014		0.012	0.5	10	50
Antimony *	< 0.0017		< 0.017	0.06	0.7	5
Selenium *	< 0.0040		< 0.040	0.1	0.5	7
Zinc *	0.015		0.13	4	50	200
Chloride *	1.1		9.0	800	15000	25000
Fluoride*	0.94		7.9	10	150	500
Sulphate *	190		1600	1000	20000	50000
TDS*	300		2500	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-
DOC	4.73		39.6	500	800	1000
Leach Test Information						
Stone Content (%)	< 0.1					
Sample Mass (kg)	1.1					
Dry Matter (%)	83					
Moisture (%)	17					
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)						
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited						

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 23-16223
Project / Site name: A46 Newark

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2577095	S3BH07R	None Supplied	1.2	Brown clay and sand with gravel.
2577097	S3BH05R	None Supplied	1.5	Brown sand with gravel and vegetation.

Analytical Report Number : 23-16223

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance"	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270.	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031	W	ISO 17025

Analytical Report Number : 23-16223
 Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
 Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



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Analytical Report Number : 23-17195

Project / Site name:	A46 Newark Bypass	Samples received on:	07/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	10/02/2023
Your order number:	VE292904	Analysis completed by:	21/02/2023
Report Issue Number:	1	Report issued on:	22/02/2023
Samples Analysed:	3 leachate samples - 6 soil samples		

Signed: 

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-17195
Project / Site name: A46 Newark Bypass

Lab Sample Number	2582802	2582803	2582804	2582805	2582806			
Sample Reference	S3TP06	S3TP07	S3TP08	S3TP10	S3TP19			
Sample Number	2	6	4	2	3			
Depth (m)	0.20	1.00	0.50	0.20	1.00			
Date Sampled	01/02/2023	01/02/2023	01/02/2023	01/02/2023	04/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	13	17	14	4.4
Total mass of sample received	kg	0.001	NONE	1.2	1.2	1.2	1.2	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KWB	KWB	KWB	KWB	KWB

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.3	7.4	6.5	6.4
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	23	81	56	35	5.1
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.011	0.041	0.028	0.018	0.0025
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	11.3	40.7	28.1	17.5	2.5
Total Sulphur	mg/kg	50	MCERTS	430	260	220	440	< 50
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.023	0.0099	0.0093	0.024	0.0027

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.13	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.06	< 0.05	< 0.05	0.24	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.07	< 0.05	< 0.05	0.21	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.11	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.1	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	-	< 0.05	0.1	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	-	< 0.05	0.08	< 0.05
Benzo(b)fluoranthene & Benzo(k)fluoranthene	mg/kg	0.1	ISO 17025	< 0.1	< 0.1	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	1.02	< 0.80
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Analytical Report Number: 23-17195
Project / Site name: A46 Newark Bypass

Lab Sample Number	2582802	2582803	2582804	2582805	2582806
Sample Reference	S3TP06	S3TP07	S3TP08	S3TP10	S3TP19
Sample Number	2	6	4	2	3
Depth (m)	0.20	1.00	0.50	0.20	1.00
Date Sampled	01/02/2023	01/02/2023	01/02/2023	01/02/2023	04/02/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Element	Unit	Limit of detection	Accreditation Status	2582802	2582803	2582804	2582805	2582806
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	14	12	13	5.2
Barium (aqua regia extractable)	mg/kg	1	MCERTS	340	350	230	360	19
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.6	1.4	1.1	1.3	0.34
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	1.1	0.3	0.6	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.6	1.4	1.1	2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	34	33	25	31	6.3
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	34	26	32	6.5
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	24	19	35	11
Iron (aqua regia extractable)	mg/kg	40	MCERTS	42000	47000	38000	35000	16000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	170	120	58	140	11
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1100	1400	830	1200	180
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.7	1.5	1.3	1.5	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	34	26	34	7.7
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	47	49	38	42	12
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	200	220	180	220	28

Monoaromatics & Oxygenates

Compound	Unit	Limit of detection	Accreditation Status	2582802	2582803	2582804	2582805	2582806
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

Parameter	Unit	Limit of detection	Accreditation Status	2582802	2582803	2582804	2582805	2582806
TPH-CWG - Aliphatic >EC5 - EC6 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 _{HS,1D,AL}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 _{EH,CU,1D,AL}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 _{EH,CU,1D,AL}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 _{EH,CU,1D,AL}	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) _{EH,CU+HS,1D,AL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

Parameter	Unit	Limit of detection	Accreditation Status	2582802	2582803	2582804	2582805	2582806
TPH-CWG - Aromatic >EC5 - EC7 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 _{HS,1D,AR}	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 _{EH,CU,1D,AR}	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 _{EH,CU,1D,AR}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 _{EH,CU,1D,AR}	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) _{EH,CU+HS,1D,AR}	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-17195
Project / Site name: A46 Newark Bypass

Lab Sample Number				2582807
Sample Reference				S3TP27
Sample Number				6
Depth (m)				1.00
Date Sampled				01/02/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	15
Total mass of sample received	kg	0.001	NONE	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	KWB

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	66
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.033
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	33
Total Sulphur	mg/kg	50	MCERTS	230
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0093

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(b)fluoranthene & Benzo(k)fluoranthene	mg/kg	0.1	ISO 17025	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80
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Analytical Report Number: 23-17195
Project / Site name: A46 Newark Bypass

Lab Sample Number				2582807
Sample Reference				S3TP27
Sample Number				6
Depth (m)				1.00
Date Sampled				01/02/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	310
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.6
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (III)	mg/kg	1	NONE	24
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	22
Iron (aqua regia extractable)	mg/kg	40	MCERTS	33000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	150
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1300
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	36
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_ID_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_ID_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_ID_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_ID_AL	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_ID_AL	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_ID_AL	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_ID_AL	mg/kg	10	NONE	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_ID_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_ID_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_ID_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_ID_AR	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_ID_AR	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_ID_AR	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_ID_AR	mg/kg	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Analytical Report Number: 23-17195
Project / Site name: A46 Newark Bypass

Lab Sample Number	2582808			2582809			2582810		
Sample Reference	S3TP06			S3TP07			S3TP19		
Sample Number	2			6			3		
Depth (m)	0.20			1.00			1.00		
Date Sampled	01/02/2023			01/02/2023			04/02/2023		
Time Taken	None Supplied			None Supplied			None Supplied		
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status						

General Inorganics

Parameter	Units	N/A	ISO 17025	7.1	7.2	6.8
pH (automated)	pH Units	N/A	ISO 17025	7.1	7.2	6.8
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Complex Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10
Free Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010	< 0.010
Sulphate as SO ₄	mg/l	0.1	ISO 17025	1.5	13.6	0.6
Chloride	mg/l	0.15	ISO 17025	0.85	1.2	0.9
Fluoride	µg/l	50	ISO 17025	780	580	190
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15	< 15	< 15

Speciated PAHs

Parameter	Units	N/A	ISO 17025	< 0.01	< 0.01	< 0.01
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01

Total PAH

Parameter	Units	N/A	ISO 17025	< 0.2	< 0.2	< 0.2
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2

Heavy Metals / Metalloids

Parameter	Units	N/A	ISO 17025	< 1.7	< 1.7	< 1.7
Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	35	14	1.5
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	34	26	< 10
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	4.8	< 0.4	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	20	4.9	9.8
Iron (dissolved)	mg/l	0.004	ISO 17025	1.4	0.23	0.094
Lead (dissolved)	µg/l	1	ISO 17025	6.6	2.5	2.6
Manganese (dissolved)	µg/l	0.06	ISO 17025	42	15	13
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	0.9	0.4	0.7
Nickel (dissolved)	µg/l	0.3	ISO 17025	4.5	< 0.3	0.3
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	4.6	< 1.7	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	30	6.6	12

Calcium (dissolved)	mg/l	0.012	ISO 17025	2.8	6.4	1.4
Magnesium (dissolved)	mg/l	0.005	ISO 17025	1.3	1.9	0.24



Analytical Report Number: 23-17195
 Project / Site name: A46 Newark Bypass

Lab Sample Number				2582808	2582809	2582810
Sample Reference				S3TP06	S3TP07	S3TP19
Sample Number				2	6	3
Depth (m)				0.20	1.00	1.00
Date Sampled				01/02/2023	01/02/2023	04/02/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)				Units	Limit of detection	Accreditation Status

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_ID_TOTAL_MS	µg/l	10	NONE	< 10	< 10	< 10
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U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-17195

Project / Site name: A46 Newark Bypass

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2582802	S3TP06	2	0.2	Brown clay and sand with gravel.
2582803	S3TP07	6	1	Brown clay and sand with gravel.
2582804	S3TP08	4	0.5	Brown clay and sand with gravel.
2582805	S3TP10	2	0.2	Brown clay and sand with gravel and vegetation.
2582806	S3TP19	3	1	Brown sand.
2582807	S3TP27	6	1	Brown clay and sand with gravel.

Analytical Report Number : 23-17195
Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L0338-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L1028-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS

Analytical Report Number : 23-17195

Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS

Analytical Report Number : 23-17195
 Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Analytical Report Number : 23-17195

Project / Site name: A46 Newark Bypass

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
S3TP06	2	S	2582802	c	Free cyanide in soil	L080-PL	c
S3TP07	6	S	2582803	c	Free cyanide in soil	L080-PL	c
S3TP08	4	S	2582804	c	Free cyanide in soil	L080-PL	c
S3TP10	2	S	2582805	c	Free cyanide in soil	L080-PL	c
S3TP19	3	S	2582806	c	Free cyanide in soil	L080-PL	c
S3TP27	6	S	2582807	c	Free cyanide in soil	L080-PL	c



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Analytical Report Number : 23-17903

Project / Site name:	A46 Newark Bypass	Samples received on:	15/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	15/02/2023
Your order number:	VE292904	Analysis completed by:	24/02/2023
Report Issue Number:	1	Report issued on:	24/02/2023
Samples Analysed:	2 leachate samples - 4 soil samples		

Signed: _____

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-17903
 Project / Site name: A46 Newark Bypass
 Your Order No: VE292904

Lab Sample Number	2587230	2587231	2587232	2587233			
Sample Reference	S3TP18	S3TP22	S3TP25	S3TP26			
Sample Number	2	2	6	1			
Depth (m)	0.50	0.50	1.00	0.20			
Date Sampled	03/02/2023	07/02/2023	08/02/2023	08/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	42	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	4.9	11	11	16
Total mass of sample received	kg	0.001	NONE	1.3	1.3	1.3	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM	WEM	WEM

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.9	8	7.5
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	14	11	15	27
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0072	0.0055	0.0076	0.013
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	7.2	5.5	7.6	13.4
Total Sulphur	mg/kg	50	MCERTS	< 50	64	150	410
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.0019	0.0033	0.0093	0.027

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.06
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.1
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.09
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.1
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 23-17903
 Project / Site name: A46 Newark Bypass
 Your Order No: VE292904

Lab Sample Number	2587230	2587231	2587232	2587233
Sample Reference	S3TP18	S3TP22	S3TP25	S3TP26
Sample Number	2	2	6	1
Depth (m)	0.50	0.50	1.00	0.20
Date Sampled	03/02/2023	07/02/2023	08/02/2023	08/02/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Element	mg/kg	Limit	Standard	2587230	2587231	2587232	2587233
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	1.9	1.9	< 1.0	4.8
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.1	6	7.1	20
Barium (aqua regia extractable)	mg/kg	1	MCERTS	40	66	140	400
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.33	0.69	1.4	1.7
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.7	2.4	3.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.3	0.3	1.9
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (III)	mg/kg	1	NONE	9.3	21	48	43
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	9.4	21	48	43
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.9	10	13	32
Iron (aqua regia extractable)	mg/kg	40	MCERTS	13000	26000	54000	49000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	8.2	11	16	180
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	390	530	1200	1600
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.77	0.61	0.84	2.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	19	36	40
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	12	22	40	66
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	20	42	77	230

Monoaromatics & Oxygenates

Compound	µg/kg	Limit	Standard	2587230	2587231	2587232	2587233
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

Parameter	mg/kg	Limit	Standard	2587230	2587231	2587232	2587233
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	< 10	< 10	< 10

Parameter	mg/kg	Limit	Standard	2587230	2587231	2587232	2587233
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Analytical Report Number: 23-17903
Project / Site name: A46 Newark Bypass

Your Order No: VE292904

Lab Sample Number				2587234	2587235
Sample Reference				S3TP18	S3TP22
Sample Number				2	2
Depth (m)				0.50	0.50
Date Sampled				03/02/2023	07/02/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	6.9	7.1
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010
Complex Cyanide	mg/l	0.01	ISO 17025	< 0.0100	< 0.0100
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10
Free Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010
Sulphate as SO ₄	mg/l	0.1	ISO 17025	1.2	2.8
Chloride	mg/l	0.15	ISO 17025	0.82	0.74
Fluoride	µg/l	50	ISO 17025	65	170
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15	< 15

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2
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Analytical Report Number: 23-17903
Project / Site name: A46 Newark Bypass

Your Order No: VE292904

Lab Sample Number				2587234	2587235
Sample Reference				S3TP18	S3TP22
Sample Number				2	2
Depth (m)				0.50	0.50
Date Sampled				03/02/2023	07/02/2023
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7
Arsenic (dissolved)	mg/l	0.001	ISO 17025	0.001	0.002
Barium (dissolved)	mg/l	0.00005	ISO 17025	0.0023	0.0109
Beryllium (dissolved)	mg/l	0.0002	ISO 17025	< 0.0002	< 0.0002
Boron (dissolved)	mg/l	0.01	ISO 17025	< 0.01	0.01
Cadmium (dissolved)	mg/l	0.00008	ISO 17025	< 0.0008	< 0.0008
Chromium (hexavalent)	mg/l	0.005	ISO 17025	< 0.005	< 0.005
Chromium (III)	mg/l	0.005	NONE	< 0.005	< 0.005
Chromium (dissolved)	mg/l	0.0004	ISO 17025	< 0.0004	0.0008
Copper (dissolved)	mg/l	0.0007	ISO 17025	0.0046	0.0019
Iron (dissolved)	mg/l	0.004	ISO 17025	0.084	0.42
Lead (dissolved)	mg/l	0.001	ISO 17025	< 0.001	< 0.001
Manganese (dissolved)	mg/l	0.00006	NONE	0.027	0.033
Mercury (dissolved)	mg/l	0.0005	ISO 17025	< 0.0005	< 0.0005
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	< 0.4	< 0.4
Nickel (dissolved)	mg/l	0.0003	ISO 17025	0.0004	0.0011
Selenium (dissolved)	mg/l	0.004	ISO 17025	< 0.004	< 0.004
Vanadium (dissolved)	mg/l	0.0017	ISO 17025	0.0031	< 0.0017
Zinc (dissolved)	mg/l	0.0004	ISO 17025	0.0045	0.0039

Calcium (dissolved)	mg/l	0.012	ISO 17025	1.6	2.6
Magnesium (dissolved)	mg/l	0.005	ISO 17025	0.33	0.67

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_ID_TOTAL_MS	µg/l	10	NONE	< 10	< 10
TPH1 (C10 - C40) EH_ID_TOTAL_MS	mg/l	0.01	NONE	< 0.01	< 0.01

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-17903

Project / Site name: A46 Newark Bypass

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2587230	S3TP18	2	0.5	Light brown sand with gravel and stones.
2587231	S3TP22	2	0.5	Brown sand with gravel.
2587232	S3TP25	6	1	Brown sandy clay.
2587233	S3TP26	1	0.2	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 23-17903
Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 23-17903
Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS

Analytical Report Number : 23-17903
 Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



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Analytical Report Number : 23-19195

Project / Site name:	A46 Newark Bypass	Samples received on:	03/02/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	23/02/2023
Your order number:	VE292904	Analysis completed by:	02/03/2023
Report Issue Number:	1	Report issued on:	02/03/2023
Samples Analysed:	1 leachate sample - 1 soil sample		

Signed: 

Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-19195
 Project / Site name: A46 Newark Bypass
 Your Order No: VE292904

Lab Sample Number				2595209
Sample Reference				S3TP33
Sample Number				2
Depth (m)				0.50
Date Sampled				31/01/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	25
Total mass of sample received	kg	0.001	NONE	1.5

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SFS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	150
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.075
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	75.3
Total Sulphur	mg/kg	50	MCERTS	440
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.014

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80
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Analytical Report Number: 23-19195
 Project / Site name: A46 Newark Bypass
 Your Order No: VE292904

Lab Sample Number	2595209			
Sample Reference	S3TP33			
Sample Number	2			
Depth (m)	0.50			
Date Sampled	31/01/2023			
Time Taken	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Element	Units	Limit of detection	Accreditation Status	Result
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	360
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.7
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.9
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (III)	mg/kg	1	NONE	41
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	41
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29
Iron (aqua regia extractable)	mg/kg	40	MCERTS	50000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	120
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	1300
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	38
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	57
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	250

Monoaromatics & Oxygenates

Compound	Units	Limit of detection	Accreditation Status	Result
Benzene	µg/kg	5	MCERTS	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	Result
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10

Parameter	Units	Limit of detection	Accreditation Status	Result
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-19195
Project / Site name: A46 Newark Bypass

Your Order No: VE292904

Lab Sample Number				2595210
Sample Reference				S3TP33
Sample Number				2
Depth (m)				0.50
Date Sampled				31/01/2023
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.8
Total Cyanide	µg/l	10	ISO 17025	< 10
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010
Complex Cyanide	mg/l	0.01	ISO 17025	< 0.0100
Free Cyanide	µg/l	10	ISO 17025	< 10
Free Cyanide	mg/l	0.01	ISO 17025	< 0.010
Sulphate as SO ₄	mg/l	0.1	ISO 17025	16.1
Chloride	mg/l	0.15	ISO 17025	1.9
Fluoride	µg/l	50	ISO 17025	570
Ammoniacal Nitrogen as N	µg/l	15	NONE	< 15

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
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Analytical Report Number: 23-19195
Project / Site name: A46 Newark Bypass

Your Order No: VE292904

Lab Sample Number				2595210
Sample Reference				S3TP33
Sample Number				2
Depth (m)				0.50
Date Sampled				31/01/2023
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7
Arsenic (dissolved)	mg/l	0.001	ISO 17025	0.001
Barium (dissolved)	mg/l	0.00005	ISO 17025	0.0161
Beryllium (dissolved)	mg/l	0.0002	ISO 17025	< 0.0002
Boron (dissolved)	mg/l	0.01	ISO 17025	0.03
Cadmium (dissolved)	mg/l	0.00008	ISO 17025	< 0.00008
Chromium (hexavalent)	mg/l	0.005	ISO 17025	< 0.005
Chromium (III)	mg/l	0.005	NONE	< 0.005
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4
Chromium (dissolved)	mg/l	0.0004	ISO 17025	< 0.0004
Copper (dissolved)	mg/l	0.0007	ISO 17025	0.0062
Iron (dissolved)	mg/l	0.004	ISO 17025	0.34
Lead (dissolved)	mg/l	0.001	ISO 17025	< 0.001
Manganese (dissolved)	mg/l	0.00006	NONE	0.0091
Mercury (dissolved)	mg/l	0.0005	ISO 17025	< 0.0005
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	0.7
Nickel (dissolved)	mg/l	0.0003	ISO 17025	0.0014
Selenium (dissolved)	mg/l	0.004	ISO 17025	< 0.004
Vanadium (dissolved)	mg/l	0.0017	ISO 17025	< 0.0017
Zinc (dissolved)	mg/l	0.0004	ISO 17025	0.0074

Calcium (dissolved)	mg/l	0.012	ISO 17025	9
Magnesium (dissolved)	mg/l	0.005	ISO 17025	3.1

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_ID_TOTAL_MS	µg/l	10	NONE	< 10
TPH1 (C10 - C40) EH_ID_TOTAL_MS	mg/l	0.01	NONE	< 0.01

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-19195
Project / Site name: A46 Newark Bypass

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2595209	S3TP33	2	0.5	Brown clay and sand.

Analytical Report Number : 23-19195

Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 23-19195
Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Complex cyanide in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L040-PL	W	ISO 17025
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS

Analytical Report Number : 23-19195
 Project / Site name: A46 Newark Bypass

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC. Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Analytical Report Number : 23-19195

Project / Site name: A46 Newark Bypass

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
S3TP33	2	S	2595209	c	Free cyanide in soil	L080-PL	c
S3TP33	2	S	2595209	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
S3TP33	2	S	2595209	c	Speciated EPA-16 PAHs in soil	L064-PL	c
S3TP33	2	S	2595209	c	TPHCWG (Soil)	L088/76-PL	c



4041

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Van Elle
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA



Environmental Science

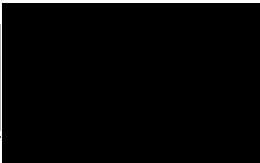
i2 Analytical Ltd.
7 Woodshots Meadow,
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Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 23-20283

Project / Site name:	A46 Newark	Samples received on:	28/02/2023
Your job number:	G221209-ENV10	Samples instructed on/ Analysis started on:	01/03/2023
Your order number:	G221209	Analysis completed by:	08/03/2023
Report Issue Number:	1	Report issued on:	08/03/2023
Samples Analysed:	5 water samples		

Signed:


Dominika Warjan
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



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Environmental Science

Analytical Report Number: 23-20283

Project / Site name: A46 Newark

Your Order No: G221209

Lab Sample Number	2601288		2601289		2601290		2601291		2601292	
Sample Reference	S3WS07		S3WS06		S3BH07		S3WS01		S3WS05	
Sample Number	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Date Sampled	27/02/2023		27/02/2023		28/02/2023		28/02/2023		28/02/2023	
Time Taken	None Supplied		None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status							

General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	2601288	2601289	2601290	2601291	2601292
pH (L005B)	pH Units	N/A	ISO 17025	7.3	6.3	6.8	7.4	7.2
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	1.7	13	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate as SO4	mg/l	0.045	ISO 17025	1100	137	228	219	39.3
Total Sulphur	µg/l	15	NONE	370000	46000	76000	73000	13000
Chloride	mg/l	0.15	ISO 17025	160	25	1700	61	17
Fluoride	µg/l	50	ISO 17025	160	59	240	380	160
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	40	48	630	16	59
Nitrate as N	mg/l	0.01	ISO 17025	11.5	15.7	I/S	1.61	31.9
Nitrate as NO3	mg/l	0.05	ISO 17025	50.7	69.4	I/S	7.14	141
Total Dissolved Solids (Gravimetric) (L004B)	mg/l	4	ISO 17025	2200	860	3300	660	460

Hardness - Total	mg CaCO ₃ /l	1	ISO 17025	1660	221	496	439	345
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Phenols by HPLC

Parameter	Units	Limit of detection	Accreditation Status	2601288	2601289	2601290	2601291	2601292
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	< 3.5
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Speciated PAHs

Parameter	Units	Limit of detection	Accreditation Status	2601288	2601289	2601290	2601291	2601292
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	I/S	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	I/S	< 0.16	< 0.16
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Environmental Science

Analytical Report Number: 23-20283

Project / Site name: A46 Newark

Your Order No: G221209

Lab Sample Number	2601288			2601289			2601290			2601291			2601292		
Sample Reference	S3WS07			S3WS06			S3BH07			S3WS01			S3WS05		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Date Sampled	27/02/2023			27/02/2023			28/02/2023			28/02/2023			28/02/2023		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status												

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	170	58	170	110	64
Calcium (dissolved)	mg/l	0.012	ISO 17025	550	67	140	120	110
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.041	0.14	0.061	0.006	0.031
Magnesium (dissolved)	mg/l	0.005	ISO 17025	71	13	37	31	14
Sodium (dissolved)	mg/l	0.01	ISO 17025	61	40	1200	38	15

Antimony (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.7	0.8	0.5	1.1
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.92	0.7	2.56	0.26	0.5
Barium (dissolved)	µg/l	0.06	ISO 17025	49	68	190	94	66
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.07	0.28	0.03	0.22	0.03
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.7	< 0.2	< 0.2	0.7
Copper (dissolved)	µg/l	0.5	ISO 17025	0.7	17	< 0.5	0.6	1.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	49	33	2200	6000	1.6
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	0.89	1.1	14	5.2	4.5
Nickel (dissolved)	µg/l	0.5	ISO 17025	5.8	11	11	5.6	3.5
Selenium (dissolved)	µg/l	0.6	ISO 17025	3.2	1.5	1.6	3.1	0.9
Vanadium (dissolved)	µg/l	0.2	ISO 17025	3.6	0.2	0.4	< 0.2	0.6
Zinc (dissolved)	µg/l	0.5	ISO 17025	< 0.5	5.8	5.5	1.9	< 0.5

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Aliphatic >C10 - C12 EH_2D_AL_#1_#2	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aliphatic >C12 - C16 EH_2D_AL_#1_#2	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aliphatic >C16 - C21 EH_2D_AL_#1_#2	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aliphatic >C21 - C35 EH_2D_AL_#1_#2	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aliphatic >C10 - C35 EH_2D_AL_#1_#2	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



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Environmental Science

Analytical Report Number: 23-20283

Project / Site name: A46 Newark

Your Order No: G221209

Lab Sample Number	2601288	2601289	2601290	2601291	2601292			
Sample Reference	S3WS07	S3WS06	S3BH07	S3WS01	S3WS05			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Date Sampled	27/02/2023	27/02/2023	28/02/2023	28/02/2023	28/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					
Aromatic >C10 - C12 <small>EH_2D_AR_#1_#2</small>	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aromatic >C12 - C16 <small>EH_2D_AR_#1_#2</small>	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aromatic >C16 - C21 <small>EH_2D_AR_#1_#2</small>	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aromatic >C21 - C35 <small>EH_2D_AR_#1_#2</small>	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10
Aromatic >C10 - C35 <small>EH_2D_AR_#1_#2</small>	µg/l	10	ISO 17025	< 10	< 10	I/S	< 10	< 10

VOCs

Chloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0*	< 3.0	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	11.3	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	19.1	< 3.0	< 3.0	< 3.0	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	10.9	< 3.0	< 3.0	< 3.0	< 3.0
2,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	23.5	< 3.0	< 3.0*	< 3.0	< 3.0
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trichloroethene	µg/l	3	ISO 17025	19.6	< 3.0	< 3.0	< 3.0	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0*	< 3.0	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p & m-Xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Tribromomethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
o-Xylene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0



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Environmental Science

Analytical Report Number: 23-20283

Project / Site name: A46 Newark

Your Order No: G221209

Lab Sample Number	2601288	2601289	2601290	2601291	2601292			
Sample Reference	S3WS07	S3WS06	S3BH07	S3WS01	S3WS05			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Date Sampled	27/02/2023	27/02/2023	28/02/2023	28/02/2023	28/02/2023			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Butylbenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number : 23-20283

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH C10-C35 by GCxGC-FID	Determination of total petroleum hydrocarbons in water by GC x GC FID with carbon banding aliphatic and aromatic C10-C35. Accredited Matrices SW,GW,PW.	In-house method	L101B-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025



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Environmental Science

Analytical Report Number : 23-20283

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Chloride in water	Determination of Chloride (dissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

*Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and therefore may be compromised.

Sample Deviation Report



Analytical Report Number : 23-20283

Project / Site name: A46 Newark

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
S3BH07	None Supplied	W	2601290	b	BTEX and MTBE in water (Monoaromatics)	L073B-PL	b
S3BH07	None Supplied	W	2601290	b	Volatile organic compounds in water	L073B-PL	b



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Analytical Report Number : 23-21052

Project / Site name:	A46 Newark	Samples received on:	03/03/2023
Your job number:	G221209	Samples instructed on/ Analysis started on:	03/03/2023
Your order number:	VE292904	Analysis completed by:	14/03/2023
Report Issue Number:	1	Report issued on:	15/03/2023
Samples Analysed:	3 leachate samples - 5 soil samples		

Signed: _____

Anna Goc
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-21052

Project / Site name: A46 Newark

Lab Sample Number	2605970				2605971	2605972	2605973	2605974
Sample Reference	S3WS06R				S3WS06R	S3WS05R	S3WS05R	S3WS04R
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20				0.50	0.20	1.20	0.50
Date Sampled	02/03/2023				02/03/2023	02/03/2023	02/03/2023	02/03/2023
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	9.7	9.1	6.4	9.8
Total mass of sample received	kg	0.001	NONE	1	1	1	1	1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SFS	SFS	SFS	SFS	SFS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7	7.8	7.5	7.3	6.8
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	15	25	13	5.5	22
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0074	0.012	0.0067	0.0028	0.011
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	7.4	12.3	6.7	2.8	11
Total Sulphur	%	0.005	MCERTS	0.02	0.013	0.017	< 0.005	0.013
Fraction Organic Carbon (FOC) Automated	N/A	0.001	MCERTS	0.015	0.0085	0.011	0.0012	0.0076

Phenols by HPLC

Catechol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	MCERTS	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	MCERTS	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Total Phenols

Total Phenols (HPLC)	mg/kg	1.3	MCERTS	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 23-21052

Project / Site name: A46 Newark

Lab Sample Number	2605970	2605971	2605972	2605973	2605974
Sample Reference	S3WS06R	S3WS06R	S3WS05R	S3WS05R	S3WS04R
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20	0.50	0.20	1.20	0.50
Date Sampled	02/03/2023	02/03/2023	02/03/2023	02/03/2023	02/03/2023
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Element	Unit	Limit	MCERTS	2605970	2605971	2605972	2605973	2605974
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.7	5	7	3.9	6.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	85	89	71	24	84
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.51	0.43	0.56	0.32	0.58
Boron (water soluble)	mg/kg	0.2	MCERTS	1	0.6	0.5	< 0.2	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.3	< 0.2	0.4
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	16	13	15	6.1	14
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	14	15	6.3	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	13	17	11	16
Iron (aqua regia extractable)	mg/kg	40	MCERTS	17000	16000	19000	9900	21000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	33	20	33	6.9	32
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	320	270	530	240	880
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.75	0.69	0.86	0.49	1.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	11	13	9	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25	21	23	8.9	22
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	55	46	58	24	72

Monoaromatics & Oxygenates

Compound	Unit	Limit	MCERTS	2605970	2605971	2605972	2605973	2605974
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	Unit	Limit	MCERTS	2605970	2605971	2605972	2605973	2605974
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	Unit	Limit	MCERTS	2605970	2605971	2605972	2605973	2605974
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

Analytical Report Number: 23-21052

Project / Site name: A46 Newark

Lab Sample Number	2605970				2605971	2605972	2605973	2605974
Sample Reference	S3WS06R				S3WS06R	S3WS05R	S3WS05R	S3WS04R
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20				0.50	0.20	1.20	0.50
Date Sampled	02/03/2023				02/03/2023	02/03/2023	02/03/2023	02/03/2023
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

VOCs

Compound	Units	Limit of detection	Accreditation Status	2605970	2605971	2605972	2605973	2605974
Chloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloromethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p & m-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Styrene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Tribromomethane	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Isopropylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
n-Propylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
p-Isopropyltoluene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Butylbenzene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Analytical Report Number: 23-21052

Project / Site name: A46 Newark

Lab Sample Number				2605970	2605971	2605972	2605973	2605974
Sample Reference				S3WS06R	S3WS06R	S3WS05R	S3WS05R	S3WS04R
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.20	1.20	0.50
Date Sampled				02/03/2023	02/03/2023	02/03/2023	02/03/2023	02/03/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number: 23-21052

Project / Site name: A46 Newark

Lab Sample Number				2605975	2605976	2605977
Sample Reference				S3WS06R	S3WS05R	S3WS04R
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.50	1.20	0.50
Date Sampled				02/03/2023	02/03/2023	02/03/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status			

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.4	7	6.5
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Complex Cyanide (Low Level)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1
Sulphate as SO ₄	mg/l	0.1	ISO 17025	4.3	3	6.5
Chloride	mg/l	0.15	ISO 17025	1.7	1.4	4.7
Fluoride	µg/l	50	ISO 17025	430	180	75
Ammoniacal Nitrogen as N	µg/l	15	NONE	32	23	41

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5
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Heavy Metals / Metalloids

Antimony (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	20	5.5	26
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	22	12	20
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.7	1.2	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	19	7.7	11
Iron (dissolved)	mg/l	0.004	ISO 17025	1	0.36	0.046
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0
Manganese (dissolved)	µg/l	0.06	ISO 17025	41	17	19
Mercury - CV-AFS	µg/l	0.007	ISO 17025	0.0155	0.0122	< 0.0070
Molybdenum (dissolved)	µg/l	0.4	ISO 17025	4.6	1.9	< 0.4
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.9	1.7	1.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	4	2.3	3.3
Zinc (dissolved)	µg/l	0.4	ISO 17025	12	3.4	10

Calcium (dissolved)	mg/l	0.012	ISO 17025	8.2	3.9	23
Magnesium (dissolved)	mg/l	0.005	ISO 17025	1.2	0.97	3.6

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-21052

Project / Site name: A46 Newark

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2605970	S3WS06R	None Supplied	0.2	Brown loam and sand with gravel and vegetation.
2605971	S3WS06R	None Supplied	0.5	Brown loam and sand with gravel and vegetation.
2605972	S3WS05R	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
2605973	S3WS05R	None Supplied	1.2	Brown sandy loam with gravel.
2605974	S3WS04R	None Supplied	0.5	Brown loam and sand with gravel.

Analytical Report Number : 23-21052

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Phenols, speciated, in soil, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex cyanide (Low level) in leachate	Determination of complex cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Fluoride in leachate	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS

Analytical Report Number : 23-21052

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammoniacal Nitrogen as N in leachate	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	NONE
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Cr (III) in leachate	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Chloride in leachate	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil™	L039-PL	W	ISO 17025
Fraction Organic Carbon FOC Automated	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method	L009	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 23-21052

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Mercury Low Level in leachate	Mercury in leachate by CV-AFS,	In-house method based on USEPA method 1631	L085-PL	W	ISO 17025
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



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Environmental Science

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Analytical Report Number : 23-25250

Project / Site name:	A46 Newark	Samples received on:	27/03/2023
Your job number:	221209	Samples instructed on/ Analysis started on:	27/03/2023
Your order number:	VE295121	Analysis completed by:	03/04/2023
Report Issue Number:	1	Report issued on:	03/04/2023
Samples Analysed:	1 water sample		

Signed: _____

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.



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Analytical Report Number: 23-25250

Project / Site name: A46 Newark

Your Order No: VE295121

Lab Sample Number				2631044
Sample Reference				S3BH07
Sample Number				1
Depth (m)				None Supplied
Date Sampled				27/03/2023
Time Taken				0900
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (L005B)	pH Units	N/A	ISO 17025	7
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	15
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Sulphate as SO4	mg/l	0.045	ISO 17025	308
Total Sulphur	µg/l	15	NONE	100000
Chloride	mg/l	0.15	ISO 17025	1100 #
Fluoride	µg/l	50	ISO 17025	350
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	35
Nitrate as N	mg/l	0.01	ISO 17025	0.93
Nitrate as NO3	mg/l	0.05	ISO 17025	4.12
Total Dissolved Solids (Gravimetric) (L004B)	mg/l	4	ISO 17025	2400

Hardness - Total	mg CaCO3/l	1	ISO 17025	256
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Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5
Resorcinol	µg/l	0.5	NONE	< 0.5
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5
Cresols	µg/l	0.5	NONE	< 0.5
Naphthols	µg/l	0.5	NONE	< 0.5
Isopropylphenol	µg/l	0.5	NONE	< 0.5
Phenol	µg/l	0.5	NONE	< 0.5
Trimethylphenol	µg/l	0.5	NONE	< 0.5

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16
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Analytical Report Number: 23-25250

Project / Site name: A46 Newark

Your Order No: VE295121

Lab Sample Number	2631044		
Sample Reference	S3BH07		
Sample Number	1		
Depth (m)	None Supplied		
Date Sampled	27/03/2023		
Time Taken	0900		
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status

Heavy Metals / Metalloids

Boron (dissolved)	µg/l	10	ISO 17025	150
Calcium (dissolved)	mg/l	0.012	ISO 17025	74
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (III)	µg/l	5	NONE	< 5.0
Iron (dissolved)	mg/l	0.004	ISO 17025	0.012
Magnesium (dissolved)	mg/l	0.005	ISO 17025	18
Sodium (dissolved)	mg/l	0.01	ISO 17025	900

Antimony (dissolved)	µg/l	0.4	ISO 17025	0.7
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.85
Barium (dissolved)	µg/l	0.06	ISO 17025	77
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	1.2
Chromium (dissolved)	µg/l	0.2	ISO 17025	0.5
Copper (dissolved)	µg/l	0.5	ISO 17025	4.6
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	54
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	2
Nickel (dissolved)	µg/l	0.5	ISO 17025	4.6
Selenium (dissolved)	µg/l	0.6	ISO 17025	4.2
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.3
Zinc (dissolved)	µg/l	0.5	ISO 17025	16

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0



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Environmental Science

Analytical Report Number: 23-25250

Project / Site name: A46 Newark

Your Order No: VE295121

Lab Sample Number				2631044
Sample Reference				S3BH07
Sample Number				1
Depth (m)				None Supplied
Date Sampled				27/03/2023
Time Taken				0900
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6 _{HS_1D_AL}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8 _{HS_1D_AL}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10 _{HS_1D_AL}	µg/l	1	ISO 17025	< 1.0

Aliphatic >C10 - C12 _{EH_2D_AL_#1_#2}	µg/l	10	ISO 17025	< 10
Aliphatic >C12 - C16 _{EH_2D_AL_#1_#2}	µg/l	10	ISO 17025	< 10
Aliphatic >C16 - C21 _{EH_2D_AL_#1_#2}	µg/l	10	ISO 17025	< 10
Aliphatic >C21 - C35 _{EH_2D_AL_#1_#2}	µg/l	10	ISO 17025	< 10
Aliphatic >C10 - C35 _{EH_2D_AL_#1_#2}	µg/l	10	ISO 17025	< 10

TPH-CWG - Aromatic >C5 - C7 _{HS_1D_AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 _{HS_1D_AR}	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 _{HS_1D_AR}	µg/l	1	ISO 17025	< 1.0

Aromatic >C10 - C12 _{EH_2D_AR_#1_#2}	µg/l	10	ISO 17025	< 10
Aromatic >C12 - C16 _{EH_2D_AR_#1_#2}	µg/l	10	ISO 17025	< 10
Aromatic >C16 - C21 _{EH_2D_AR_#1_#2}	µg/l	10	ISO 17025	< 10
Aromatic >C21 - C35 _{EH_2D_AR_#1_#2}	µg/l	10	ISO 17025	< 10
Aromatic >C10 - C35 _{EH_2D_AR_#1_#2}	µg/l	10	ISO 17025	< 10



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Environmental Science

Analytical Report Number: 23-25250

Project / Site name: A46 Newark

Your Order No: VE295121

Lab Sample Number				2631044
Sample Reference				S3BH07
Sample Number				1
Depth (m)				None Supplied
Date Sampled				27/03/2023
Time Taken				0900
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	

VOCs

Analytical Parameter	Units	Limit of detection	Accreditation Status	Result
Chloromethane	µg/l	3	ISO 17025	< 3.0
Chloroethane	µg/l	3	ISO 17025	< 3.0
Bromomethane	µg/l	3	ISO 17025	< 3.0
Vinyl Chloride	µg/l	3	NONE	< 3.0
Trichlorofluoromethane	µg/l	3	NONE	< 3.0
1,1-Dichloroethene	µg/l	3	ISO 17025	< 3.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	3	ISO 17025	< 3.0
Cis-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0
1,1-Dichloroethane	µg/l	3	ISO 17025	< 3.0
2,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0
Trichloromethane	µg/l	3	ISO 17025	< 3.0
1,1,1-Trichloroethane	µg/l	3	ISO 17025	< 3.0
1,2-Dichloroethane	µg/l	3	ISO 17025	< 3.0
1,1-Dichloropropene	µg/l	3	ISO 17025	< 3.0
Trans-1,2-dichloroethene	µg/l	3	ISO 17025	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0
Tetrachloromethane	µg/l	3	ISO 17025	< 3.0
1,2-Dichloropropane	µg/l	3	ISO 17025	< 3.0
Trichloroethene	µg/l	3	ISO 17025	< 3.0
Dibromomethane	µg/l	3	ISO 17025	< 3.0
Bromodichloromethane	µg/l	3	ISO 17025	< 3.0
Cis-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0
Trans-1,3-dichloropropene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
1,1,2-Trichloroethane	µg/l	3	ISO 17025	< 3.0
1,3-Dichloropropane	µg/l	3	ISO 17025	< 3.0
Dibromochloromethane	µg/l	3	ISO 17025	< 3.0
Tetrachloroethene	µg/l	3	ISO 17025	< 3.0
1,2-Dibromoethane	µg/l	3	ISO 17025	< 3.0
Chlorobenzene	µg/l	3	ISO 17025	< 3.0
1,1,1,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-Xylene	µg/l	3	ISO 17025	< 3.0
Styrene	µg/l	3	ISO 17025	< 3.0
Tribromomethane	µg/l	3	ISO 17025	< 3.0
o-Xylene	µg/l	3	ISO 17025	< 3.0
1,1,2,2-Tetrachloroethane	µg/l	3	ISO 17025	< 3.0
Isopropylbenzene	µg/l	3	ISO 17025	< 3.0
Bromobenzene	µg/l	3	ISO 17025	< 3.0
n-Propylbenzene	µg/l	3	ISO 17025	< 3.0
2-Chlorotoluene	µg/l	3	ISO 17025	< 3.0
4-Chlorotoluene	µg/l	3	ISO 17025	< 3.0
1,3,5-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0
tert-Butylbenzene	µg/l	3	ISO 17025	< 3.0
1,2,4-Trimethylbenzene	µg/l	3	ISO 17025	< 3.0
sec-Butylbenzene	µg/l	3	ISO 17025	< 3.0
1,3-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0
p-Isopropyltoluene	µg/l	3	ISO 17025	< 3.0
1,2-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0
1,4-Dichlorobenzene	µg/l	3	ISO 17025	< 3.0
Butylbenzene	µg/l	3	ISO 17025	< 3.0



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Environmental Science

Analytical Report Number: 23-25250

Project / Site name: A46 Newark

Your Order No: VE295121

Lab Sample Number				2631044
Sample Reference				S3BH07
Sample Number				1
Depth (m)				None Supplied
Date Sampled				27/03/2023
Time Taken				0900
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status	
1,2-Dibromo-3-chloropropane	µg/l	3	ISO 17025	< 3.0
1,2,4-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0
Hexachlorobutadiene	µg/l	3	ISO 17025	< 3.0
1,2,3-Trichlorobenzene	µg/l	3	ISO 17025	< 3.0

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



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Environmental Science

Analytical Report Number : 23-25250

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Fluoride in water	Determination of fluoride in water by 1:1 ratio with a buffer solution followed by Ion Selective Electrode. Accredited matrices: SW, PW, GW.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total Sulphur in water	Determination of total sulphur in water by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH C10-C35 by GCxGC-FID	Determination of total petroleum hydrocarbons in water by GC x GC FID with carbon banding aliphatic and aromatic C10-C35. Accredited Matrices SW,GW,PW.	In-house method	L101B-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW, FSE, LL.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025

Analytical Report Number : 23-25250

Project / Site name: A46 Newark

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Cr (III) in water	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Free cyanide (low level) in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total dissolved solids in water (Gravimetric)	Determination of total dissolved solids in water by gravimetry.	In house method based on BSEN 15216:2007	L004-PL	W	ISO 17025
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Result was reported from high dilution and should be interpreted with care.

Appendix F: Geotechnical Laboratory Results



LABORATORY REPORT



4043

Contract Number: PSL22/8092

Report Date: 12 January 2023
Client's Reference: G221909
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass

Date Received: 21/12/2022
Date Commenced: 21/12/2022

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

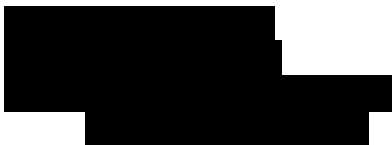


L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

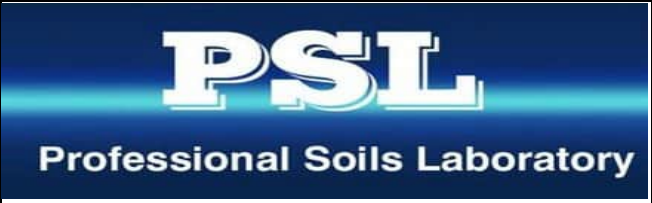
M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR



SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH11	16	D	4.25		Brown slightly gravelly sandy CLAY.



A46 Newark Bypass

Contract No:
PSL22/8092
Client Ref:
G221209



SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

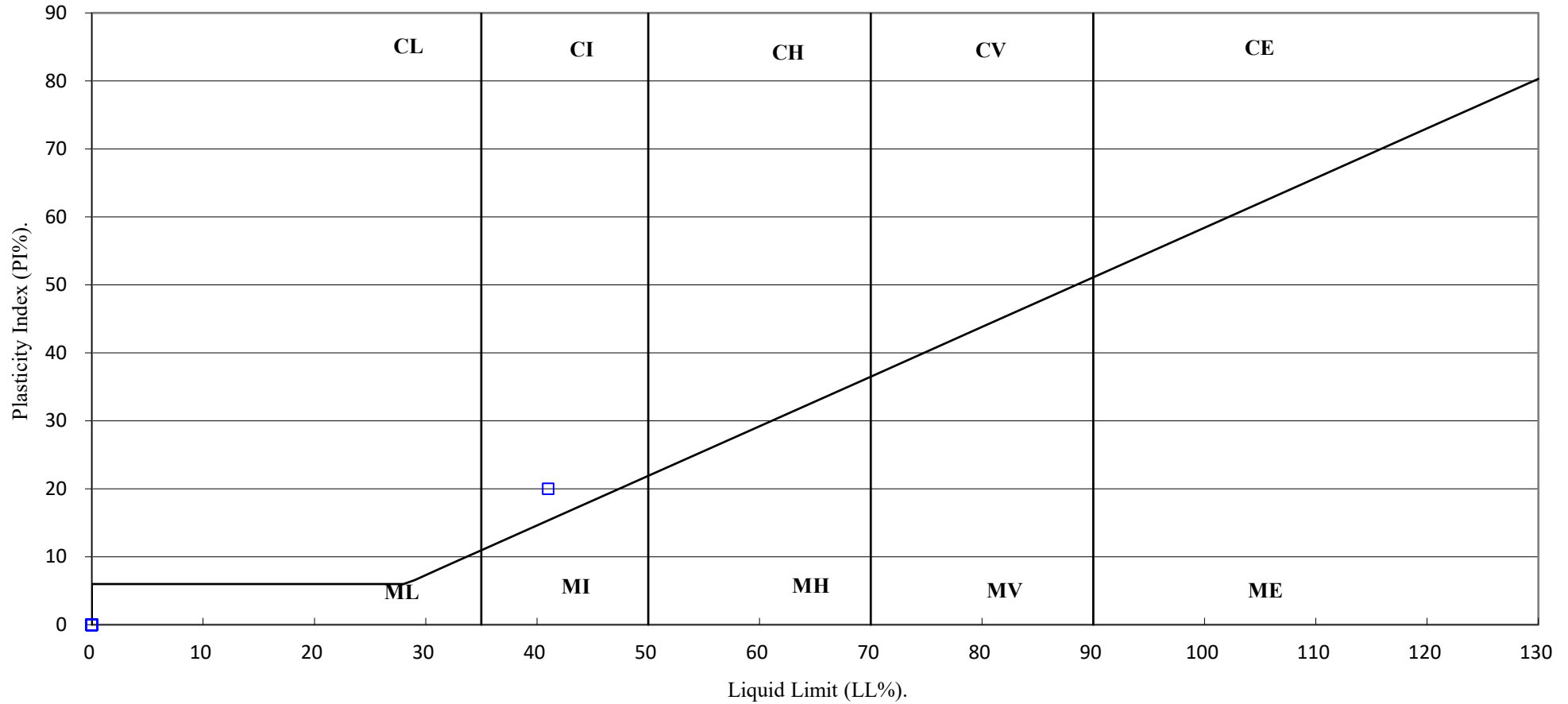
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % <small>Clause 3.2</small>	Linear Shrinkage % <small>Clause 6.5</small>	Particle Density Mg/m ³ <small>Clause 8.2</small>	Liquid Limit % <small>Clause 4.3/4</small>	Plastic Limit % <small>Clause 5.3</small>	Plasticity Index % <small>Clause 5.4</small>	Passing .425mm %	Remarks
S3BH11	16	D	4.25		28			41	21	20	93	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

 4043		A46 Newark Bypass	Contract No:
			PSL22/8092
			Client Ref:
			G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

A46 Newark Bypass

Contract No:

PSL22/8092

Client Ref:

G221209

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
S3BH11	43	CSS	15.13	15.34	100	160	1.6	3131	2.49	16	2.15	34.8	4.4	Brittle	19/01/23	



A46 Newark Bypass

Contract No:
PSL22/8092
Client Ref:
G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation Par / Perp	Dimensions (mm)		Area (mm ²)	D _e ²	D _e (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					W	D				(Mpa)	(kN)					
S3BH11	23.15	44	A	Perp	100	51	5100	6493.52	80.58	-	3.09	0.48	1.240	0.59	Valid	
S3BH11	19.11	47	A	Perp	100	48	4800	6111.55	78.18	-	3.57	0.58	1.223	0.71	Valid	

*Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular



A46 Newark Bypass

Contract No:
PSL22/8092
Client Ref:
G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D _c ²	D _c (mm)	Failure Load		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					Par / Perp	L			D	(Mpa)					
S3BH11	23.15	44	D	Par	-	100	10000	100.00	-	2.47	0.247	1.366	0.34	Valid	
S3BH11	19.11	47	D	Par	-	100	10000	100.00	-	3.01	0.301	1.366	0.41	Valid	

***Note** All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random



A46 Newark Bypass

Contract No:
PSL22/8092
Client Ref:
G221209



LABORATORY REPORT



4043

Contract Number: PSL22/8128

Report Date: 18 January 2023
Client's Reference: G221209-02
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass
Date Received: 21/12/2022
Date Commenced: 21/12/2022
Date Completed: 18/1/2022

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

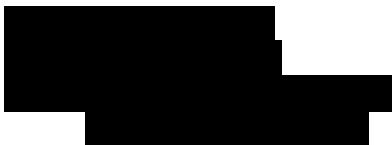
L Knight
(Assistant Laboratory Manager)


S Eyre
(Senior Technician)

T Watkins
(Senior Technician)

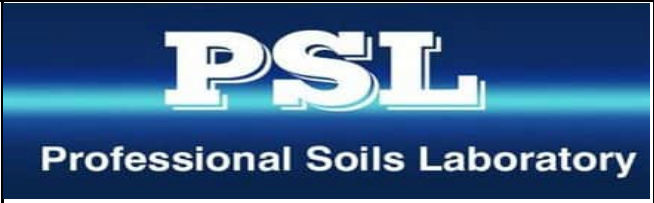
5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR

Page 1 of



SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH02	9	D	2.00	2.45	Brown mottled grey gravelly very sandy CLAY.
S3BH02	21	D	4.50	4.95	Reddish brown MUDSTONE.
S3BH02	27	D	6.20	6.30	Reddish brown MUDSTONE.
S3BH14	17	D	7.00	7.45	Reddish brown very silty CLAY.
S3BH14	21	D	9.00	9.40	Reddish brown very silty CLAY.



A46 Newark Bypass

Contract No:
PSL22/8128
Client Ref:
G221209

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % <small>Clause 3.2</small>	Linear Shrinkage % <small>Clause 6.5</small>	Particle Density Mg/m ³ <small>Clause 8.2</small>	Liquid Limit % <small>Clause 4.3/4</small>	Plastic Limit % <small>Clause 5.3</small>	Plasticity Index % <small>Clause 5.4</small>	Passing .425mm %	Remarks
S3BH02	9	D	2.00	2.45	15			29	16	13	81	Low Plasticity CL
S3BH02	21	D	4.50	4.95	16			31	18	13	71	Low Plasticity CL
S3BH02	27	D	6.20	6.30	19			28	18	10	70	Low Plasticity CL
S3BH14	17	D	7.00	7.45	39			36	22	14	100	Intermediate Plasticity CI
S3BH14	21	D	9.00	9.40	16			34	22	12	100	Low Plasticity CL

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



A46 Newark Bypass

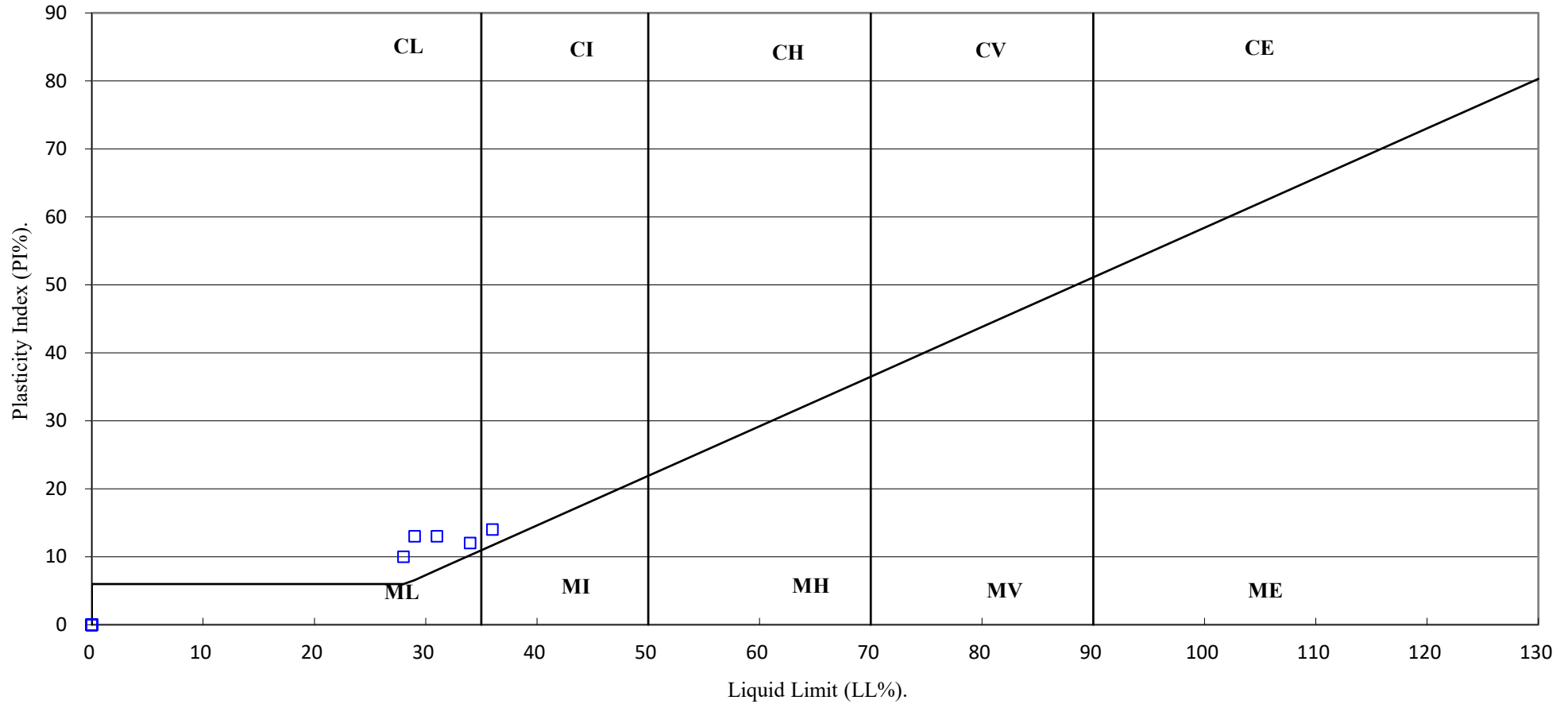
Contract No:

PSL22/8128

Client Ref:

G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

A46 Newark Bypass

Contract No:

PSL22/8128

Client Ref:



G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area (mm ²)	D _c ²	D _c (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					Par / Perp	W				D	(Mpa)					
S3BH14	18.20	47	A	Perp	100	33	3300	4201.69	64.82	-	0.38	0.09	1.124	0.10	Valid	

***Note** All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

		<p>A46 Newark Bypass</p>	Contract No:
			PSL22/8128
			Client Ref:
			G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D _e ²	D _e (mm)	Failure Load		I _s (MPa)	Corr Fac F	I ₅₀ (MPa)	Failure Type	Remarks
					Par / Perp	L			D	(Mpa)					
S3BH14	18.20	47	D	Par	-	100	10000	100.00	-	0.31	0.031	1.366	0.04	Valid	

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random



PSL Professional Soils Laboratory

UKAS TESTING 4043

A46 Newark Bypass

Contract No:
PSL22/8128
Client Ref:
G221209

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
S3BH14	50	CSS	19.95	20.15	100	160	1.6	2342	1.86	7.9	1.73	8.1	1.0	Brittle	16/01/23	



A46 Newark Bypass

Contract No:
PSL22/8128
Client Ref:
G221209



ANALYTICAL TEST REPORT

Contract no: 117561(1)
Contract name: A46 Newark Bypass
Client reference: PSL22/8128
Clients name: Professional Soils Laboratory
Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 11 January 2023

Analysis started: 11 January 2023

Analysis completed: 16 January 2023

Report issued: 02 March 2023

This is a supplementary report to report number 117561 issued 16 January 2023.

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:



Abbie Neasham-Bourn
Senior Reporting Administrator

Unit 6 Parkhead, Greencroft Industrial Park, Stanley, County Durham, DH9 7YB
Tel 01207 528578 Email customerservices@chemtech-env.co.uk
Vat Reg No. 772 5703 18 Registered in England number 4284013

Chemtech Environmental Limited

SOILS

Lab number			117561-1	117561-2	117561-3	117561-4	117561-5
Sample id			S3BH02	S3BH02	S3BH02	S3BH14	S3BH14
Depth (m)			1.50-2.00	3.00-3.45	7.70-7.90	8.00-8.34	13.50-13.95
Sample Type			D	D	D	D	D
Date sampled			31/10/2022	31/10/2022	31/10/2022	21/10/2022	21/10/2022
Test	Method	Units					
pH	CE004 ^u	units	7.2	8.7	8.4	8.4	8.4
Magnesium (2:1 water soluble)	CE061	mg/l Mg	2.5	3.3	2.7	7.4	12
Chloride (2:1 water soluble)	CE049 ^u	mg/l Cl	20	9.1	11	3.4	6.3
Nitrate (2:1 water soluble)	CE049 ^u	mg/l NO ₃	15	8.3	1.6	<1	<1
Sulphate (2:1 water soluble)	CE061 ^u	mg/l SO ₄	23	44	66	113	190
Sulphate (acid extractable)	CE062 ^u	mg/kg SO ₄	124	1632	1023	877	1138
Sulphate (acid extractable)	CE062 ^u	% w/w SO ₄	0.01	0.16	0.10	0.09	0.11
Sulphur (total)	CE119	mg/kg S	327	640	385	313	422
Sulphur (total)	CE119	% w/w S	0.03	0.06	0.04	0.03	0.04

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	100	mg/kg SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	0.01	% w/w SO ₄
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		0.01	% w/w S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
117561-1	S3BH02	1.50-2.00	Y	pH,Mg,Cl,NO3 (EHT)
117561-2	S3BH02	3.00-3.45	Y	pH,Mg,Cl,NO3 (EHT)
117561-3	S3BH02	7.70-7.90	Y	pH,Mg,Cl,NO3 (EHT)
117561-4	S3BH14	8.00-8.34	Y	pH,Mg,Cl,NO3 (EHT)
117561-5	S3BH14	13.50-13.95	Y	pH,Mg,Cl,NO3 (EHT)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones, where applicable.

Chemtech Environmental Limited

TEST REPORT REVISIONS

The table below identifies amendments that have been made to this test report for each revision.

Test Report Reference	Details of amendments to test report	Issue Date
117561	Original report issued	16 January 2023
117561(1)	Sampling dates added	02 March 2023



LABORATORY REPORT



4043

Contract Number: PSL22/8126

Report Date: 18 January 2023
Client's Reference: G221209-03
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass

Date Received: 21/12/2022
Date Commenced: 21/12/2022

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Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)



L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR



Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH01	4	D	2.00		Reddish brown gravelly very sandy CLAY.
S3BH01	11	D	4.50	4.95	Reddish brown slightly gravelly sandy silty CLAY.
S3BH01	15	D	6.00	6.45	Reddish brown slightly gravelly very sandy silty CLAY.
S3BH01	25	D	12.00	12.43	Reddish brown slightly gravelly very sandy silty CLAY.
S3BH01	34	D	16.50	16.95	Reddish brown slightly gravelly very sandy silty CLAY.



PSL
Professional Soils Laboratory

UKAS TESTING
4043

A46 Newark Bypass

Contract No:
PSL22/8126
Client Ref:
G221209


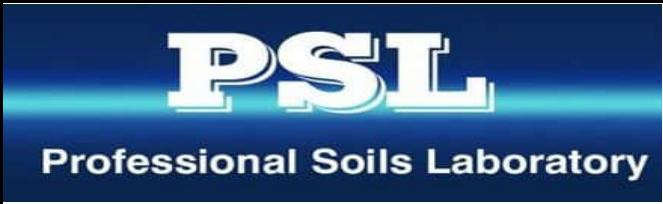
SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

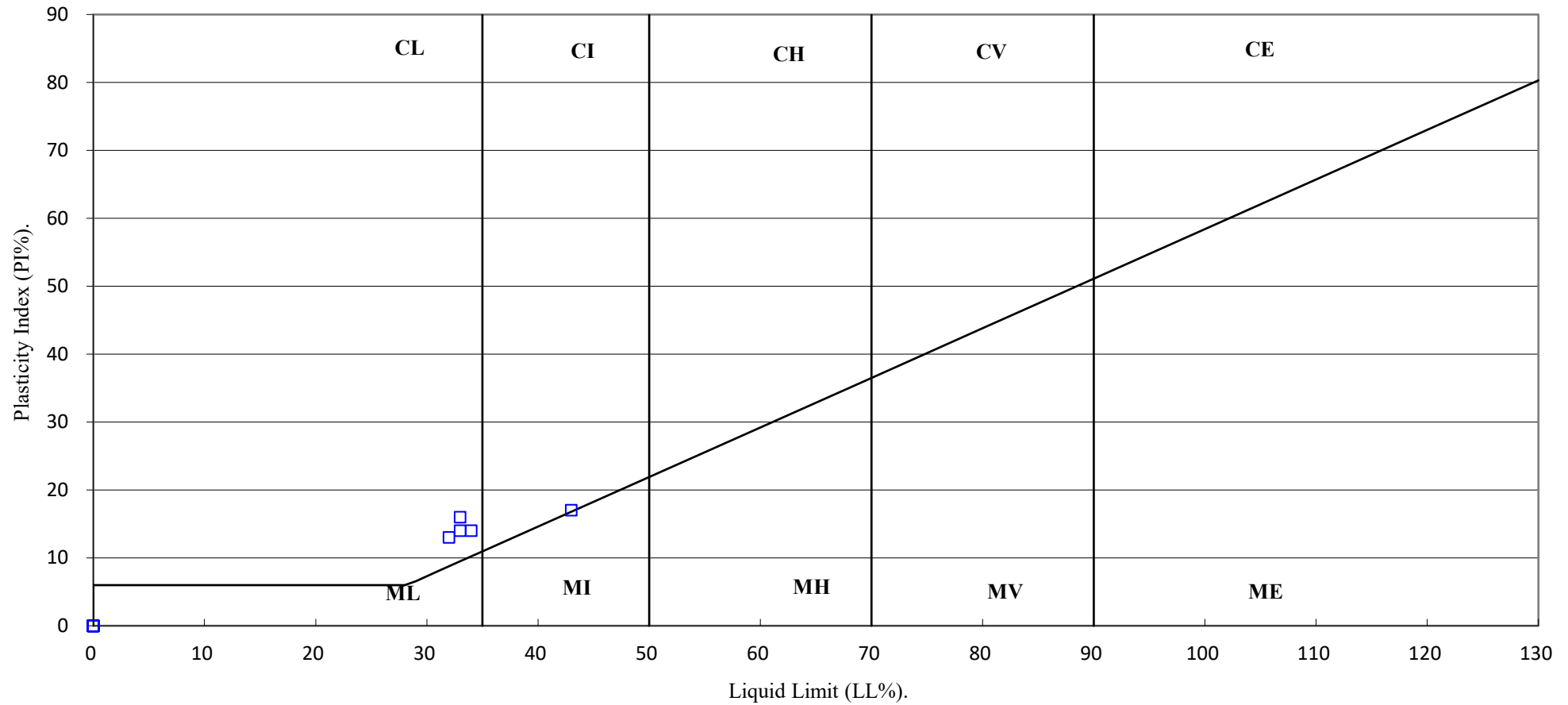
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % <small>Clause 3.2</small>	Linear Shrinkage % <small>Clause 6.5</small>	Particle Density Mg/m ³ <small>Clause 8.2</small>	Liquid Limit % <small>Clause 4.3/4</small>	Plastic Limit % <small>Clause 5.3</small>	Plasticity Index % <small>Clause 5.4</small>	Passing .425mm %	Remarks
S3BH01	4	D	2.00		27			32	19	13	84	Low Plasticity CL
S3BH01	11	D	4.50	4.95	26			43	26	17	98	Intermediate Plasticity CI
S3BH01	15	D	6.00	6.45	20			33	17	16	93	Low Plasticity CL
S3BH01	25	D	12.00	12.43	18			33	19	14	99	Low Plasticity CL
S3BH01	34	D	16.50	16.95	22			34	20	14	98	Low Plasticity CL

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

 4043		A46 Newark Bypass	Contract No:
			PSL22/8126
			Client Ref:
			G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

A46 Newark Bypass

Contract No:

PSL22/8126

Client Ref:

G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation Par / Perp	Dimensions (mm)		Area (mm ²)	D _c ²	D _c (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					W	D				(Mpa)	(kN)					
					S3BH01	20.65				43	A					
S3BH01	23.45	49	A	Perp	100	57	5700	7257.47	85.19	-	2.31	0.32	1.271	0.40	Valid	
S3BH01	25.95	54	A	Perp	100	38	3800	4838.31	69.56	-	2.44	0.50	1.160	0.59	Valid	

*Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular



A46 Newark Bypass

Contract No:
PSL22/8126
Client Ref:
G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D _e ²	D _e (mm)	Failure Load		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
				Par / Perp	L	D			(Mpa)	(kN)					
S3BH01	20.65	43	D	Par	-	100	10000	100.00	-	1.96	0.196	1.366	0.27	Valid	
S3BH01	23.45	49	D	Par	-	100	10000	100.00	-	1.81	0.181	1.366	0.25	Valid	
S3BH01	25.95	54	D	Par	-	100	10000	100.00	-	2.01	0.201	1.366	0.27	Valid	

**Note* All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random



A46 Newark Bypass

Contract No:
PSL22/8126
Client Ref:
G221209

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
S3BH01	58	CSS	29.20	29.50	100	159	1.6	2952	2.36	15	2.06	27.0	3.4	Brittle	17/01/23	



A46 Newark Bypass

Contract No:
PSL22/8126
Client Ref:
G221209



ANALYTICAL TEST REPORT

Contract no: 117530

Contract name: A46 Newark Bypass

Client reference: PSL22/8126

Clients name: Professional Soils Laboratory

Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 10 January 2023

Analysis started: 10 January 2023

Analysis completed: 16 January 2023

Report issued: 16 January 2023

Key

- U UKAS accredited test
- M MCERTS & UKAS accredited test
- \$ Test carried out by an approved subcontractor
- I/S Insufficient sample to carry out test
- N/S Sample not suitable for testing

Approved by:



Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SOILS

Lab number			117530-1	117530-2	117530-3	117530-4
Sample id			S3BH01	S3BH01	S3BH01	S3BH01
Depth (m)			2.80	9.00-9.42	11.00-11.10	15.00-15.45
Sample Type			D	D	D	D
Date sampled			-	09/11/2022	-	09/11/2022
Test	Method	Units				
pH	CE004 ^U	units	7.7	8.7	8.4	8.7
Magnesium (2:1 water soluble)	CE061	mg/l Mg	68	53	19	19
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	28	78	15	20
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	4.2	1.4	1.3	4.0
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	1805	773	240	199
Sulphate (acid extractable)	CE062 ^U	mg/kg SO ₄	14056	2080	1673	1108
Sulphate (acid extractable)	CE062 ^U	% w/w SO ₄	1.41	0.21	0.17	0.11
Sulphur (total)	CE119	mg/kg S	5197	736	635	447
Sulphur (total)	CE119	% w/w S	0.52	0.07	0.06	0.04

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	100	mg/kg SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	0.01	% w/w SO ₄
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		0.01	% w/w S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
117530-1	S3BH01	2.80	Y	All (NSD)
117530-2	S3BH01	9.00-9.42	Y	All (EHT)
117530-3	S3BH01	11.00-11.10	Y	All (NSD)
117530-4	S3BH01	15.00-15.45	Y	All (EHT)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones, where applicable.



LABORATORY REPORT



4043

Contract Number: PSL22/8125

Report Date: 18 January 2023
Client's Reference: G221209-04
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass

Date Received: 21/12/2022
Date Commenced: 21/12/2022

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH09	7	D	1.55	1.60	Brown slightly sandy CLAY.
S3BH09	8	D	2.00	2.45	Brown sandy CLAY.



PSL

Professional Soils Laboratory

A46 Newark Bypass

Contract No:
PSL22/8125
Client Ref:
G221209

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % <small>Clause 3.2</small>	Linear Shrinkage % <small>Clause 6.5</small>	Particle Density Mg/m ³ <small>Clause 8.2</small>	Liquid Limit % <small>Clause 4.3/4</small>	Plastic Limit % <small>Clause 5.3</small>	Plasticity Index % <small>Clause 5.4</small>	Passing .425mm %	Remarks
S3BH09	7	D	1.55	1.60	23			55	26	29	100	High Plasticity CH
S3BH09	8	D	2.00	2.45	28			47	24	23	100	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic

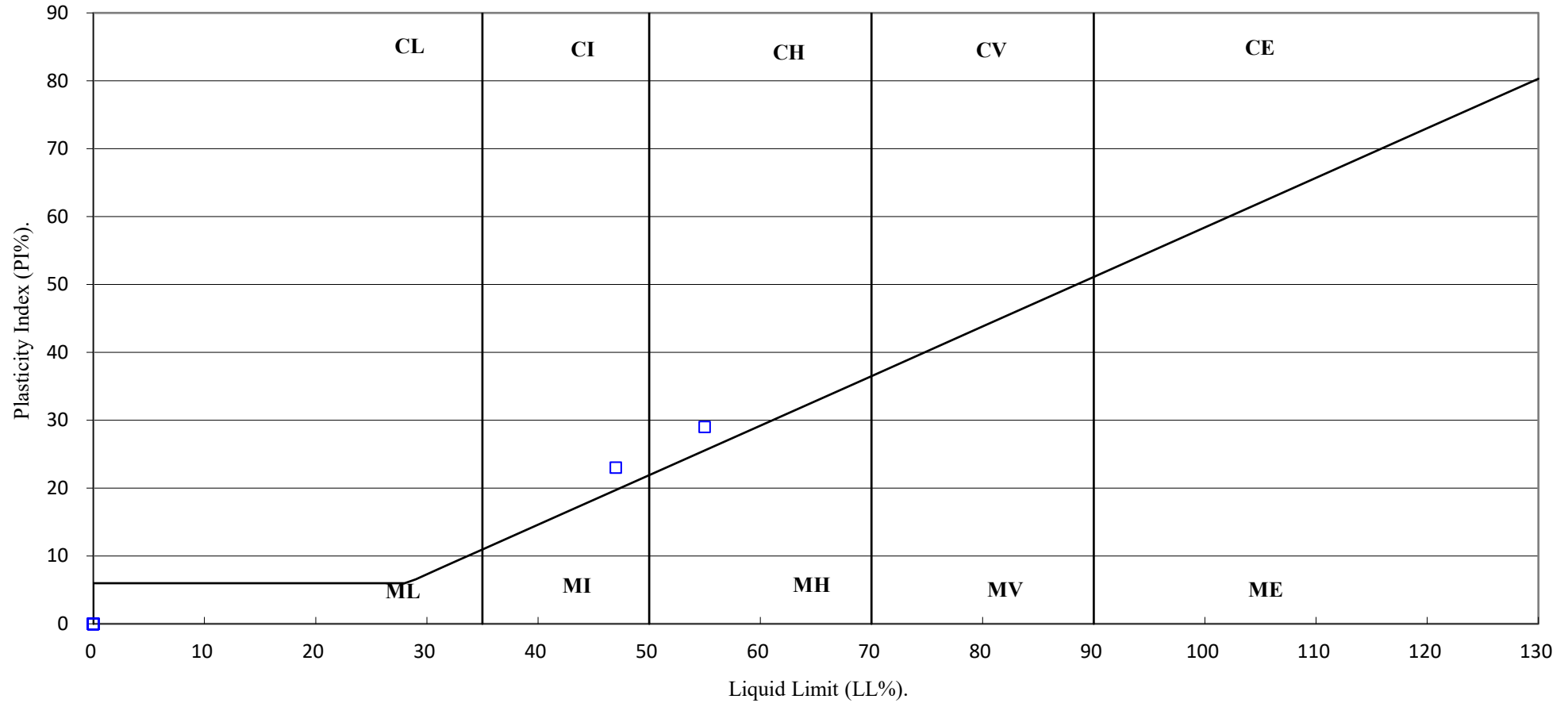
* : Liquid Limit and Plastic Limit Wet Sieved.



A46 Newark Bypass

Contract No:
PSL22/8125
Client Ref:
G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

A46 Newark Bypass

Contract No:

PSL22/8125

Client Ref:

G221209

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation Par / Perp	Dimensions (mm)		Area (mm ²)	D _c ²	D _c (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					W	D				(Mpa)	(kN)					
					S3BH09	14.08				45	A					
S3BH09	21.84	60	A	Perp	100	51	5100	6493.52	80.58	-	0.38	0.06	1.240	0.07	Valid	

*Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

 4043		A46 Newark Bypass	Contract No:
			PSL22/8125
			Client Ref:
			G221209

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
S3BH09	41	CSS	11.60	11.80	100	160	1.6	2547	2.03	19.0	1.70	11.3	1.4	Brittle	17/01/23	
S3BH09	53	CSS	17.70	17.90	100	160	1.6	2602	2.07	13.7	1.82	21.4	2.7	Brittle	17/01/23	



A46 Newark Bypass

Contract No:
PSL22/8125
Client Ref:
G221209



ANALYTICAL TEST REPORT

Contract no: 117516

Contract name: A46 Newark Bypass

Client reference: PSL22/8125

Clients name: Professional Soils Laboratory

Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 10 January 2023

Analysis started: 10 January 2023

Analysis completed: 16 January 2023

Report issued: 16 January 2023

Key

- U UKAS accredited test
- M MCERTS & UKAS accredited test
- \$ Test carried out by an approved subcontractor
- I/S Insufficient sample to carry out test
- N/S Sample not suitable for testing

Approved by:



Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SOILS

Lab number			117516-1	117516-2
Sample id			S3BH09	S3BH09
Depth (m)			3.00-3.45	8.00-8.45
Sample Type			D	D
Date sampled			-	-
Test	Method	Units		
pH	CE004 ^U	units	6.5	7.9
Magnesium (2:1 water soluble)	CE061	mg/l Mg	8.8	42
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	43	8.4
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	2.5	<1
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	692	1607
Sulphate (acid extractable)	CE062 ^U	mg/kg SO ₄	2100	60341
Sulphate (acid extractable)	CE062 ^U	% w/w SO ₄	0.21	6.03
Sulphur (total)	CE119	mg/kg S	2192	18410
Sulphur (total)	CE119	% w/w S	0.22	1.84

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	100	mg/kg SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	0.01	% w/w SO ₄
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		0.01	% w/w S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
117516-1	S3BH09	3.00-3.45	Y	All (NSD)
117516-2	S3BH09	8.00-8.45	Y	All (NSD)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones, where applicable.



LABORATORY REPORT



4043

Contract Number: PSL22/8127

Report Date: 19 January 2023
Client's Reference: G221209-05
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass
Date Received: 21/12/2022
Date Commenced: 21/12/2022
Date Completed: 19/1/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

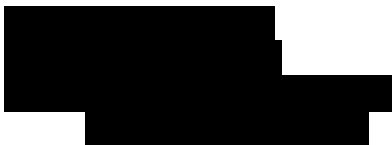
L Knight
(Assistant Laboratory Manager)


S Eyre
(Senior Technician)

T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR

Page 1 of



SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH13	9	D	2.00	2.45	Dark grey mottled brown sandy CLAY.



PSL

Professional Soils Laboratory

4043

A46 Newark Bypass

Contract No:
PSL22/8127
Client Ref:
G221209/ Geo 05

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % <small>Clause 3.2</small>	Linear Shrinkage % <small>Clause 6.5</small>	Particle Density Mg/m ³ <small>Clause 8.2</small>	Liquid Limit % <small>Clause 4.3/4</small>	Plastic Limit % <small>Clause 5.3</small>	Plasticity Index % <small>Clause 5.4</small>	Passing .425mm %	Remarks
S3BH13	9	D	2.00	2.45	35			41	20	21	100	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic

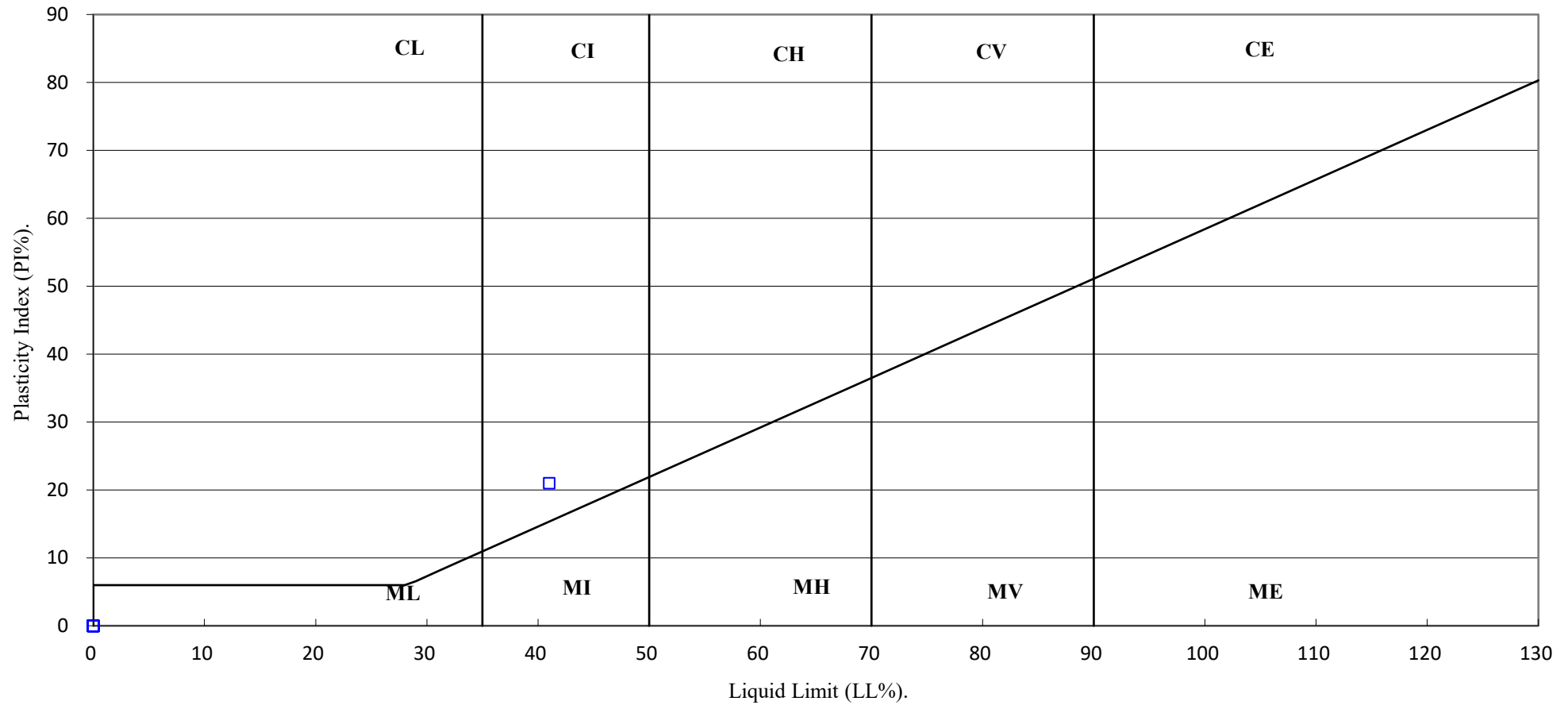
* : Liquid Limit and Plastic Limit Wet Sieved.



A46 Newark Bypass

Contract No:
PSL22/8127
Client Ref:
G221209/ Geo 05

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

A46 Newark Bypass

Contract No:

PSL22/8127

Client Ref:

G221209/ Geo 05

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation Par / Perp	Dimensions (mm)		Area (mm ²)	D _c ²	D _c (mm)	Failure Load (P)		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					W	D				(Mpa)	(kN)					
S3BH13	16.41	29	A	Perp	100	56	5600	7130.14	84.44	-	1.32	0.19	1.266	0.23	Valid	

*Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular



PSL
Professional Soils Laboratory
UKAS TESTING
4043

A46 Newark Bypass

Contract No:
PSL22/8127
Client Ref:
G221209/ Geo 05

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D _c ²	D _c (mm)	Failure Load		I _s (MPa)	Corr Fac F	I _{s50} (MPa)	Failure Type	Remarks
					Par / Perp	L			D	(Mpa)					
S3BH13	16.41	29	D	Par	-	100	10000	100.00	-	0.54	0.054	1.366	0.07	Valid	

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random



A46 Newark Bypass

Contract No:
PSL22/8127
Client Ref:
G221209/ Geo 05

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
S3BH13	38	CSS	19.80	20.00	100	160	1.6	2922	2.32	16	2.01	19.7	2.5	Brittle	18/01/23	
S3BH13	45	CSS	23.50	23.80	100	160	1.6	2954	2.35	13	2.07	23.7	3.0	Brittle	18/01/23	



A46 Newark Bypass

Contract No:
PSL22/8127
Client Ref:
G221209/ Geo 05



ANALYTICAL TEST REPORT

Contract no: 117585

Contract name: A46 Newark Bypass

Client reference: PSL22/8127

Clients name: Professional Soils Laboratory

Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 11 January 2023

Analysis started: 11 January 2023

Analysis completed: 16 January 2023

Report issued: 16 January 2023

Key

- U UKAS accredited test
- M MCERTS & UKAS accredited test
- \$ Test carried out by an approved subcontractor
- I/S Insufficient sample to carry out test
- N/S Sample not suitable for testing

Approved by:



Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SOILS

Lab number			117585-1	117585-2	117585-3
Sample id			S3BH13	S3BH13	S3BH13
Depth (m)			1.00-1.45	5.10-5.55	9.50-9.85
Sample Type			D	D	D
Date sampled			09/11/2023	10/11/2023	10/11/2023
Test	Method	Units			
pH	CE004 ^U	units	8.1	8.2	8.5
Magnesium (2:1 water soluble)	CE061	mg/l Mg	8.3	12	9.4
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	91	9.9	4.9
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	4.1	1.2	1.6
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	168	216	179
Sulphate (acid extractable)	CE062 ^U	mg/kg SO ₄	623	920	1346
Sulphate (acid extractable)	CE062 ^U	% w/w SO ₄	0.06	0.09	0.13
Sulphur (total)	CE119	mg/kg S	366	343	486
Sulphur (total)	CE119	% w/w S	0.04	0.03	0.05

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	100	mg/kg SO ₄
CE062	Sulphate (acid extractable)	HCl extract, analysed by ICP-OES	Dry	U	0.01	% w/w SO ₄
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Aqua regia digest, analysed by ICP-OES	Dry		0.01	% w/w S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
117585-1	S3BH13	1.00-1.45	Y	All (EHT)
117585-2	S3BH13	5.10-5.55	Y	All (EHT)
117585-3	S3BH13	9.50-9.85	Y	All (EHT)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones, where applicable.



LABORATORY REPORT



4043

Contract Number: PSL22/8091

Report Date: 12 January 2023
Client's Reference: G221909
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass

Date Received: 21/12/2022
Date Commenced: 21/12/2022

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

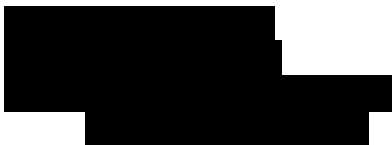


L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

M Fennell
(Senior Technician)

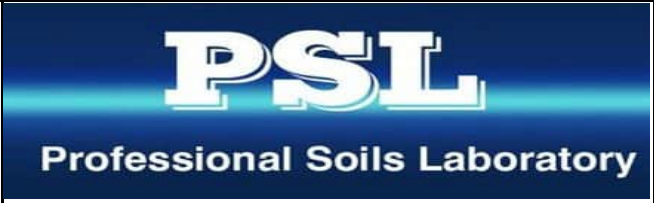
5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR



Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH07	6	SD	1.20	1.65	Brown very sandy CLAY.
S3BH07	9	SD	2.00	2.45	Brown very sandy CLAY.



A46 Newark Bypass



Contract No:
PSL22/8091
Client Ref:
G221209

SUMMARY OF SOIL CLASSIFICATION TESTS

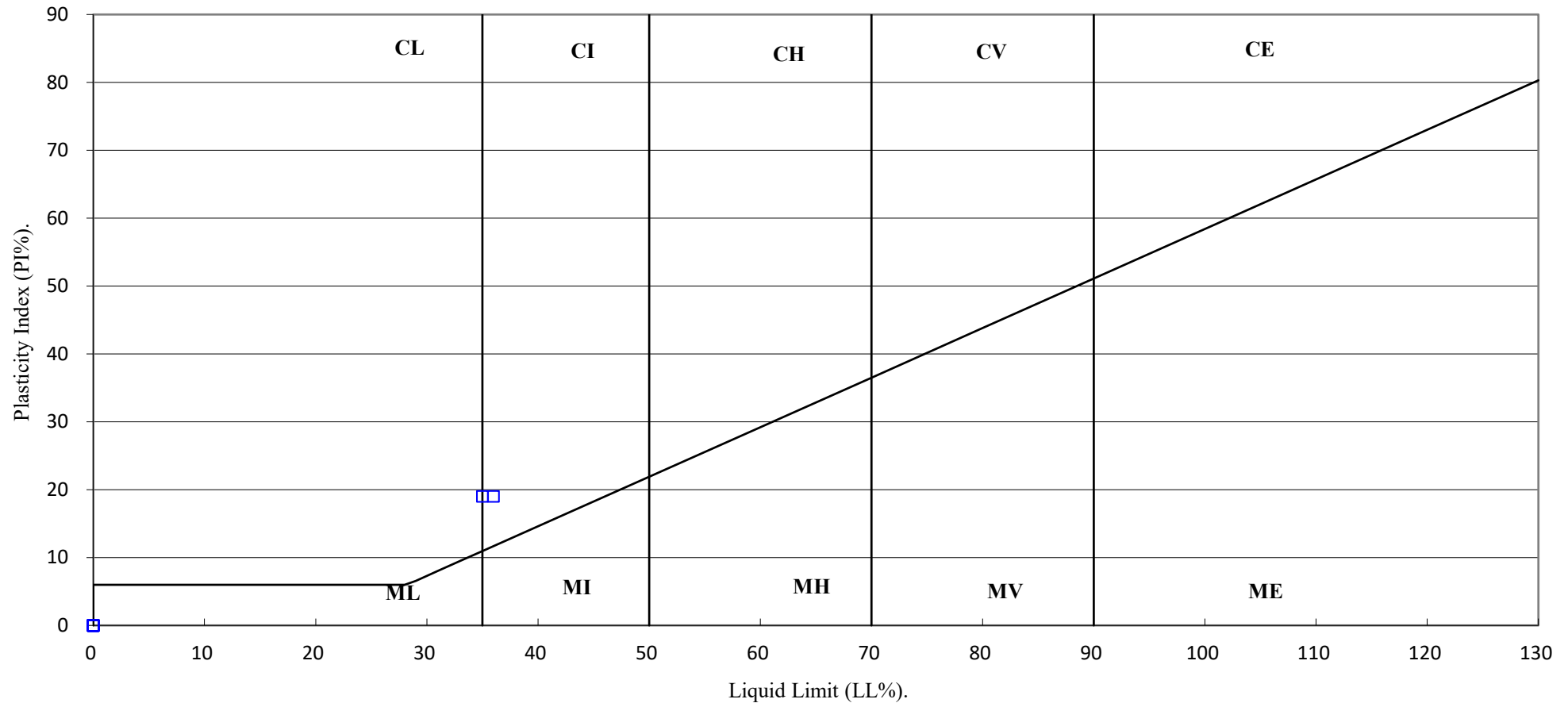
(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % <small>Clause 3.2</small>	Linear Shrinkage % <small>Clause 6.5</small>	Particle Density Mg/m ³ <small>Clause 8.2</small>	Liquid Limit % <small>Clause 4.3/4</small>	Plastic Limit % <small>Clause 5.3</small>	Plasticity Index % <small>Clause 5.4</small>	Passing .425mm %	Remarks
S3BH07	6	SD	1.20	1.65	18			35	16	19	100	Intermediate Plasticity CI
S3BH07	9	SD	2.00	2.45	17			36	17	19	100	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic * : Liquid Limit and Plastic Limit Wet Sieved.

 4043		A46 Newark Bypass	Contract No:
			PSL22/8091
			Client Ref:
			G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

A46 Newark Bypass

Contract No:

PSL22/8091

Client Ref:

G221209



SUMMARY REPORT

DETERMINATION OF UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Tested in Accordance with: ISRM, 2007, p153, part 1

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Van Elle
Client Address: Kirkby Lane, Pinxton,
Nottinghamshire, NG16 6JA

Contact: Jon Wright
Site Address: A46 Newark Bypass

Client Reference: G221209-GEO 07
Job Number: 23-15295-1
Date Sampled: Not Given
Date Received: 25/01/2023
Date Tested: 21/02/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

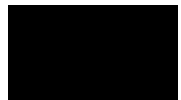
Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Specimen Dimensions (2)				Bulk density (2) Mg/m3	Water Content (1) %	Uniaxial Compression (3)			
		Reference	Depth Top	Depth Base	Type			Diameter	Length	H/D	Orientation of sample			Condition	Stress Rate	Mode of failure	UCS
			m	m													
2572245	S3BH02	Not Given	22.10	22.40	U	Brown to grey SILTSTONE with gypsum veins	Duration of test, fell below time specified in ISRM method, 2007, p153, part1.	101.5	266.8	2.6	Vertical	2.30	10.6	as received	0.0124	MS + AC	3.69

Note: 1 - ISRM p87 test 1, water content at 105 ± 3 °C - not accredited, 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. Compaction machine: VJ Tech AUTOCON - VJT 51-3011; Mode of failure legend: S - Single shear, MS - multiple shear, AC - Axial cleavage, F - Fragmented

Comments:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd



LABORATORY REPORT



Contract Number: PSL23/1627

Report Date: 22 March 2023
Client's Reference: G221209
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass
Date Received: 16/3/2023
Date Commenced: 16/3/2023
Date Completed: 22/3/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


T Watkins
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098

Page 1 of



SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
CPWS07	4	B	1.20	2.00	Brown sandy slightly silty GRAVEL.
CPWS07	5	B	2.00	3.00	Brown sandy slightly silty GRAVEL.
S3BH10	32	D	12.20	12.30	Grey highly weathered MUDSTONE.
S3BH10	33	D	12.60	12.70	Grey highly weathered MUDSTONE.
S3BH15	19	D	1.50		Grey SILT.
S3BH15	24	D	3.00		Grey SILT.
S3BH15	26	D	4.10		Grey SILT.
S3BH15	32	D	6.90		Grey SILT.
S3BH15	16	D	15.00	15.45	Brown very gravelly very sandy CLAY.
S3BH15	57	D	16.50		Brown mottled grey very sandy CLAY.
S3BH15	60	B	18.00	18.40	Brown sandy CLAY.
S3BH15	63	D	19.50		Brown sandy CLAY.
S3TP06	5	B	1.00		Brown slightly gravelly very sandy CLAY.
S3TP06	8	B	1.60		Brown slightly gravelly very clayey SAND.
S3TP07	5	B	1.00		Brown gravelly very sandy CLAY.
S3TP07	8	B	1.70		Brown slightly gravelly very sandy CLAY.
S3TP08	5	B	1.00		Brown slightly gravelly very silty SAND.
S3TP08	8	B	1.80		Brown very sandy slightly silty GRAVEL.
S3TP10	5	B	1.00		Brown very sandy CLAY.



A46 Newark Bypass

Contract No:

PSL23/1627

Client Ref:

G221209

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3TP10	8	B	2.00		Brown very gravelly silty SAND.
S3TP12	5	B	1.00		Brown slightly gravelly very sandy CLAY.
S3TP24	5	B	1.00		Brown gravelly silty SAND.
S3TP24	6	B	2.00		Brown very sandy CLAY.
S3TP25	5	B	1.00		Brown mottled grey slightly sandy CLAY.
S3TP25	8	B	2.00		Brown gravelly clayey SAND.
S3TP26	8	B	2.00		Brown slightly gravelly very sandy CLAY.
S3TP26	12	B	3.00		Brown sandy slightly silty GRAVEL with cobbles.
S3TP27	5	B	1.00		Brown very sandy CLAY.
S3TP27	10	B	2.80		Brown very sandy slightly silty GRAVEL.
S3TP29	6	B	1.00		Brown silty SAND.
S3TP30	6	B	1.00		Brown slightly gravelly clayey SAND.
S3TP31	6	B	1.00		Brown slightly gravelly very clayey SAND.
S3TP32	6	B	1.00		Brown very gravelly slightly silty SAND.
S3TP33	6	B	1.00		Brown mottled grey slightly gravelly very clayey SAND.
S3TP34	4	B	0.00	0.20	Brown very sandy CLAY.
S3TP34	6	B	1.00		Brown very sandy slightly silty GRAVEL.
S3WS01	15	B	2.00		Brown slightly sandy slightly clayey GRAVEL with cobbles.



A46 Newark Bypass

Contract No:

PSL23/1627

Client Ref:

G221209

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
S3BH10	32	D	12.20	12.30	25			39	23	16	96	Intermediate Plasticity CI
S3BH10	33	D	12.60	12.70	28			38	23	15	86	Intermediate Plasticity CI
S3BH15	19	D	1.50		22				NP			
S3BH15	24	D	3.00		22				NP			
S3BH15	26	D	4.10		23				NP			
S3BH15	32	D	6.90		21				NP			
S3BH15	16	D	15.00	15.45	9.7			28	15	13	60	Low Plasticity CL
S3BH15	57	D	16.50		27			31	16	15	100	Low Plasticity CL
S3BH15	60	B	18.00	18.40	34			43	21	22	100	Intermediate Plasticity CI
S3BH15	63	D	19.50		21			45	22	23	80	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



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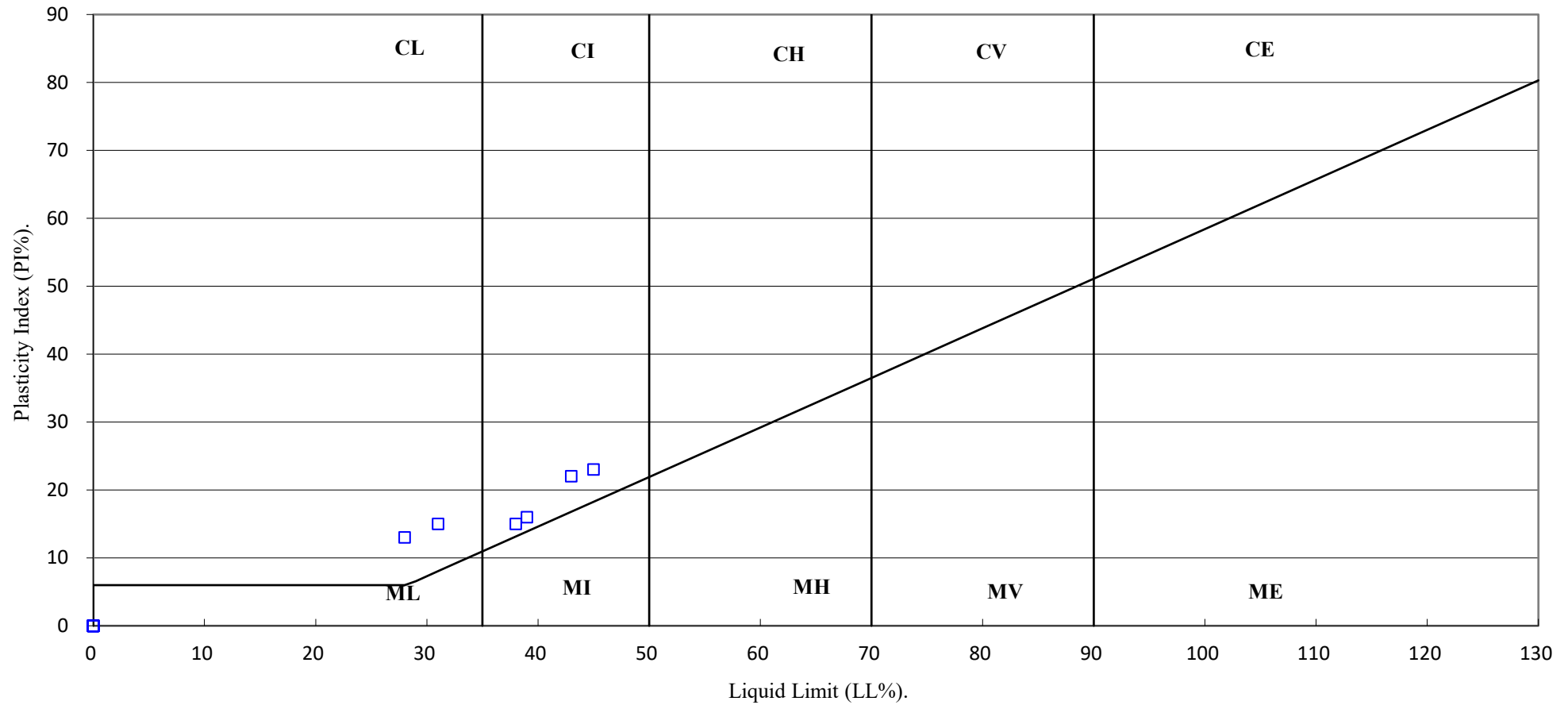
Contract No:

PSL23/1627

Client Ref:

G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



A46 Newark Bypass

Contract No:

PSL23/1627

Client Ref:

G221209

PARTICLE SIZE DISTRIBUTION TEST

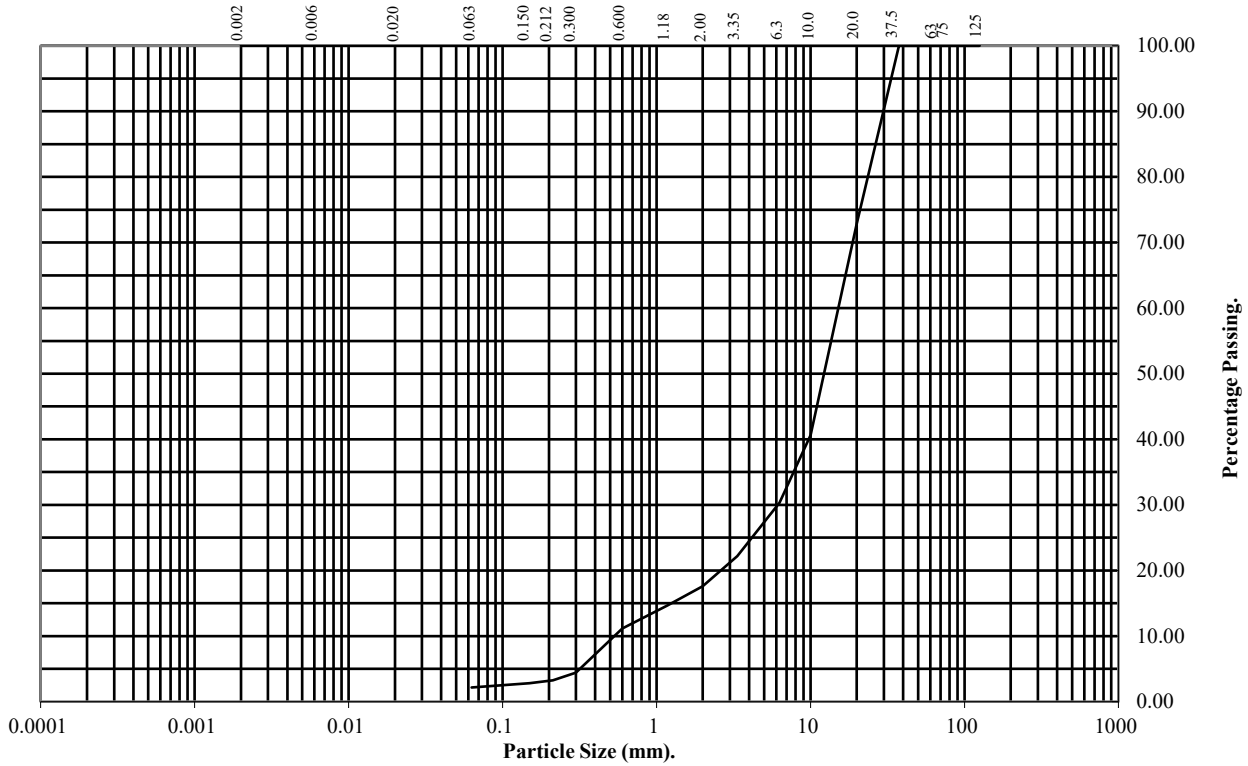
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: CPWS07 **Top Depth (m):** 1.20

Sample Number: 4 **Base Depth(m):** 2.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	73
10	41
6.3	30
3.35	22
2	18
1.18	15
0.6	11
0.3	4
0.212	3
0.15	3
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	82
Sand	16
Silt/Clay	2

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

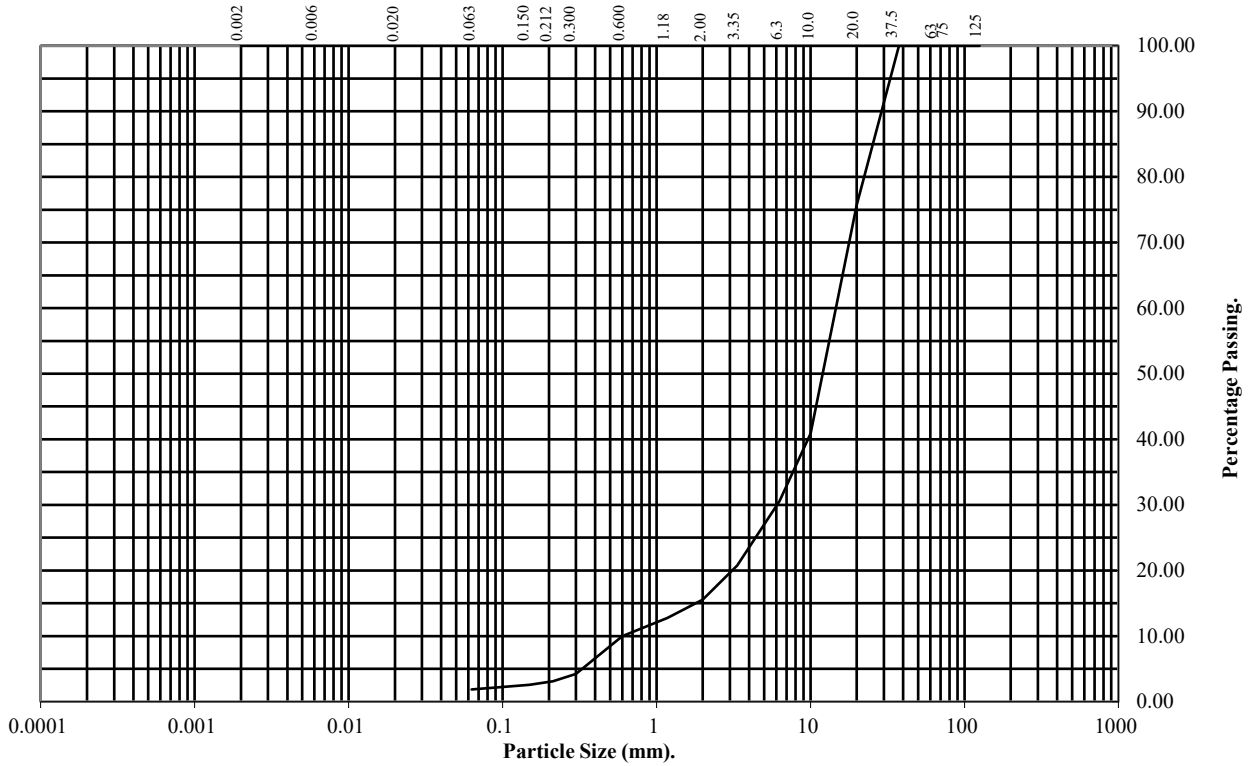
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: CPWS07 **Top Depth (m):** 2.00

Sample Number: 5 **Base Depth(m):** 3.00

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	76
10	41
6.3	31
3.35	21
2	16
1.18	13
0.6	10
0.3	4
0.212	3
0.15	3
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	84
Sand	14
Silt/Clay	2

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

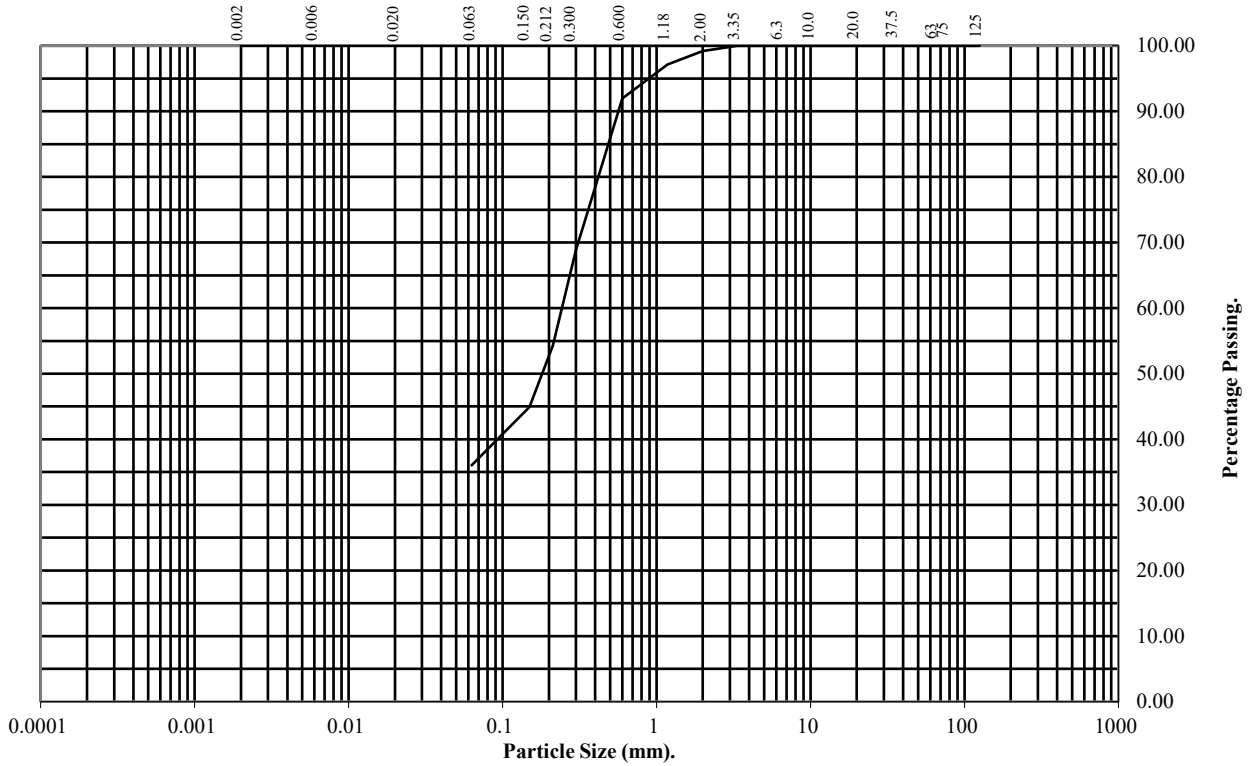
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP06** Top Depth (m): **1.00**

Sample Number: **5** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	97
0.6	92
0.3	69
0.212	54
0.15	45
0.063	36

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	63
Silt/Clay	36

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

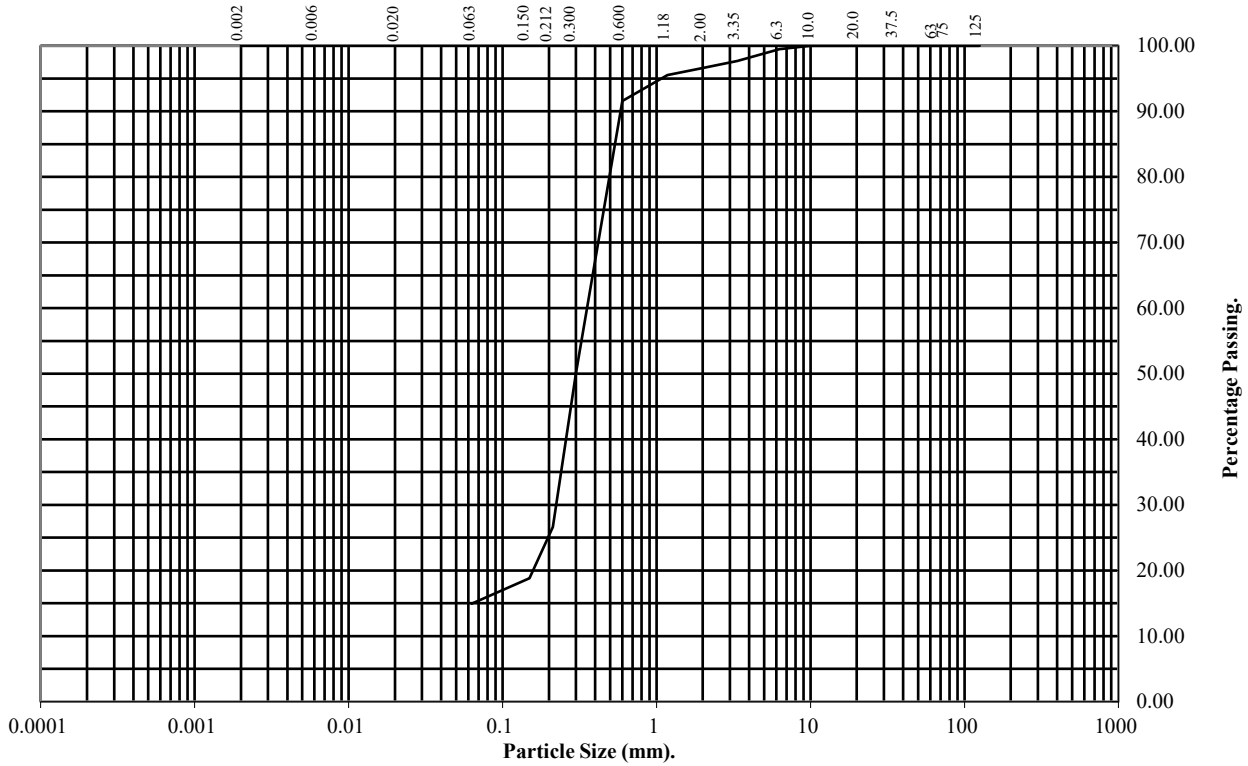
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP06** Top Depth (m): **1.60**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	98
2	97
1.18	96
0.6	92
0.3	50
0.212	27
0.15	19
0.063	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	82
Silt/Clay	15

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

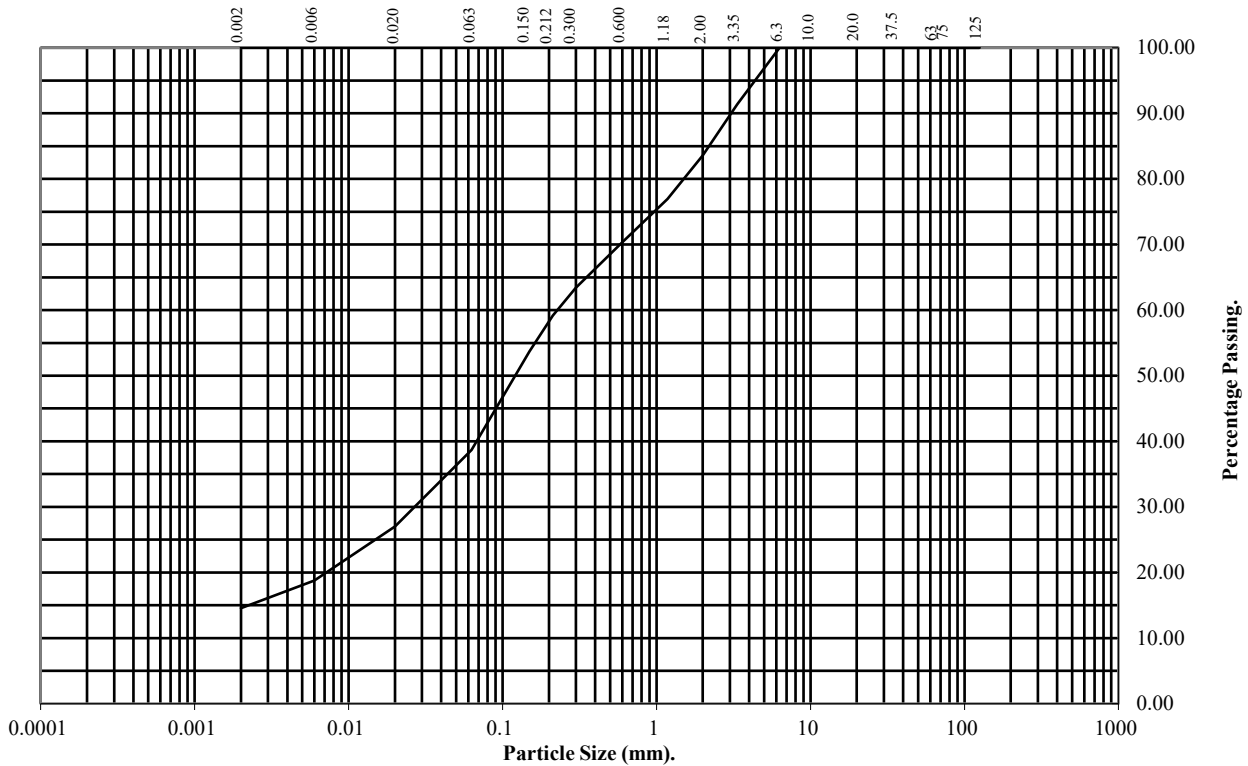
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **S3TP07** Top Depth (m): **1.00**

Sample Number: **5** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	91
2	84
1.18	77
0.6	70
0.3	63
0.212	59
0.15	54
0.063	39

Particle Diameter	Percentage Passing
0.02	27
0.006	19
0.002	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	16
Sand	45
Silt	24
Clay	15

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

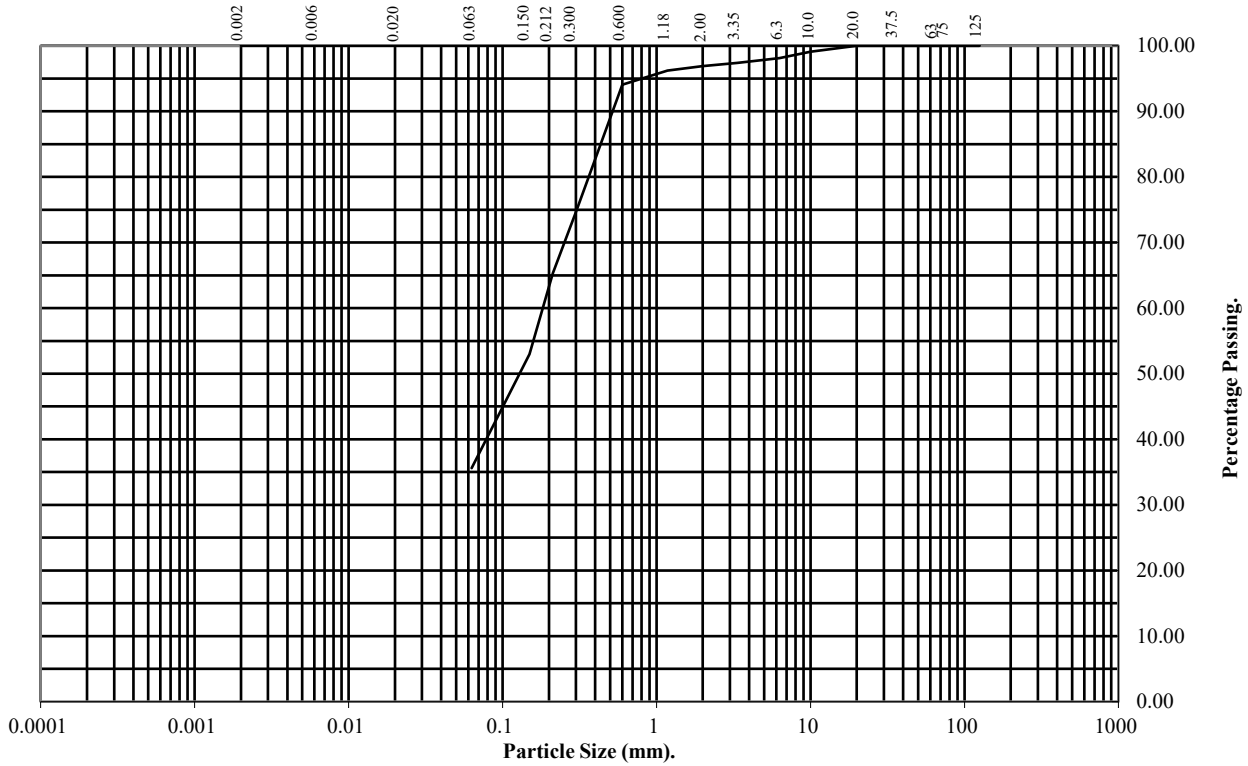
Hole Number: S3TP07

Top Depth (m): 1.70

Sample Number: 8

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	98
3.35	97
2	97
1.18	96
0.6	94
0.3	75
0.212	65
0.15	53
0.063	36

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	61
Silt/Clay	36

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

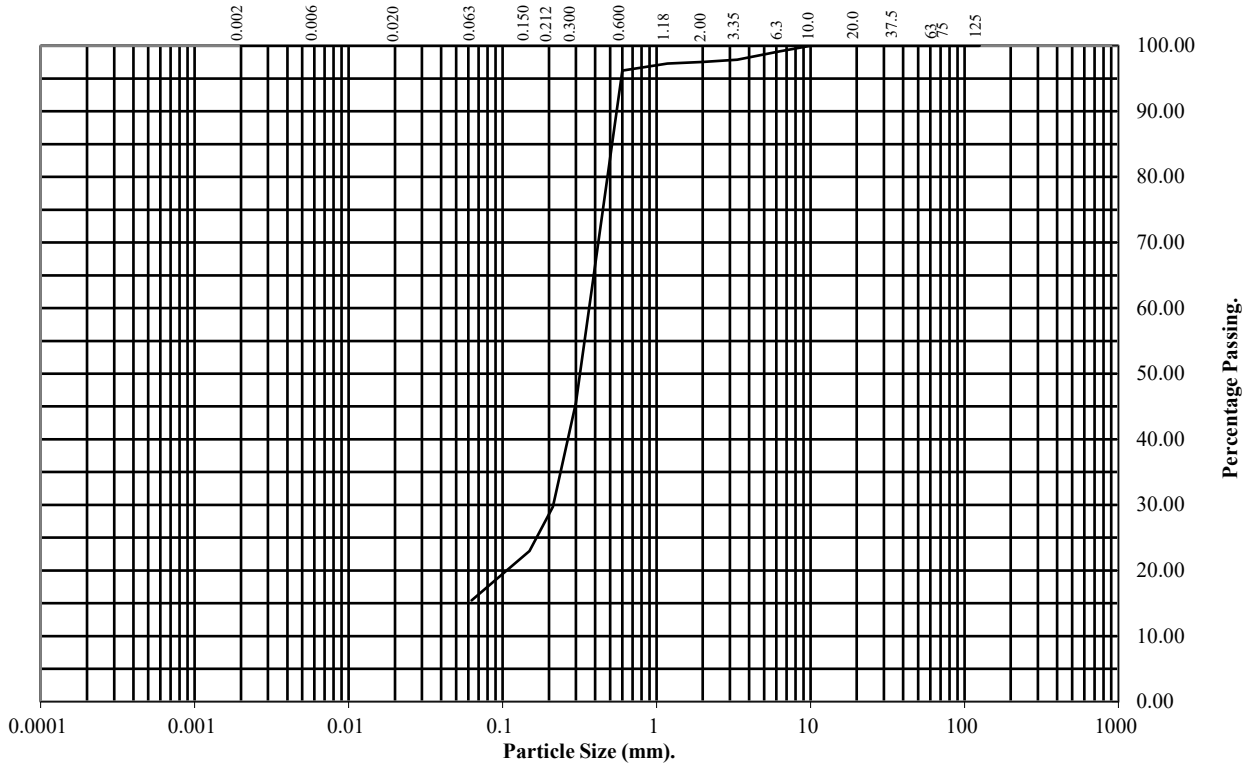
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP08** Top Depth (m): **1.00**

Sample Number: **5** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	98
1.18	97
0.6	96
0.3	46
0.212	30
0.15	23
0.063	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	83
Silt/Clay	15

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

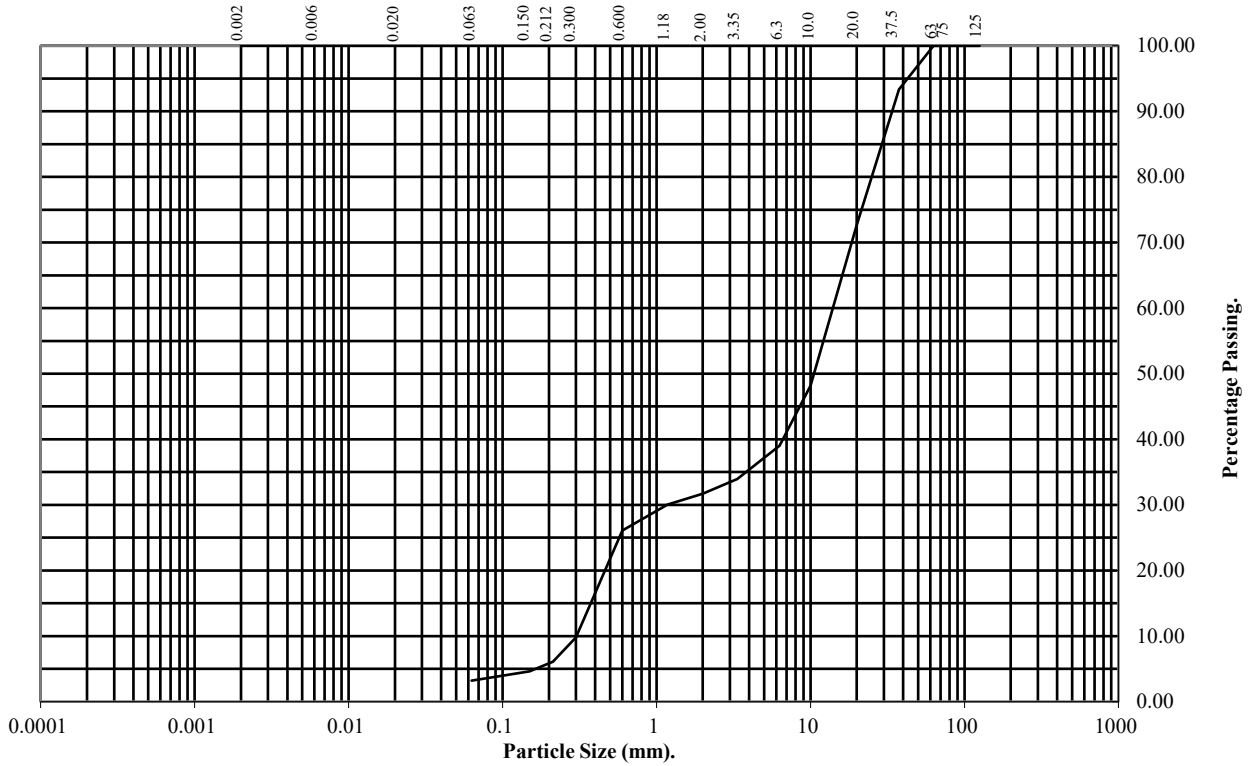
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP08** Top Depth (m): **1.80**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	73
10	48
6.3	39
3.35	34
2	32
1.18	30
0.6	26
0.3	10
0.212	6
0.15	5
0.063	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	68
Sand	29
Silt/Clay	3

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

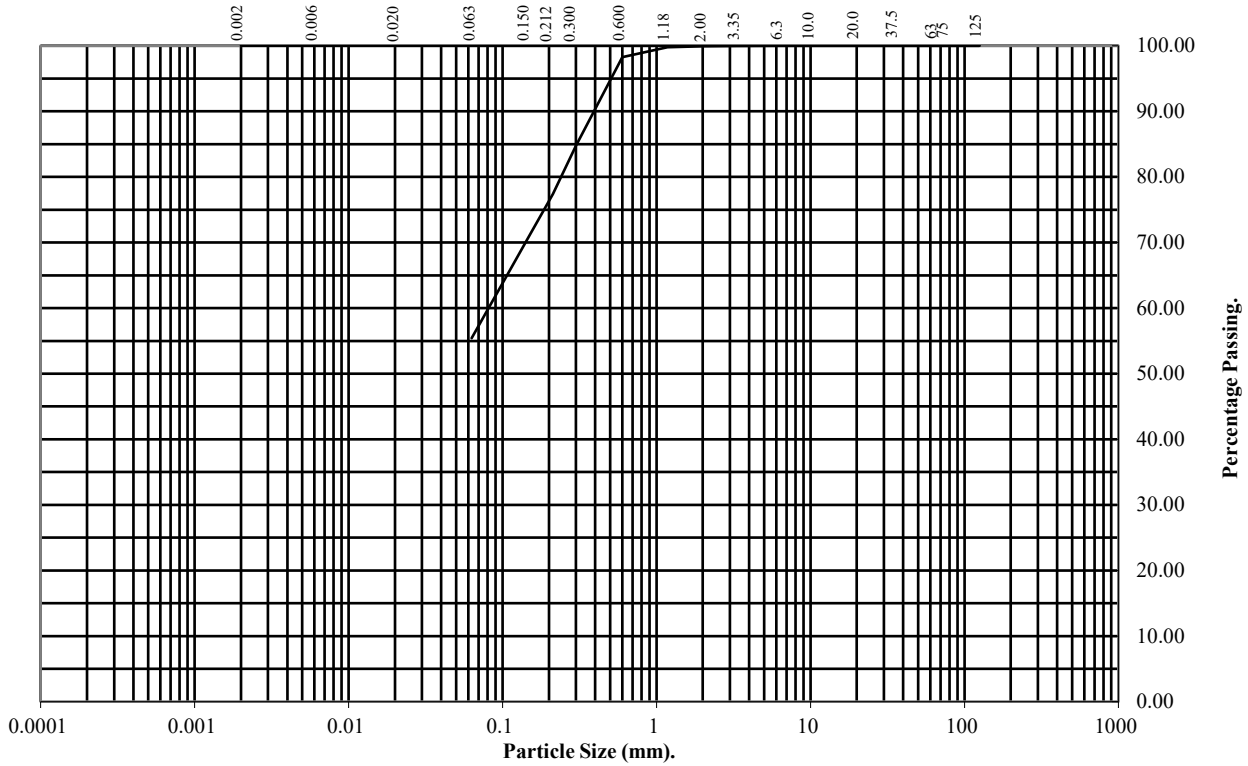
Hole Number: S3TP10

Top Depth (m): 1.00

Sample Number: 5

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	98
0.3	85
0.212	77
0.15	71
0.063	55

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	45
Silt/Clay	55

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

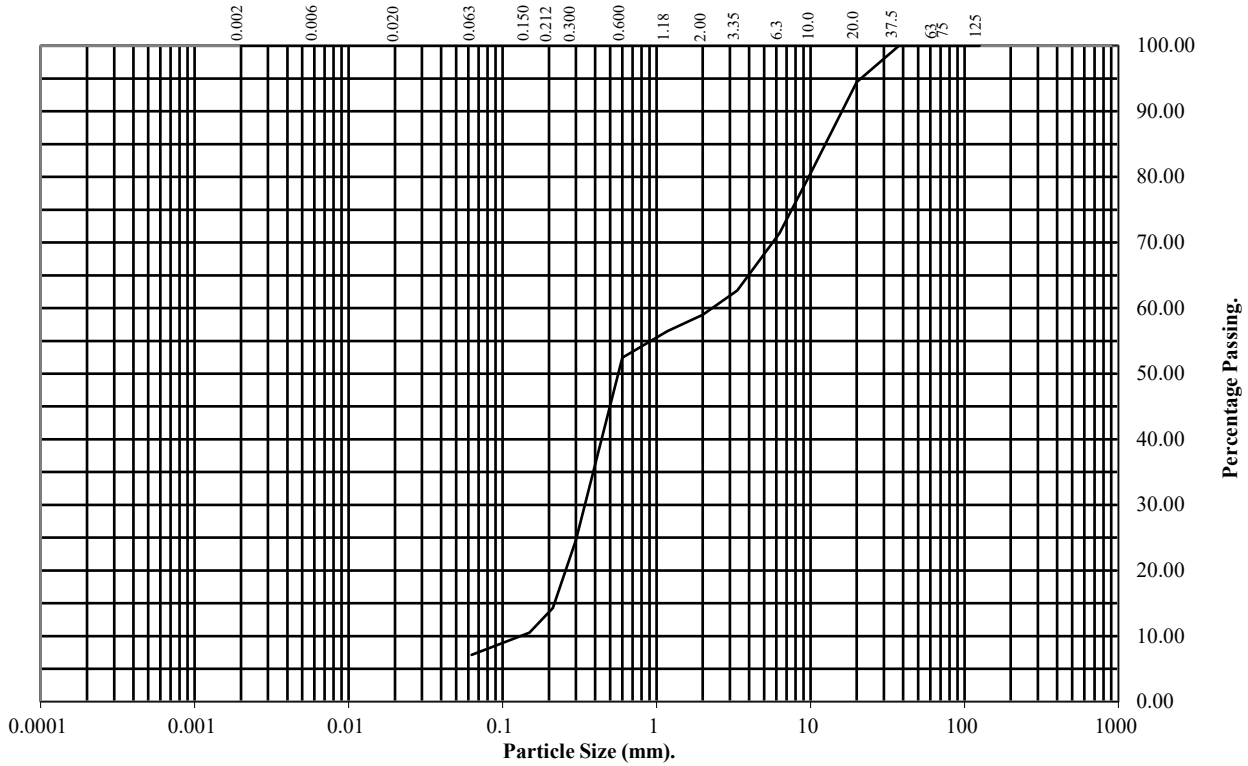
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP10** Top Depth (m): **2.00**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	94
10	81
6.3	71
3.35	63
2	59
1.18	56
0.6	52
0.3	25
0.212	14
0.15	11
0.063	7

Soil Fraction	Total Percentage
Cobbles	0
Gravel	41
Sand	52
Silt/Clay	7

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

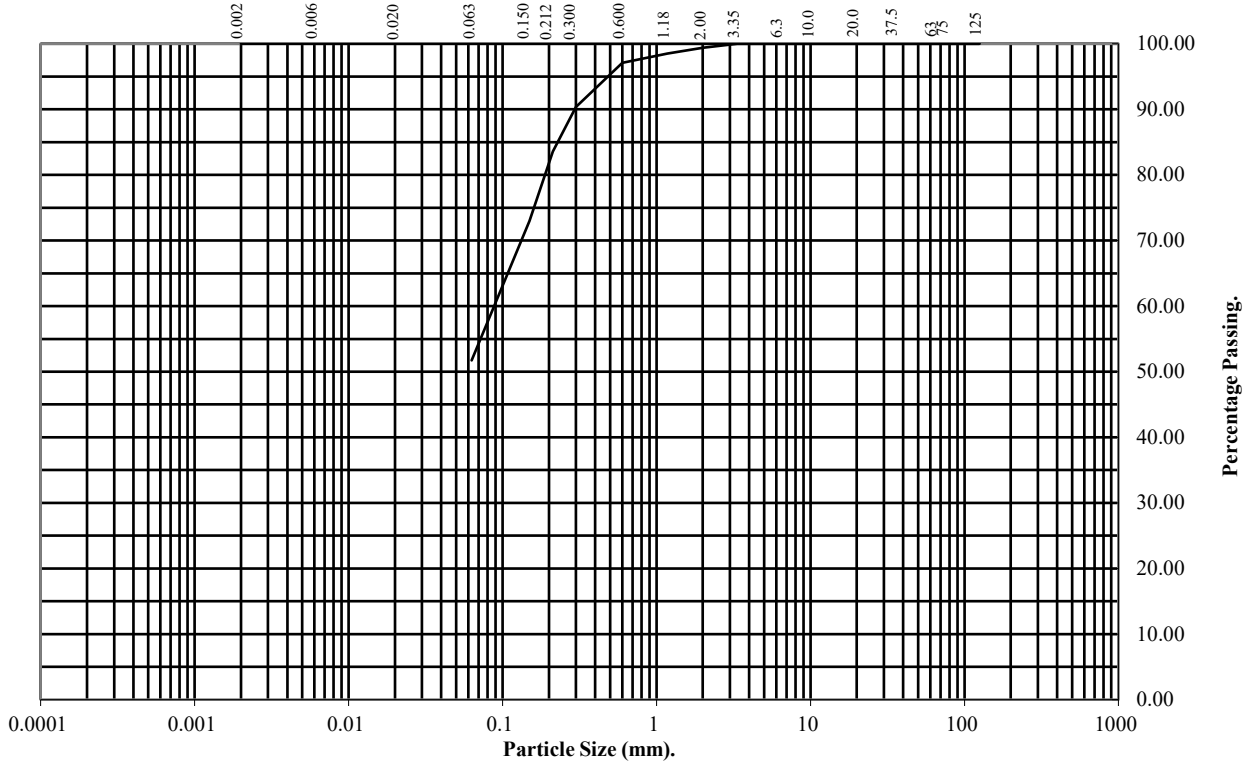
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP12** Top Depth (m): **1.00**

Sample Number: **5** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	97
0.3	90
0.212	84
0.15	73
0.063	52

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	47
Silt/Clay	52

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

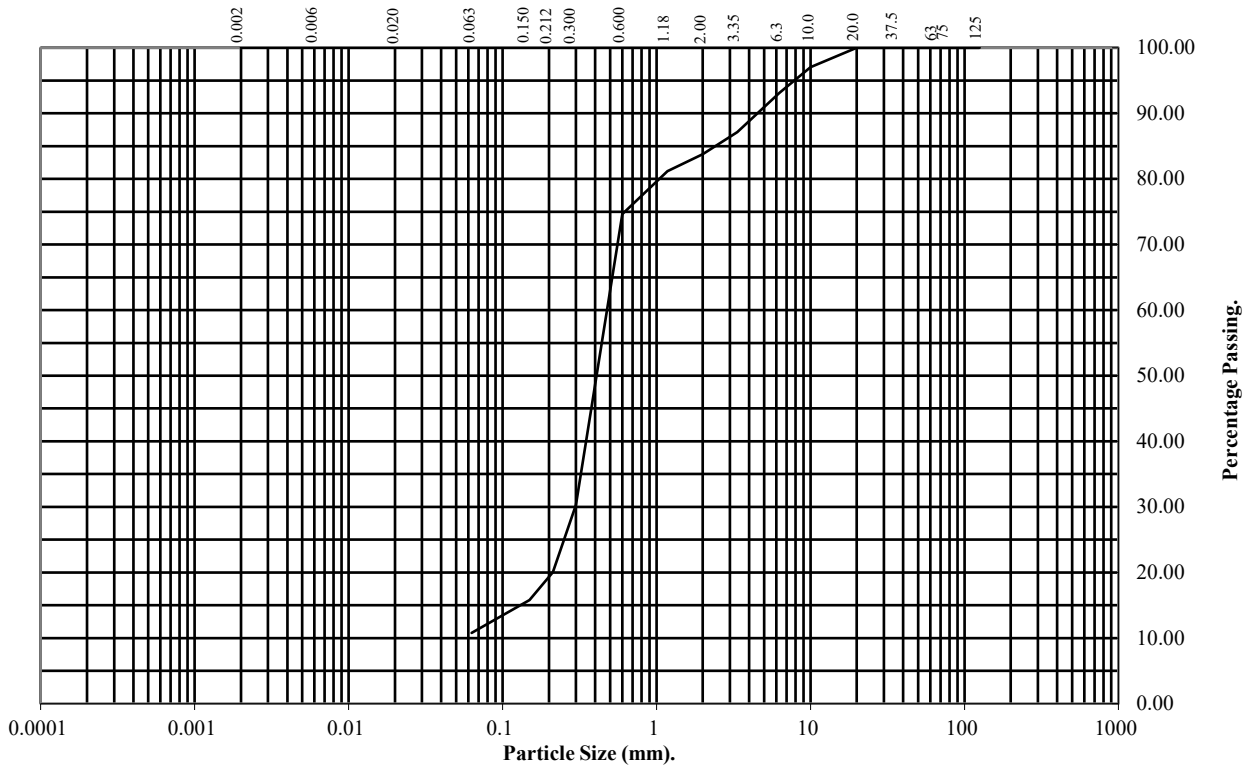
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP24 Top Depth (m): 1.00

Sample Number: 5 Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	93
3.35	87
2	84
1.18	81
0.6	75
0.3	30
0.212	20
0.15	16
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	16
Sand	73
Silt/Clay	11

Remarks:

See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

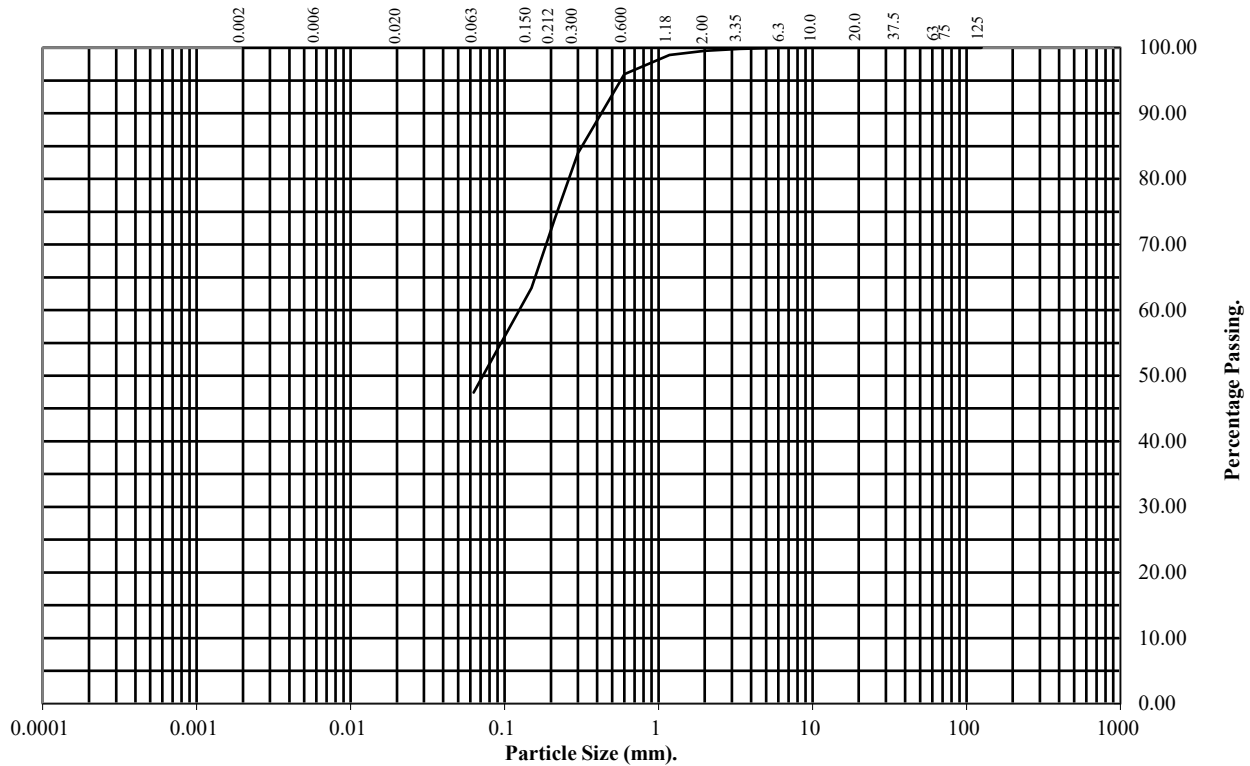
Hole Number: S3TP24

Top Depth (m): 2.00

Sample Number: 6

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	96
0.3	84
0.212	74
0.15	63
0.063	47

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	53
Silt/Clay	47

Remarks:

See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

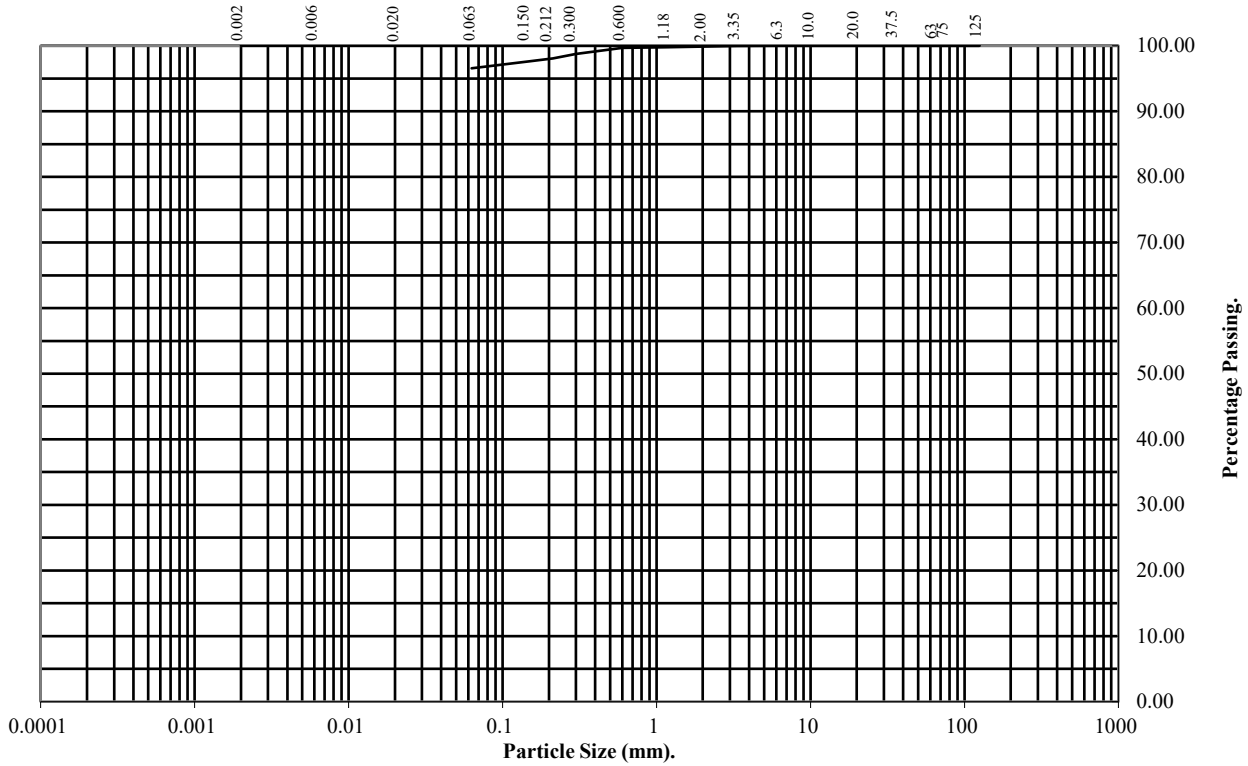
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP25** Top Depth (m): **1.00**

Sample Number: **5** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	99
0.212	98
0.15	98
0.063	97

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	3
Silt/Clay	97

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

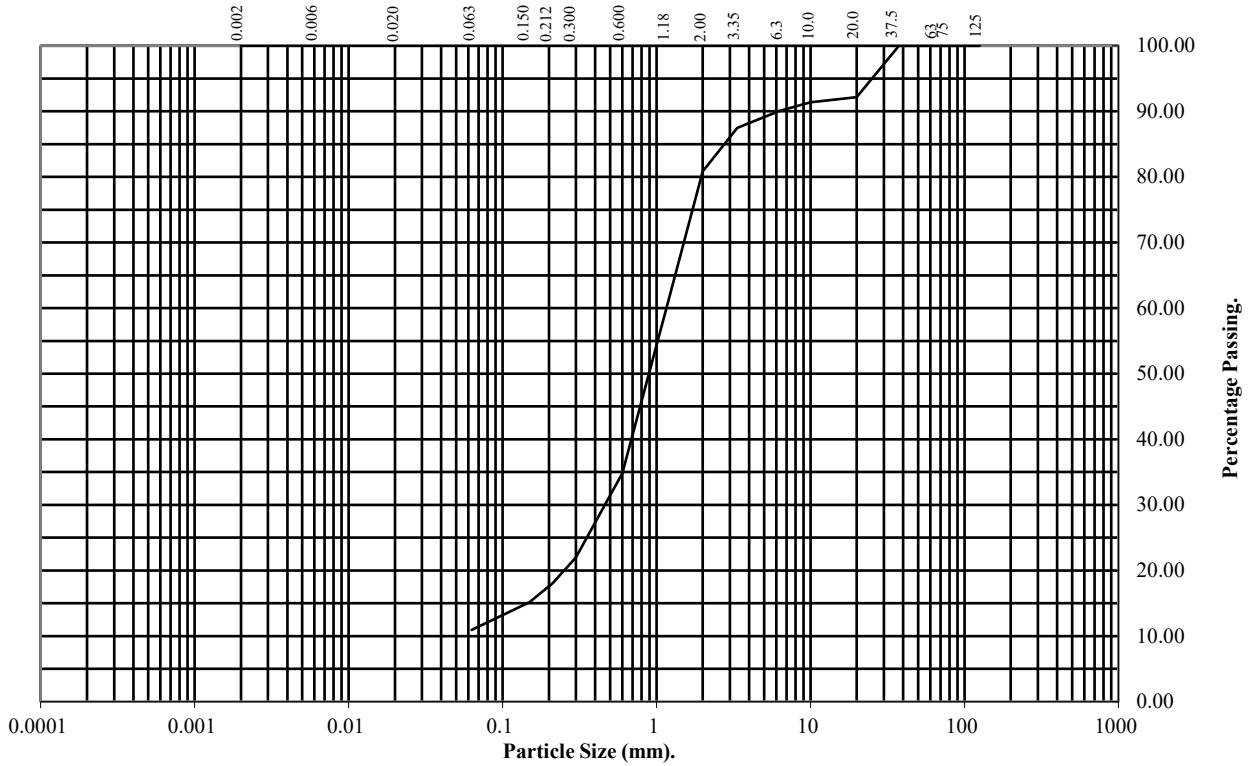
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP25** Top Depth (m): **2.00**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	91
6.3	90
3.35	87
2	81
1.18	61
0.6	35
0.3	22
0.212	18
0.15	15
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	19
Sand	70
Silt/Clay	11

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

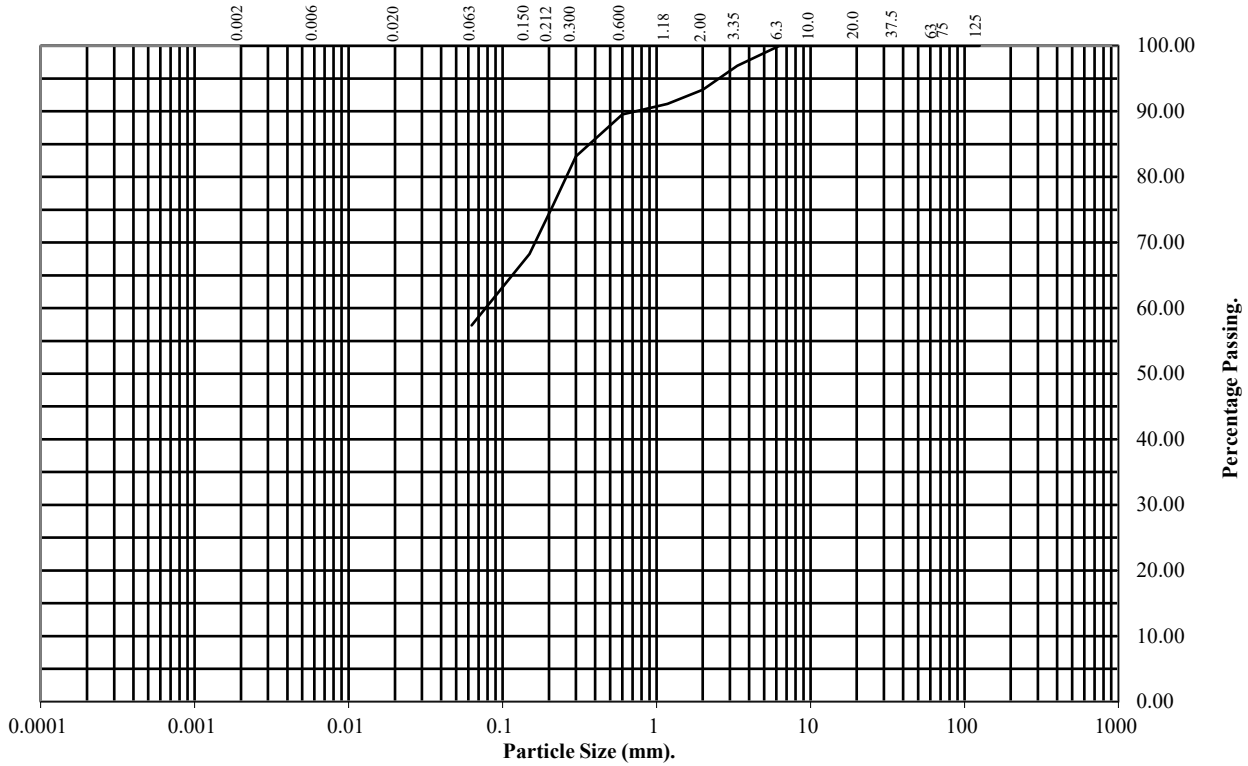
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP26** Top Depth (m): **2.00**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	97
2	93
1.18	91
0.6	90
0.3	83
0.212	76
0.15	68
0.063	57

Soil Fraction	Total Percentage
Cobbles	0
Gravel	7
Sand	36
Silt/Clay	57

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

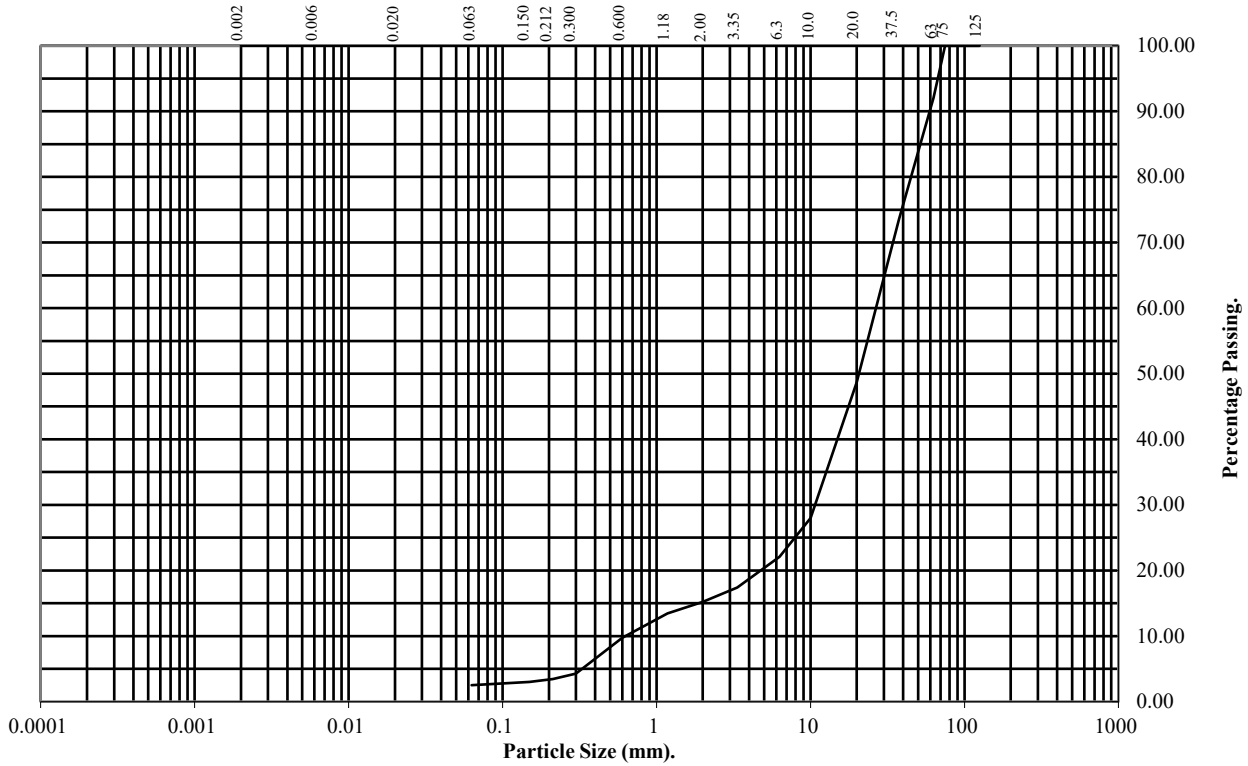
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP26** Top Depth (m): **3.00**

Sample Number: **12** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	92
37.5	74
20	49
10	28
6.3	22
3.35	17
2	15
1.18	13
0.6	10
0.3	4
0.212	3
0.15	3
0.063	3

Soil Fraction	Total Percentage
Cobbles	8
Gravel	77
Sand	12
Silt/Clay	3

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

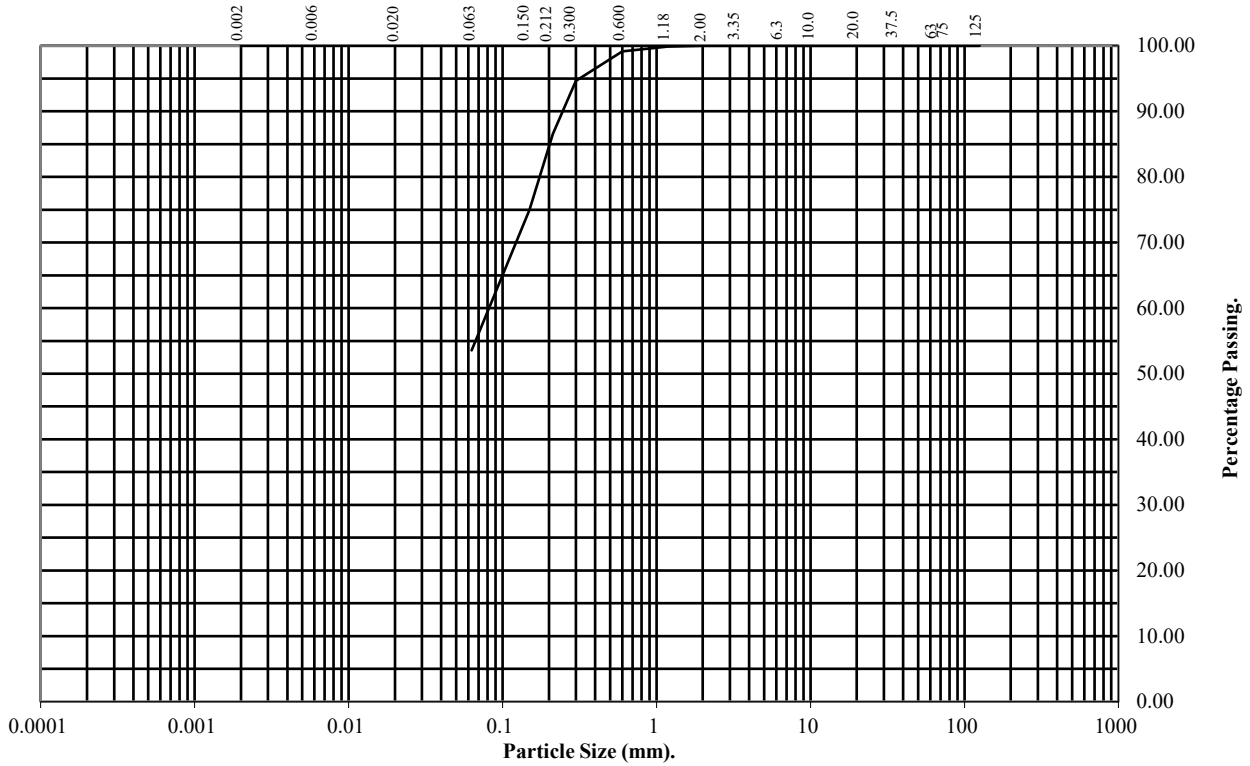
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP27** Top Depth (m): **1.00**

Sample Number: **5** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	95
0.212	87
0.15	75
0.063	54

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	46
Silt/Clay	54

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

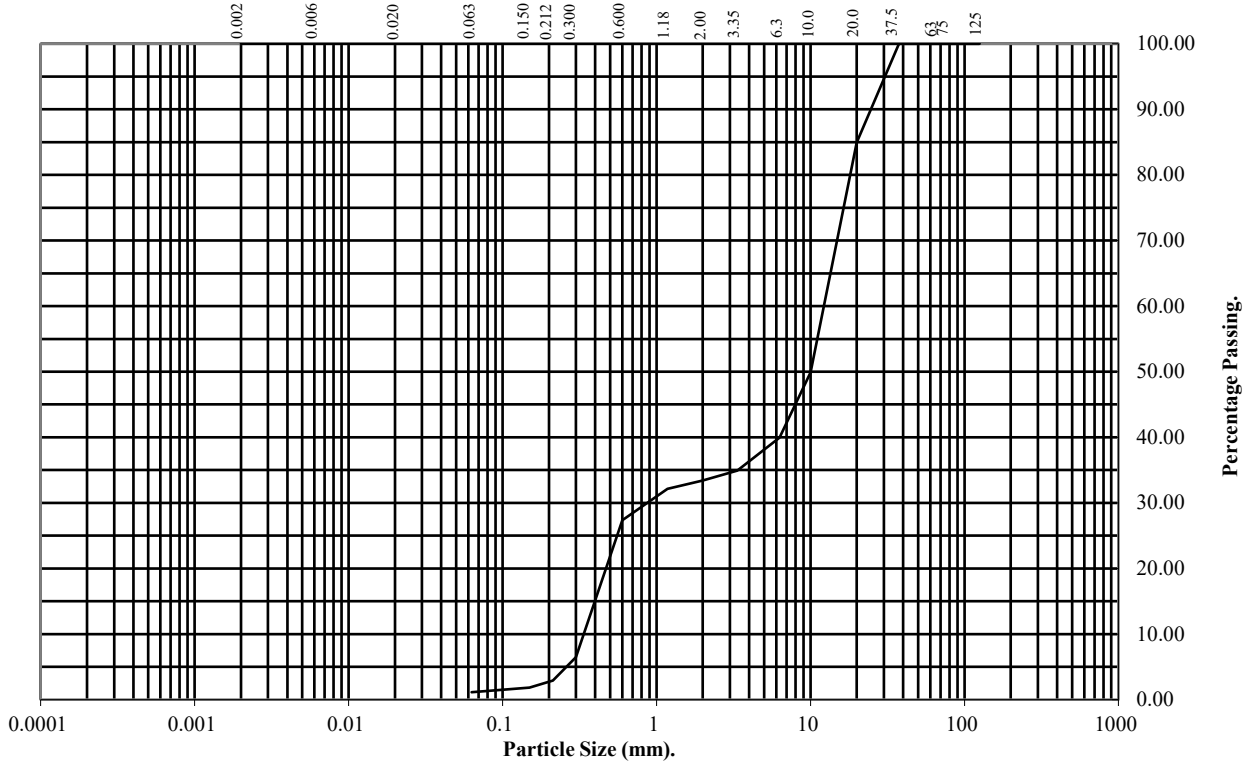
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP27** Top Depth (m): **2.80**

Sample Number: **10** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	85
10	50
6.3	40
3.35	35
2	33
1.18	32
0.6	27
0.3	6
0.212	3
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	67
Sand	32
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

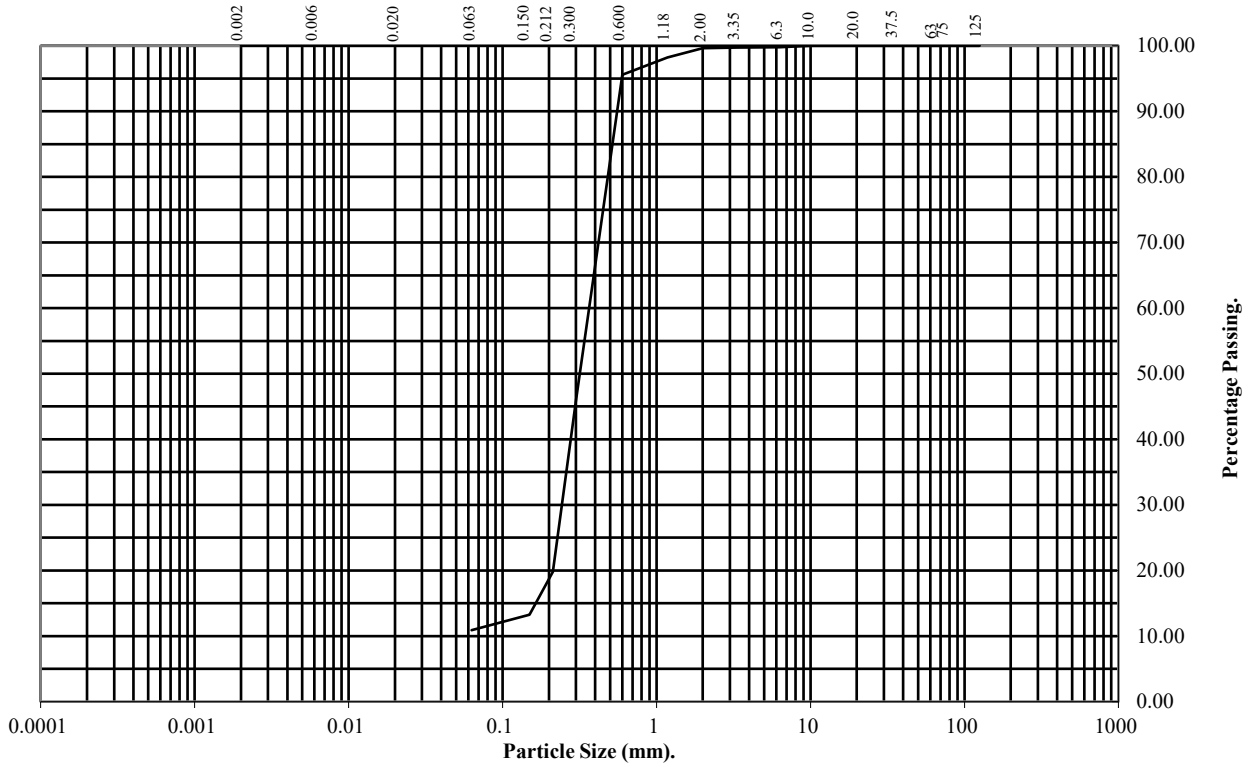
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP29** Top Depth (m): **1.00**

Sample Number: **6** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	98
0.6	96
0.3	46
0.212	20
0.15	13
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	89
Silt/Clay	11

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

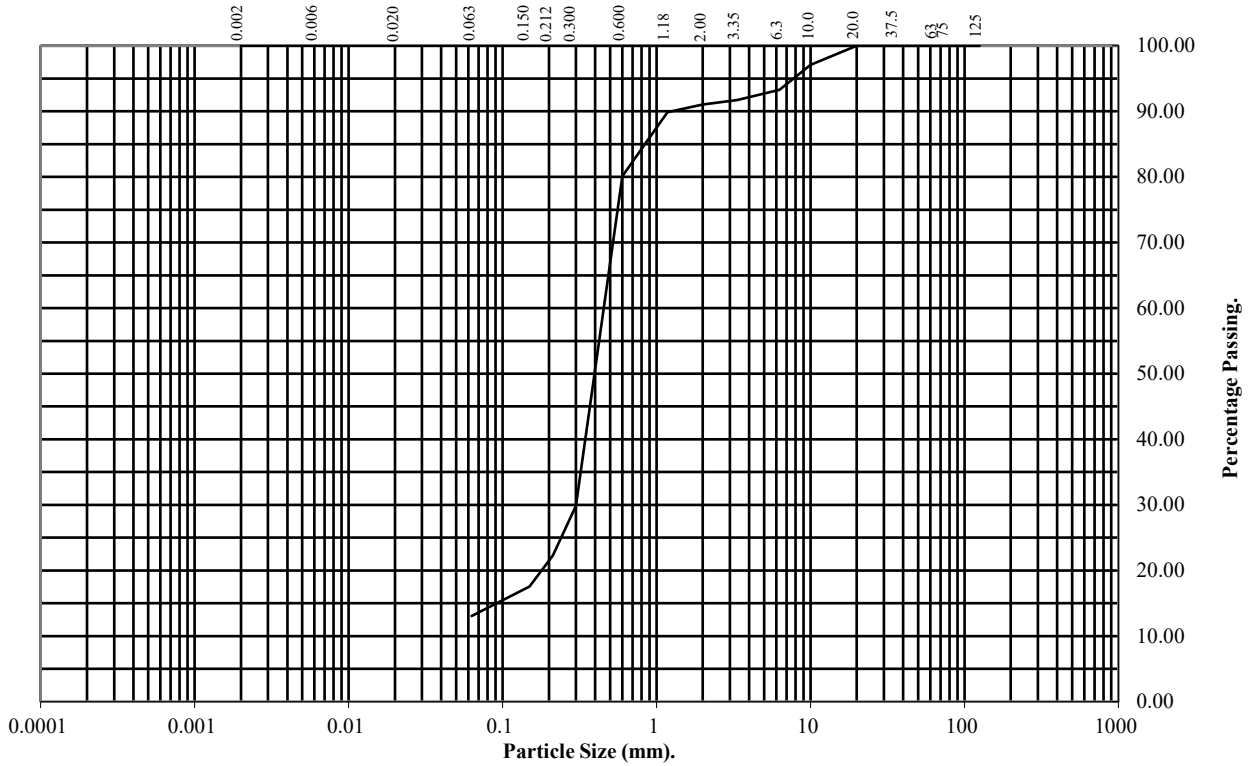
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP30 **Top Depth (m):** 1.00

Sample Number: 6 **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	93
3.35	92
2	91
1.18	90
0.6	80
0.3	30
0.212	22
0.15	18
0.063	13

Soil Fraction	Total Percentage
Cobbles	0
Gravel	9
Sand	78
Silt/Clay	13

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

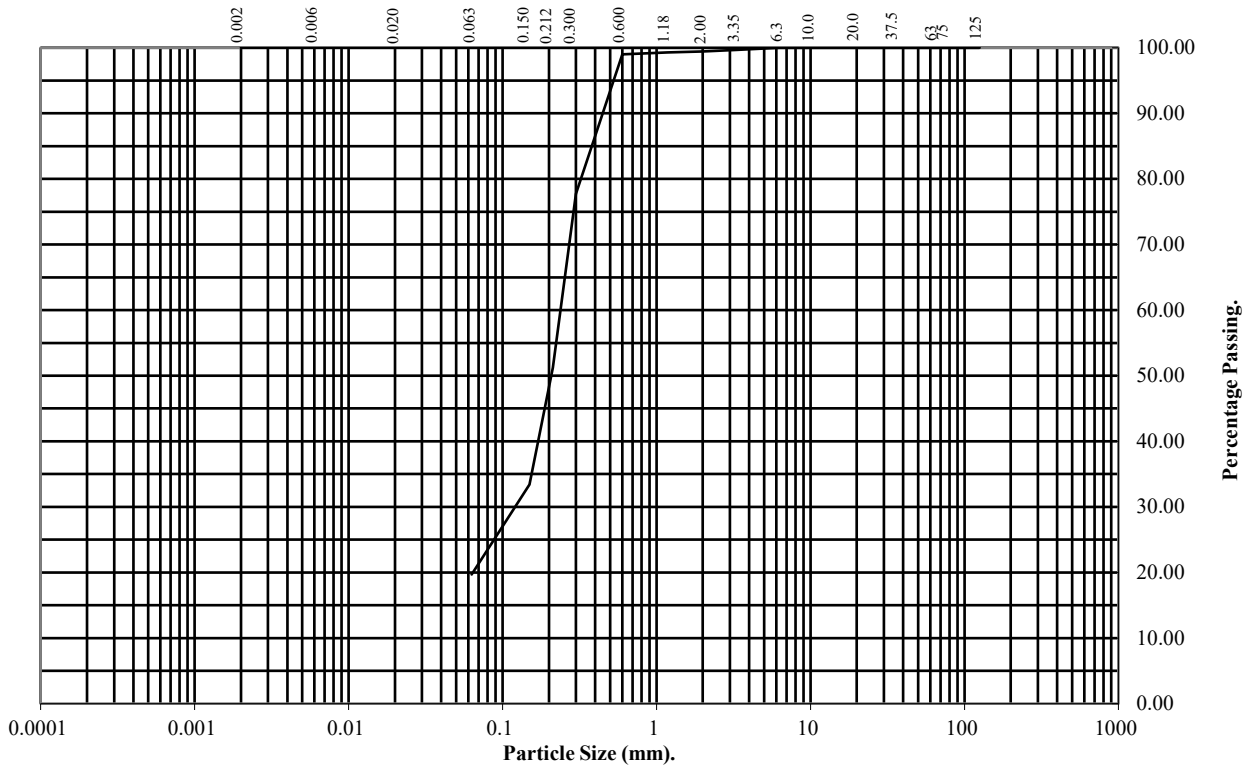
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP31** Top Depth (m): **1.00**

Sample Number: **6** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	99
0.3	78
0.212	51
0.15	33
0.063	20

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	79
Silt/Clay	20

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

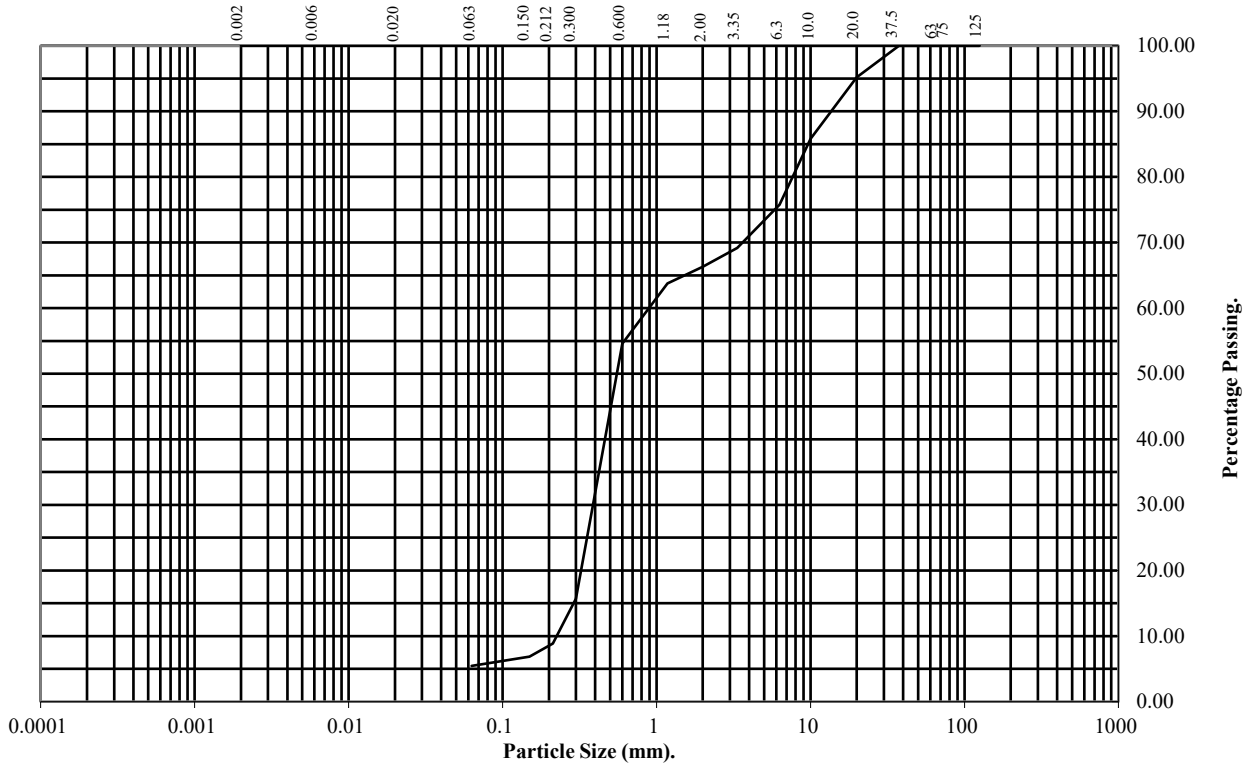
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP32** Top Depth (m): **1.00**

Sample Number: **6** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	95
10	86
6.3	76
3.35	69
2	66
1.18	64
0.6	55
0.3	16
0.212	9
0.15	7
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	34
Sand	61
Silt/Clay	5

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

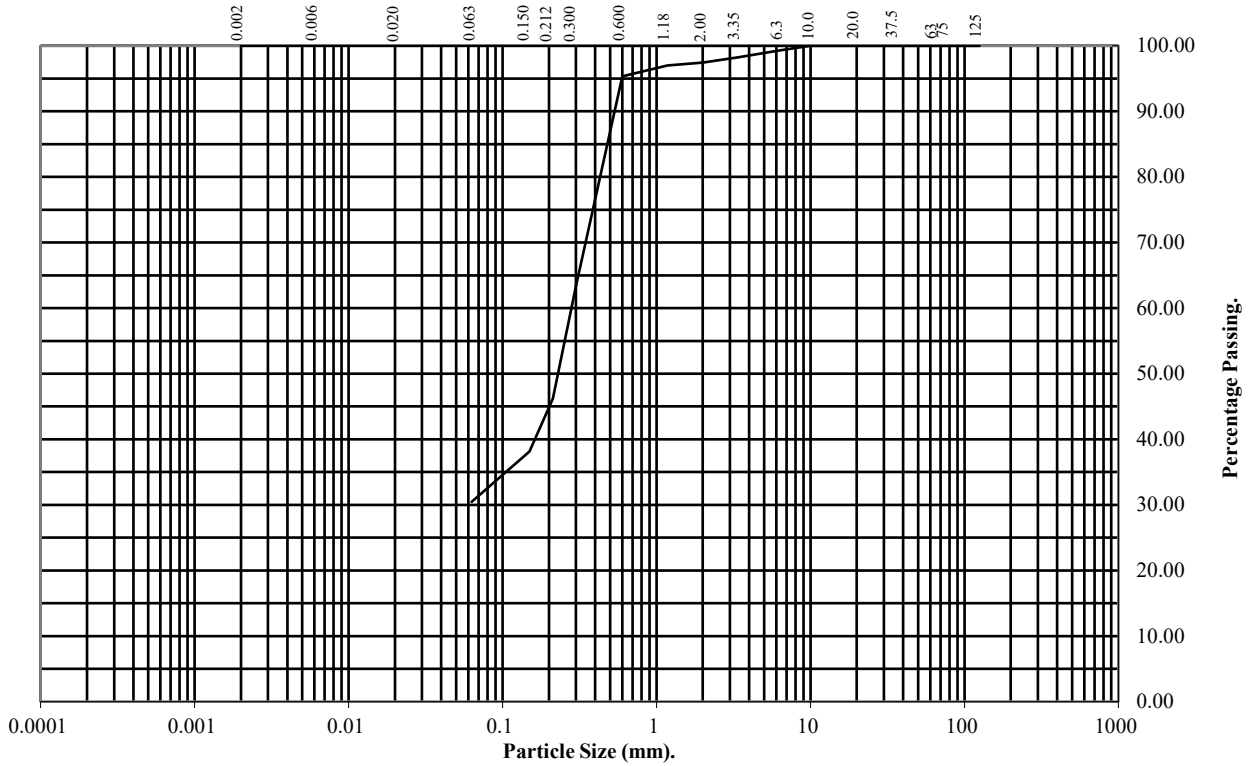
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP33 **Top Depth (m):** 1.00

Sample Number: 6 **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	97
1.18	97
0.6	95
0.3	63
0.212	46
0.15	38
0.063	30

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	67
Silt/Clay	30

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

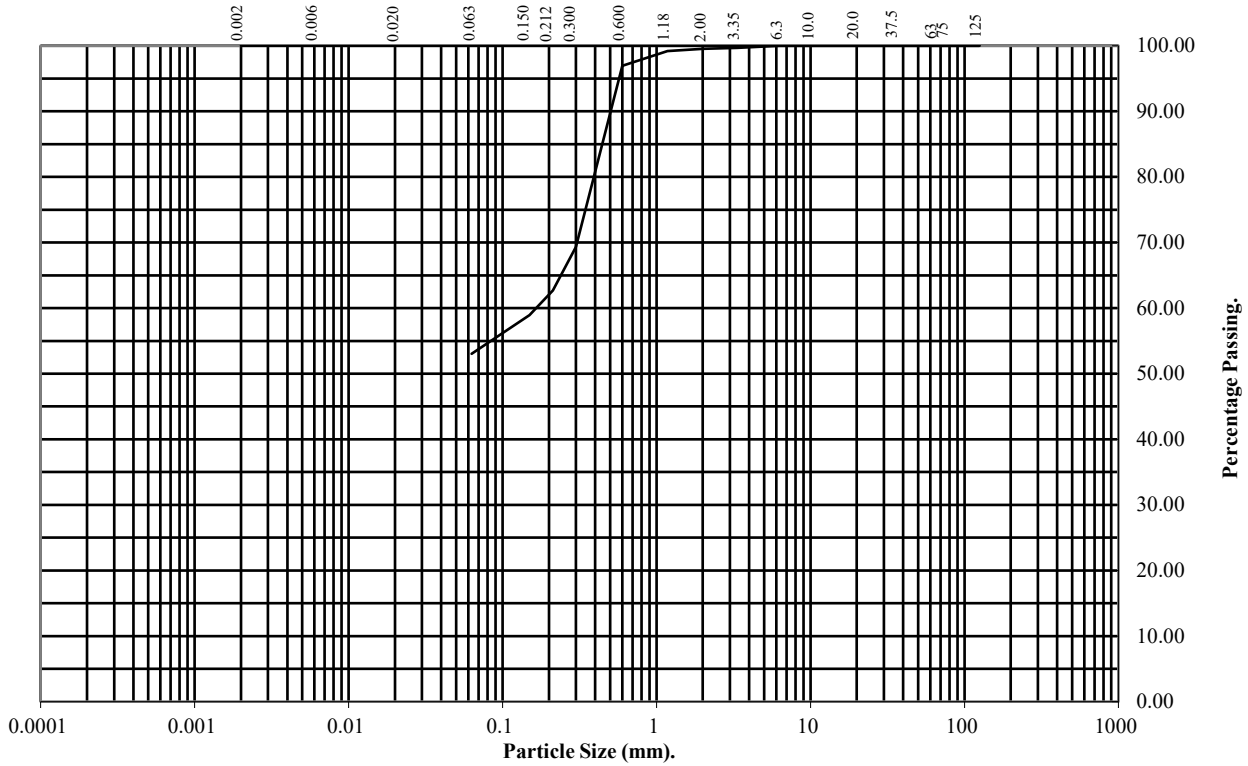
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP34 **Top Depth (m):** 0.00

Sample Number: 4 **Base Depth(m):** 0.20

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	97
0.3	69
0.212	63
0.15	59
0.063	53

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	47
Silt/Clay	53

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

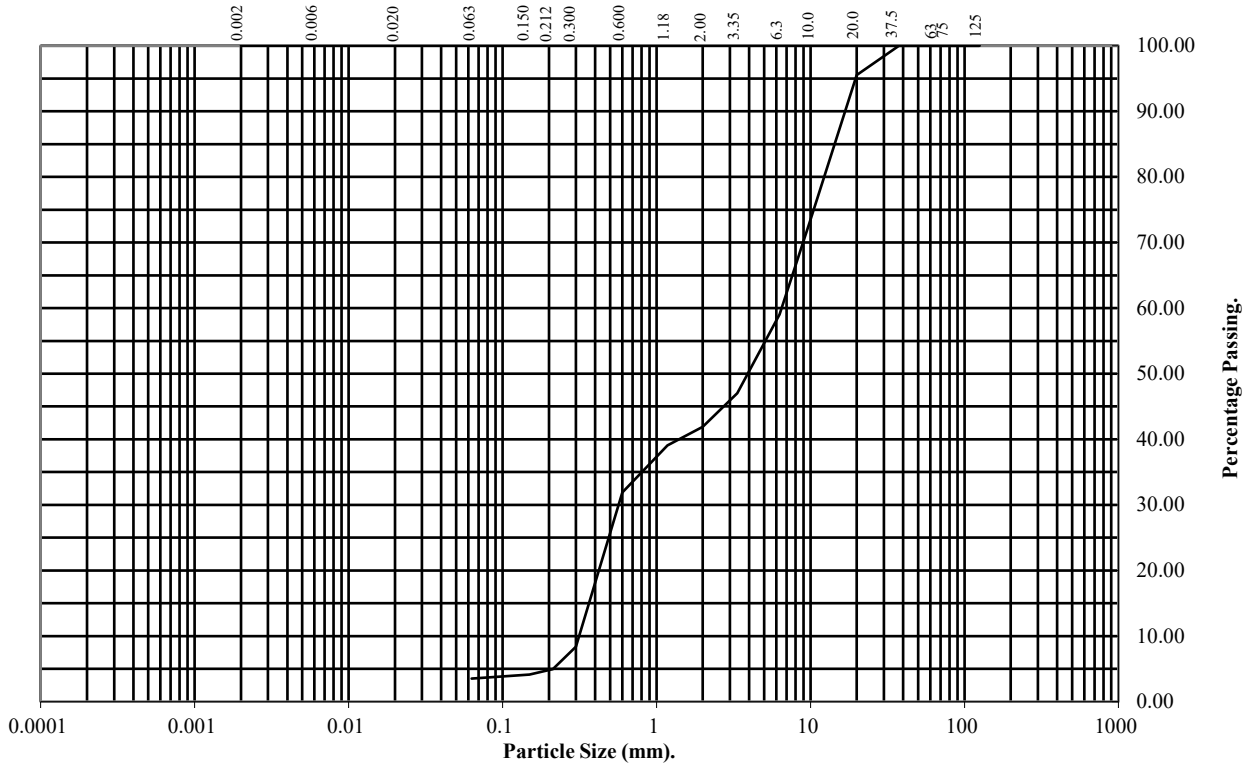
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP34 Top Depth (m): 1.00

Sample Number: 6 Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	74
6.3	59
3.35	47
2	42
1.18	39
0.6	32
0.3	8
0.212	5
0.15	4
0.063	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	58
Sand	38
Silt/Clay	4

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

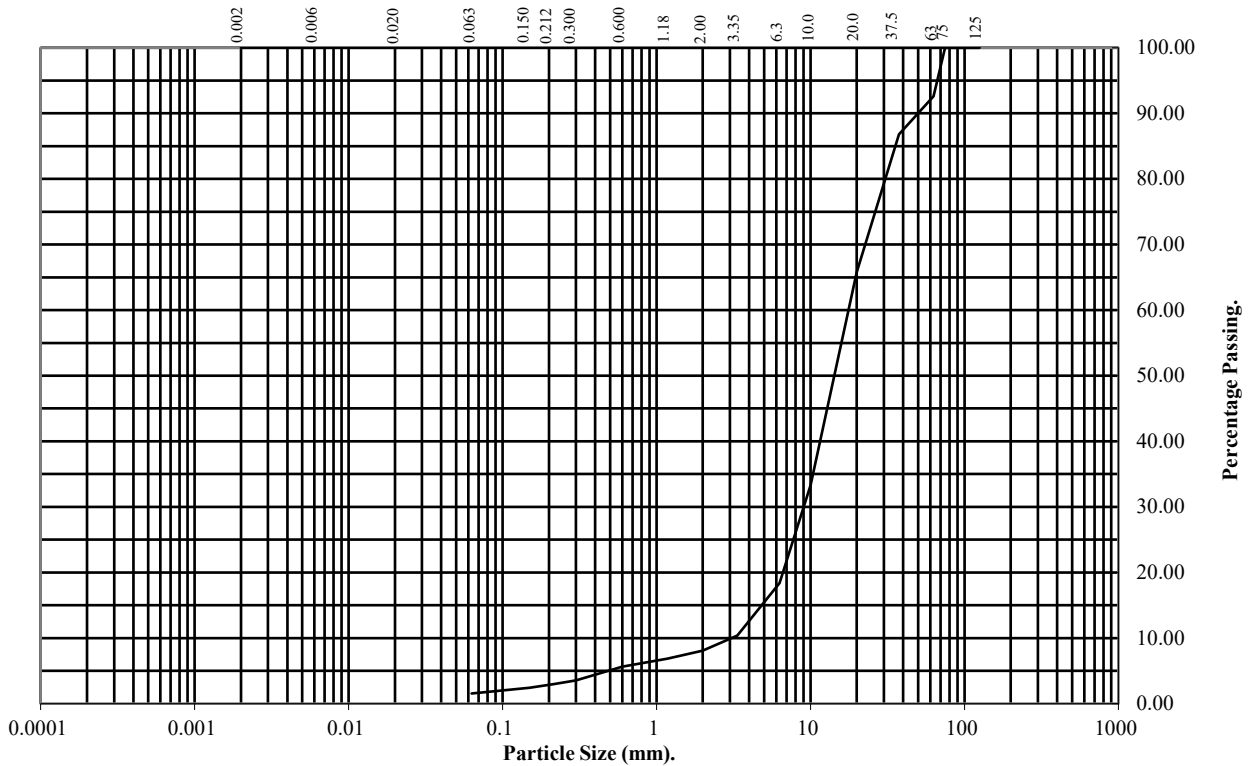
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3WS01 **Top Depth (m):** 2.00

Sample Number: 15 **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	93
37.5	87
20	66
10	33
6.3	18
3.35	10
2	8
1.18	7
0.6	6
0.3	4
0.212	3
0.15	2
0.063	2

Soil Fraction	Total Percentage
Cobbles	7
Gravel	85
Sand	6
Silt/Clay	2

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1627
Client Ref:
G221209

Emailed Client 17-3-23



TEST AMENDMENT NOTICE

(Please tick boxes as appropriate)

From: **Matt Wooldridge**

To: **Zaac Lovett**

Date: **7 / 3 / 2023**

Laboratory Ref: **PSL23/1627**

Contract Number:

Location: **A46**

BH TP Sample Number

Depth (m):

Sample Type: U B D W P C

Test/s:

S3BH10 8-8.3m U

The above sample cannot be tested for the following reasons:

- The Sample has not been received
- There is insufficient material for BS1377: 1990 testing
 - Maximum Grain Size (Minimum 10%): Fine Medium Coarse
 - Sample Mass (kg):
 - Required Mass (kg):
- The Sample has been previously tested.
- The Sample has been misplaced in the Laboratory.
- The Sample is unsuitable for testing because:

Please advise action required:

- Perform original test on the following alternative Sample:
 - BII TP Sample Number: Depth (m):
 - Sample Type: U B D W P C
- Combine original Sample with the following sample:
 - BH TP Sample Number: Depth (m):
 - Sample Type: U B D W P C
- Perform the following alternative test/s on the original Sample
- Perform non-standard test on material available
- Take no further action.

Signed
(Project Engineer)

Date



DETS

Certificate of Analysis

Certificate Number 23-06623

Issued: 28-Mar-23

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 23-06623

Client Reference PSL23/1627

Order No (not supplied)

Contract Title A46 Newark Bypass

Description 28 Soil samples.

Date Received 20-Mar-23

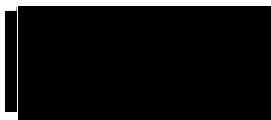
Date Started 20-Mar-23

Date Completed 28-Mar-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis Soil Samples

Our Ref 23-06623

Client Ref PSL23/1627

Contract Title A46 Newark Bypass

Lab No	2143261	2143262	2143263	2143264	2143265	2143266	2143267	2143268	2143269	2143270	2143271
Sample ID	CPWS07	CPWS07	S3BH05	S3TP06	S3TP06	S3TP07	S3TP07	S3TP08	S3TP08	S3TP10	S3TP10
Depth	2.00	3.60-4.05	3.00-3.45	0.50	1.60	1.00	2.00	0.50	1.80	1.00	2.00
Other ID	15	7	11	3	9	7	11	3	9	7	9
Sample Type	D	D	S	D	D	D	D	D	D	D	D
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units	2143261	2143262	2143263	2143264	2143265	2143266	2143267	2143268	2143269	2143270	2143271
Metals														
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	26	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Inorganics														
pH	DETSC 2008#		pH	9.0	8.3	6.9	7.0	6.3	7.2	7.1	7.2	7.3	7.2	7.6
Organic matter	DETSC 2002#	0.1	%			< 0.1								
Chloride Aqueous Extract	DETSC 2055	1	mg/l	14	16	7.2	8.1	8.1	6.4	5.1	6.2	8.4	7.1	5.8
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	2.9	< 1.0	< 1.0	2.9	< 1.0	5.8	< 1.0	3.5	< 1.0	7.0	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	47	500	41	49	24	38	22	31	21	31	28
Sulphur as S, Total	DETSC 2320	0.01	%	0.01	0.08	0.02	0.03	0.01	0.03	0.02	0.09	0.01	0.13	< 0.01
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.02	0.25	0.03	0.07	0.03	0.07	0.04	0.06	0.03	0.09	0.03

Summary of Chemical Analysis Soil Samples

Our Ref 23-06623

Client Ref PSL23/1627

Contract Title A46 Newark Bypass

Lab No	2143272	2143273	2143274	2143275	2143276	2143277	2143278	2143279	2143280	2143281	2143282
Sample ID	S3TP12	S3TP17	S3TP18	S3TP24	S3TP24	S3TP25	S3TP25	S3TP26	S3TP26	S3TP27	S3TP27
Depth	1.00	2.00	1.00	1.00	2.00	1.00	2.00	2.00	3.00	1.00	2.80
Other ID	6	8	7	9	10	7	9	9	13	7	11
Sample Type	D	D	D	D	D	D	D	D	D	D	D
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units											
Metals														
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Inorganics														
pH	DETSC 2008#		pH	7.3	7.5	7.6	7.2	7.6	7.5	8.5	7.2	8.7	7.5	7.6
Organic matter	DETSC 2002#	0.1	%											
Chloride Aqueous Extract	DETSC 2055	1	mg/l	6.4	4.5	9.6	2.5	8.9	3.6	3.4	4.0	5.7	8.5	9.6
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	3.0	2.1	12	1.5	3.4	4.9	4.5	3.6	< 1.0	3.3	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	32	< 10	22	< 10	12	26	13	21	18	26	110
Sulphur as S, Total	DETSC 2320	0.01	%	0.02	< 0.01	< 0.01	0.02	0.02	< 0.01	0.02	0.04	0.01	0.03	0.08
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.06	< 0.01	0.02	0.02	0.02	0.05	0.06	0.08	0.04	0.07	0.07

Summary of Chemical Analysis Soil Samples

Our Ref 23-06623

Client Ref PSL23/1627

Contract Title A46 Newark Bypass

Lab No	2143283	2143284	2143285	2143286	2143287	2143288
Sample ID	S3TP29	S3TP31	S3TP32	S3TP33	S3TP34	S3WS01
Depth	1.00	1.00	1.00	1.00	1.00	1.60
Other ID	7	7	7	7	7	14
Sample Type	D	D	D	D	D	D
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10	< 10	11	< 10	< 10
Inorganics									
pH	DETSC 2008#		pH	6.9	7.6	8.9	7.0	7.5	7.4
Organic matter	DETSC 2002#	0.1	%						
Chloride Aqueous Extract	DETSC 2055	1	mg/l	7.9	14	12	18	5.5	7.1
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	6.0	< 1.0	< 1.0	< 1.0	3.0	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	42	48	18	150	19	35
Sulphur as S, Total	DETSC 2320	0.01	%	0.01	0.01	0.07	0.11	< 0.01	0.01
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03	0.03	0.05	0.10	0.02	0.03



DETS

Certificate of Analysis

Certificate Number 23-07767

Issued: 11-Apr-23

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 23-07767

Client Reference PSL23/1627

Order No (not supplied)

Contract Title A46 Newark Bypass

Description One Soil sample.

Date Received 31-Mar-23

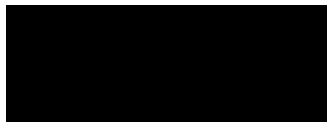
Date Started 31-Mar-23

Date Completed 11-Apr-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved B



Kirk Bridgewood
General Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 23-07767

Client Ref PSL23/1627

Contract Title A46 Newark Bypass

Lab No	2149787
Sample ID	S3TP30
Depth	1.00
Other ID	7
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10
Inorganics				
pH	DETSC 2008#		pH	7.9
Chloride Aqueous Extract	DETSC 2055	1	mg/l	8.8
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	64
Sulphur as S, Total	DETSC 2320	0.01	%	0.03
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03

Information in Support of the Analytical Results

Our Ref 23-07767

Client Ref PSL23/1627

Contract A46 Newark Bypass

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2149787	S3TP30 1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report



LABORATORY REPORT



Contract Number: PSL23/1636

Report Date: 21 March 2023
Client's Reference: G221209/gEO08b
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass
Date Received: 16/3/2023
Date Commenced: 16/3/2023
Date Completed: 20/03/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)




M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3BH08B	2	D	1.50	1.95	Brown slightly gravelly sandy CLAY.
S3BH08B	7	D	6.50	6.95	Brown slightly gravelly sandy very silty CLAY.
S3BH08B	11	D	9.50	9.78	Brown gravelly sandy CLAY.

		<p style="font-size: 1.2em;">A46 Newark Bypass</p>	Contract No: PSL23/1636 Client Ref: G221209
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SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

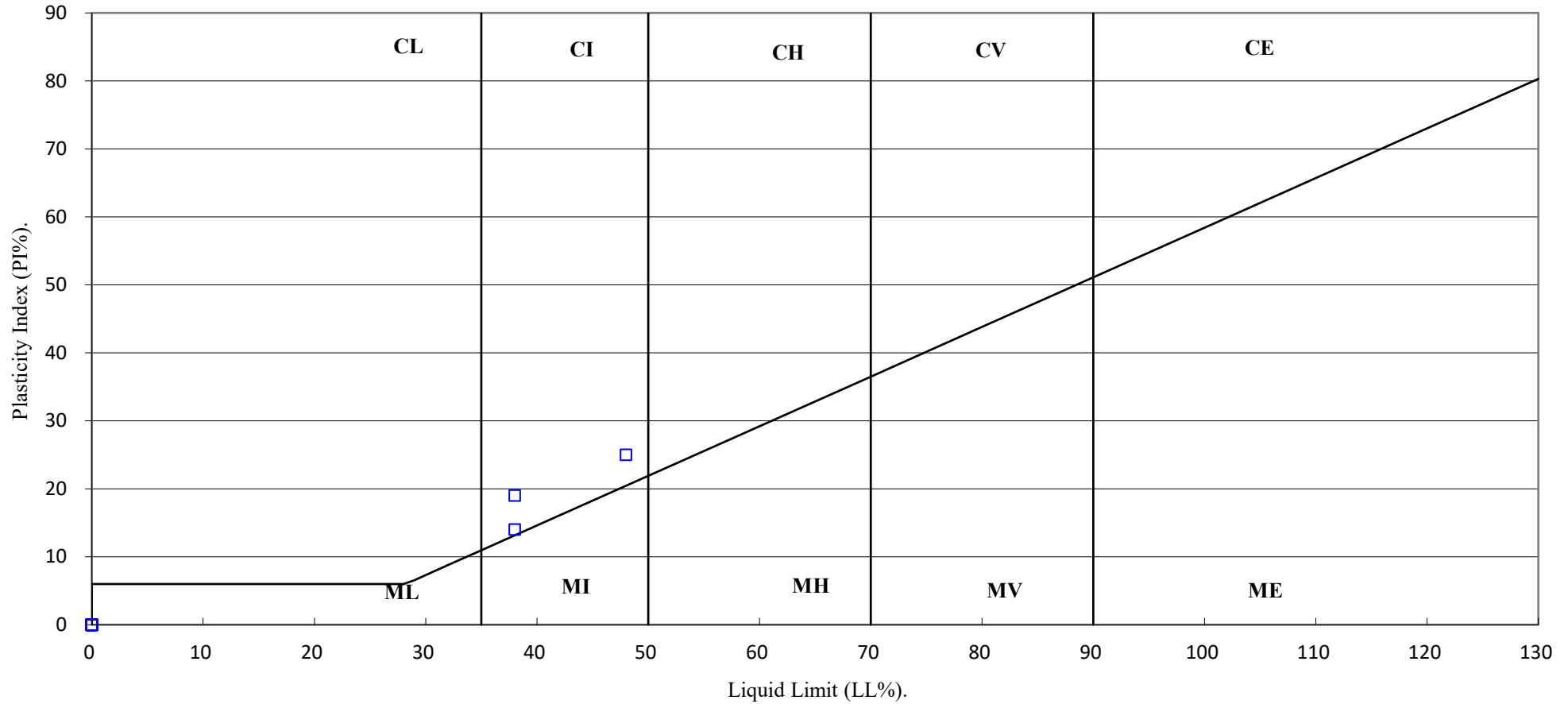
Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
S3BH08B	2	D	1.50	1.95	25			38	19	19	95	Intermediate Plasticity CI
S3BH08B	7	D	6.50	6.95	31			38	24	14	97	Intermediate Plasticity CI
S3BH08B	11	D	9.50	9.78	22			48	23	25	84	Intermediate Plasticity CI

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

 	<p>A46 Newark Bypass</p>	Contract No:
		PSL23/1636
		Client Ref:
		G221209

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



A46 Newark Bypass

Contract No:

PSL23/1636

Client Ref:

G221209



LABORATORY REPORT



Contract Number: PSL23/1635

Report Date: 21 March 2023
Client's Reference: G221209/Geo 09
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass
Date Received: 16/3/2023
Date Commenced: 16/3/2023
Date Completed: 20/03/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


M Fennell
(Senior Technician)



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Hexthorpe,
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Tel: 01302 768098

Page 1 of



SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
S3RCWS01	11	B	1.40	1.80	Brown very sandy silty GRAVEL.
S3RCWS01	16	B	2.50	2.90	Brown very sandy slightly silty GRAVEL.

		<p style="font-size: 1.2em; margin: 0;">A46 Newark Bypass</p>	Contract No:
			PSL23/1635
			Client Ref:
			G221209

PARTICLE SIZE DISTRIBUTION TEST

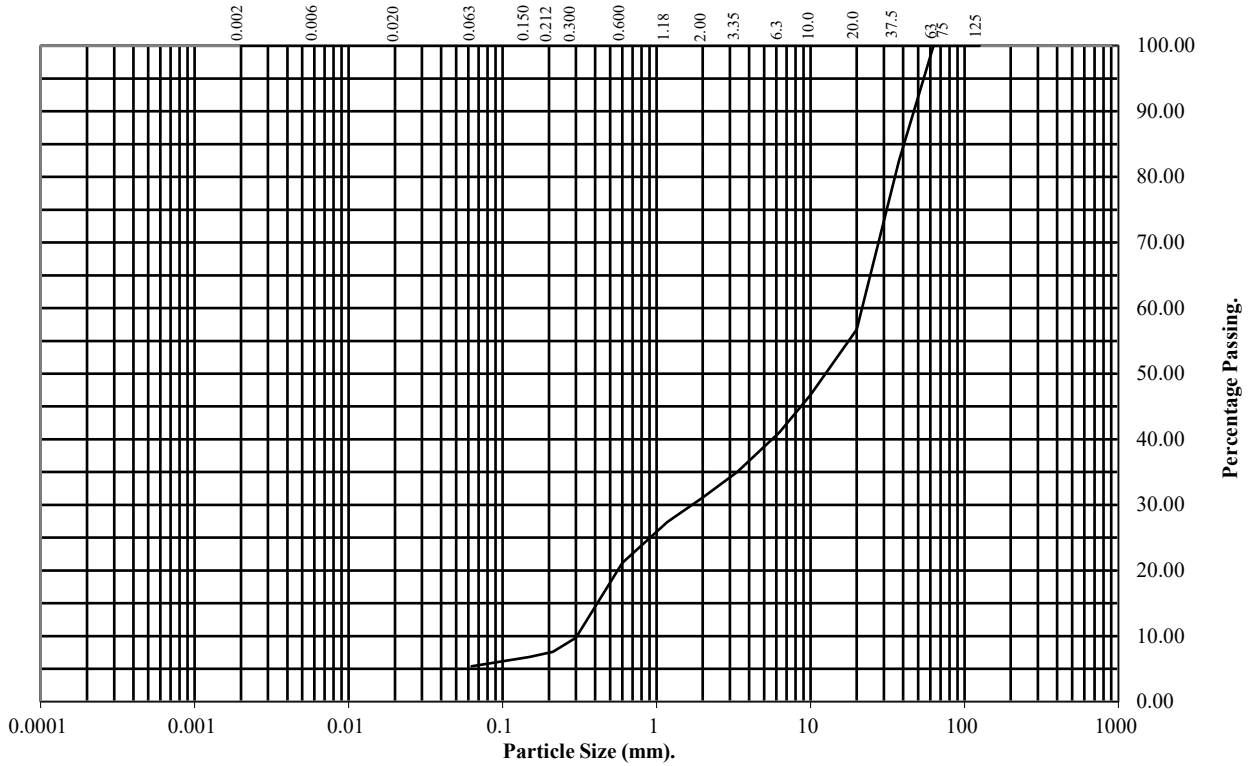
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3RCWS01 **Top Depth (m):** 1.40

Sample Number: 11 **Base Depth(m):** 1.80

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	82
20	57
10	47
6.3	41
3.35	35
2	31
1.18	27
0.6	21
0.3	10
0.212	8
0.15	7
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	69
Sand	26
Silt/Clay	5

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1635
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

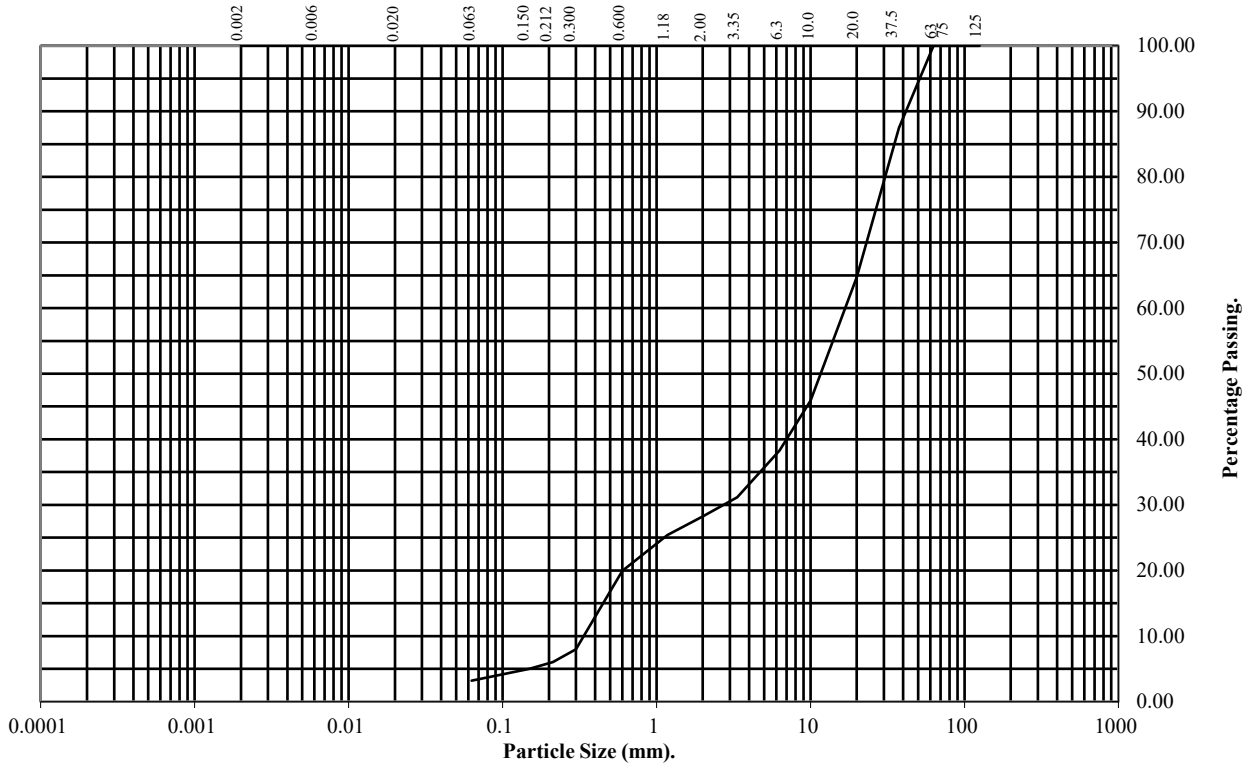
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3RCWS01 **Top Depth (m):** 2.50

Sample Number: 16 **Base Depth(m):** 2.90

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	87
20	65
10	46
6.3	38
3.35	31
2	28
1.18	25
0.6	20
0.3	8
0.212	6
0.15	5
0.063	3

Soil Fraction	Total Percentage
Cobbles	0
Gravel	72
Sand	25
Silt/Clay	3

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1635
Client Ref:
G221209



Certificate of Analysis

Certificate Number 23-06629

Issued: 27-Mar-23

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 23-06629

Client Reference PSL23/1635

Order No (not supplied)

Contract Title A46 Newark Bypass

Description 2 Soil samples.

Date Received 20-Mar-23

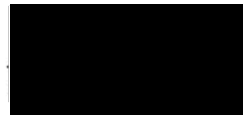
Date Started 20-Mar-23

Date Completed 27-Mar-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis Soil Samples

Our Ref 23-06629

Client Ref PSL23/1635

Contract Title A46 Newark Bypass

Lab No	2143332	2143333
Sample ID	S3RCWS01	S3RCWS01
Depth	1.80-2.00	2.90-3.00
Other ID	12	17
Sample Type	D	D
Sampling Date	n/s	n/s
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Metals					
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	18	< 10
Inorganics					
pH	DETSC 2008#		pH	7.9	6.4
Chloride Aqueous Extract	DETSC 2055	1	mg/l	37	5.1
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	310	42
Sulphur as S, Total	DETSC 2320	0.01	%	0.04	0.01
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.09	0.03

Information in Support of the Analytical Results

Our Ref 23-06629
 Client Ref PSL23/1635
 Contract A46 Newark Bypass

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2143332	S3RCWS01 1.80-2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
2143333	S3RCWS01 2.90-3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report



LABORATORY REPORT



Contract Number: PSL23/1278

Report Date: 13 April 2023
Client's Reference: G221209
Client Name: Strata Geotechnics
Kirkby Lane
Pinxton
Nottinghamshire
NG16 6JA

For the attention of: Izaak Lovatt

Contract Title: A46 Newark Bypass
Date Received: 2/3/2023
Date Commenced: 2/3/2023
Date Completed: 14/03/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

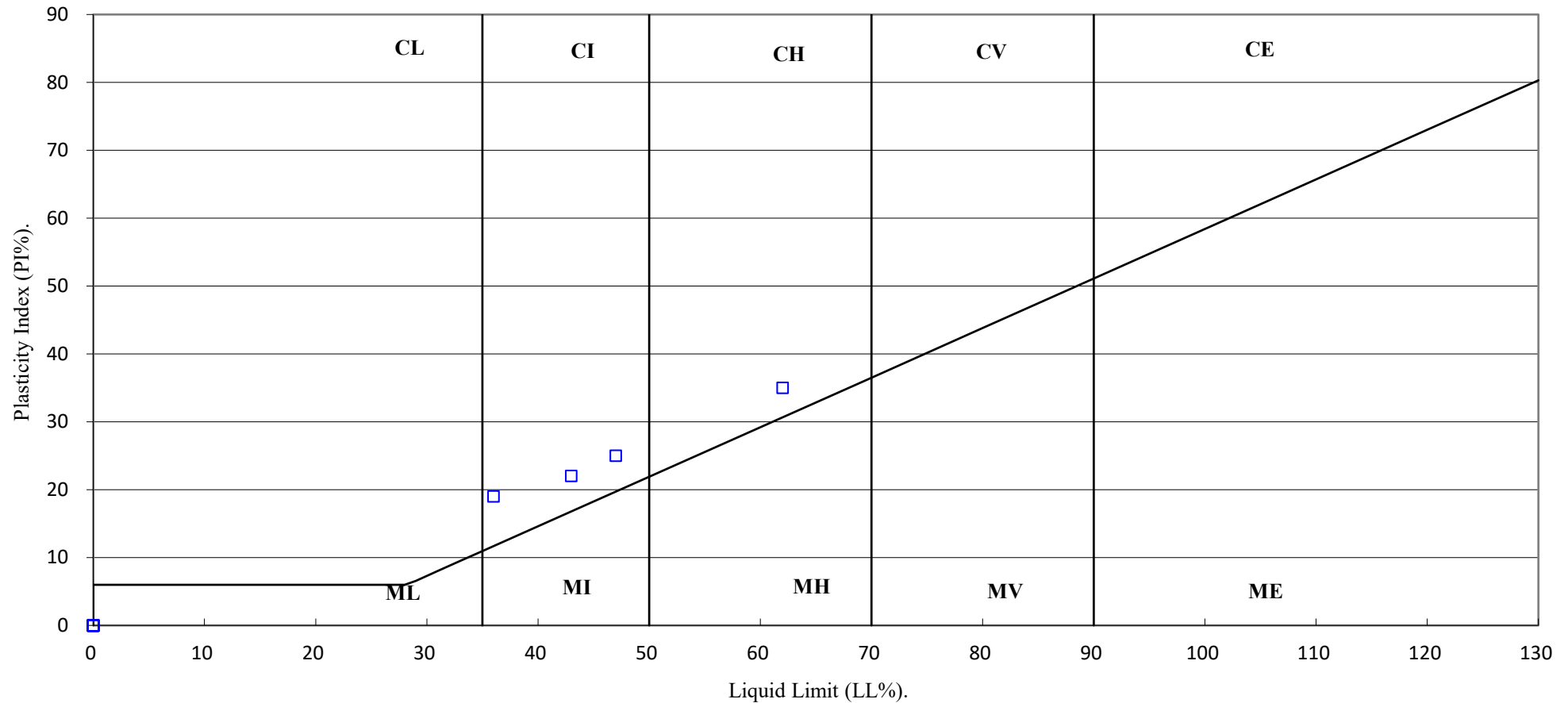
S Eyre
(Senior Technician)


M Fennel
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098

Page 1 of

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



A46 Newark Bypass

Contract No:

PSL23/1278

Client Ref:

G221209

PARTICLE SIZE DISTRIBUTION TEST

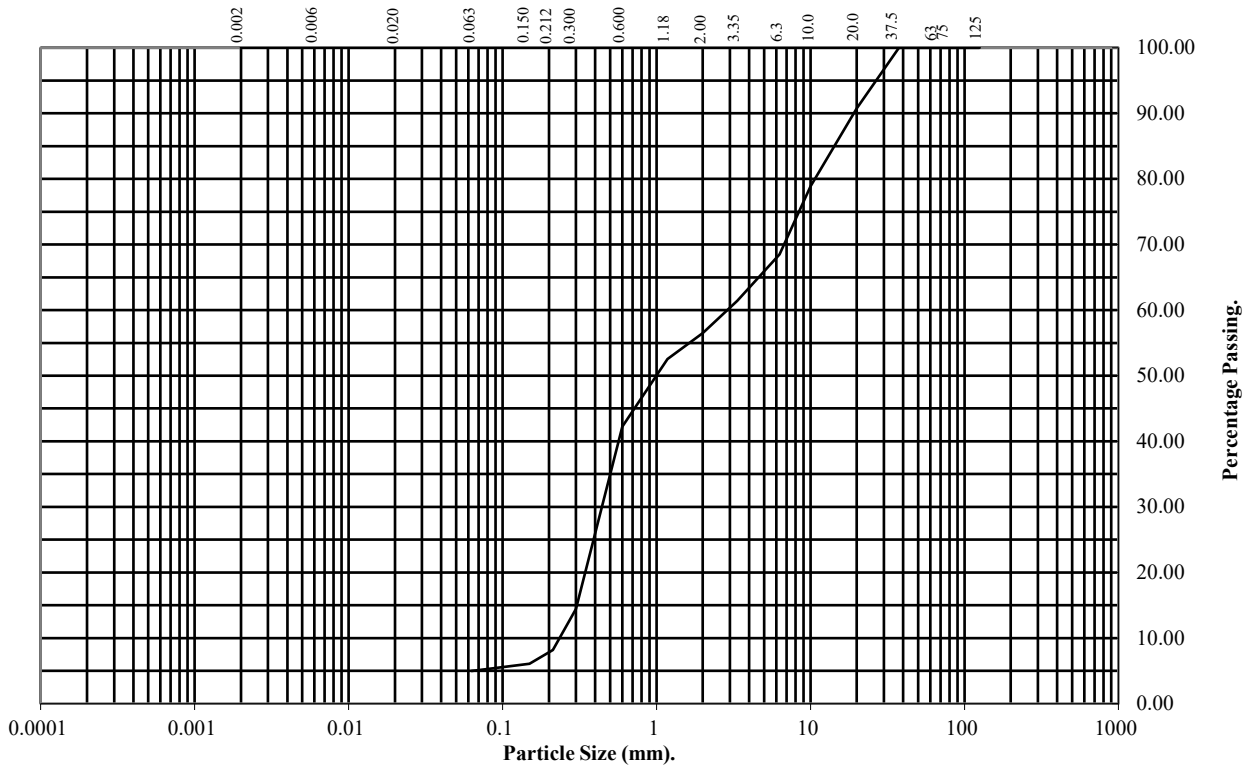
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP19 Top Depth (m): 3.00

Sample Number: 10 Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	91
10	79
6.3	68
3.35	61
2	56
1.18	53
0.6	42
0.3	14
0.212	8
0.15	6
0.063	5

Soil Fraction	Total Percentage
Cobbles	0
Gravel	44
Sand	51
Silt/Clay	5

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

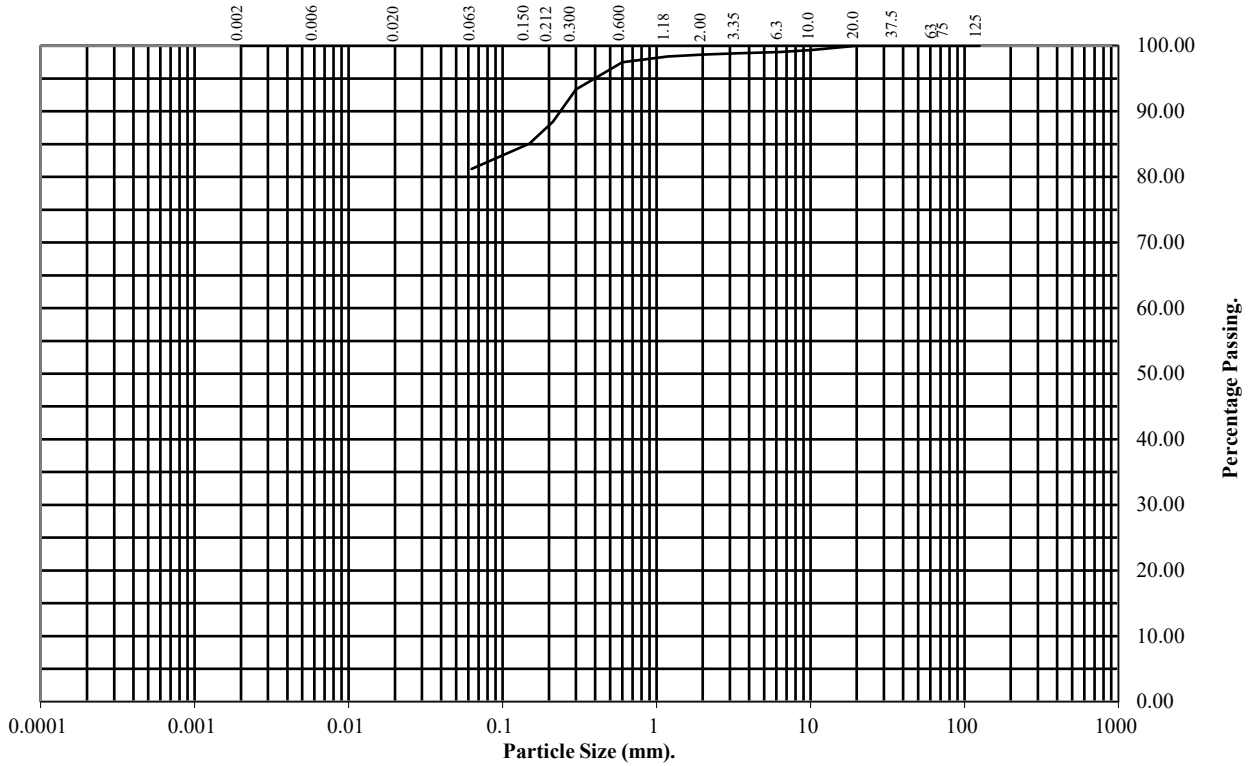
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP21** Top Depth (m): **2.00**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	99
3.35	99
2	99
1.18	98
0.6	97
0.3	93
0.212	88
0.15	85
0.063	81

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	18
Silt/Clay	81

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

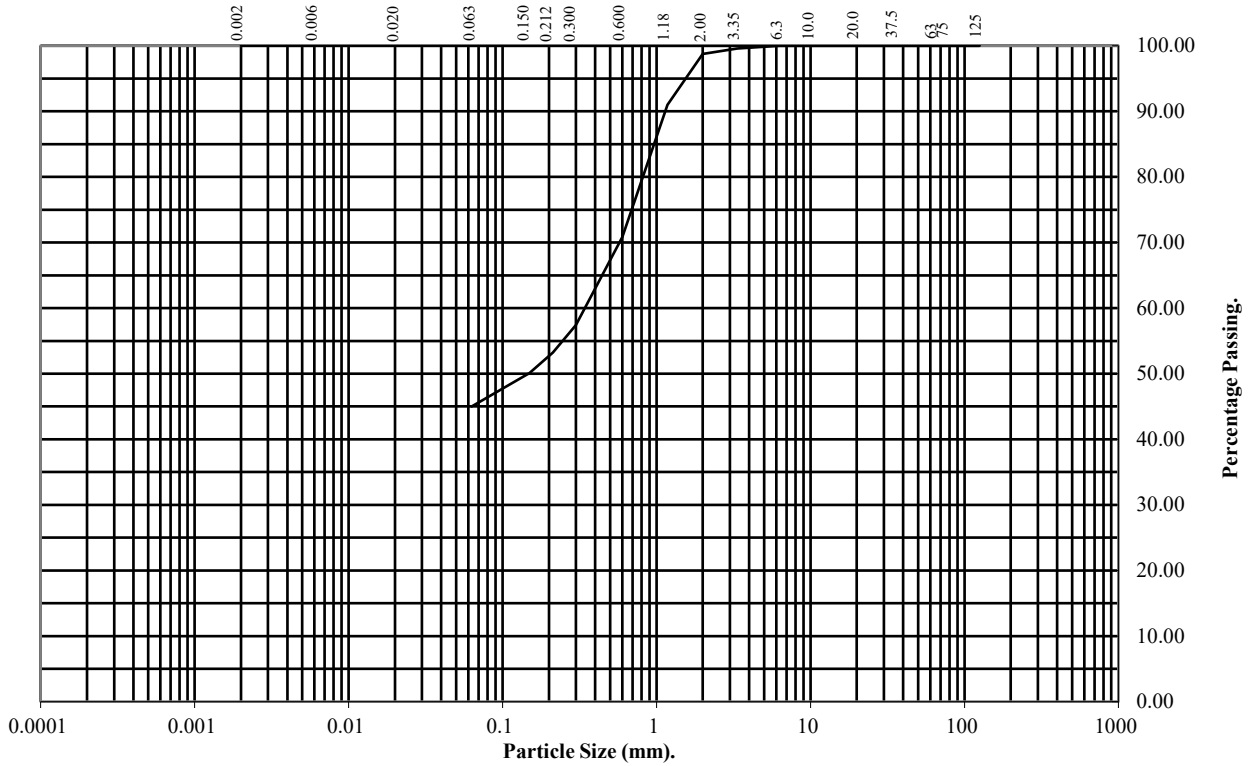
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP21 Top Depth (m): 3.00

Sample Number: 10 Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	91
0.6	71
0.3	57
0.212	53
0.15	50
0.063	45

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	54
Silt/Clay	45

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

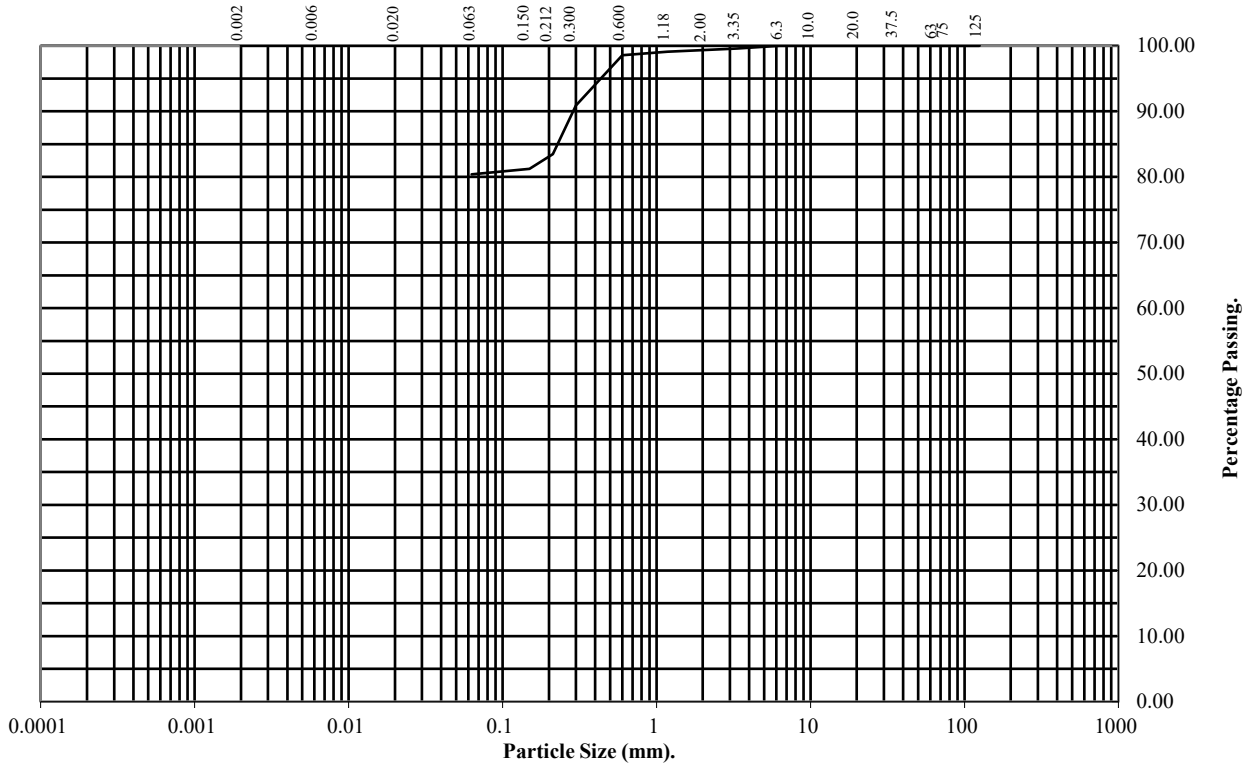
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP22** Top Depth (m): **2.00**

Sample Number: **8** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	99
1.18	99
0.6	99
0.3	91
0.212	83
0.15	81
0.063	80

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	19
Silt/Clay	80

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

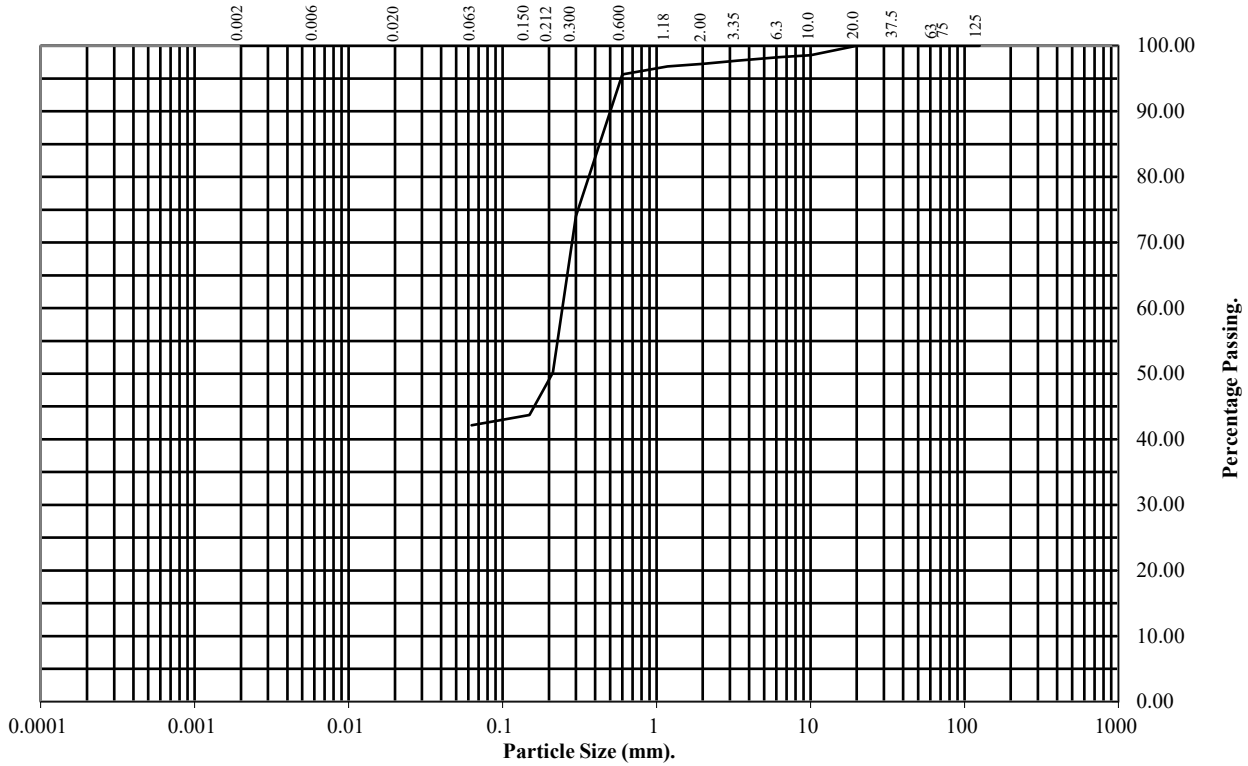
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP22** Top Depth (m): **3.00**

Sample Number: **10** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	98
3.35	98
2	97
1.18	97
0.6	96
0.3	74
0.212	50
0.15	44
0.063	42

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	55
Silt/Clay	42

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

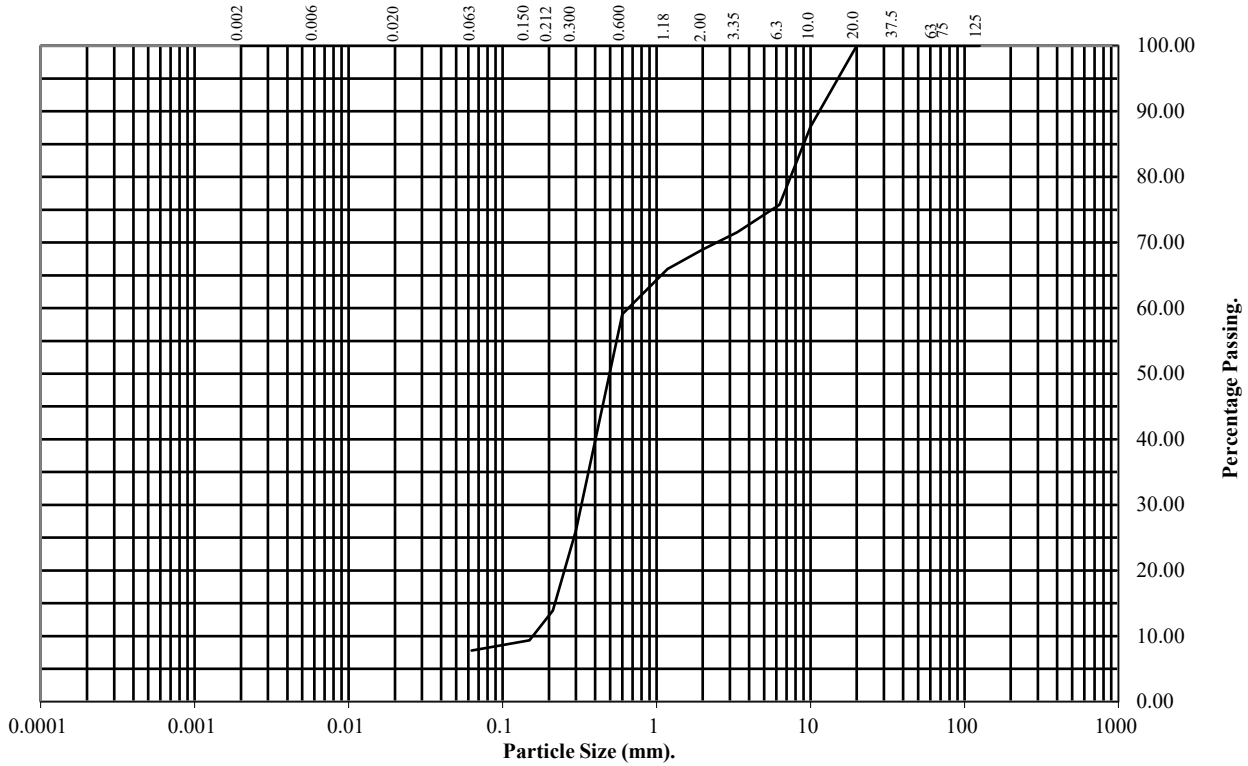
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: S3TP23 **Top Depth (m):** 1.00

Sample Number: 5 **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	88
6.3	76
3.35	72
2	69
1.18	66
0.6	59
0.3	26
0.212	14
0.15	9
0.063	8

Soil Fraction	Total Percentage
Cobbles	0
Gravel	31
Sand	61
Silt/Clay	8

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209

PARTICLE SIZE DISTRIBUTION TEST

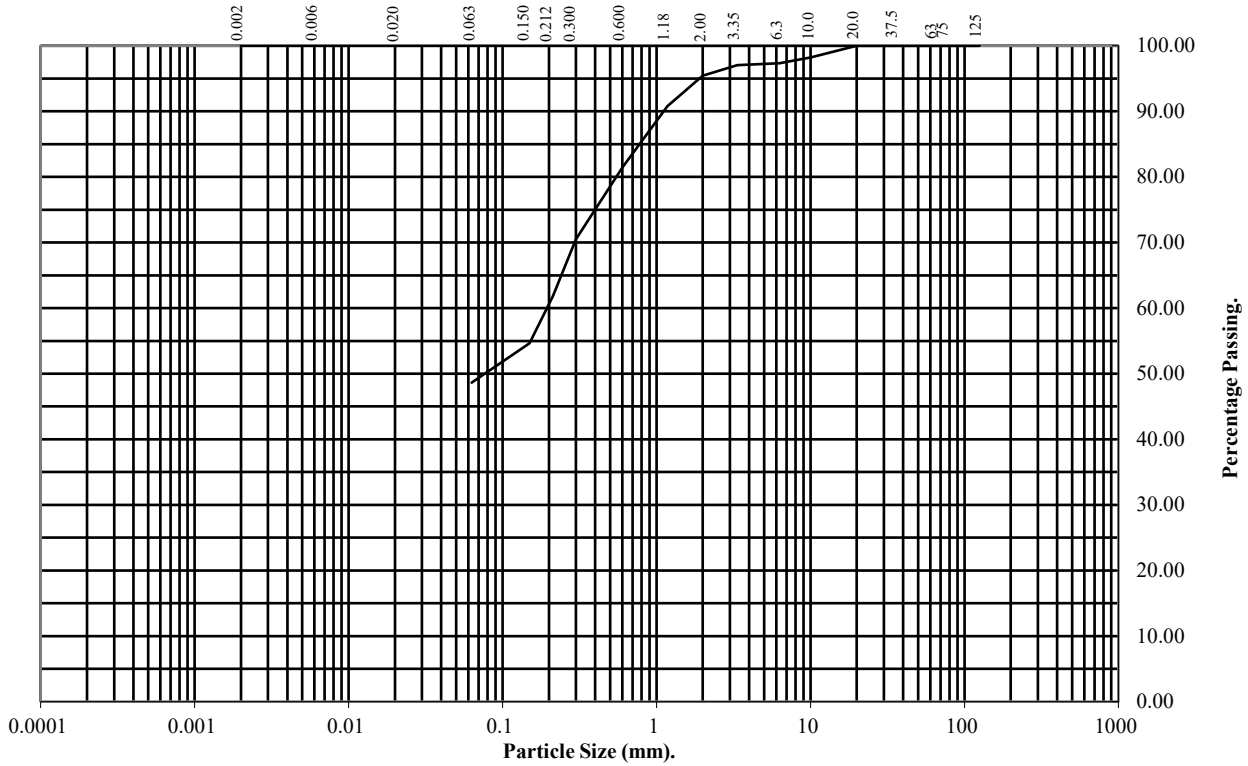
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **S3TP23** Top Depth (m): **2.00**

Sample Number: **6** Base Depth(m):

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	98
6.3	97
3.35	97
2	95
1.18	91
0.6	81
0.3	71
0.212	62
0.15	55
0.063	49

Soil Fraction	Total Percentage
Cobbles	0
Gravel	5
Sand	46
Silt/Clay	49

Remarks:
See Summary of Soil Descriptions



A46 Newark Bypass

Contract No:
PSL23/1278
Client Ref:
G221209



DETS

Certificate of Analysis

Certificate Number 23-05795

Issued: 17-Mar-23

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 23-05795

Client Reference PSL23/1278

Order No (not supplied)

Contract Title A46 Newark Bypass

Description One Soil sample.

Date Received 09-Mar-23

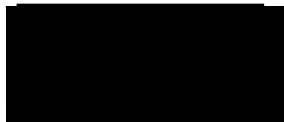
Date Started 09-Mar-23

Date Completed 17-Mar-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Kirk Bridgewood
General Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 23-05795
 Client Ref PSL23/1278
 Contract Title A46 Newark Bypass

Lab No	2137976
Sample ID	S3TP18
Depth	1.00
Other ID	7
Sample Type	D
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10
Inorganics				
pH	DETSC 2008#		pH	8.2
Chloride Aqueous Extract	DETSC 2055	1	mg/l	13
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	5.9
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	22
Sulphur as S, Total	DETSC 2320	0.01	%	0.06
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.02

Information in Support of the Analytical Results

Our Ref 23-05795
 Client Ref PSL23/1278
 Contract A46 Newark Bypass

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2137976	S3TP18 1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Appendix G: Geophysical Logging

**REPORT ON THE
GEOPHYSICAL LOGGING
OF
NINE BOREHOLES
AT
A46 NEWARK**



**Prepared For:
Strata Geotechnics
Summit Close
Kirkby-in-Ashfield
Nottinghamshire
NG17 8GJ**

OCT 2022/STGEO2207_ A46_Newark_rpt/SK85

	Name	Date
Logged by:	D. Hingley C. Clinton K. Clark M Kynaston	25.10.22 – 01.02.23
Report by:	K. Clark	18.11.22
Amended by:	M. Hand	06.03.23
Checked by:	M Magill	14.04.23

CONTENTS

1. INTRODUCTION	1
2. THE GEOPHYSICAL LOGGING METHODS.....	3
3. PROCESSING AND PRESENTATION OF RESULTS.....	5
4. SITE DETAILS.....	6
5. BOREHOLE LOGGING CONSTRAINTS.....	7

LIST OF FIGURES

Figure 3.1	Example P and S wave data.
<hr/>	
Figure 4.1	Location map showing approximate site location highlighted in red.
<hr/>	
Appendix 1	Geophysical Logs.

1.0 INTRODUCTION

At the request of Strata Geotechnics geophysical logging was carried out in the following boreholes located at various sites

The work was carried out by European Geophysical Services between 25th October and 17th November 2022 and the 1st February 2023.

The following logs were run:-

S3BH01			
Tool / Log (unit)		Log Depths (m)*	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.0	31.0
P & S Suspension Logger	Formation Velocity (m/s)	19.0	28.0

S3BH02			
Tool / Log (unit)		Log Depths (m)*	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	2.0	17.1
P & S Suspension Logger	Formation Velocity (m/s)	10.5	14

S3BH08			
Tool / Log (unit)		Log Depths (m)*	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.4	24.7
P & S Suspension Logger	Formation Velocity (m/s)	11	23

S3BH09			
Tool / Log (unit)		Log Depths (m)*	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.2	25.5
P & S Suspension Logger	Formation Velocity (m/s)	12.0	24.0

1.0 INTRODUCTION

S3BH10			
Tool / Log (unit)		Log Depths (m)	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.4	20.2
P & S Suspension Logger	Formation Velocity (m/s)	10	20

S3BH11			
Tool / Log (unit)		Log Depths (m)	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.0	25.0
P & S Suspension Logger	Formation Velocity (m/s)	13.5	22.5

S3BH13			
Tool / Log (unit)		Log Depths (m)	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.63	25.4
P & S Suspension Logger	Formation Velocity (m/s)	17.0	22.4

S3BH14			
Tool / Log (unit)		Log Depths (m)	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.33	25.2
P & S Suspension Logger	Formation Velocity (m/s)	14.5	22.0

S3BH15			
Tool / Log (unit)		Log Depths (m)	
Dual Densities (Long / Short spaced)	LSD / SSD (Apparent g/cm ³)	1.5	32.7
P & S Suspension Logger	Formation Velocity (m/s)	20	30

2.0 THE GEOPHYSICAL LOGGING METHODS

The Equipment and Field Procedure

A fully digital logging system with a 600m capacity motorised winch mounted in a 4x4 van was used.

P & S Wave (V_p & V_s)

This tool is suspended stationary in the borehole at depth positions of interest and allows simultaneous measurement of P wave (V_p) and S wave (V_s) velocities.

There are two sets of receivers at a spacing of 2m and 3m from the transmitter. Each receiver contains two transducers, a piezo-electric device for the detection of P waves, and a geophone for the detection of S waves. The time of the P and S wave first arrivals to the receivers are recorded. The distance between the receivers is 1m and the time taken is the difference between the arrival times to the two sets of receivers. As the distance travelled and the time taken is known the speed of the P and S waves can be calculated. By using the difference in arrival times between the two receivers any borehole effects are greatly reduced.

The transmitter operates as a dipole source producing energy in two directions, 180° out of phase. The transmitter pulses are directed perpendicular to the borehole wall. This type of source generates strong shear waves within the formation.

Results can be affected by the competency of the rock material, fractured zones, low velocity zones and irregular borehole diameters.

The P and S suspension tool is 4.5m long. Readings cannot be taken closer than 2m to the water level and no deeper than 3m from the base. This tool can only be used in fluid filled unlined boreholes.

2.0 THE GEOPHYSICAL LOGGING METHODS

Full Wave Sonic (FWS)

This tool has been specially designed to provide a full wave form recording of sonic signals and uses fixed spaced transmitter – receivers.

The received signals are digitised at a fast sampling rate with high resolution. Data may be sampled at typically 5cm or 10cm intervals dependent upon resolution required.

The data is processed for P wave velocity (or transit time) and amplitude. This tool can only be used in fluid filled unlined boreholes.

Shear wave arrivals occur after the P-wave. They are waves that have travelled across the borehole fluid to the rock as P-waves and have undergone P to S conversion. Shear waves which refract at the fluid/rock boundary at the S-wave critical angle travel through the rock at V_s and if modal conversion back to P wave occurs the waves can be received by the tool.

Dual - Density (LSD / HRD)

The density tool has two detectors at different spacing's from a source of gamma radiation. The logs from each detector indicate the apparent bulk density of the material surrounding the tool at a radius of investigation related to the spacing's. The Long Spaced Density (LSD) has a spacing of 48cm and the High Resolution Density (HRD) has a spacing of 24cm.

The High Resolution Density has the smaller radius of investigation, up to around 10cm under average/medium range of densities, and its response is also more affected by the quality of the borehole lining. The Long Spaced Density has the greater radius of investigation, up to 15 - 20cms under average conditions, but least resolution.

In lined sections of boreholes these logs give qualitative information on the density of the material behind the linings, such as the presence of voids or grouts and the logs are expressed in terms of apparent density (g.cm^{-3}).

3.0 PROCESSING AND PRESENTATION OF RESULTS

P&S wave data have been processed in specialist software. This software displays whole P and S waveform for the different receivers, the software is used to pick the first arrivals times. The distance between the receivers is 1m and the time taken is the difference between the arrival times to the two sets of receivers. As the distance travelled and the time taken is known the velocity of the P and S waves can be calculated. Example waveforms and process screenshot are shown below (Figure 3.1).

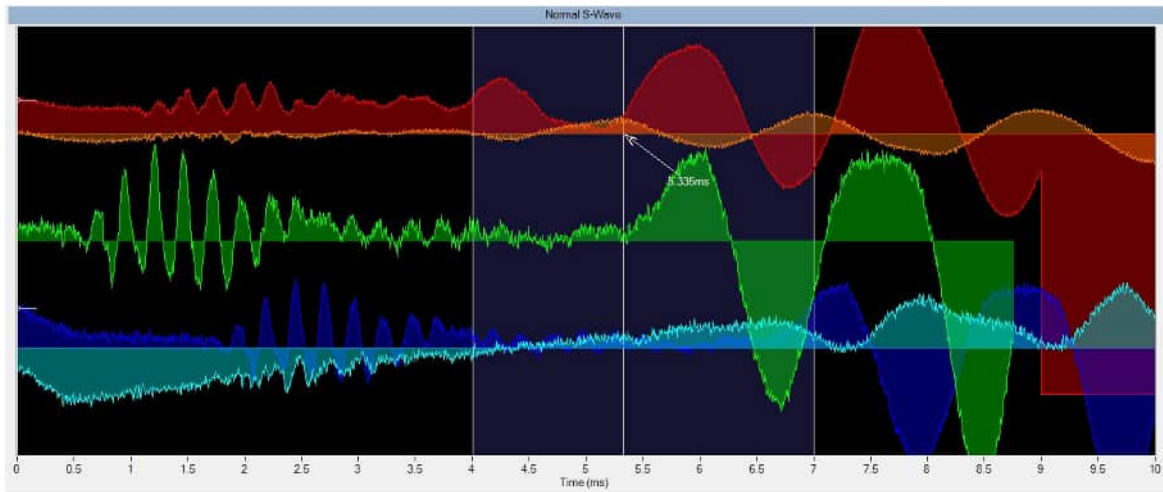


Figure 3.1 Example P and S wave data.

4.0 SITE DETAILS

Site: A46 Newark on Trent

OS Grid Ref: SK 80137 53838



Figure 4.1 Location map showing approximate site location highlighted in red.
© Crown copyright Bing Maps 2022

5.0 BOREHOLE LOGGING CONSTRAINTS

- **Vehicle access restrictions**

None

- **Tool access restrictions**

None

- **Borehole conditions / risk to equipment**

S3BH01: Density logged through Geobore due to BH instability issues.

S3BH02: Instability and collapse at ~17m; unable to log past this depth.

S3BH13: Instability and collapse at 16.7m. Geobore lining inserted to 25.4m and density logs run inside the lining (data is marked as apparent density only on logs). Geobore lining pulled back to 17m. Seismic logs run between 17 - 25.4m in the unlined hole.

- **Lack of fluid filled column / cloudy fluid**

None

- **Time constraint**

None

- **Borehole construction / casing**

Cased to stable rock head, plain steel casing where required.

Appendix 1
Geophysical Logs.



EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

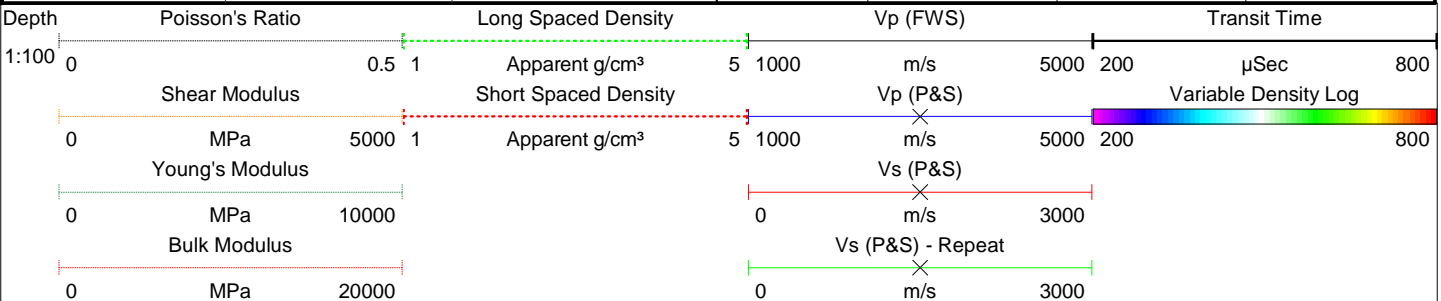
Borehole: **S3BH01**

Seismic

Location: **A46** Area: **Newark Bypass** Grid Ref: Elevation:

Drilled Depth: (m)	31.0	Date:	11.11.22
Logged Depth: (m)	31.0	Recorded By:	C. Clinton
Logging Datum:	Ground Level	Remarks: Apparent density logged through casing. Casing then pulled to 17.7m before seismic logging.	
Logged Interval: (m)	1.0 - 31.0		
Fluid Level: (m)	~3.0		

BOREHOLE RECORD			CASING RECORD			
Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
			Steel	124	-0.3	30.7
124	17.7	31.0	Steel	124	-0.3	17.7





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH02**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

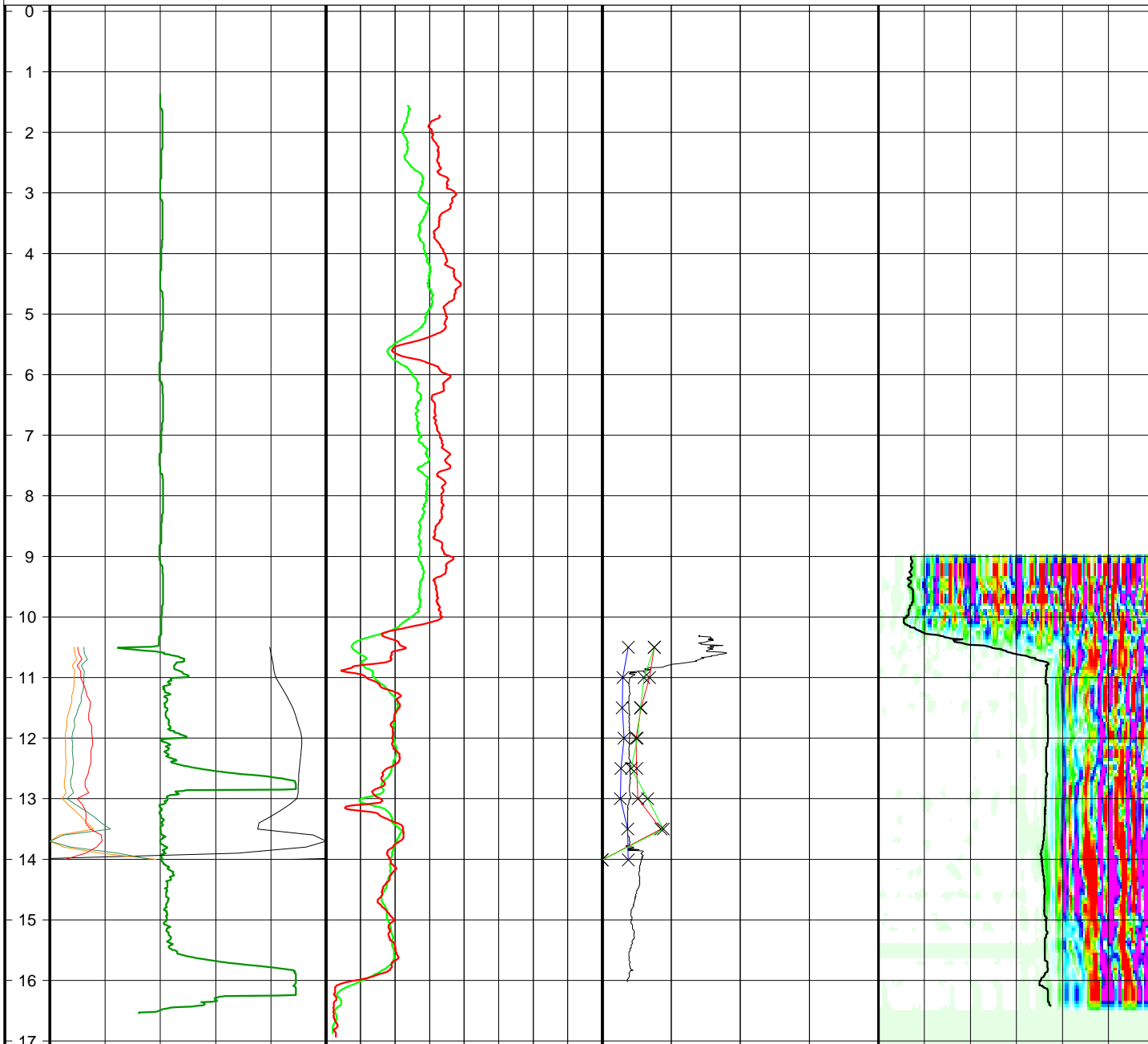
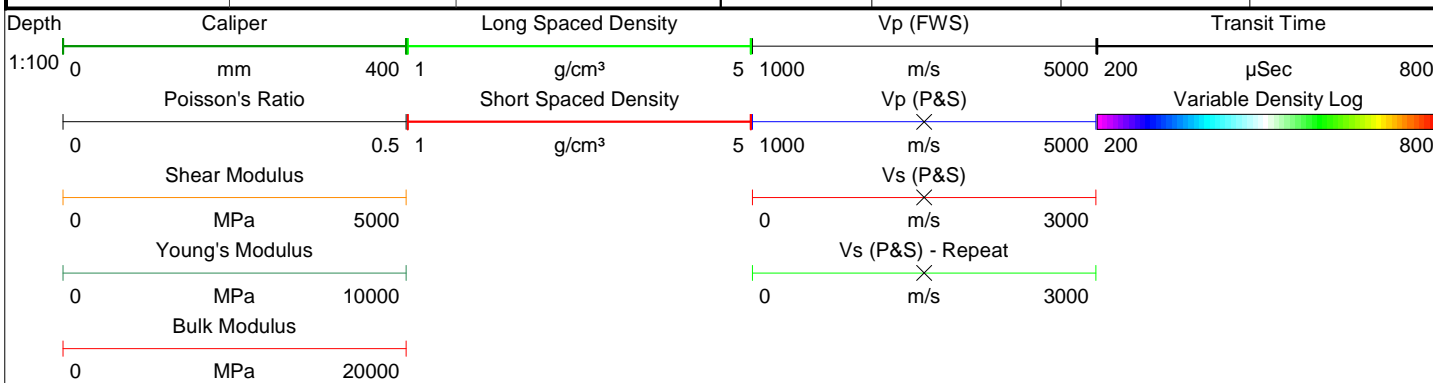
Elevation:

Drilled Depth: (m)	25.0	Date:	03.11.22
Logged Depth: (m)	17.1	Recorded By:	K. Clark
Logging Datum:	Ground Level	Remarks: Borehole collapsed at ~17m, an area of known instability as reported by the drillers. Tried re-drill, to no avail. Apparent density above 10.5m	
Logged Interval: (m)	10.5 - 17.1		
Fluid Level: (m)	4.0		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
150	10.5	17.1	Steel	170	0.0	10.5





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH08**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

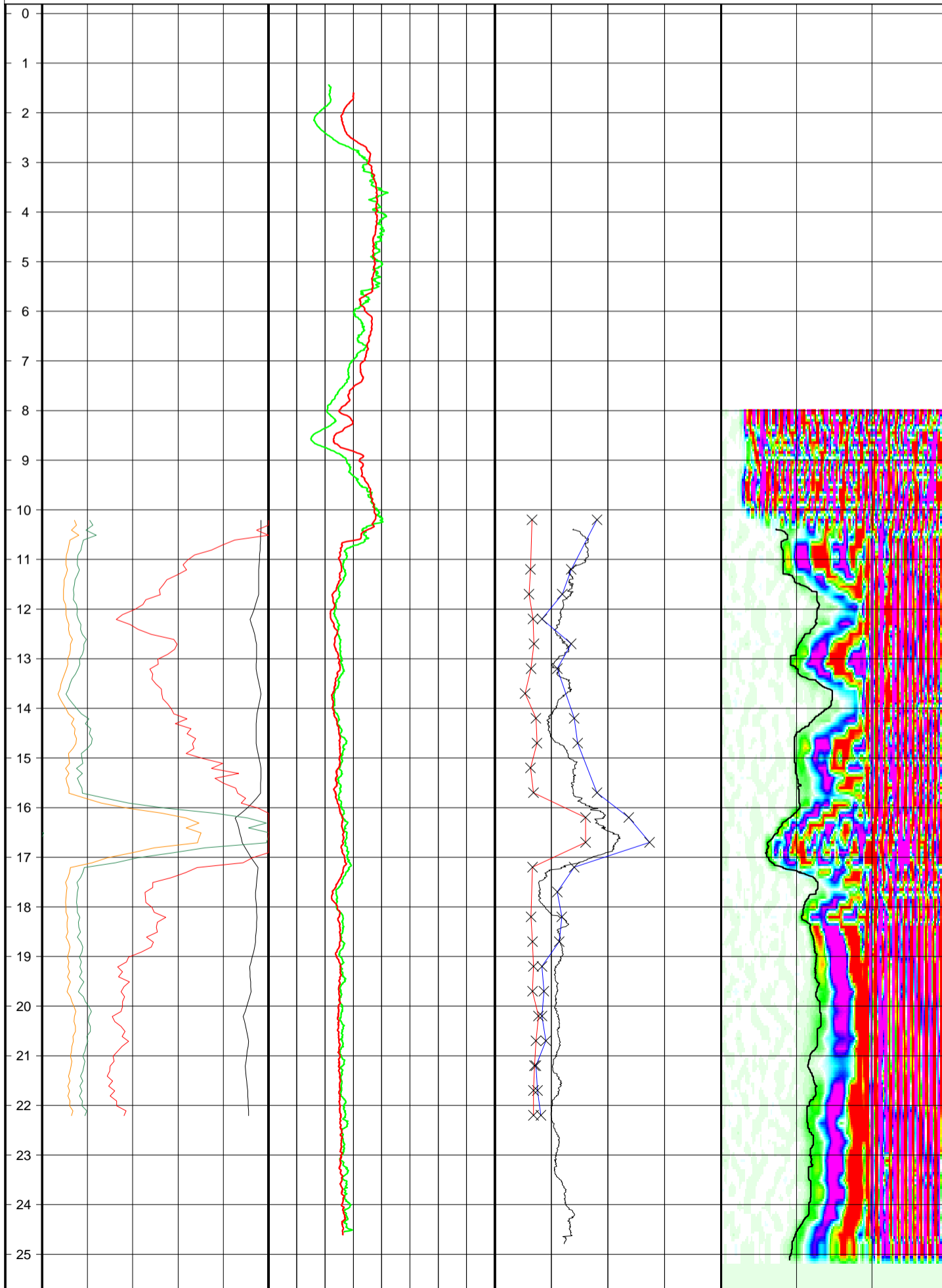
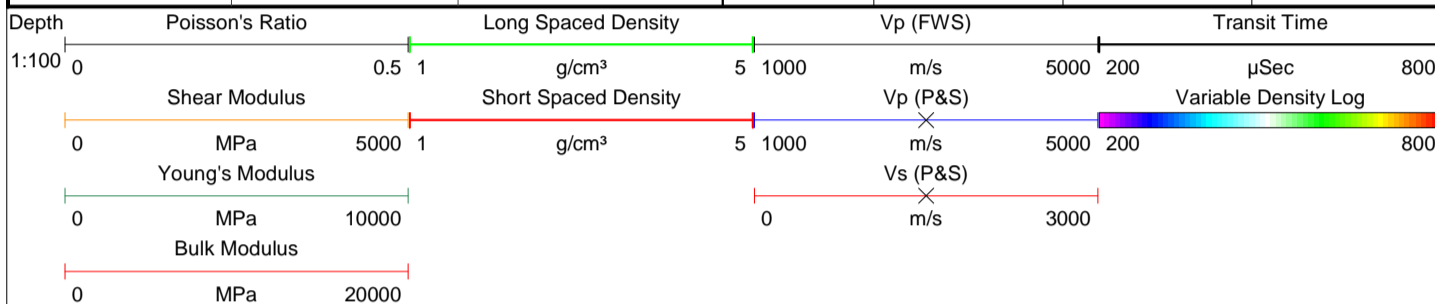
Elevation:

Drilled Depth: (m)	25	Date:	01.02.2023
Logged Depth: (m)	24.7	Recorded By:	M. Kynaston
Logging Datum:	Ground level	Remarks:	
Logged Interval: (m)	1.4 - 24.7		
Fluid Level: (m)	1		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
147	9.8	25	STEEL	200	0	9.8





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH09**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

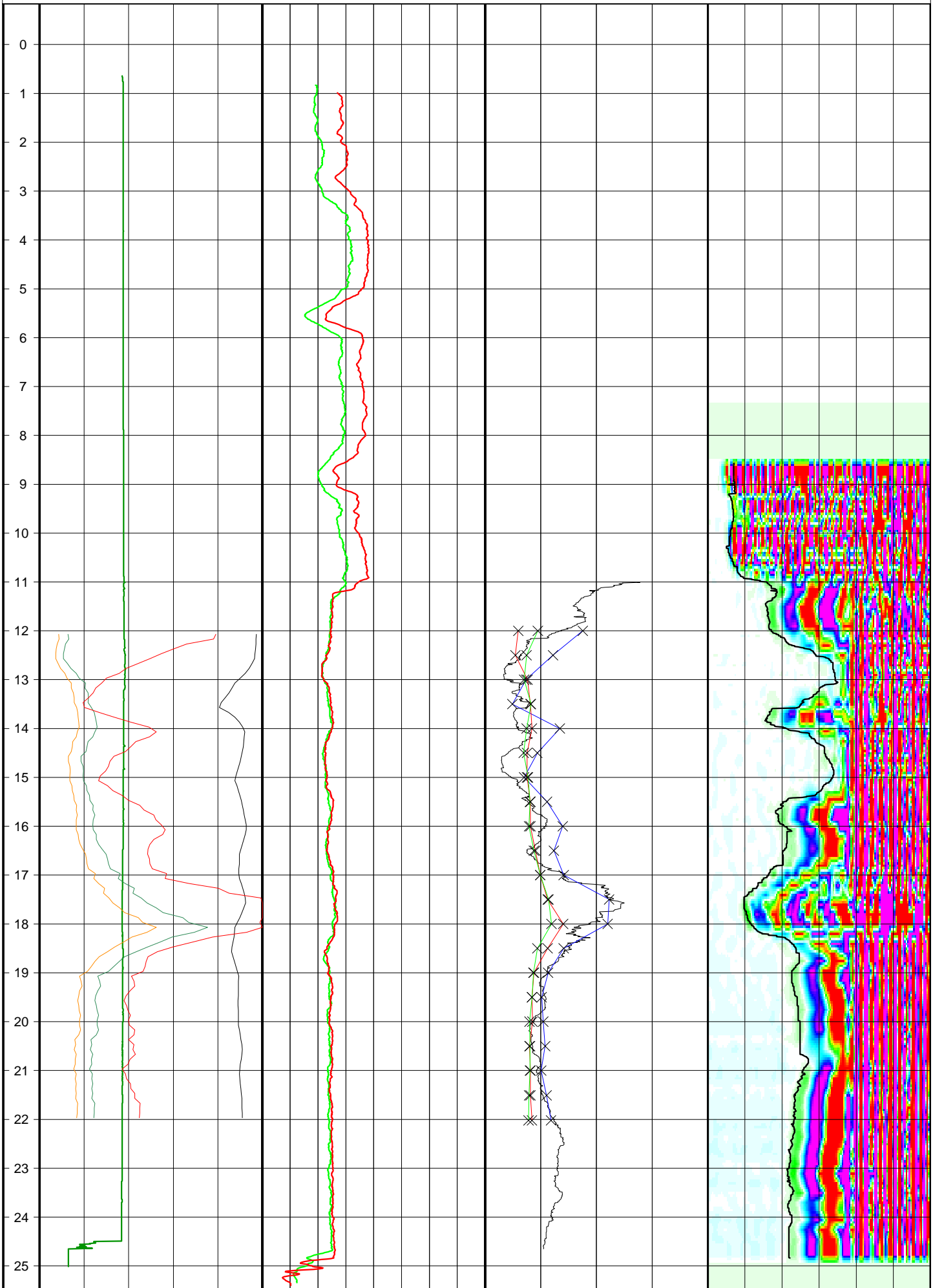
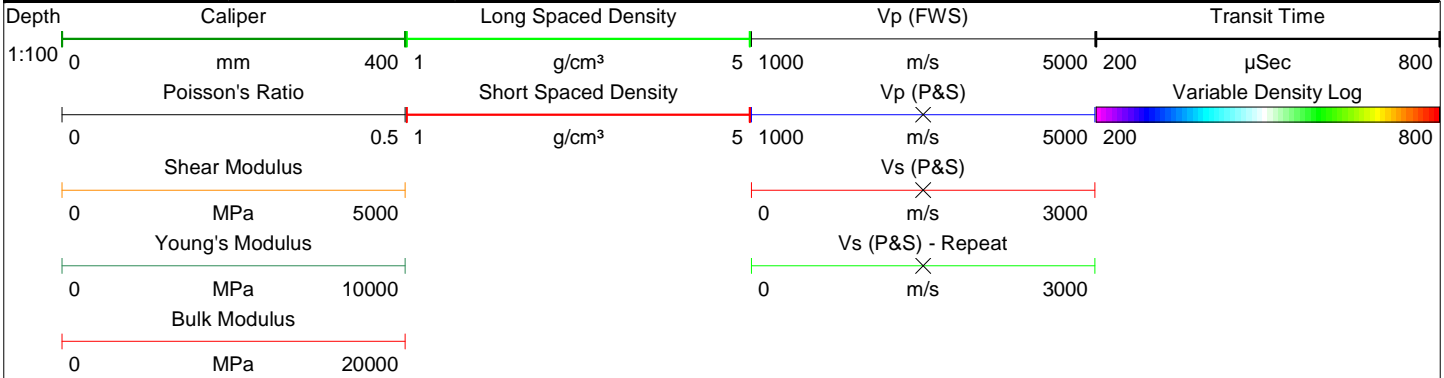
Elevation:

Drilled Depth: (m)	25.0	Date:	11.11.22
Logged Depth: (m)	25.5	Recorded By:	C. Clinton
Logging Datum:	Ground Level	Remarks: Apparent density above 11.0m	
Logged Interval: (m)	1.0 - 25.5		
Fluid Level: (m)	~4.0		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
150	11.0	25.5	Steel	150	0.0	11.0





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH10**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

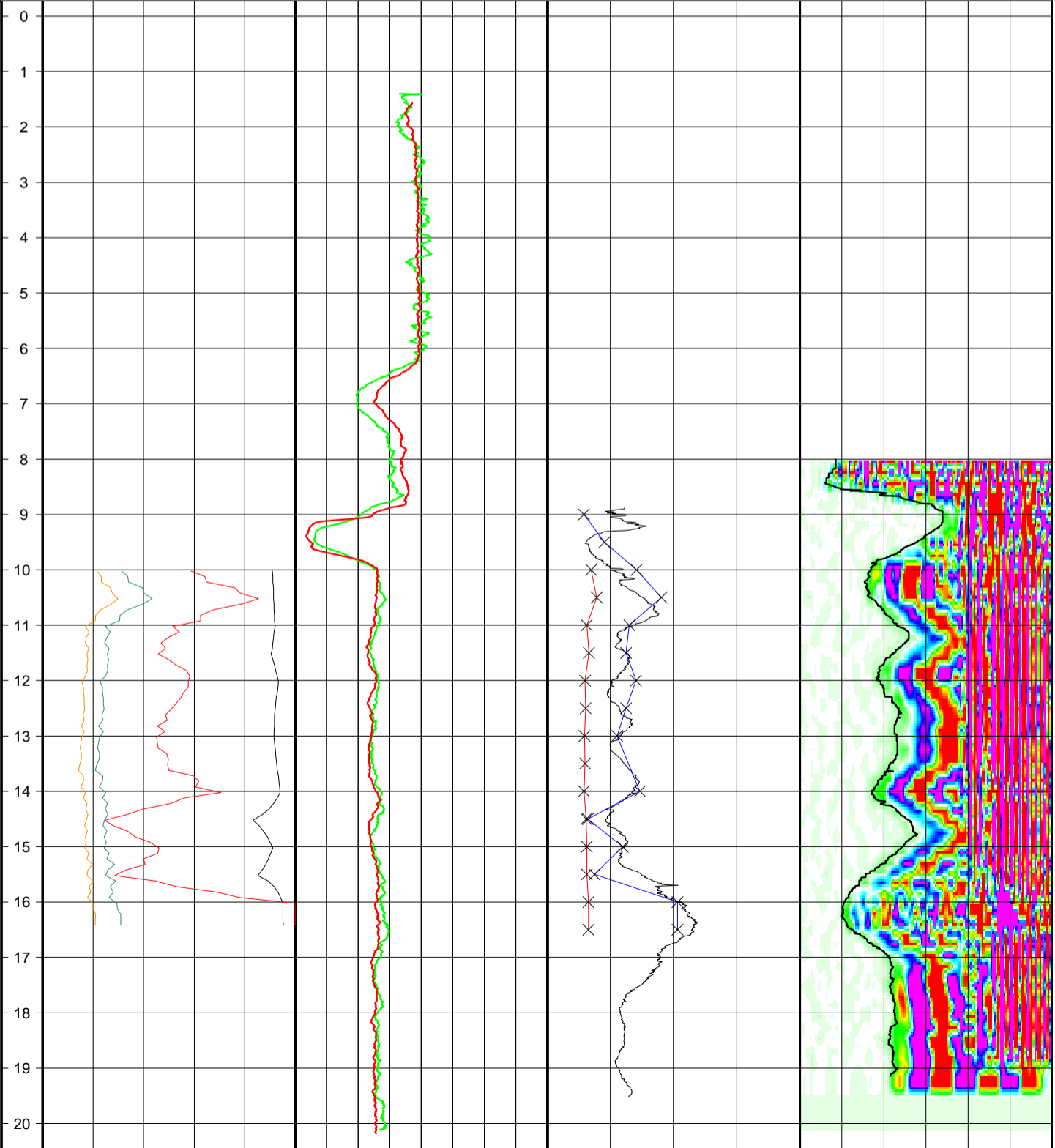
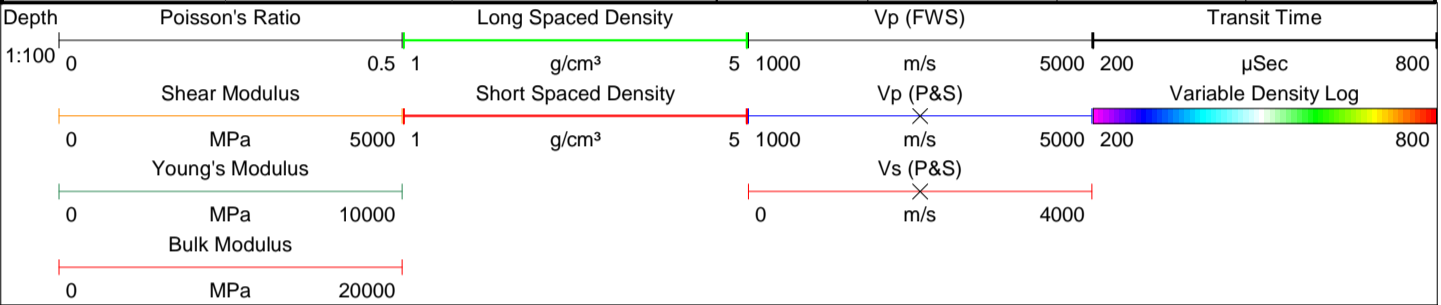
Elevation:

Drilled Depth: (m)	20.5	Date:	25-26.01.2023
Logged Depth: (m)	20.2	Recorded By:	M. Kynaston
Logging Datum:	Ground level	Remarks:	
Logged Interval: (m)	1.4 - 20.2		
Fluid Level: (m)	1.0		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
155	9.0	20.5	STEEL	200	0.0	9.0





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH11**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

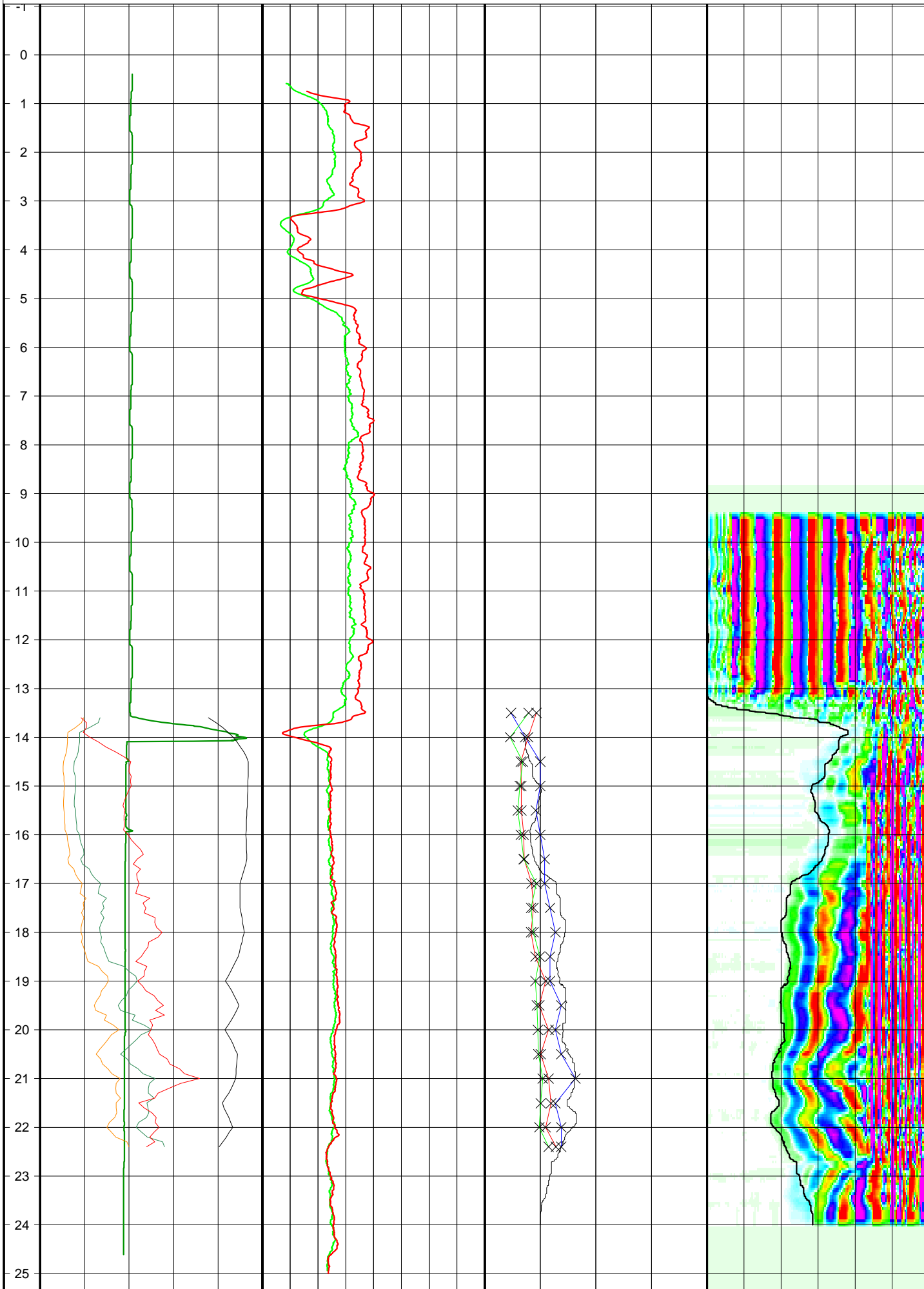
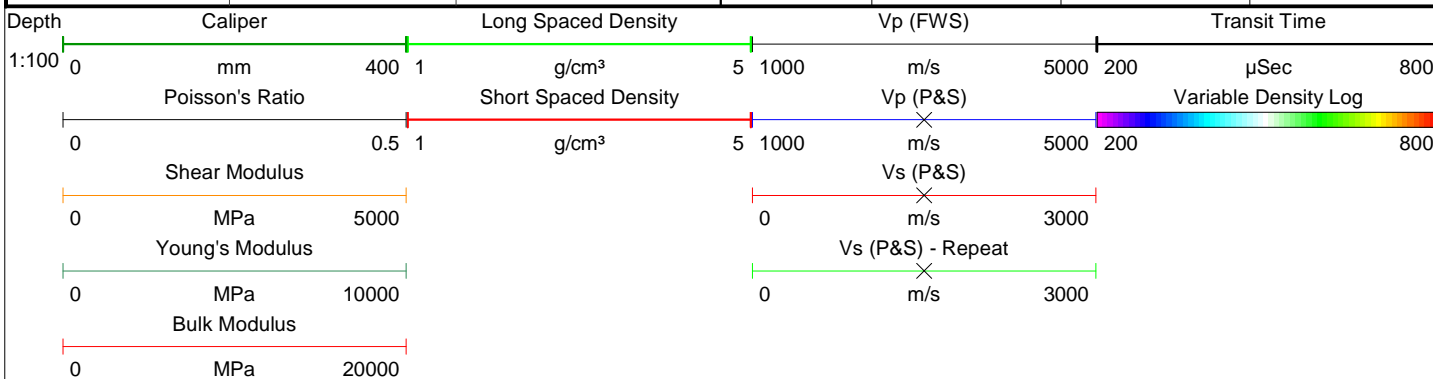
Elevation:

Drilled Depth: (m)	25.0	Date:	25.10.22
Logged Depth: (m)	25.0	Recorded By:	D. Hingley
Logging Datum:	Ground Level	Remarks: Apparent density above 13.5m	
Logged Interval: (m)	0.0 - 25.0		
Fluid Level: (m)	~5.0		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
150	13.5	25.0	Steel	178	0.0	13.5





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH13**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

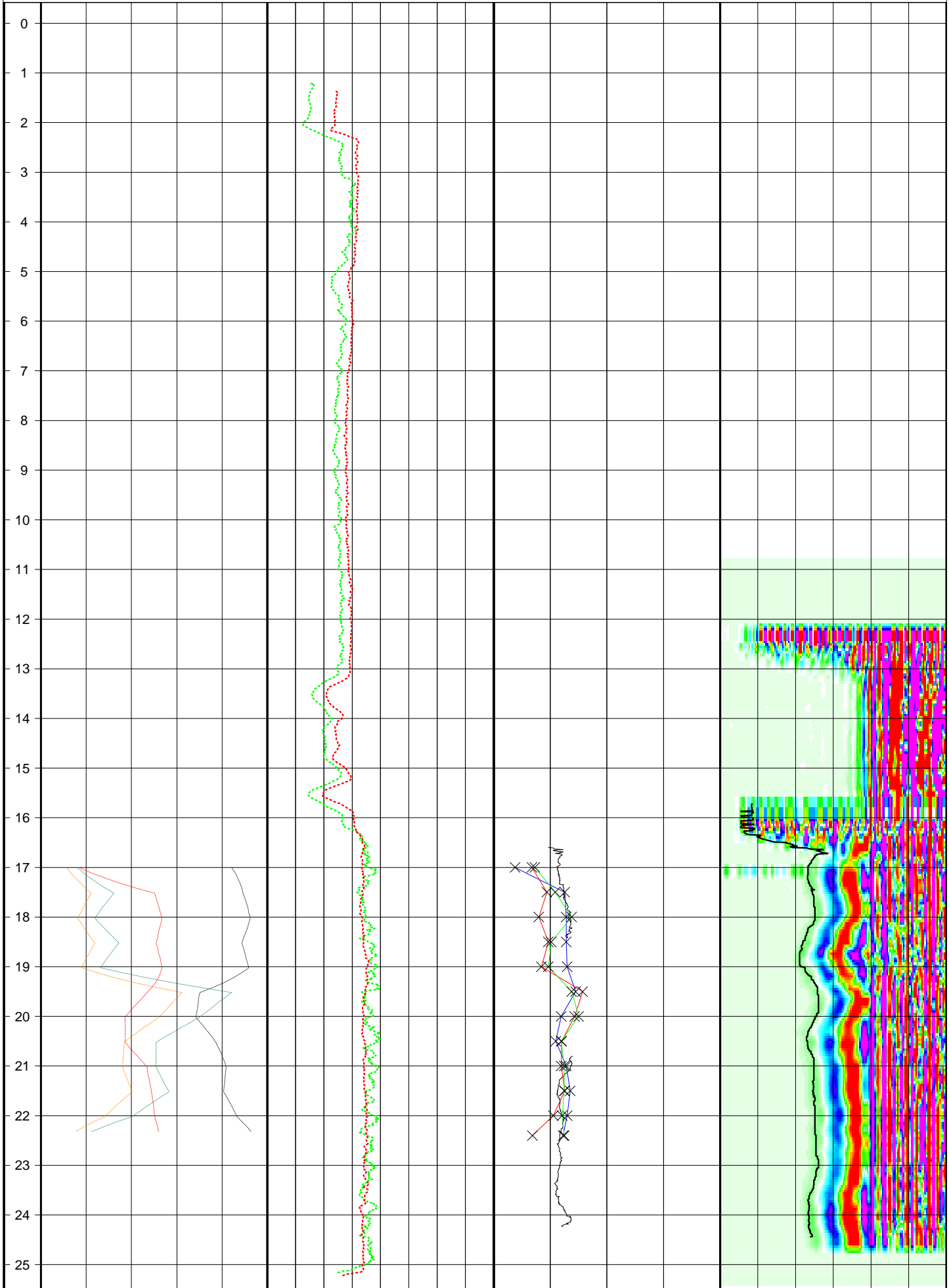
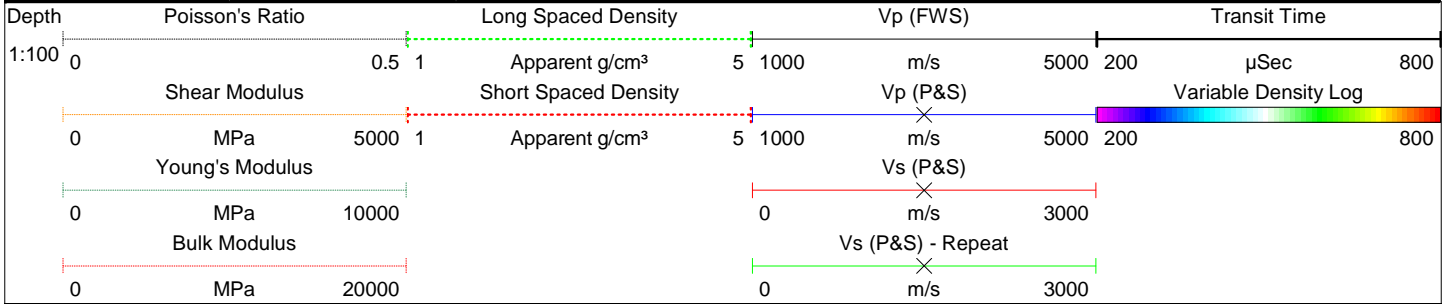
Elevation:

Drilled Depth: (m)	25.7	Date:	17.11.22
Logged Depth: (m)	25.4	Recorded By:	K. Clark
Logging Datum:	Ground Level	Remarks: Hole collapse at 16.7m. Geobore inserted to 25.4m, density logs run inside lining (apparent density only). Borehole collapsed when removing Geobore for seismic logs.	
Logged Interval: (m)	1.0 - 25.2		
Fluid Level: (m)	0.7		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
150	13.1	25.4	Steel	190	0.0	13.1
			Geobore	150	-0.37	25.4





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH14**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

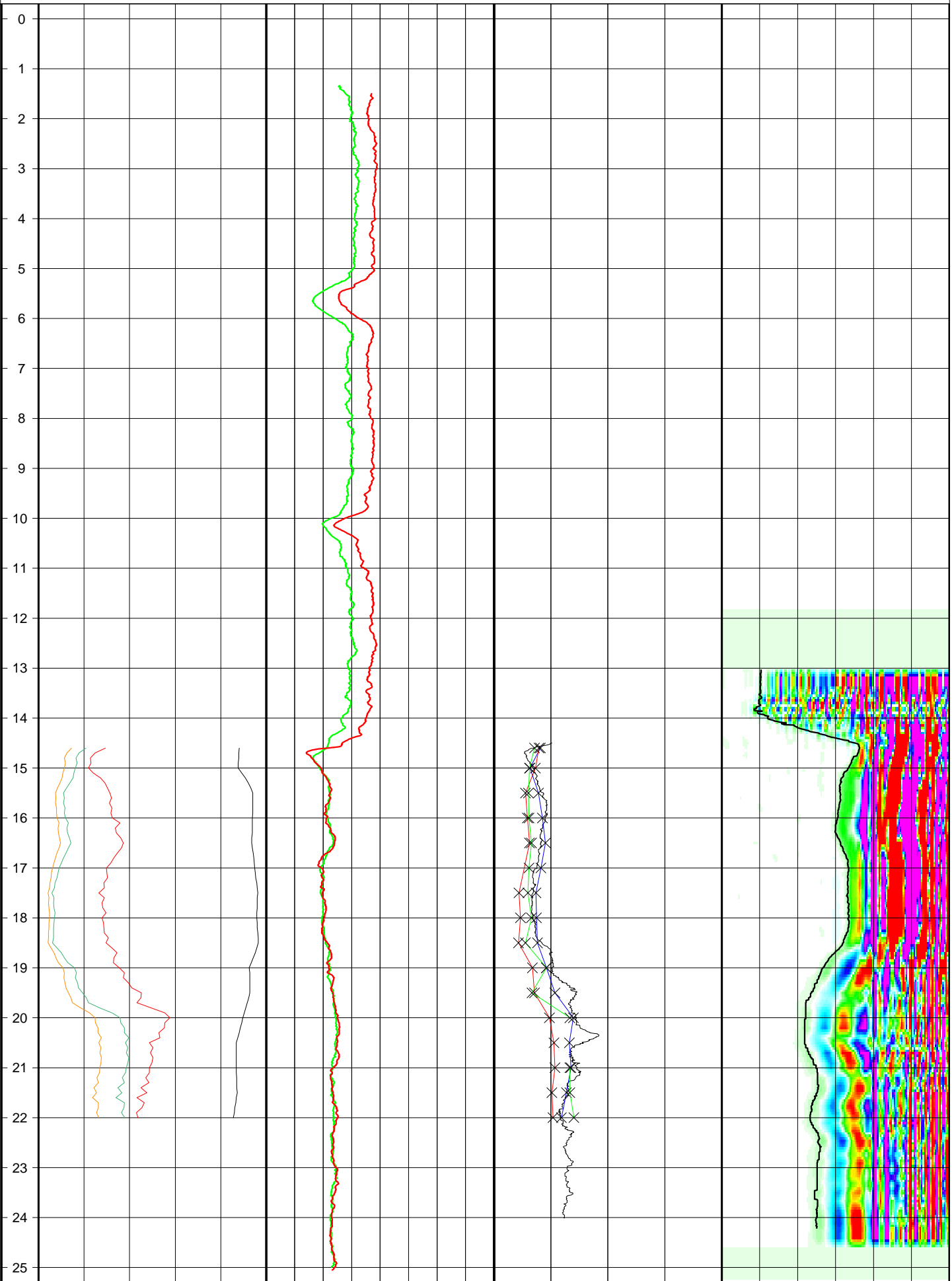
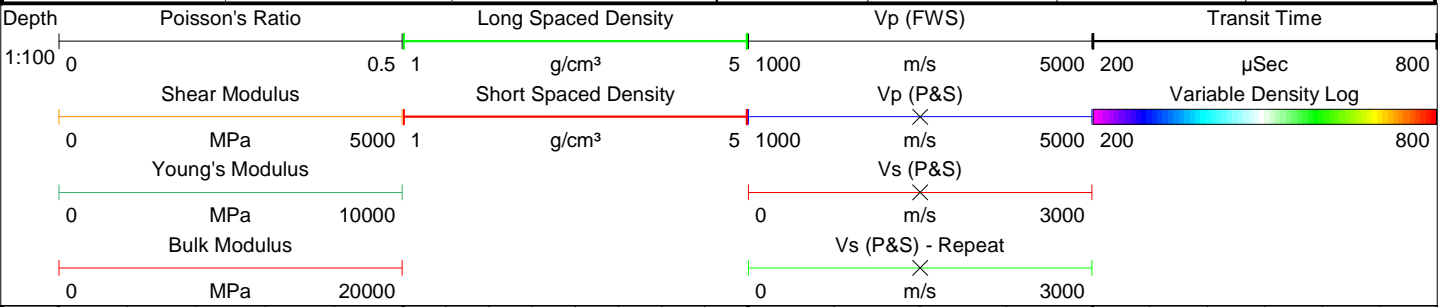
Elevation:

Drilled Depth: (m)	25.0	Date:	07.11.22
Logged Depth: (m)	25.2	Recorded By:	K. Clark
Logging Datum:	Ground Level	Remarks:	
Logged Interval: (m)	1.0 - 25.2		
Fluid Level: (m)	0.0		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
150	14.5	25.2	Geobore	120	-0.67	25
			Steel	200	-0.24	14.5





EUROPEAN GEOPHYSICAL SERVICES LTD

Client: **Strata Geotechnics**

Log Type:

Borehole: **S3BH15**

Seismic

Location: **A46**

Area: **Newark Bypass**

Grid Ref:

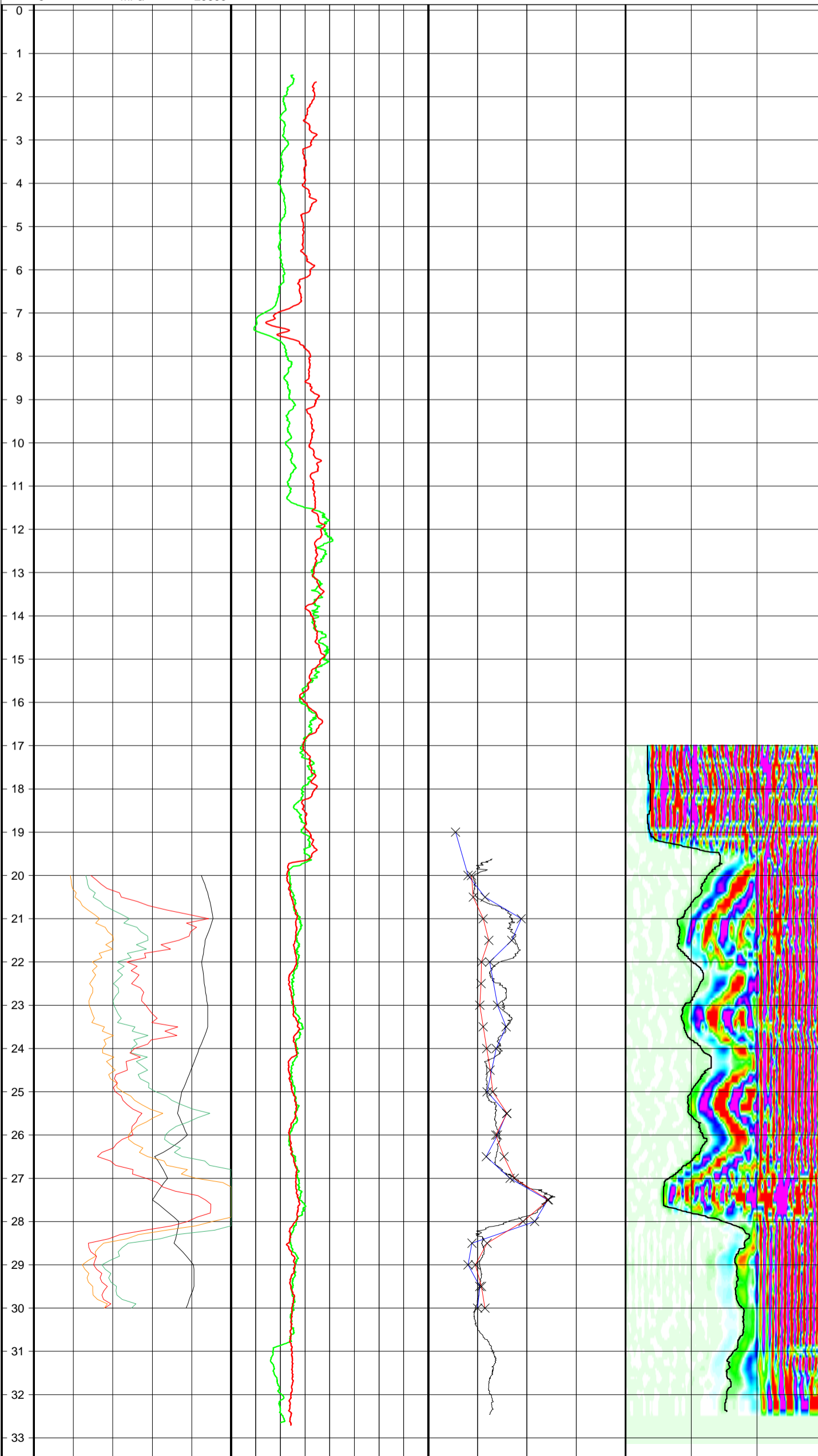
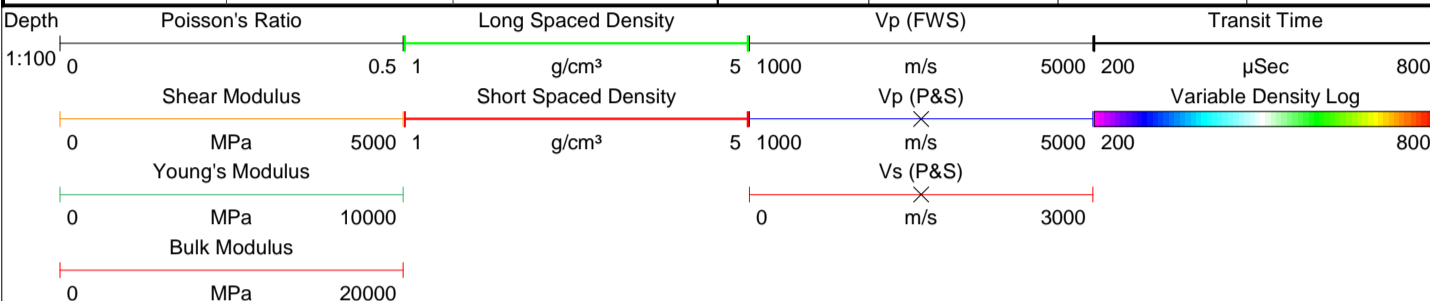
Elevation:

Drilled Depth: (m)	33.0	Date:	18.01.2023
Logged Depth: (m)	32.7	Recorded By:	M. Kynaston
Logging Datum:	Ground level	Remarks:	
Logged Interval: (m)	1.5 - 32.7		
Fluid Level: (m)	5.0		

BOREHOLE RECORD

CASING RECORD

Bit: (mm)	From: (m)	To: (m)	Type	Size: (mm)	From: (m)	To: (m)
150	19.5	33.0	STEEL	200	0.0	19.5



Appendix H: Geophysical Survey Report

GEOPHYSICAL SURVEY REPORT

Project

Soil Resistivity Testing

Location

A46, Newark Bypass

Client

Strata

Unit 1
Link Trade Park
Penarth Road
Cardiff
CF11 8TQ
United Kingdom



Tel: +44 (0)2920 700127

Web: www.terradat.co.uk

Job reference: 8122
Date: February 2023
Version: 1

GEOPHYSICAL SURVEY REPORT

Project

Soil Resistivity Testing

Location

A46, Newark Bypass

Client

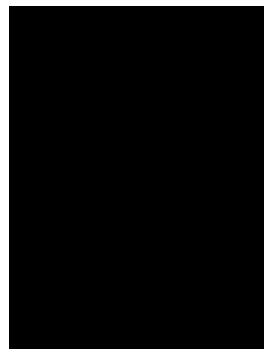
Strata

Project Geophysicist: R Stevens MEdSci (Int) FGS

Reviewer: Dr Simon Hughes BSc FGS

Job Reference: 8122

Date: February 2023



CONTENTS

1	EXECUTIVE SUMMARY	3
2	INTRODUCTION	4
	2.1 Site Description and Geology	4
	2.2 Geological setting	5
3	Survey objectives	5
	3.1 Survey design	6
	3.2 Quality control	6
4	SURVEY DESCRIPTION	6
	4.1 Survey design	7
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Figures

Figure 1: Soil resistivity testing results – S3RT01

Figure 2: Soil resistivity testing results – S3RT02

Figure 3: Soil resistivity testing results – Comparison

Appendices

Appendix A: Iris Syscal Jr SN#242 calibration certificate

1 EXECUTIVE SUMMARY

A soil resistivity testing survey was carried out at two locations along an embankment section on the A46 Newark Bypass to investigate the corrosivity of the Pulverised fuel ash (PFA) fill material. The survey work was commissioned by Strata (the Client) and took place on 31st January 2023.

The survey design was based on BS 1377-9:1990 Clause 5.1 and used the following Wenner array electrode ('a') spacings: 0.5, 1.0, 2.0, 3.0 m. The testing was carried out at two separate locations, and for each position, the data were acquired in 2 perpendicular directions.

The overall range of apparent resistivity values is consistent with the anticipated geology. With a range of 56 to 154 ohm.m. However, the range of apparently resistivity values for the northern test location is marginally higher than the southern test positions, and the disparity between the orthogonal profiles may suggest some lateral variation in ground material or condition.

2 INTRODUCTION

A soil resistivity testing survey was carried out at two embankment locations on the A46 Newark Bypass to investigate the corrosivity of the Pulverised fuel ash (PFA) fill material. The survey work was commissioned by Strata (the Client) and took place on 31st January 2023.

2.1 Site Description and Geology

Both tests were located on the northern embankment section of the A46 Newark Bypass and centred on OSGB 480111, 355282. The two test locations were specified by the Client (Plates 1 and 2) and were planted with juvenile trees.

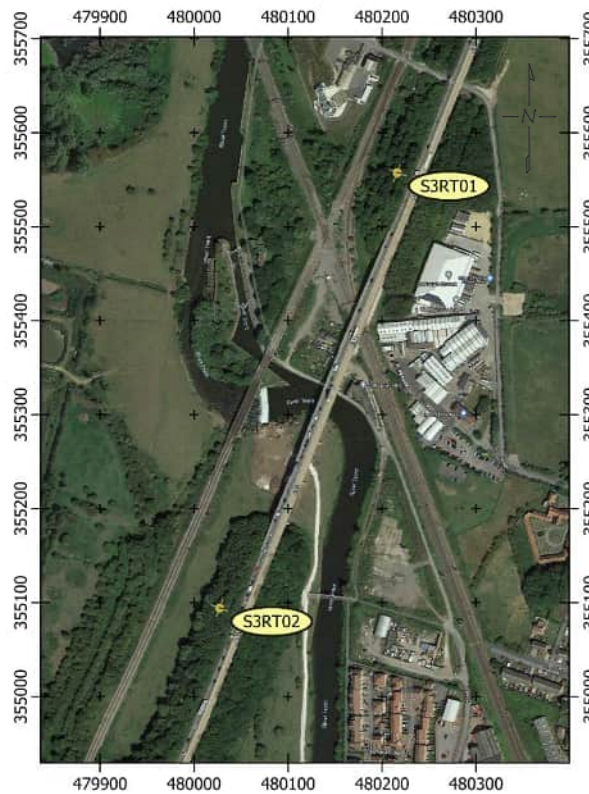


Plate 1: Test locations



Plate 2: Test locations: S3RT01 (top) and S3RT02 (bottom)

2.2 Geological setting

Based on the online British Geological Survey (BGS) geology viewer, the underlying natural geology consists of clay, silt, sand and gravel (alluvium) overlaying the Mercia Mudstone Group (Mudstone). However, there is also likely to be a variable thickness of PFA material within the embankment.

3 Survey objectives

The objective of the survey is as follows:

- Produce apparent resistivity data from vertical electrical soundings at two specified locations.

3.1 Survey design

The Client specified vertical electrical soundings from 4-pin testing to investigate corrosivity. The 4-pin testing was carried out at the two specified locations.

3.2 Quality control

The geophysical data were collected in line with normal operating procedures as outlined by the instrument manufacturer and TerraDat company policy. On completion of the survey, the data sets were downloaded from the survey instrument to a computer and backed up appropriately. The acquired datasets were checked initially for errors that may be caused by instrument noise, weak batteries, and positional discrepancies. Any field notes are subsequently written up or incorporated in the data processing stage. The data sets are then processed using standard processing routines, and once completed, the resulting plots are subject to peer review to ensure the integrity of the interpretation. The quality control standards are BS EN ISO 9001:2015 certified.

4 SURVEY DESCRIPTION

Soil resistivity survey – background information

Resistivity measurements are made by passing a DC electrical current through the ground using a pair of electrodes and measuring the resulting potential gradient within the subsurface using a second electrode pair. There are several different electrode configurations; the most common type used is the Wenner array, which uses equal-spaced electrodes (Plate 3).

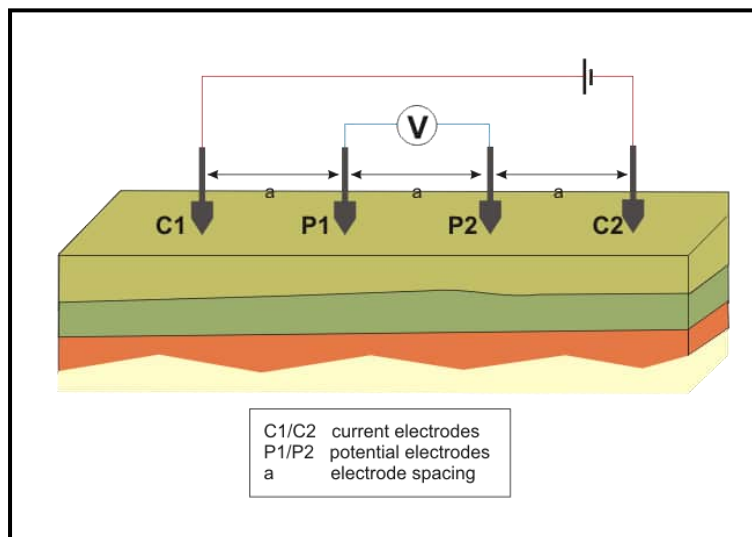


Plate 3: Resistivity testing setup (Wenner array)

For a given electrode spacing 'a', the resistivity calculation is based on

$$\rho_a = 2\pi aR$$

where

ρ_a Apparent resistivity

a electrode spacing

R voltage/current (V/I)

By gradually increasing the spacing between the current/potential electrodes, the depth of investigation is increased.

4.1 Survey design

The survey design was based on BS 1377-9:1990 Clause 5.1 and used the following Wenner array spacings 'a' (in meters): 0.5, 1.0, 2.0, 3.0. For each test location, the data were acquired in 2 perpendicular directions.

The test locations were marked out by the Client (Table 1).

The instrument used for the testing was an IRIS SYSCAL Junior Switch 72 resistivity meter (Serial number 279). The calibration certificate for this meter is included in the Appendix.

Location	LOCATION	EASTING	NORTHING	MAX 'a' SPACING
S3RT01	CENTRE	480216.0	355557.7	3 m
S3RT02	CENTRE	480027.3	355094.3	3 m

Table 1: Test locations in OSGB coordinates.

Location	Weather	Site conditions	Notes
S3RT01	Dry, sunny (10 °C)	Damp ground	Data collection on 31/01/23 in the morning; embankment of juvenile trees.
S3RT02	Dry, sunny (10 °C)	Damp ground	Data collection on 31/01/23 in the morning; embankment of juvenile trees.

Table 2: Summary of notes for individual tests

5 RESULTS

The results of the soil resistivity tests are presented in Figures 1 to 2 and include the following measurements: Potential (V_p), current (I_n) and derived apparent Resistivity (Ohm meters). The apparent resistivity (ρ) for the Wenner array is calculated using the formula ($\rho=2\pi aR$), where resistance (R) is derived from the current and potential readings as ($R=V/I$).

To provide some comparison between the locations, a compiled summary plot is displayed in Figure 3.

Summary observations

The overall range of apparent resistivity values is consistent with the anticipated geology. With a range of 56 to 154 ohm.m. However, the range of apparently resistivity values for the northern test location is marginally higher than the southern test positions, and the disparity between the orthogonal profiles may suggest some lateral variation in ground material or condition.

For test location S3RT01, the range of apparently resistivity values are higher than S3RT02, and there is more of a disparity between the orthogonal profiles. This disparity may suggest some lateral variation in ground material or condition.

At test location S3RT02, the results for both sets of readings are almost identical and show a gradual reduction in apparent resistivity down to a depth of 1.5 m BGL then becoming more consistent.

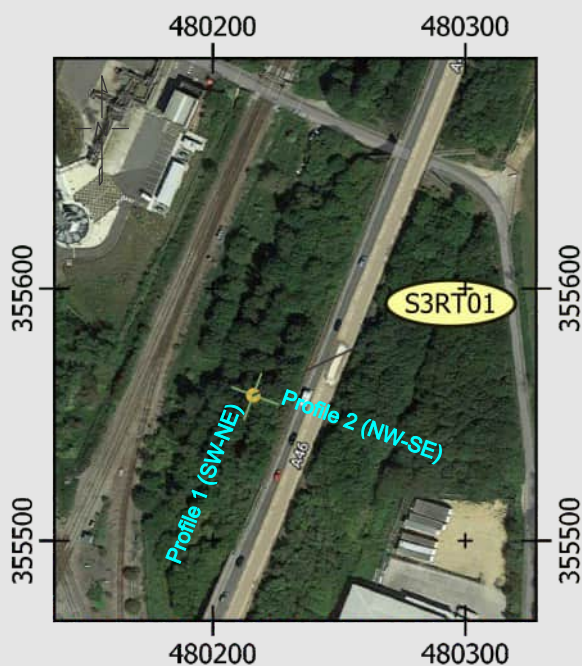
Disclaimer

This report represents an opinionated interpretation of the geophysical data. It is intended for guidance with any invasive follow-up investigation. Features that do not produce measurable geophysical anomalies or are hidden by other features may remain undetected. Geophysical surveys complement invasive/destructive methods and provide a tool for investigating the subsurface; they do not produce data that can be taken to represent all of the ground conditions found within the surveyed area. Areas that have not been surveyed due to obstructed access or any other reason are excluded from the interpretation.

Figures

Sounding location	Line (1 / 2)	Electrode spacing "a" (m)	Dist. X to potential probe (m)	Dist. Y to current probe (m)	Soil resistivity depth "d" (3/4 of "a") (m)	SP (mV)	VMN (mV)	IAB (mA)	Apparent resistivity p (Ohm.m)	Average Apparent resistivity p (Ohm.m)
S3RT01	SW-NE	0.5	0.25	0.75	0.375	-6	81.797	1.985	129.44	129.45
S3RT01	SW-NE	0.5	0.25	0.75	0.375	-19	77.353	1.877	129.46	
S3RT01	SW-NE	1	0.5	1.5	0.75	-96	32.663	1.92	106.89	106.925
S3RT01	SW-NE	1	0.5	1.5	0.75	-37	31.036	1.823	106.96	
S3RT01	SW-NE	2	1	3	1.5	-70	16.276	1.782	114.79	114.715
S3RT01	SW-NE	2	1	3	1.5	-52	15.109	1.656	114.64	
S3RT01	SW-NE	3	1.5	4.5	2.25	29	14.518	2.357	116.1	116.07
S3RT01	SW-NE	3	1.5	4.5	2.25	91	13.66	2.219	116.04	
S3RT01	NW-SE	0.5	0.25	0.75	0.375	-61	96.588	2.343	129.52	129.535
S3RT01	NW-SE	0.5	0.25	0.75	0.375	-38	88.355	2.143	129.55	
S3RT01	NW-SE	1	0.5	1.5	0.75	153	46.015	2.143	134.94	135.19
S3RT01	NW-SE	1	0.5	1.5	0.75	168	43.376	2.012	135.44	
S3RT01	NW-SE	2	1	3	1.5	397	28.235	2.311	153.53	153.44
S3RT01	NW-SE	2	1	3	1.5	411	26.573	2.178	153.35	
S3RT01	NW-SE	3	1.5	4.5	2.25	-85	16.012	2.197	137.4	136.595
S3RT01	NW-SE	3	1.5	4.5	2.25	-107	14.989	2.081	135.79	

LOCATION PLOT



KEY

- Resistivity sounding line
- Centre point of sounding location

Location of sounding S3RT01

Centre location at:
480216.0 355557.7

TERRA DAT geophysical innovation
Tel: +44 (0) 2920 700127
Web: www.terradat.co.uk
Email: web@terradat.co.uk

Title:
SOIL RESISTIVITY TESTING RESULTS - S3RT01

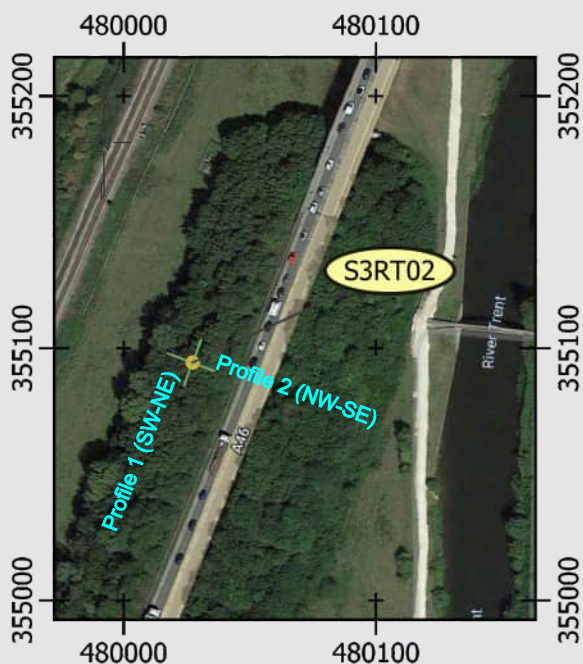
Project:
A46, Newark Bypass

Scale: **NTS**
Drawn by/Ref: **RS/8122/1**
Date: **02 FEB 2023**

FIGURE 1

Sounding location	Line (1 / 2)	Electrode spacing "a" (m)	Dist. X to potential probe (m)	Dist. Y to current probe (m)	Soil resistivity depth "d" (3/4 of "a") (m)	SP (mV)	VMN (mV)	IAB (mA)	Apparent resistivity p (Ohm.m)	Average Apparent resistivity p (Ohm.m)
S3RT02	SW-NE	0.5	0.25	0.75	0.375	-36	80.001	2.497	100.65	100.745
S3RT02	SW-NE	0.5	0.25	0.75	0.375	4	75.709	2.359	100.84	
S3RT02	SW-NE	1	0.5	1.5	0.75	8	21.623	1.702	79.81	79.805
S3RT02	SW-NE	1	0.5	1.5	0.75	-24	22.974	1.809	79.8	
S3RT02	SW-NE	2	1	3	1.5	-64	19.741	4.023	61.67	61.83
S3RT02	SW-NE	2	1	3	1.5	-69	19.156	3.883	61.99	
S3RT02	SW-NE	3	1.5	4.5	2.25	22	17.35	5.87	55.71	56.24
S3RT02	SW-NE	3	1.5	4.5	2.25	26	17.316	5.749	56.77	
S3RT02	NW-SE	0.5	0.25	0.75	0.375	-12	70.124	2.429	90.71	90.71
S3RT02	NW-SE	0.5	0.25	0.75	0.375	-3	67.603	2.341	90.71	
S3RT02	NW-SE	1	0.5	1.5	0.75	5	36.23	2.693	84.54	84.55
S3RT02	NW-SE	1	0.5	1.5	0.75	11	34.803	2.586	84.56	
S3RT02	NW-SE	2	1	3	1.5	91	12.458	2.551	61.37	61.75
S3RT02	NW-SE	2	1	3	1.5	24	11.899	2.406	62.13	
S3RT02	NW-SE	3	1.5	4.5	2.25	27	17.688	5.198	64.15	64.29
S3RT02	NW-SE	3	1.5	4.5	2.25	27	17.157	5.02	64.43	

LOCATION PLOT



KEY

- Resistivity sounding line
- Centre point of sounding location

Location of sounding S3RT02

Centre location at:
480027.3 355094.3



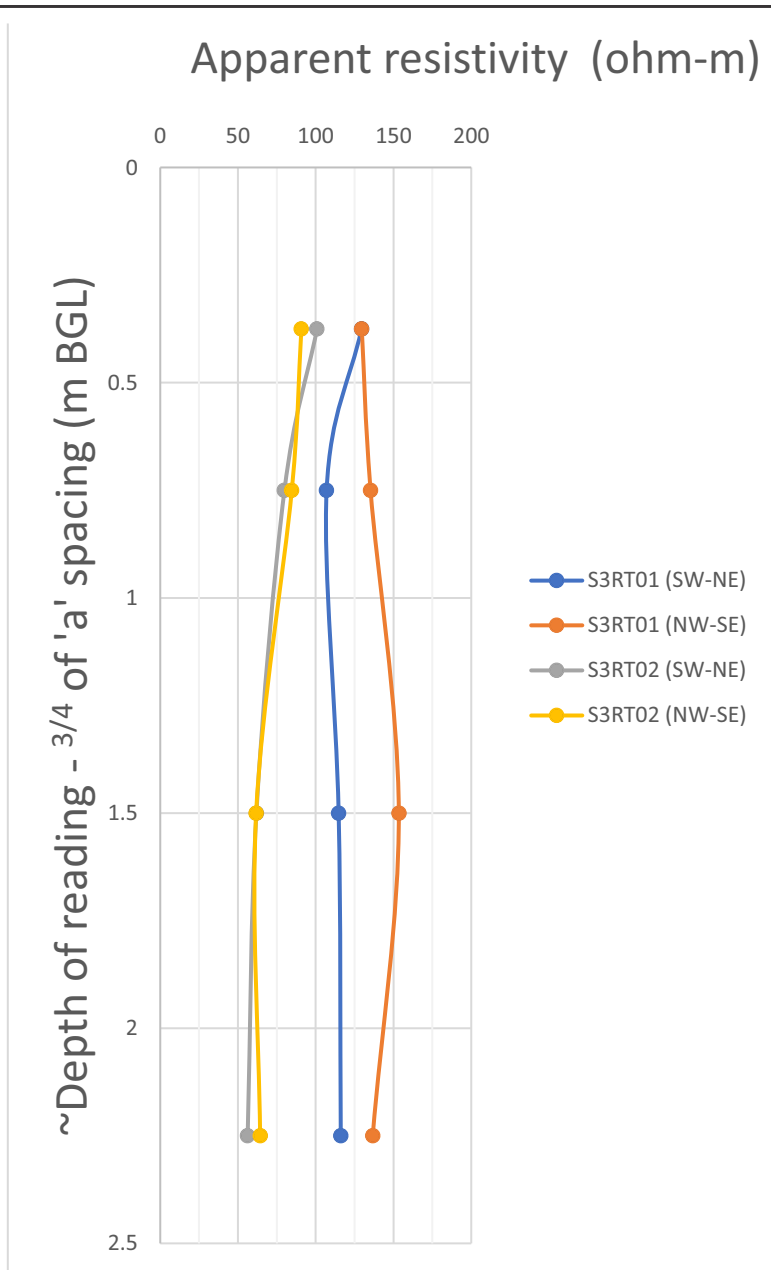
Tel: +44 (0) 2920 700127
Web: www.terradata.co.uk
Email: web@terradata.co.uk

Title:
SOIL RESISTIVITY TESTING RESULTS - S3RT02

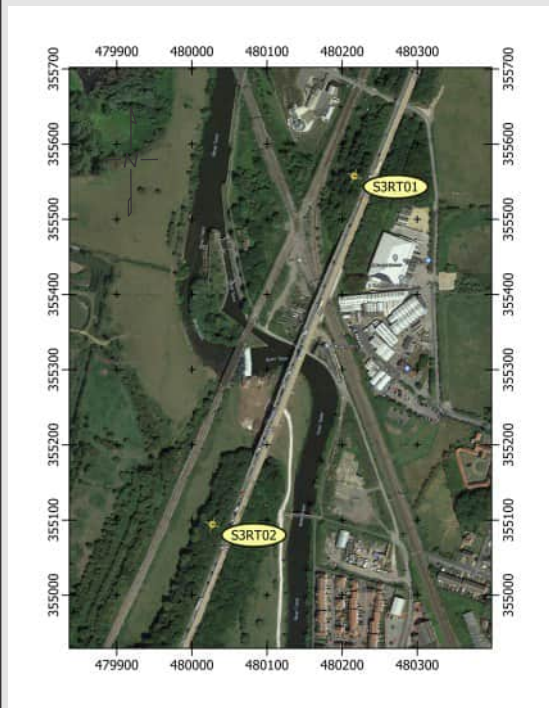
Project:
A46, Newark Bypass

Scale: **NTS**
Drawn by/Ref: **RS/8122/2**
Date: **02 FEB 2023**

FIGURE 2



LOCATION PLOT



KEY

- Resistivity sounding line
- Centre point of sounding location

Location of soundings

S3RT01:
480216.0 355557.7

S3RT02:
480027.3 355094.3

TERRA DAT geophysical innovation
 Tel: +44 (0) 2920 700127
 Web: www.terra-dat.co.uk
 Email: web@terra-dat.co.uk

Title:
SOIL RESISTIVITY TESTING - COMPARISON

Project:
A46, Newark Bypass

Scale: **NTS**
 Drawn by/Ref: **RS/8122/3**
 Date: **02 FEB 2023**

FIGURE 3

Appendices

Serial Number: 279	SYSCAL JUNIOR switch 72	Test report & Certificate of calibration	
Tested by: SA			
Date: 12/10/19			
Page 1 / 1			

Test equipment used		
Multimeter : FLUKE 189	Serial Number : PM02	Calibration due date : 10/01/20
Multimeter : FLUKE 189	Serial Number : PM03	Calibration due date : 10/01/20
Battery tester	Serial Number : PTB01	Calibration due date : 08/03/20
SWITCH Tester	Model with Extension Link connector	
COMSYS Module	Model with COMSYS SP option	

Detailed Test Report				
Nature of the test	Test conditions, reference data (ammeter, voltmeter, ohmmeter, battery tester...)	Expected Specifications	Unit under test	Pass / Fail
Software				
Software	Version 12.0a			
Measures				
Vmn measure	From Save Energy to Vp max	< 0.2 % typ	0.13%	ok
Precision of the current measure	Deviation from I = 854.1 mA	< 0.2 % typ	0.02%	ok
Input voltage saturation	Injection of voltage > 5 V	5 V	5.0V	ok
Functional tests				
Test of the full output power	For Vab maximum and Rab ≈ 1700 Ω	200 W ± 2.5%	96.54 W	ok
Test of the short circuit output current	For Vab = 50 V and Rab = 20 Ω	2.35 A min	1.229 A	ok
Test of the maximum output voltage	Pointed out during the full output power test	≈ 600 V	403 V	ok
Electrodes switching tested	Check with Prosys II			ok
Leakage Test	Rmn = 33 kΩ, In ≈ 14 mA, 250 ms	Vp < 2 mV	0.124 mV	ok
Isolation test with the front panel	Performed during injection			ok
Batteries				
Type of internal batteries	Sealed lead acid battery type			
Tx battery : Ref & values from the battery tester	Batch ref. number: 150622E MF17E	12V / 7.2 Ah	13.9V / 7 Ah	ok
Rx battery : Ref & values from the battery tester	Batch ref. number: 190130A HA24MA	12V / 7.2 Ah	13.4V / 7.7 Ah	ok
Internal and external Tx battery operation	Tests performed in both settings			ok
Visual indication of very low Tx battery	Voltage below which the LED lights red		9.60 V	ok
Visual indication of good Tx battery	Voltage below which the LED lights green		11.30 V	ok
Lithium backup battery	Level voltage	3.6 V	3.69 V	ok
Data				
Check internal data storage and copy to PC	With USB cable and Prosys II software			ok
Download data to the IRIS SD Card reader	Reading data with Prosys II software			ok
Load a sequence from ELECTRE Pro software	Check file in Syscal memory			ok
Options				
Check "Extension link" connector	Connector not available on this device			NA
COMSYS SP Option	Option not available on this device			NA
In the field test of endurance				
Electrical survey	Wenner - Schlumberger, 15 different spacing			ok
Multi-electrode survey	To Vp max and external battery: Dipôle-Dipôle, Pôle-Dipôle, Pôle-Pôle, Wenner-Schlumberger et Dipôle-Dipôle multi spacing			ok

Made at IRIS Instruments in Orleans, France,
December 11th, 2019

L. Cabaret,	Production manager
	

Appendix I: CPT Results

IN SITU

SITE INVESTIGATION

STATIC CONE PENETRATION TEST
FACTUAL REPORT

CLIENT: Strata Geotechnics
PROJECT: A46 Newark Bypass



Project	A46 Newark Bypass
Project No.	1220514
Client	Strata Geotechnics
Address	Summit Close, Kirkby in Ashfield, Nottingham, NG17 8GJ

Attention: Mr Kieron Done

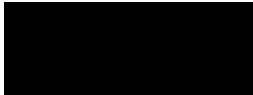
Dear Mr Done,

We have pleasure in providing a digital copy of our report and data in AGS format for the above project.

We hope that you are satisfied with the performance of our staff, equipment and reporting on this project. If you should have any queries about any aspect of the works carried out, please do not hesitate to contact us. We look forward to being of service to you in the future.

Yours faithfully,

In Situ Site Investigation Limited



Darren Ward

Director

Report Issue

Issue	Date	Prepared	Sign	Checked	Sign	Approved	Sign
03	22/05/2023	Chloe Donovan		Luisa Dhimitri		Darren Ward	

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1.0 INTRODUCTION

In Situ Site Investigation Limited (In Situ) was engaged in a geotechnical site investigation at A46 Newark Bypass at the request of Strata Geotechnics. The site investigation consisted of completing 35 Static Piezocone Penetration Tests (CPTU), and 4 Seismic Tests (SCPT) to provide information on the soil conditions and derived geotechnical parameters at:

Newark Showground,
Coddington,
Newark,
Nottinghamshire,
NG24 2NY

All test locations were provided by the client. A site map is included in the end of Appendix A of this report (if provided by the client). The tests were stopped when they reached the target depth as per the client's technical specifications or for other technical reasons, as detailed in the *Project Summary Table* in *Appendix A.1* and on each CPTU log included in Appendix B of this report.

The fieldwork was carried out from 25th October 2022 to 11th November 2022 as per the client's request.

The work on site and the final factual reporting have been undertaken in accordance with the international technical standard *ISO 22476-1:2021(E)*.

2.0 FIELDWORK

2.1 CONE PENETRATION TESTS

The fieldwork activity is summarised in Table 2.1.

Table 2.1 Fieldwork Summary	
CPT Operator/s	Callum Murray, Dave Roberts & Josh Cogle
Date Started	25 th October 2022
Date Finished	11 th November 2022
In Situ S.I. Project Manager	Darren Ward
Main Contractor's Site Manager	David Pond

2.1.1 Rig Information

Details of CPTU rig used in this project are shown in Table 2.2. Full data sheet for the rig is presented in *Appendix A.2*.

Table 2.2 Rig Summary	
Rig Name	Rig Description
CPT006	14 Tonne Track Mounted CPT Rig

2.1.2 CPTU Cone

Details of electric CPTU cone (Type TE2) used in this project conforming to the requirements of Application Class 2 of *ISO 22476-1:2012*, are shown in Table 2.3.

Table 2.3 Cone Summary		
Number	Cross-section area	Filter position
S15-CFIP.2089	15cm ²	U ₂
DP15-CFPTxy.71212	15cm ²	U ₂

A full datasheet of the cone used is shown in *Appendix A.3*.

The cone's measured parameters are shown in Table 2.4.

Table 2.4 Completed Fieldwork Summary

35 CPTU to a maximum depth of 13.01m. Each test measured Cone Resistance, q_c , Sleeve Friction, f_s , Porewater Pressure in the shoulder position, u_2 , Inclination in X and Y axes.

4 Seismic tests to a maximum depth of 6.5m. Each SCPT test measured Shear Wave Velocity, V_s .

Provision of factual report with estimated soil type, derived geotechnical parameters & AGS data file.

2.1.3 CPTU Cone Calibration

The cone resistance and sleeve friction are recorded by calibrated load cells in the cone. The CPTU load cells and pressure transducers are regularly calibrated in line with *ISO 22476-1:2021(E)* standard by the cone manufacturer. The cone calibration certificate for the cone used at this site are presented in *Appendix A.4*.

2.1.4 CPTU Cone Saturation

The pore water pressure is recorded using a calibrated pressure transducer located in the piezocone. To ensure pore water pressure measurements are not affected by the presence of air in the measuring transducer, a de-airing procedure is carried out prior to each test. The cone and filter are saturated using a glycerine fluid with a viscosity of 10,000 CST.

2.1.5 Test Procedure

The tests are carried out in accordance with the *International Standard for Electrical Cone and Piezocone Penetration Test ISO 22476-1:2021(E)*.

The final depths of the tests were determined by either completion to the specified test depth or when the maximal safe capacity of the equipment was reached. A schedule of the tests performed is shown in *Appendix A.1*, which has been compiled from the operators' daily progress reports.

The data is transmitted from the digital CPTU through an umbilical cable that runs through the push rods to the data acquisition system. Results are displayed instantaneously on the computer logging screen. The results are recorded on the computer hard disc.

The rate of penetration is kept constant at 20 mm/s \pm 5 mm/s except when penetrating very dense or hard strata. Before each test is carried out zero values are taken of the cone to check if it is within calibration. At the end of each test, zero values are taken again to see if there has been any drift during the test. These values are inspected during the post processing stage. This is a quality check on the data and the testing procedure. Individual test zero values are shown on their corresponding test results in *Appendix B*.

2.1.6 *In Situ Pore Pressure (u_0)*

The in situ or hydrostatic pore pressure is required for the calculation of several derived parameters included in this report. For this report, the groundwater level is assumed at 0.5m below ground surface, for calculation purposes. The in situ pore pressure, u_0 values are presented on the pore pressure plot, on *CPT Log 01*, which is included in *Appendix B*.

2.2 POSITIONING

Positioning and surveying of all investigated locations was the responsibility of the client.

2.3 SEISMIC TESTS S WAVE PROCEDURE

The SDMT is a seismic module for recording seismic waves in the soil to evaluate shear wave velocity, V_s . The device is equipped with two geophone receivers with a vertical offset of 0.50 m, which records the shear wave generated at surface. The instrument may be combined with a DMT blade, a dummy cone or a CPT probe.

The S-wave is usually generated with a hammer striking in the horizontal direction a shear beam, which must be vertically pressed downwards to ensure good coupling with the soil. The longitudinal axis of the shear beam must be parallel to the axis of the sensors, to maximize sensitivity to the generated shear wave, as shown in Figure 2.1. The shear wave velocity, V_s is the ratio between the difference of the distances between the centre of the shear beam to each receiver, $S_2 - S_1$ and the delay time, Δt of the wave arrival to upper and lower receivers.

The dual sensor configuration enables true Interval interpretation of the shear wave velocity, comparing the traces of the same generated wave recorded by each receiver. In addition, two independent pseudo Interval interpretations of V_s are possible, considering the traces of each of the two receivers with depth.

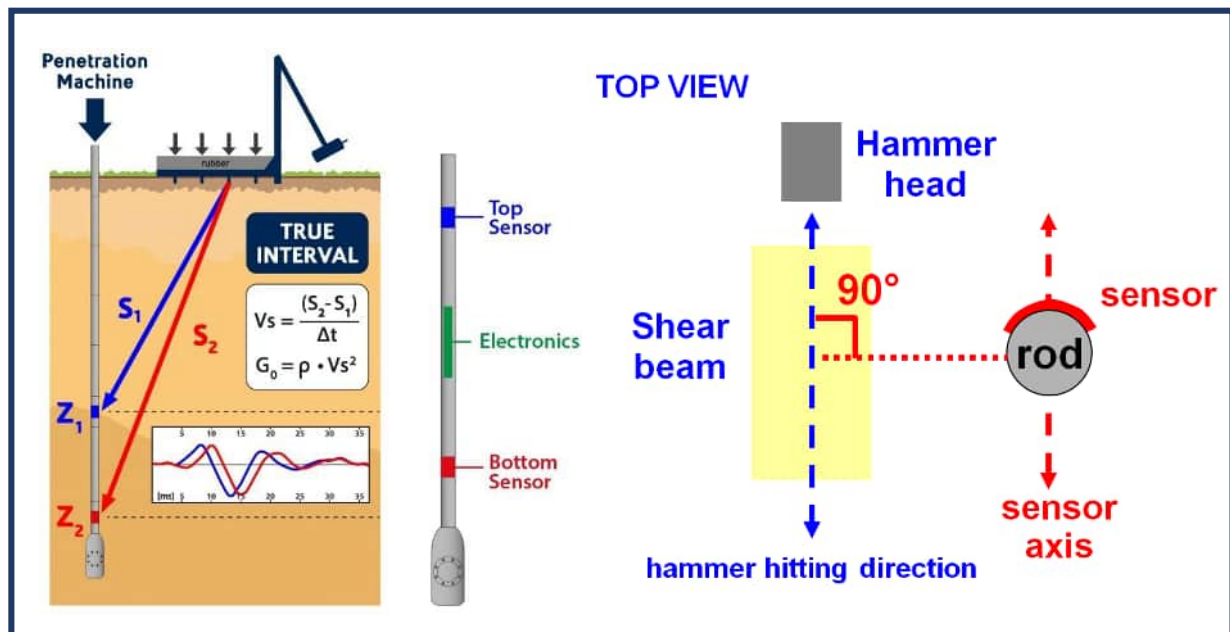


Figure 2.1: SDMT set up (after Marchetti D., 2022)

Once collected the V_s is calculates by re-phasing the S2 wave over the S1 wave as shown in Figure 2.2.

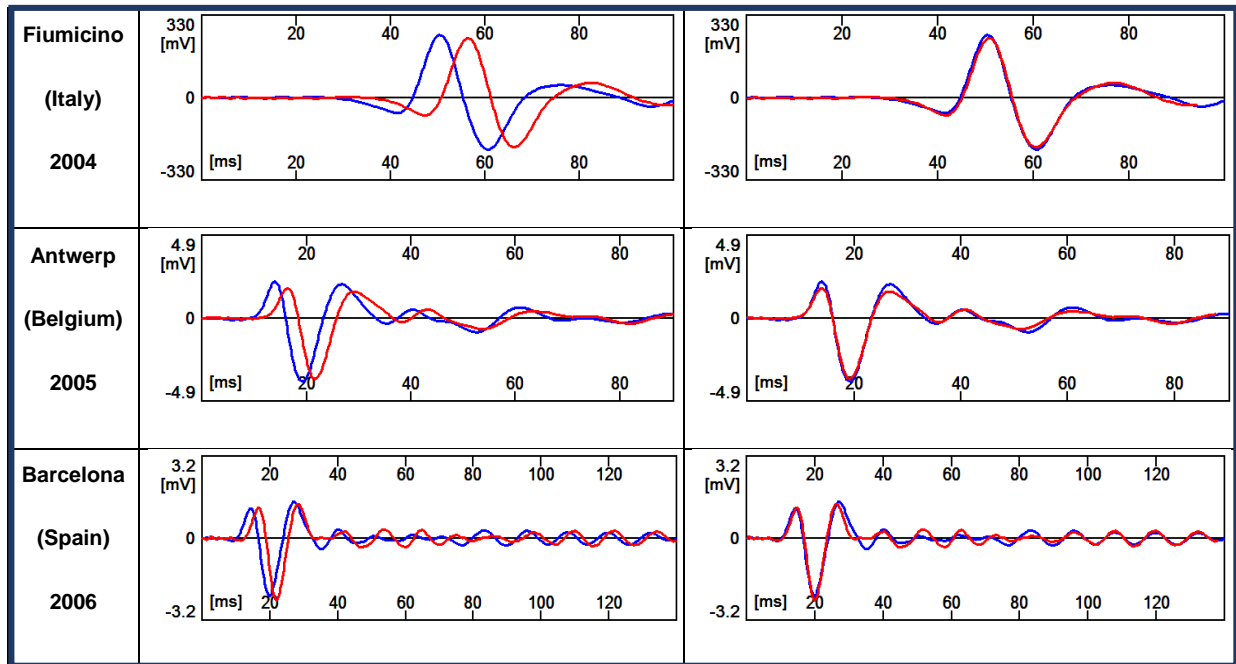


Figure 2.2: Vs wave re-phasing.

The maximum shear modulus, G_0 is calculated directly from the measured shear wave velocities on site, using the equation from Elastic Theory:

$$G_0 = \rho V_s^2$$

where

ρ is mass density of the soil, estimated based on *Marchetti & Crapps, 1981* chart.

V_s and G_0 results are presented alongside the CPT results in the Seismic Log in *Appendix B*.

All seismogram data and tabular data are presented in *Appendix C*.

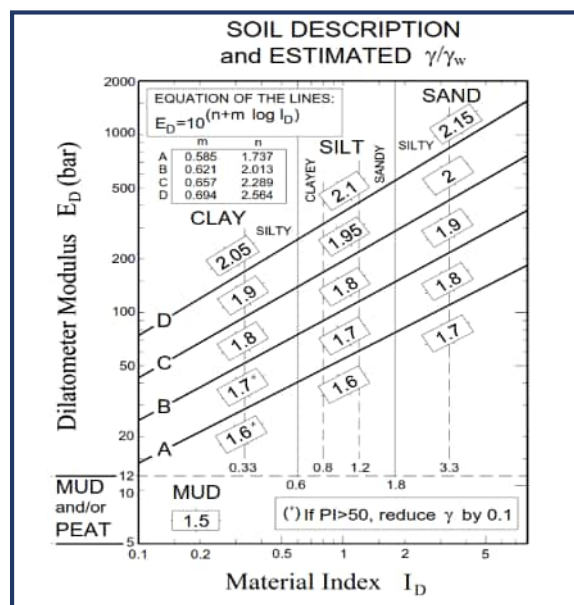


Figure 2.3: Soil estimated unit weight after *Marchetti & Crapps, 1981*

3.0 CONE PENETRATION MEASURED PARAMETERS

All measured parameters of tests carried with the CPTU cone are shown in *Appendix B* and all the information about data processing and results are given in sections 3.1, 3.2 and 3.3.

3.1 DATA PROCESSING

The measured parameters, cone end resistance, q_c , sleeve friction, f_s , porewater pressure measurements with filter in shoulder position, u_2 and inclination for x and y axis, l_x , l_y , were recorded for every 10 mm of penetration keeping a constant speed of 20 mm/s \pm 5 mm/s, which may slightly change when the cone is penetrating hard strata.

The measured data from the site works is processed and presented using specialised CPT software. The interpretations on the CPTU results were carried out following the recommendations of *ISO 22476-1:2021(E)*, *Lunne et al. (1997)* and *Robertson (2015)*. Measured parameters, mentioned in *Sections 3.2* and *3.3*, were used to derive all the geotechnical parameters, which are presented in *Chapter 4.0*. The soil behaviour type method used on this report is *Robertson et al. (1986)*, shown in *Figure 3.2*.

3.1.1 Zero Measurements

Before and after each CPTU test, zero measurements are recorded for each channel of the cone. The zero measurements are presented on the logs in *Appendix B*. This is a routine quality check carried out on site.

3.2 MEASURED PARAMETERS

3.2.1 Cone Resistance (q_c)

Cone resistance, q_c , is measured as the total force acting on the cone, divided by the projected area of the cone. The results are presented in MPa, on *CPT Log 01*, in *Appendix B*, scale 0-20 MPa with a minor scale printing on the same graph at 0-4 MPa.

3.2.2 Sleeve Friction (f_s)

Sleeve friction, f_s , is measured as the total frictional force acting on the friction sleeve divided by its surface area. The results are presented in kPa, on *CPT Log 01*, in *Appendix B*, using a scale of 0-500 kPa.

3.2.3 Porewater pressure (u_2)

The pore pressure, u_2 , is measured during the test. If the material is free draining and saturation is maintained it will normally measure hydrostatic pore pressure. In materials that are not free draining, it will record the total pore pressure (hydrostatic plus any excess pore pressures generated) created by the cone penetration through this material.

The filter element can be mounted in one of three positions. For all tests carried out in this project the filter was mounted in the u_2 position (see *Figure 3.1*).

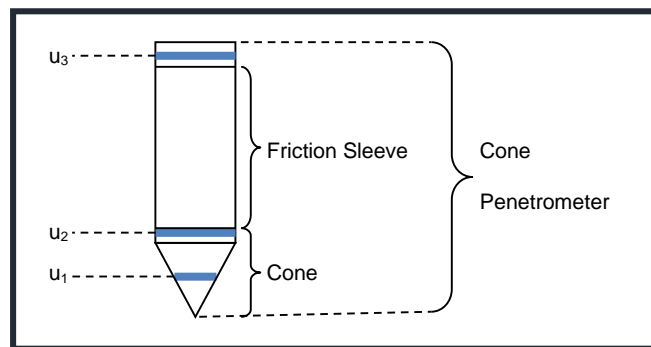


Figure 3.1: Diagram showing pore pressure filter locations (after Lunne et al., 1997)

3.2.4 Inclination (I_x, I_y)

The CPT rig was set up to obtain a thrust direction as near as possible to vertical. The CPTU cones have inclinometers incorporated to measure the non-verticality of the test. For test depths less than 15 m, significant non-verticality is unusual, provided the initial thrust direction is vertical.

3.3 ESTIMATED SOIL BEHAVIOUR TYPE

3.3.1 Friction Ratio (R_f)

The friction ratio, R_f is the ratio between the sleeve friction and the cone resistance (Lunne et al., 1997).

$$\text{Friction Ratio } (R_f) = \left(\frac{\text{Sleeve Friction } (f_s)}{\text{Cone Resistance } (q_c)} \right) \times 100$$

3.3.2 Estimated Soil Behaviour Type (SBT)

The estimation of soil behaviour type, *SBT*, using measurements of cone resistance and sleeve friction is based upon the variations of the friction ratio and cone resistance. The friction

ratio varies depending upon whether the soil is cohesive or granular. The cone resistance varies depending on the strength and densities of the soil.

The interpretation used in this report is *Robertson et al. (1986)*, which is shown in Figure 3.2. The results are presented on *CPT Log 01*, in *Appendix B*.

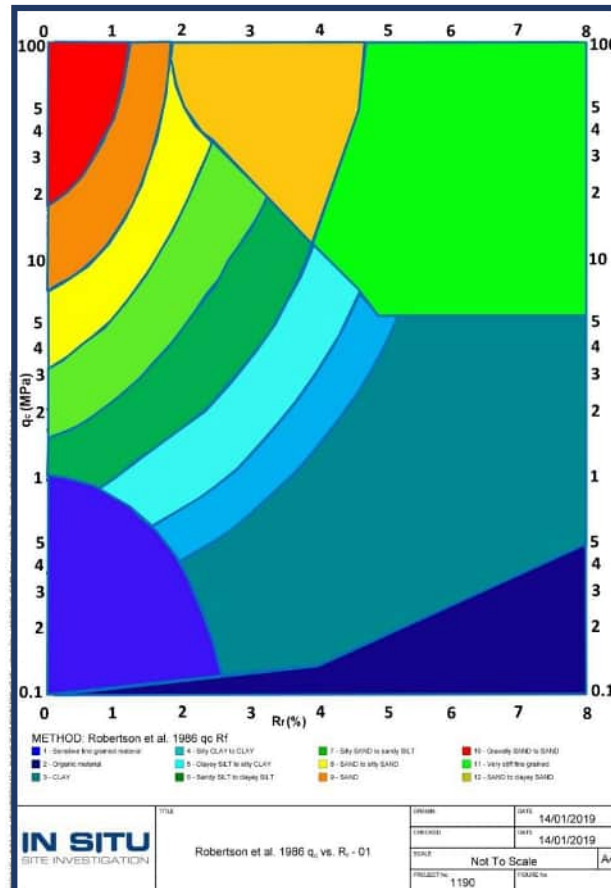


Figure 3.2: *Robertson et al., 1986 soil behaviour type chart.*

3.3.3 Pore Pressure Ratio (B_q)

Pore pressure ratio, B_q is the ratio between the measured pore pressure generated during penetration and the corrected cone resistance minus the total overburden stress.

Pore pressure ratio as defined by *Senneset and Janbu (1985)* is defined as:

$$B_q = \frac{u_2 - u_0}{q_t - \sigma_{vo}}$$

where

- u_2 is pore pressure measured between the cone and the friction sleeve
- u_0 is equilibrium pore pressure
- σ_{vo} is total overburden stress
- q_t is cone resistance corrected for unequal end area effects

3.4 APPLIED CORRECTIONS

3.4.1 Corrected Cone Resistance (q_t)

For each penetration test, the measured cone resistance, q_c , can be corrected for the “unequal area effect” due to the influence of the ambient pore water pressure acting on the cone.

The correction has been applied using the following equation by Lunne et al., 1997:

$$q_t = q_c + [u_2 \cdot (1 - \alpha)]$$

where

α is the cone area ratio

The cone used on this project has a cone area ratio of 0.79. This value is geometrically measured.

3.4.2 Depth Correction

All tests in the report have been corrected for depth difference caused by inclination. This has been calculated using the method described in ISO 22476-1:2012.

To calculate the corrected depth the following formula is used:

$$z = \int_0^l C_{inc} \cdot dl$$

where

z is penetration depth, in m

l is penetration length, in m

C_{inc} is correction factor for the effect of the inclination of the CPTU relative to the vertical axis.

The equation for calculating the correction factor for the influence of the inclination for a bi-axial inclinometer is:

$$C_{inc} = \frac{1}{\sqrt{(1 + \tan^2 \beta_1 + \tan^2 \beta_2)}}$$

where

β_1 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees

β_2 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1 , in degrees

4.0 GEOTECHNICAL DERIVED PARAMETERS

A number of empirical correlations can be used to derive geotechnical parameters from CPTU data. This report includes only the parameters which are described in this chapter. The results of all correlations used to obtain the geotechnical derived parameters are presented on *CPT Log 02* and *CPT Log 03* in *Appendix B*.

Please, note that each empirical correlation is derived for a certain type of soil, and may not be appropriate for all the soil types encountered on this project.

4.1 SOIL BEHAVIOUR TYPE INDEX (I_c)

The soil behaviour type index, I_c , was derived by *Jefferies and Davies (1991)*, and was created to simplify the application of CPTU SBT chart shown in *Chapter 3, Figure 3.2*. This approach has been modified for use with the *Robertson (1990)* normalised CPT soil classification chart, *Figure 4.1*. The normalised cone parameters Q_t and F_r (for definitions see *Appendix A5 Symbol List*) can be combined into one Soil Behaviour Type Index, I_c , (*Lunne et al., 1997*).

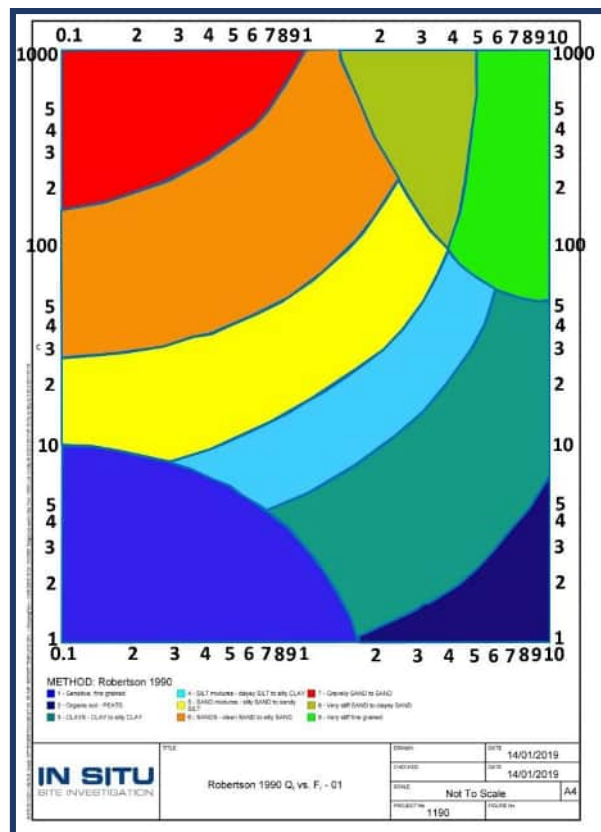


Figure 4.1: Robertson 1990 soil behaviour type chart.

The soil behaviour type index, I_c , can then be defined using *Robertson (2010)* formula, given below:

$$I_c = ((3.47 - \log Q_t)^2 + (\log F_r + 1.22)^2)^{0.5}$$

where

Q_t is the normalized cone resistance which represents the simple normalization with a stress exponent (n) of 1.0, which applies well to clay-like soils

F_R is the normalized friction ratio, in %

The boundaries of soil behaviour type are then given in terms of the index, I_c , presented in *Table 4.1* below.

The soils behaviour type index does not apply to zones 1, 8 and 9. The profiles of I_c provide a simple guide to the continuous variation of soil behaviour type in a given soil profile based on CPTU results, with a reliability greater than 80% compared with soil samples (*Robertson, 2015*).

Zone	Soil Behaviour Type	I_c
1	Sensitive fine grained	N/A
2	Organic Soils – clay	>3.6
3	Clays – silty clay to clay	2.95 – 3.6
4	Silt mixtures – clayey silt to silty clay	2.60 – 2.95
5	Sand mixtures – silty sand to sandy silt	2.05 – 2.6
6	Sands – clean sand to silty sand	1.31 – 2.05
7	Gravelly sand to dense sand	<1.31
8	Very stiff sand to clayey sand*	N/A
9	Very stiff fine grained *	N/A

* Heavily over consolidated or cemented

Table 4.1: Normalized CPTU Soil Behaviour Type (SBT_n) Index values, I_c . (*Robertson, 2010*)

4.2 N VALUE OF STANDARD PENETRATION TEST (SPT) (N_{60})

The derived N value of SPT, N_{60} , is strongly and directly related to the cone resistance, q_c .

In this report the N_{60} value is derived using the following correlations, developed by *Robertson and Wride (1998)*, *Jefferies and Davies (1998)* and *Robertson (2012)*:

- 1) *Robertson & Wride (1998)*

$$N_{60} = \frac{q_c}{8.5 \cdot p_a \left(1 - \frac{I_c}{4.6}\right)}$$

- 2) *Jefferies and Davies (1993)*

$$N_{60} = \frac{q_c}{0.85 \cdot \left(1 - \frac{I_c}{4.75}\right)}$$

- 3) *Robertson (2012)*

$$N_{60} = \frac{\frac{q_c}{p_a}}{10^{1.1268 - 0.2817I_c}}$$

where

- q_c is the cone resistance
- p_a is the atmospheric pressure equal to 100 kPa
- I_c is the soil behaviour type index calculated as given in *section 4.1*

It is suggested that these methods provide a better estimation of the N_{60} value than the actual measured N , due to the poor repeatability of SPT test. However, in fine grained soil with high sensitivity these methods may overestimate N_{60} (*Jefferies and Davies, 1991*). The third method suggested by *Robertson (2012)* provides improved estimates of N_{60} for insensitive clays.

4.3 RELATIVE DENSITY (D_r)

Relative density, D_r , is an intermediate parameter for coarse grained soils, widely used to describe sand deposits. All the research on deriving the relative density from CPTU tests results are carried out for **clean predominantly quartz sands**. The studies have shown that CPTU resistance in granular soils is controlled by sand relative density, in situ effective stresses and compressibility. The more compressible sands tend to give lower penetration resistance for a given relative density than less compressible sands.

In this report relative density is calculated using the methods suggested by *Baldi et al., (1986)*, *Jamiolkowski et al., (2001)* and *Kulhawy and Mayne (1990)* as shown in the equations below:

1) Baldi et al., (1986)

$$D_r = \frac{1}{C_2} \cdot \ln \left(\frac{q_c \cdot Wehr}{C_1 \cdot (\sigma'_{v0})^{0.55}} \right) \cdot 100$$

where

C_1 is a consolidation coefficient which is 157 for normally consolidated soils and 181 for over consolidated soils

C_2 is a consolidation coefficient which is 2.41 for normally consolidated soils and 2.46 for over consolidated soils

Wehr is a correction coefficient for calcareous soils

2) Jamiolkowski et al., (2001)

$$D_r = 100 \cdot \left[0.268 \cdot \ln \left(\frac{q_t / \sigma_{atm}}{\sqrt{\sigma'_{v0} / \sigma_{atm}}} \right) + C_1 \right]$$

where

C_1 is a compressibility coefficient which is -0.675 for average compressible soils, ≤ 1.0 for high compressible soils and carbonate or calcareous sands and ≥ -2.0 for low compressible soils

q_t is corrected cone resistance

σ_{atm} is the atmospheric pressure

3) Kulhawy and Mayne, (1990)

$$D_r = \left[\frac{q_{c1}}{305 \cdot C_1 \cdot OCR^{0.18} \cdot (1.2 + 0.05 \cdot \log(t/100))} \right]^{0.5} \cdot 100$$

where

q_{c1} is the cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{c1} = \frac{q_c}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

where

q_c is the cone resistance in kPa

σ'_{v0} is the initial vertical effective stress in kPa

C_1 is a compressibility coefficient which is -0.91 for low compressible sands, 1.0 for medium compressible sands and 1.09 for high compressible sands

t is time in years

4.4 FRICTION ANGLE (ϕ')

Friction angle, ϕ' , is used to express the shear strength of uncemented, coarse grained soils. In this report friction angle is derived by the correlations of *Mayne and Campanella (2005)*, *Robertson and Campanella (1983)* and *Kulhawy and Mayne (1990)*.

- 1) Mayne and Campanella, (2005)

$$\phi' = 29.5^0 \cdot B_q^{0.121} \cdot [0.256 + 0.336 \cdot B_q + \log Q_t]$$

where

B_q is the pore pressure ratio, calculated as in Session 3.3

Q_t is the normalized cone resistance

- 2) Robertson and Campanella, (1983)

$$\phi' = \tan^{-1} \left(0.1 + 0.38 \cdot \log \left(\frac{q_c}{\sigma'_{v0}} \right) \right)$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

- 3) Kulhawy and Mayne, (1990)

$$\phi' = 17.6^0 + 11.0^0 \cdot \log(q_{t1})$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

The method suggested by *Mayne and Campanella (2005)* will not provide reliable results for heavily over consolidated soils, fissured geomaterials and highly cemented or structures clays. This approach gives reliable results when pore pressure is positive and varies $0.1 < B_q < 1.0$. The correlation suggested by *Robertson and Campanella (1983)* estimates the peak friction angle for uncemented, unaged, moderately compressible, predominately quartz sands. For sands of higher compressibility, the method will tend to predict low friction angles. The method suggested by *Kulhawy and Mayne (1990)* is an alternate relationship for clean, rounded, uncemented, quartz sands.

4.5 FINES CONTENT (FC)

The fines content, FC , in this report is estimated using two different methods, one from *Robertson and Wride (1998)* and the other, *Suzuki et al. (1998)* as presented below:

- 1) Robertson and Wride (1998)

$$I_c < 1.26: FC = 0$$

$$1.26 \leq I_c \leq 3.5: FC(\%) = 1.75I_c^{3.25} - 3.7$$

$$3.5 < I_c: FC = 100\%$$

- 2) Suzuki et al. (1998)

$$FC(\%) = 2.8I_c^{2.6}$$

where

I_c is the soil behaviour type index, calculated as in section 4.1

4.6 UNDRAINED SHEAR STRENGTH (s_u)

Estimation of undrained shear strength, s_u , from CPTU tests using corrected cone resistance is carried out using the following correlation from *Lunne et al. (1981)*:

$$S_u = \frac{(q_t - \sigma_{v0})}{N_{kt}}$$

where

N_{kt} is the empirical cone factor, which varies from 10 (6 for very soft sensitive fine grained soils) to 20. In this report 3 values are considered: 15, 17.5 and 20. N_{kt} tends to increase with increasing plasticity and decrease with increasing soil sensitivity. It decreases as B_q increases. (*Lunne et al., 1997*)

σ_{v0} = total overburden stress.

This report only presents the undrained shear strength data on soils with soil behaviour type index, I_c values greater than 2.60.

The value of undrained shear strength, s_u to be used in analysis depends on the design problem. In general, the simple shear in the direction of loading often represents the average undrained strength. For larger, moderate to high risk projects, where high quality field and laboratory data may be available, site specific correlations should be developed based on appropriate and reliable values of s_u .

4.7 SENSITIVITY (S_t)

The sensitivity, S_t of clays is defined as the ratio of undisturbed peak undrained shear strength to totally remoulded undrained shear strength.

In this report S_t is calculated using two correlations developed by *Schmertmann (1978)* and *Mayne (2007)*.

- 1) Schmertmann (1978)

$$S_t = \frac{s_u}{s_{u(rem)}} = \frac{q_t - \sigma_v}{N_{kt}} \left(\frac{1}{f_s} \right)$$

where

$s_{u(rem)}$ is the remoulded undrained shear strength. It can be assumed equal to the sleeve resistance, f_s .

- 2) Mayne (2007)

$$S_t = \frac{0.073 \cdot (q_t - \sigma_{v0})}{f_s}$$

For relatively sensitive clays, $S_t > 10$, the value of f_s can be very low and not very accurate, hence the estimate of sensitivity should be used as a guide only.

4.8 SOIL UNIT WEIGHT (γ)

Soil unit weight, γ in this report is calculated by using one method for sands, considered under dry conditions and two methods for clays, considered under saturated conditions. These relationships are developed by *Mayne (2007)* and the equations are presented below:

Dry unit weight for sands:

$$\gamma_{dry} = 1.89 \cdot \log(q_{t1}) + 11.82$$

Saturated unit weight for clays method 1

$$\gamma_{sat} = 8.32 \cdot \log(V_s) - 1.61 \cdot \log(z)$$

Saturated unit for clays method 2

$$\gamma_{sat} = 2.60 \cdot \log(f_s) + 15 \cdot G_s - 26.5$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula:

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

z is the depth

V_s is the shear wave velocity, calculated as $V_s = 118.8 \cdot \log(f_s) + 18.5$
 G_s is the specific gravity of solids, typically between 2.40 and 2.90

4.9 STATE PARAMETER (ψ)

The state parameter, ψ is defined as the difference between the current void ratio, e and the void ratio at critical state e_{cs} , at the same mean effective stress for granular soils.

The problem of evaluating the state parameter from CPTU response is complex and depends on several soil parameters, including shear stiffness, shear strength, compressibility and plastic hardening. (*Jefferies and Been, 2006*)

In this report, the state parameter is calculated based on five methods as follows:

- 1) Been et al. (1987)

$$\psi = -\frac{\ln\left(\frac{Q_p}{k}\right)}{m}$$

$$Q_p = \left(\frac{3Q_t}{1 + 2K_0}\right)$$

where

Q_t is the normalized cone resistance
 K_0 is the coefficient of lateral earth pressure

- 2) Shuttle and Jefferies (1998)

$$\psi = -\frac{\ln\left(\frac{Q_p}{k}\right)}{m}$$

where

$$k = \left((3.79 + 1.12 \ln(I_r)) (1 + 1.06(M - 1.25)) (1 - 0.30(N - 0.2)) (H/1000)^{0.326} (-1.55(\lambda - 0.01)) \right)^{1.45}$$

$$m = 1.45(1.04 + 0.46 \ln(I_r)) (1 - 0.4(M - 1.25)) (1 - 0.30(N - 0.2)) (H/100)^{0.15} (1 - 2.21(\lambda - 0.01))$$

where

Q_t is the normalised cone resistance
 I_r is rigidity index
 K_0 is the coefficient of lateral earth pressure
 M is critical state ratio
 N is dilation parameter
 H is plastic hardening modulus;
 λ is slope CSL line

3) Shuttle and Jefferies (1998)

The state parameter calculated according this third method is similar to state parameter calculated as presented in the second method, except for the rigidity index that is calculated as follows:

$$I_r = I_{r100} \left(\frac{P_a}{\sigma'_{v0}} \right)^{0.5}$$

where

I_{r100} is rigidity index in reference pressure
 P_a is the reference pressure equal to 100 kPa
 σ'_{v0} is effective vertical overburden stress

4) Plewes (1992)

$$\psi = - \frac{\ln \left(\frac{Q_p / (1 - B_q)}{k'} \right)}{m'}$$

where

$$k' = M \left(3 + \frac{0.85}{\lambda} \right)$$

$$m' = 11.9 - 13.3\lambda$$

$$\lambda = \frac{F_r}{10}$$

where

Q_t is the normalised cone resistance
 B_q is pore pressure ratio
 K_0 is the coefficient of lateral earth pressure
 F_R is normalised friction ratio
 M is critical state ration

5) Been and Jefferies (1992)

$$\psi = - \frac{\ln \left(\frac{Q_p / (1 - B_q)}{k'} \right)}{m'}$$

where

$$k' = M \left(3 + \frac{0.85}{\lambda} \right)$$

$$m' = 11.9 - 13.3\lambda$$

$$\lambda = \frac{1}{34 - 10I_c}$$

For high-risk projects a detailed interpretation of CPTU results using laboratory results and numerical modelling can be appropriate (e.g. *Shuttle and Cunning, 2007*), although soil

variability can complicate the interpretation procedure. For low risk projects and in the initial screening for high-risk projects there is a need for a simple estimate of soil state.

Plewes et al (1991) provided a mean to estimate soil state using the normalised soil behaviour type, *SBT_n* chart suggested by *Jefferies and Davies (1991)*. *Jefferies and Been (2006)* suggested that soils with a state parameter less than -0.05 are dilative at large strains.

4.10 IN SITU STRESS RATIO (K_0)

There are various estimations to determine in situ stress ratio, K_0 , from CPTU in fine grained soils. In this report the methods suggested by *Mayne (2007)* and *Kulhawy and Mayne (1990)* are used, as given below:

- 1) Mayne (2007)

$$K_0 = (1 - \sin\phi')OCR^{\sin\phi'}$$

$$\text{Max } K_0 = K_p = \frac{(1 + \sin\phi')}{(1 - \sin\phi')}$$

$$K_0 = 0.192 \left(\frac{q_t}{\sigma_{atm}} \right)^{0.22} \left(\frac{\sigma_{atm}}{\sigma_{v0}} \right)^{0.22} OCR^{0.27}$$

where

OCR is the overconsolidation ratio, calculated as presented in session 4.12

- 2) Kulhawy and Mayne (1990)

$$K_0 = 0.1 \left(\frac{q_t - \sigma_{v0}}{\sigma_{v0}'} \right)$$

These approaches are generally limited to mechanically overconsolidated, fine grained soils. As considerable scatter exists in the database used for these correlations, in moderate to high risk projects further tests should be performed and these correlations must be considered only as a guide.

4.11 OVERCONSOLIDATION RATIO (OCR)

Overconsolidation ratio, *OCR* is defined as the ratio of the maximum past effective consolidation stress and the present effective overburden stress:

$$OCR = \frac{\sigma'_p}{\sigma'_{v0}}$$

This definition is appropriate for mechanically overconsolidated soils, where the only change has been the removal of overburden stress. For cemented and aged soils, the *OCR* may represent the ratio of the yield stress and the present effective overburden stress.

In this report σ'_p is calculated based on six methods as presented below:

- 1) Mayne (1995)

$$\sigma'_p = 0.33(q_t - \sigma_{v0})$$

- 2) Chen and Mayne (1996)

$$\sigma'_p = 0.53\Delta u$$

- 3) Mayne (2005)

$$\sigma'_p = 0.6(q_t - u_2)$$

- 4) Robertson (2009)

$$\sigma'_p = 0.25(Q_t^{1.25} - \sigma'_{v0})$$

- 5) Mayne (2005)

$$\sigma'_p = \left[\frac{0.192 \left(\frac{q_t}{\sigma_{atm}} \right)^{0.125}}{(1 - \sin\phi') \left(\frac{\sigma'_{v0}}{\sigma_{atm}} \right)^{0.31}} \right]^{\left(\frac{1}{\sin\phi' - 0.27} \right)} \sigma'_{v0}$$

- 6) Mayne (2007)

$$\sigma'_p = 0.101 \sigma_{atm}^{0.102} (G_0)^{0.478} \sigma'_{v0}{}^{0.420}$$

For larger, moderate to high risk projects, where additional high-quality field and laboratory data may be available, site specific correlations should be developed based in consistent and relevant values of *OCR*.

4.12 SMALL STRAIN YOUNG'S MODULUS (E_0)

Deriving small strain undrained Young's modulus, E_0 , from CPTU is difficult. There is insufficient data available to make a direct correlation and it is recommended that c_u should be derived, then E_U estimated as a rough order of value from one of the available correlations between E_U and c_u (Meigh, 1987).

In this report the small strain Young's modulus is derived as follows:

- 1) Defined from elastic theory:

$$E_0 = 2(1 + \nu)G_0$$

where

- ν is the Poisson ratio, equal to 0.2
- G_0 is the small strain shear modulus calculated by the formula given below:

$$G_0 = 1634 \left(\frac{q_c}{\sqrt{\sigma'_{v0}}} \right)^{-0.75} q_c$$

- 2) Calculated based on the degree of loading, q_c , effective stress and reduction factor

$$E_0 = \alpha q_c$$

where

- α is calculated from degree of loading, q_c , effective stress and reduction factor, given in *Figure 4.2*

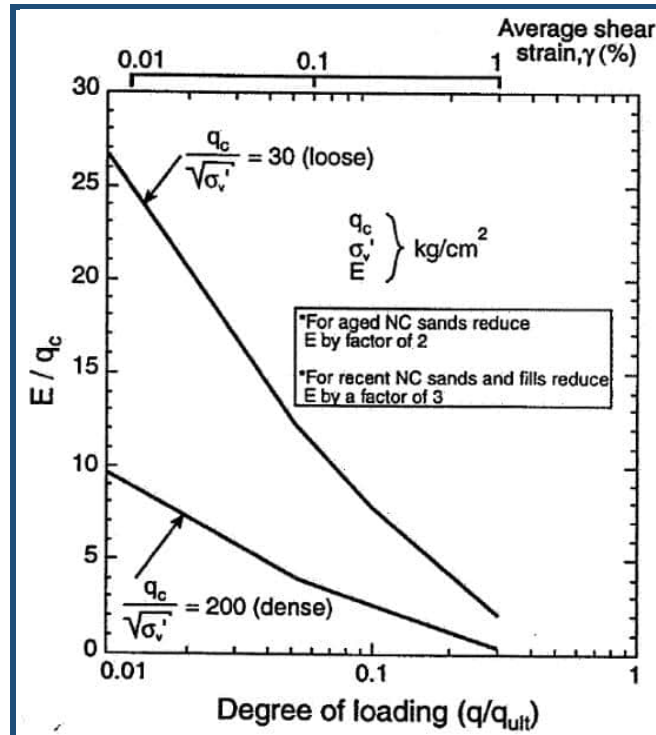


Figure 4.2: Estimation of equivalent Young's modulus for sand based on degree of loading
(Robertson, 1990)

4.13 CONSTRAINED MODULUS (M)

Constrained Modulus, M , can be estimated by CPTU using the following empirical relationship:

$$M = \alpha_M (q_t - \sigma_{v0})$$

where

α_M varies with soil plasticity and natural water content for a wide range of fine-grained soils and organic soils. *Meigh (1987)* suggested that α_M lies in the range of 2 to 8, whereas *Mayne (2001)* suggested the value of 5.

Robertson (2001) suggested that α_M varies with Q_t , such that:

When $I_c > 2.2$ (fine grained soils) use: $\alpha_M = Q_t$ when $Q_t < 14$

$\alpha_M = 14$ when $Q_t > 14$

When $I_c < 2.2$ (coarse grained soils) use: $\alpha_M = 0.0188[10^{(0.55I_c+1.68)}]$

In this report the Constrained Modulus, M , is calculated after *Kulhawy and Mayne (1990)* using the equation below:

$$M = 8.25(q_t - \sigma_{v0})$$

Also, an alternative method is included in the results, developed by *Burns and Mayne (2002)* using the following relationship:

$$M = 0.02G_0$$

4.13.1 Equivalent Oedometer Coefficient of Compressibility (m_v)

Equivalent oedometer coefficient of compressibility, m_v can be calculated directly by the Constrained Modulus, M , as follows:

$$m_v = \frac{1}{M}$$

4.14 SMALL STRAIN SHEAR MODULUS (G_0)

In this report the small strain shear modulus, G_0 , is calculated from the measured V_s on site as explained in *Section 2.4* (or Elastic Theory) and also derived using the correlation developed by *Rix and Stoke (1992)*.

- 1) Rix and Stoke (1992)

$$G_0 = 1634 \left(\frac{q_c}{\sqrt{\sigma'_{v0}}} \right)^{-0.75} q_c$$

where

q_c is the net cone tip resistance in kPa
 σ'_{v0} is the effective initial vertical stress in kPa
 γ_{bulk} is the bulk density of the soil
 V_s is the shear wave velocity

This correlation of G_0 is applicable to all soil types.

4.15 RIGIDITY INDEX (I_R)

The rigidity index, I_R , for fine grained soils is defined using the following formula, developed by *Mayne (2001)*:

$$I_R = \exp\left[\left(\frac{1.5}{M} + 2.925\right)\left(\frac{q_t - \sigma_{v0}}{q_t - u_2}\right)\right] - 2.925$$

where

M is the Cam-Clay constant, slope of the critical state line defined as:

$$M = \frac{6 \sin \phi'}{3 - \sin \phi'}$$

where

ϕ' is the internal friction angle.

The second method used to define the rigidity index, I_R , for fine grained soils is based on plasticity index and overconsolidation ratio, OCR and calculated after the relationship developed by *Keaveny and Mitchell (1986)* as follows:

$$I_R = \frac{\exp(0.0435(137 - PI))}{[1 + \ln\{1 + 0.385(OCR - 1)^{3.2}\}]^{0.8}}$$

where

PI is the plasticity index of the soil, equal to 20.

OCR is the overconsolidation ratio of the soil

A third method to estimate the Rigidity Index is by using the Small Shear Strain Modulus, G_0 from seismic tests and the Undrained Shear Strength, s_u derived from *Lunne et al. (1997)* as explained in *Section 4.6* for cone factor $N_k = 15$, using the correlation below:

$$I_R = \frac{G_0}{s_u}$$

4.16 CONSOLIDATION CHARACTERISTICS (ch and cv)

All results for consolidation characteristics calculated from dissipation tests measurements using the formulas below are presented in *Dissipation Graphs in Appendix B*.

The coefficient of consolidation is interlinked with the hydraulic conductivity through the formula below:

$$c = \frac{kM}{\gamma_w}$$

where

- M is the 1-D constrained modulus relevant to the problem (i.e. unloading, reloading, virgin loading, etc)
- γ_w is the unit weight of water
- k is the hydraulic conductivity

In geotechnical practice it is very difficult to measure *coefficient of consolidation* and *permeability of soils*. Due to soil anisotropy *c* and *k* have different values in the horizontal, c_h and k_h and vertical c_v and k_v directions. The relevant design values depend on drainage and loading direction.

The coefficient of consolidation can be estimated from dissipation data and should be interpreted at 50% degree of dissipation, using the following formula below:

$$c = \left(\frac{T_{50}}{t_{50}}\right)r_0^2$$

where

- T_{50} is theoretical time factor
- t_{50} is measured time for 50% degree of dissipation
- r_0 is penetrometer radius

In soils of very low permeability the time for dissipation can be decreased by using smaller diameter probes. A theoretical solution for these cases is given by *Teh and Houlsby (1991)* and it is compared with data from around the world by *Robertson et al. (1992)*, as shown in *Figure 4.3*.

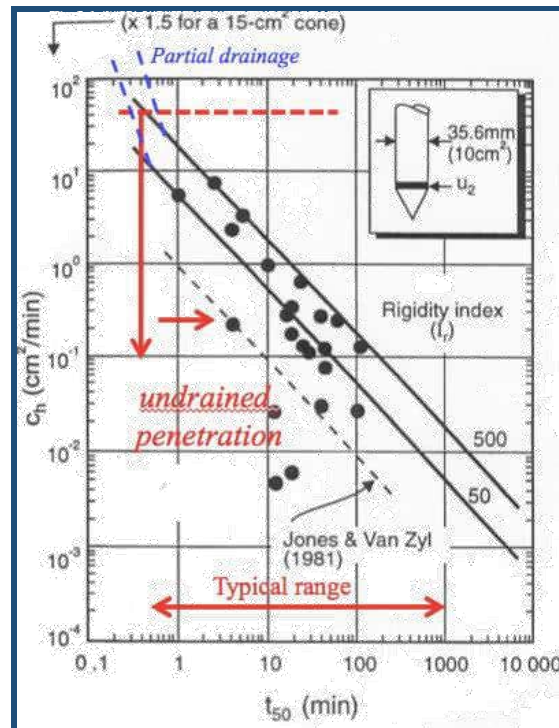


Figure 4.3: Average laboratory c_h values and CPTU results

(after Robertson et al. 1992, Teh and Houlsby theory shown as solid lines for $I_R = 50$ and $I_R = 500$).

c_h estimation is controlled by soil stress history, sensitivity, anisotropy, rigidity index (relative stiffness), fabric and history. In overconsolidated soils, the pore pressure behind the cone tip can be low or negative, results in dissipation data that can initially rise before decreasing to the equilibrium values. Care is required to ensure the dissipation test to end at the right moment of time, not stopped prematurely after the initial rise.

An approximate estimate of the coefficient of consolidation in the vertical direction can be obtained using the ratios of permeability in the horizontal and vertical directions as follows:

$$c_v = c_h \left(\frac{k_v}{k_h} \right)$$

Jamiolkowski et al. (1985) presented the range of field values (Table 4.4), which can be used to estimate k_v from k_h .

Based on the table below, the nature of clay for this site is considered no macrofabric, or only slightly developed macrofabric, essentially homogenous deposits, so the ratio use is k_h/k_v equal to 1.25 and the ratio c_h/c_v used for calculation purposes in this report is equal to 1.25.

Nature of clay	k_h/k_v
No macrofabric, or only slightly developed macrofabric, essentially homogeneous deposits	1 to 1.5
From fairly well to well-developed macrofabric, e.g. sedimentary clays with discontinuous lenses and layers of more permeable material	2 to 4
Varved clays and other deposits containing embedded and more or less continuous permeable layers	3 to 15

Table 4.4: Range of field values of k_h/k_v for soft clays (from Jamiolkowski et al., 1985).

Estimation of soil permeability from CPTU and dissipation data is subject to much uncertainty and should be used as a guide only.

4.17 HYDRAULIC CONDUCTIVITY (k)

Hydraulic conductivity or coefficient of permeability, k , based on Soil Behaviour Type Index, I_c , can be estimated from the following relationships:

When $1.0 < I_c \leq 3.27$ $k = 10^{(0.952 - 3.04I_c)}$
 When $3.27 < I_c \leq 4.0$ $k = 10^{(-4.52 - 1.37I_c)}$

However, in this report the hydraulic conductivity is estimated from 2 soil behaviour classification charts, *Robertson et al. (1986)* and *Robertson et al. (1990)* presented in Table 4.3 and 4.4, respectively.

SBT Zone	Soil Behaviour Type (SBT)	Range of hydraulic conductivity, k (m/s)
1	Sensitive fine grained	3×10^{-9} to 3×10^{-8}
2	Organic soils	1×10^{-8} to 1×10^{-6}
3	Clay	1×10^{-10} to 1×10^{-9}
4	Silty CLAY to CLAY	3×10^{-9} to 1×10^{-8}
5	Clayey SILT to silty CLAY	1×10^{-8} to 1×10^{-7}
6	Sandy SILT to clayey SILT	1×10^{-7} to 1×10^{-6}
7	Silty SAND to sandy SILT	1×10^{-5} to 1×10^{-6}
8	SAND to silty SAND	1×10^{-5} to 1×10^{-4}
9	SAND	1×10^{-4} to 1×10^{-3}
10	Gravelly SAND to SAND	1×10^{-3} to 1
11	Very stiff fine grained	1×10^{-8} to 1×10^{-6}
12	SAND to clayey SAND	3×10^{-7} to 3×10^{-4}

Table 4.3: Estimated soil permeability (k) based on SBT chart by Robertson et al. (1986)

SBT Zone	Soil Behaviour Type (SBT)	Range of hydraulic conductivity, k (m/s)
1	Sensitive fine grained	3×10^{-9} to 3×10^{-8}
2	Organic soils	1×10^{-8} to 1×10^{-6}
3	Clay	1×10^{-10} to 1×10^{-9}
4	Silt Mixture	3×10^{-9} to 1×10^{-7}
5	Sand Mixture	1×10^{-7} to 1×10^{-5}
6	Sand	1×10^{-5} to 1×10^{-3}
7	Gravelly sands to dense sands	1×10^{-3} to 1
8	Very stiff sand to clayey sand	1×10^{-8} to 1×10^{-6}
9	Very stiff fine grained	1×10^{-8} to 1×10^{-6}

Table 4.4: Estimated soils' permeability (k) based on SBT chart by Robertson et al. (1990).

4.18 DERIVED SHEAR WAVE VELOCITY (V_s)

For the purpose of this project the Shear Wave Velocity is measured as explained in Section 2.4. However, by using various correlations from the literature it is possible to also derive the Shear Wave Velocity, V_s . In this report the derived V_s results generated using Mayne (2006), Hegazy and Mayne (1995), Mayne and Rix (1995) and Baldi et al. (1989) correlations.

- 1) Mayne (2006)

$$V_s = 118.8 \log f_s + 18.5$$

where

f_s is the measured sleeve friction *in kPa*

- 2) Hegazy and Mayne (1995)

$$V_s = (10.1 \log q_t - 11.4)^{1.67} \left(\frac{f_s}{q_t} \cdot 100 \right)^{0.3}$$

where

q_t, f_s are corrected cone resistance and measured sleeve friction, respectively *in kPa*

- 3) Mayne and Rix (1995)

$$V_s = 1.75 (q_t)^{0.627}$$

where

q_t is the corrected cone resistance *in kPa*

- 4) Baldi et al. (1989)

$$V_s = 277 (q_t)^{0.13} (\sigma'_{v0})^{0.13}$$

where

q_t, σ'_{v0} are corrected cone resistance and effective vertical stress, respectively *in kPa*

5.0 CPTU RESULTS APPLICATIONS

5.1 SOIL PROFILING AND APPLICATIONS IN GEOTECHNICAL DESIGN

5.1.1 Soil Behaviour Type

The major applications of CPTU are on *soil behaviour type and soil profiling*. Typically, the cone resistance, q_c is high in sands and low in clays, and the friction ratio, $R_f = f_s/q_t$ is low in sands and high in clays. The CPTU cannot be expected to provide accurate predictions of soil type based on *physical characteristics*, e.g. *grain size distribution*, but provides a guide to the *mechanical characteristics*, including: *strength, stiffness, and compressibility* of the soils, or the *soil behaviour type, SBT*.

The most commonly used CPTU soil behaviour type chart, suggested by *Robertson et al. (1986)* uses the basic CPTU measured parameters of cone resistance, q_c and friction ratio, R_f . The chart is global in nature and can provide reasonable predictions of soil behaviour type for CPTU testing. The expected overlap in some zones is modified in the interpretations of this report somewhat based on previous experience or local knowledge of the site.

Since both the penetration resistance and sleeve resistance increase with depth due to the increase in effective overburden stress, the CPTU data requires normalization for overburden stress for very shallow and/or very deep tests. A popular CPTU soil behaviour chart based on normalized CPTU data is firstly proposed by *Robertson (1990)*. The chart identifies general trends in ground response, such as: *increasing soil density, OCR, age and cementation* for granular soils, and *increasing stress history, OCR and soil sensitivity* for cohesive soils.

A more general normalized CPTU SBT chart, using large strain *soil behaviour* descriptions, proposed by *Robertson (2012)* is shown in *Figure 5.1*.

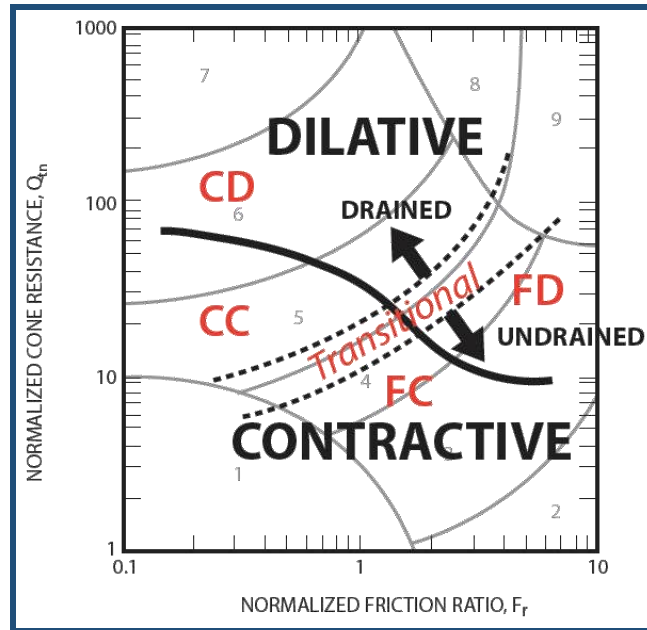


Figure 5.1: Normalized CPTU Soil Behaviour Type (SBT_n) chart, Q_{tn} - F_R using general large strain soil behaviour description (Robertson, 2012).

*

- CD is coarse grained dilative soil-predominately drained CPTU
- CC is coarse grained contractive soil-predominately drained CPTU
- FD is fine grained dilative soil-predominately undrained CPTU
- FC is fine grained contractive soil-predominately undrained CPTU

5.1.2 Soil Profiling

CPTU is an excellent test for soil profiling. The continuous monitoring of pore pressure during the cone penetration improves the soil stratigraphy descriptions. The pore pressure develops in response to the soil type being penetrated in the area where the pore pressure element is located. Soft, firm or stiff clays and contractive silts can show very high pore pressure. Very stiff overconsolidated clays and dilative silts can give very low or negative pore pressures same as very dense silty sands.

The thin layers of sand, or silt in a thick layer of clay, or thin layers of clay or silt in a thick layer of sand are easily distinguished during a CPTU test, which will give a response time sufficiently fast to observe pore pressure changes even in the very thin layers of soils (< 5mm), depending on the response of soil to the advancing of cone.

The sandy soils tend to produce high cone resistance and low friction ratio, whereas soft clayey soils tend to produce low cone resistance and high friction ratio. Organic soils such as peat tend to have very low cone resistance and very high friction ratio. Soils with high horizontal stresses (*high OCR*) tend to have higher cone resistance and friction ratio.

CPTU is an excellent tool to classify the soils based on their behaviour type, and not based on grain size distribution.

The measurement of sleeve friction, f_s is often less reliable than the measurement of cone resistance, q_c (Lunne *et al.*, 1986), but to overpass these problems pore pressure parameter ratio, B_{q_c} , and the classification charts based on it.

For more reliability in soil profiling, the soil interpretations in this report are carried out based on three parameters measured on site, cone resistance, sleeve friction and pore pressure and three derived geotechnical parameters soil behaviour type index for all soils, undrained shear strength for cohesive soils and relative density for granular soils.

Generally, soils that fall in zones 8, 9 and 10 of Robertson *et al.* (1986) chart (6 and 7 of Robertson (1990) chart) represent approximately drained penetration, whereas, soils in zones 1, 2, 3, 4, 5 and 6 of Robertson *et al.* (1986) chart (1, 2, 3 and 4 of Robertson (1990) chart) represent approximately undrained penetration. Soils in zones 7, 11 and 12 of Robertson *et al.* (1986) (5, 8 and 9 of Robertson (1990) chart) may represent partially drained penetration. The classification is often influenced by changes in *stress history, in situ stresses, sensitivity, stiffness, mineralogy, etc.* An advantage of pore pressure measurements during cone penetration is the ability to evaluate drainage conditions more directly. (Lunne *et al.*, 1997)

The information about the rate and manner of excess pore pressures during the dissipations significantly helps the accurate classification in the corresponding depths of dissipation tests. In very stiff, overconsolidated clayey soils, the pore pressure behind the cone is very low and sometimes negative of the equilibrium pore pressure, u_0 , whereas the pore pressure on the face of the cone is very large due to the large increase in normal stresses created by the cone penetration. When penetration is stopped in overconsolidated clays, pore pressure recorded behind the cone may initially increase before decreasing to the equilibrium pore pressure. The rise is caused by local equalization of the high pore pressure gradient around the cone.

Cone penetration in fine grained soils, such as clays and silts, is generally undrained. Cone penetration tests under undrained conditions generate high pore pressure and this reading is extremely useful, because it affects both cone resistance and sleeve friction measurements. These parameters should be corrected using the measured pore pressure.

CPTU in coarse grained soils, such as sandy or gravelly soils is generally drained. In these conditions there is no excess pore pressure generated as a result of cone penetration. Relative density has been used as the main parameter for description of sandy deposits.

5.1.3 Applications in geotechnical design

CPTU measured parameters are used to derive geotechnical parameters, which are the input in several geotechnical analyses. An alternate approach is to directly apply CPTU results to the geotechnical calculations.

As a guide, *Table 5.1* shows a summary of the applicability of CPTU results for direct design applications. The ratings shown in the table have been assigned based on current experience and represent a qualitative evaluation of the confidence level assessed to each design problem and general soil type. Details of ground conditions and project requirements can influence these ratings.

Type of soil	Pile Design	Bearing Capacity	Settlement	Compaction Control	Liquefaction
Sand	A-B	A-B	B-C	A-B	A-B
Clay	A-B	A-B	B-C	C-D	A-B
Intermediate Soils	A-B	B-C	B-C	B-C	A-B

Table 5.1: *Perceived applicability of CPTU for various direct design problems.*

- A is high
- B is high to moderate
- C is moderate
- D is moderate to low

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APPENDIX A

APPENDIX A1 – Project Summary Sheet

Piezocene Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Cone Used	Test Remarks
S3CPT01	3.65	31/10/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT01A	7.18	31/10/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT02	6.34	31/10/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT03	6.72	31/10/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT04	6.82	31/10/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT12	9.17	08/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT13	7.75	08/11/2022	S15-CFIP.2089	Test refused on inclination.
S3CPT14	9.18	09/11/2022	S15-CFIP.2089	Test refused on inclination.
S3CPT15	9.34	09/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT24	10.57	10/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT25	10.01	10/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT26	9.38	10/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT27	9.64	11/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT30	11.40	07/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT31	12.32	07/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT32	11.67	07/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT33	8.92	07/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT34	12.99	03/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT35	11.61	03/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT36	13.01	03/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT37	4.32	02/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT37A	9.32	02/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT38	3.62	03/11/2022	S15-CFIP.2089	Test stopped due to buckling rods.
S3CPT38A	3.89	03/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT38B	7.50	03/11/2022	S15-CFIP.2089	Test refused on inclination.
S3CPT40	6.89	10/11/2022	S15-CFIP.2089	Test refused on total pressure.
S3CPT41	4.36	10/11/2022	DP15-CFPTxy.71212	Test refused on total pressure.
S3CPT42	8.57	09/11/2022	S15-CFIP.2089	Test refused on total pressure.

S3SCPT05	4.12	01/11/2022	DP15-CFPTxy.71212	Test refused on total pressure.
S3SCPT05A	6.02	01/11/2022	DP15-CFPTxy.71212	Test refused on total pressure.
S3SCPT28	1.40	25/10/2022	S15-CFIP.2089	Test refused on tip resistance.
S3SCPT28A	1.50	25/10/2022	S15-CFIP.2089	Test refused on tip resistance.
S3SCPT28B	1.37	25/10/2022	S15-CFIP.2089	Test refused on tip resistance.
S3SCPT29	1.42	25/10/2022	S15-CFIP.2089	Test refused on tip resistance.
S3SCPT29A	1.53	25/10/2022	S15-CFIP.2089	Test refused on tip resistance.
S3SCPT29B	1.00	25/10/2022	S15-CFIP.2089	Test refused on tip resistance.

Seismic Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Number of seismic measurements
S3SCPT05	3.60	01/11/2022	6
S3SCPT05A	6.00	01/11/2022	10
S3SCPT41	3.90	10/11/2022	6
S3SCPT41A	6.50	11/11/2022	11

Piezocene Test Coordinates

HOLE ID	Eastings	Northings	Elevation
S3CPT01	481128.70	355935.51	10.47
S3CPT01A	481128.70	355935.51	10.47
S3CPT02	480997.82	356046.52	11.00
S3CPT03	481099.43	356042.41	10.48
S3CPT04	481080.27	356129.00	10.49
S3CPT12	480024.25	355136.65	9.23
S3CPT13	479996.64	355068.96	9.41
S3CPT14	479976.45	355015.23	9.73
S3CPT15	479944.00	354945.36	9.47
S3CPT24	479548.34	354707.97	9.77
S3CPT25	479504.74	354701.57	9.84
S3CPT26	479415.98	354711.66	9.94
S3CPT27	479376.71	354732.66	10.01
S3CPT30	479327.21	354588.14	9.59
S3CPT31	479284.19	354582.99	9.21
S3CPT32	479245.53	354564.81	9.42
S3CPT33	479206.86	354543.90	9.59
S3CPT34	479288.39	354647.78	9.95
S3CPT35	479259.93	354634.49	9.73
S3CPT36	479228.23	354619.28	9.82
S3CPT37	479152.86	354577.24	10.00
S3CPT37A	479152.86	354577.24	10.00
S3CPT38	479108.99	354554.85	10.06
S3CPT38A	479108.99	354554.85	10.06
S3CPT38B	479108.99	354554.85	10.06
S3CPT40	478203.67	353538.85	10.20
S3CPT41	478065.46	352921.14	10.88
S3CPT42	478067.08	352995.59	10.81
S3SCPT05	481180.68	356035.87	10.03
S3SCPT05A	481180.68	356035.87	10.03

S3SCPT28	479373.17	354647.42	12.76
S3SCPT28A	479373.17	354647.42	12.76
S3SCPT28B	479373.17	354647.42	12.76
S3SCPT29	479338.95	354648.56	13.01
S3SCPT29A	479338.95	354648.56	13.01
S3SCPT29B	479338.95	354648.56	13.01

APPENDIX A2 – CPT Rig Datasheet

RIGS

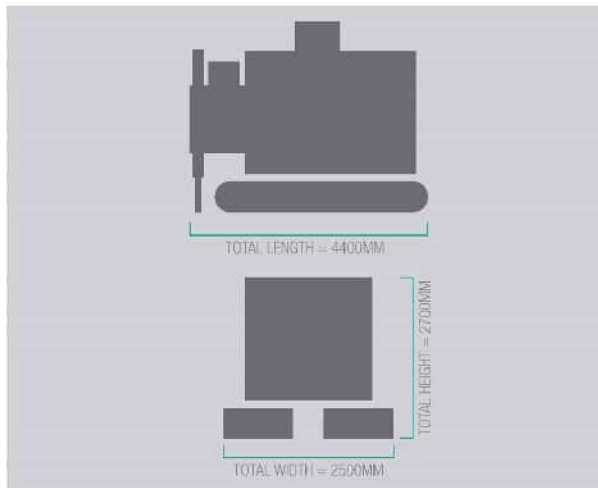
14 TONNE MOUNTED RIGS (CPT005 and CPT006)

We have two 14 tonne track mounted CPT rigs, each weighing 14 tonnes. One of our rigs, CPT005, 'Erik' is based in the Middle East and the other, CPT006, 'Zoe' in the UK. These rigs have low ground bearing pressure and are ideal for soft, boggy sites. They are capable of pushing up to 120 metres a day, depending on access to positions.

CPT RIG DETAILS

TOTAL WEIGHT	14 TONNES
CPT RAM THRUST CAPACITY	20 TONNES
MAXIMUM PENETRATION	20-30M DEPENDING ON THE GROUND CONDITIONS
PERFORMANCE RATES	120M OF TESTING IN A DAY DEPENDING ON ACCESS TO POSITIONS
TYPICAL SITES FOR THIS RIG	SOFT BOGGY SITES. THE RIG HAS LOW GROUND BEARING PRESSURE

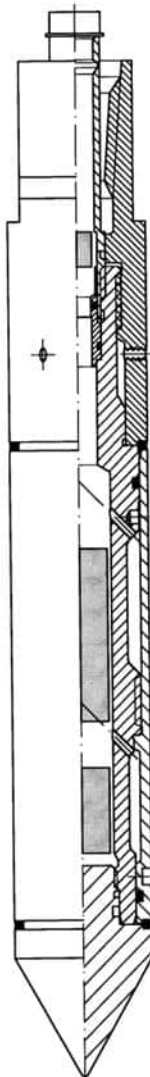
CPT RIG DIMENSIONS



APPENDIX A3 – Cone Datasheet



Rijksstraatweg 22F
2171 AL Sassenheim
Tel. : +31 71 301 92 51
Fax : +31 71 301 92 52
E-mail : info@geopoint.nl
ING bank : 68.23.01.396
Postbank : 5226758
BTW nr. : NL806331677801



SPECIFICATIONS

S15 SERIES

ELECTRICAL CONES

The electronic subtraction cones have been developed to address the durability problems inherent in other cone designs. The unit consists of a single element temperature compensated strain gauge transducer for measuring both cone resistance and local sleeve friction. This design is therefore more robust than a compression type cone. The cone support electronics package is located directly behind the transducer. The precision strain gauge amplifiers and power supply eliminate the effects of cable resistance on the measurements. A standard subtraction cone is capable of measuring simultaneously the following channels: Tip, Local friction, Pore pressure, Temperature and Inclination.

GENERAL SPECIFICATIONS

Cone Tip Section Area	1,500 mm ²
Friction Sleeve Surface	22,500 mm ²
Total Length	325 mm
Weight	4200 g
Power Supply	± 15 VDC, 100 mA.
Output	0 – 10 VDC*
Working Temperature	0 - 60°C
Storage Temperature	- 40 to + 85°C
Connector	Lemo 10 pins (others on request)

TIP RESISTANCE

Range	100/150* kN
Accuracy	0.25 % FS
Maximum Load	150 % of range
Cone Area Ratio	0.75

LOCAL SLEEVE FRICTION

Range	100/150* kN
Accuracy	0.50 % FS
Maximum Load	150 %
Sleeve Area Ratio	1.0 (EA)

PORE PRESSURE

Range	1/2/5/10* MPa
Accuracy	0.5 % FS
Maximum Load	150 % of range

INCLINATION

Range	25 ° (biaxial)
Accuracy	< 2 °

All our equipment complies with the ISSMGE, ASTM, DIN and NEN Standards.

**Other output and voltage ranges available on request. Loadcells may be calibrated for lower ranges.*



Manual: Electric CPT Cone P10-CFPTxy and P15CFPTxy (PIEZOCONE)

All cones are temperature compensated and provided with a built-in precision strain-gauge amplifier. The cone characteristics and available measurement ranges are listed below.

2	Technical Specifications	P10CFPTxy	P15CFPTxy
	Overall length	: 254 mm	307 mm
	Section area of conical tip	: 1,000 mm ²	1,500 mm ²
	Apex angle of conical tip	: 60°	60°
	Surface of friction sleeve	: 15,000 mm ²	22,500 mm ²
	Weight	: 1,480 gr	2,250 gr
	Power supply	: 5 Vdc	5 Vdc
	Analogue signal output	: 0 – 5 Vdc	0 – 5 Vdc
	Digital signal output	: RS-485	RS-485
	Screw thread	: Female GHD-36	Female GHD-44
	Connector	: Gold-plated 10 pins	Gold-plated 10 pins
	Working temperature	: 0 till 60 °C	0 till 60 °C
	Storage temperature	: -40 till 85 °C	-40 till 85 °C
	Cone Resistance (q_C)		
	Available measuring ranges *)	: 0 – 100 MPa	0 – 100 MPa
	Accuracy	: 0.25% of the full scale (FS)	0.25% of the full scale
	Maximum allowable load	: 150% of the measuring range	150% of the range
	Cone area factor	: 0.71	0.75
	Local Sleeve Friction (f_S) + Cone Resistance (q_C)		
	Available measuring ranges *)	: 0 – 100 kN	0 – 150 kN
	Accuracy local sleeve friction	: 0.50% of the full scale (FS)	0.50% of the full scale
	Maximum allowable load	: 150% of the measuring range	150% of the range
	Sleeve area ratio	: 1.0	1.0
	Inclination	(biaxial)	
	Available measuring range	: 0 – 25° (biaxial)	0 – 25° (biaxial)
	Accuracy	: < 0,5°	< 0,5°
	Pore Pressure (p)		
	Available measuring ranges *)	: 0 – 5 MPa (standard)	0 – 5 MPa
	Accuracy	: 0.5% of the full scale (FS)	0.5% of the full scale
	Temperature (T)		
	Available measuring ranges	: 0 – 50 °C	0 – 50 °C

APPENDIX A4 – Cone Calibration Certificate



Rijkstraatweg 22F
2171 AL Sassenheim
The Netherlands

T +31 71 301 9251
E info@eijkelkamp-geopoint.com
I eijkelkamp-geopoint.com

Cone Calibration Certificate

Certificate: **GS-2089-001**
Instrument Type: Electric Subtraction Cone
Model: S15-CFIIP
Serial number: 2089
Calibration date: 24-02-2022
Client: Insitu
Calibrated by: M.de Bruin

Calibration instruments
Manufacturer: Hottinger Baldwin Messtechnik GmbH
NMI certificate: 2461165.00501

Calibration conditions
Ambient temperature: 23.2 °C
Atmospheric pressure: 1006 mBar

Cone specifications
Cone base area: 1500 mm²
Load tip resistance (nom.): 100 kN
Friction sleeve area: 22500 mm²
Load tip + local friction (nom.): 100 kN
Load friction sleeve (nom.): 22.5 kN
Load pore pressure (nom.): 2 MPa
Inclination (nom.): +/- 20 °
Temperature compensation (all channels): 0...+40 °C
Maximum overload capacity (all channels): 100 %
Cone area ratio (a): 0.79
Max. Inaccuracy, relative to measurement value: 1.0 %

	Tip:		Sleeve:		Pore Pressure:		Inclinometer:		
	qc in kN	mV	fs in kN	mV	MPa	mV	Degrees	X (mV)	Y (mV)
Zero points:		0238		0233		0331			
	0	0	0	0	0	0	0	2529	2529
	5	0293	5	0303	0.4	1458	-20	0544	0583
	10	0586	10	0605	0.8	2908	20	4498	4495
	15	0879	15	0906	1.2	4369			
	20	1172	20	1208	1.6	5828			
	25	1464	25	1508	2	7265			
	30	1756	30	1808					
	35	2046	35	2107					
	40	2337	40	2407					
	45	2628	45	2707					
	50	2919	50	3006					
	75	4370	75	4501					
	100	5819	100	5993					

Max. error, abs. qc: 35 kPa
Max. error, abs. fs: 2 kPa
Max. error, abs. u2: 10 kPa
Max. error, abs. I: 1 °

This calibration is compliant with Eijkelkamp GeoPoint SoilSolutions internal quality system, internal calibration procedures and meets the requirements of NEN2649, NEN-EN-ISO 22476-1, NORSOK G-001, ISSMFE and ASTM using calibration equipment traceable to (Inter-)National Standards.

Approved by: B. Kop
Date: 24-02-2022

Eijkelkamp GeoPoint SoilSolutions
V.A.T. NO. NL 8584.21.422.B01
Trade Reg. Arnhem no. 70686149

IBAN NL43 RABO 0326 7904 38
BIC: RABONL2U



Gouda Geo-Equipment B.V.
Satellietbaan 8
2181 MH Hillegom
The Netherlands

Tel. + 31 (0)715.318.475
E-mail: info@gouda-geo.com

Certificate of Calibration

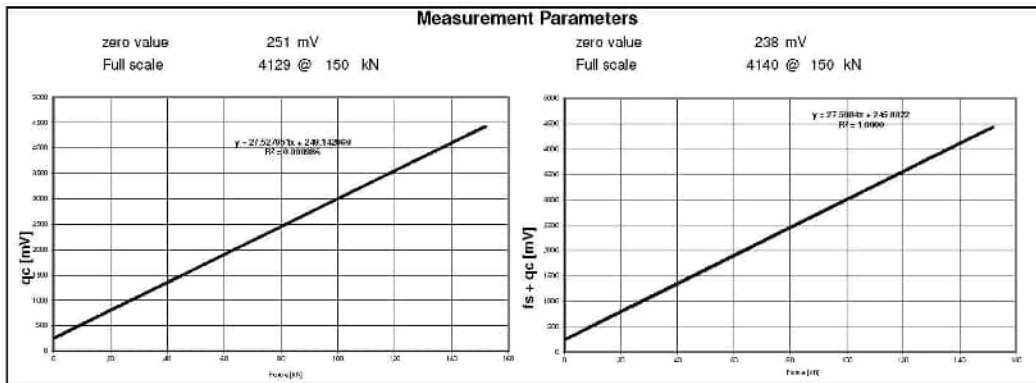
Certificate No. CMI 22.09.4940

Instrument		
Instrument Type:	Electrical Subtraction Cone	Calibration Result: Certified
Manufacturer:	Gouda Geo-Equipment B.V	
Model No.:	DP15-CFPTxy	Date Calibrated: 22-9-2022
Serial No.:	71212	Next Due Date: 22-3-2023
Cone area factor:	0,75	
Used Calibration Procedure:	GGECP004, ISO22476	Location: Hillegom (The Netherlands)

Customer
In Situ Site Investigation Ltd.

Calibration Instruments		
Instrument Type: GPT Logger	Instrument Type: CPT Logger	Instrument Type: Load-cell + amplifier
Manufacturer: Gouda Geo Equipment	Manufacturer: Gouda Geo Equipment	Manufacturer: Futek
Model No.: A	Model No.: A	Model No.: LCF500 + IAA100
Serial No.: 3010	Serial No.: 3129	Serial No.: 1016780 + 1013883
Accuracy: 0.01% + 2 Counts	Accuracy: 0.01% + 2 Counts	Accuracy: 0.1%
Date Calibrated: 28 June, 2022	Date Calibrated: 28 June, 2022	Date Calibrated: 24 March, 2022
Next Due Date: 28 December, 2022	Next Due Date: 28 December, 2022	Next Due Date: 24 March, 2023
Calibrated By: Manufacturer	Calibrated By: Manufacturer	Calibrated By: Futek
Traceability: CMI 22.06.4716	Traceability: CMI 22.06.4715	Traceability: 2203240009

Calibration Conditions		
Environmental conditions whilst performing the calibration:	Ambient Temperat	20.2 °C
	Relative Humidity:	42.3 %
Condition of Calibrated Apparatus when Received: Fair		



Remarks
Data "As Received" = "As Left" unless otherwise noted. Calibration data for this item was derived from one or more of the following sources: the Nederlands Meetinstituut (NMI) or other national laboratory, a natural physical constant, or a ratio technique. The data is on file at the NMI. This calibration is compliant with Gouda Geo-Equipment's internal quality system, internal calibration procedure and meets the requirements of standard ISO22476. The Calibration Interval will vary from customer use and different conditions. All calibrations are verified at a



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APPENDIX A5 – Symbol List

English

a	is area ratio of the cone ($= A_n/A_c$)
A	is area
A_c	is projected area of the cone
A_n	is cross sectional area of load cell or shaft
A_s	is area of friction sleeve
A_{sb}	is bottom end area of friction sleeve
A_{st}	is top end area of friction sleeve
B_q	is pore pressure parameter ($= (u_2 - u_0)/(q_t - \sigma_{v0})$)
C_h	is horizontal coefficient of consolidation
C_v	is vertical coefficient of consolidation
D	is diameter
D_r	is relative density ($= \frac{e_{max}-e}{e_{max}-e_{min}} \times 100\%$)
e	is void ratio
e_{max}	is maximum void ratio
e_{min}	is minimum void ratio
E	is Young's modulus
f_s	is unit sleeve friction resistance
f_t	is sleeve friction corrected for pore pressure effects
F_s	is total force acting on friction sleeve
F_R	is normalized friction ratio ($= f_s/(q_t - \sigma_{v0})$)
FoS	is factor of safety
FC	is fines content
g	is acceleration due to gravity
G_0	is initial or maximum shear modulus, shear stiffness
I_c	is soil behavior type index
I_r	is rigidity index ($= G/s_u$)
I_p	is plasticity index
k	is coefficient of permeability
k_h	is coefficient of permeability in horizontal direction
k_v	is coefficient of permeability in vertical direction
K_0	is coefficient of earth pressure at rest ($= \sigma'_{h0}/\sigma'_{v0}$)
L	is length
m_v	is coefficient of volume change
M	is constrained deformation modulus
M7.5	is earthquake magnitude of 7.5 Richter scale
N	is number of blows of SPT
N_{60}	is SPT energy ratio
N_k	is cone factor
N_{ke}	is cone factor
N_{kt}	is cone factor
$N_{\Delta u}$	is cone factor
p_a	is reference stress ($= 100 \text{ kPa}$)
q_c	is measured cone resistance
q_e	is effective cone resistance ($= q_t - u_2$)
q_n	is net cone resistance ($= q_t - \sigma_{v0}$)
q_t	is corrected cone resistance ($= q_c - (1 - a)u_2$)
Q_c	is total force acting on the cone
Q_t	is normalized cone resistance ($= q_t - \sigma_{v0}/\sigma'_{v0}$)

R_f	is friction ratio ($= (f_t/q_t) \times 100\%$ or alternatively $= (f_t/q_t) \times 100\%$)
s_u	is undrained shear strength
s_{ur}	is remoulded undrained shear strength
S_t	is sensitivity
t	is time
t_{50}	is time for 50% dissipation of excess pore water pressure
T_{50}	is time factor at $U = 50\%$
u	is pore water pressure
u_0	is in situ pore pressure
u_1	is pore pressure measured on the cone
u_2	is pore pressure measured behind the cone
u_3	is pore pressure measured behind sleeve friction
Δu	is excess pore water pressure
U	is normalized excess pore pressure
V_s	is shear wave velocity
z	is depth

Greek

α	is constant
α	is cone roughness
β	is constant
β_1	is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees
β_2	is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1 , in degrees
γ	is unit weight of soil
γ_w	unit weight of water
Δ	is change
Δu	is excess pore pressure ($= u - u_0$)
μ	is Poisson's ratio
ρ	is density
ψ	is state parameter
σ, σ'	is normal stress (total, effective)
σ_h, σ'_h	is horizontal stress (total, effective)
σ_v, σ'_v	is horizontal stress (total, effective)
$\sigma_{v0}, \sigma'_{v0}$	is overburden stress (total, effective)
T_{av}	is average cyclic shear stress
T_{cy}	is cyclic shear stress
ϕ'	is effective friction angle

APPENDIX A6 – Abbreviations

ASTM	American Society for Testing and Materials
CPTU	Cone Penetration Test with Pore Pressure Measurement (Piezocone Test)
CRR	Cyclic Resistance Ratio
CSR	Cyclic Stress Ratio
GWT	Ground Water Table
NC	Normally Consolidated
OC	Over consolidated
OCR	Over consolidation Ratio
PL	Limit Pressure
SCPT	Seismic Cone Penetration
SDMT	Seismic Dilatometer Marchetti
SPT	Standard Penetration Test
TC	Technical Committee

APPENDIX A7 – Glossary

CPT

Cone Penetration Test.

Cone

The part of the cone penetrometer on which the end bearing is developed.

Cone Penetrometer

The assembly containing the *cone*, *friction sleeve*, any other sensors and measuring systems, as well as the connections to the *push-rods*.

Cone resistance, q_c

The total force acting on the cone, Q_c , divided by the projected area of the cone, A_c . $q_c = Q_c/A_c$

Corrected cone resistance, q_t

The *cone resistance*, q_c corrected for pore water pressure effects.

Corrected sleeve friction, f_t

The *sleeve friction* corrected for pore water pressure effects on the ends of the *friction sleeve*.

Data acquisition system

The system used to measure and record the measurements made by the *cone penetrometer*.

Dissipation Test

A test when the decay of the pore water pressure is monitored during a pause in penetration.

Filter element

The porous element inserted into the cone penetrometer to allow transmission of the pore water pressure to the pore pressure sensor, while maintaining the correct profile of the *cone penetrometer*.

Friction ratio, R_f

The ratio, expressed as a percentage of the *sleeve friction*, f_s , to the *cone resistance*, q_c , both measured at the same depth.

Friction reducer

A local enlargement on the push-rod surface, placed at a distance above the cone penetrometer, and provided to reduce the friction on the *push-rods*.

Friction sleeve

The section of the *cone penetrometer* upon which the *sleeve friction* is measured.

Normalized cone resistance, Q_c or Q_t

The *cone resistance* expressed in a non-dimensional form and taking account of stress changes *in situ*, $Q_c = (q_c - \sigma_{v0})/\sigma'_{v0}$, or when the *corrected cone resistance* is used $Q_t = (q_t - \sigma_{v0})/\sigma'_{v0}$. Where σ_{v0} and σ'_{v0} are the total and effective vertical stress respectively.

Net cone resistance, q_n

The *corrected cone resistance* minus the vertical total stress. $q_n = q_t - \sigma_{v0}$

Normalized friction ratio, F_r

The *sleeve friction* normalized by the *net cone resistance*.

Piezocone

A *cone penetrometer* containing a pore pressure sensor.

Pore pressure, u

The pore pressure generated during penetration and measured by a pore pressure sensor, u_1 when measured on the cone, u_2 when measured just behind the cone and u_3 when measured just behind the friction sleeve.

Pore pressure ratio, B_q

The *net pore pressure* normalized with respect to the *net cone resistance*.

Push-rods

The thick-walled tubes or rods used for advancing the cone penetrometer.

Rig machine

The equipment which pushes the cone penetrometer and rods into the ground.

Sleeve friction, f_s

The total frictional force acting on the *friction sleeve*, F_s , divided by its *surface area*, A_s . $f_s = F_s/A_s$

APPENDIX A8 – Soils Description Tables

GRANULAR SOILS (Sands and Gravels)

Description	Relative Density D_r (%)	SPT N value, N_{SPT}
Very Loose	0 – 15	0 - 4
Loose	15 – 35	4 - 10
Medium Dense	35 – 65	10 - 30
Dense	65 – 85	30 - 50
Very Dense	>85	>50

COHESIVE SOILS (Clays and Silts)

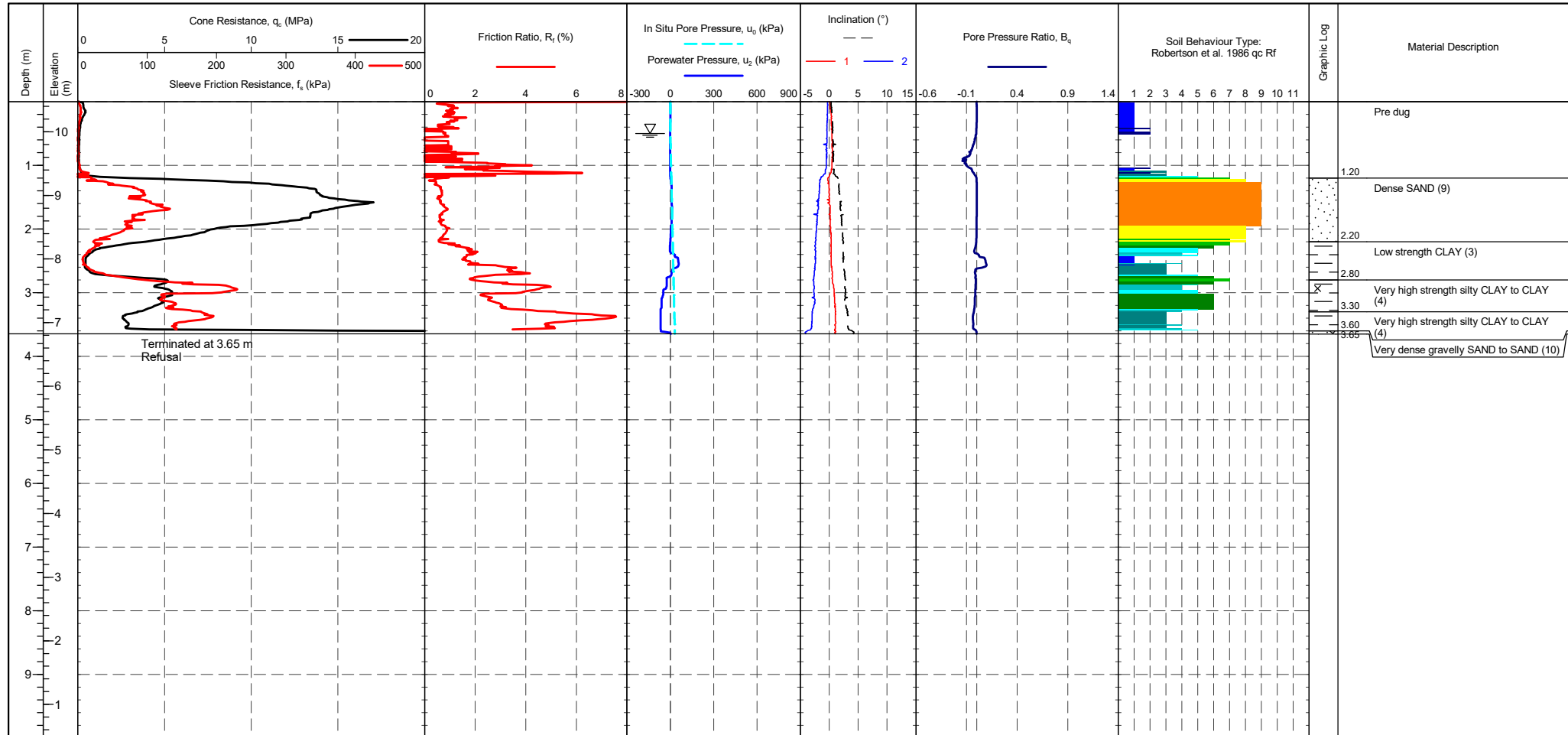
Term based on measurement	Undrained Shear Strength Classification, s_u (kPa)
Extremely low	<10
Very low	10 - 20
Low	20 - 40
Medium	40 - 75
High	75 - 150
Very high	150 - 300
Extremely high	>300

APPENDIX B

Cone Penetration Measured Parameters and Geotechnical Derived Parameters

PointID	S3CPT01
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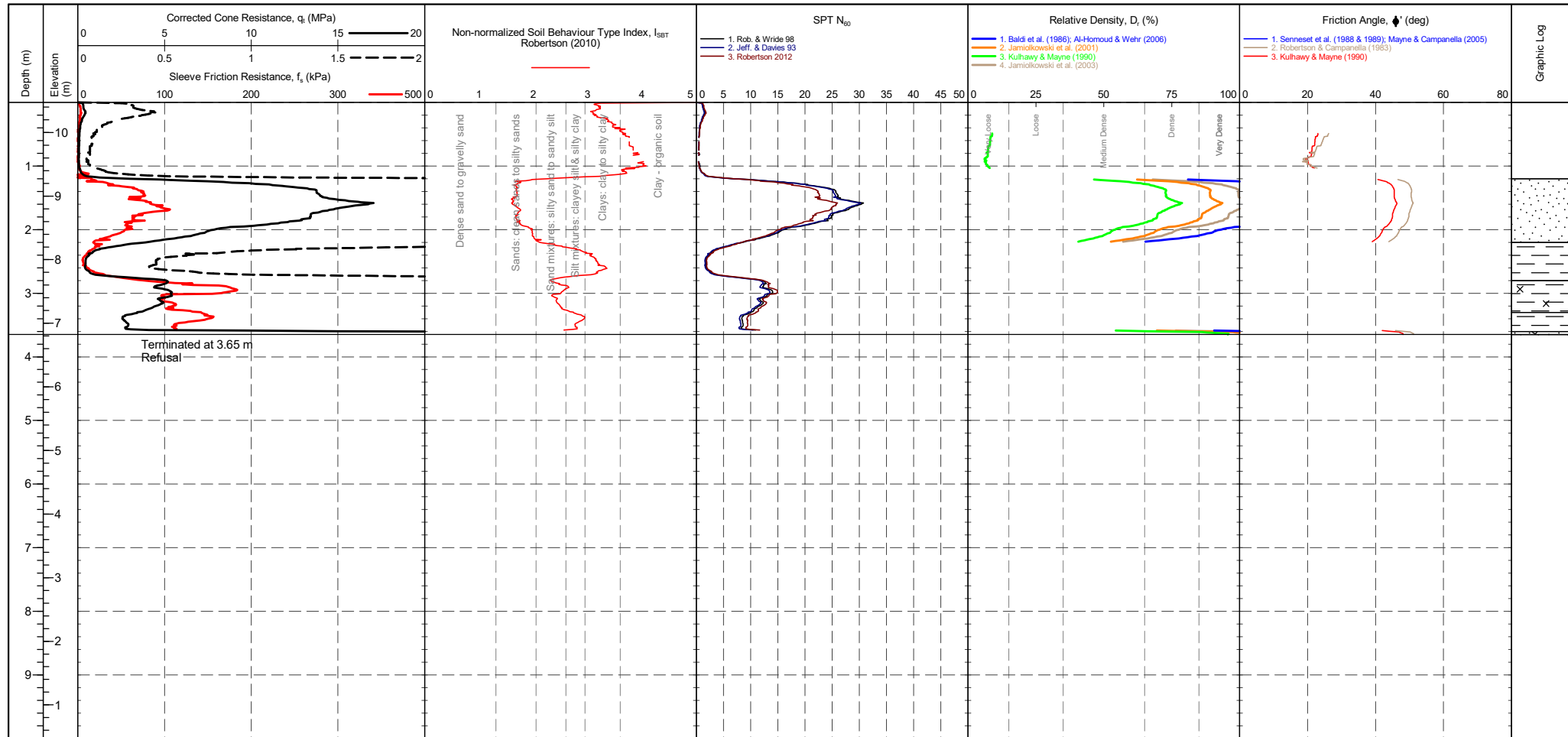
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481128.696 m NORTHING : 355935.512 m ELEVATION : 10.472 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>363 mV</td> <td>364 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>275 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>319 mV</td> <td>303 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2530 mV</td> <td>2535 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	363 mV	364 mV	0.011 MPa	Sleeve	273 mV	275 mV	0.001 kPa	Pore Pressure 2	319 mV	303 mV	-0.004 kPa	X-Y Inclinometer	2530 mV	2535 mV		METHOD: Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																																	
Tip	363 mV	364 mV	0.011 MPa																																	
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4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND																																		

PointID	S3CPT01
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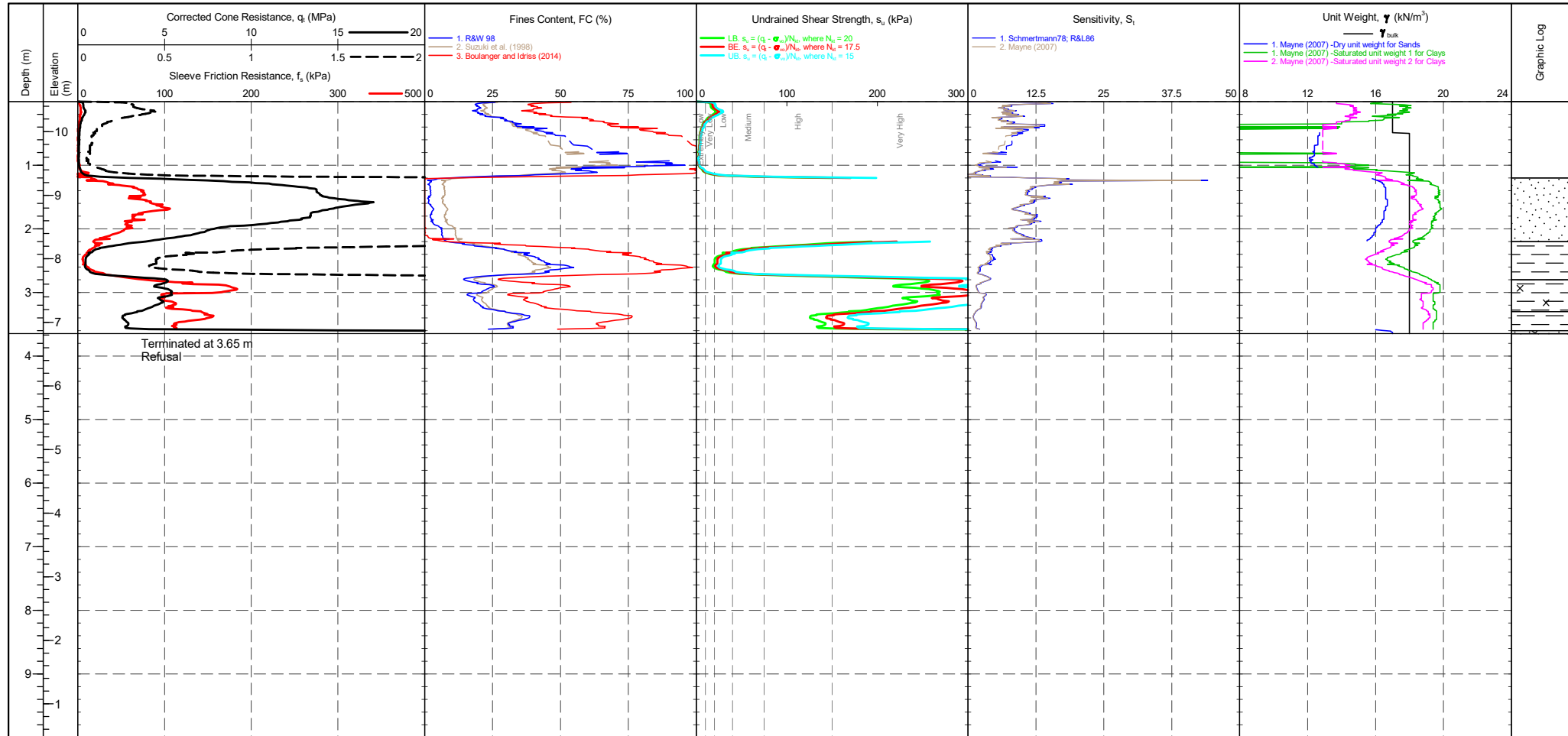
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481128.696 m NORTHING : 355935.512 m ELEVATION : 10.472 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>363 mV</td> <td>364 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>275 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>319 mV</td> <td>303 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2530 mV</td> <td>2535 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	363 mV	364 mV	0.011 MPa	Sleeve	273 mV	275 mV	0.001 kPa	Pore Pressure 2	319 mV	303 mV	-0.004 kPa	X-Y Inclinator	2530 mV	2535 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	▽ Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																																																									
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Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35																																																							
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65																																																							
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85																																																							
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																																							

PointID
S3CPT01

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481128.696 m NORTHING : 355935.512 m ELEVATION : 10.472 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>363 mV</td><td>364 mV</td><td>0.011 MPa</td></tr> <tr><td>Sleeve</td><td>273 mV</td><td>275 mV</td><td>0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>319 mV</td><td>303 mV</td><td>-0.004 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2530 mV</td><td>2535 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	363 mV	364 mV	0.011 MPa	Sleeve	273 mV	275 mV	0.001 kPa	Pore Pressure 2	319 mV	303 mV	-0.004 kPa	X-Y Inclinator	2530 mV	2535 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>s_u (kPa)</th><th>Term based on measurement</th><th>s_u (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
Transducer	Pre	Post	Difference																																									
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PointID

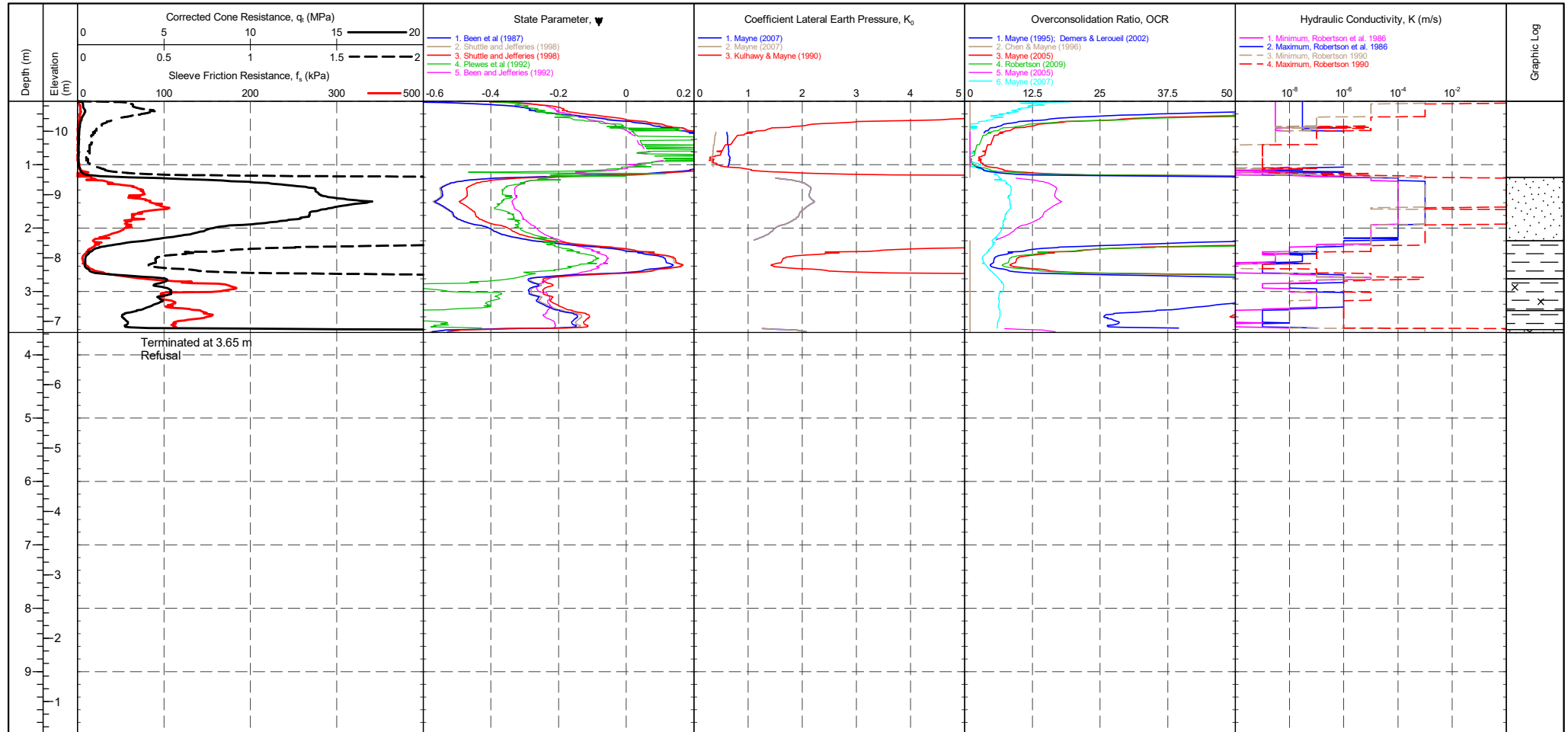
S3CPT01

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 481128.696 m
 NORTHING : 355935.512 m
 ELEVATION : 10.472 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 31/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & DR
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

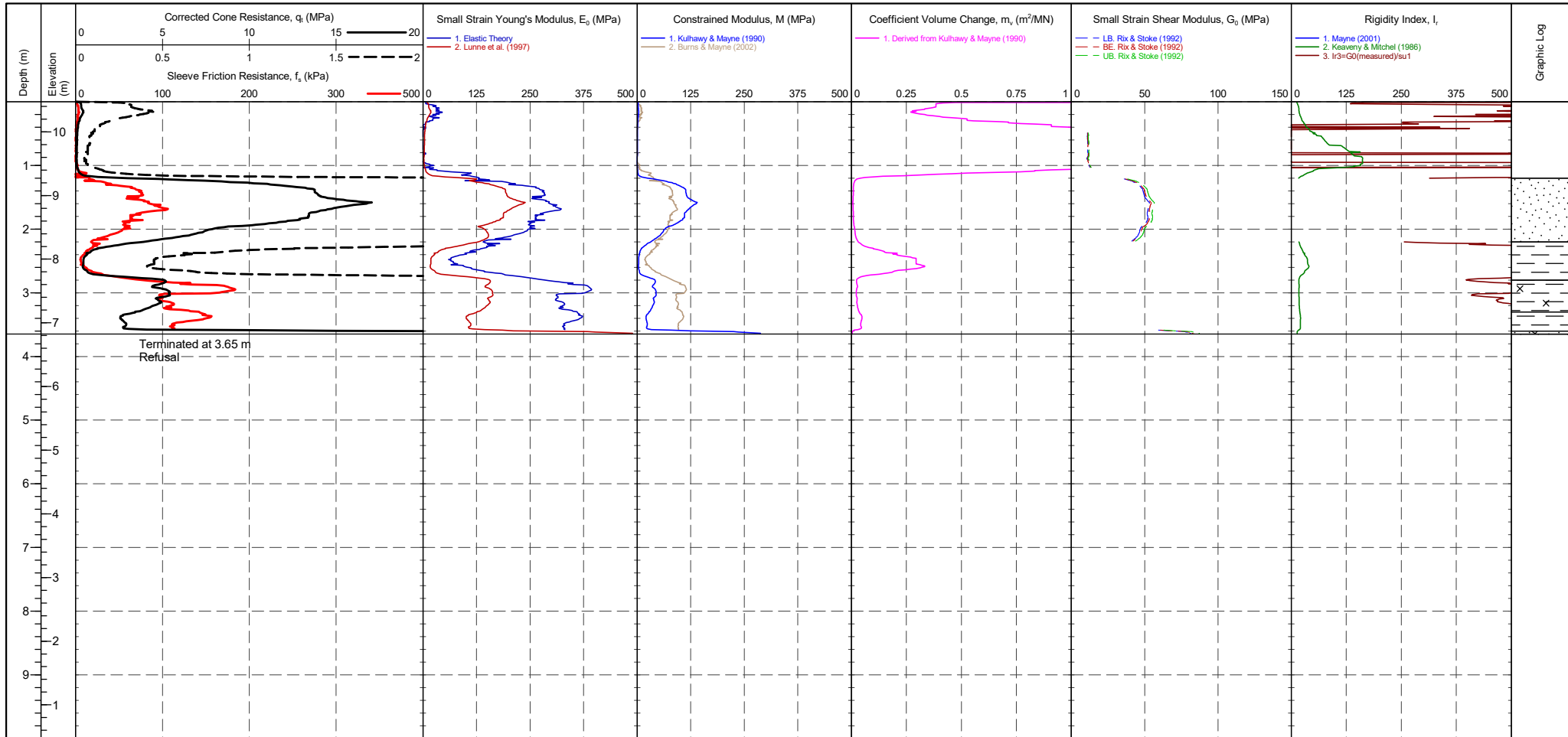
CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	363 mV	364 mV	0.011 MPa
Sleeve	273 mV	275 mV	0.001 kPa
Pore Pressure 2	319 mV	303 mV	-0.004 kPa
X-Y Inclinator	2530 mV	2535 mV	

Groundwater Level
 Dissipation Test

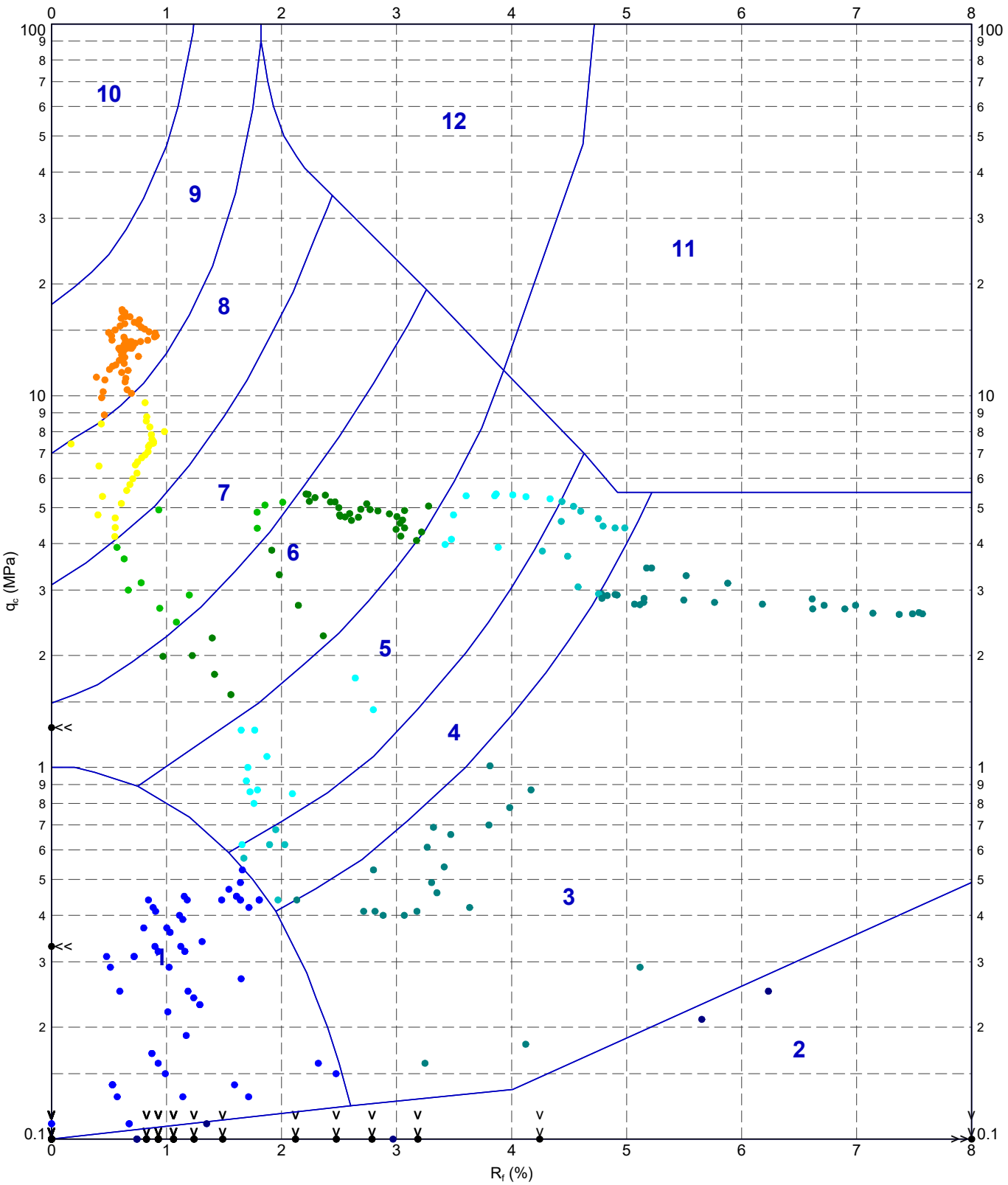
PointID
S3CPT01

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481128.696 m NORTHING : 355935.512 m ELEVATION : 10.472 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>363 mV</td> <td>364 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>275 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>319 mV</td> <td>303 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2530 mV</td> <td>2535 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	363 mV	364 mV	0.011 MPa	Sleeve	273 mV	275 mV	0.001 kPa	Pore Pressure 2	319 mV	303 mV	-0.004 kPa	X-Y Inclinator	2530 mV	2535 mV		Groundwater Level Dissipation Test
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Pore Pressure 2	319 mV	303 mV	-0.004 kPa																				
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220699-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:18 10.03.00.09 Dalgard Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10

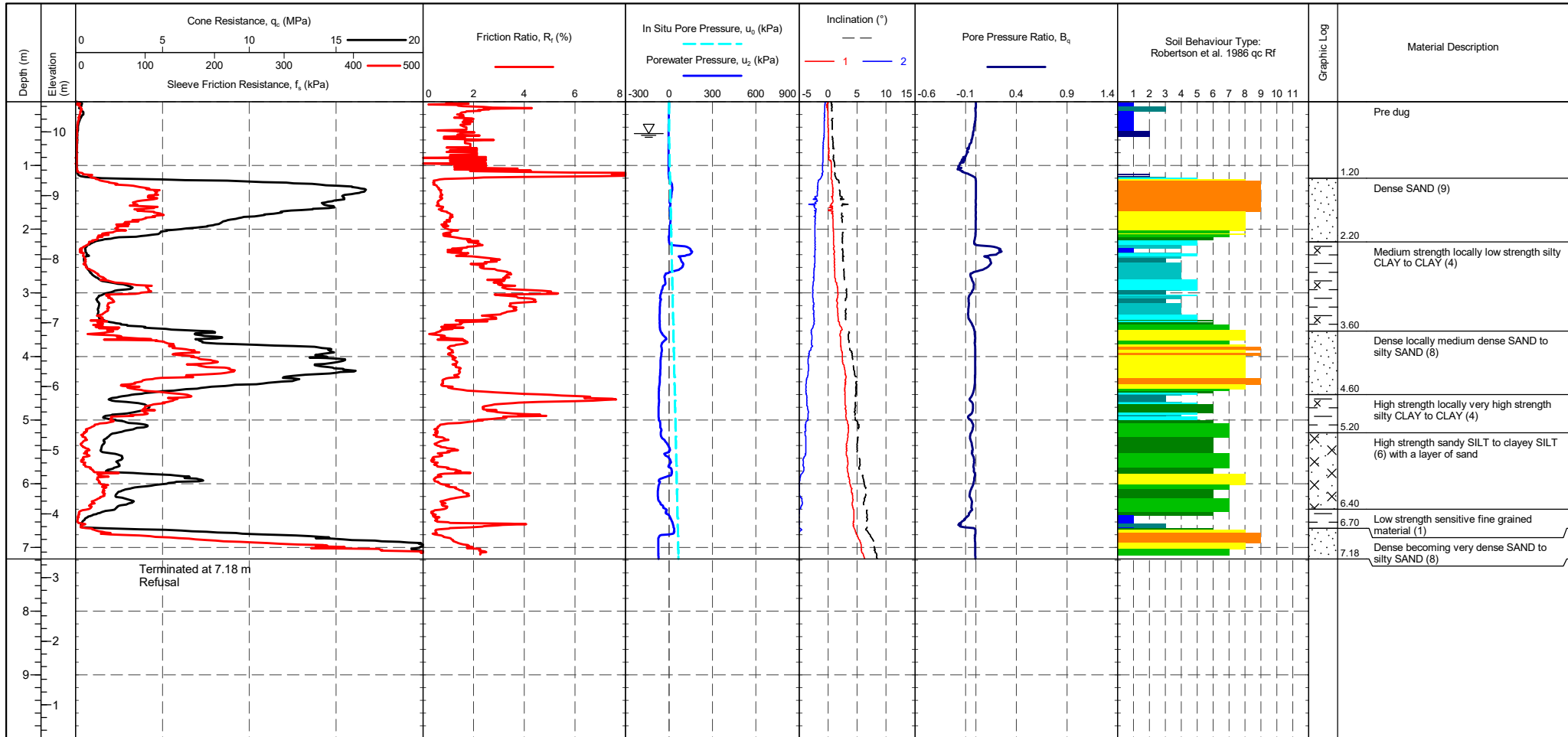


- METHOD: Robertson et al. 1986 qc Rf**
- 1 - Sensitive fine grained material
 - 4 - Silty CLAY to CLAY
 - 7 - Silty SAND to sandy SILT
 - 10 - Gravelly SAND to SAND
 - 2 - Organic material
 - 5 - Clayey SILT to silty CLAY
 - 8 - SAND to silty SAND
 - 11 - Very stiff fine grained
 - 3 - CLAY
 - 6 - Sandy SILT to clayey SILT
 - 9 - SAND
 - 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT01	CHECKED	DATE
	SCALE	Not To Scale	
	PROJECT No 1220514	FIGURE No A4	

PointID
S3CPT01A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481128.696 m NORTHING : 355935.512 m ELEVATION : 10.472 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 364 mV 362 mV -0.023 MPa Sleeve 274 mV 273 mV -0.001 kPa Pore Pressure 2 316 mV 306 mV -0.003 kPa X-Y Inclinometer 2504 mV 2494 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

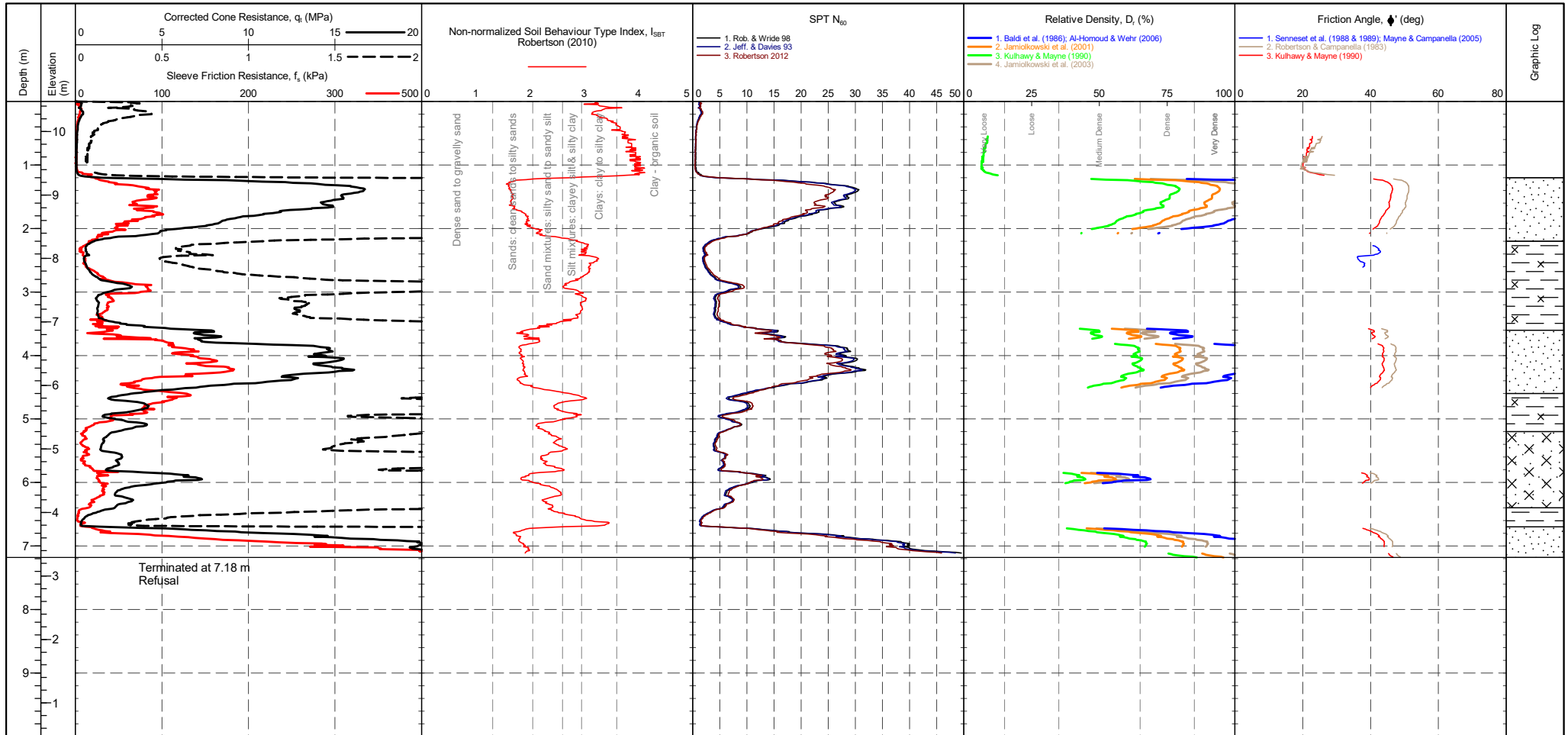
S3CPT01A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 481128.696 m
 NORTHING : 355935.512 m
 ELEVATION : 10.472 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 31/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & DR
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	364 mV	362 mV	-0.023 MPa
Sleeve	274 mV	273 mV	-0.001 kPa
Pore Pressure 2	316 mV	306 mV	-0.003 kPa
X-Y Inclinator	2504 mV	2494 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12			
Description	SBT Index, I _c	Description	SPT N value, NSPT
Clays	2.95-3.60	Very Loose	0 - 4
Silt mixtures	2.60-2.95	Loose	4 - 10
Sand mixtures	2.05-2.60	Medium Dense	10 - 30
Sands	1.31-2.05	Dense	30 - 50
Gravelly sand	<1.31	Very Dense	>50

Groundwater Level
 Dissipation Test

PointID

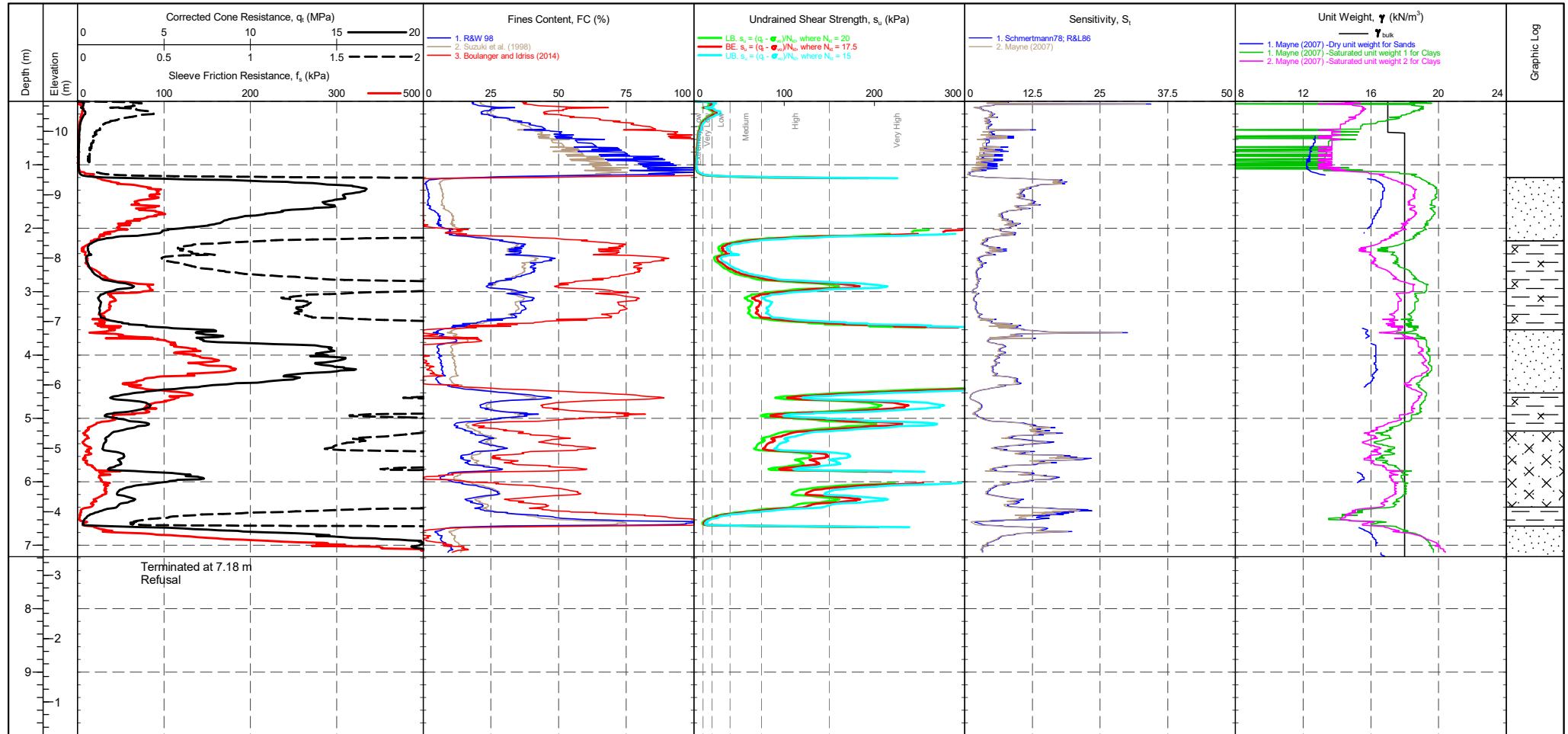
S3CPT01A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 481128.696 m
 NORTHING : 355935.512 m
 ELEVATION : 10.472 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 31/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2	CPTU ZERO VALUES			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11				Groundwater Level Dissipation Test
	RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 364 mV Sleeve : 274 mV Pore Pressure 2 : 316 mV X-Y Inclinator : 2504 mV	Post : 362 mV : 273 mV : 306 mV : 2494 mV	Difference : -0.023 MPa : -0.001 kPa : -0.003 kPa	Term based on measurement Extremely low strength Very low strength Low strength	su (kPa) <10 10-20 20-40	Term based on measurement Medium strength High strength Very high strength Extremely high strength	su (kPa) 40-75 75-150 150-300 >300	

PointID

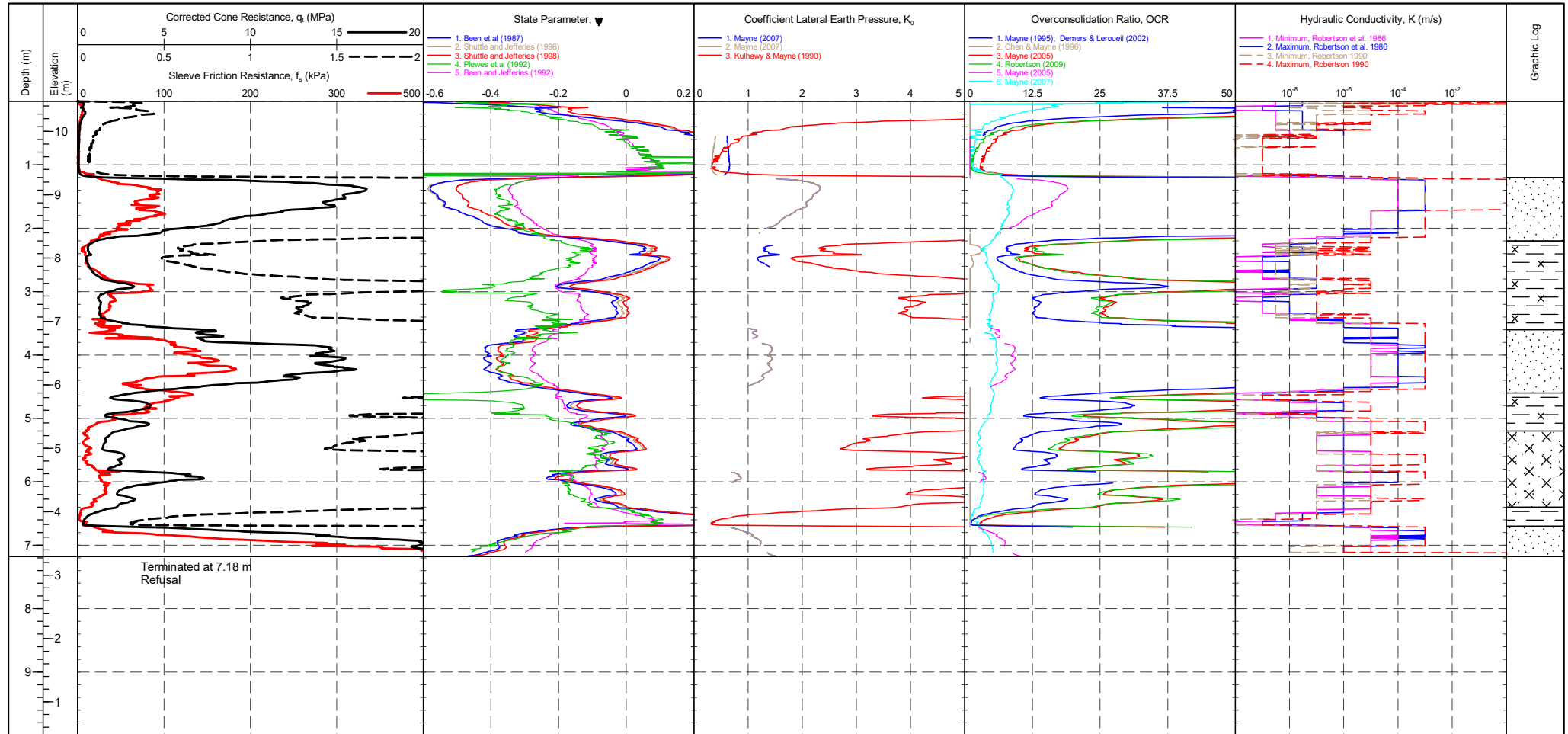
S3CPT01A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 481128.696 m
 NORTHING : 355935.512 m
 ELEVATION : 10.472 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 31/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & DR
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

CPTU ZERO VALUES

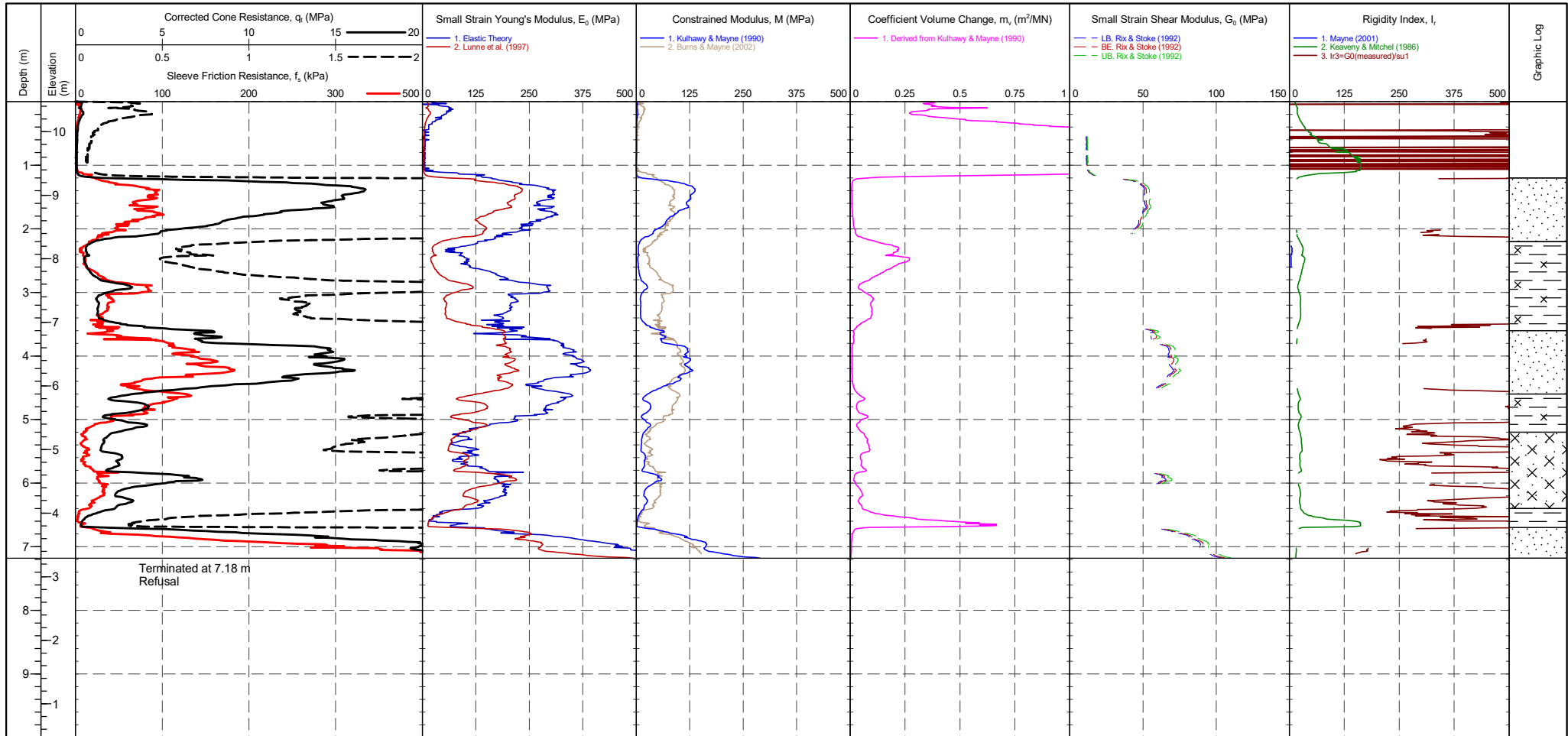
Transducer	Pre	Post	Difference
Tip	364 mV	362 mV	-0.023 MPa
Sleeve	274 mV	273 mV	-0.001 kPa
Pore Pressure 2	316 mV	306 mV	-0.003 kPa
X-Y Inclinator	2504 mV	2494 mV	

Groundwater Level
 Dissipation Test

PointID

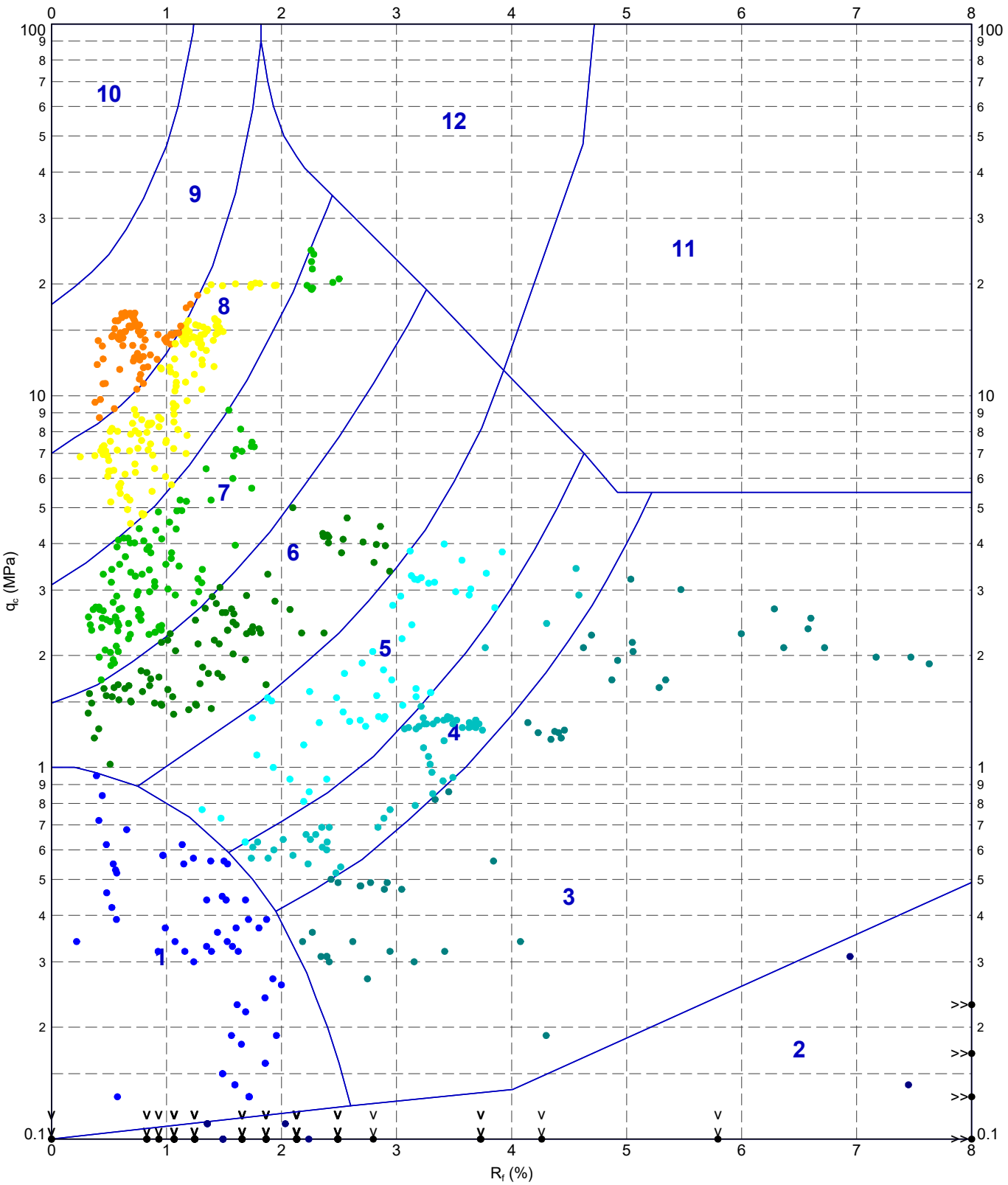
S3CPT01A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481128.696 m NORTHING : 355935.512 m ELEVATION : 10.472 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>362 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>273 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>316 mV</td> <td>306 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2504 mV</td> <td>2494 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	362 mV	-0.023 MPa	Sleeve	274 mV	273 mV	-0.001 kPa	Pore Pressure 2	316 mV	306 mV	-0.003 kPa	X-Y Inclinator	2504 mV	2494 mV		Groundwater Level Dissipation Test
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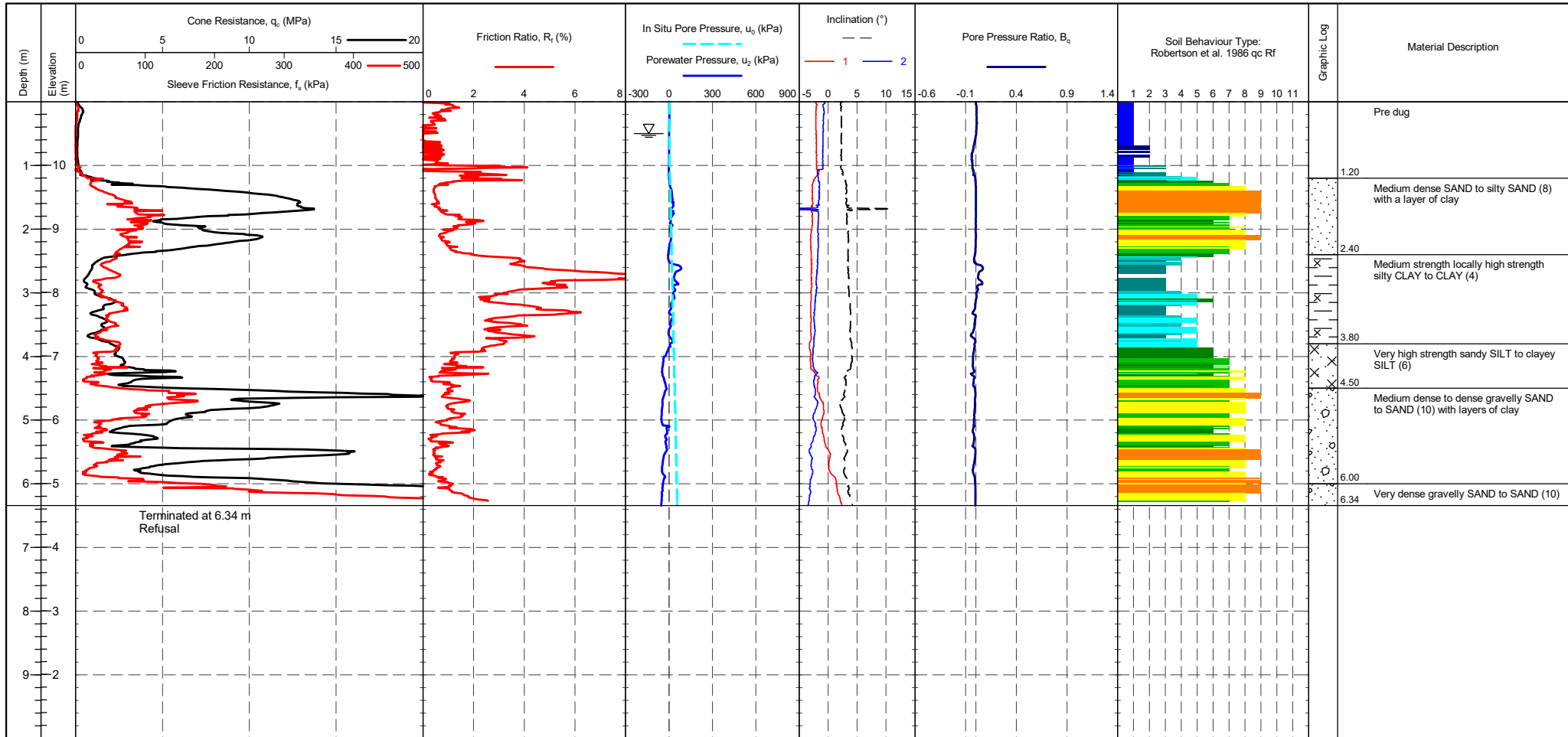
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN		DATE	
	Strata Geotechnics Newark		CHECKED		DATE
	A46 Newark Bypass		SCALE		A4
	Robertson et al. 1986 qc vs. Rf - S3CPT01A		PROJECT No 1220514		FIGURE No

PointID	S3CPT02
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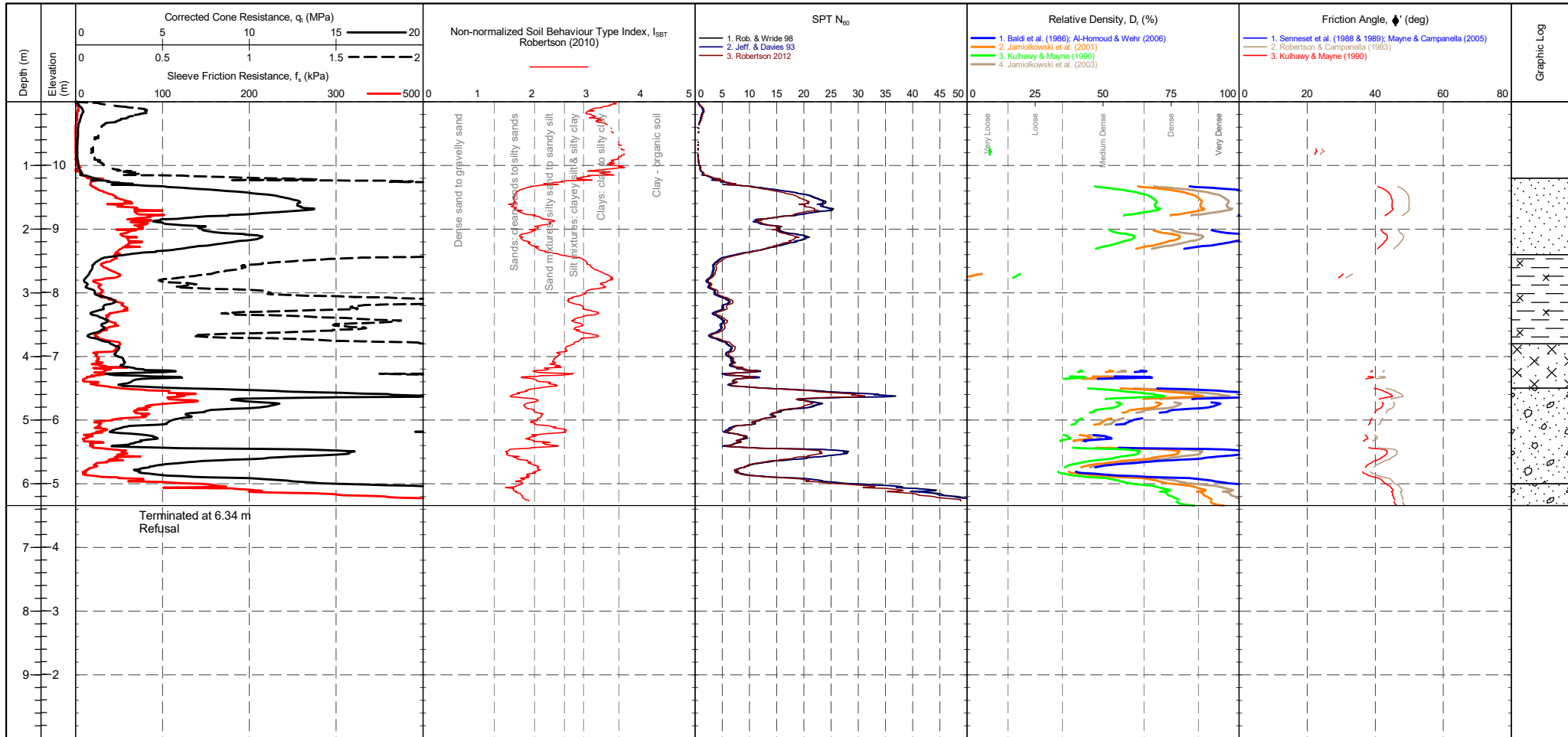
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 480997.820 m NORTHING : 356046.517 m ELEVATION : 10.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer : Pre 362 mV, Post 362 mV, Difference 0 MPa Tip : Pre 274 mV, Post 272 mV, Difference -0.001 kPa Sleeve : Pre 309 mV, Post 308 mV, Difference 0 kPa Pore Pressure 2 : Pre 2287 mV, Post 2307 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT02
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 480997.820 m NORTHING : 356046.517 m ELEVATION : 10.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>362 mV</td> <td>362 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>272 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>309 mV</td> <td>308 mV</td> <td>0 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2287 mV</td> <td>2307 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	362 mV	0 MPa	Sleeve	274 mV	272 mV	-0.001 kPa	Pore Pressure 2	309 mV	308 mV	0 kPa	X-Y Inclinometer	2287 mV	2307 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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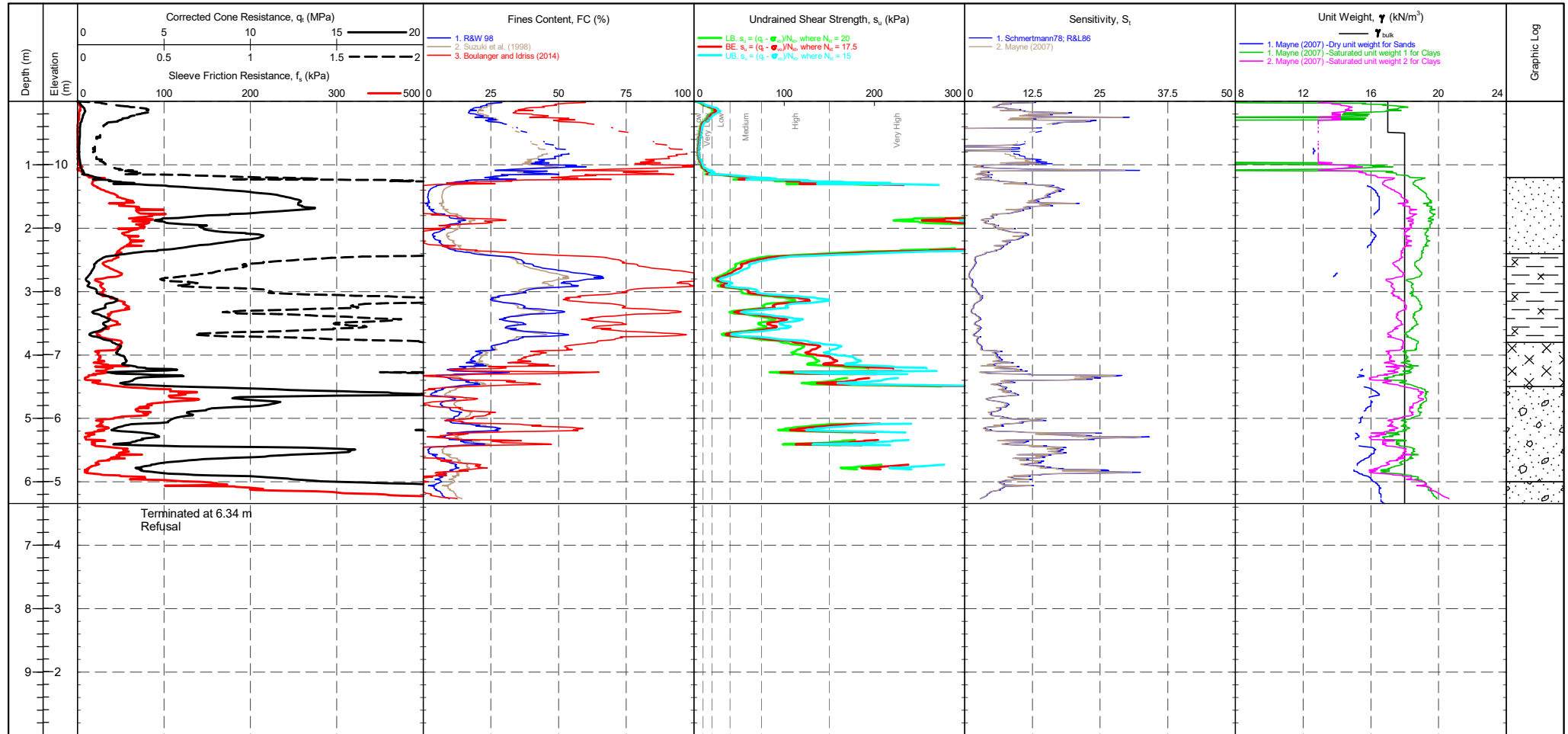
S3CPT02

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 480997.820 m
 NORTHING : 356046.517 m
 ELEVATION : 10.995 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

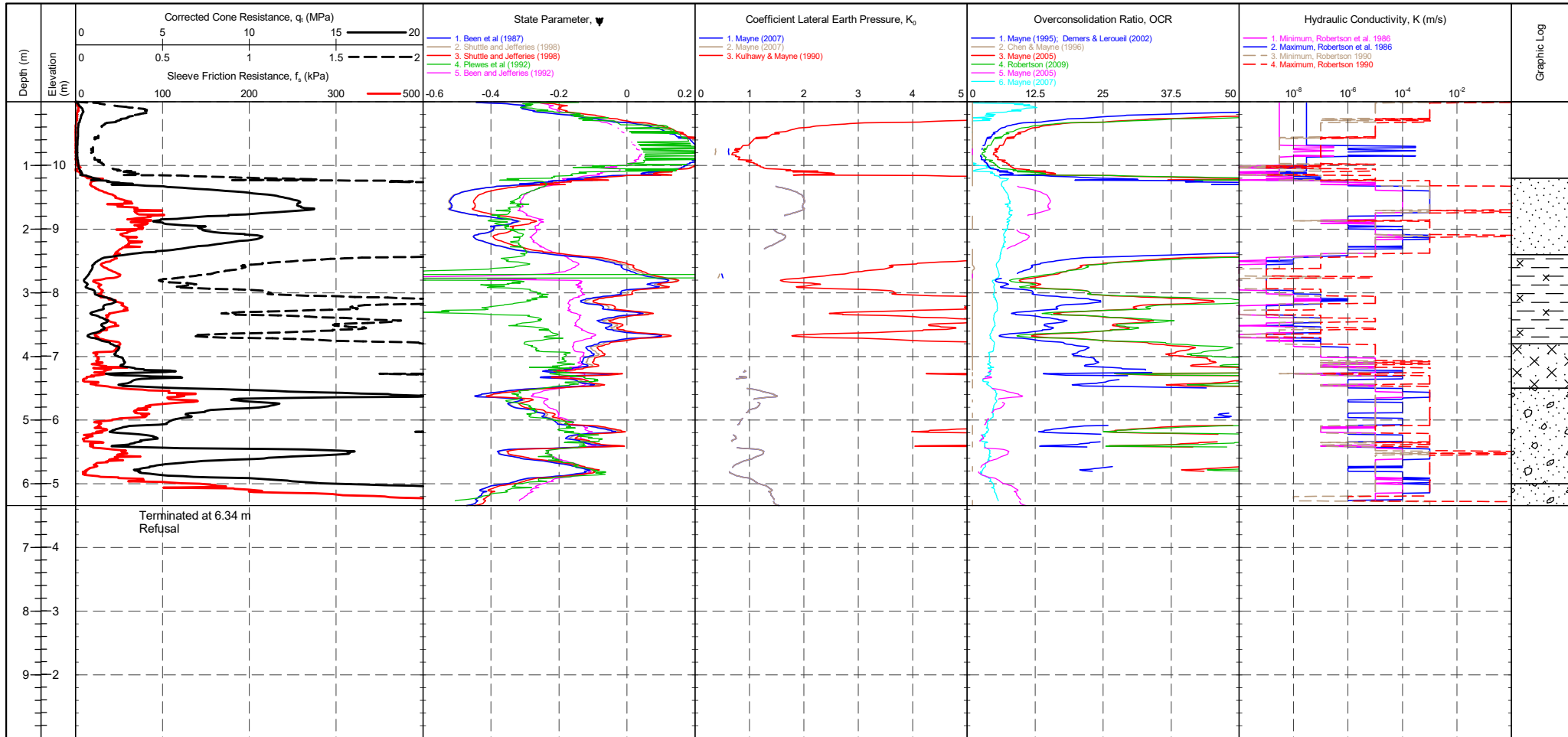
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 31/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 362 mV 274 mV 309 mV 2287 mV	Post 362 mV 272 mV 308 mV 2307 mV	Difference 0 MPa -0.001 kPa 0 kPa	Term based on measurement Extremely low strength Very low strength Low strength	s_u (kPa) <10 10-20 20-40	Term based on measurement Medium strength High strength Very high strength Extremely high strength	

PointID
S3CPT02

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 480997.820 m NORTHING : 356046.517 m ELEVATION : 10.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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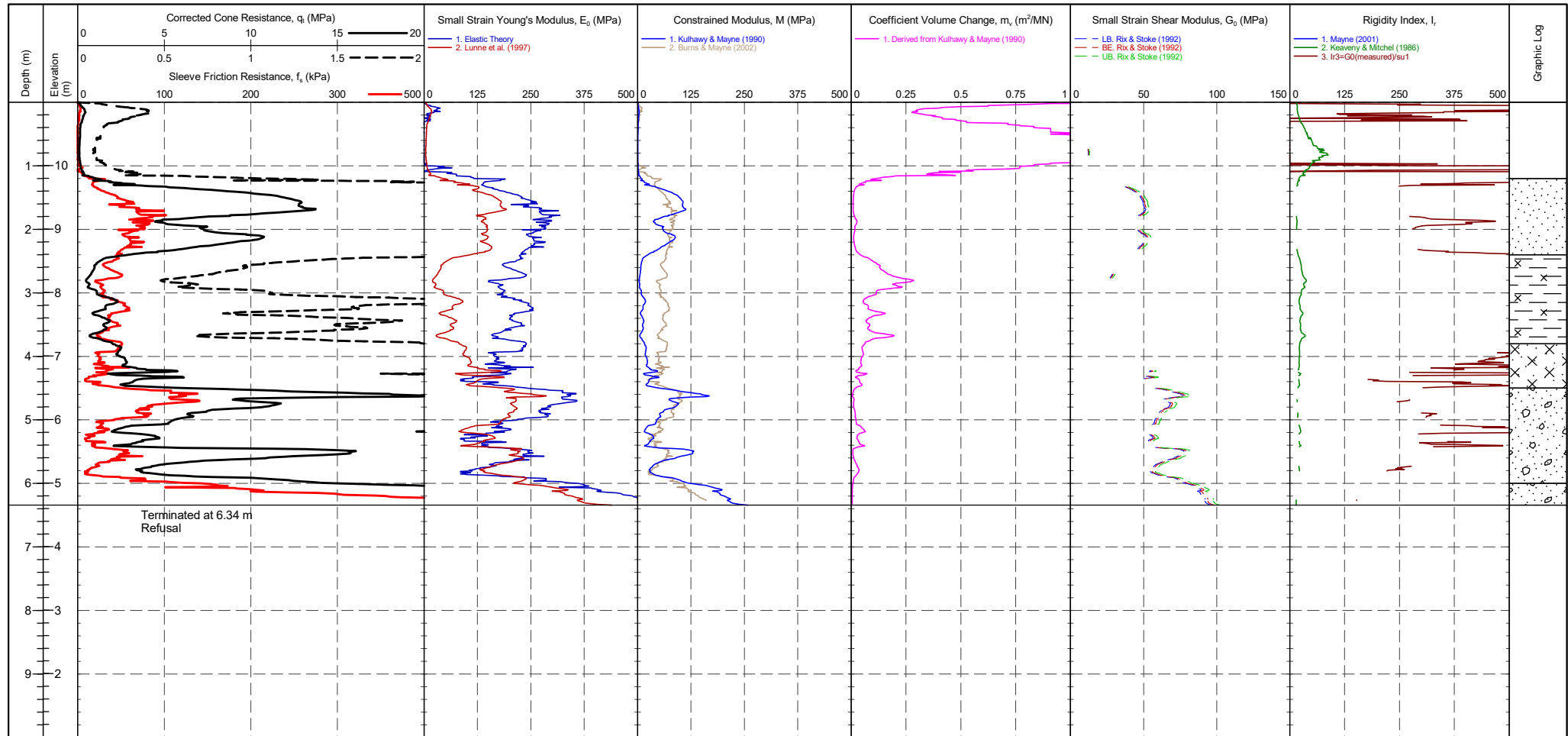


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>362 mV</td> <td>362 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>272 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>309 mV</td> <td>308 mV</td> <td>0 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2287 mV</td> <td>2307 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	362 mV	0 MPa	Sleeve	274 mV	272 mV	-0.001 kPa	Pore Pressure 2	309 mV	308 mV	0 kPa	X-Y Inclinator	2287 mV	2307 mV		Groundwater Level Dissipation Test
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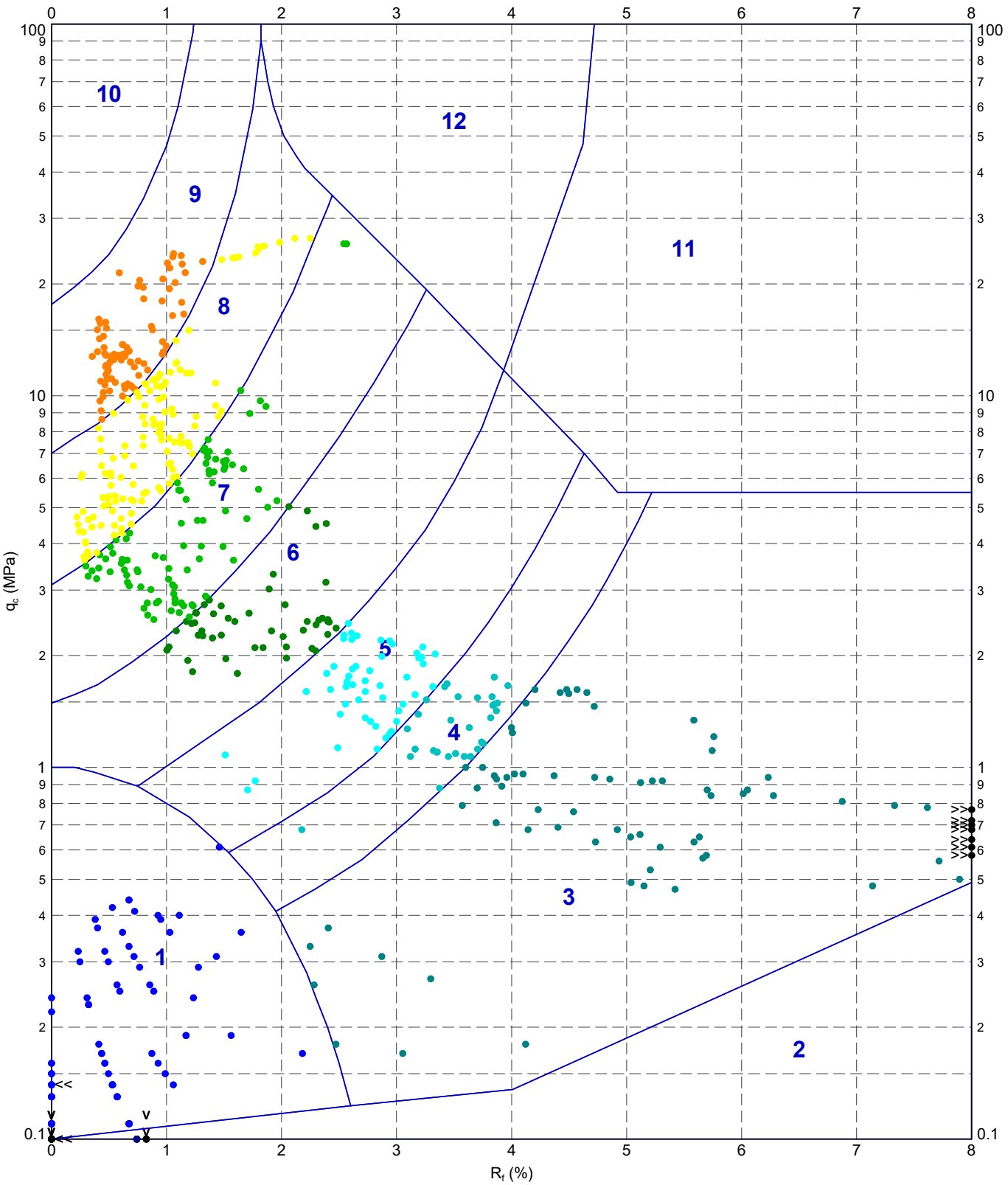
S3CPT02

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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>362 mV</td> <td>362 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>272 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>309 mV</td> <td>308 mV</td> <td>0 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2287 mV</td> <td>2307 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	362 mV	0 MPa	Sleeve	274 mV	272 mV	-0.001 kPa	Pore Pressure 2	309 mV	308 mV	0 kPa	X-Y Inclinator	2287 mV	2307 mV		Groundwater Level Dissipation Test
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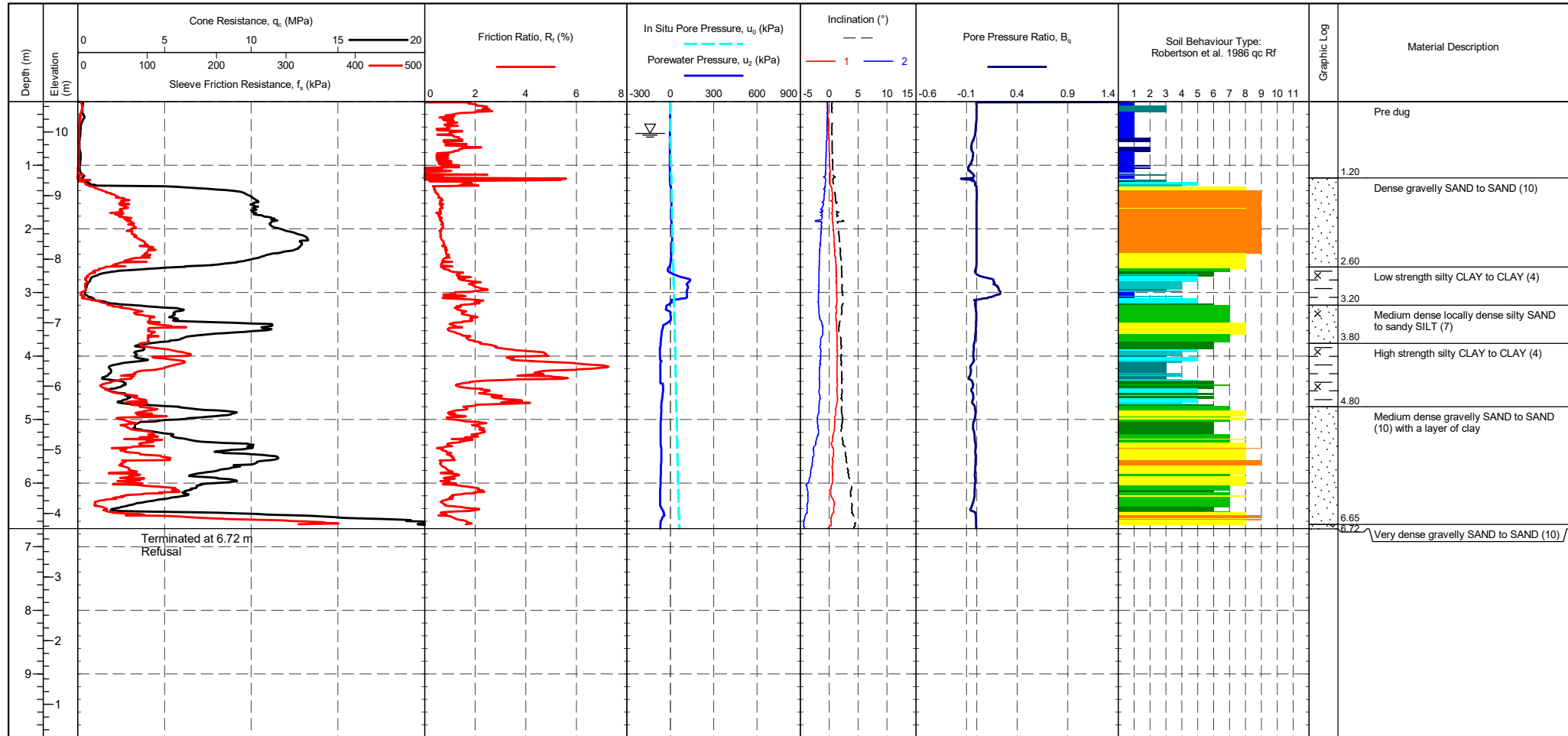
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT02	CHECKED	DATE
		SCALE	FIGURE No
		PROJECT No	FIGURE No
		Not To Scale	A4
		1220514	

PointID	S3CPT03
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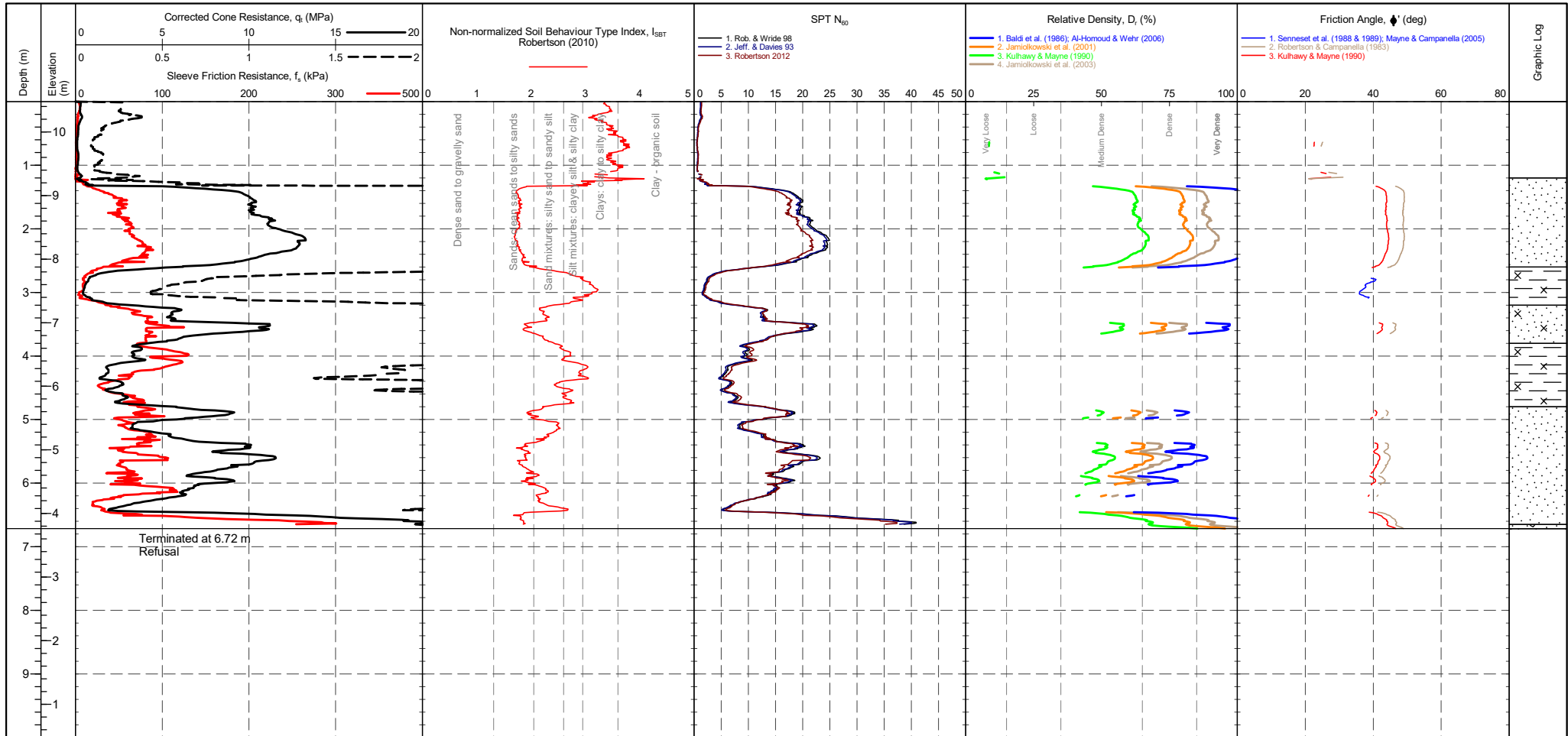
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481099.432 m NORTHING : 356042.412 m ELEVATION : 10.477 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer : Pre 364 mV, Post 362 mV, Difference -0.023 MPa Tip : 274 mV, 273 mV, -0.001 kPa Sleeve : 318 mV, 303 mV, -0.004 kPa Pore Pressure 2 : 2487 mV, 2492 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT03

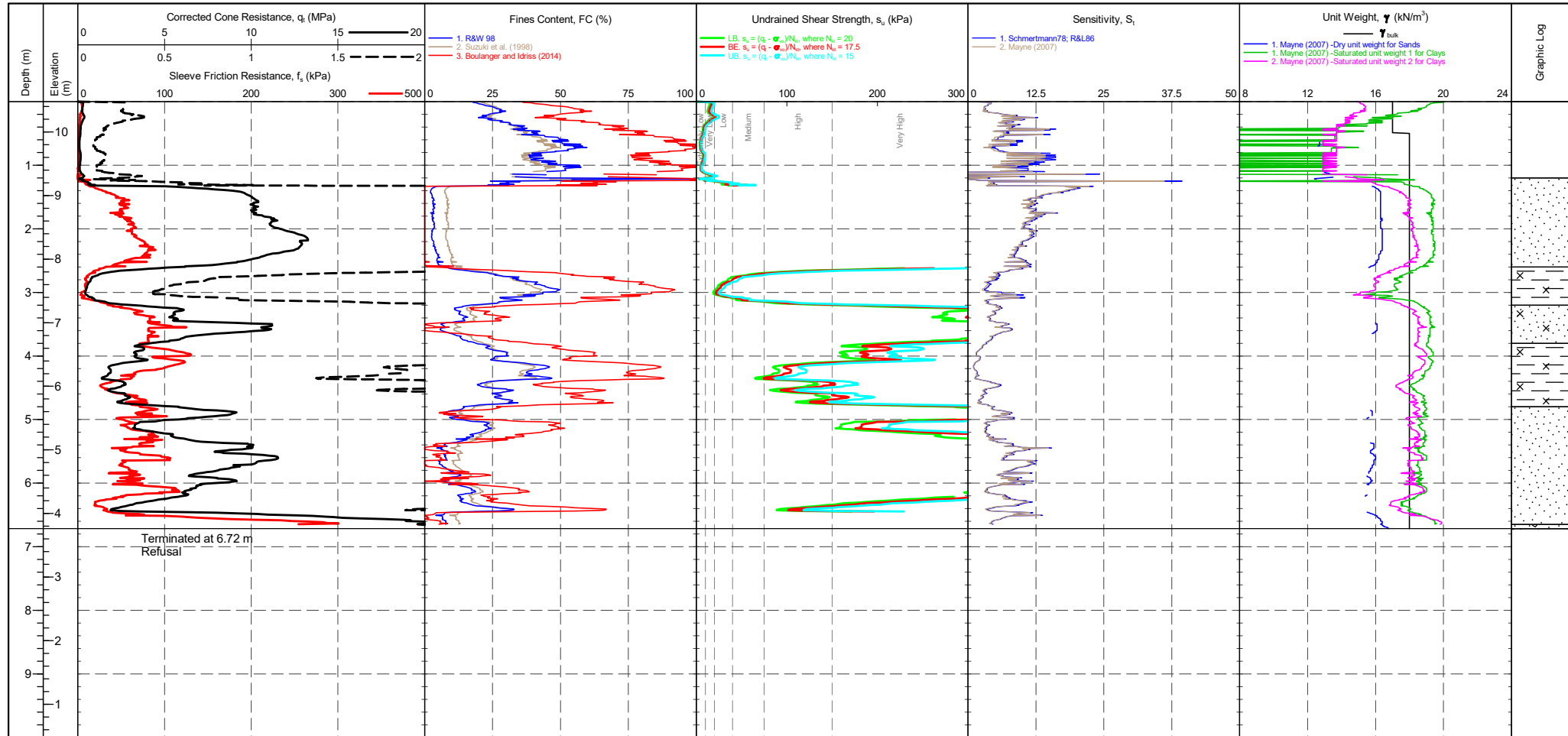
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PointID	S3CPT03
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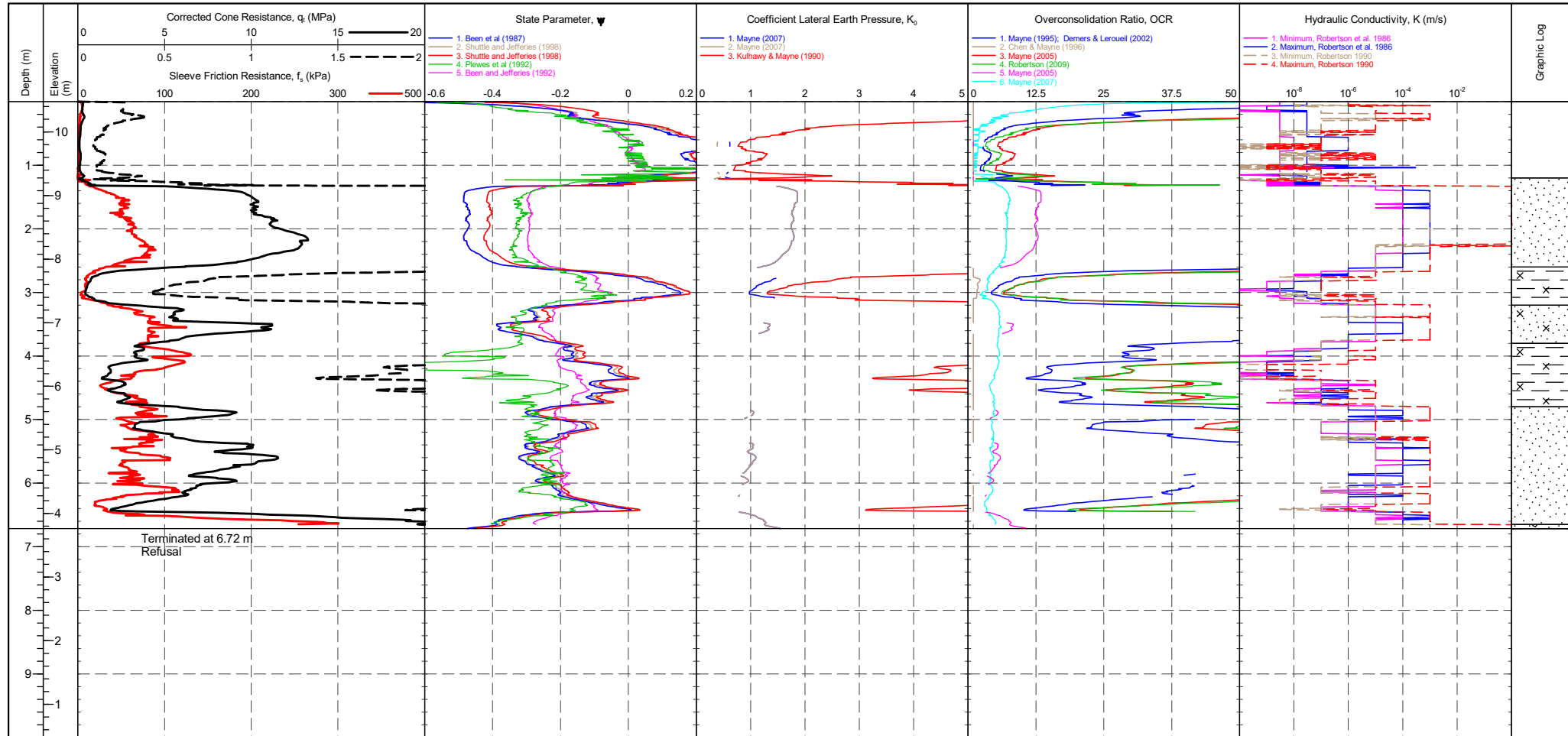
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481099.432 m NORTHING : 356042.412 m ELEVATION : 10.477 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>362 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>273 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>318 mV</td> <td>303 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2487 mV</td> <td>2492 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	362 mV	-0.023 MPa	Sleeve	274 mV	273 mV	-0.001 kPa	Pore Pressure 2	318 mV	303 mV	-0.004 kPa	X-Y Inclinator	2487 mV	2492 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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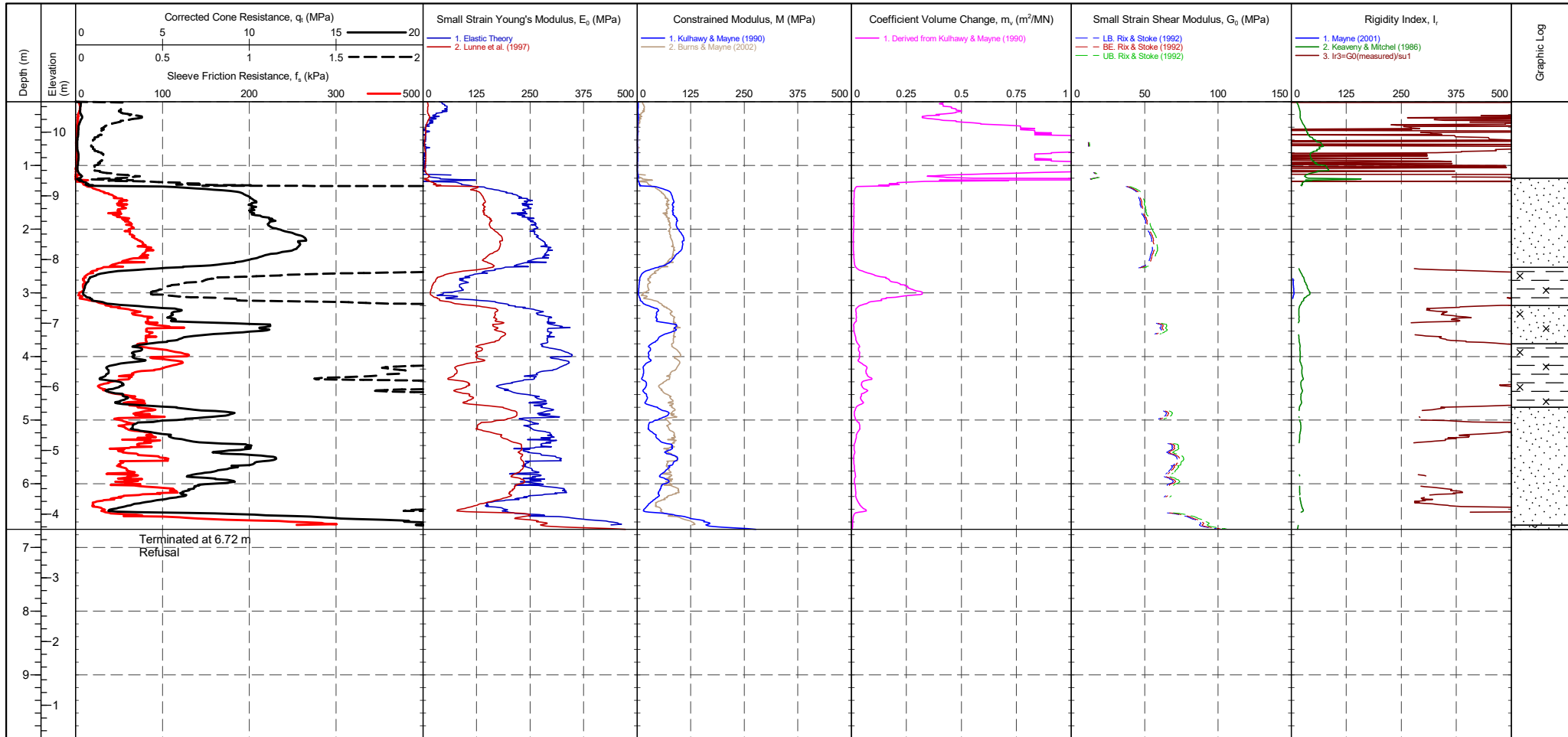
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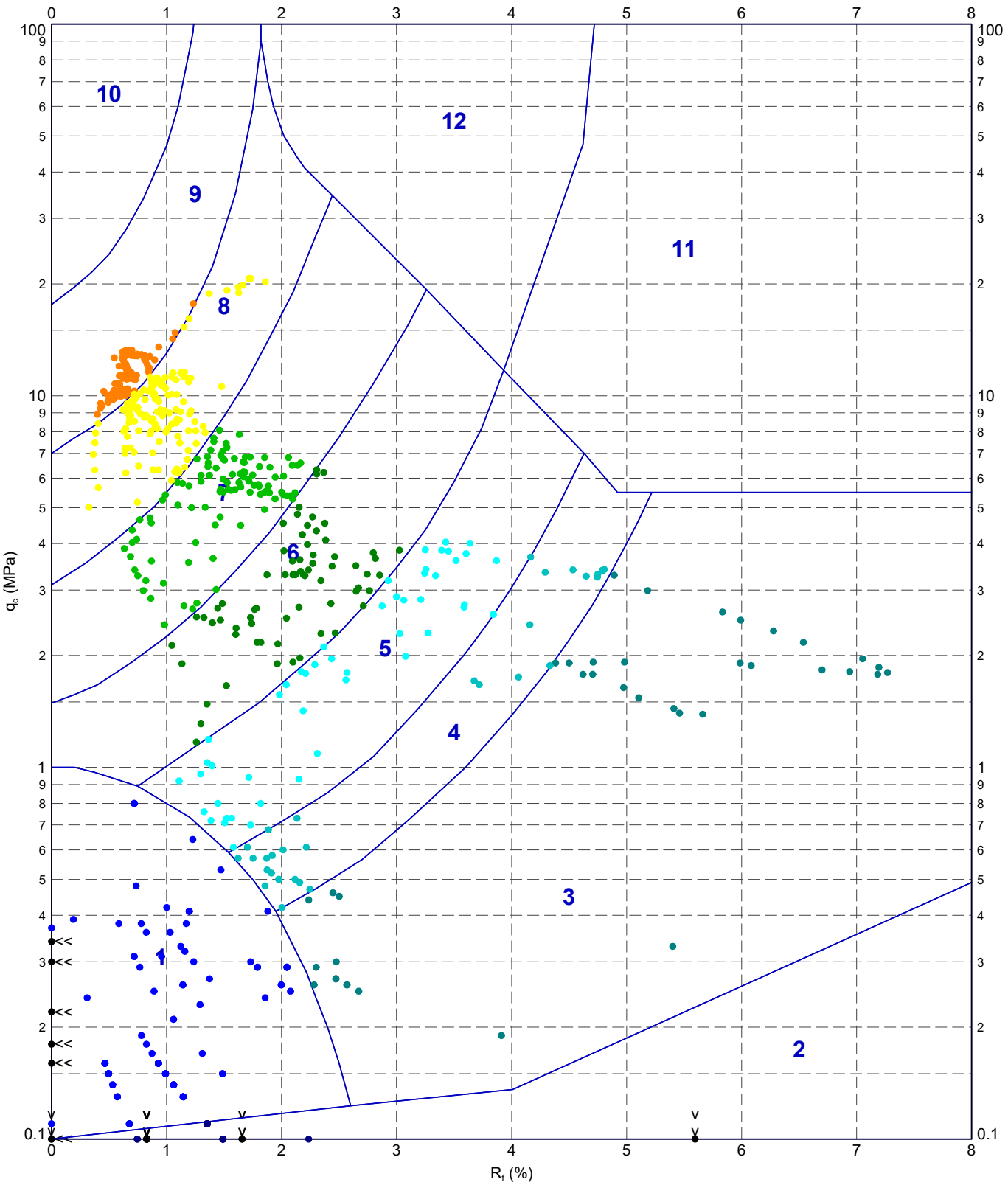
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481099.432 m NORTHING : 356042.412 m ELEVATION : 10.477 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>362 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>273 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>318 mV</td> <td>303 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2487 mV</td> <td>2492 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	362 mV	-0.023 MPa	Sleeve	274 mV	273 mV	-0.001 kPa	Pore Pressure 2	318 mV	303 mV	-0.004 kPa	X-Y Inclinator	2487 mV	2492 mV		Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																				
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Pore Pressure 2	318 mV	303 mV	-0.004 kPa																				
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220699-ADVANCED REPORT INSTITUSI 2.02.1 LUB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFiles> 2010520232222 10.03.00.09 Daiged Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10



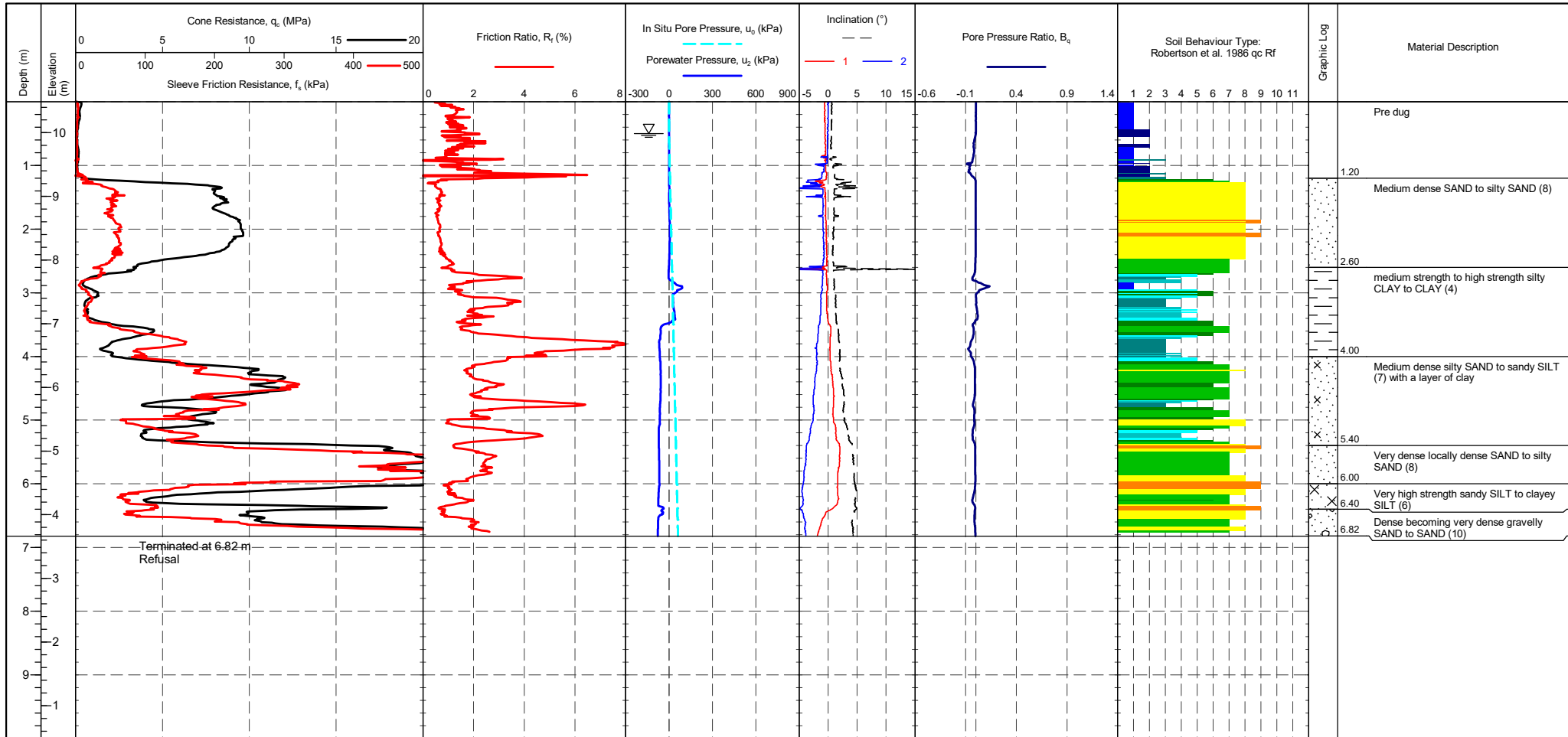
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark	CHECKED	20/05/2023
	A46 Newark Bypass	SCALE	Not To Scale
	Robertson et al. 1986 qc vs. Rf - S3CPT03	PROJECT No 1220514	FIGURE No
		A4	

PointID	S3CPT04
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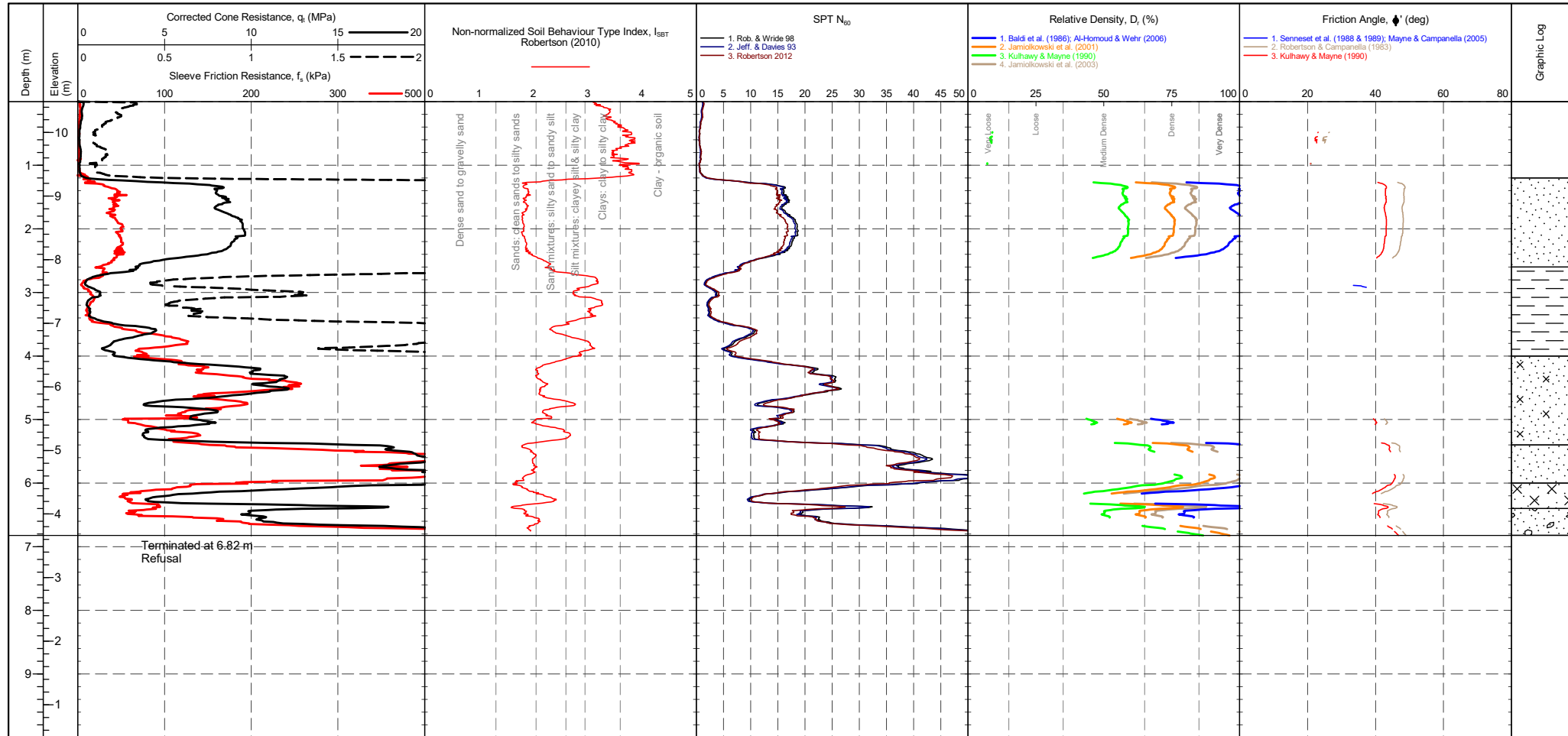
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481080.269 m NORTHING : 356129.003 m ELEVATION : 10.486 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 364 mV 359 mV -0.057 MPa Sleeve 274 mV 271 mV -0.002 kPa Pore Pressure 2 315 mV 299 mV -0.004 kPa X-Y Inclinometer 2484 mV 2504 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT04

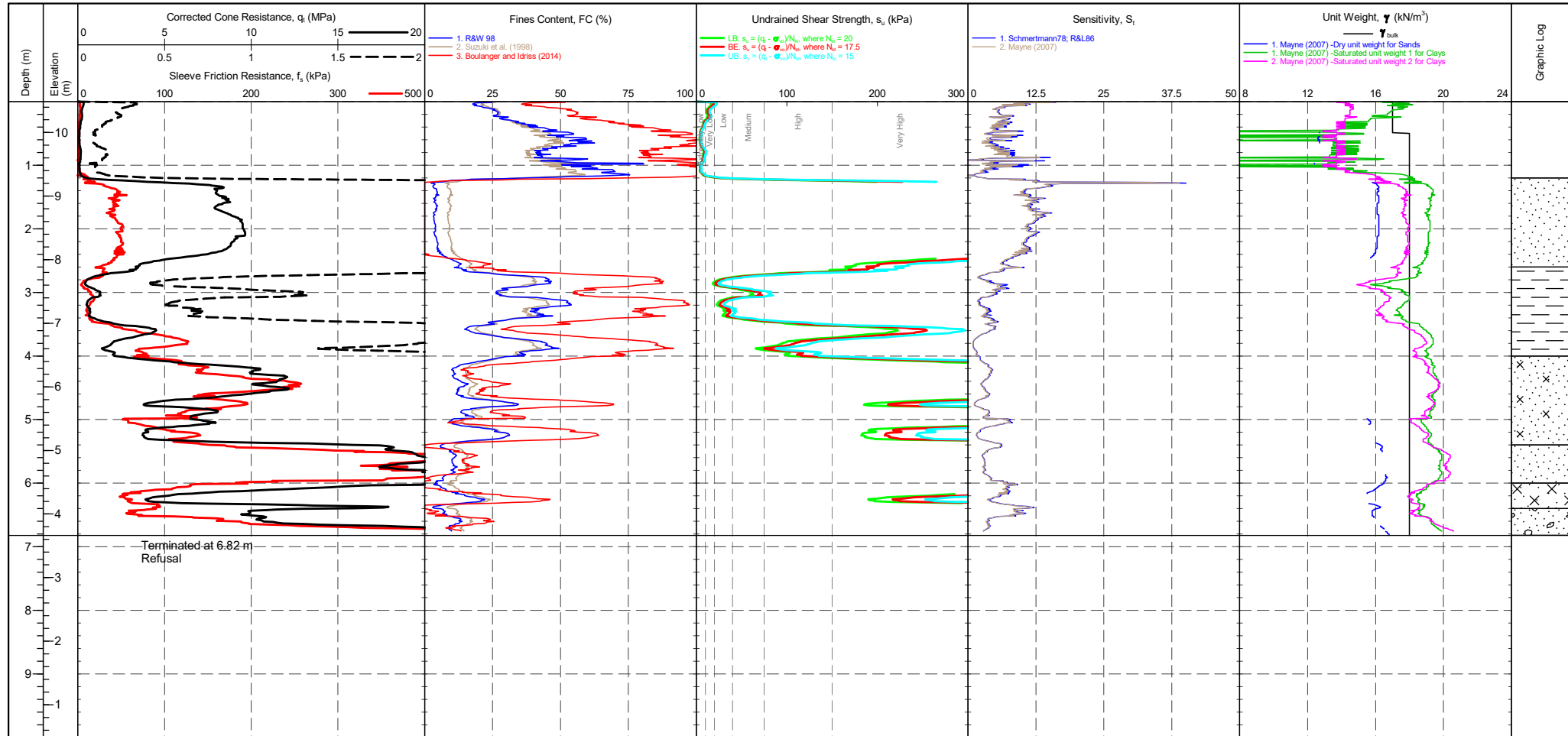
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481080.269 m NORTHING : 356129.003 m ELEVATION : 10.486 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Tip 364 mV 359 mV -0.057 MPa Sleeve 274 mV 271 mV -0.002 kPa Pore Pressure 2 315 mV 299 mV -0.004 kPa X-Y Inclinator 2484 mV 2504 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)																																			
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Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																			

PointID	S3CPT04
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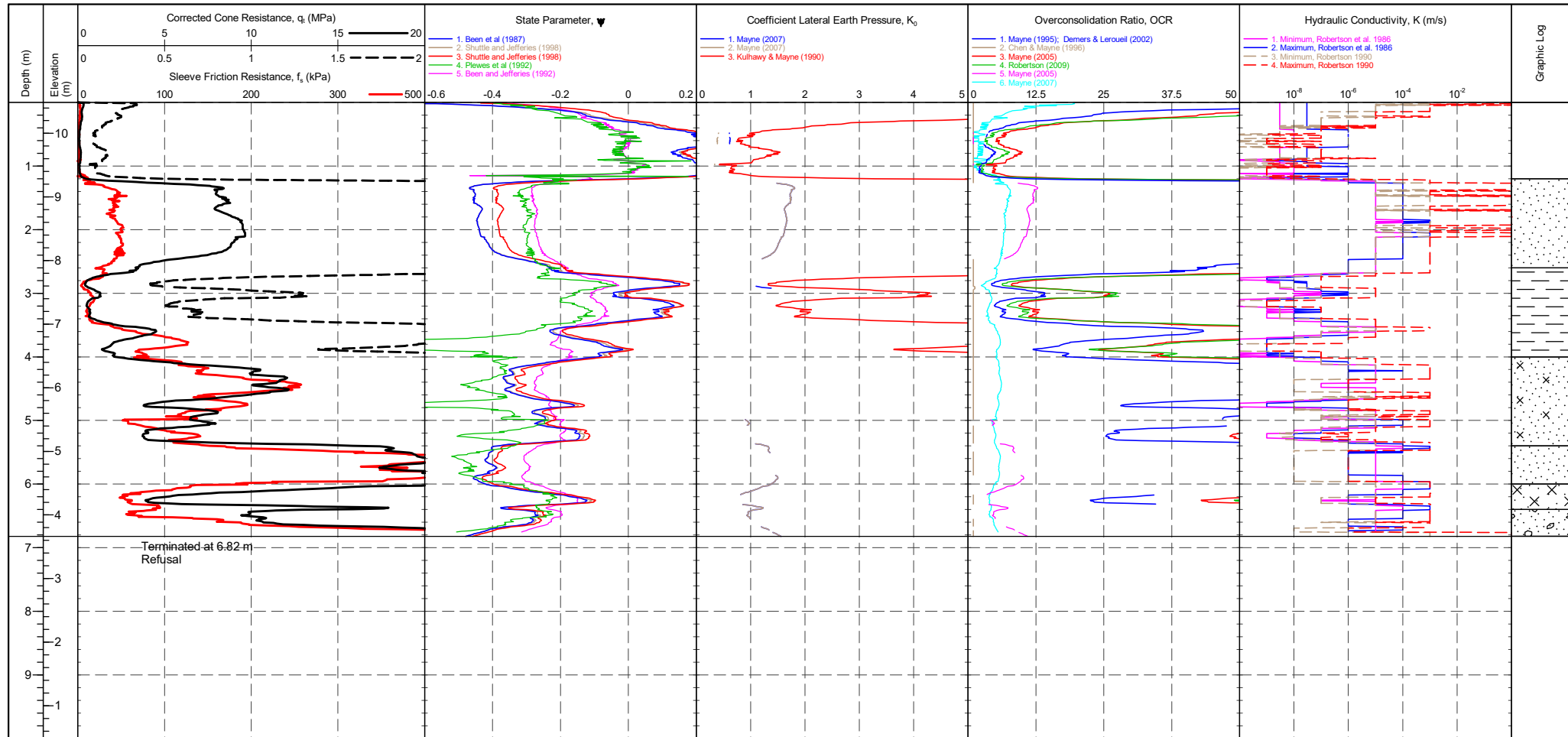
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481080.269 m NORTHING : 356129.003 m ELEVATION : 10.486 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>359 mV</td> <td>-0.057 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>271 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>315 mV</td> <td>299 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2484 mV</td> <td>2504 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	359 mV	-0.057 MPa	Sleeve	274 mV	271 mV	-0.002 kPa	Pore Pressure 2	315 mV	299 mV	-0.004 kPa	X-Y Inclinator	2484 mV	2504 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>s_u (kPa)</th> <th>Term based on measurement</th> <th>s_u (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																																									
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PointID
S3CPT04

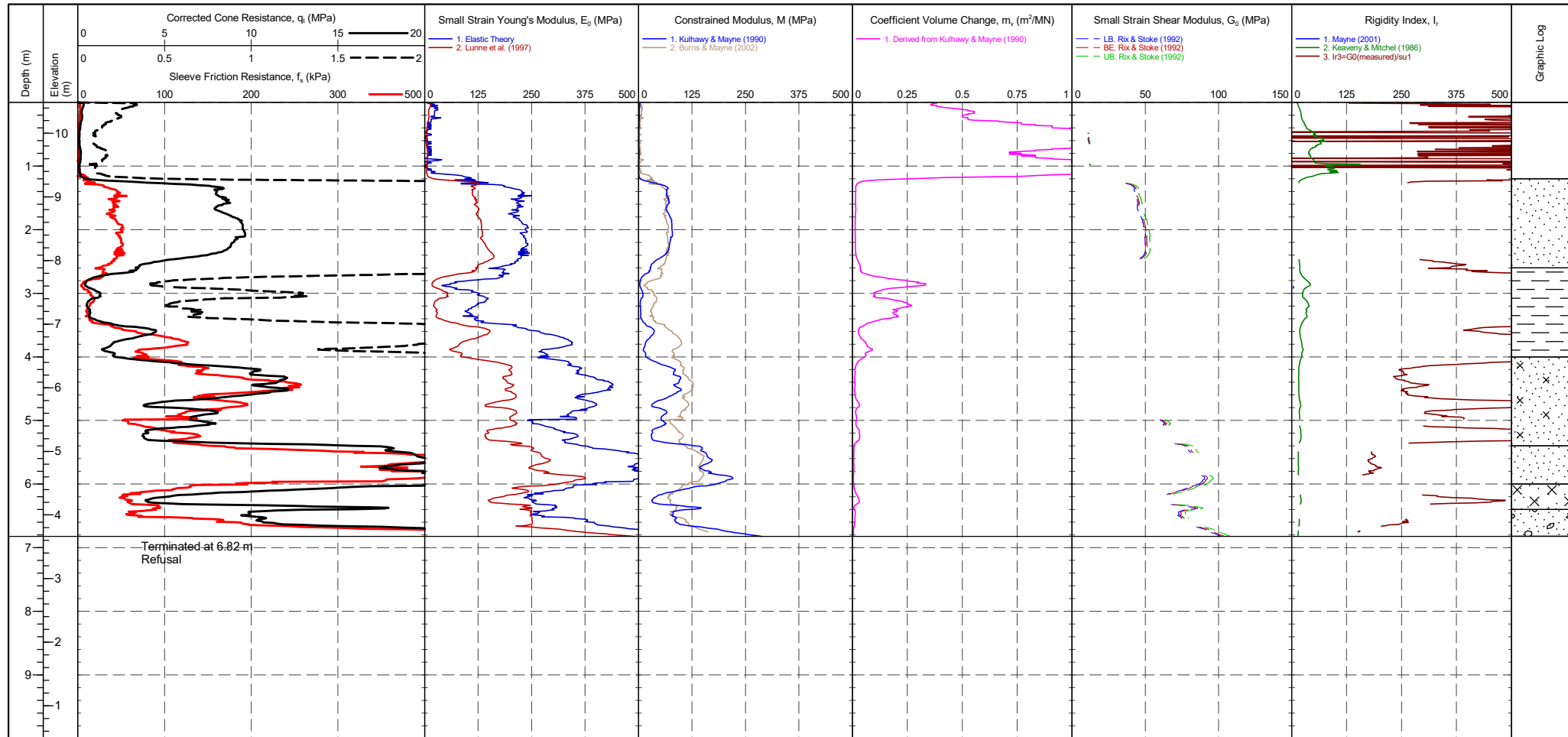
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481080.269 m NORTHING : 356129.003 m ELEVATION : 10.486 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>359 mV</td> <td>-0.057 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>271 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>315 mV</td> <td>299 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2484 mV</td> <td>2504 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	359 mV	-0.057 MPa	Sleeve	274 mV	271 mV	-0.002 kPa	Pore Pressure 2	315 mV	299 mV	-0.004 kPa	X-Y Inclinator	2484 mV	2504 mV		Groundwater Level Dissipation Test
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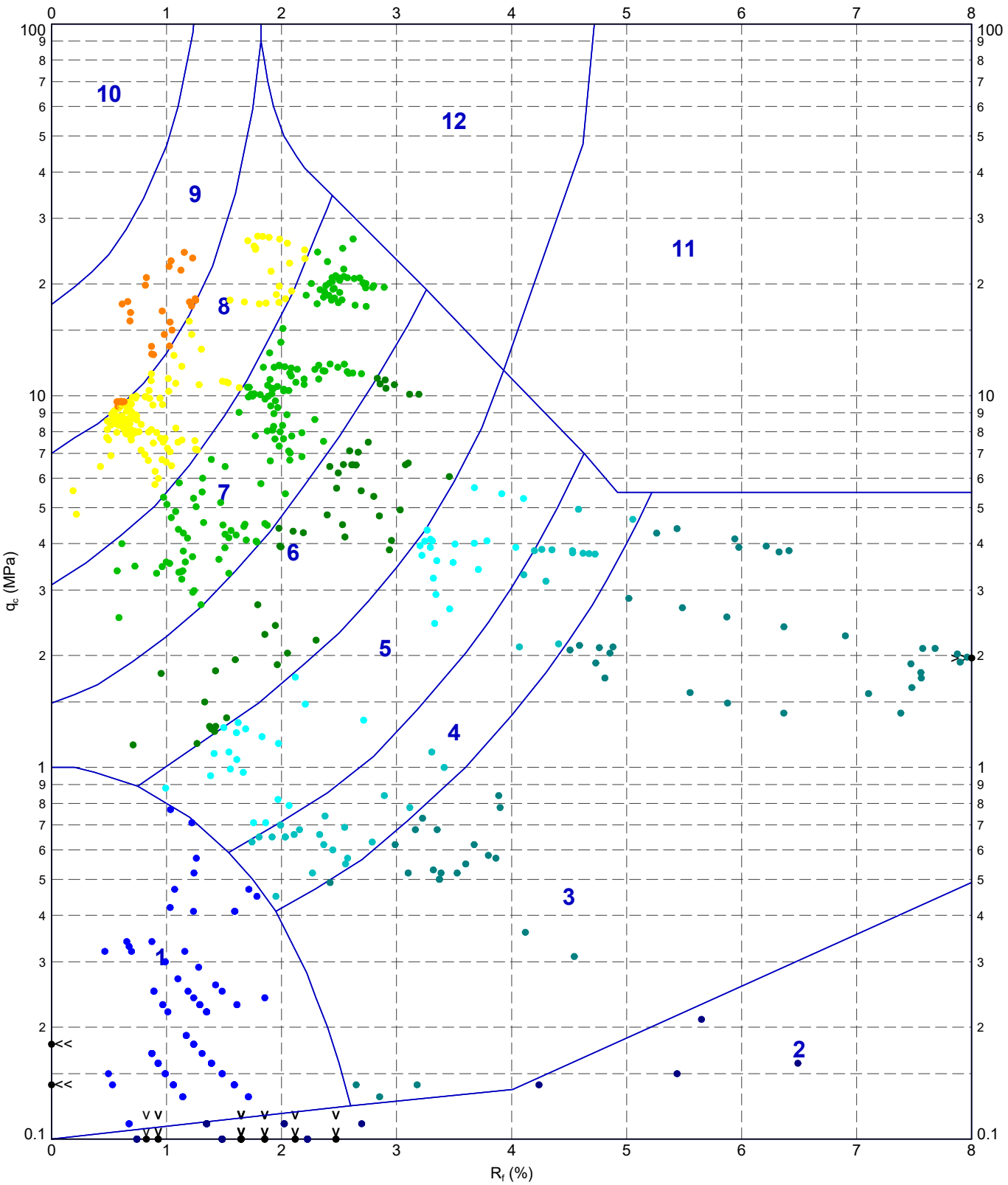
PointID
S3CPT04

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481080.269 m NORTHING : 356129.003 m ELEVATION : 10.486 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 31/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>359 mV</td> <td>-0.057 MPa</td> </tr> <tr> <td>Sleeve</td> <td>274 mV</td> <td>271 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>315 mV</td> <td>299 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2484 mV</td> <td>2504 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	359 mV	-0.057 MPa	Sleeve	274 mV	271 mV	-0.002 kPa	Pore Pressure 2	315 mV	299 mV	-0.004 kPa	X-Y Inclinator	2484 mV	2504 mV		Groundwater Level Dissipation Test
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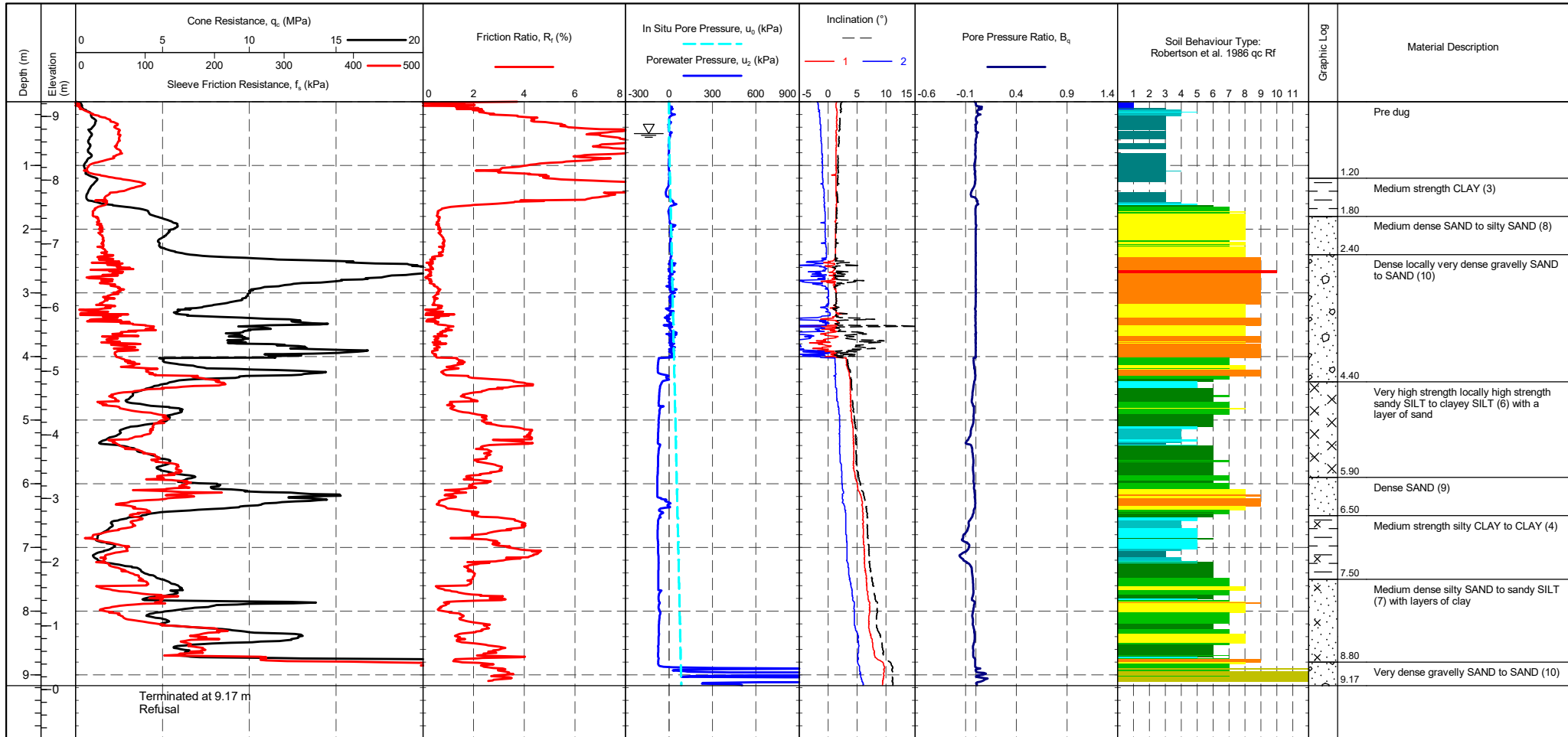
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT04	DRAWN	DATE 20/05/2023
		CHECKED	DATE 20/05/2023
		SCALE Not To Scale	A4
		PROJECT No 1220514	FIGURE No

PointID	S3CPT12
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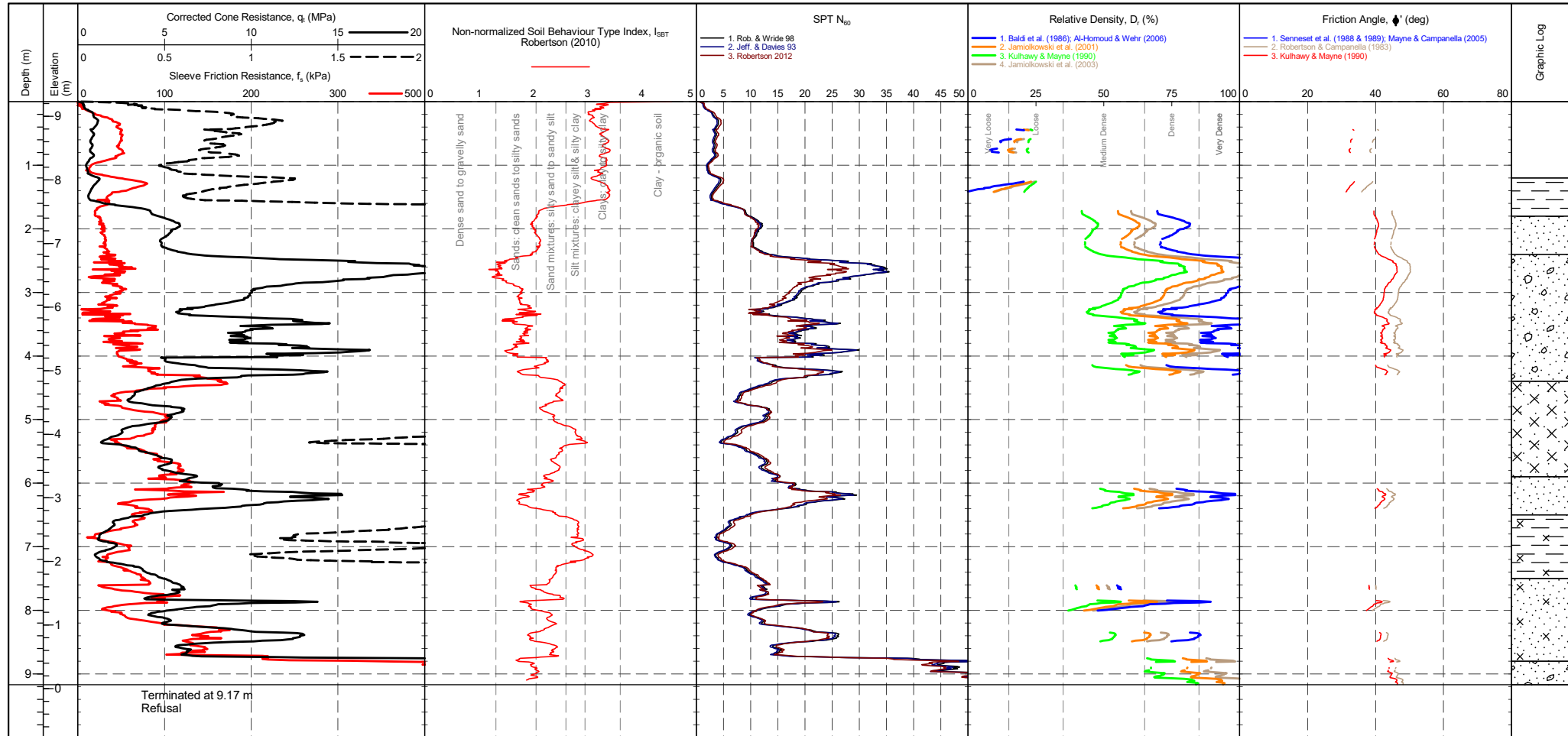
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 480024.250 m NORTHING : 355136.649 m ELEVATION : 9.232 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 365 mV 362 mV -0.034 MPa Sleeve 287 mV 284 mV -0.002 kPa Pore Pressure 2 318 mV 199 mV -0.033 kPa X-Y Inclinometer 2671 mV 2604 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT12
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 480024.250 m NORTHING : 355136.649 m ELEVATION : 9.232 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 365 mV / 362 mV / -0.034 MPa Sleeve: 287 mV / 284 mV / -0.002 kPa Pore Pressure 2: 318 mV / 199 mV / -0.033 kPa X-Y Inclinator: 2671 mV / 2604 mV	CPTU ZERO VALUES Pre: 365 mV, Post: 362 mV, Difference: -0.034 MPa Pre: 287 mV, Post: 284 mV, Difference: -0.002 kPa Pre: 318 mV, Post: 199 mV, Difference: -0.033 kPa Pre: 2671 mV, Post: 2604 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)																																				
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Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85																																				
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																				

PointID

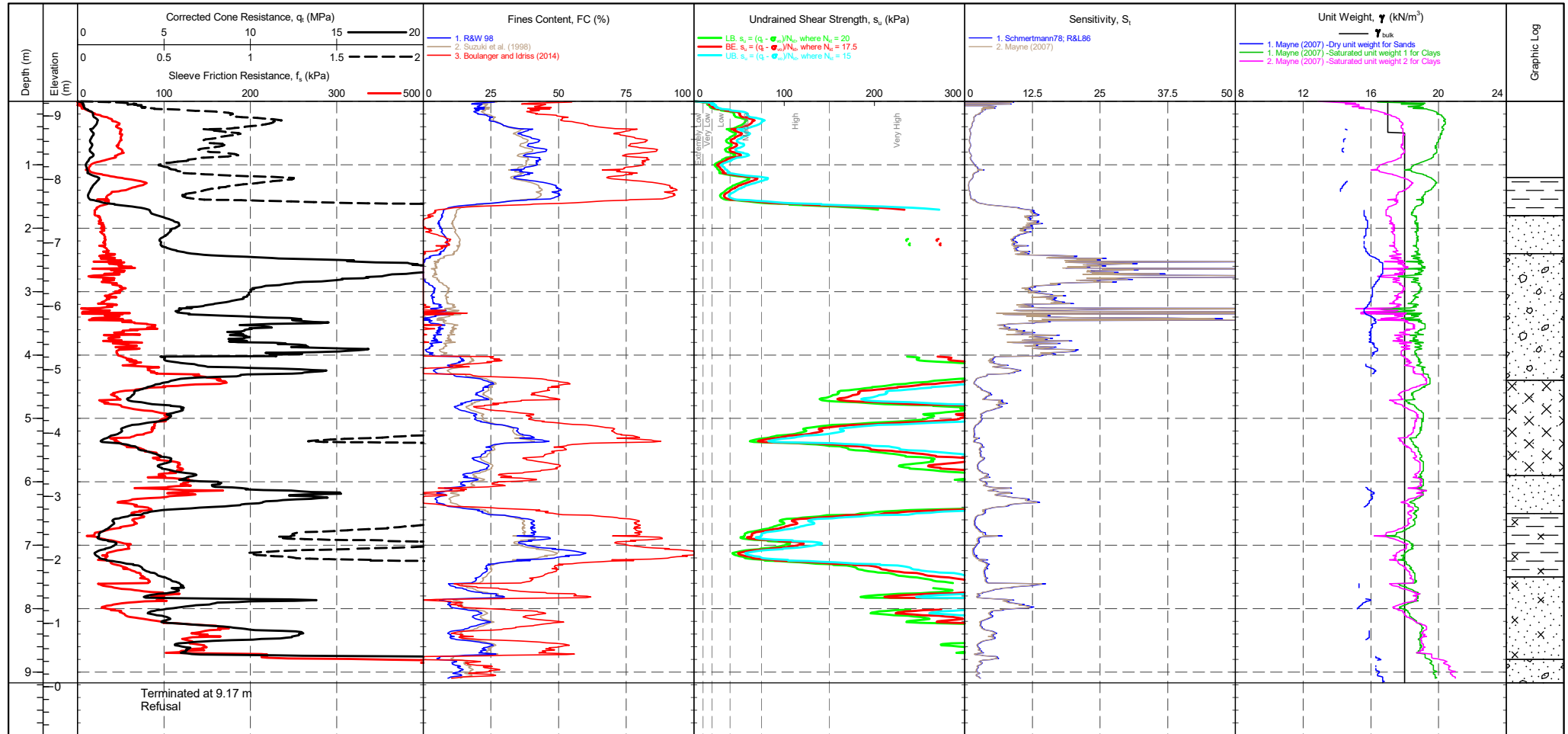
S3CPT12

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 480024.250 m
 NORTHING : 355136.649 m
 ELEVATION : 9.232 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 08/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 365 mV / 362 mV Sleeve : 287 mV / 284 mV Pore Pressure 2 : 318 mV / 199 mV X-Y Inclinator : 2671 mV / 2604 mV	CPTU ZERO VALUES Difference : -0.034 MPa Difference : -0.002 kPa Difference : -0.033 kPa	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength : <10 Very low strength : 10-20 Low strength : 20-40	Term based on measurement su (kPa) Medium strength : 40-75 High strength : 75-150 Very high strength : 150-300 Extremely high strength : >300	Groundwater Level Dissipation Test
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PointID

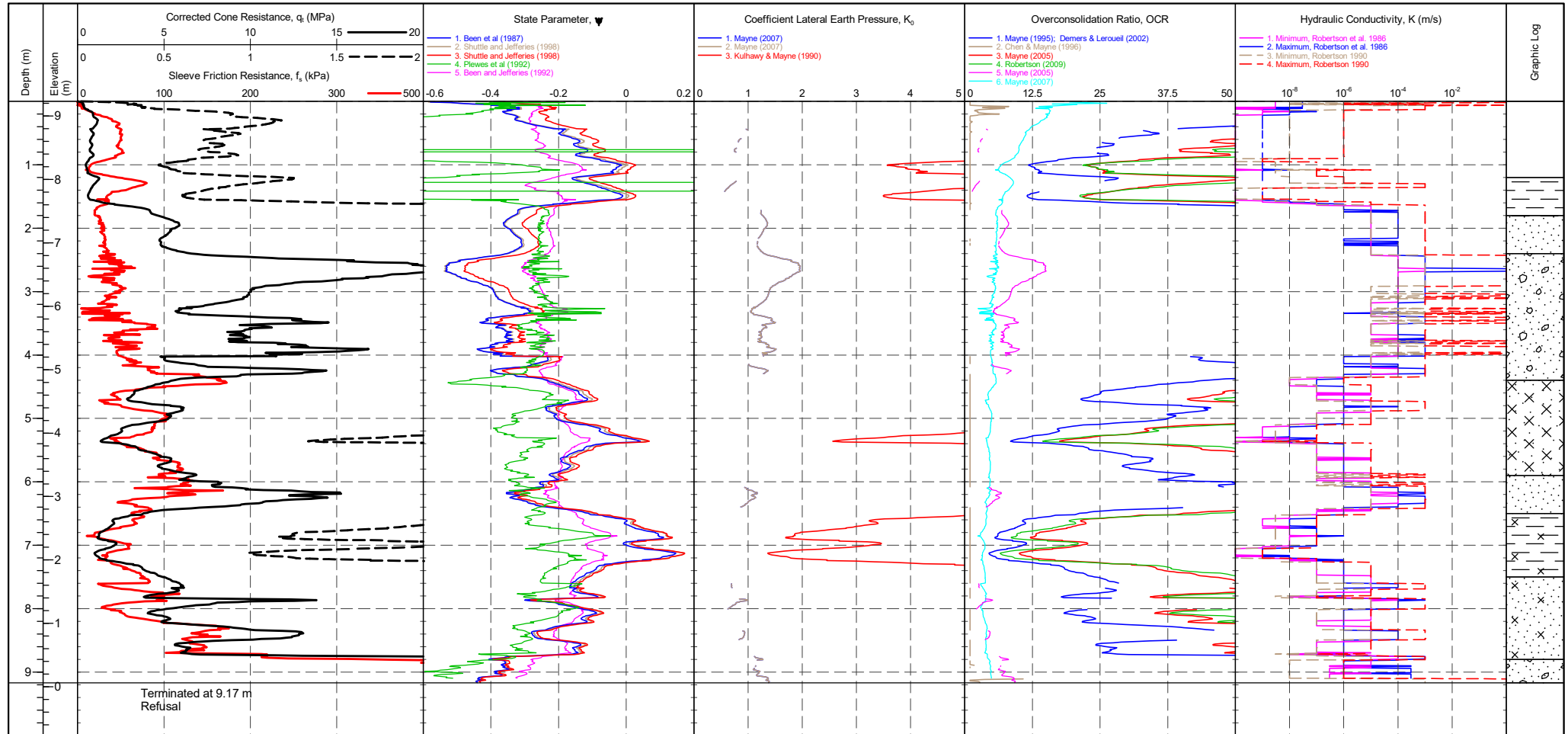
S3CPT12

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 480024.250 m
 NORTHING : 355136.649 m
 ELEVATION : 9.232 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

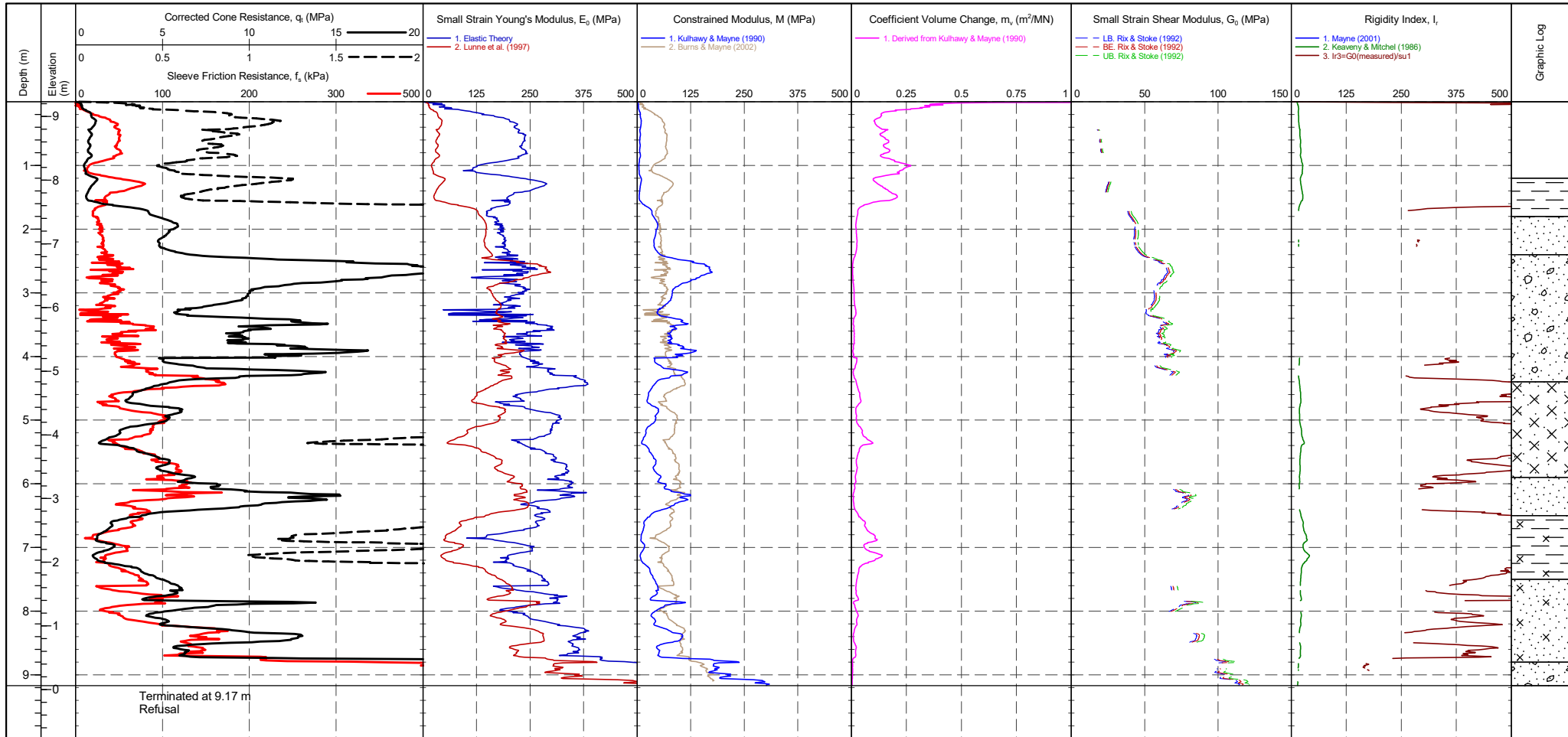
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 08/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2	CPTU ZERO VALUES			Groundwater Level Dissipation Test
	RIG : CPT 006 - Zoe OPERATOR : CM & DR	Transducer Pre Post Difference Tip 365 mV 362 mV -0.034 MPa Sleeve 287 mV 284 mV -0.002 kPa Pore Pressure 2 318 mV 199 mV -0.033 kPa X-Y Inclinator 2671 mV 2604 mV			
	FRICITION REDUCER : None WEATHER : Overcast & Mild				

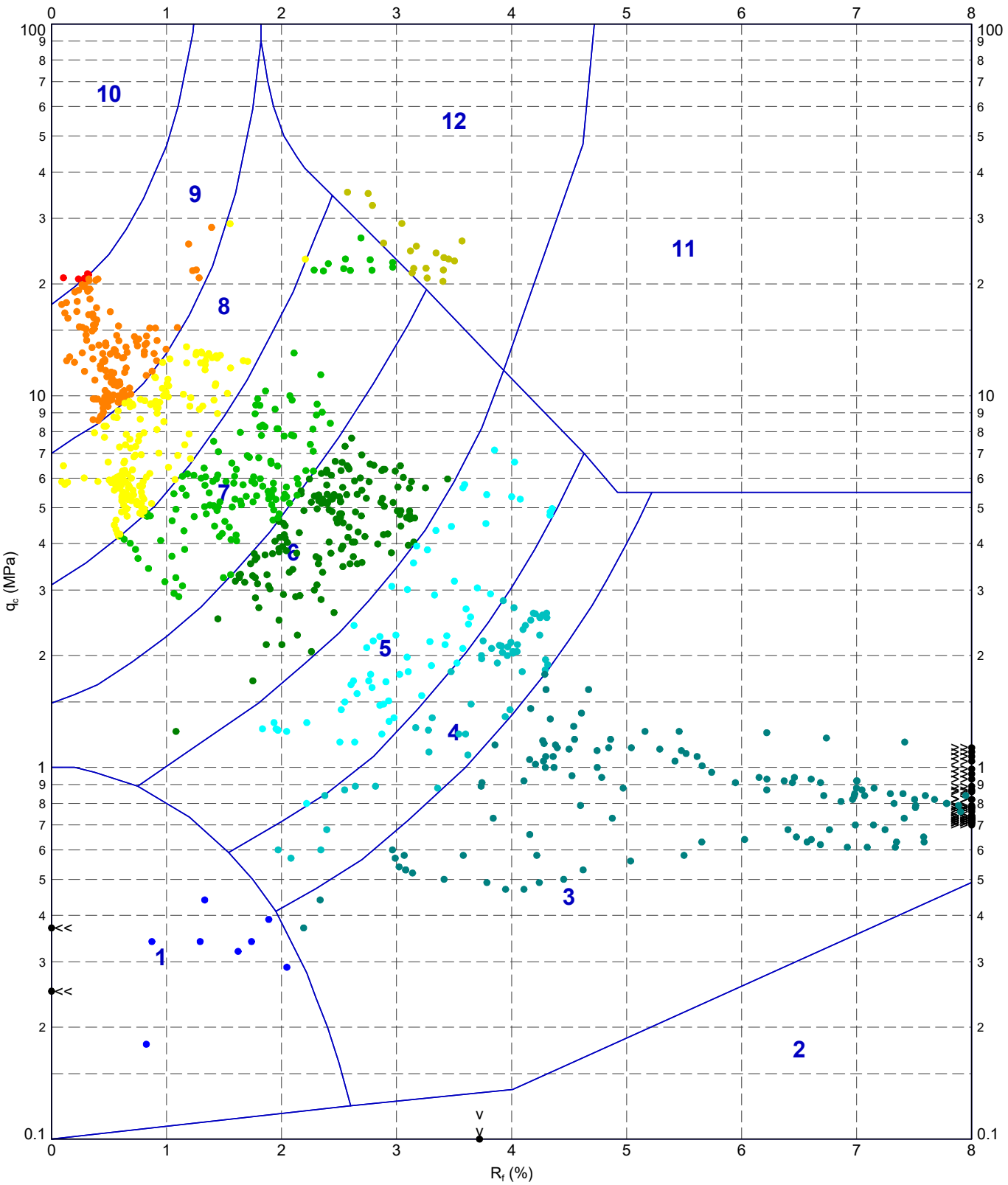
PointID
S3CPT12

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 480024.250 m NORTHING : 355136.649 m ELEVATION : 9.232 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>365 mV</td> <td>362 mV</td> <td>-0.034 MPa</td> </tr> <tr> <td>Sleeve</td> <td>287 mV</td> <td>284 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>318 mV</td> <td>199 mV</td> <td>-0.033 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2671 mV</td> <td>2604 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	362 mV	-0.034 MPa	Sleeve	287 mV	284 mV	-0.002 kPa	Pore Pressure 2	318 mV	199 mV	-0.033 kPa	X-Y Inclinator	2671 mV	2604 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:24 10.00.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



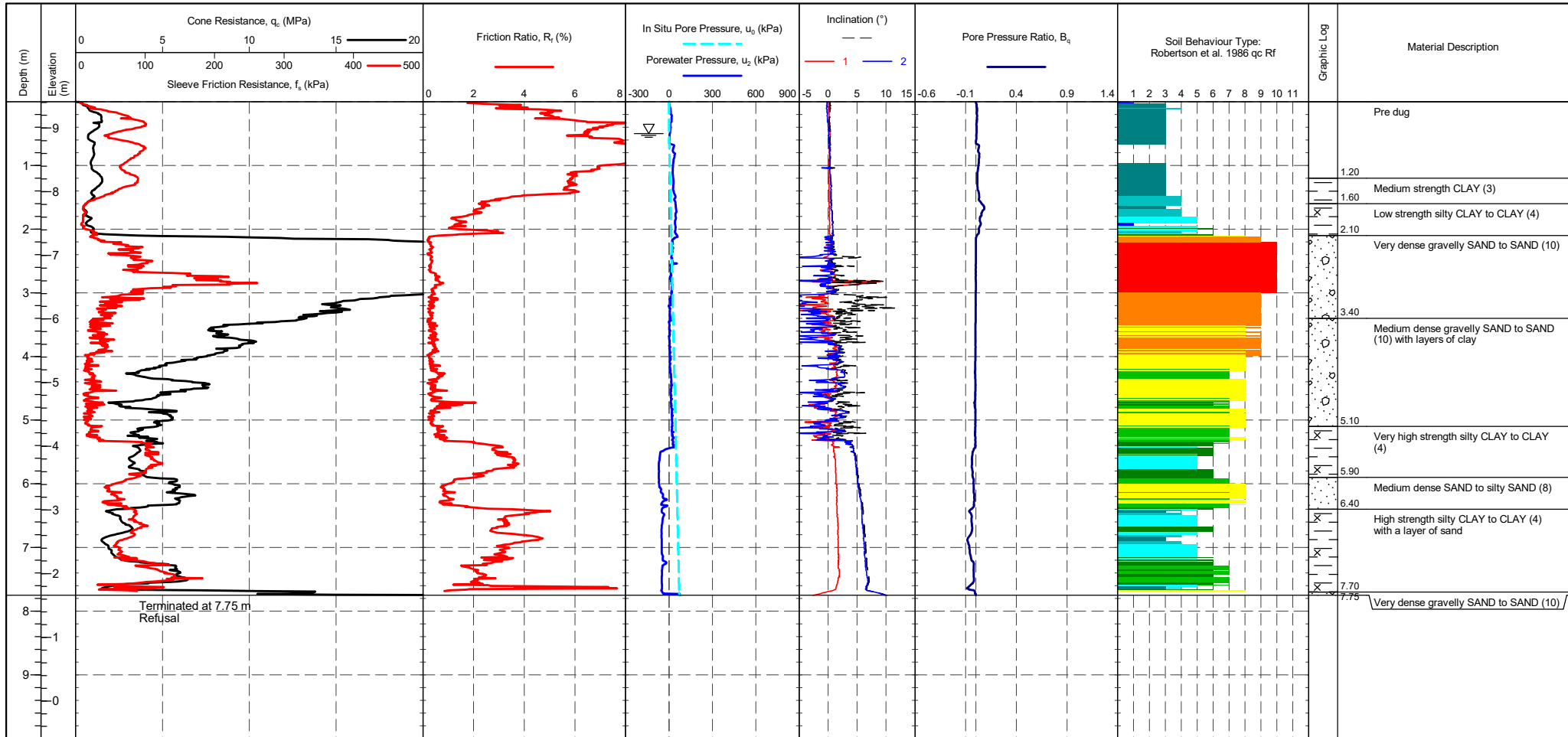
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN		DATE	
	Strata Geotechnics Newark A46 Newark Bypass		CHECKED		DATE
	Robertson et al. 1986 qc vs. Rf - S3CPT12		SCALE		
			PROJECT No 1220514		FIGURE No
		Not To Scale		A4	

PointID	S3CPT13
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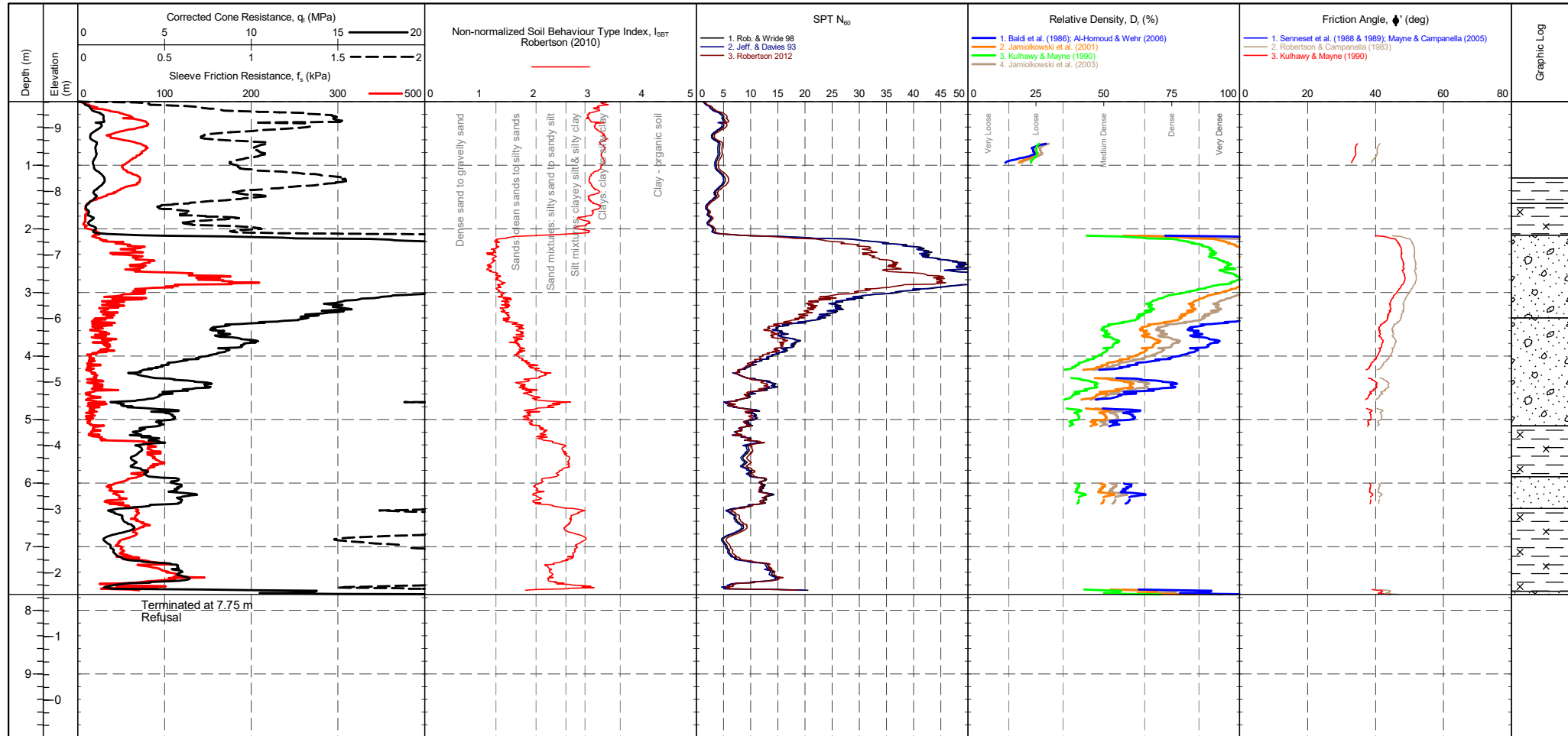
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479996.637 m NORTHING : 355068.959 m ELEVATION : 9.411 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 364 mV 0 MPa Sleeve 285 mV 288 mV 0.002 kPa Pore Pressure 2 315 mV 323 mV 0.002 kPa X-Y Inclinometer 2546 mV 2532 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT13
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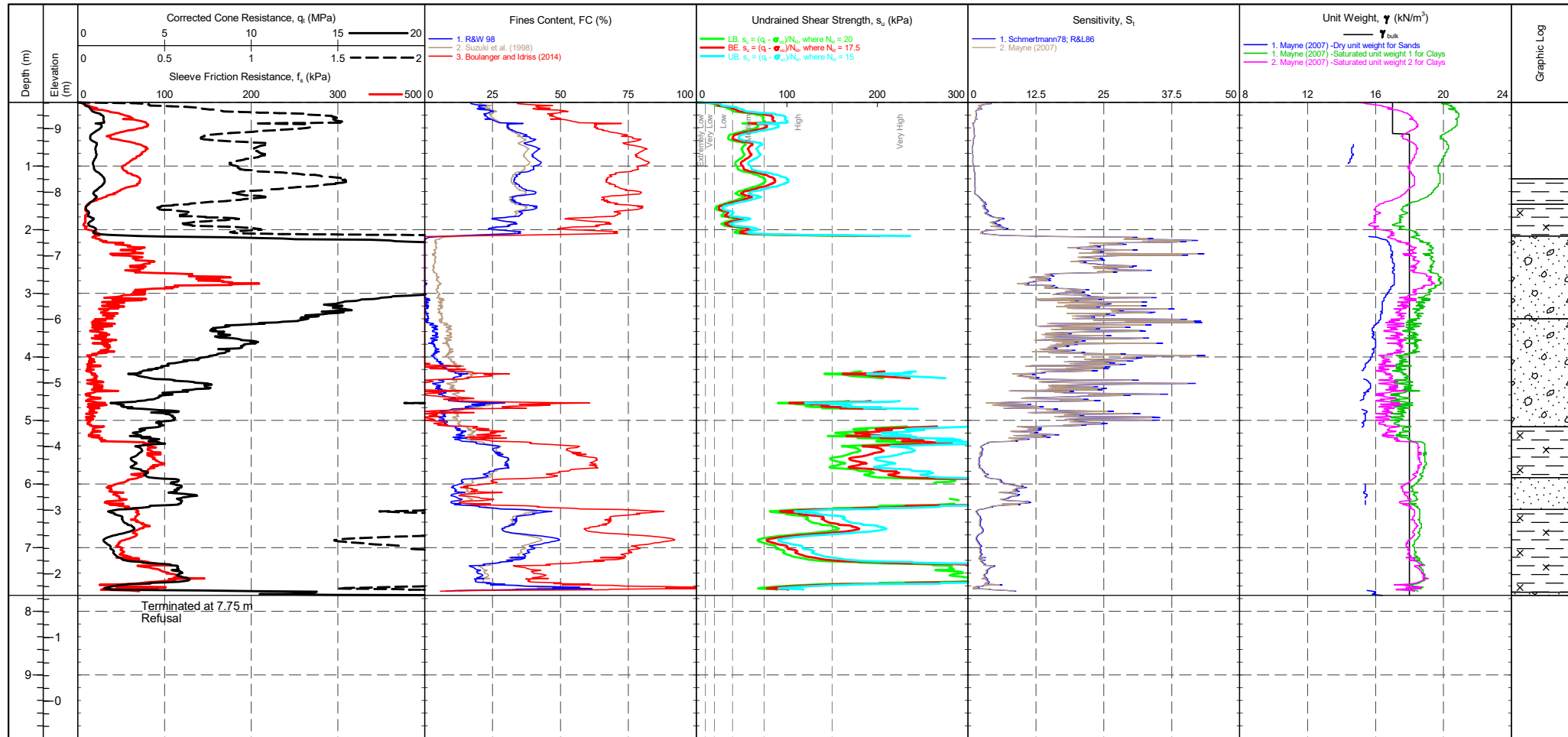
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479996.637 m NORTHING : 355068.959 m ELEVATION : 9.411 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>364 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>285 mV</td> <td>288 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>315 mV</td> <td>323 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2546 mV</td> <td>2532 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	285 mV	288 mV	0.002 kPa	Pore Pressure 2	315 mV	323 mV	0.002 kPa	X-Y Inclinator	2546 mV	2532 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	▽ Groundwater Level Dissipation Test
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PointID	S3CPT13
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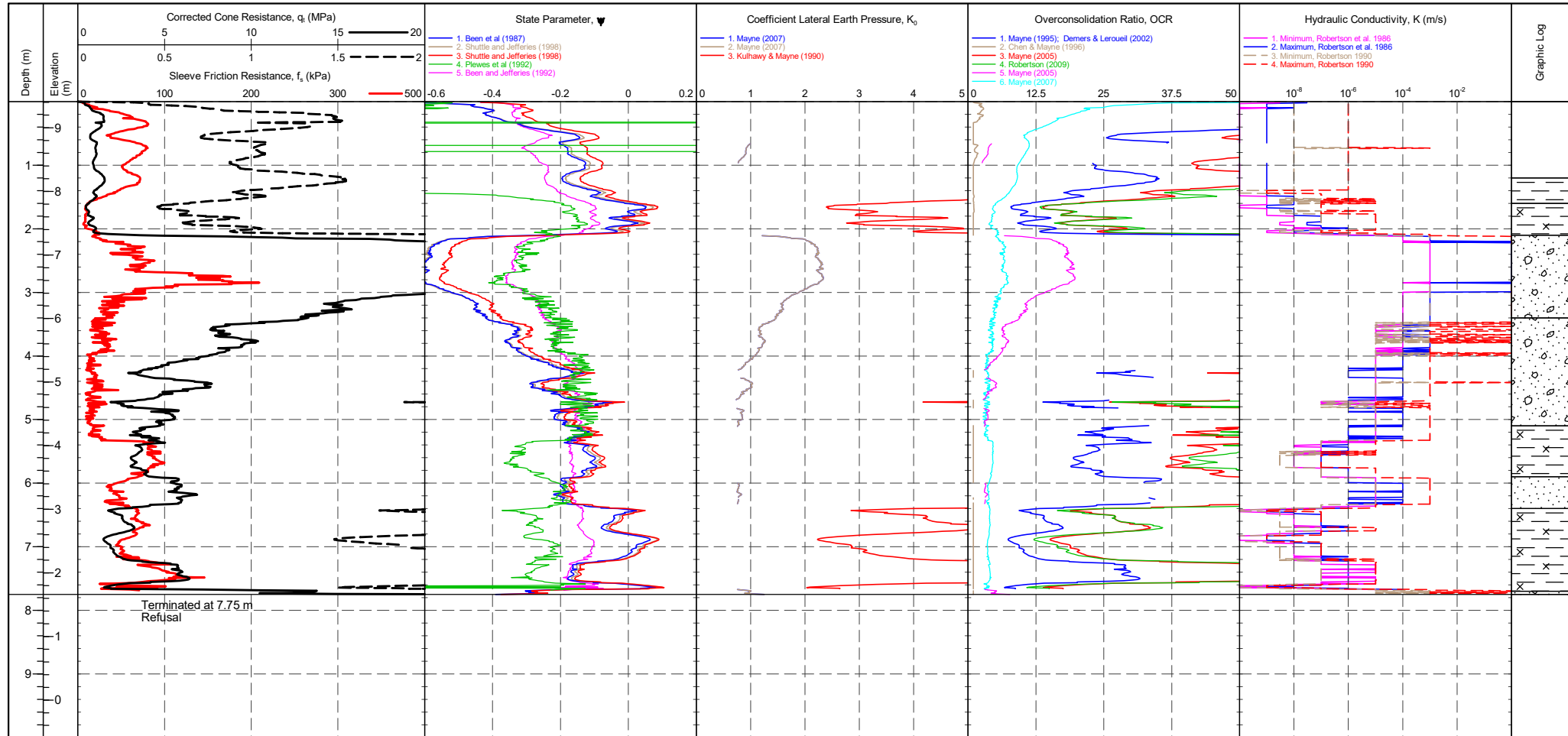
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479996.637 m NORTHING : 355068.959 m ELEVATION : 9.411 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>364 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>285 mV</td> <td>288 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>315 mV</td> <td>323 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2546 mV</td> <td>2532 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	285 mV	288 mV	0.002 kPa	Pore Pressure 2	315 mV	323 mV	0.002 kPa	X-Y Inclinator	2546 mV	2532 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID
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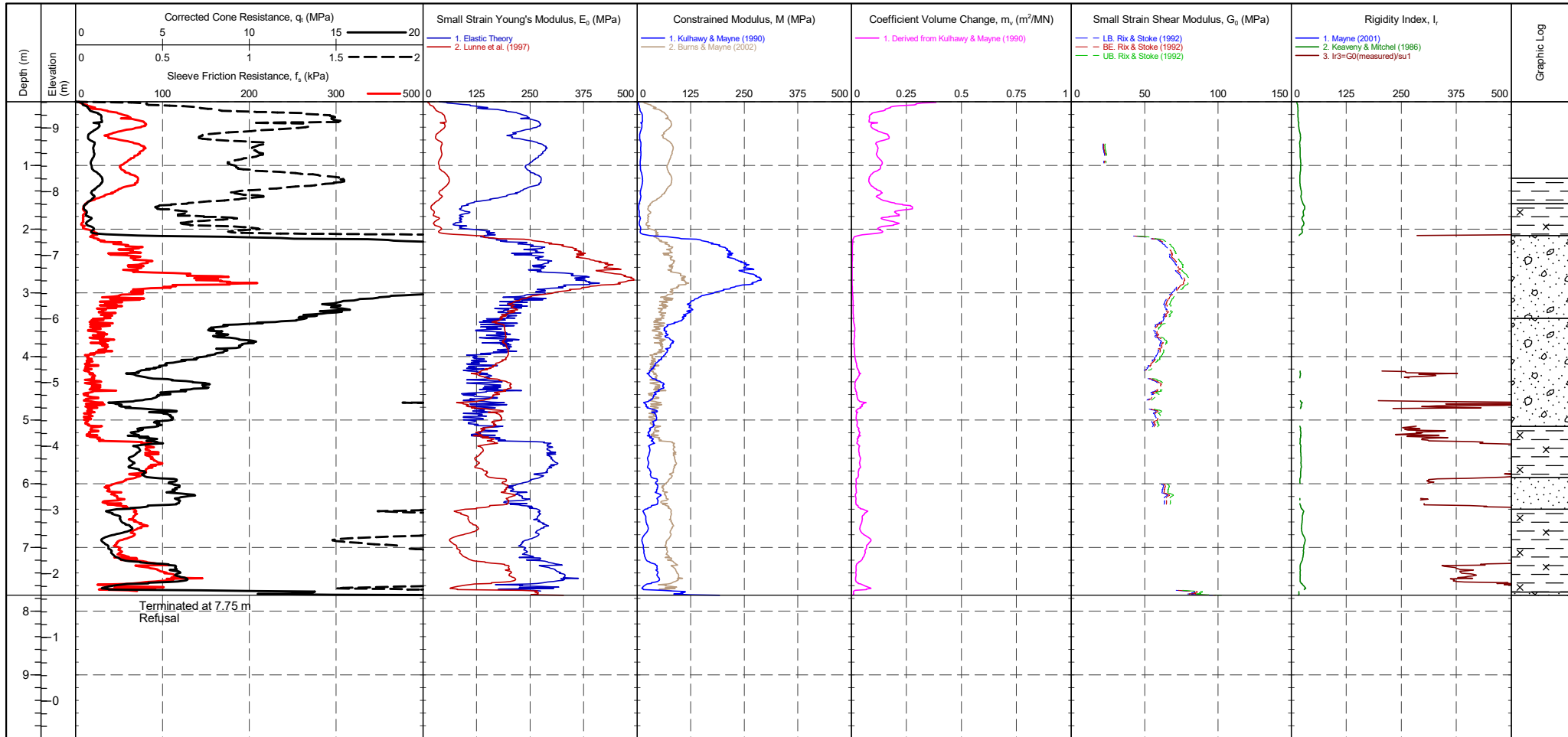
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479996.637 m NORTHING : 355068.959 m ELEVATION : 9.411 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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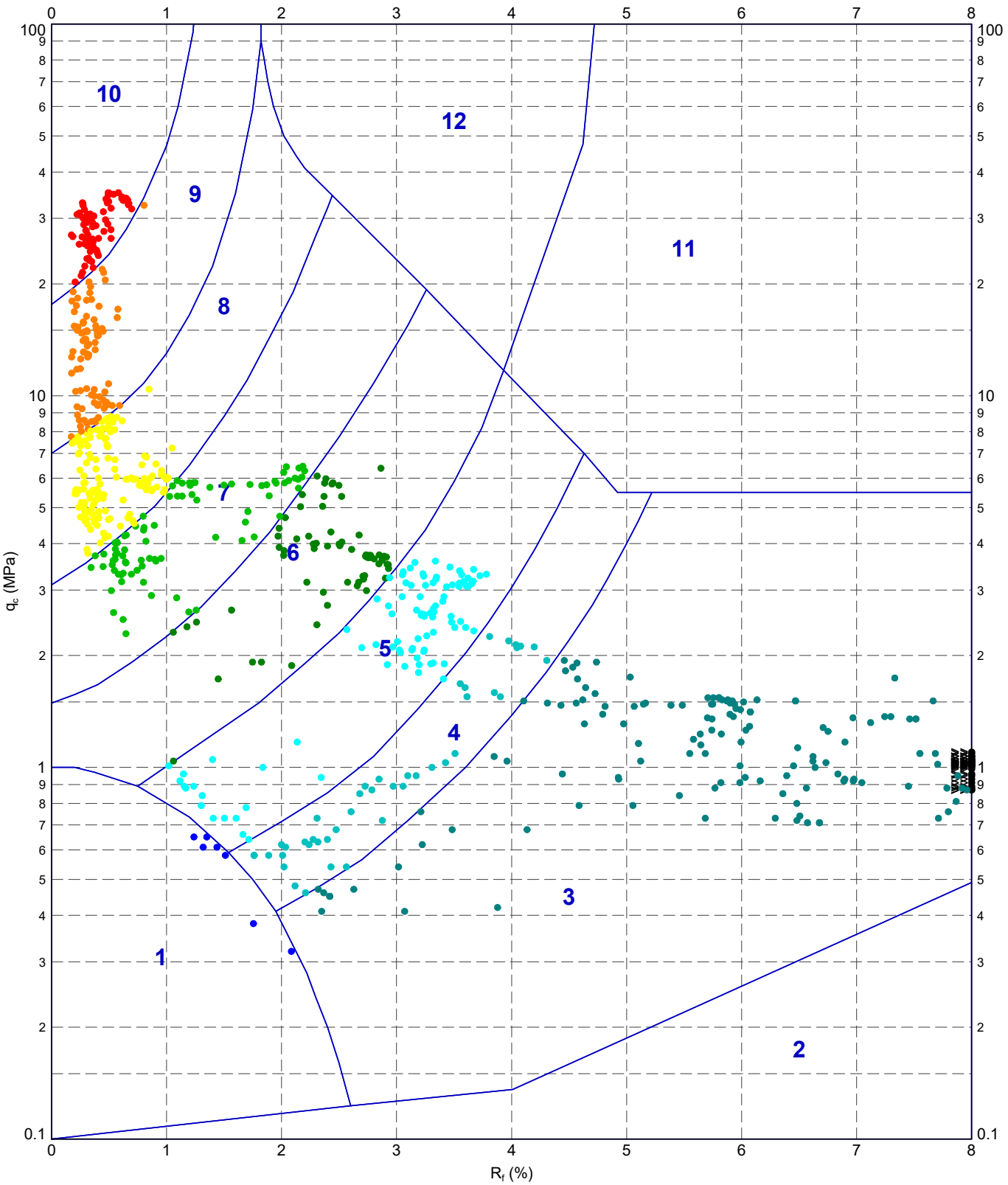
PointID
S3CPT13

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479996.637 m NORTHING : 355068.959 m ELEVATION : 9.411 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 08/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>364 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>285 mV</td> <td>288 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>315 mV</td> <td>323 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2546 mV</td> <td>2532 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	285 mV	288 mV	0.002 kPa	Pore Pressure 2	315 mV	323 mV	0.002 kPa	X-Y Inclinometer	2546 mV	2532 mV		Groundwater Level Dissipation Test
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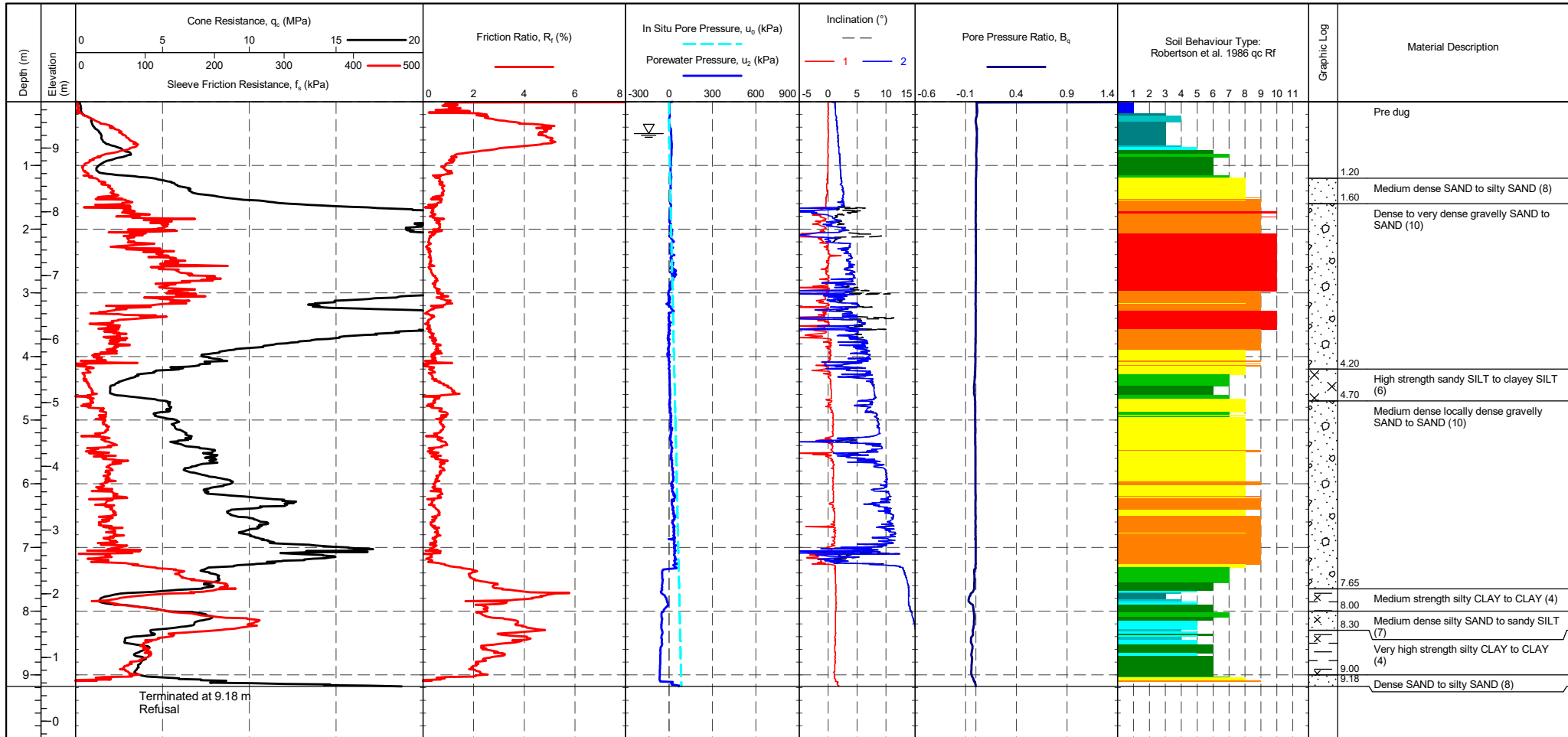
METHOD: Robertson et al. 1986 q_c R_f

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
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- 6 - Sandy SILT to clayey SILT
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- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 q _c vs. R _f - S3CPT13	CHECKED	DATE
	SCALE	Not To Scale	
	PROJECT No 1220514	FIGURE No A4	

PointID	S3CPT14
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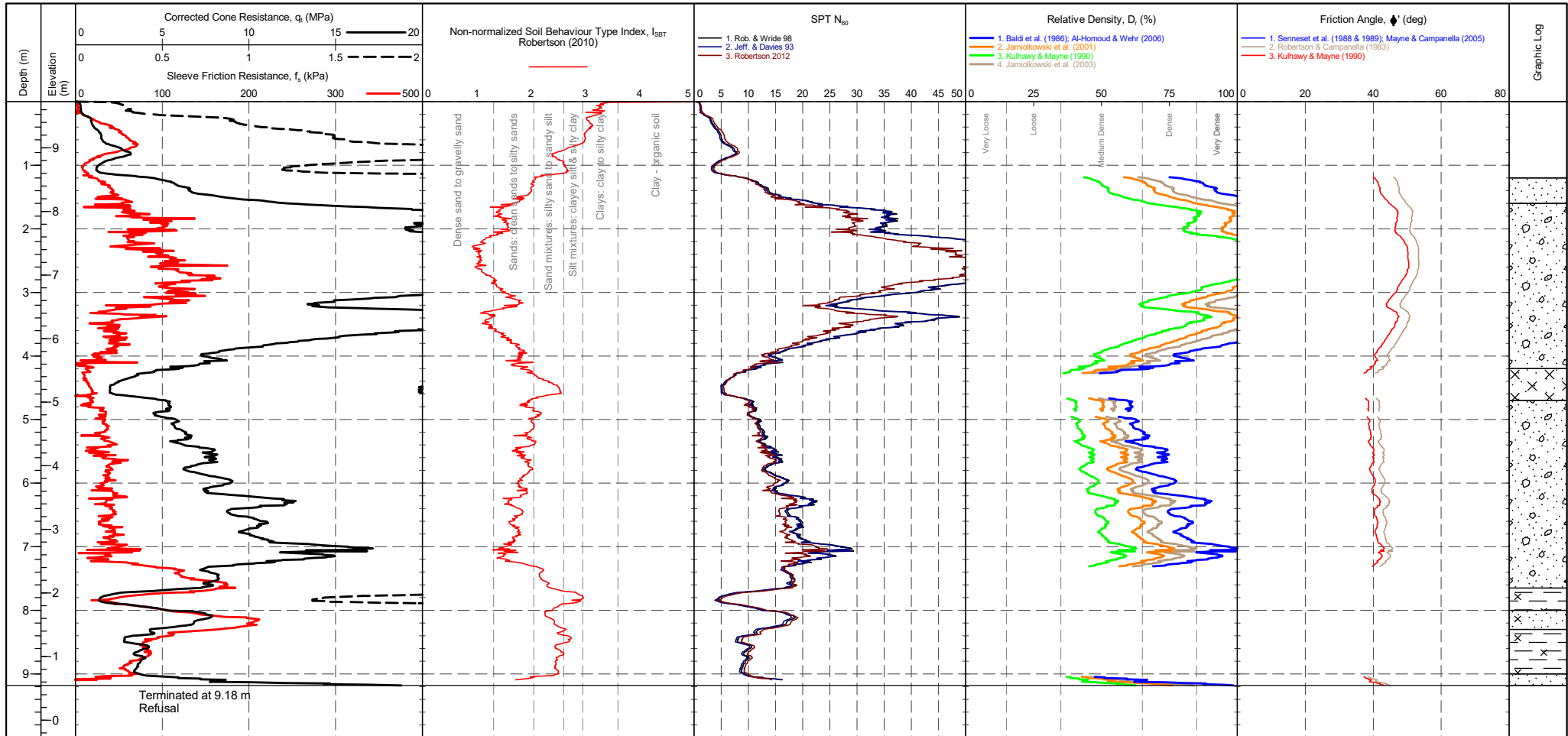
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479976.453 m NORTHING : 355015.232 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 366 mV 365 mV -0.011 MPa Sleeve 291 mV 290 mV -0.001 kPa Pore Pressure 2 344 mV 322 mV -0.006 kPa X-Y Inclinator 2574 mV 2523 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clay SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT14

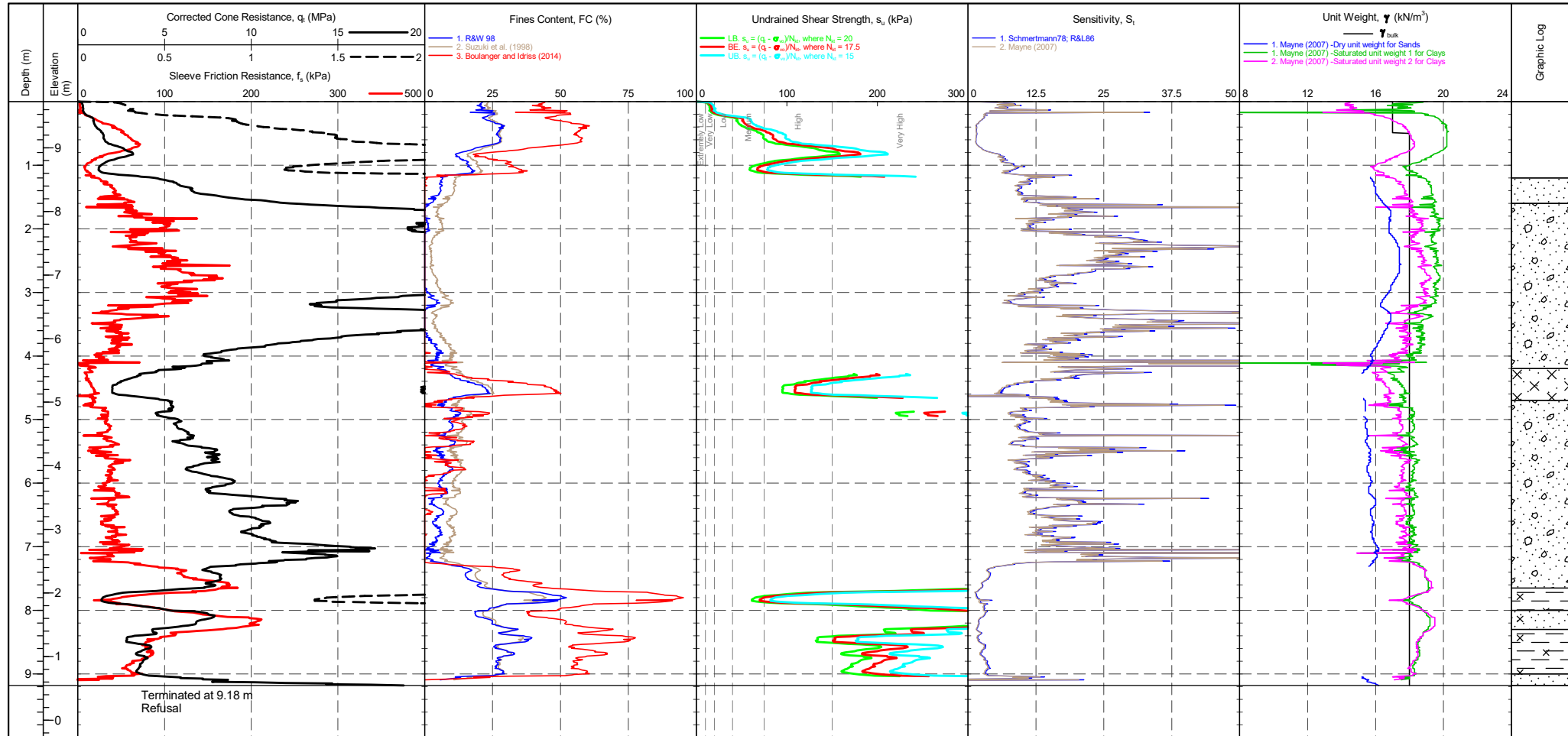
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479976.453 m NORTHING : 355015.232 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 366 mV Sleeve: 291 mV Pore Pressure 2: 344 mV X-Y Inclinator: 2574 mV	CPTU ZERO VALUES Pre: 365 mV Post: 290 mV Difference: -0.011 MPa -0.001 kPa -0.006 kPa 2523 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)																																				
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15																																				
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35																																				
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65																																				
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85																																				
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																				

PointID	S3CPT14
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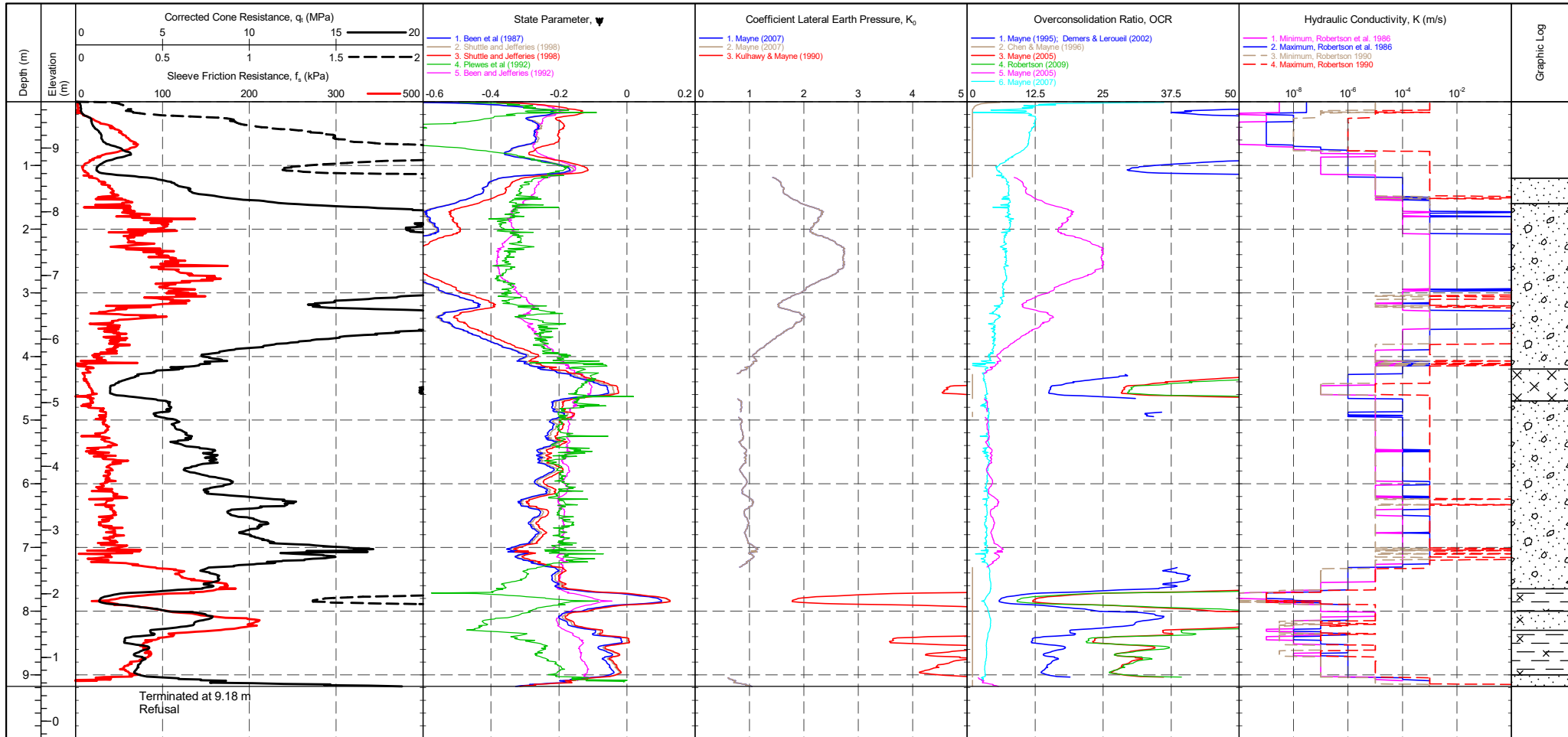
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479976.453 m NORTHING : 355015.232 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 366 mV / 365 mV / -0.011 MPa Sleeve: 291 mV / 290 mV / -0.001 kPa Pore Pressure 2: 344 mV / 322 mV / -0.006 kPa X-Y Inclinator: 2574 mV / 2523 mV	CPTU ZERO VALUES Pre: 366 mV, Post: 365 mV, Difference: -0.011 MPa Sleeve: 291 mV, 290 mV, -0.001 kPa Pore Pressure 2: 344 mV, 322 mV, -0.006 kPa X-Y Inclinator: 2574 mV, 2523 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	▽ Groundwater Level ▮ Dissipation Test
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PointID
S3CPT14

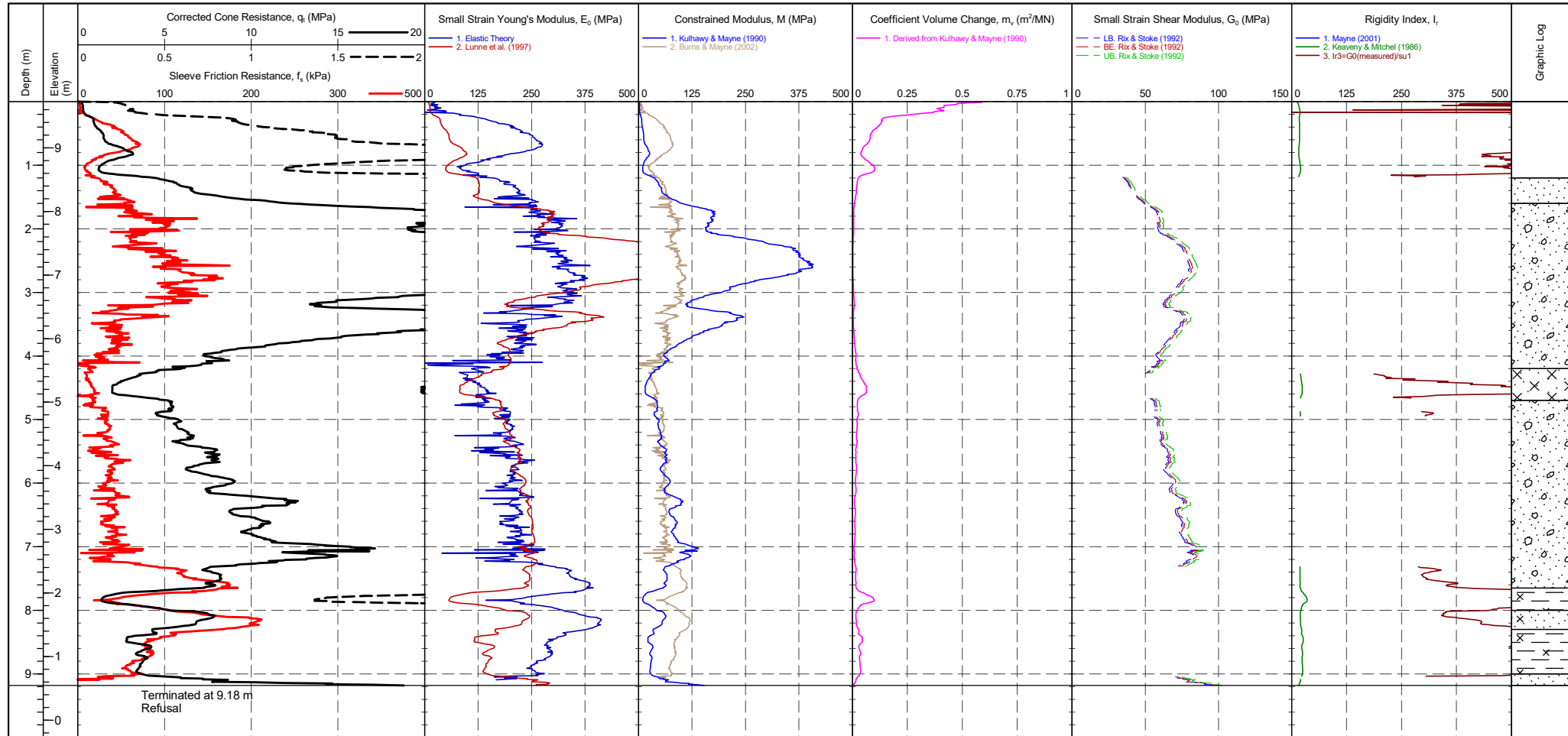
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479976.453 m NORTHING : 355015.232 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>365 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>291 mV</td> <td>290 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>344 mV</td> <td>322 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2523 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	365 mV	-0.011 MPa	Sleeve	291 mV	290 mV	-0.001 kPa	Pore Pressure 2	344 mV	322 mV	-0.006 kPa	X-Y Inclinator	2574 mV	2523 mV		Groundwater Level Dissipation Test
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Sleeve	291 mV	290 mV	-0.001 kPa																				
Pore Pressure 2	344 mV	322 mV	-0.006 kPa																				
X-Y Inclinator	2574 mV	2523 mV																					

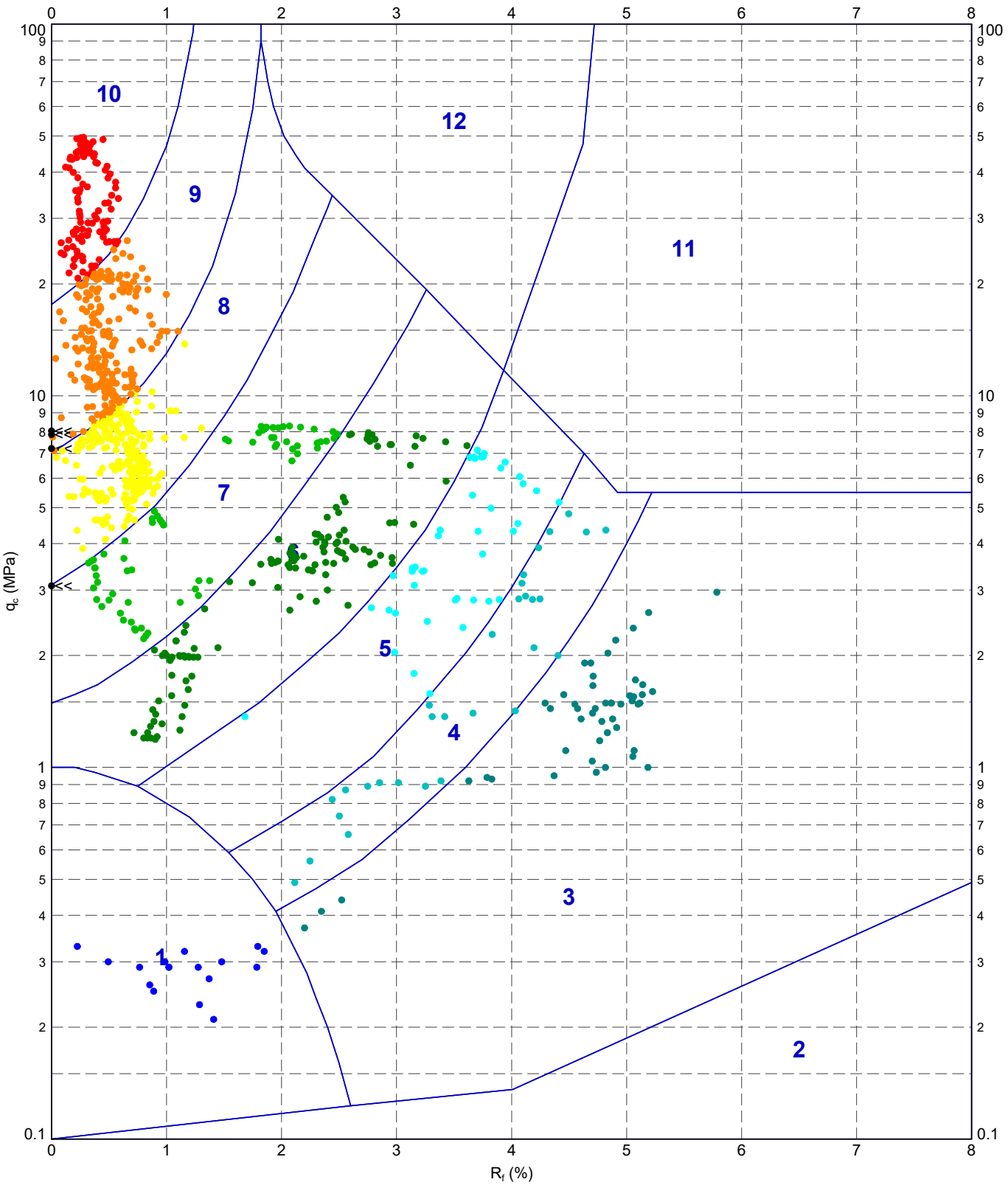
PointID
S3CPT14

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479976.453 m NORTHING : 355015.232 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>365 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>291 mV</td> <td>290 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>344 mV</td> <td>322 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2523 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	365 mV	-0.011 MPa	Sleeve	291 mV	290 mV	-0.001 kPa	Pore Pressure 2	344 mV	322 mV	-0.006 kPa	X-Y Inclinator	2574 mV	2523 mV		Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																				
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Pore Pressure 2	344 mV	322 mV	-0.006 kPa																				
X-Y Inclinator	2574 mV	2523 mV																					

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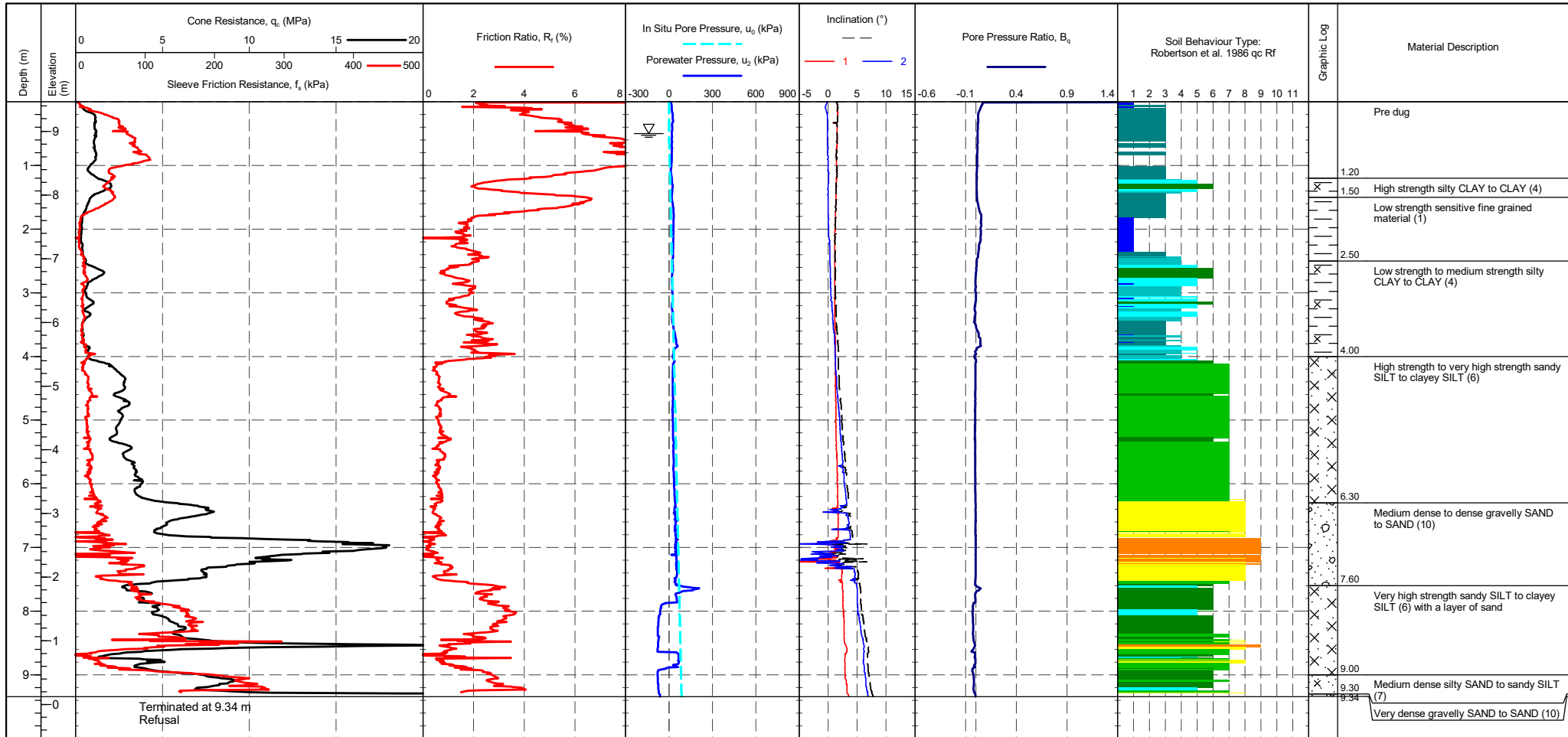
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT14</p>	DRAWN	DATE 20/05/2023	
		CHECKED	DATE 20/05/2023	
		SCALE	Not To Scale	A4
		PROJECT No 1220514	FIGURE No	

PointID	S3CPT15
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479943.996 m NORTHING : 354945.357 m ELEVATION : 9.466 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer : Pre 366 mV, Post 366 mV, Difference 0 MPa Tip : 290 mV, 291 mV, 0.001 kPa Sleeve : 332 mV, 321 mV, -0.003 kPa Pore Pressure 2 : 332 mV, 321 mV, -0.003 kPa X-Y Inclinator : 2705 mV, 2732 mV	METHOD : Robertson et al. 1986 qc Rf Legend: 1 - Sensitive fine grained material (Blue) 2 - Organic material (Dark Blue) 3 - CLAY (Teal) 4 - Silty CLAY to CLAY (Light Blue) 5 - Clayey SILT to silty CLAY (Cyan) 6 - Sandy SILT to clayey SILT (Green) 7 - Silty SAND to sandy SILT (Light Green) 8 - SAND to silty SAND (Yellow) 9 - SAND (Orange) 10 - Gravelly SAND to SAND (Red) 11 - Very stiff fine grained (Light Yellow) 12 - SAND to clayey SAND (Light Orange)	Groundwater Level Dissipation Test
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PointID

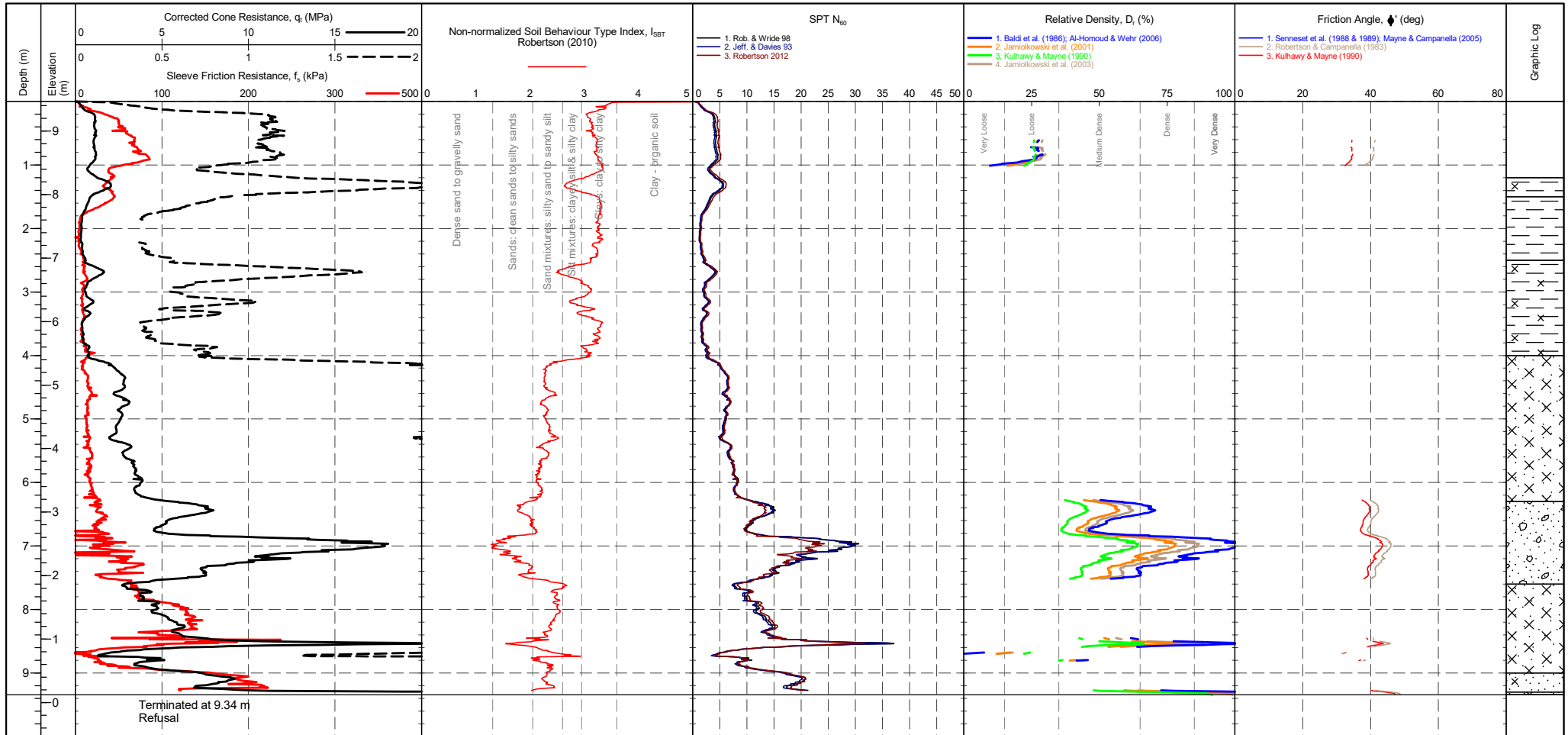
S3CPT15

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479943.996 m
 NORTHING : 354945.357 m
 ELEVATION : 9.466 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 09/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012

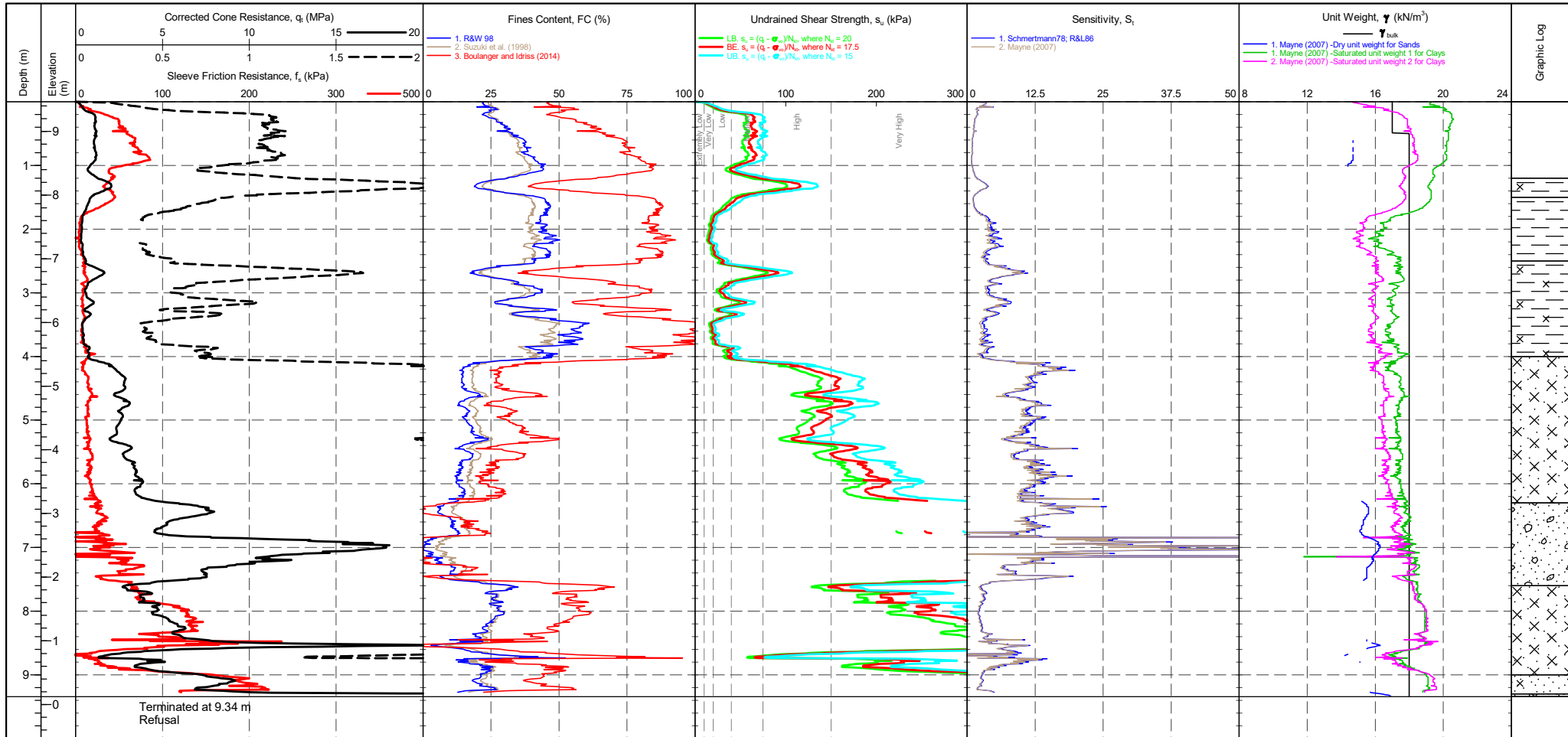


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinometer	Pre 366 mV 290 mV 332 mV 2705 mV	Post 366 mV 291 mV 321 mV 2732 mV	Difference 0 MPa 0.001 kPa -0.003 kPa	Description Clays Silt mixtures Sand mixtures Sands Gravelly sand	SBT Index, I _c 2.95-3.60 2.60-2.95 2.05-2.60 1.31-2.05 <1.31	Description Very Loose Loose Medium Dense Dense Very Dense	

PointID

S3CPT15

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479943.996 m NORTHING : 354945.357 m ELEVATION : 9.466 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 366 mV / 366 mV / 0 MPa Sleeve: 290 mV / 291 mV / 0.001 kPa Pore Pressure 2: 332 mV / 321 mV / -0.003 kPa X-Y Inclinator: 2705 mV / 2732 mV	CPTU ZERO VALUES Pre: 366 mV, Post: 366 mV, Difference: 0 MPa Sleeve: 290 mV, 291 mV, 0.001 kPa Pore Pressure 2: 332 mV, 321 mV, -0.003 kPa X-Y Inclinator: 2705 mV, 2732 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	▽ Groundwater Level ▮ Dissipation Test
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PointID

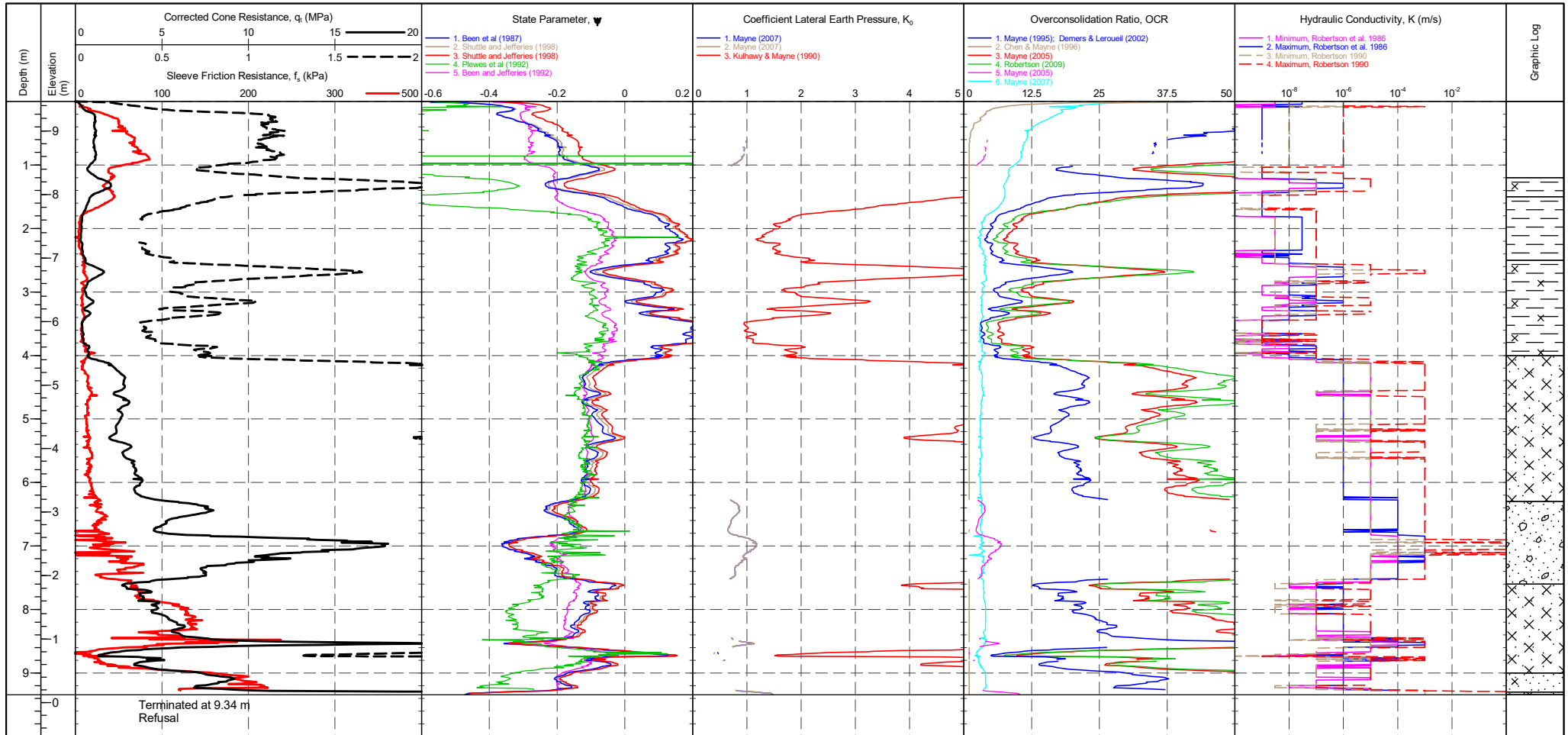
S3CPT15

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479943.996 m
 NORTHING : 354945.357 m
 ELEVATION : 9.466 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 09/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



Graphic Log

CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & DR
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

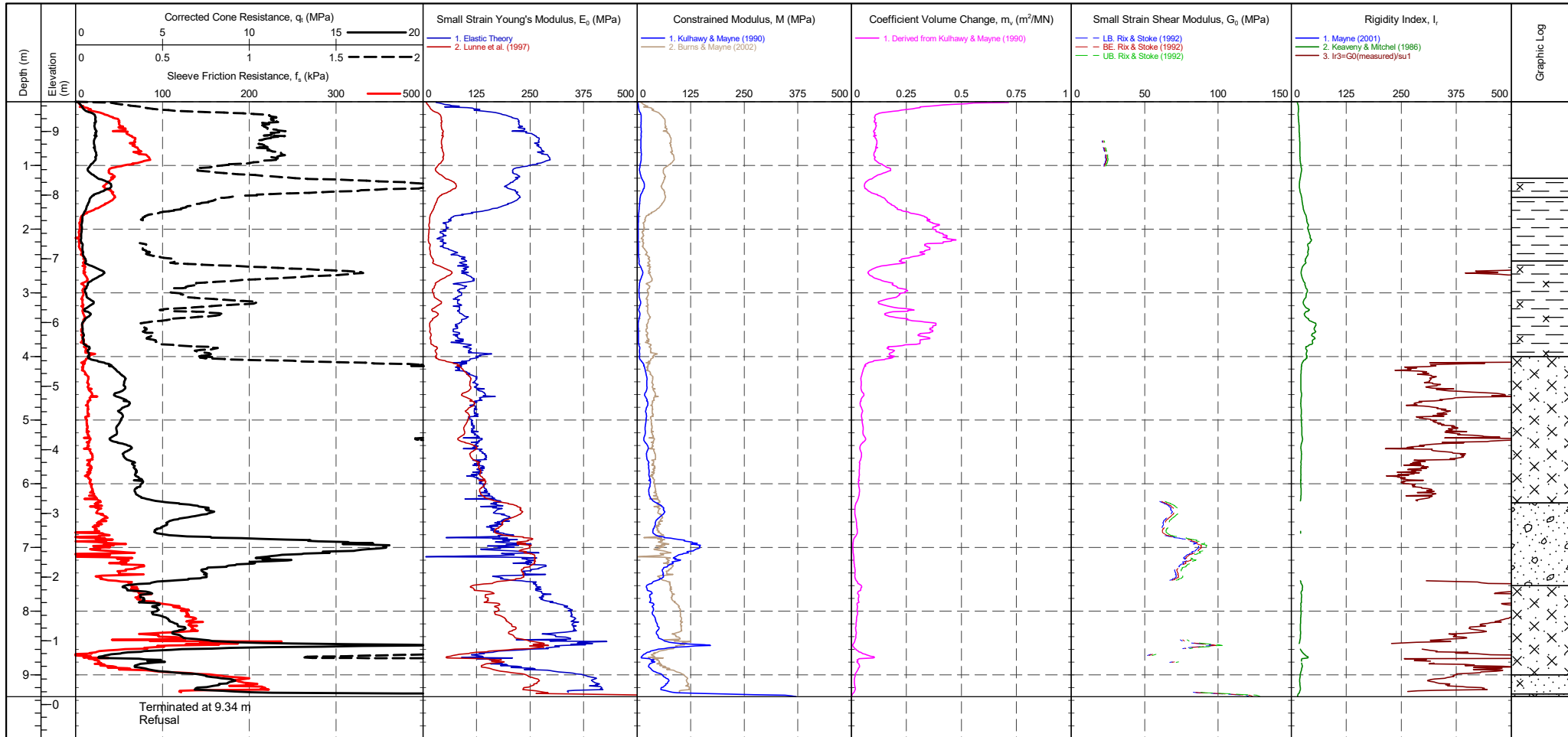
CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	366 mV	366 mV	0 MPa
Sleeve	290 mV	291 mV	0.001 kPa
Pore Pressure 2	332 mV	321 mV	-0.003 kPa
X-Y Inclinator	2705 mV	2732 mV	

Groundwater Level
 Dissipation Test

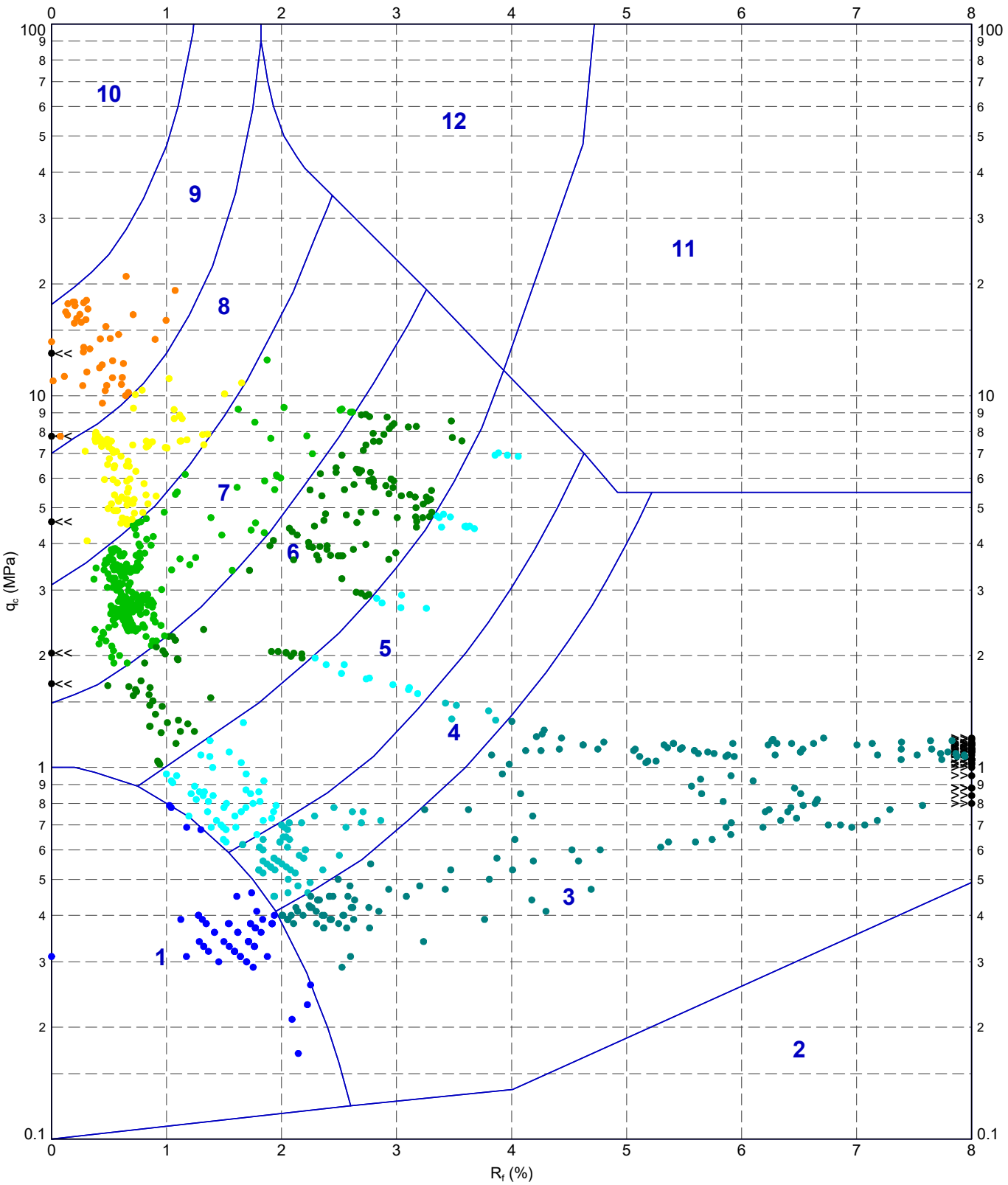
PointID
S3CPT15

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479943.996 m NORTHING : 354945.357 m ELEVATION : 9.466 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><td>Transducer</td><td>Pre</td><td>Post</td><td>Difference</td></tr> <tr><td>Tip</td><td>366 mV</td><td>366 mV</td><td>0 MPa</td></tr> <tr><td>Sleeve</td><td>290 mV</td><td>291 mV</td><td>0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>332 mV</td><td>321 mV</td><td>-0.003 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2705 mV</td><td>2732 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	366 mV	0 MPa	Sleeve	290 mV	291 mV	0.001 kPa	Pore Pressure 2	332 mV	321 mV	-0.003 kPa	X-Y Inclinator	2705 mV	2732 mV		Groundwater Level Dissipation Test
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Sleeve	290 mV	291 mV	0.001 kPa																				
Pore Pressure 2	332 mV	321 mV	-0.003 kPa																				
X-Y Inclinator	2705 mV	2732 mV																					

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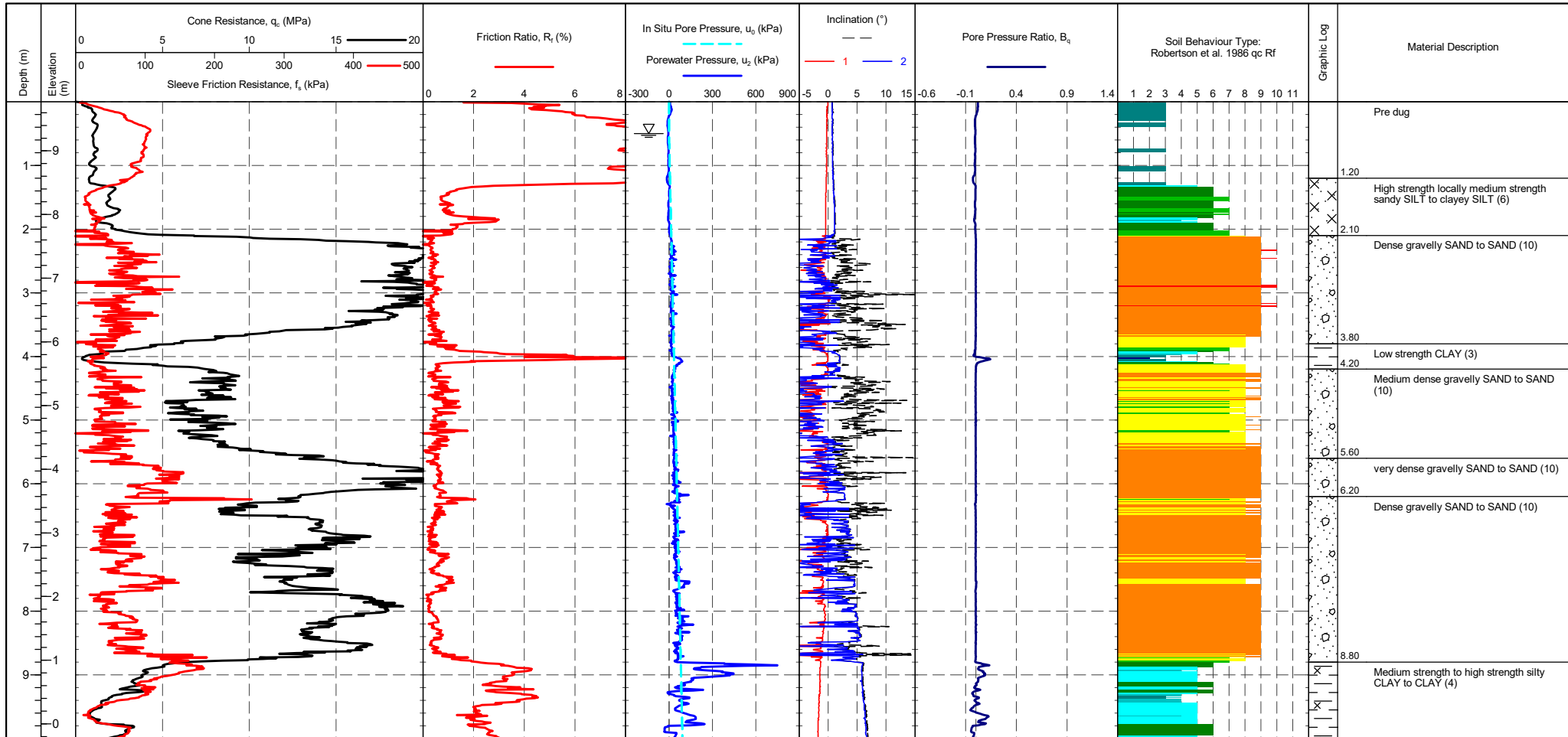
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT15</p>	DRAWN	DATE	20/05/2023	
		CHECKED	DATE	20/05/2023	
		SCALE	Not To Scale		A4
		PROJECT No	1220514		
		FIGURE No			

PointID	S3CPT24
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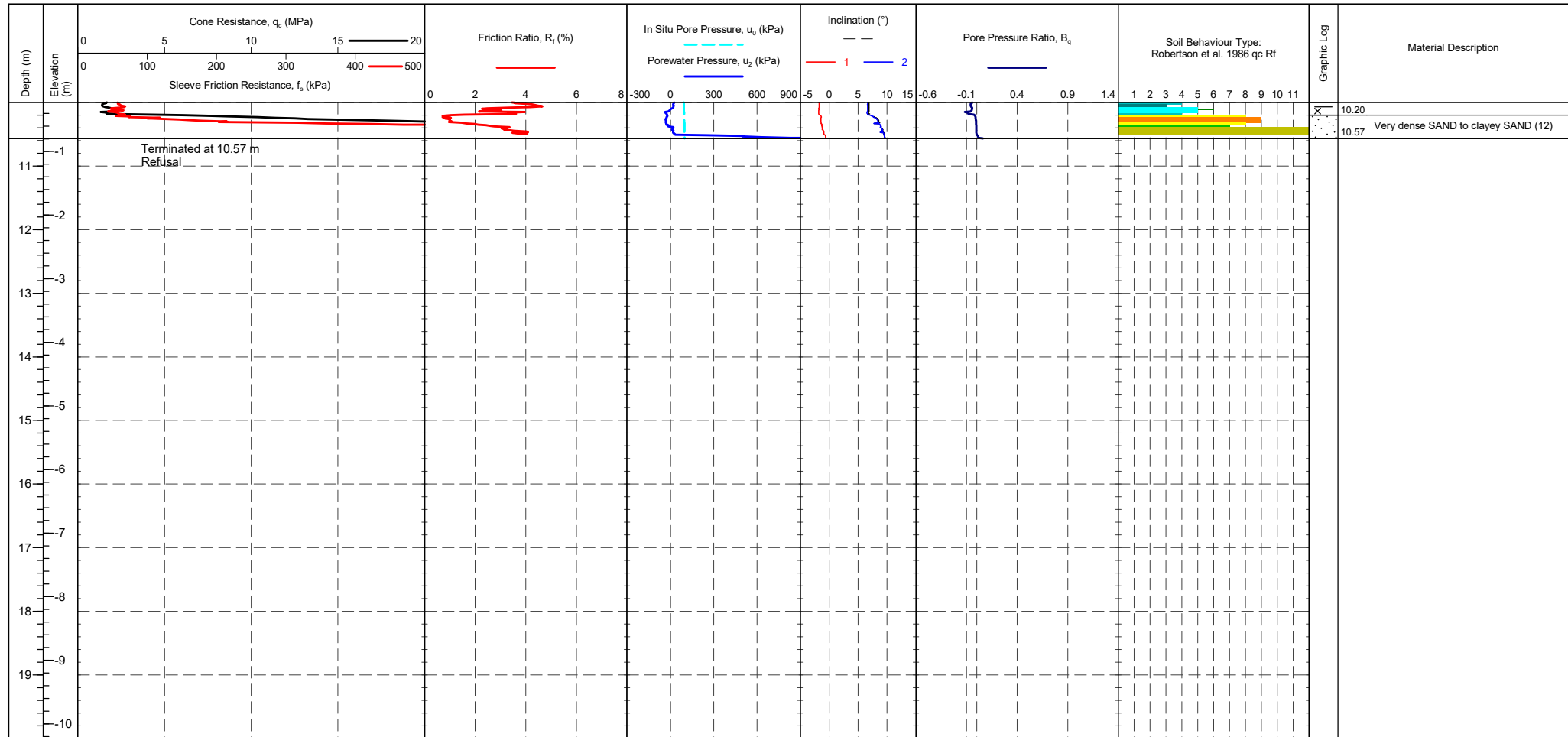
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479548.341 m NORTHING : 354707.965 m ELEVATION : 9.771 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 365 mV 361 mV -0.046 MPa Sleeve 296 mV 293 mV -0.002 kPa Pore Pressure 2 306 mV 346 mV 0.011 kPa X-Y Inclinator 2524 mV 2550 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT24
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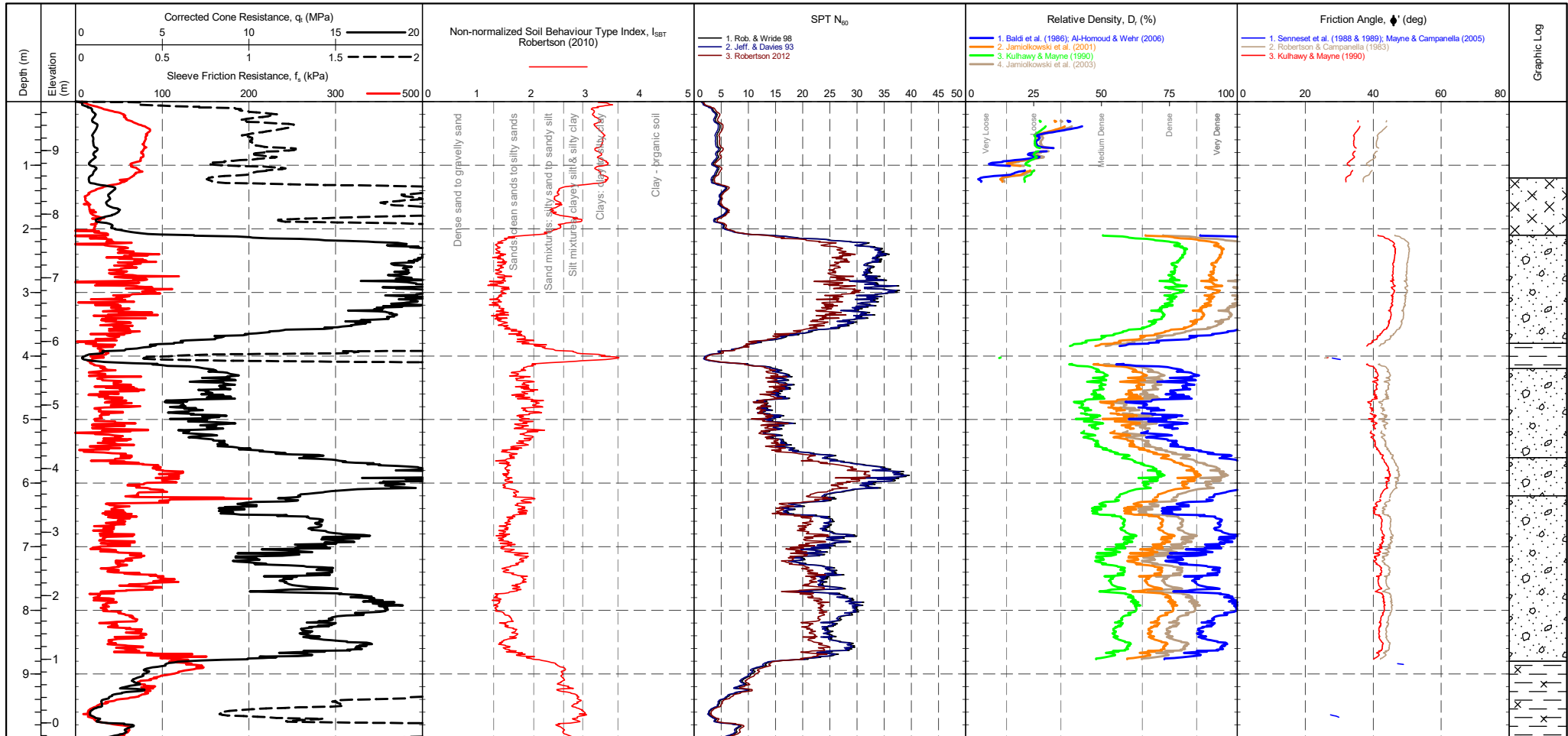
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479548.341 m NORTHING : 354707.965 m ELEVATION : 9.771 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip</td> <td>365 mV</td> <td>361 mV</td> <td>-0.046 MPa</td> </tr> <tr> <td>Sleeve</td> <td>296 mV</td> <td>293 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>306 mV</td> <td>346 mV</td> <td>0.011 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2524 mV</td> <td>2550 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	361 mV	-0.046 MPa	Sleeve	296 mV	293 mV	-0.002 kPa	Pore Pressure 2	306 mV	346 mV	0.011 kPa	X-Y Inclinometer	2524 mV	2550 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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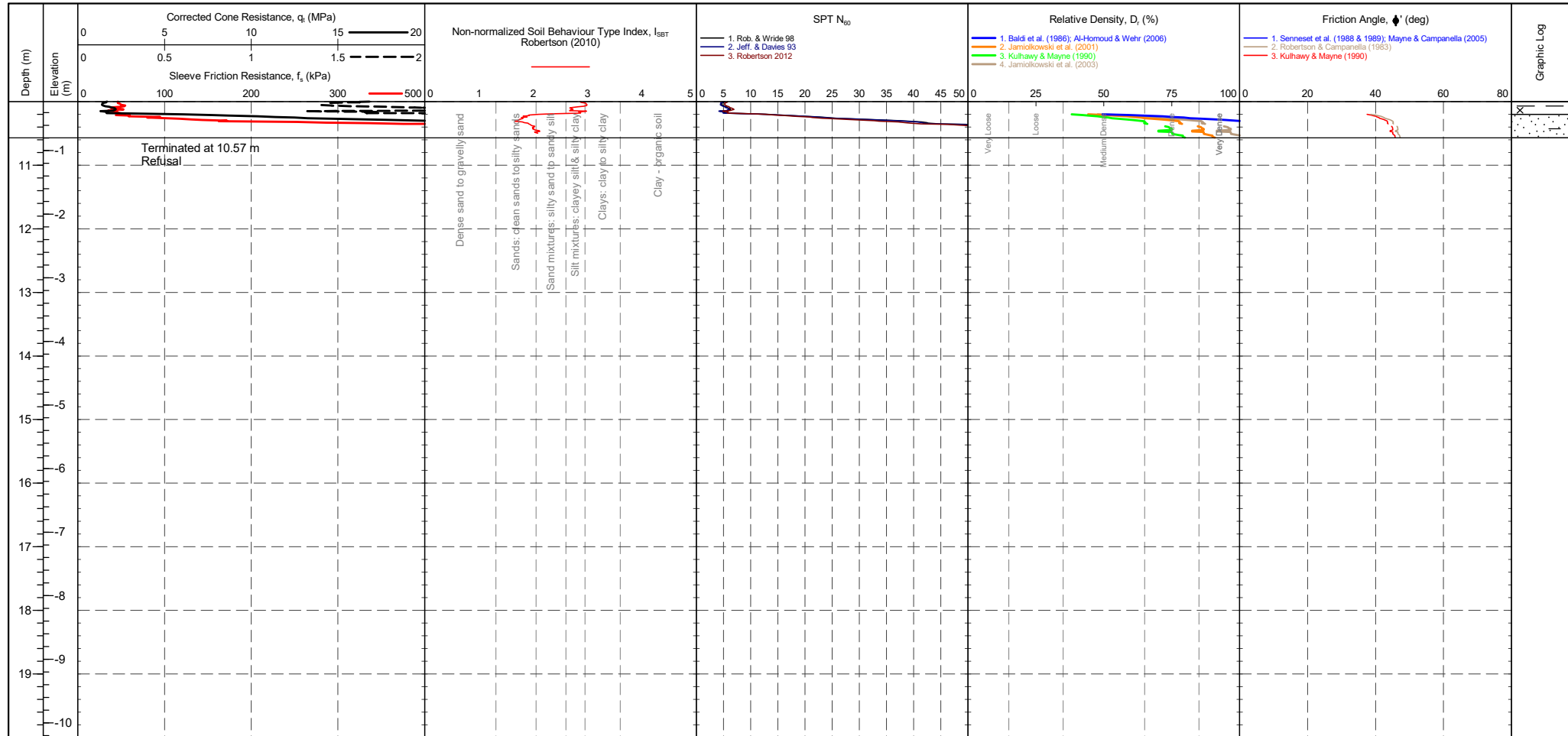
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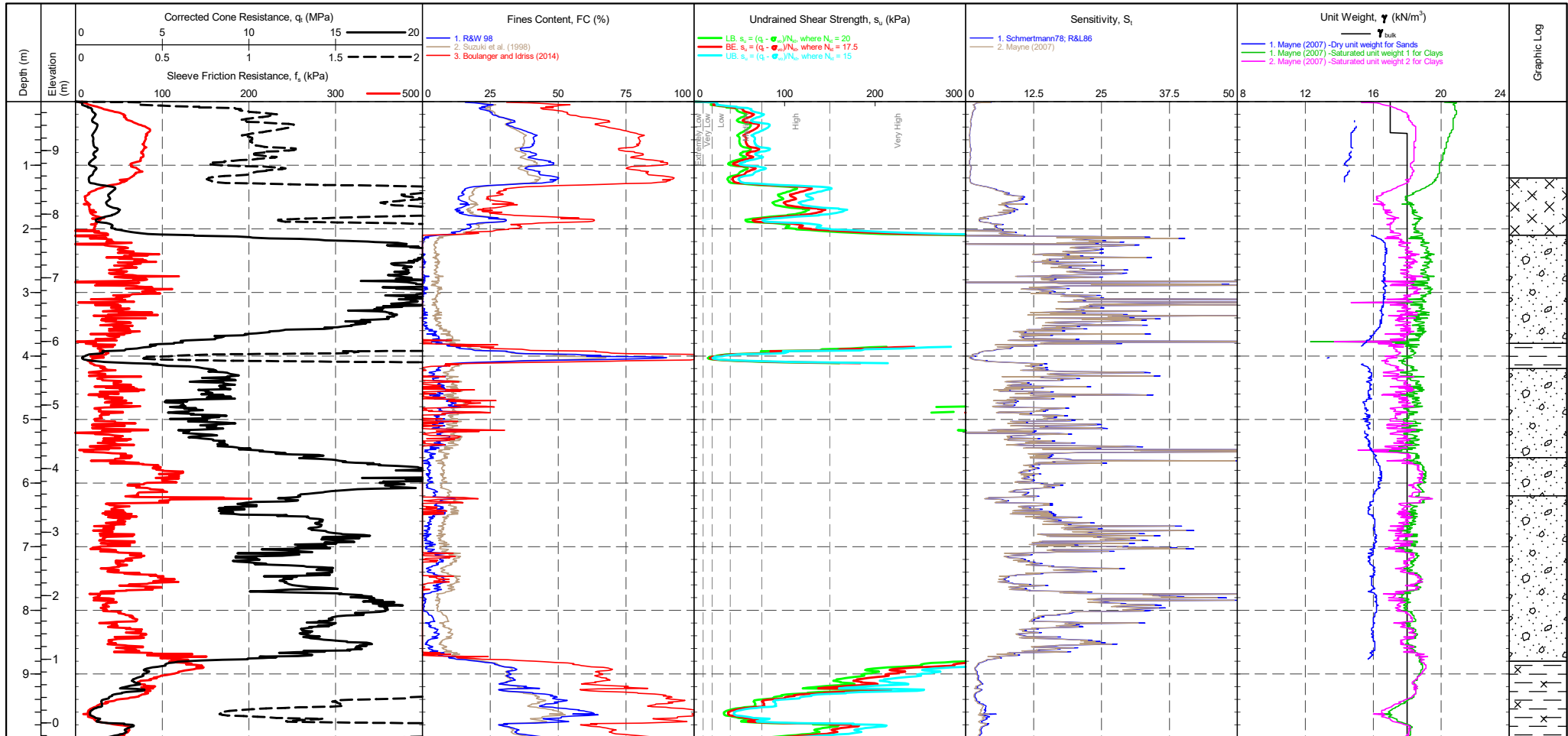
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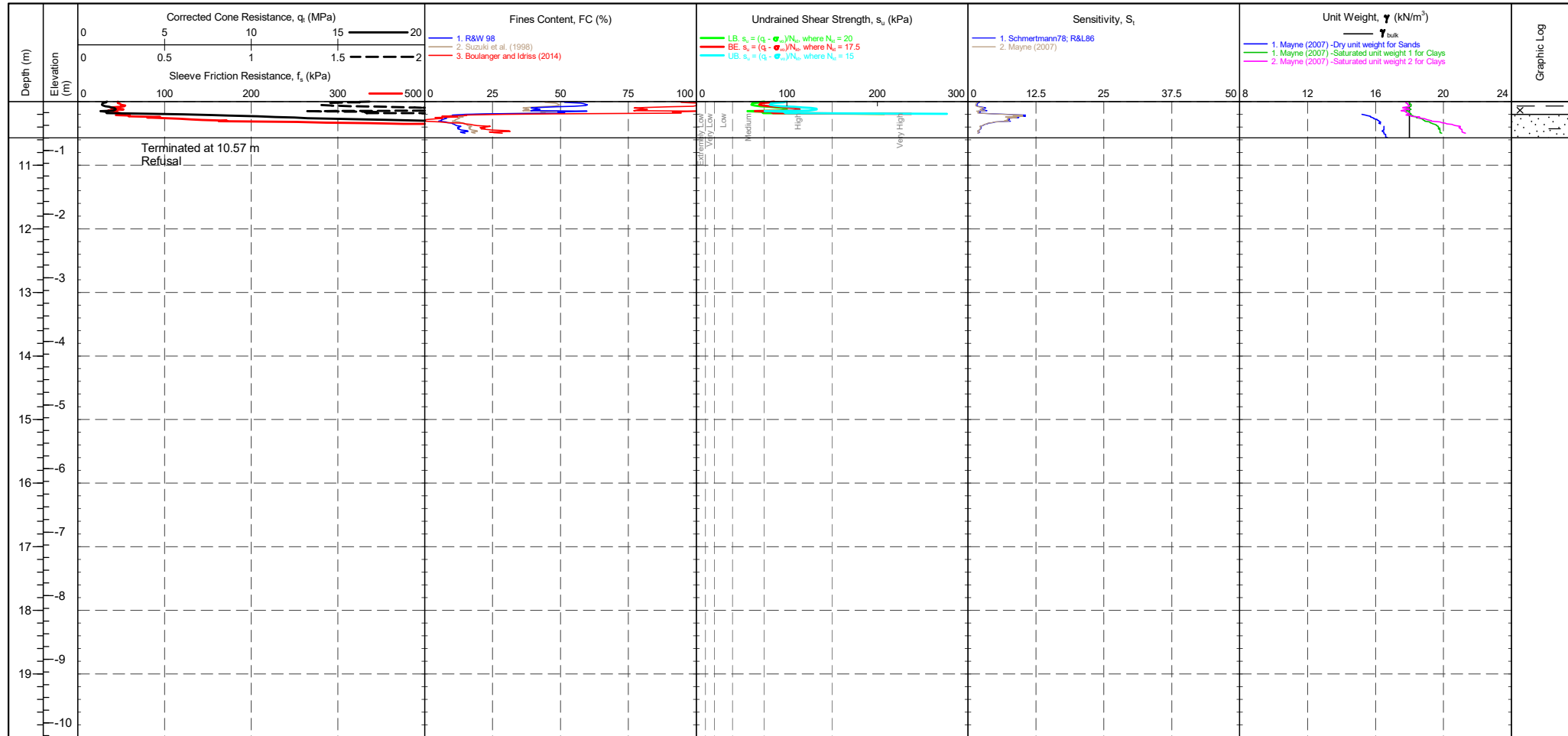
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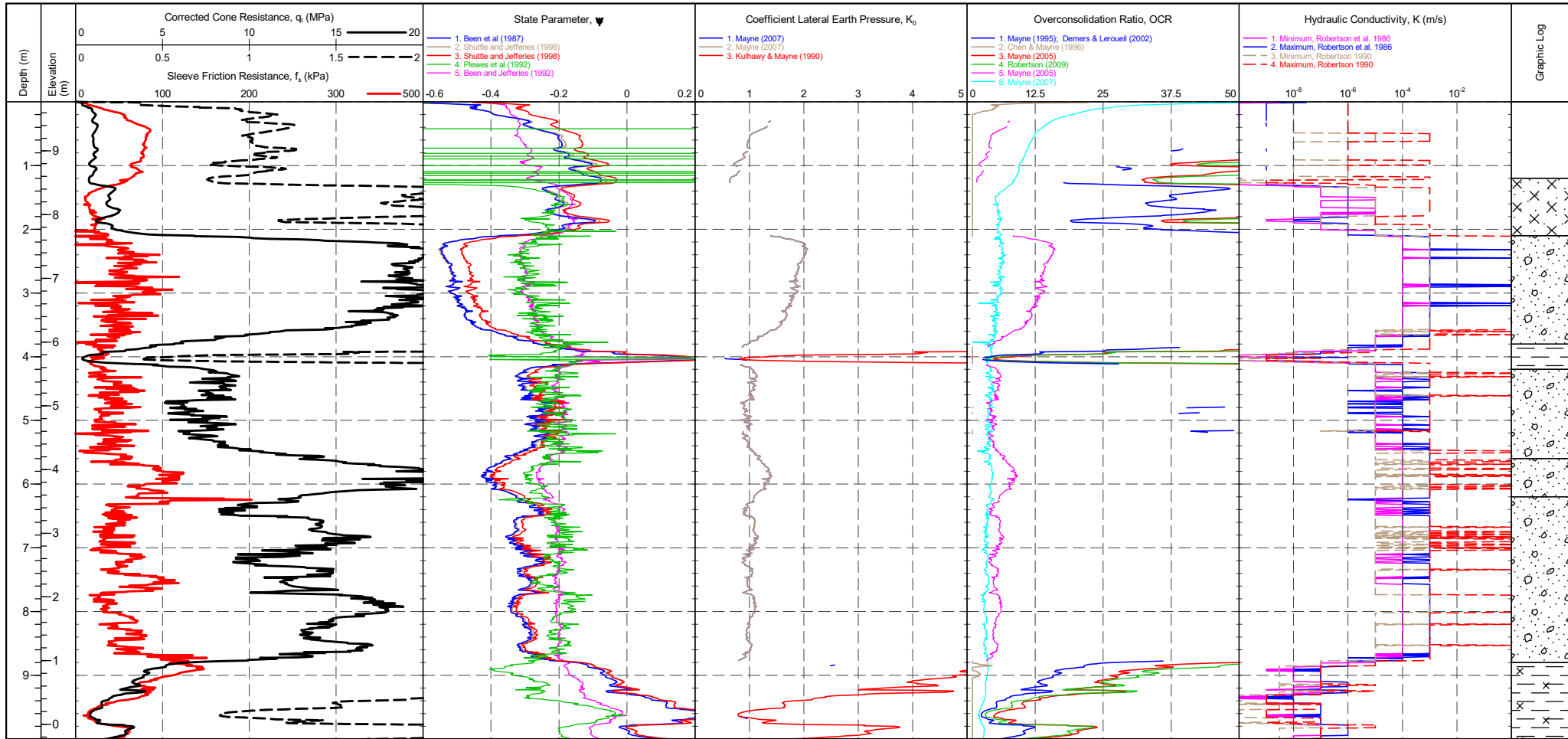
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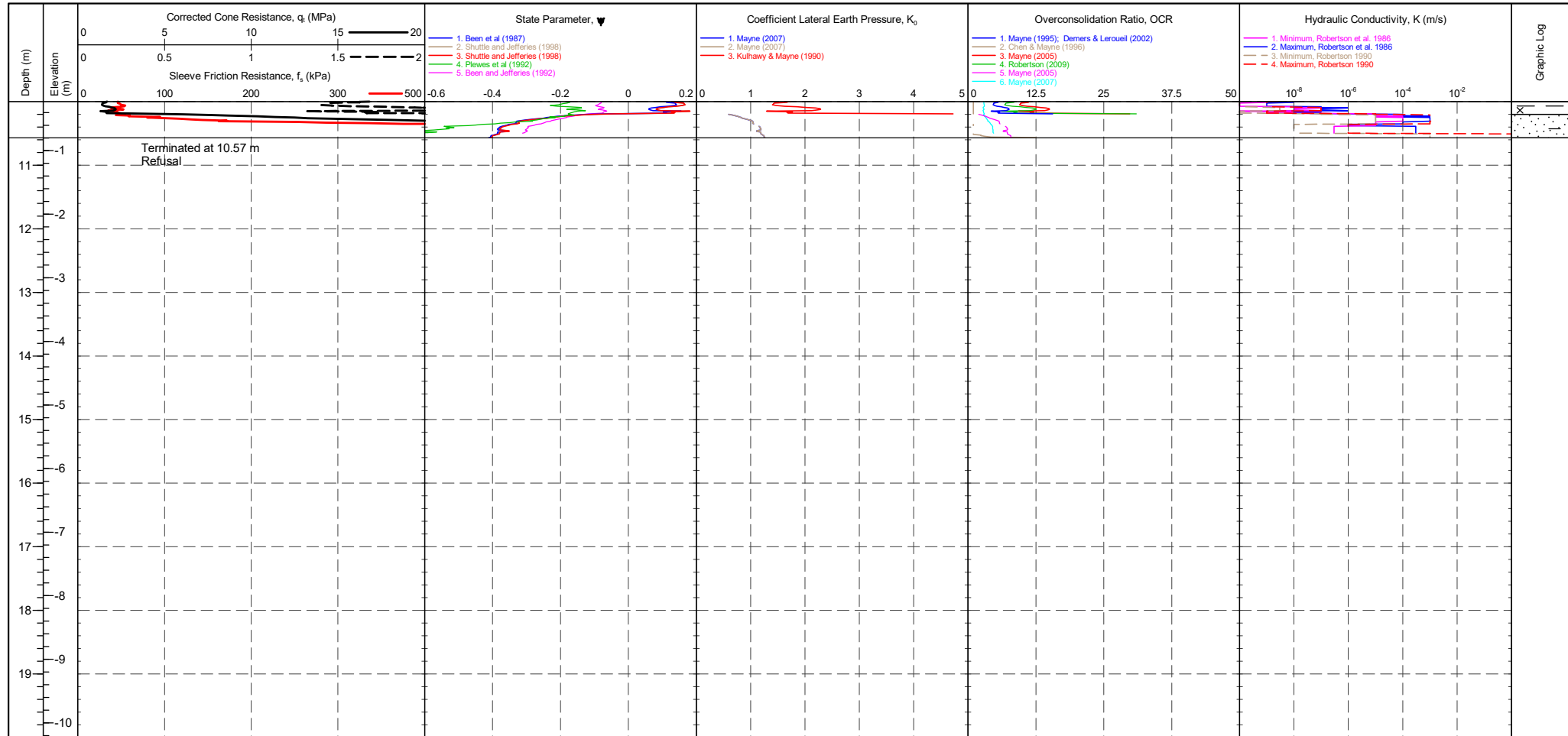
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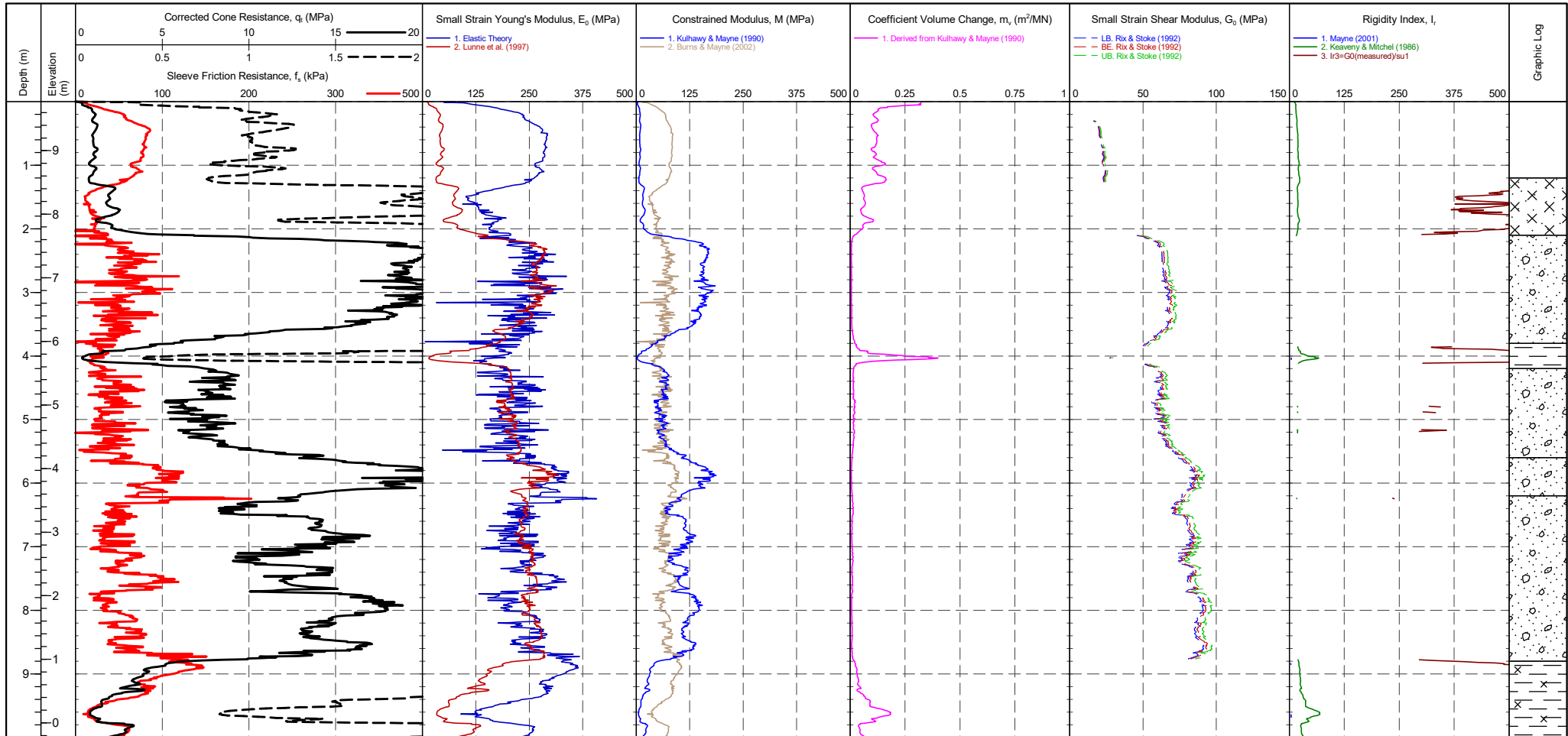
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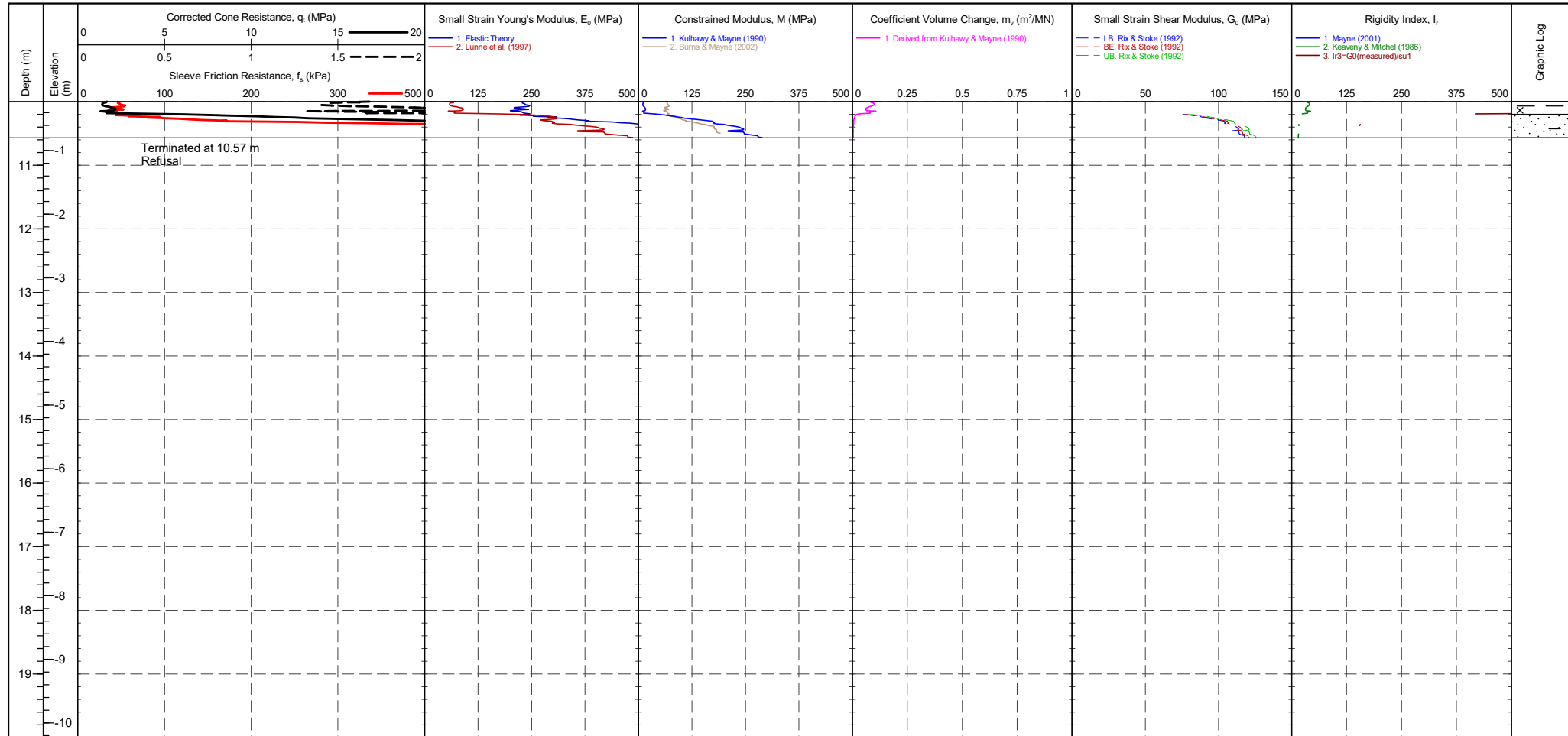
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>365 mV</td> <td>361 mV</td> <td>-0.046 MPa</td> </tr> <tr> <td>Sleeve</td> <td>296 mV</td> <td>293 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>306 mV</td> <td>346 mV</td> <td>0.011 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2524 mV</td> <td>2550 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	361 mV	-0.046 MPa	Sleeve	296 mV	293 mV	-0.002 kPa	Pore Pressure 2	306 mV	346 mV	0.011 kPa	X-Y Inclinator	2524 mV	2550 mV		Groundwater Level Dissipation Test
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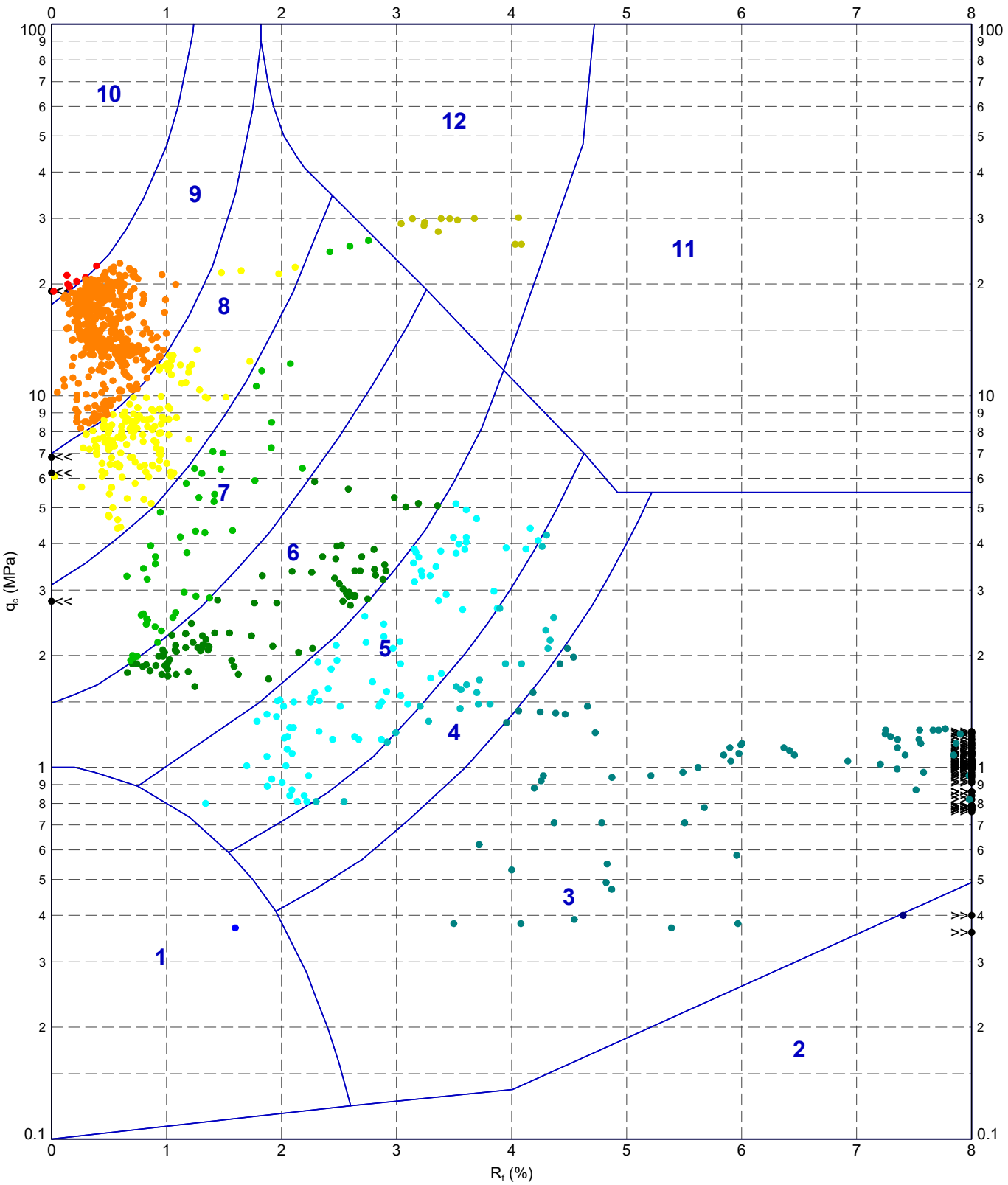
PointID
S3CPT24

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479548.341 m NORTHING : 354707.965 m ELEVATION : 9.771 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>365 mV</td> <td>361 mV</td> <td>-0.046 MPa</td> </tr> <tr> <td>Sleeve</td> <td>296 mV</td> <td>293 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>306 mV</td> <td>346 mV</td> <td>0.011 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2524 mV</td> <td>2550 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	361 mV	-0.046 MPa	Sleeve	296 mV	293 mV	-0.002 kPa	Pore Pressure 2	306 mV	346 mV	0.011 kPa	X-Y Inclinator	2524 mV	2550 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:31 10.03.00.09 Daiged Lab and In Situ Tool - DGD Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



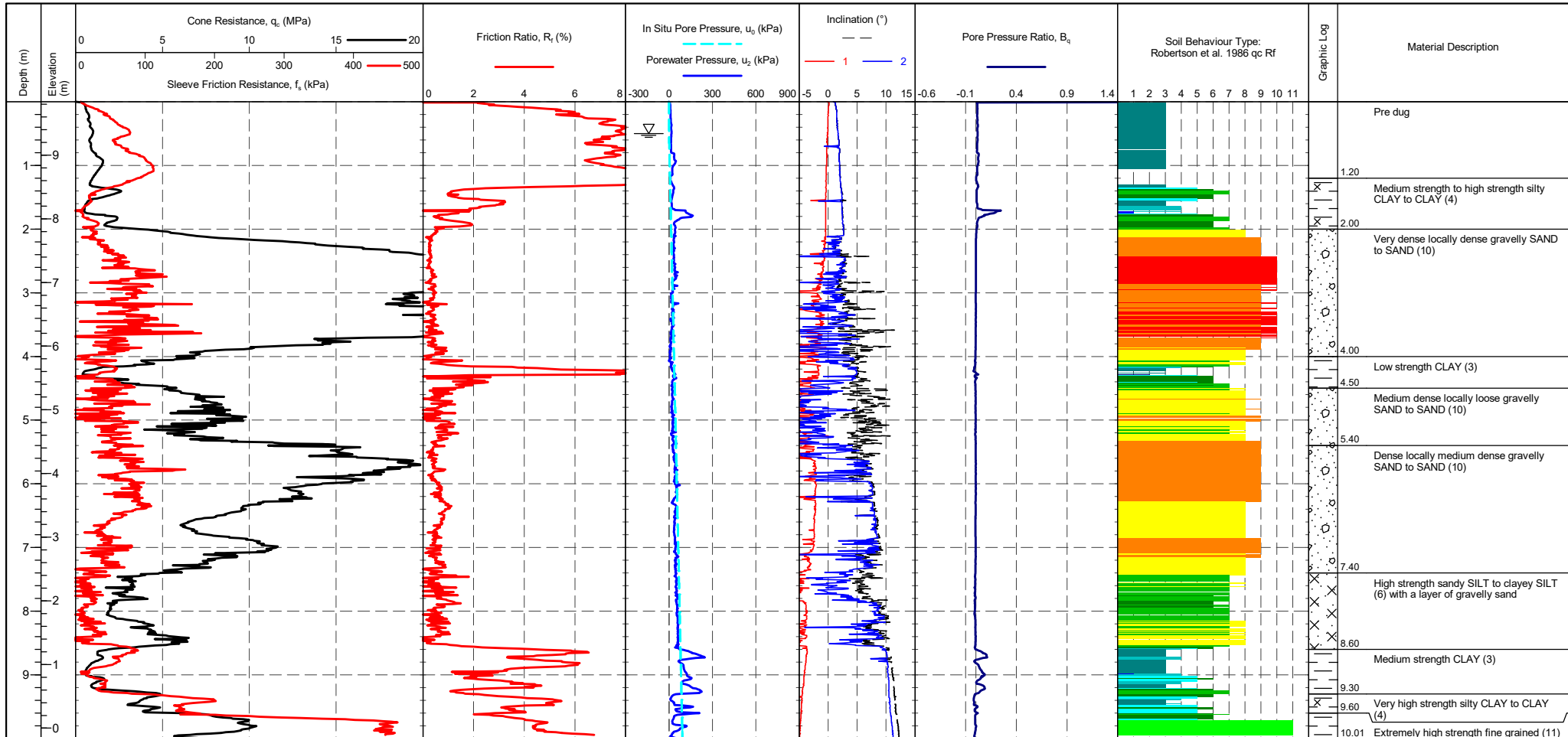
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN		DATE	
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT24		CHECKED		DATE
			SCALE		A4
			PROJECT No 1220514		
		Not To Scale		20/05/2023	
				20/05/2023	

PointID	S3CPT25
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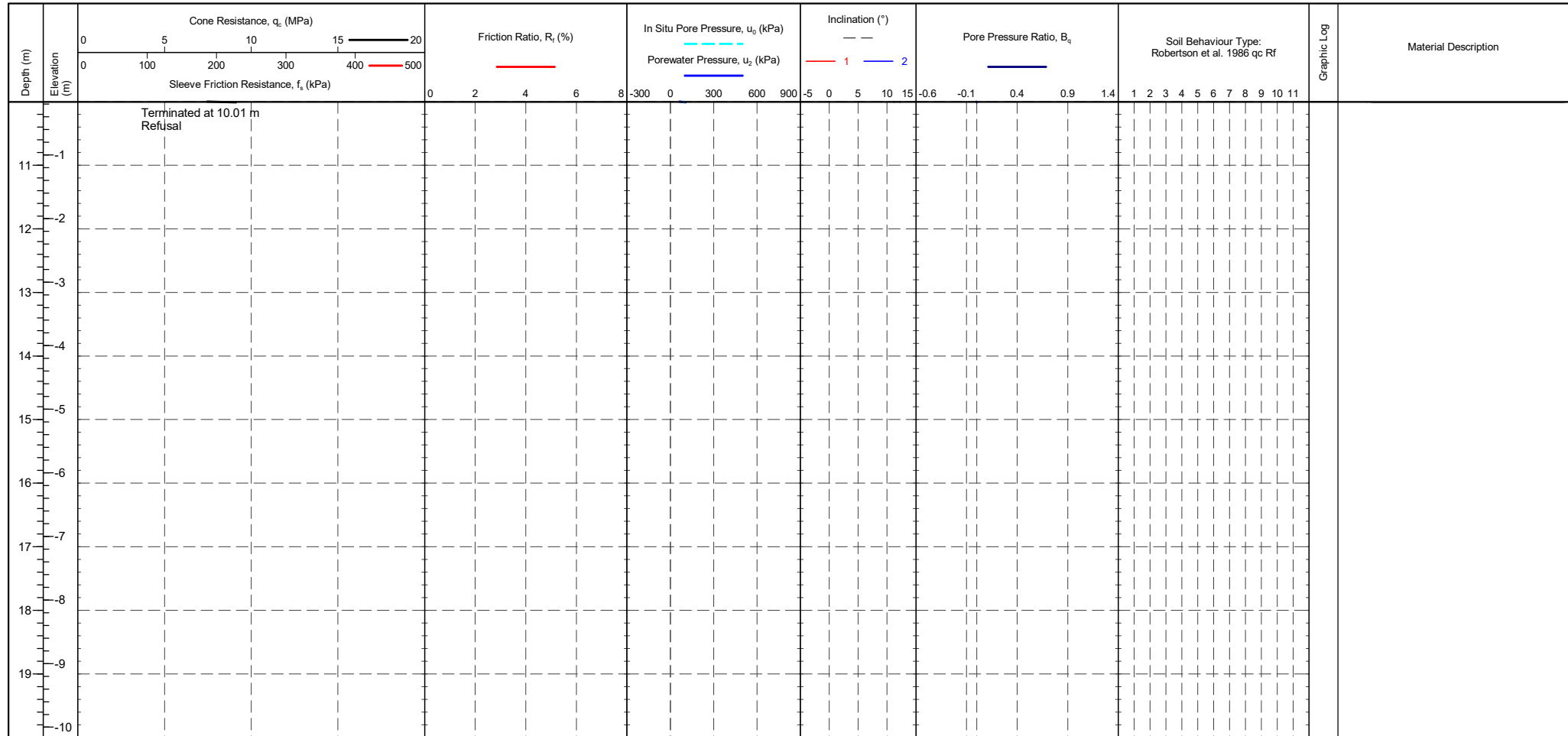
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479504.736 m NORTHING : 354701.571 m ELEVATION : 9.838 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 364 mV 0 MPa Sleeve 295 mV 295 mV 0 kPa Pore Pressure 2 323 mV 345 mV 0.006 kPa X-Y Inclinator 2510 mV 2583 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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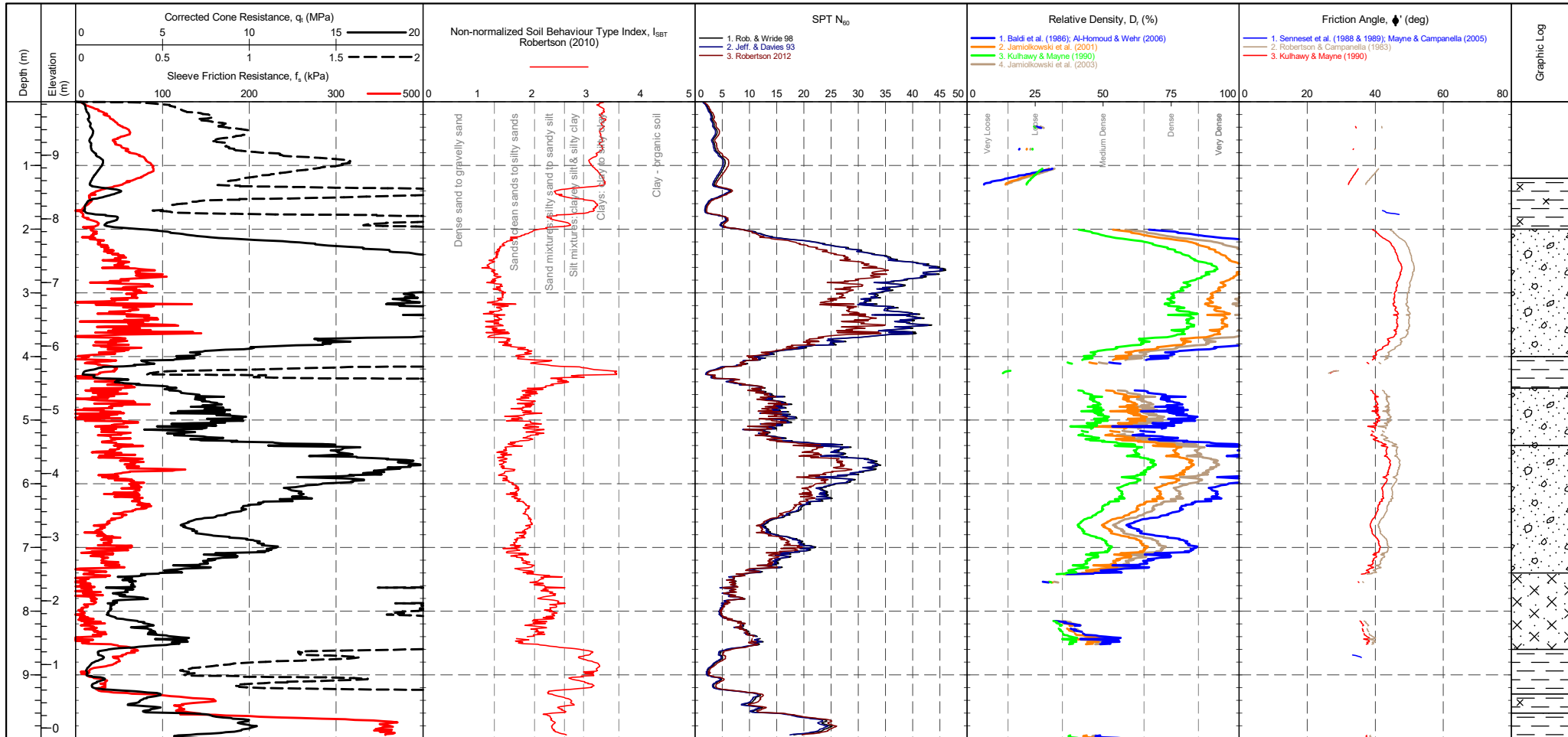
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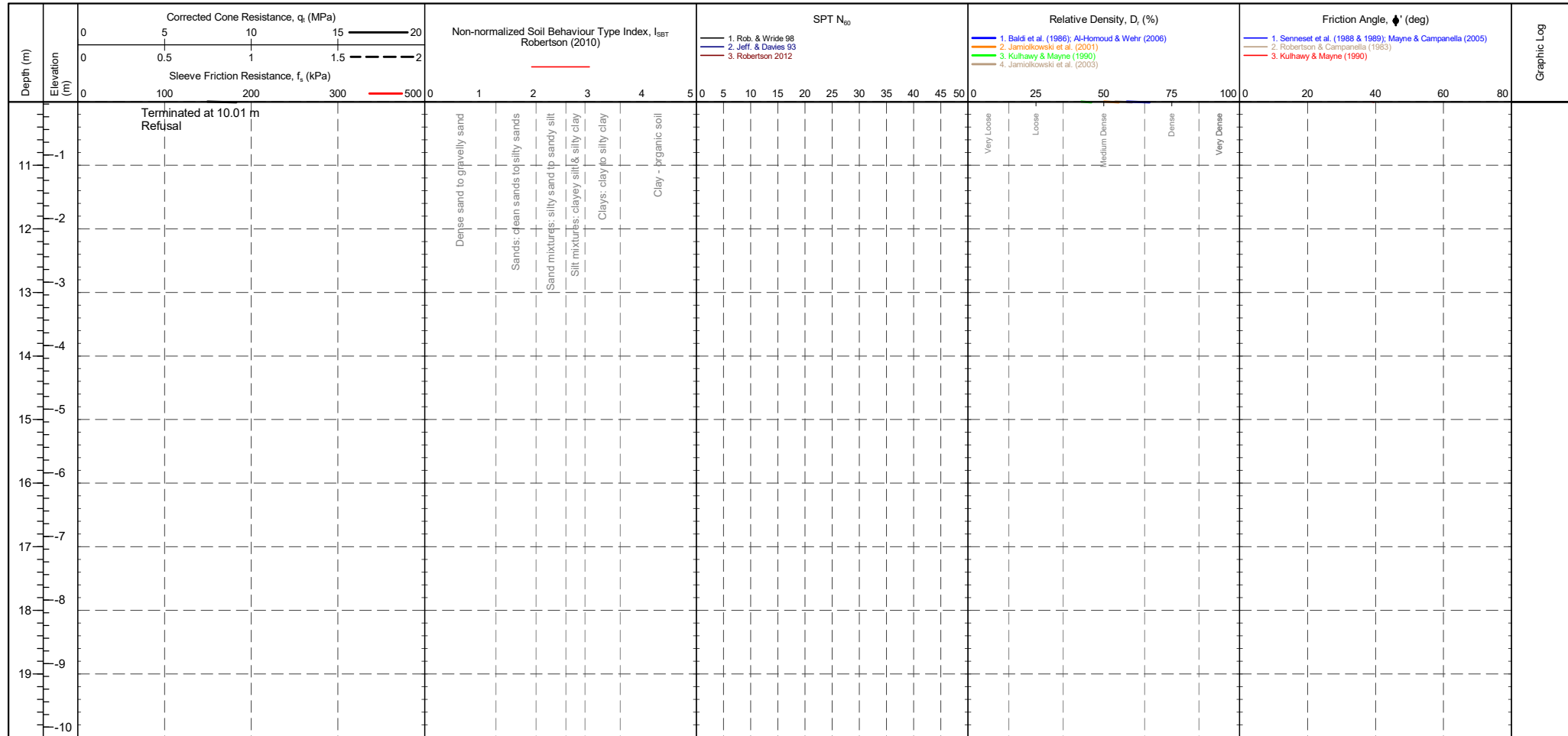
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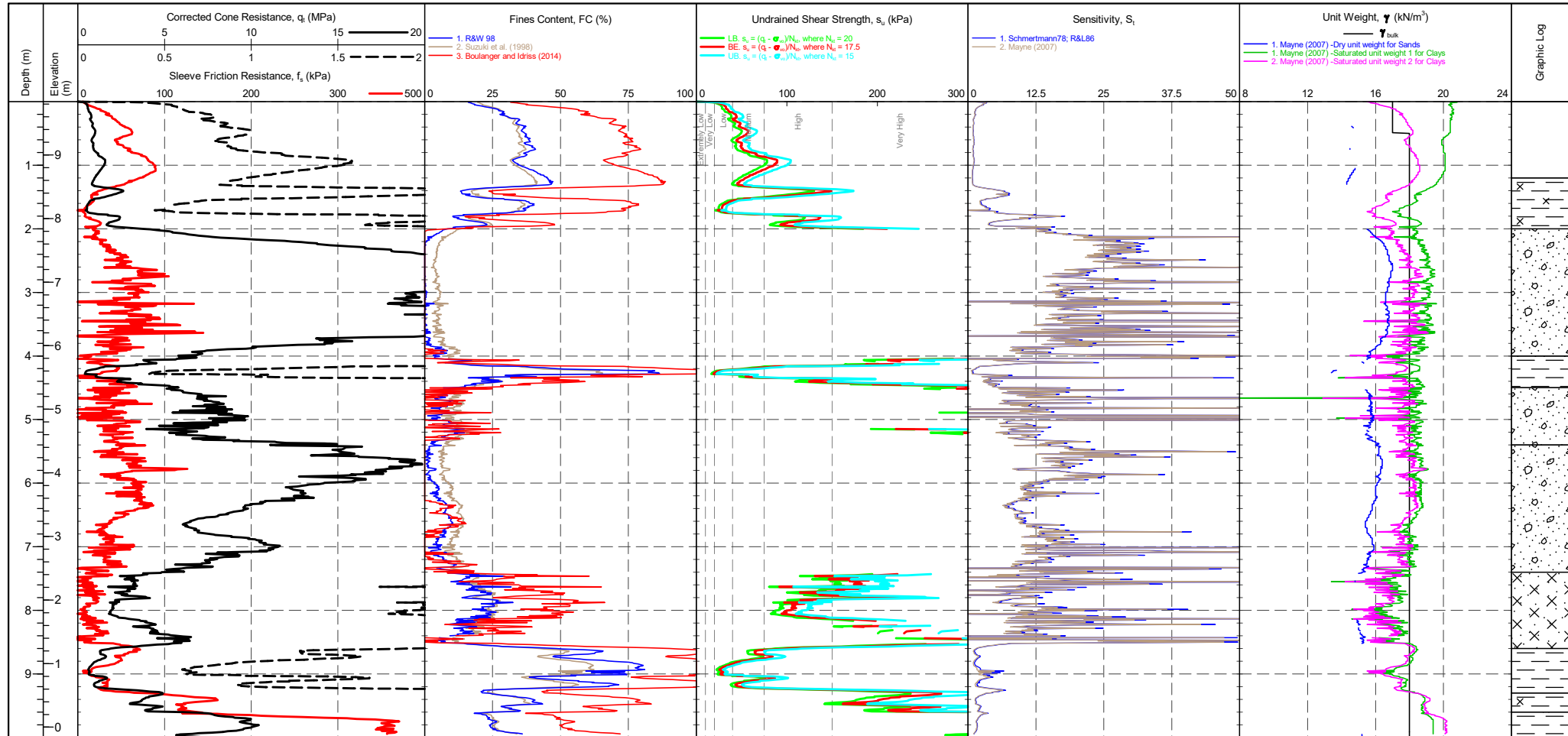
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479504.736 m NORTHING : 354701.571 m ELEVATION : 9.838 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr><td>Transducer</td><td>Pre</td><td>Post</td><td>Difference</td></tr> <tr><td>Tip</td><td>364 mV</td><td>364 mV</td><td>0 MPa</td></tr> <tr><td>Sleeve</td><td>295 mV</td><td>295 mV</td><td>0 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>323 mV</td><td>345 mV</td><td>0.006 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2510 mV</td><td>2583 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	295 mV	295 mV	0 kPa	Pore Pressure 2	323 mV	345 mV	0.006 kPa	X-Y Inclinator	2510 mV	2583 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <tr><th>Description</th><th>SBT Index, I_c</th><th>Description</th><th>SPT N value, NSPT</th><th>Description</th><th>Relative Density Dr (%)</th></tr> <tr><td>Clays</td><td>2.95-3.60</td><td>Very Loose</td><td>0 - 4</td><td>Very Loose</td><td>0 - 15</td></tr> <tr><td>Silt mixtures</td><td>2.60-2.95</td><td>Loose</td><td>4 - 10</td><td>Loose</td><td>15 - 35</td></tr> <tr><td>Sand mixtures</td><td>2.05-2.60</td><td>Medium Dense</td><td>10 - 30</td><td>Medium Dense</td><td>35 - 65</td></tr> <tr><td>Sands</td><td>1.31-2.05</td><td>Dense</td><td>30 - 50</td><td>Dense</td><td>65 - 85</td></tr> <tr><td>Gravelly sand</td><td><1.31</td><td>Very Dense</td><td>>50</td><td>Very Dense</td><td>>85</td></tr> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	Transducer Tip: 364 mV Sleeve: 295 mV Pore Pressure 2: 323 mV X-Y Inclinator: 2510 mV	CPTU ZERO VALUES Pre: 364 mV Post: 364 mV Difference: 0 MPa 295 mV 295 mV 0 kPa 323 mV 345 mV 0.006 kPa 2510 mV 2583 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▭ Dissipation Test
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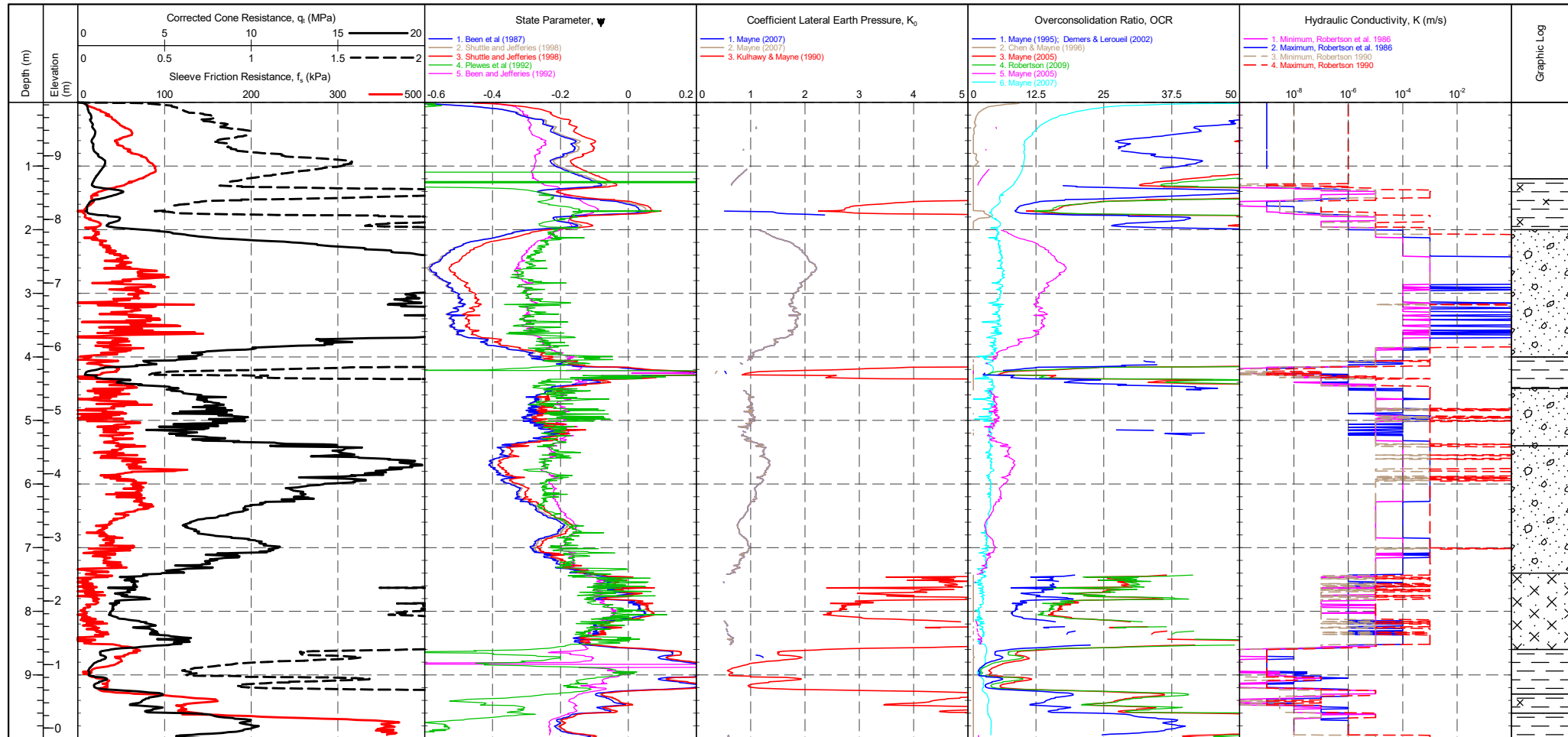
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Sleeve	295 mV	295 mV	0 kPa																																									
Pore Pressure 2	323 mV	345 mV	0.006 kPa																																									
X-Y Inclinator	2510 mV	2583 mV																																										
Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)																																									
Extremely low strength	<10	Medium strength	40-75																																									
Very low strength	10-20	High strength	75-150																																									
Low strength	20-40	Very high strength	150-300																																									
		Extremely high strength	>300																																									

PointID
S3CPT25

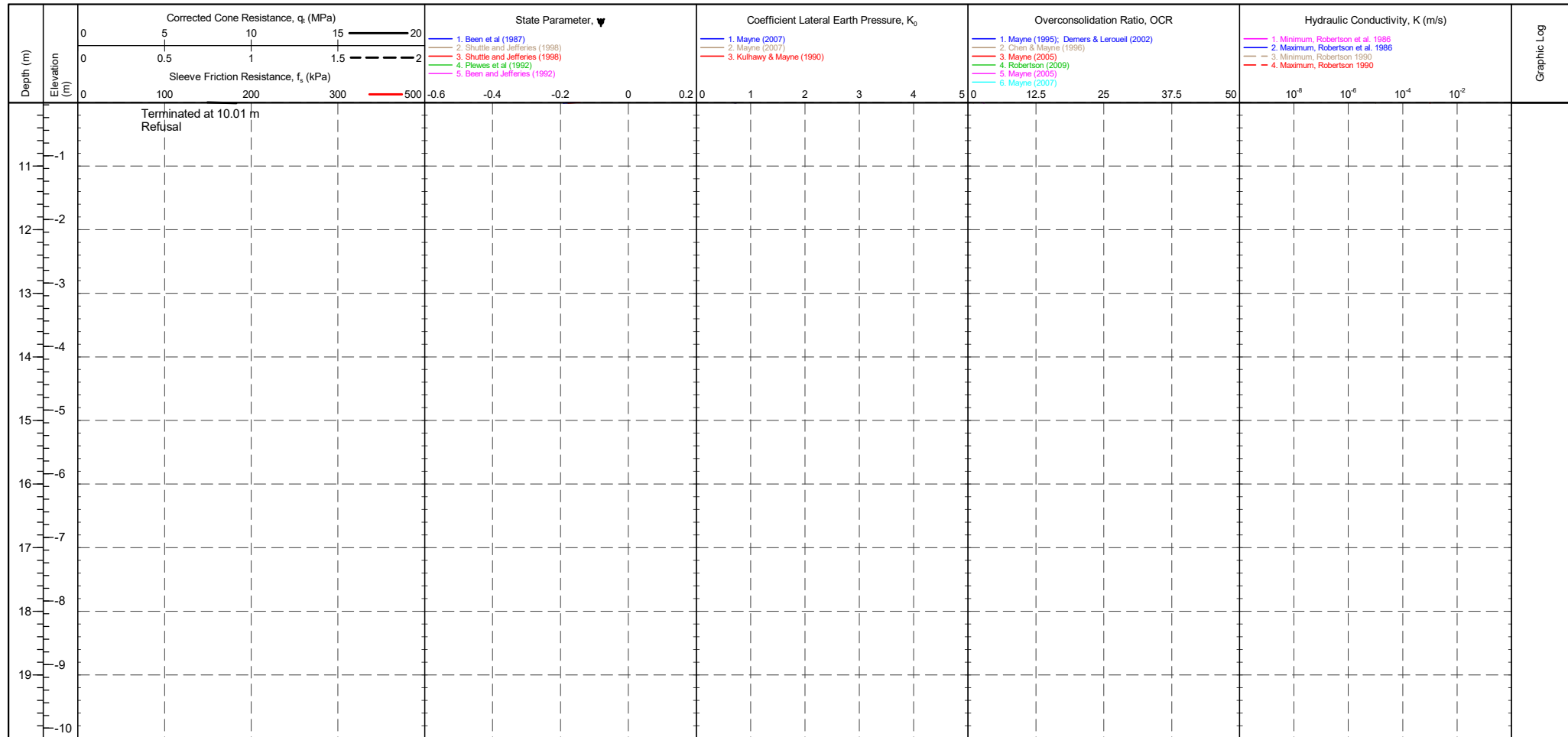
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479504.736 m NORTHING : 354701.571 m ELEVATION : 9.838 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>364 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>295 mV</td> <td>295 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>323 mV</td> <td>345 mV</td> <td>0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2510 mV</td> <td>2583 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	295 mV	295 mV	0 kPa	Pore Pressure 2	323 mV	345 mV	0.006 kPa	X-Y Inclinator	2510 mV	2583 mV		Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																				
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X-Y Inclinator	2510 mV	2583 mV																					

PointID
S3CPT25

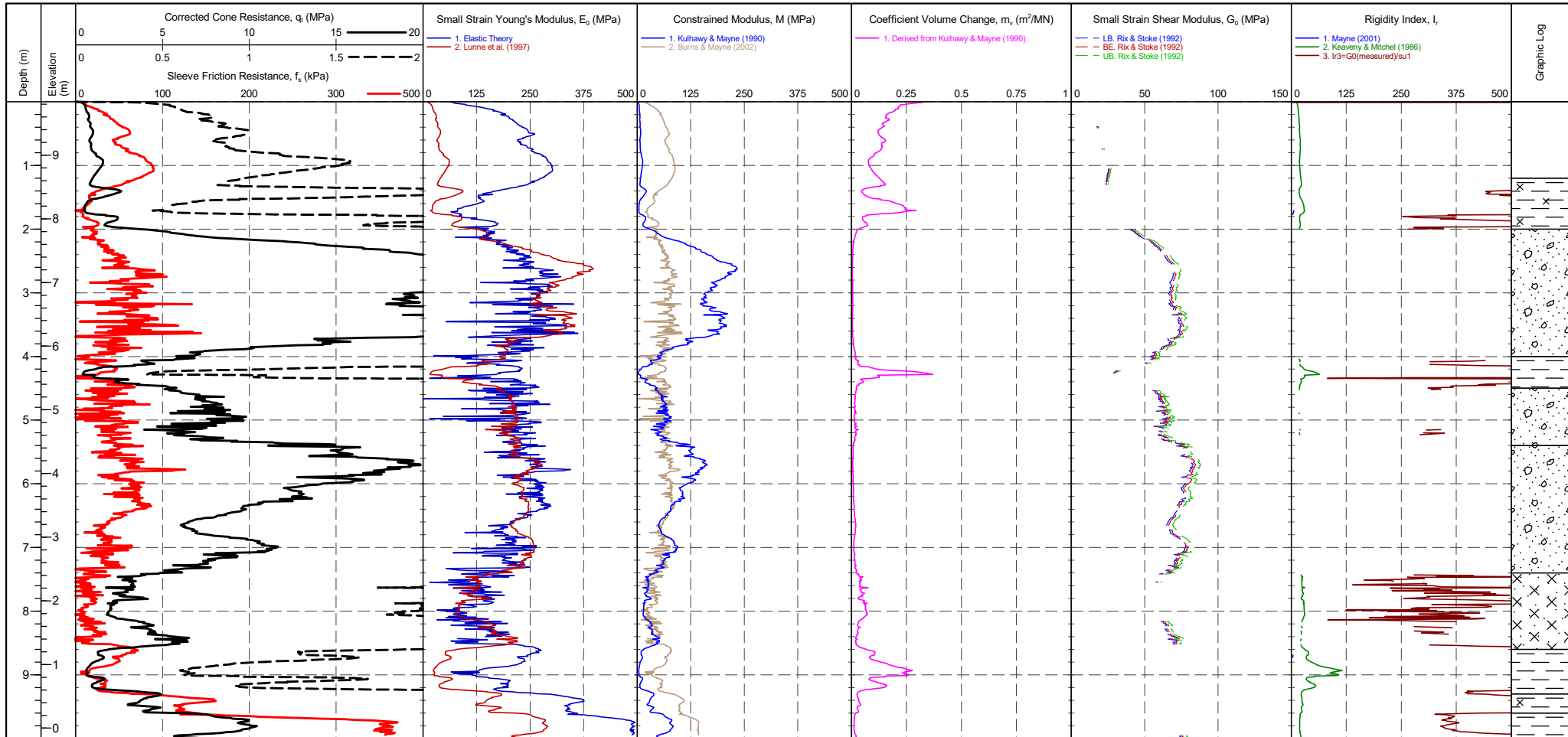
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479504.736 m NORTHING : 354701.571 m ELEVATION : 9.838 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>364 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>295 mV</td> <td>295 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>323 mV</td> <td>345 mV</td> <td>0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2510 mV</td> <td>2583 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	295 mV	295 mV	0 kPa	Pore Pressure 2	323 mV	345 mV	0.006 kPa	X-Y Inclinator	2510 mV	2583 mV		Groundwater Level Dissipation Test
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X-Y Inclinator	2510 mV	2583 mV																					

PointID
S3CPT25

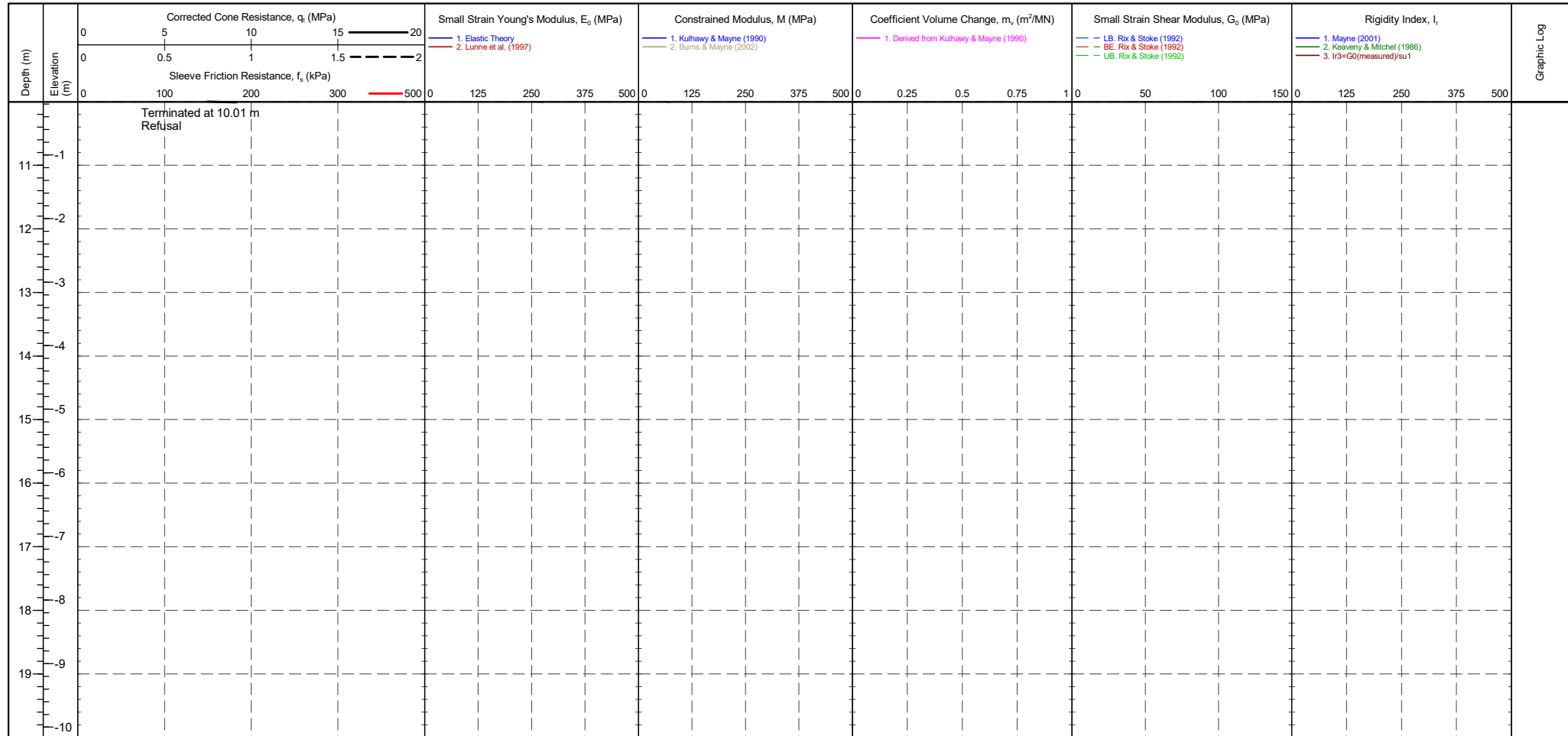
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479504.736 m NORTHING : 354701.571 m ELEVATION : 9.838 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>364 mV</td><td>364 mV</td><td>0 MPa</td></tr> <tr><td>Sleeve</td><td>295 mV</td><td>295 mV</td><td>0 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>323 mV</td><td>345 mV</td><td>0.006 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2510 mV</td><td>2583 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	295 mV	295 mV	0 kPa	Pore Pressure 2	323 mV	345 mV	0.006 kPa	X-Y Inclinator	2510 mV	2583 mV		Groundwater Level Dissipation Test
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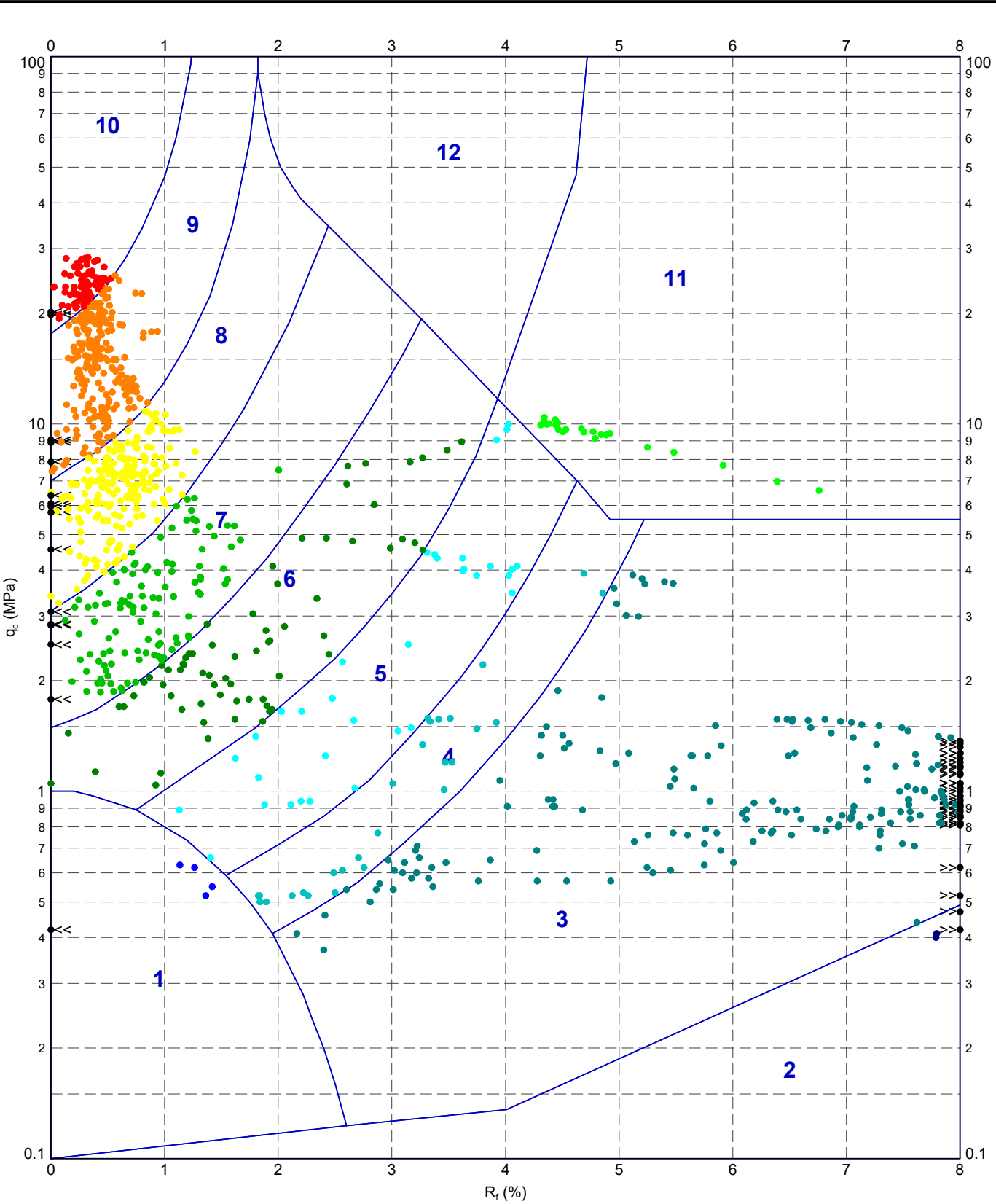
PointID
S3CPT25

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479504.736 m NORTHING : 354701.571 m ELEVATION : 9.838 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>364 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>295 mV</td> <td>295 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>323 mV</td> <td>345 mV</td> <td>0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2510 mV</td> <td>2583 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	364 mV	0 MPa	Sleeve	295 mV	295 mV	0 kPa	Pore Pressure 2	323 mV	345 mV	0.006 kPa	X-Y Inclinator	2510 mV	2583 mV		Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																				
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Pore Pressure 2	323 mV	345 mV	0.006 kPa																				
X-Y Inclinator	2510 mV	2583 mV																					

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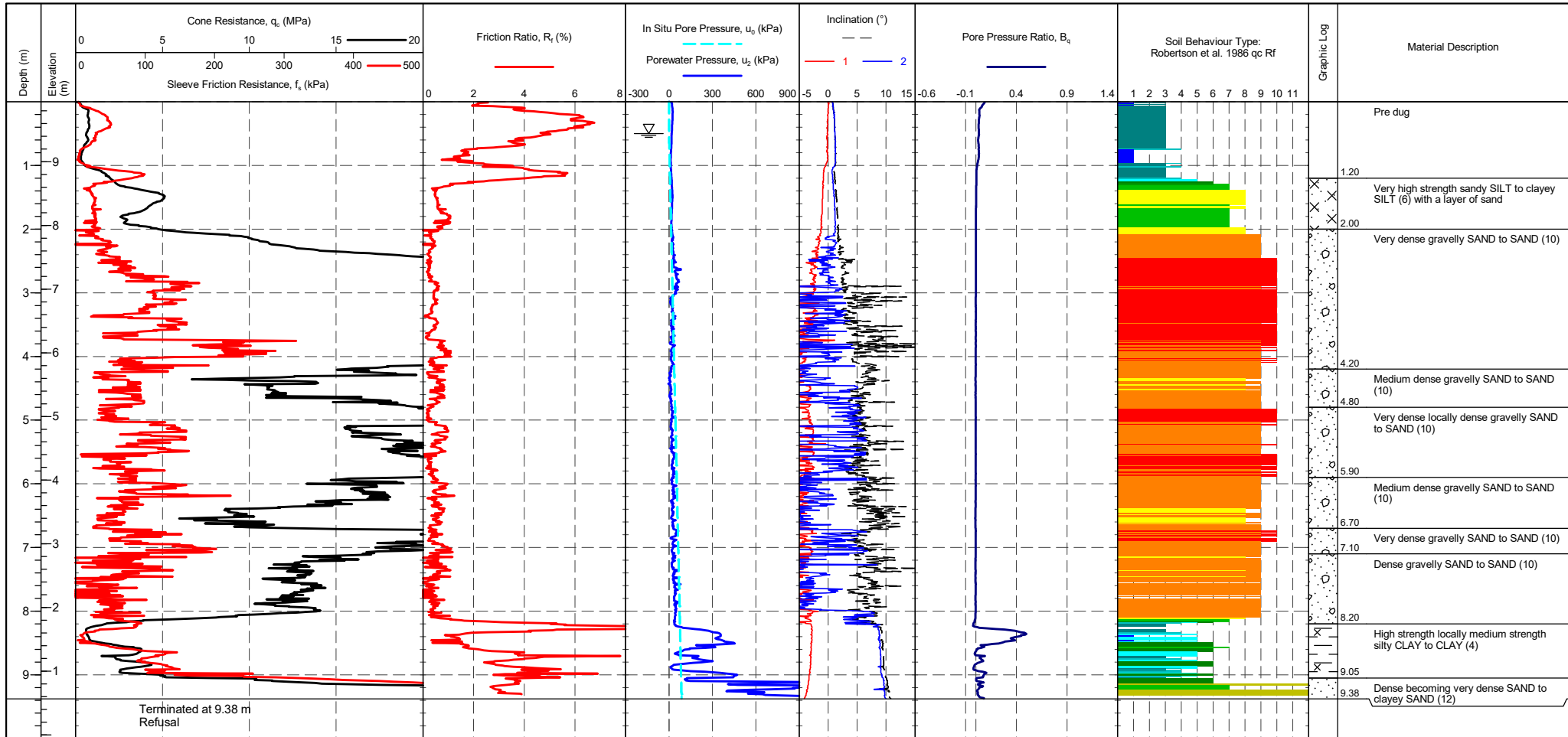
METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

	TITLE	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT25	
	DRAWN	DATE	20/05/2023
	CHECKED	DATE	20/05/2023
	SCALE	Not To Scale	
PROJECT No	1220514	FIGURE No	A4

PointID	S3CPT26
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479415.976 m NORTHING : 354711.663 m ELEVATION : 9.943 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR WEATHER : Sunny & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 359 mV -0.057 MPa Sleeve 296 mV 291 mV -0.004 kPa Pore Pressure 2 327 mV 313 mV -0.004 kPa X-Y Inclinometer 2573 mV 2466 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

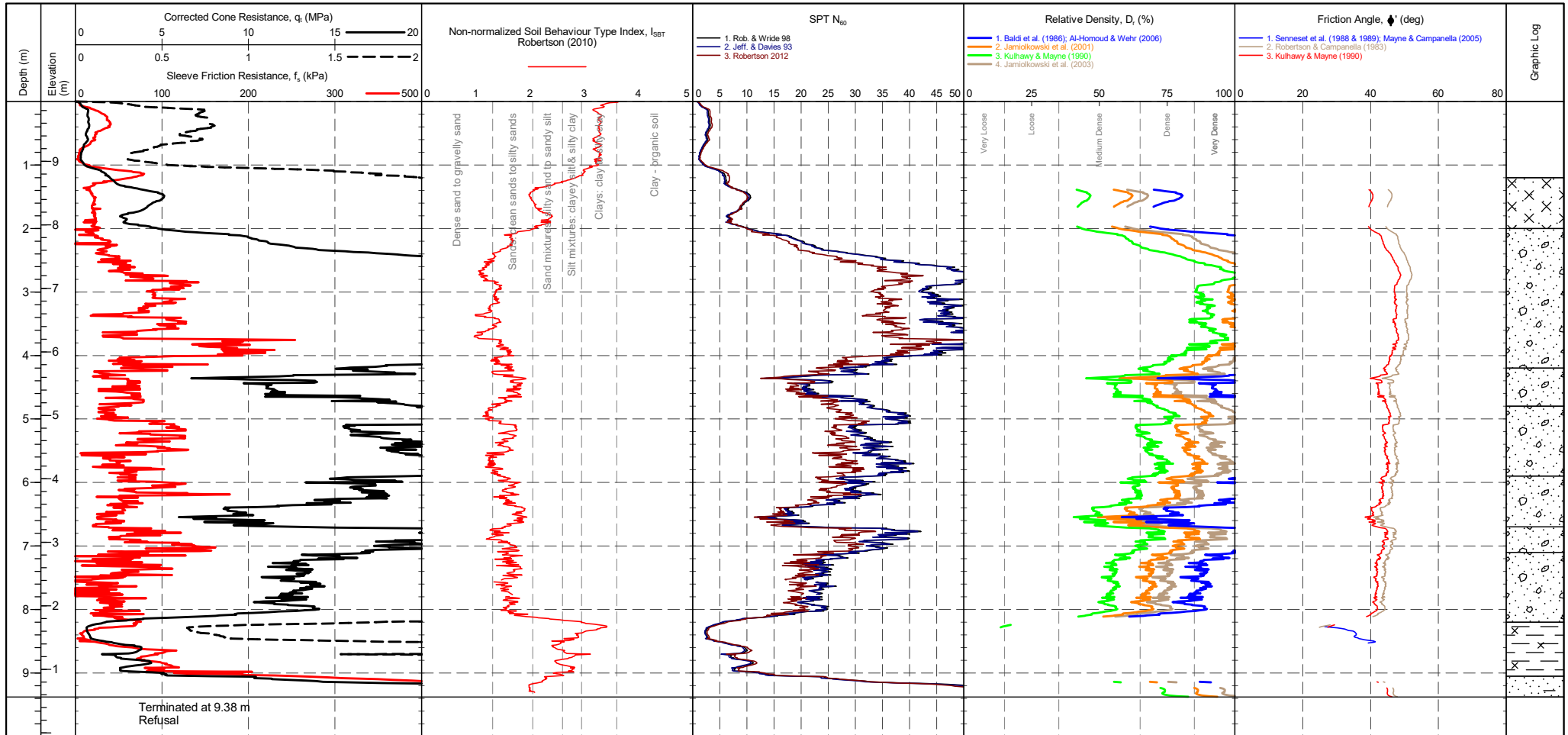
S3CPT26

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479415.976 m
 NORTHING : 354711.663 m
 ELEVATION : 9.943 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 10/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICTION REDUCER : None WEATHER : Sunny & Mild	Transducer Tip : 364 mV Sleeve : 296 mV Pore Pressure 2 : 327 mV X-Y Inclinator : 2573 mV	CPTU ZERO VALUES Pre : 359 mV Post : 291 mV Difference : -0.057 MPa -0.004 kPa -0.004 kPa 2466 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 Description SBT Index, I _c Clays 2.95-3.60 Silt mixtures 2.60-2.95 Sand mixtures 2.05-2.60 Sands 1.31-2.05 Gravelly sand <1.31	Description SPT N value, NSPT Very Loose 0 - 4 Loose 4 - 10 Medium Dense 10 - 30 Dense 30 - 50 Very Dense >50	Description Relative Density D _r (%) Very Loose 0 - 15 Loose 15 - 35 Medium Dense 35 - 65 Dense 65 - 85 Very Dense >85	Groundwater Level Dissipation Test
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PointID

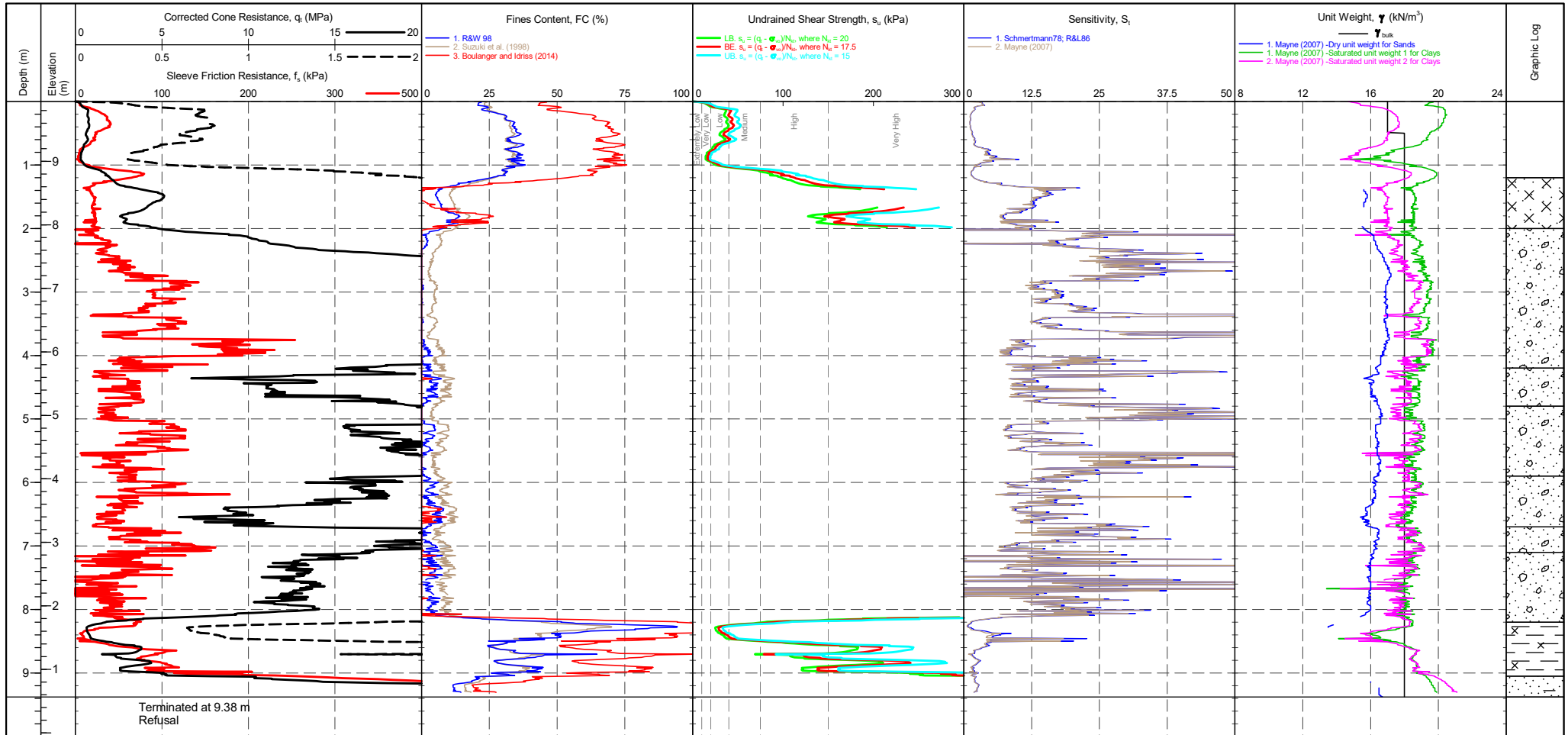
S3CPT26

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479415.976 m
 NORTHING : 354711.663 m
 ELEVATION : 9.943 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

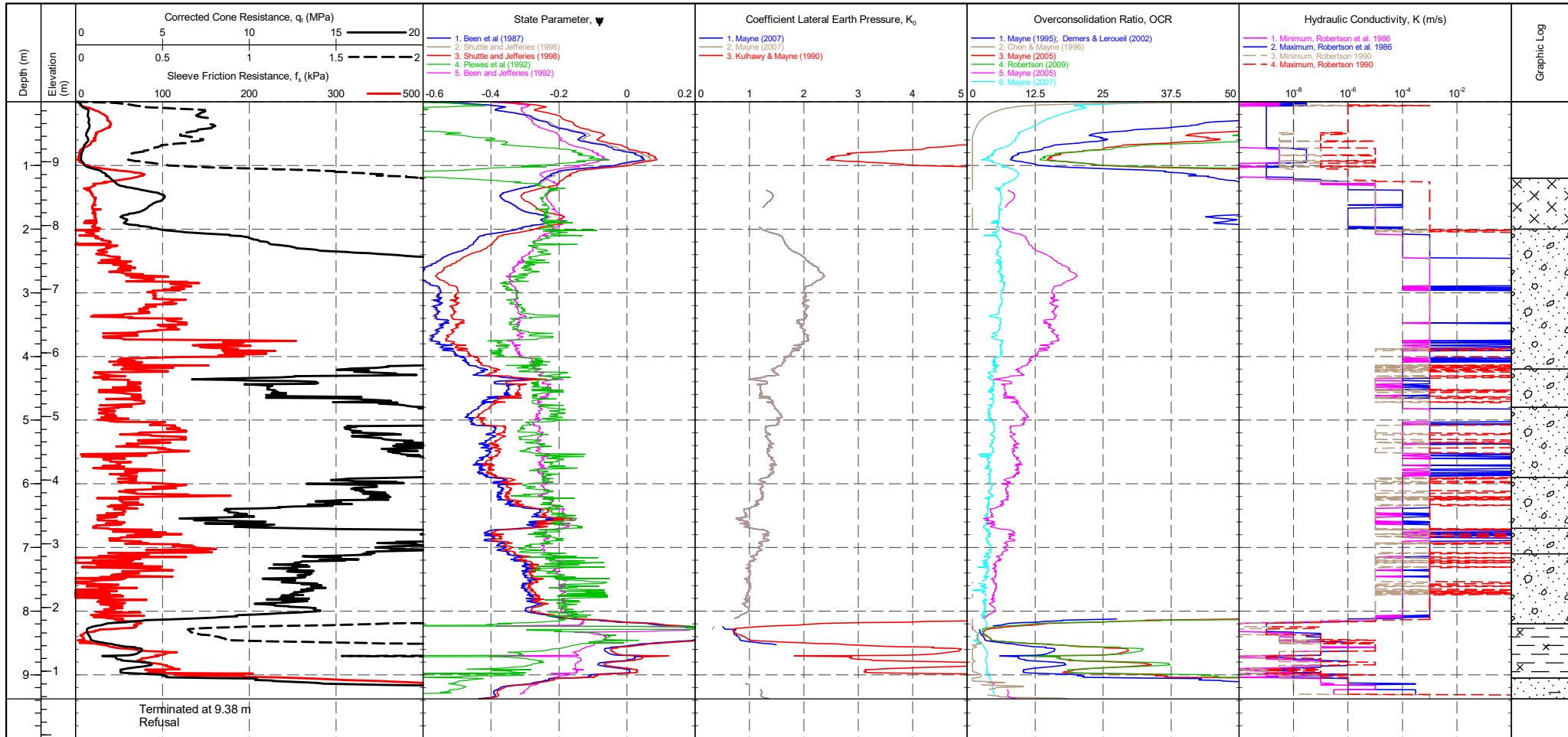
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 10/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICTION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 359 mV -0.057 MPa Sleeve 296 mV 291 mV -0.004 kPa Pore Pressure 2 327 mV 313 mV -0.004 kPa X-Y Inclinator 2573 mV 2466 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement s_u (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40 Term based on measurement s_u (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID
S3CPT26

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479415.976 m NORTHING : 354711.663 m ELEVATION : 9.943 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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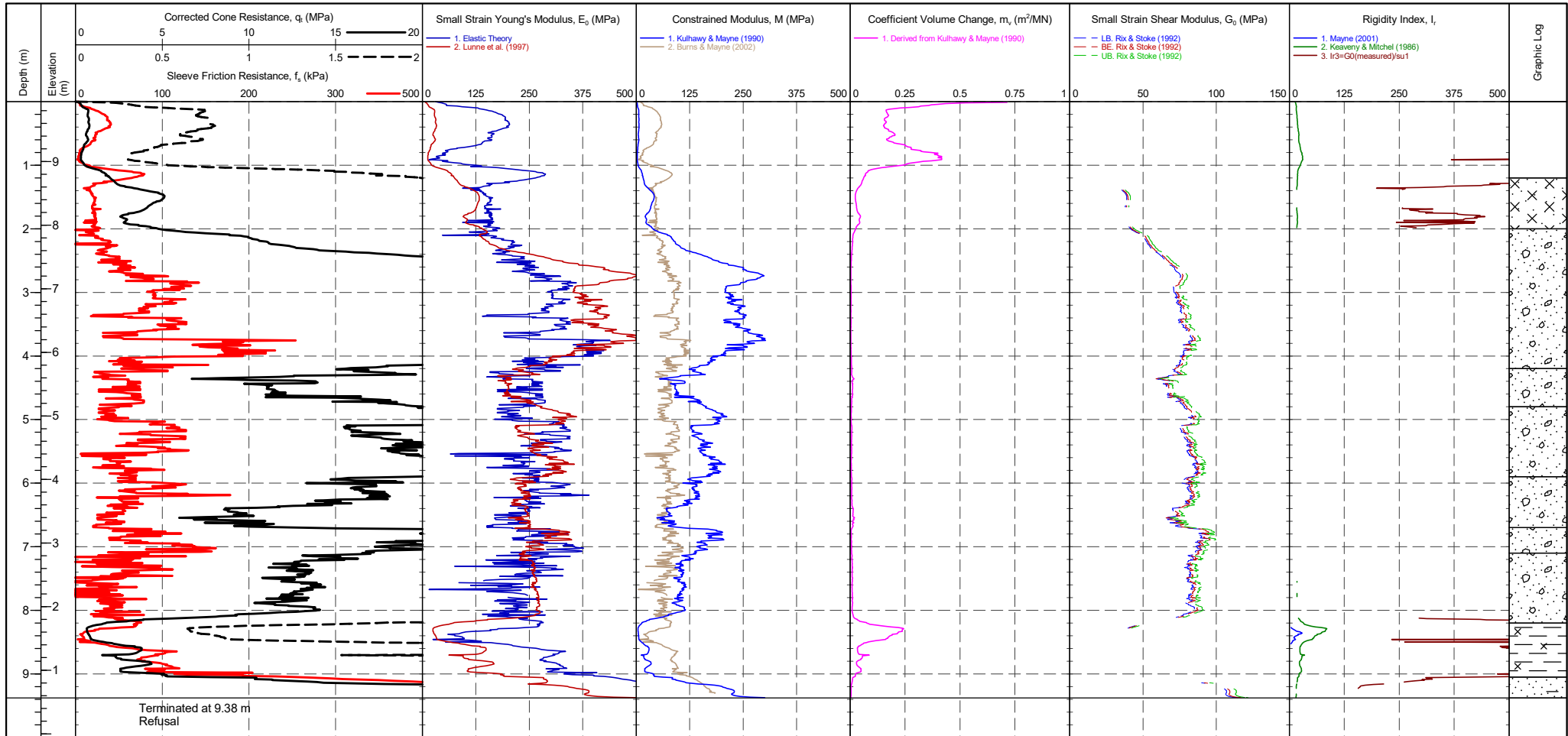


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>364 mV</td><td>359 mV</td><td>-0.057 MPa</td></tr> <tr><td>Sleeve</td><td>296 mV</td><td>291 mV</td><td>-0.004 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>327 mV</td><td>313 mV</td><td>-0.004 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2573 mV</td><td>2466 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	359 mV	-0.057 MPa	Sleeve	296 mV	291 mV	-0.004 kPa	Pore Pressure 2	327 mV	313 mV	-0.004 kPa	X-Y Inclinator	2573 mV	2466 mV		Groundwater Level Dissipation Test
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Pore Pressure 2	327 mV	313 mV	-0.004 kPa																				
X-Y Inclinator	2573 mV	2466 mV																					

PointID

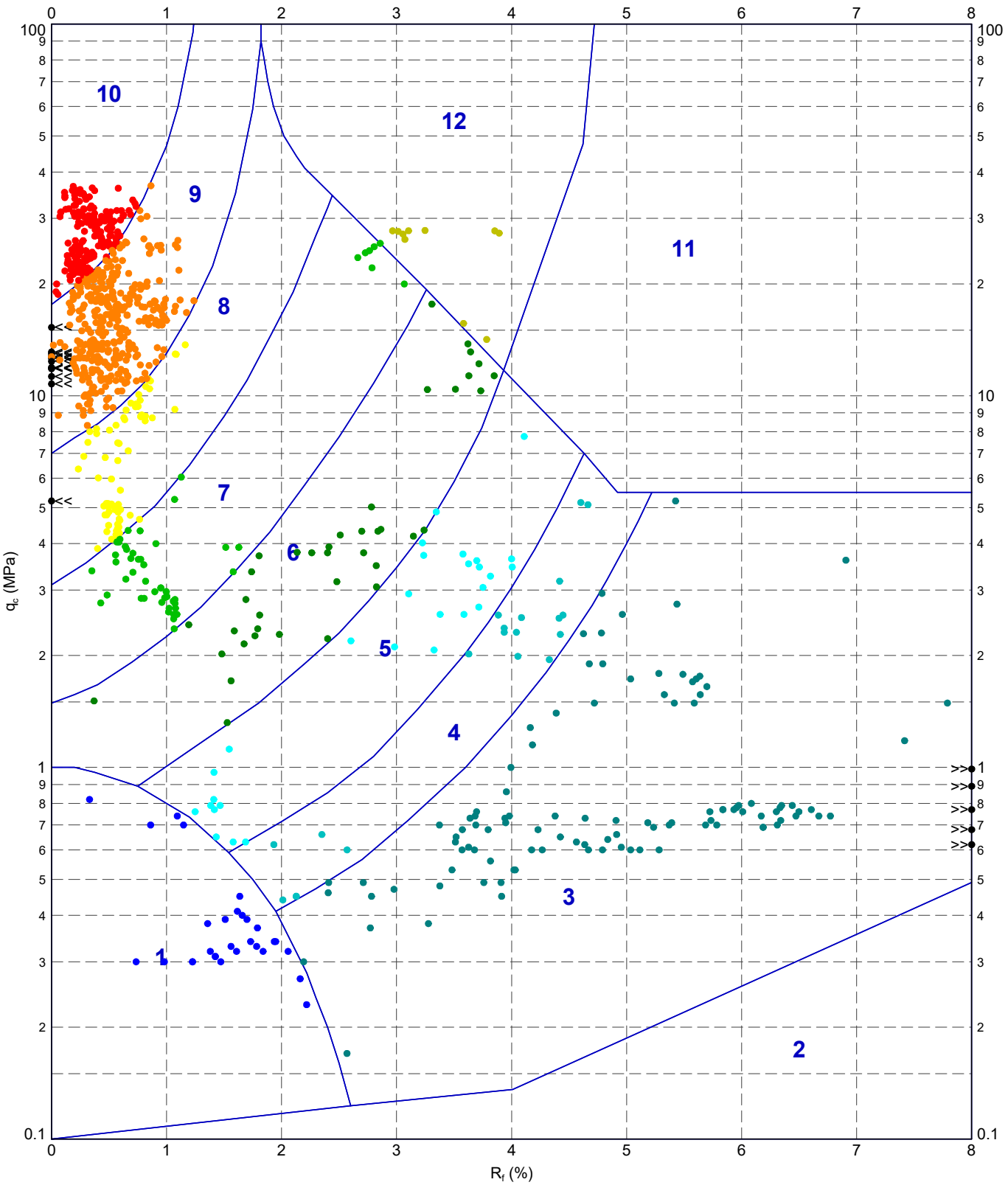
S3CPT26

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479415.976 m NORTHING : 354711.663 m ELEVATION : 9.943 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 359 mV -0.057 MPa Sleeve 296 mV 291 mV -0.004 kPa Pore Pressure 2 327 mV 313 mV -0.004 kPa X-Y Inclinator 2573 mV 2466 mV	Groundwater Level Dissipation Test
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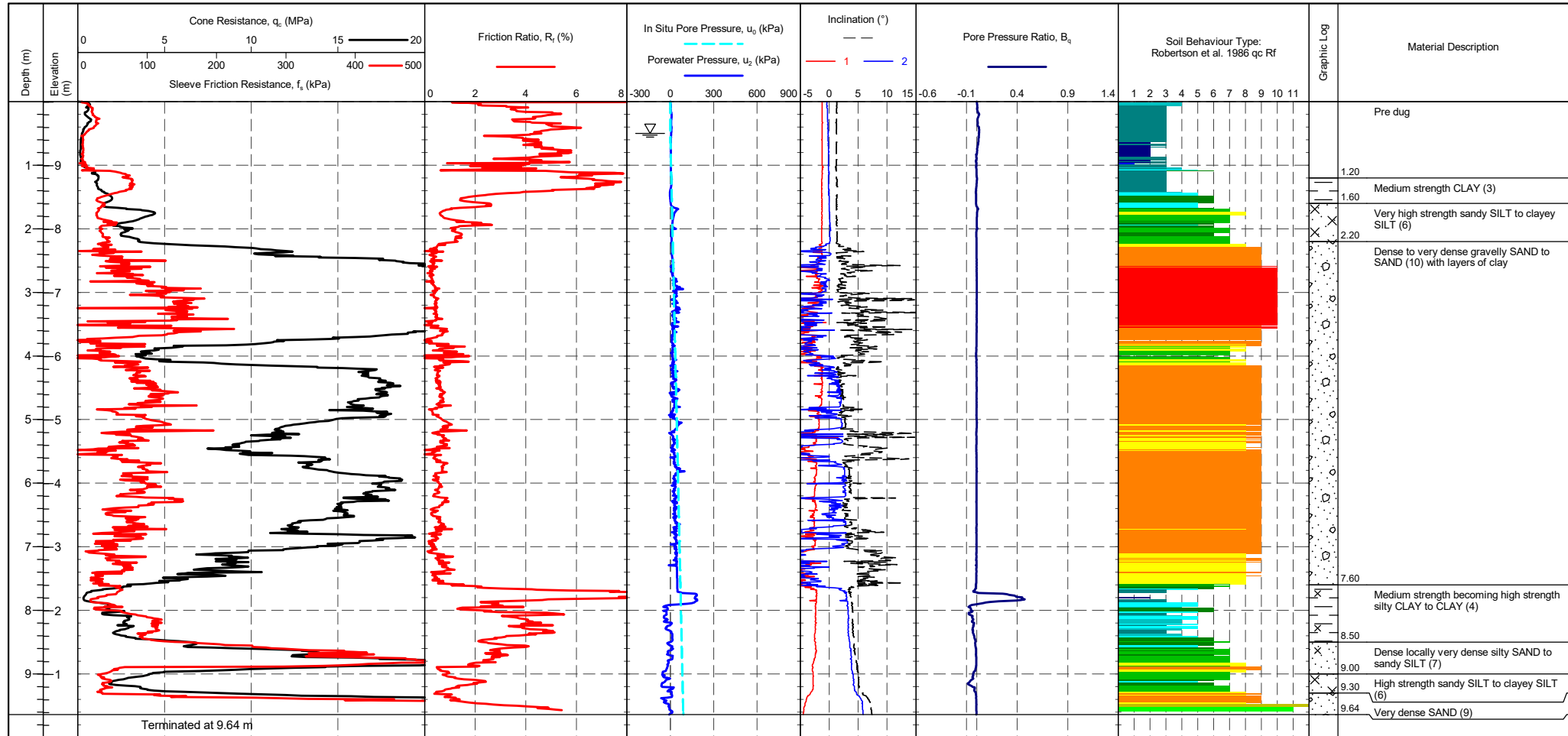
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT26	
	DRAWN	DATE	20/05/2023
	CHECKED	DATE	20/05/2023
	SCALE	Not To Scale	
PROJECT No	1220514		FIGURE No

PointID	S3CPT27
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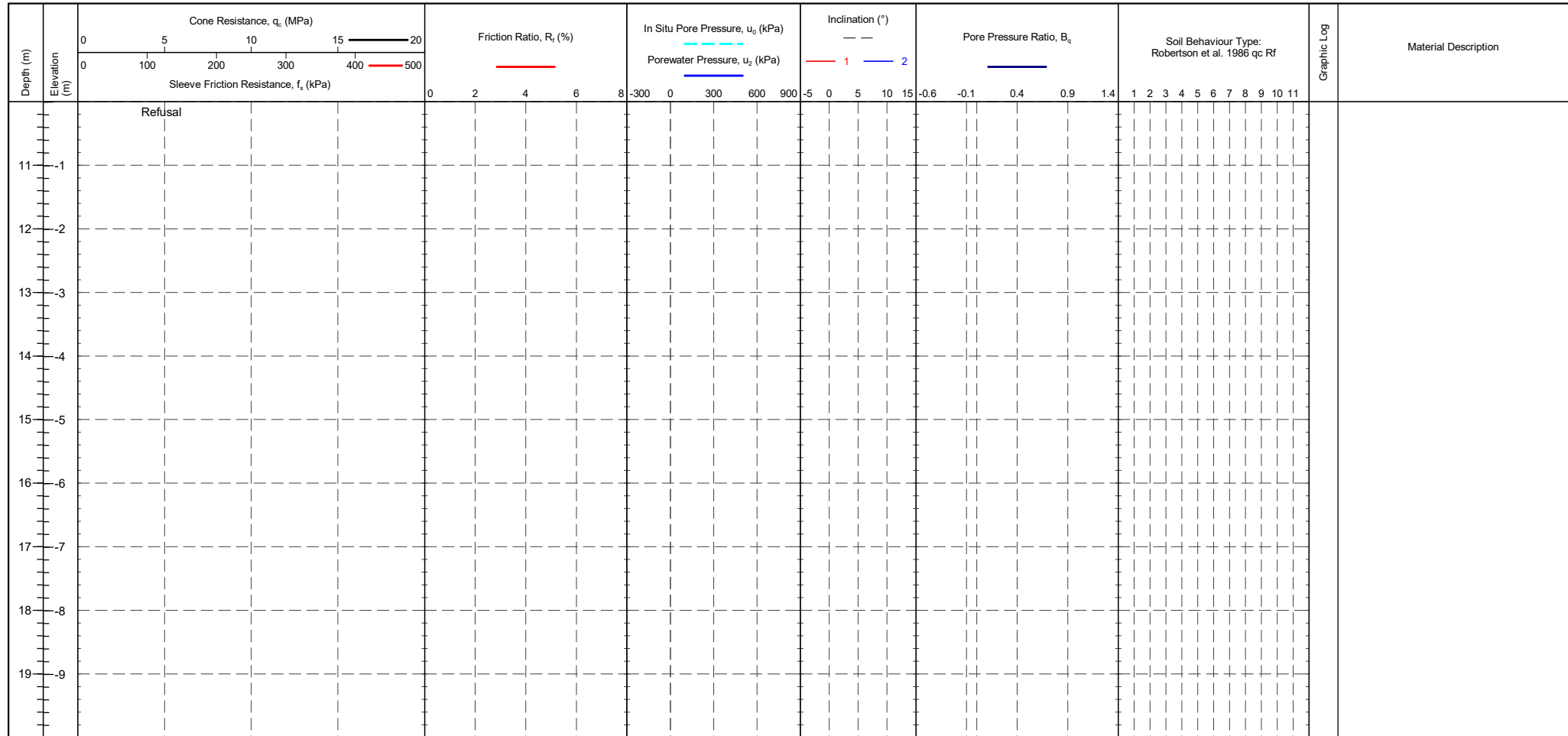
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 366 mV 360 mV -0.069 MPa Sleeve 301 mV 298 mV -0.002 kPa Pore Pressure 2 317 mV 290 mV -0.007 kPa X-Y Inclinometer 2412 mV 2386 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT27

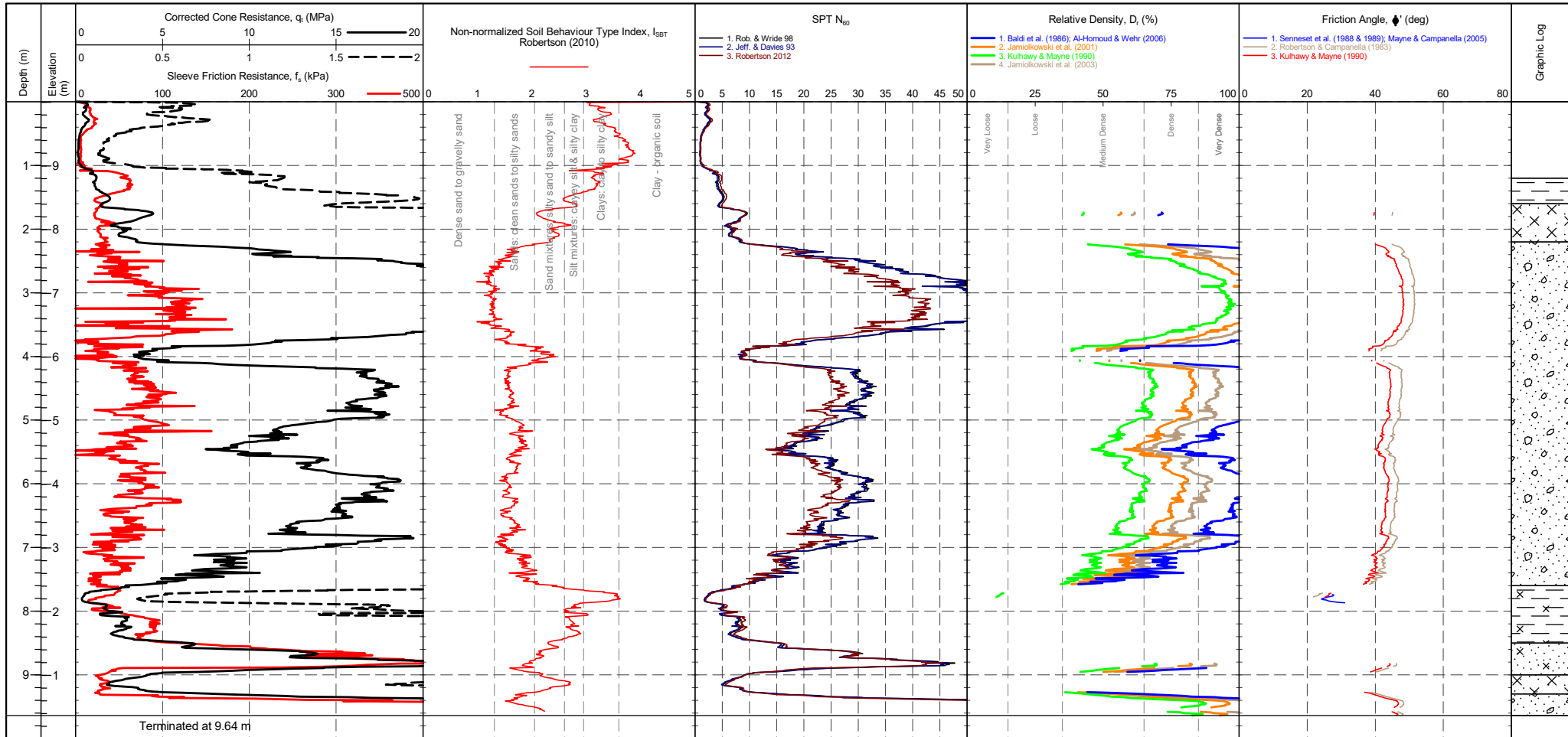
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>360 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>298 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>290 mV</td> <td>-0.007 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2412 mV</td> <td>2386 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	360 mV	-0.069 MPa	Sleeve	301 mV	298 mV	-0.002 kPa	Pore Pressure 2	317 mV	290 mV	-0.007 kPa	X-Y Inclinometer	2412 mV	2386 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																																	
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PointID
S3CPT27

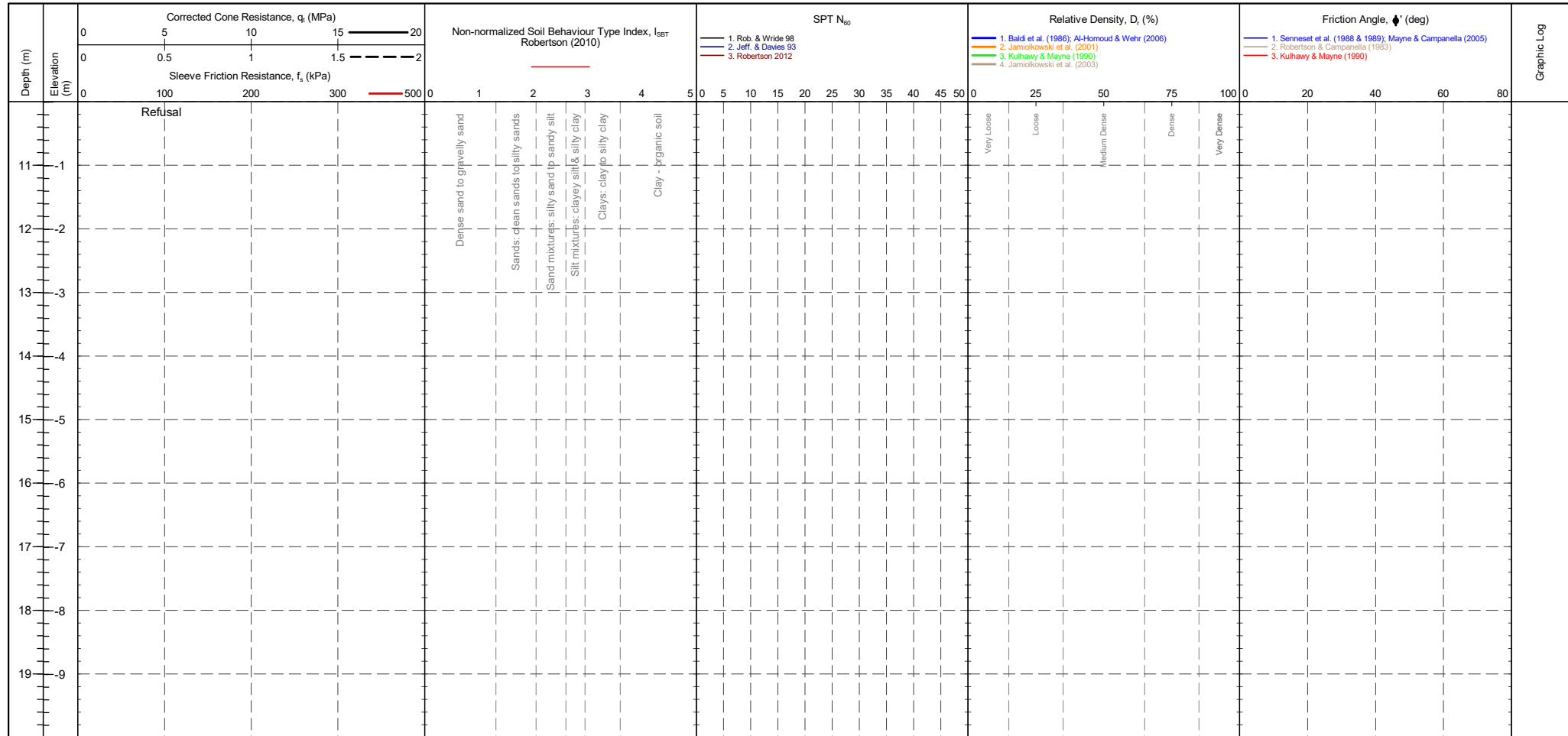
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 366 mV Sleeve: 301 mV Pore Pressure 2: 317 mV X-Y Inclinator: 2412 mV	CPTU ZERO VALUES Pre: 360 mV Post: 298 mV Difference: -0.069 MPa -0.002 kPa -0.007 kPa 2386 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 Description: Clays, Silt mixtures, Sand mixtures, Sands, Gravelly sand SBT Index, I_c : 2.95-3.60, 2.60-2.95, 2.05-2.60, 1.31-2.05, <1.31 Description: Very Loose, Loose, Medium Dense, Dense, Very Dense SPT N value, NSPT: 0 - 4, 4 - 10, 10 - 30, 30 - 50, >50 Description: Very Loose, Loose, Medium Dense, Dense, Very Dense Relative Density D_r (%): 0 - 15, 15 - 35, 35 - 65, 65 - 85, >85	Groundwater Level Dissipation Test
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PointID	S3CPT27
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>360 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>298 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>290 mV</td> <td>-0.007 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2412 mV</td> <td>2386 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	360 mV	-0.069 MPa	Sleeve	301 mV	298 mV	-0.002 kPa	Pore Pressure 2	317 mV	290 mV	-0.007 kPa	X-Y Inclinator	2412 mV	2386 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

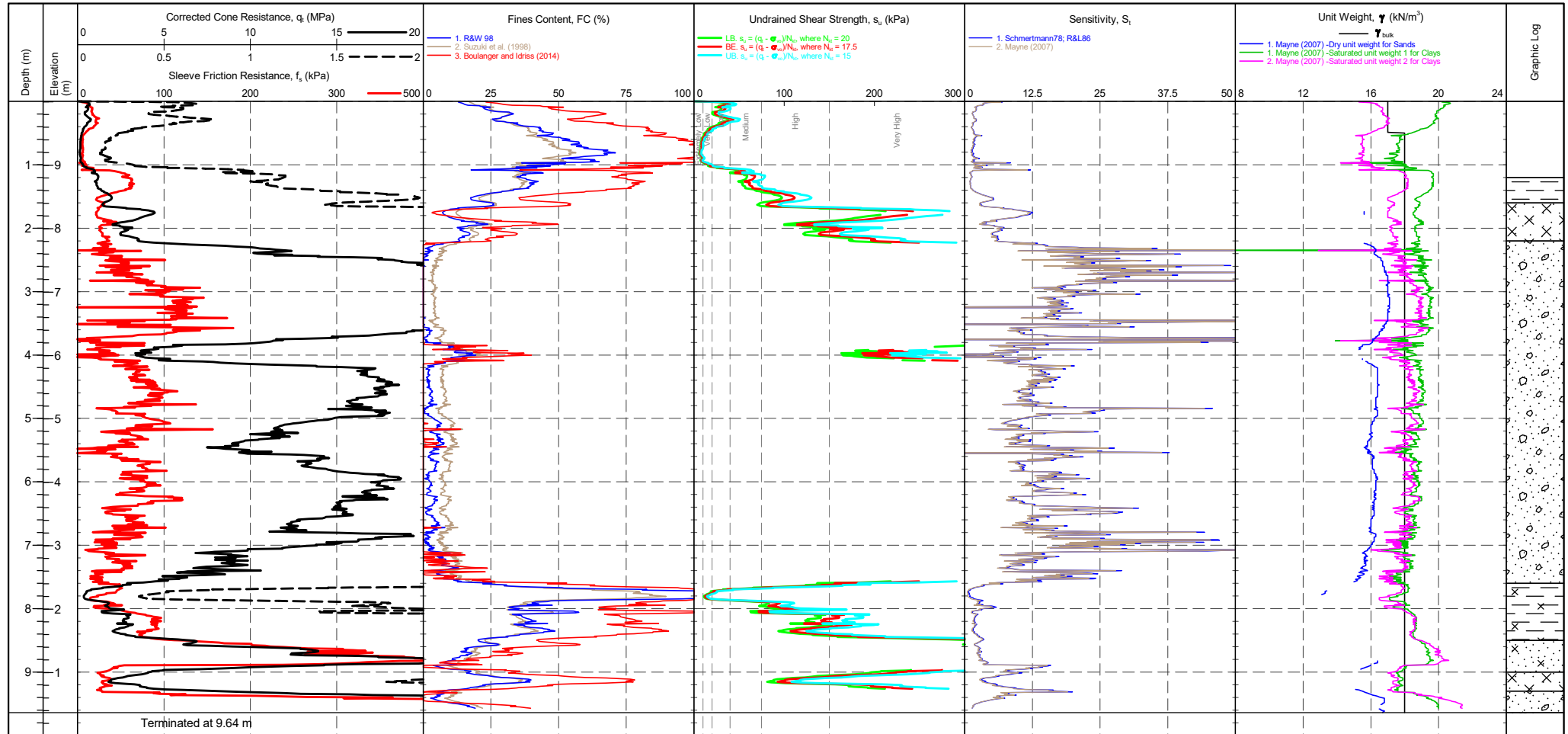
S3CPT27

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479376.706 m
 NORTHING : 354732.663 m
 ELEVATION : 10.008 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 2
 STATUS : Final
 TEST DATE : 11/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 366 mV Sleeve : 301 mV Pore Pressure 2 : 317 mV X-Y Inclinator : 2412 mV	CPTU ZERO VALUES Post : 360 mV Difference : -0.069 MPa 298 mV -0.002 kPa 290 mV -0.007 kPa 2386 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID
S3CPT27

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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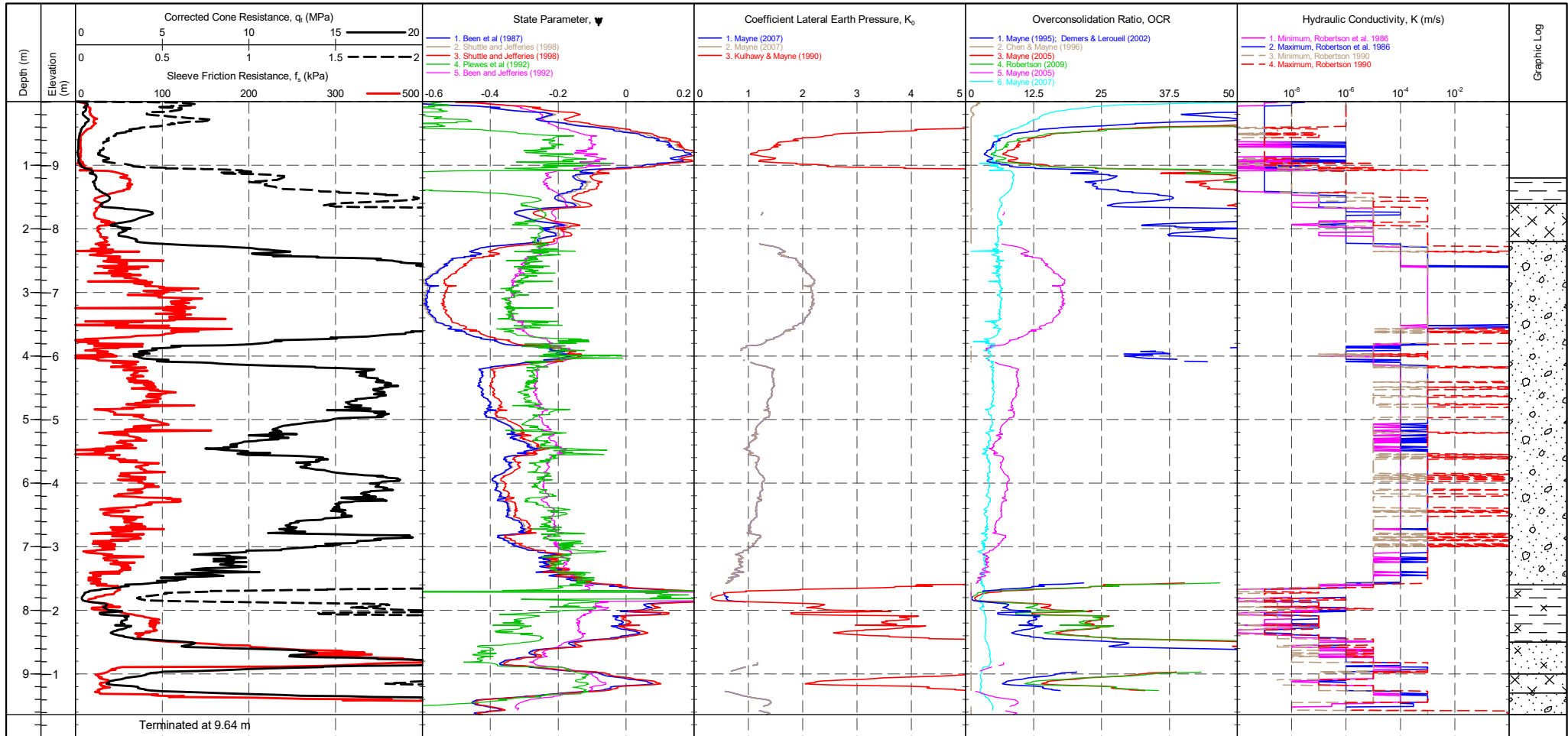


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>366 mV</td><td>360 mV</td><td>-0.069 MPa</td></tr> <tr><td>Sleeve</td><td>301 mV</td><td>298 mV</td><td>-0.002 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>317 mV</td><td>290 mV</td><td>-0.007 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2412 mV</td><td>2386 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	360 mV	-0.069 MPa	Sleeve	301 mV	298 mV	-0.002 kPa	Pore Pressure 2	317 mV	290 mV	-0.007 kPa	X-Y Inclinator	2412 mV	2386 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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S3CPT27

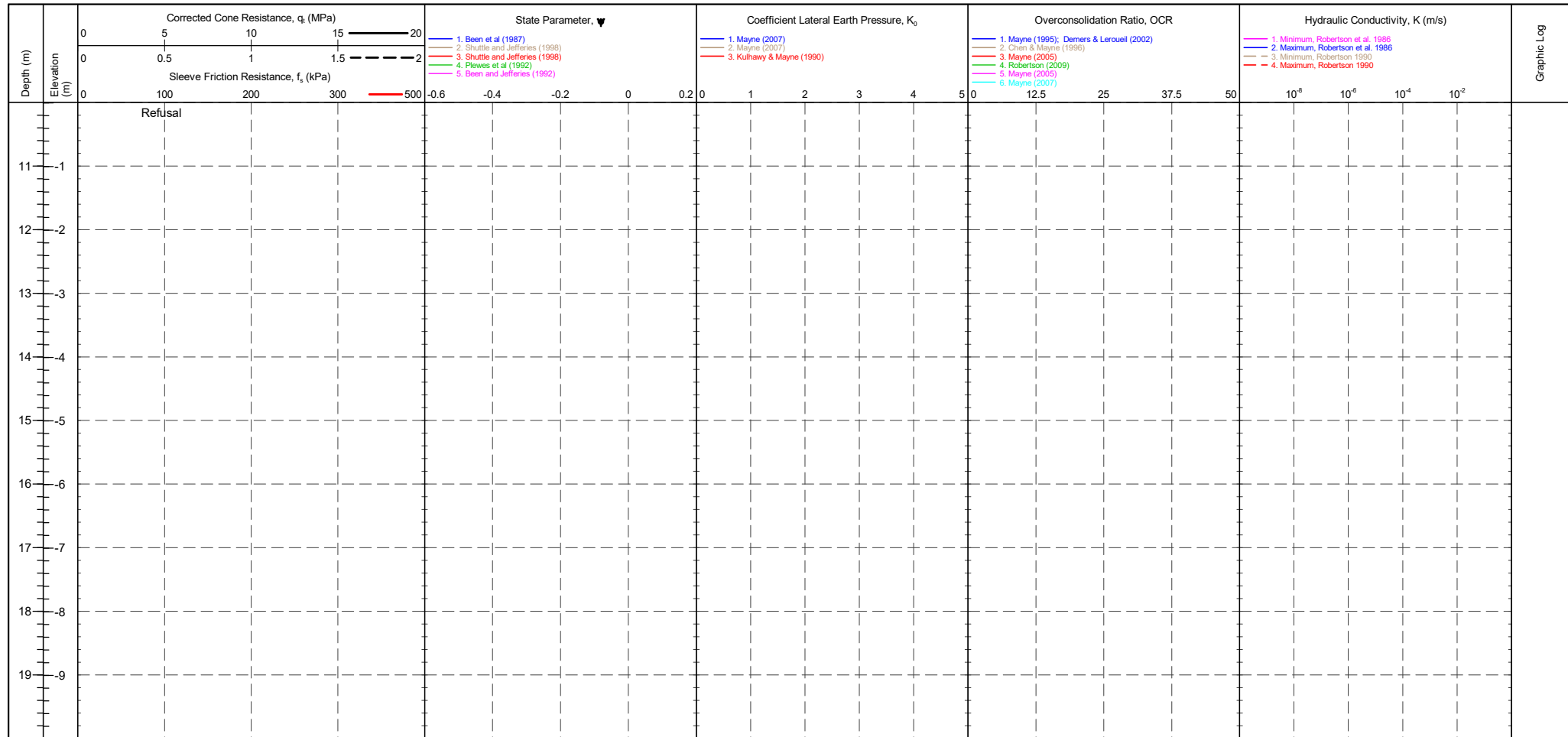
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>360 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>298 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>290 mV</td> <td>-0.007 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2412 mV</td> <td>2386 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	360 mV	-0.069 MPa	Sleeve	301 mV	298 mV	-0.002 kPa	Pore Pressure 2	317 mV	290 mV	-0.007 kPa	X-Y Inclinator	2412 mV	2386 mV		Groundwater Level Dissipation Test
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S3CPT27

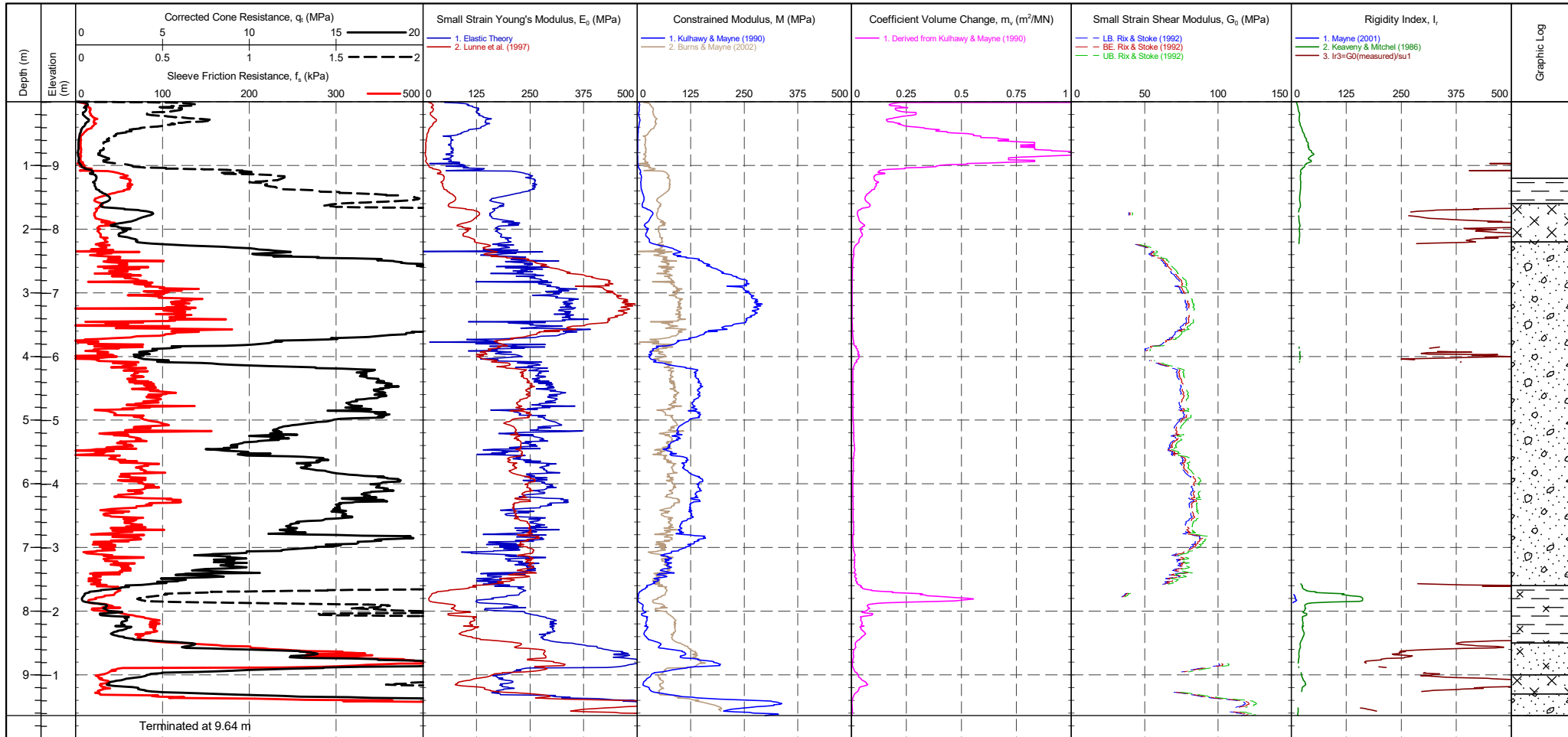
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>360 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>298 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>290 mV</td> <td>-0.007 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2412 mV</td> <td>2386 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	360 mV	-0.069 MPa	Sleeve	301 mV	298 mV	-0.002 kPa	Pore Pressure 2	317 mV	290 mV	-0.007 kPa	X-Y Inclinator	2412 mV	2386 mV		Groundwater Level Dissipation Test
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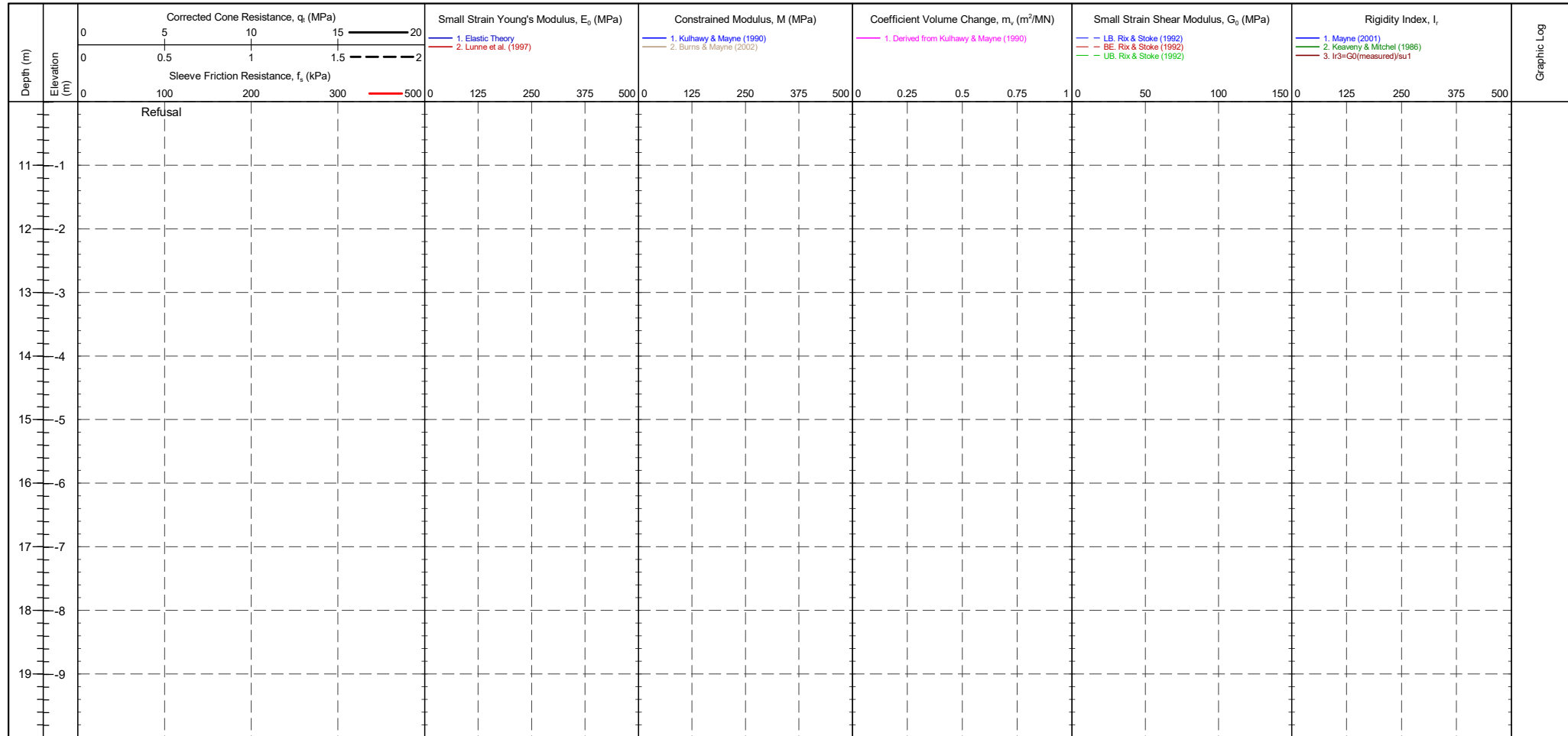
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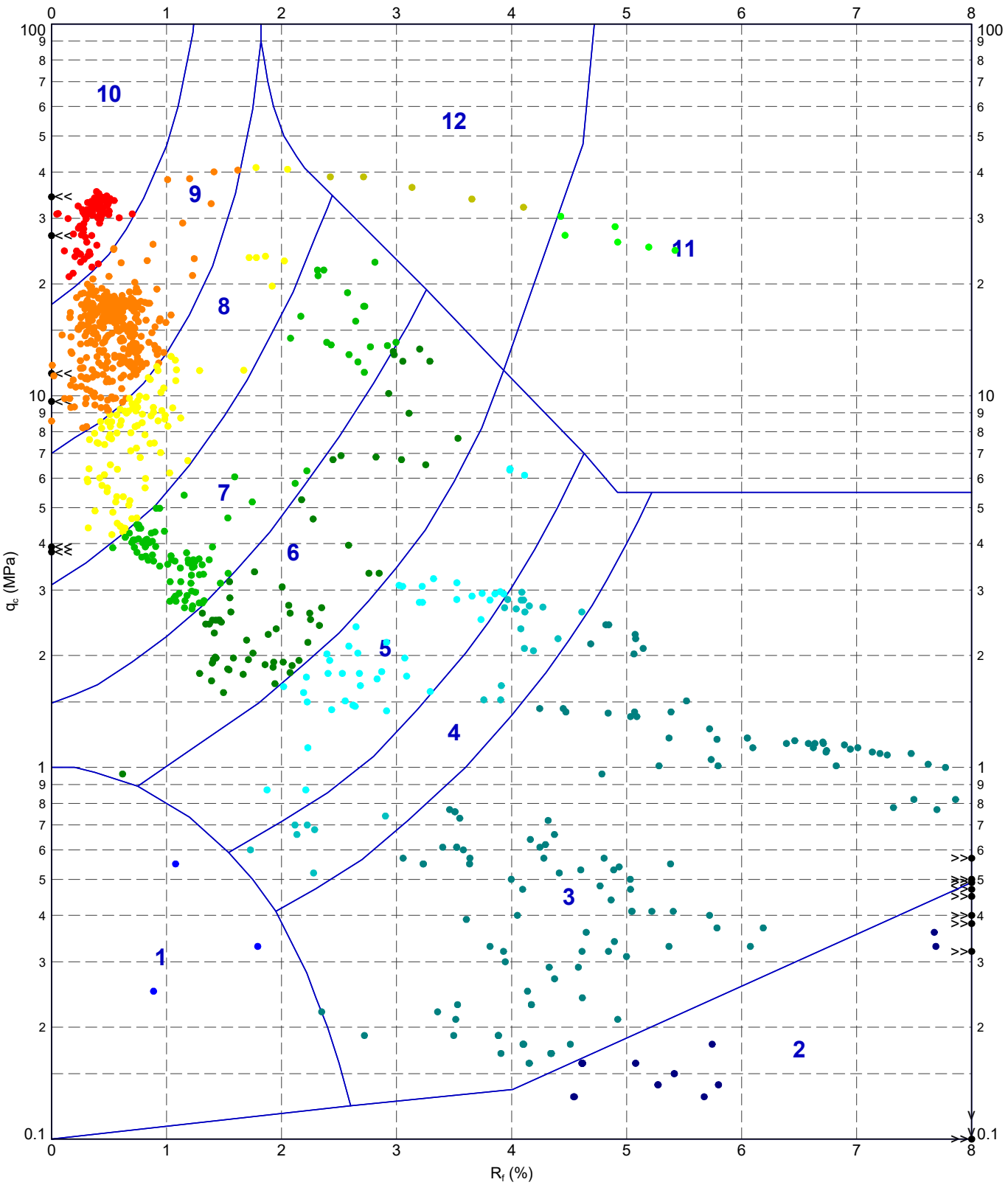
PointID
S3CPT27

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479376.706 m NORTHING : 354732.663 m ELEVATION : 10.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 11/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 366 mV 360 mV -0.069 MPa Sleeve 301 mV 298 mV -0.002 kPa Pore Pressure 2 317 mV 290 mV -0.007 kPa X-Y Inclinator 2412 mV 2386 mV	Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF AMP 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:37 10.03.00.09 Dalgard Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



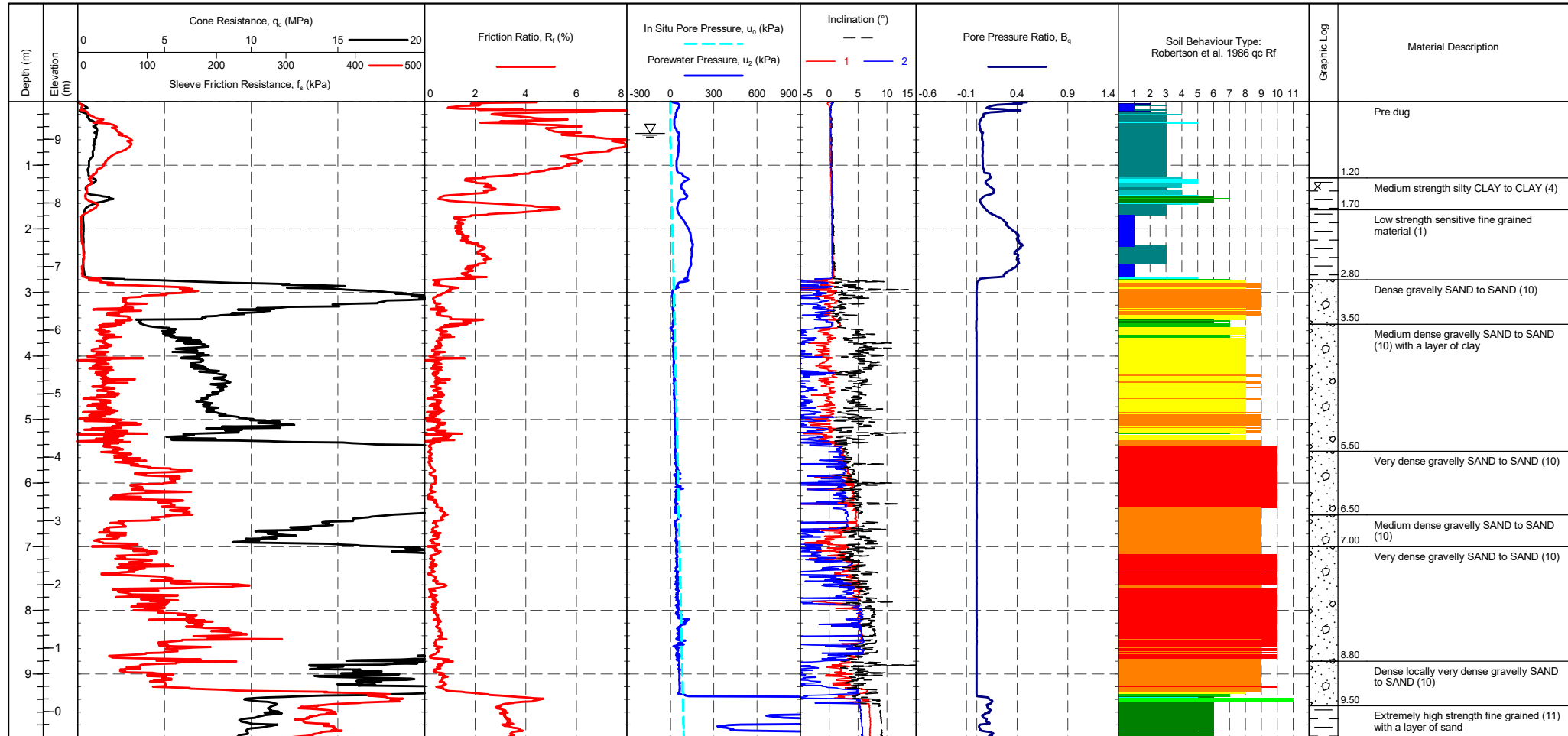
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark	CHECKED	20/05/2023
	A46 Newark Bypass	SCALE	Not To Scale
	Robertson et al. 1986 qc vs. Rf - S3CPT27	PROJECT No 1220514	FIGURE No
		A4	

PointID	S3CPT30
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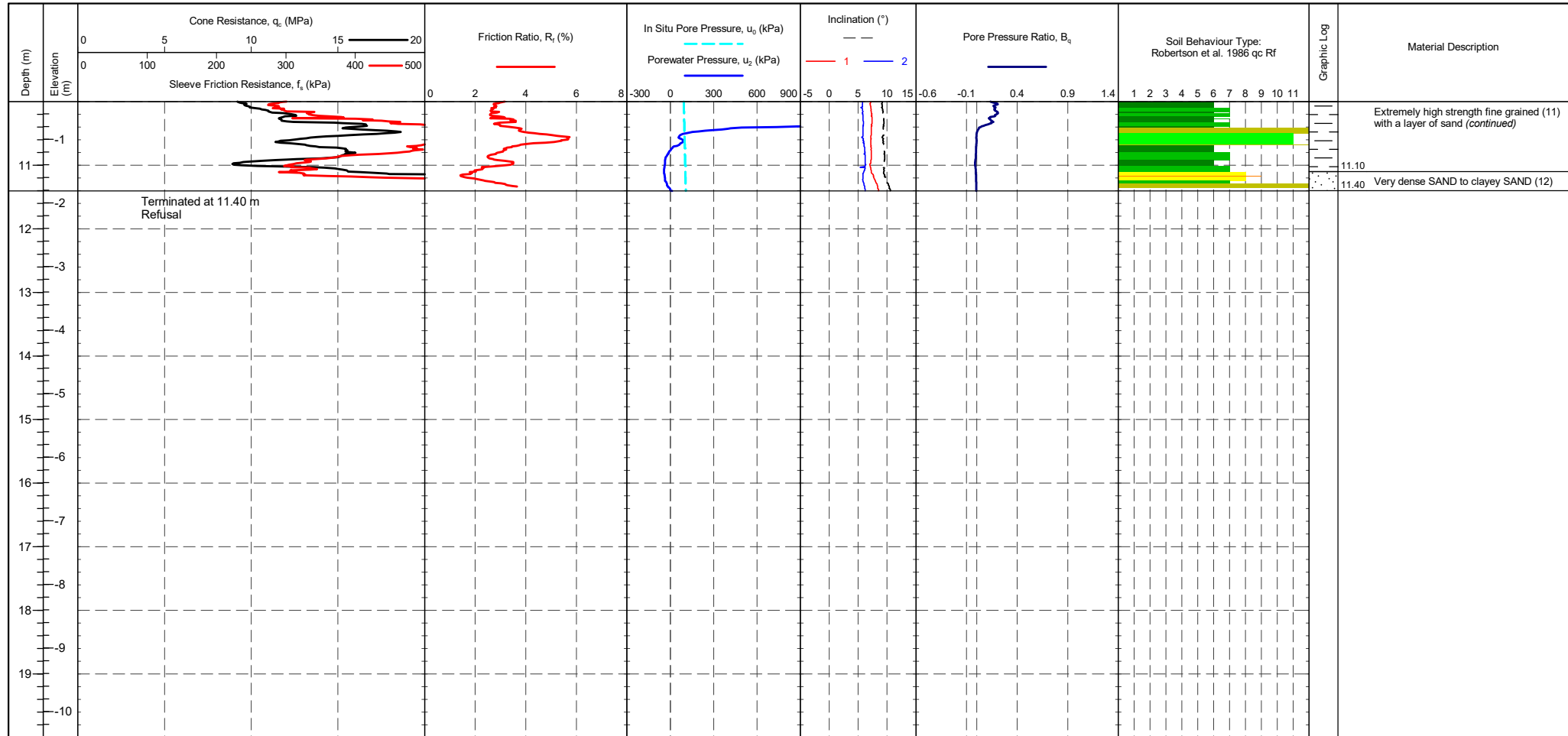
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479327.208 m NORTHING : 354588.138 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 366 mV 352 mV -0.16 MPa Sleeve 283 mV 277 mV -0.004 kPa Pore Pressure 2 319 mV 335 mV 0.004 kPa X-Y Inclinator 2577 mV 2523 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT30

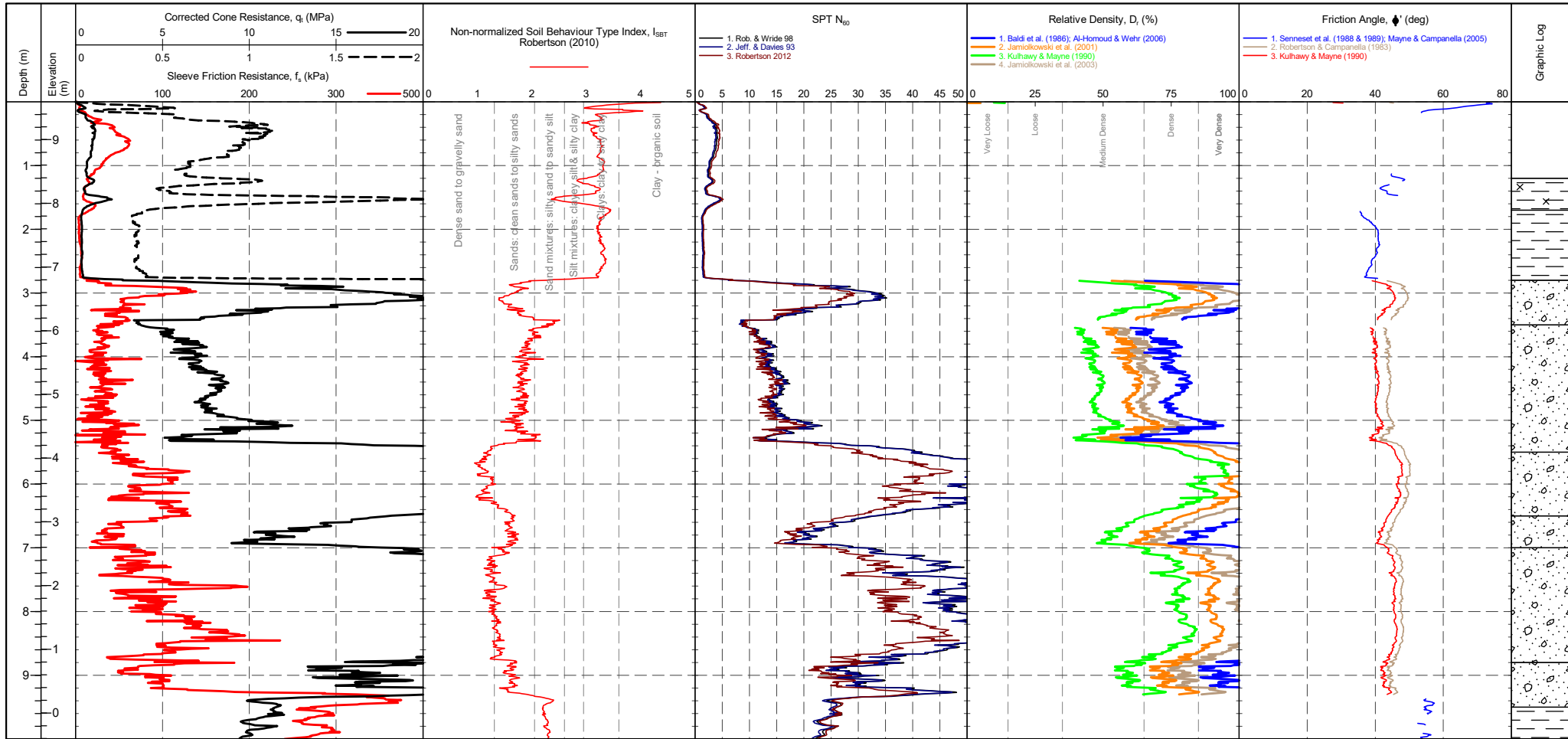
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479327.208 m NORTHING : 354588.138 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>352 mV</td> <td>-0.16 MPa</td> </tr> <tr> <td>Sleeve</td> <td>283 mV</td> <td>277 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>319 mV</td> <td>335 mV</td> <td>0.004 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2577 mV</td> <td>2523 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	352 mV	-0.16 MPa	Sleeve	283 mV	277 mV	-0.004 kPa	Pore Pressure 2	319 mV	335 mV	0.004 kPa	X-Y Inclinometer	2577 mV	2523 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Tip: 366 mV / 352 mV / -0.16 MPa Sleeve: 283 mV / 277 mV / -0.004 kPa Pore Pressure 2: 319 mV / 335 mV / 0.004 kPa X-Y Inclinator: 2577 mV / 2523 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

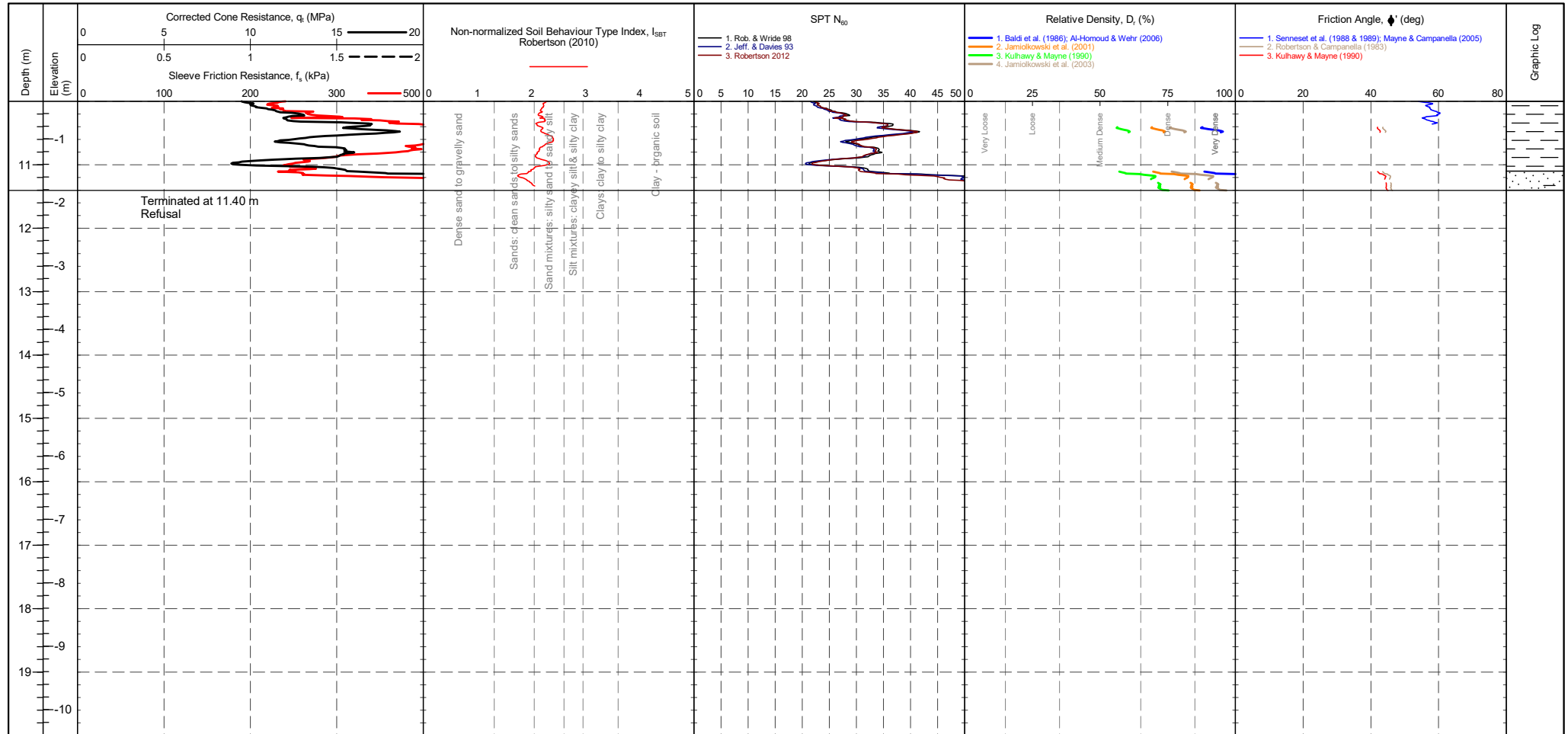
S3CPT30

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479327.208 m
 NORTHING : 354588.138 m
 ELEVATION : 9.592 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

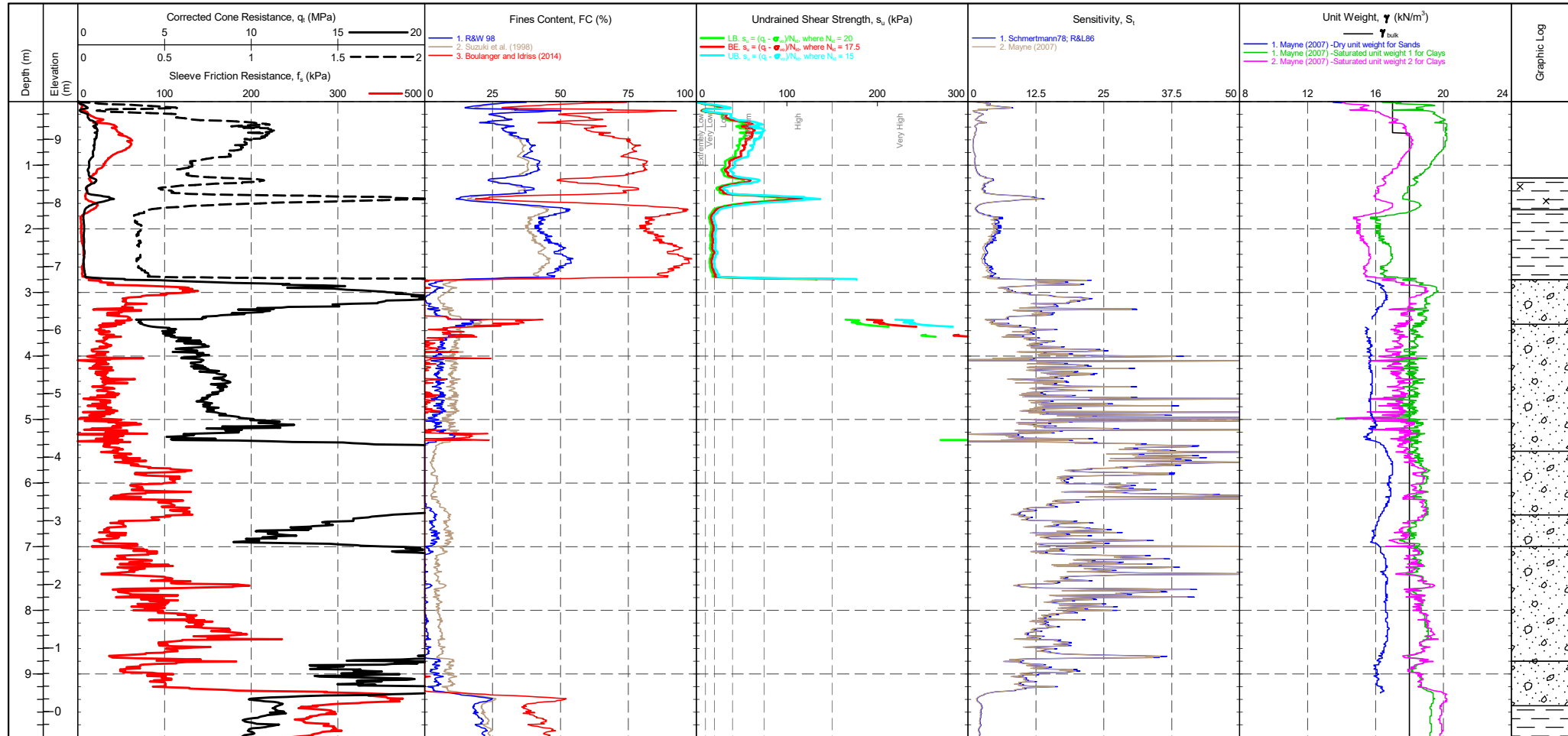
SHEET : 2 OF 2
 STATUS : Final
 TEST DATE : 07/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 366 mV 283 mV 319 mV 2577 mV	Post 352 mV 277 mV 335 mV 2523 mV	Difference -0.16 MPa -0.004 kPa 0.004 kPa	Description Clays Silt mixtures Sand mixtures Sands Gravelly sand	SBT Index, I_c 2.95-3.60 2.60-2.95 2.05-2.60 1.31-2.05 <1.31	Description Very Loose Loose Medium Dense Dense Very Dense	

PointID	S3CPT30
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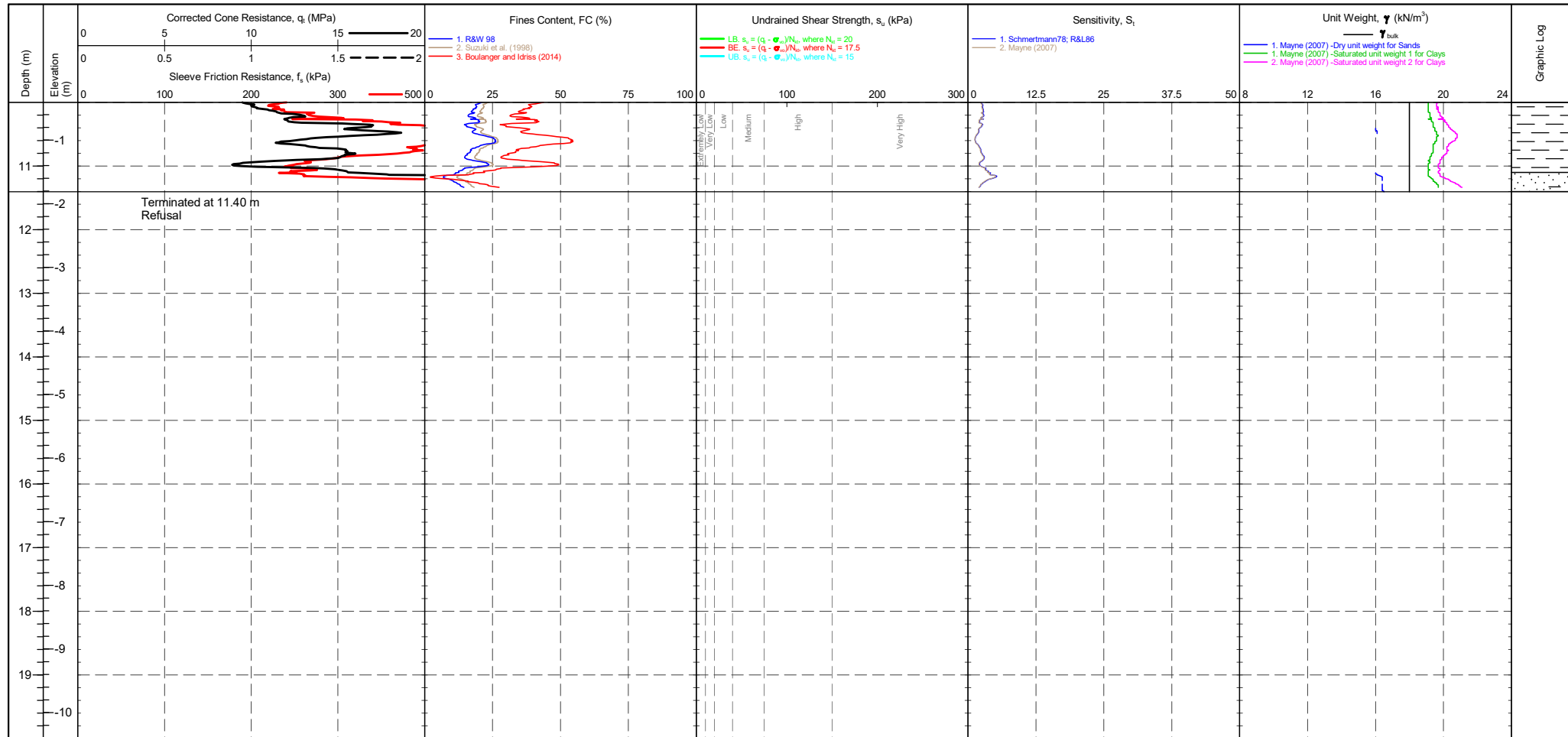
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479327.208 m NORTHING : 354588.138 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 366 mV / 352 mV / -0.16 MPa Sleeve: 283 mV / 277 mV / -0.004 kPa Pore Pressure 2: 319 mV / 335 mV / 0.004 kPa X-Y Inclinator: 2577 mV / 2523 mV	CPTU ZERO VALUES Pre Post Difference Tip: 366 mV 352 mV -0.16 MPa Sleeve: 283 mV 277 mV -0.004 kPa Pore Pressure 2: 319 mV 335 mV 0.004 kPa X-Y Inclinator: 2577 mV 2523 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Term based on measurement su (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300	▽ Groundwater Level ▮ Dissipation Test
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PointID
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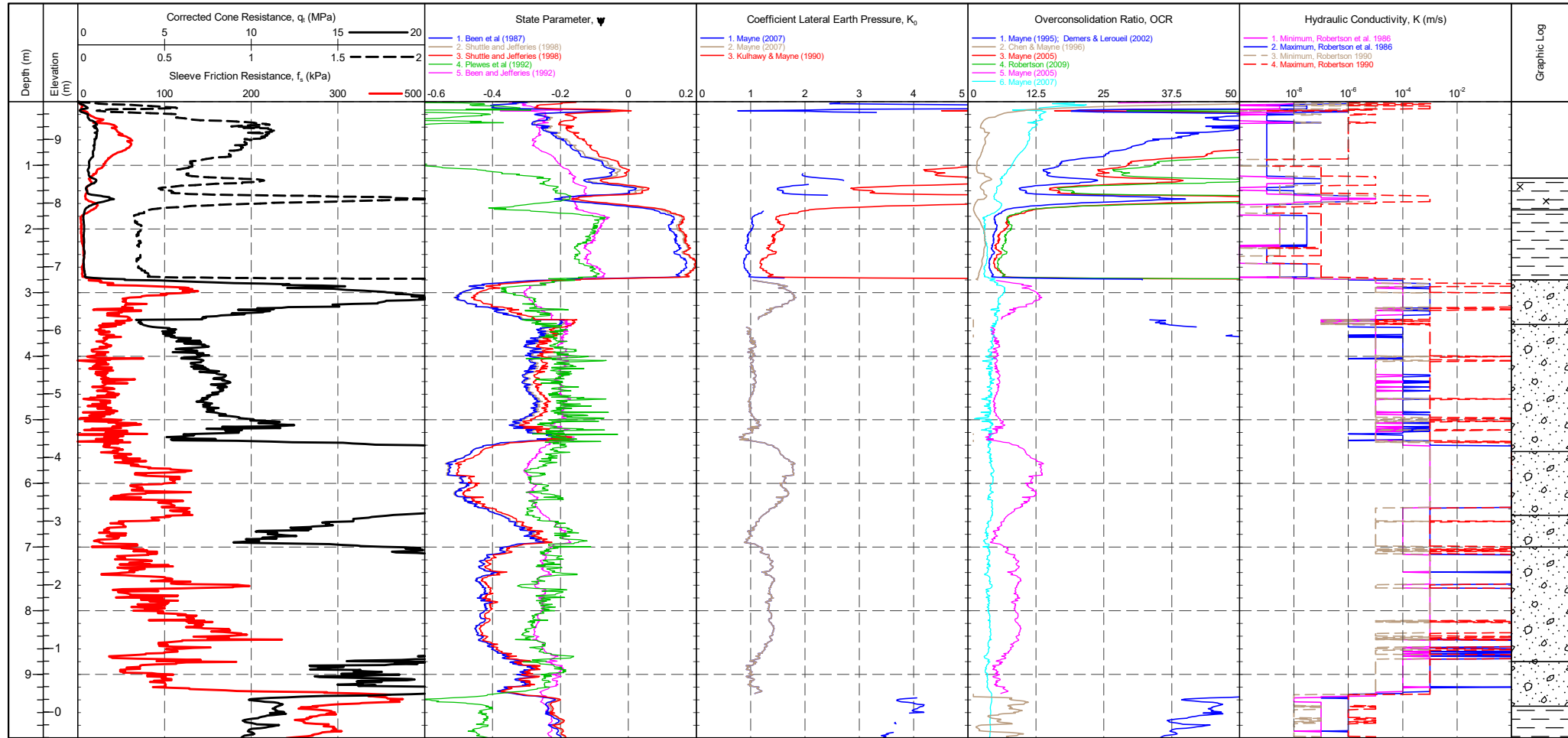
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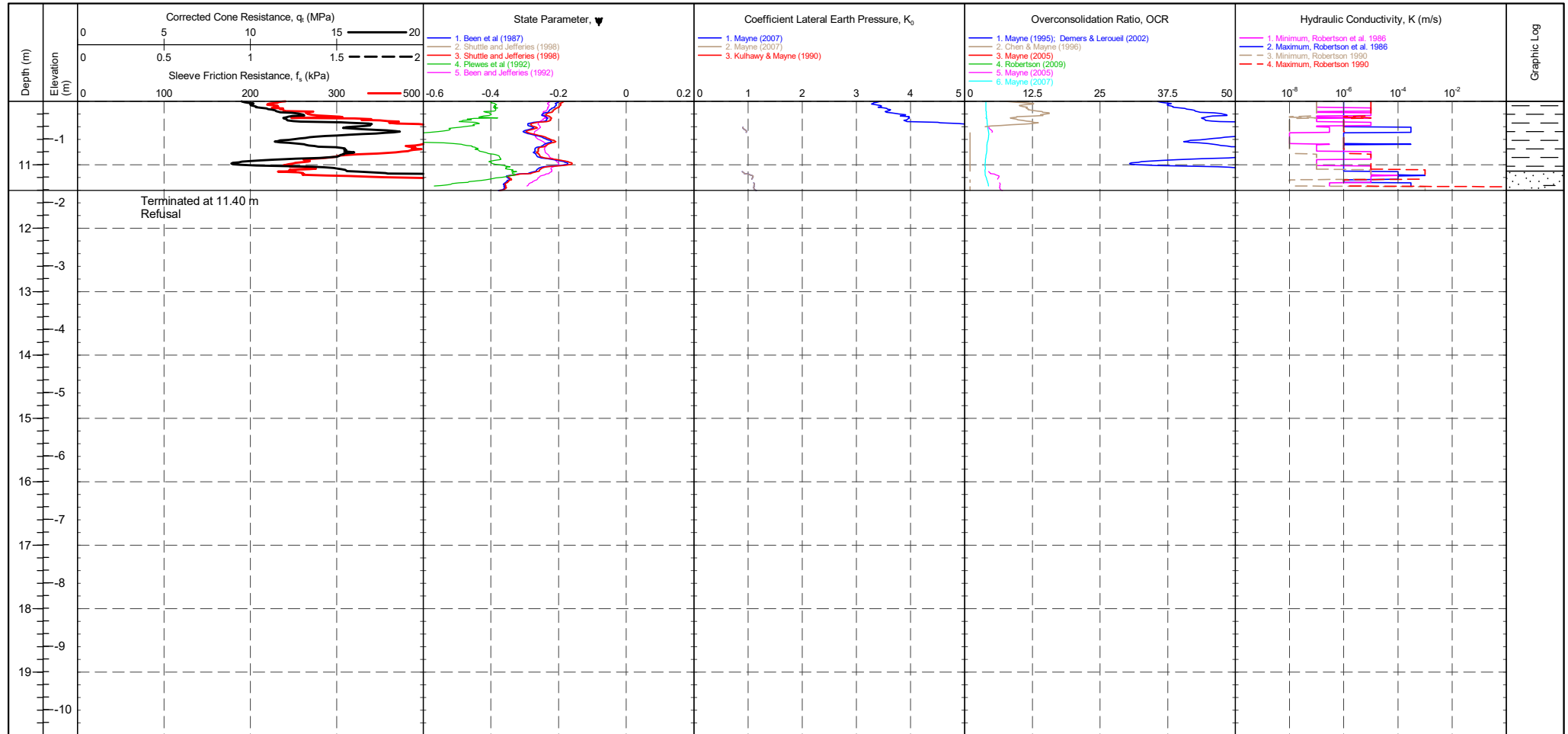


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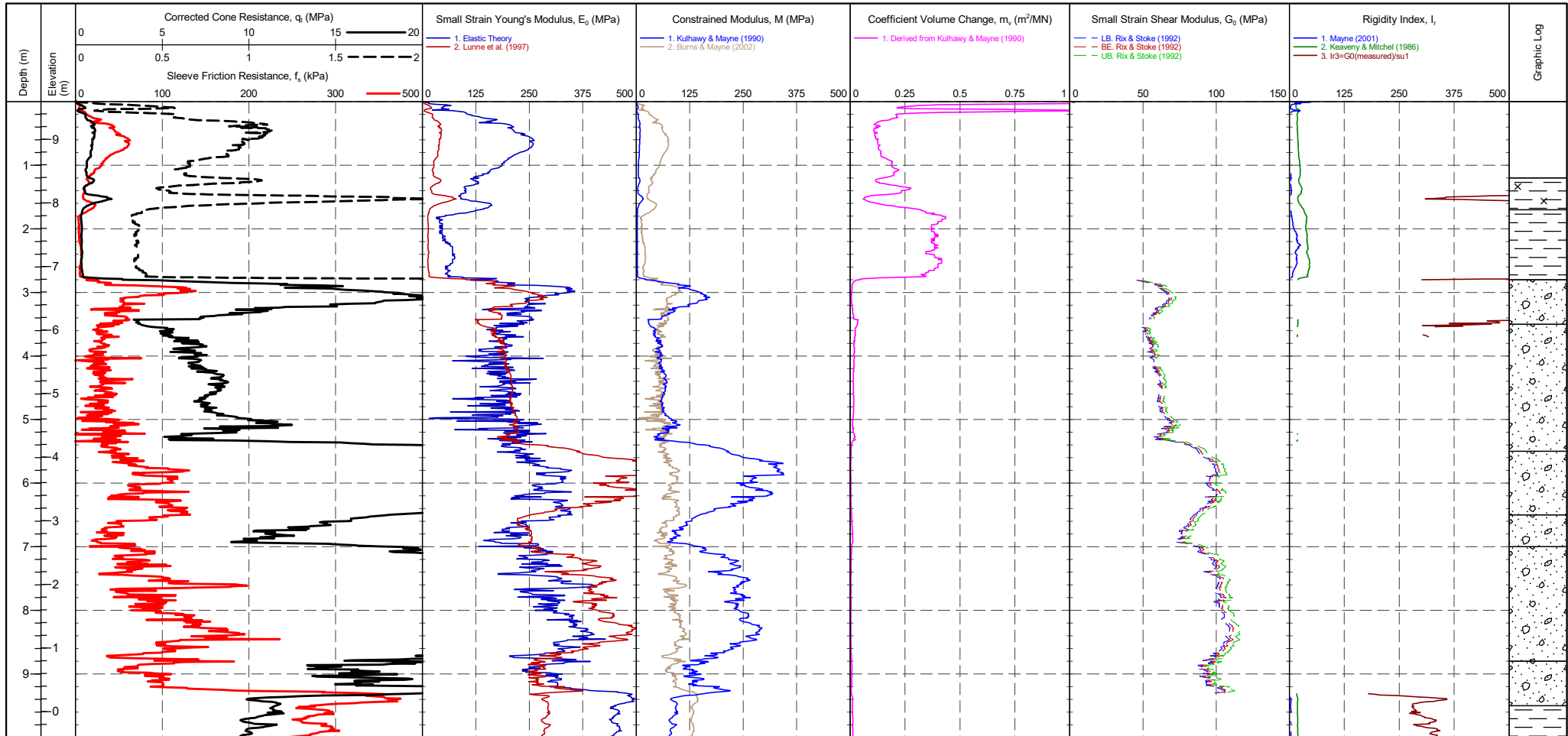


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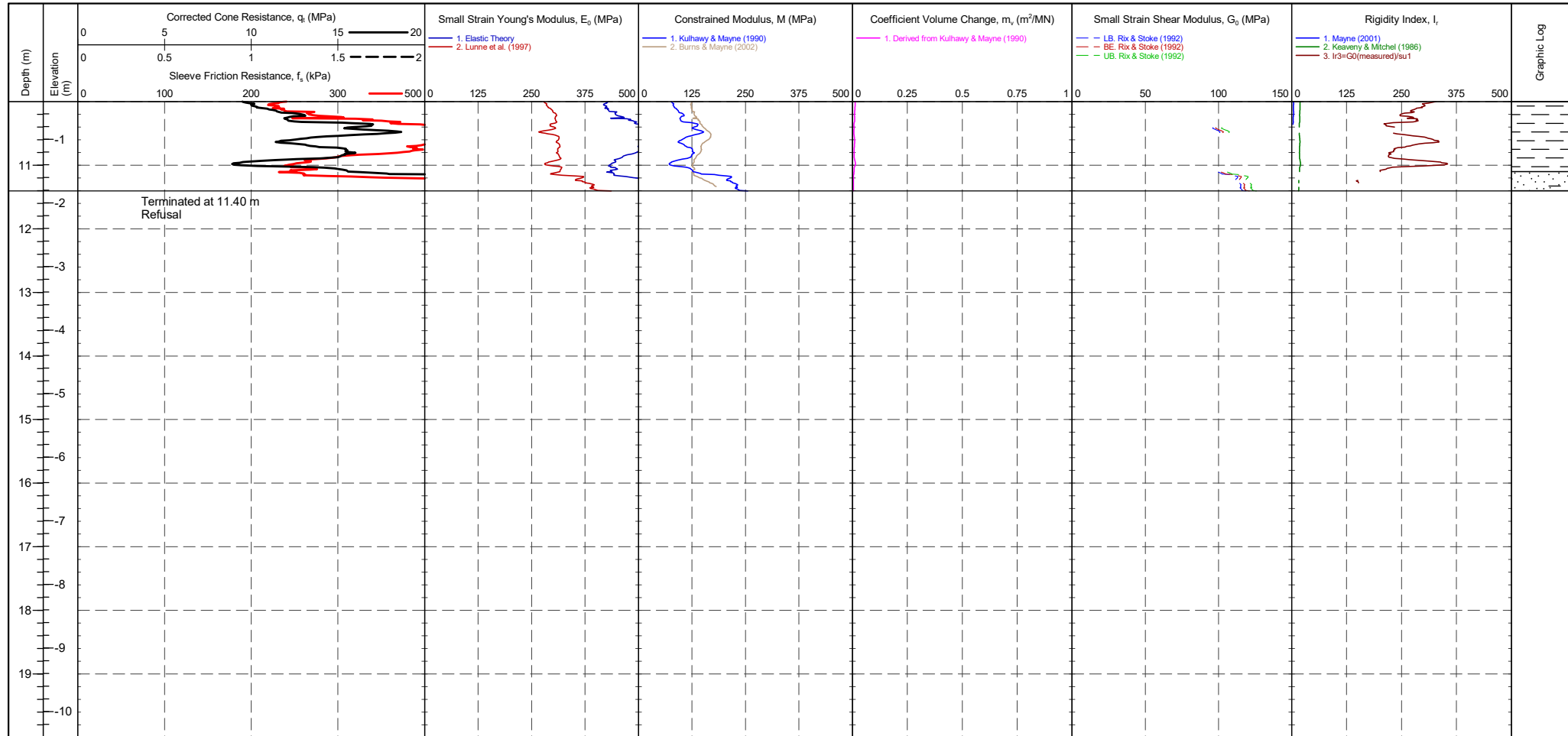
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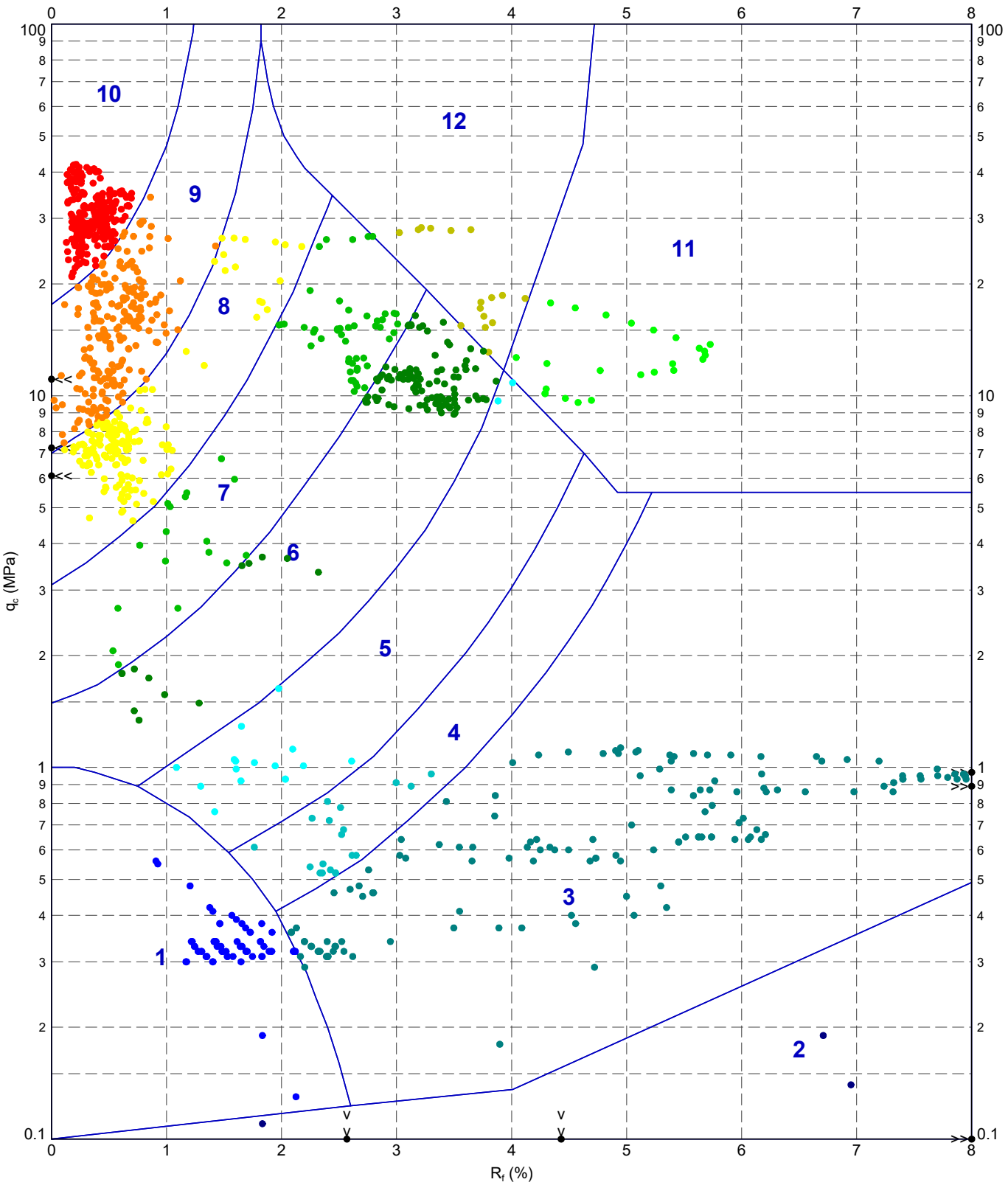
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479327.208 m NORTHING : 354588.138 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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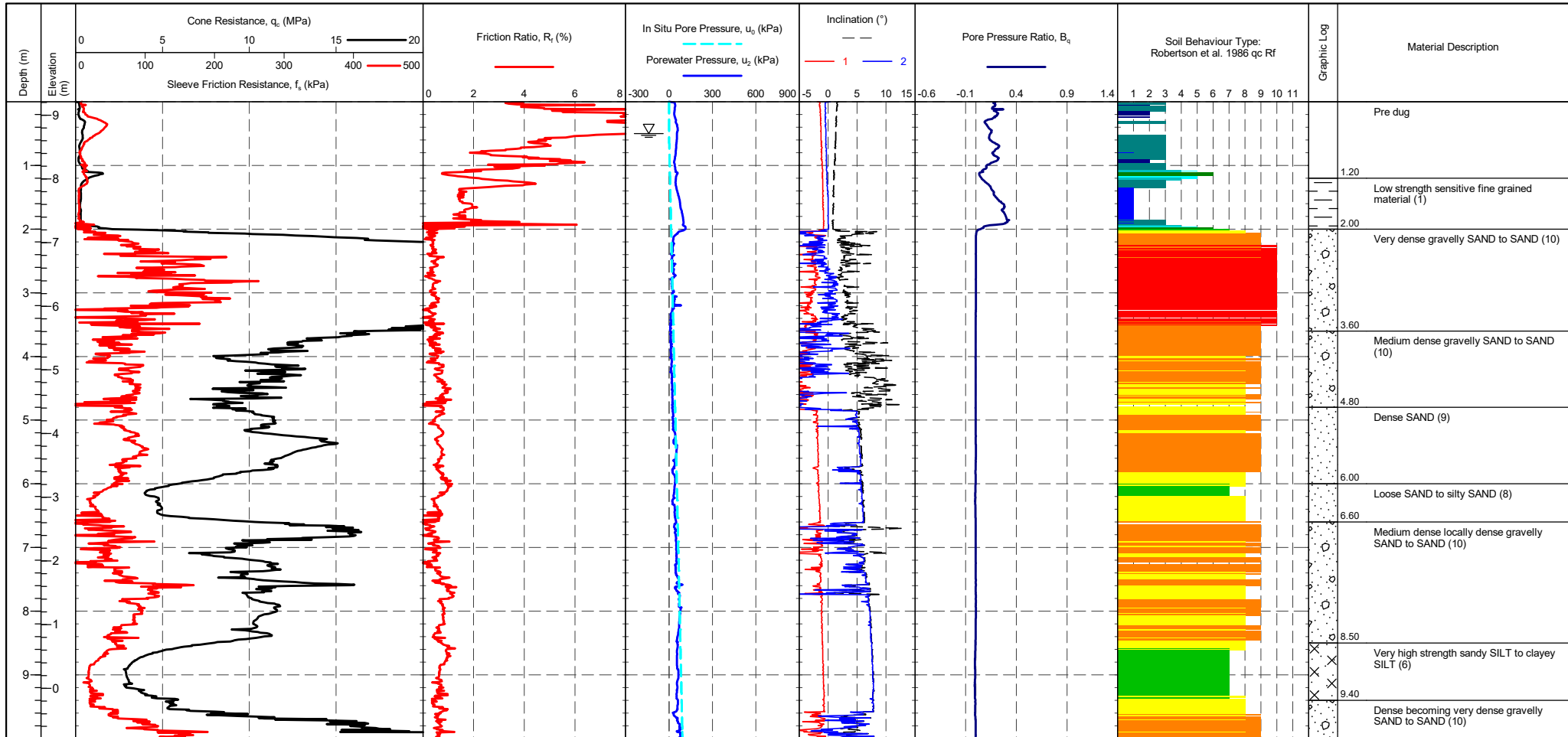
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT30	CHECKED	20/05/2023
		SCALE	DATE
		Not To Scale	20/05/2023
	PROJECT No	SCALE	FIGURE No
	1220514	A4	

PointID	S3CPT31
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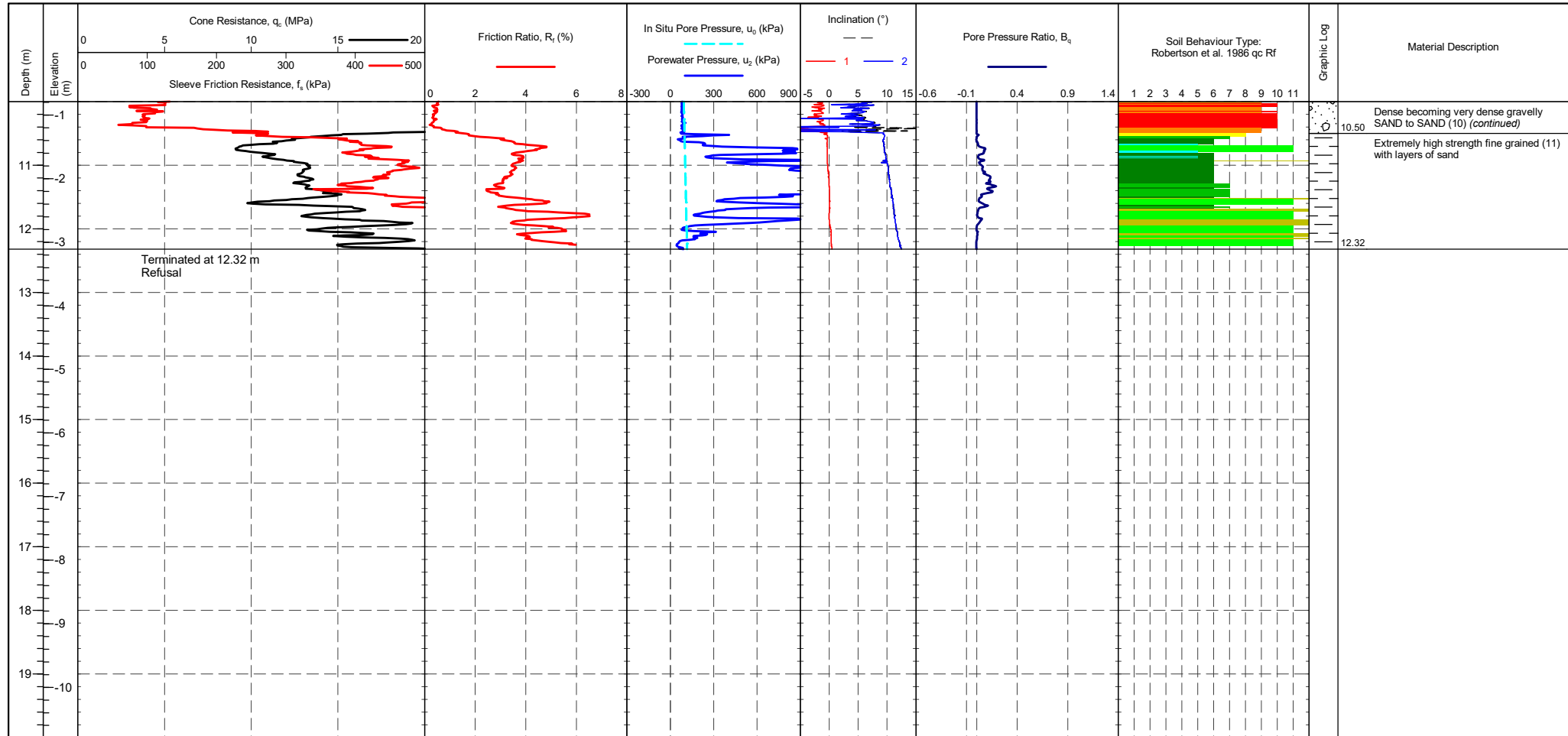
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479284.190 m NORTHING : 354582.986 m ELEVATION : 9.211 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: Pre 359 mV, Post 358 mV, Difference -0.011 MPa Sleeve: Pre 281 mV, Post 279 mV, Difference -0.001 kPa Pore Pressure 2: Pre 319 mV, Post 325 mV, Difference 0.002 kPa X-Y Inclinometer: Pre 2350 mV, Post 2446 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clay SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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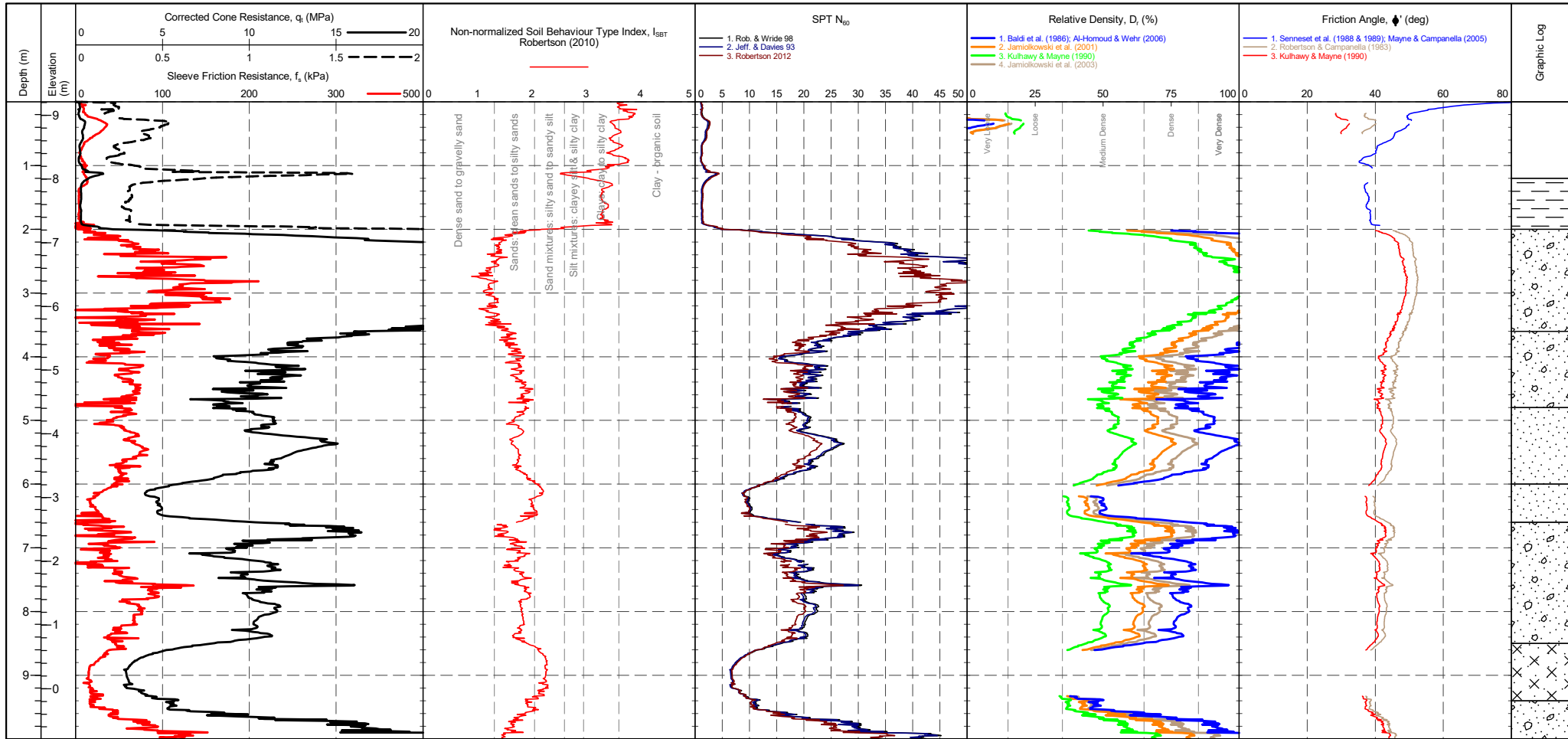
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479284.190 m NORTHING : 354582.986 m ELEVATION : 9.211 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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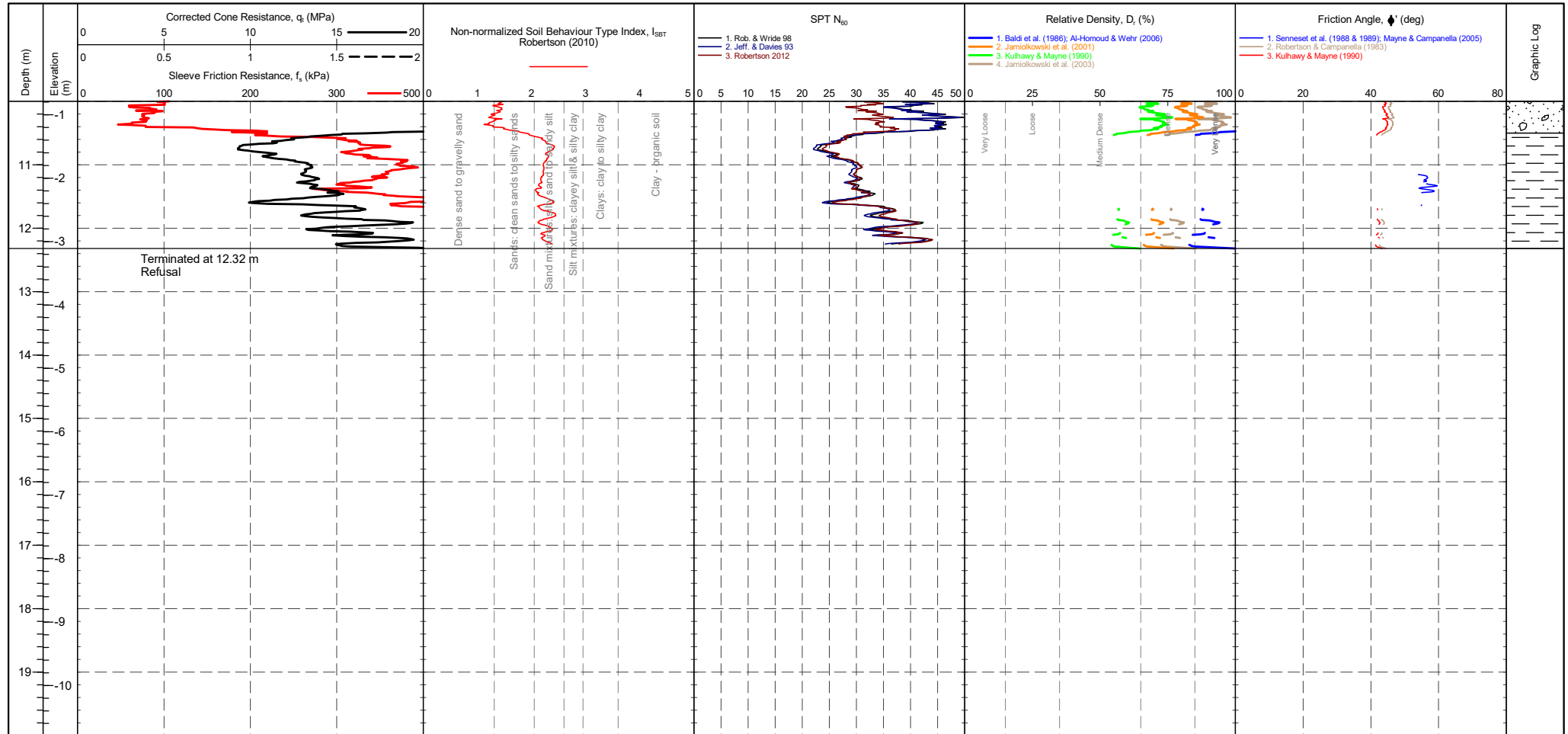


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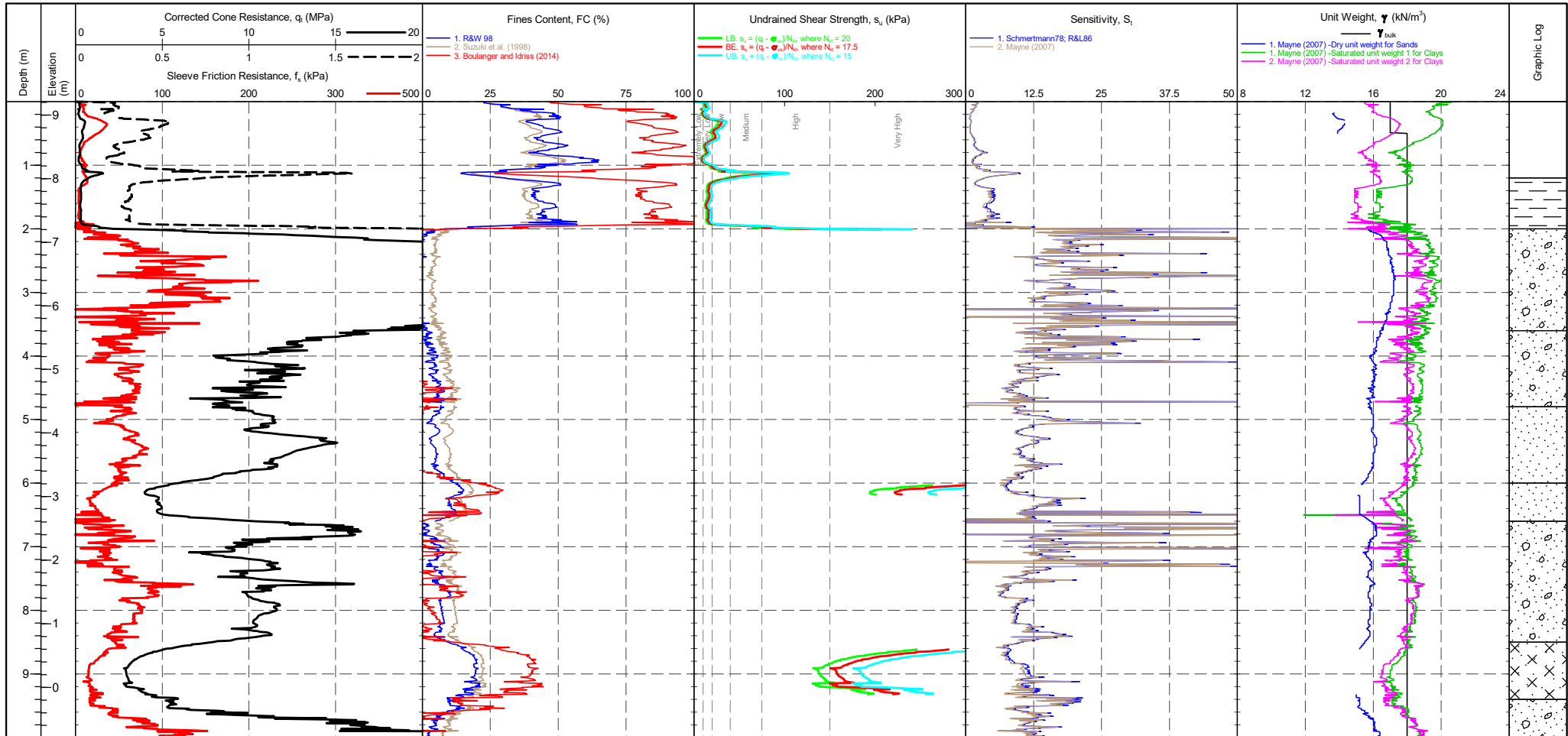
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479284.190 m NORTHING : 354582.986 m ELEVATION : 9.211 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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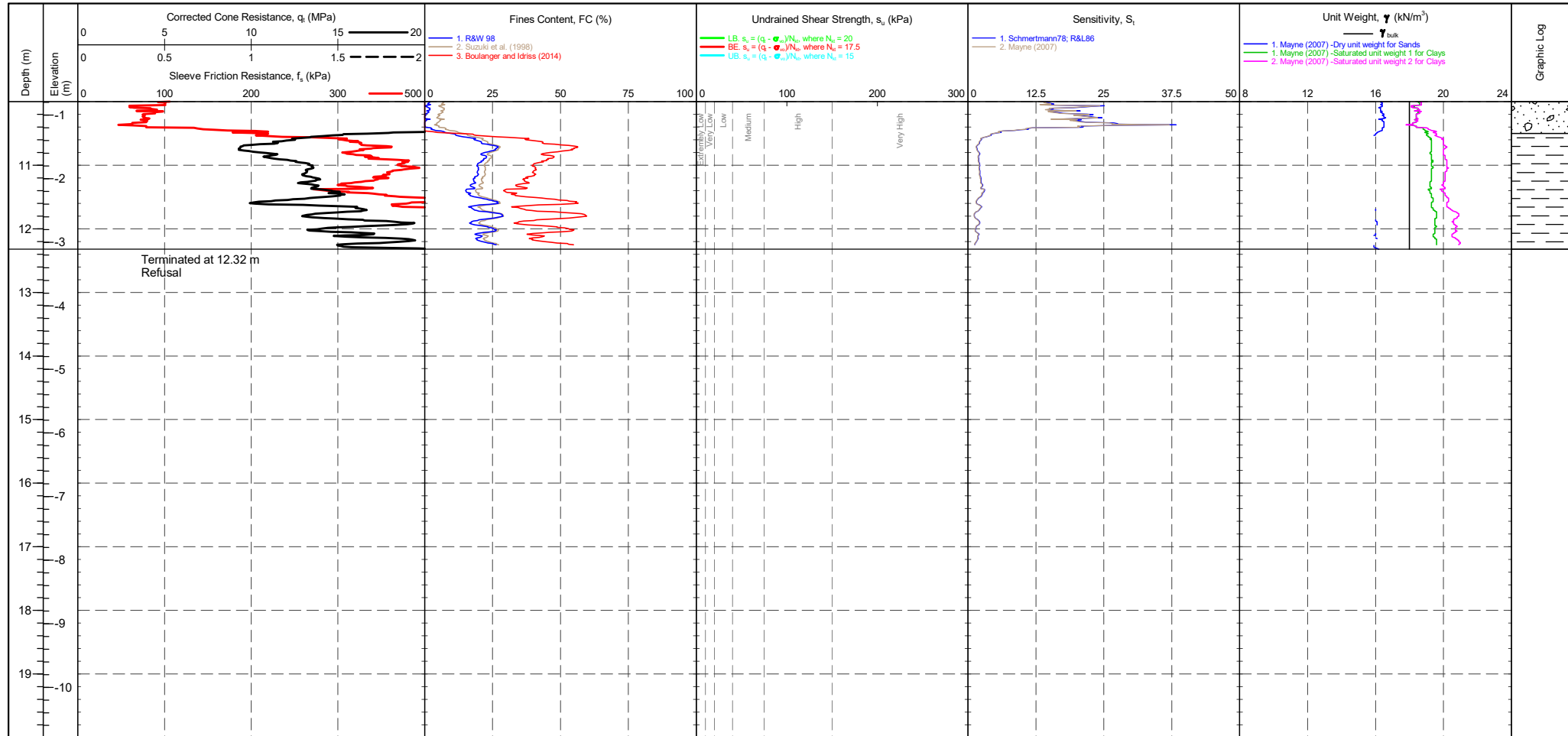
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479284.190 m NORTHING : 354582.986 m ELEVATION : 9.211 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 359 mV / 358 mV / -0.011 MPa Sleeve: 281 mV / 279 mV / -0.001 kPa Pore Pressure 2: 319 mV / 325 mV / 0.002 kPa X-Y Inclinator: 2350 mV / 2446 mV	CPTU ZERO VALUES Pre: 359 mV, Post: 358 mV, Difference: -0.011 MPa Sleeve: 281 mV, Post: 279 mV, Difference: -0.001 kPa Pore Pressure 2: 319 mV, Post: 325 mV, Difference: 0.002 kPa X-Y Inclinator: 2350 mV, Post: 2446 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement s_u (kPa) Term based on measurement s_u (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300	▽ Groundwater Level ▮ Dissipation Test
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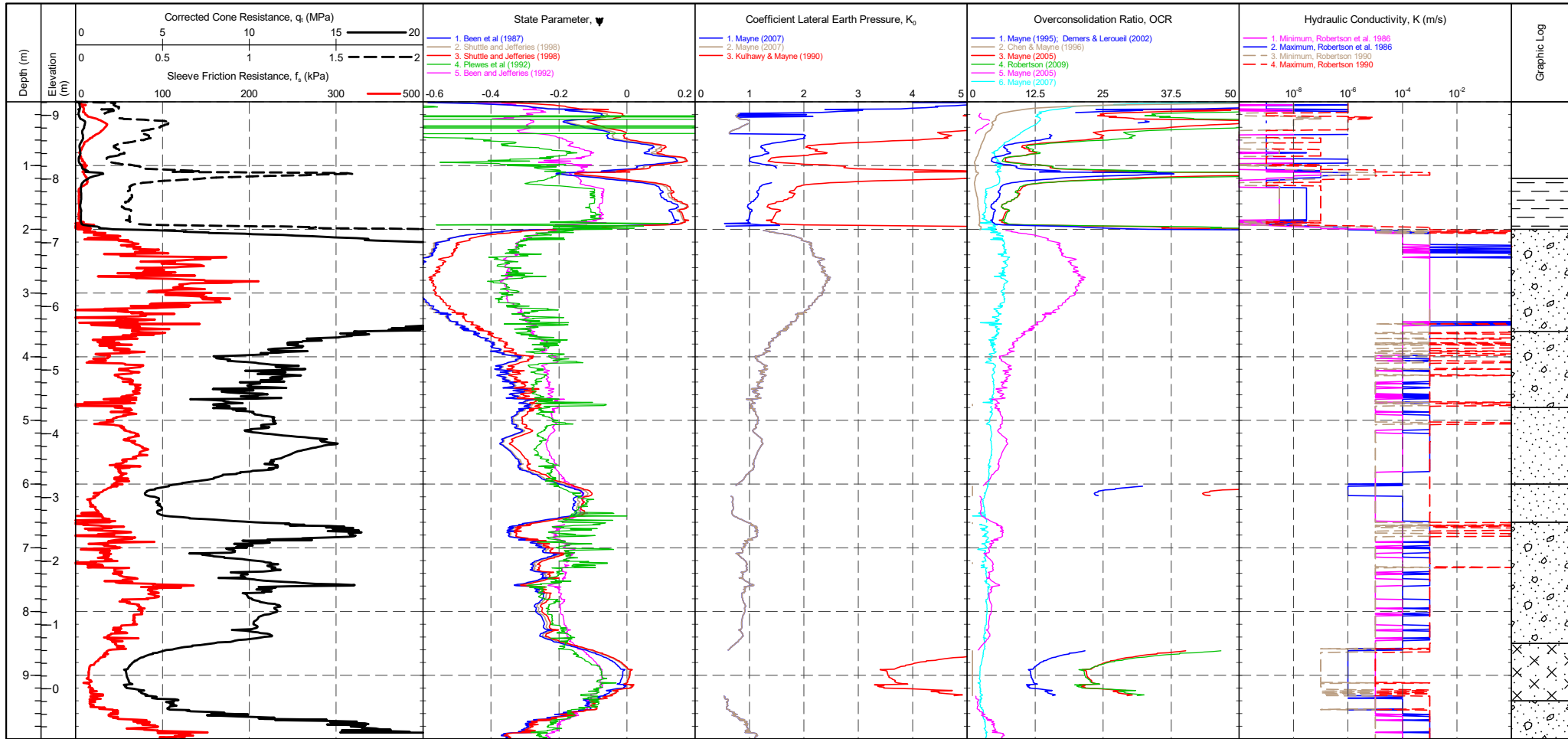
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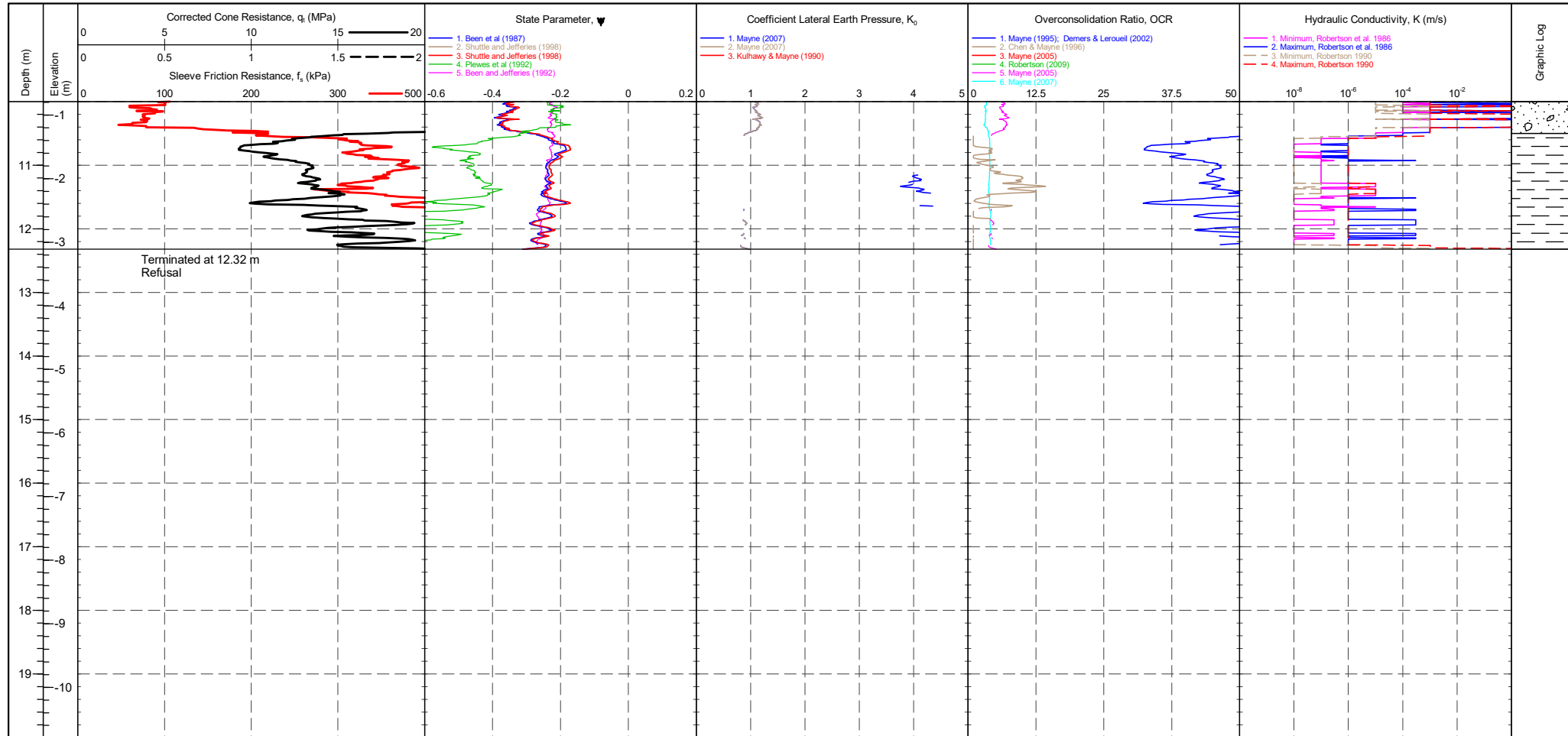
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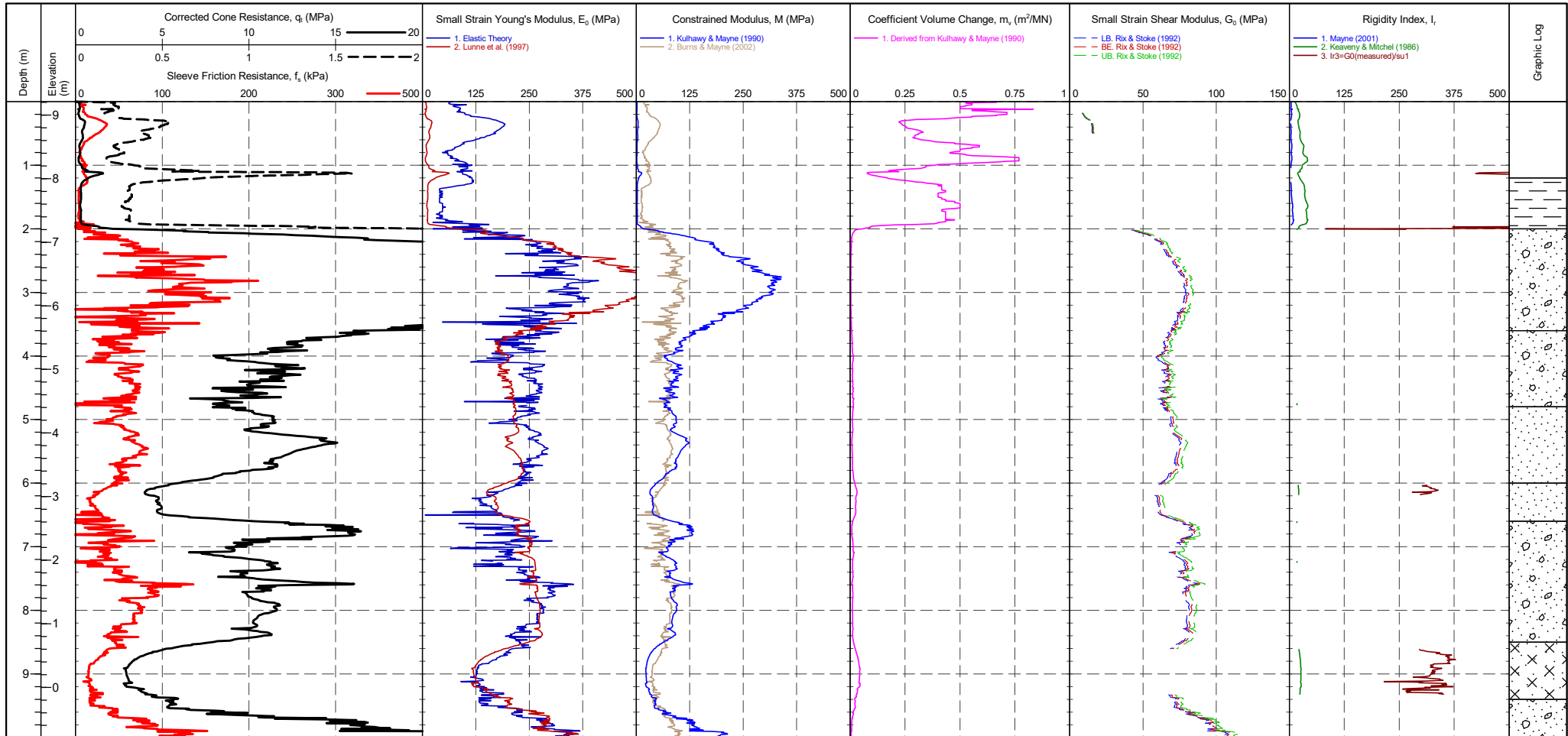
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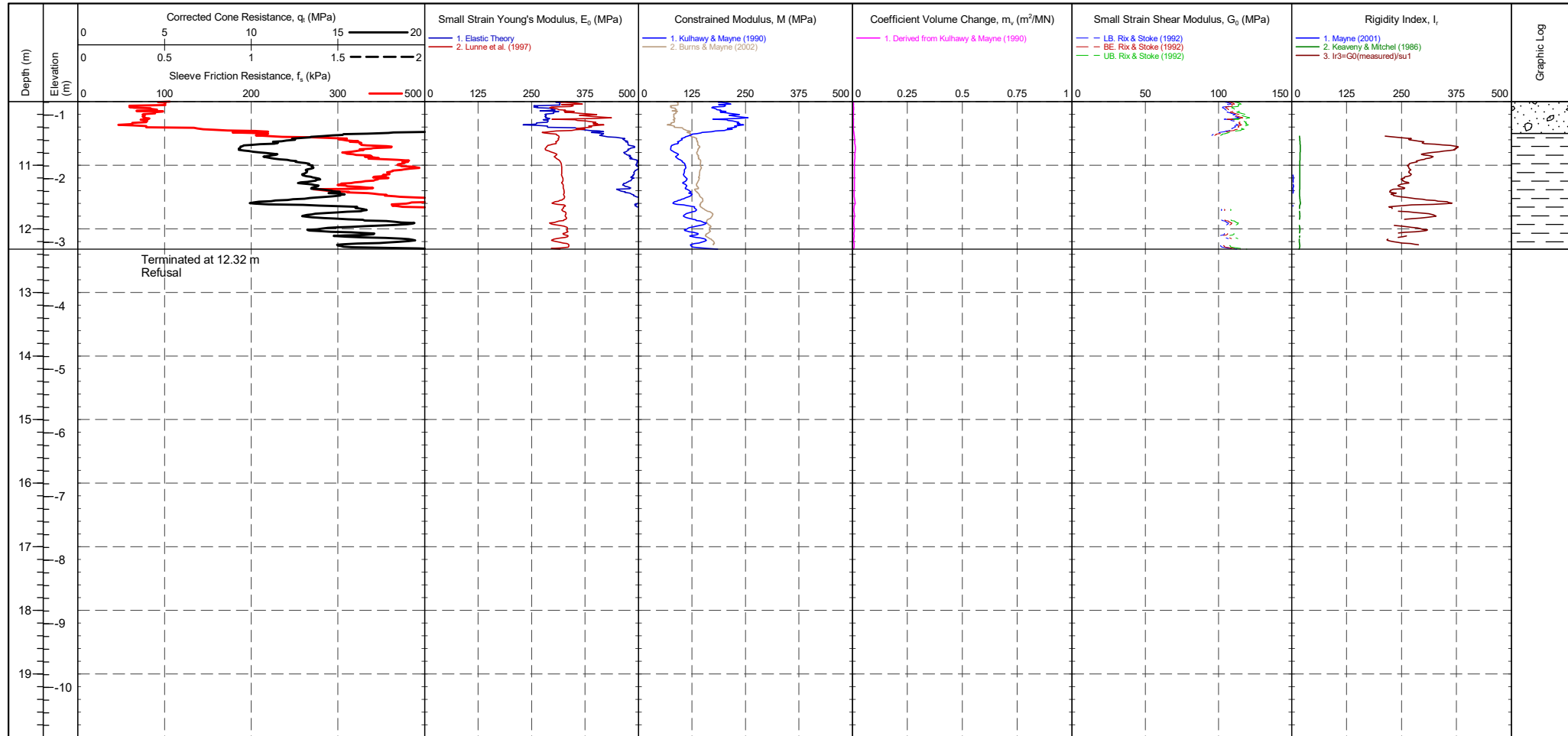
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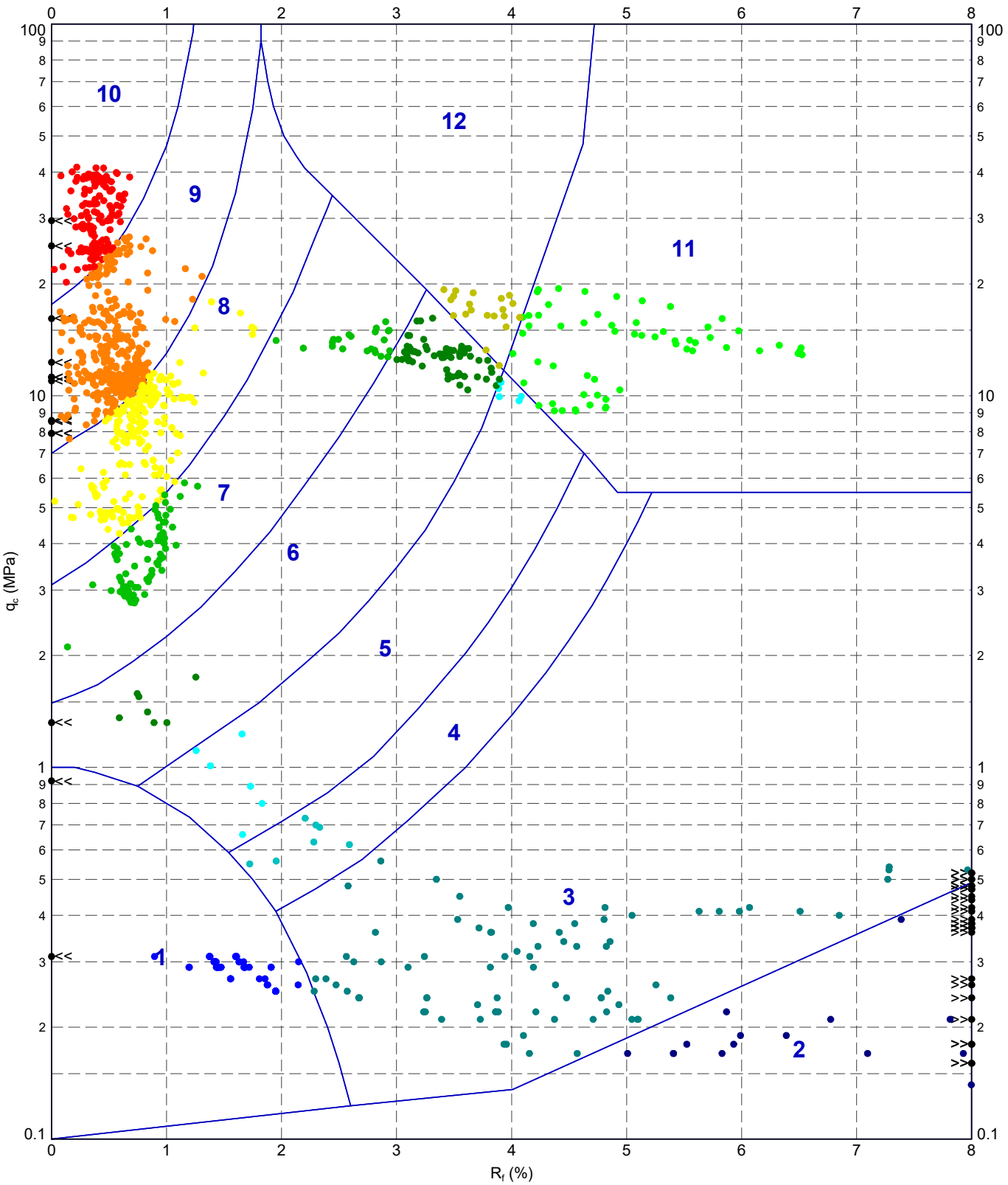
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479284.190 m NORTHING : 354582.986 m ELEVATION : 9.211 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>359 mV</td> <td>358 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>281 mV</td> <td>279 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>319 mV</td> <td>325 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2350 mV</td> <td>2446 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	359 mV	358 mV	-0.011 MPa	Sleeve	281 mV	279 mV	-0.001 kPa	Pore Pressure 2	319 mV	325 mV	0.002 kPa	X-Y Inclinator	2350 mV	2446 mV		Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF MAP 1220514-A46 NEWARK BYPASS.GPJ <DrawingFiles> 20105202322:41 10.03.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10]



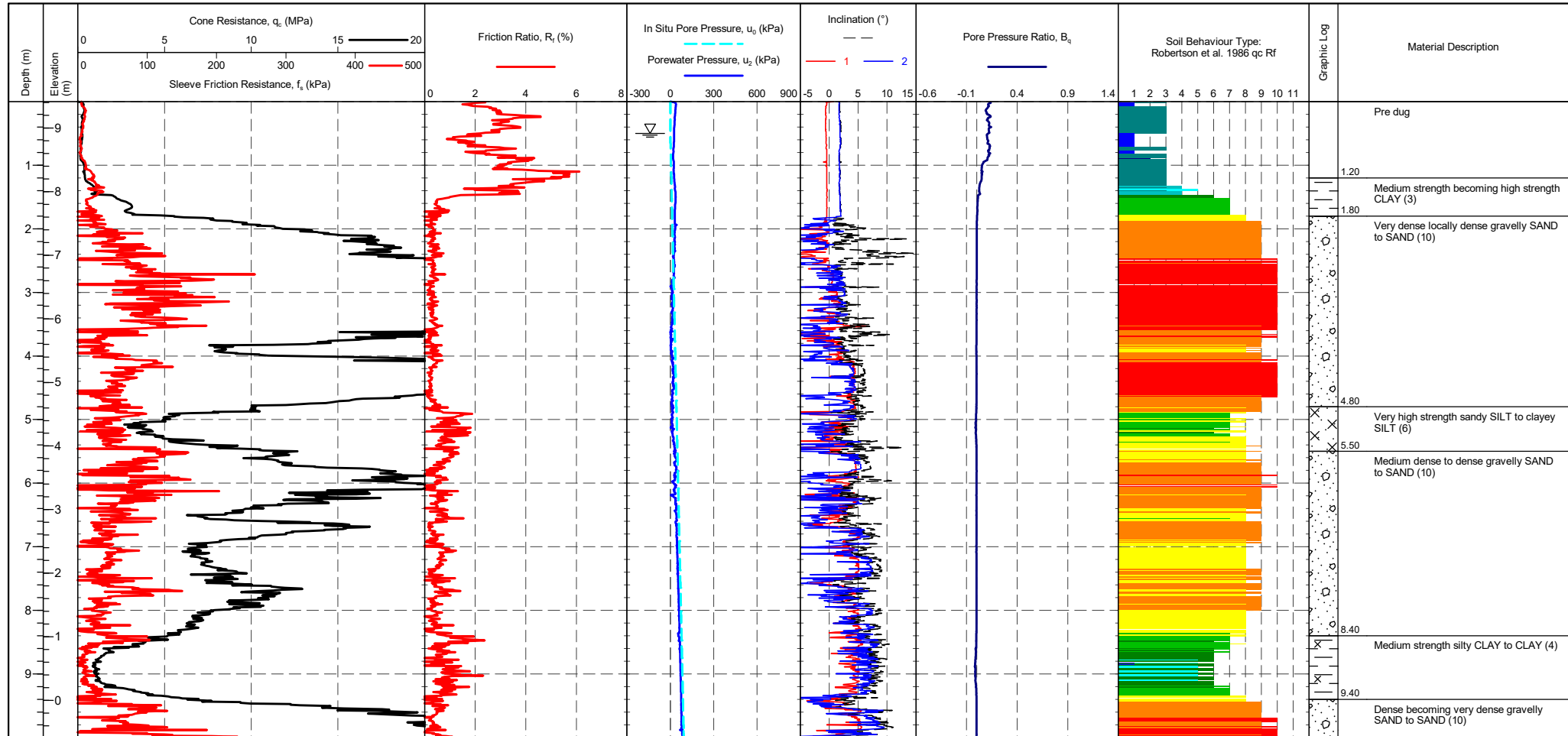
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT31	DRAWN	DATE 20/05/2023
		CHECKED	DATE 20/05/2023
		SCALE Not To Scale	A4
		PROJECT No 1220514	FIGURE No

PointID	S3CPT32
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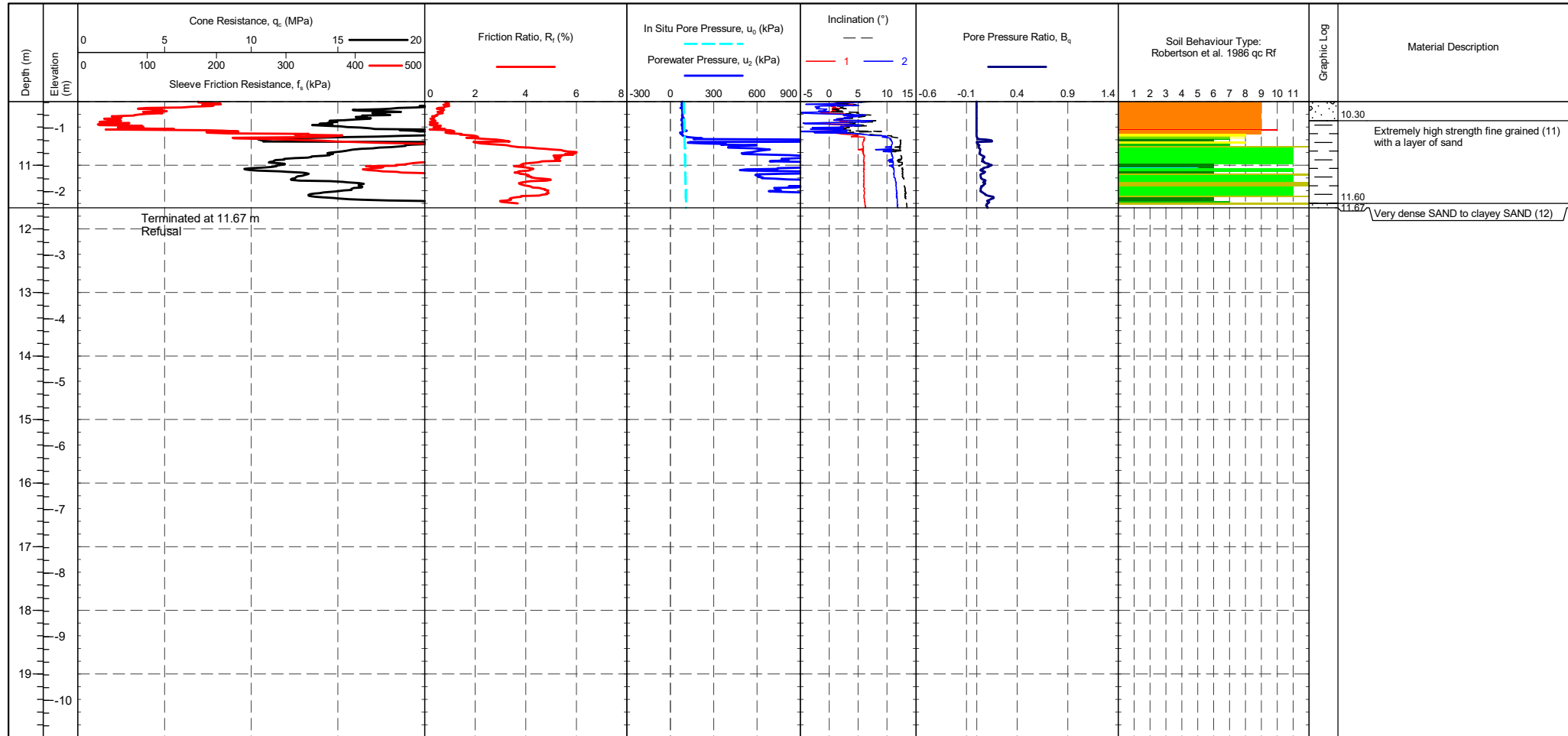
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479245.532 m NORTHING : 354564.807 m ELEVATION : 9.416 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 362 mV 360 mV -0.023 MPa Sleeve 281 mV 279 mV -0.001 kPa Pore Pressure 2 323 mV 335 mV 0.003 kPa X-Y Inclinometer 2587 mV 2482 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT32
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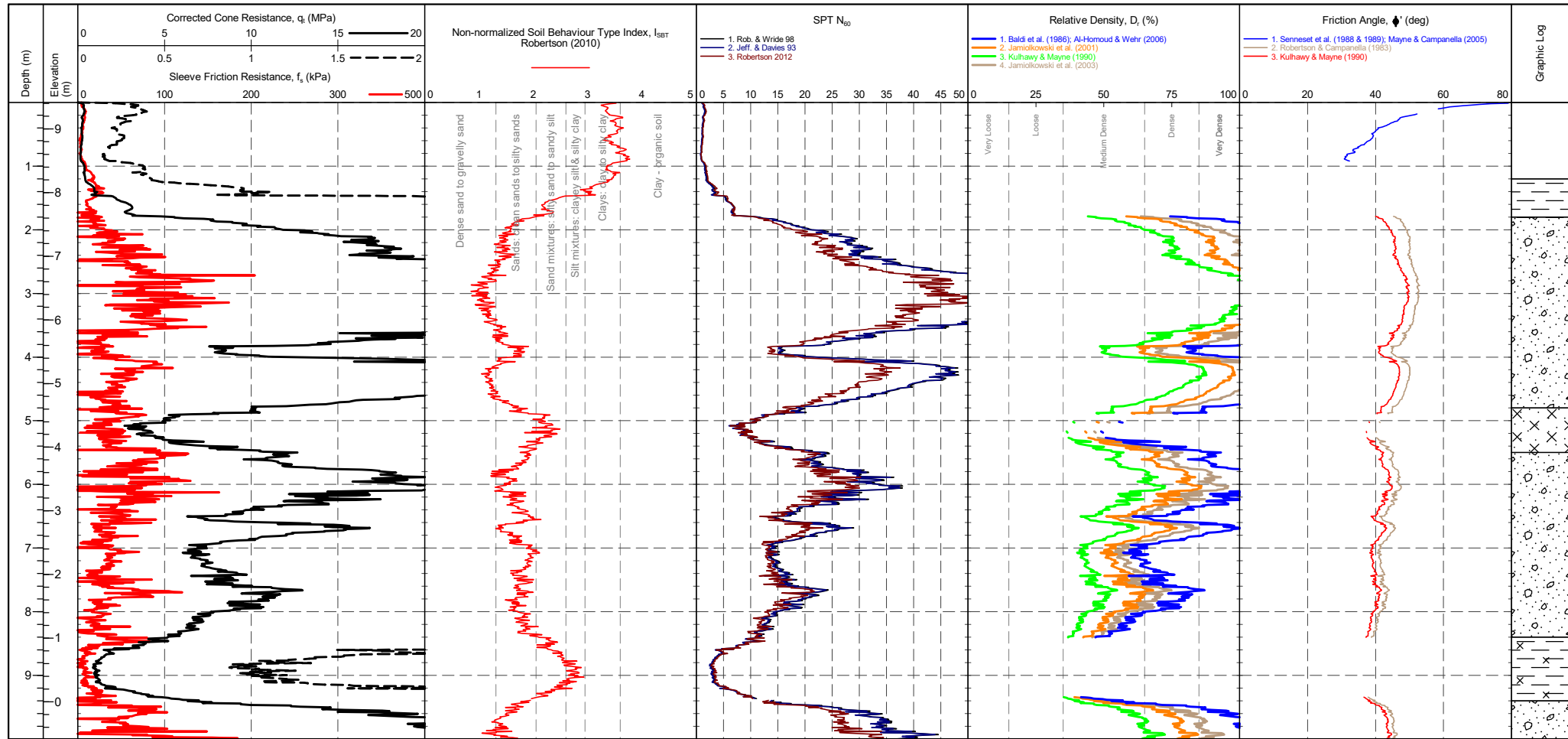
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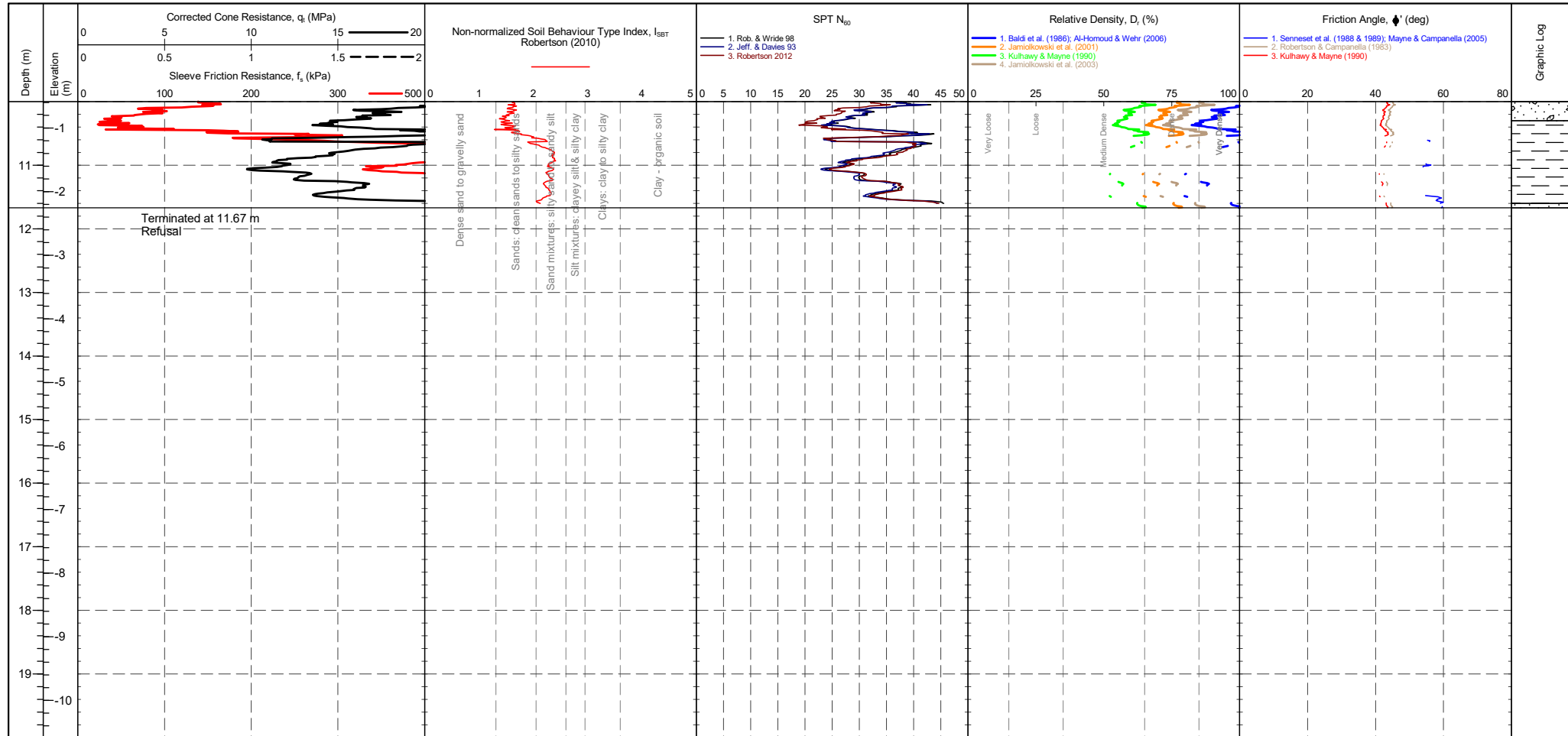
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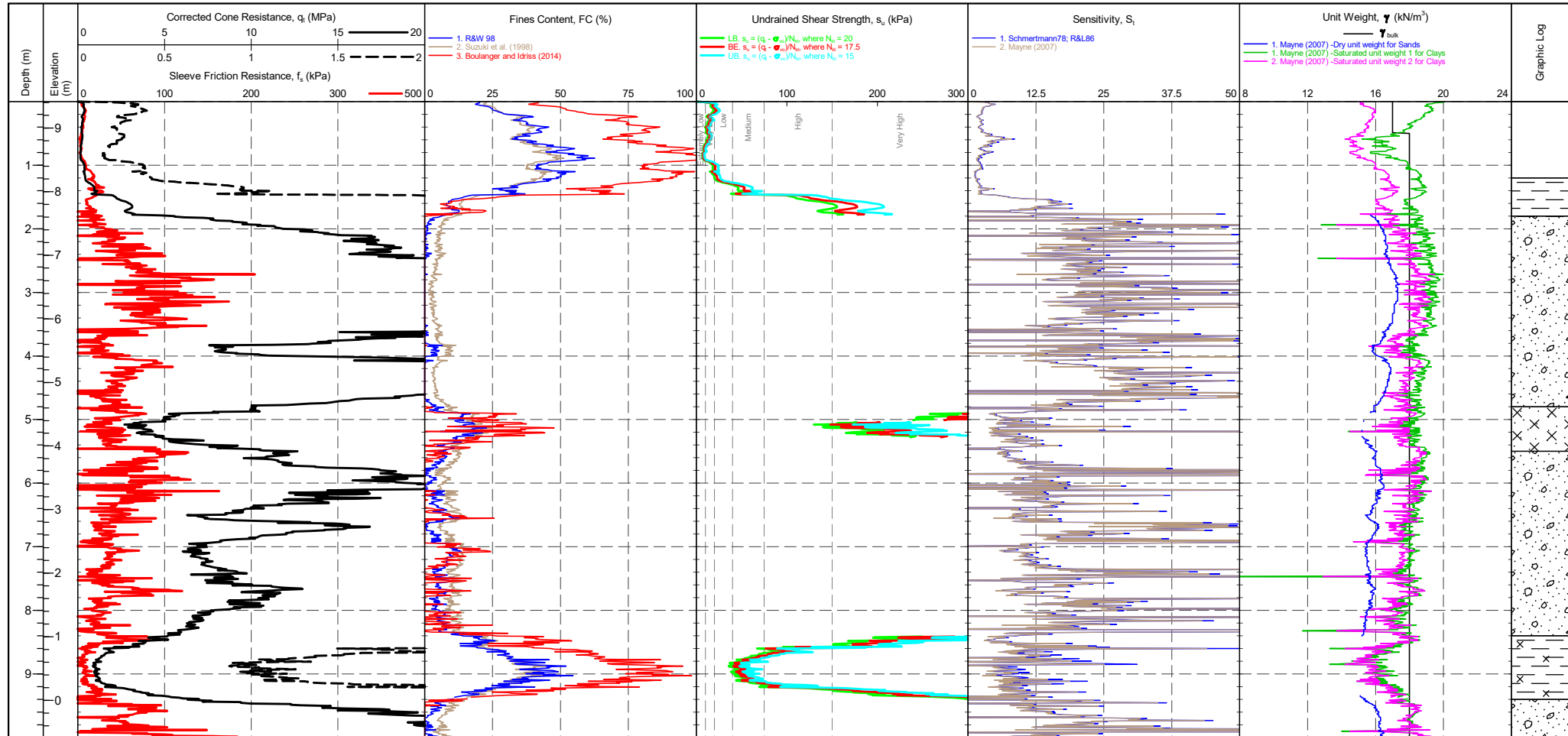
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479245.532 m NORTHING : 354564.807 m ELEVATION : 9.416 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>362 mV</td><td>360 mV</td><td>-0.023 MPa</td></tr> <tr><td>Sleeve</td><td>281 mV</td><td>279 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>323 mV</td><td>335 mV</td><td>0.003 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2587 mV</td><td>2482 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	360 mV	-0.023 MPa	Sleeve	281 mV	279 mV	-0.001 kPa	Pore Pressure 2	323 mV	335 mV	0.003 kPa	X-Y Inclinator	2587 mV	2482 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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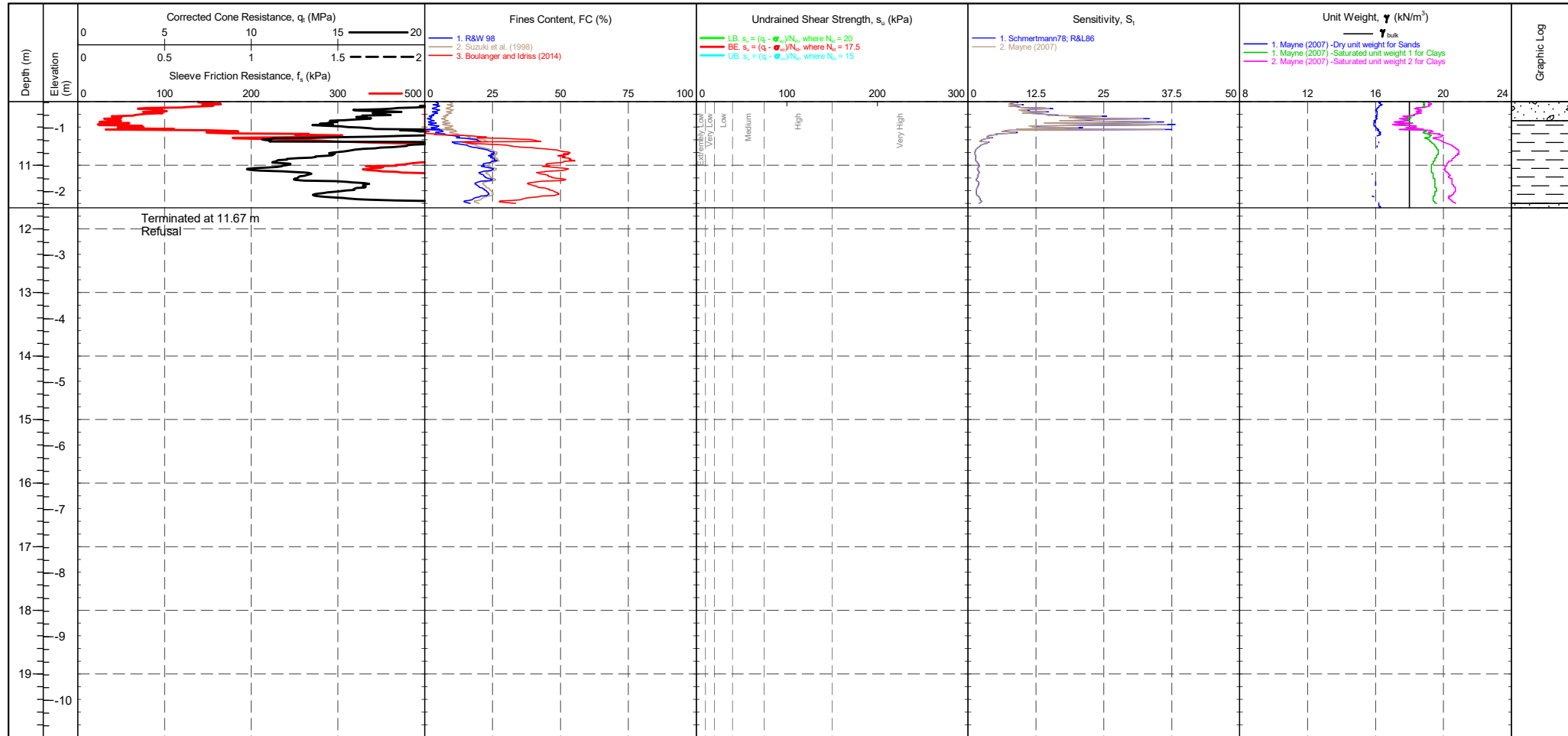
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 362 mV Sleeve: 281 mV Pore Pressure 2: 323 mV X-Y Inclinator: 2587 mV	CPTU ZERO VALUES Pre: 360 mV Post: 360 mV Difference: -0.023 MPa 279 mV -0.001 kPa 335 mV 0.003 kPa 2482 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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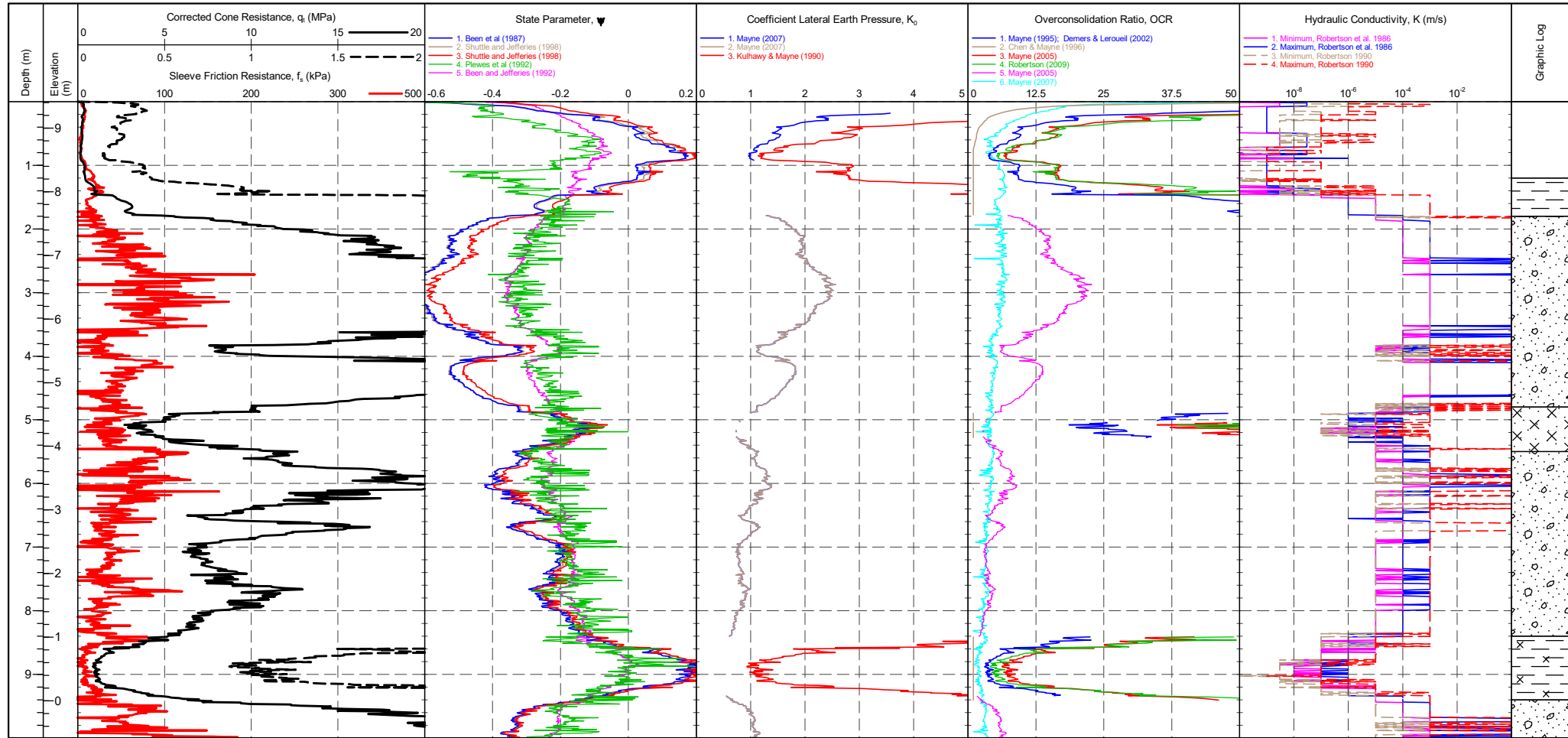
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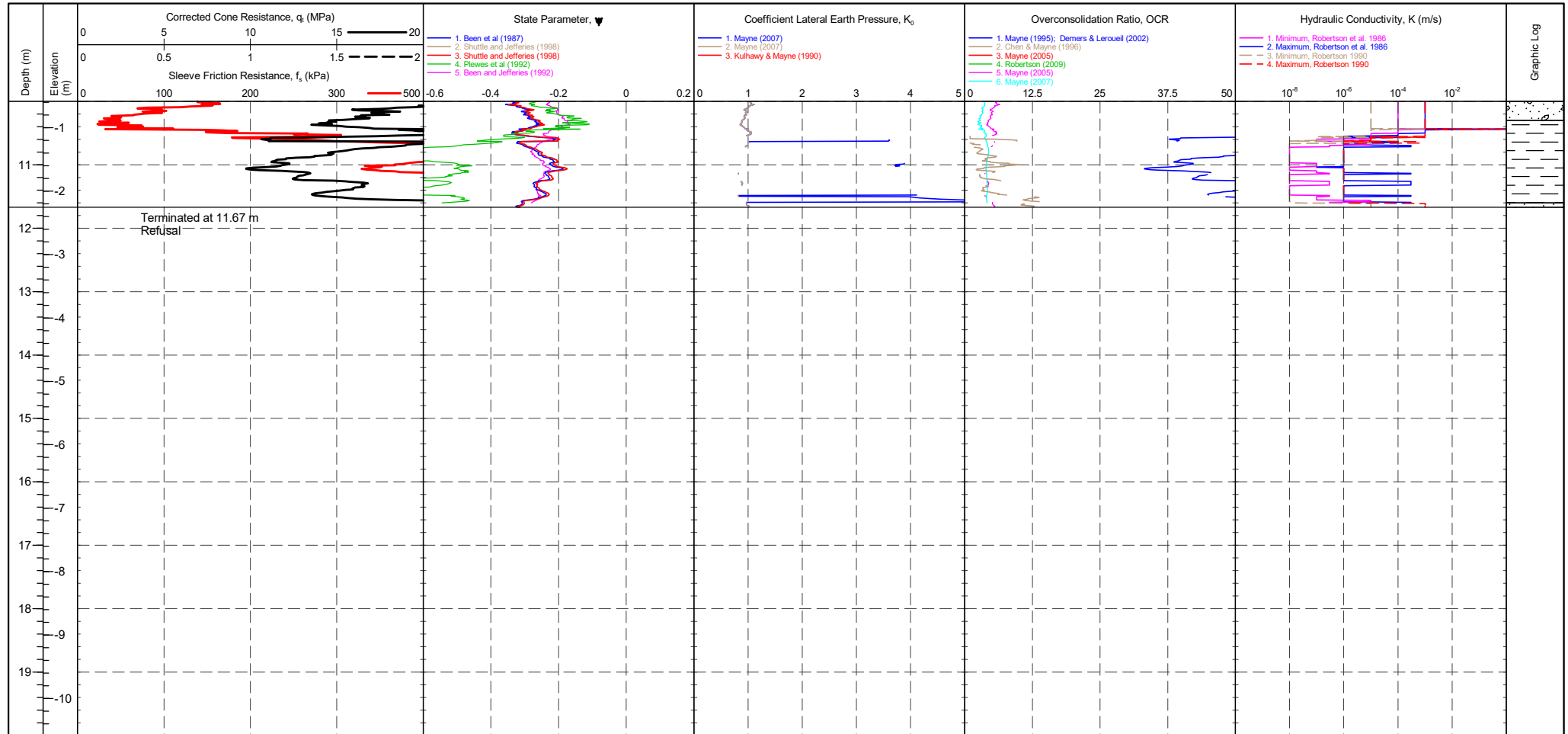


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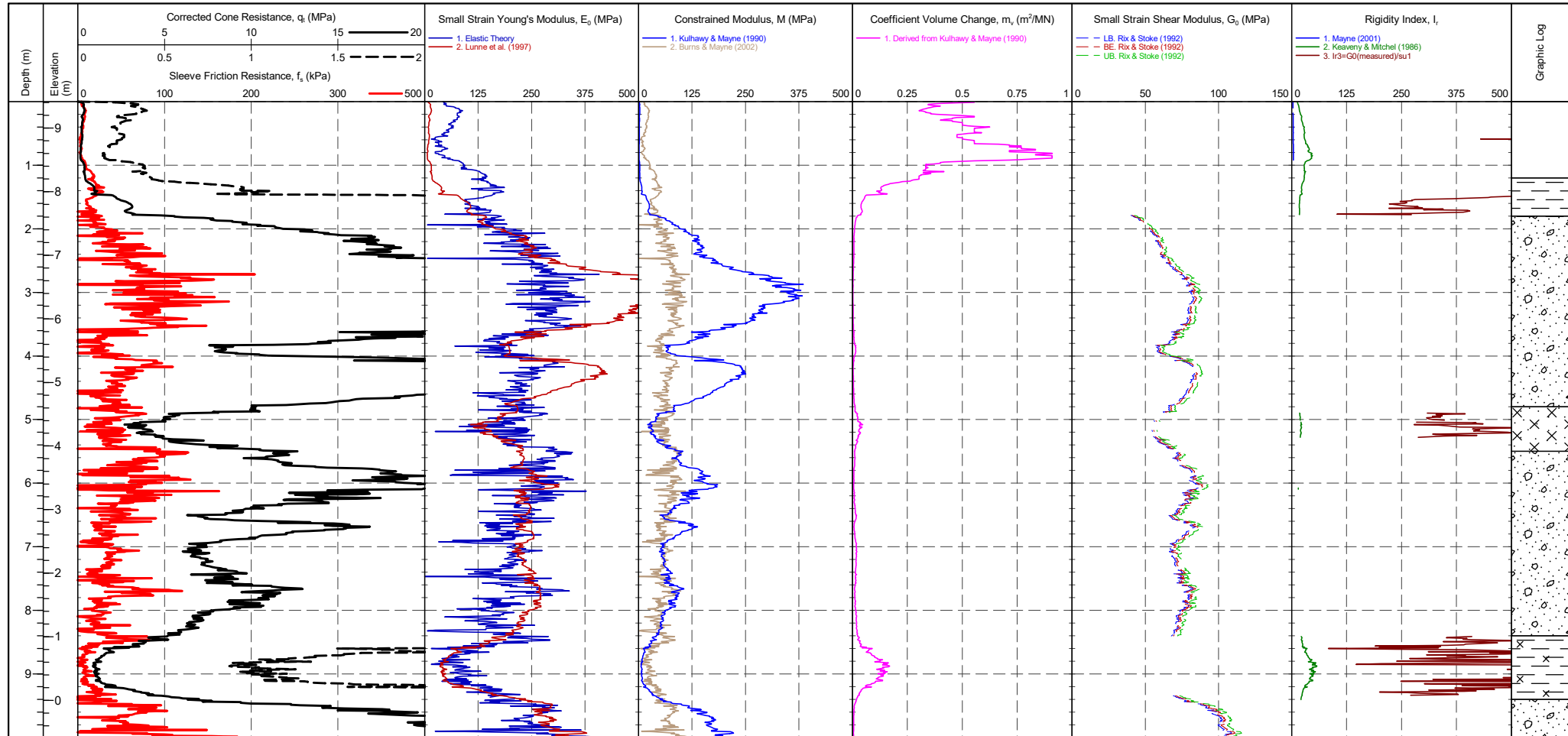
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479245.532 m NORTHING : 354564.807 m ELEVATION : 9.416 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>362 mV</td> <td>360 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>281 mV</td> <td>279 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>323 mV</td> <td>335 mV</td> <td>0.003 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2587 mV</td> <td>2482 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	360 mV	-0.023 MPa	Sleeve	281 mV	279 mV	-0.001 kPa	Pore Pressure 2	323 mV	335 mV	0.003 kPa	X-Y Inclinator	2587 mV	2482 mV		Groundwater Level Dissipation Test
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Pore Pressure 2	323 mV	335 mV	0.003 kPa																				
X-Y Inclinator	2587 mV	2482 mV																					

PointID
S3CPT32

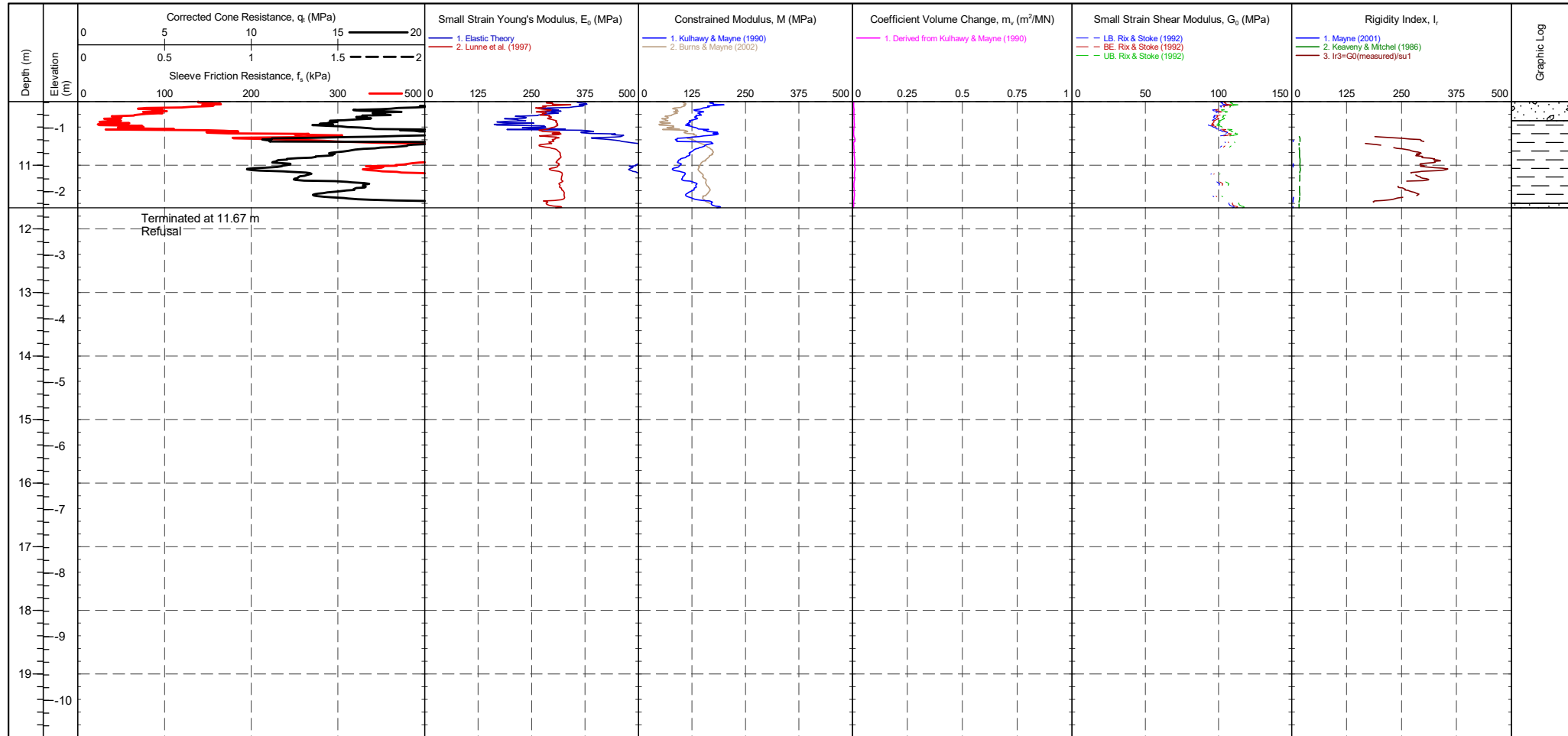
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479245.532 m NORTHING : 354564.807 m ELEVATION : 9.416 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>362 mV</td> <td>360 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>281 mV</td> <td>279 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>323 mV</td> <td>335 mV</td> <td>0.003 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2587 mV</td> <td>2482 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	360 mV	-0.023 MPa	Sleeve	281 mV	279 mV	-0.001 kPa	Pore Pressure 2	323 mV	335 mV	0.003 kPa	X-Y Inclinometer	2587 mV	2482 mV		Groundwater Level Dissipation Test
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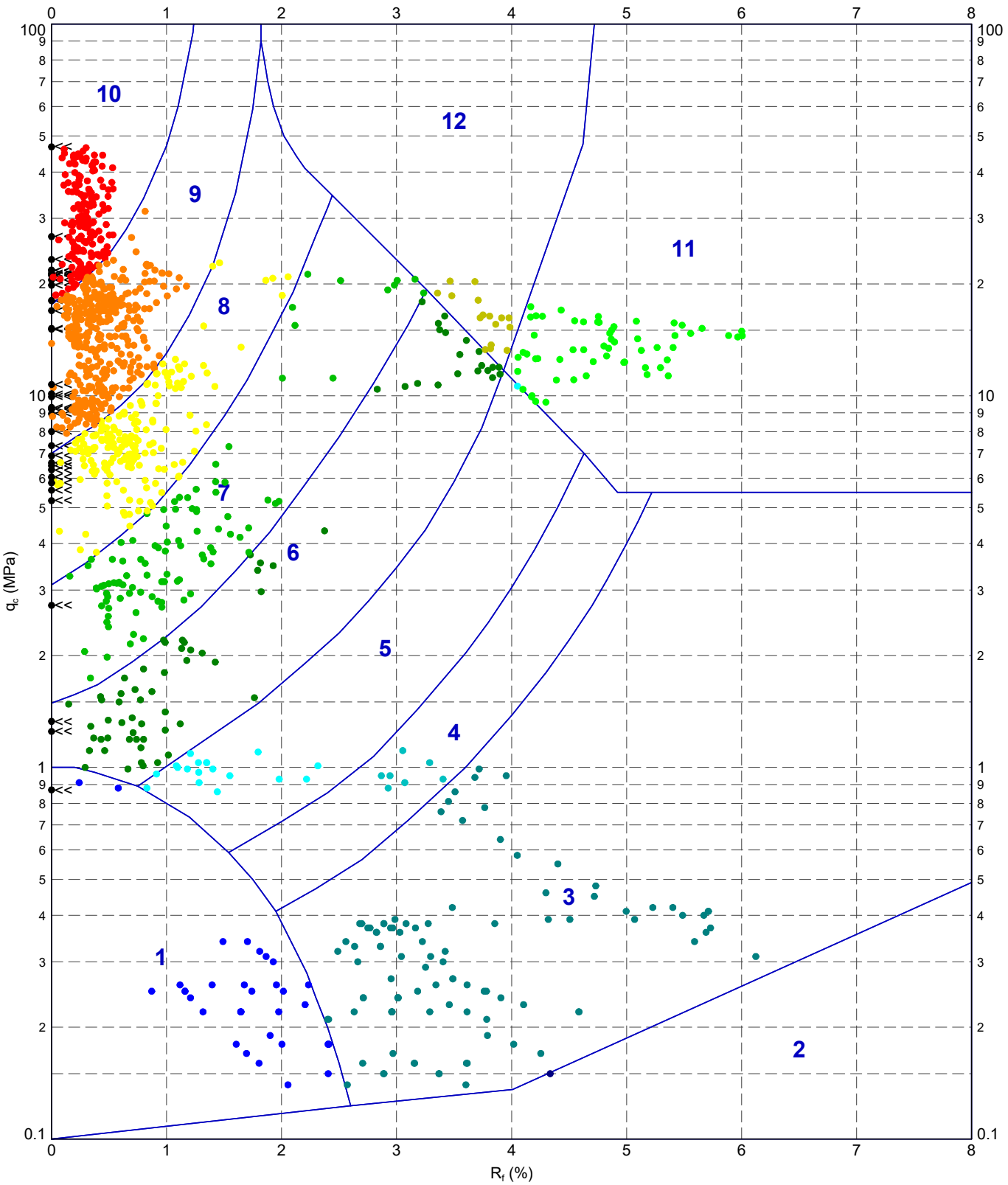
PointID
S3CPT32

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479245.532 m NORTHING : 354564.807 m ELEVATION : 9.416 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>362 mV</td> <td>360 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>281 mV</td> <td>279 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>323 mV</td> <td>335 mV</td> <td>0.003 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2587 mV</td> <td>2482 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	362 mV	360 mV	-0.023 MPa	Sleeve	281 mV	279 mV	-0.001 kPa	Pore Pressure 2	323 mV	335 mV	0.003 kPa	X-Y Inclinometer	2587 mV	2482 mV		Groundwater Level Dissipation Test
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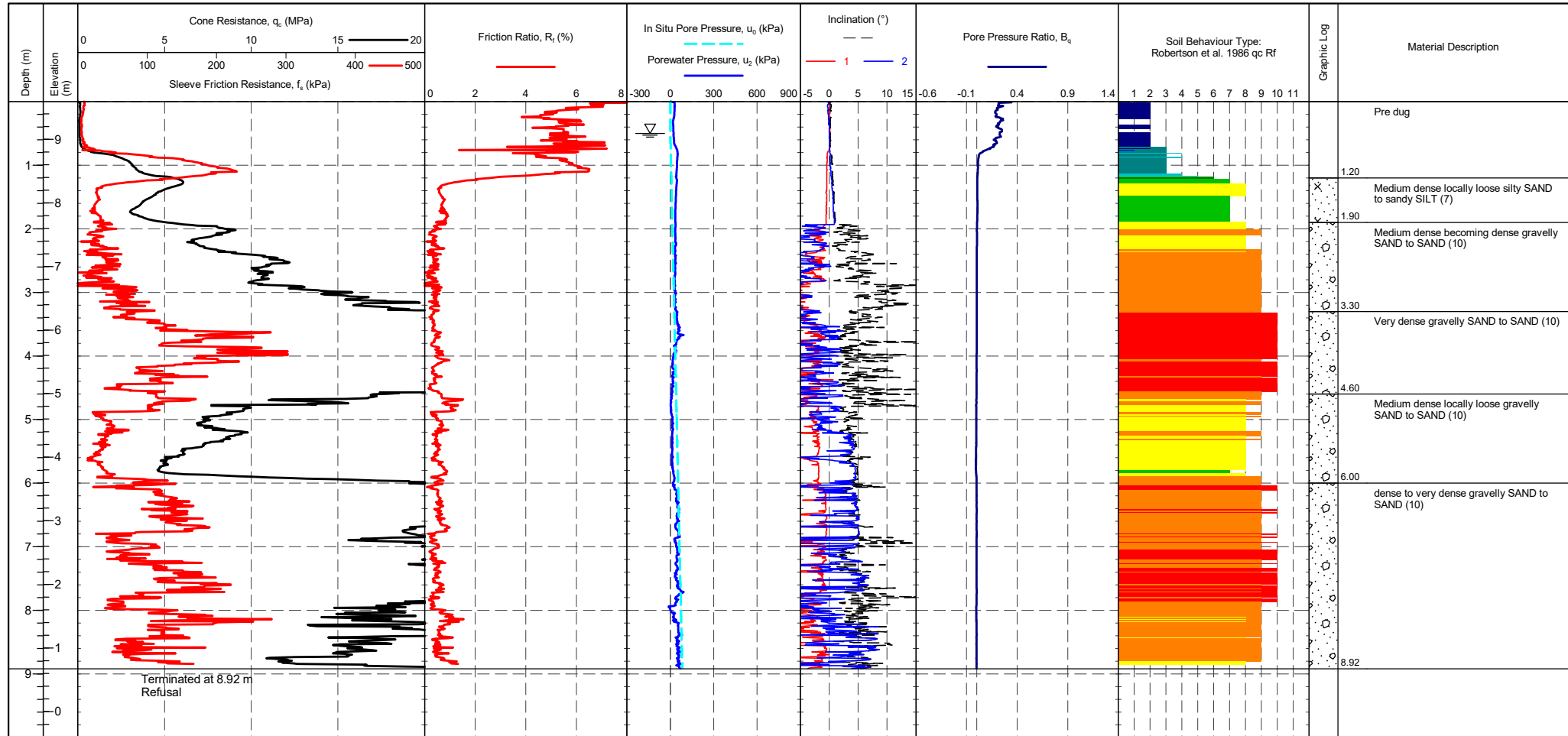
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT32	CHECKED	20/05/2023
		SCALE	DATE
	PROJECT No 1220514	Not To Scale	20/05/2023
		FIGURE No	A4

PointID	S3CPT33
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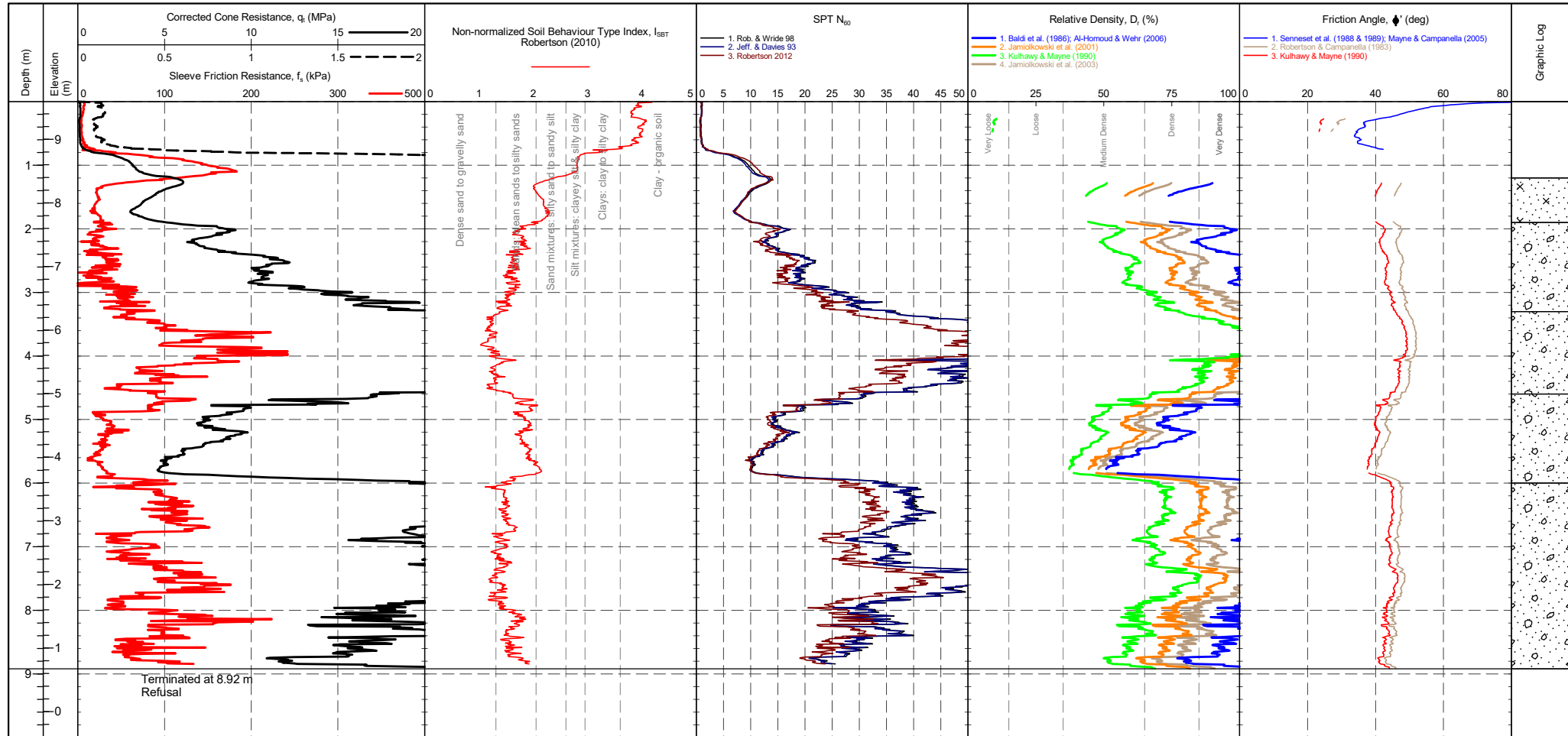
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479206.856 m NORTHING : 354543.897 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 360 mV -0.046 MPa Sleeve 282 mV 280 mV -0.001 kPa Pore Pressure 2 320 mV 314 mV -0.002 kPa X-Y Inclinator 2558 mV 2525 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT33

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479206.856 m NORTHING : 354543.897 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>364 mV</td><td>360 mV</td><td>-0.046 MPa</td></tr> <tr><td>Sleeve</td><td>282 mV</td><td>280 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>320 mV</td><td>314 mV</td><td>-0.002 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2558 mV</td><td>2525 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	360 mV	-0.046 MPa	Sleeve	282 mV	280 mV	-0.001 kPa	Pore Pressure 2	320 mV	314 mV	-0.002 kPa	X-Y Inclinator	2558 mV	2525 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr><td>Clays</td><td>2.95-3.60</td><td>Very Loose</td><td>0 - 4</td><td>Very Loose</td><td>0 - 15</td></tr> <tr><td>Silt mixtures</td><td>2.60-2.95</td><td>Loose</td><td>4 - 10</td><td>Loose</td><td>15 - 35</td></tr> <tr><td>Sand mixtures</td><td>2.05-2.60</td><td>Medium Dense</td><td>10 - 30</td><td>Medium Dense</td><td>35 - 65</td></tr> <tr><td>Sands</td><td>1.31-2.05</td><td>Dense</td><td>30 - 50</td><td>Dense</td><td>65 - 85</td></tr> <tr><td>Gravelly sand</td><td><1.31</td><td>Very Dense</td><td>>50</td><td>Very Dense</td><td>>85</td></tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																																							

PointID

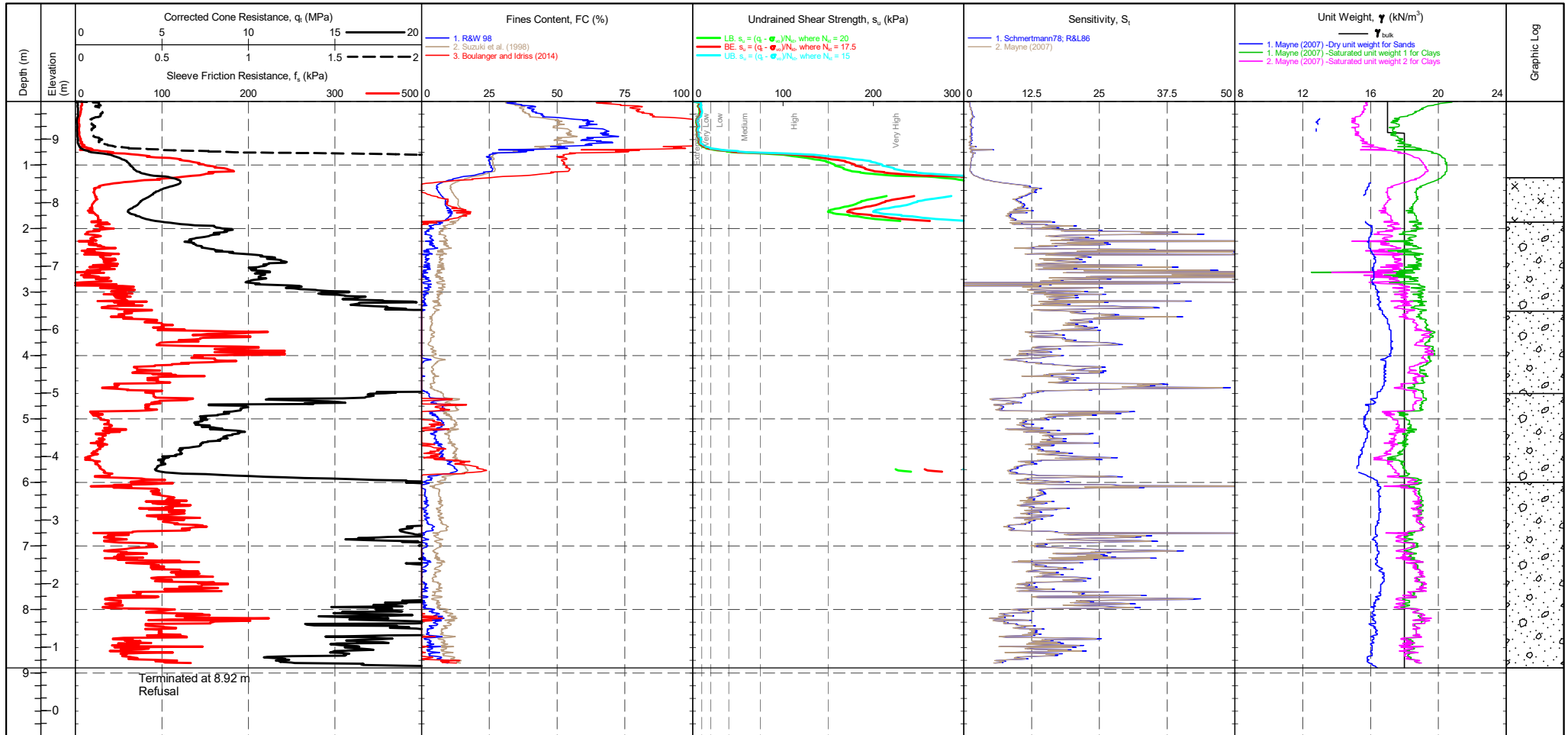
S3CPT33

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479206.856 m
 NORTHING : 354543.897 m
 ELEVATION : 9.592 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 07/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE		TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild		CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 360 mV -0.046 MPa Sleeve 282 mV 280 mV -0.001 kPa Pore Pressure 2 320 mV 314 mV -0.002 kPa X-Y Inclinator 2558 mV 2525 mV			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement s_u (kPa) Term based on measurement s_u (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300				Groundwater Level Dissipation Test
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PointID

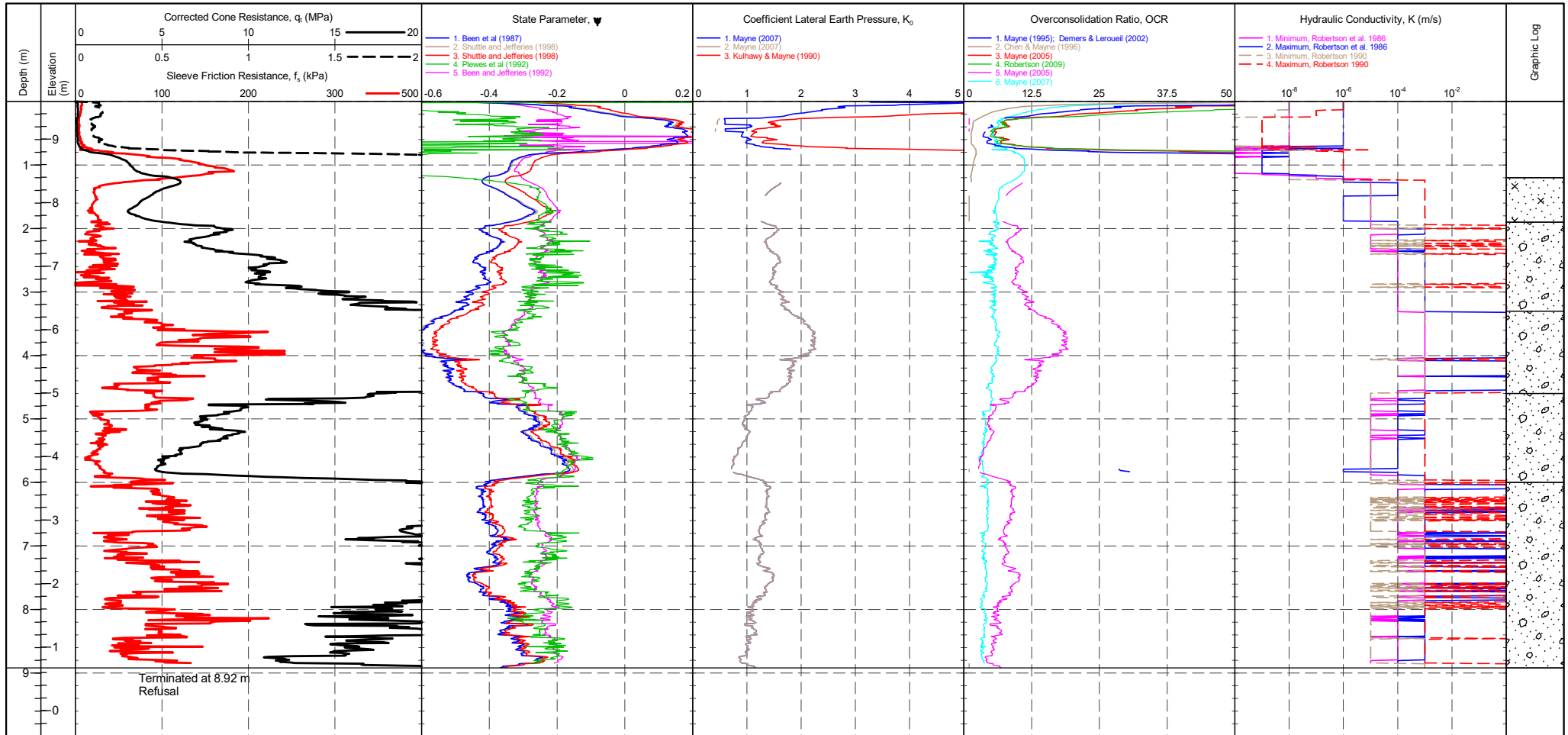
S3CPT33

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479206.856 m
 NORTHING : 354543.897 m
 ELEVATION : 9.592 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 07/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & DR
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

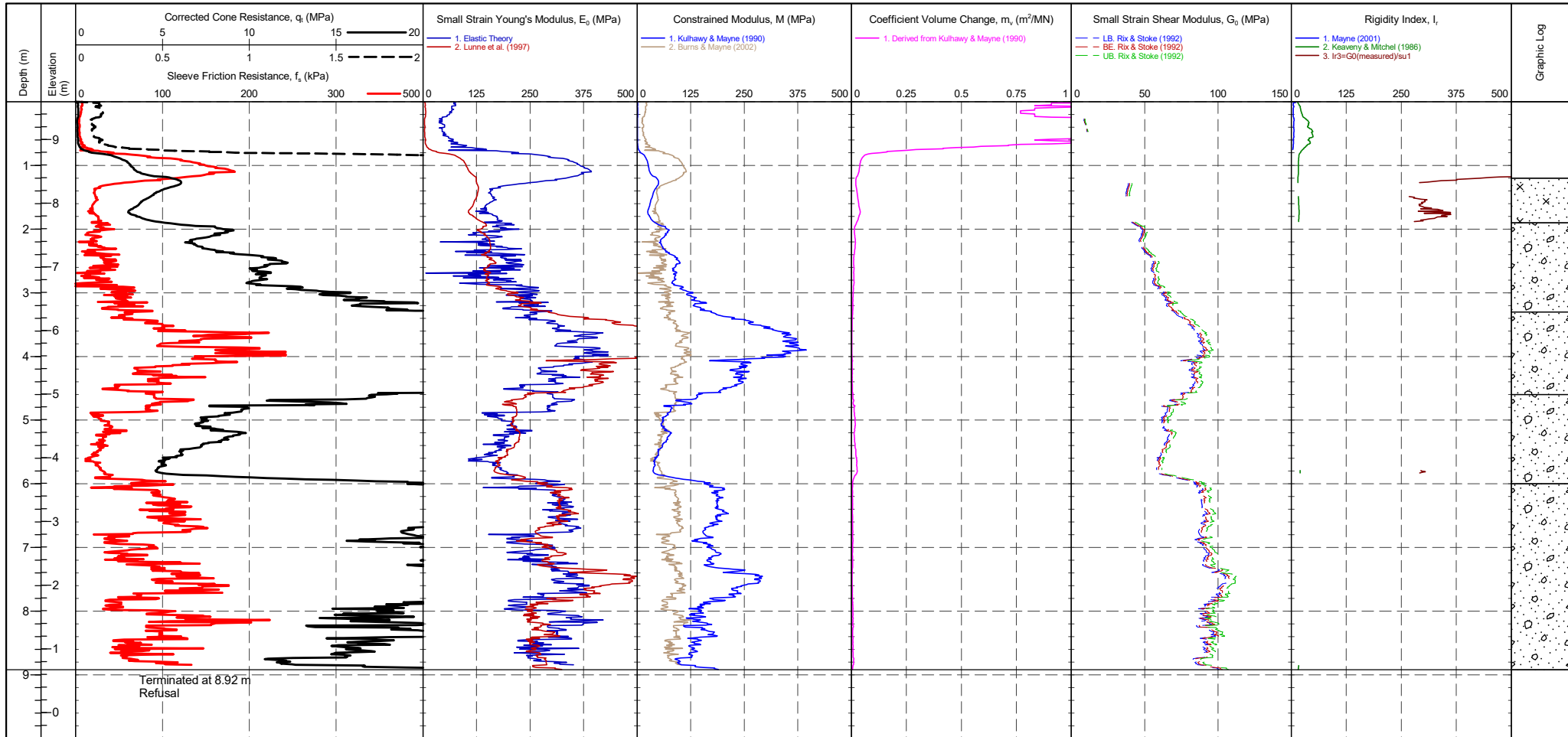
CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	364 mV	360 mV	-0.046 MPa
Sleeve	282 mV	280 mV	-0.001 kPa
Pore Pressure 2	320 mV	314 mV	-0.002 kPa
X-Y Inclinator	2558 mV	2525 mV	

Groundwater Level
 Dissipation Test

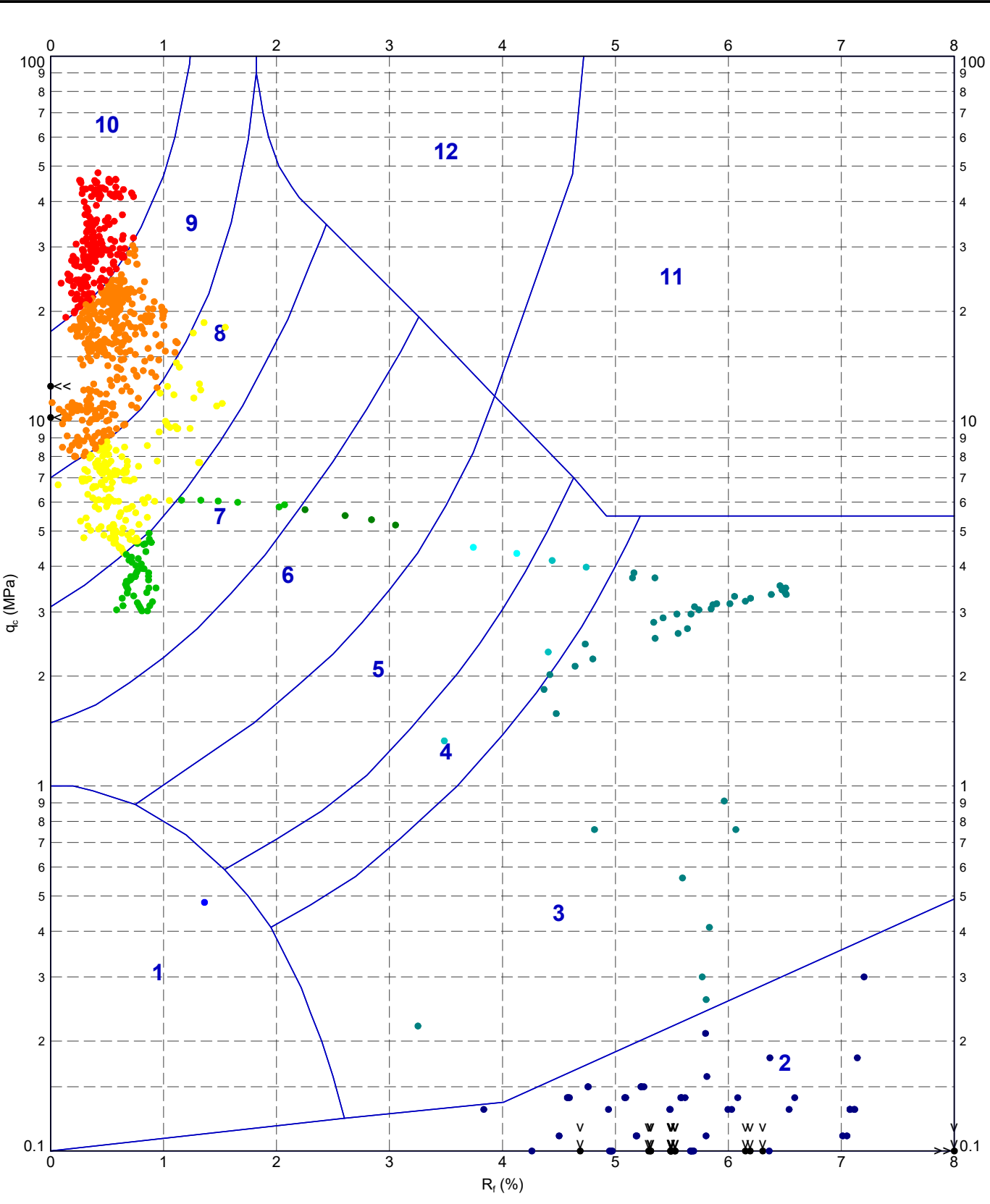
PointID
S3CPT33

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479206.856 m NORTHING : 354543.897 m ELEVATION : 9.592 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 07/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>360 mV</td> <td>-0.046 MPa</td> </tr> <tr> <td>Sleeve</td> <td>282 mV</td> <td>280 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>320 mV</td> <td>314 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2558 mV</td> <td>2525 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	360 mV	-0.046 MPa	Sleeve	282 mV	280 mV	-0.001 kPa	Pore Pressure 2	320 mV	314 mV	-0.002 kPa	X-Y Inclinator	2558 mV	2525 mV		Groundwater Level Dissipation Test
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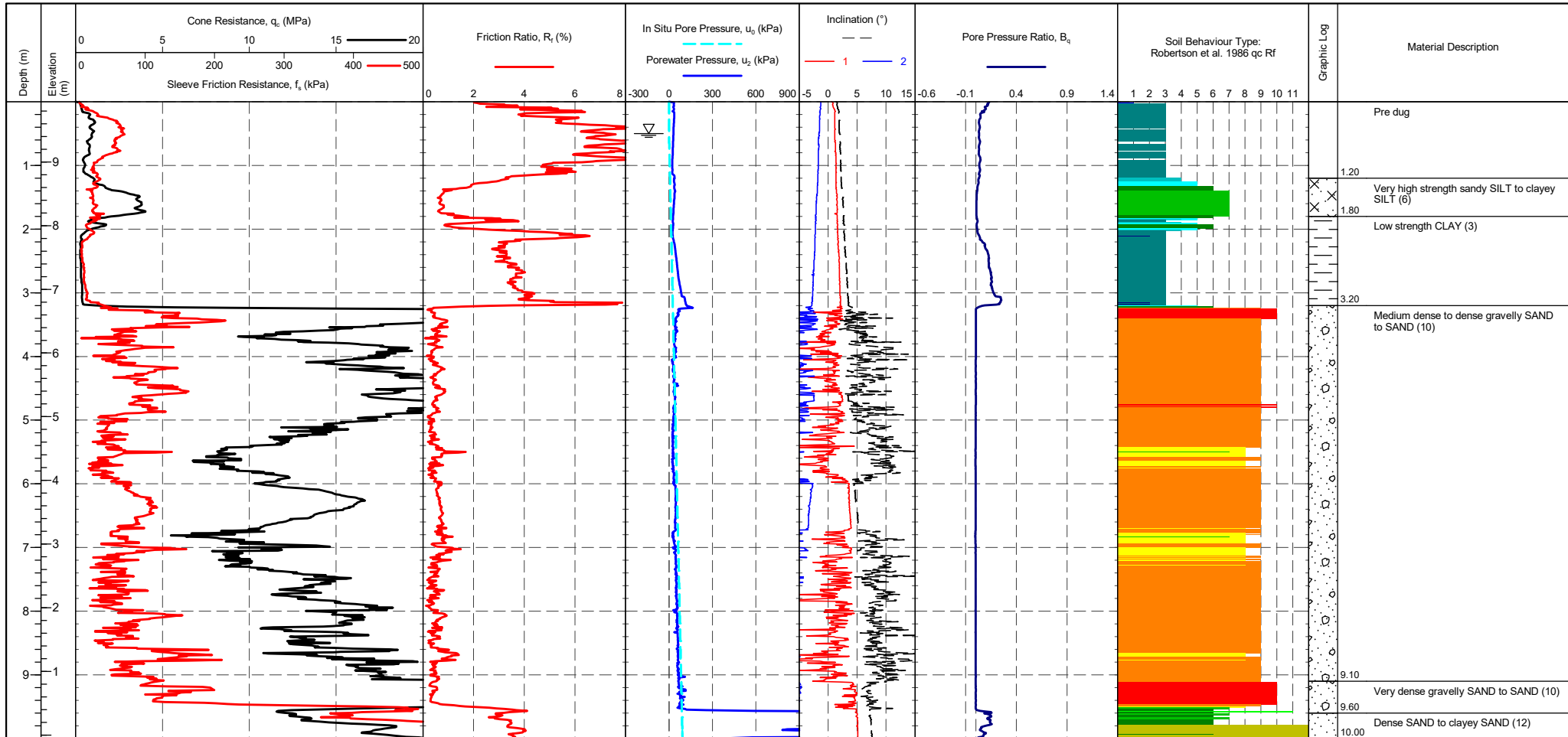


- METHOD: Robertson et al. 1986 qc Rf**
- 1 - Sensitive fine grained material
 - 4 - Silty CLAY to CLAY
 - 7 - Silty SAND to sandy SILT
 - 10 - Gravelly SAND to SAND
 - 2 - Organic material
 - 5 - Clayey SILT to silty CLAY
 - 8 - SAND to silty SAND
 - 11 - Very stiff fine grained
 - 3 - CLAY
 - 6 - Sandy SILT to clayey SILT
 - 9 - SAND
 - 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT33	CHECKED	DATE
		SCALE	DATE
	PROJECT No 1220514	FIGURE No	A4

PointID	S3CPT34
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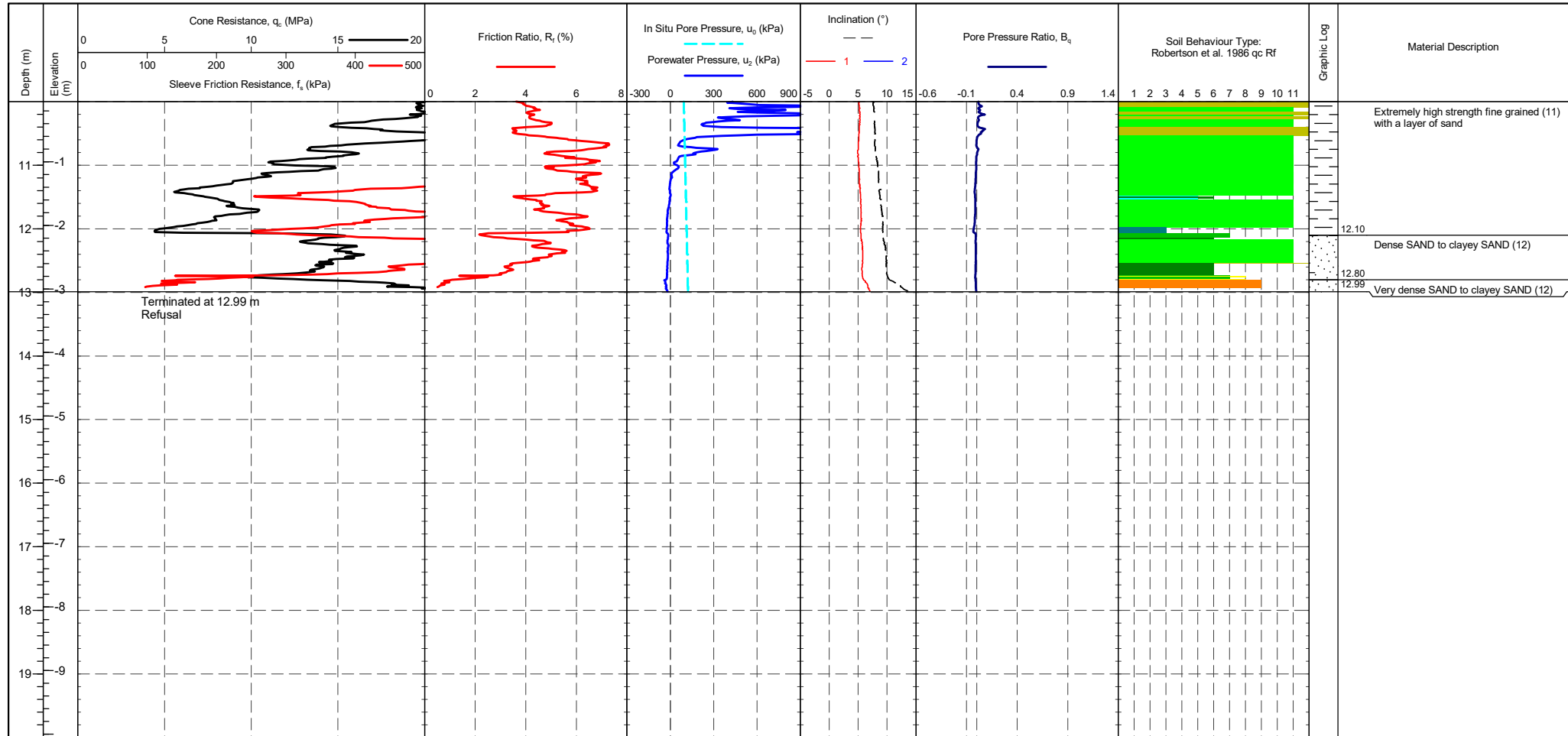
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 360 mV 353 mV -0.08 MPa Sleeve 273 mV 269 mV -0.003 kPa Pore Pressure 2 314 mV 322 mV 0.002 kPa X-Y Inclinator 2598 mV 2503 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT34
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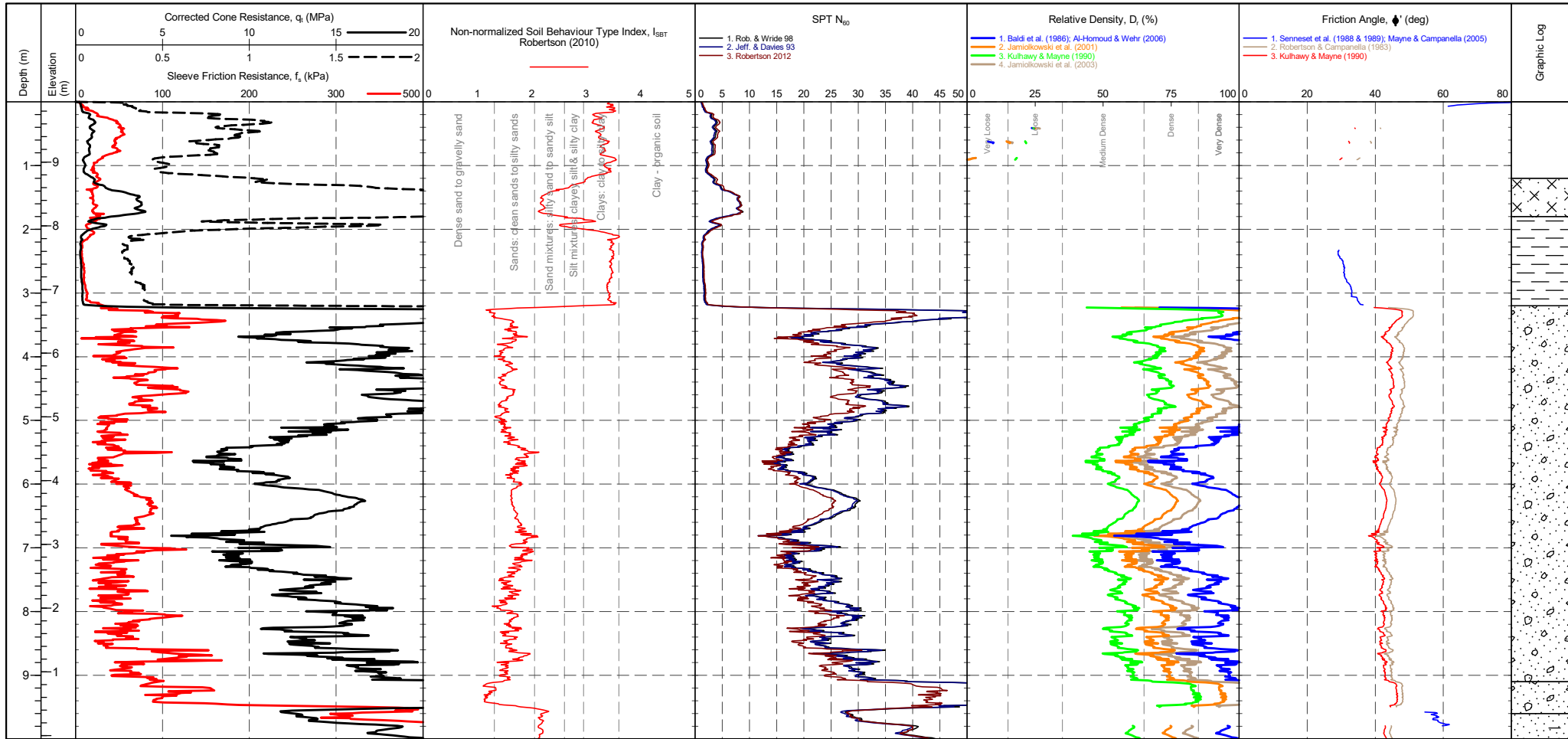
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>360 mV</td> <td>353 mV</td> <td>-0.08 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>269 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>314 mV</td> <td>322 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2598 mV</td> <td>2503 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	360 mV	353 mV	-0.08 MPa	Sleeve	273 mV	269 mV	-0.003 kPa	Pore Pressure 2	314 mV	322 mV	0.002 kPa	X-Y Inclinator	2598 mV	2503 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT34
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>360 mV</td> <td>353 mV</td> <td>-0.08 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>269 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>314 mV</td> <td>322 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2598 mV</td> <td>2503 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	360 mV	353 mV	-0.08 MPa	Sleeve	273 mV	269 mV	-0.003 kPa	Pore Pressure 2	314 mV	322 mV	0.002 kPa	X-Y Inclinator	2598 mV	2503 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

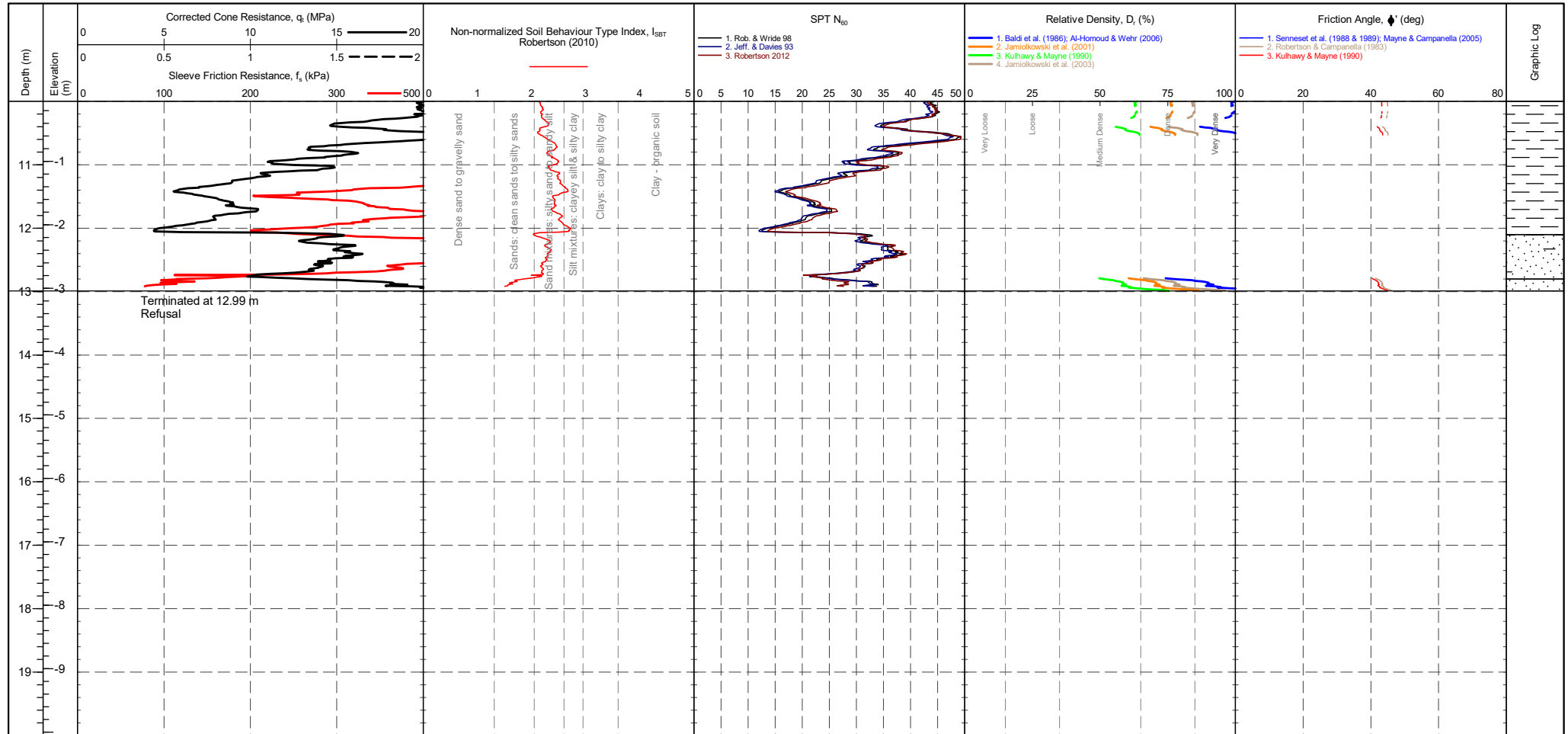
S3CPT34

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479288.392 m
 NORTHING : 354647.776 m
 ELEVATION : 9.946 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 2 OF 2
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 360 mV 273 mV 314 mV 2598 mV	Post 353 mV 269 mV 322 mV 2503 mV	Difference -0.08 MPa -0.003 kPa 0.002 kPa	Description Clays Silt mixtures Sand mixtures Sands Gravelly sand	SBT Index, I _c 2.95-3.60 2.60-2.95 2.05-2.60 1.31-2.05 <1.31	Description Very Loose Loose Medium Dense Dense Very Dense	

PointID

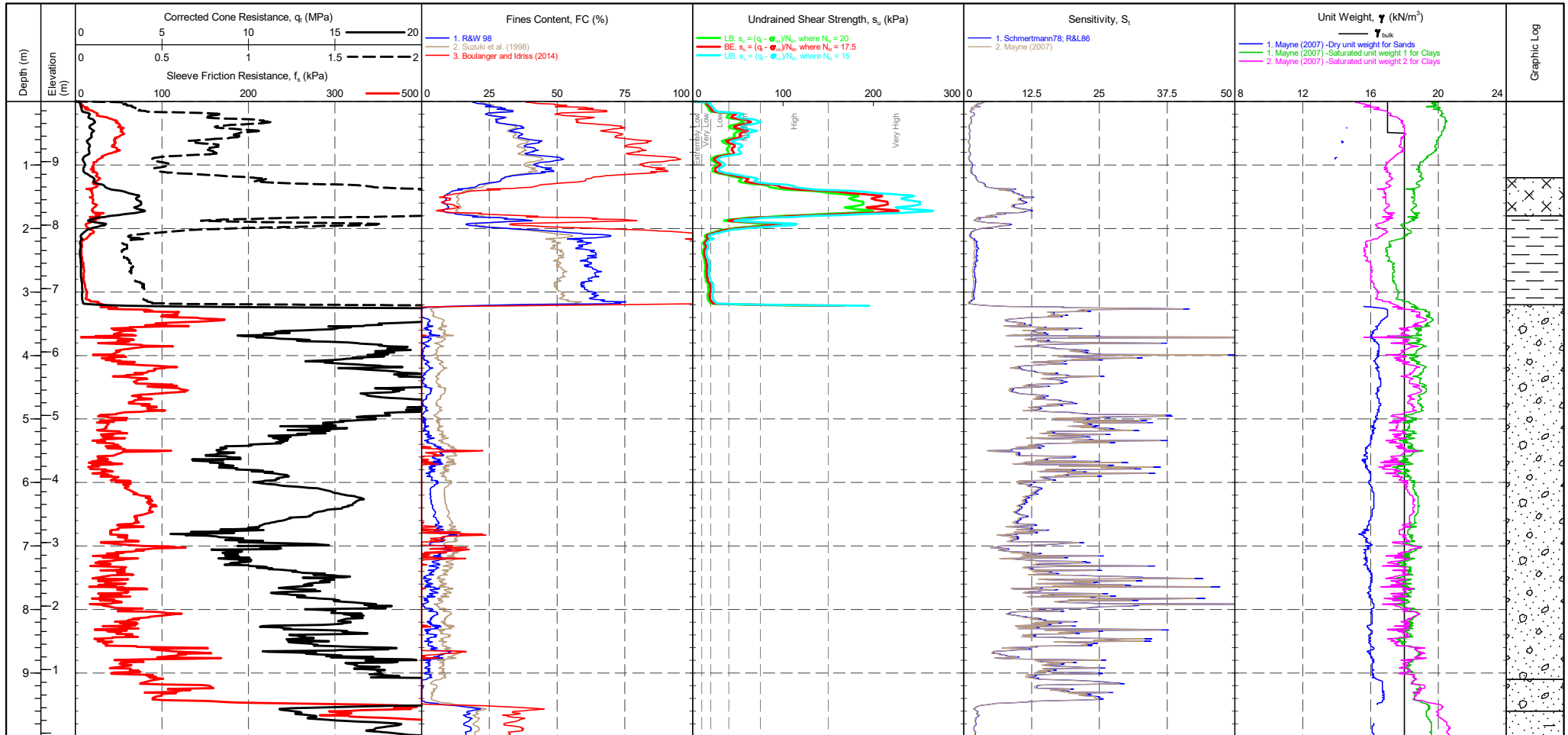
S3CPT34

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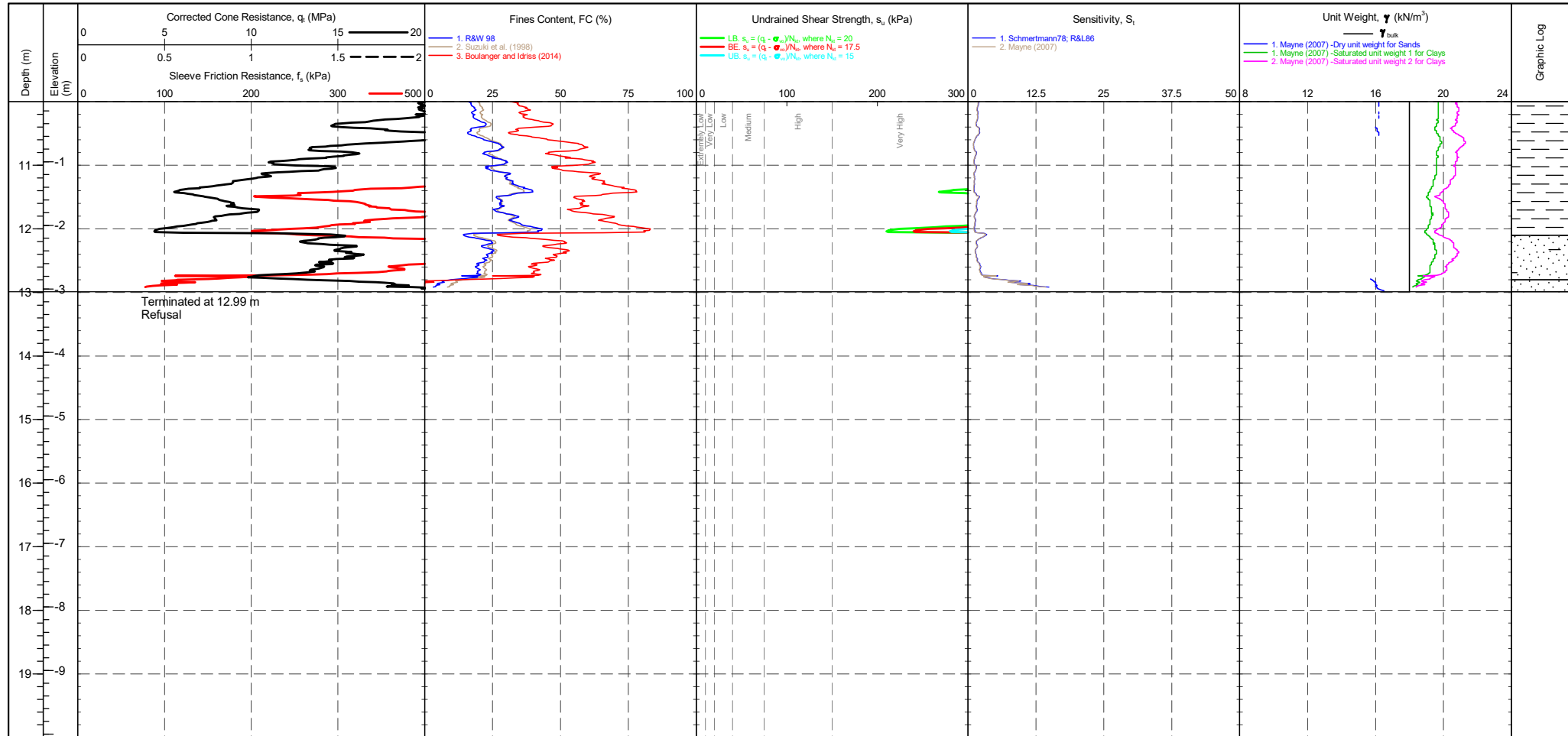
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 360 mV Sleeve : 273 mV Pore Pressure 2 : 314 mV X-Y Inclinator : 2598 mV	CPTU ZERO VALUES Pre : 353 mV Post : 269 mV Difference : -0.08 MPa -0.003 kPa 0.002 kPa 2503 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID
S3CPT34

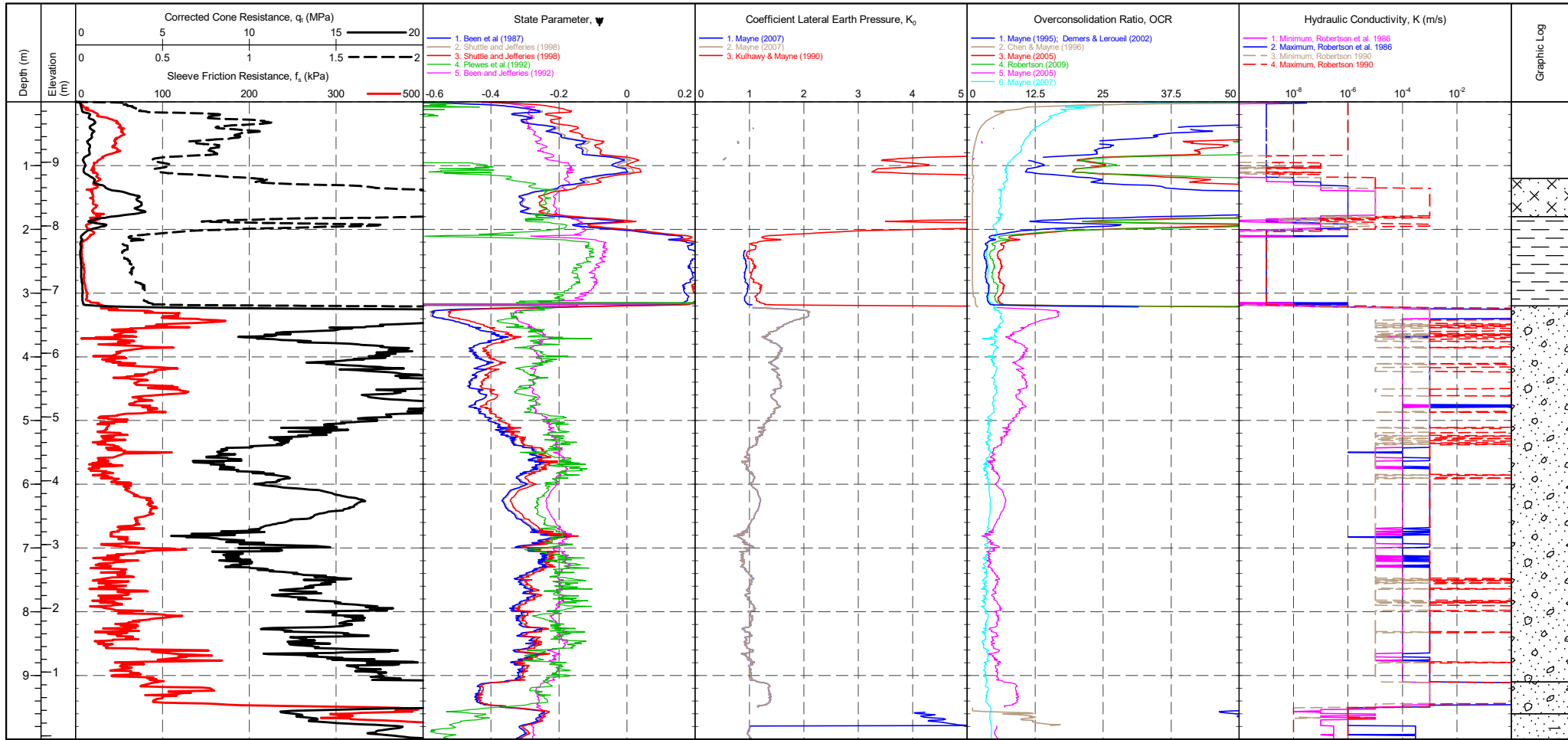
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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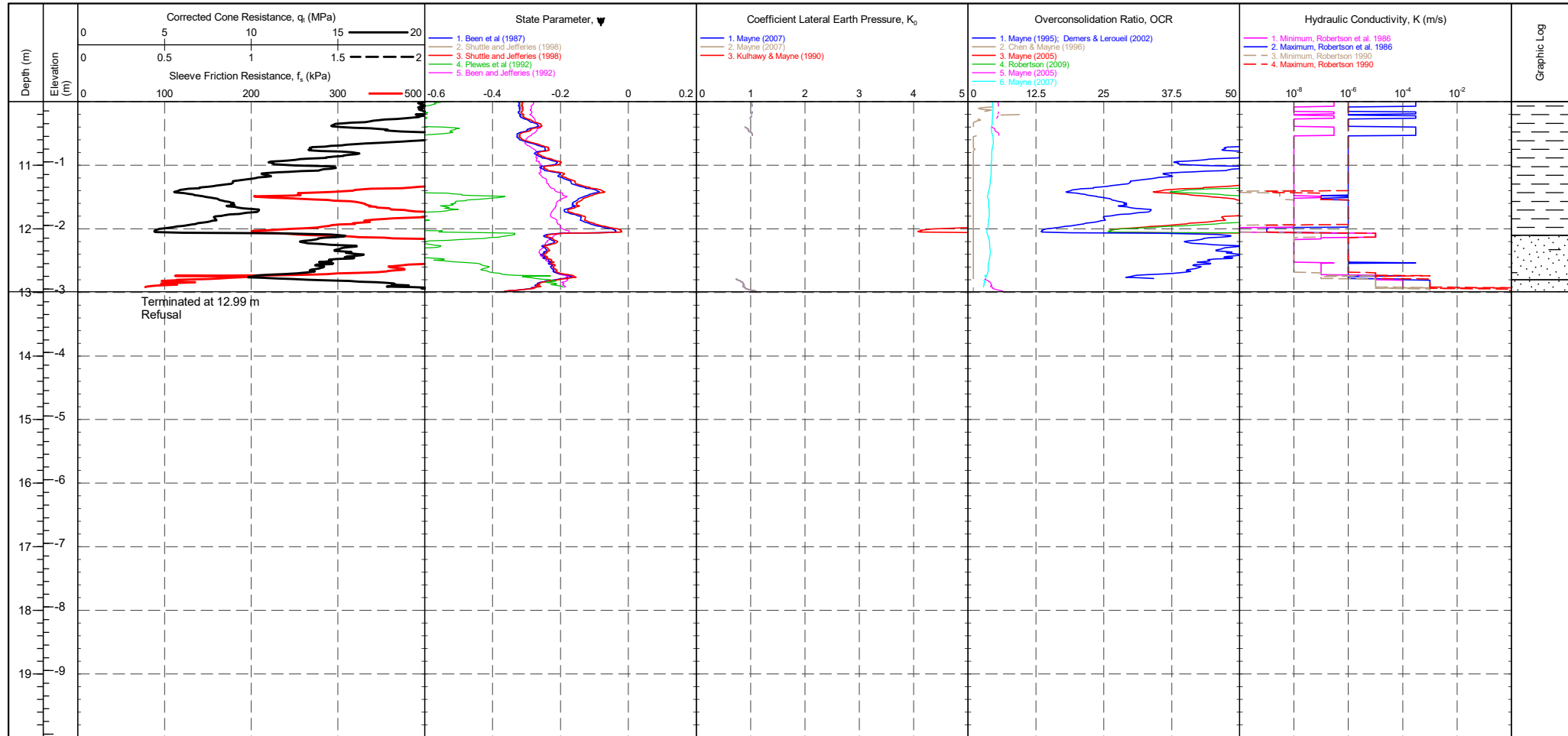
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>360 mV</td> <td>353 mV</td> <td>-0.08 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>269 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>314 mV</td> <td>322 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2598 mV</td> <td>2503 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	360 mV	353 mV	-0.08 MPa	Sleeve	273 mV	269 mV	-0.003 kPa	Pore Pressure 2	314 mV	322 mV	0.002 kPa	X-Y Inclinator	2598 mV	2503 mV		Groundwater Level Dissipation Test
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PointID
S3CPT34

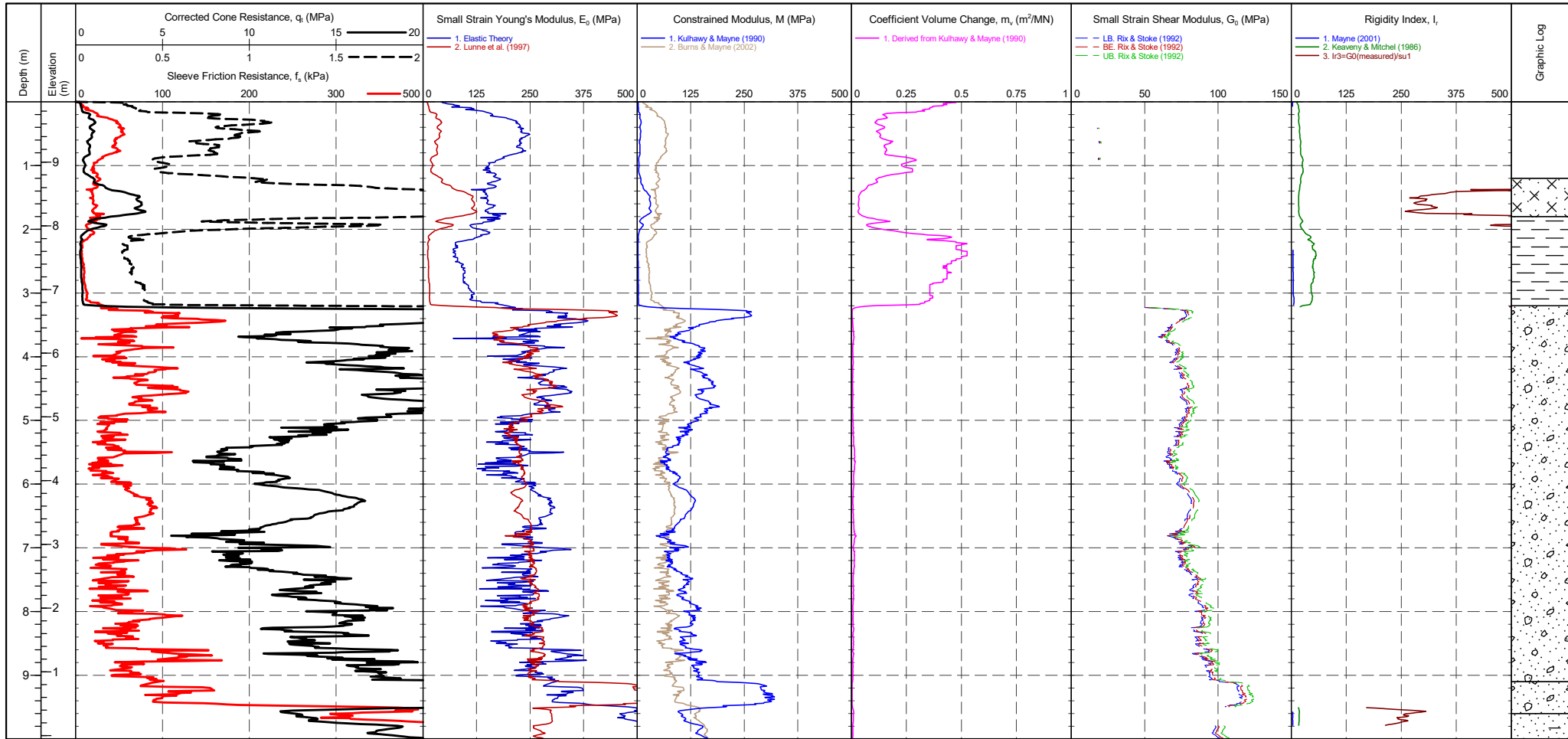
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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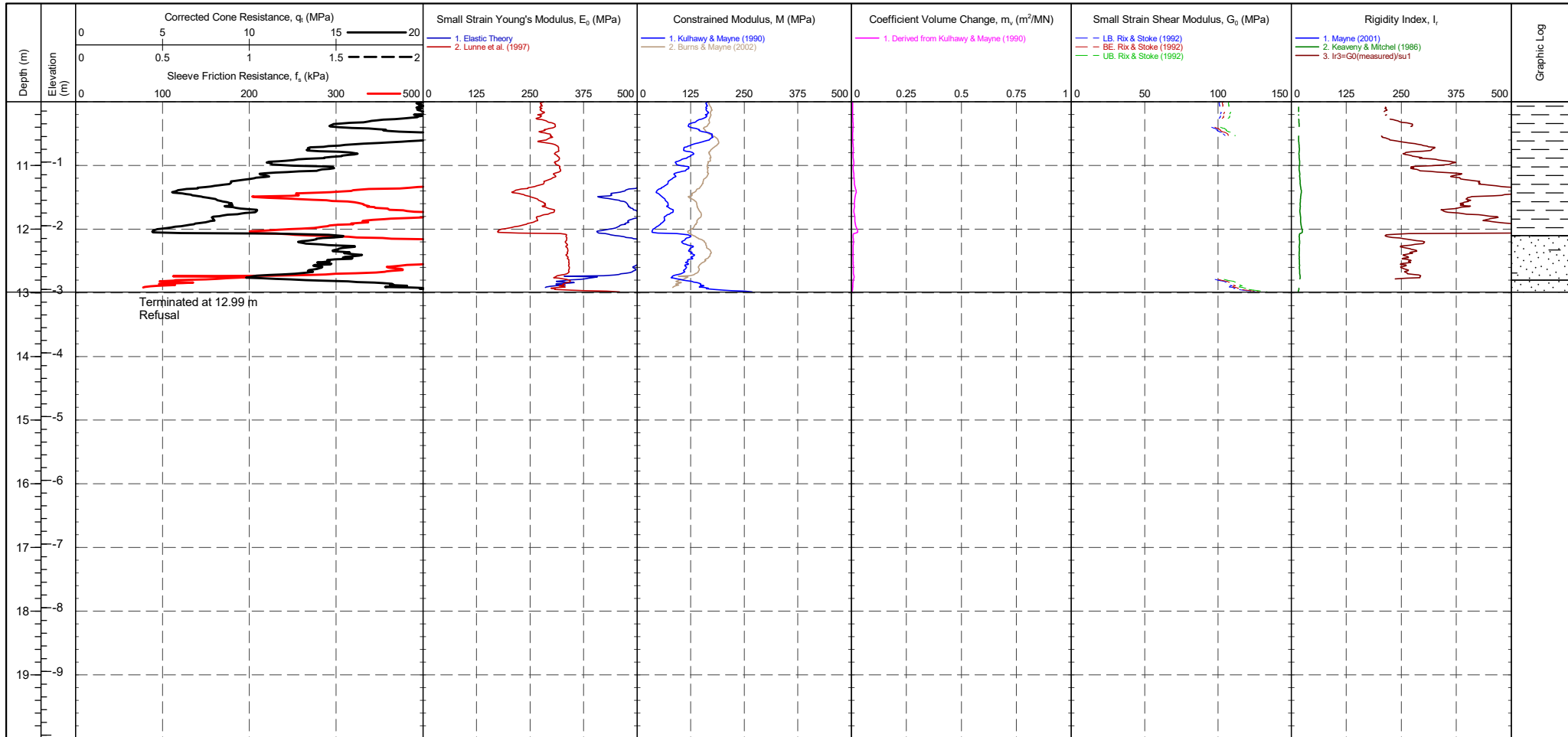
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>360 mV</td> <td>353 mV</td> <td>-0.08 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>269 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>314 mV</td> <td>322 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2598 mV</td> <td>2503 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	360 mV	353 mV	-0.08 MPa	Sleeve	273 mV	269 mV	-0.003 kPa	Pore Pressure 2	314 mV	322 mV	0.002 kPa	X-Y Inclinator	2598 mV	2503 mV		Groundwater Level Dissipation Test
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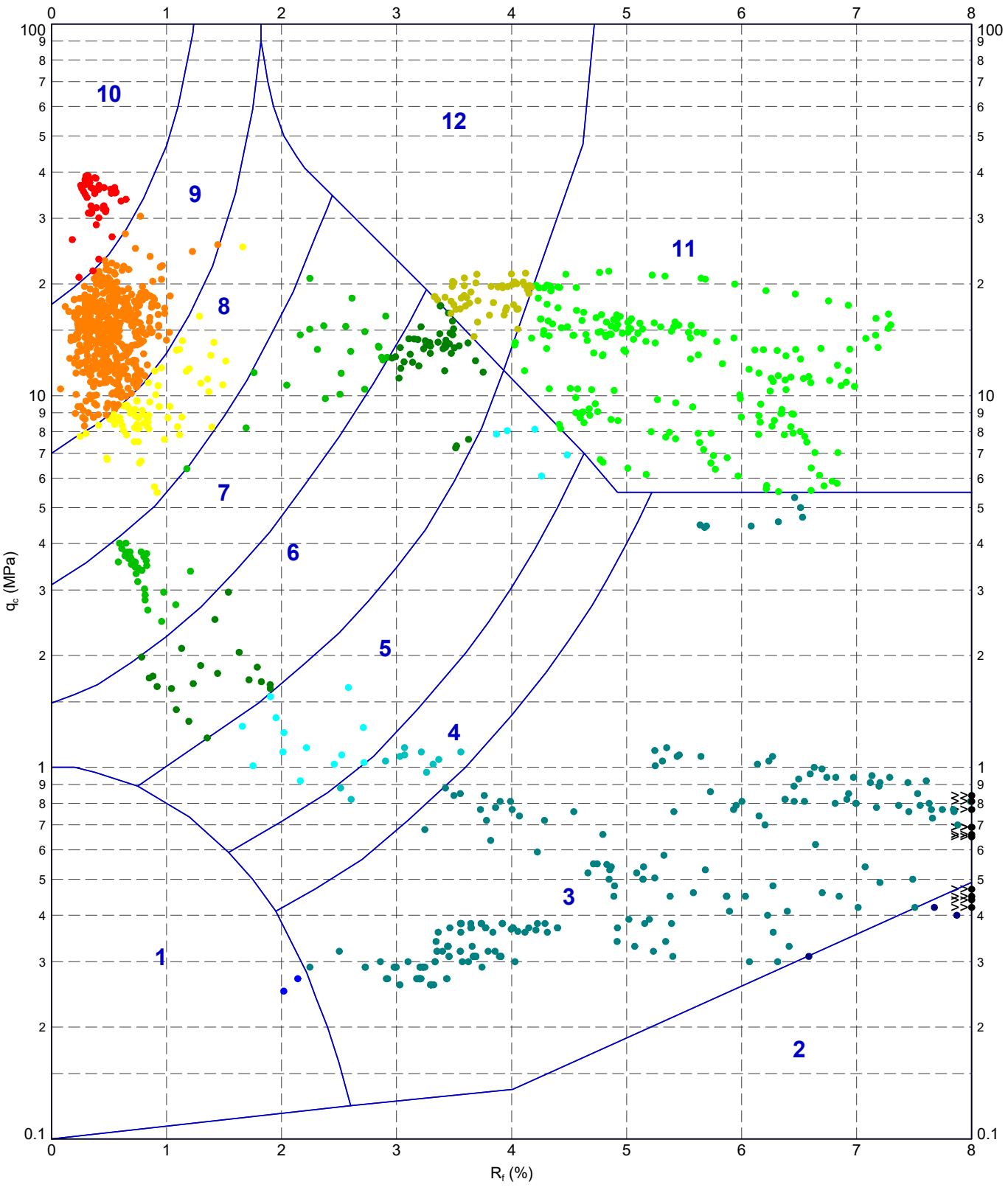
PointID
S3CPT34

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479288.392 m NORTHING : 354647.776 m ELEVATION : 9.946 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>360 mV</td> <td>353 mV</td> <td>-0.08 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>269 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>314 mV</td> <td>322 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2598 mV</td> <td>2503 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	360 mV	353 mV	-0.08 MPa	Sleeve	273 mV	269 mV	-0.003 kPa	Pore Pressure 2	314 mV	322 mV	0.002 kPa	X-Y Inclinometer	2598 mV	2503 mV		Groundwater Level Dissipation Test
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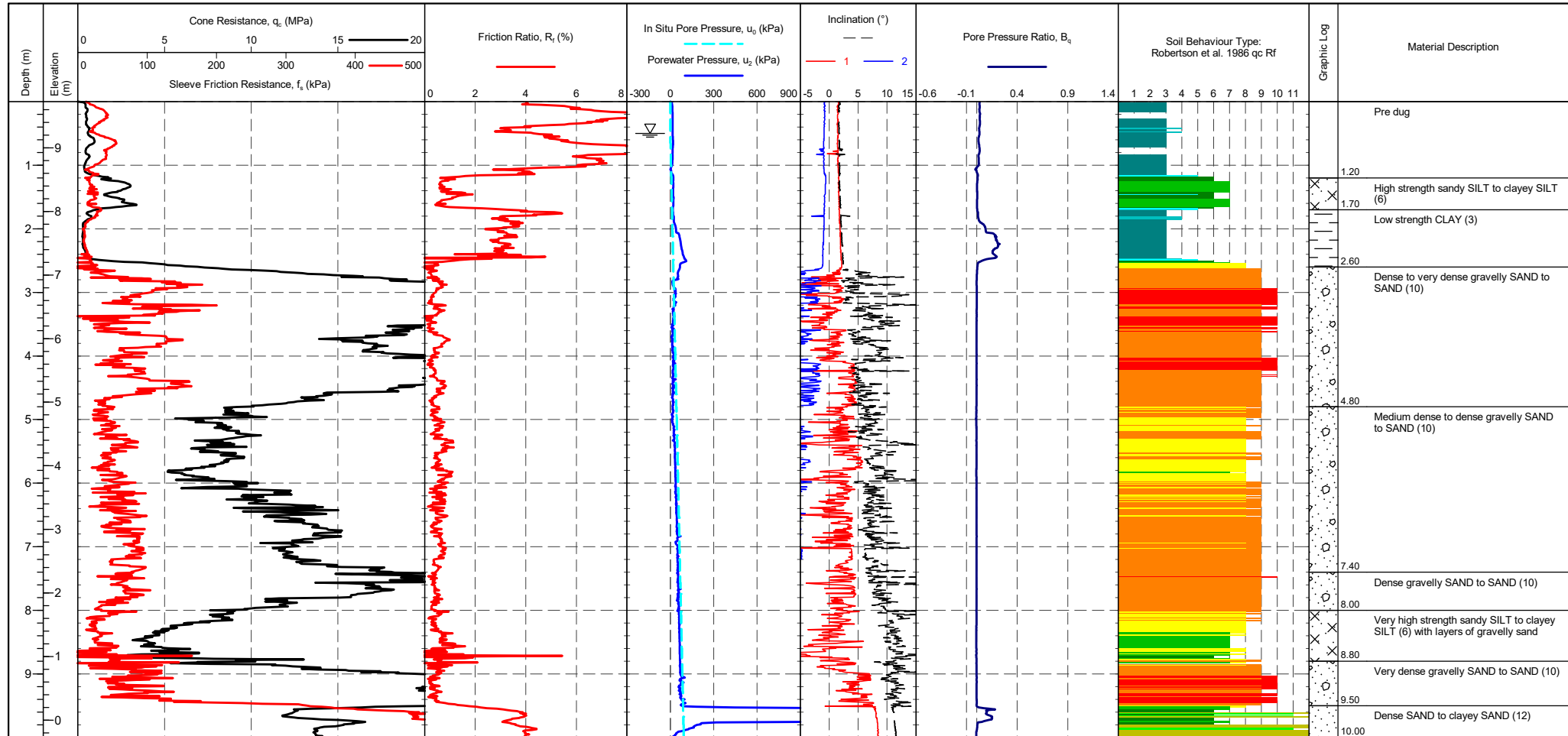
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT34	CHECKED	20/05/2023
		SCALE	DATE
	PROJECT No 1220514	Not To Scale	20/05/2023
		FIGURE No	A4

PointID	S3CPT35
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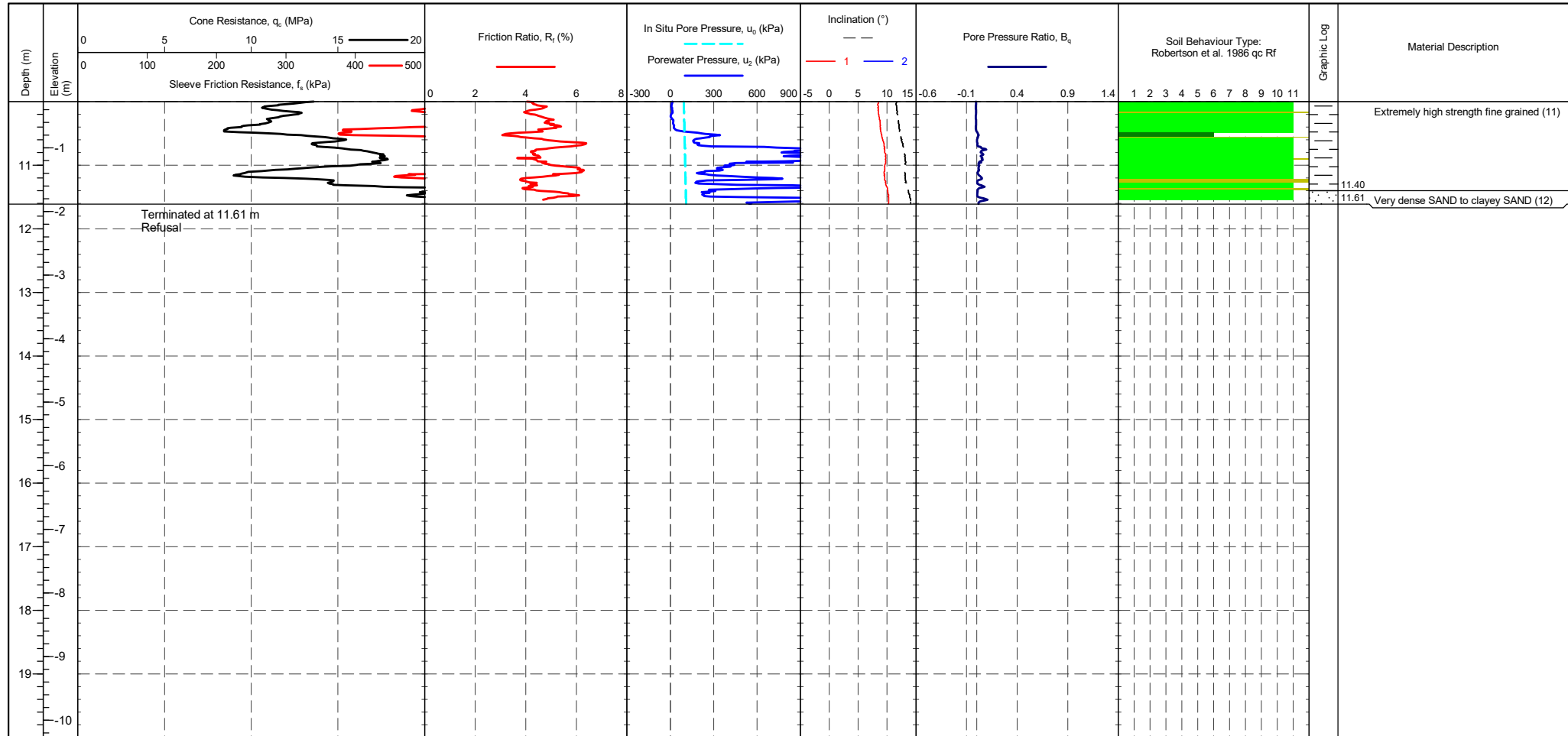
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479259.931 m NORTHING : 354634.486 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 359 mV 353 mV -0.069 MPa Sleeve 273 mV 267 mV -0.004 kPa Pore Pressure 2 306 mV 312 mV 0.002 kPa X-Y Inclinator 2690 mV 2663 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clay SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT35
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479259.931 m NORTHING : 354634.486 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip : 359 mV / 353 mV / -0.069 MPa Sleeve : 273 mV / 267 mV / -0.004 kPa Pore Pressure 2 : 306 mV / 312 mV / 0.002 kPa X-Y Inclinometer : 2690 mV / 2663 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

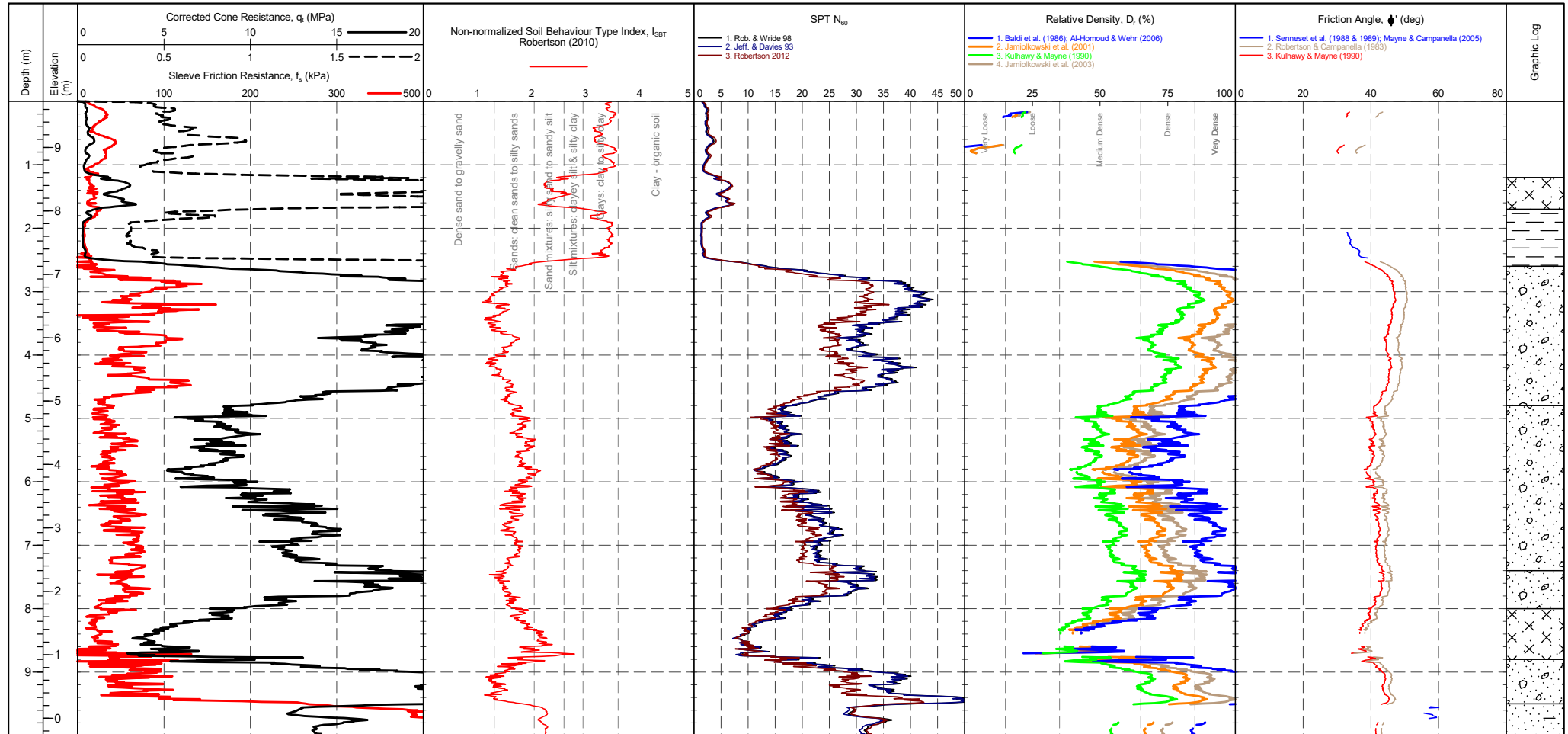
S3CPT35

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479259.931 m
 NORTHING : 354634.486 m
 ELEVATION : 9.727 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 2
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012

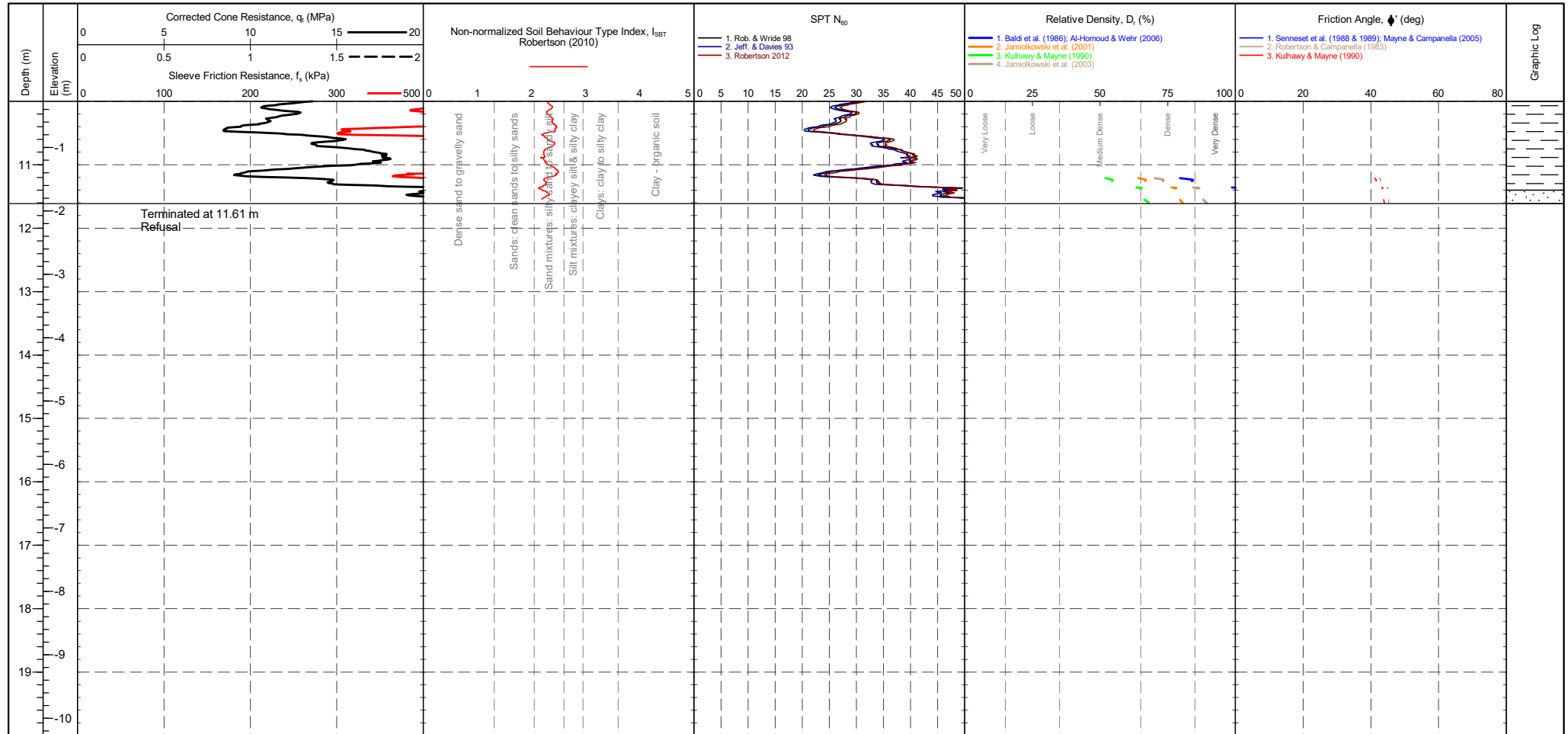


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 359 mV Sleeve : 273 mV Pore Pressure 2 : 306 mV X-Y Inclinator : 2690 mV	CPTU ZERO VALUES Post : 353 mV Difference : -0.069 MPa -0.004 kPa 312 mV 2663 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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S3CPT35

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479259.931 m NORTHING : 354634.486 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>359 mV</td> <td>353 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>267 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>306 mV</td> <td>312 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2690 mV</td> <td>2663 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	359 mV	353 mV	-0.069 MPa	Sleeve	273 mV	267 mV	-0.004 kPa	Pore Pressure 2	306 mV	312 mV	0.002 kPa	X-Y Inclinator	2690 mV	2663 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

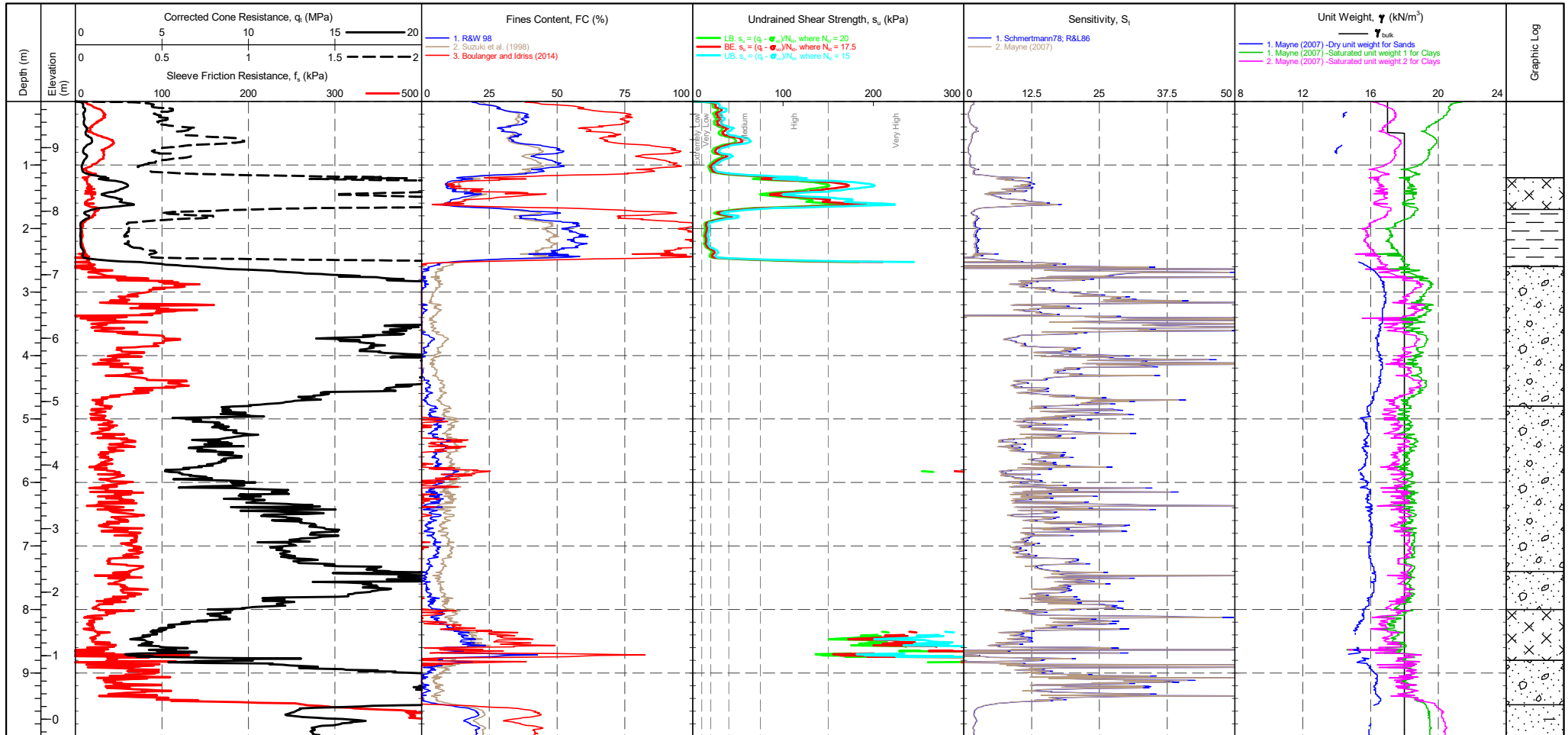
S3CPT35

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479259.931 m
 NORTHING : 354634.486 m
 ELEVATION : 9.727 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 2
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012

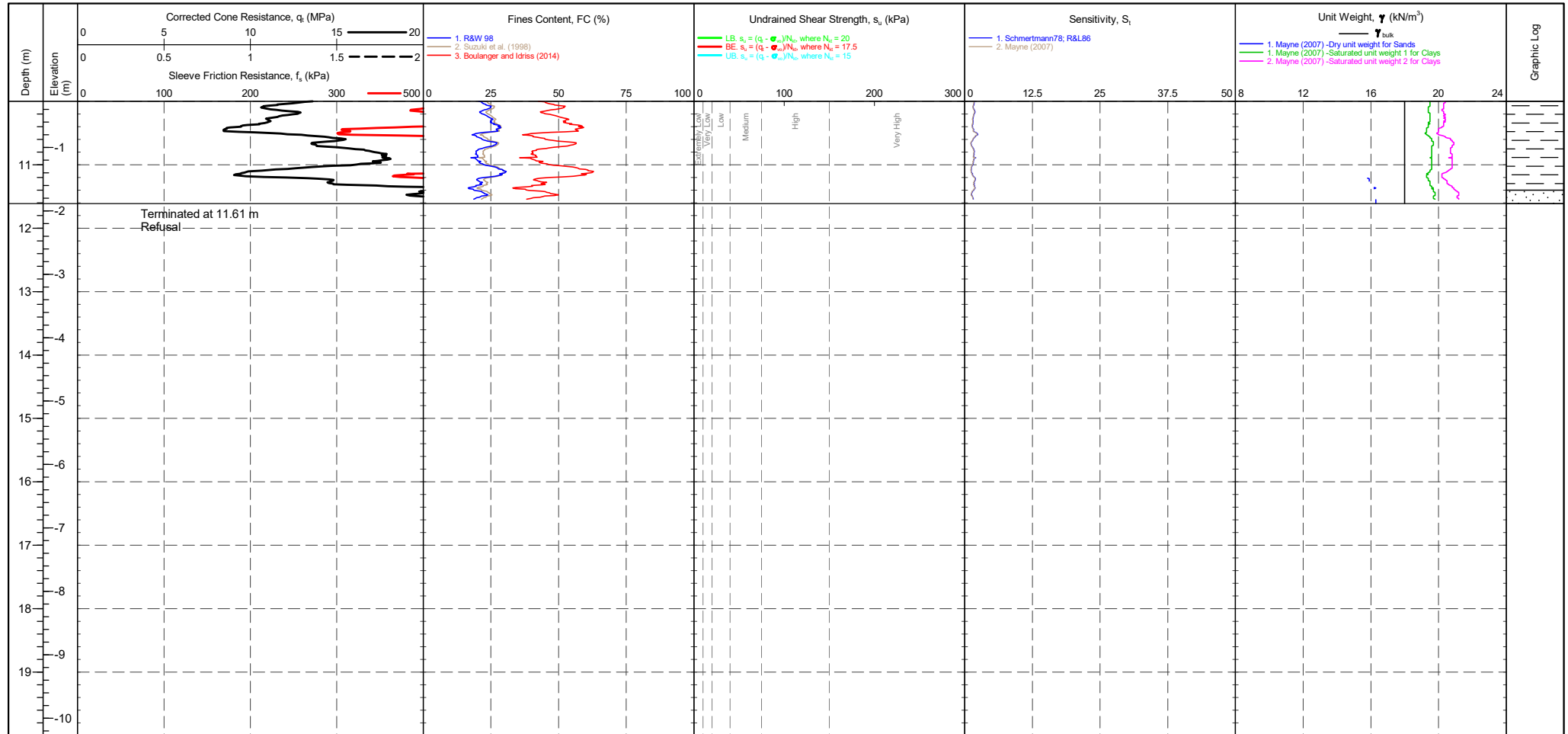


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 359 mV Sleeve : 273 mV Pore Pressure 2 : 306 mV X-Y Inclinator : 2690 mV	CPTU ZERO VALUES Post : 353 mV Difference : -0.069 MPa Post : 267 mV Difference : -0.004 kPa Post : 312 mV Difference : 0.002 kPa Post : 2663 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength : <10 Very low strength : 10-20 Low strength : 20-40	Term based on measurement su (kPa) Medium strength : 40-75 High strength : 75-150 Very high strength : 150-300 Extremely high strength : >300	Groundwater Level Dissipation Test
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PointID

S3CPT35

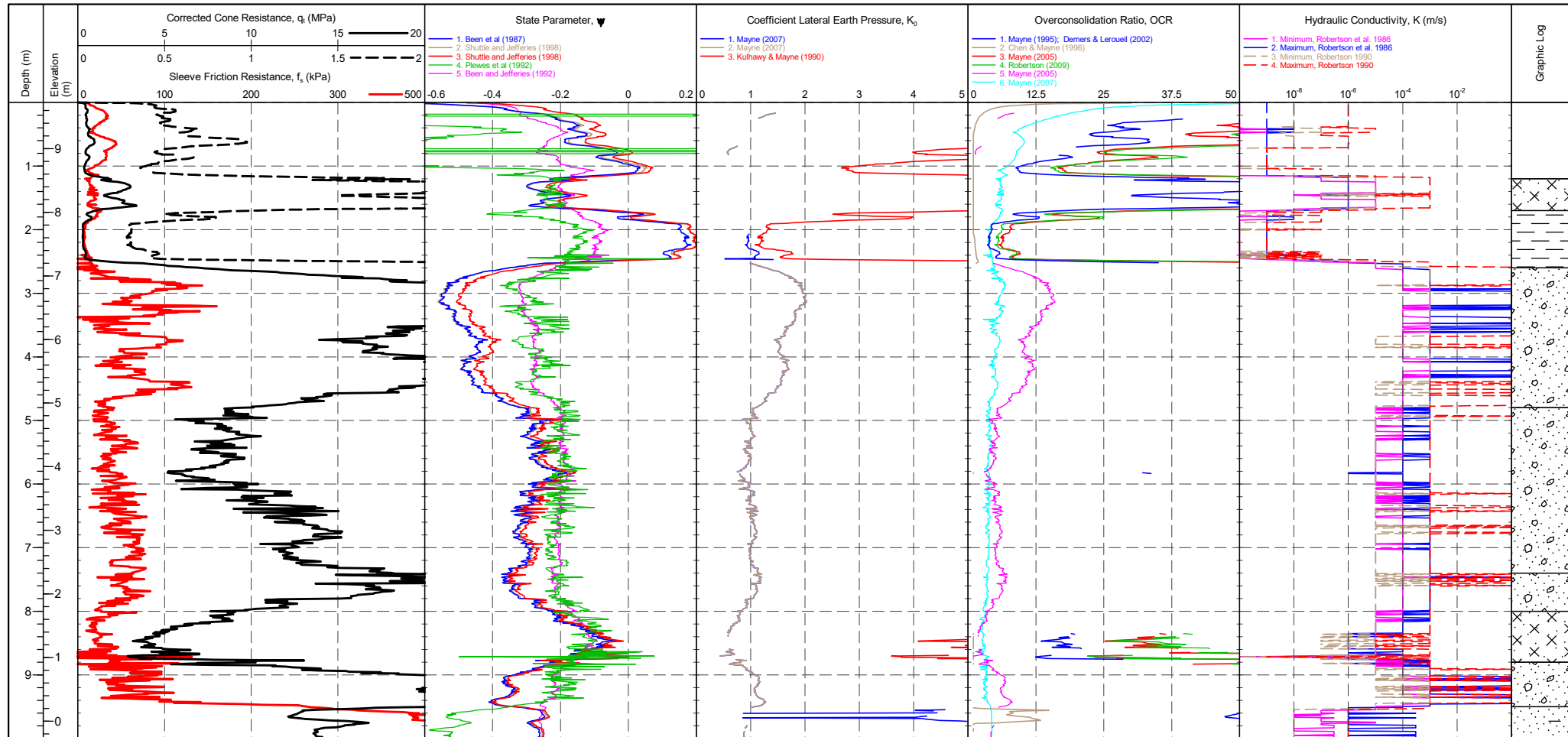
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479259.931 m NORTHING : 354634.486 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>359 mV</td><td>353 mV</td><td>-0.069 MPa</td></tr> <tr><td>Sleeve</td><td>273 mV</td><td>267 mV</td><td>-0.004 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>306 mV</td><td>312 mV</td><td>0.002 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2690 mV</td><td>2663 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	359 mV	353 mV	-0.069 MPa	Sleeve	273 mV	267 mV	-0.004 kPa	Pore Pressure 2	306 mV	312 mV	0.002 kPa	X-Y Inclinator	2690 mV	2663 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID
S3CPT35

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479259.931 m NORTHING : 354634.486 m ELEVATION : 9.727 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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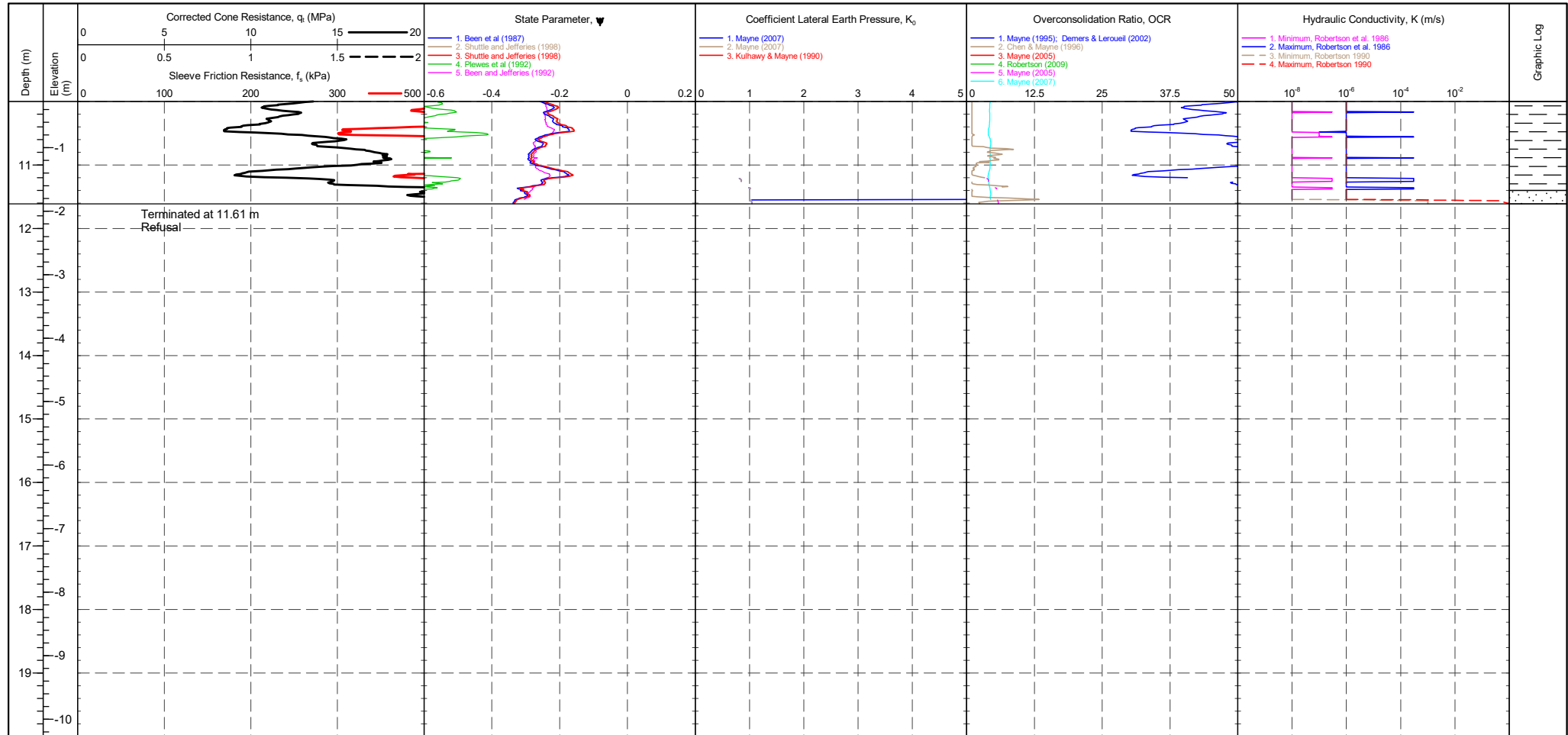


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>359 mV</td> <td>353 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>267 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>306 mV</td> <td>312 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2690 mV</td> <td>2663 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	359 mV	353 mV	-0.069 MPa	Sleeve	273 mV	267 mV	-0.004 kPa	Pore Pressure 2	306 mV	312 mV	0.002 kPa	X-Y Inclinator	2690 mV	2663 mV		Groundwater Level Dissipation Test
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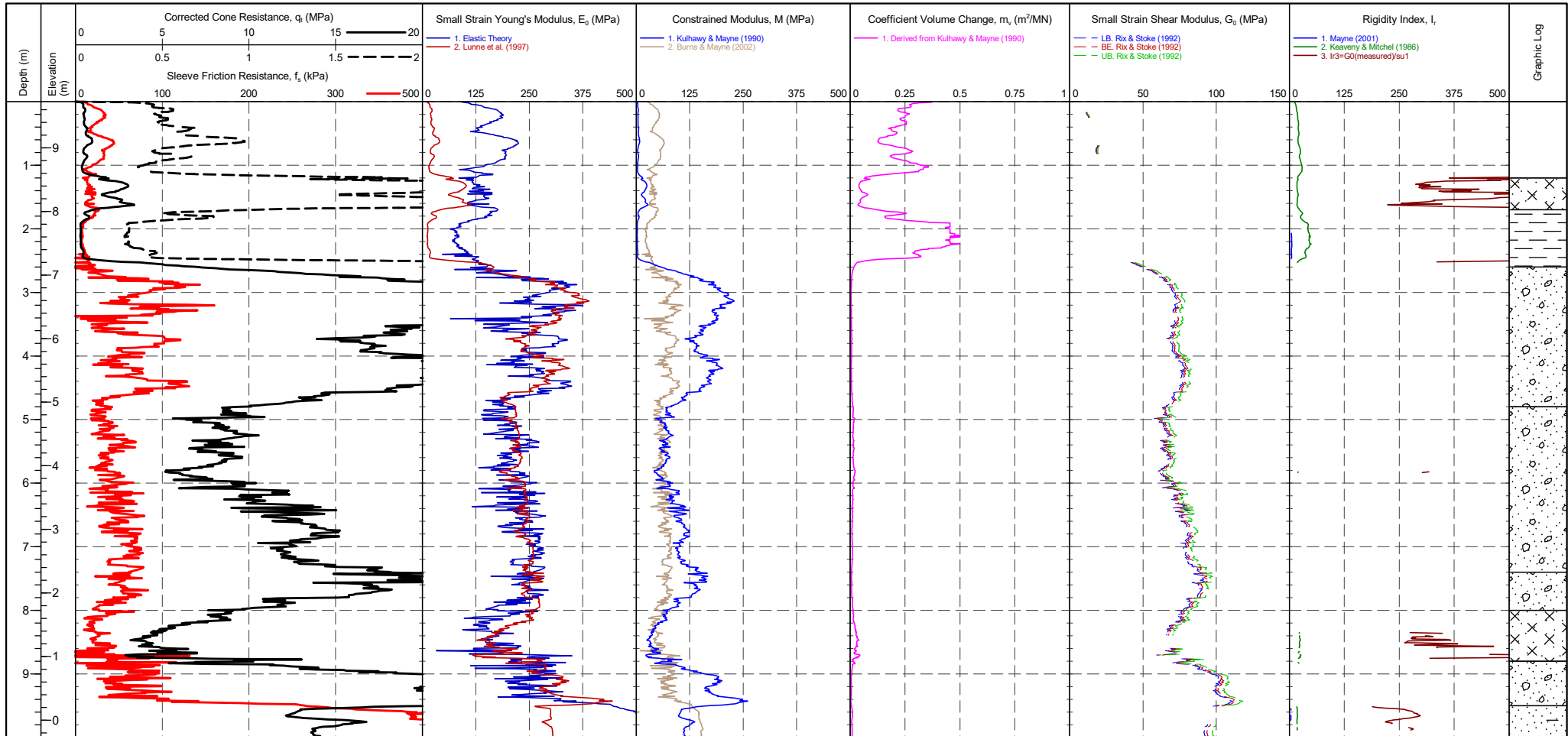


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>359 mV</td> <td>353 mV</td> <td>-0.069 MPa</td> </tr> <tr> <td>Sleeve</td> <td>273 mV</td> <td>267 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>306 mV</td> <td>312 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2690 mV</td> <td>2663 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	359 mV	353 mV	-0.069 MPa	Sleeve	273 mV	267 mV	-0.004 kPa	Pore Pressure 2	306 mV	312 mV	0.002 kPa	X-Y Inclinator	2690 mV	2663 mV		Groundwater Level Dissipation Test
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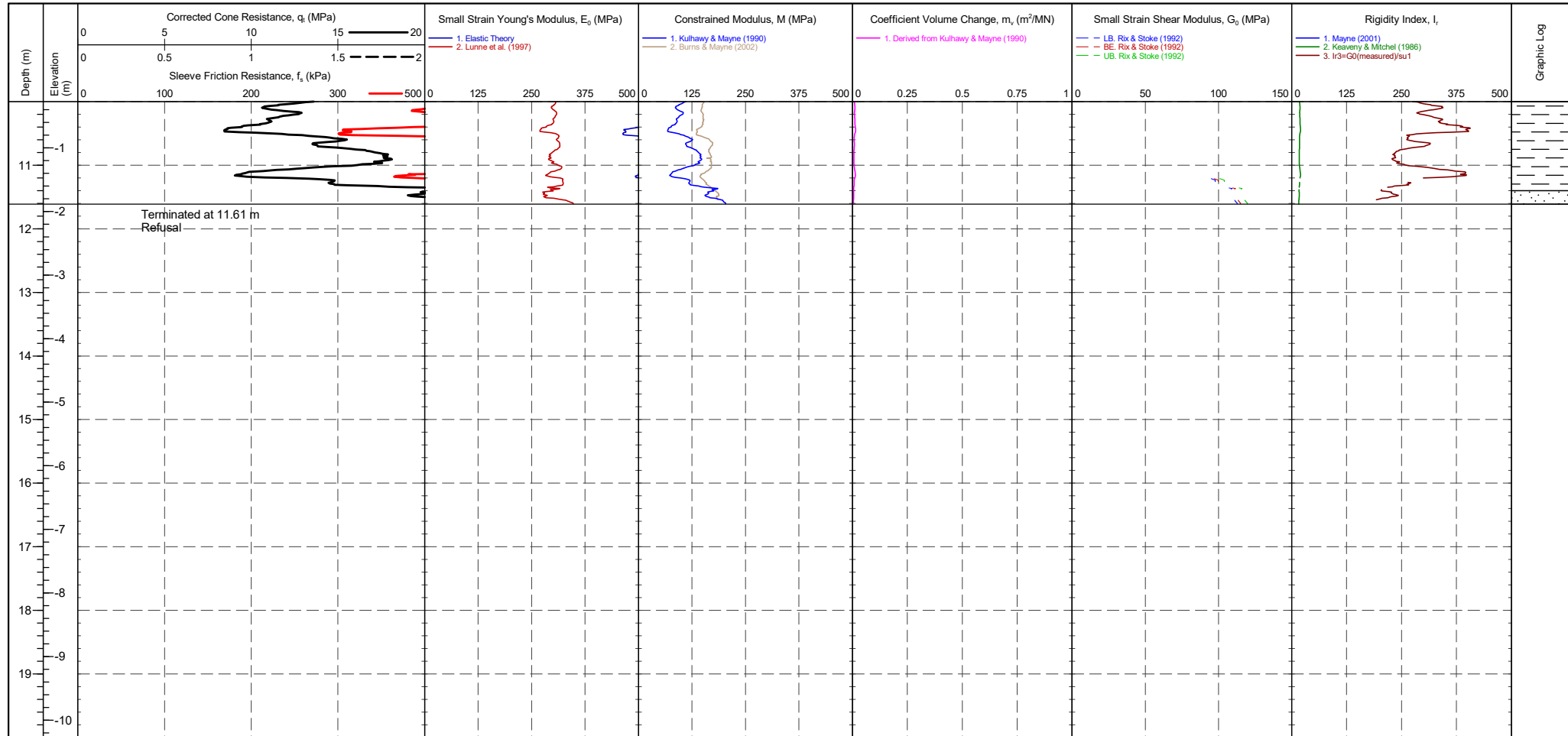
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 359 mV 353 mV -0.069 MPa Sleeve 273 mV 267 mV -0.004 kPa Pore Pressure 2 306 mV 312 mV 0.002 kPa X-Y Inclinator 2690 mV 2663 mV	Groundwater Level Dissipation Test
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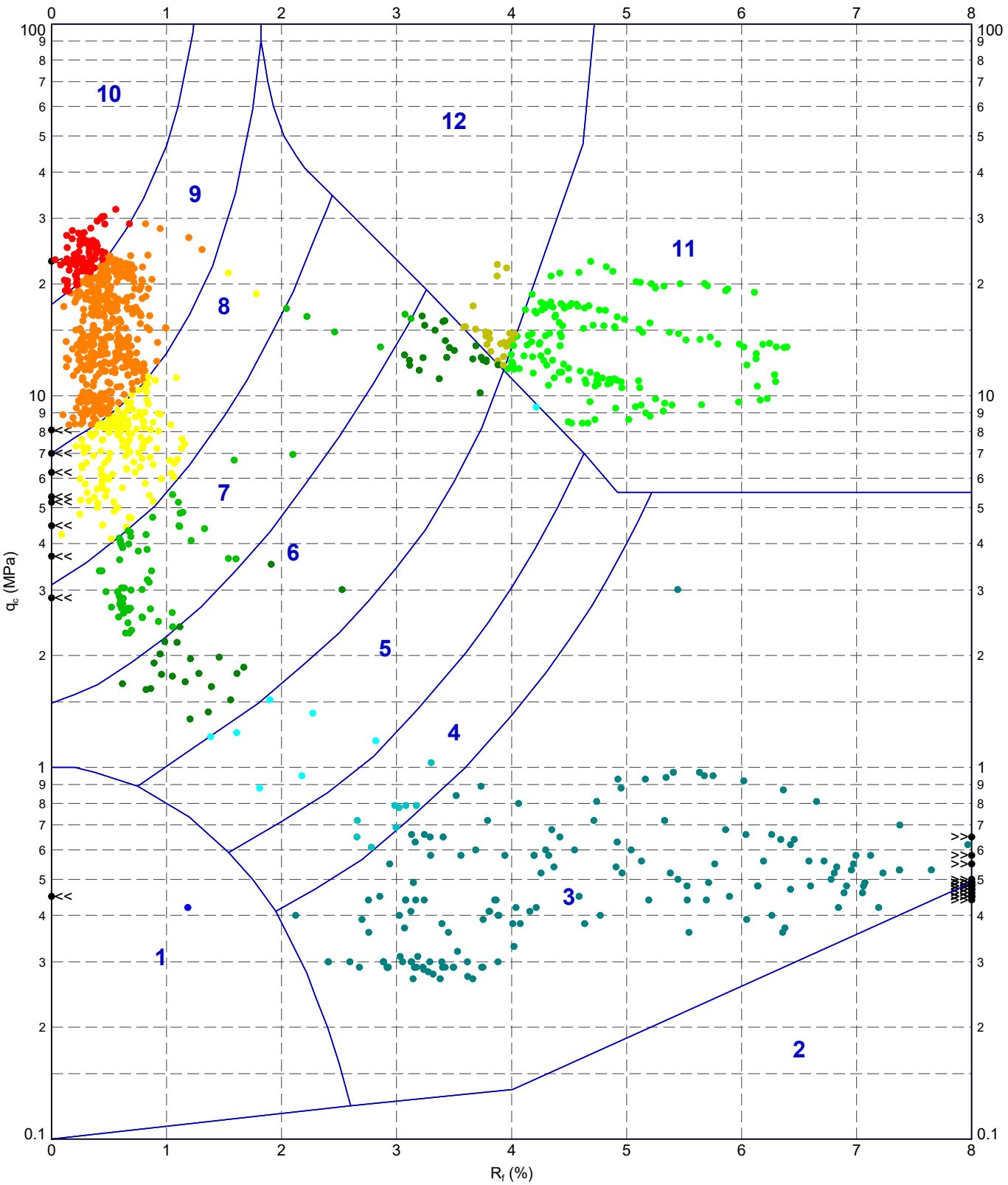
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220699-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile>> 20/05/2023 22:50 10.00.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT35	CHECKED	DATE
		SCALE	DATE
	PROJECT No 1220514	FIGURE No	A4

PointID

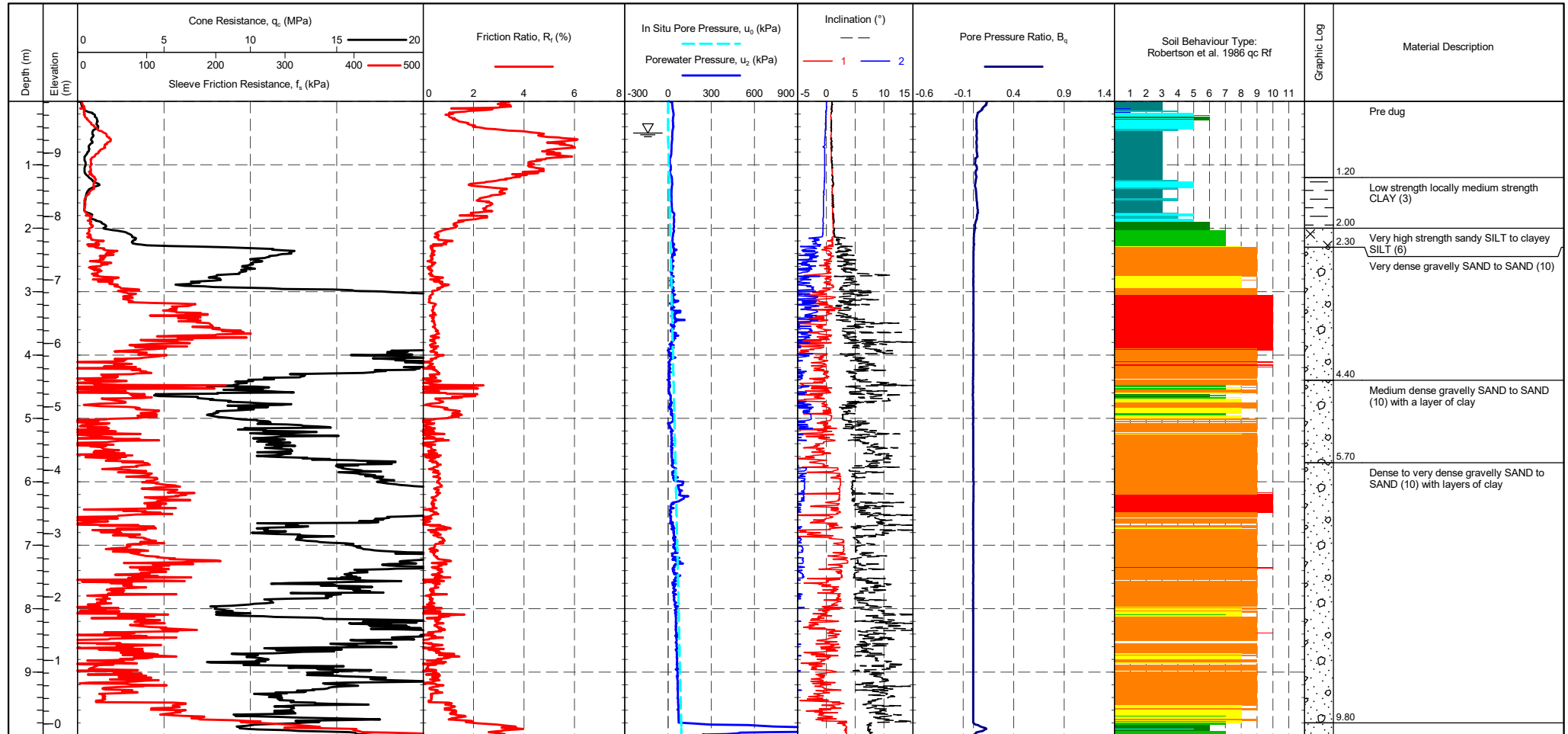
S3CPT36

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479228.234 m
 NORTHING : 354619.280 m
 ELEVATION : 9.817 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 2
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CALIBRATION DATE : 24/02/2022
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & DR
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild
 GROUNDWATER DEPTH : Assumed for calculation purposes

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	361 mV	353 mV	-0.092 MPa
Sleeve	276 mV	268 mV	-0.006 kPa
Pore Pressure 2	317 mV	295 mV	-0.006 kPa
X-Y Inclinator	2623 mV	2619 mV	

METHOD: Robertson et al. 1986 qc Rf

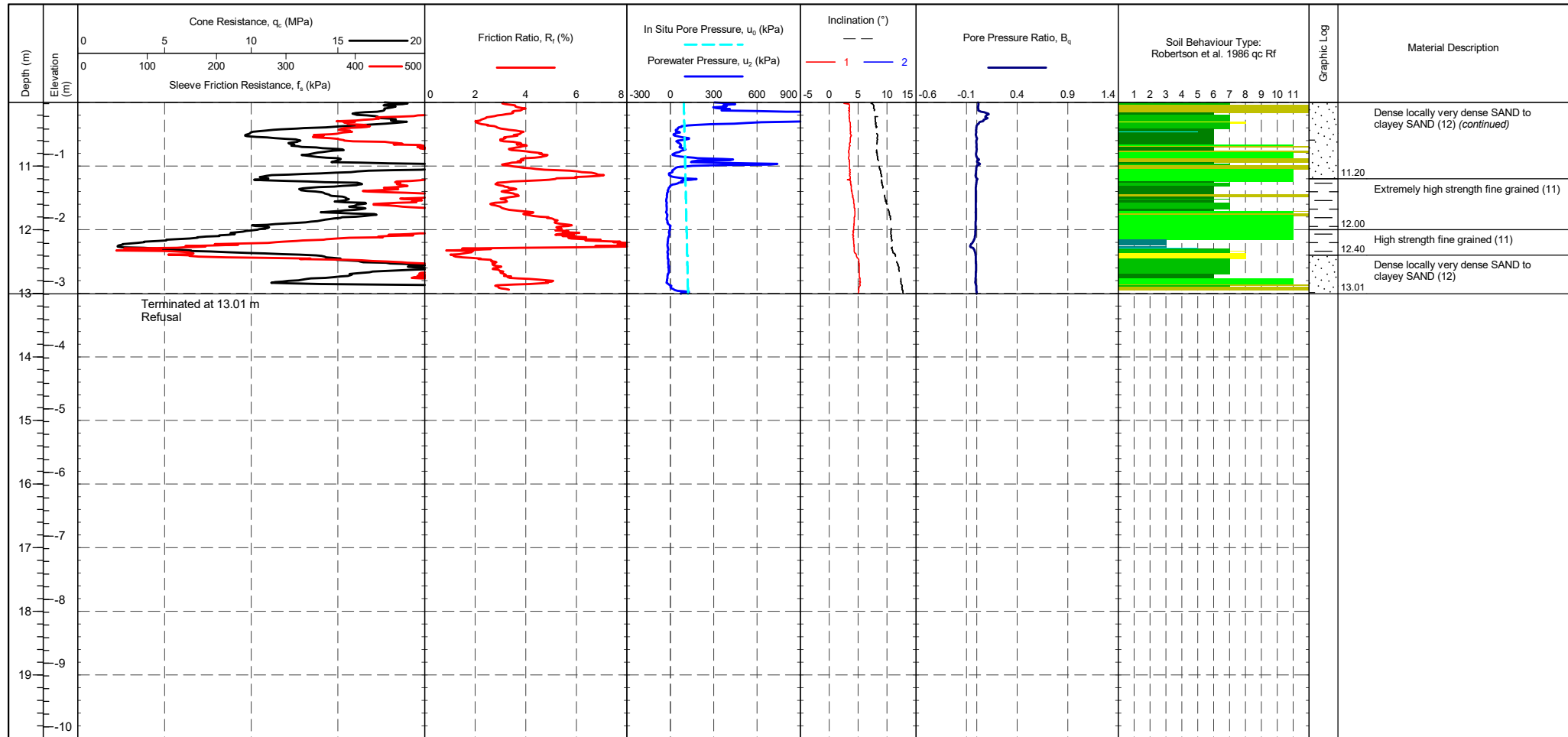
1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND
2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND
3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained
4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND

Groundwater Level

Dissipation Test

PointID	S3CPT36
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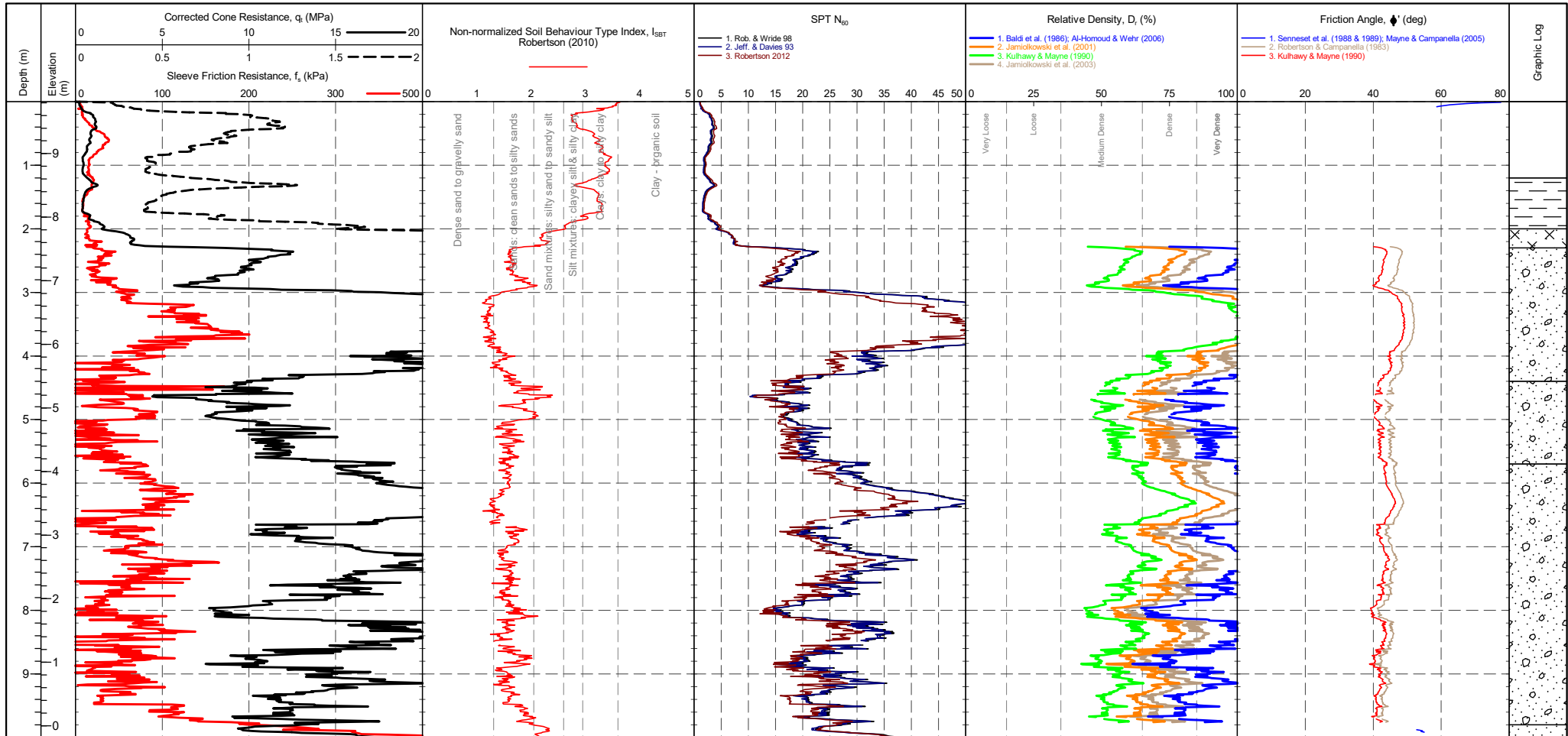
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479228.234 m NORTHING : 354619.280 m ELEVATION : 9.817 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 361 mV 353 mV -0.092 MPa Sleeve 276 mV 268 mV -0.006 kPa Pore Pressure 2 317 mV 295 mV -0.006 kPa X-Y Inclinator 2623 mV 2619 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT36

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479228.234 m NORTHING : 354619.280 m ELEVATION : 9.817 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>361 mV</td> <td>353 mV</td> <td>-0.092 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>268 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>295 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2623 mV</td> <td>2619 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	353 mV	-0.092 MPa	Sleeve	276 mV	268 mV	-0.006 kPa	Pore Pressure 2	317 mV	295 mV	-0.006 kPa	X-Y Inclinometer	2623 mV	2619 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	▽ Groundwater Level Dissipation Test
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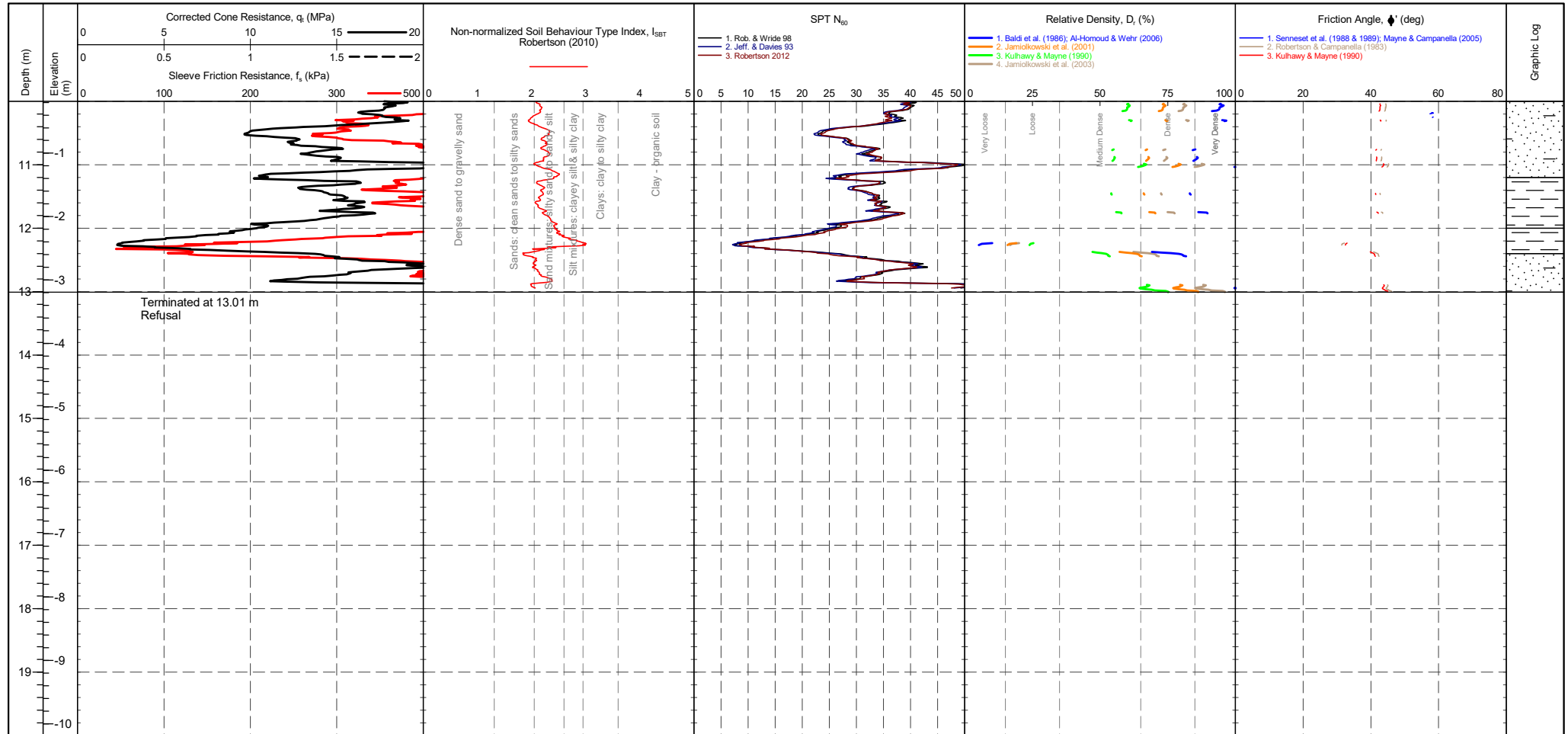
S3CPT36

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479228.234 m
 NORTHING : 354619.280 m
 ELEVATION : 9.817 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 2 OF 2
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 361 mV 353 mV -0.092 MPa Sleeve 276 mV 268 mV -0.006 kPa Pore Pressure 2 317 mV 295 mV -0.006 kPa X-Y Inclinator 2623 mV 2619 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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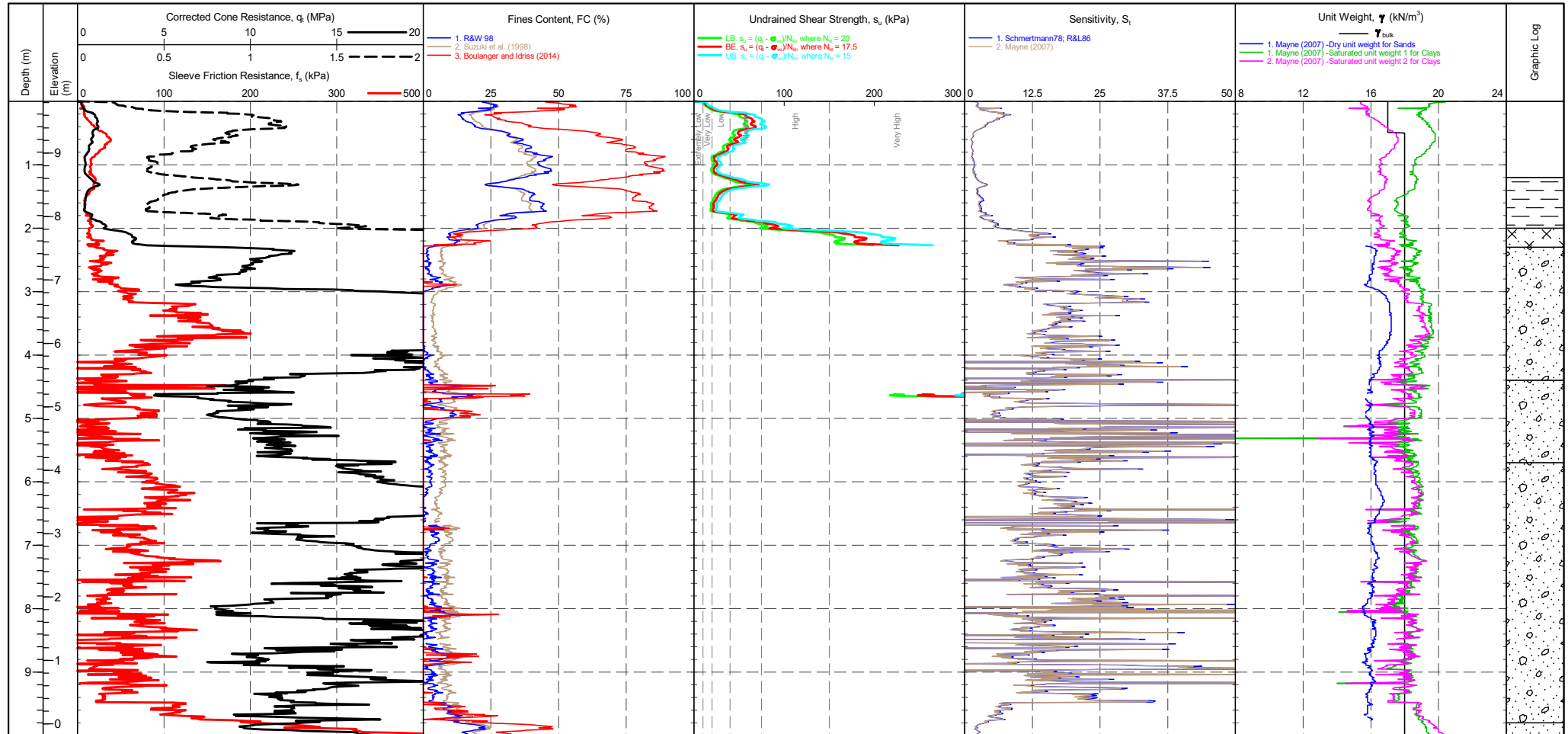
S3CPT36

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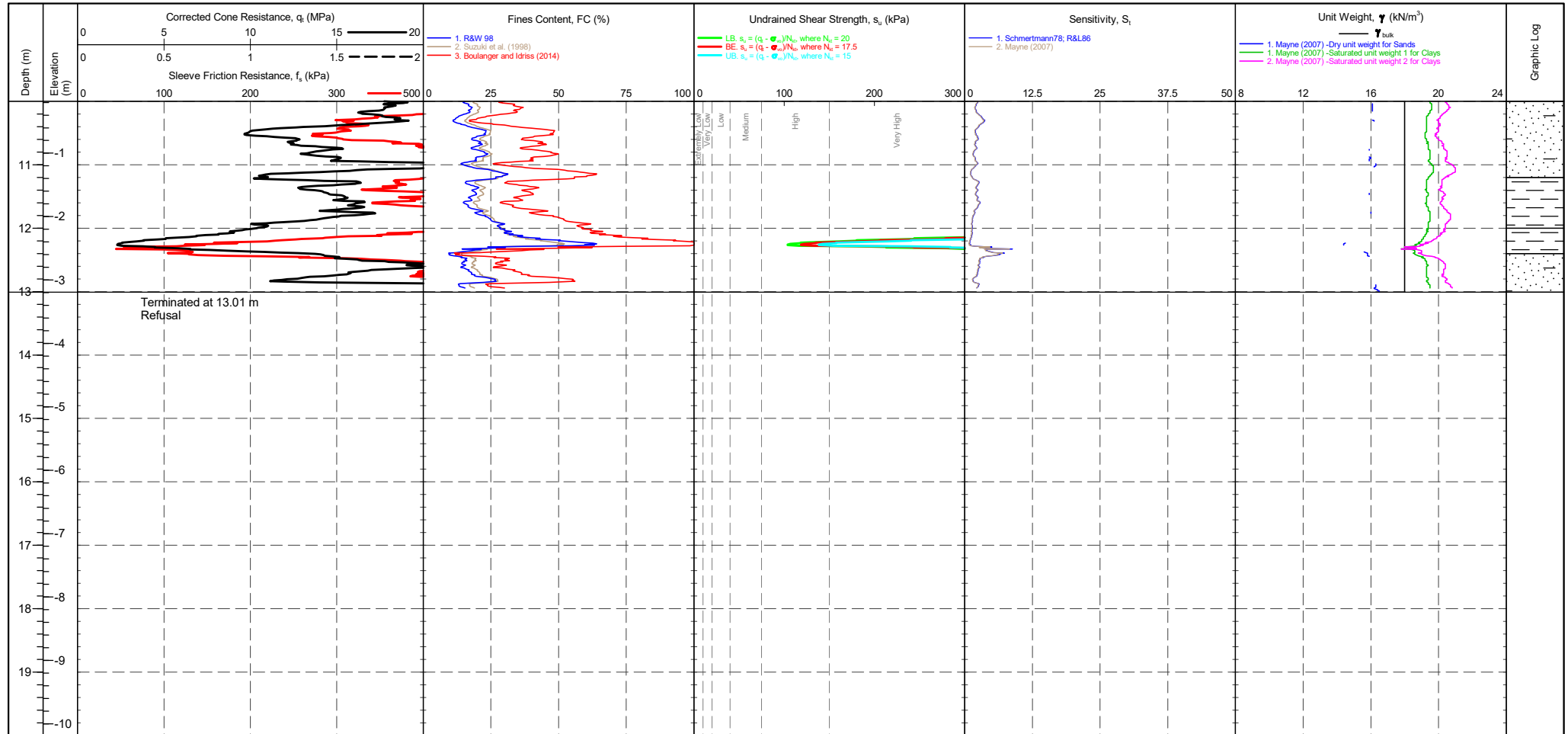


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	CPTU ZERO VALUES Pre Post Difference 361 mV 353 mV -0.092 MPa 276 mV 268 mV -0.006 kPa 317 mV 295 mV -0.006 kPa 2623 mV 2619 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID

S3CPT36

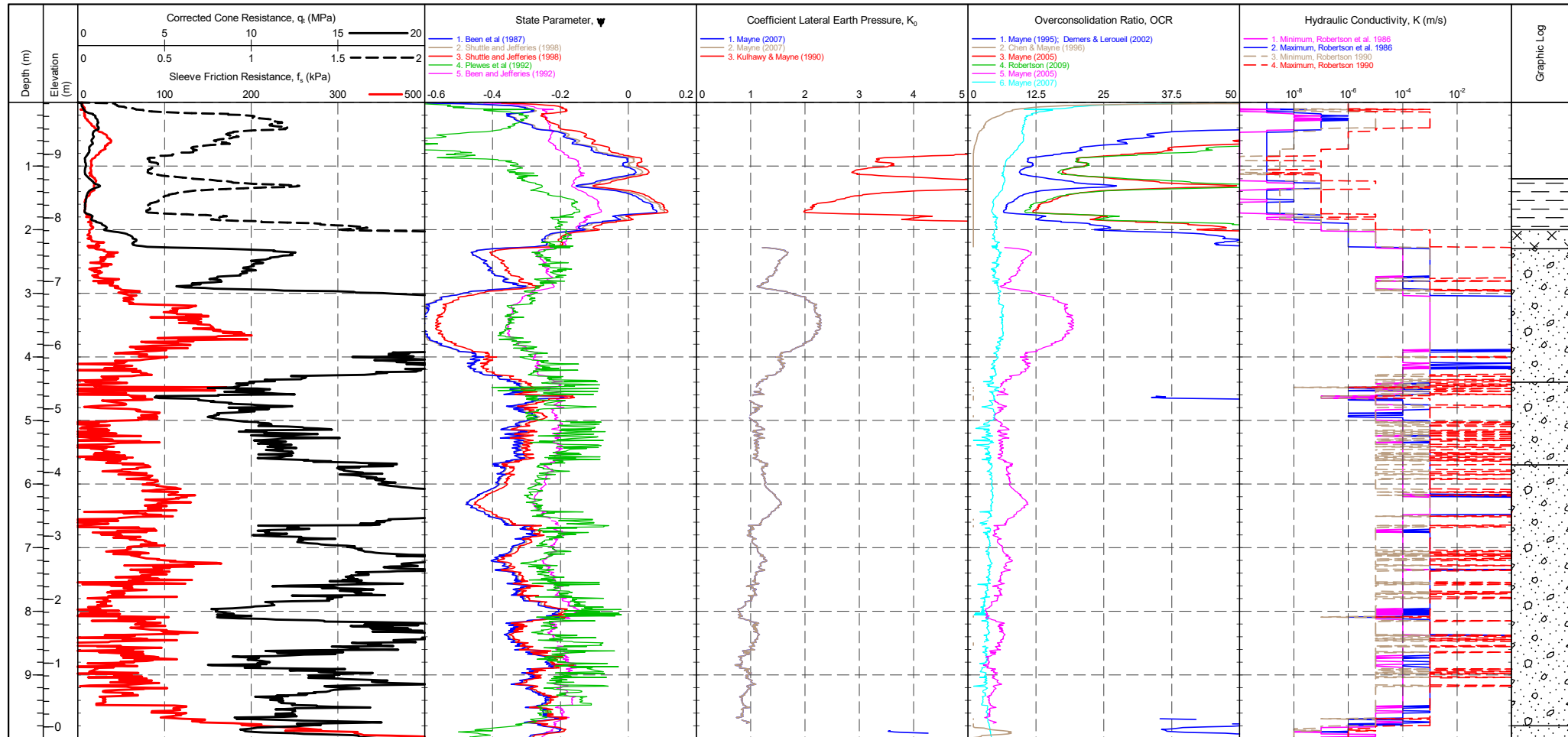
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>361 mV</td><td>353 mV</td><td>-0.092 MPa</td></tr> <tr><td>Sleeve</td><td>276 mV</td><td>268 mV</td><td>-0.006 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>317 mV</td><td>295 mV</td><td>-0.006 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2623 mV</td><td>2619 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	353 mV	-0.092 MPa	Sleeve	276 mV	268 mV	-0.006 kPa	Pore Pressure 2	317 mV	295 mV	-0.006 kPa	X-Y Inclinator	2623 mV	2619 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>s_u (kPa)</th><th>Term based on measurement</th><th>s_u (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479228.234 m NORTHING : 354619.280 m ELEVATION : 9.817 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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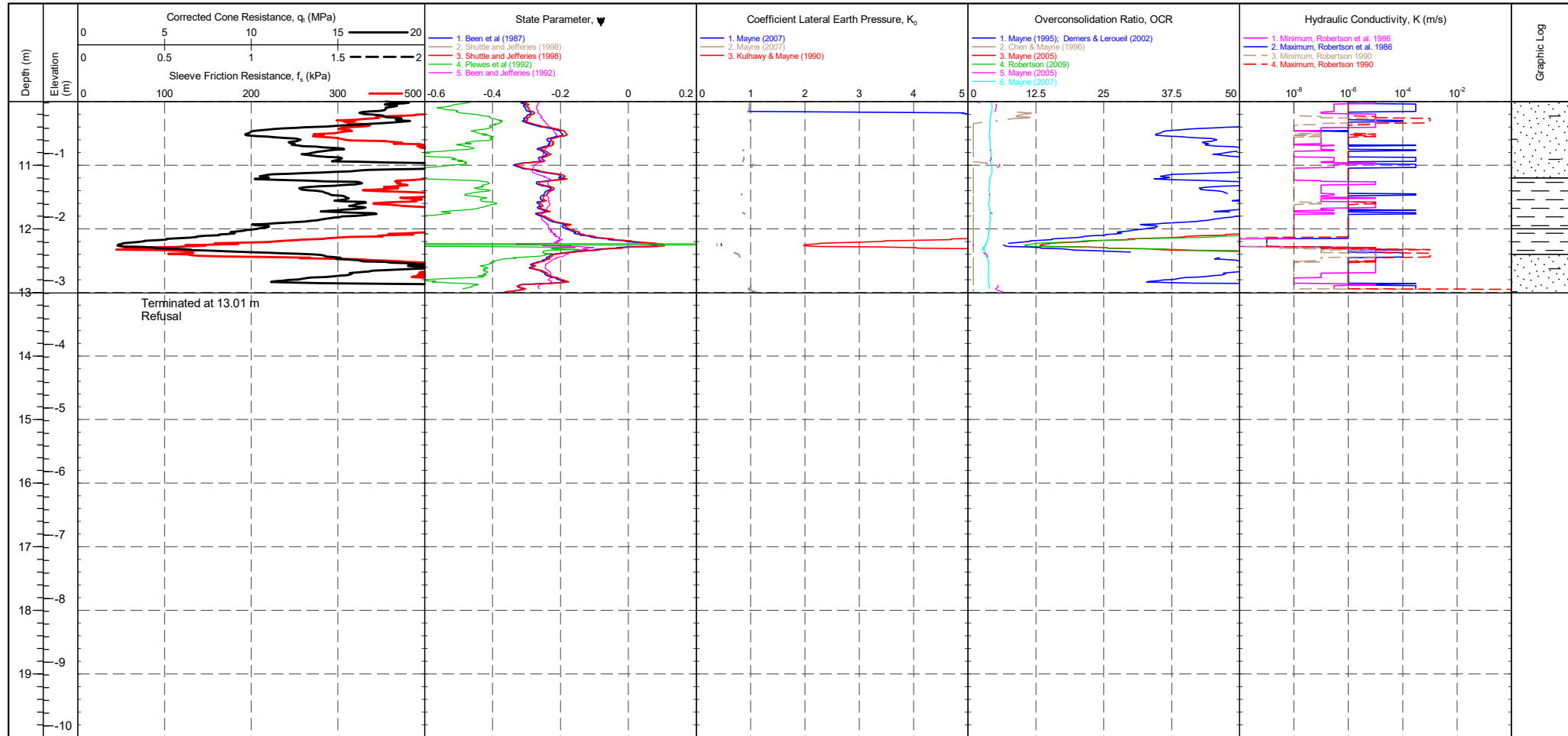


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>361 mV</td> <td>353 mV</td> <td>-0.092 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>268 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>295 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2623 mV</td> <td>2619 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	353 mV	-0.092 MPa	Sleeve	276 mV	268 mV	-0.006 kPa	Pore Pressure 2	317 mV	295 mV	-0.006 kPa	X-Y Inclinator	2623 mV	2619 mV		Groundwater Level Dissipation Test
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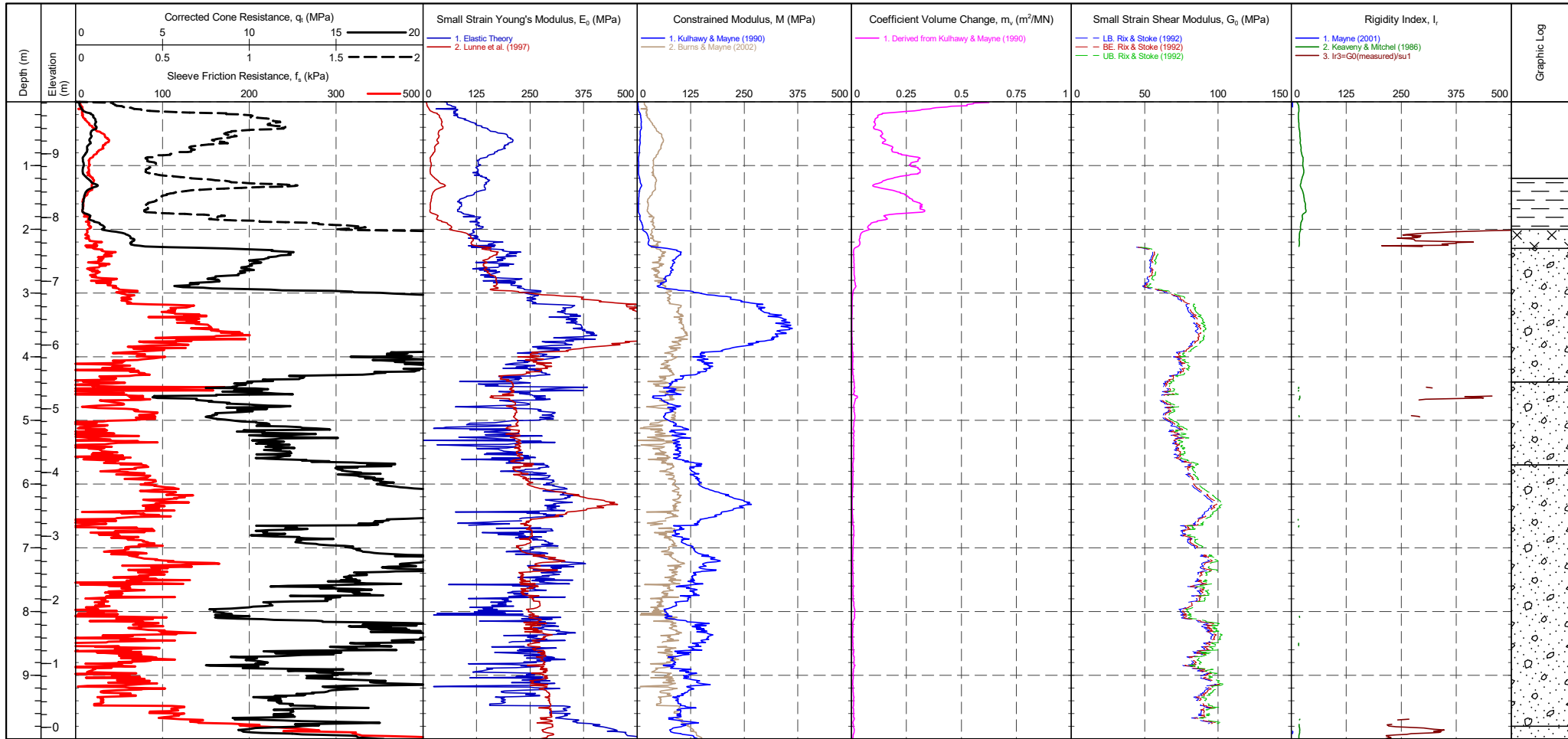
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>361 mV</td> <td>353 mV</td> <td>-0.092 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>268 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>317 mV</td> <td>295 mV</td> <td>-0.006 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2623 mV</td> <td>2619 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	353 mV	-0.092 MPa	Sleeve	276 mV	268 mV	-0.006 kPa	Pore Pressure 2	317 mV	295 mV	-0.006 kPa	X-Y Inclinator	2623 mV	2619 mV		Groundwater Level Dissipation Test
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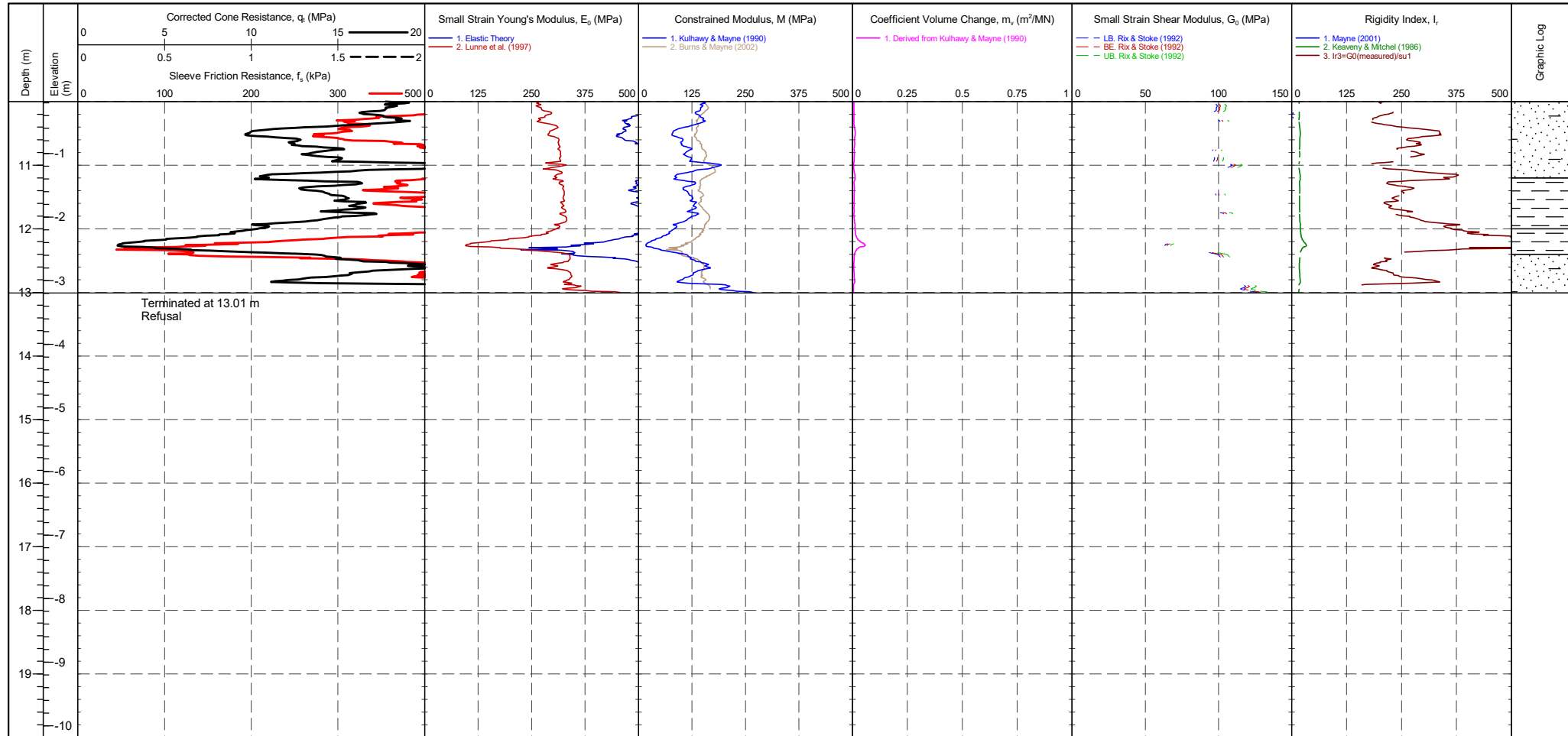
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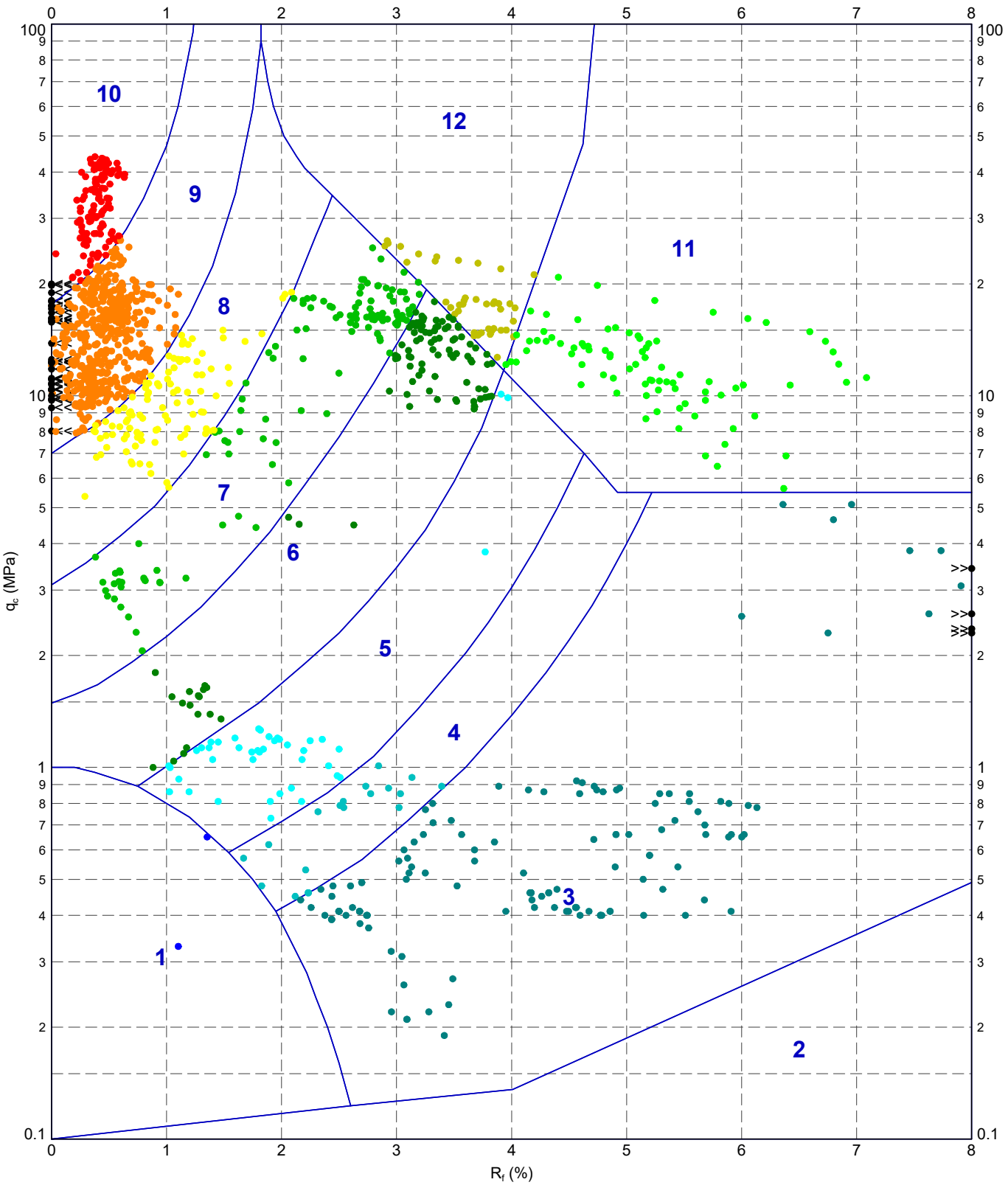
PointID
S3CPT36

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479228.234 m NORTHING : 354619.280 m ELEVATION : 9.817 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>361 mV</td><td>353 mV</td><td>-0.092 MPa</td></tr> <tr><td>Sleeve</td><td>276 mV</td><td>268 mV</td><td>-0.006 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>317 mV</td><td>295 mV</td><td>-0.006 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2623 mV</td><td>2619 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	353 mV	-0.092 MPa	Sleeve	276 mV	268 mV	-0.006 kPa	Pore Pressure 2	317 mV	295 mV	-0.006 kPa	X-Y Inclinator	2623 mV	2619 mV		Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																				
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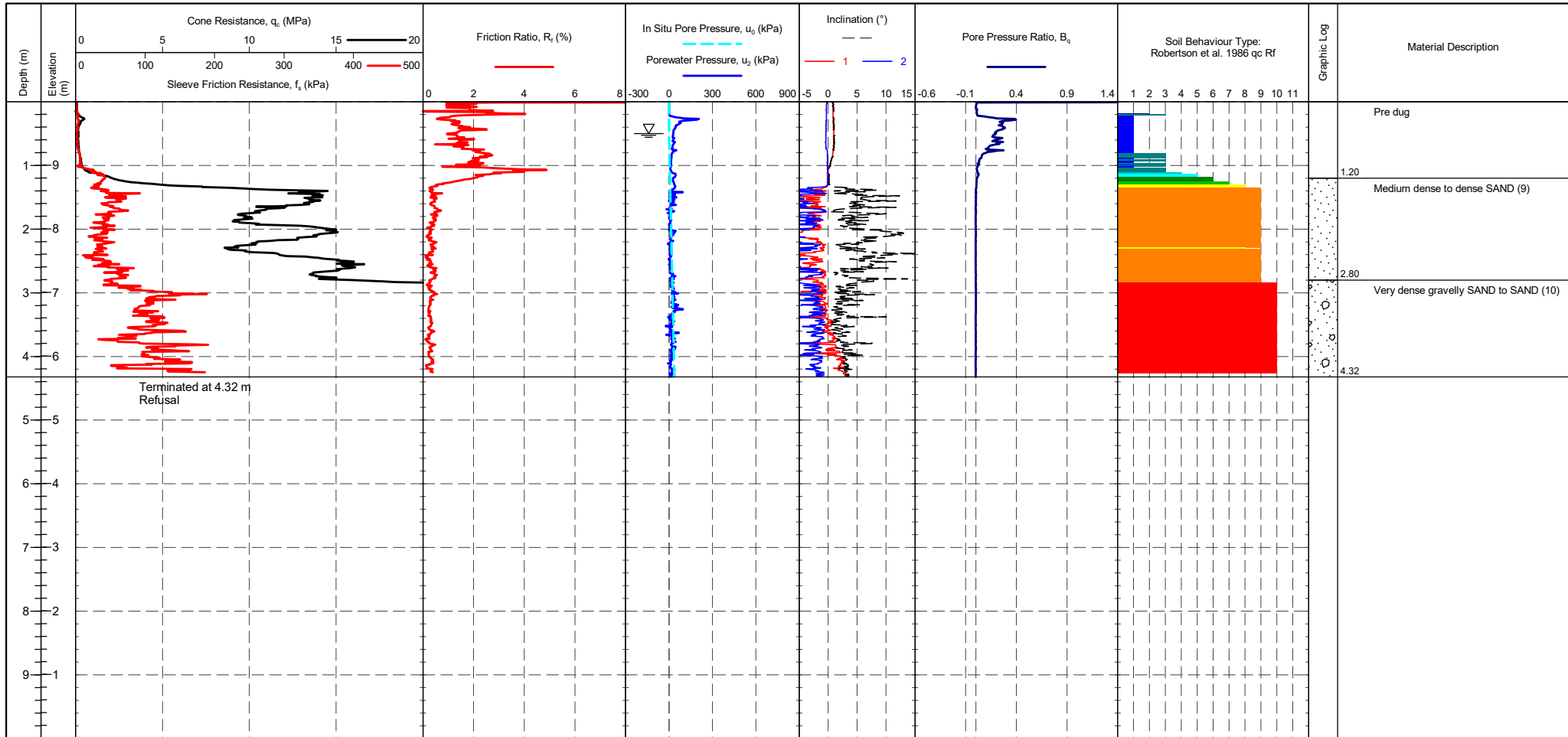
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT36	CHECKED	DATE
		SCALE	DATE
		PROJECT No	FIGURE No
		Not To Scale	A4
		1220514	

PointID	S3CPT37
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer : Pre Post Difference Tip : 365 mV 356 mV -0.103 MPa Sleeve : 276 mV 275 mV -0.001 kPa Pore Pressure 2 : 331 mV 276 mV -0.015 kPa X-Y Inclinometer : 2574 mV 2548 mV	METHOD: Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

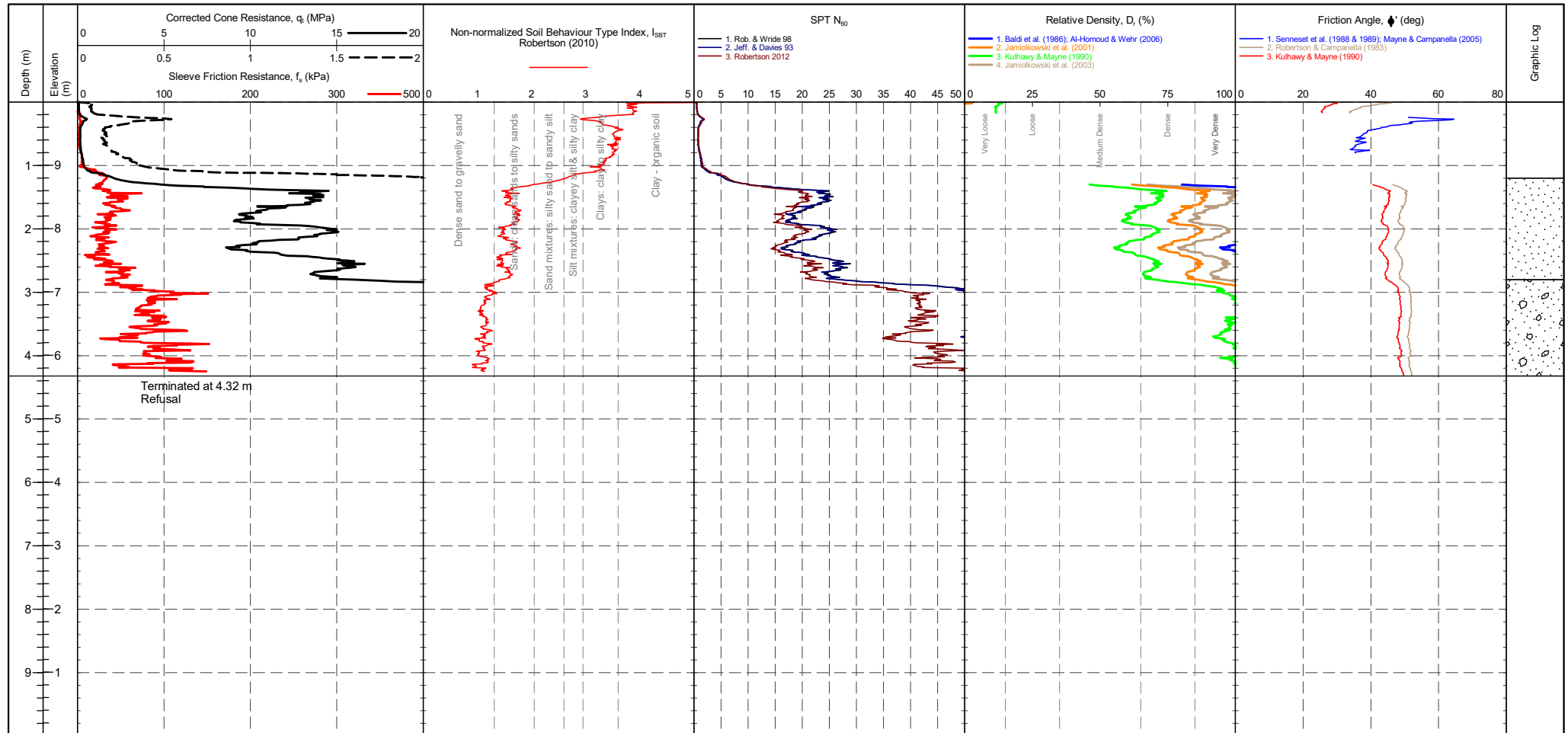
S3CPT37

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479152.856 m
 NORTHING : 354577.240 m
 ELEVATION : 9.995 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 02/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012

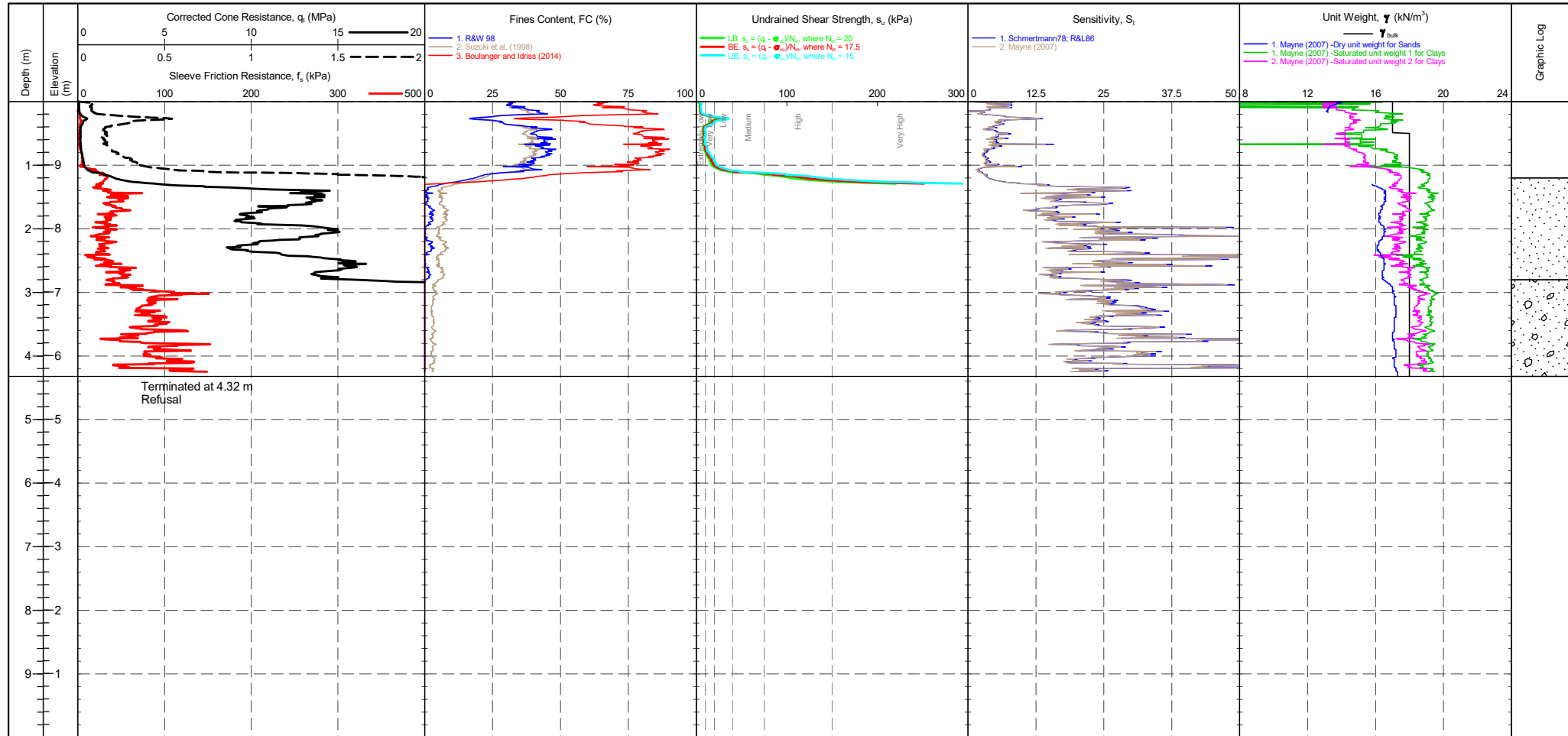


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer : Pre Post Difference Tip : 365 mV 356 mV -0.103 MPa Sleeve : 276 mV 275 mV -0.001 kPa Pore Pressure 2 : 331 mV 276 mV -0.015 kPa X-Y Inclinator : 2574 mV 2548 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)																																			
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PointID

S3CPT37

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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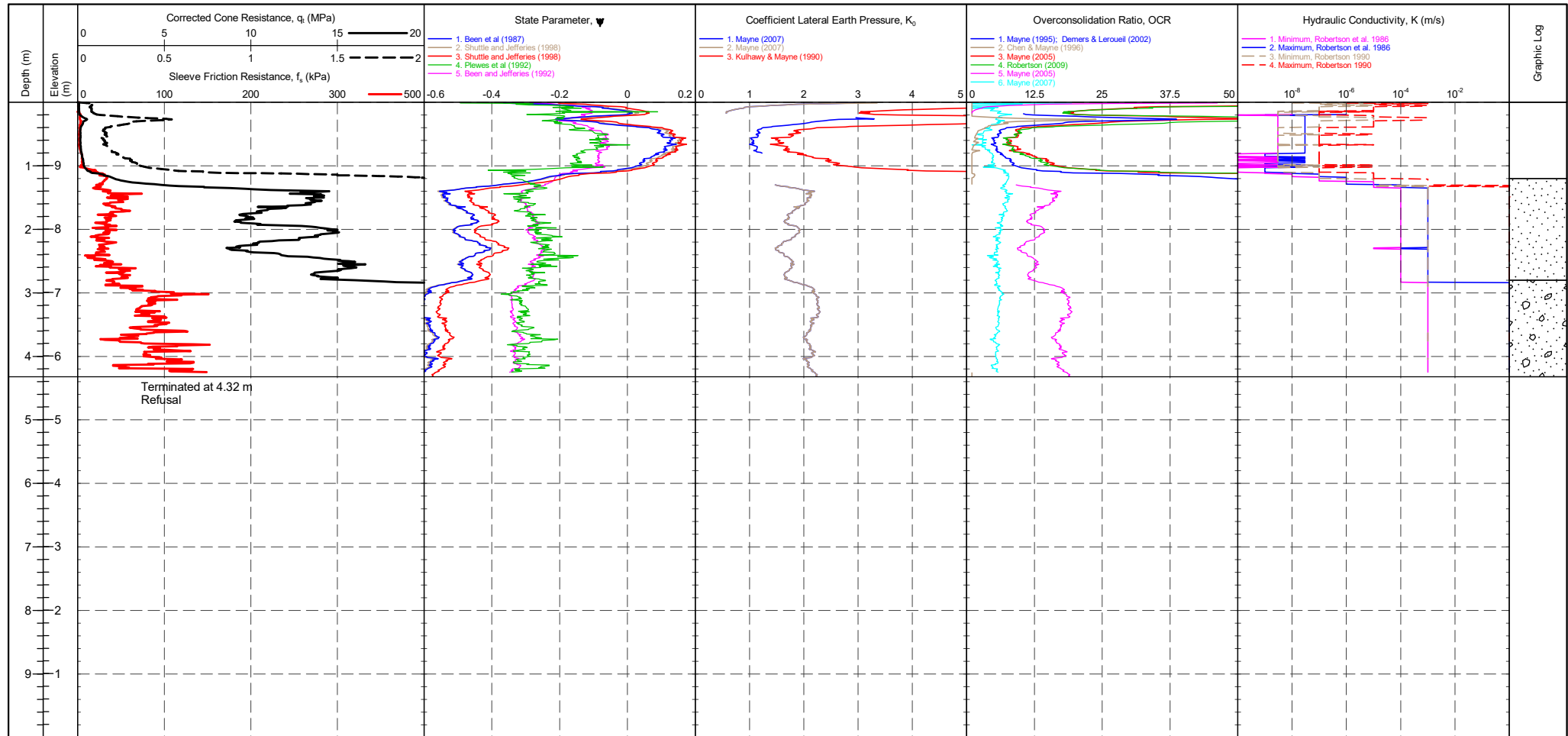


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>365 mV</td><td>356 mV</td><td>-0.103 MPa</td></tr> <tr><td>Sleeve</td><td>276 mV</td><td>275 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>331 mV</td><td>276 mV</td><td>-0.015 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2574 mV</td><td>2548 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	356 mV	-0.103 MPa	Sleeve	276 mV	275 mV	-0.001 kPa	Pore Pressure 2	331 mV	276 mV	-0.015 kPa	X-Y Inclinator	2574 mV	2548 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>s_u (kPa)</th><th>Term based on measurement</th><th>s_u (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID

S3CPT37

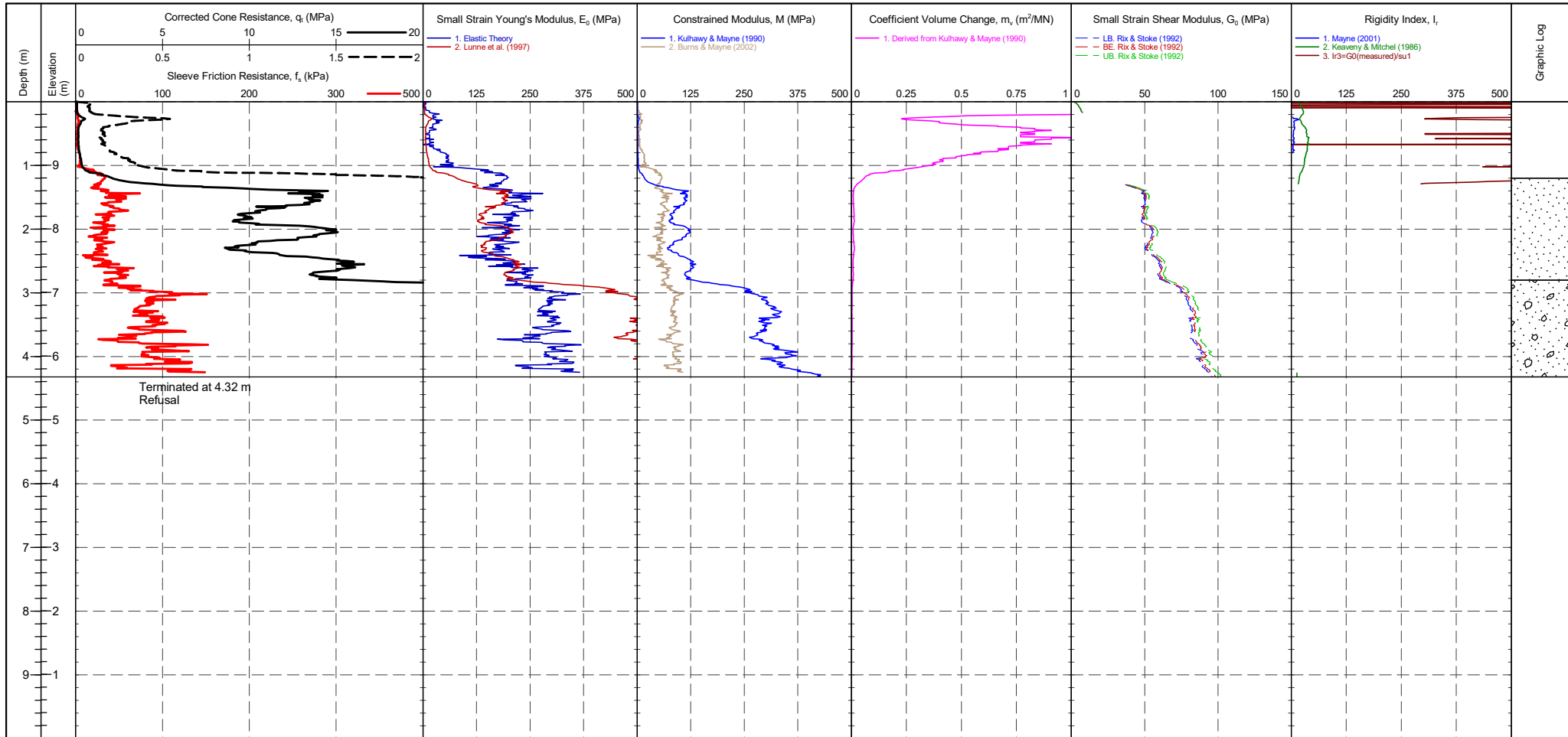
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>365 mV</td> <td>356 mV</td> <td>-0.103 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>275 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>331 mV</td> <td>276 mV</td> <td>-0.015 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2548 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	356 mV	-0.103 MPa	Sleeve	276 mV	275 mV	-0.001 kPa	Pore Pressure 2	331 mV	276 mV	-0.015 kPa	X-Y Inclinator	2574 mV	2548 mV		Groundwater Level Dissipation Test
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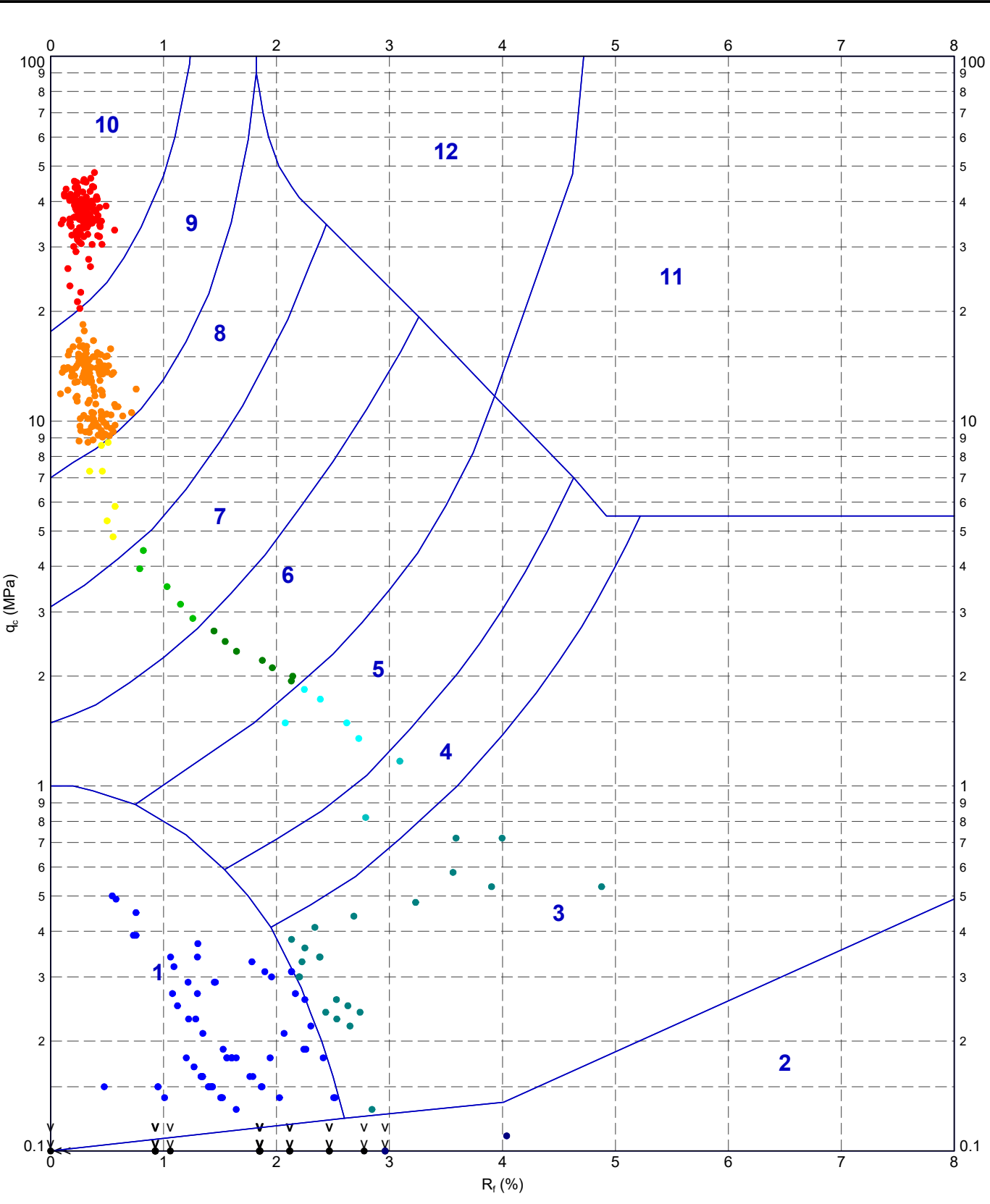
PointID
S3CPT37

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>365 mV</td> <td>356 mV</td> <td>-0.103 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>275 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>331 mV</td> <td>276 mV</td> <td>-0.015 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2548 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	365 mV	356 mV	-0.103 MPa	Sleeve	276 mV	275 mV	-0.001 kPa	Pore Pressure 2	331 mV	276 mV	-0.015 kPa	X-Y Inclinator	2574 mV	2548 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LUB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:53 10.03.00.09 Dalgard Lab and In Situ Tool - In Situ SI 2.02.0 2017-07-10



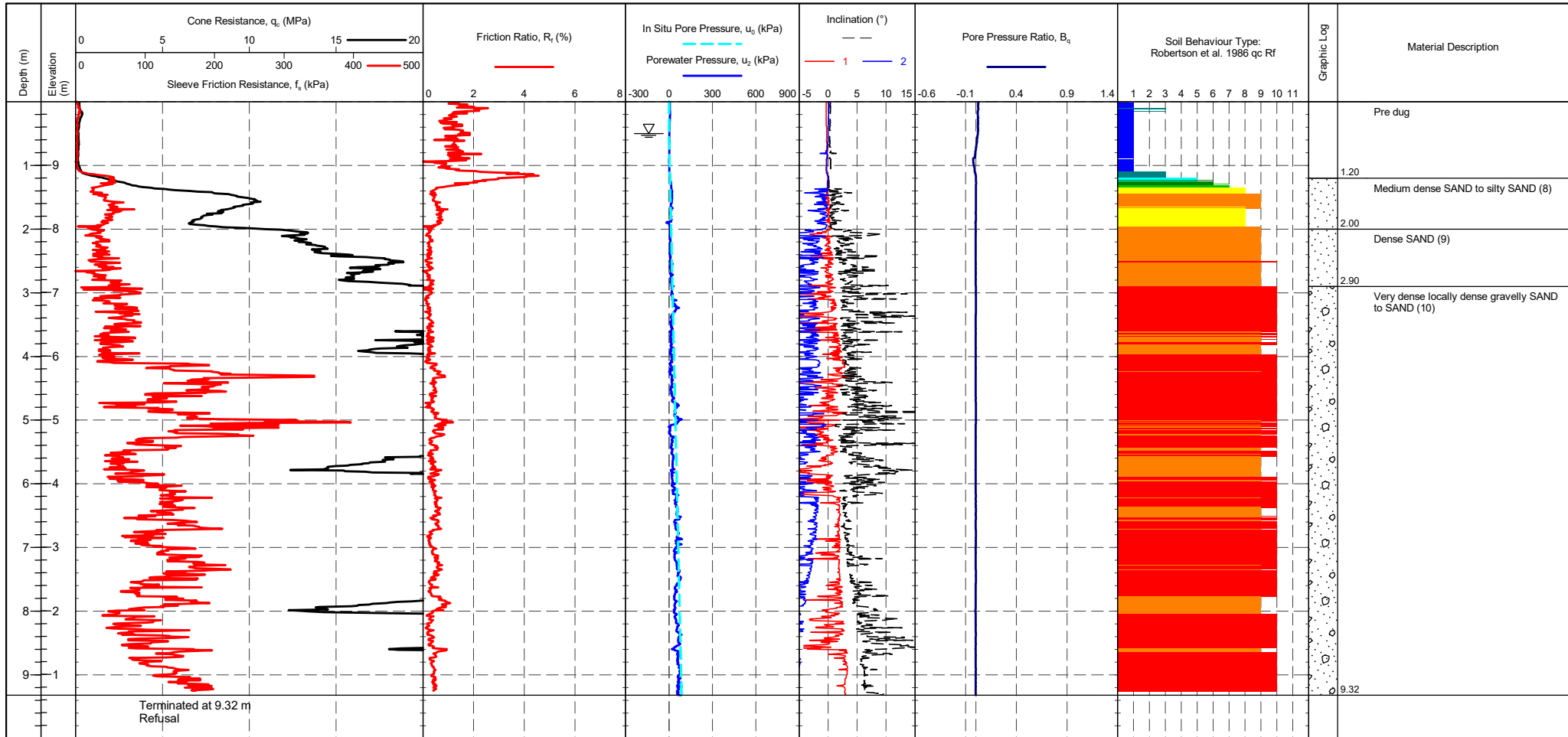
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT37	CHECKED	DATE
		SCALE	FIGURE No
		PROJECT No 1220514	A4

PointID	S3CPT37A
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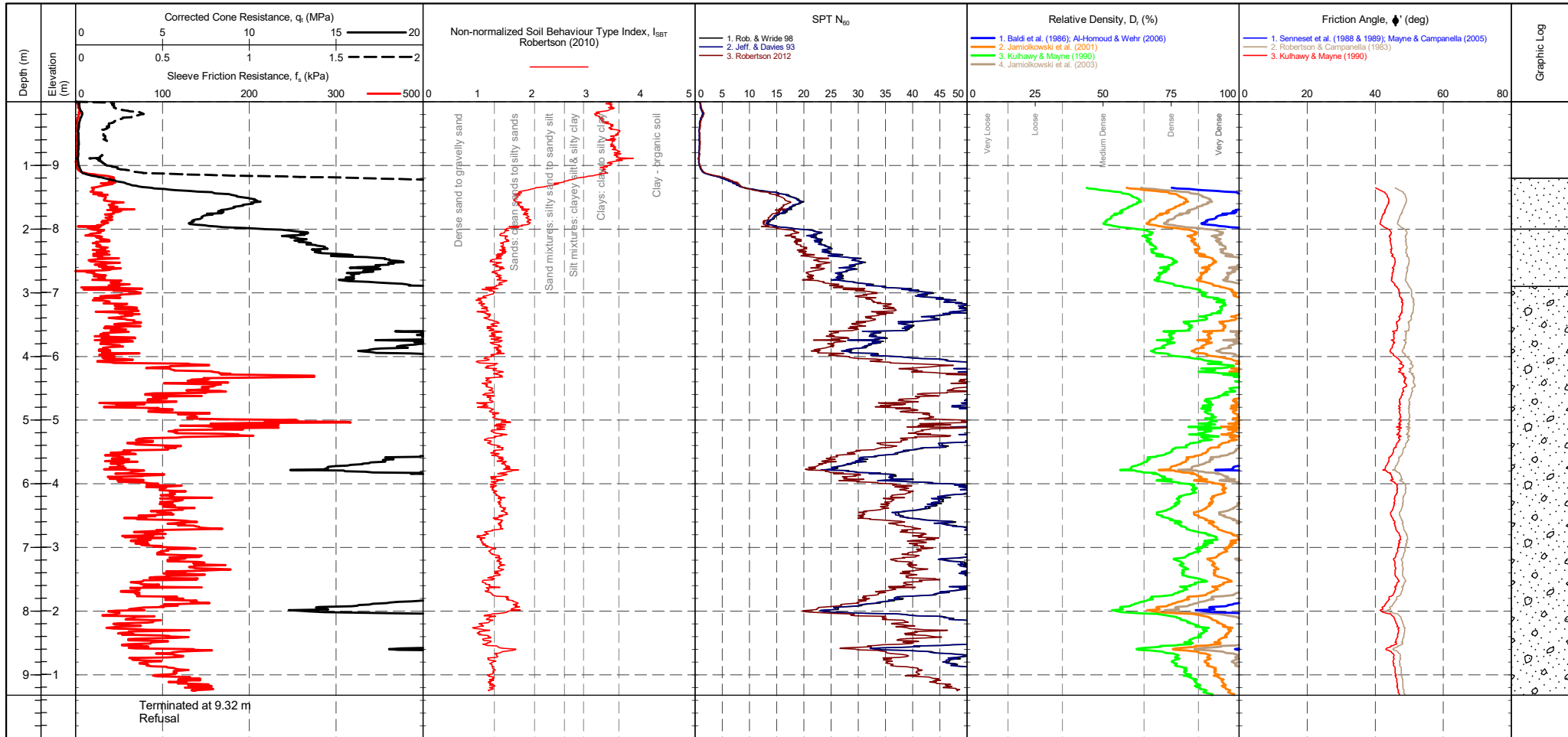
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: 363 mV / 355 mV / -0.092 MPa Sleeve: 276 mV / 272 mV / -0.003 kPa Pore Pressure 2: 318 mV / 309 mV / -0.002 kPa X-Y Inclinator: 2533 mV / 2500 mV	METHOD : Robertson et al. 1986 qc Rf	Groundwater Level Dissipation Test
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PointID
S3CPT37A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip 363 mV 355 mV -0.092 MPa Sleeve 276 mV 272 mV -0.003 kPa Pore Pressure 2 318 mV 309 mV -0.002 kPa X-Y Inclinator 2533 mV 2500 mV	CPTU ZERO VALUES Pre Post Difference Tip 363 mV 355 mV -0.092 MPa Sleeve 276 mV 272 mV -0.003 kPa Pore Pressure 2 318 mV 309 mV -0.002 kPa X-Y Inclinator 2533 mV 2500 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 Description SBT Index, I_c Description SPT N value, NSPT Description Relative Density D_r (%) Clays 2.95-3.60 Very Loose 0 - 4 Very Loose 0 - 15 Silt mixtures 2.60-2.95 Loose 4 - 10 Loose 15 - 35 Sand mixtures 2.05-2.60 Medium Dense 10 - 30 Medium Dense 35 - 65 Sands 1.31-2.05 Dense 30 - 50 Dense 65 - 85 Gravelly sand <1.31 Very Dense >50 Very Dense >85	Groundwater Level Dissipation Test
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PointID

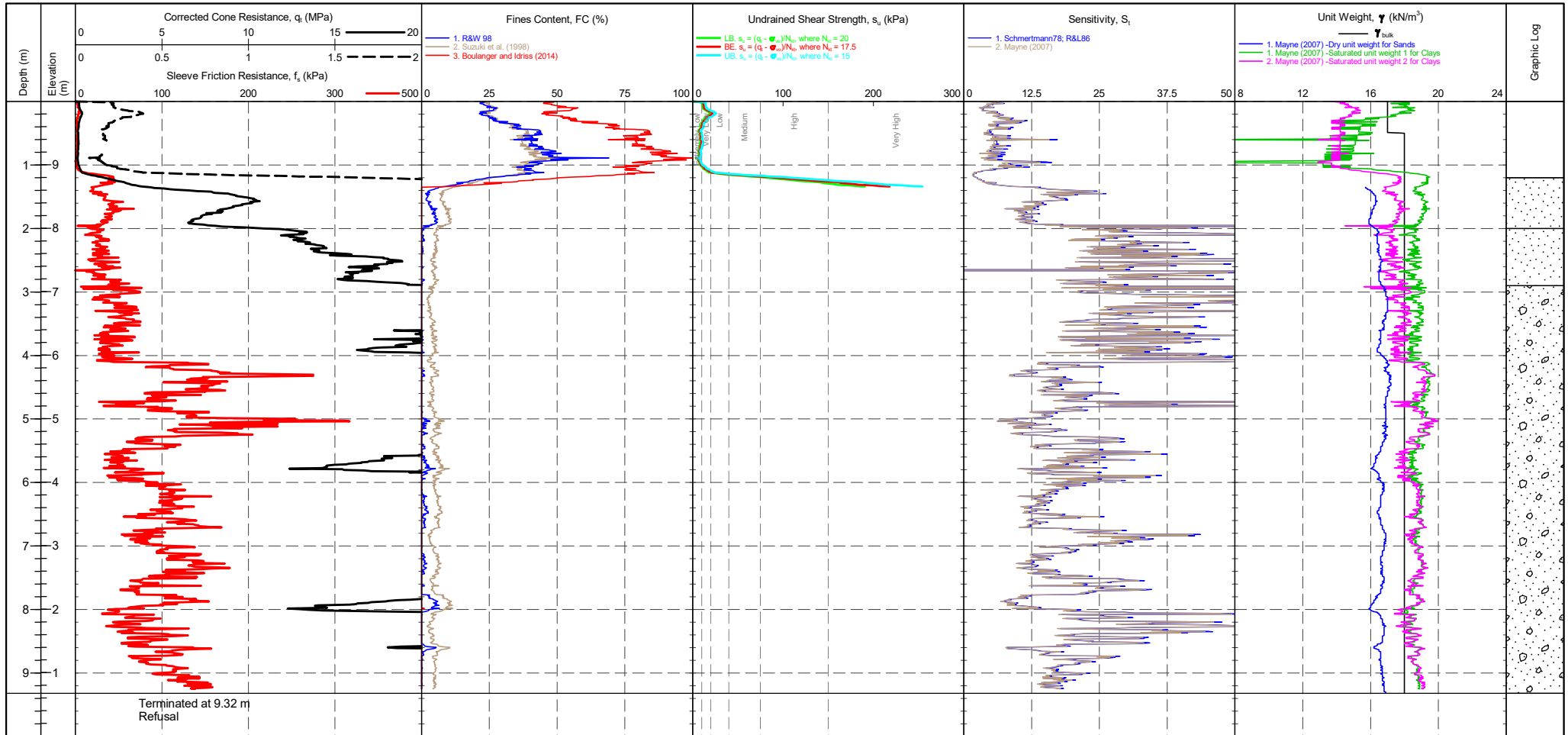
S3CPT37A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479152.856 m
 NORTHING : 354577.240 m
 ELEVATION : 9.995 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

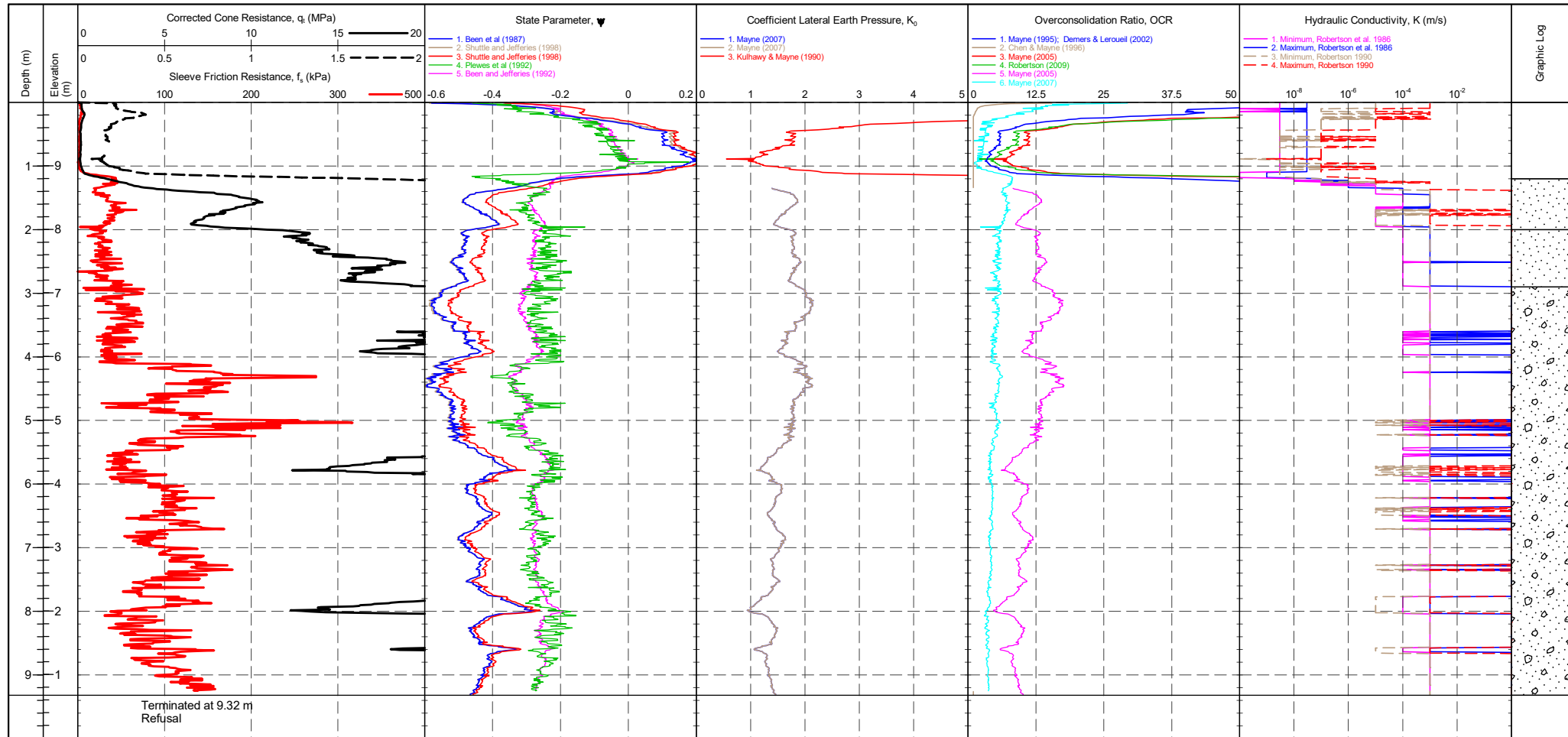
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 02/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11				▽ Groundwater Level ▮ Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 363 mV 276 mV 318 mV 2533 mV	Post 355 mV 272 mV 309 mV 2500 mV	Difference -0.092 MPa -0.003 kPa -0.002 kPa	Term based on measurement Extremely low strength Very low strength Low strength	s_u (kPa) <10 10-20 20-40	Term based on measurement Medium strength High strength Very high strength Extremely high strength	

PointID
S3CPT37A

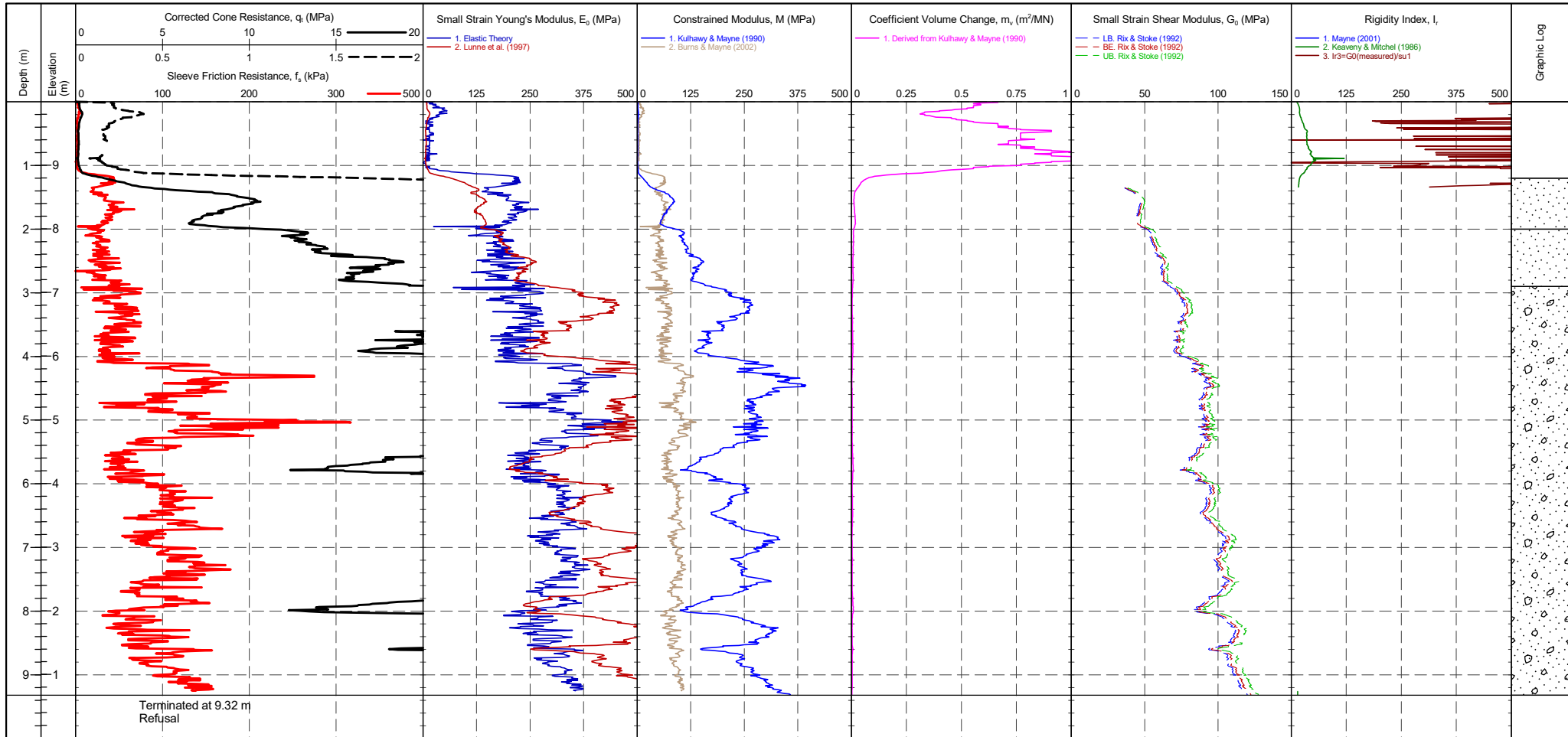
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>363 mV</td> <td>355 mV</td> <td>-0.092 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>272 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>318 mV</td> <td>309 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2533 mV</td> <td>2500 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	363 mV	355 mV	-0.092 MPa	Sleeve	276 mV	272 mV	-0.003 kPa	Pore Pressure 2	318 mV	309 mV	-0.002 kPa	X-Y Inclinator	2533 mV	2500 mV		Groundwater Level Dissipation Test
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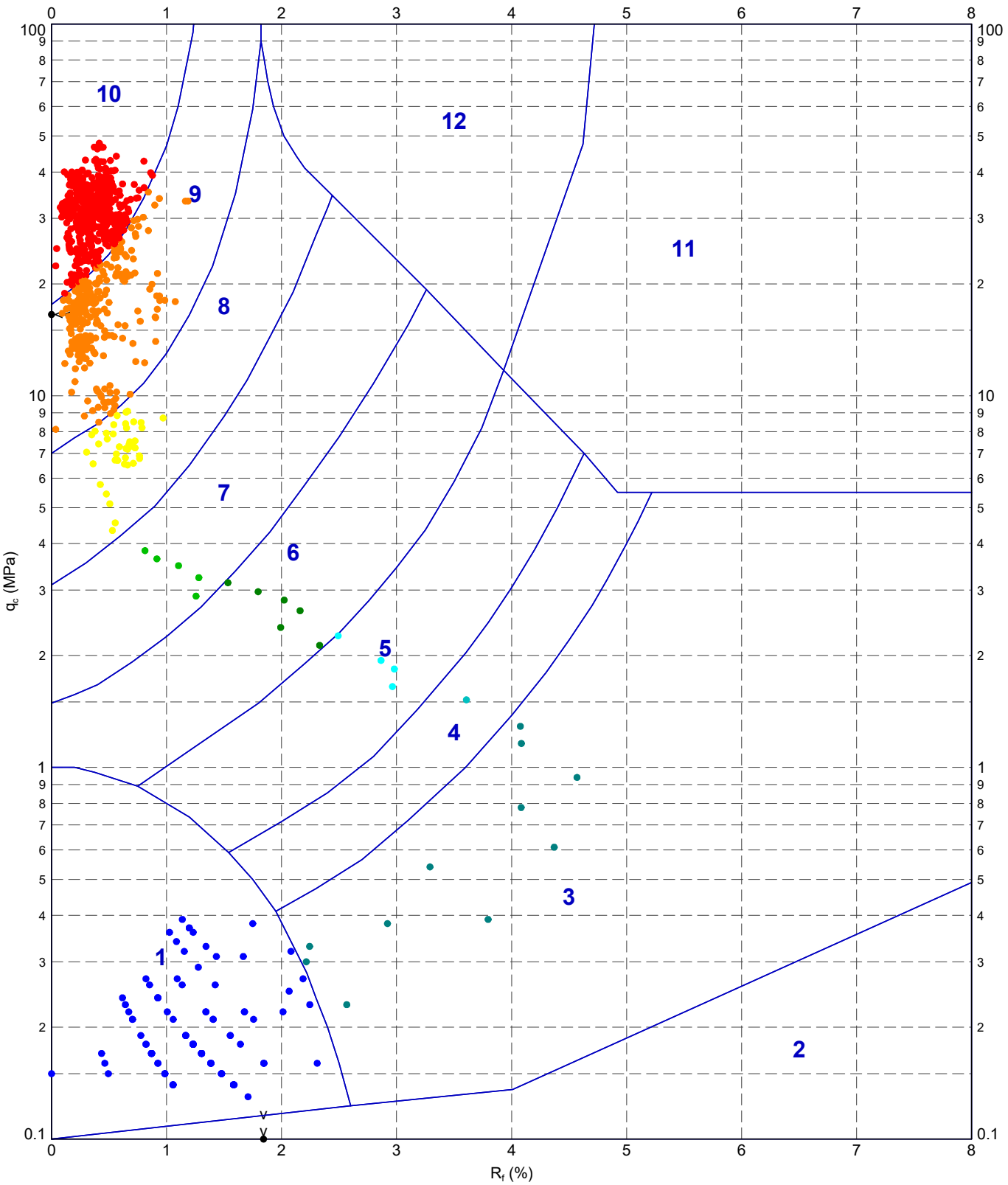
PointID
S3CPT37A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479152.856 m NORTHING : 354577.240 m ELEVATION : 9.995 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 02/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>363 mV</td> <td>355 mV</td> <td>-0.092 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>272 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>318 mV</td> <td>309 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2533 mV</td> <td>2500 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	363 mV	355 mV	-0.092 MPa	Sleeve	276 mV	272 mV	-0.003 kPa	Pore Pressure 2	318 mV	309 mV	-0.002 kPa	X-Y Inclinometer	2533 mV	2500 mV		Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:55 10.03.00.09 Dalgid Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



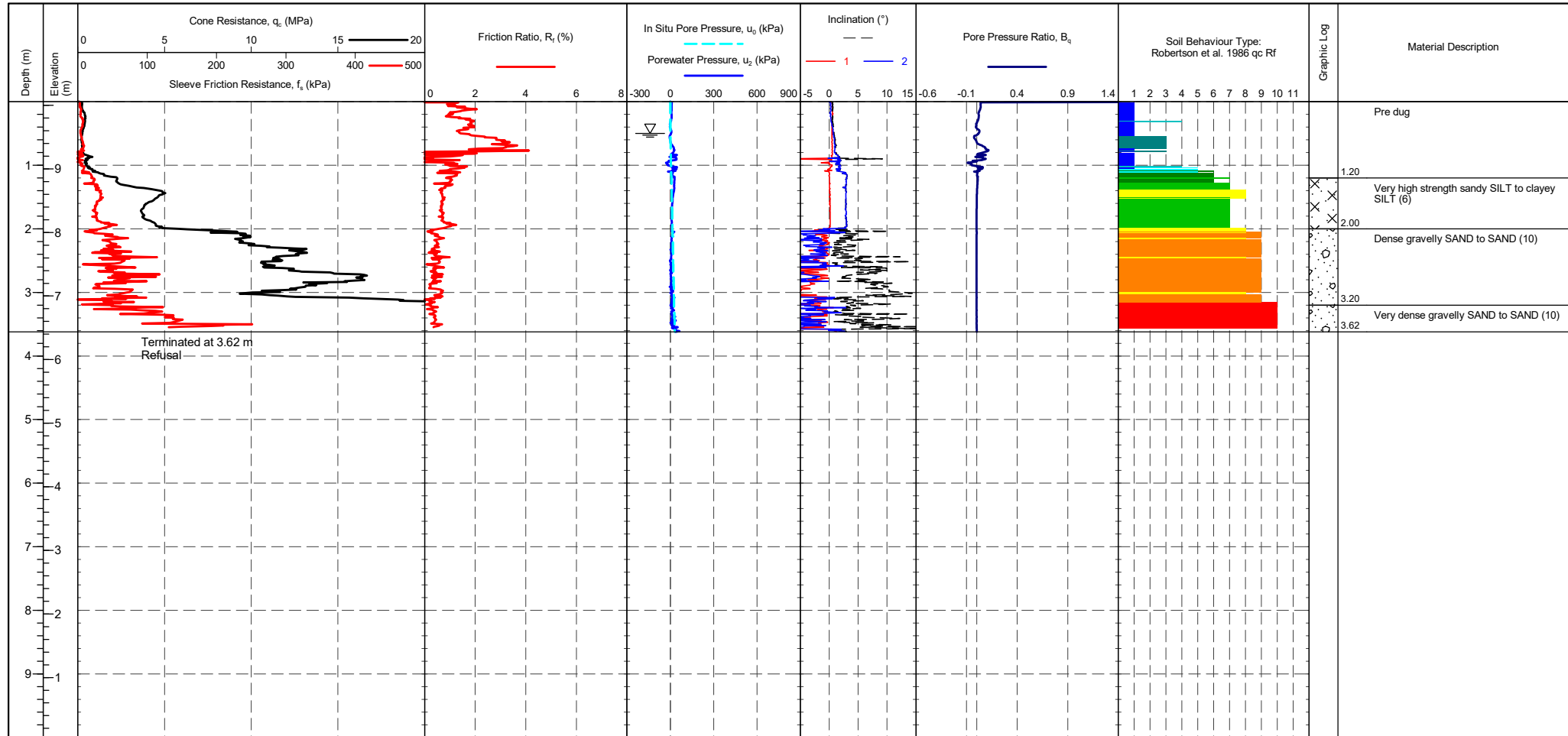
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark	CHECKED	20/05/2023
	A46 Newark Bypass	SCALE	Not To Scale
	Robertson et al. 1986 qc vs. Rf - S3CPT37A	PROJECT No 1220514	FIGURE No
		A4	

PointID	S3CPT38
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 360 mV -0.046 MPa Sleeve 277 mV 276 mV -0.001 kPa Pore Pressure 2 327 mV 291 mV -0.01 kPa X-Y Inclinometer 2545 mV 2554 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

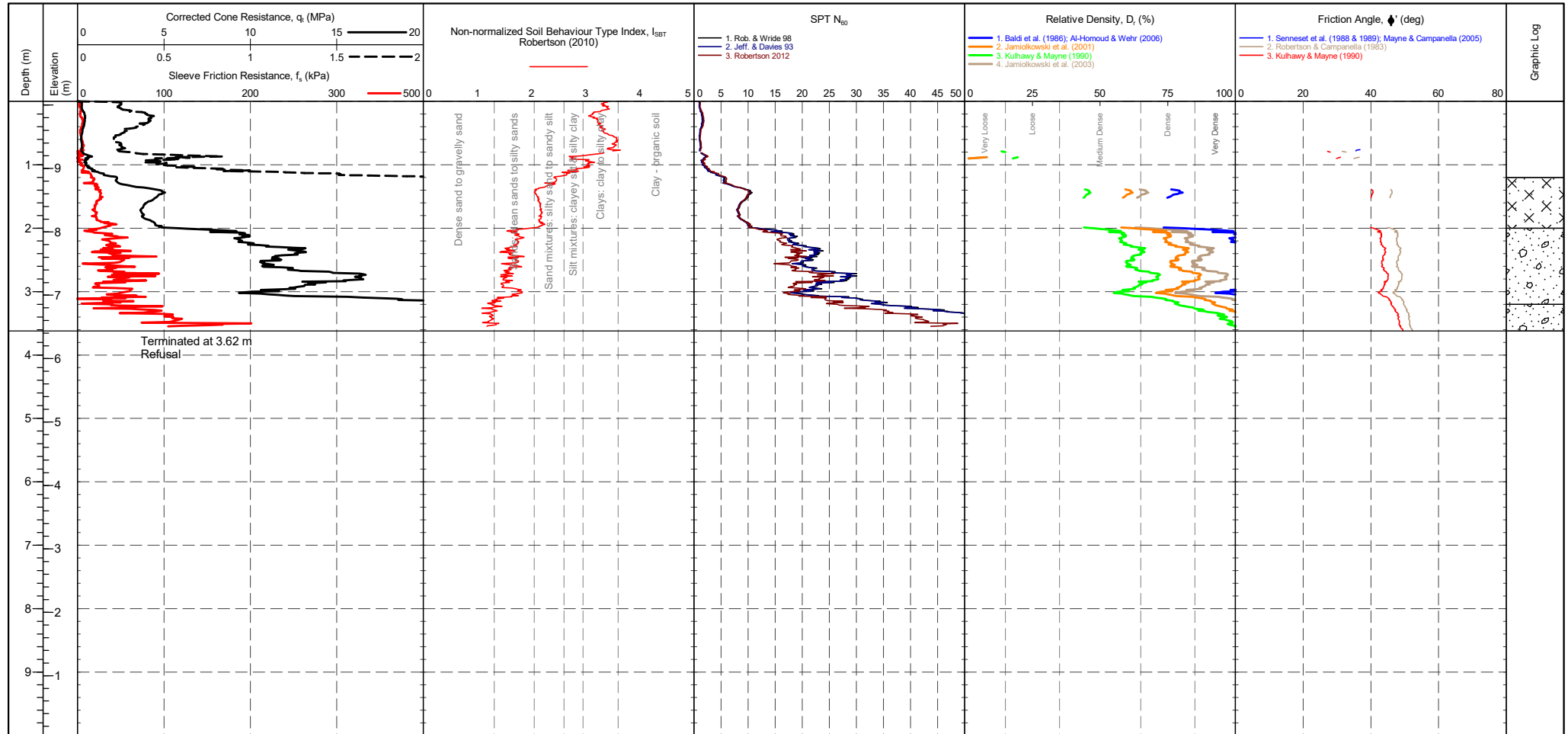
S3CPT38

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479108.988 m
 NORTHING : 354554.851 m
 ELEVATION : 10.057 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test stopped due to buckling rods.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012

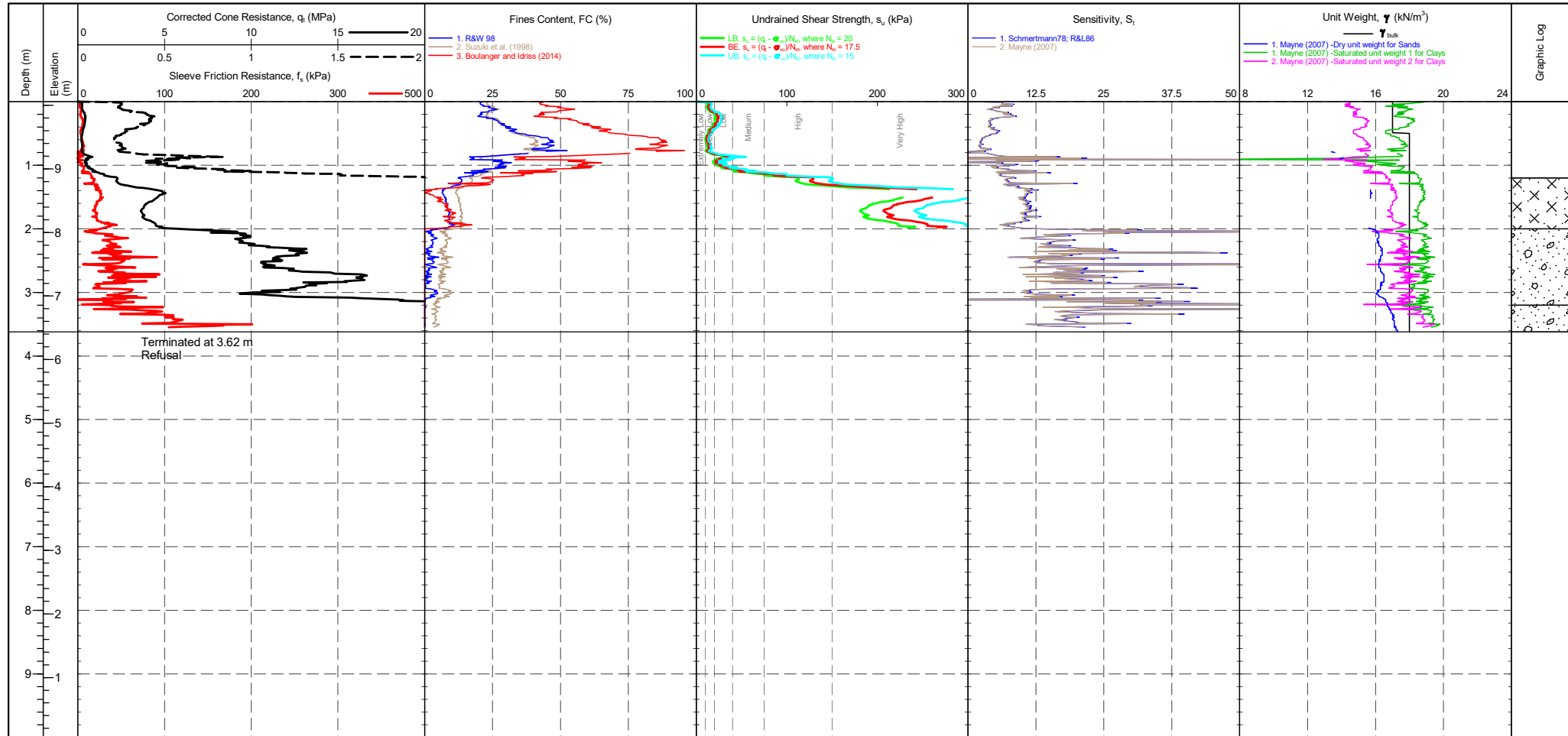


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 364 mV 360 mV -0.046 MPa Sleeve 277 mV 276 mV -0.001 kPa Pore Pressure 2 327 mV 291 mV -0.01 kPa X-Y Inclinator 2545 mV 2554 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

S3CPT38

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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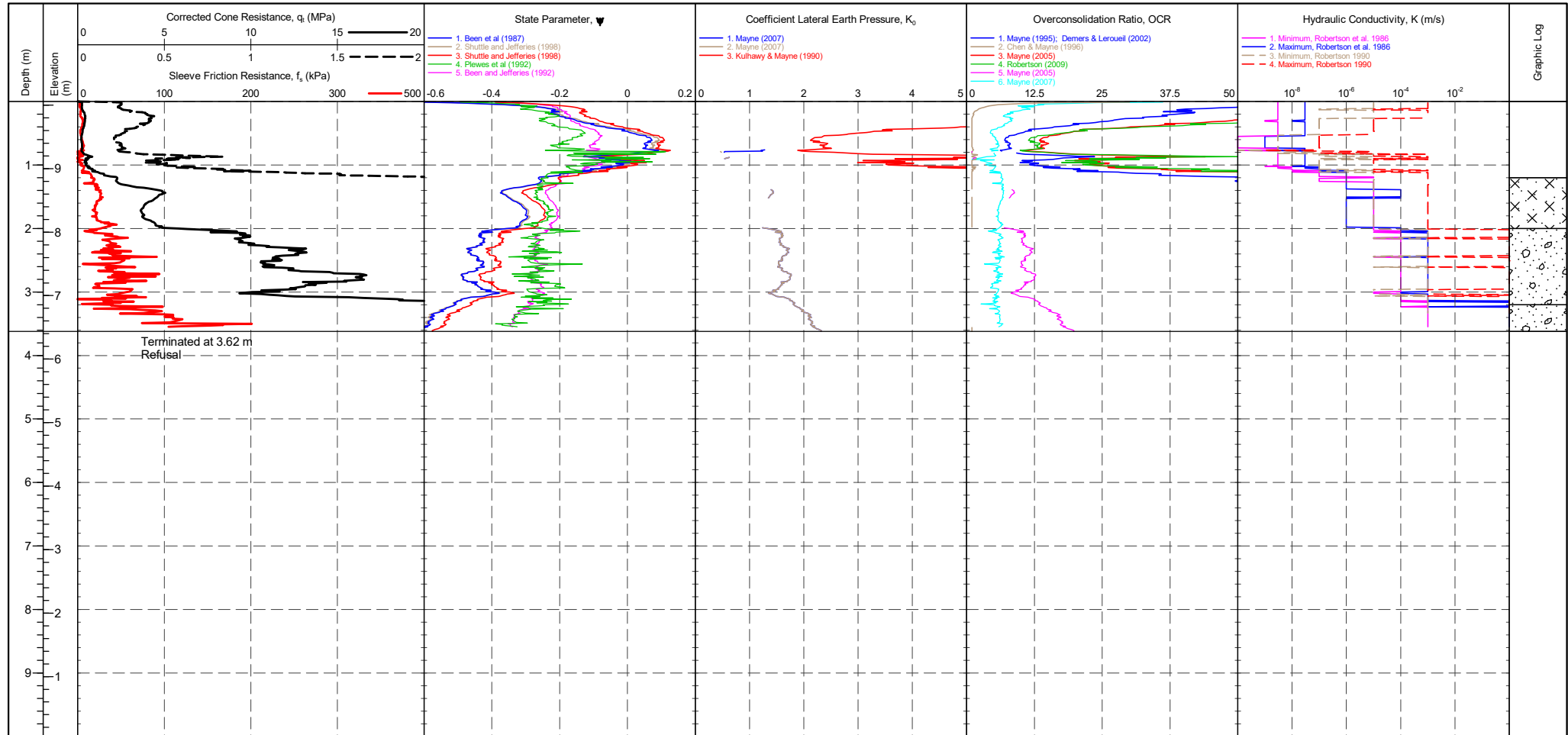


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>364 mV</td><td>360 mV</td><td>-0.046 MPa</td></tr> <tr><td>Sleeve</td><td>277 mV</td><td>276 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>327 mV</td><td>291 mV</td><td>-0.01 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2545 mV</td><td>2554 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	360 mV	-0.046 MPa	Sleeve	277 mV	276 mV	-0.001 kPa	Pore Pressure 2	327 mV	291 mV	-0.01 kPa	X-Y Inclinator	2545 mV	2554 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID

S3CPT38

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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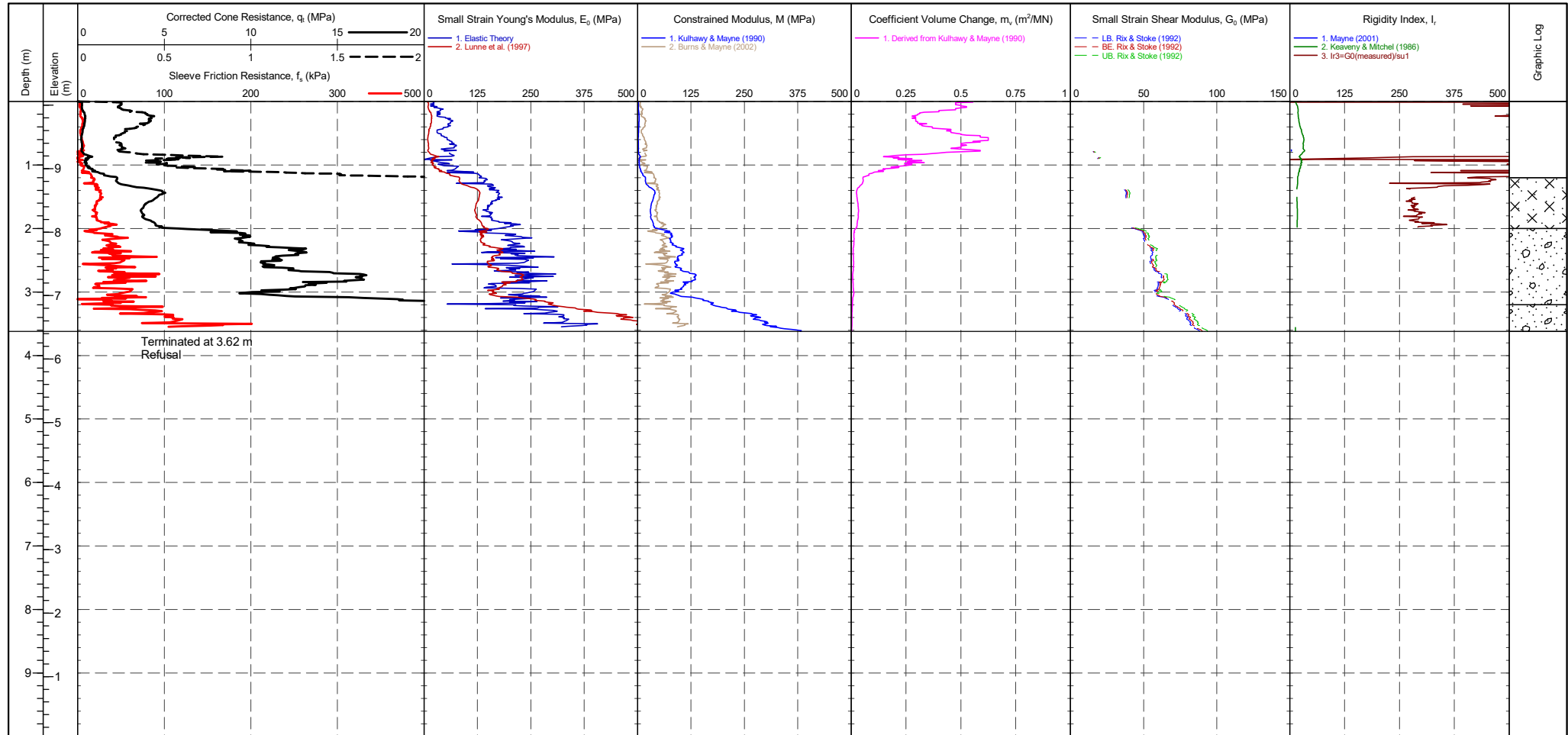


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>360 mV</td> <td>-0.046 MPa</td> </tr> <tr> <td>Sleeve</td> <td>277 mV</td> <td>276 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>327 mV</td> <td>291 mV</td> <td>-0.01 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2545 mV</td> <td>2554 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	360 mV	-0.046 MPa	Sleeve	277 mV	276 mV	-0.001 kPa	Pore Pressure 2	327 mV	291 mV	-0.01 kPa	X-Y Inclinator	2545 mV	2554 mV		Groundwater Level Dissipation Test
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PointID

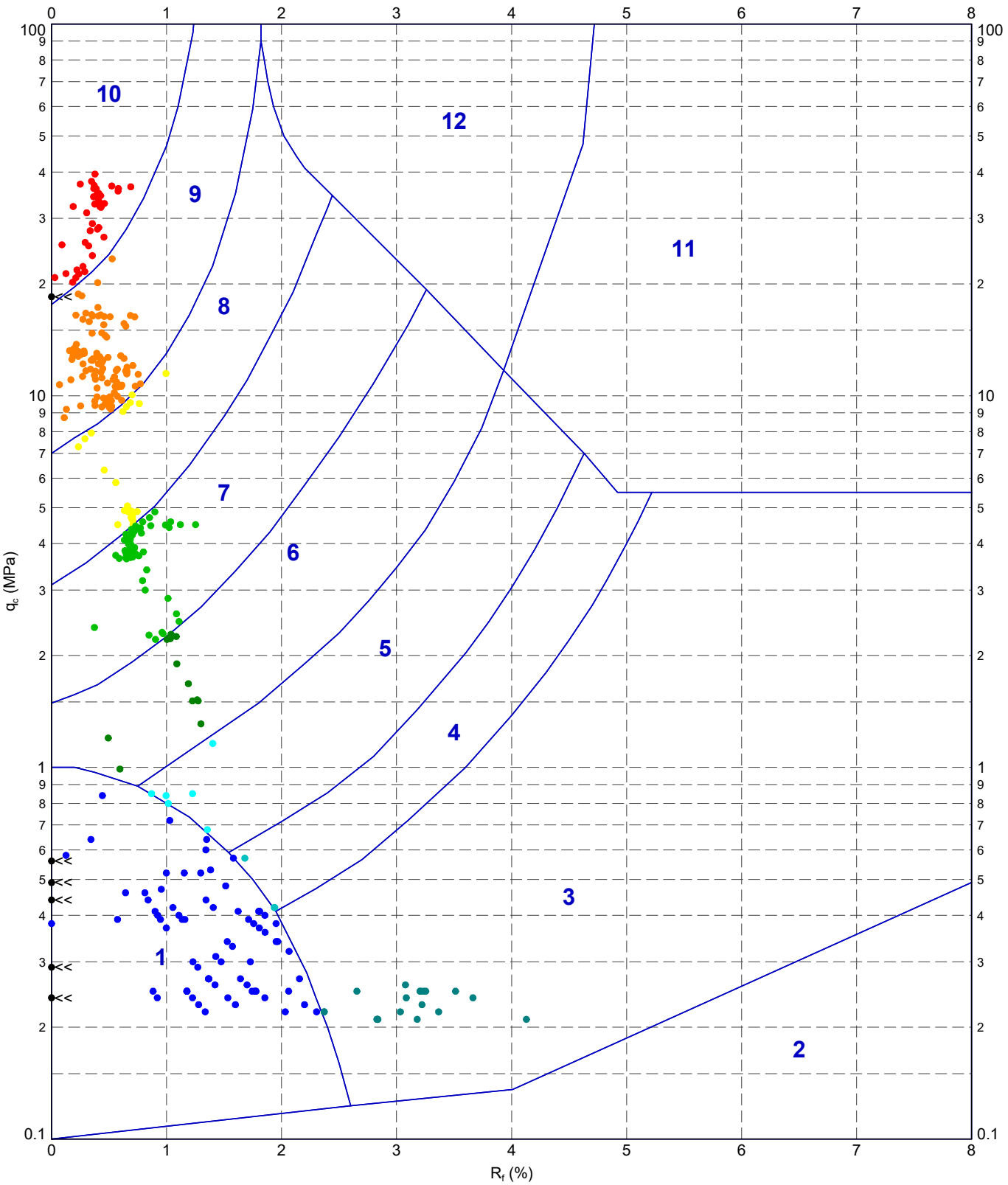
S3CPT38

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>360 mV</td> <td>-0.046 MPa</td> </tr> <tr> <td>Sleeve</td> <td>277 mV</td> <td>276 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>327 mV</td> <td>291 mV</td> <td>-0.01 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2545 mV</td> <td>2554 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	360 mV	-0.046 MPa	Sleeve	277 mV	276 mV	-0.001 kPa	Pore Pressure 2	327 mV	291 mV	-0.01 kPa	X-Y Inclinator	2545 mV	2554 mV		Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF A4P 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:56 10.03.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



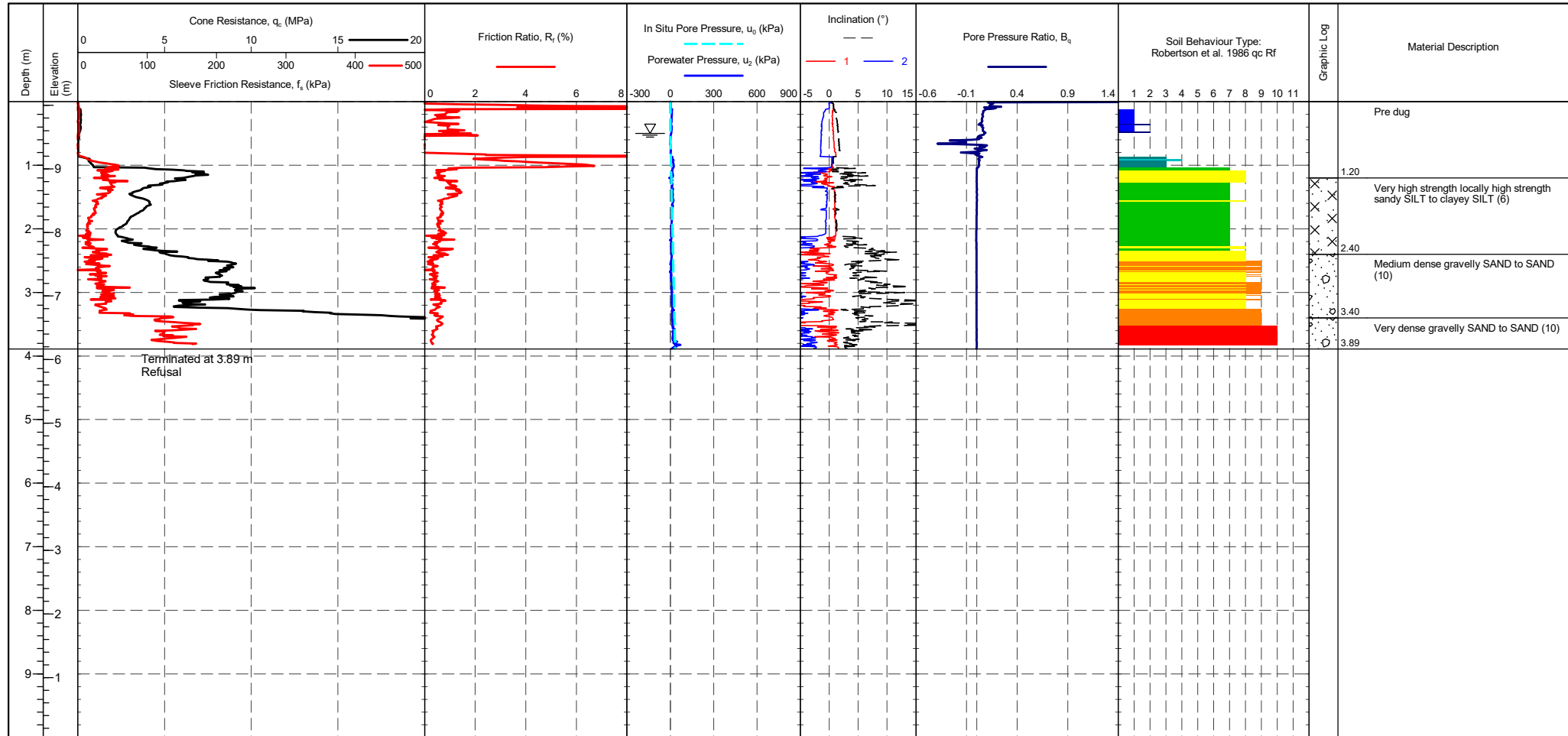
METHOD: Robertson et al. 1986 q_c R_f

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 q_c vs. R_f - S3CPT38</p>	DRAWN	DATE	20/05/2023	
		CHECKED	DATE	20/05/2023	
		SCALE	Not To Scale		A4
		PROJECT No	FIGURE No		
	1220514				

PointID	S3CPT38A
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 361 mV 360 mV -0.011 MPa Sleeve 276 mV 276 mV 0 kPa Pore Pressure 2 293 mV 291 mV -0.001 kPa X-Y Inclinator 2556 mV 2557 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

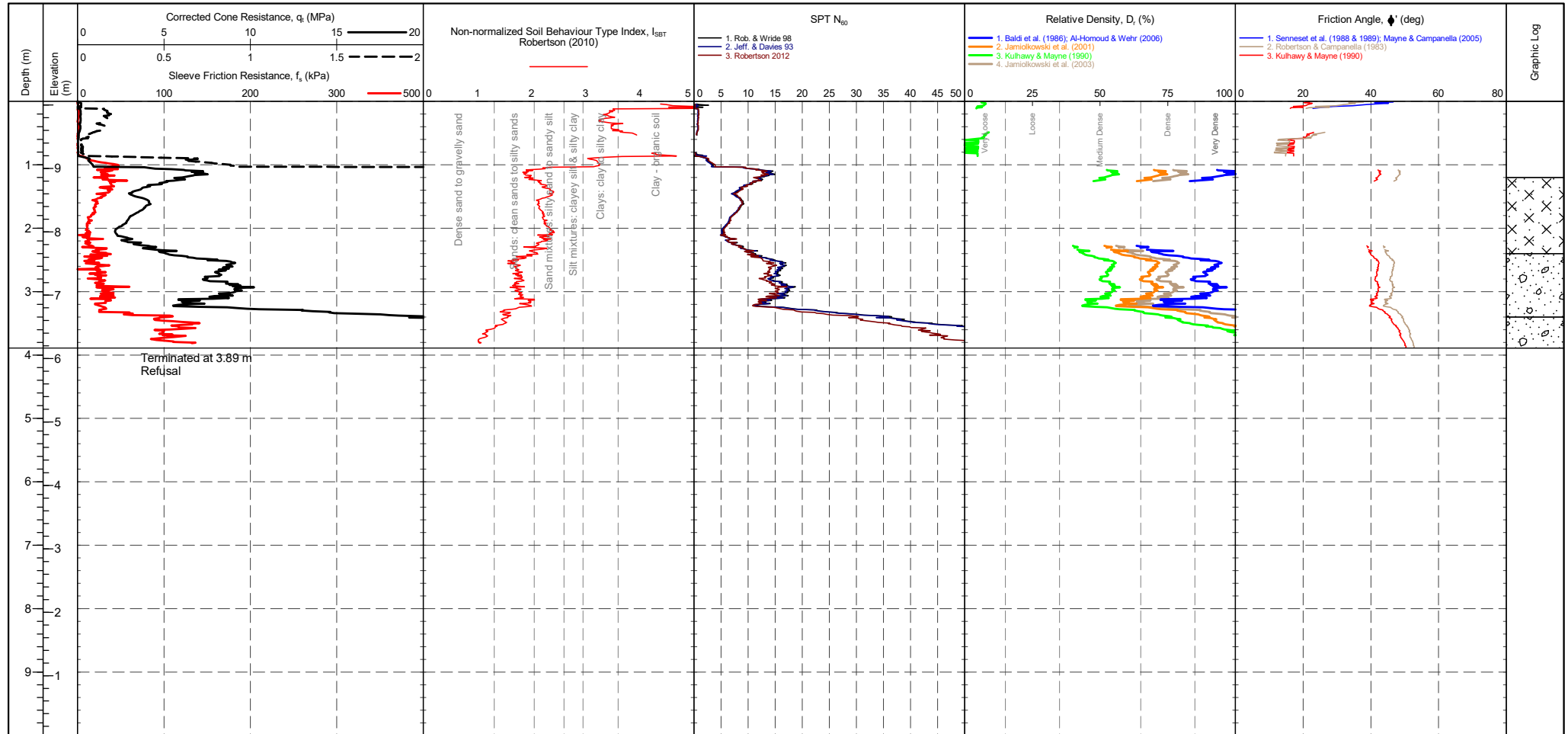
S3CPT38A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479108.988 m
 NORTHING : 354554.851 m
 ELEVATION : 10.057 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

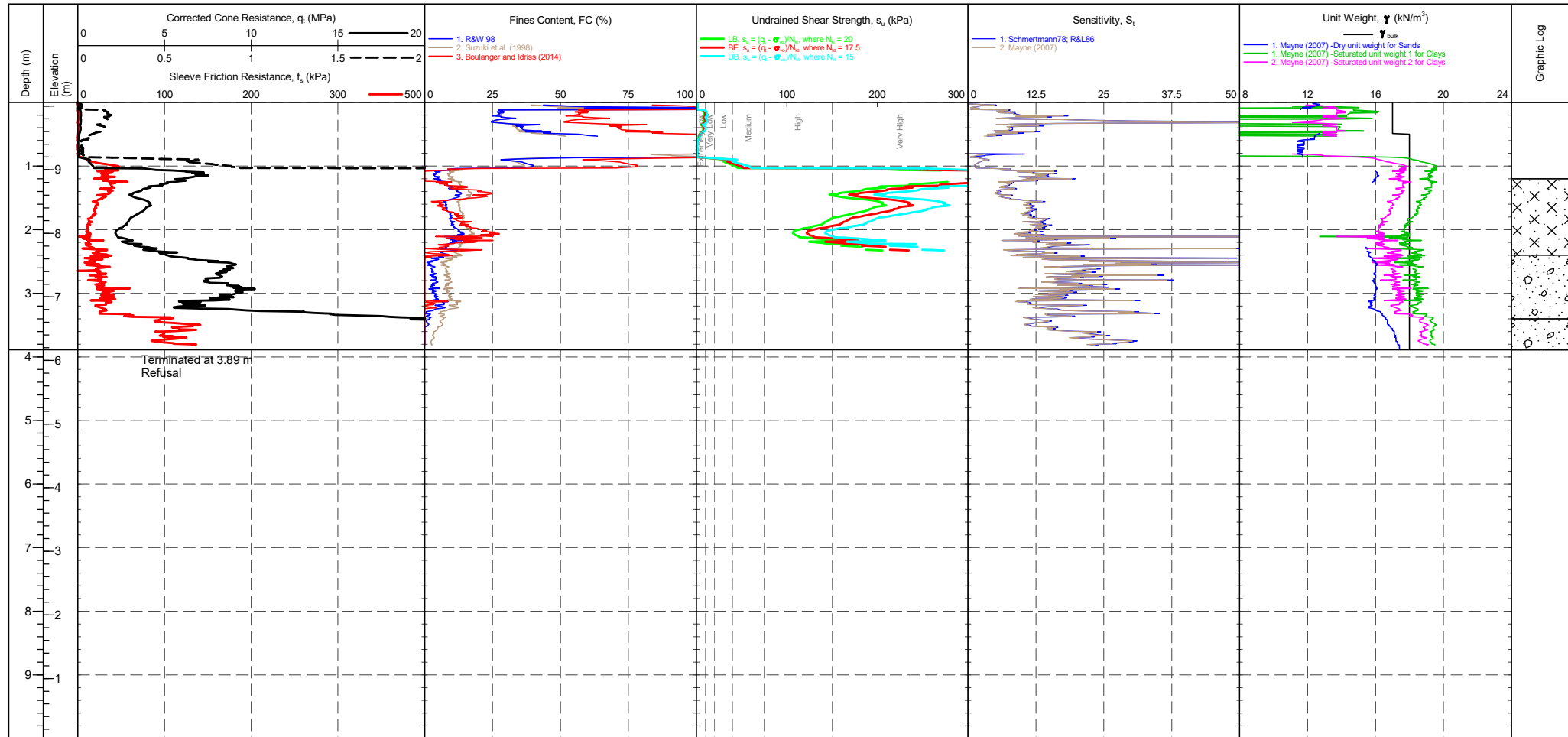
SHEET : 1 OF 1
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Tip : 361 mV / 360 mV / -0.011 MPa Sleeve : 276 mV / 276 mV / 0 kPa Pore Pressure 2 : 293 mV / 291 mV / -0.001 kPa X-Y Inclinator : 2556 mV / 2557 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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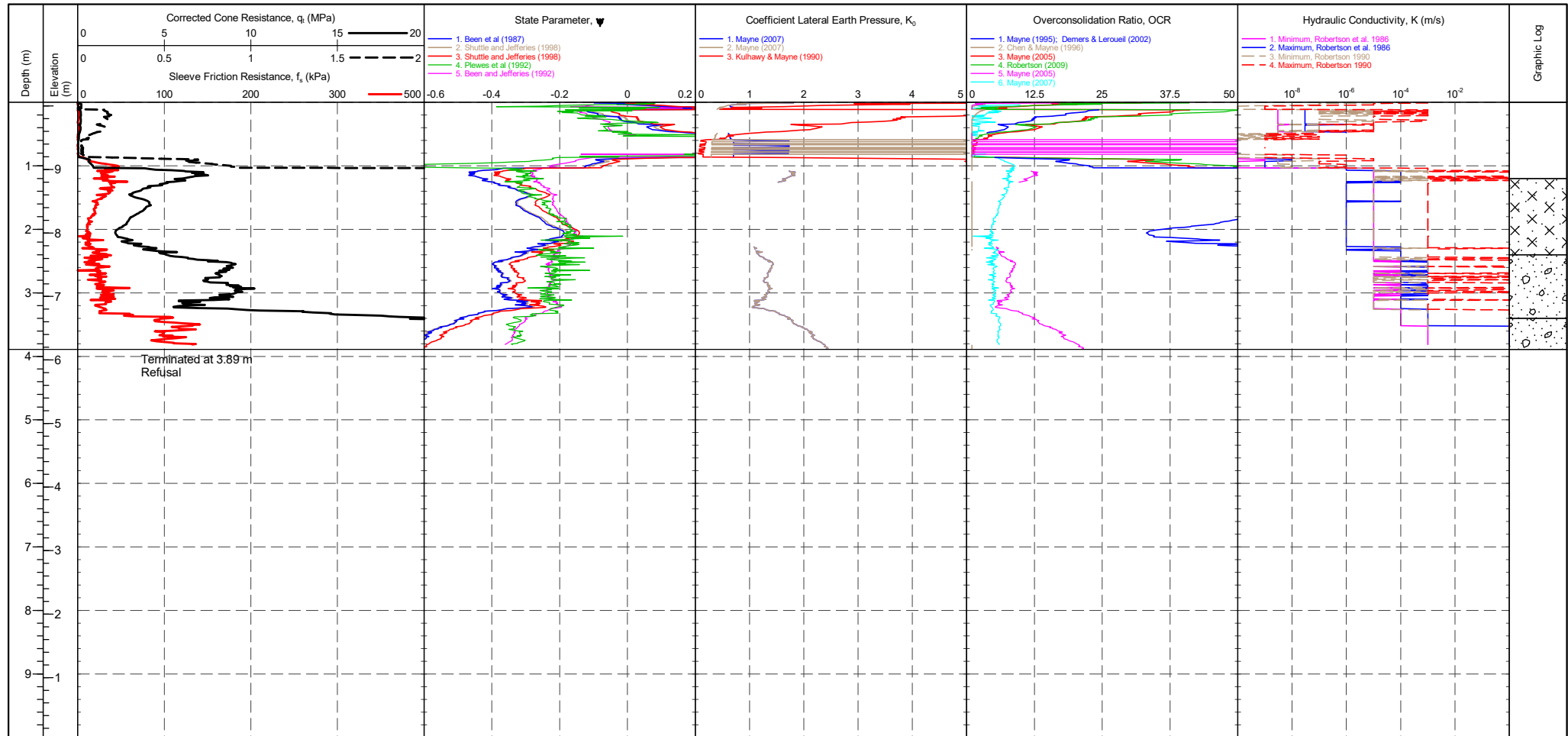


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>361 mV</td><td>360 mV</td><td>-0.011 MPa</td></tr> <tr><td>Sleeve</td><td>276 mV</td><td>276 mV</td><td>0 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>293 mV</td><td>291 mV</td><td>-0.001 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2556 mV</td><td>2557 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	360 mV	-0.011 MPa	Sleeve	276 mV	276 mV	0 kPa	Pore Pressure 2	293 mV	291 mV	-0.001 kPa	X-Y Inclinator	2556 mV	2557 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>s_u (kPa)</th><th>Term based on measurement</th><th>s_u (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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		Extremely high strength	>300																																									

PointID

S3CPT38A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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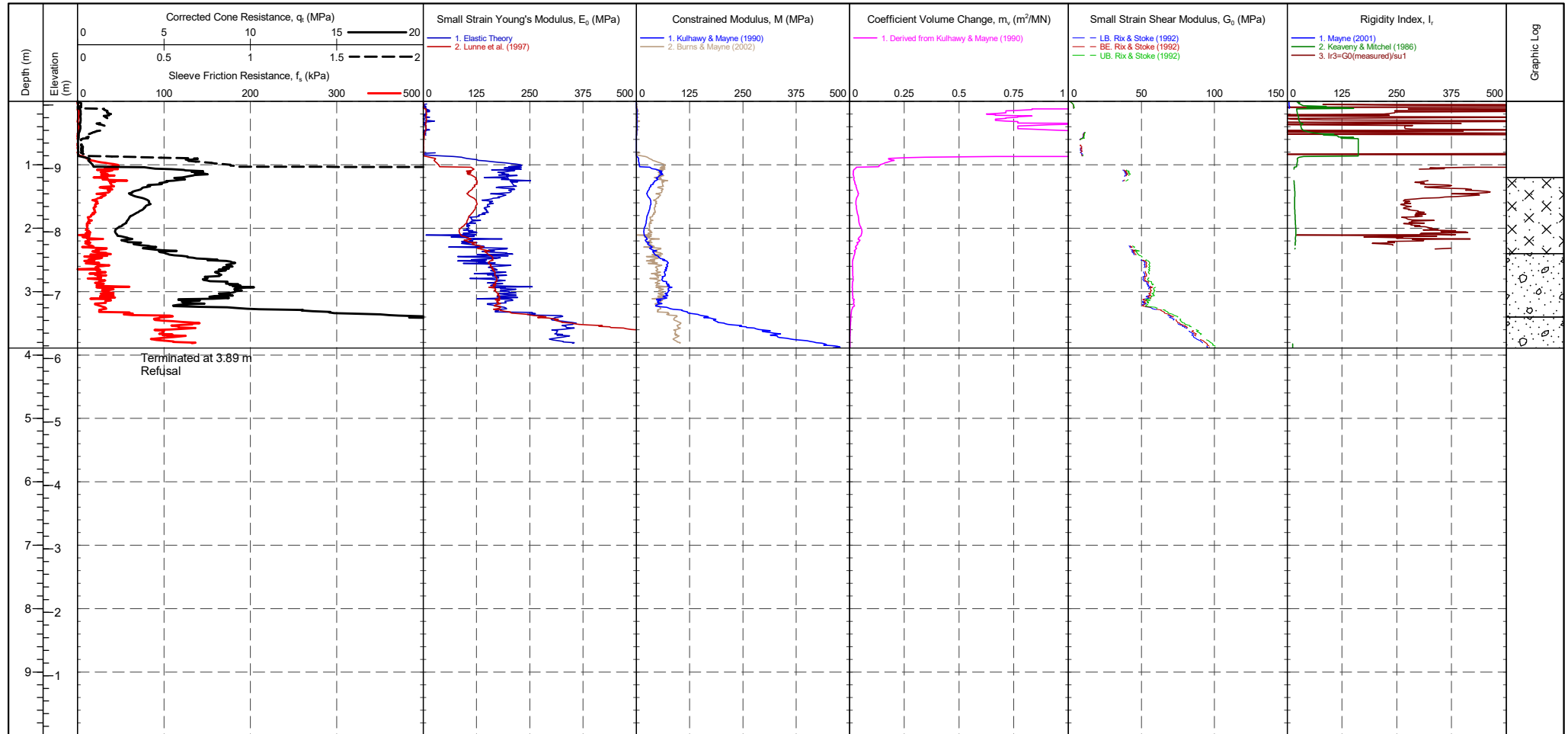


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>361 mV</td> <td>360 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>276 mV</td> <td>276 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>293 mV</td> <td>291 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2556 mV</td> <td>2557 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	360 mV	-0.011 MPa	Sleeve	276 mV	276 mV	0 kPa	Pore Pressure 2	293 mV	291 mV	-0.001 kPa	X-Y Inclinator	2556 mV	2557 mV		Groundwater Level Dissipation Test
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PointID

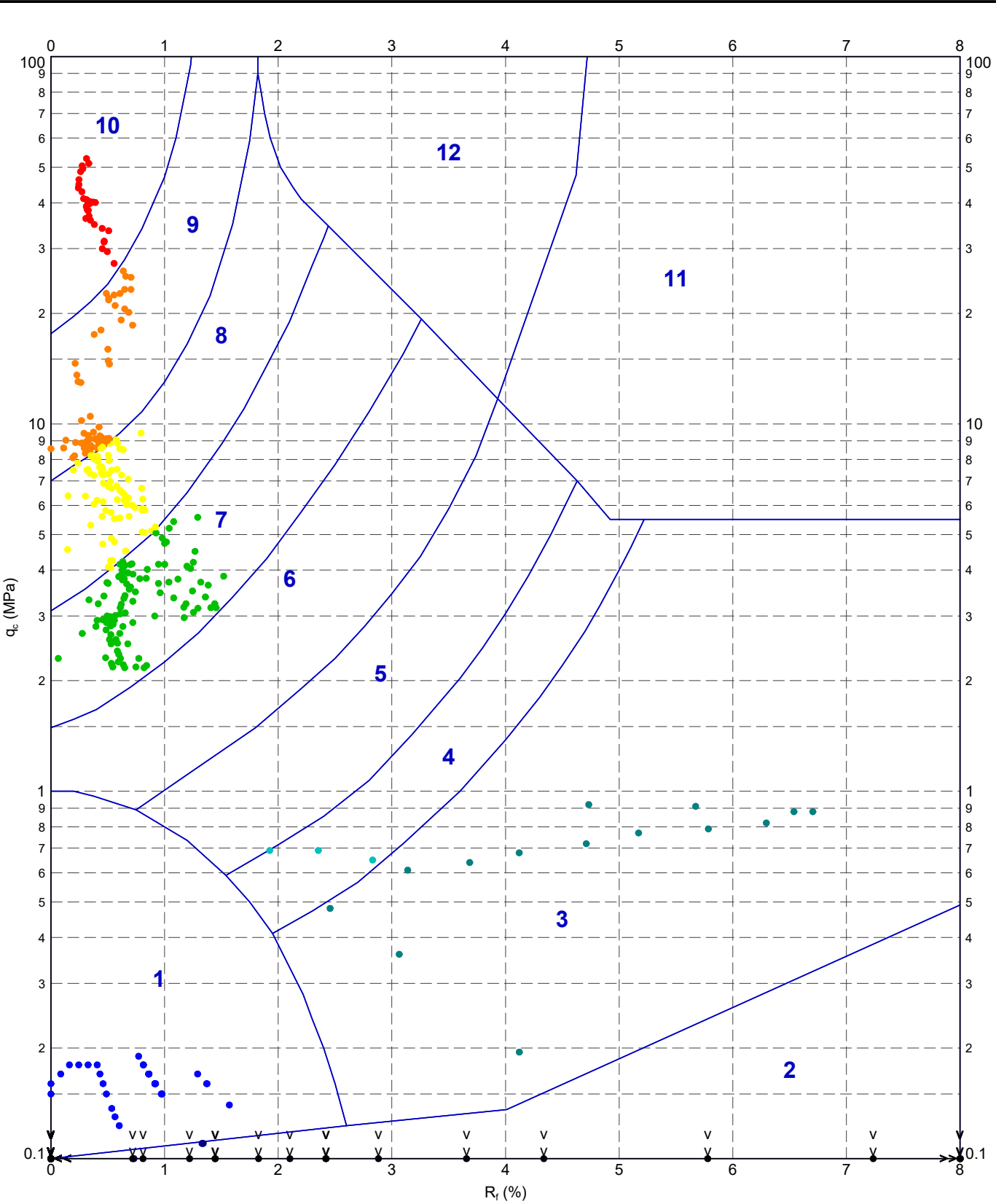
S3CPT38A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>361 mV</td><td>360 mV</td><td>-0.011 MPa</td></tr> <tr><td>Sleeve</td><td>276 mV</td><td>276 mV</td><td>0 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>293 mV</td><td>291 mV</td><td>-0.001 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2556 mV</td><td>2557 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	361 mV	360 mV	-0.011 MPa	Sleeve	276 mV	276 mV	0 kPa	Pore Pressure 2	293 mV	291 mV	-0.001 kPa	X-Y Inclinator	2556 mV	2557 mV		Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. Rf - A46 NEWARK BYPASS.GPJ <DrawingFile>> 20/05/2023 22:57 10.03.00.09 Dalgid Lab and In Situ Tool - DGD [Lib.: In Situ SI 2.02.0.2017-07-10 Proj.: In Situ SI 2.02.0.2017-07-10



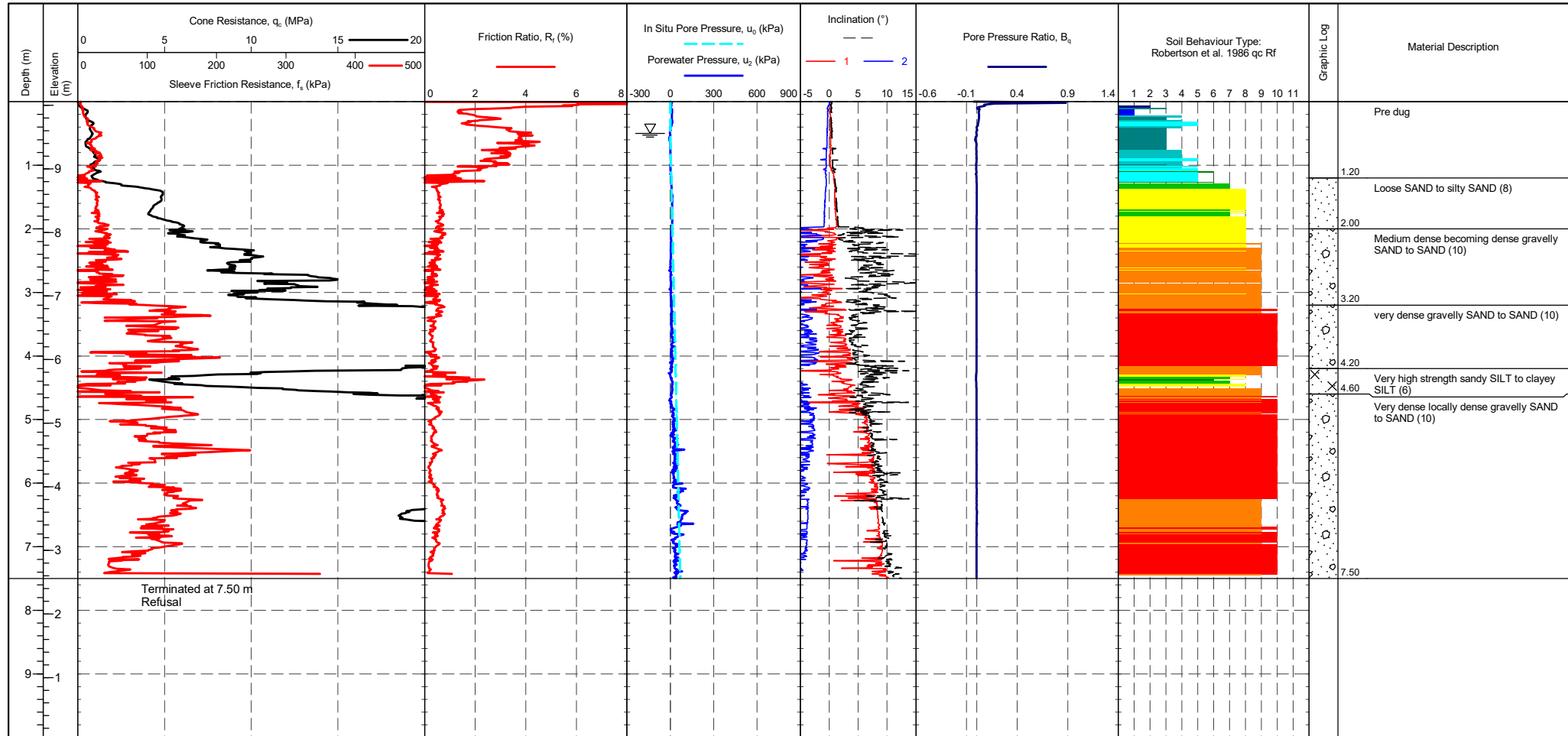
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics Newark		CHECKED	DATE
	A46 Newark Bypass		SCALE	
	Robertson et al. 1986 qc vs. Rf - S3CPT38A		Not To Scale	
		PROJECT No	FIGURE No	
		1220514	A4	

PointID	S3CPT38B
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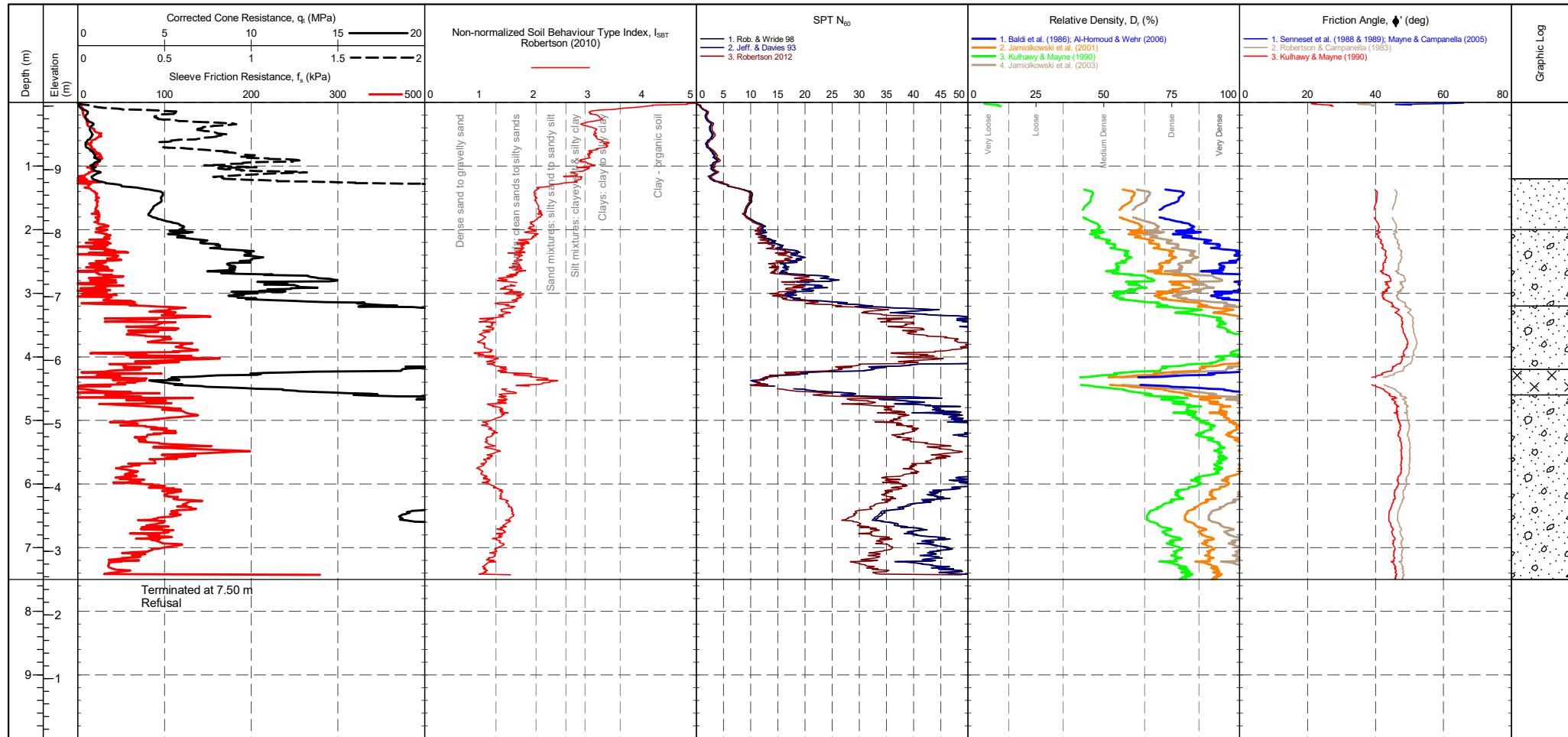
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 364 mV 355 mV -0.103 MPa Sleeve 277 mV 273 mV -0.003 kPa Pore Pressure 2 321 mV 312 mV -0.002 kPa X-Y Inclinator 2574 mV 2627 mV	METHOD : Robertson et al. 1986 $q_c R_f$ 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT38B

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>355 mV</td> <td>-0.103 MPa</td> </tr> <tr> <td>Sleeve</td> <td>277 mV</td> <td>273 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>321 mV</td> <td>312 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2627 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	355 mV	-0.103 MPa	Sleeve	277 mV	273 mV	-0.003 kPa	Pore Pressure 2	321 mV	312 mV	-0.002 kPa	X-Y Inclinator	2574 mV	2627 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

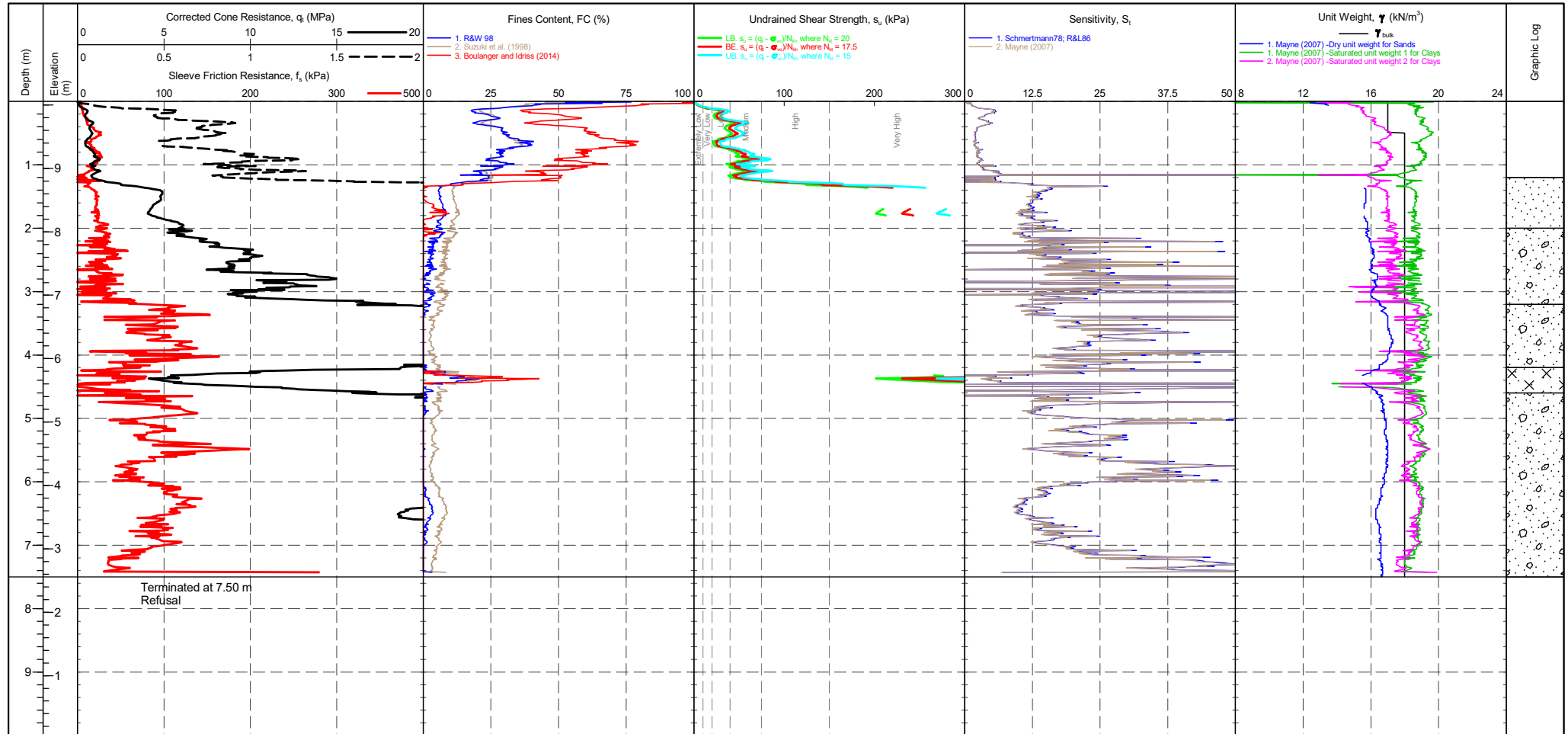
S3CPT38B

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479108.988 m
 NORTHING : 354554.851 m
 ELEVATION : 10.057 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on inclination.

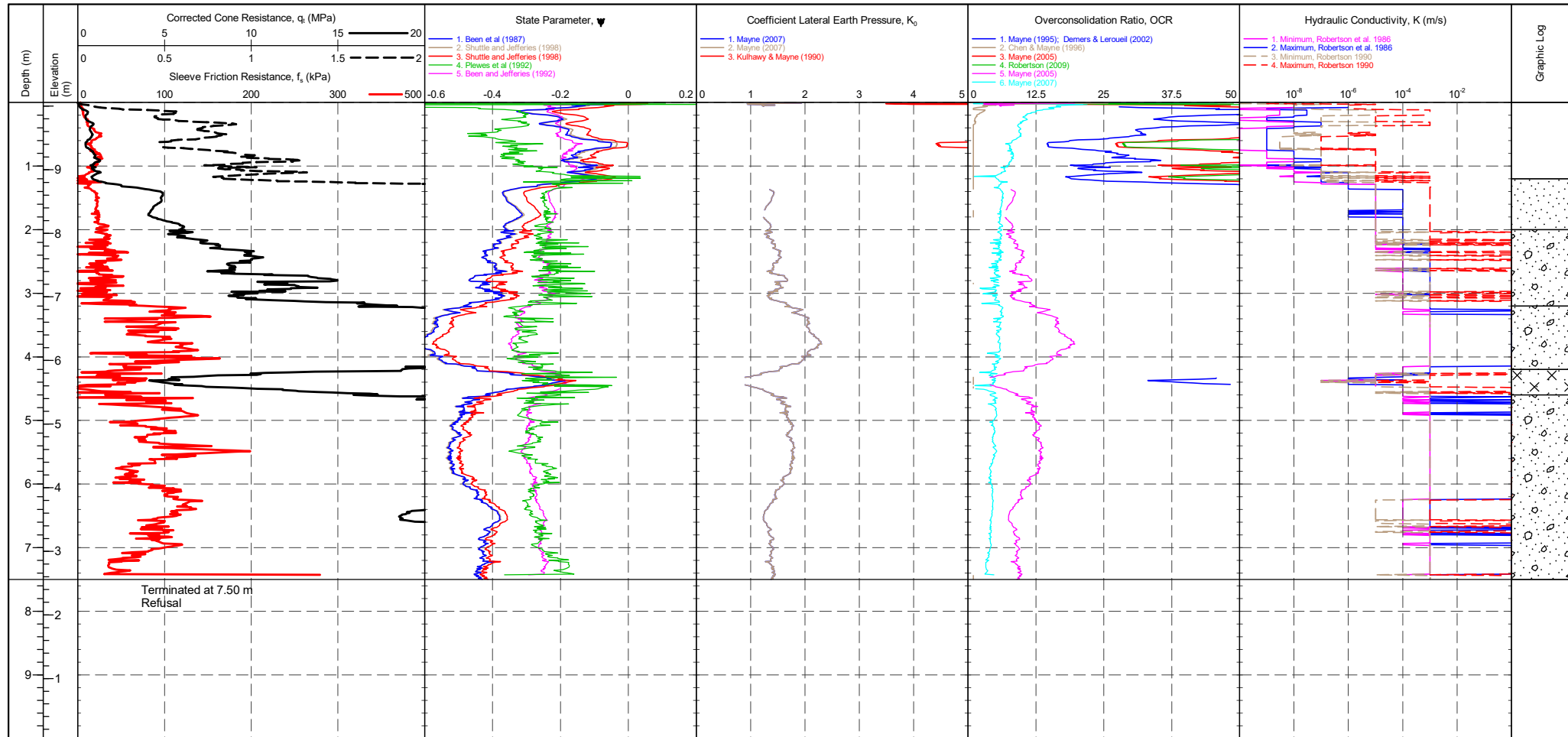
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 03/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 364 mV 277 mV 321 mV 2574 mV	Post 355 mV 273 mV 312 mV 2627 mV	Difference -0.103 MPa -0.003 kPa -0.002 kPa	Term based on measurement su (kPa) <10 10-20 20-40	Term based on measurement su (kPa) 40-75 75-150 150-300 >300	Extremely low strength Very low strength Low strength	

PointID
S3CPT38B

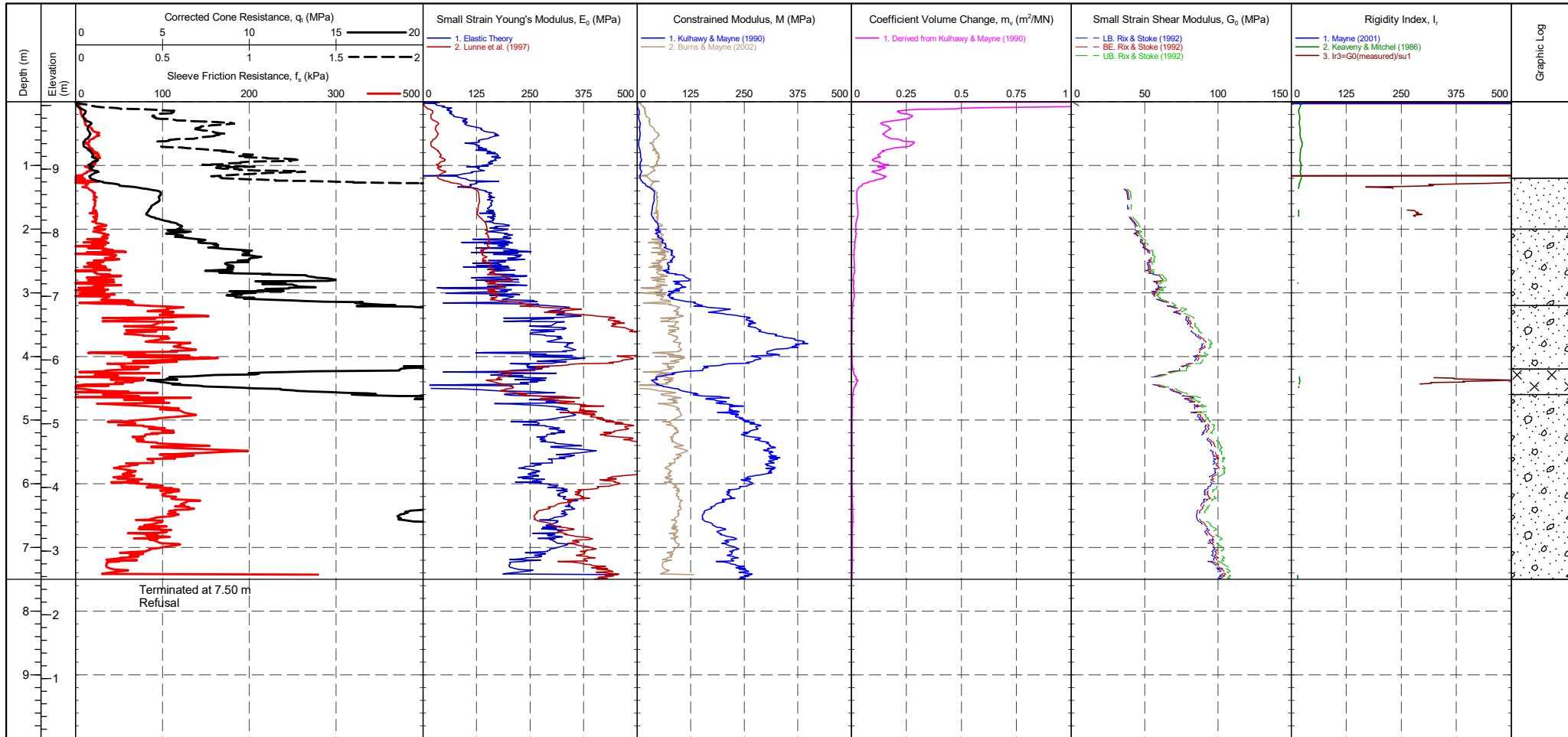
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>355 mV</td> <td>-0.103 MPa</td> </tr> <tr> <td>Sleeve</td> <td>277 mV</td> <td>273 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>321 mV</td> <td>312 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2627 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	355 mV	-0.103 MPa	Sleeve	277 mV	273 mV	-0.003 kPa	Pore Pressure 2	321 mV	312 mV	-0.002 kPa	X-Y Inclinator	2574 mV	2627 mV		Groundwater Level Dissipation Test
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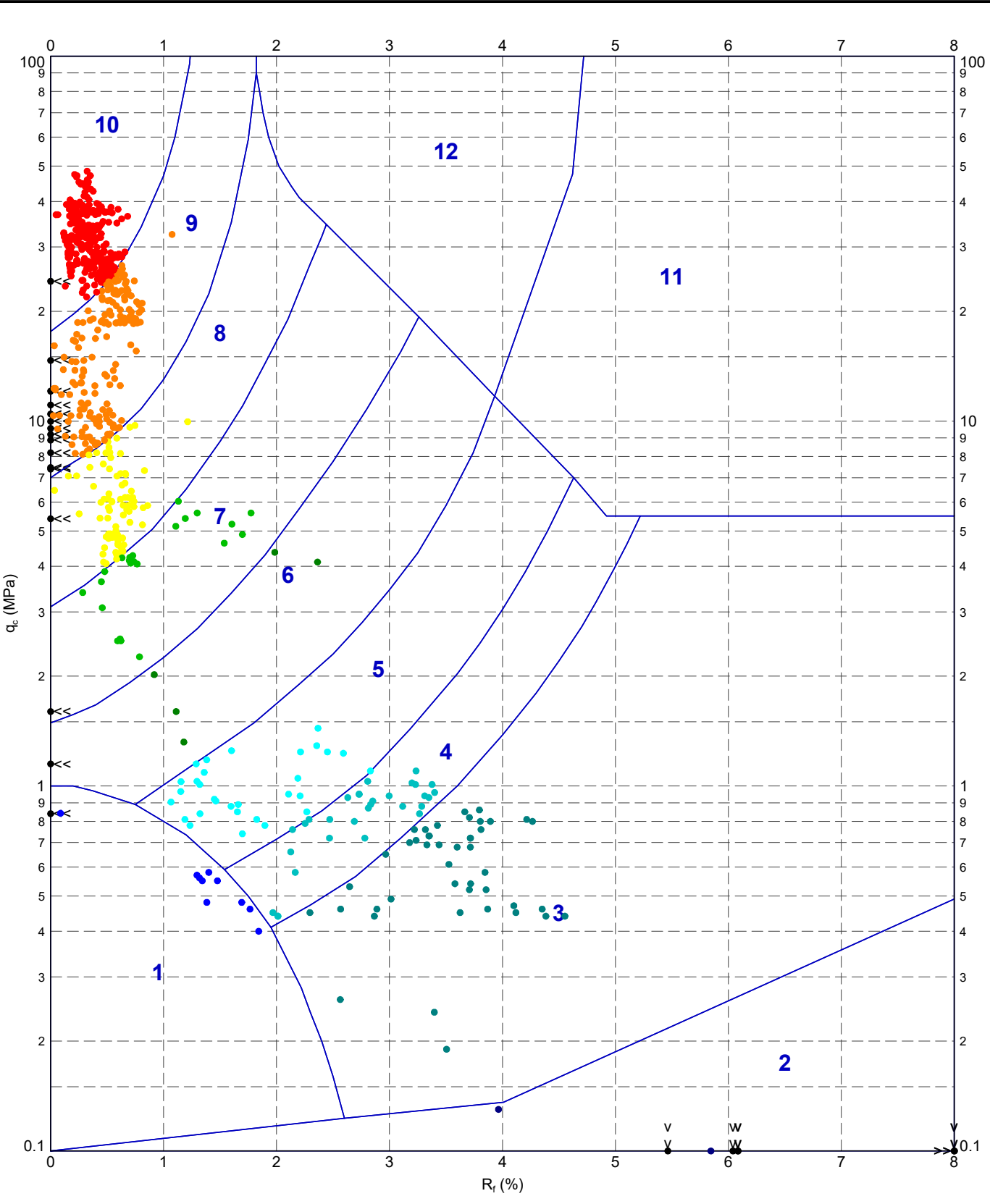
PointID
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479108.988 m NORTHING : 354554.851 m ELEVATION : 10.057 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>364 mV</td> <td>355 mV</td> <td>-0.103 MPa</td> </tr> <tr> <td>Sleeve</td> <td>277 mV</td> <td>273 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>321 mV</td> <td>312 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2574 mV</td> <td>2627 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	364 mV	355 mV	-0.103 MPa	Sleeve	277 mV	273 mV	-0.003 kPa	Pore Pressure 2	321 mV	312 mV	-0.002 kPa	X-Y Inclinator	2574 mV	2627 mV		Groundwater Level Dissipation Test
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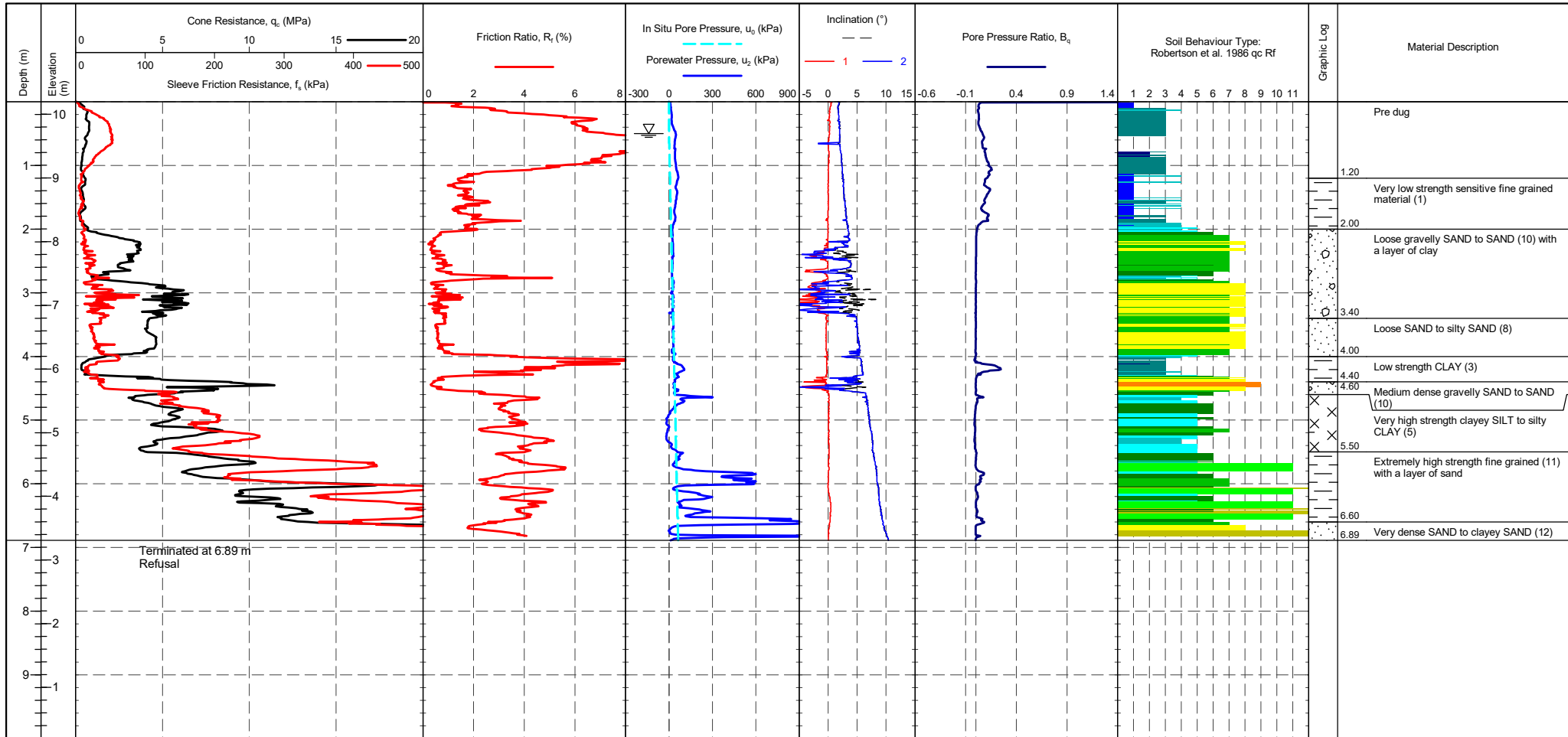
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT38B	DRAWN	DATE 20/05/2023
		CHECKED	DATE 20/05/2023
		SCALE Not To Scale	A4
		PROJECT No 1220514	FIGURE No

PointID	S3CPT40
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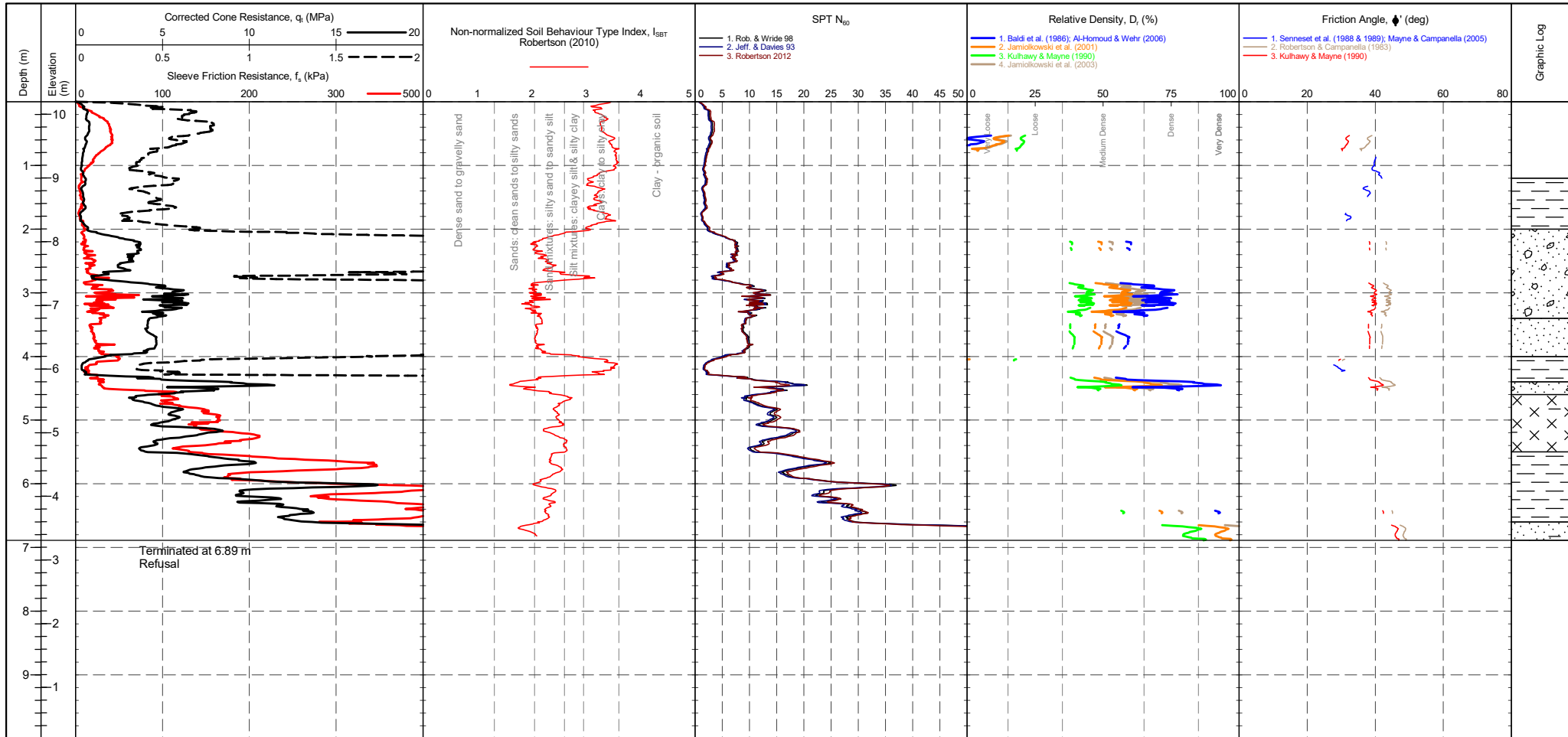
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478203.671 m NORTHING : 353538.845 m ELEVATION : 10.197 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 366 mV 361 mV -0.057 MPa Sleeve 296 mV 292 mV -0.003 kPa Pore Pressure 2 343 mV 336 mV -0.002 kPa X-Y Inclinator 2489 mV 2609 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT40
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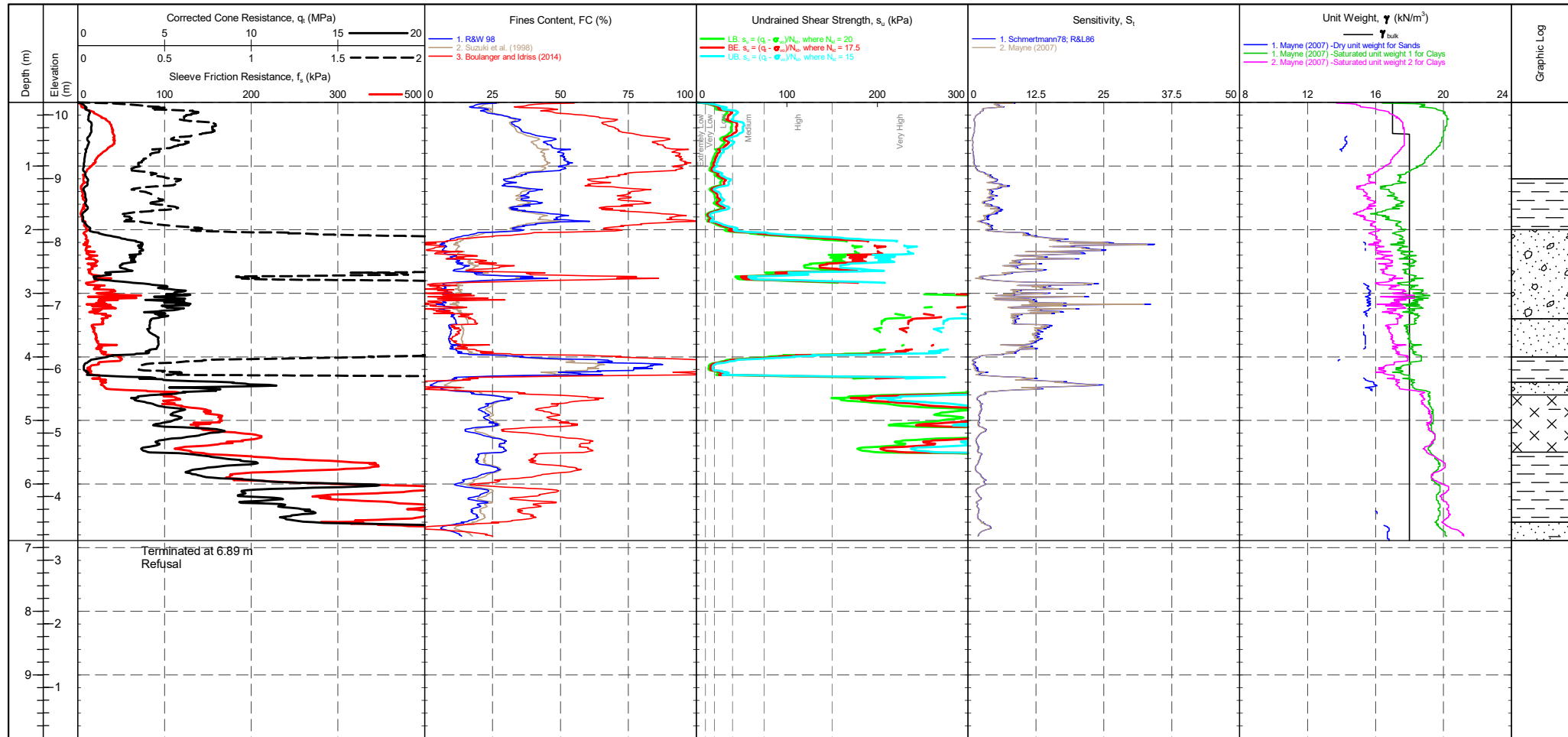
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478203.671 m NORTHING : 353538.845 m ELEVATION : 10.197 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>361 mV</td> <td>-0.057 MPa</td> </tr> <tr> <td>Sleeve</td> <td>296 mV</td> <td>292 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>343 mV</td> <td>336 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2489 mV</td> <td>2609 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	361 mV	-0.057 MPa	Sleeve	296 mV	292 mV	-0.003 kPa	Pore Pressure 2	343 mV	336 mV	-0.002 kPa	X-Y Inclinometer	2489 mV	2609 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID	S3CPT40
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>366 mV</td> <td>361 mV</td> <td>-0.057 MPa</td> </tr> <tr> <td>Sleeve</td> <td>296 mV</td> <td>292 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>343 mV</td> <td>336 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2489 mV</td> <td>2609 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	366 mV	361 mV	-0.057 MPa	Sleeve	296 mV	292 mV	-0.003 kPa	Pore Pressure 2	343 mV	336 mV	-0.002 kPa	X-Y Inclinator	2489 mV	2609 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>s_u (kPa)</th> <th>Term based on measurement</th> <th>s_u (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▭ Dissipation Test
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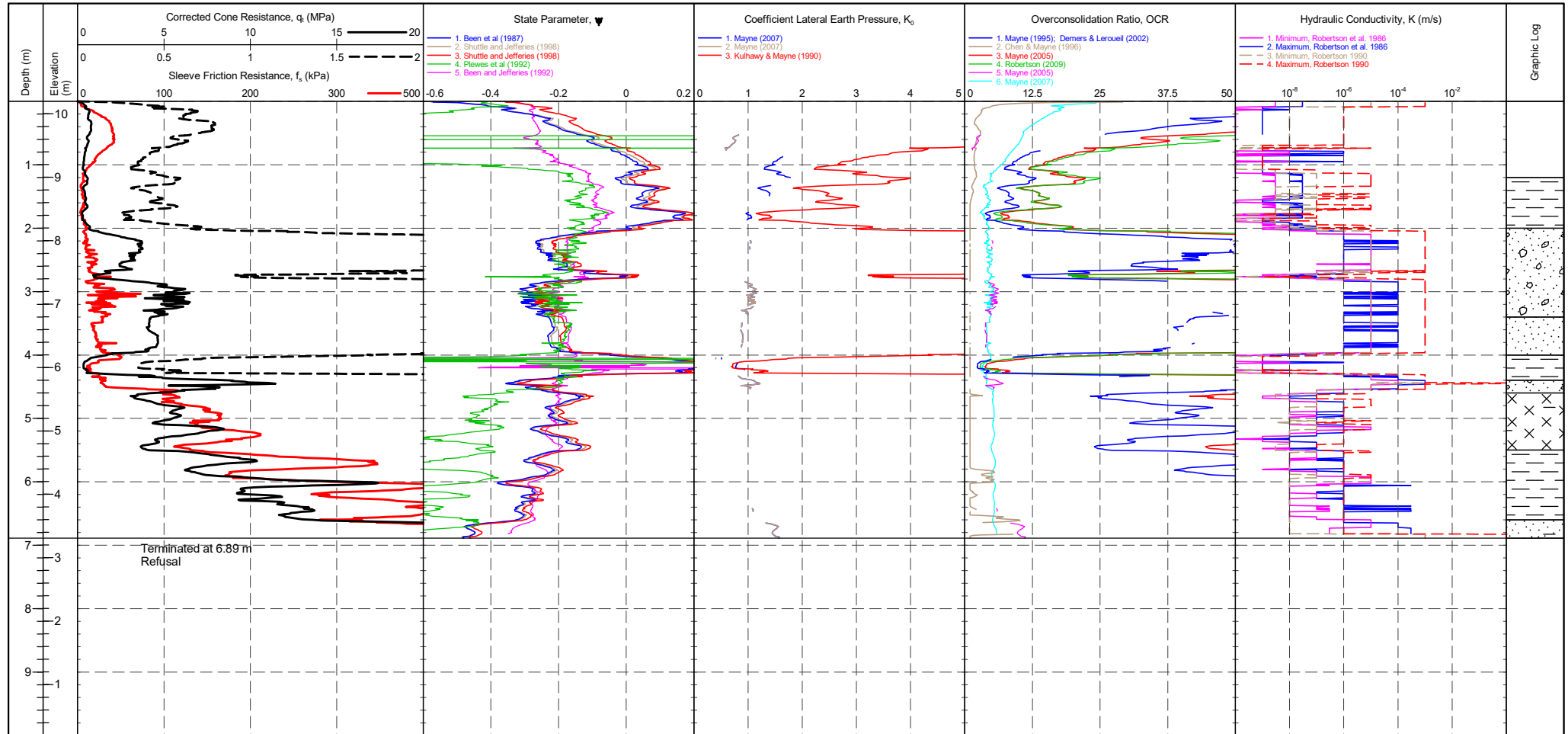
S3CPT40

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 478203.671 m
 NORTHING : 353538.845 m
 ELEVATION : 10.197 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

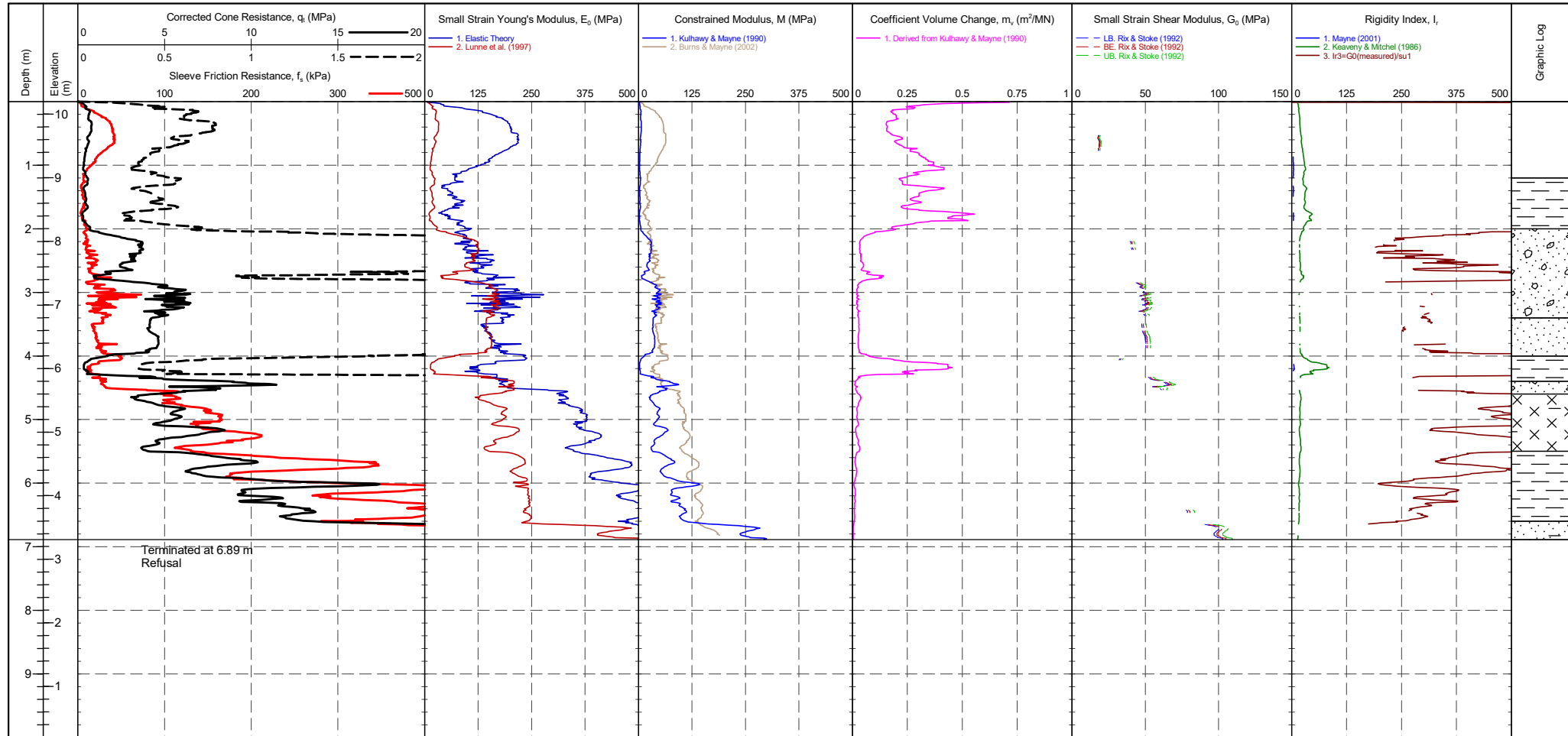
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 STATUS : Final
 TEST DATE : 10/11/2022
 PLOT DATE : 20/05/2023
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & DR FRICTION REDUCER : None WEATHER : Sunny & Mild	Transducer Pre Post Difference Tip 366 mV 361 mV -0.057 MPa Sleeve 296 mV 292 mV -0.003 kPa Pore Pressure 2 343 mV 336 mV -0.002 kPa X-Y Inclinator 2489 mV 2609 mV	CPTU ZERO VALUES Difference -0.057 MPa -0.003 kPa -0.002 kPa	Groundwater Level Dissipation Test
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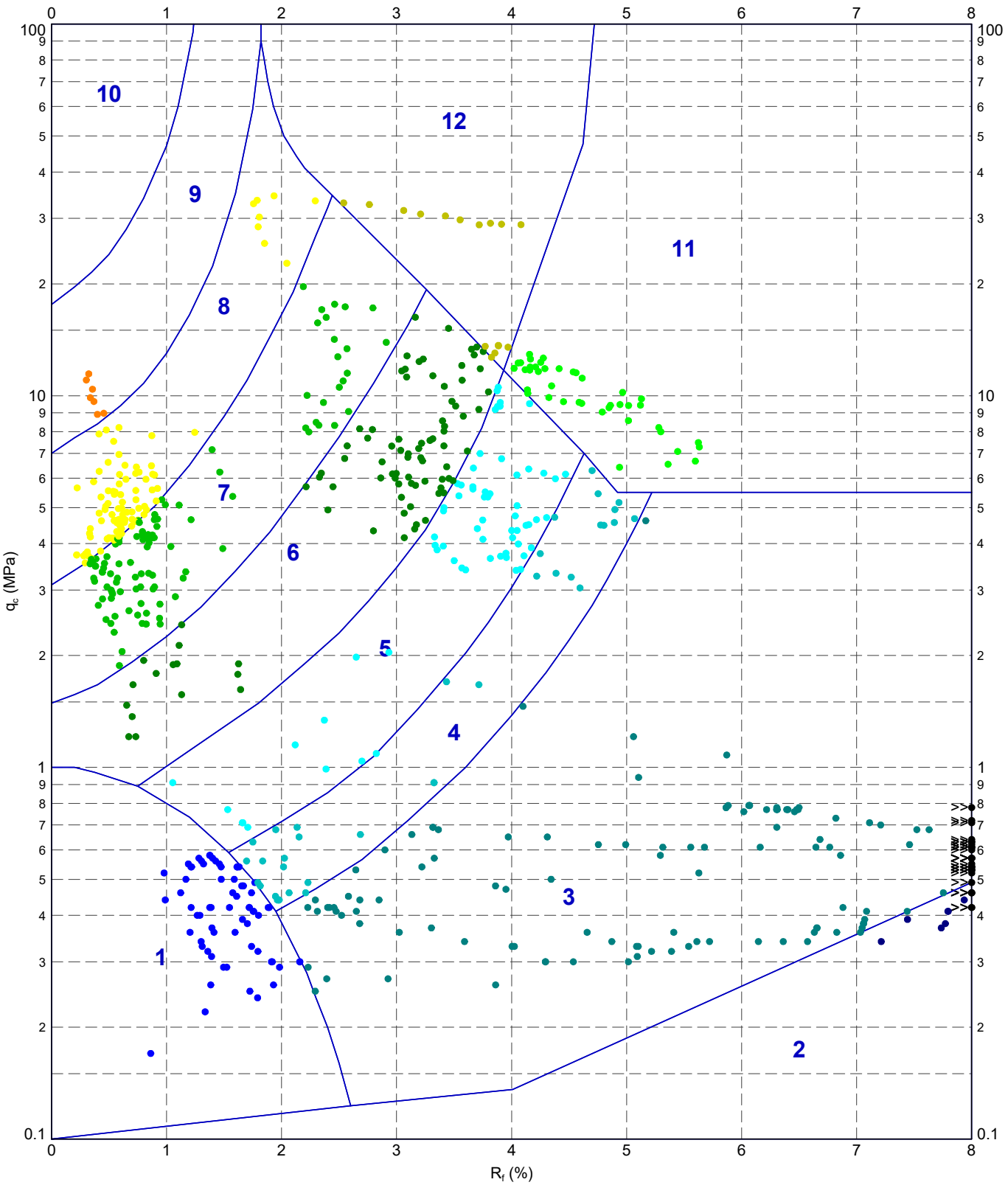
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478203.671 m NORTHING : 353538.845 m ELEVATION : 10.197 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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220629-ADVANCED REPORT INSTITUTE 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 201052023 23:00 10.03.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10



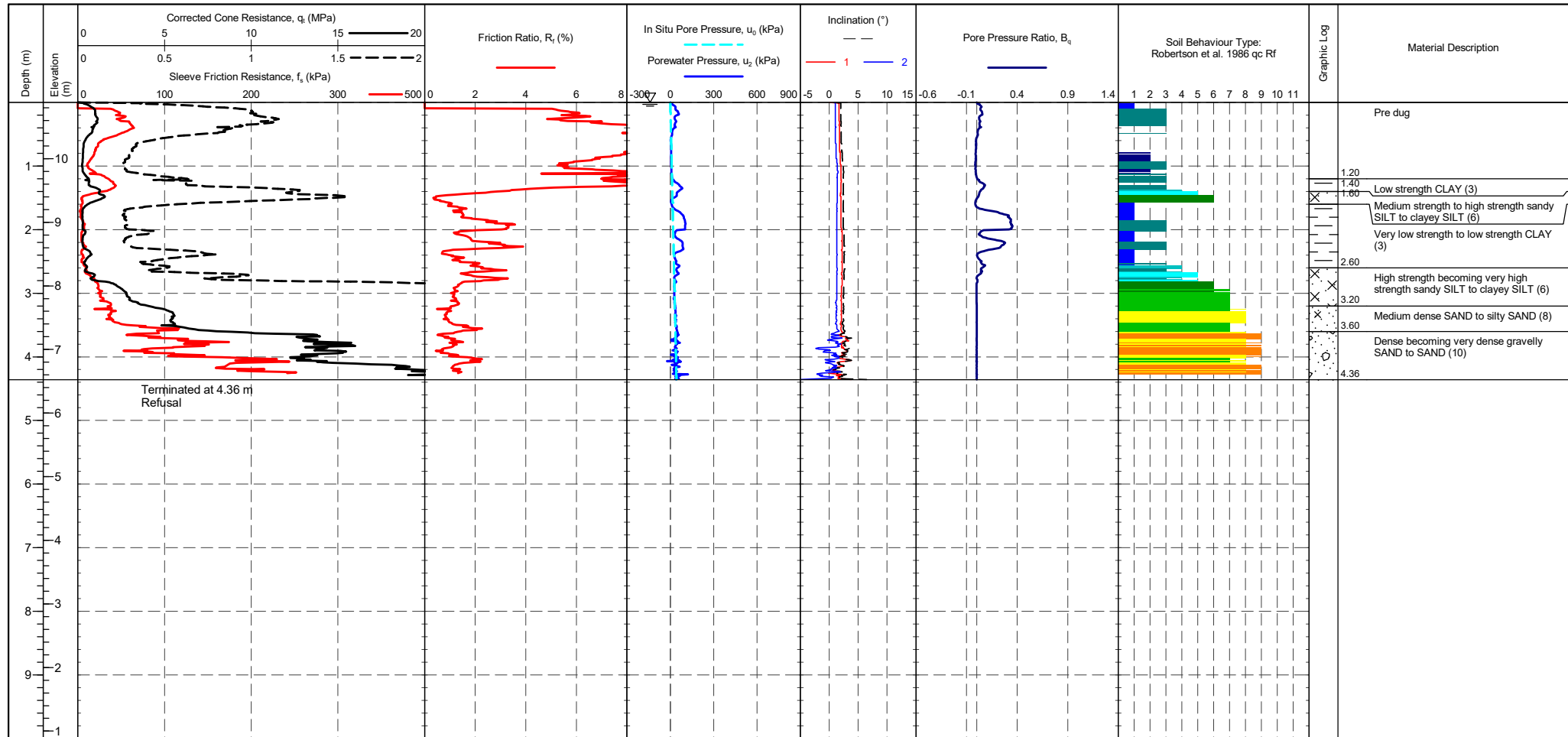
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark	CHECKED	20/05/2023
	A46 Newark Bypass	SCALE	Not To Scale
	Robertson et al. 1986 qc vs. Rf - S3CPT40	PROJECT No 1220514	FIGURE No
		A4	

PointID	S3CPT41
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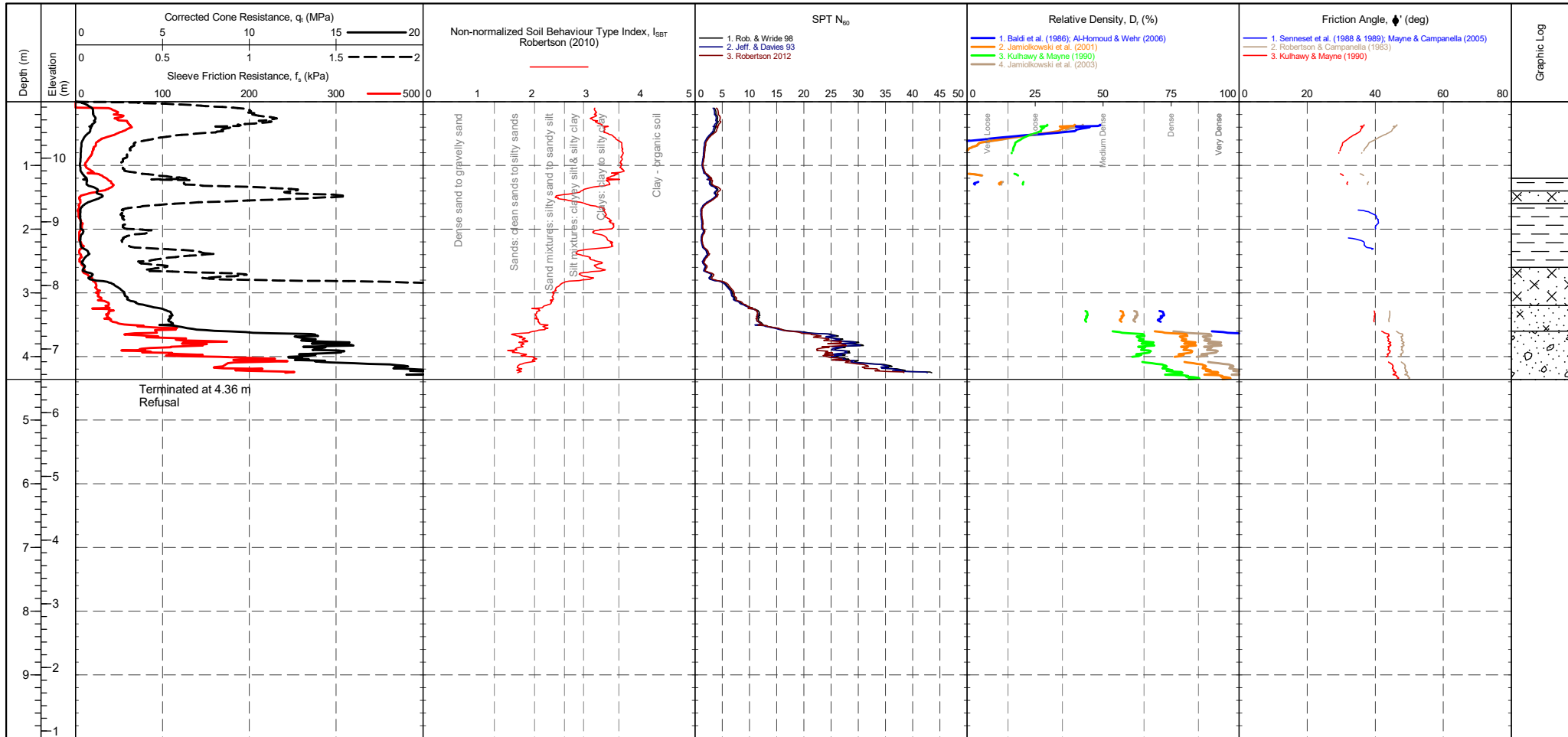
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CONE ID : DP15CFPTXY.71212 CALIBRATION DATE : 22/09/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR & JC FRICITION REDUCER : None WEATHER : Sunny & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip (MPa) 0.00 0.00 0 Sleeve (kPa) 0.00 0.00 0 u2 (kPa) 0.00 0.00 0 Inclinometer 1 (°) Inclinometer 2 (°)	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT41
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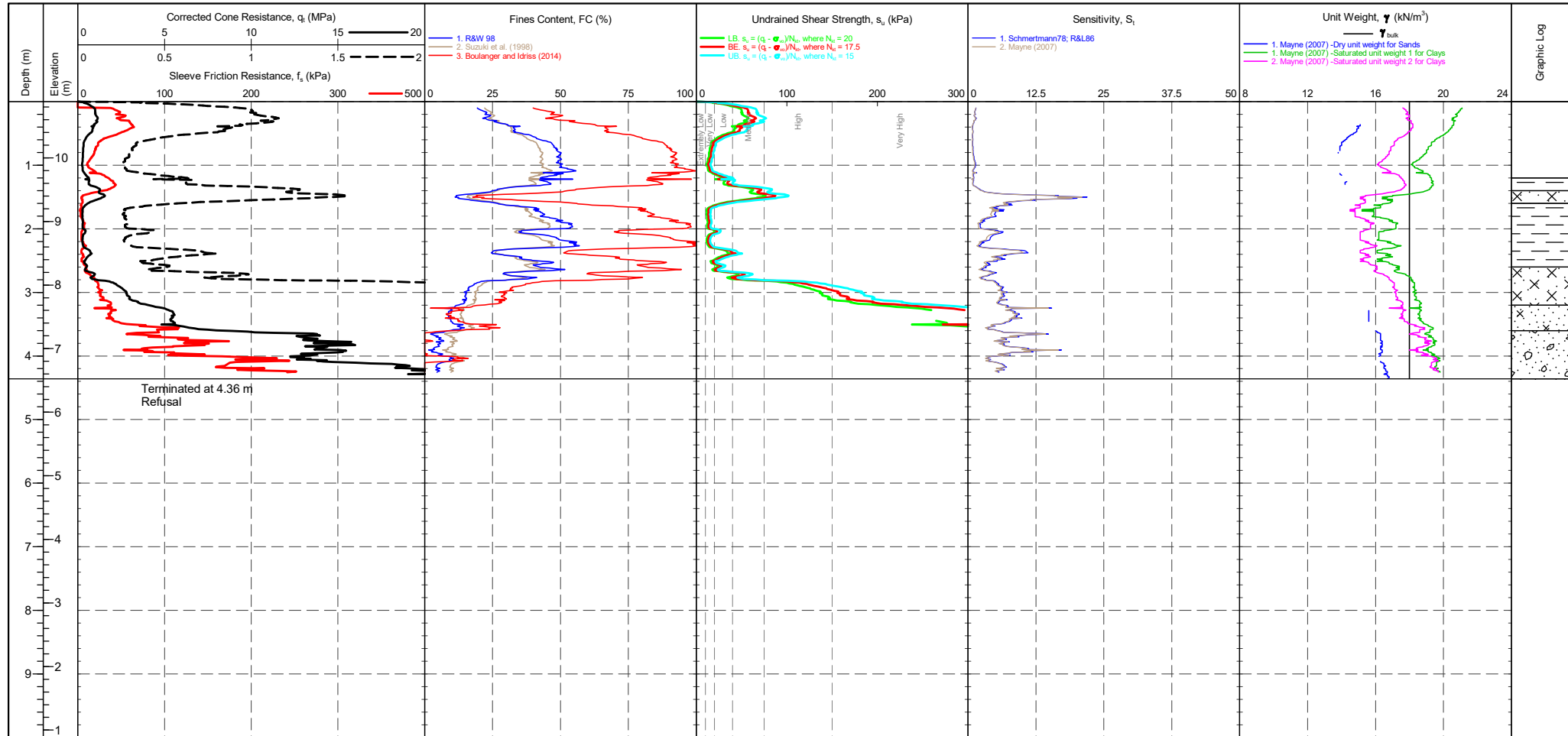
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CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR & JC FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td></td> <td></td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Inclinometer 1 (°)				Inclinometer 2 (°)				GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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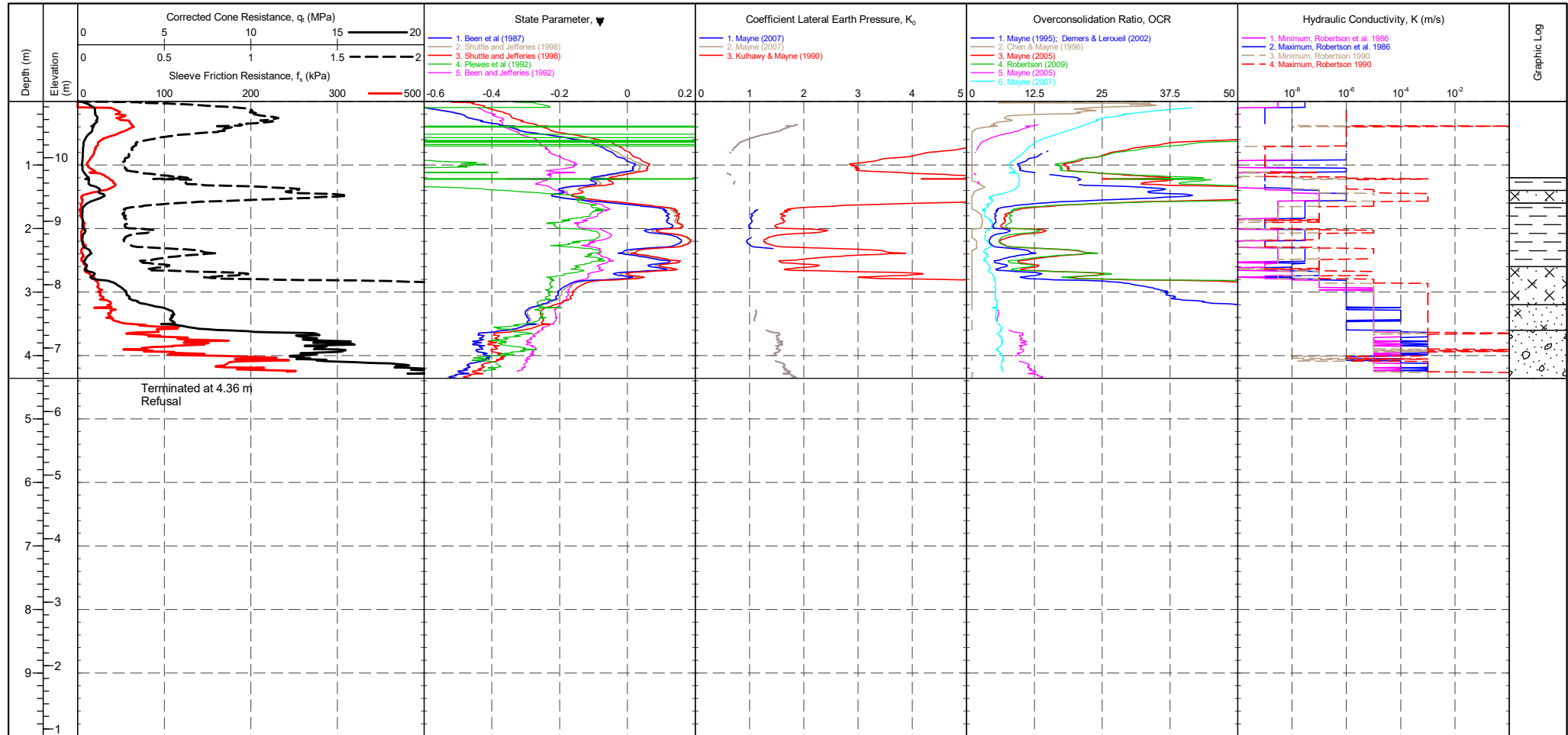


CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR & JC FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip (MPa)</td><td>0.00</td><td>0.00</td><td>0</td></tr> <tr><td>Sleeve (kPa)</td><td>0.00</td><td>0.00</td><td>0</td></tr> <tr><td>u2 (kPa)</td><td>0.00</td><td>0.00</td><td>0</td></tr> <tr><td>Inclinometer 1 (°)</td><td></td><td></td><td></td></tr> <tr><td>Inclinometer 2 (°)</td><td></td><td></td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Inclinometer 1 (°)				Inclinometer 2 (°)				COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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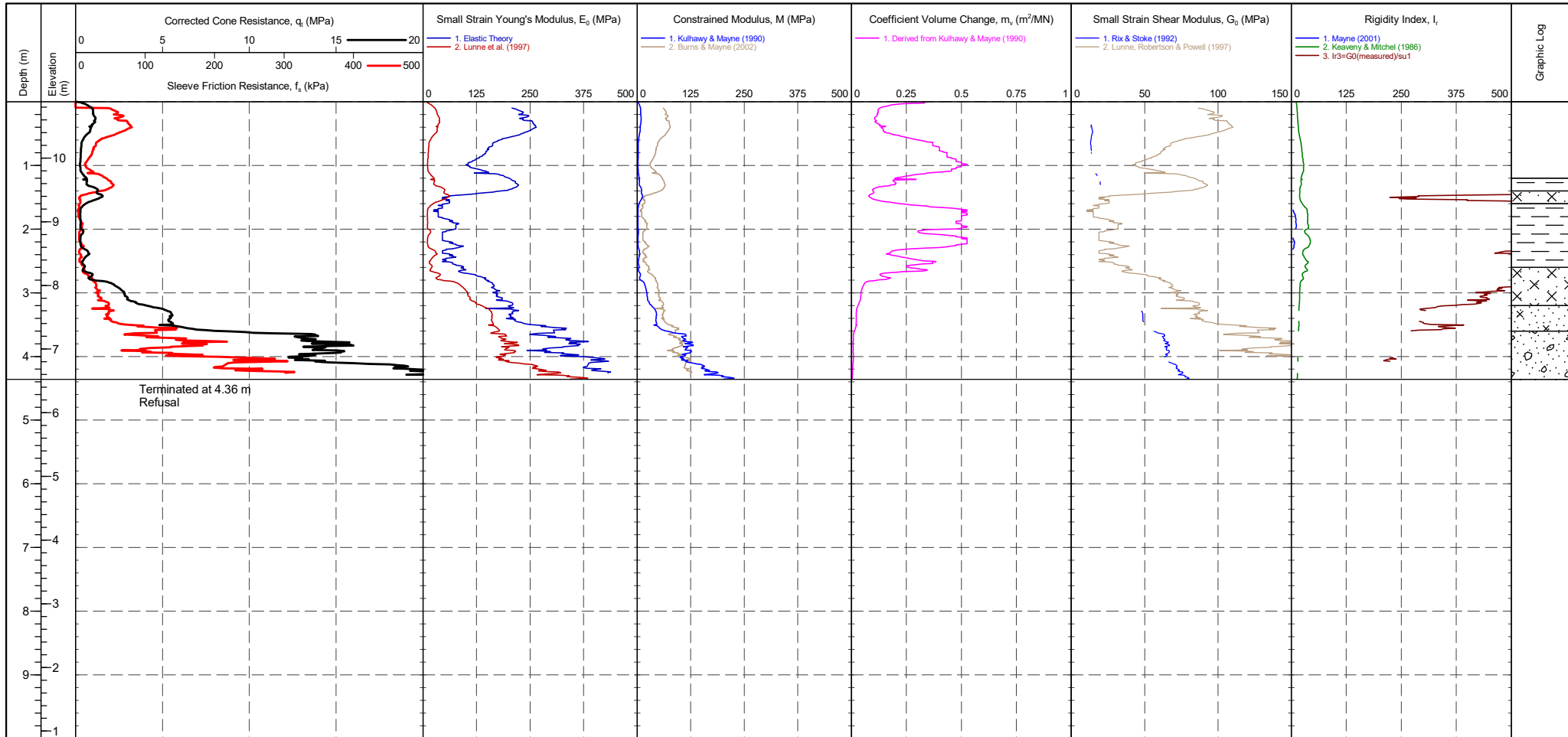
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478065.460 m NORTHING : 352921.138 m ELEVATION : 10.884 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR & JC FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td></td> <td></td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Inclinometer 1 (°)				Inclinometer 2 (°)				Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																								
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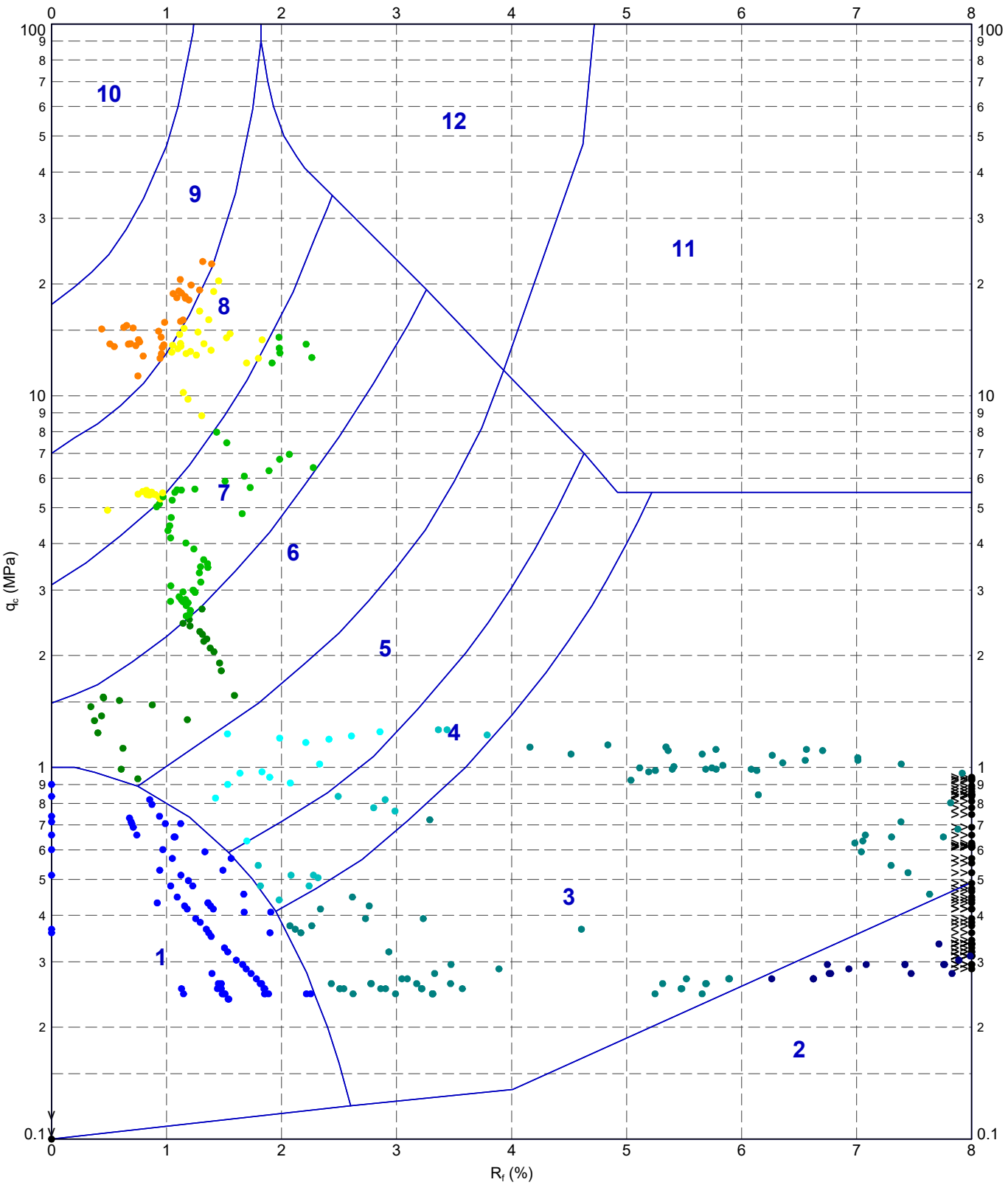
PointID
S3CPT41

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478065.460 m NORTHING : 352921.138 m ELEVATION : 10.884 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 10/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR & JC FRICITION REDUCER : None WEATHER : Sunny & Mild	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td></td> <td></td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Inclinometer 1 (°)				Inclinometer 2 (°)				Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF A4P 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> - 20105202322:11 10.03.00.09 Daiged Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10



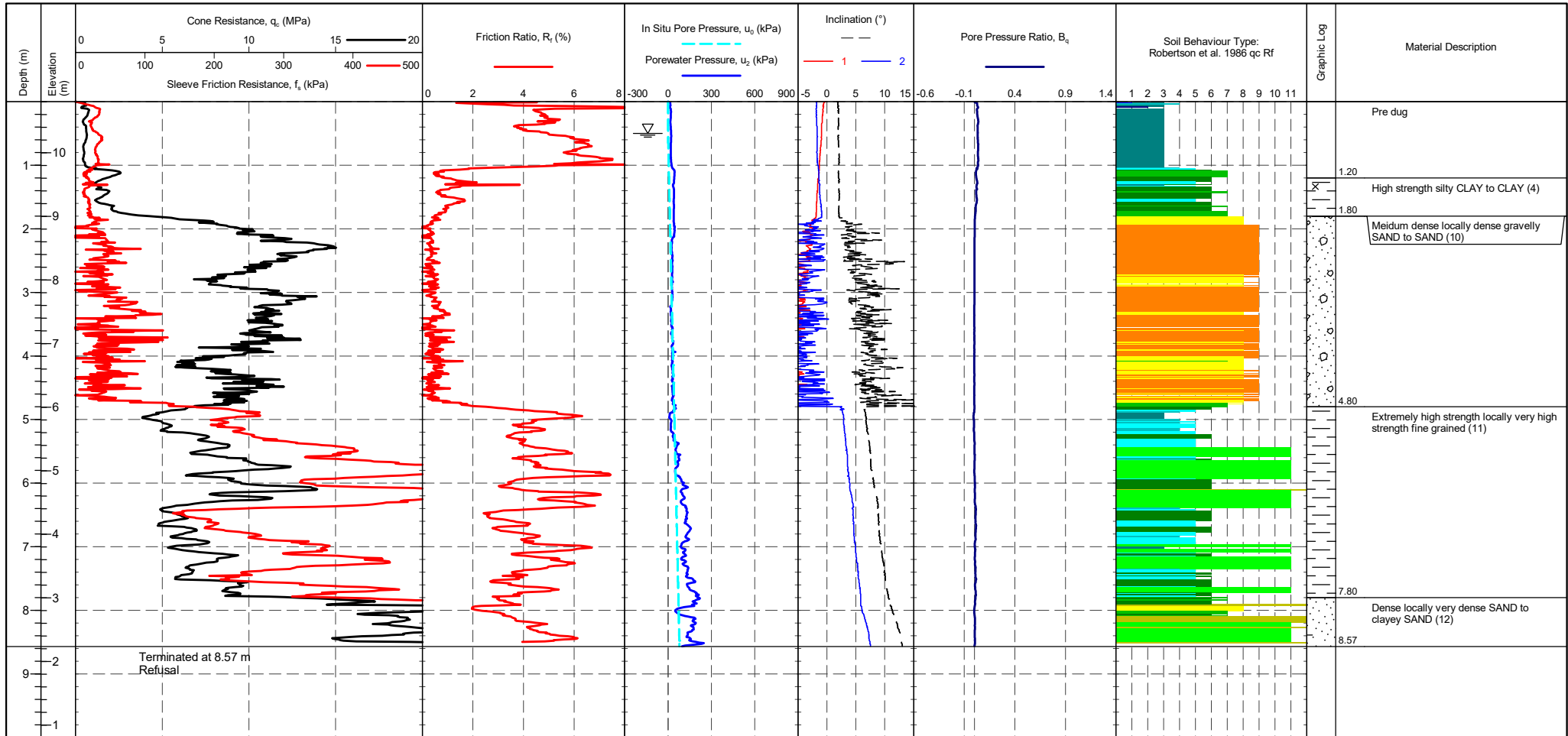
METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

	TITLE	Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3CPT41	
	DRAWN	DATE	20/05/2023
	CHECKED	DATE	20/05/2023
	SCALE	Not To Scale	
PROJECT No	1220514	FIGURE No	A4

PointID	S3CPT42
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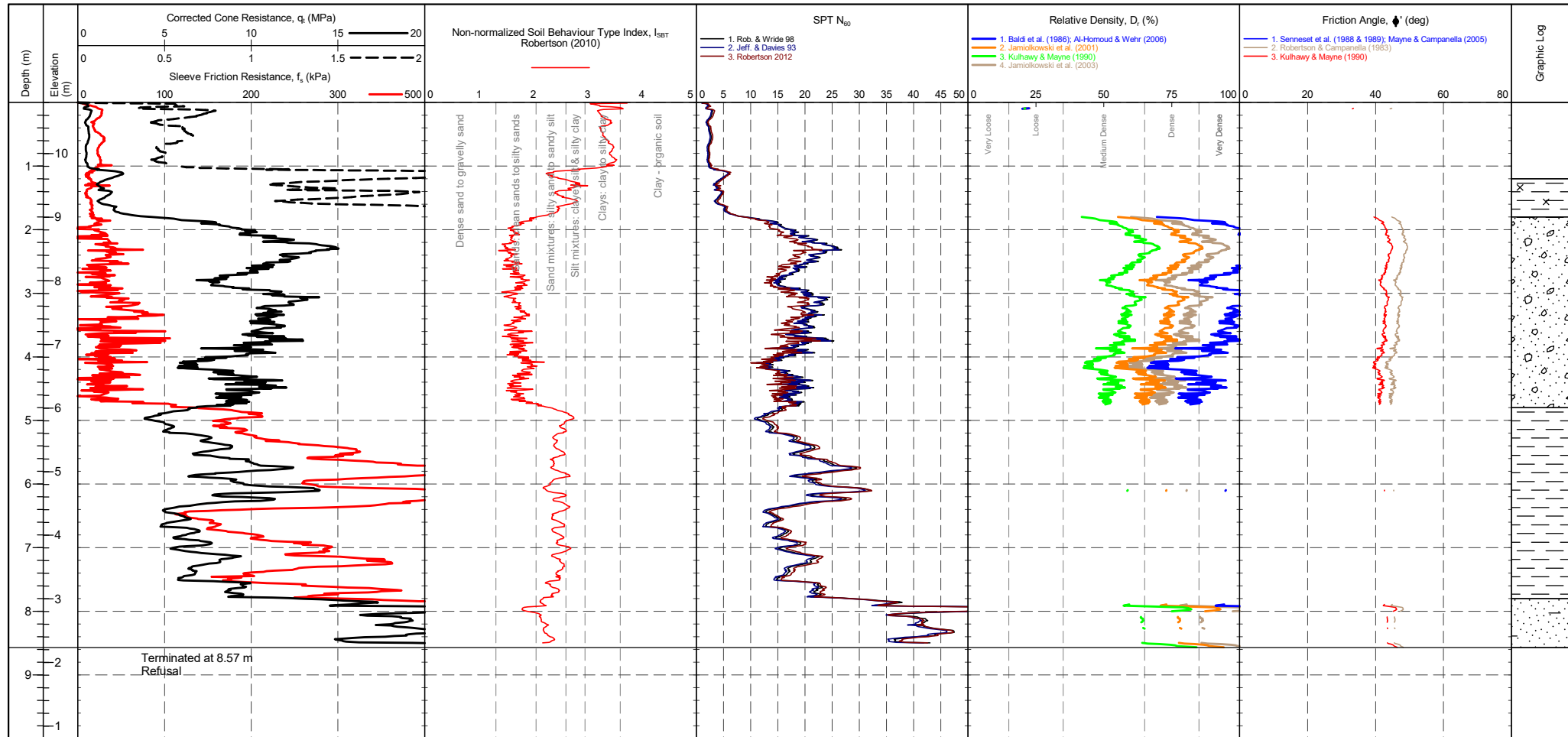
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478067.078 m NORTHING : 352995.588 m ELEVATION : 10.805 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 368 mV 359 mV -0.103 MPa Sleeve 293 mV 284 mV -0.007 kPa Pore Pressure 2 322 mV 317 mV -0.001 kPa X-Y Inclinometer 2504 mV 2484 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT42
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478067.078 m NORTHING : 352995.588 m ELEVATION : 10.805 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>368 mV</td> <td>359 mV</td> <td>-0.103 MPa</td> </tr> <tr> <td>Sleeve</td> <td>293 mV</td> <td>284 mV</td> <td>-0.007 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>322 mV</td> <td>317 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2504 mV</td> <td>2484 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	368 mV	359 mV	-0.103 MPa	Sleeve	293 mV	284 mV	-0.007 kPa	Pore Pressure 2	322 mV	317 mV	-0.001 kPa	X-Y Inclinator	2504 mV	2484 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

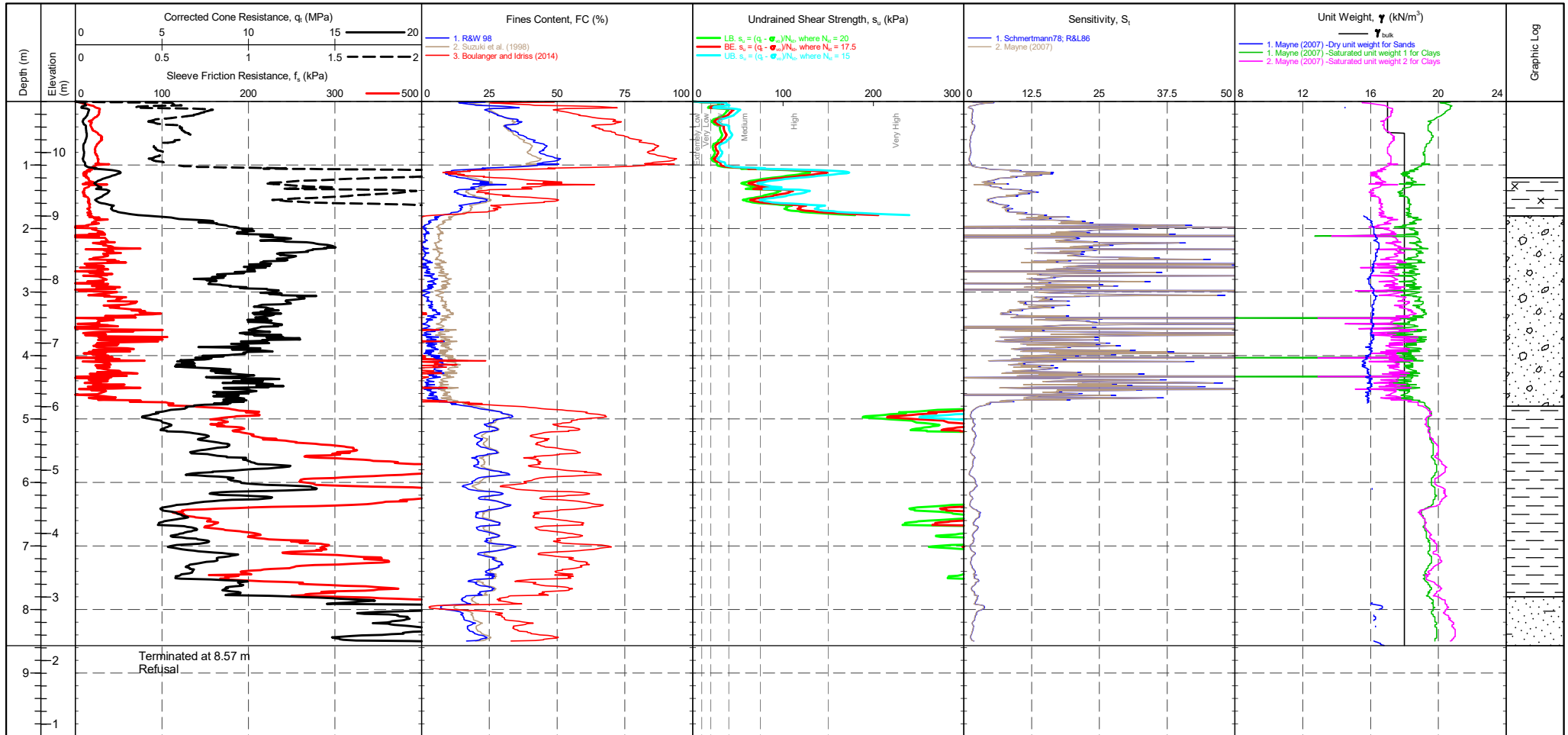
S3CPT42

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 478067.078 m
 NORTHING : 352995.588 m
 ELEVATION : 10.805 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

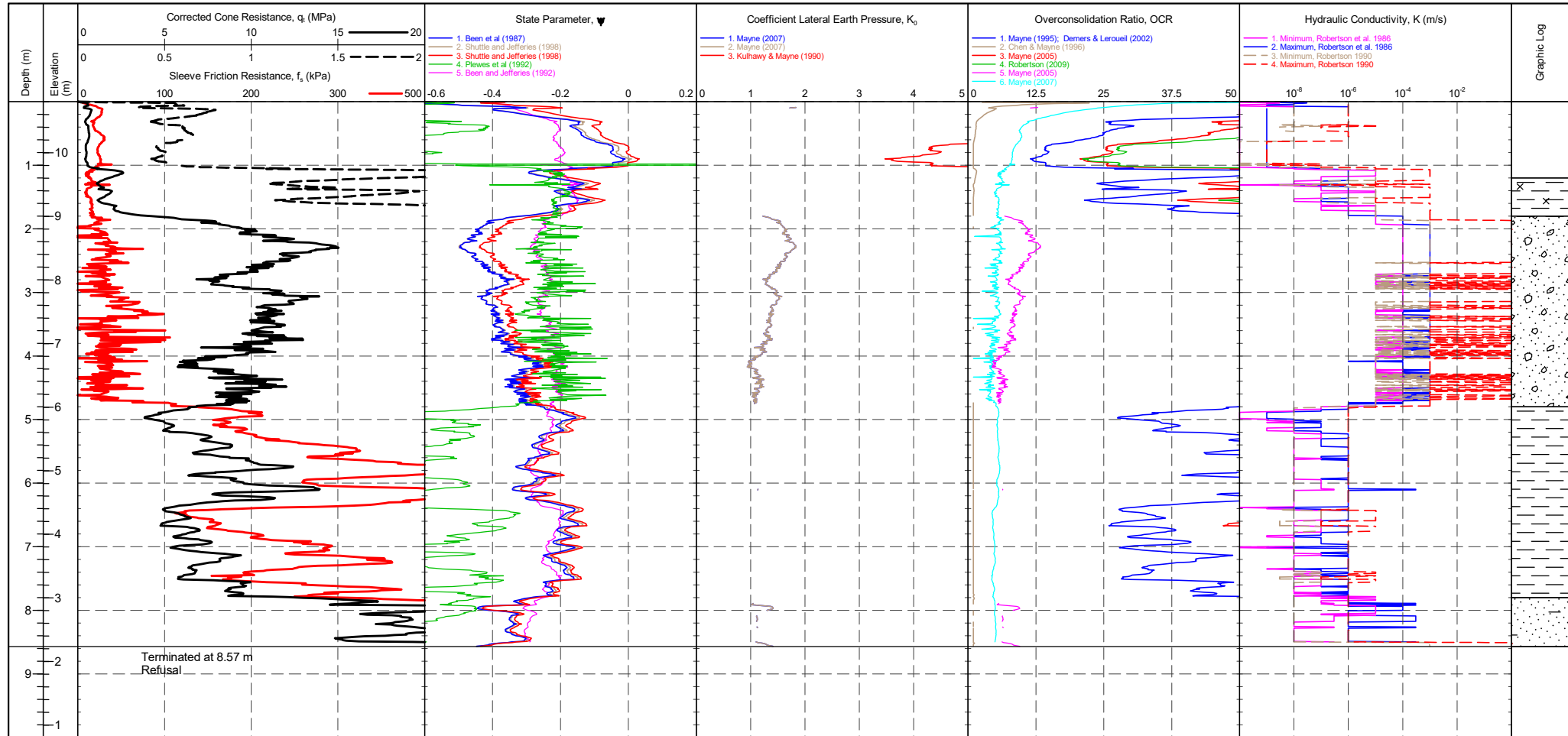
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 09/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE		TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild		CPTU ZERO VALUES Transducer Pre Post Difference Tip 368 mV 359 mV -0.103 MPa Sleeve 293 mV 284 mV -0.007 kPa Pore Pressure 2 322 mV 317 mV -0.001 kPa X-Y Inclinator 2504 mV 2484 mV			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Term based on measurement su (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300				Groundwater Level Dissipation Test
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PointID
S3CPT42

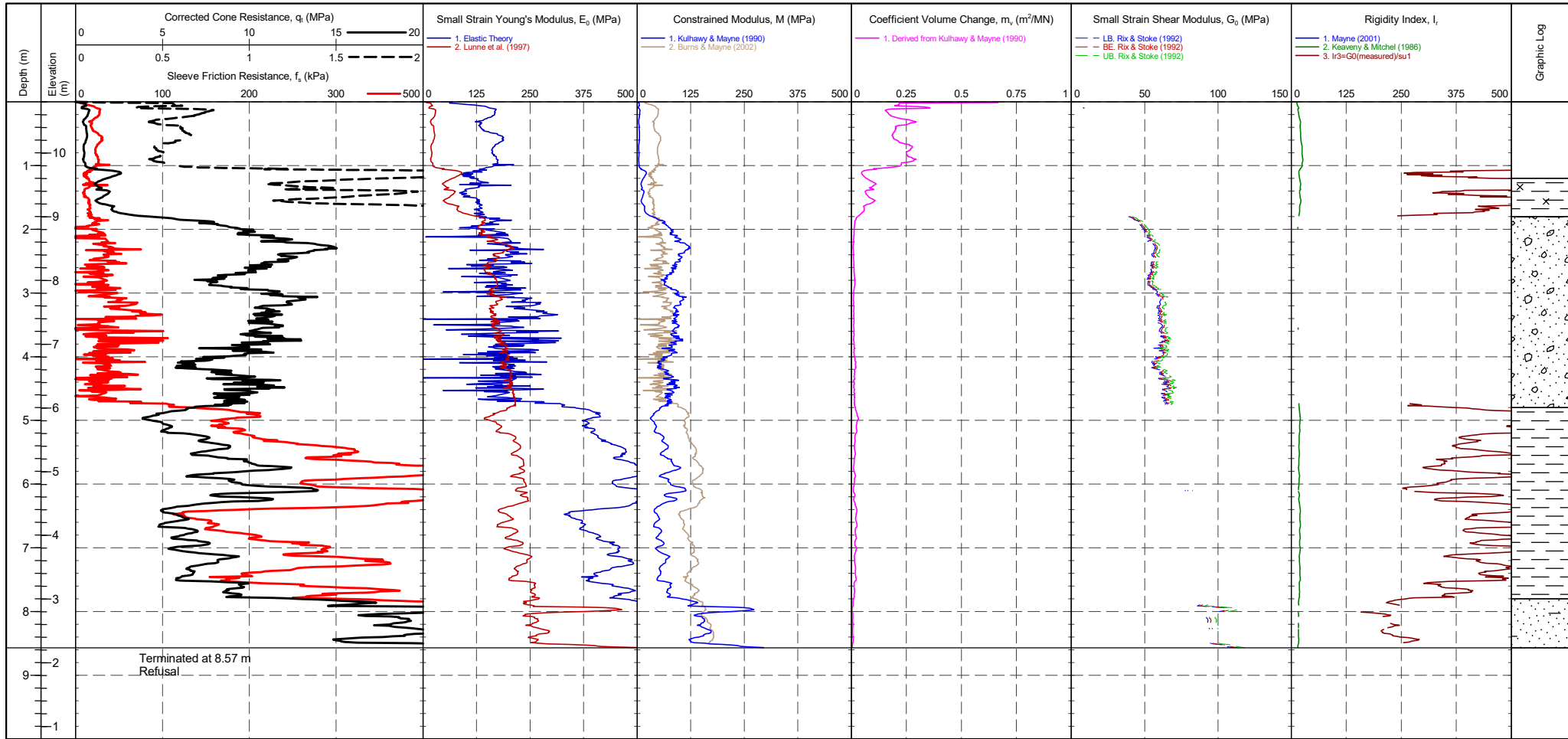
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478067.078 m NORTHING : 352995.588 m ELEVATION : 10.805 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><td>Transducer</td><td>Pre</td><td>Post</td><td>Difference</td></tr> <tr><td>Tip</td><td>368 mV</td><td>359 mV</td><td>-0.103 MPa</td></tr> <tr><td>Sleeve</td><td>293 mV</td><td>284 mV</td><td>-0.007 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>322 mV</td><td>317 mV</td><td>-0.001 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2504 mV</td><td>2484 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	368 mV	359 mV	-0.103 MPa	Sleeve	293 mV	284 mV	-0.007 kPa	Pore Pressure 2	322 mV	317 mV	-0.001 kPa	X-Y Inclinator	2504 mV	2484 mV		Groundwater Level Dissipation Test
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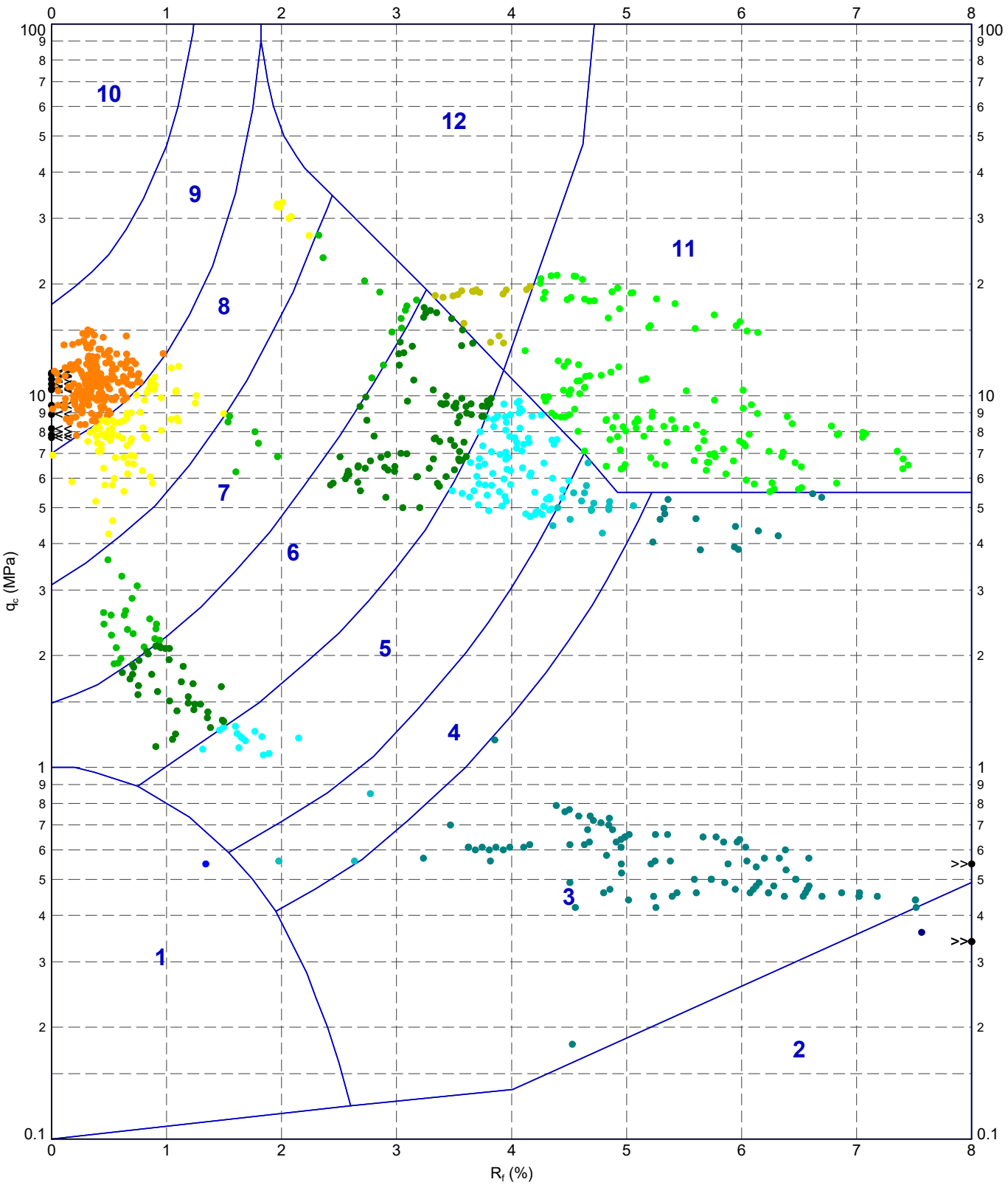
PointID
S3CPT42

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 478067.078 m NORTHING : 352995.588 m ELEVATION : 10.805 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 09/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>368 mV</td><td>359 mV</td><td>-0.103 MPa</td></tr> <tr><td>Sleeve</td><td>293 mV</td><td>284 mV</td><td>-0.007 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>322 mV</td><td>317 mV</td><td>-0.001 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2504 mV</td><td>2484 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	368 mV	359 mV	-0.103 MPa	Sleeve	293 mV	284 mV	-0.007 kPa	Pore Pressure 2	322 mV	317 mV	-0.001 kPa	X-Y Inclinator	2504 mV	2484 mV		Groundwater Level Dissipation Test
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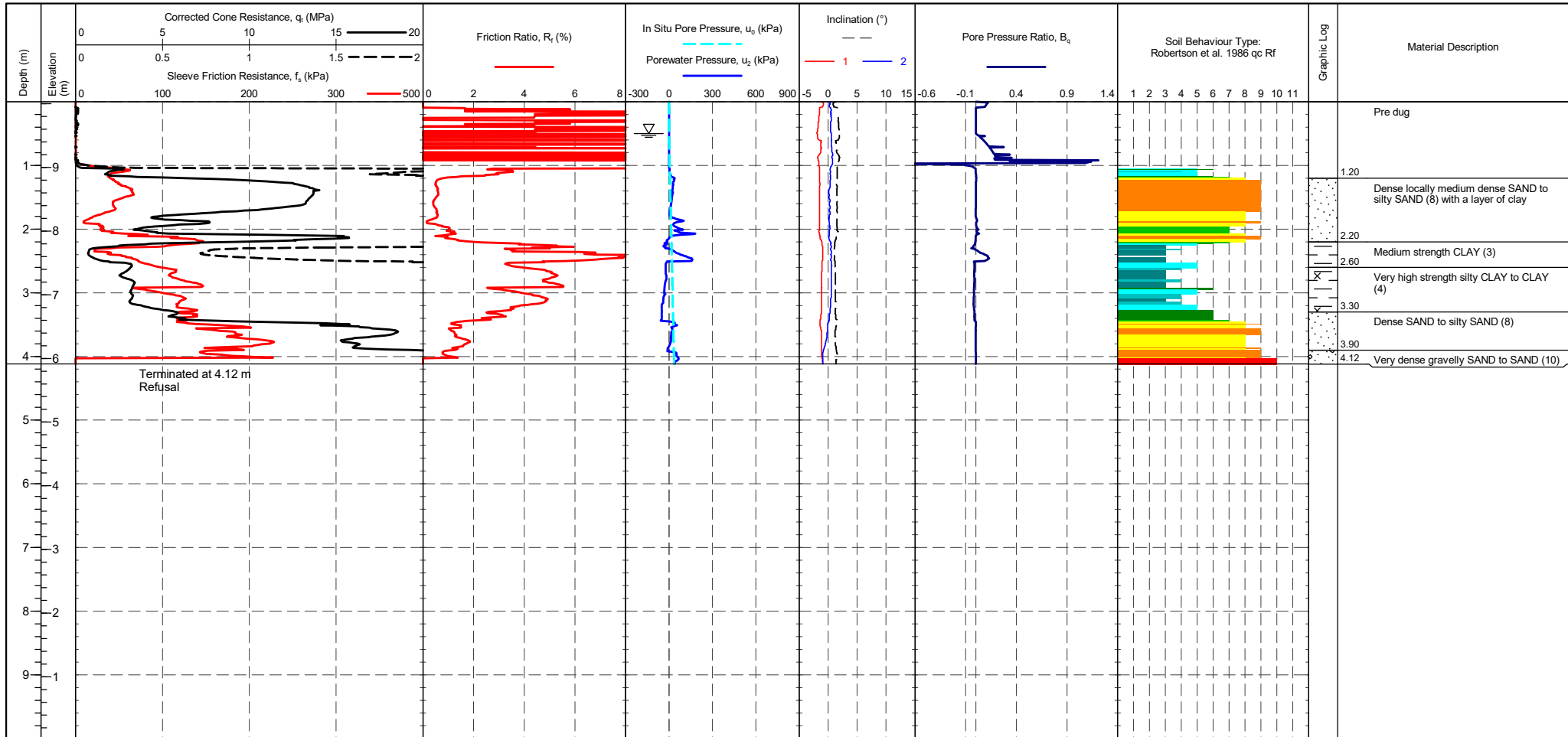
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
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- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics Newark		CHECKED	DATE
	A46 Newark Bypass		SCALE	
	Robertson et al. 1986 qc vs. Rf - S3CPT42		Not To Scale	
		PROJECT No	FIGURE No	
		1220514	A4	

PointID	S3SCPT05
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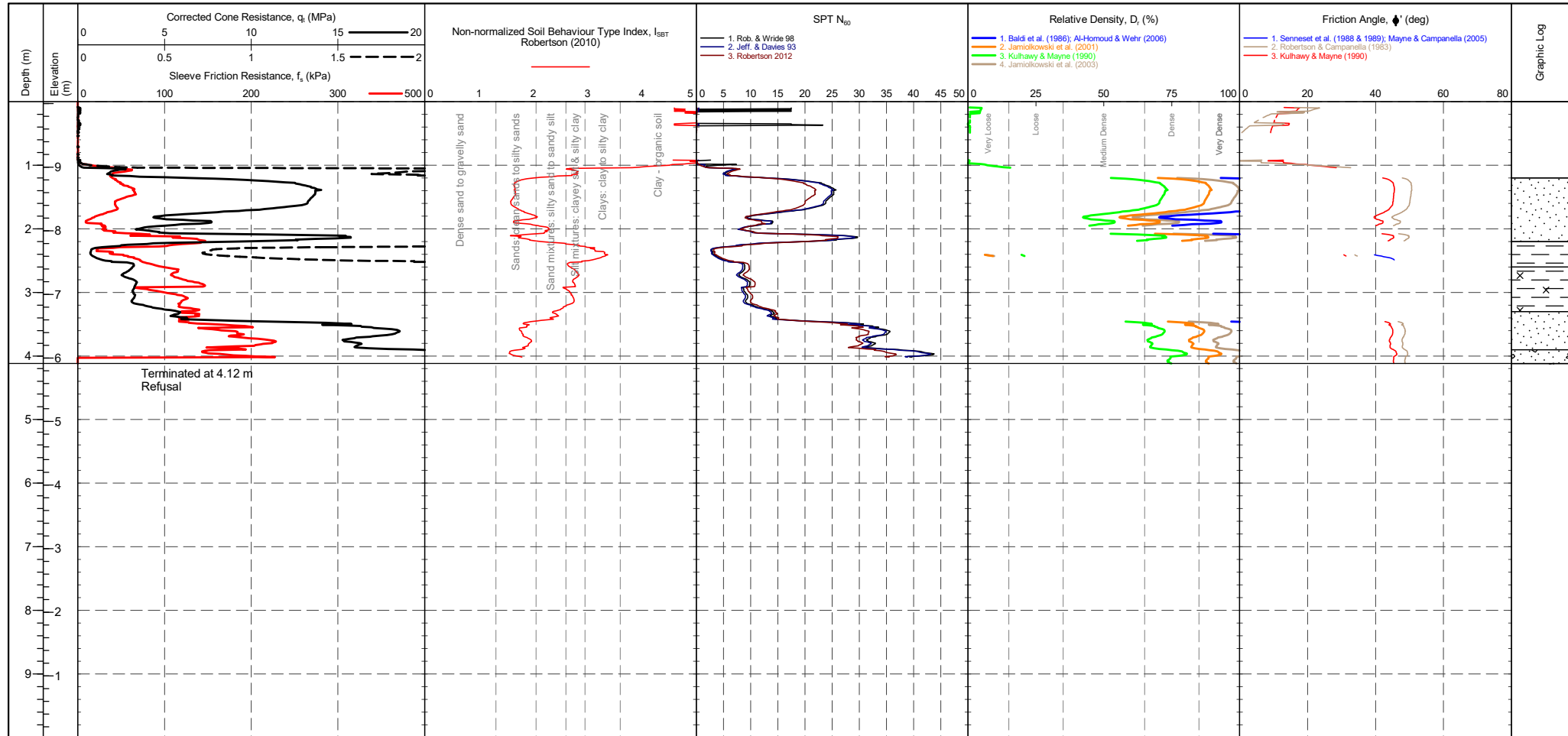
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CALIBRATION DATE : 10/12/2021 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip (MPa)</td> <td>0.00323</td> <td>-0.0404</td> <td>0.0436</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>-0.0231</td> <td>-0.139</td> <td>0.1156</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.00763</td> <td>-0.00297</td> <td>-0.0047</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>-1.28</td> <td>-0.827</td> <td>-0.4528</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.592</td> <td>0.218</td> <td>0.374</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00323	-0.0404	0.0436	Sleeve (kPa)	-0.0231	-0.139	0.1156	u2 (kPa)	-0.00763	-0.00297	-0.0047	Inclinometer 1 (°)	-1.28	-0.827	-0.4528	Inclinometer 2 (°)	0.592	0.218	0.374	METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
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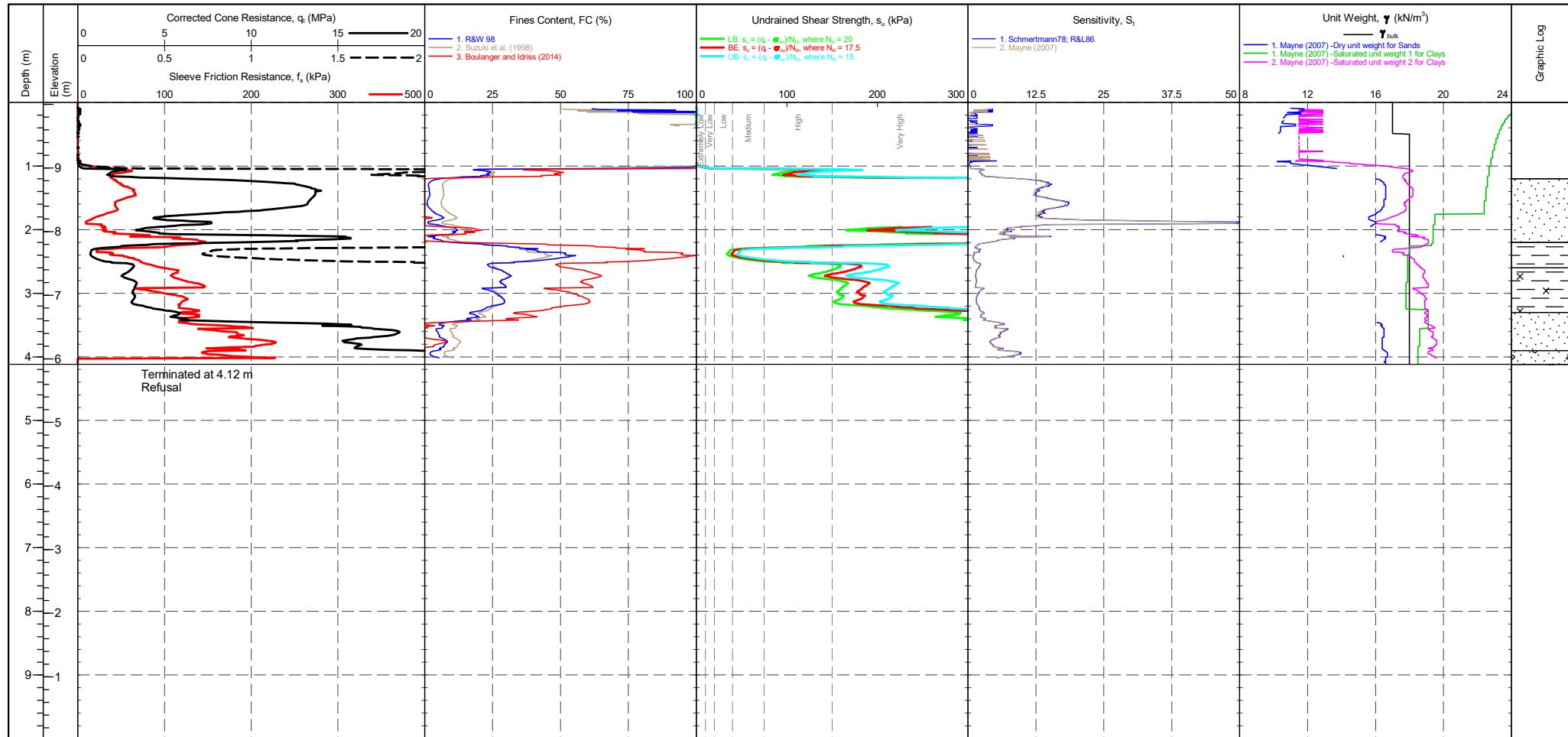
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00323</td> <td>-0.0404</td> <td>0.0436</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>-0.0231</td> <td>-0.139</td> <td>0.1156</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.00763</td> <td>-0.00297</td> <td>-0.0047</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>-1.28</td> <td>-0.827</td> <td>-0.4528</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.592</td> <td>0.218</td> <td>0.374</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00323	-0.0404	0.0436	Sleeve (kPa)	-0.0231	-0.139	0.1156	u2 (kPa)	-0.00763	-0.00297	-0.0047	Inclinometer 1 (°)	-1.28	-0.827	-0.4528	Inclinometer 2 (°)	0.592	0.218	0.374	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID	S3SCPT05
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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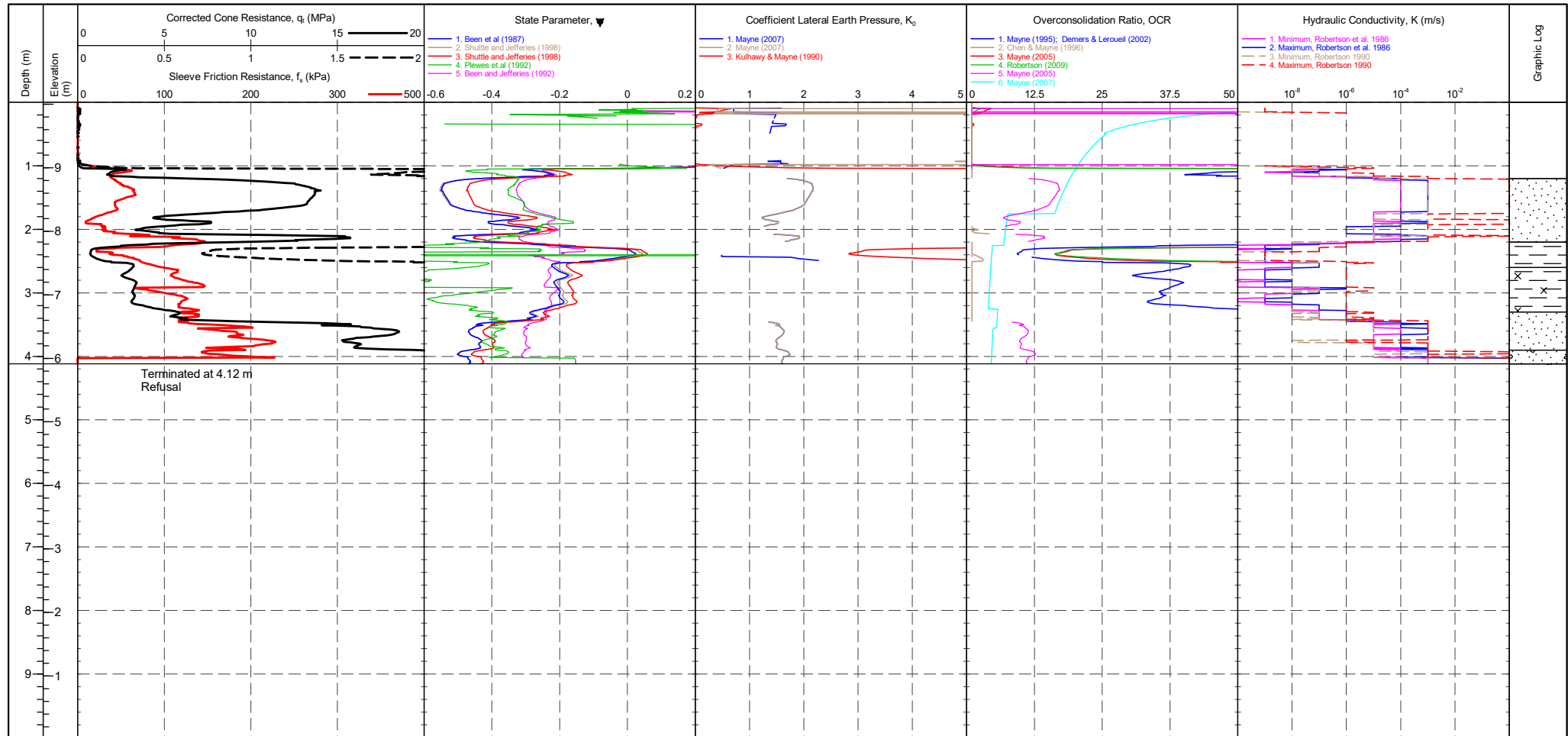


CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip (MPa) 0.00323 -0.0404 0.0436 Sleeve (kPa) -0.0231 -0.139 0.1156 u2 (kPa) -0.00763 -0.00297 -0.0047 Inclinator 1 (°) -1.28 -0.827 -0.4528 Inclinator 2 (°) 0.592 0.218 0.374	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement s_u (kPa) Term based on measurement s_u (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID

S3SCPT05

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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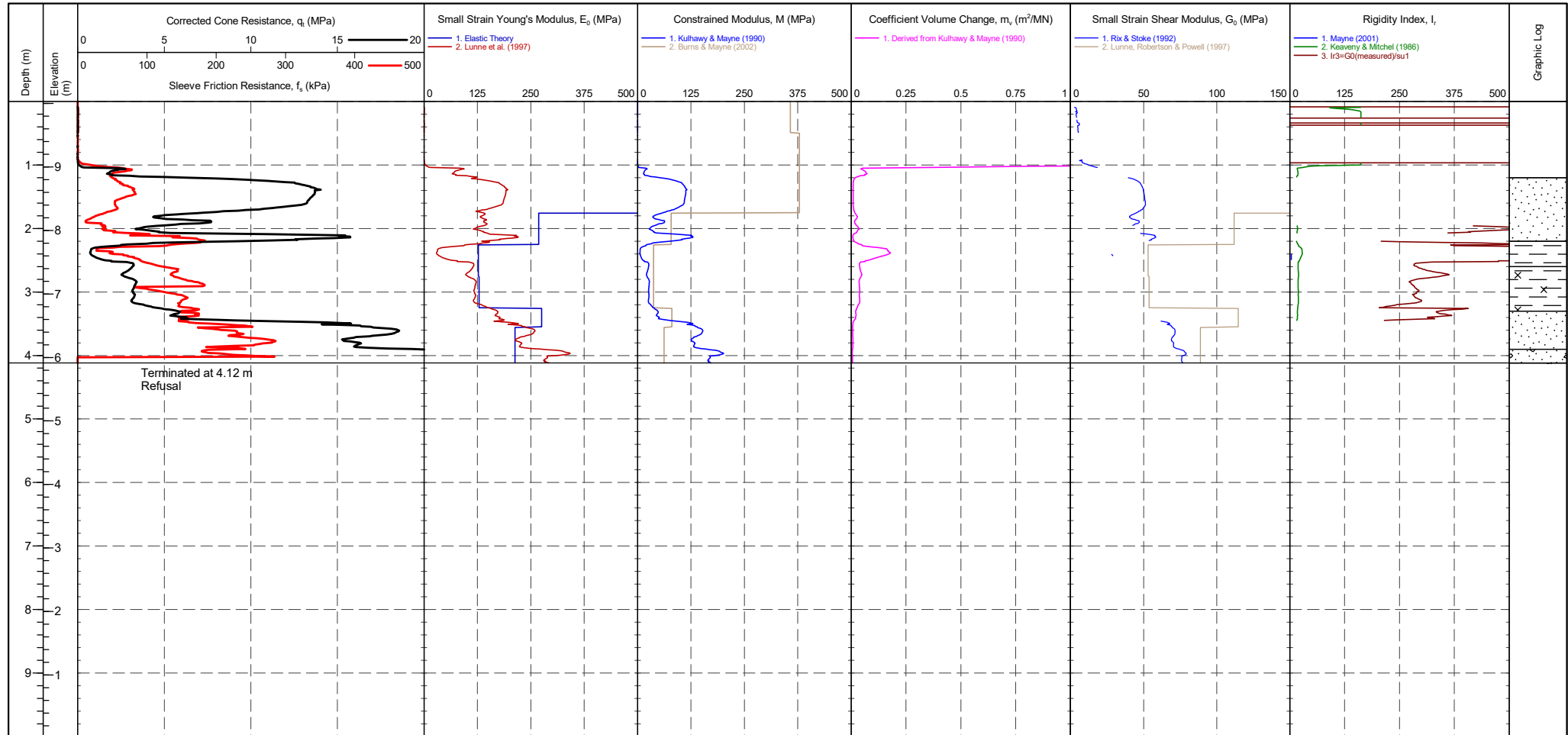
Graphic Log

CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00323</td> <td>-0.0404</td> <td>0.0436</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>-0.0231</td> <td>-0.139</td> <td>0.1156</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.00763</td> <td>-0.00297</td> <td>-0.0047</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>-1.28</td> <td>-0.827</td> <td>-0.4528</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.592</td> <td>0.218</td> <td>0.374</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00323	-0.0404	0.0436	Sleeve (kPa)	-0.0231	-0.139	0.1156	u2 (kPa)	-0.00763	-0.00297	-0.0047	Inclinometer 1 (°)	-1.28	-0.827	-0.4528	Inclinometer 2 (°)	0.592	0.218	0.374	Groundwater Level Dissipation Test
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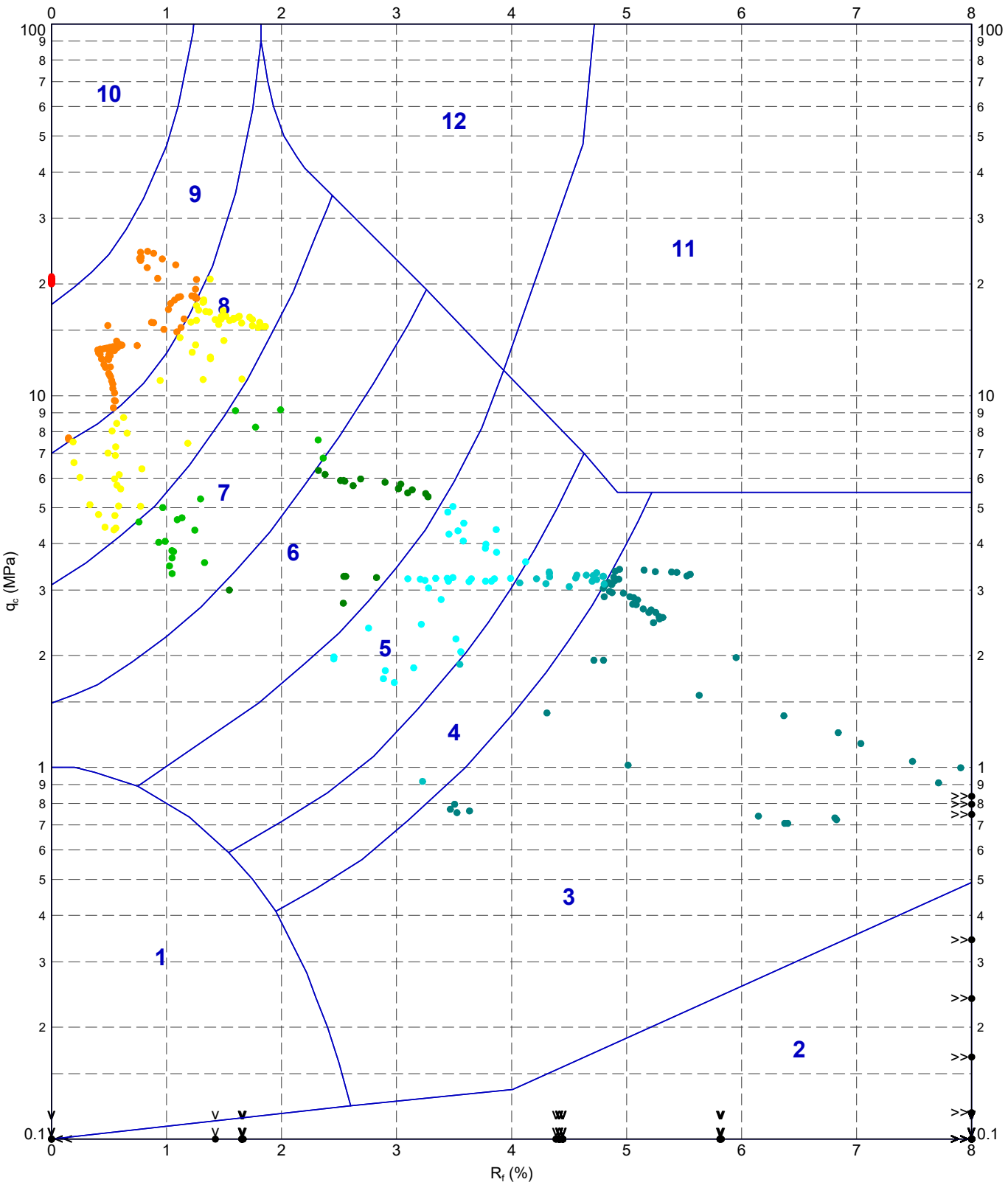
S3SCPT05

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00323</td> <td>-0.0404</td> <td>0.0436</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>-0.0231</td> <td>-0.139</td> <td>0.1156</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.00763</td> <td>-0.00297</td> <td>-0.0047</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>-1.28</td> <td>-0.827</td> <td>-0.4528</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.592</td> <td>0.218</td> <td>0.374</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00323	-0.0404	0.0436	Sleeve (kPa)	-0.0231	-0.139	0.1156	u2 (kPa)	-0.00763	-0.00297	-0.0047	Inclinometer 1 (°)	-1.28	-0.827	-0.4528	Inclinometer 2 (°)	0.592	0.218	0.374	Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF AMP 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 22:13 10.03.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10]



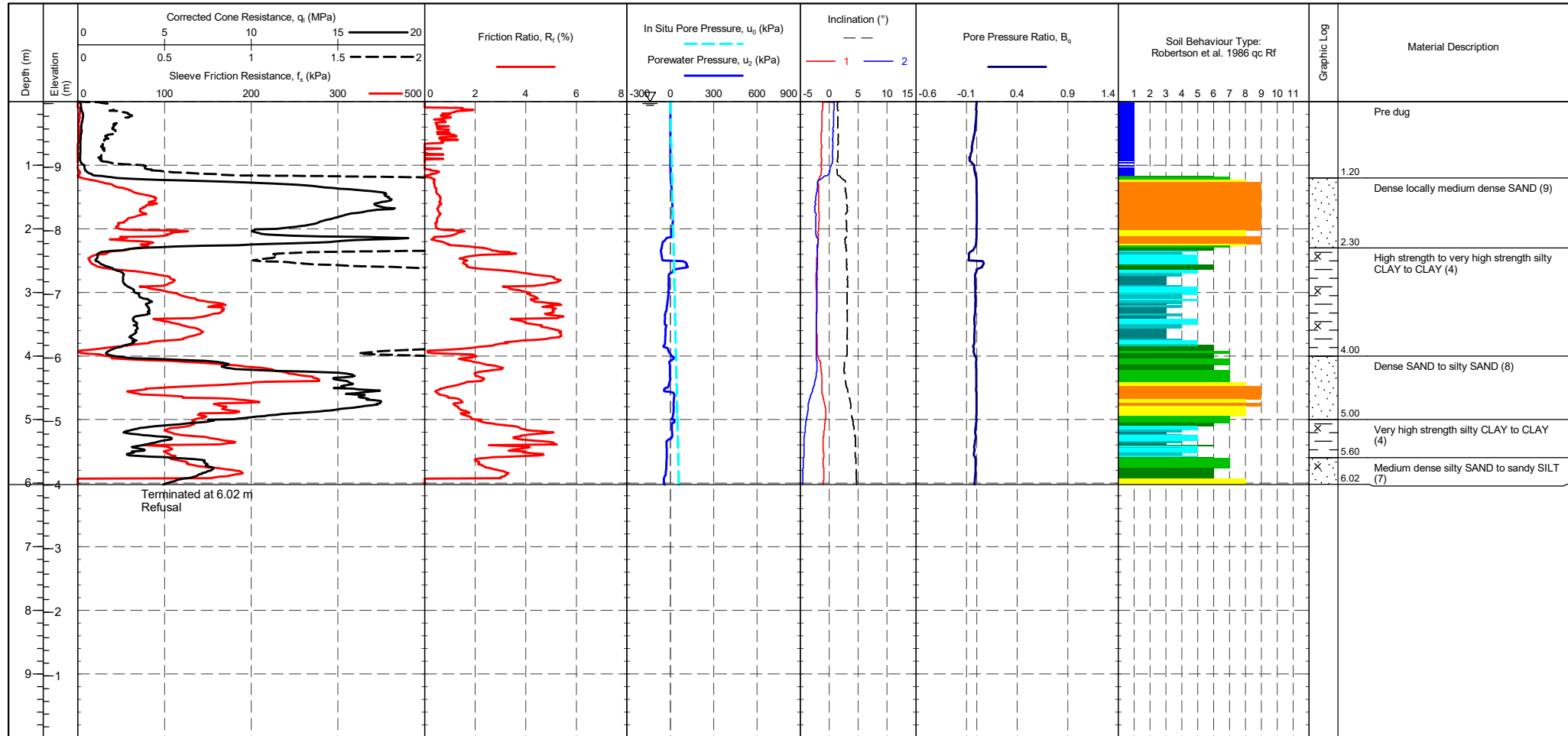
METHOD: Robertson et al. 1986 q_c vs R_f

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 q_c vs. R_f - S3SCPT05</p>	DRAWN	DATE	20/05/2023	
		CHECKED	DATE	20/05/2023	
		SCALE	Not To Scale		A4
		PROJECT No	1220514		
		FIGURE No			

PointID	S3SCPT05A
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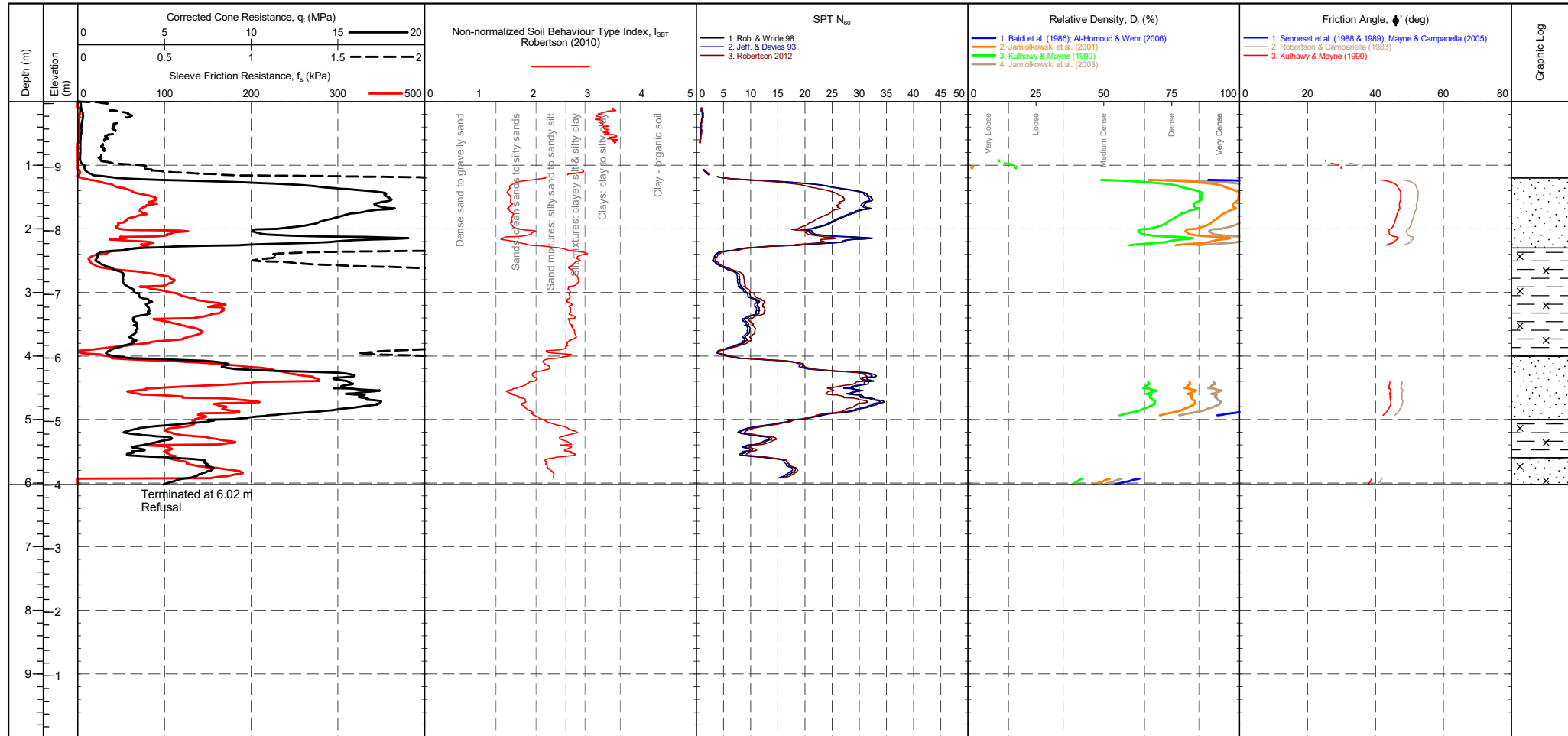
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CONE ID : DP15CFPTXY.71212 CALIBRATION DATE : 22/09/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> </table> Inclinometer 1 ($^\circ$) Inclinometer 2 ($^\circ$)	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3SCPT05A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td></td> <td></td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Inclinometer 1 (°)				Inclinometer 2 (°)				GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	▽ Groundwater Level Dissipation Test
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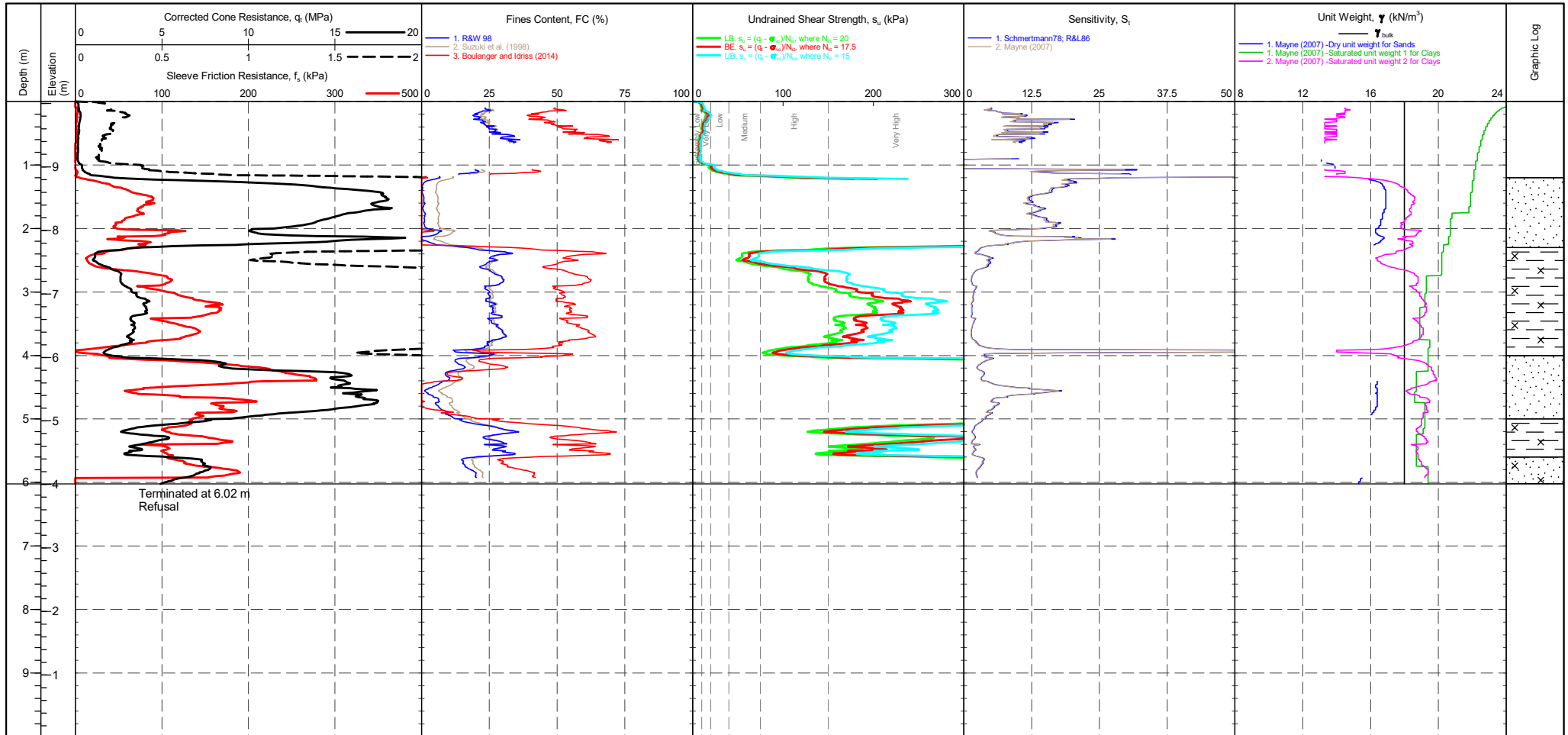
S3SCPT05A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 481180.683 m
 NORTHING : 356035.868 m
 ELEVATION : 10.031 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 01/11/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012

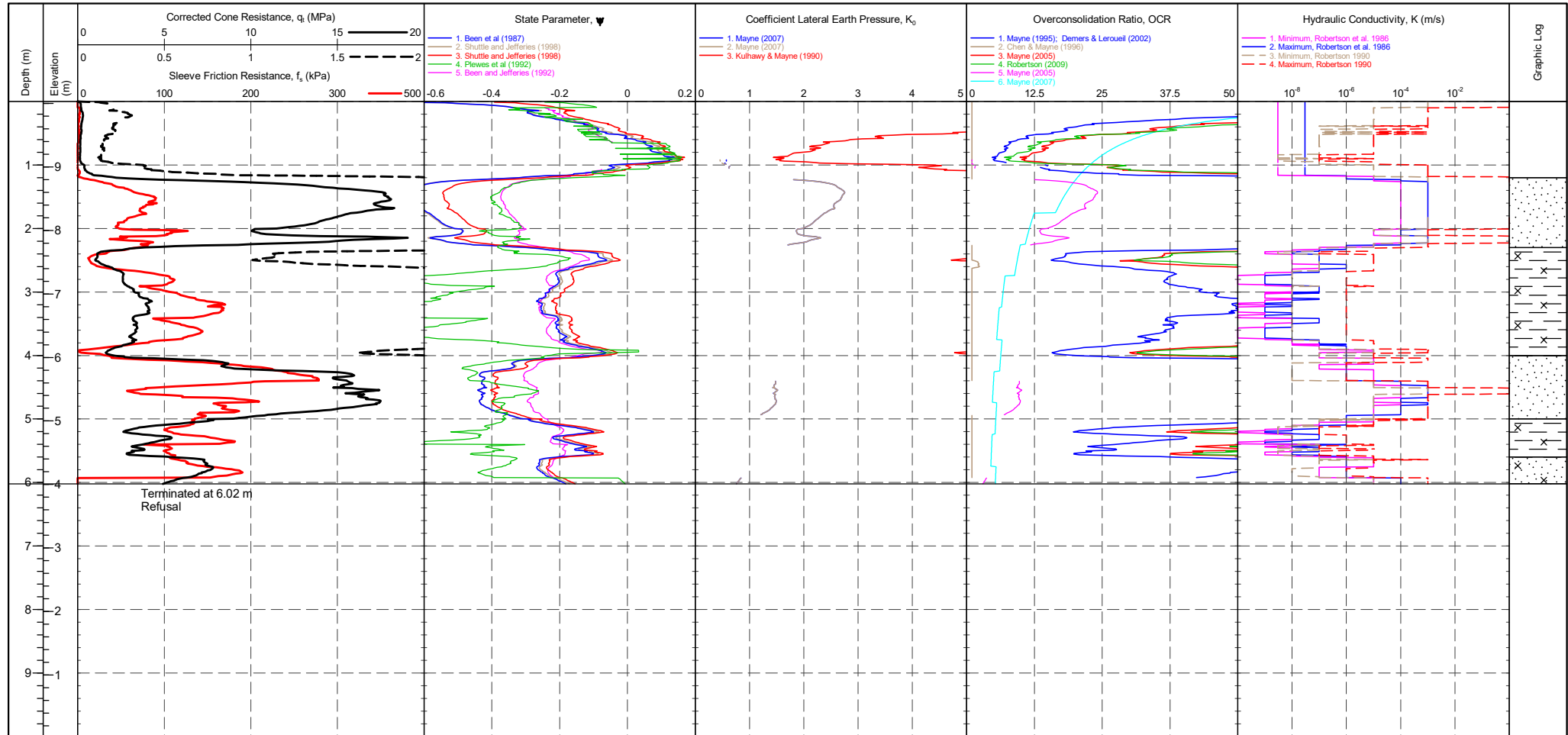


CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11				▽ Groundwater Level ▭ Dissipation Test
		Transducer Tip (MPa) Sleeve (kPa) u2 (kPa) Inclinator 1 (°) Inclinator 2 (°)	Pre 0.00 0.00 0.00 0.00	Post 0.00 0.00 0.00 0.00	Difference 0 0 0 0	Term based on measurement Extremely low strength Very low strength Low strength	su (kPa) <10 10-20 20-40	Term based on measurement Medium strength High strength Very high strength Extremely high strength	

PointID

S3SCPT05A

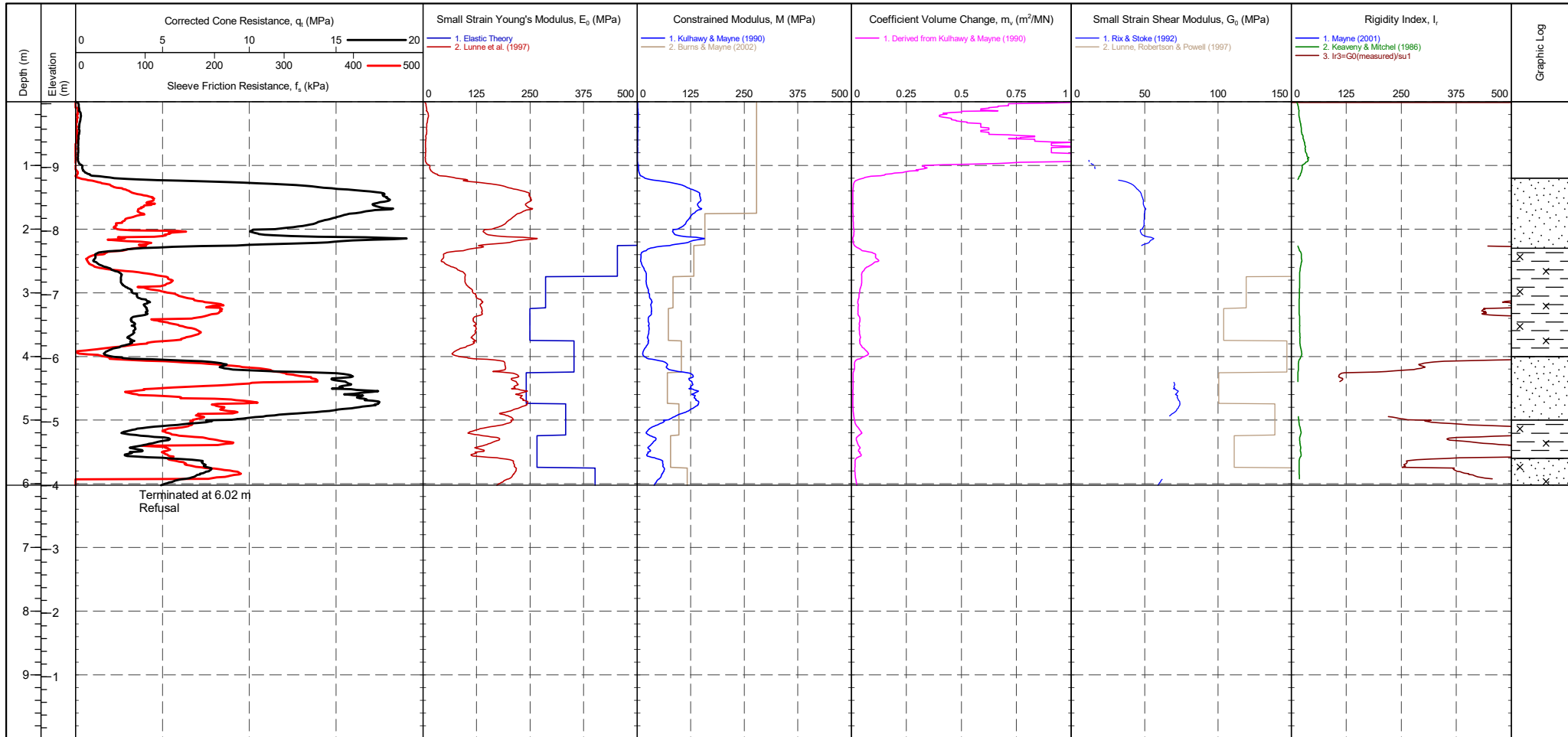
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td></td> <td></td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Inclinometer 1 (°)				Inclinometer 2 (°)				Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																								
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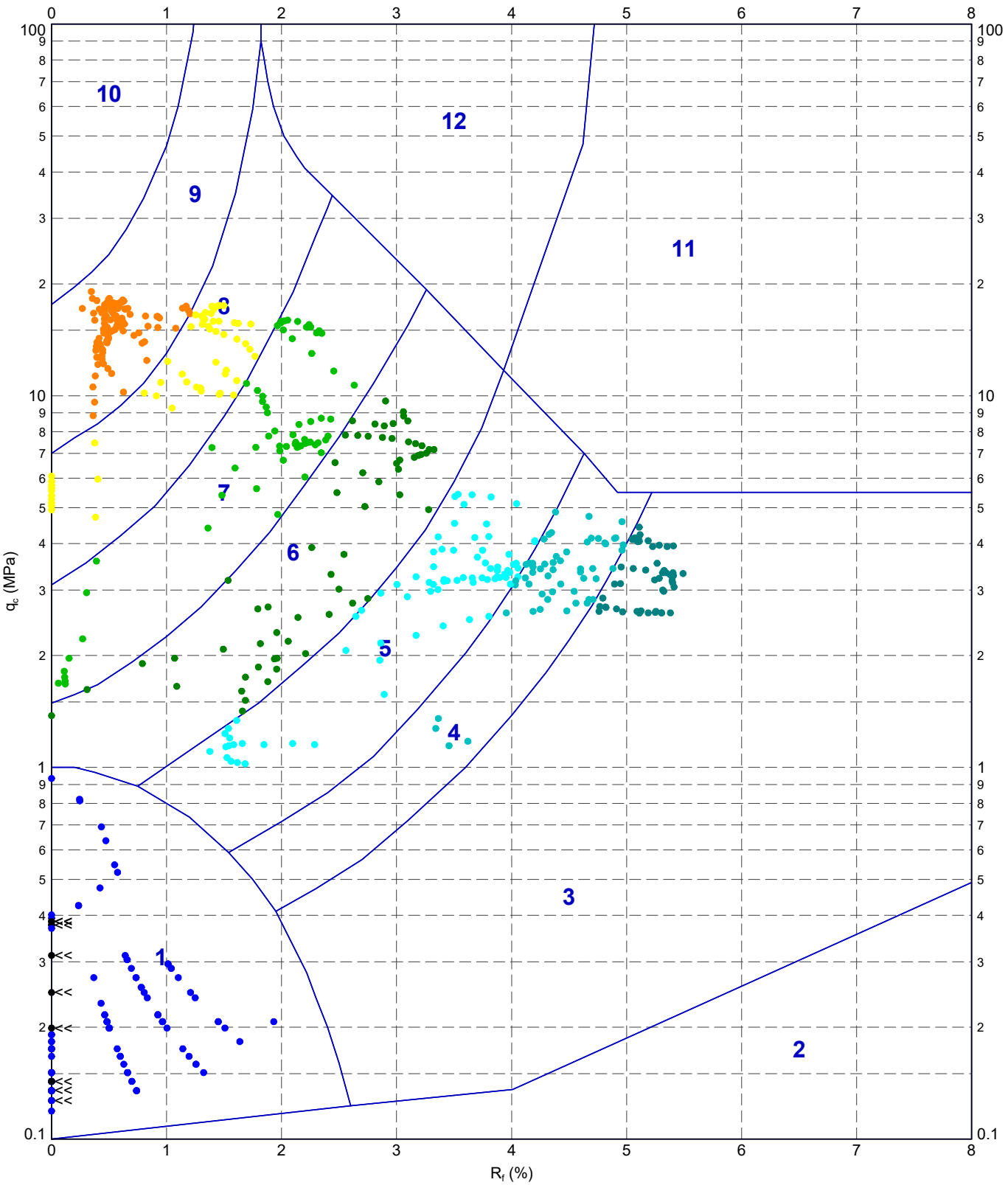
PointID
S3SCPT05A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 481180.683 m NORTHING : 356035.868 m ELEVATION : 10.031 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 01/11/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15CFPTY.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & DR FRICION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip (MPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> <tr> <td>u2 (kPa)</td> <td>0.00</td> <td>0.00</td> <td>0</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.00	0.00	0	Sleeve (kPa)	0.00	0.00	0	u2 (kPa)	0.00	0.00	0	Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																
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Sleeve (kPa)	0.00	0.00	0																
u2 (kPa)	0.00	0.00	0																

22069-ADVANCED REPORT INSTITUTE 2.02.1 LUB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile>> 20/05/2023 22:14 10.03.00.09 Dalgid Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10]



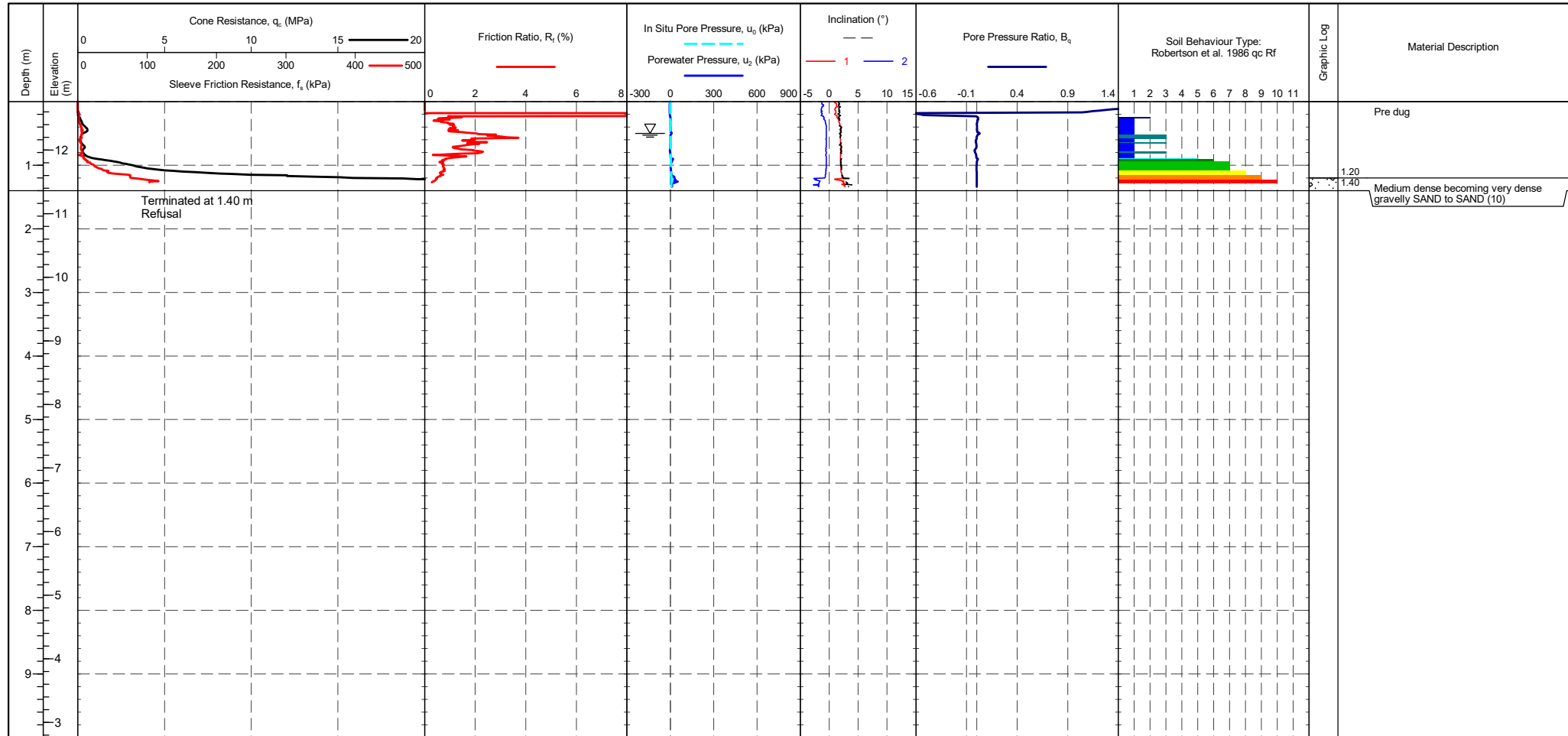
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics Newark		CHECKED	DATE
	A46 Newark Bypass		SCALE	
	Robertson et al. 1986 qc vs. Rf - S3SCPT05A		Not To Scale	
	PROJECT No 1220514		FIGURE No A4	

PointID
S3SCPT28

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>345 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>261 mV</td> <td>262 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>330 mV</td> <td>298 mV</td> <td>-0.009 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2604 mV</td> <td>2623 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	345 mV	0 MPa	Sleeve	261 mV	262 mV	0.001 kPa	Pore Pressure 2	330 mV	298 mV	-0.009 kPa	X-Y Inclinator	2604 mV	2623 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

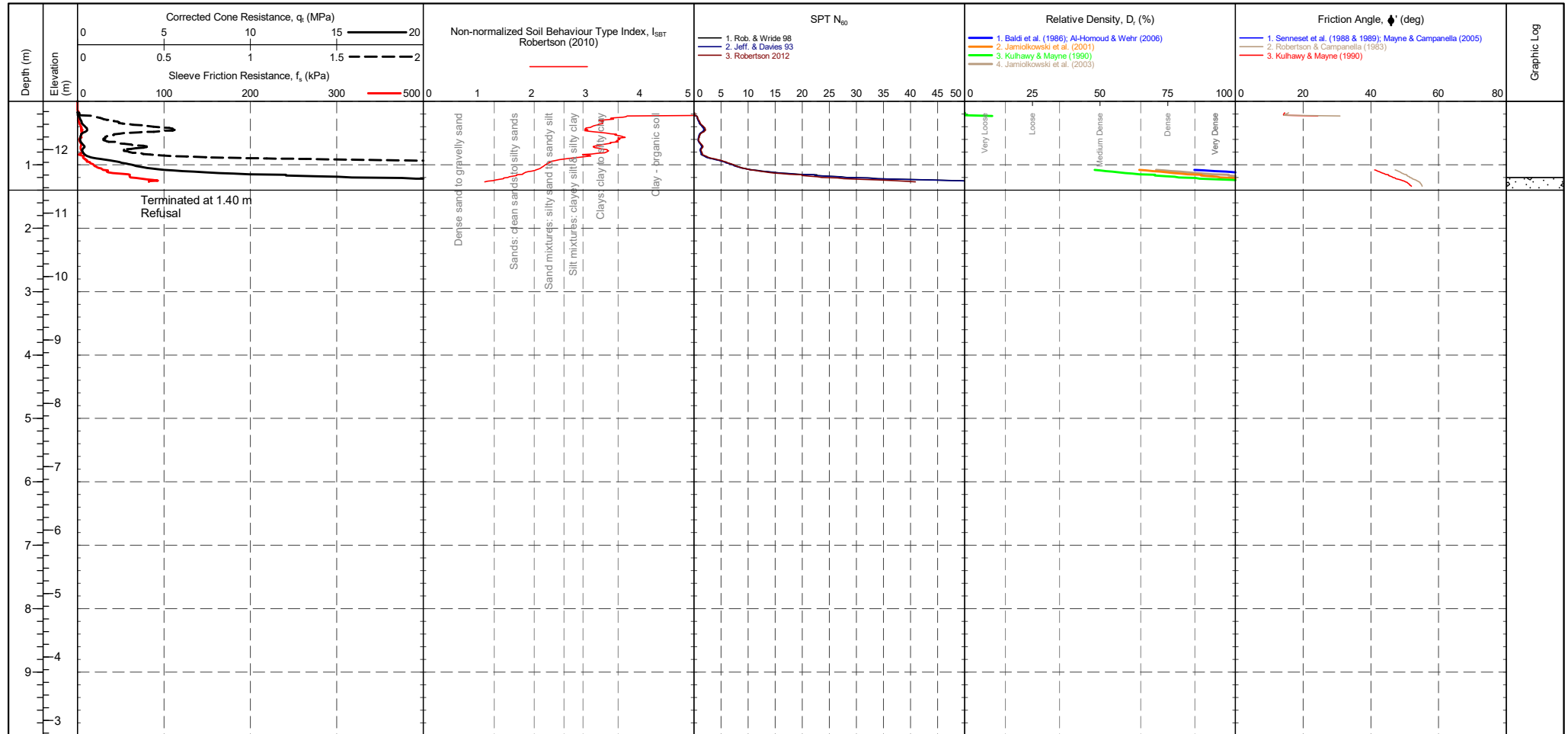
S3SCPT28

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479373.171 m
 NORTHING : 354647.423 m
 ELEVATION : 12.762 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on tip resistance.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 25/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & JC
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	345 mV	345 mV	0 MPa
Sleeve	261 mV	262 mV	0.001 kPa
Pore Pressure 2	330 mV	298 mV	-0.009 kPa
X-Y Inclinator	2604 mV	2623 mV	

GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12

Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85

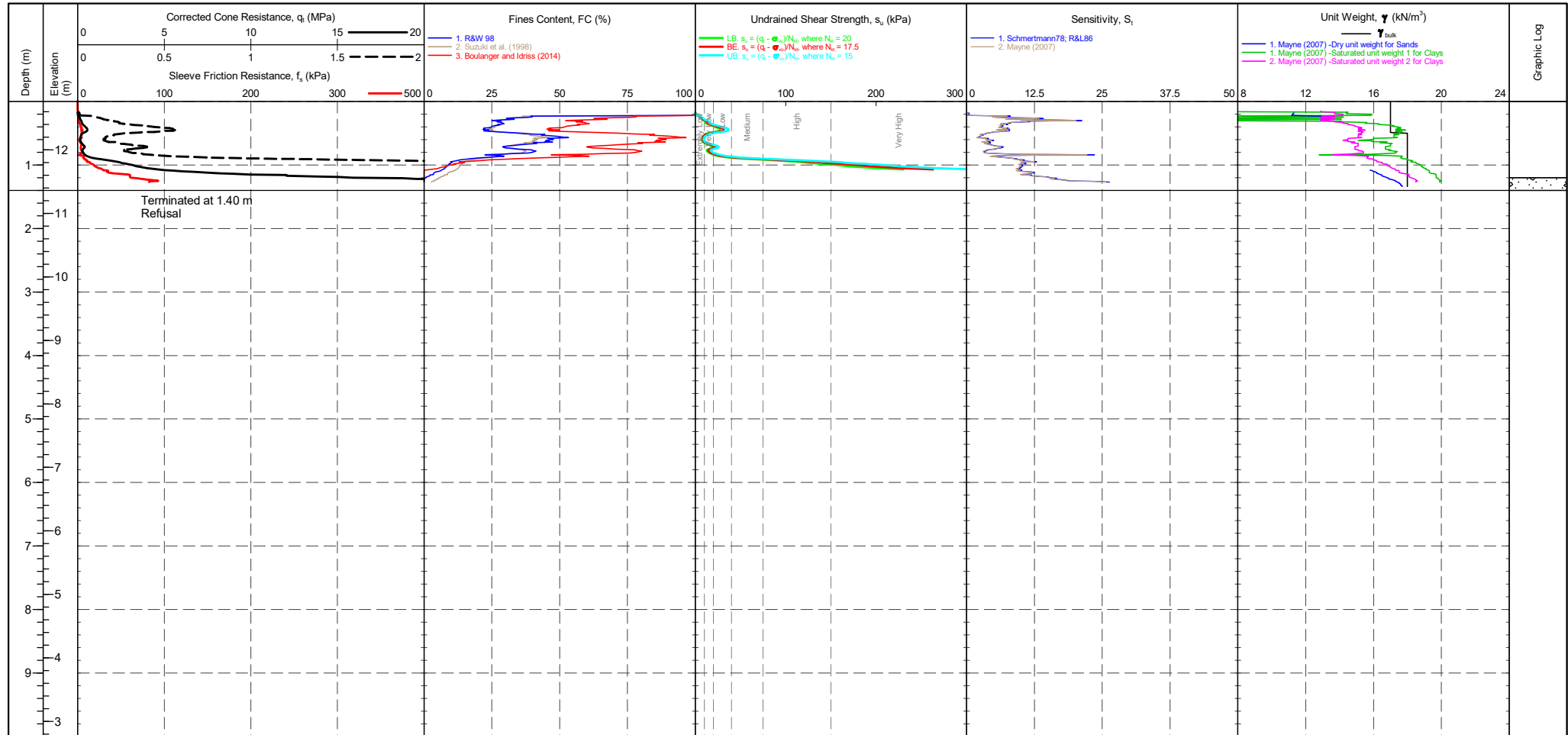
Groundwater Level

Dissipation Test

PointID

S3SCPT28

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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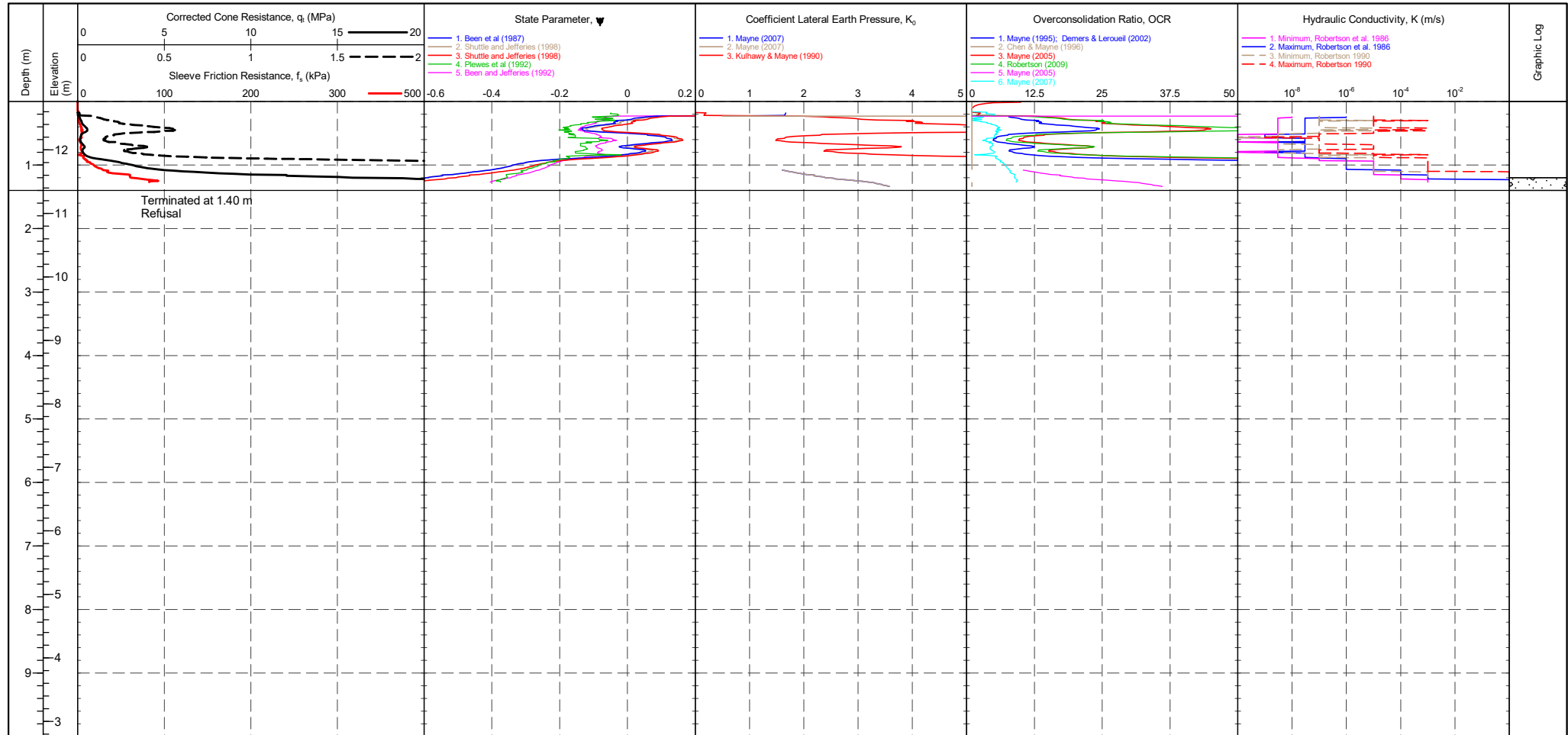


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>345 mV</td><td>345 mV</td><td>0 MPa</td></tr> <tr><td>Sleeve</td><td>261 mV</td><td>262 mV</td><td>0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>330 mV</td><td>298 mV</td><td>-0.009 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2604 mV</td><td>2623 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	345 mV	0 MPa	Sleeve	261 mV	262 mV	0.001 kPa	Pore Pressure 2	330 mV	298 mV	-0.009 kPa	X-Y Inclinator	2604 mV	2623 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▬ Dissipation Test
Transducer	Pre	Post	Difference																																									
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PointID

S3SCPT28

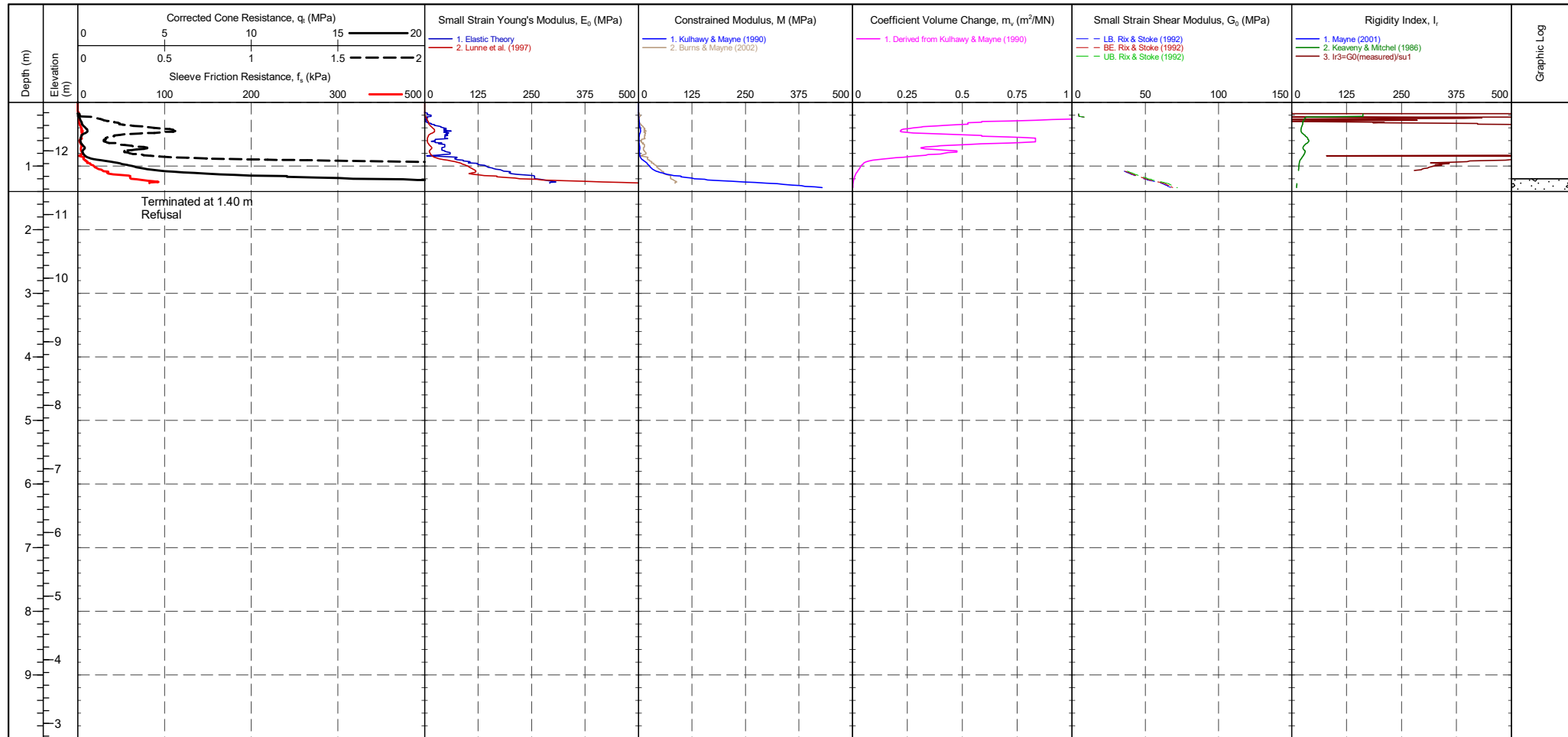
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>345 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>261 mV</td> <td>262 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>330 mV</td> <td>298 mV</td> <td>-0.009 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2604 mV</td> <td>2623 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	345 mV	0 MPa	Sleeve	261 mV	262 mV	0.001 kPa	Pore Pressure 2	330 mV	298 mV	-0.009 kPa	X-Y Inclinator	2604 mV	2623 mV		Groundwater Level Dissipation Test
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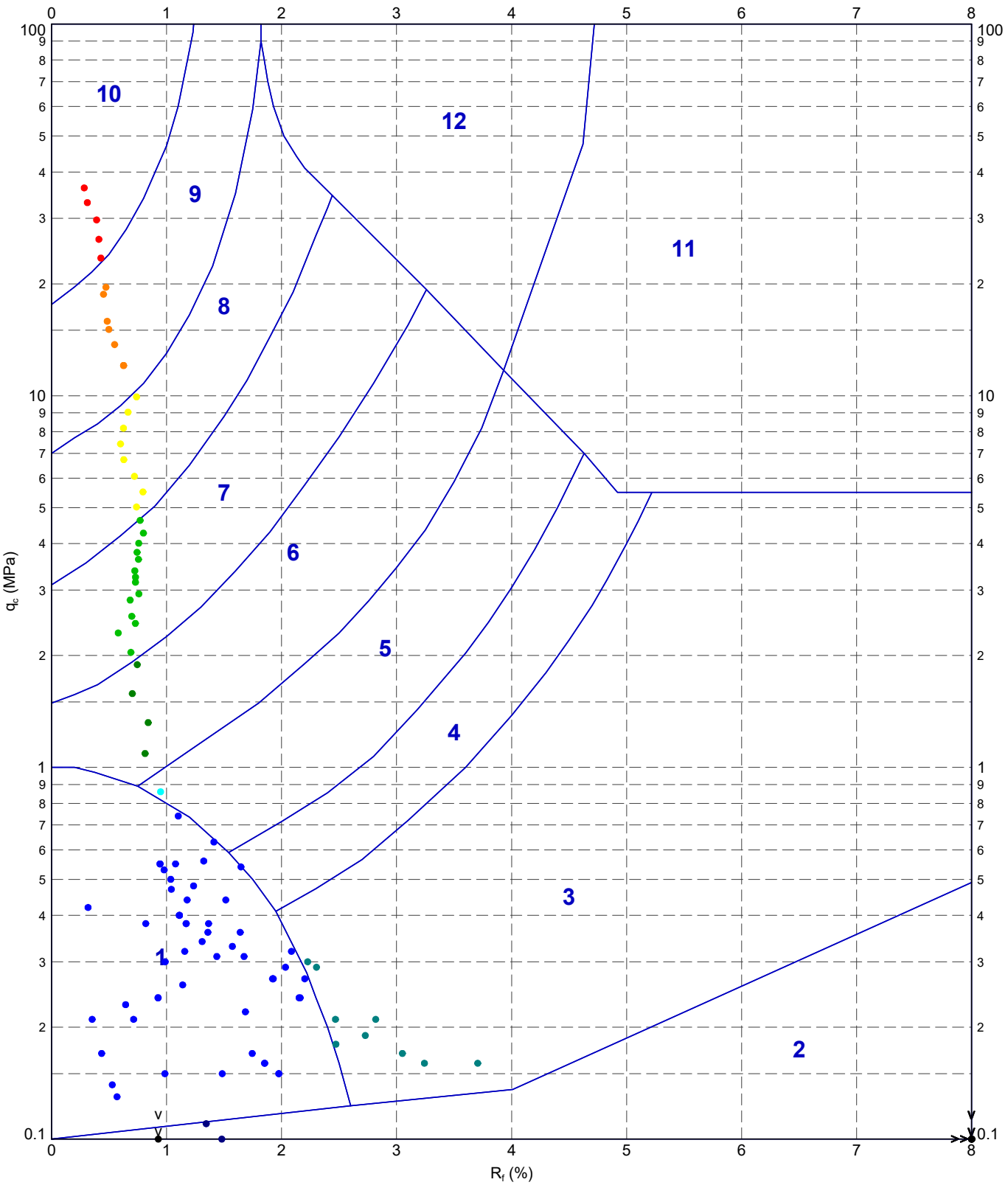
PointID
S3SCPT28

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>345 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>261 mV</td> <td>262 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>330 mV</td> <td>298 mV</td> <td>-0.009 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2604 mV</td> <td>2623 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	345 mV	0 MPa	Sleeve	261 mV	262 mV	0.001 kPa	Pore Pressure 2	330 mV	298 mV	-0.009 kPa	X-Y Inclinator	2604 mV	2623 mV		Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> - 20/05/2023 23:03 10.00.00.09 Dalgard Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10



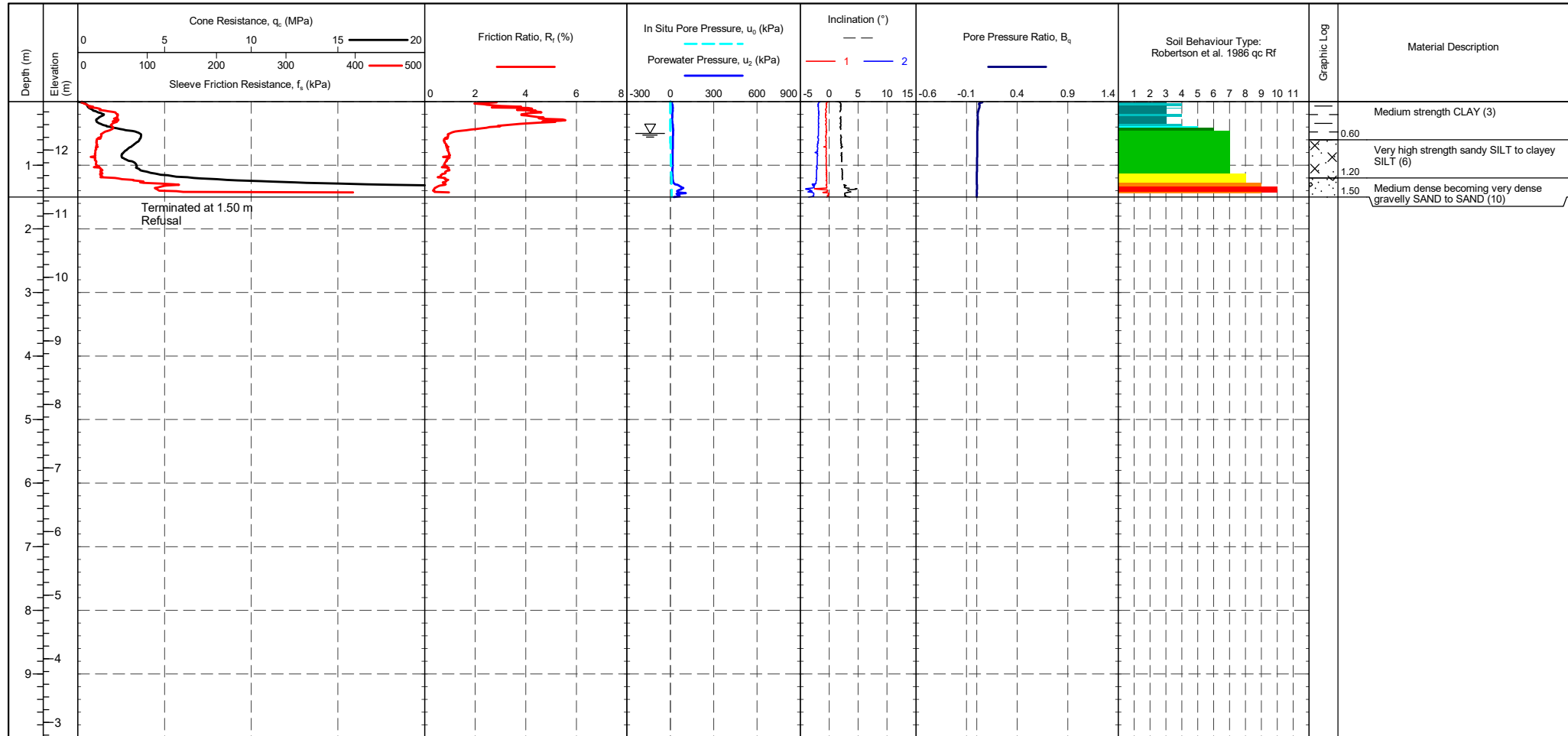
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
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	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3SCPT28</p>	DRAWN	DATE	20/05/2023	
		CHECKED	DATE	20/05/2023	
		SCALE	Not To Scale		A4
		PROJECT No	1220514		FIGURE No

PointID
S3SCPT28A

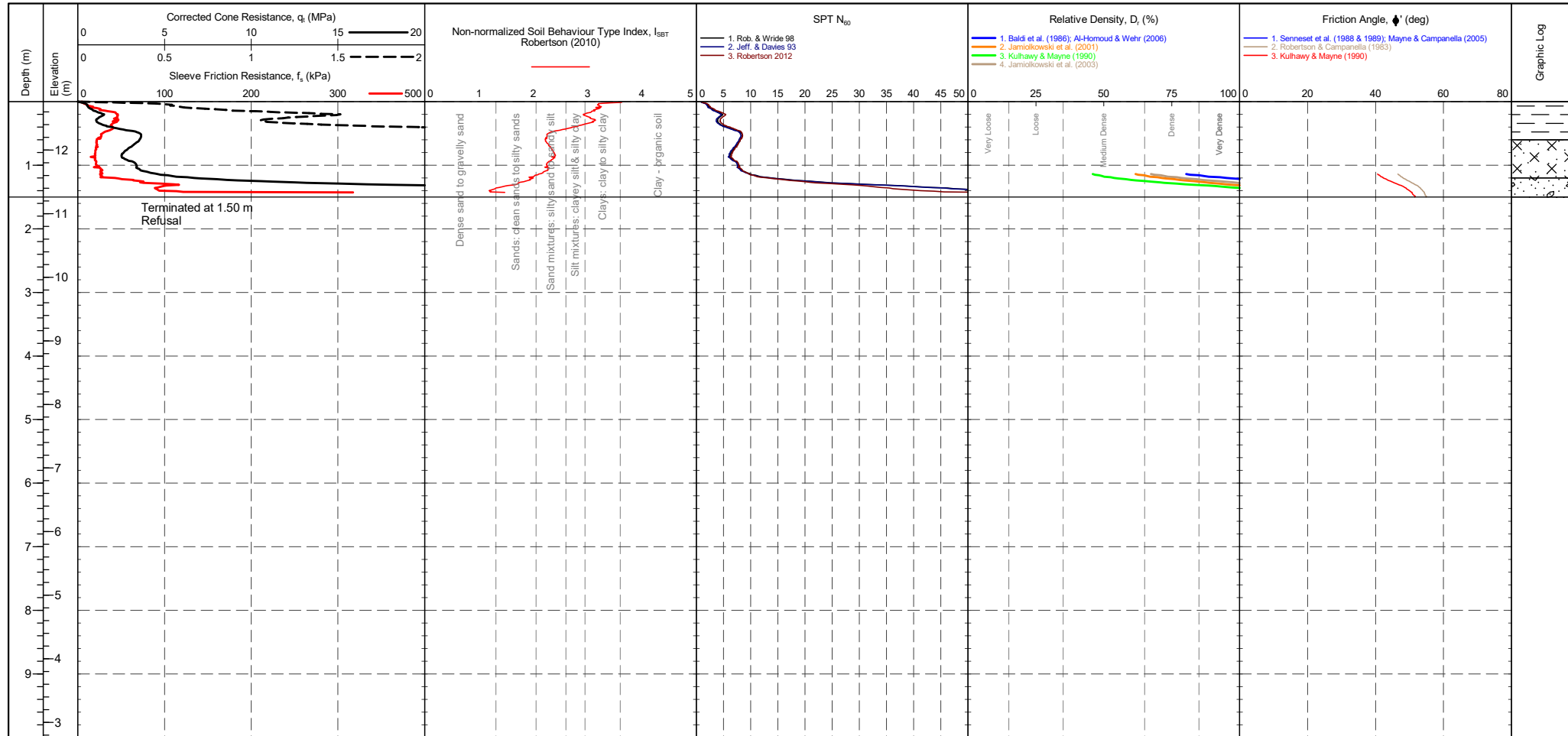
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>343 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>262 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>298 mV</td> <td>295 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2490 mV</td> <td>2383 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	343 mV	-0.023 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	295 mV	-0.001 kPa	X-Y Inclinator	2490 mV	2383 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3SCPT28A

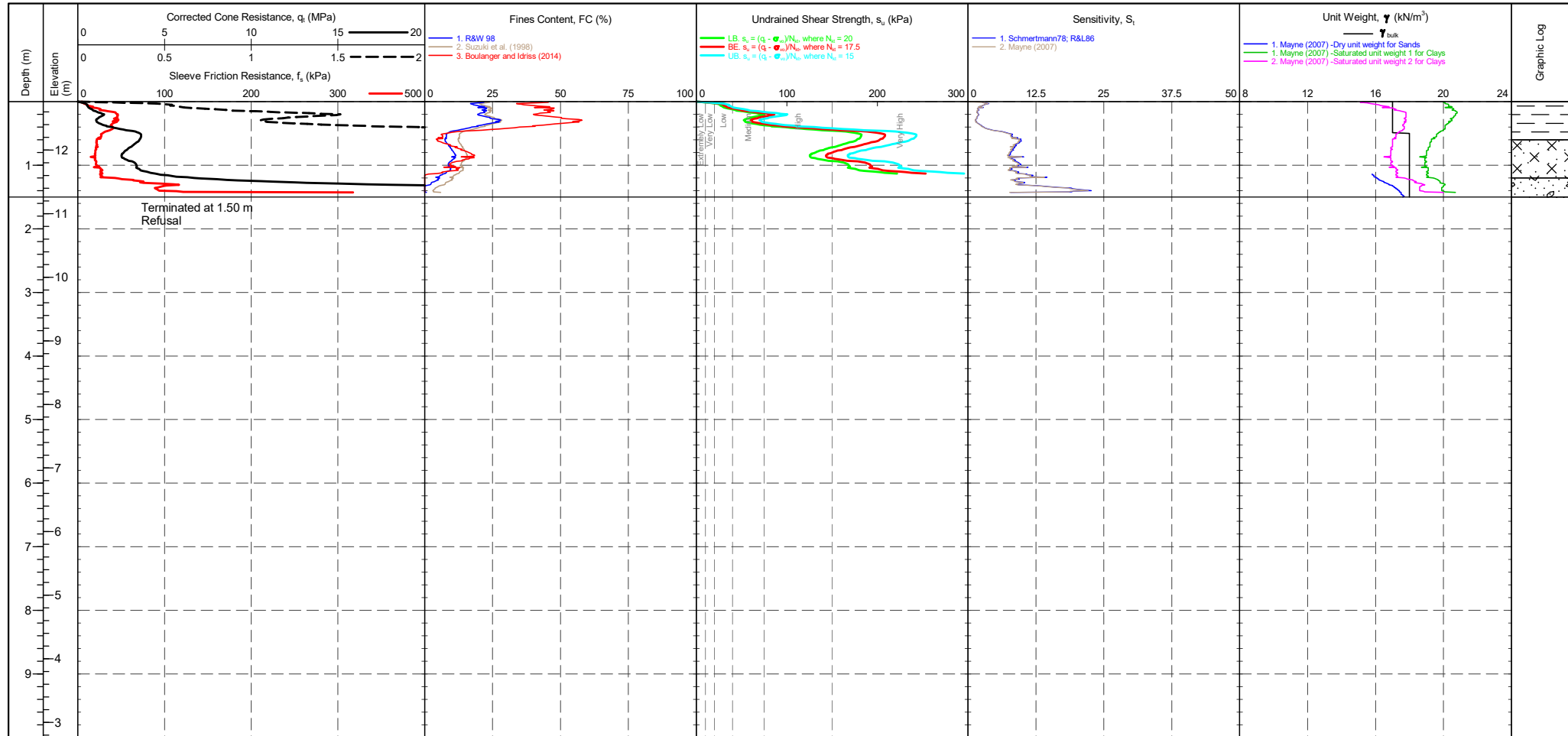
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>345 mV</td><td>343 mV</td><td>-0.023 MPa</td></tr> <tr><td>Sleeve</td><td>262 mV</td><td>262 mV</td><td>0 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>298 mV</td><td>295 mV</td><td>-0.001 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2490 mV</td><td>2383 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	343 mV	-0.023 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	295 mV	-0.001 kPa	X-Y Inclinator	2490 mV	2383 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr><td>Clays</td><td>2.95-3.60</td><td>Very Loose</td><td>0 - 4</td><td>Very Loose</td><td>0 - 15</td></tr> <tr><td>Silt mixtures</td><td>2.60-2.95</td><td>Loose</td><td>4 - 10</td><td>Loose</td><td>15 - 35</td></tr> <tr><td>Sand mixtures</td><td>2.05-2.60</td><td>Medium Dense</td><td>10 - 30</td><td>Medium Dense</td><td>35 - 65</td></tr> <tr><td>Sands</td><td>1.31-2.05</td><td>Dense</td><td>30 - 50</td><td>Dense</td><td>65 - 85</td></tr> <tr><td>Gravelly sand</td><td><1.31</td><td>Very Dense</td><td>>50</td><td>Very Dense</td><td>>85</td></tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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S3SCPT28A

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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>345 mV</td><td>343 mV</td><td>-0.023 MPa</td></tr> <tr><td>Sleeve</td><td>262 mV</td><td>262 mV</td><td>0 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>298 mV</td><td>295 mV</td><td>-0.001 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2490 mV</td><td>2383 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	343 mV	-0.023 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	295 mV	-0.001 kPa	X-Y Inclinator	2490 mV	2383 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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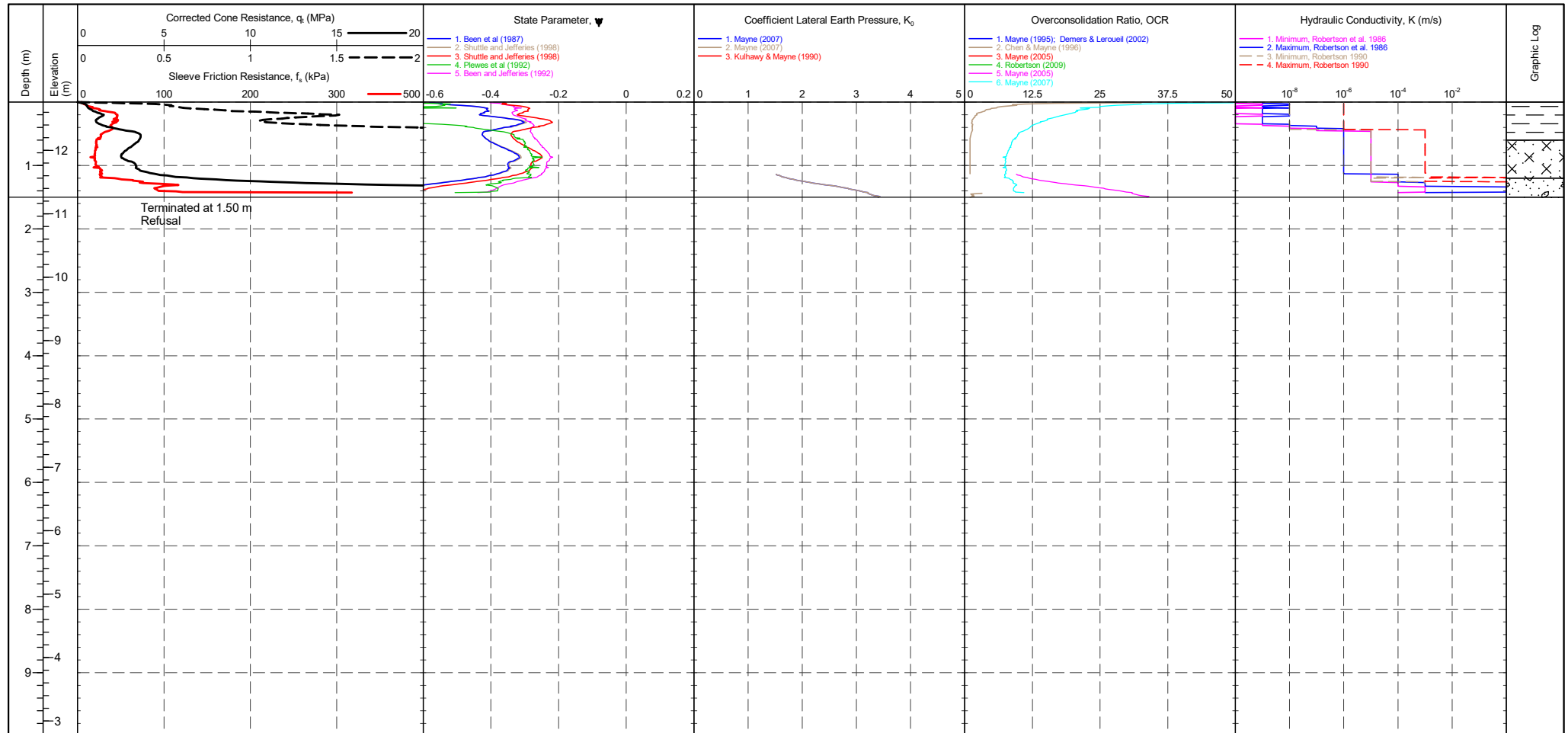
S3SCPT28A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479373.171 m
 NORTHING : 354647.423 m
 ELEVATION : 12.762 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on tip resistance.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 25/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & JC
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

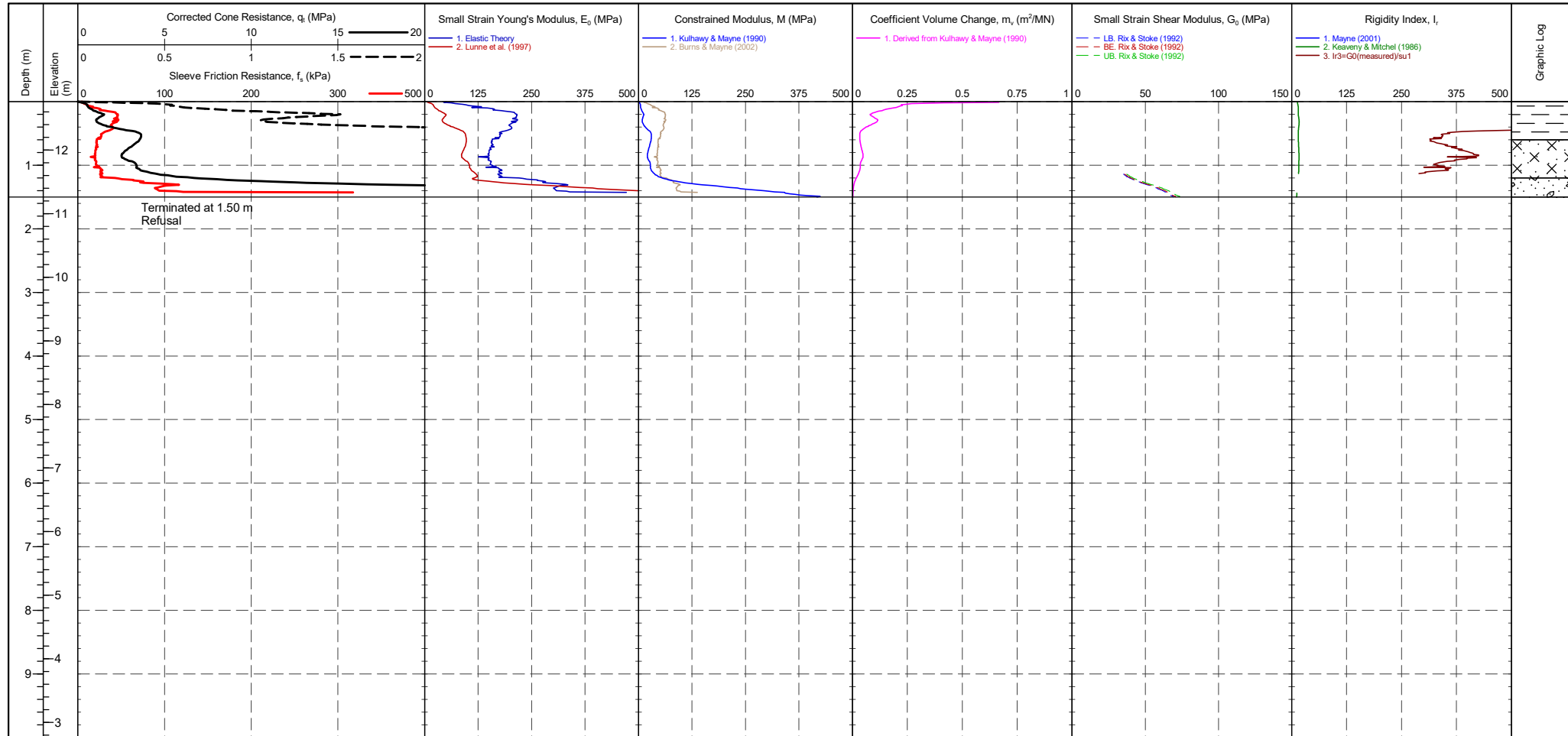
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Groundwater Level
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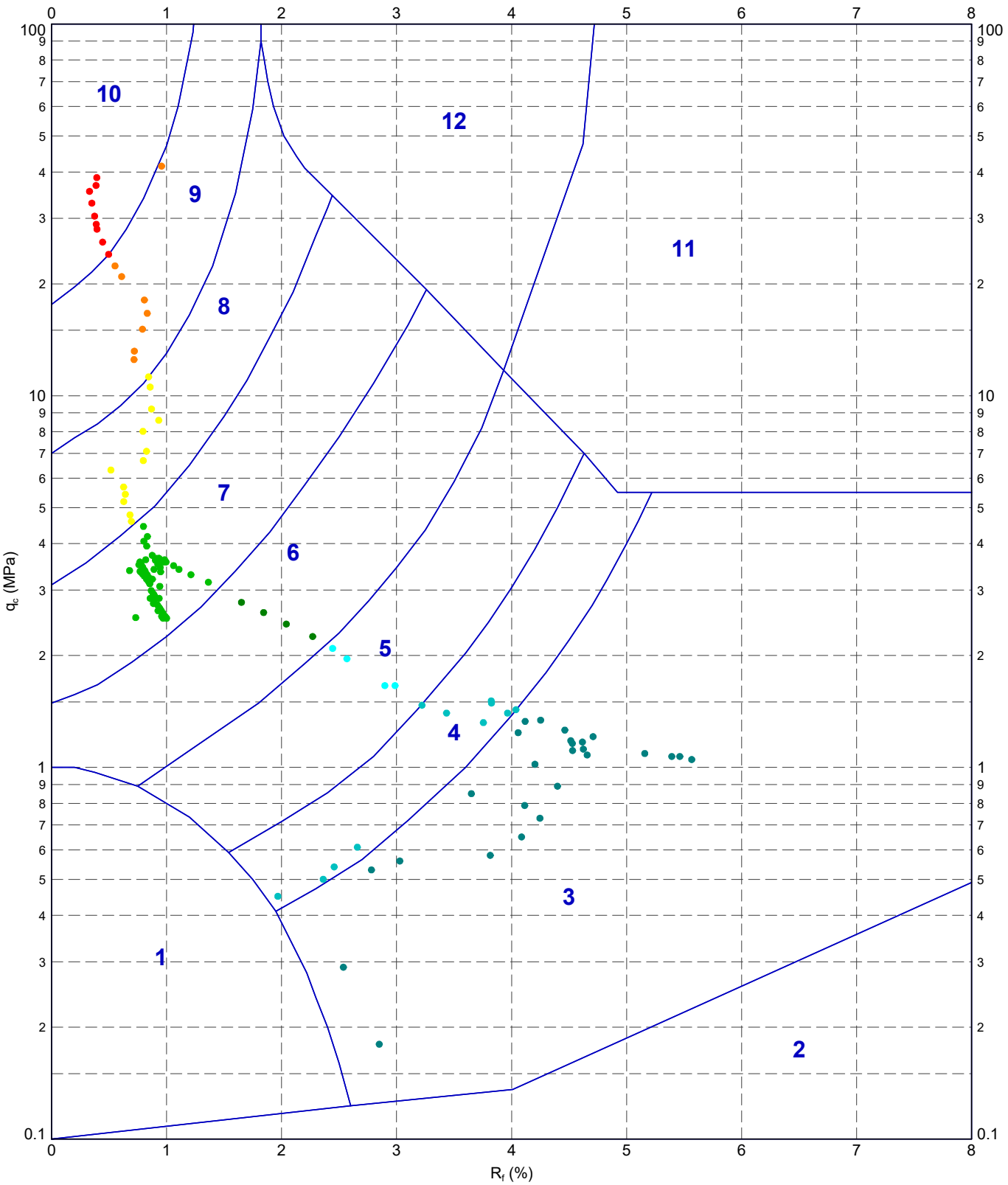
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>343 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>262 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>298 mV</td> <td>295 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2490 mV</td> <td>2383 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	343 mV	-0.023 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	295 mV	-0.001 kPa	X-Y Inclinator	2490 mV	2383 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. Rf APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 23:04 10.03.00.09 Dargel Lab and In Situ Tool - DGD [Lib.: In Situ SI 2.02.0.2017-07-10 Proj. In Situ SI 2.02.0.2017-07-10



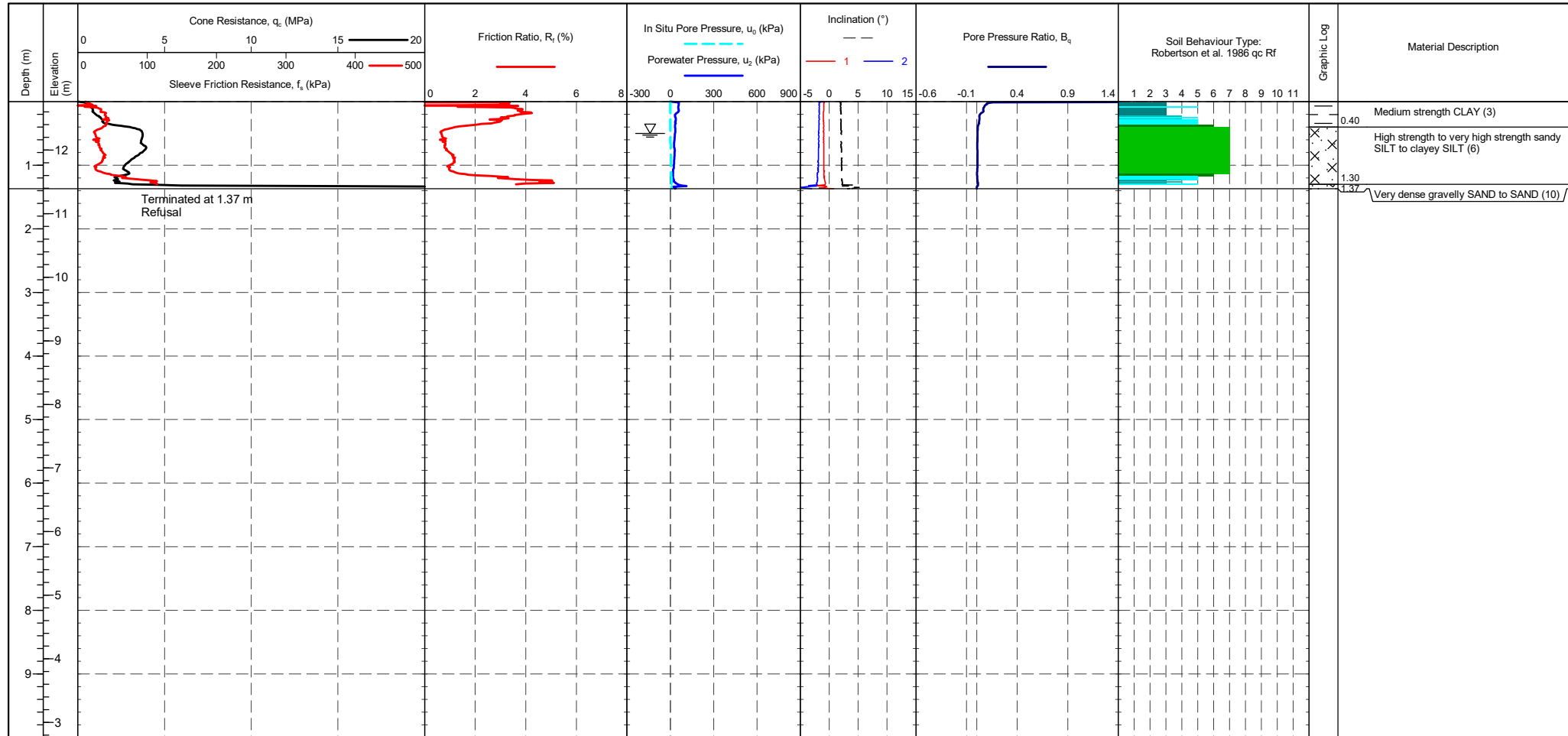
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark	CHECKED	20/05/2023
	A46 Newark Bypass	SCALE	Not To Scale
	Robertson et al. 1986 qc vs. Rf - S3SCPT28A	PROJECT No 1220514	FIGURE No
		A4	

PointID
S3SCPT28B

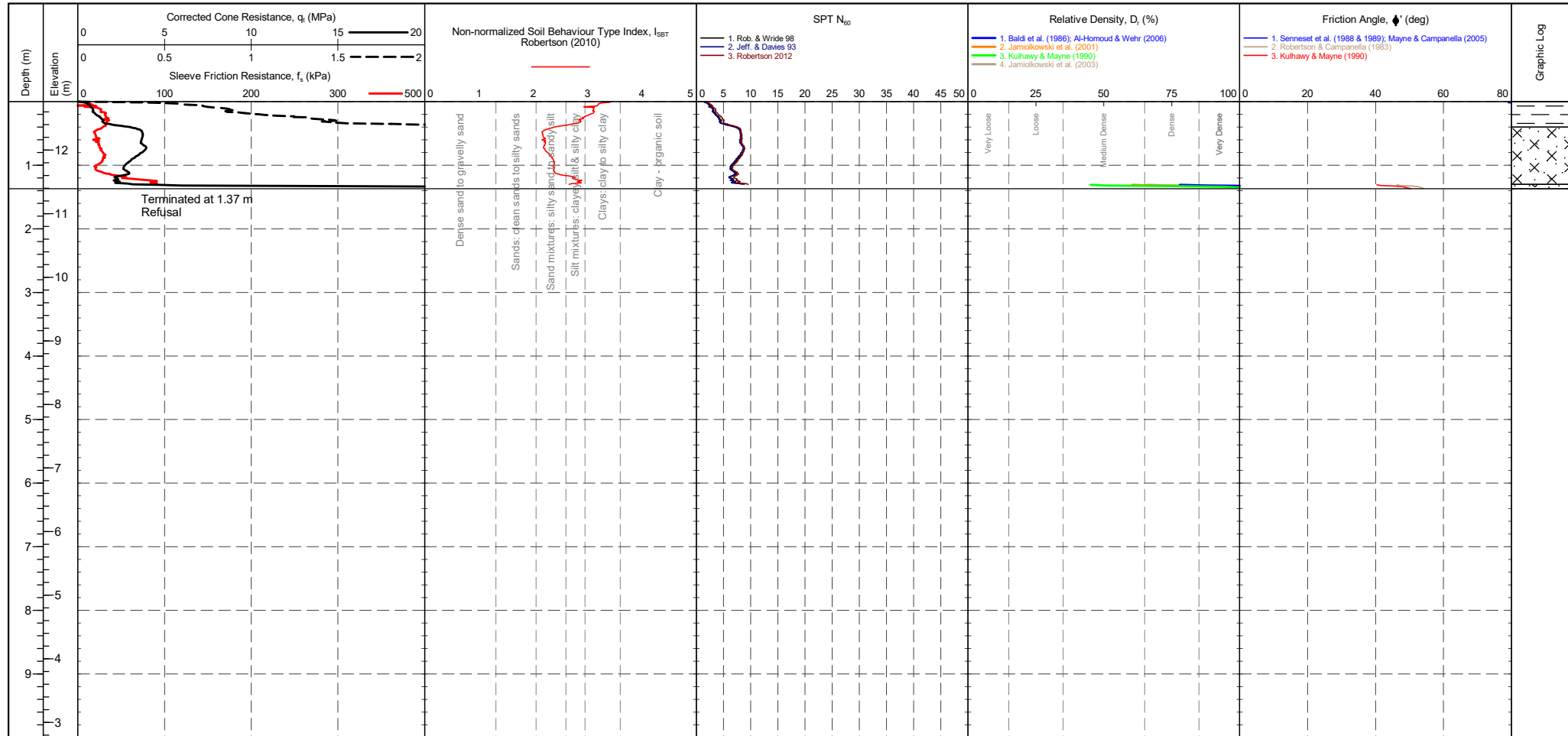
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>343 mV</td> <td>343 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>262 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>298 mV</td> <td>307 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2376 mV</td> <td>2402 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	343 mV	343 mV	0 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	307 mV	0.002 kPa	X-Y Inclinometer	2376 mV	2402 mV		METHOD: Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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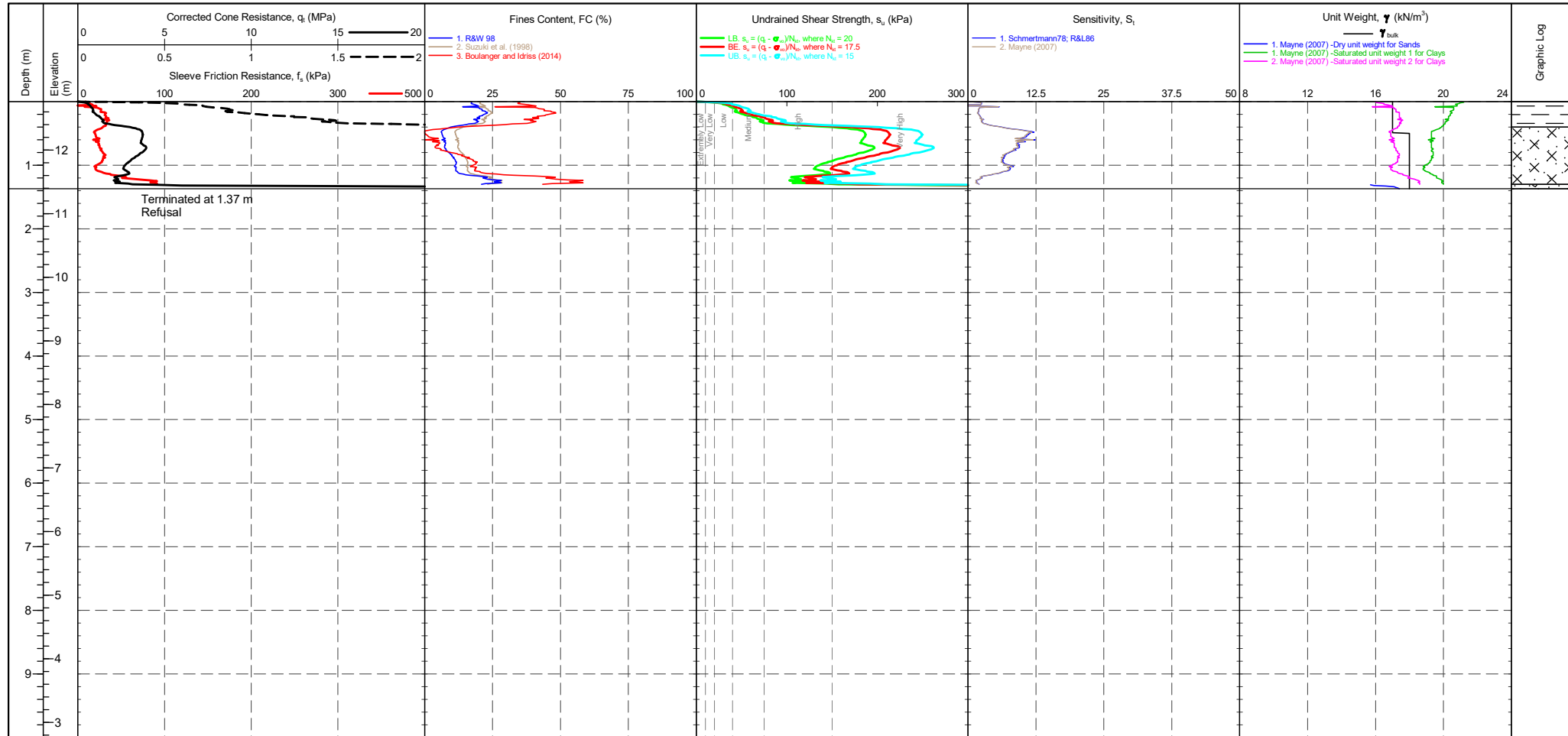
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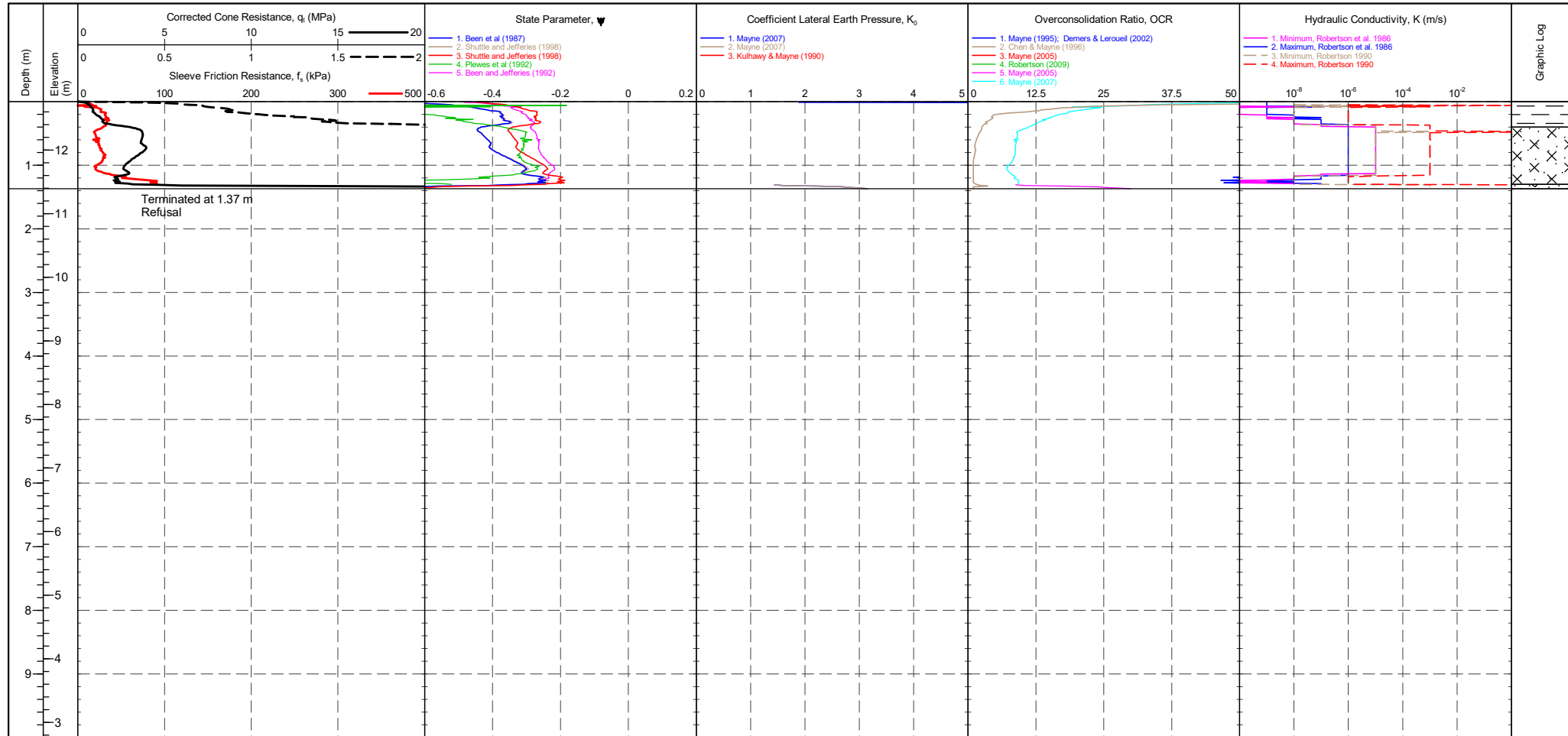
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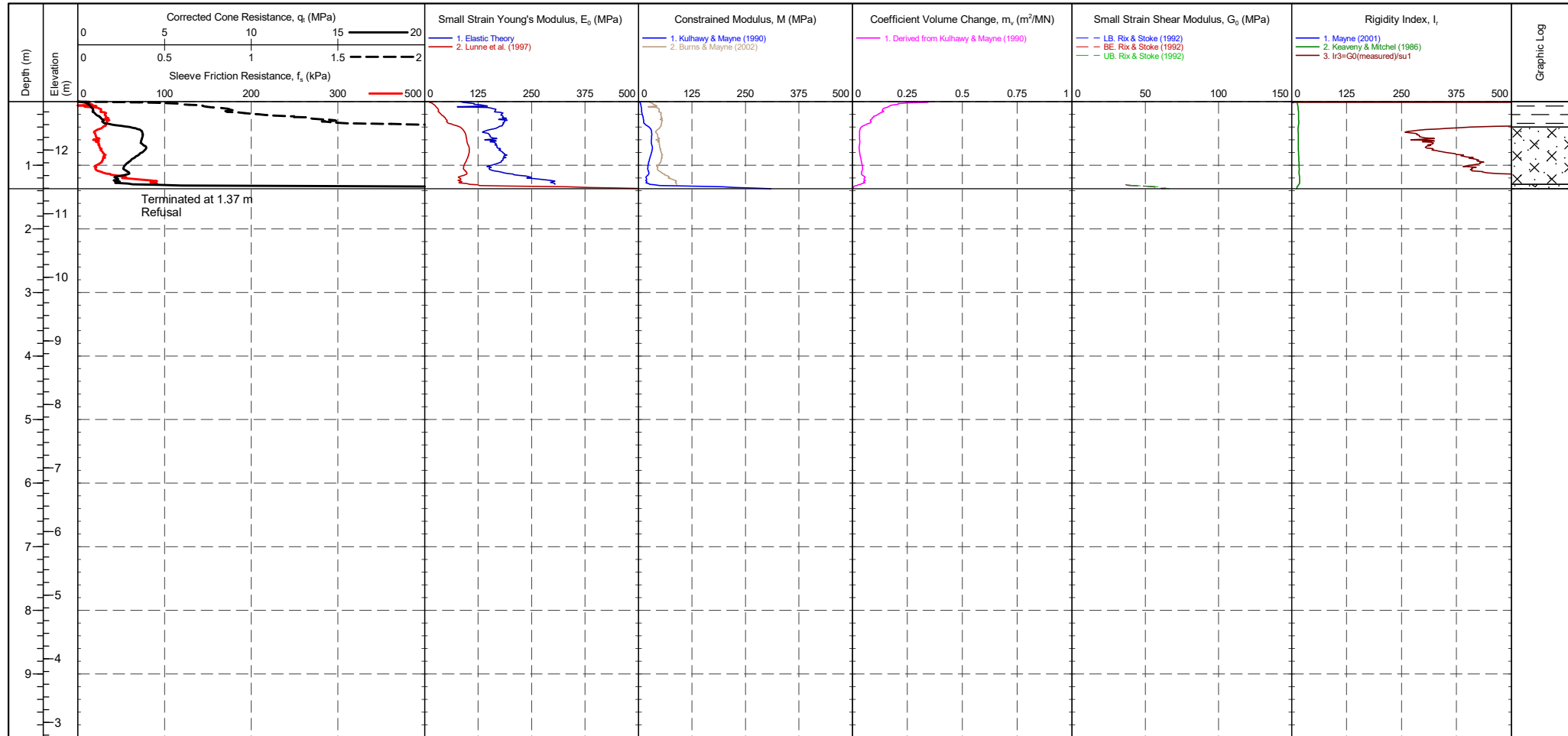
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>343 mV</td> <td>343 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>262 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>298 mV</td> <td>307 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2376 mV</td> <td>2402 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	343 mV	343 mV	0 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	307 mV	0.002 kPa	X-Y Inclinator	2376 mV	2402 mV		Groundwater Level Dissipation Test
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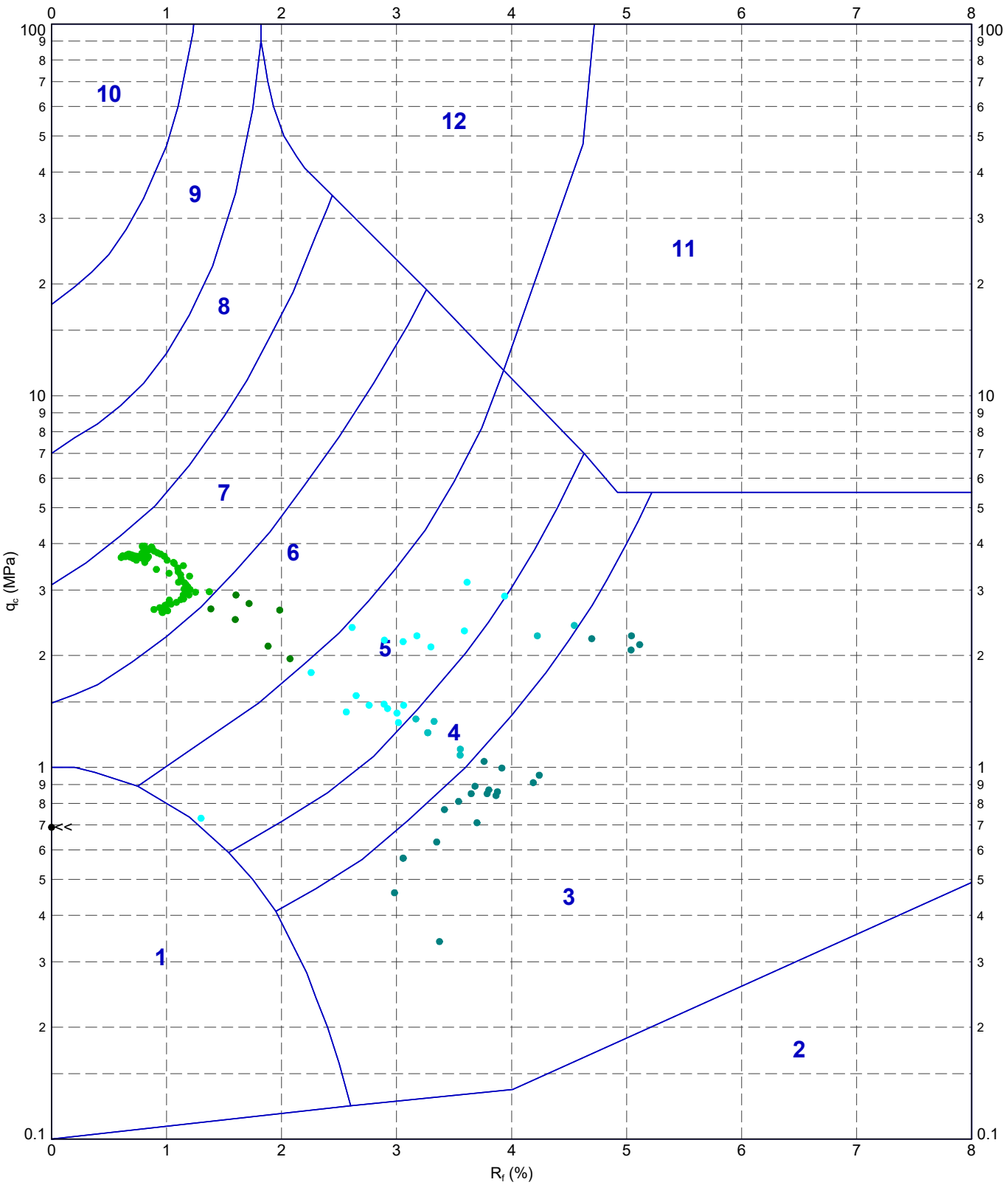
PointID
S3SCPT28B

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479373.171 m NORTHING : 354647.423 m ELEVATION : 12.762 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>343 mV</td> <td>343 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>262 mV</td> <td>0 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>298 mV</td> <td>307 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2376 mV</td> <td>2402 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	343 mV	343 mV	0 MPa	Sleeve	262 mV	262 mV	0 kPa	Pore Pressure 2	298 mV	307 mV	0.002 kPa	X-Y Inclinator	2376 mV	2402 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. Rf MP 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> 20/05/2023 23:05 10.03.00.09 Dalgel Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



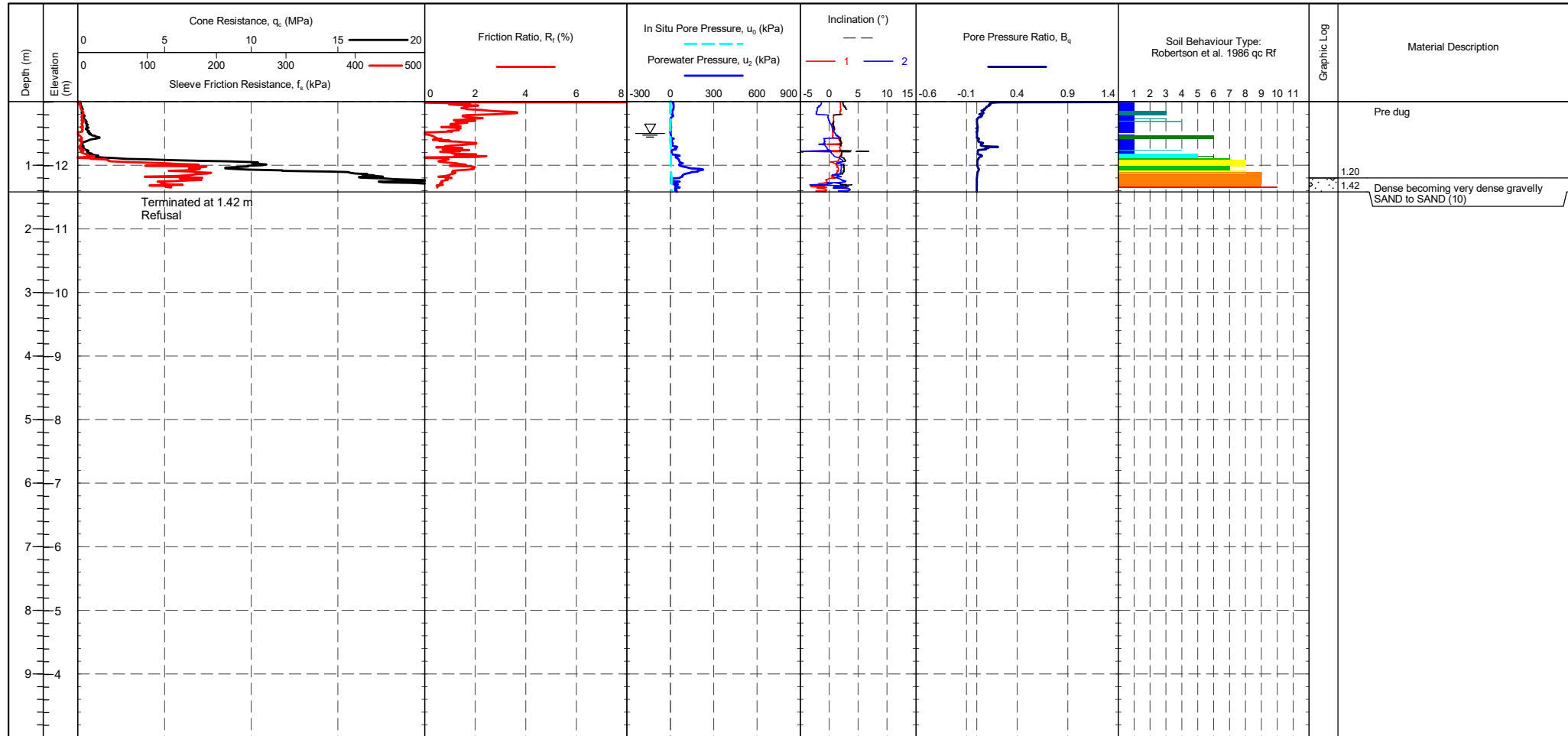
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3SCPT28B</p>	DRAWN	DATE	20/05/2023	
		CHECKED	DATE	20/05/2023	
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		PROJECT No	1220514		
		FIGURE No			

PointID	S3SCPT29
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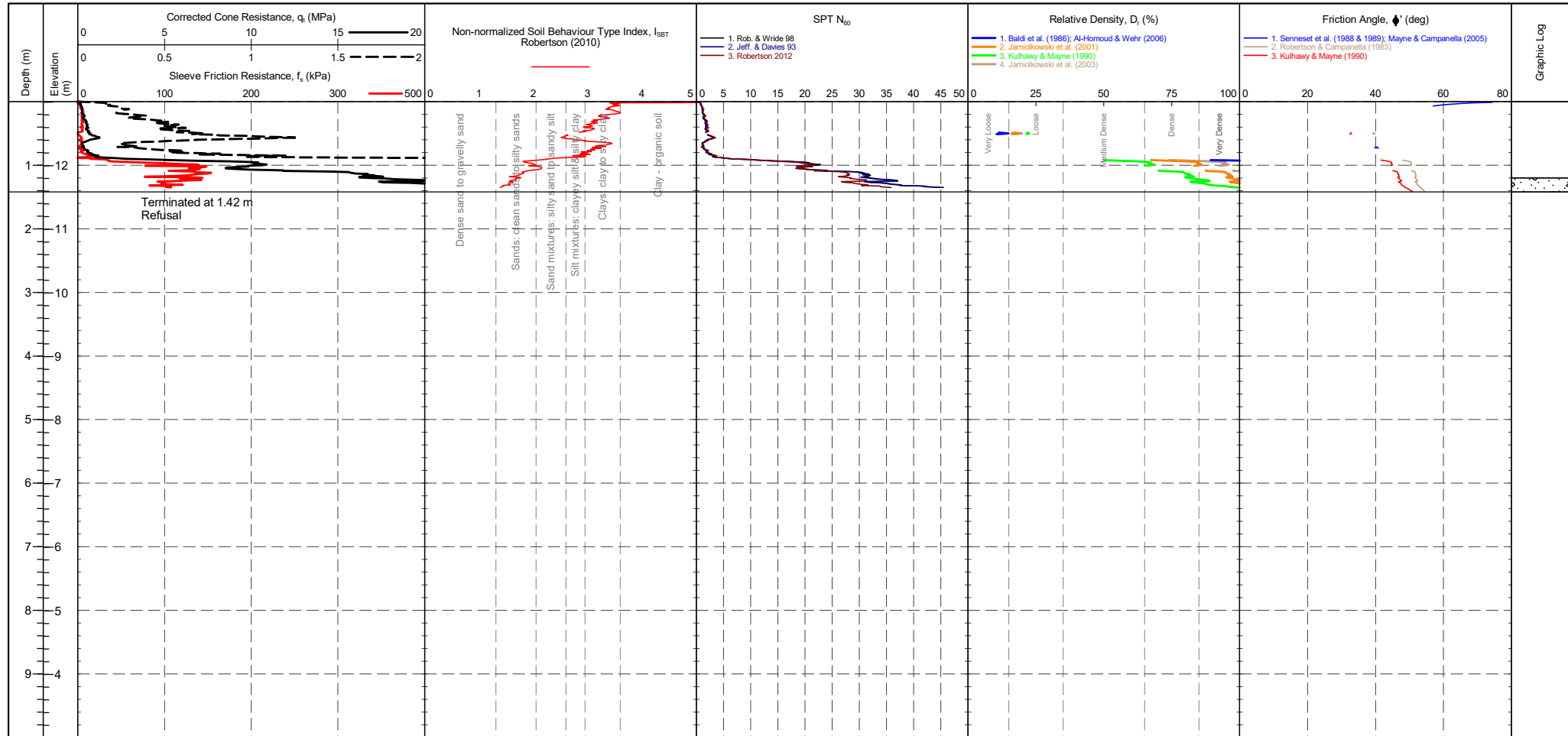
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 344 mV 345 mV 0.011 MPa Sleeve 262 mV 261 mV -0.001 kPa Pore Pressure 2 307 mV 296 mV -0.003 kPa X-Y Inclinometer 2679 mV 2683 mV	METHOD: Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3SCPT29
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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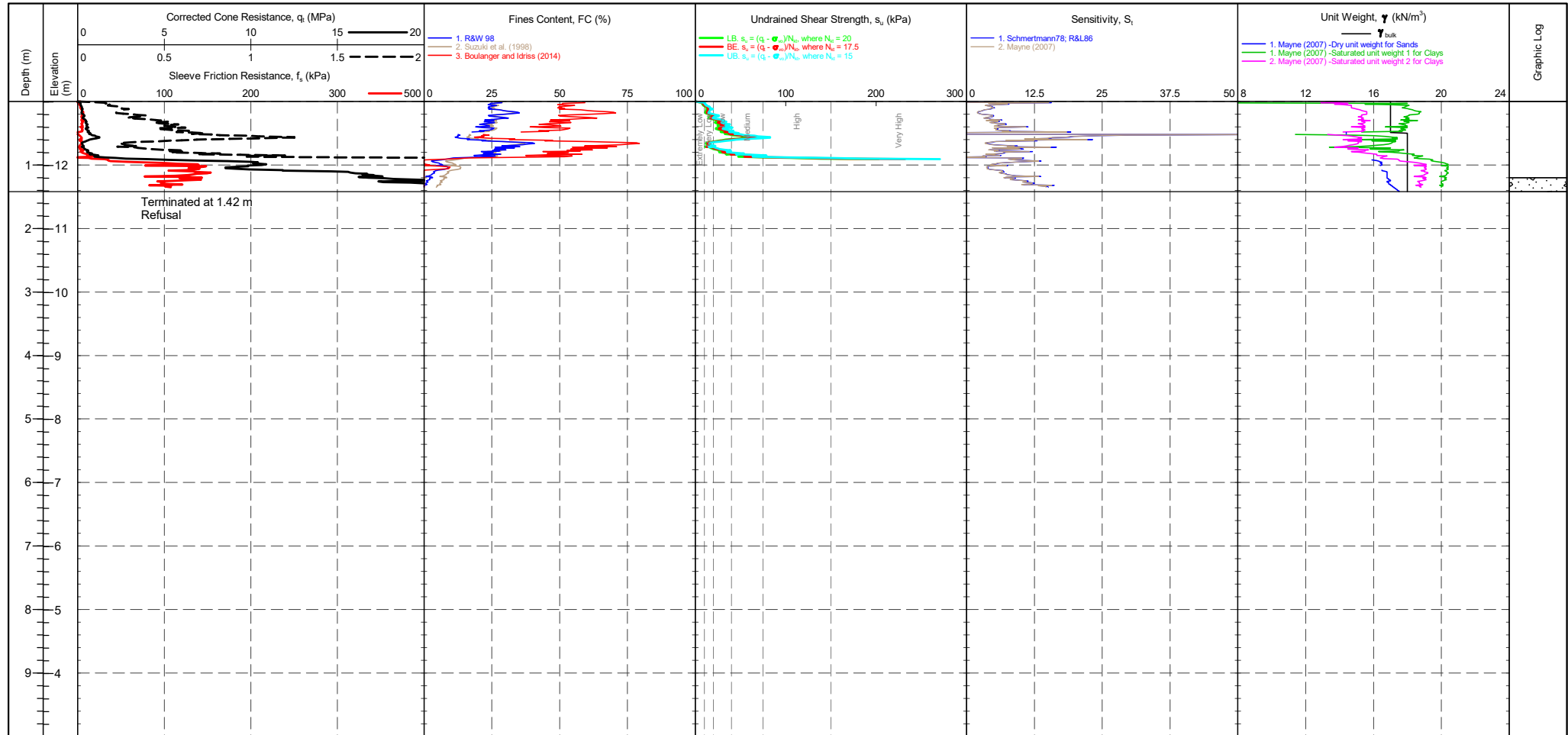


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>344 mV</td> <td>345 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>261 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>307 mV</td> <td>296 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2679 mV</td> <td>2683 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	344 mV	345 mV	0.011 MPa	Sleeve	262 mV	261 mV	-0.001 kPa	Pore Pressure 2	307 mV	296 mV	-0.003 kPa	X-Y Inclinator	2679 mV	2683 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID

S3SCPT29

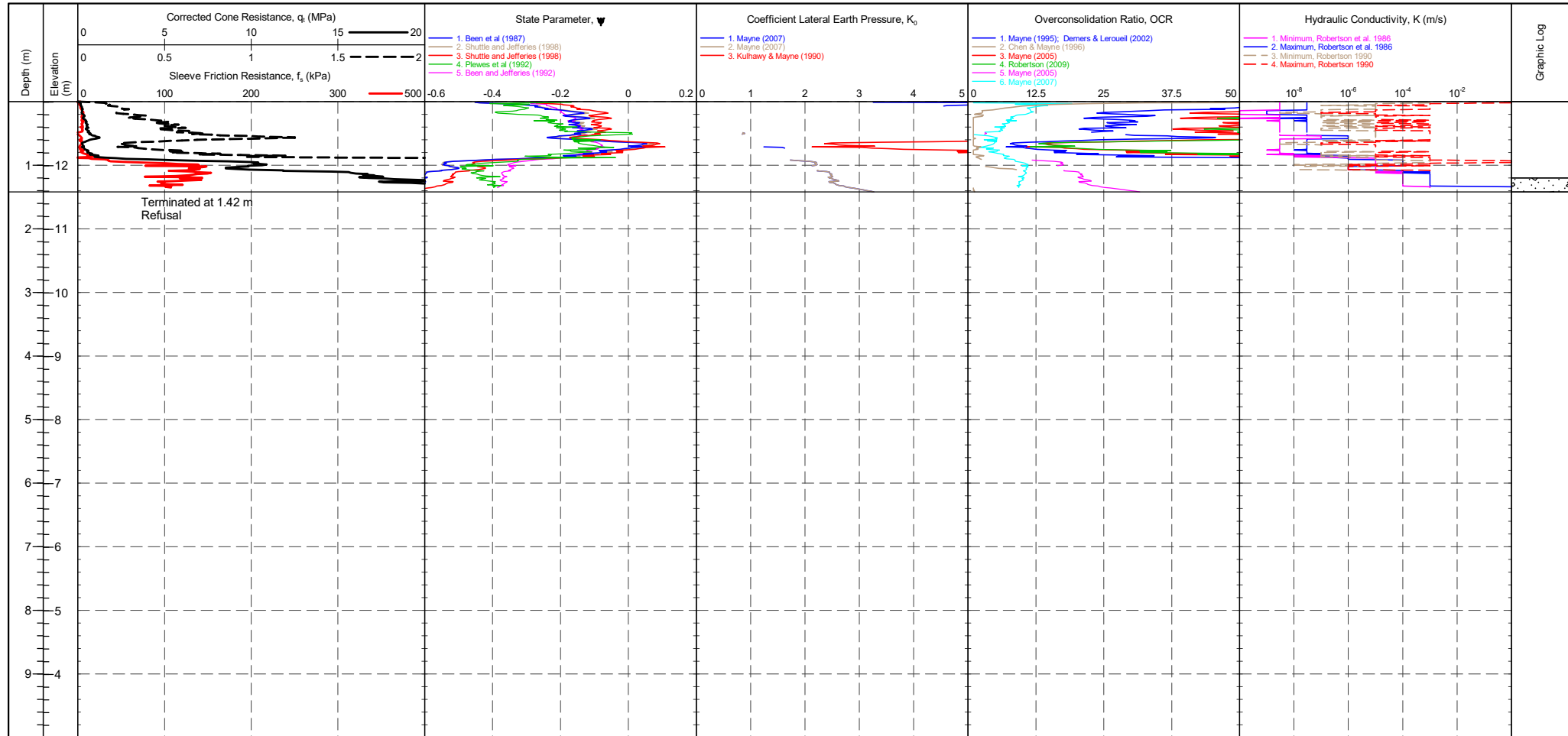
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>344 mV</td> <td>345 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>261 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>307 mV</td> <td>296 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2679 mV</td> <td>2683 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	344 mV	345 mV	0.011 MPa	Sleeve	262 mV	261 mV	-0.001 kPa	Pore Pressure 2	307 mV	296 mV	-0.003 kPa	X-Y Inclinator	2679 mV	2683 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID
S3SCPT29

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>344 mV</td> <td>345 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>261 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>307 mV</td> <td>296 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2679 mV</td> <td>2683 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	344 mV	345 mV	0.011 MPa	Sleeve	262 mV	261 mV	-0.001 kPa	Pore Pressure 2	307 mV	296 mV	-0.003 kPa	X-Y Inclinator	2679 mV	2683 mV		Groundwater Level Dissipation Test
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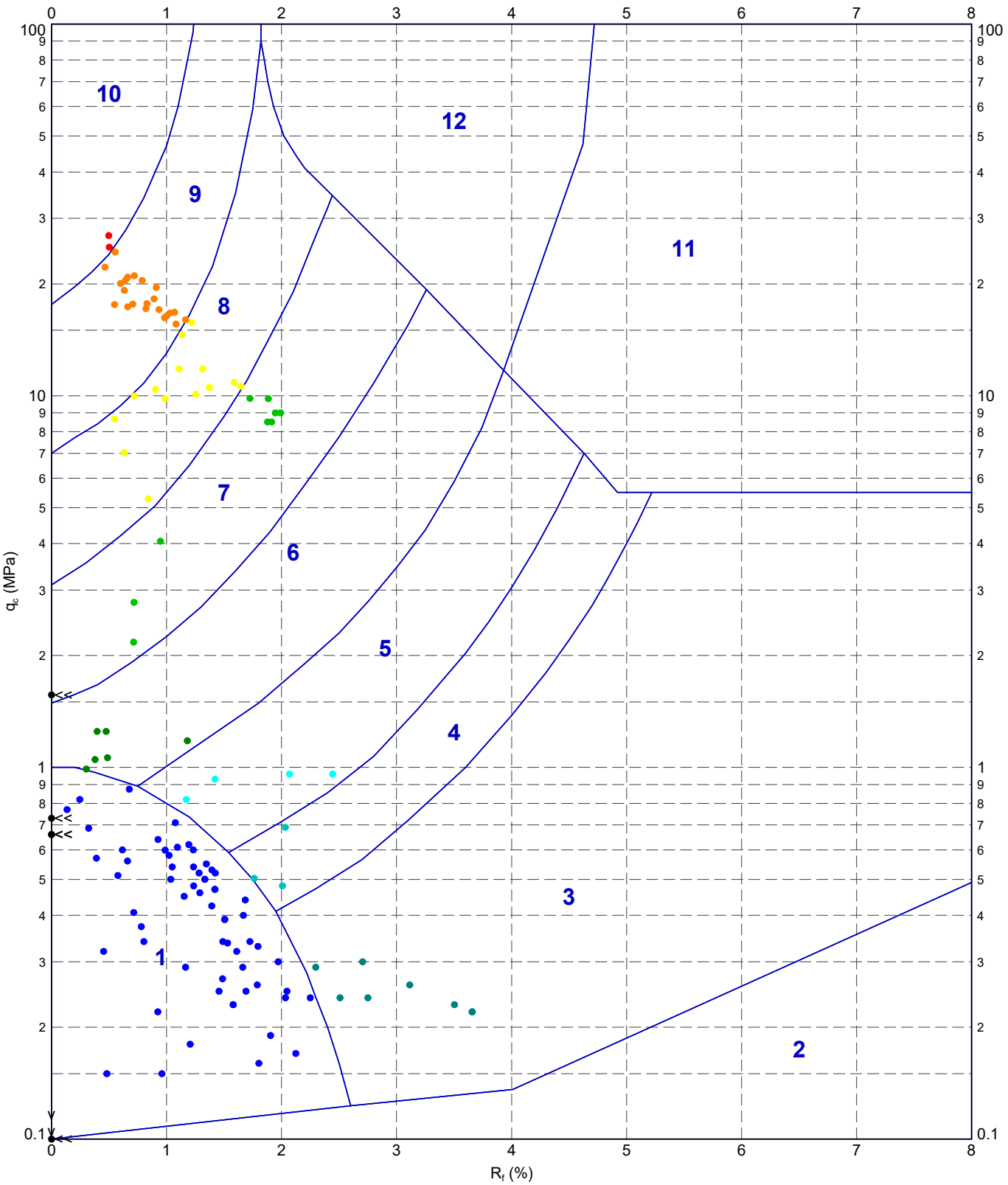
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>344 mV</td> <td>345 mV</td> <td>0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>262 mV</td> <td>261 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>307 mV</td> <td>296 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2679 mV</td> <td>2683 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	344 mV	345 mV	0.011 MPa	Sleeve	262 mV	261 mV	-0.001 kPa	Pore Pressure 2	307 mV	296 mV	-0.003 kPa	X-Y Inclinator	2679 mV	2683 mV		Groundwater Level Dissipation Test
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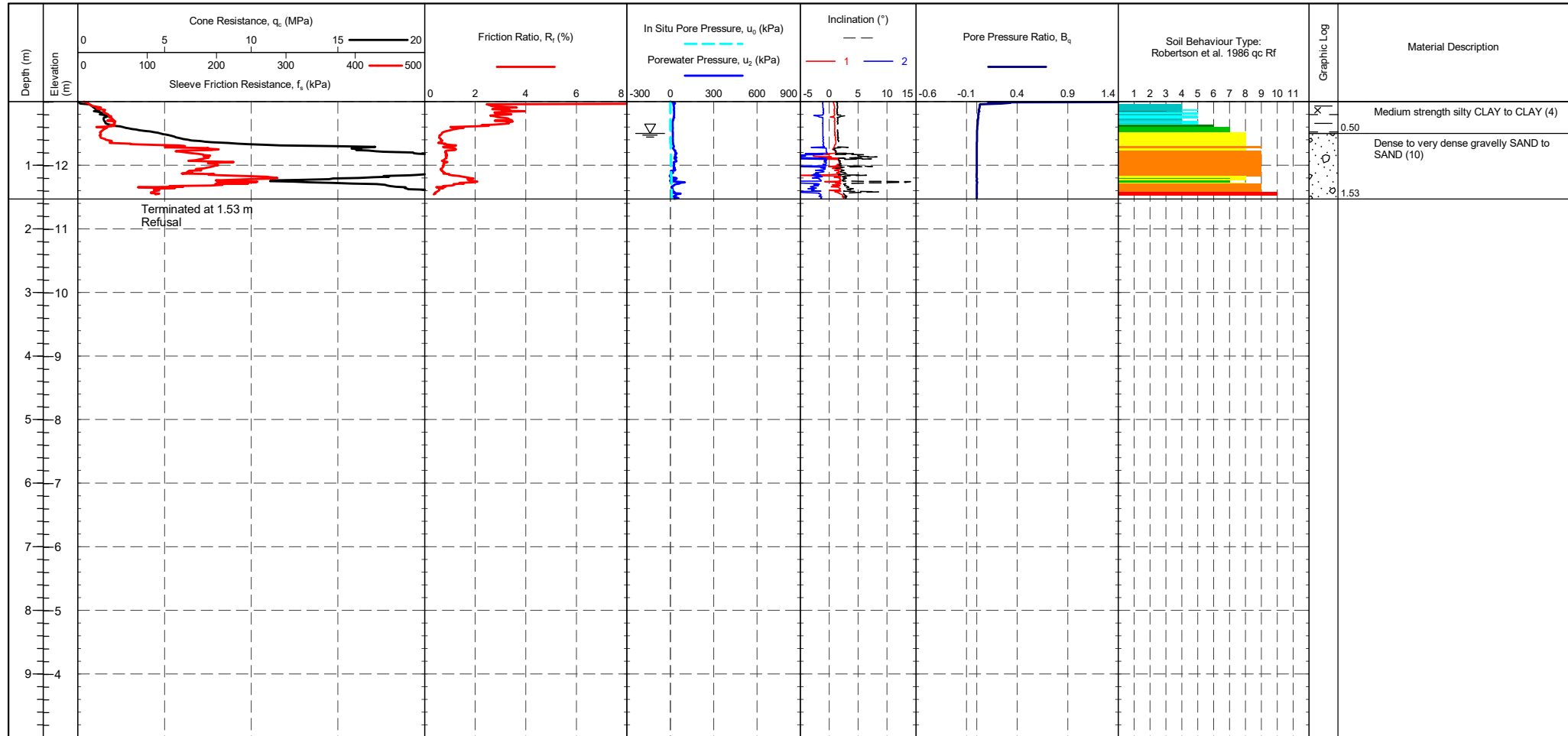
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
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	TITLE Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 qc vs. Rf - S3SCPT29	DRAWN	DATE 20/05/2023
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PointID
S3SCPT29A

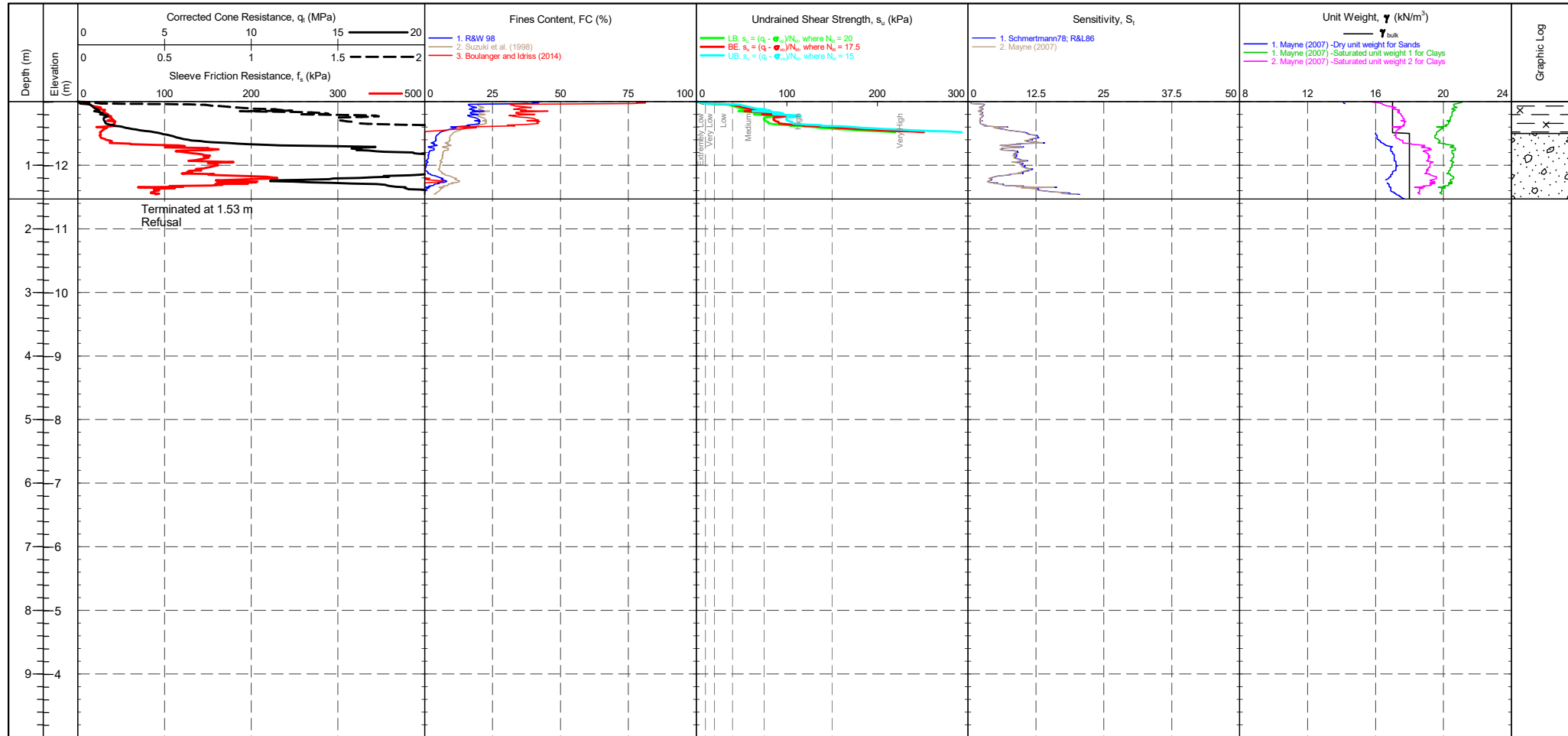
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PointID
S3SCPT29A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>348 mV</td> <td>0.034 MPa</td> </tr> <tr> <td>Sleeve</td> <td>261 mV</td> <td>264 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>301 mV</td> <td>285 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2610 mV</td> <td>2604 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	348 mV	0.034 MPa	Sleeve	261 mV	264 mV	0.002 kPa	Pore Pressure 2	301 mV	285 mV	-0.004 kPa	X-Y Inclinator	2610 mV	2604 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID

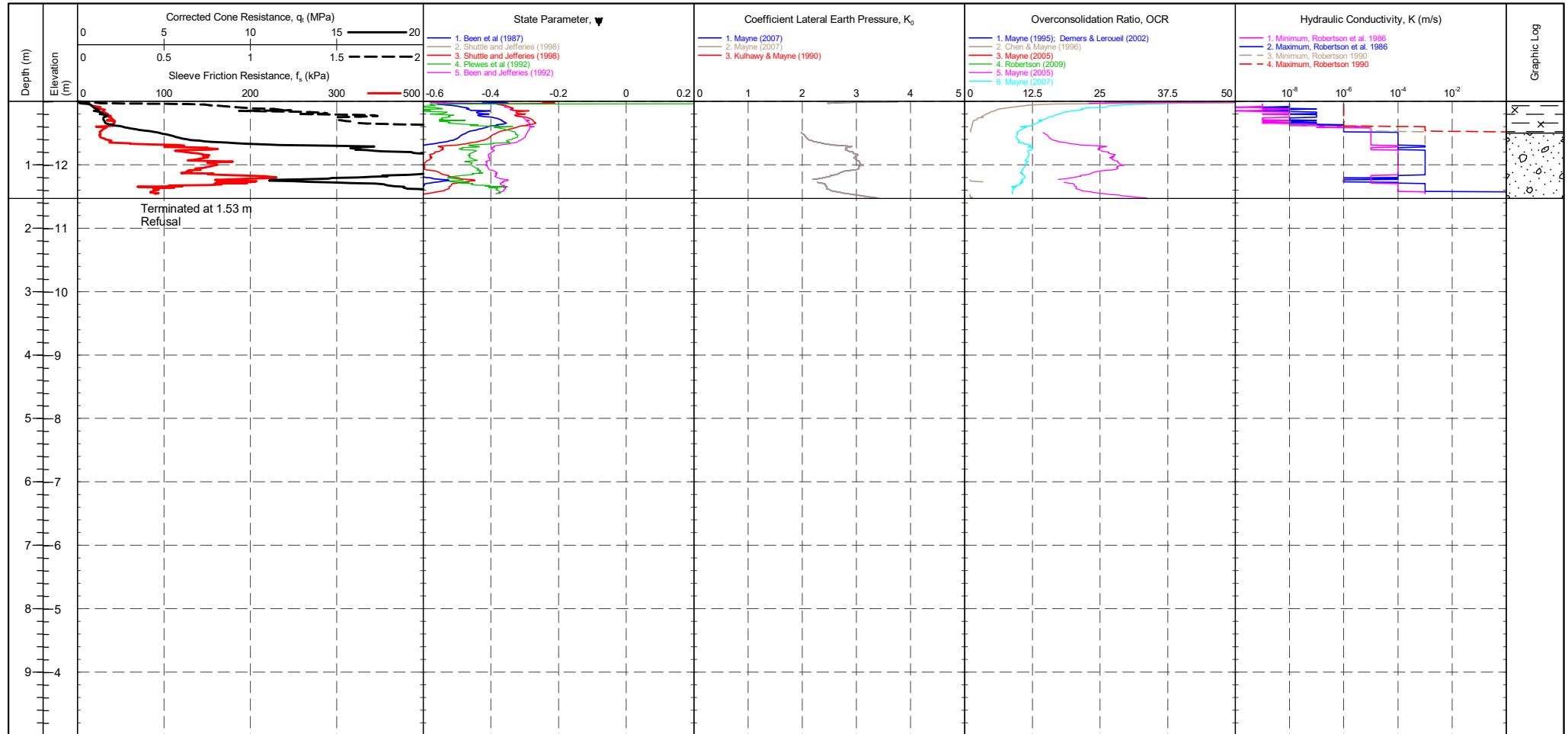
S3SCPT29A

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass
 LOCATION : Newark
 PROJECT No. : 1220514

EASTING : 479338.948 m
 NORTHING : 354648.560 m
 ELEVATION : 13.008 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on tip resistance.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 25/10/2022
 PLOT DATE : 20/05/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : CM & JC
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

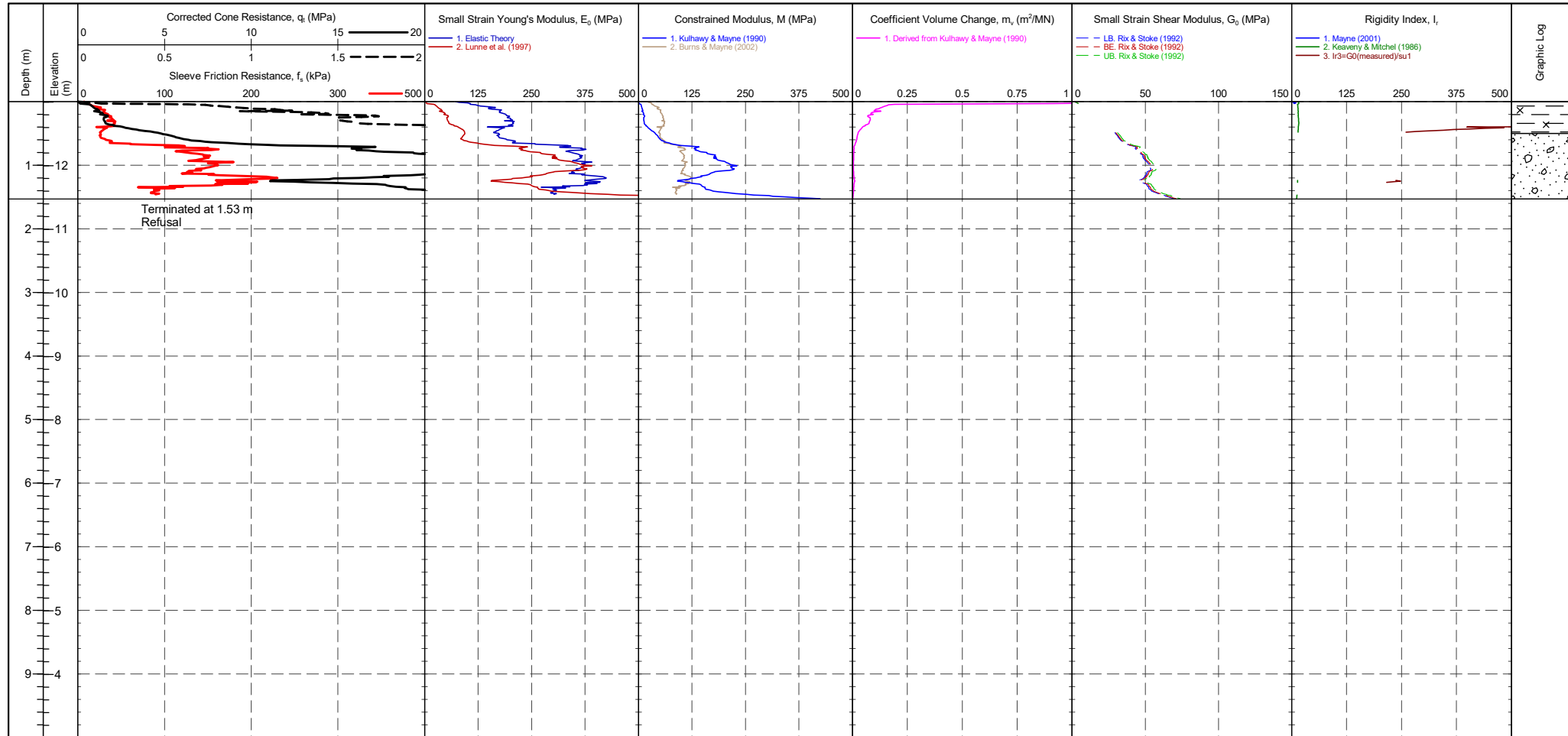
CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	345 mV	348 mV	0.034 MPa
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Pore Pressure 2	301 mV	285 mV	-0.004 kPa
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Groundwater Level
 Dissipation Test

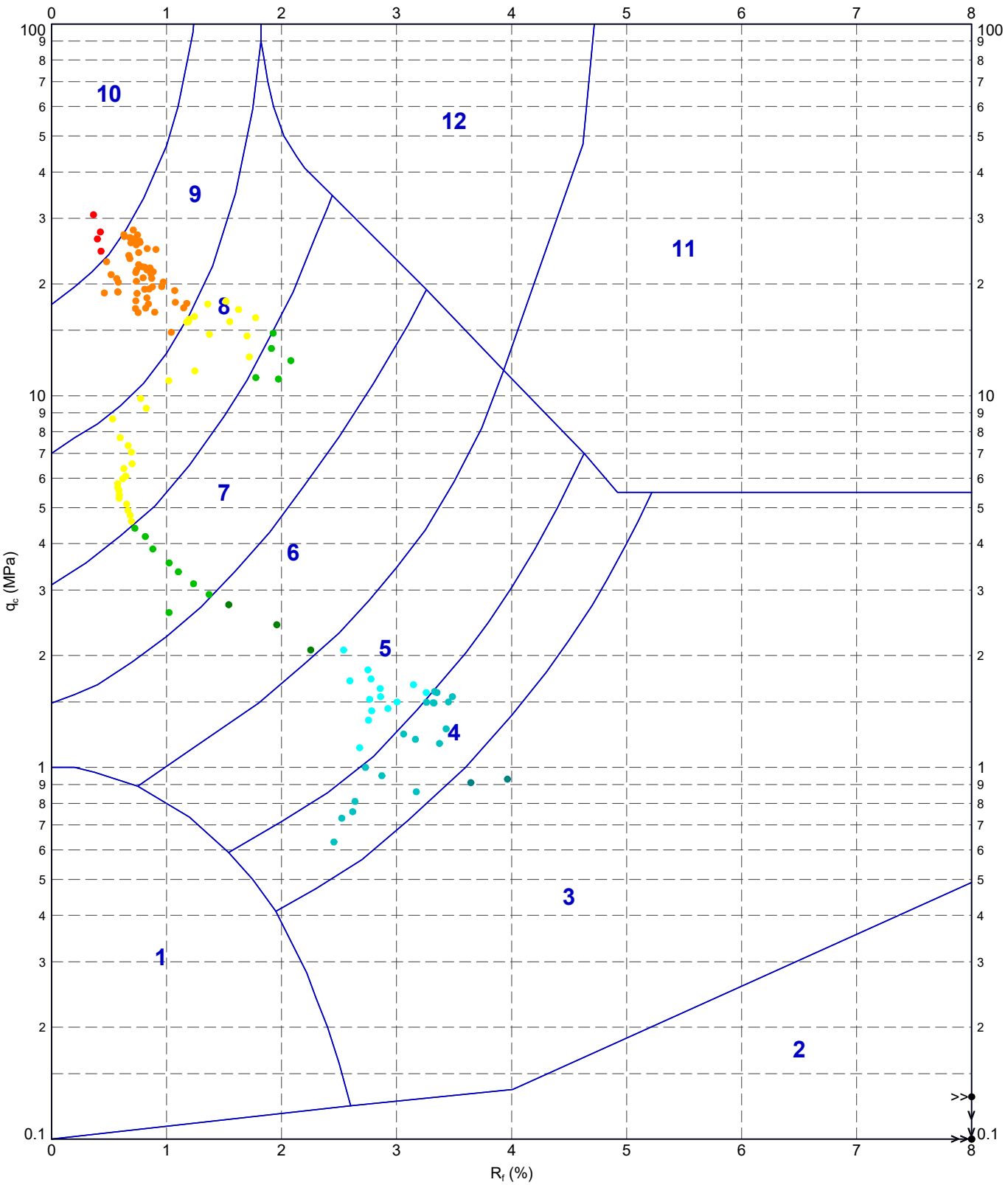
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S3SCPT29A

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>345 mV</td> <td>348 mV</td> <td>0.034 MPa</td> </tr> <tr> <td>Sleeve</td> <td>261 mV</td> <td>264 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>301 mV</td> <td>285 mV</td> <td>-0.004 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2610 mV</td> <td>2604 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	345 mV	348 mV	0.034 MPa	Sleeve	261 mV	264 mV	0.002 kPa	Pore Pressure 2	301 mV	285 mV	-0.004 kPa	X-Y Inclinator	2610 mV	2604 mV		Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUTE 2.02.1.LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. RF APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile> - 20/05/2023 23:08 10.00.00.09 Dalgard Lab and In Situ Tool - DGD | Lib: In Situ SI 2.02.0.2017-07-10 Proj: In Situ SI 2.02.0.2017-07-10



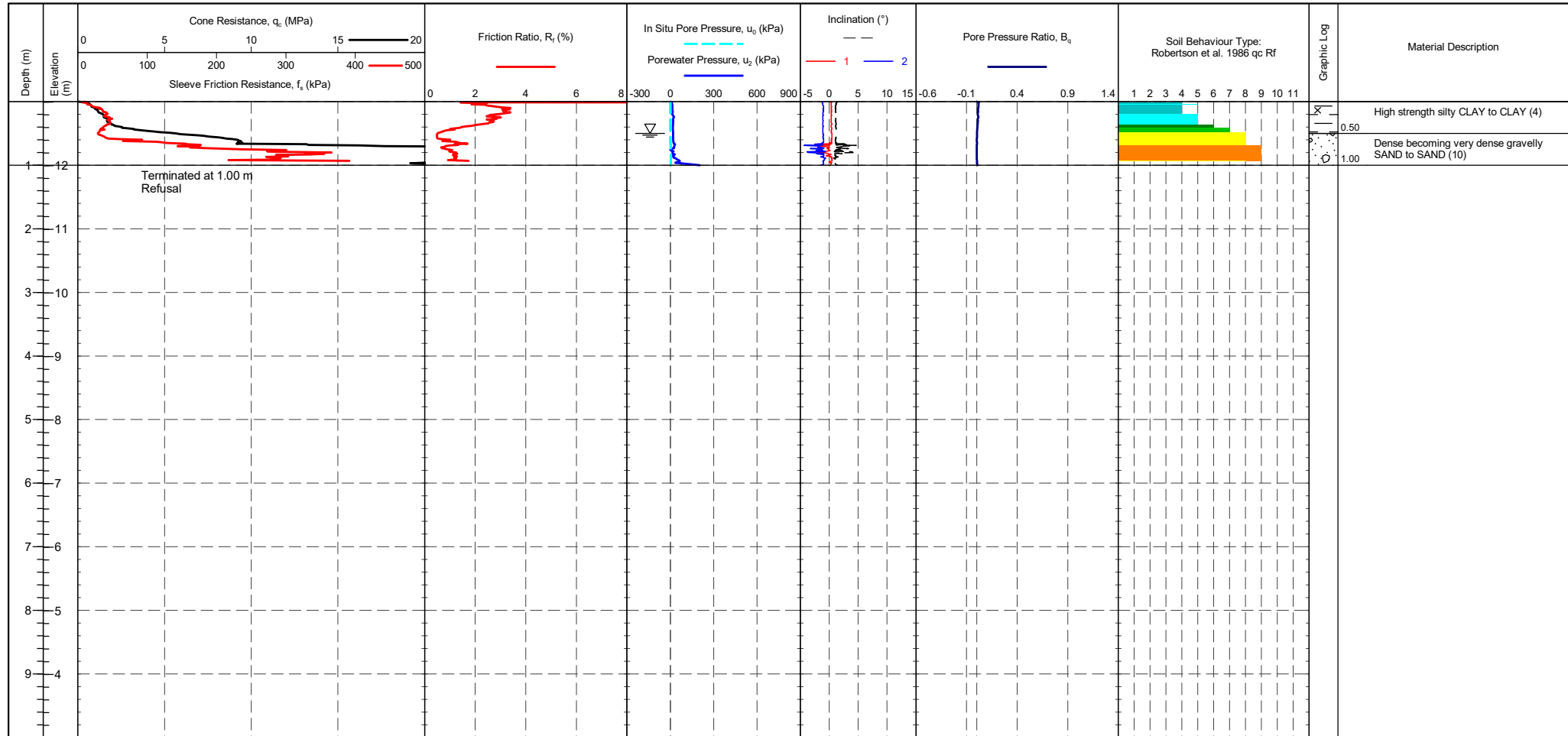
METHOD: Robertson et al. 1986 q_c R_f

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics Newark	CHECKED	20/05/2023
	A46 Newark Bypass	SCALE	Not To Scale
	Robertson et al. 1986 q_c vs. R_f - S3SCPT29A	PROJECT No 1220514	FIGURE No
		A4	

PointID
S3SCPT29B

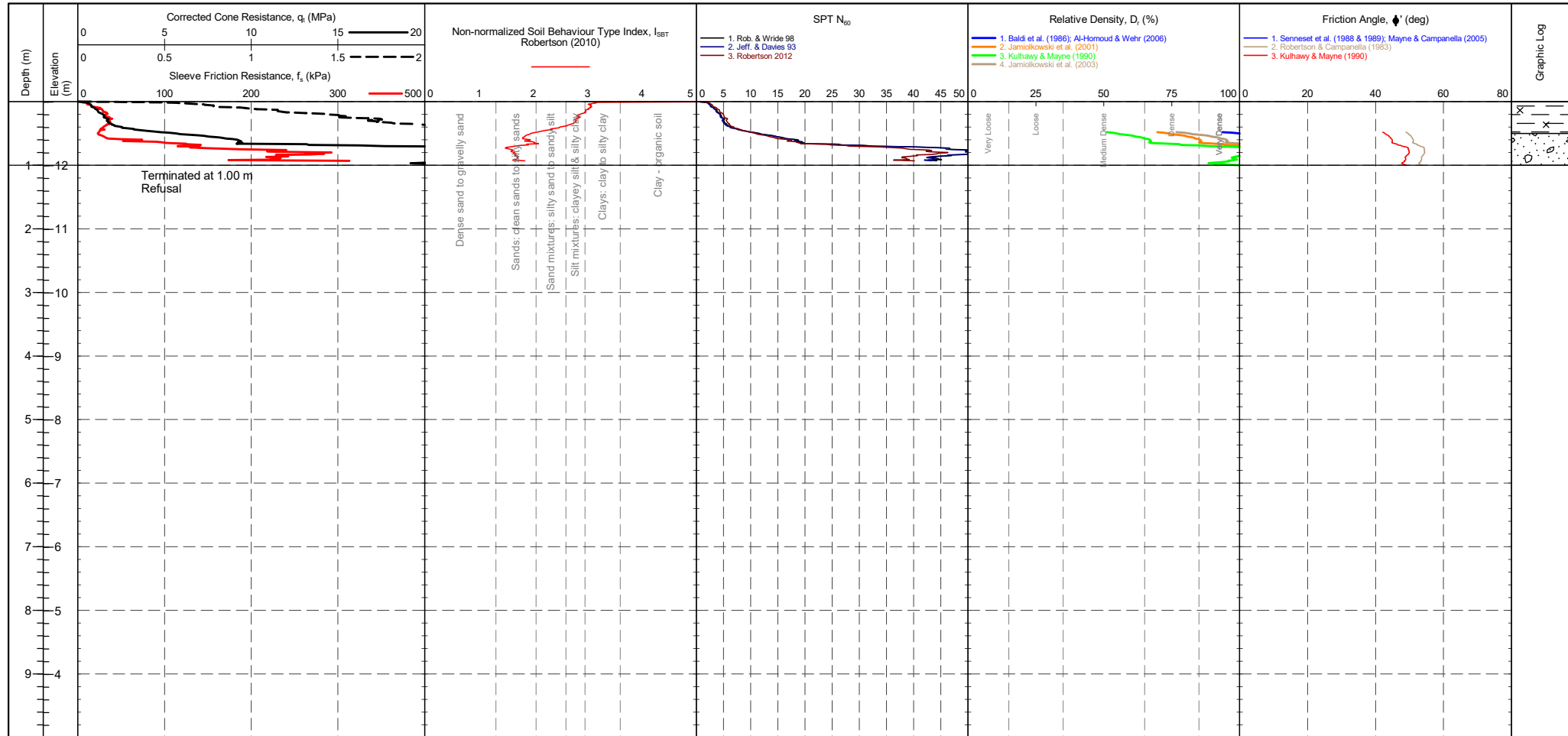
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: Pre 346 mV, Post 343 mV, Difference -0.034 MPa Sleeve: Pre 263 mV, Post 260 mV, Difference -0.002 kPa Pore Pressure 2: Pre 288 mV, Post 298 mV, Difference 0.003 kPa X-Y Inclinometer: Pre 2534 mV, Post 2564 mV	METHOD: Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3SCPT29B

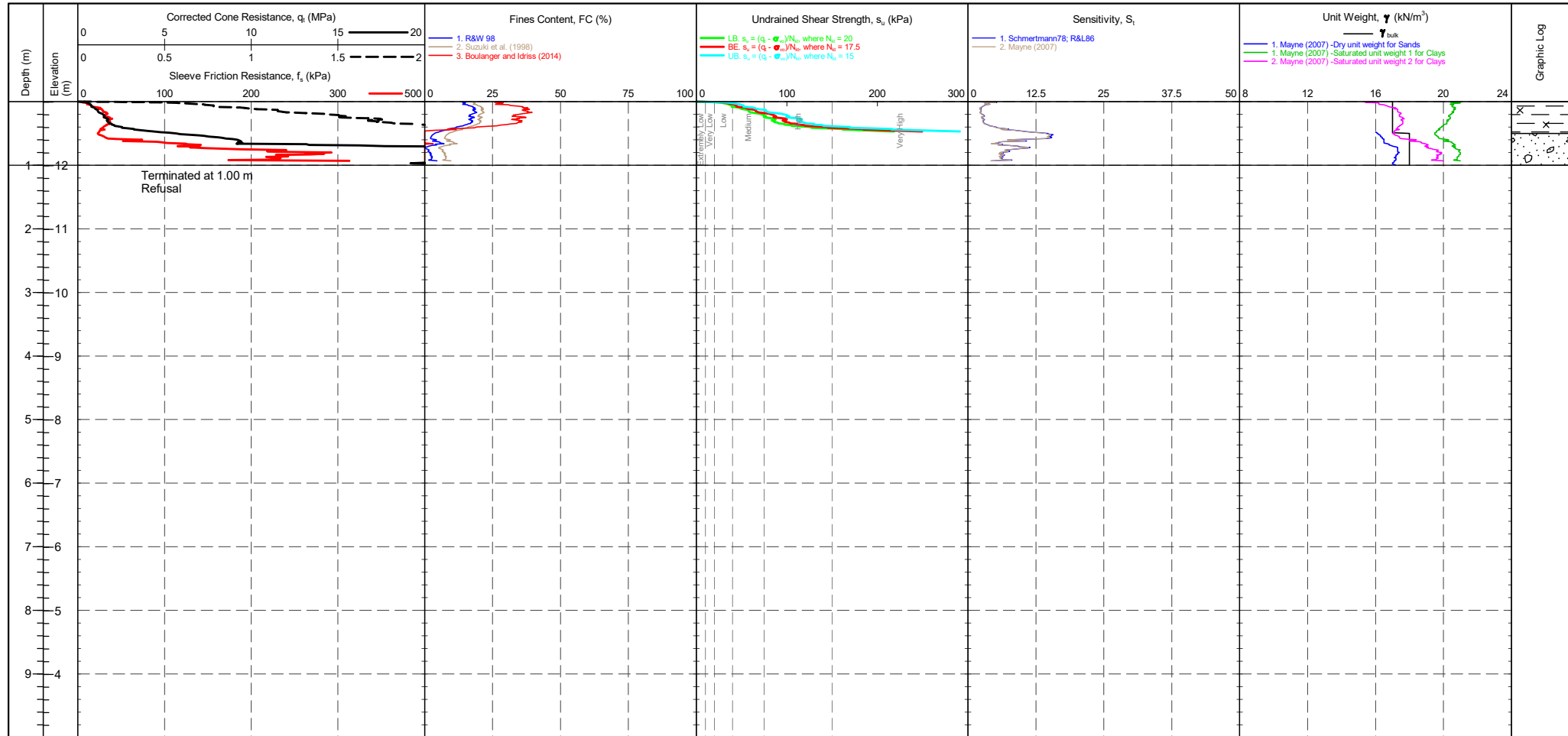
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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PointID
S3SCPT29B

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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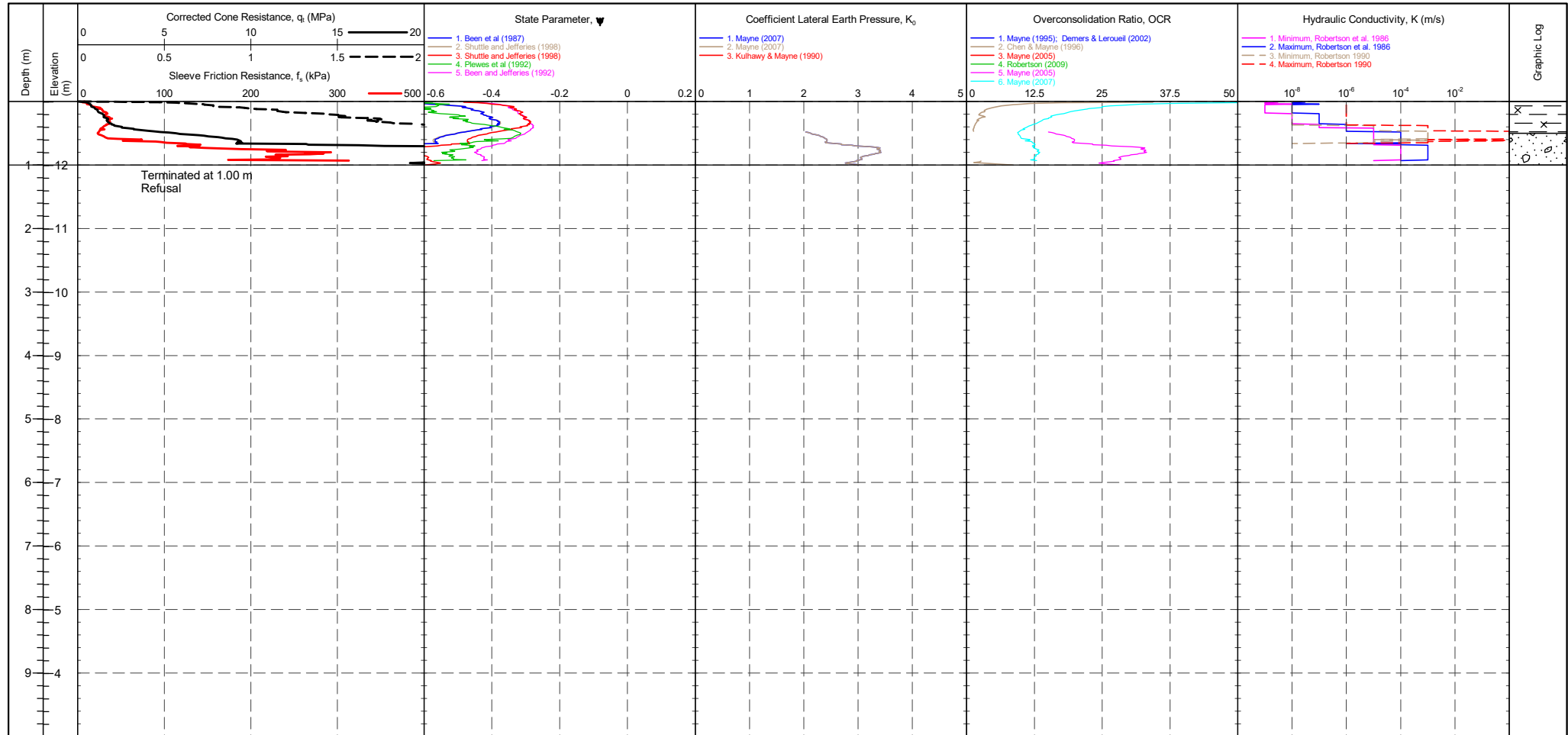


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : CM & JC FRICITION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>346 mV</td><td>343 mV</td><td>-0.034 MPa</td></tr> <tr><td>Sleeve</td><td>263 mV</td><td>260 mV</td><td>-0.002 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>288 mV</td><td>298 mV</td><td>0.003 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2534 mV</td><td>2564 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	346 mV	343 mV	-0.034 MPa	Sleeve	263 mV	260 mV	-0.002 kPa	Pore Pressure 2	288 mV	298 mV	0.003 kPa	X-Y Inclinator	2534 mV	2564 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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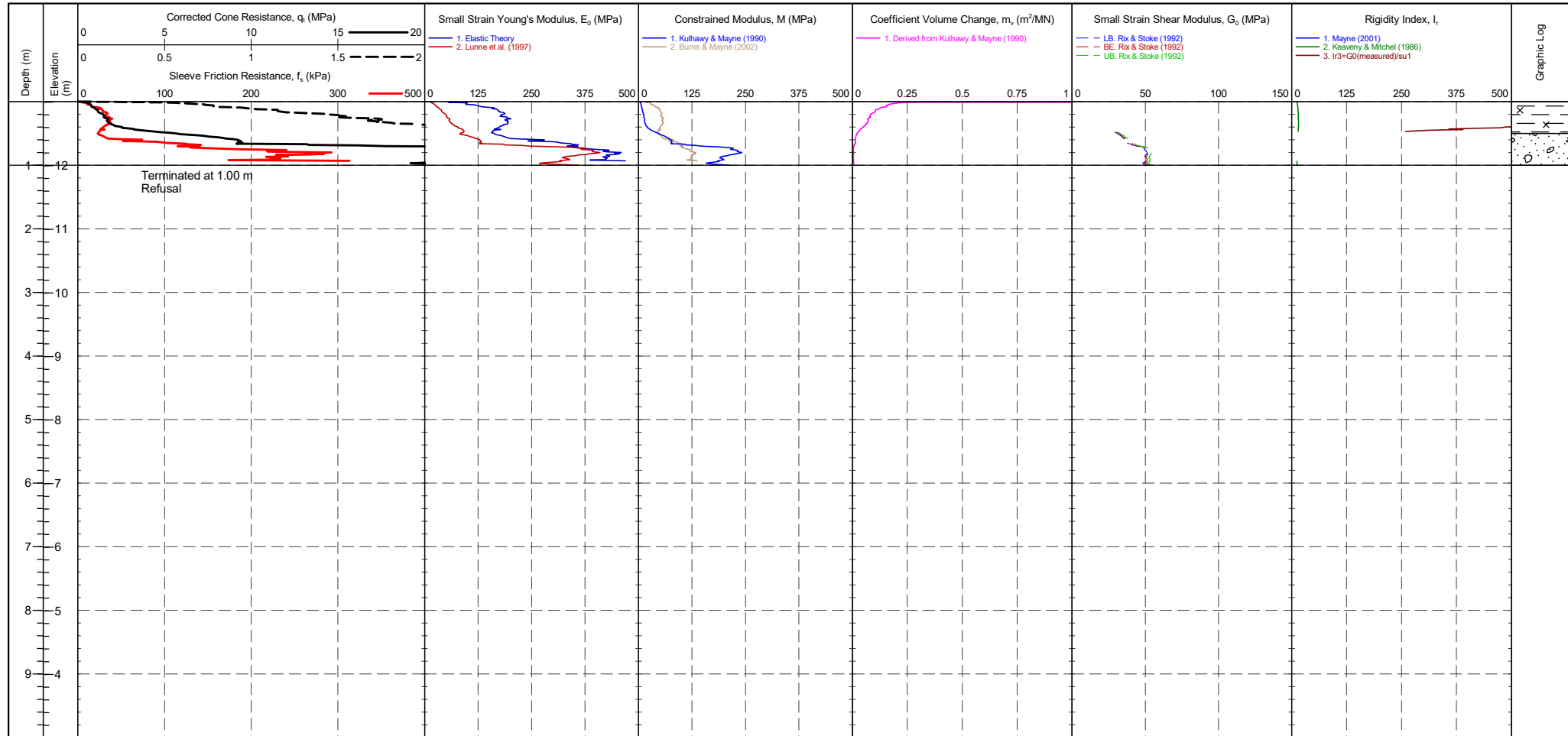
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass LOCATION : Newark PROJECT No. : 1220514	EASTING : 479338.948 m NORTHING : 354648.560 m ELEVATION : 13.008 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/10/2022 PLOT DATE : 20/05/2023 METHOD : ISO 22476-1:2012
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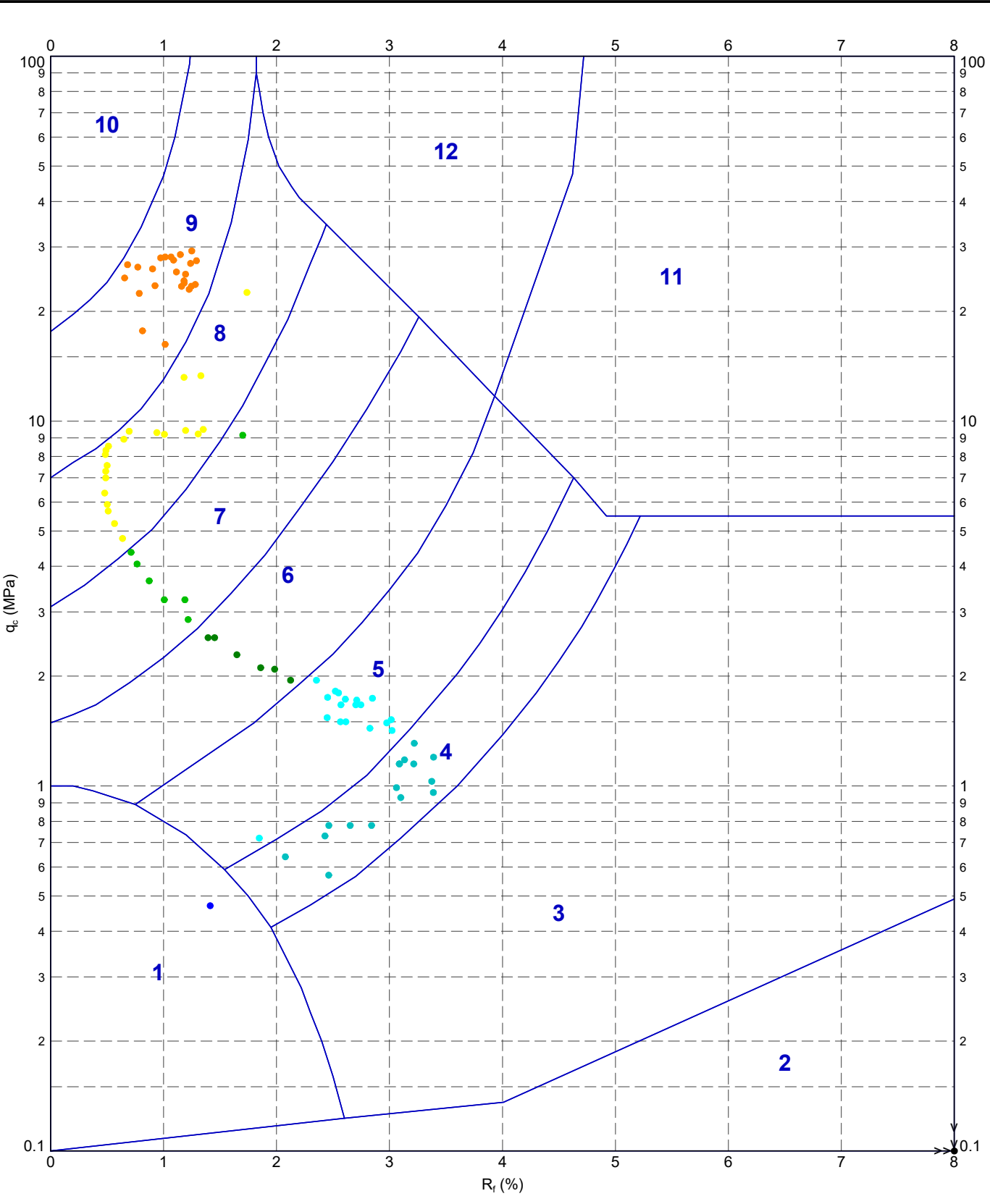
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220699-ADVANCED REPORT INSTITUTE 2.02.1 LIB - CHLOE.GLB Graph CPT ROBERTSON ET AL. 8F QC VS. Rf APF 1220514-A46 NEWARK BYPASS.GPJ <DrawingFile>> 20/05/2023 23:09 10.03.00.09 Dalgel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10]



METHOD: Robertson et al. 1986 q_c R_f

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
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	<p>TITLE</p> <p>Strata Geotechnics Newark A46 Newark Bypass Robertson et al. 1986 q_c vs. R_f - S3SCPT29B</p>	DRAWN	DATE	20/05/2023	
		CHECKED	DATE	20/05/2023	
		SCALE	Not To Scale		A4
		PROJECT No	1220514		
		FIGURE No			

APPENDIX C

Seismic Dilatometer Marchetti (SDMT) Measurements



Project:	A46 Newark
Firm	IN SITU S.I.
Customer	Strata Geotechnics
Job	1220514
Location	Newark

Description of S-wave measurements using the SDMT

The SDMT is a seismic module for recording seismic waves in the soil to evaluate shear wave velocity V_s . The device is equipped with two geophone receivers with a vertical offset of 0.50 m, which record the shear wave generated at surface. The instrument may be combined with a DMT blade, a dummy cone or a CPT probe.

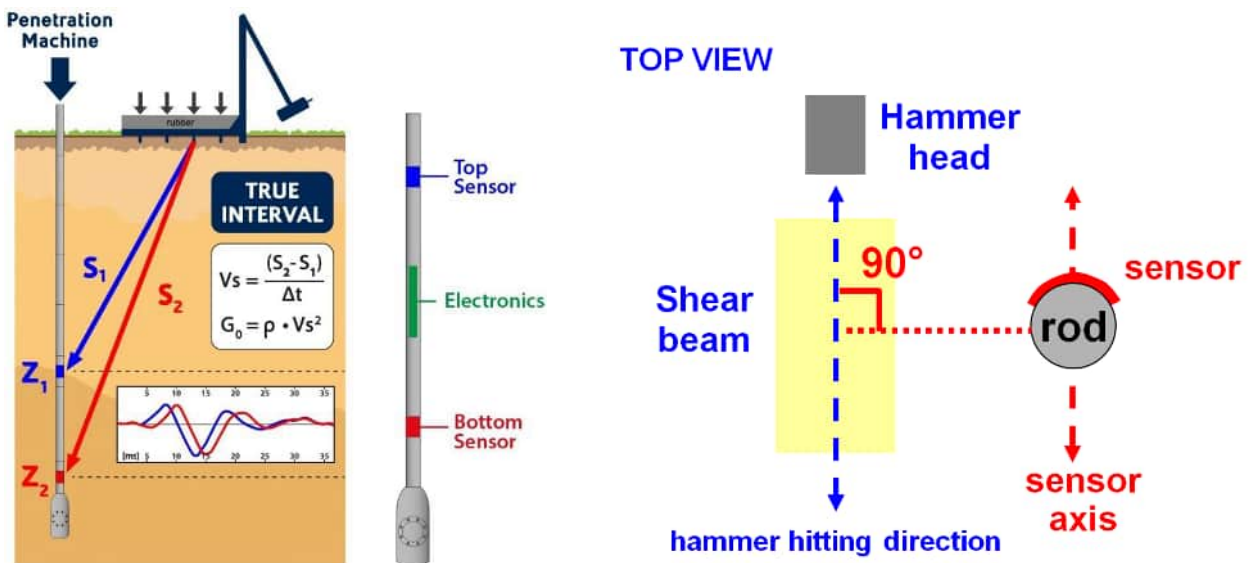
The S-wave is usually generated with a hammer striking in the horizontal direction a shear beam, which must be vertically pressed downwards to ensure good coupling with the soil. The longitudinal axis of the shear beam must be parallel to the axis of the sensors, to maximize sensitivity to the generated shear wave.

The shear wave velocity V_s is the ratio between the difference of the distances between the center of the shear beam to each receiver ($S_2 - S_1$) and the delay time (Δt) of the wave arrival to the upper and to the lower receiver.

V_s measurements are recommended with 0.50 m depth interval, to obtain wave registrations in all soil layers of the test location.

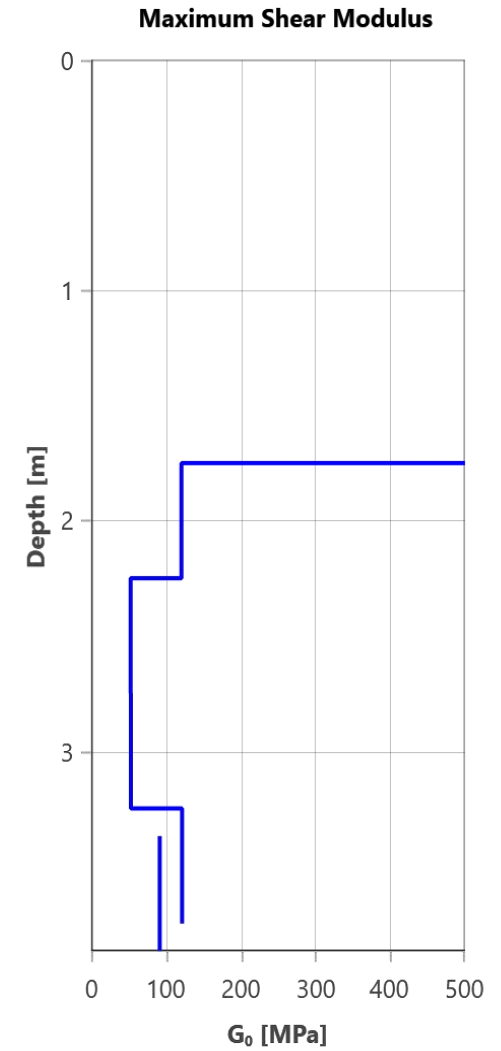
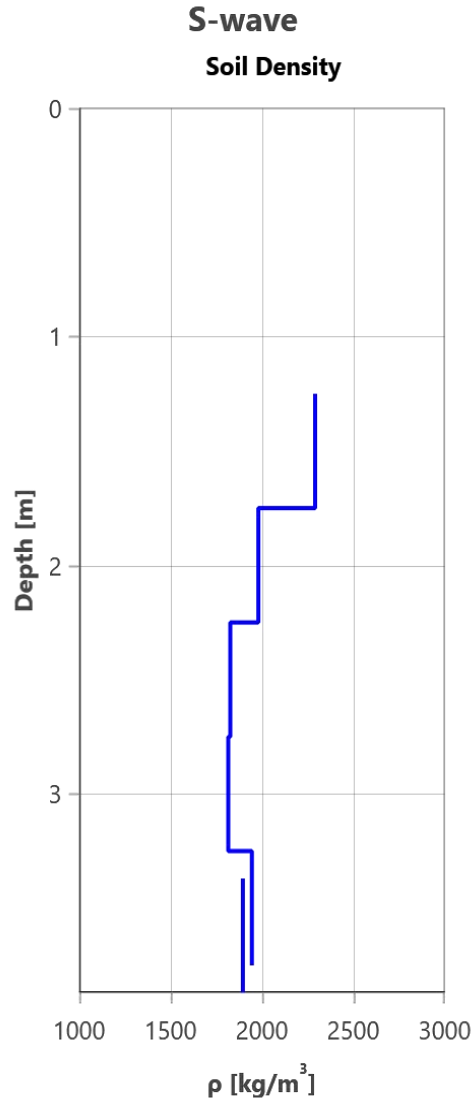
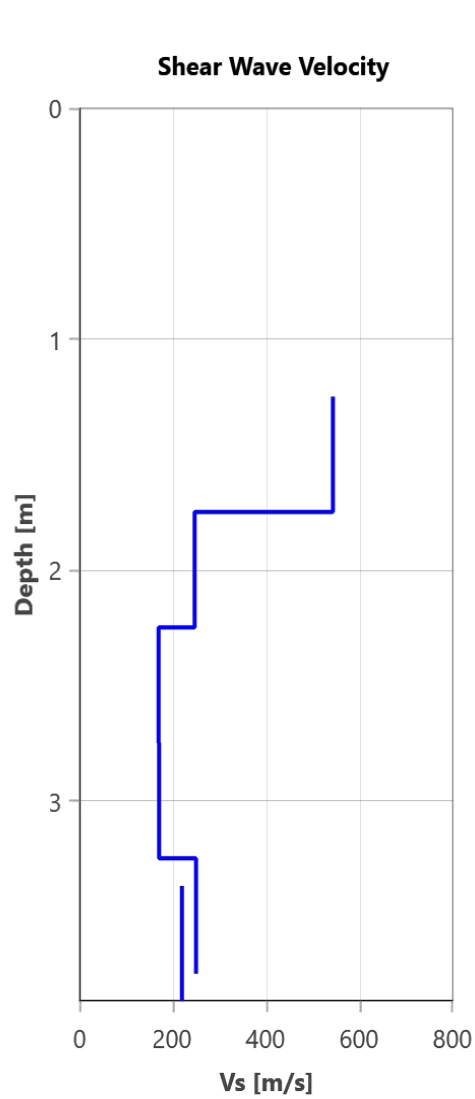
The dual sensor configuration enables True Interval interpretation of the shear wave velocity, comparing the traces of the same generated wave recorded by each receiver. In addition, two independent Pseudo Interval interpretations of V_s are possible, considering the traces of each of the two receivers with depth.

The maximum shear modulus G_0 is calculated using the well known formula: $G_0 = \rho V_s^2$, Where ρ is the soil density and V_s is the shear wave velocity. Soil density is evaluated from the unit weight, estimated using the Marchetti & Crapps 1981 chart or with values provided manually by the user.



References

- ASTM International. 2014. 'Standard Test Methods for Downhole Seismic Testing'. ASTM D7400-14. West Conshohocken, PA. ASTM International, approved November 1, 2014.
- Marchetti, S., Monaco, P., Totani, G. & Marchetti, D. 2008. 'In situ tests by seismic dilatometer (SDMT)'. Proceedings. From Re-search to Practice in Geotechnical Engineering, ASCE Ge-otech. Spec. Publ. No. 180 (honoring J.H. Schmertmann): 292-311.
- Amoroso S., Monaco P., Lehane B. M., Marchetti D. 2014. Examination of the Potential of the Seismic Dilatometer (SDMT) to Estimate In Situ Stiffness Decay Curves in Various Soil Types. Soils and Rocks 37(3):177-194.



S3SCPT05

S-wave

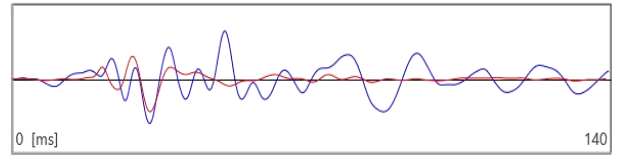
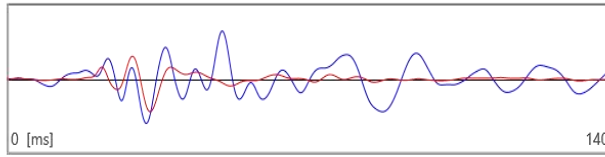
01/11/2022

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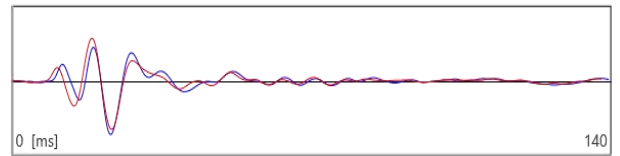
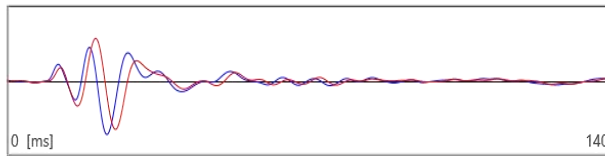
Recorded Signals

Rephased Signals

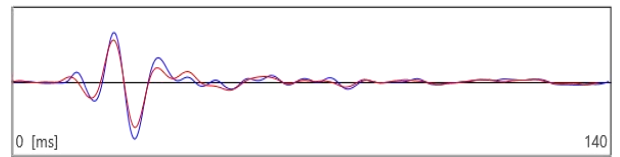
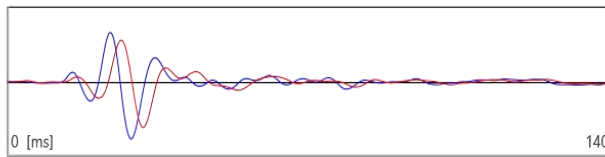
Z = 1.5 m
Ds = 0.41 m
Dt = 0.78 ms
Vs = 533 m/s
01/11/2022
12:17:19



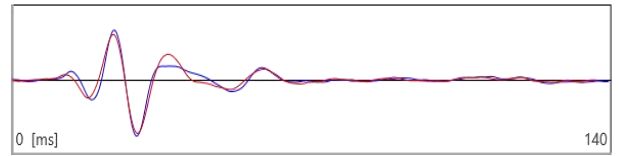
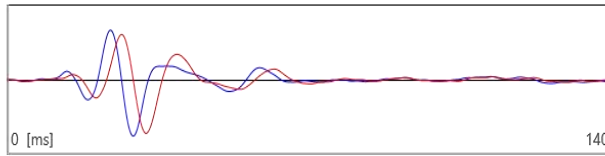
Z = 2.0 m
Ds = 0.45 m
Dt = 1.76 ms
Vs = 254 m/s
01/11/2022
12:22:07



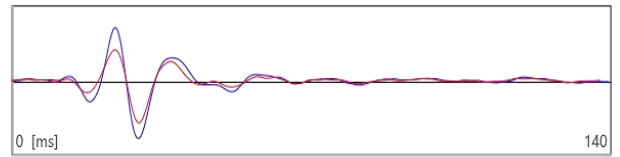
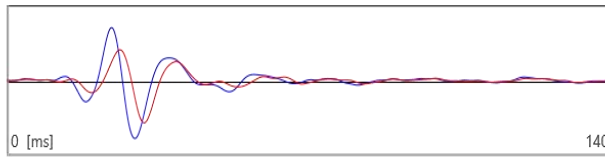
Z = 2.5 m
Ds = 0.46 m
Dt = 2.67 ms
Vs = 174 m/s
01/11/2022
12:24:46



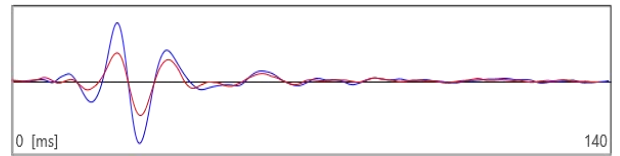
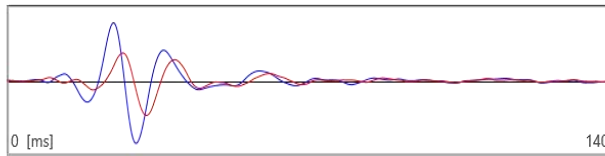
Z = 3.0 m
Ds = 0.47 m
Dt = 2.79 ms
Vs = 170 m/s
01/11/2022
12:26:32



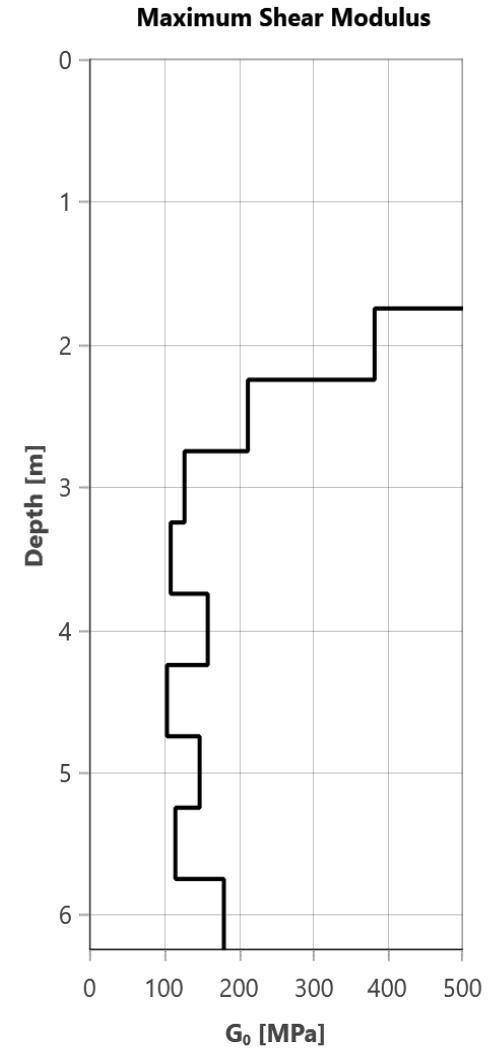
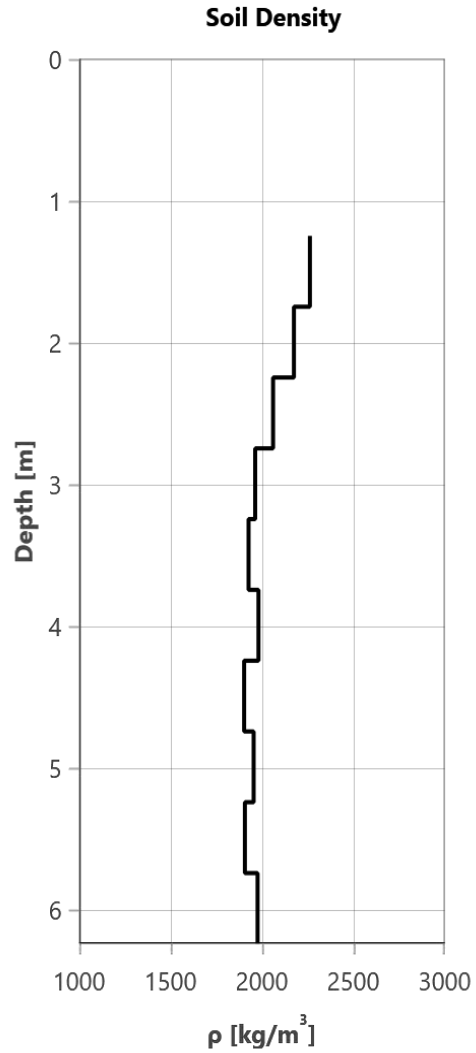
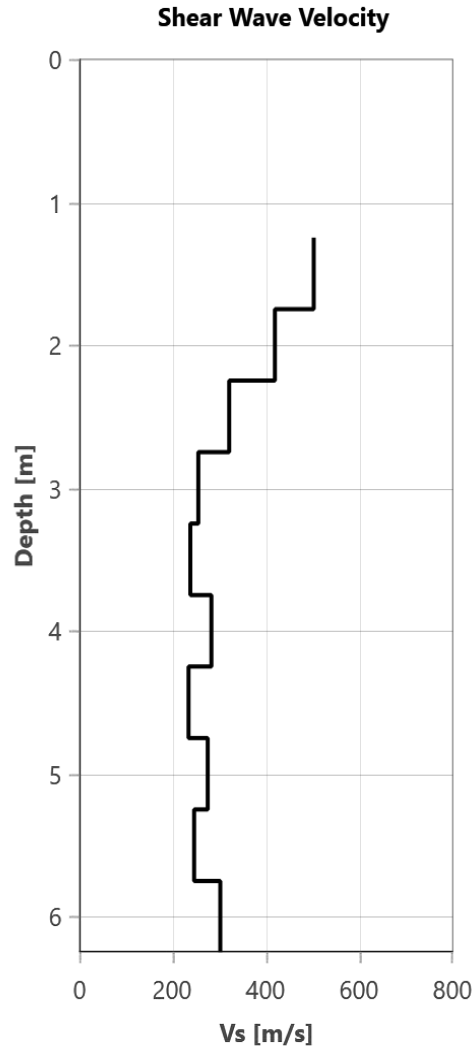
Z = 3.5 m
Ds = 0.48 m
Dt = 2.00 ms
Vs = 240 m/s
01/11/2022
12:28:57



Z = 3.6 m
Ds = 0.48 m
Dt = 2.20 ms
Vs = 219 m/s
01/11/2022
12:33:25



S-wave



S3SCPT05A

S-wave

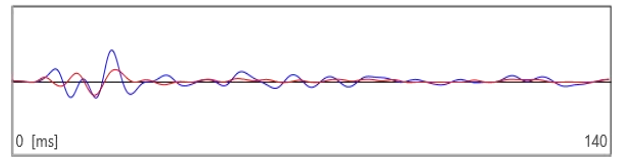
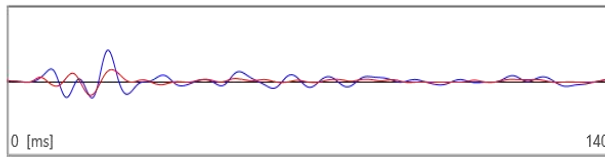
01/11/2022

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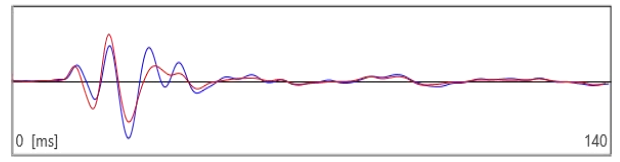
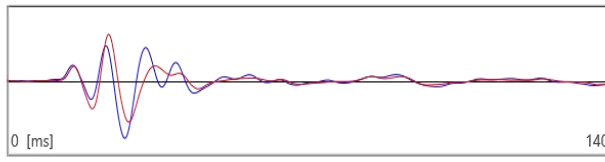
Recorded Signals

Rephased Signals

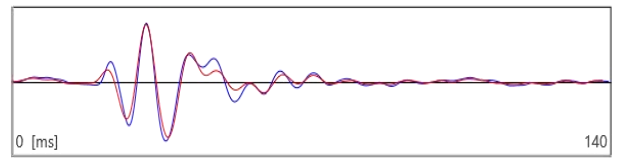
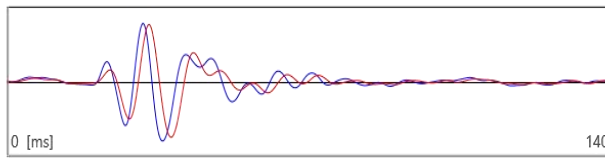
Z = 1.5 m
Ds = 0.41 m
Dt = ms
Vs = m/s
01/11/2022
14:09:23



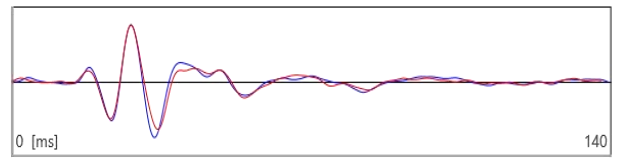
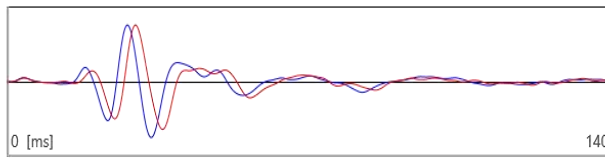
Z = 2.0 m
Ds = 0.45 m
Dt = 0.81 ms
Vs = 554 m/s
01/11/2022
14:13:23



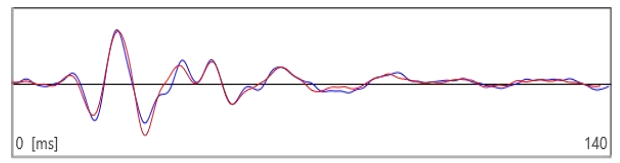
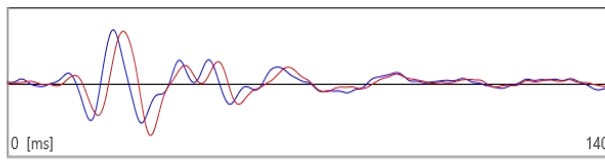
Z = 2.5 m
Ds = 0.46 m
Dt = 1.46 ms
Vs = 317 m/s
01/11/2022
14:15:45



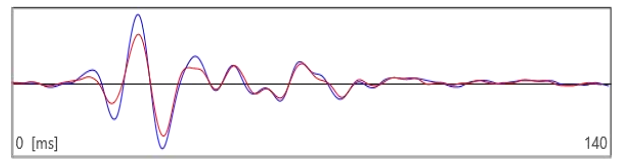
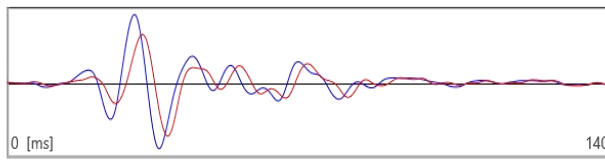
Z = 3.0 m
Ds = 0.47 m
Dt = 1.86 ms
Vs = 255 m/s
01/11/2022
14:17:42



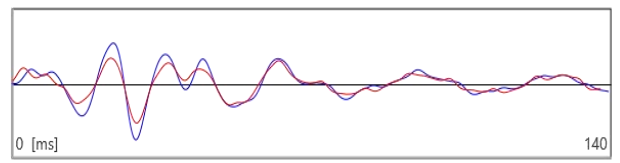
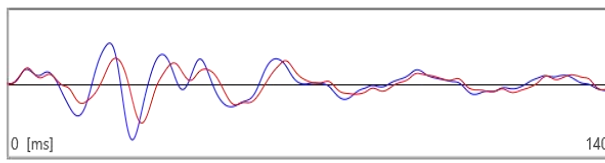
Z = 3.5 m
Ds = 0.48 m
Dt = 2.05 ms
Vs = 234 m/s
01/11/2022
14:23:08



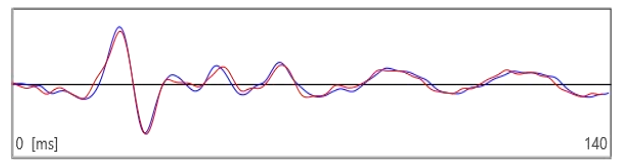
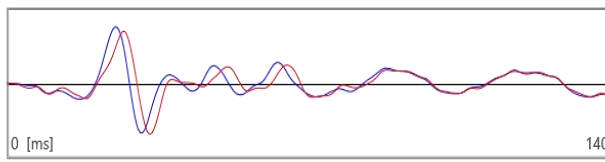
Z = 4.0 m
Ds = 0.49 m
Dt = 1.74 ms
Vs = 279 m/s
01/11/2022
14:25:09



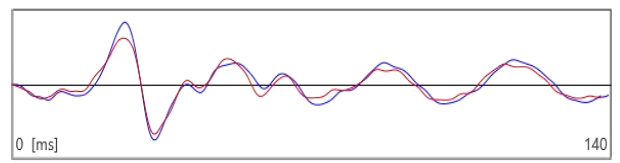
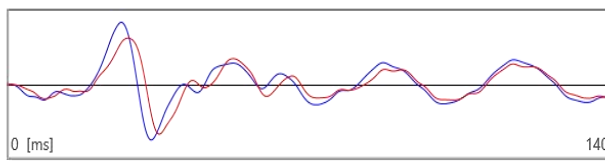
Z = 4.5 m
Ds = 0.49 m
Dt = 1.98 ms
Vs = 247 m/s
01/11/2022
14:30:03



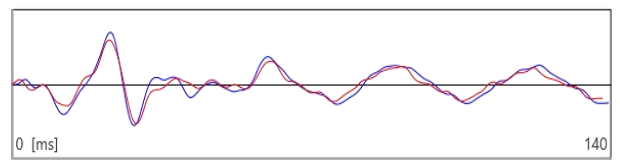
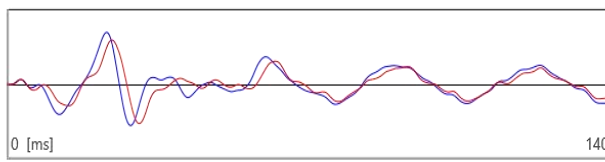
Z = 5.0 m
Ds = 0.49 m
Dt = 1.68 ms
Vs = 292 m/s
01/11/2022
14:33:00

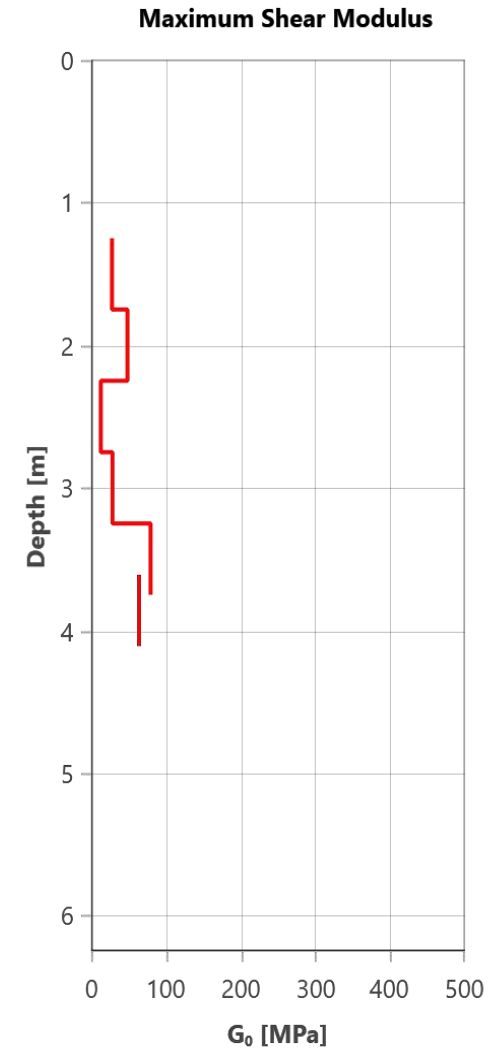
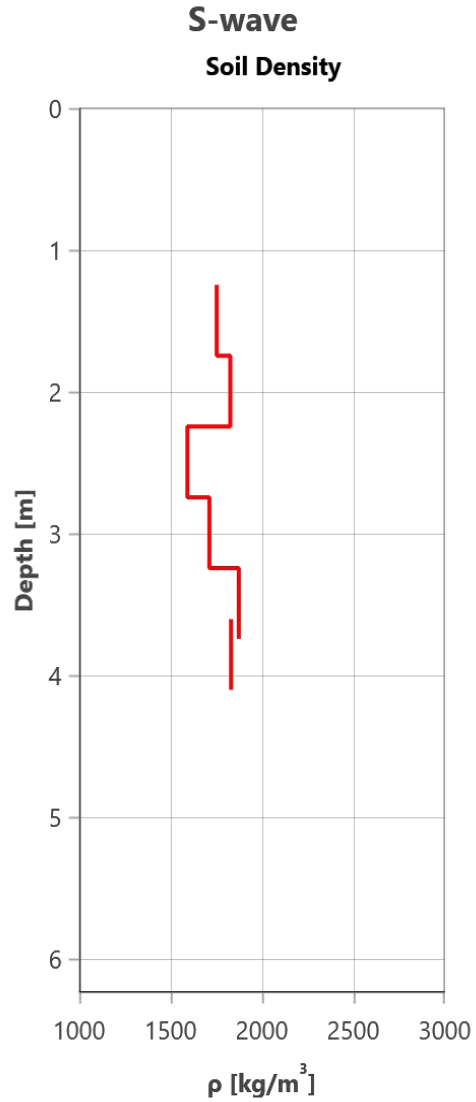
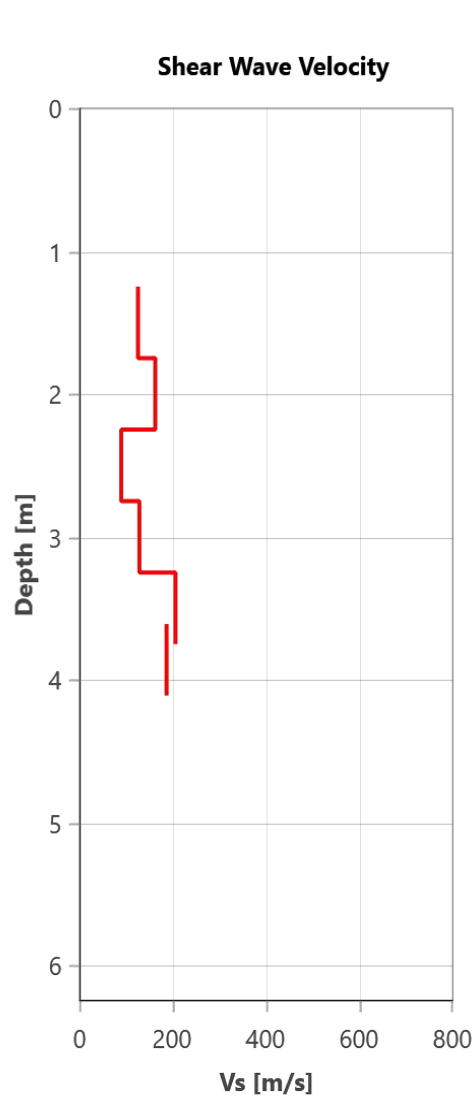


Z = 5.5 m
Ds = 0.49 m
Dt = 1.88 ms
Vs = 261 m/s
01/11/2022
14:37:01



Z = 6.0 m
Ds = 0.49 m
Dt = 1.46 ms
Vs = 337 m/s
01/11/2022
14:47:40





S3SCPT41

S-wave

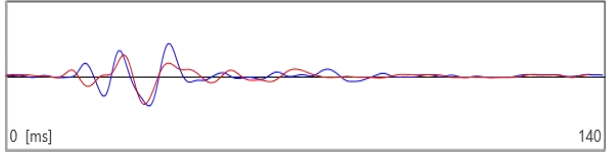
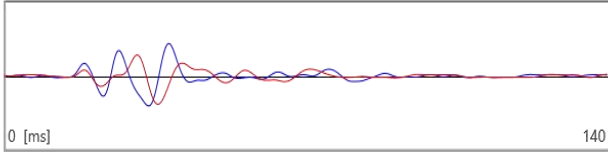
10/11/2022

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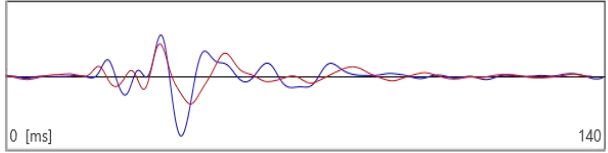
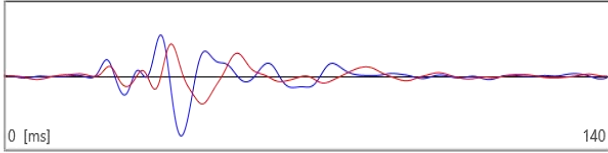
Recorded Signals

Rephased Signals

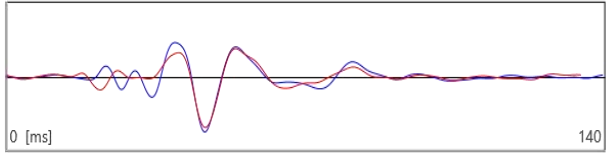
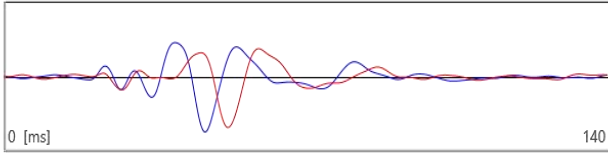
Z = 1.5 m
Ds = 0.41 m
Dt = 3.24 ms
Vs = 128 m/s
10/11/2022
11:18:48



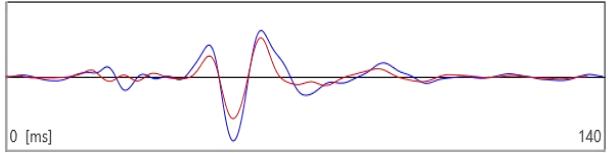
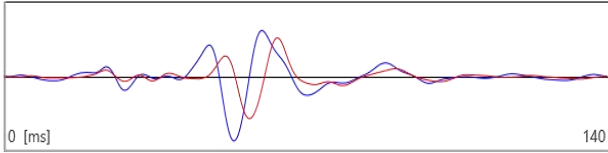
Z = 2.0 m
Ds = 0.45 m
Dt = 2.67 ms
Vs = 167 m/s
10/11/2022
11:21:12



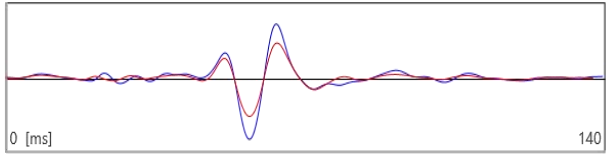
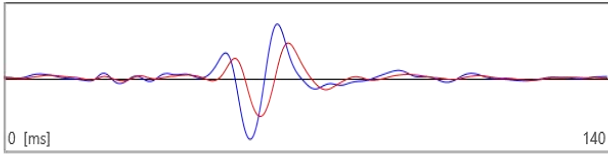
Z = 2.5 m
Ds = 0.46 m
Dt = 5.16 ms
Vs = 90 m/s
10/11/2022
11:22:50



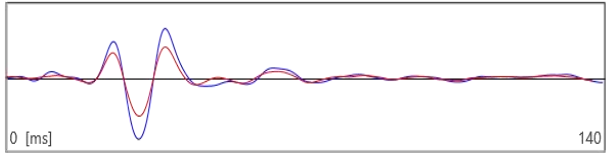
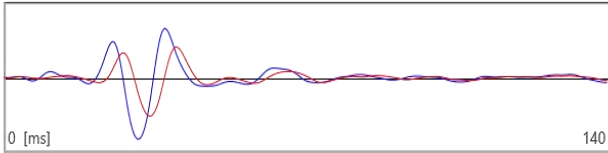
Z = 3.0 m
Ds = 0.47 m
Dt = 3.65 ms
Vs = 130 m/s
10/11/2022
11:24:31

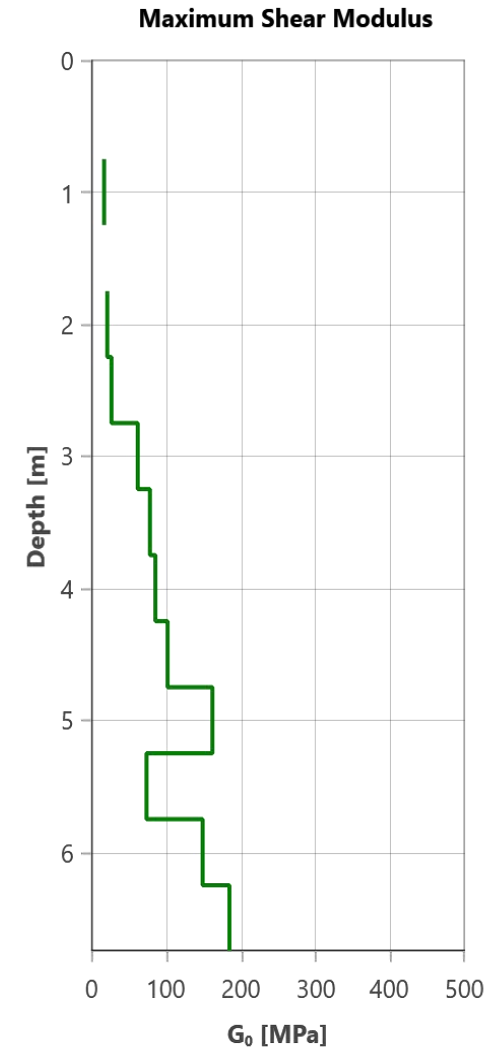
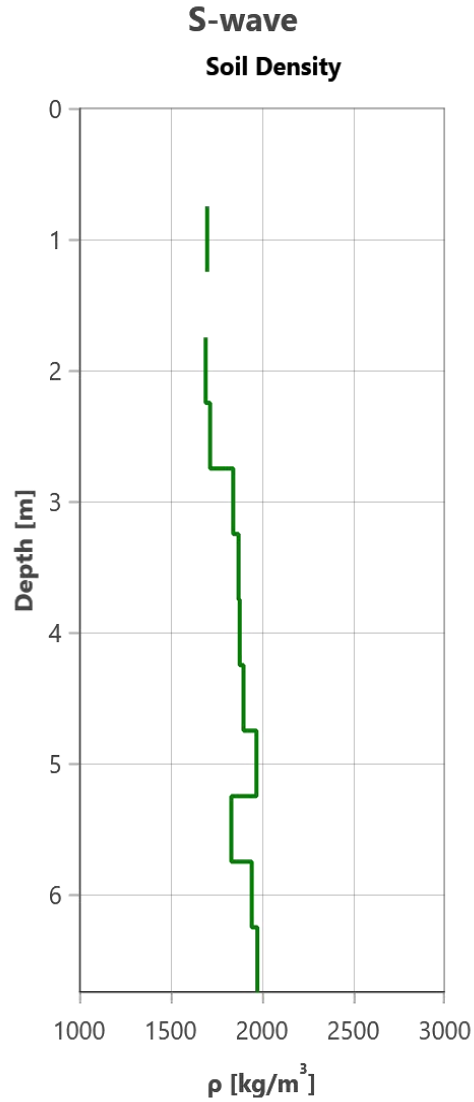
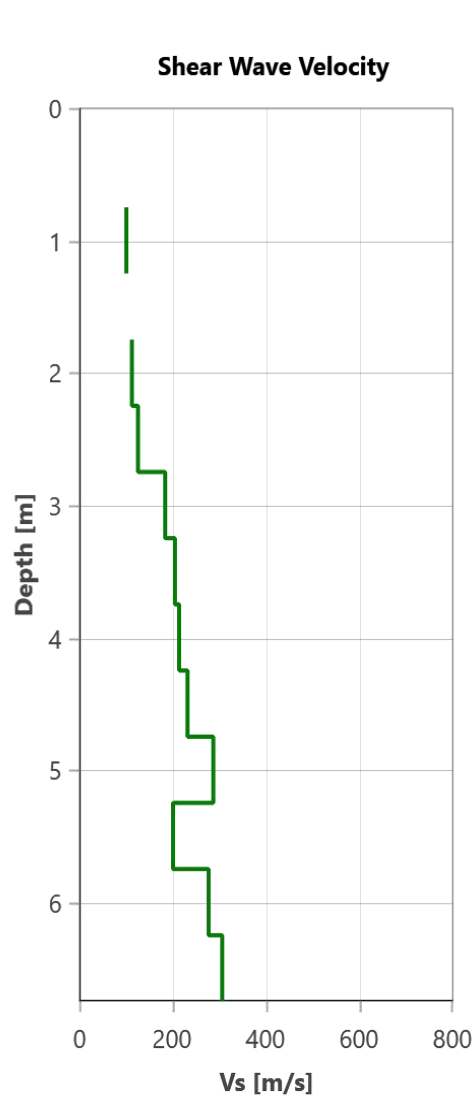


Z = 3.5 m
Ds = 0.48 m
Dt = 2.33 ms
Vs = 206 m/s
10/11/2022
11:26:14



Z = 3.9 m
Ds = 0.48 m
Dt = 2.59 ms
Vs = 187 m/s
10/11/2022
11:29:30





S3SCPT41A

S-wave

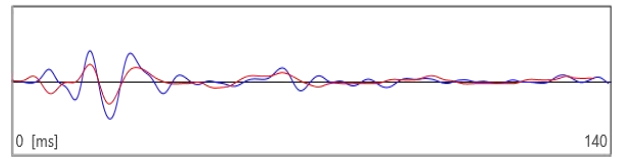
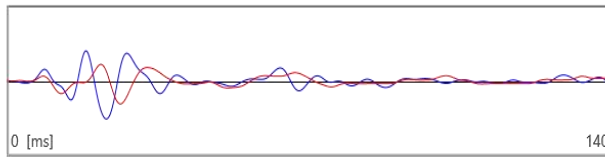
11/11/2022

Project: A46 Newark

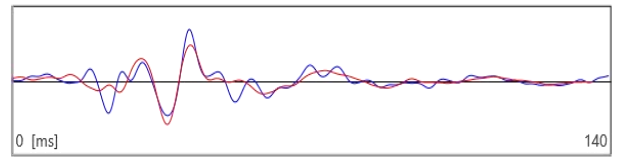
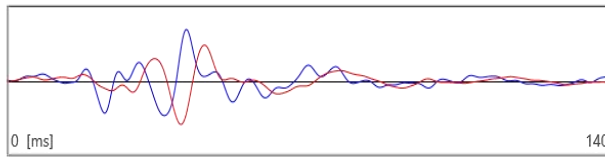
Recorded Signals

Rephased Signals

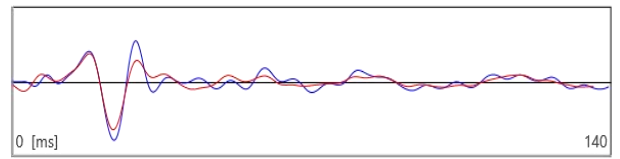
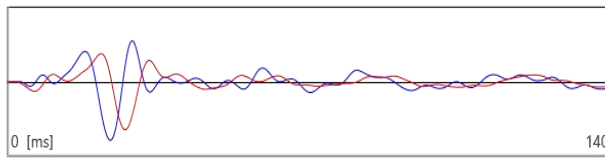
Z = 1.0 m
Ds = 0.35 m
Dt = 3.44 ms
Vs = 102 m/s
11/11/2022
11:34:23



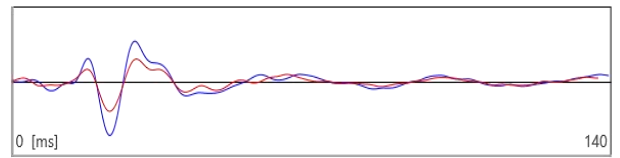
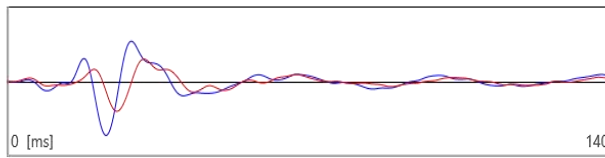
Z = 2.0 m
Ds = 0.45 m
Dt = 3.88 ms
Vs = 115 m/s
11/11/2022
11:37:07



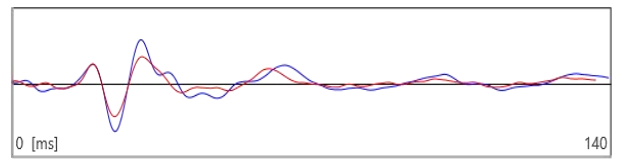
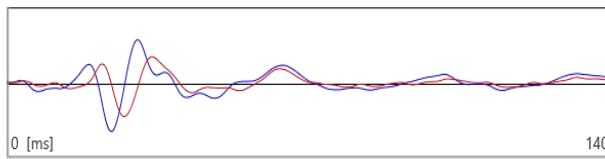
Z = 2.5 m
Ds = 0.46 m
Dt = 3.62 ms
Vs = 128 m/s
11/11/2022
11:38:55



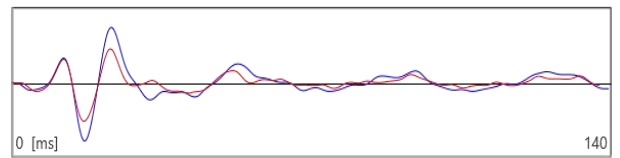
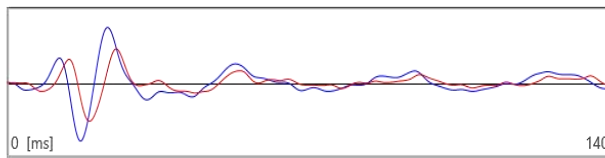
Z = 3.0 m
Ds = 0.47 m
Dt = 2.55 ms
Vs = 186 m/s
11/11/2022
11:40:31



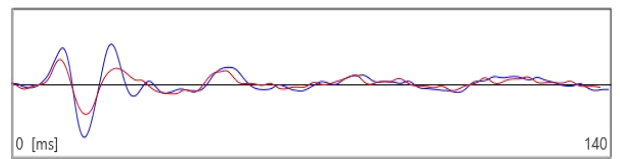
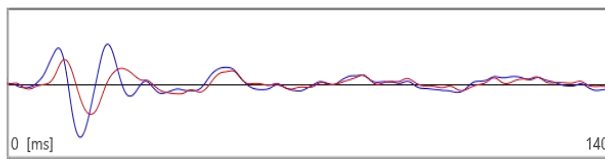
Z = 3.5 m
Ds = 0.48 m
Dt = 3.10 ms
Vs = 155 m/s
11/11/2022
11:43:11



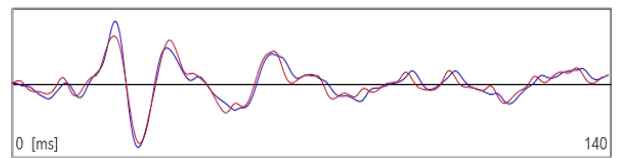
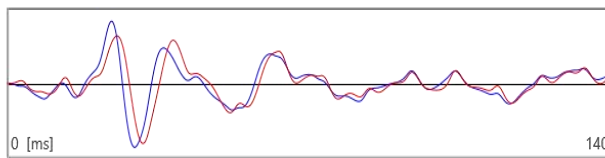
Z = 4.0 m
Ds = 0.49 m
Dt = 2.20 ms
Vs = 220 m/s
11/11/2022
11:46:44



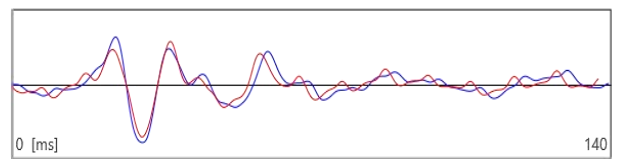
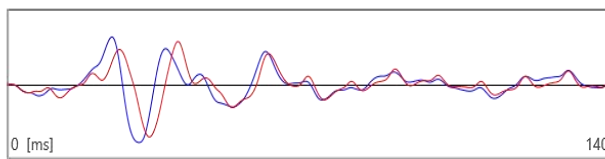
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Dt = 2.06 ms
Vs = 237 m/s
11/11/2022
11:49:22



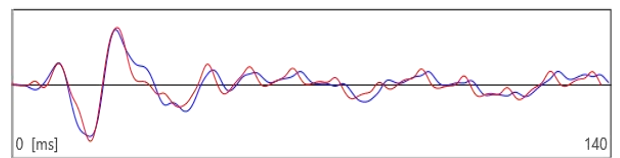
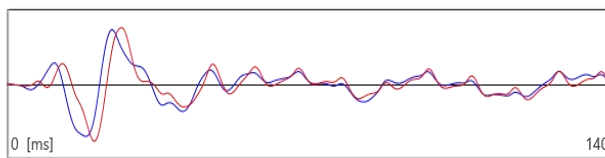
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Dt = 1.58 ms
Vs = 311 m/s
11/11/2022
11:52:16



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Ds = 0.49 m
Dt = 2.48 ms
Vs = 198 m/s
11/11/2022
11:54:15



Z = 6.0 m
Ds = 0.49 m
Dt = 1.83 ms
Vs = 269 m/s
11/11/2022
11:56:22



S3SCPT41A

S-wave

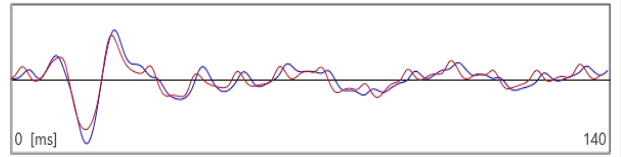
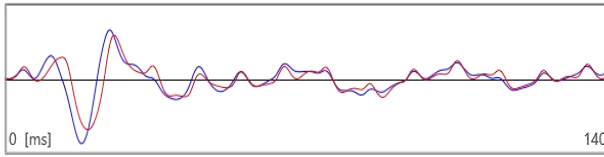
11/11/2022

Project: A46 Newark

Recorded Signals

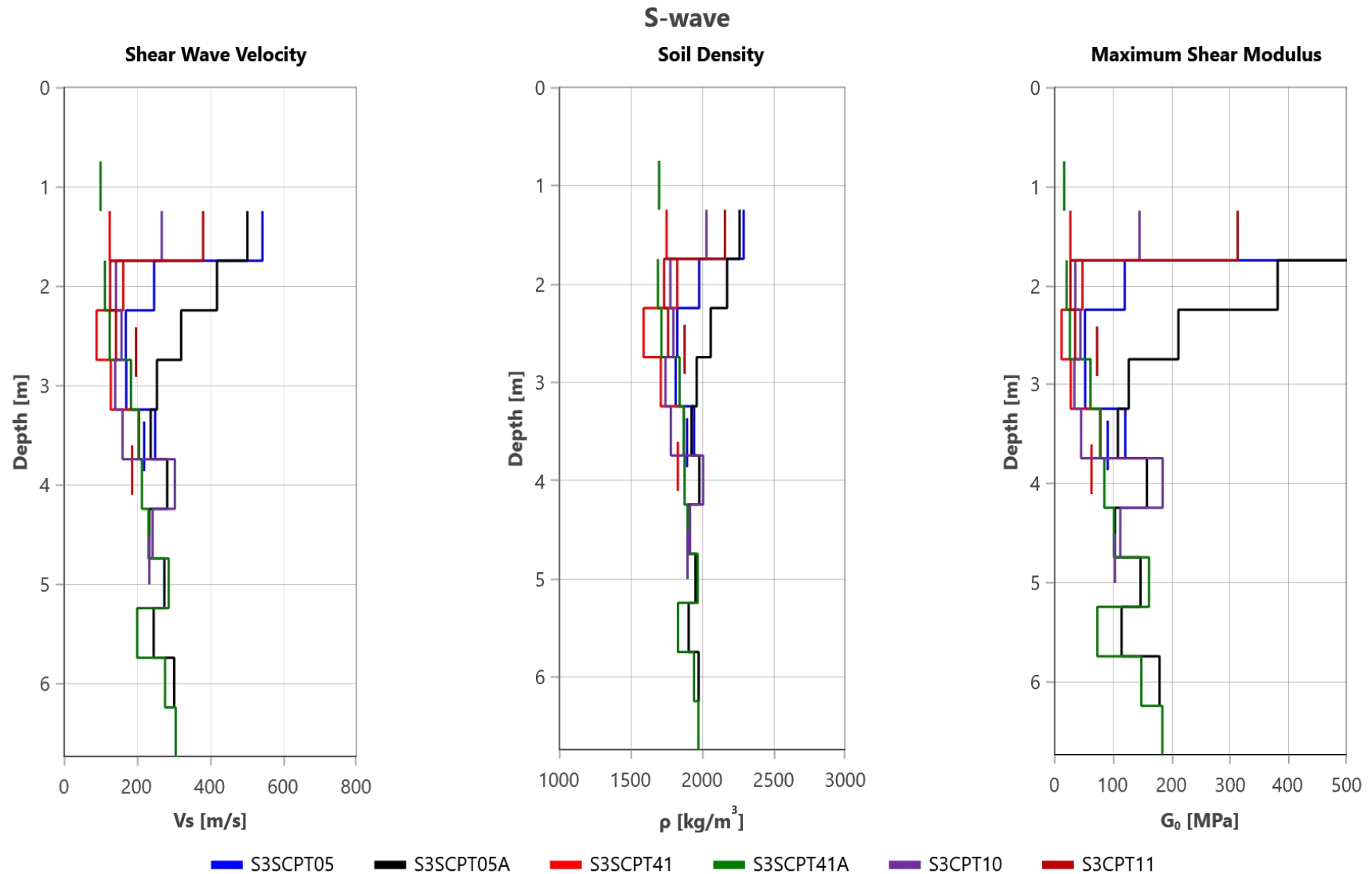
Rephased Signals

Z = 6.5 m
Ds = 0.49 m
Dt = 1.69 ms
Vs = 292 m/s
11/11/2022
11:57:48



Overlay plots

Project: A46 Newark





IN SITU SITE INVESTIGATION

Unit 23 Hastings Innovation
Centre,
Highfield Drive
St. Leonards on Sea, East Sussex,
TN38 9UH, U.K.

Company No.: 6339499
VAT No.: 922 3561 41

IN SITU

SITE INVESTIGATION

STATIC CONE PENETRATION TEST
FACTUAL REPORT

CLIENT: Strata Geotechnics
PROJECT: A46 Newark Bypass



Project	A46 Newark Bypass
Project No.	1230122
Client	Strata Geotechnics
Address	Summit Close, Kirkby in Ashfield, Nottingham, NG17 8GJ

Attention: Mr Kieron Done

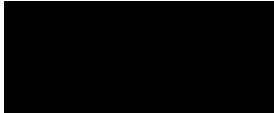
Dear Mr Done,

We have pleasure in providing a digital copy of our report and data in AGS format for the above project.

We hope that you are satisfied with the performance of our staff, equipment and reporting on this project. If you should have any queries about any aspect of the works carried out, please do not hesitate to contact us. We look forward to being of service to you in the future.

Yours faithfully,

In Situ Site Investigation Limited



Darren Ward
Director

Report Issue

Issue	Date	Prepared	Sign	Checked	Sign	Approved	Sign
01	06/02/2023	Chloe Donovan		Luisa Dhimitri		Darren Ward	

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1.0 INTRODUCTION

In Situ Site Investigation Limited (In Situ) was engaged in a geotechnical site investigation at A46 Newark Bypass at the request of Strata Geotechnics. The site investigation consisted of completing 12 Static Piezocone Penetration Tests (CPTU), and 2 Seismic Tests (SCPT) to provide information on the soil conditions and derived geotechnical parameters at:

Newark Showground,
Coddington,
Newark,
Nottinghamshire,
NG24 2NY

All test locations were provided by the client. A site map is included in the end of Appendix A of this report (if provided by the client). The tests were stopped when they reached the target depth as per the client's technical specifications or for other technical reasons, as detailed in the *Project Summary Table* in *Appendix A.1* and on each CPTU log included in Appendix B of this report.

The fieldwork was carried out from 19th January 2023 to 25th January 2023 as per the client's request.

The work on site and the final factual reporting have been undertaken in accordance with the international technical standard *ISO 22476-1:2021(E)*.

2.0 FIELDWORK

2.1 CONE PENETRATION TESTS

The fieldwork activity is summarised in Table 2.1.

Table 2.1 Fieldwork Summary	
CPT Operator/s	Callum Murray & Josh Cogle
Date Started	19 th January 2023
Date Finished	25 th January 2023
In Situ S.I. Project Manager	Darren Ward
Main Contractor's Site Manager	David Pond

2.1.1 Rig Information

Details of CPTU rig used in this project are shown in Table 2.2. Full data sheet for the rig is presented in *Appendix A.2*.

Table 2.2 Rig Summary	
Rig Name	Rig Description
CPT006	14 Tonne Track Mounted CPT Rig

2.1.2 CPTU Cone

Details of electric CPTU cone (Type TE2) used in this project conforming to the requirements of Application Class 2 of *ISO 22476-1:2021*, are shown in Table 2.3.

Table 2.3 Cone Summary		
Number	Cross-section area	Filter position
S15-CFIP.1488	15cm ²	U ₂
S15-CFIP.2089	15cm ²	U ₂
DP15-CFPTxy.71212	15cm ²	U ₂

A full datasheet of the cone used is shown in *Appendix A.3*.

The cone's measured parameters are shown in Table 2.4.

Table 2.4 Completed Fieldwork Summary

12 CPTU to a maximum depth of 11.75m. Each test measured Cone Resistance, q_c , Sleeve Friction, f_s , Porewater Pressure in the shoulder position, u_2 , Inclination in X and Y axes.

2 Seismic tests to a maximum depth of xxm. Each SCPT test measured Shear Wave Velocity, V_s .

Provision of factual report with estimated soil type, derived geotechnical parameters & AGS data file.

2.1.3 CPTU Cone Calibration

The cone resistance and sleeve friction are recorded by calibrated load cells in the cone. The CPTU load cells and pressure transducers are regularly calibrated in line with *ISO 22476-1:2021(E)* standard by the cone manufacturer. The cone calibration certificate for the cone used at this site are presented in *Appendix A.4*.

2.1.4 CPTU Cone Saturation

The pore water pressure is recorded using a calibrated pressure transducer located in the piezocone. To ensure pore water pressure measurements are not affected by the presence of air in the measuring transducer, a de-airing procedure is carried out prior to each test. The cone and filter are saturated using a glycerine fluid with a viscosity of 10,000 CST.

2.1.5 Test Procedure

The tests are carried out in accordance with the *International Standard for Electrical Cone and Piezocone Penetration Test ISO 22476-1:2021(E)*.

The final depths of the tests were determined by either completion to the specified test depth or when the maximal safe capacity of the equipment was reached. A schedule of the tests performed is shown in *Appendix A.1*, which has been compiled from the operators' daily progress reports.

The data is transmitted from the digital CPTU through an umbilical cable that runs through the push rods to the data acquisition system. Results are displayed instantaneously on the computer logging screen. The results are recorded on the computer hard disc.

The rate of penetration is kept constant at 20 mm/s \pm 5 mm/s except when penetrating very dense or hard strata. Before each test is carried out zero values are taken of the cone to check if it is within calibration. At the end of each test, zero values are taken again to see if there has been any drift during the test. These values are inspected during the post processing stage. This is a quality check on the data and the testing procedure. Individual test zero values are shown on their corresponding test results in *Appendix B*.

2.1.6 *In Situ Pore Pressure (u_0)*

The in situ or hydrostatic pore pressure is required for the calculation of several derived parameters included in this report. For this report, the groundwater level is assumed at 0.5m below ground surface, for calculation purposes. The in situ pore pressure, u_0 values are presented on the pore pressure plot, on *CPT Log 01*, which is included in *Appendix B*.

2.2 POSITIONING

Positioning and surveying of all investigated locations was the responsibility of the client.

2.3 SEISMIC TESTS S WAVE PROCEDURE

The SDMT is a seismic module for recording seismic waves in the soil to evaluate shear wave velocity, V_s . The device is equipped with two geophone receivers with a vertical offset of 0.50 m, which records the shear wave generated at surface. The instrument may be combined with a DMT blade, a dummy cone or a CPT probe.

The S-wave is usually generated with a hammer striking in the horizontal direction a shear beam, which must be vertically pressed downwards to ensure good coupling with the soil. The longitudinal axis of the shear beam must be parallel to the axis of the sensors, to maximize sensitivity to the generated shear wave, as shown in Figure 2.1. The shear wave velocity, V_s is the ratio between the difference of the distances between the centre of the shear beam to each receiver, $S_2 - S_1$ and the delay time, Δt of the wave arrival to upper and lower receivers.

The dual sensor configuration enables true Interval interpretation of the shear wave velocity, comparing the traces of the same generated wave recorded by each receiver. In addition, two independent pseudo Interval interpretations of V_s are possible, considering the traces of each of the two receivers with depth.

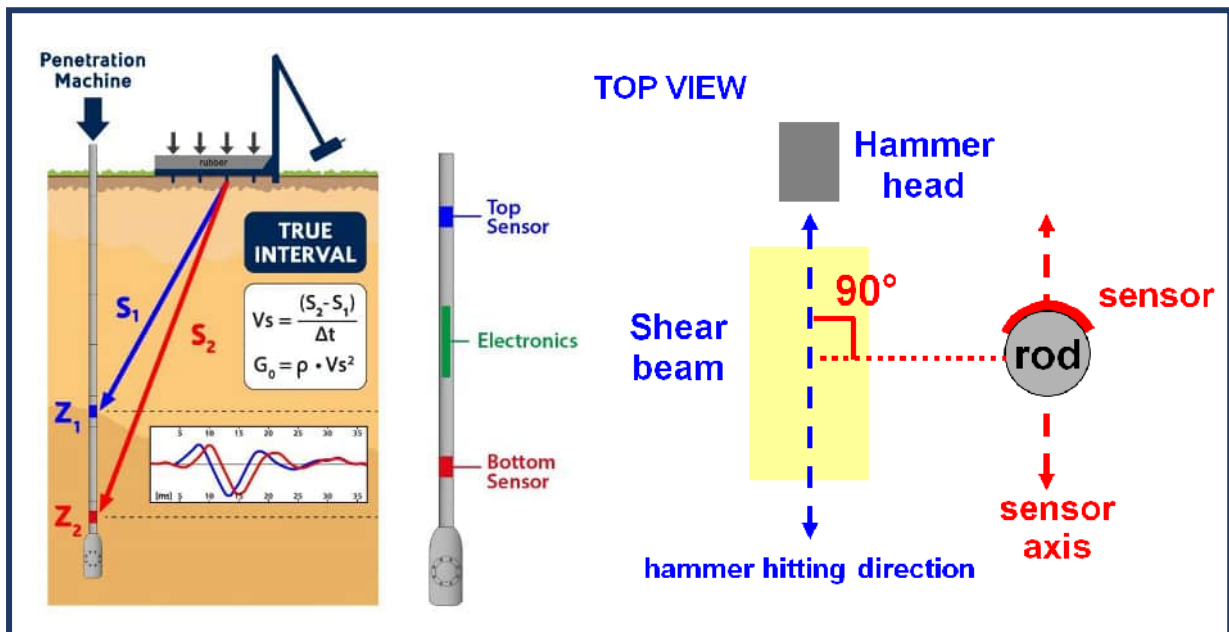


Figure 2.1: SDMT set up (after Marchetti D., 2022)

Once collected the V_s is calculates by re-phasing the S2 wave over the S1 wave as shown in Figure 2.2.

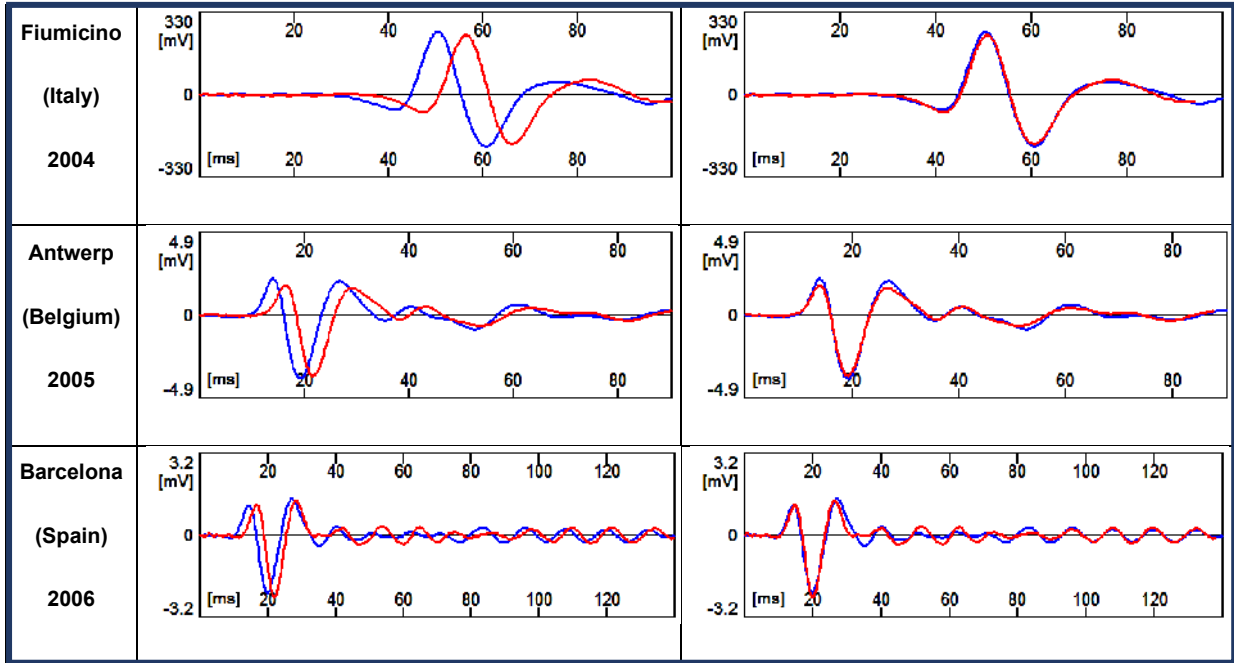


Figure 2.2: Vs wave re-phasing.

The maximum shear modulus, G_0 is calculated directly from the measured shear wave velocities on site, using the equation from Elastic Theory:

$$G_0 = \rho V_s^2$$

where

ρ is mass density of the soil, estimated based on *Marchetti & Crapps, 1981* chart.

V_s and G_0 results are presented alongside the CPT results in the Seismic Log in *Appendix B*.

All seismogram data and tabular data are presented in *Appendix C*.

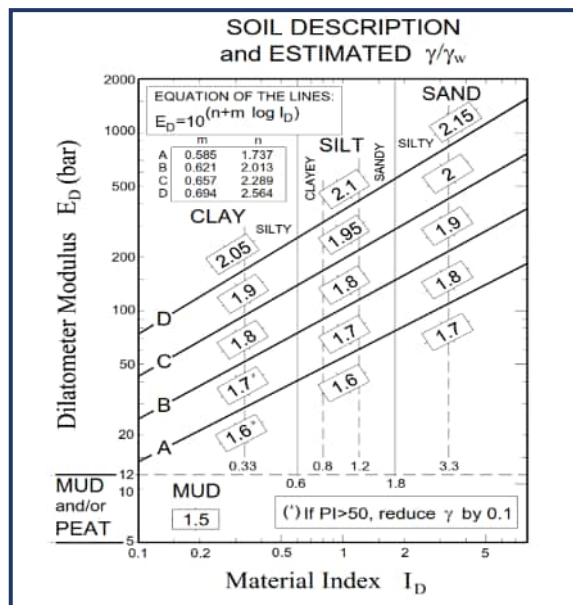


Figure 2.3: Soil estimated unit weight after *Marchetti & Crapps, 1981*

3.0 CONE PENETRATION MEASURED PARAMETERS

All measured parameters of tests carried with the CPTU cone are shown in *Appendix B* and all the information about data processing and results are given in sections 3.1, 3.2 and 3.3.

3.1 DATA PROCESSING

The measured parameters, cone end resistance, q_c , sleeve friction, f_s , porewater pressure measurements with filter in shoulder position, u_2 and inclination for x and y axis, l_x , l_y , were recorded for every 10 mm of penetration keeping a constant speed of 20 mm/s \pm 5 mm/s, which may slightly change when the cone is penetrating hard strata.

The measured data from the site works is processed and presented using specialised CPT software. The interpretations on the CPTU results were carried out following the recommendations of *ISO 22476-1:2021(E)*, *Lunne et al. (1997)* and *Robertson (2015)*. Measured parameters, mentioned in *Sections 3.2* and *3.3*, were used to derive all the geotechnical parameters, which are presented in *Chapter 4.0*. The soil behaviour type method used on this report is *Robertson et al. (1986)*, shown in *Figure 3.2*.

3.1.1 Zero Measurements

Before and after each CPTU test, zero measurements are recorded for each channel of the cone. The zero measurements are presented on the logs in *Appendix B*. This is a routine quality check carried out on site.

3.2 MEASURED PARAMETERS

3.2.1 Cone Resistance (q_c)

Cone resistance, q_c , is measured as the total force acting on the cone, divided by the projected area of the cone. The results are presented in MPa, on *CPT Log 01*, in *Appendix B*, scale 0-20 MPa with a minor scale printing on the same graph at 0-4 MPa.

3.2.2 Sleeve Friction (f_s)

Sleeve friction, f_s , is measured as the total frictional force acting on the friction sleeve divided by its surface area. The results are presented in kPa, on *CPT Log 01*, in *Appendix B*, using a scale of 0-500 kPa.

3.2.3 Porewater pressure (u_2)

The pore pressure, u_2 , is measured during the test. If the material is free draining and saturation is maintained it will normally measure hydrostatic pore pressure. In materials that are not free draining, it will record the total pore pressure (hydrostatic plus any excess pore pressures generated) created by the cone penetration through this material.

The filter element can be mounted in one of three positions. For all tests carried out in this project the filter was mounted in the u_2 position (see *Figure 3.1*).

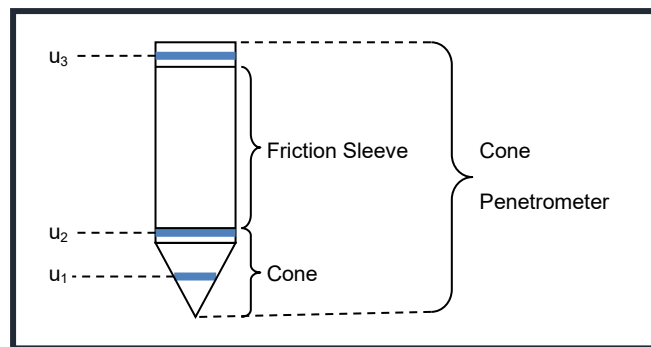


Figure 3.1: Diagram showing pore pressure filter locations (after Lunne et al., 1997)

3.2.4 Inclination (I_x, I_y)

The CPT rig was set up to obtain a thrust direction as near as possible to vertical. The CPTU cones have inclinometers incorporated to measure the non-verticality of the test. For test depths less than 15 m, significant non-verticality is unusual, provided the initial thrust direction is vertical.

3.3 ESTIMATED SOIL BEHAVIOUR TYPE

3.3.1 Friction Ratio (R_f)

The friction ratio, R_f is the ratio between the sleeve friction and the cone resistance (Lunne et al., 1997).

$$\text{Friction Ratio } (R_f) = \left(\frac{\text{Sleeve Friction } (f_s)}{\text{Cone Resistance } (q_c)} \right) \times 100$$

3.3.2 Estimated Soil Behaviour Type (SBT)

The estimation of soil behaviour type, *SBT*, using measurements of cone resistance and sleeve friction is based upon the variations of the friction ratio and cone resistance. The friction

ratio varies depending upon whether the soil is cohesive or granular. The cone resistance varies depending on the strength and densities of the soil.

The interpretation used in this report is *Robertson et al. (1986)*, which is shown in Figure 3.2. The results are presented on *CPT Log 01*, in *Appendix B*.

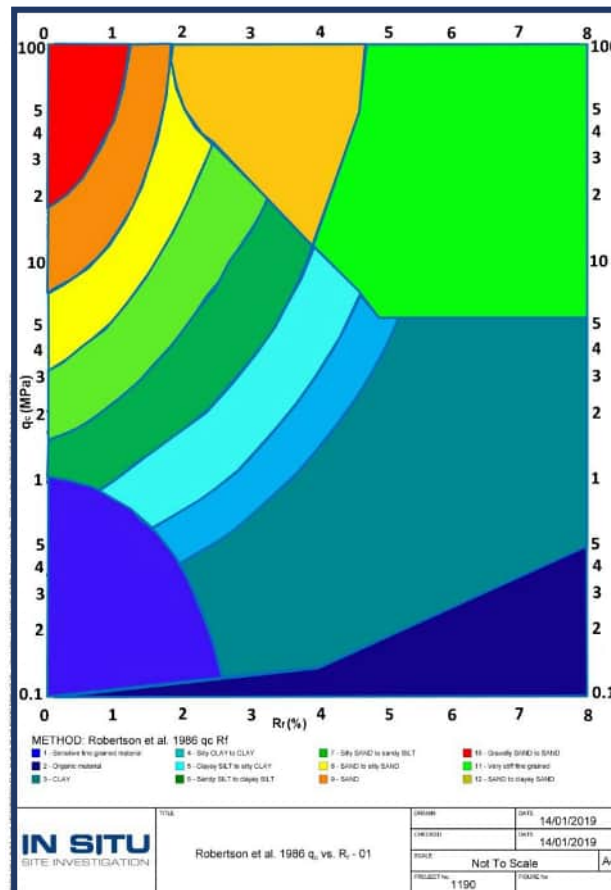


Figure 3.2: Robertson et al., 1986 soil behaviour type chart.

3.3.3 Pore Pressure Ratio (B_q)

Pore pressure ratio, B_q is the ratio between the measured pore pressure generated during penetration and the corrected cone resistance minus the total overburden stress.

Pore pressure ratio as defined by *Senneset and Janbu (1985)* is defined as:

$$B_q = \frac{u_2 - u_0}{q_t - \sigma_{vo}}$$

where

- u_2 is pore pressure measured between the cone and the friction sleeve
- u_0 is equilibrium pore pressure
- σ_{vo} is total overburden stress
- q_t is cone resistance corrected for unequal end area effects

3.4 APPLIED CORRECTIONS

3.4.1 Corrected Cone Resistance (q_t)

For each penetration test, the measured cone resistance, q_c , can be corrected for the “unequal area effect” due to the influence of the ambient pore water pressure acting on the cone.

The correction has been applied using the following equation by Lunne et al., 1997:

$$q_t = q_c + [u_2 \cdot (1 - \alpha)]$$

where

α is the cone area ratio

The cone area ratio used for this project is stated on both the cone calibration certificate and the data footer. This value is geometrically measured.

3.4.2 Depth Correction

All tests in the report have been corrected for depth difference caused by inclination. This has been calculated using the method described in *ISO 22476-1:2021*.

To calculate the corrected depth the following formula is used:

$$z = \int_0^l C_{inc} \cdot dl$$

where

z is penetration depth, in m

l is penetration length, in m

C_{inc} is correction factor for the effect of the inclination of the CPTU relative to the vertical axis.

The equation for calculating the correction factor for the influence of the inclination for a bi-axial inclinometer is:

$$C_{inc} = \frac{1}{\sqrt{(1 + \tan^2 \beta_1 + \tan^2 \beta_2)}}$$

where

β_1 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees

β_2 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1 , in degrees

4.0 GEOTECHNICAL DERIVED PARAMETERS

A number of empirical correlations can be used to derive geotechnical parameters from CPTU data. This report includes only the parameters which are described in this chapter. The results of all correlations used to obtain the geotechnical derived parameters are presented on *CPT Log 02* and *CPT Log 03* in *Appendix B*.

Please, note that each empirical correlation is derived for a certain type of soil, and may not be appropriate for all the soil types encountered on this project.

4.1 SOIL BEHAVIOUR TYPE INDEX (I_c)

The soil behaviour type index, I_c , was derived by *Jefferies and Davies (1991)*, and was created to simplify the application of CPTU SBT chart shown in *Chapter 3, Figure 3.2*. This approach has been modified for use with the *Robertson (1990)* normalised CPT soil classification chart, *Figure 4.1*. The normalised cone parameters Q_t and F_r (for definitions see *Appendix A5 Symbol List*) can be combined into one Soil Behaviour Type Index, I_c , (*Lunne et al., 1997*).

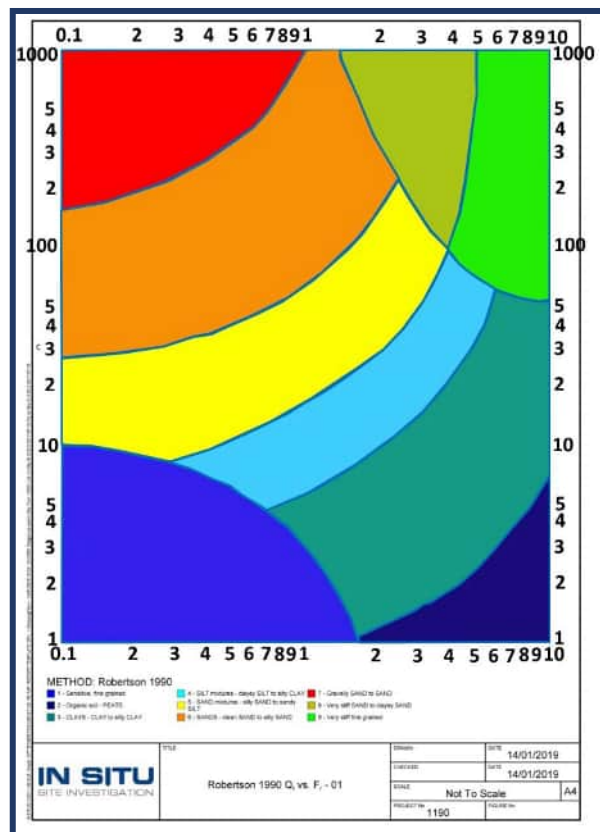


Figure 4.1: Robertson 1990 soil behaviour type chart.

The soil behaviour type index, I_c , can then be defined using *Robertson (2010)* formula, given below:

$$I_c = ((3.47 - \log Q_t)^2 + (\log F_r + 1.22)^2)^{0.5}$$

where

Q_t is the normalized cone resistance which represents the simple normalization with a stress exponent (n) of 1.0, which applies well to clay-like soils

F_R is the normalized friction ratio, in %

The boundaries of soil behaviour type are then given in terms of the index, I_c , presented in *Table 4.1* below.

The soils behaviour type index does not apply to zones 1, 8 and 9. The profiles of I_c provide a simple guide to the continuous variation of soil behaviour type in a given soil profile based on CPTU results, with a reliability greater than 80% compared with soil samples (*Robertson, 2015*).

Zone	Soil Behaviour Type	I_c
1	Sensitive fine grained	N/A
2	Organic Soils – clay	>3.6
3	Clays – silty clay to clay	2.95 – 3.6
4	Silt mixtures – clayey silt to silty clay	2.60 – 2.95
5	Sand mixtures – silty sand to sandy silt	2.05 – 2.6
6	Sands – clean sand to silty sand	1.31 – 2.05
7	Gravelly sand to dense sand	<1.31
8	Very stiff sand to clayey sand*	N/A
9	Very stiff fine grained *	N/A

* Heavily over consolidated or cemented

Table 4.1: Normalized CPTU Soil Behaviour Type (SBT_n) Index values, I_c . (*Robertson, 2010*)

4.2 N VALUE OF STANDARD PENETRATION TEST (SPT) (N_{60})

The derived N value of SPT, N_{60} , is strongly and directly related to the cone resistance, q_c .

In this report the N_{60} value is derived using the following correlations, developed by *Robertson and Wride (1998)*, *Jefferies and Davies (1998)* and *Robertson (2012)*:

- 1) *Robertson & Wride (1998)*

$$N_{60} = \frac{q_c}{8.5 \cdot p_a \left(1 - \frac{I_c}{4.6}\right)}$$

- 2) *Jefferies and Davies (1993)*

$$N_{60} = \frac{q_c}{0.85 \cdot \left(1 - \frac{I_c}{4.75}\right)}$$

- 3) *Robertson (2012)*

$$N_{60} = \frac{\frac{q_c}{p_a}}{10^{1.1268 - 0.2817I_c}}$$

where

- q_c is the cone resistance
- p_a is the atmospheric pressure equal to 100 kPa
- I_c is the soil behaviour type index calculated as given in *section 4.1*

It is suggested that these methods provide a better estimation of the N_{60} value than the actual measured N , due to the poor repeatability of SPT test. However, in fine grained soil with high sensitivity these methods may overestimate N_{60} (*Jefferies and Davies, 1991*). The third method suggested by *Robertson (2012)* provides improved estimates of N_{60} for insensitive clays.

4.3 RELATIVE DENSITY (D_r)

Relative density, D_r , is an intermediate parameter for coarse grained soils, widely used to describe sand deposits. All the research on deriving the relative density from CPTU tests results are carried out for **clean predominantly quartz sands**. The studies have shown that CPTU resistance in granular soils is controlled by sand relative density, in situ effective stresses and compressibility. The more compressible sands tend to give lower penetration resistance for a given relative density than less compressible sands.

In this report relative density is calculated using the methods suggested by *Baldi et al., (1986)*, *Jamiolkowski et al., (2001)* and *Kulhawy and Mayne (1990)* as shown in the equations below:

1) Baldi et al., (1986)

$$D_r = \frac{1}{C_2} \cdot \ln \left(\frac{q_c \cdot Wehr}{C_1 \cdot (\sigma'_{v0})^{0.55}} \right) \cdot 100$$

where

C_1 is a consolidation coefficient which is 157 for normally consolidated soils and 181 for over consolidated soils

C_2 is a consolidation coefficient which is 2.41 for normally consolidated soils and 2.46 for over consolidated soils

Wehr is a correction coefficient for calcareous soils

2) Jamiolkowski et al., (2001)

$$D_r = 100 \cdot \left[0.268 \cdot \ln \left(\frac{q_t / \sigma_{atm}}{\sqrt{\sigma'_{v0} / \sigma_{atm}}} \right) + C_1 \right]$$

where

C_1 is a compressibility coefficient which is -0.675 for average compressible soils, ≤ 1.0 for high compressible soils and carbonate or calcareous sands and ≥ -2.0 for low compressible soils

q_t is corrected cone resistance

σ_{atm} is the atmospheric pressure

3) Kulhawy and Mayne, (1990)

$$D_r = \left[\frac{q_{c1}}{305 \cdot C_1 \cdot OCR^{0.18} \cdot (1.2 + 0.05 \cdot \log(t/100))} \right]^{0.5} \cdot 100$$

where

q_{c1} is the cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{c1} = \frac{q_c}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

C_1 is a compressibility coefficient which is -0.91 for low compressible sands, 1.0 for medium compressible sands and 1.09 for high compressible sands

t is time in years

4.4 FRICTION ANGLE (ϕ')

Friction angle, ϕ' , is used to express the shear strength of uncemented, coarse grained soils. In this report friction angle is derived by the correlations of *Mayne and Campanella (2005)*, *Robertson and Campanella (1983)* and *Kulhawy and Mayne (1990)*.

- 1) Mayne and Campanella, (2005)

$$\phi' = 29.5^{\circ} \cdot B_q^{0.121} \cdot [0.256 + 0.336 \cdot B_q + \log Q_t]$$

where

B_q is the pore pressure ratio, calculated as in Session 3.3

Q_t is the normalized cone resistance

- 2) Robertson and Campanella, (1983)

$$\phi' = \tan^{-1} \left(0.1 + 0.38 \cdot \log \left(\frac{q_t}{\sigma'_{v0}} \right) \right)$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

- 3) Kulhawy and Mayne, (1990)

$$\phi' = 17.6^{\circ} + 11.0^{\circ} \cdot \log(q_{t1})$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

The method suggested by *Mayne and Campanella (2005)* will not provide reliable results for heavily over consolidated soils, fissured geomaterials and highly cemented or structures clays. This approach gives reliable results when pore pressure is positive and varies $0.1 < B_q < 1.0$. The correlation suggested by *Robertson and Campanella (1983)* estimates the peak friction angle for uncemented, unaged, moderately compressible, predominately quartz sands. For sands of higher compressibility, the method will tend to predict low friction angles. The method suggested by *Kulhawy and Mayne (1990)* is an alternate relationship for clean, rounded, uncemented, quartz sands.

4.5 FINES CONTENT (FC)

The fines content, FC , in this report is estimated using two different methods, one from *Robertson and Wride (1998)* and the other, *Suzuki et al. (1998)* as presented below:

- 1) Robertson and Wride (1998)

$$I_c < 1.26: FC = 0$$

$$1.26 \leq I_c \leq 3.5: FC(\%) = 1.75I_c^{3.25} - 3.7$$

$$3.5 < I_c: FC = 100\%$$

- 2) Suzuki et al. (1998)

$$FC(\%) = 2.8I_c^{2.6}$$

where

I_c is the soil behaviour type index, calculated as in section 4.1

4.6 UNDRAINED SHEAR STRENGTH (s_u)

Estimation of undrained shear strength, s_u , from CPTU tests using corrected cone resistance is carried out using the following correlation from *Lunne et al. (1981)*:

$$S_u = \frac{(q_t - \sigma_{v0})}{N_{kt}}$$

where

N_{kt} is the empirical cone factor, which varies from 10 (6 for very soft sensitive fine grained soils) to 20. In this report 3 values are considered: 15, 17.5 and 20. N_{kt} tends to increase with increasing plasticity and decrease with increasing soil sensitivity. It decreases as B_q increases. (*Lunne et al., 1997*)

σ_{v0} = total overburden stress.

This report only presents the undrained shear strength data on soils with soil behaviour type index, I_c values greater than 2.60.

The value of undrained shear strength, s_u to be used in analysis depends on the design problem. In general, the simple shear in the direction of loading often represents the average undrained strength. For larger, moderate to high risk projects, where high quality field and laboratory data may be available, site specific correlations should be developed based on appropriate and reliable values of s_u .

4.7 SENSITIVITY (S_t)

The sensitivity, S_t of clays is defined as the ratio of undisturbed peak undrained shear strength to totally remoulded undrained shear strength.

In this report S_t is calculated using two correlations developed by *Schmertmann (1978)* and *Mayne (2007)*.

- 1) Schmertmann (1978)

$$S_t = \frac{s_u}{s_{u(rem)}} = \frac{q_t - \sigma_v}{N_{kt}} \left(\frac{1}{f_s} \right)$$

where

$s_{u(rem)}$ is the remoulded undrained shear strength. It can be assumed equal to the sleeve resistance, f_s .

- 2) Mayne (2007)

$$S_t = \frac{0.073 \cdot (q_t - \sigma_{v0})}{f_s}$$

For relatively sensitive clays, $S_t > 10$, the value of f_s can be very low and not very accurate, hence the estimate of sensitivity should be used as a guide only.

4.8 SOIL UNIT WEIGHT (γ)

Soil unit weight, γ in this report is calculated by using one method for sands, considered under dry conditions and two methods for clays, considered under saturated conditions. These relationships are developed by *Mayne (2007)* and the equations are presented below:

Dry unit weight for sands:

$$\gamma_{dry} = 1.89 \cdot \log(q_{t1}) + 11.82$$

Saturated unit weight for clays method 1

$$\gamma_{sat} = 8.32 \cdot \log(V_s) - 1.61 \cdot \log(z)$$

Saturated unit for clays method 2

$$\gamma_{sat} = 2.60 \cdot \log(f_s) + 15 \cdot G_s - 26.5$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula:

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

z is the depth

V_s is the shear wave velocity, calculated as $V_s = 118.8 \cdot \log(f_s) + 18.5$
 G_s is the specific gravity of solids, typically between 2.40 and 2.90

4.9 STATE PARAMETER (ψ)

The state parameter, ψ is defined as the difference between the current void ratio, e and the void ratio at critical state e_{cs} , at the same mean effective stress for granular soils.

The problem of evaluating the state parameter from CPTU response is complex and depends on several soil parameters, including shear stiffness, shear strength, compressibility and plastic hardening. (*Jefferies and Been, 2006*)

In this report, the state parameter is calculated based on five methods as follows:

1) Been et al. (1987)

$$\psi = -\frac{\ln\left(\frac{Q_p}{k}\right)}{m}$$

$$Q_p = \left(\frac{3Q_t}{1 + 2K_0}\right)$$

where

Q_t is the normalized cone resistance
 K_0 is the coefficient of lateral earth pressure

2) Shuttle and Jefferies (1998)

$$\psi = -\frac{\ln\left(\frac{Q_p}{k}\right)}{m}$$

where

$$k = \left((3.79 + 1.12\ln(I_r))(1 + 1.06(M - 1.25))(1 - 0.30(N - 0.2))(H/1000)^{0.326}(-1.55(\lambda - 0.01))\right)^{1.45}$$

$$m = 1.45(1.04 + 0.46\ln(I_r))(1 - 0.4(M - 1.25))(1 - 0.30(N - 0.2))(H/100)^{0.15}(1 - 2.21(\lambda - 0.01))$$

where

Q_t is the normalised cone resistance
 I_r is rigidity index
 K_0 is the coefficient of lateral earth pressure
 M is critical state ratio
 N is dilation parameter
 H is plastic hardening modulus;
 λ is slope CSL line

3) Shuttle and Jefferies (1998)

The state parameter calculated according this third method is similar to state parameter calculated as presented in the second method, except for the rigidity index that is calculated as follows:

$$I_r = I_{r100} \left(\frac{P_a}{\sigma'_{v0}} \right)^{0.5}$$

where

I_{r100} is rigidity index in reference pressure
 P_a is the reference pressure equal to 100 kPa
 σ'_{v0} is effective vertical overburden stress

4) Plewes (1992)

$$\psi = - \frac{\ln \left(\frac{Q_p / (1 - B_q)}{k'} \right)}{m'}$$

where

$$k' = M \left(3 + \frac{0.85}{\lambda} \right)$$

$$m' = 11.9 - 13.3\lambda$$

$$\lambda = \frac{F_r}{10}$$

where

Q_t is the normalised cone resistance
 B_q is pore pressure ratio
 K_0 is the coefficient of lateral earth pressure
 F_R is normalised friction ratio
 M is critical state ration

5) Been and Jefferies (1992)

$$\psi = - \frac{\ln \left(\frac{Q_p / (1 - B_q)}{k'} \right)}{m'}$$

where

$$k' = M \left(3 + \frac{0.85}{\lambda} \right)$$

$$m' = 11.9 - 13.3\lambda$$

$$\lambda = \frac{1}{34 - 10I_c}$$

For high-risk projects a detailed interpretation of CPTU results using laboratory results and numerical modelling can be appropriate (e.g. *Shuttle and Cunning, 2007*), although soil

variability can complicate the interpretation procedure. For low risk projects and in the initial screening for high-risk projects there is a need for a simple estimate of soil state.

Plewes et al (1991) provided a mean to estimate soil state using the normalised soil behaviour type, *SBT_n* chart suggested by *Jefferies and Davies (1991)*. *Jefferies and Been (2006)* suggested that soils with a state parameter less than -0.05 are dilative at large strains.

4.10 IN SITU STRESS RATIO (K_0)

There are various estimations to determine in situ stress ratio, K_0 , from CPTU in fine grained soils. In this report the methods suggested by *Mayne (2007)* and *Kulhawy and Mayne (1990)* are used, as given below:

- 1) Mayne (2007)

$$K_0 = (1 - \sin\phi')OCR^{\sin\phi'}$$

$$\text{Max } K_0 = K_p = \frac{(1 + \sin\phi')}{(1 - \sin\phi')}$$

$$K_0 = 0.192\left(\frac{q_t}{\sigma_{atm}}\right)^{0.22}\left(\frac{\sigma_{atm}}{\sigma_{v0}}\right)^{0.22}OCR^{0.27}$$

where

OCR is the overconsolidation ratio, calculated as presented in session 4.12

- 2) Kulhawy and Mayne (1990)

$$K_0 = 0.1\left(\frac{q_t - \sigma_{v0}}{\sigma_{v0}'}\right)$$

These approaches are generally limited to mechanically overconsolidated, fine grained soils. As considerable scatter exists in the database used for these correlations, in moderate to high risk projects further tests should be performed and these correlations must be considered only as a guide.

4.11 OVERCONSOLIDATION RATIO (OCR)

Overconsolidation ratio, *OCR* is defined as the ratio of the maximum past effective consolidation stress and the present effective overburden stress:

$$OCR = \frac{\sigma'_p}{\sigma'_{v0}}$$

This definition is appropriate for mechanically overconsolidated soils, where the only change has been the removal of overburden stress. For cemented and aged soils, the *OCR* may represent the ratio of the yield stress and the present effective overburden stress.

In this report σ'_p is calculated based on six methods as presented below:

- 1) Mayne (1995)

$$\sigma'_p = 0.33(q_t - \sigma_{v0})$$

- 2) Chen and Mayne (1996)

$$\sigma'_p = 0.53\Delta u$$

- 3) Mayne (2005)

$$\sigma'_p = 0.6(q_t - u_2)$$

- 4) Robertson (2009)

$$\sigma'_p = 0.25(Q_t^{1.25} - \sigma'_{v0})$$

- 5) Mayne (2005)

$$\sigma'_p = \left[\frac{0.192 \left(\frac{q_t}{\sigma_{atm}} \right)^{0.125}}{(1 - \sin\phi') \left(\frac{\sigma'_{v0}}{\sigma_{atm}} \right)^{0.31}} \right]^{\left(\frac{1}{\sin\phi' - 0.27} \right)} \sigma'_{v0}$$

- 6) Mayne (2007)

$$\sigma'_p = 0.101 \sigma_{atm}^{0.102} (G_0)^{0.478} \sigma'_{v0}{}^{0.420}$$

For larger, moderate to high risk projects, where additional high-quality field and laboratory data may be available, site specific correlations should be developed based in consistent and relevant values of *OCR*.

4.12 SMALL STRAIN YOUNG'S MODULUS (E_0)

Deriving small strain undrained Young's modulus, E_0 , from CPTU is difficult. There is insufficient data available to make a direct correlation and it is recommended that c_u should be derived, then E_U estimated as a rough order of value from one of the available correlations between E_U and c_u (Meigh, 1987).

In this report the small strain Young's modulus is derived as follows:

- 1) Defined from elastic theory:

$$E_0 = 2(1 + \nu)G_0$$

where

ν is the Poisson ratio, equal to 0.2

G_0 is the small strain shear modulus calculated by the formula given below:

$$G_0 = 1634 \left(\frac{q_c}{\sqrt{\sigma'_{v0}}} \right)^{-0.75} q_c$$

- 2) Calculated based on the degree of loading, q_c , effective stress and reduction factor

$$E_0 = \alpha q_c$$

where

α is calculated from degree of loading, q_c , effective stress and reduction factor, given in *Figure 4.2*

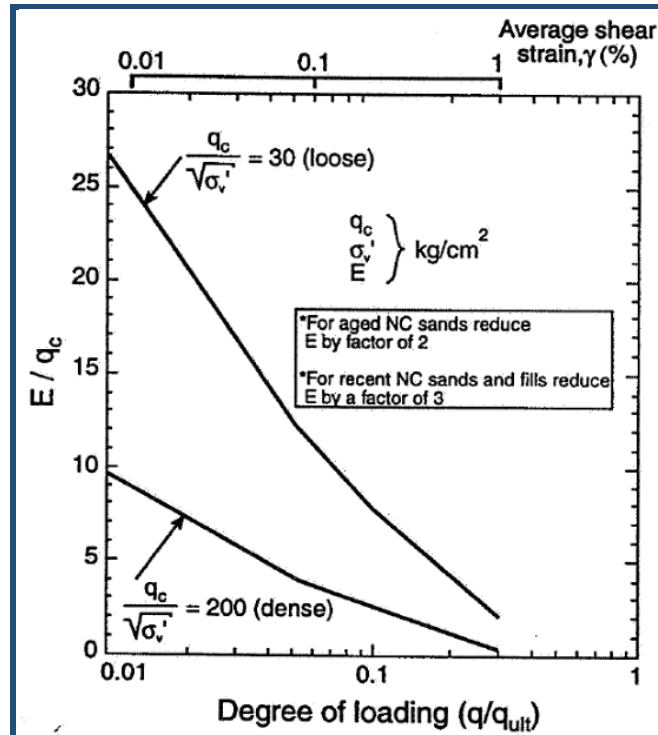


Figure 4.2: Estimation of equivalent Young's modulus for sand based on degree of loading
(Robertson, 1990)

4.13 CONSTRAINED MODULUS (M)

Constrained Modulus, M , can be estimated by CPTU using the following empirical relationship:

$$M = \alpha_M (q_t - \sigma_{v0})$$

where

α_M varies with soil plasticity and natural water content for a wide range of fine-grained soils and organic soils. *Meigh (1987)* suggested that α_M lies in the range of 2 to 8, whereas *Mayne (2001)* suggested the value of 5.

Robertson (2001) suggested that α_M varies with Q_t , such that:

When $I_c > 2.2$ (fine grained soils) use: $\alpha_M = Q_t$ when $Q_t < 14$
 $\alpha_M = 14$ when $Q_t > 14$

When $I_c < 2.2$ (coarse grained soils) use: $\alpha_M = 0.0188[10^{(0.55I_c+1.68)}]$

In this report the Constrained Modulus, M , is calculated after *Kulhawy and Mayne (1990)* using the equation below:

$$M = 8.25(q_t - \sigma_{v0})$$

Also, an alternative method is included in the results, developed by *Burns and Mayne (2002)* using the following relationship:

$$M = 0.02G_0$$

4.13.1 Equivalent Oedometer Coefficient of Compressibility (m_v)

Equivalent oedometer coefficient of compressibility, m_v can be calculated directly by the Constrained Modulus, M , as follows:

$$m_v = \frac{1}{M}$$

4.14 SMALL STRAIN SHEAR MODULUS (G_0)

In this report the small strain shear modulus, G_0 , is calculated from the measured V_s on site as explained in *Section 2.4* (or Elastic Theory) and also derived using the correlation developed by *Rix and Stoke (1992)*.

1) *Rix and Stoke (1992)*

$$G_0 = 1634 \left(\frac{q_c}{\sqrt{\sigma'_{v0}}} \right)^{-0.75} q_c$$

where

q_c is the net cone tip resistance in kPa
 σ'_{v0} is the effective initial vertical stress in kPa
 γ_{bulk} is the bulk density of the soil
 V_s is the shear wave velocity

This correlation of G_0 is applicable to all soil types.

4.15 RIGIDITY INDEX (I_R)

The rigidity index, I_R , for fine grained soils is defined using the following formula, developed by *Mayne (2001)*:

$$I_R = \exp \left[\left(\frac{1.5}{M} + 2.925 \right) \left(\frac{q_t - \sigma_{v0}}{q_t - u_2} \right) - 2.925 \right]$$

where

M is the Cam-Clay constant, slope of the critical state line defined as:

$$M = \frac{6 \sin \phi'}{3 - \sin \phi'}$$

where

ϕ' is the internal friction angle.

The second method used to define the rigidity index, I_R , for fine grained soils is based on plasticity index and overconsolidation ratio, OCR and calculated after the relationship developed by *Keaveny and Mitchell (1986)* as follows:

$$I_R = \frac{\exp (0.0435(137 - PI))}{[1 + \ln\{1 + 0.385(OCR - 1)^{3.2}\}]^{0.8}}$$

where

PI is the plasticity index of the soil, equal to 20.

OCR is the overconsolidation ratio of the soil

A third method to estimate the Rigidity Index is by using the Small Shear Strain Modulus, G_0 from seismic tests and the Undrained Shear Strength, s_u derived from *Lunne et al. (1997)* as explained in *Section 4.6* for cone factor $N_k = 15$, using the correlation below:

$$I_R = \frac{G_0}{s_u}$$

4.16 CONSOLIDATION CHARACTERISTICS (ch and cv)

All results for consolidation characteristics calculated from dissipation tests measurements using the formulas below are presented in *Dissipation Graphs in Appendix B*.

The coefficient of consolidation is interlinked with the hydraulic conductivity through the formula below:

$$c = \frac{kM}{\gamma_w}$$

where

- M is the 1-D constrained modulus relevant to the problem (i.e. unloading, reloading, virgin loading, etc)
- γ_w is the unit weight of water
- k is the hydraulic conductivity

In geotechnical practice it is very difficult to measure *coefficient of consolidation* and *permeability of soils*. Due to soil anisotropy *c* and *k* have different values in the horizontal, c_h and k_h and vertical c_v and k_v directions. The relevant design values depend on drainage and loading direction.

The coefficient of consolidation can be estimated from dissipation data and should be interpreted at 50% degree of dissipation, using the following formula below:

$$c = \left(\frac{T_{50}}{t_{50}}\right)r_0^2$$

where

- T_{50} is theoretical time factor
- t_{50} is measured time for 50% degree of dissipation
- r_0 is penetrometer radius

In soils of very low permeability the time for dissipation can be decreased by using smaller diameter probes. A theoretical solution for these cases is given by *Teh and Houlsby (1991)* and it is compared with data from around the world by *Robertson et al. (1992)*, as shown in *Figure 4.3*.

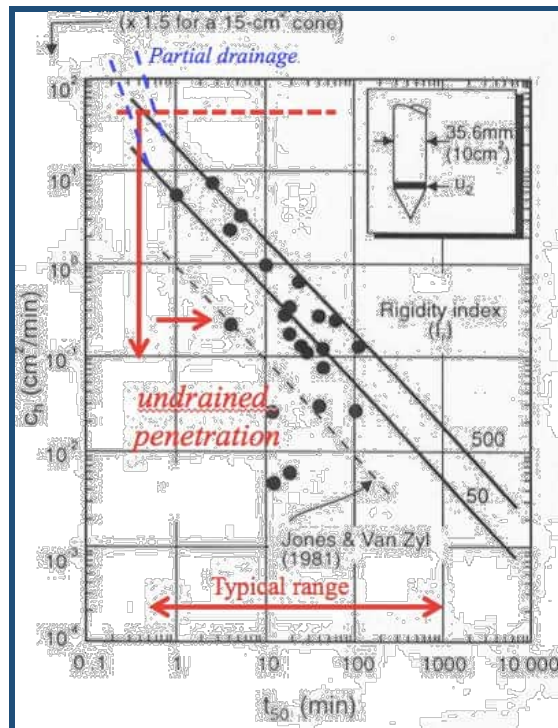


Figure 4.3: Average laboratory c_h values and CPTU results

(after Robertson et al. 1992, Teh and Houlsby theory shown as solid lines for $I_R = 50$ and $I_R = 500$).

c_h estimation is controlled by soil stress history, sensitivity, anisotropy, rigidity index (relative stiffness), fabric and history. In overconsolidated soils, the pore pressure behind the cone tip can be low or negative, results in dissipation data that can initially rise before decreasing to the equilibrium values. Care is required to ensure the dissipation test to end at the right moment of time, not stopped prematurely after the initial rise.

An approximate estimate of the coefficient of consolidation in the vertical direction can be obtained using the ratios of permeability in the horizontal and vertical directions as follows:

$$c_v = c_h \left(\frac{k_v}{k_h} \right)$$

Jamiolkowski et al. (1985) presented the range of field values (Table 4.4), which can be used to estimate k_v from k_h .

Based on the table below, the nature of clay for this site is considered no macrofabric, or only slightly developed macrofabric, essentially homogenous deposits, so the ratio use is k_h/k_v equal to 1.25 and the ratio c_h/c_v used for calculation purposes in this report is equal to 1.25.

Nature of clay	k_h/k_v
No macrofabric, or only slightly developed macrofabric, essentially homogeneous deposits	1 to 1.5
From fairly well to well-developed macrofabric, e.g. sedimentary clays with discontinuous lenses and layers of more permeable material	2 to 4
Varved clays and other deposits containing embedded and more or less continuous permeable layers	3 to 15

Table 4.4: Range of field values of k_h/k_v for soft clays (from Jamiolkowski et al., 1985).

Estimation of soil permeability from CPTU and dissipation data is subject to much uncertainty and should be used as a guide only.

4.17 HYDRAULIC CONDUCTIVITY (k)

Hydraulic conductivity or coefficient of permeability, k , based on Soil Behaviour Type Index, I_c , can be estimated from the following relationships:

When $1.0 < I_c \leq 3.27$ $k = 10^{(0.952 - 3.04I_c)}$
 When $3.27 < I_c \leq 4.0$ $k = 10^{(-4.52 - 1.37I_c)}$

However, in this report the hydraulic conductivity is estimated from 2 soil behaviour classification charts, *Robertson et al. (1986)* and *Robertson et al. (1990)* presented in Table 4.3 and 4.4, respectively.

SBT Zone	Soil Behaviour Type (SBT)	Range of hydraulic conductivity, <i>k</i> (m/s)
1	Sensitive fine grained	3×10^{-9} to 3×10^{-8}
2	Organic soils	1×10^{-8} to 1×10^{-6}
3	Clay	1×10^{-10} to 1×10^{-9}
4	Silty CLAY to CLAY	3×10^{-9} to 1×10^{-8}
5	Clayey SILT to silty CLAY	1×10^{-8} to 1×10^{-7}
6	Sandy SILT to clayey SILT	1×10^{-7} to 1×10^{-6}
7	Silty SAND to sandy SILT	1×10^{-5} to 1×10^{-6}
8	SAND to silty SAND	1×10^{-5} to 1×10^{-4}
9	SAND	1×10^{-4} to 1×10^{-3}
10	Gravelly SAND to SAND	1×10^{-3} to 1
11	Very stiff fine grained	1×10^{-8} to 1×10^{-6}
12	SAND to clayey SAND	3×10^{-7} to 3×10^{-4}

Table 4.3: Estimated soil permeability (*k*) based on SBT chart by Robertson et al. (1986)

SBT Zone	Soil Behaviour Type (SBT)	Range of hydraulic conductivity, <i>k</i> (m/s)
1	Sensitive fine grained	3×10^{-9} to 3×10^{-8}
2	Organic soils	1×10^{-8} to 1×10^{-6}
3	Clay	1×10^{-10} to 1×10^{-9}
4	Silt Mixture	3×10^{-9} to 1×10^{-7}
5	Sand Mixture	1×10^{-7} to 1×10^{-5}
6	Sand	1×10^{-5} to 1×10^{-3}
7	Gravelly sands to dense sands	1×10^{-3} to 1
8	Very stiff sand to clayey sand	1×10^{-8} to 1×10^{-6}
9	Very stiff fine grained	1×10^{-8} to 1×10^{-6}

Table 4.4: Estimated soils' permeability (*k*) based on SBT chart by Robertson et al. (1990).

4.18 DERIVED SHEAR WAVE VELOCITY (V_s)

For the purpose of this project the Shear Wave Velocity is measured as explained in Section 2.4. However, by using various correlations from the literature it is possible to also derive the Shear Wave Velocity, V_s . In this report the derived V_s results generated using Mayne (2006), Hegazy and Mayne (1995), Mayne and Rix (1995) and Baldi et al. (1989) correlations.

- 1) Mayne (2006)

$$V_s = 118.8 \log f_s + 18.5$$

where

f_s is the measured sleeve friction *in kPa*

- 2) Hegazy and Mayne (1995)

$$V_s = (10.1 \log q_t - 11.4)^{1.67} \left(\frac{f_s}{q_t} \cdot 100 \right)^{0.3}$$

where

q_t, f_s are corrected cone resistance and measured sleeve friction, respectively *in kPa*

- 3) Mayne and Rix (1995)

$$V_s = 1.75 (q_t)^{0.627}$$

where

q_t is the corrected cone resistance *in kPa*

- 4) Baldi et al. (1989)

$$V_s = 277 (q_t)^{0.13} (\sigma'_{v0})^{0.13}$$

where

q_t, σ'_{v0} are corrected cone resistance and effective vertical stress, respectively *in kPa*

5.0 CPTU RESULTS APPLICATIONS

5.1 SOIL PROFILING AND APPLICATIONS IN GEOTECHNICAL DESIGN

5.1.1 Soil Behaviour Type

The major applications of CPTU are on *soil behaviour type and soil profiling*. Typically, the cone resistance, q_c is high in sands and low in clays, and the friction ratio, $R_f = f_s/q_t$ is low in sands and high in clays. The CPTU cannot be expected to provide accurate predictions of soil type based on *physical characteristics*, e.g. *grain size distribution*, but provides a guide to the *mechanical characteristics*, including: *strength, stiffness, and compressibility* of the soils, or the *soil behaviour type, SBT*.

The most commonly used CPTU soil behaviour type chart, suggested by *Robertson et al. (1986)* uses the basic CPTU measured parameters of cone resistance, q_c and friction ratio, R_f . The chart is global in nature and can provide reasonable predictions of soil behaviour type for CPTU testing. The expected overlap in some zones is modified in the interpretations of this report somewhat based on previous experience or local knowledge of the site.

Since both the penetration resistance and sleeve resistance increase with depth due to the increase in effective overburden stress, the CPTU data requires normalization for overburden stress for very shallow and/or very deep tests. A popular CPTU soil behaviour chart based on normalized CPTU data is firstly proposed by *Robertson (1990)*. The chart identifies general trends in ground response, such as: *increasing soil density, OCR, age and cementation* for granular soils, and *increasing stress history, OCR and soil sensitivity* for cohesive soils.

A more general normalized CPTU SBT chart, using large strain *soil behaviour* descriptions, proposed by *Robertson (2012)* is shown in *Figure 5.1*.

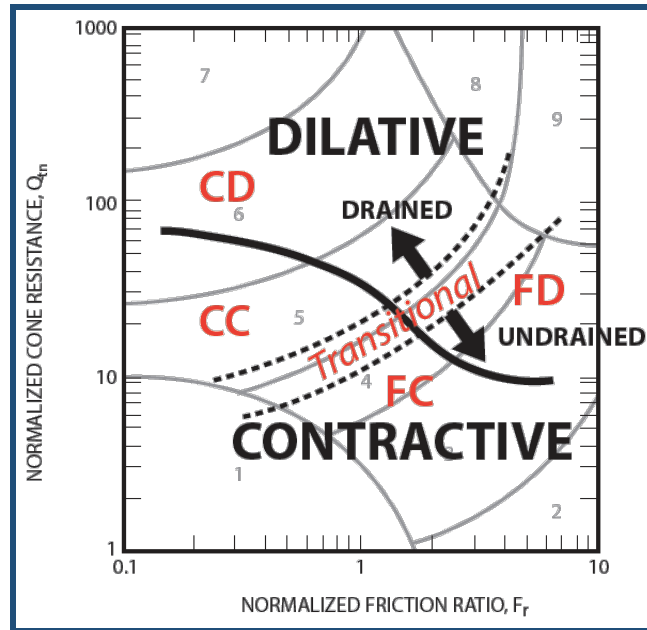


Figure 5.1: Normalized CPTU Soil Behaviour Type (SBT_n) chart, Q_{tn} - F_R using general large strain soil behaviour description (Robertson, 2012).

*

- CD is coarse grained dilative soil-predominately drained CPTU
- CC is coarse grained contractive soil-predominately drained CPTU
- FD is fine grained dilative soil-predominately undrained CPTU
- FC is fine grained contractive soil-predominately undrained CPTU

5.1.2 Soil Profiling

CPTU is an excellent test for soil profiling. The continuous monitoring of pore pressure during the cone penetration improves the soil stratigraphy descriptions. The pore pressure develops in response to the soil type being penetrated in the area where the pore pressure element is located. Soft, firm or stiff clays and contractive silts can show very high pore pressure. Very stiff overconsolidated clays and dilative silts can give very low or negative pore pressures same as very dense silty sands.

The thin layers of sand, or silt in a thick layer of clay, or thin layers of clay or silt in a thick layer of sand are easily distinguished during a CPTU test, which will give a response time sufficiently fast to observe pore pressure changes even in the very thin layers of soils (< 5mm), depending on the response of soil to the advancing of cone.

The sandy soils tend to produce high cone resistance and low friction ratio, whereas soft clayey soils tend to produce low cone resistance and high friction ratio. Organic soils such as peat tend to have very low cone resistance and very high friction ratio. Soils with high horizontal stresses (*high OCR*) tend to have higher cone resistance and friction ratio.

CPTU is an excellent tool to classify the soils based on their behaviour type, and not based on grain size distribution.

The measurement of sleeve friction, f_s is often less reliable than the measurement of cone resistance, q_c (Lunne *et al.*, 1986), but to overpass these problems pore pressure parameter ratio, B_{q_c} , and the classification charts based on it.

For more reliability in soil profiling, the soil interpretations in this report are carried out based on three parameters measured on site, cone resistance, sleeve friction and pore pressure and three derived geotechnical parameters soil behaviour type index for all soils, undrained shear strength for cohesive soils and relative density for granular soils.

Generally, soils that fall in zones 8, 9 and 10 of Robertson *et al.* (1986) chart (6 and 7 of Robertson (1990) chart) represent approximately drained penetration, whereas, soils in zones 1, 2, 3, 4, 5 and 6 of Robertson *et al.* (1986) chart (1, 2, 3 and 4 of Robertson (1990) chart) represent approximately undrained penetration. Soils in zones 7, 11 and 12 of Robertson *et al.* (1986) (5, 8 and 9 of Robertson (1990) chart) may represent partially drained penetration. The classification is often influenced by changes in *stress history, in situ stresses, sensitivity, stiffness, mineralogy, etc.* An advantage of pore pressure measurements during cone penetration is the ability to evaluate drainage conditions more directly. (Lunne *et al.*, 1997)

The information about the rate and manner of excess pore pressures during the dissipations significantly helps the accurate classification in the corresponding depths of dissipation tests. In very stiff, overconsolidated clayey soils, the pore pressure behind the cone is very low and sometimes negative of the equilibrium pore pressure, u_0 , whereas the pore pressure on the face of the cone is very large due to the large increase in normal stresses created by the cone penetration. When penetration is stopped in overconsolidated clays, pore pressure recorded behind the cone may initially increase before decreasing to the equilibrium pore pressure. The rise is caused by local equalization of the high pore pressure gradient around the cone.

Cone penetration in fine grained soils, such as clays and silts, is generally undrained. Cone penetration tests under undrained conditions generate high pore pressure and this reading is extremely useful, because it affects both cone resistance and sleeve friction measurements. These parameters should be corrected using the measured pore pressure.

CPTU in coarse grained soils, such as sandy or gravelly soils is generally drained. In these conditions there is no excess pore pressure generated as a result of cone penetration. Relative density has been used as the main parameter for description of sandy deposits.

5.1.3 Applications in geotechnical design

CPTU measured parameters are used to derive geotechnical parameters, which are the input in several geotechnical analyses. An alternate approach is to directly apply CPTU results to the geotechnical calculations.

As a guide, *Table 5.1* shows a summary of the applicability of CPTU results for direct design applications. The ratings shown in the table have been assigned based on current experience and represent a qualitative evaluation of the confidence level assessed to each design problem and general soil type. Details of ground conditions and project requirements can influence these ratings.

Type of soil	Pile Design	Bearing Capacity	Settlement	Compaction Control	Liquefaction
Sand	A-B	A-B	B-C	A-B	A-B
Clay	A-B	A-B	B-C	C-D	A-B
Intermediate Soils	A-B	B-C	B-C	B-C	A-B

Table 5.1: *Perceived applicability of CPTU for various direct design problems.*

- A is high
- B is high to moderate
- C is moderate
- D is moderate to low

6.0 REFERENCES

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APPENDIX A

APPENDIX A1 – Project Summary Sheet

Piezococone Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Cone Used	Test Remarks
S3CPT06	9.23	19/01/2023	S15-CFIP.2089	Test refused on total pressure.
S3CPT07	8.59	20/01/2023	S15-CFIP.2089	Test refused on total pressure.
S3CPT08	10.38	19/01/2023	S15-CFIP.2089	Test refused on total pressure.
S3CPT09	11.75	20/01/2023	S15-CFIP.2089	Test refused on total pressure.
S3CPT10	5.22	24/01/2023	DP15-CFPTxy.71212	Test stopped due to buckling rods.
S3CPT11	3.16	24/01/2023	DP15-CFPTxy.71212	Test refused on total pressure.
S3CPT19	5.68	25/01/2023	S15-CFIP.1488	Test refused on total pressure.
S3CPT20	5.06	25/01/2023	S15-CFIP.1488	Test refused on total pressure.
S3CPT21	6.22	25/01/2023	S15-CFIP.1488	Test refused on inclination.
S3CPT22	5.33	25/01/2023	S15-CFIP.1488	Test refused on inclination.
S3CPT23	5.06	25/01/2023	S15-CFIP.1488	Test refused on inclination.
S3CPT39	8.63	20/01/2023	S15-CFIP.2089	Test refused on total pressure.

Seismic Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Cone Used	Number of seismic measurements
S3CPT10	4.80	24/01/2023	DP15-CFPTxy.71212	8
S3CPT11	2.70	24/01/2023	DP15-CFPTxy.71212	4

APPENDIX A2 – CPT Rig Datasheet

RIGS

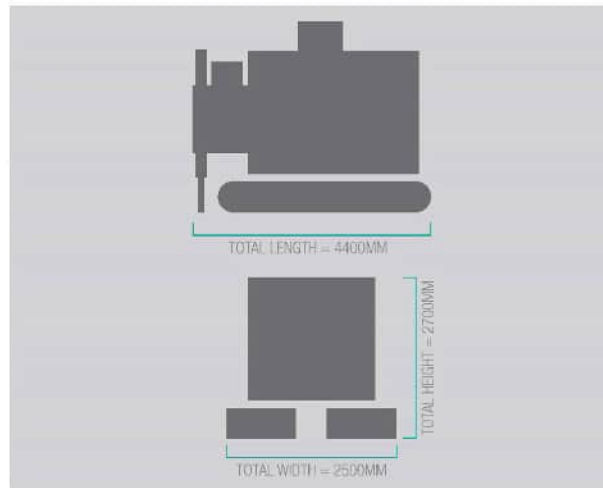
14 TONNE MOUNTED RIGS (CPT005 and CPT006)

We have two 14 tonne track mounted CPT rigs, each weighing 14 tonnes. One of our rigs, CPT005, 'Erik' is based in the Middle East and the other, CPT006, 'Zoe' in the UK. These rigs have low ground bearing pressure and are ideal for soft, boggy sites. They are capable of pushing up to 120 metres a day, depending on access to positions.

CPT RIG DETAILS

TOTAL WEIGHT	14 TONNES
CPT RAM THRUST CAPACITY	20 TONNES
MAXIMUM PENETRATION	20-30M DEPENDING ON THE GROUND CONDITIONS
PERFORMANCE RATES	120M OF TESTING IN A DAY DEPENDING ON ACCESS TO POSITIONS
TYPICAL SITES FOR THIS RIG	SOFT BOGGY SITES. THE RIG HAS LOW GROUND BEARING PRESSURE

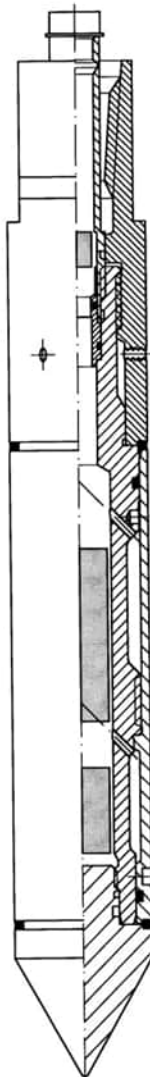
CPT RIG DIMENSIONS



APPENDIX A3 – Cone Datasheet



Rijksstraatweg 22F
2171 AL Sassenheim
Tel. : +31 71 301 92 51
Fax : +31 71 301 92 52
E-mail : info@geopoint.nl
ING bank : 68.23.01.396
Postbank : 5226758
BTW nr. : NL806331677801



SPECIFICATIONS

S15 SERIES

ELECTRICAL CONES

The electronic subtraction cones have been developed to address the durability problems inherent in other cone designs. The unit consists of a single element temperature compensated strain gauge transducer for measuring both cone resistance and local sleeve friction. This design is therefore more robust than a compression type cone. The cone support electronics package is located directly behind the transducer. The precision strain gauge amplifiers and power supply eliminate the effects of cable resistance on the measurements. A standard subtraction cone is capable of measuring simultaneously the following channels: Tip, Local friction, Pore pressure, Temperature and Inclination.

GENERAL SPECIFICATIONS

Cone Tip Section Area	1,500 mm ²
Friction Sleeve Surface	22,500 mm ²
Total Length	325 mm
Weight	4200 g
Power Supply	± 15 VDC, 100 mA.
Output	0 – 10 VDC*
Working Temperature	0 - 60°C
Storage Temperature	- 40 to + 85°C
Connector	Lemo 10 pins (others on request)

TIP RESISTANCE

Range	100/150* kN
Accuracy	0.25 % FS
Maximum Load	150 % of range
Cone Area Ratio	0.75

LOCAL SLEEVE FRICTION

Range	100/150* kN
Accuracy	0.50 % FS
Maximum Load	150 %
Sleeve Area Ratio	1.0 (EA)

PORE PRESSURE

Range	1/2/5/10* MPa
Accuracy	0.5 % FS
Maximum Load	150 % of range

INCLINATION

Range	25 ° (biaxial)
Accuracy	< 2 °

All our equipment complies with the ISSMGE, ASTM, DIN and NEN Standards.

**Other output and voltage ranges available on request. Loadcells may be calibrated for lower ranges.*



Manual: Electric CPT Cone P10-CFPTxy and P15CFPTxy (PIEZOCONE)

All cones are temperature compensated and provided with a built-in precision strain-gauge amplifier. The cone characteristics and available measurement ranges are listed below.

2	Technical Specifications	P10CFPTxy	P15CFPTxy
	Overall length	: 254 mm	307 mm
	Section area of conical tip	: 1,000 mm ²	1,500 mm ²
	Apex angle of conical tip	: 60°	60°
	Surface of friction sleeve	: 15,000 mm ²	22,500 mm ²
	Weight	: 1,480 gr	2,250 gr
	Power supply	: 5 Vdc	5 Vdc
	Analogue signal output	: 0 – 5 Vdc	0 – 5 Vdc
	Digital signal output	: RS-485	RS-485
	Screw thread	: Female GHD-36	Female GHD-44
	Connector	: Gold-plated 10 pins	Gold-plated 10 pins
	Working temperature	: 0 till 60 °C	0 till 60 °C
	Storage temperature	: -40 till 85 °C	-40 till 85 °C
	Cone Resistance (q_C)		
	Available measuring ranges *)	: 0 – 100 MPa	0 – 100 MPa
	Accuracy	: 0.25% of the full scale (FS)	0.25% of the full scale
	Maximum allowable load	: 150% of the measuring range	150% of the range
	Cone area factor	: 0.71	0.75
	Local Sleeve Friction (f_S) + Cone Resistance (q_C)		
	Available measuring ranges *)	: 0 – 100 kN	0 – 150 kN
	Accuracy local sleeve friction	: 0.50% of the full scale (FS)	0.50% of the full scale
	Maximum allowable load	: 150% of the measuring range	150% of the range
	Sleeve area ratio	: 1.0	1.0
	Inclination	(biaxial)	
	Available measuring range	: 0 – 25° (biaxial)	0 – 25° (biaxial)
	Accuracy	: < 0,5°	< 0,5°
	Pore Pressure (p)		
	Available measuring ranges *)	: 0 – 5 MPa (standard)	0 – 5 MPa
	Accuracy	: 0.5% of the full scale (FS)	0.5% of the full scale
	Temperature (T)		
	Available measuring ranges	: 0 – 50 °C	0 – 50 °C

APPENDIX A4 – Cone Calibration Certificate

Eijkelpoint
SoilSolutions

Rijkstraatweg 22F
2171 AL Sassenheim
The Netherlands

T +31 71 301 9251
E info@eijkelpoint.com
I eijkelpoint.com

Cone Calibration Certificate

Certificate: **GS-1488-012**
Instrument Type: Electric Subtraction Cone
Model: S15-CFIP
Serial number: 1488
Calibration date: 02-01-2023
Client: In Situ
Calibrated by: R.van Loon
Calibration instruments
Manufacturer: Hottinger Baldwin Messtechnik GmbH
NMI certificate: 2461165.00501
Calibration conditions
Ambient temperature: 20.8 °C
Atmospheric pressure: 1017 mBar
Cone specifications
Cone base area: 1500 mm²
Load tip resistance (nom.): 100 kN
Friction sleeve area: 22500 mm²
Load tip + local friction (nom.): 100 kN
Load friction sleeve (nom.): 22.5 kN
Load pore pressure (nom.): 2 MPa
Inclination (nom.): +/- 20 °
Temperature compensation (all channels): 0...+40 °C
Maximum overload capacity (all channels): 100 %
Cone area ratio (a): 0.79
Max. Inaccuracy, relative to measurement value: 1.0 %

	Tip:		Sleeve:		Pore Pressure:		Inclinometer:		
	qc in kN	mV	fs in kN	mV	MPa	mV	Degrees	X (mV)	Y (mV)
Zero points:		0364		0310		0205			
	0	0	0	0	0	0	0	2471	2523
	5	0304	5	0311	0.4	1443	-20	0542	0483
	10	0609	10	0625	0.8	2886	20	4417	4570
	15	0912	15	0937	1.2	4314			
	20	1219	20	1252	1.6	5742			
	25	1525	25	1563	2	7165			
	30	1827	30	1877					
	35	2132	35	2189					
	40	2436	40	2502					
	45	2742	45	2814					
	50	3046	50	3126					
	75	4568	75	4687					
	100	6087	100	6246					

Max. error, abs. qc: 35 kPa
Max. error, abs. fs: 2 kPa
Max. error, abs. u2: 10 kPa
Max. error, abs. I: 1 °

This calibration is compliant with Eijkelpoint GeoPoint SoilSolutions internal quality system, internal calibration procedures and meets the requirements of NEN2649, NEN-EN-ISO 22476-1, NORSOK G-001, ISSMFE and ASTM using calibration equipment traceable to (Inter-)National Standards.

Approved by:
Date:



Eijkelpoint GeoPoint SoilSolutions
V.A.T. NO. NL 8584.21.422.B01
Trade Reg. Arnhem no. 70686149

IBAN NL43 RABO 0326 7904 38
BIC: RABONL2U

Cone Calibration Certificate

Certificate: **GS-2089-001**
 Instrument Type: Electric Subtraction Cone
 Model: S15-CFIIP
 Serial number: 2089
 Calibration date: 24-02-2022
 Client: Insitu
 Calibrated by: M.de Bruin
Calibration instruments
 Manufacturer: Hottinger Baldwin Messtechnik GmbH
 NMI certificate: 2461165.00501
Calibration conditions
 Ambient temperature: 23.2 °C
 Atmospheric pressure: 1006 mBar
Cone specifications
 Cone base area: 1500 mm²
 Load tip resistance (nom.): 100 kN
 Friction sleeve area: 22500 mm²
 Load tip + local friction (nom.): 100 kN
 Load friction sleeve (nom.): 22.5 kN
 Load pore pressure (nom.): 2 MPa
 Inclination (nom.): +/- 20 °
 Temperature compensation (all channels): 0...+40 °C
 Maximum overload capacity (all channels): 100 %
 Cone area ratio (a): 0.79
 Max. inaccuracy, relative to measurement value: 1.0 %

	Tip:		Sleeve:		Pore Pressure:		Inclinometer:		
	qc in kN	mV	fs in kN	mV	MPa	mV	Degrees	X (mV)	Y (mV)
Zero points:	0238		0233		0331				
	0	0	0	0	0	0	0	2529	2529
	5	0293	5	0303	0.4	1458	-20	0544	0583
	10	0586	10	0605	0.8	2908	20	4498	4495
	15	0879	15	0906	1.2	4369			
	20	1172	20	1208	1.6	5828			
	25	1464	25	1508	2	7265			
	30	1756	30	1808					
	35	2046	35	2107					
	40	2337	40	2407					
	45	2628	45	2707					
	50	2919	50	3006					
	75	4370	75	4501					
	100	5819	100	5993					

Max. error, abs. qc: 35 kPa
 Max. error, abs. fs: 2 kPa
 Max. error, abs. u2: 10 kPa
 Max. error, abs. I: 1 °

This calibration is compliant with Eijkelkamp GeoPoint SoilSolutions internal quality system, internal calibration procedures and meets the requirements of NEN2649, NEN-EN-ISO 22476-1, NORSOK G-001, ISSMFE and ASTM using calibration equipment traceable to (Inter-)National Standards.

Approved by: B. Koopman
 Date: 24-02-2022

Eijkelkamp GeoPoint SoilSolutions
 V.A.T. NO. NL 8584.21.422.B01
 Trade Reg. Arnhem no. 70686149

IBAN NL43 RABO 0326 7904 38
 BIC: RABONL2U



Gouda Geo-Equipment B.V.
Satellietbaan 8
2181 MH Hillegom
The Netherlands

Tel. + 31 (0)715.318.475
E-mail: info@gouda-geo.com

Certificate of Calibration

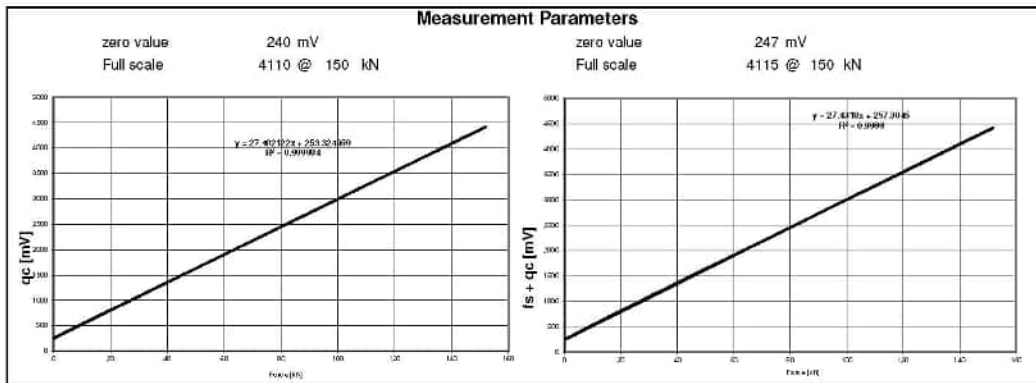
Certificate No. CMI 23.01.5256

Instrument		
Instrument Type:	Electrical Subtraction Cone	Calibration Result: Certified
Manufacturer:	Gouda Geo-Equipment B.V	
Model No.:	DP15-CFPTxy	Date Calibrated: 13-1-2023
Serial No.:	71212	Next Due Date: 13-7-2023
Cone area factor:	0,75	
Used Calibration Procedure:	GGECP004, ISO22476	Location: Hillegom (The Netherlands)

Customer
In Situ Site Investigation Ltd.

Calibration Instruments		
Instrument Type: GPT Logger	Instrument Type: CPT Logger	Instrument Type: Load-cell + amplifier
Manufacturer: Gouda Geo Equipment	Manufacturer: Gouda Geo Equipment	Manufacturer: Futek
Model No.: A	Model No.: A	Model No.: LCF500 + IAA100
Serial No.: 3010	Serial No.: 3129	Serial No.: 668966 + 695054
Accuracy: 0.01% + 2 Counts	Accuracy: 0.01% + 2 Counts	Accuracy: 0.1%
Date Calibrated: 23 December, 2022	Date Calibrated: 23 December, 2022	Date Calibrated: 1 November, 2022
Next Due Date: 23 June, 2023	Next Due Date: 23 June, 2023	Next Due Date: 1 November, 2023
Calibrated By: Manufacturer	Calibrated By: Manufacturer	Calibrated By: Futek
Traceability: CMI 22.12.5177	Traceability: CMI 22.12.5176	Traceability: 2211030065

Calibration Conditions		
Environmental conditions whilst performing the calibration:	Ambient Temperat	20.5 °C
	Relative Humidity:	38.1 %
Condition of Calibrated Apparatus when Received: Fair		



Remarks

Data "As Received" = "As Left" unless otherwise noted. Calibration data for this item was derived from one or more of the following sources: the Nederlands Meetinstituut (NMI) or other national laboratory, a natural physical constant, or a ratio technique. The data is on file at the NMI. This calibration is compliant with Gouda Geo-Equipment's internal quality system, internal calibration procedure and meets the requirements of standard ISO22476.

The Calibration Interval will vary from customer use and different conditions. All calibrations are verified at a moment in time; and confirmed within controlled temperature and humidity specified standards. Gouda Geo-Equipment is not responsible for future calibrations. Improper use of the instrument (e.g. dropping) may cause loss of calibration.

APPENDIX A5 – Symbol List

English

a	is area ratio of the cone ($= A_n/A_c$)
A	is area
A_c	is projected area of the cone
A_n	is cross sectional area of load cell or shaft
A_s	is area of friction sleeve
A_{sb}	is bottom end area of friction sleeve
A_{st}	is top end area of friction sleeve
B_q	is pore pressure parameter ($= (u_2 - u_0)/(q_t - \sigma_{v0})$)
C_h	is horizontal coefficient of consolidation
C_v	is vertical coefficient of consolidation
D	is diameter
D_r	is relative density ($= \frac{e_{max}-e}{e_{max}-e_{min}} \times 100\%$)
e	is void ratio
e_{max}	is maximum void ratio
e_{min}	is minimum void ratio
E	is Young's modulus
f_s	is unit sleeve friction resistance
f_t	is sleeve friction corrected for pore pressure effects
F_s	is total force acting on friction sleeve
F_R	is normalized friction ratio ($= f_s/(q_t - \sigma_{v0})$)
FoS	is factor of safety
FC	is fines content
g	is acceleration due to gravity
G_0	is initial or maximum shear modulus, shear stiffness
I_c	is soil behavior type index
I_r	is rigidity index ($= G/s_u$)
I_p	is plasticity index
k	is coefficient of permeability
k_h	is coefficient of permeability in horizontal direction
k_v	is coefficient of permeability in vertical direction
K_0	is coefficient of earth pressure at rest ($= \sigma'_{h0}/\sigma'_{v0}$)
L	is length
m_v	is coefficient of volume change
M	is constrained deformation modulus
M7.5	is earthquake magnitude of 7.5 Richter scale
N	is number of blows of SPT
N_{60}	is SPT energy ratio
N_k	is cone factor
N_{ke}	is cone factor
N_{kt}	is cone factor
$N_{\Delta u}$	is cone factor
p_a	is reference stress ($= 100 \text{ kPa}$)
q_c	is measured cone resistance
q_e	is effective cone resistance ($= q_t - u_2$)
q_n	is net cone resistance ($= q_t - \sigma_{v0}$)
q_t	is corrected cone resistance ($= q_c - (1 - a)u_2$)
Q_c	is total force acting on the cone
Q_t	is normalized cone resistance ($= q_t - \sigma_{v0}/\sigma'_{v0}$)

R_f	is friction ratio ($= (f_t/q_t) \times 100\%$ or alternatively $= (f_t/q_t) \times 100\%$)
s_u	is undrained shear strength
s_{ur}	is remoulded undrained shear strength
S_t	is sensitivity
t	is time
t_{50}	is time for 50% dissipation of excess pore water pressure
T_{50}	is time factor at $U = 50\%$
u	is pore water pressure
u_0	is in situ pore pressure
u_1	is pore pressure measured on the cone
u_2	is pore pressure measured behind the cone
u_3	is pore pressure measured behind sleeve friction
Δu	is excess pore water pressure
U	is normalized excess pore pressure
V_s	is shear wave velocity
z	is depth

Greek

α	is constant
α	is cone roughness
β	is constant
β_1	is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees
β_2	is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1 , in degrees
γ	is unit weight of soil
γ_w	unit weight of water
Δ	is change
Δu	is excess pore pressure ($= u - u_0$)
μ	is Poisson's ratio
ρ	is density
ψ	is state parameter
σ, σ'	is normal stress (total, effective)
σ_h, σ'_h	is horizontal stress (total, effective)
σ_v, σ'_v	is horizontal stress (total, effective)
$\sigma_{v0}, \sigma'_{v0}$	is overburden stress (total, effective)
T_{av}	is average cyclic shear stress
T_{cy}	is cyclic shear stress
ϕ'	is effective friction angle

APPENDIX A6 – Abbreviations

ASTM	American Society for Testing and Materials
CPTU	Cone Penetration Test with Pore Pressure Measurement (Piezocone Test)
CRR	Cyclic Resistance Ratio
CSR	Cyclic Stress Ratio
GWT	Ground Water Table
NC	Normally Consolidated
OC	Over consolidated
OCR	Over consolidation Ratio
PL	Limit Pressure
SCPT	Seismic Cone Penetration
SDMT	Seismic Dilatometer Marchetti
SPT	Standard Penetration Test
TC	Technical Committee

APPENDIX A7 – Glossary

CPT

Cone Penetration Test.

Cone

The part of the cone penetrometer on which the end bearing is developed.

Cone Penetrometer

The assembly containing the *cone*, *friction sleeve*, any other sensors and measuring systems, as well as the connections to the *push-rods*.

Cone resistance, q_c

The total force acting on the cone, Q_c , divided by the projected area of the cone, A_c . $q_c = Q_c/A_c$

Corrected cone resistance, q_t

The *cone resistance*, q_c corrected for pore water pressure effects.

Corrected sleeve friction, f_t

The *sleeve friction* corrected for pore water pressure effects on the ends of the *friction sleeve*.

Data acquisition system

The system used to measure and record the measurements made by the *cone penetrometer*.

Dissipation Test

A test when the decay of the pore water pressure is monitored during a pause in penetration.

Filter element

The porous element inserted into the cone penetrometer to allow transmission of the pore water pressure to the pore pressure sensor, while maintaining the correct profile of the *cone penetrometer*.

Friction ratio, R_f

The ratio, expressed as a percentage of the *sleeve friction*, f_s , to the *cone resistance*, q_c , both measured at the same depth.

Friction reducer

A local enlargement on the push-rod surface, placed at a distance above the cone penetrometer, and provided to reduce the friction on the *push-rods*.

Friction sleeve

The section of the *cone penetrometer* upon which the *sleeve friction* is measured.

Normalized cone resistance, Q_c or Q_t

The *cone resistance* expressed in a non-dimensional form and taking account of stress changes *in situ*, $Q_c = (q_c - \sigma_{v0})/\sigma'_{v0}$, or when the *corrected cone resistance* is used $Q_t = (q_t - \sigma_{v0})/\sigma'_{v0}$. Where σ_{v0} and σ'_{v0} are the total and effective vertical stress respectively.

Net cone resistance, q_n

The *corrected cone resistance* minus the vertical total stress. $q_n = q_t - \sigma_{v0}$

Normalized friction ratio, F_r

The *sleeve friction* normalized by the *net cone resistance*.

Piezocone

A *cone penetrometer* containing a pore pressure sensor.

Pore pressure, u

The pore pressure generated during penetration and measured by a pore pressure sensor, u_1 when measured on the cone, u_2 when measured just behind the cone and u_3 when measured just behind the friction sleeve.

Pore pressure ratio, B_q

The *net pore pressure* normalized with respect to the *net cone resistance*.

Push-rods

The thick-walled tubes or rods used for advancing the cone penetrometer.

Rig machine

The equipment which pushes the cone penetrometer and rods into the ground.

Sleeve friction, f_s

The total frictional force acting on the *friction sleeve*, F_s , divided by its *surface area*, A_s . $f_s = F_s/A_s$

APPENDIX A8 – Soils Description Tables

GRANULAR SOILS (Sands and Gravels)

Description	Relative Density D_r (%)	SPT N value, N_{SPT}
Very Loose	0 – 15	0 - 4
Loose	15 – 35	4 - 10
Medium Dense	35 – 65	10 - 30
Dense	65 – 85	30 - 50
Very Dense	>85	>50

COHESIVE SOILS (Clays and Silts)

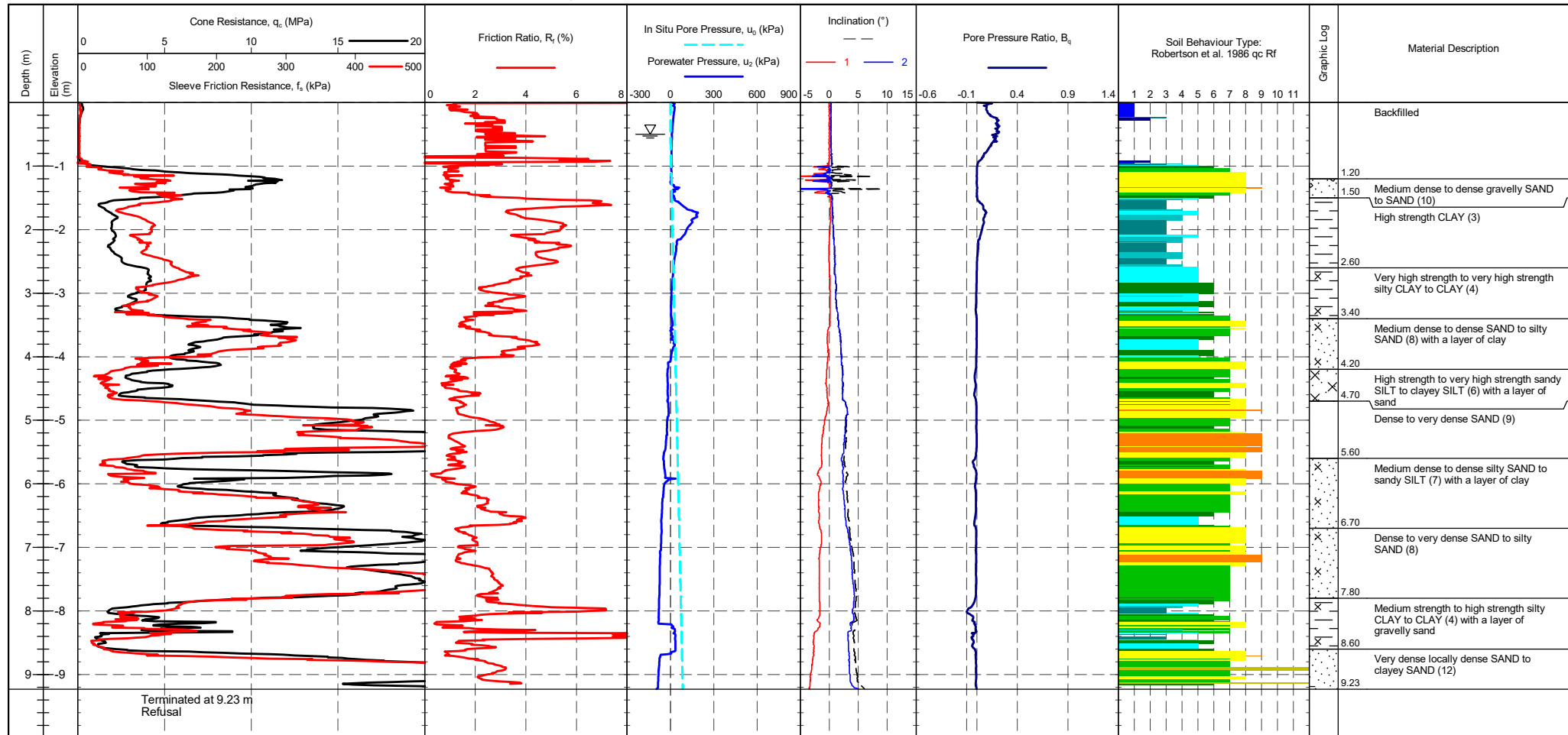
Term based on measurement	Undrained Shear Strength Classification, s_u (kPa)
Extremely low	<10
Very low	10 - 20
Low	20 - 40
Medium	40 - 75
High	75 - 150
Very high	150 - 300
Extremely high	>300

APPENDIX B

Cone Penetration Measured Parameters and Geotechnical Derived Parameters

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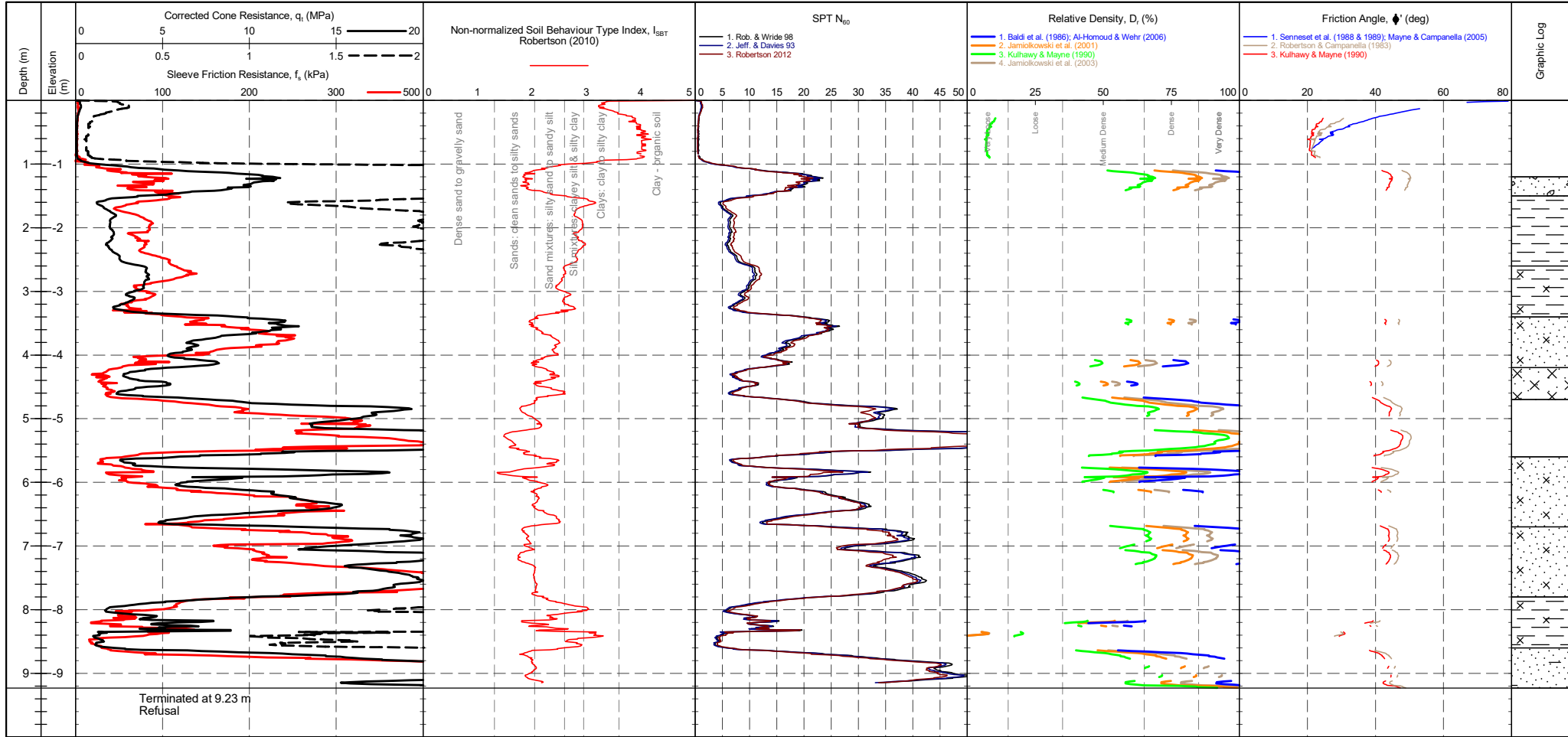
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICTION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer : Pre Post Difference Tip : 306 mV 299 mV -0.08 MPa Sleeve : 301 mV 299 mV -0.001 kPa Pore Pressure 2 : 331 mV 255 mV -0.021 kPa X-Y Inclinator : 2531 mV 2526 mV	METHOD: Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT06
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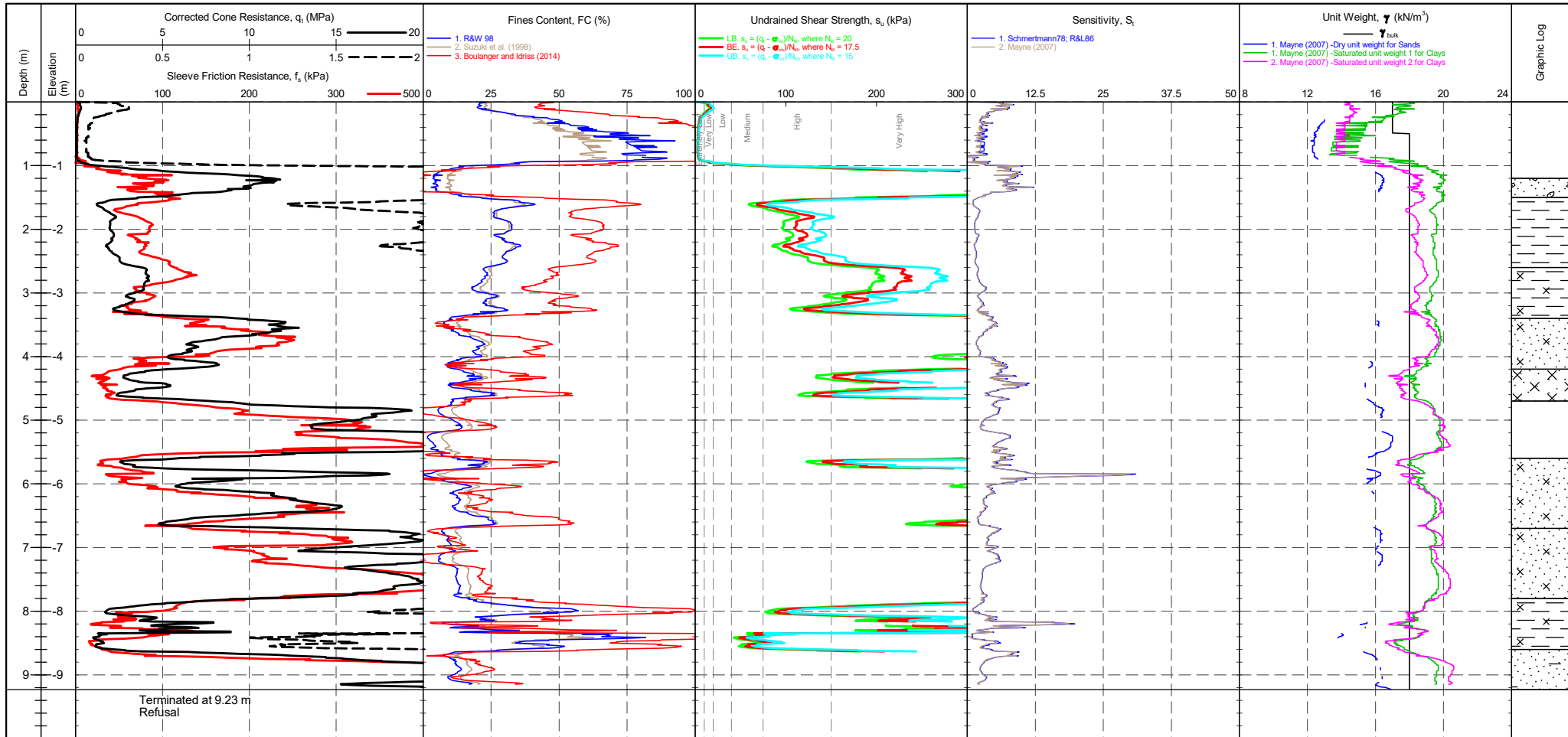
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES Transducer Pre Post Difference Tip 306 mV 299 mV -0.08 MPa Sleeve 301 mV 299 mV -0.001 kPa Pore Pressure 2 331 mV 255 mV -0.021 kPa X-Y Inclinator 2531 mV 2526 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)																																			
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15																																			
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35																																			
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65																																			
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85																																			
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																			

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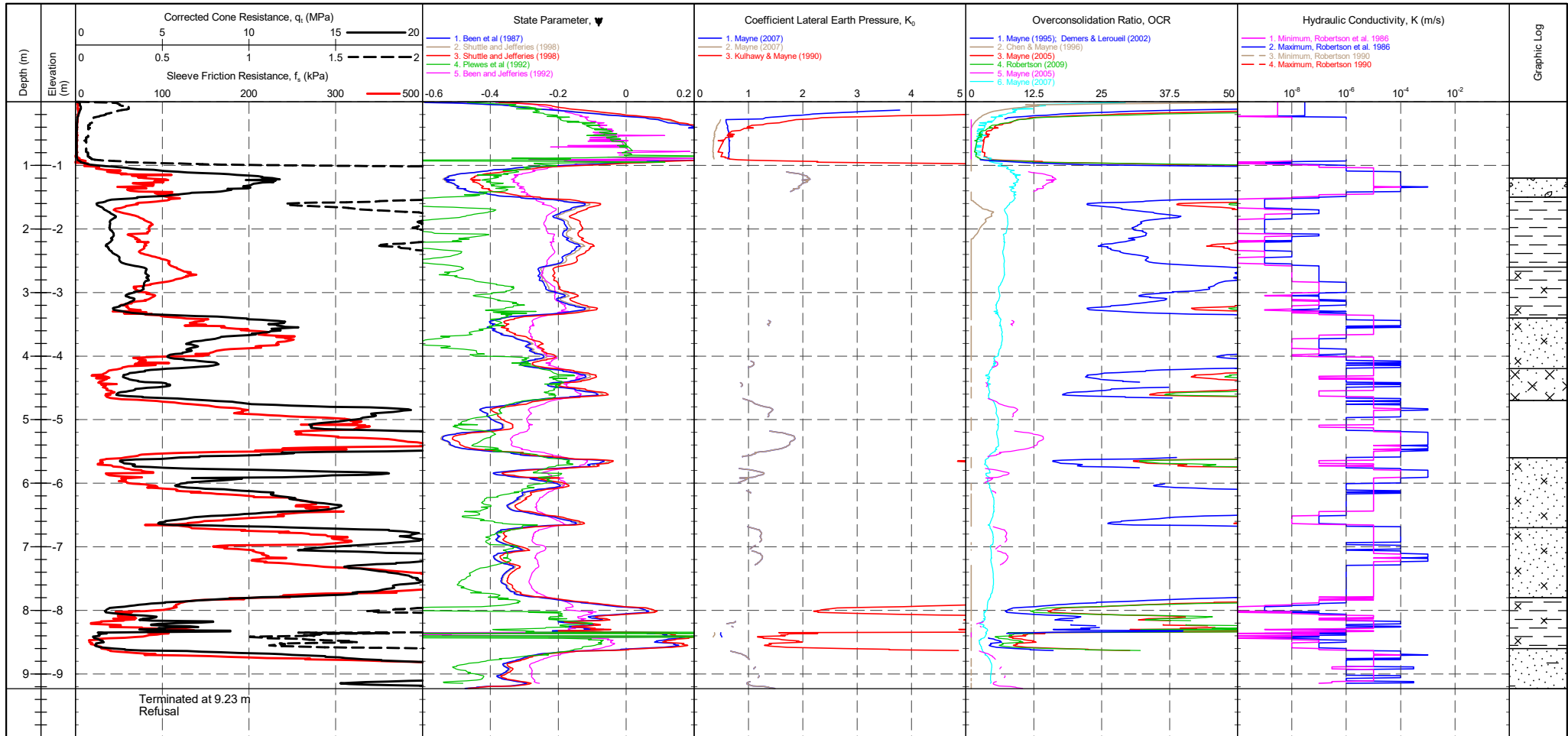
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	Transducer Tip: 306 mV Sleeve: 301 mV Pore Pressure 2: 331 mV X-Y Inclinator: 2531 mV	CPTU ZERO VALUES Post: 299 mV Difference: -0.08 MPa 299 mV -0.001 kPa 255 mV -0.021 kPa 2526 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	▽ Groundwater Level ▧ Dissipation Test
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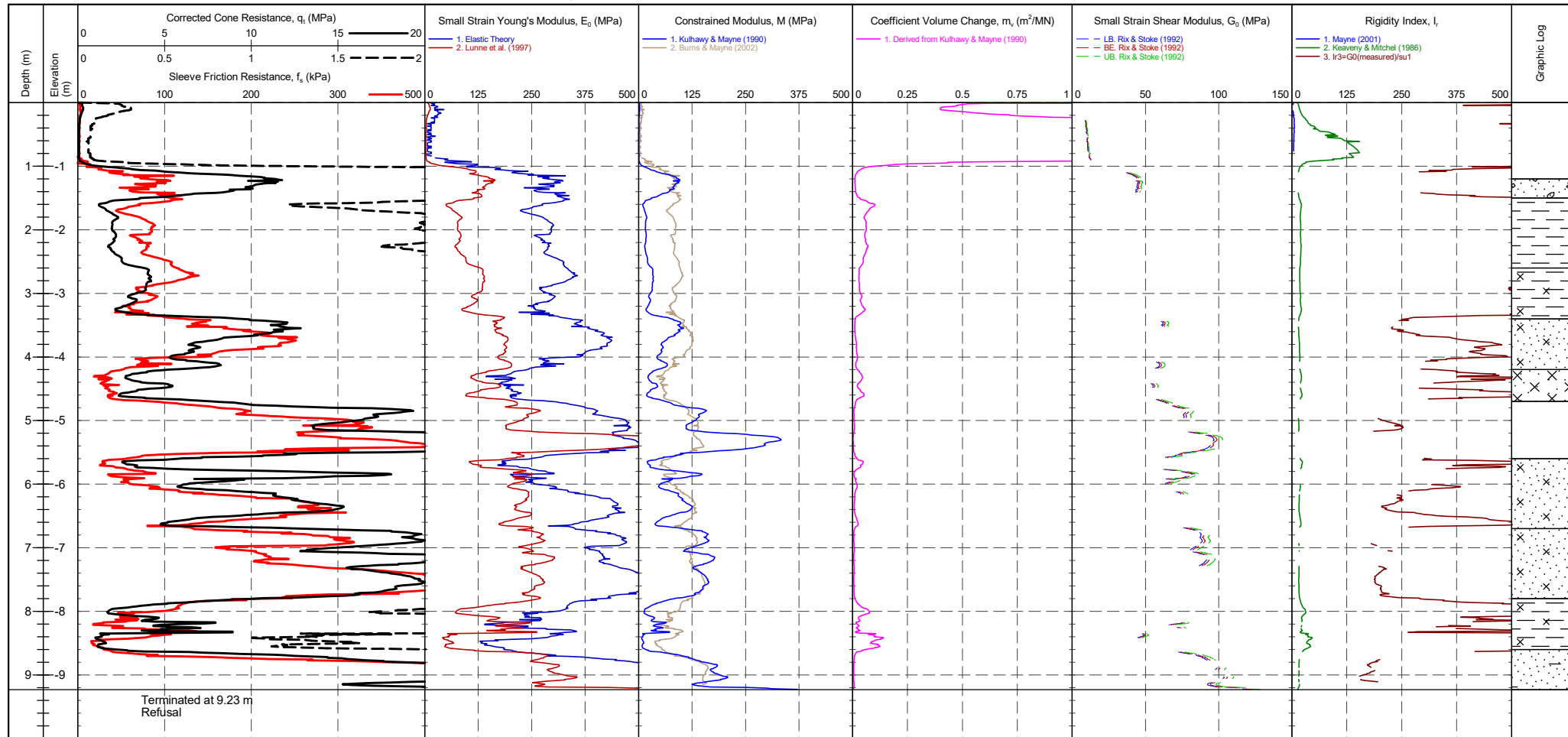
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><td>Transducer</td><td>Pre</td><td>Post</td><td>Difference</td></tr> <tr><td>Tip</td><td>306 mV</td><td>299 mV</td><td>-0.08 MPa</td></tr> <tr><td>Sleeve</td><td>301 mV</td><td>299 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>331 mV</td><td>255 mV</td><td>-0.021 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2531 mV</td><td>2526 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	306 mV	299 mV	-0.08 MPa	Sleeve	301 mV	299 mV	-0.001 kPa	Pore Pressure 2	331 mV	255 mV	-0.021 kPa	X-Y Inclinator	2531 mV	2526 mV		Groundwater Level Dissipation Test
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Sleeve	301 mV	299 mV	-0.001 kPa																				
Pore Pressure 2	331 mV	255 mV	-0.021 kPa																				
X-Y Inclinator	2531 mV	2526 mV																					

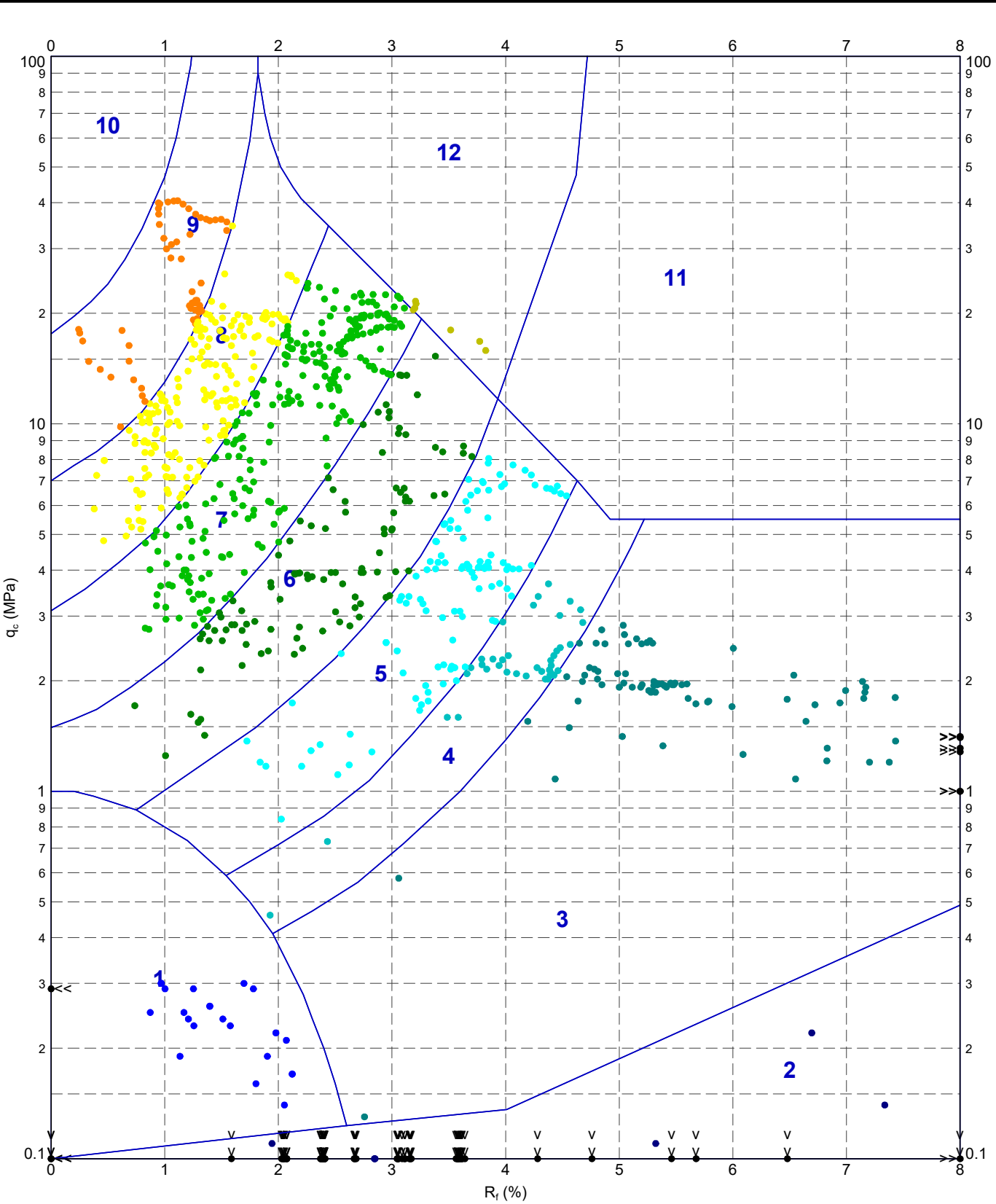
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES Transducer Pre Post Difference Tip 306 mV 299 mV -0.08 MPa Sleeve 301 mV 299 mV -0.001 kPa Pore Pressure 2 331 mV 255 mV -0.021 kPa X-Y Inclinator 2531 mV 2526 mV	Groundwater Level Dissipation Test
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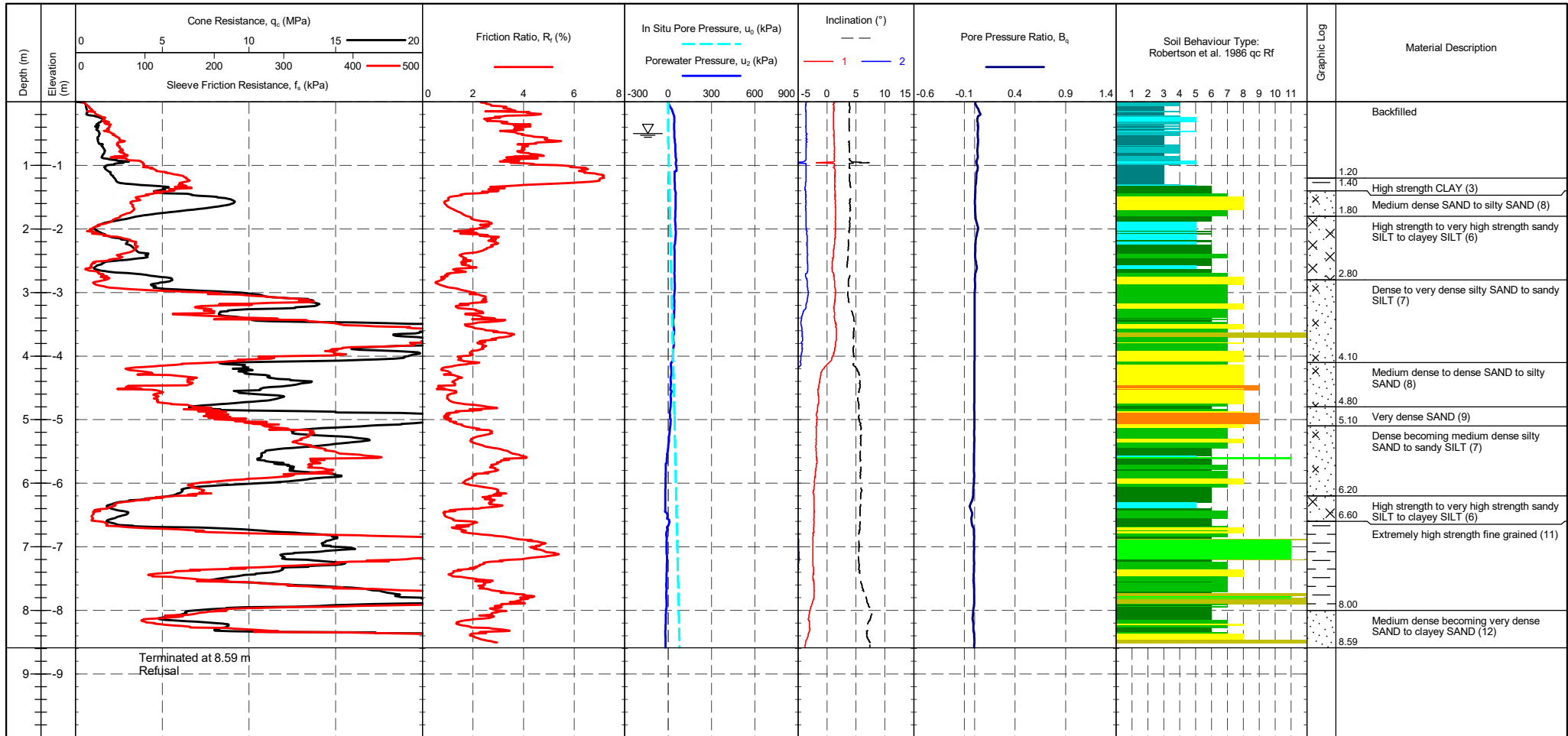
METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

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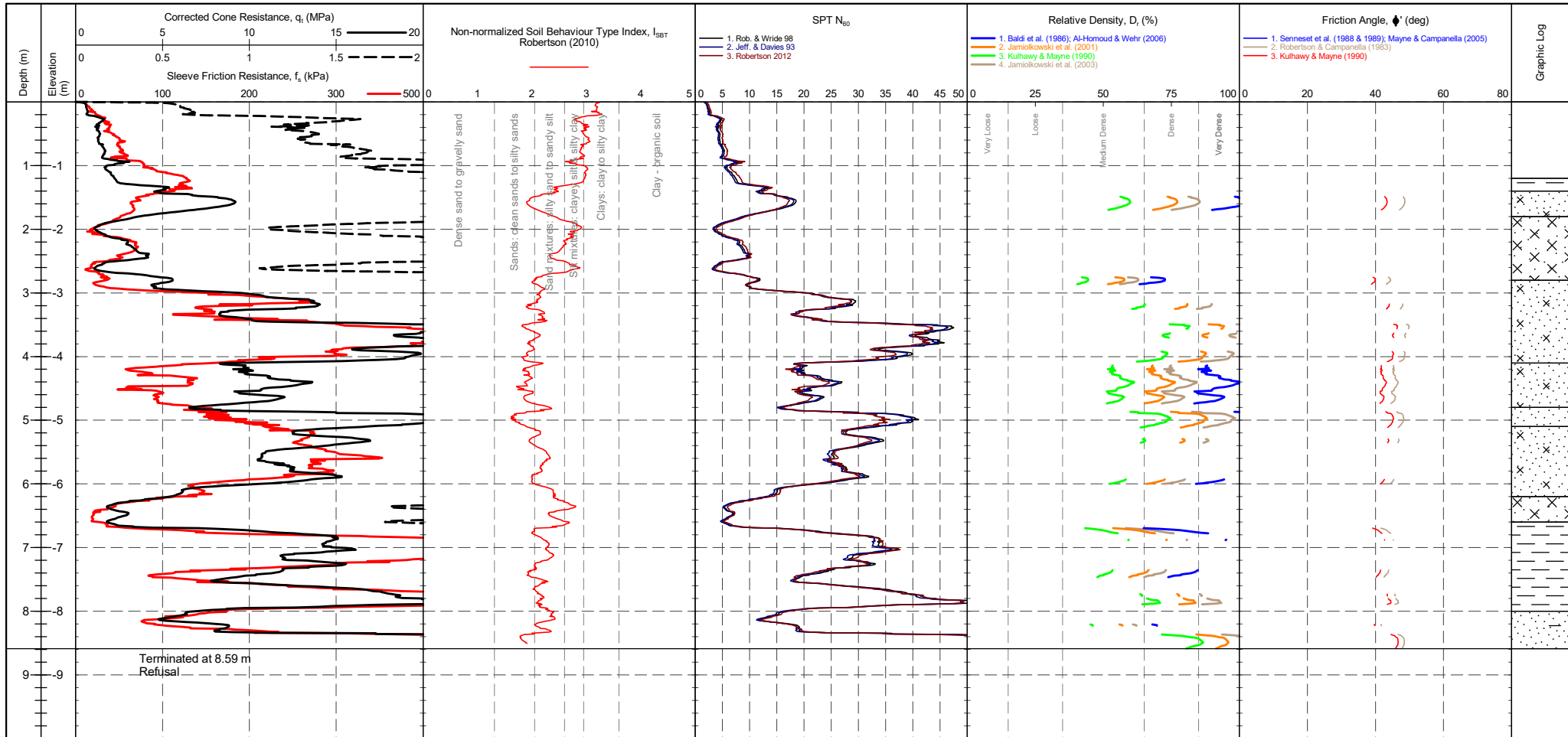
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 303 mV 301 mV -0.023 MPa Sleeve 302 mV 298 mV -0.003 kPa Pore Pressure 2 89 mV 61 mV -0.008 kPa X-Y Inclinometer 2678 mV 2592 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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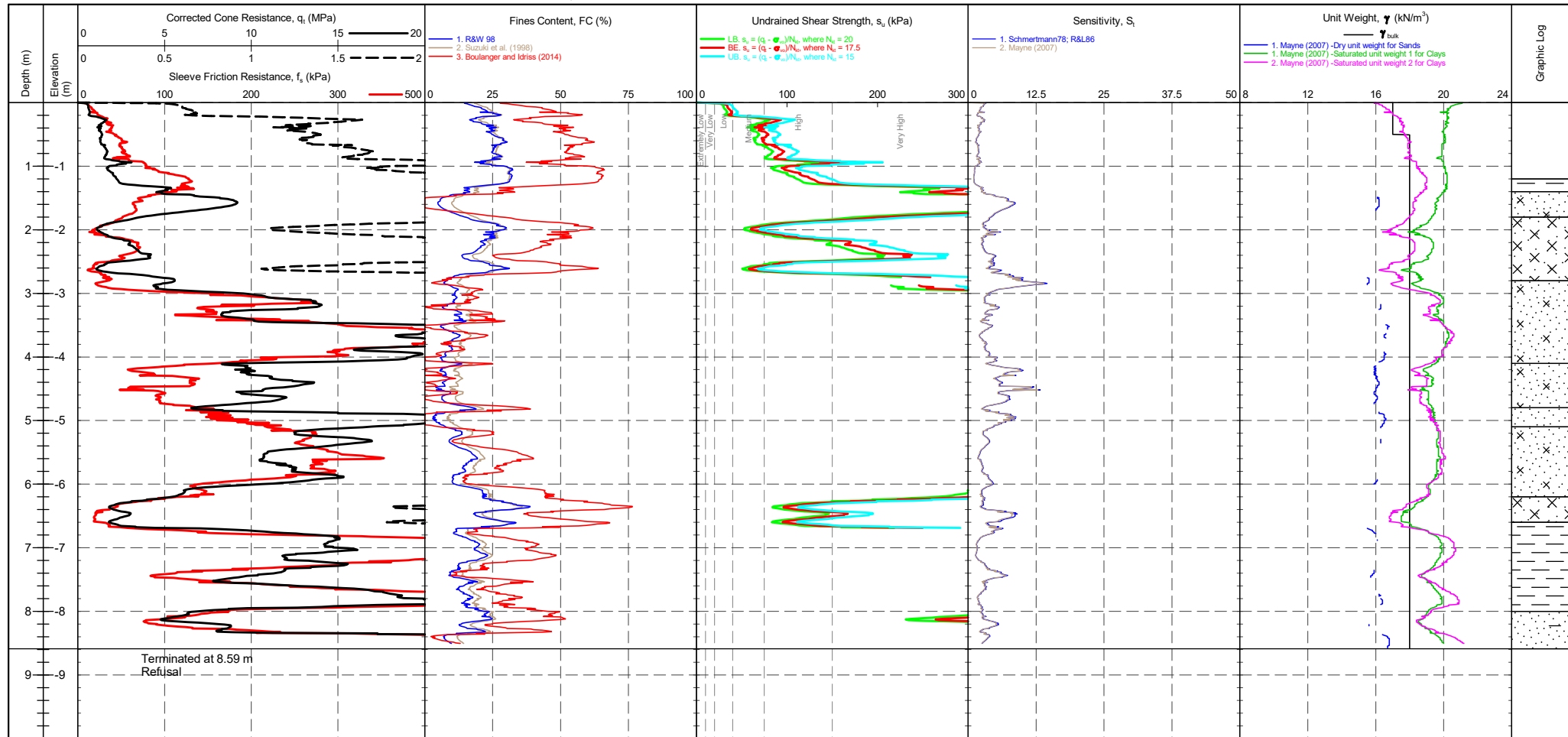
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES Transducer Tip: 303 mV Pre, 301 mV Post, -0.023 MPa Difference Sleeve: 302 mV Pre, 298 mV Post, -0.003 kPa Difference Pore Pressure 2: 89 mV Pre, 61 mV Post, -0.008 kPa Difference X-Y Inclinator: 2678 mV Pre, 2592 mV Post	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)																																			
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15																																			
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35																																			
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65																																			
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85																																			
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																			

PointID	S3CPT07
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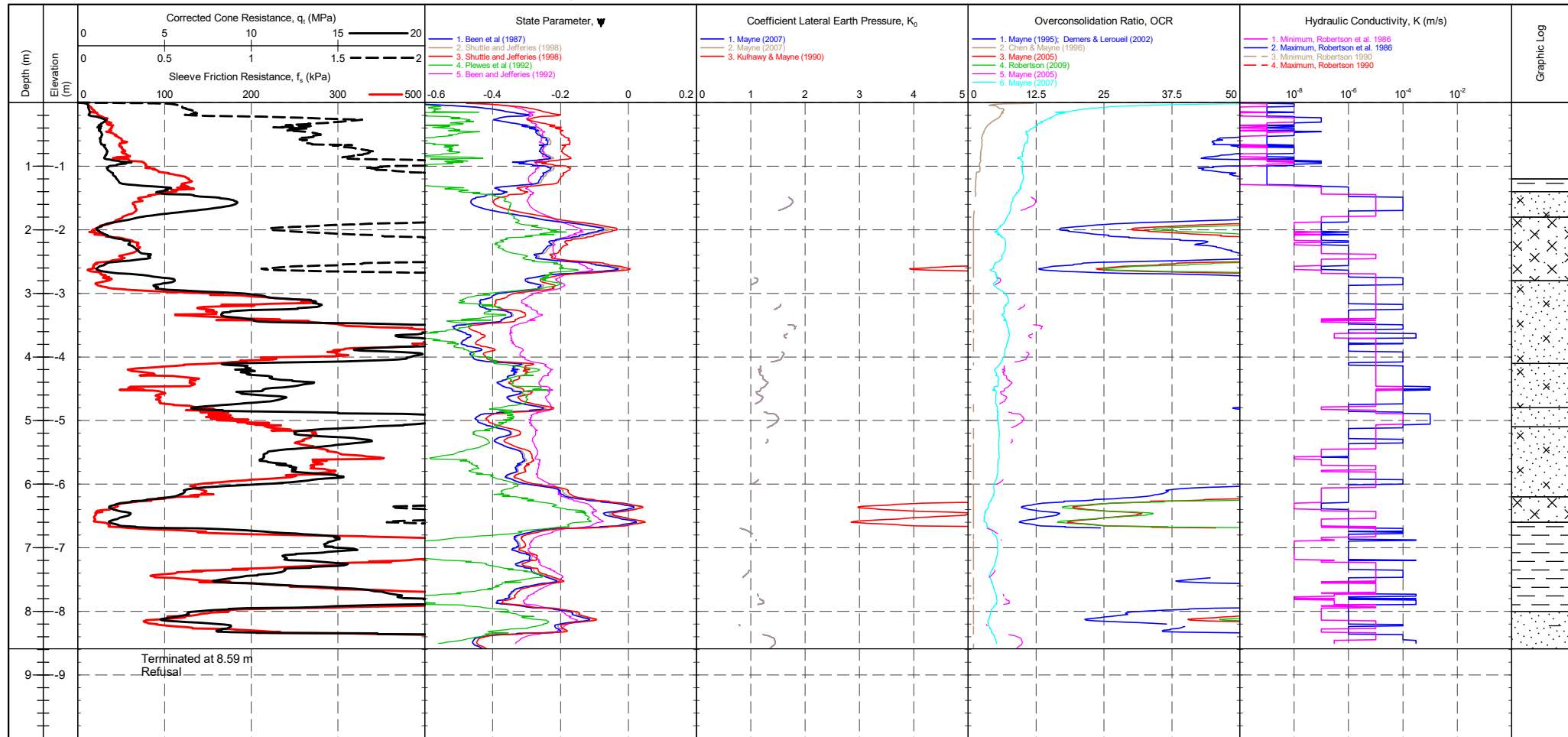
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	Transducer Tip: 303 mV / 301 mV / -0.023 MPa Sleeve: 302 mV / 298 mV / -0.003 kPa Pore Pressure 2: 89 mV / 61 mV / -0.008 kPa X-Y Inclinator: 2678 mV / 2592 mV	CPTU ZERO VALUES Pre: 301 mV Post: 301 mV Difference: -0.023 MPa	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement s_u (kPa) Term based on measurement s_u (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300	▽ Groundwater Level ▮ Dissipation Test
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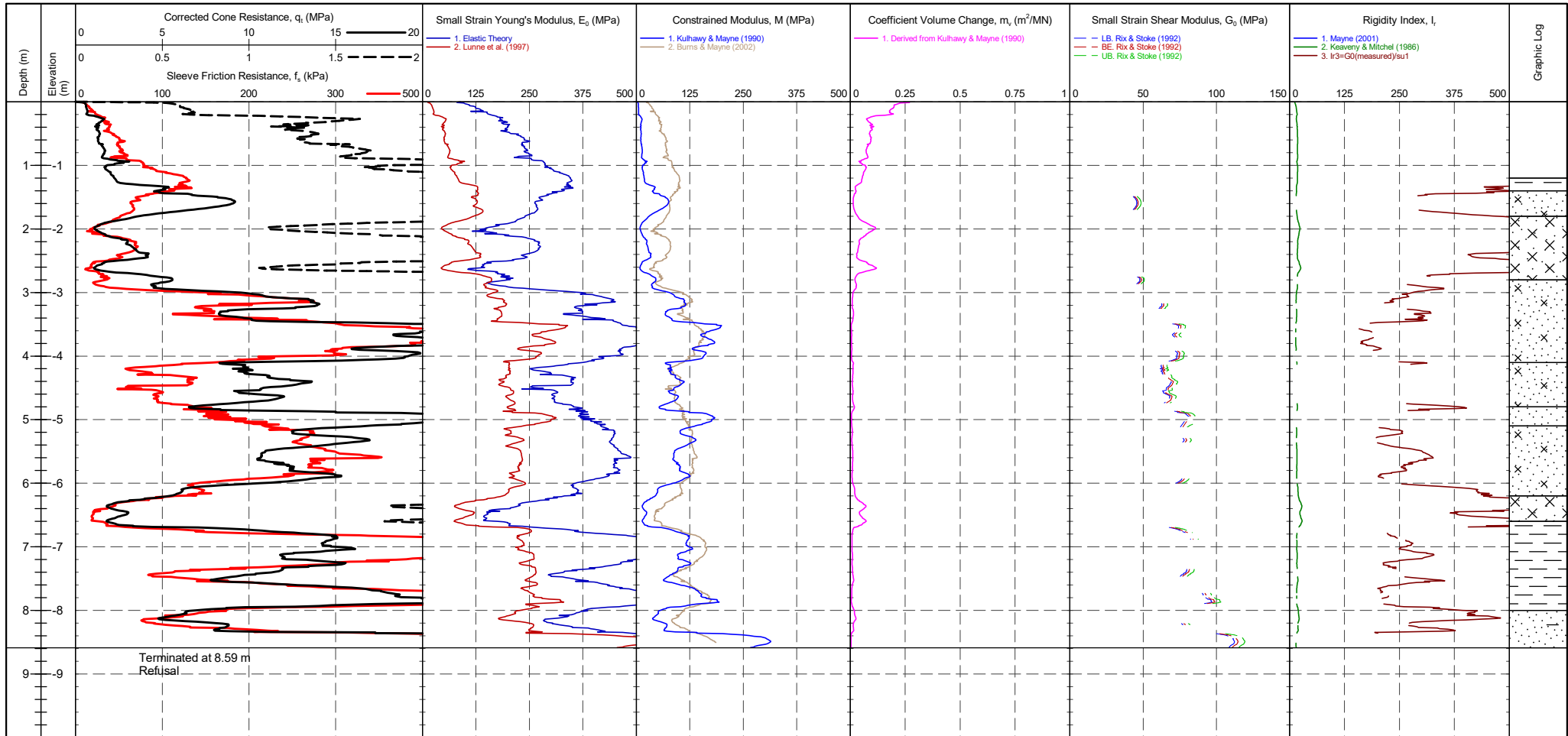
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>303 mV</td> <td>301 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>302 mV</td> <td>298 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>89 mV</td> <td>61 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2678 mV</td> <td>2592 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	303 mV	301 mV	-0.023 MPa	Sleeve	302 mV	298 mV	-0.003 kPa	Pore Pressure 2	89 mV	61 mV	-0.008 kPa	X-Y Inclinator	2678 mV	2592 mV		Groundwater Level Dissipation Test
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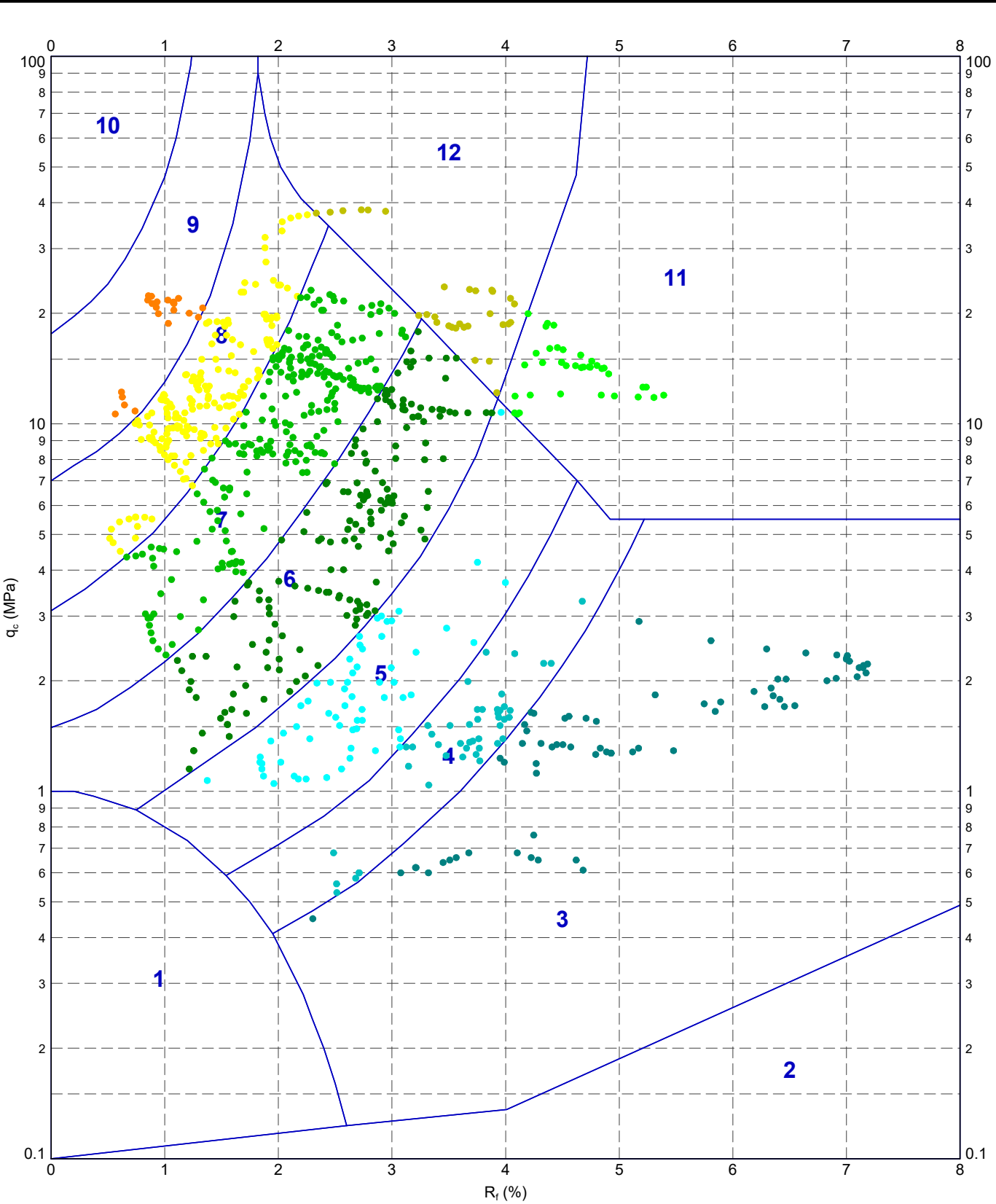
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S3CPT07

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>303 mV</td> <td>301 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>302 mV</td> <td>298 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>89 mV</td> <td>61 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2678 mV</td> <td>2592 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	303 mV	301 mV	-0.023 MPa	Sleeve	302 mV	298 mV	-0.003 kPa	Pore Pressure 2	89 mV	61 mV	-0.008 kPa	X-Y Inclinator	2678 mV	2592 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS. RF.AMP. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:23 10.03.00.09 Daggel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



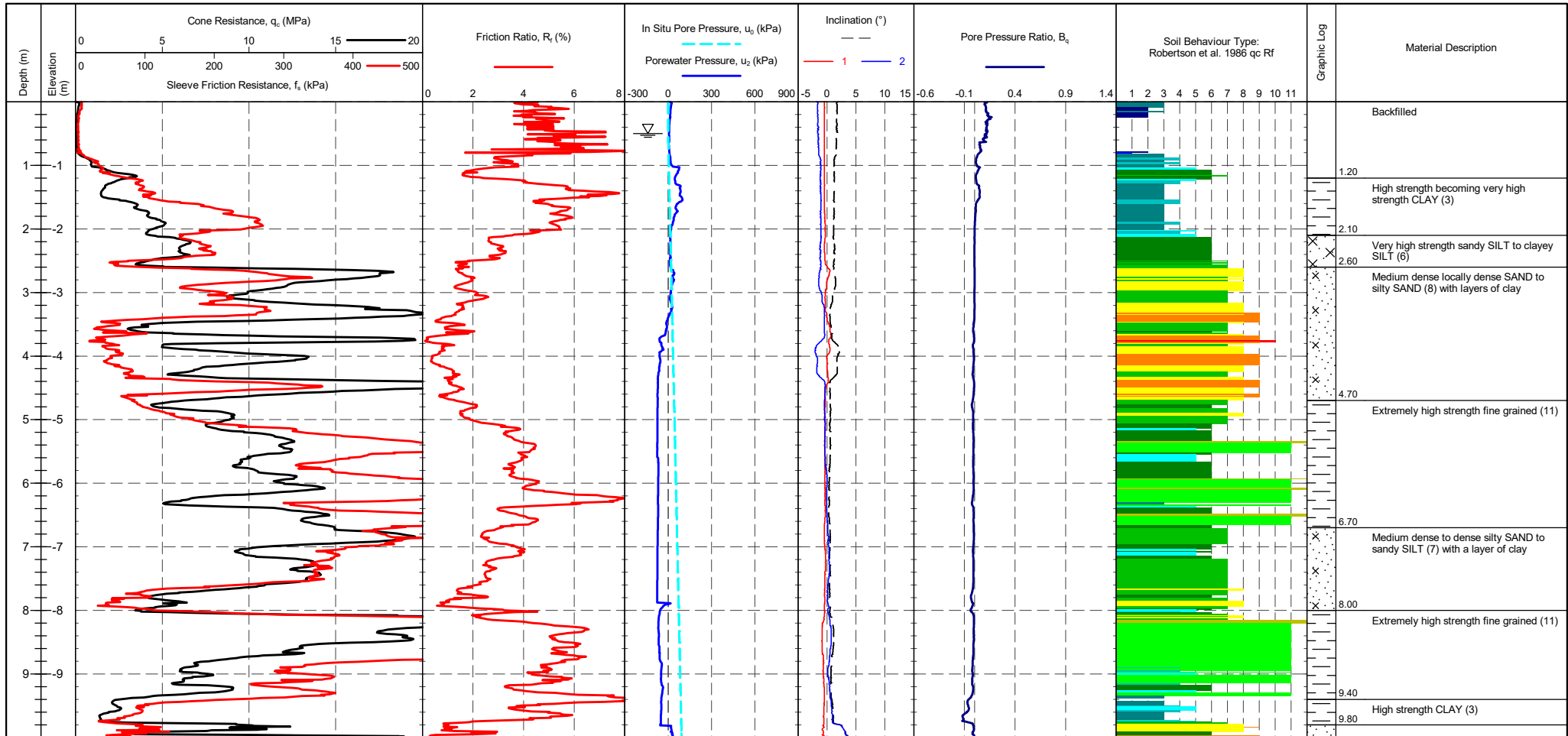
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
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			PROJECT No	
		Not To Scale		A4
		1230122		

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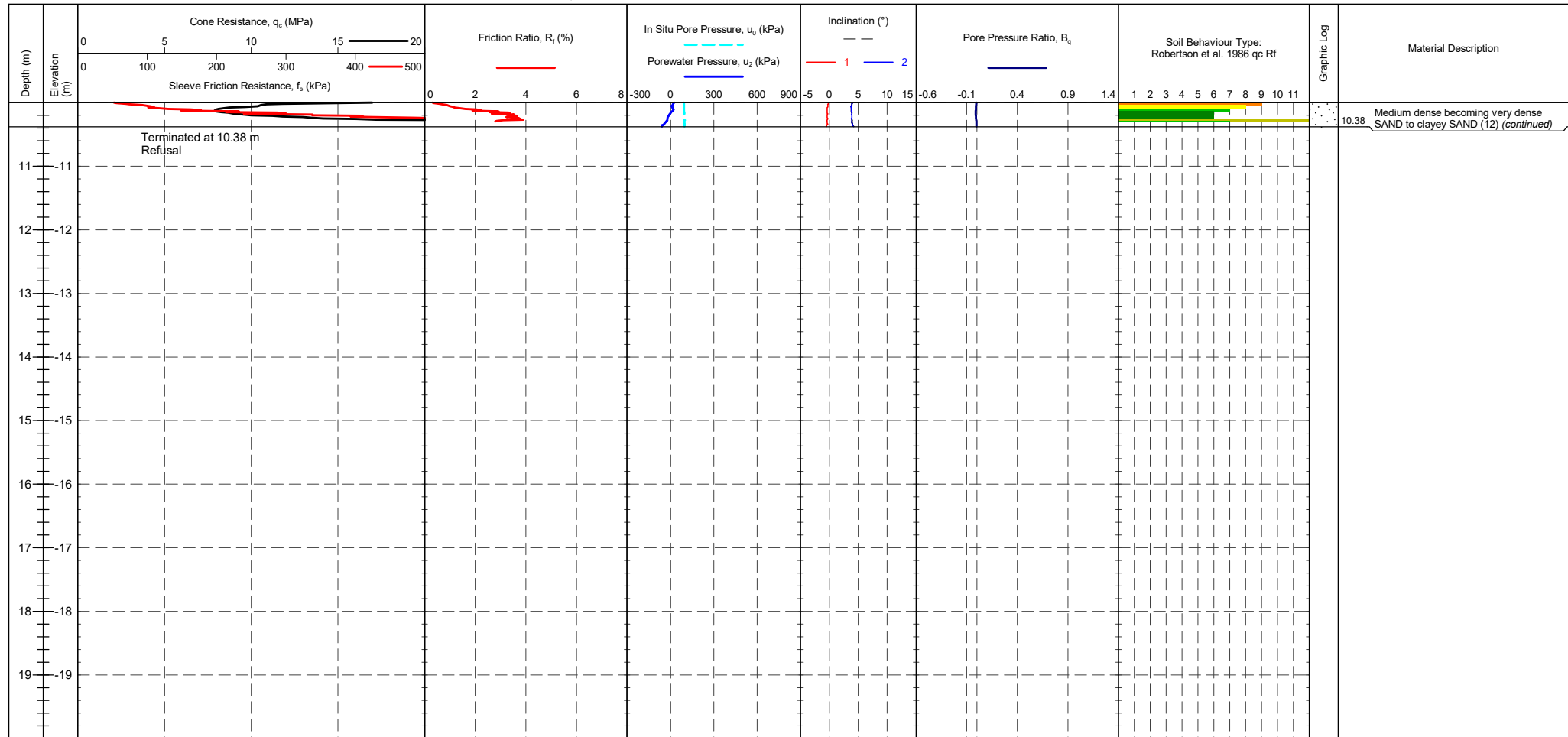
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 19/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>299 mV</td> <td>298 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>297 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>293 mV</td> <td>265 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2481 mV</td> <td>2472 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	299 mV	298 mV	-0.011 MPa	Sleeve	301 mV	297 mV	-0.003 kPa	Pore Pressure 2	293 mV	265 mV	-0.008 kPa	X-Y Inclinometer	2481 mV	2472 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravely SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravely SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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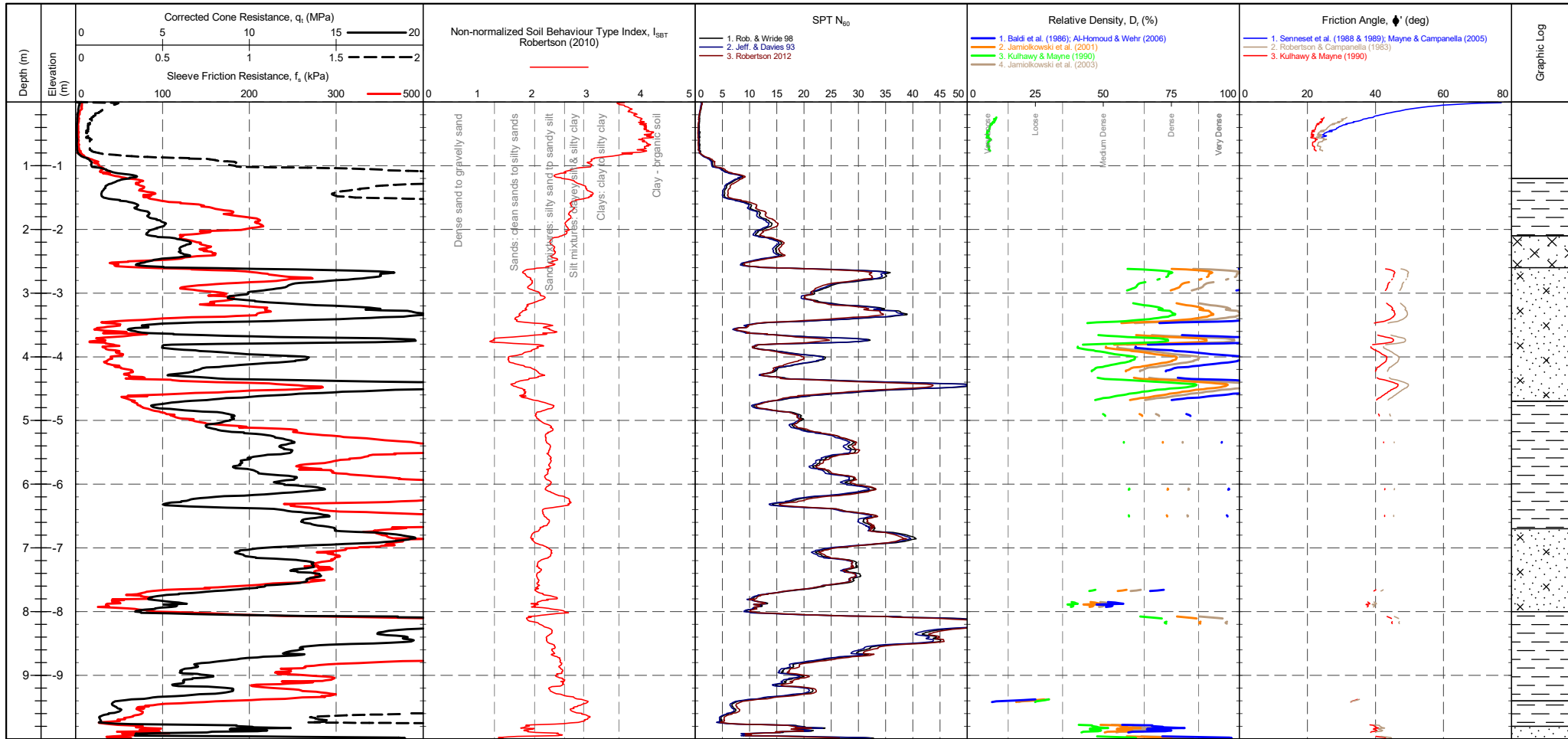
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 19/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>299 mV</td> <td>298 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>297 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>293 mV</td> <td>265 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2481 mV</td> <td>2472 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	299 mV	298 mV	-0.011 MPa	Sleeve	301 mV	297 mV	-0.003 kPa	Pore Pressure 2	293 mV	265 mV	-0.008 kPa	X-Y Inclinometer	2481 mV	2472 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravely SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravely SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT08
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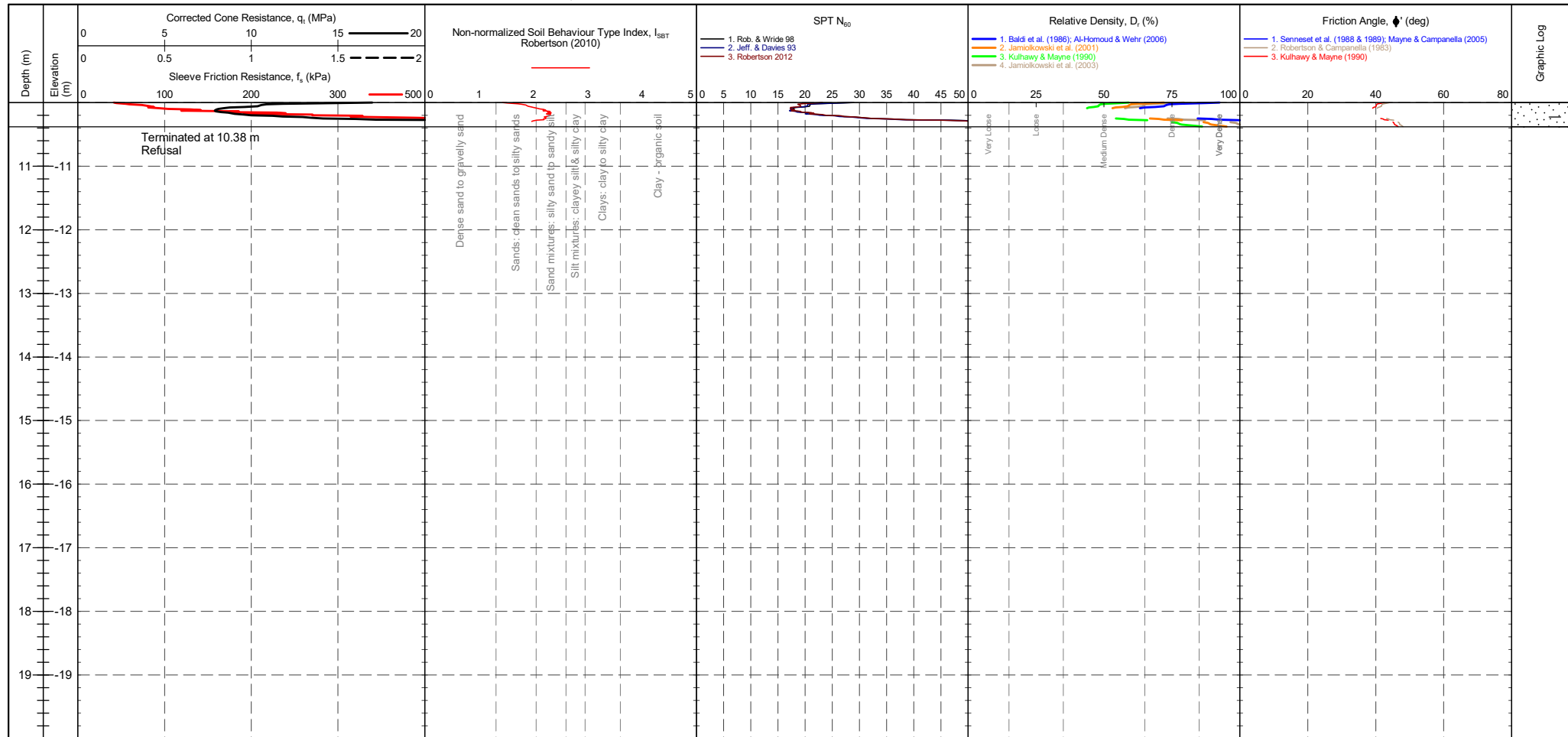
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 19/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICION REDUCER : None WEATHER : Sunny & Cold	Transducer Tip: 299 mV / 298 mV / -0.011 MPa Sleeve: 301 mV / 297 mV / -0.003 kPa Pore Pressure 2: 293 mV / 265 mV / -0.008 kPa X-Y Inclinator: 2481 mV / 2472 mV	CPTU ZERO VALUES Pre: 299 mV, Post: 298 mV, Difference: -0.011 MPa Pre: 301 mV, Post: 297 mV, Difference: -0.003 kPa Pre: 293 mV, Post: 265 mV, Difference: -0.008 kPa Pre: 2481 mV, Post: 2472 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>299 mV</td><td>298 mV</td><td>-0.011 MPa</td></tr> <tr><td>Sleeve</td><td>301 mV</td><td>297 mV</td><td>-0.003 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>293 mV</td><td>265 mV</td><td>-0.008 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2481 mV</td><td>2472 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	299 mV	298 mV	-0.011 MPa	Sleeve	301 mV	297 mV	-0.003 kPa	Pore Pressure 2	293 mV	265 mV	-0.008 kPa	X-Y Inclinator	2481 mV	2472 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr><td>Clays</td><td>2.95-3.60</td><td>Very Loose</td><td>0 - 4</td><td>Very Loose</td><td>0 - 15</td></tr> <tr><td>Silt mixtures</td><td>2.60-2.95</td><td>Loose</td><td>4 - 10</td><td>Loose</td><td>15 - 35</td></tr> <tr><td>Sand mixtures</td><td>2.05-2.60</td><td>Medium Dense</td><td>10 - 30</td><td>Medium Dense</td><td>35 - 65</td></tr> <tr><td>Sands</td><td>1.31-2.05</td><td>Dense</td><td>30 - 50</td><td>Dense</td><td>65 - 85</td></tr> <tr><td>Gravelly sand</td><td><1.31</td><td>Very Dense</td><td>>50</td><td>Very Dense</td><td>>85</td></tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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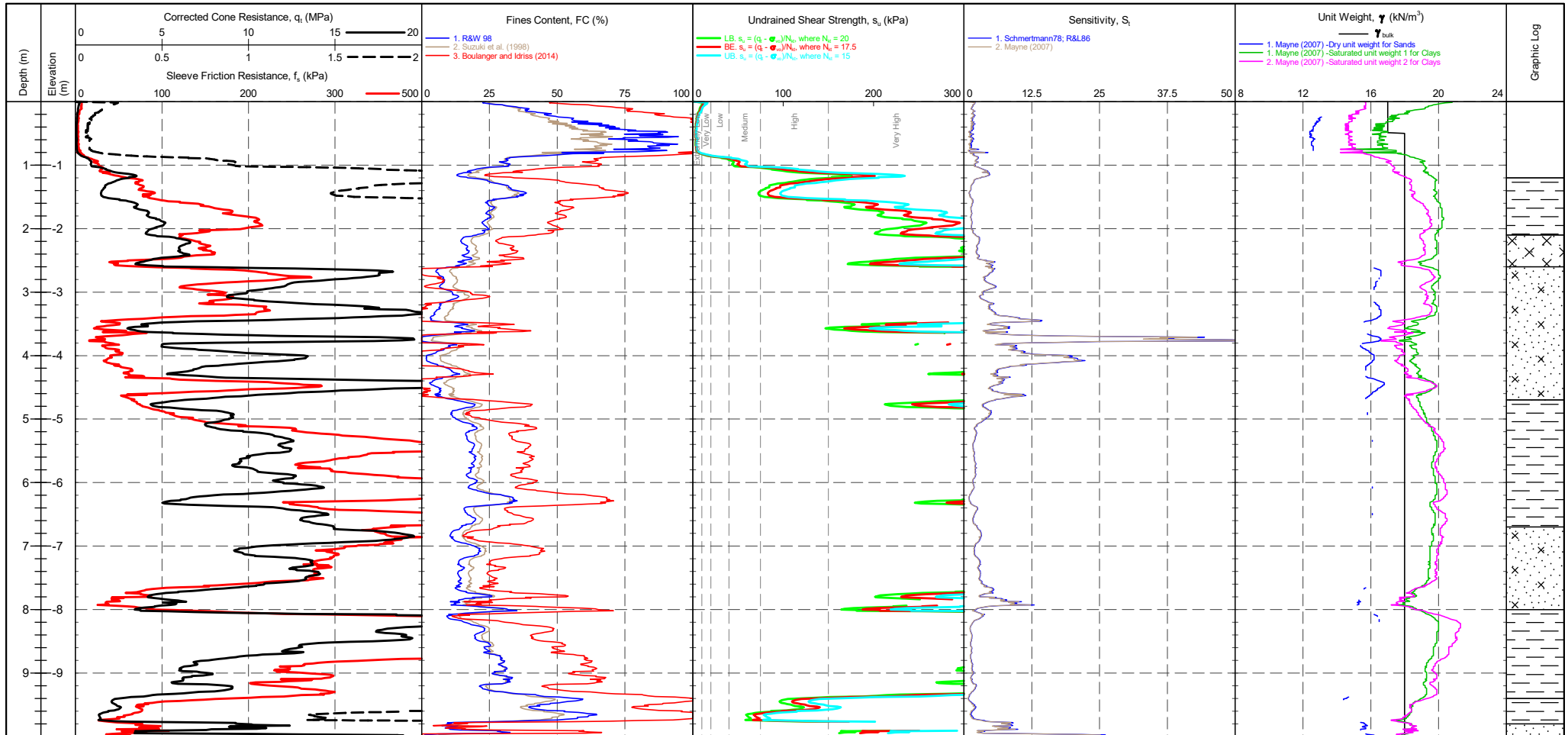
S3CPT08

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass - 2nd Visit
 LOCATION : A46 Newark Bypass
 PROJECT No. : 1230122

EASTING : 0.000 m
 NORTHING : 0.000 m
 ELEVATION : 0.000 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

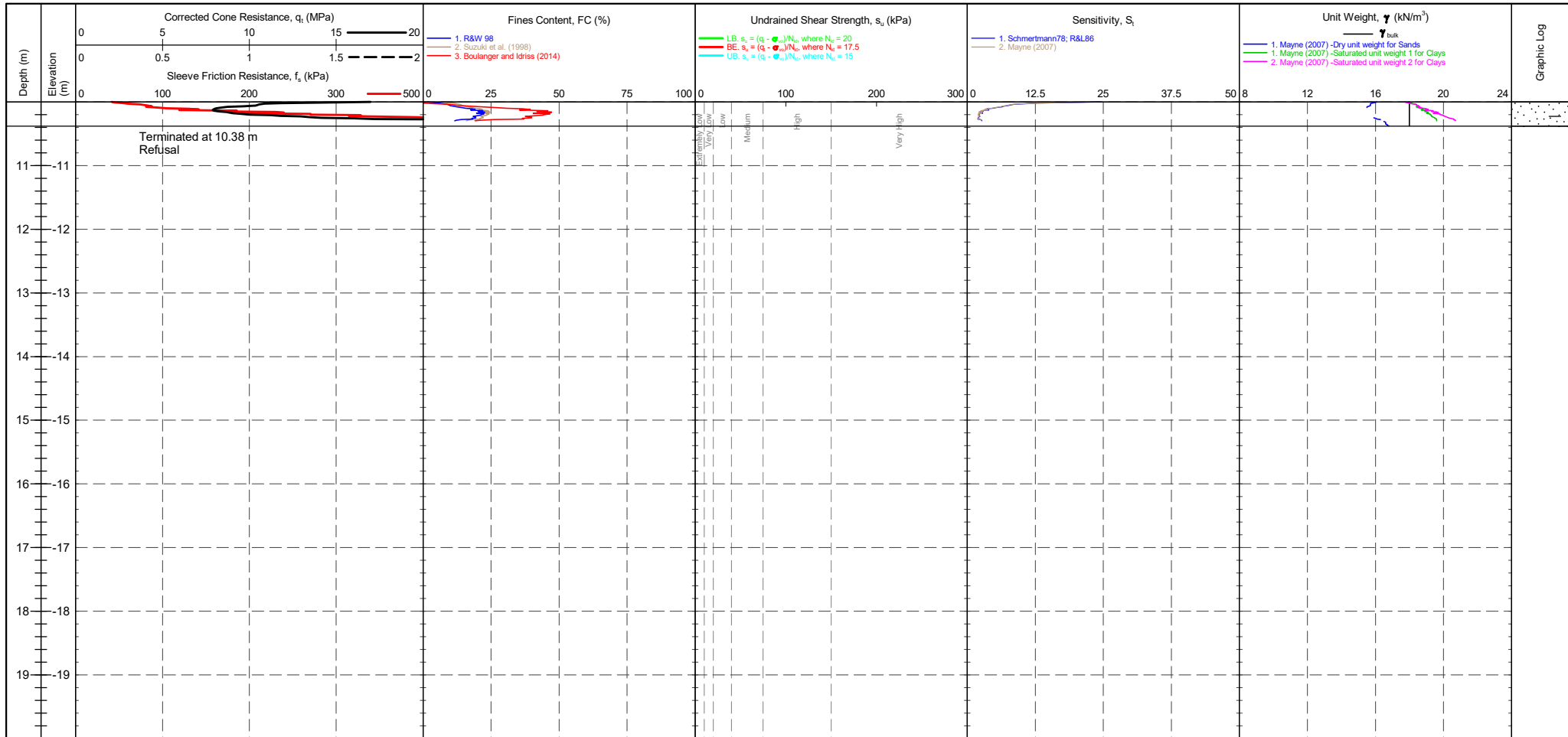
SHEET : 1 OF 2
 STATUS : Final
 TEST DATE : 19/01/2023
 PLOT DATE : 03/02/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICTION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES Transducer Pre Post Difference Tip 299 mV 298 mV -0.011 MPa Sleeve 301 mV 297 mV -0.003 kPa Pore Pressure 2 293 mV 265 mV -0.008 kPa X-Y Inclinator 2481 mV 2472 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Term based on measurement su (kPa) Extremely low strength <10 Medium strength 40-75 Very low strength 10-20 High strength 75-150 Low strength 20-40 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID
S3CPT08

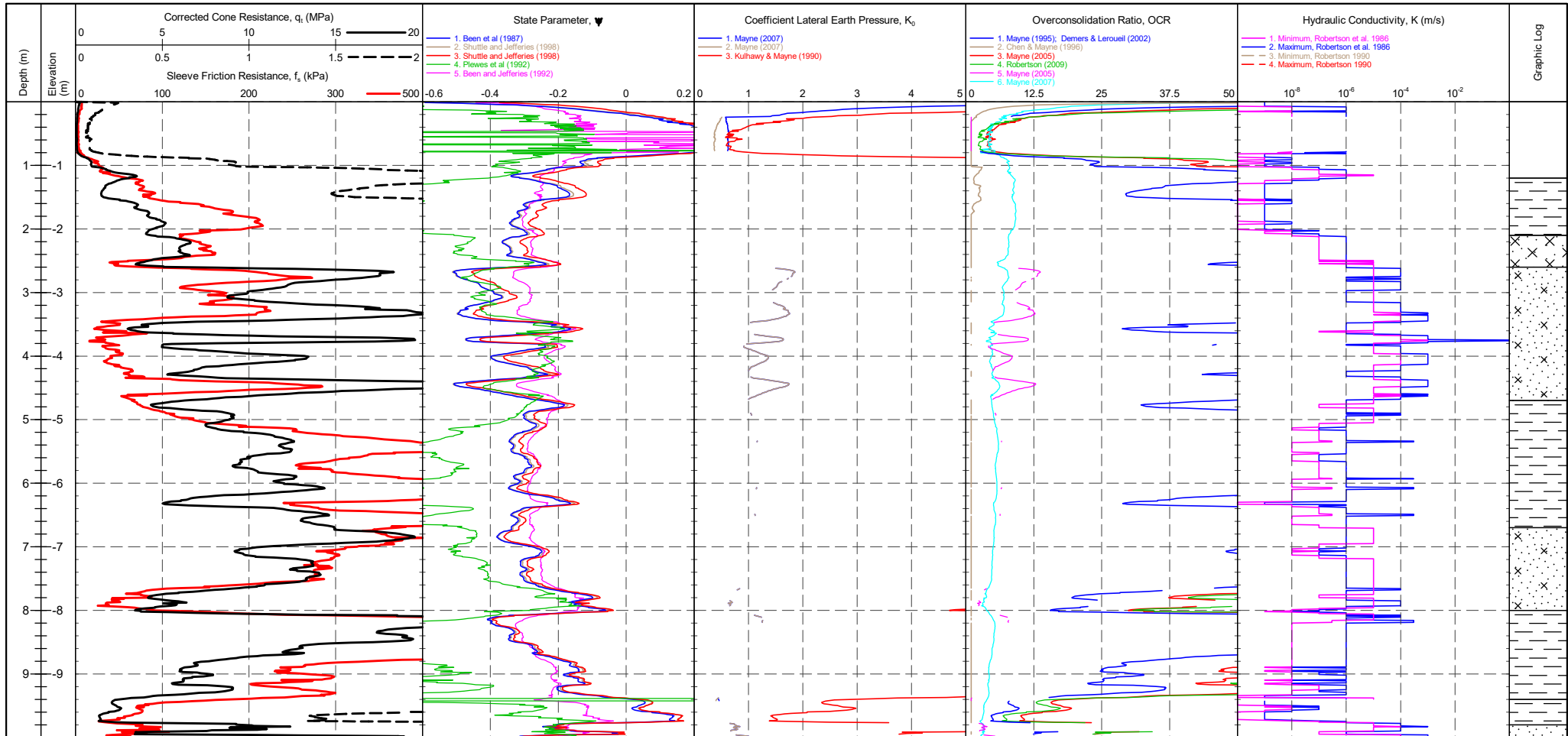
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 19/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>299 mV</td><td>298 mV</td><td>-0.011 MPa</td></tr> <tr><td>Sleeve</td><td>301 mV</td><td>297 mV</td><td>-0.003 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>293 mV</td><td>265 mV</td><td>-0.008 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2481 mV</td><td>2472 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	299 mV	298 mV	-0.011 MPa	Sleeve	301 mV	297 mV	-0.003 kPa	Pore Pressure 2	293 mV	265 mV	-0.008 kPa	X-Y Inclinator	2481 mV	2472 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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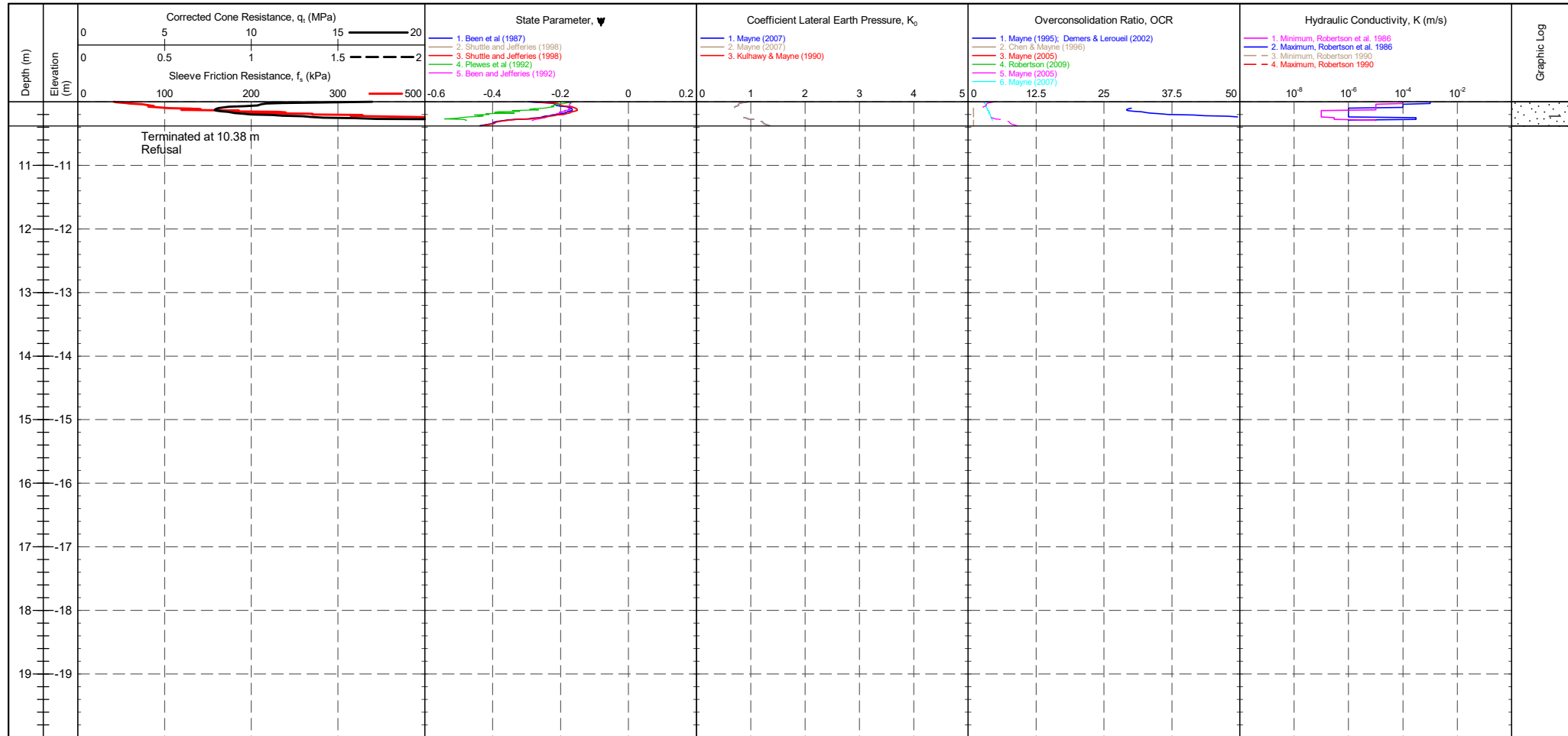
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 19/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>299 mV</td> <td>298 mV</td> <td>-0.011 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>297 mV</td> <td>-0.003 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>293 mV</td> <td>265 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2481 mV</td> <td>2472 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	299 mV	298 mV	-0.011 MPa	Sleeve	301 mV	297 mV	-0.003 kPa	Pore Pressure 2	293 mV	265 mV	-0.008 kPa	X-Y Inclinator	2481 mV	2472 mV		Groundwater Level Dissipation Test
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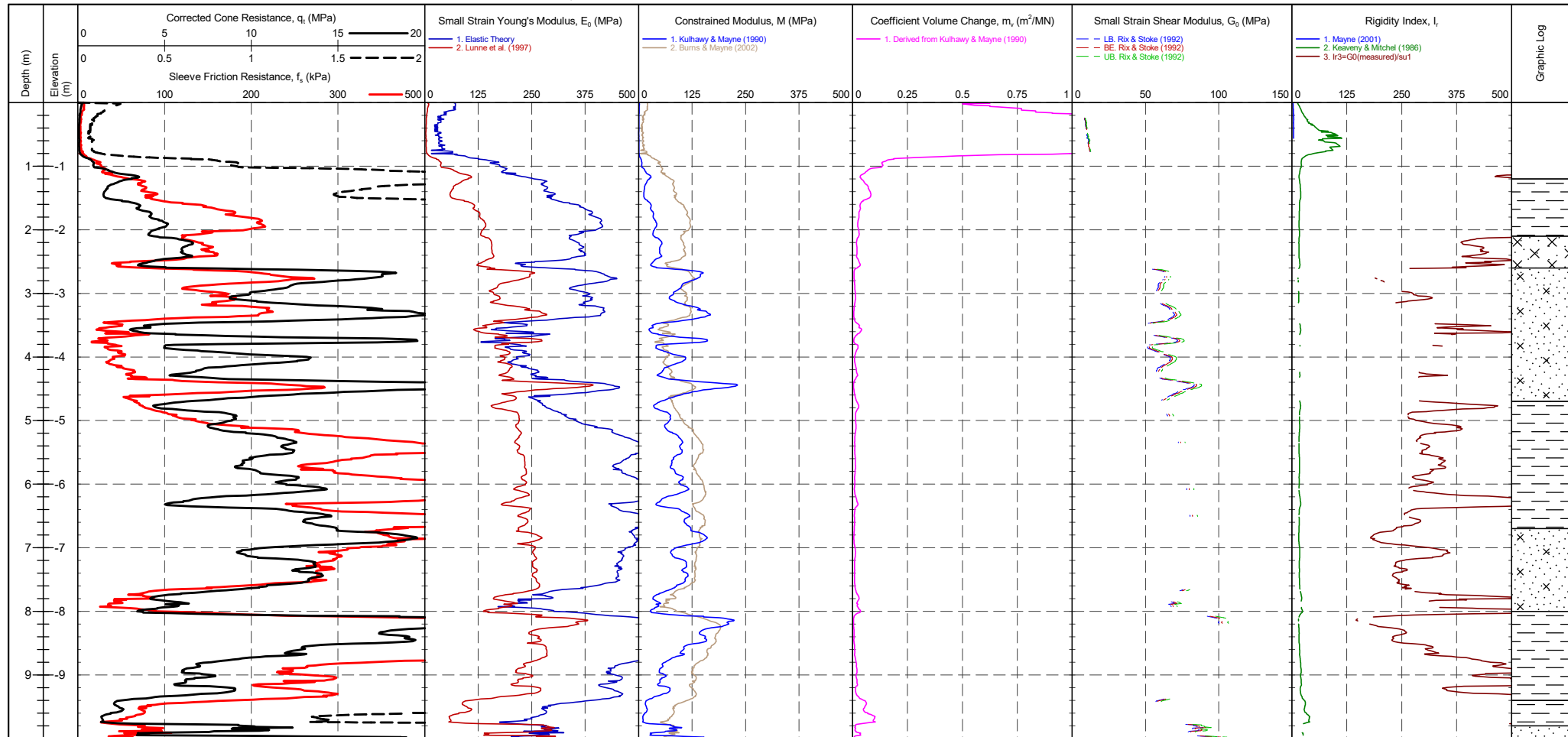
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><td>Transducer</td><td>Pre</td><td>Post</td><td>Difference</td></tr> <tr><td>Tip</td><td>299 mV</td><td>298 mV</td><td>-0.011 MPa</td></tr> <tr><td>Sleeve</td><td>301 mV</td><td>297 mV</td><td>-0.003 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>293 mV</td><td>265 mV</td><td>-0.008 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2481 mV</td><td>2472 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	299 mV	298 mV	-0.011 MPa	Sleeve	301 mV	297 mV	-0.003 kPa	Pore Pressure 2	293 mV	265 mV	-0.008 kPa	X-Y Inclinator	2481 mV	2472 mV		Groundwater Level Dissipation Test
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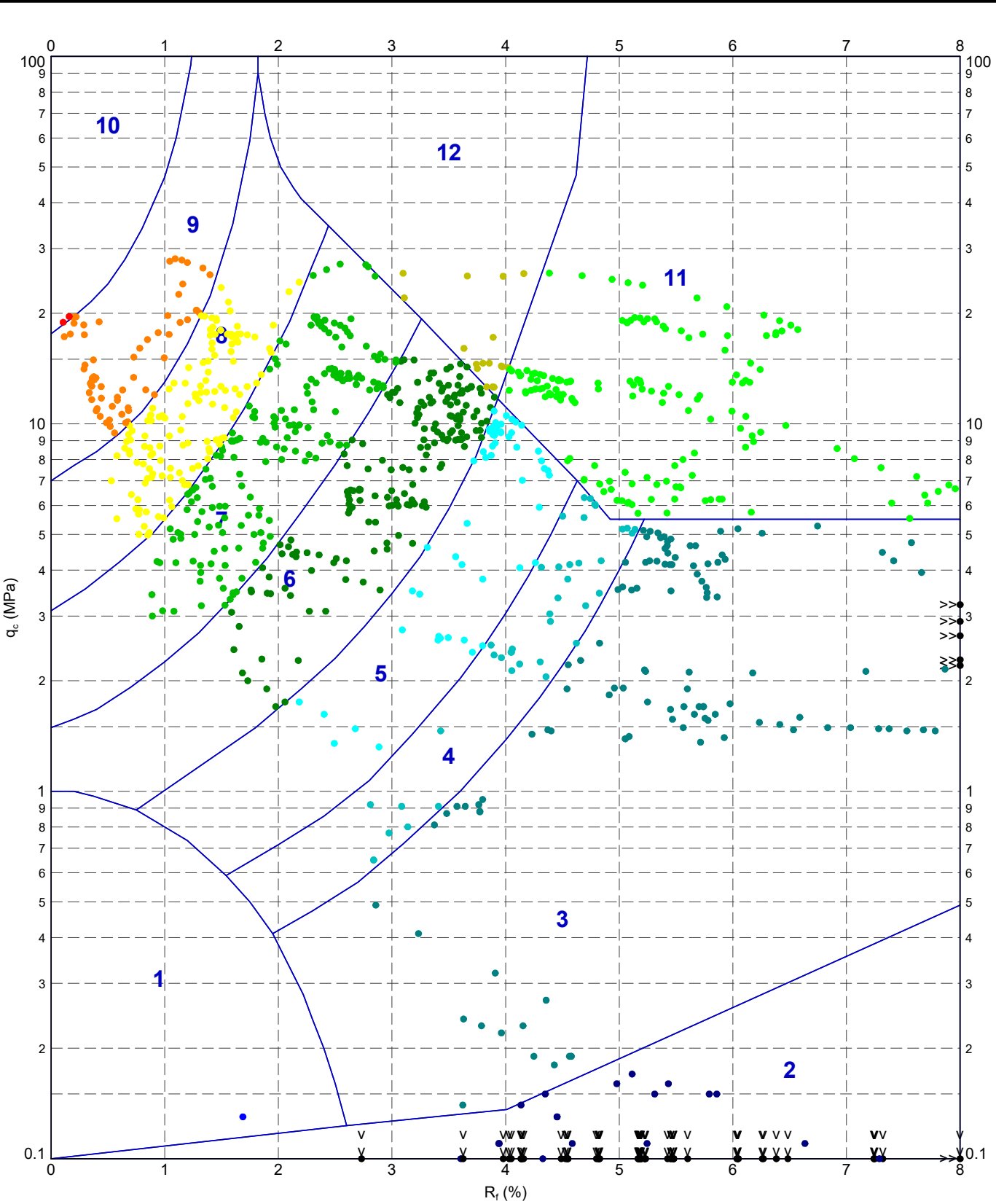
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 19/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86 QC VS. RF AMP: 1230122 A46 NEWARK BYPASS 2ND VISIT STRATA GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:24 10.03.00.09 Dargel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



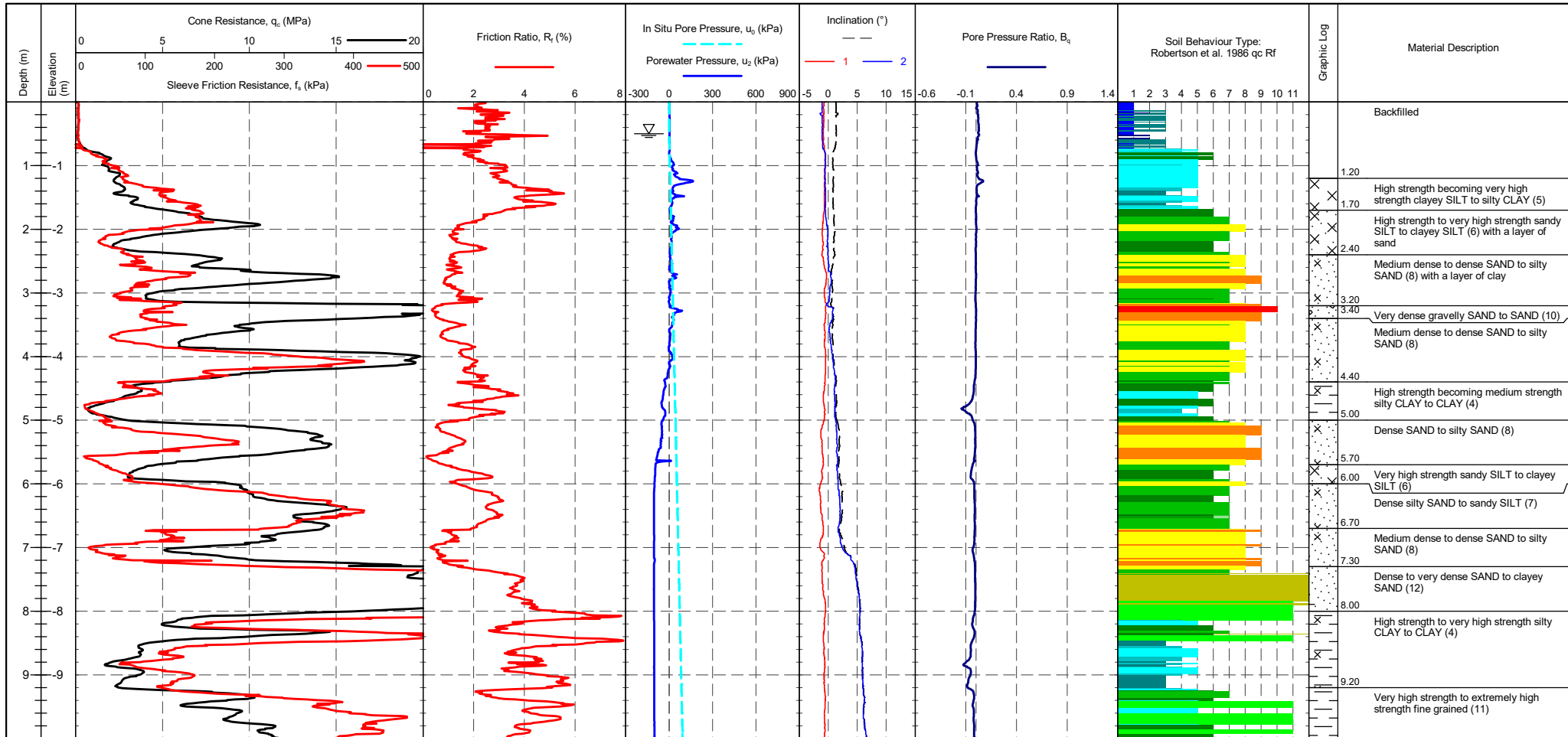
METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

	TITLE	Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 qc vs. Rf - S3CPT08	
	DRAWN	DATE	03/02/2023
	CHECKED	DATE	03/02/2023
	SCALE	Not To Scale	
PROJECT No	1230122		FIGURE No

PointID	S3CPT09
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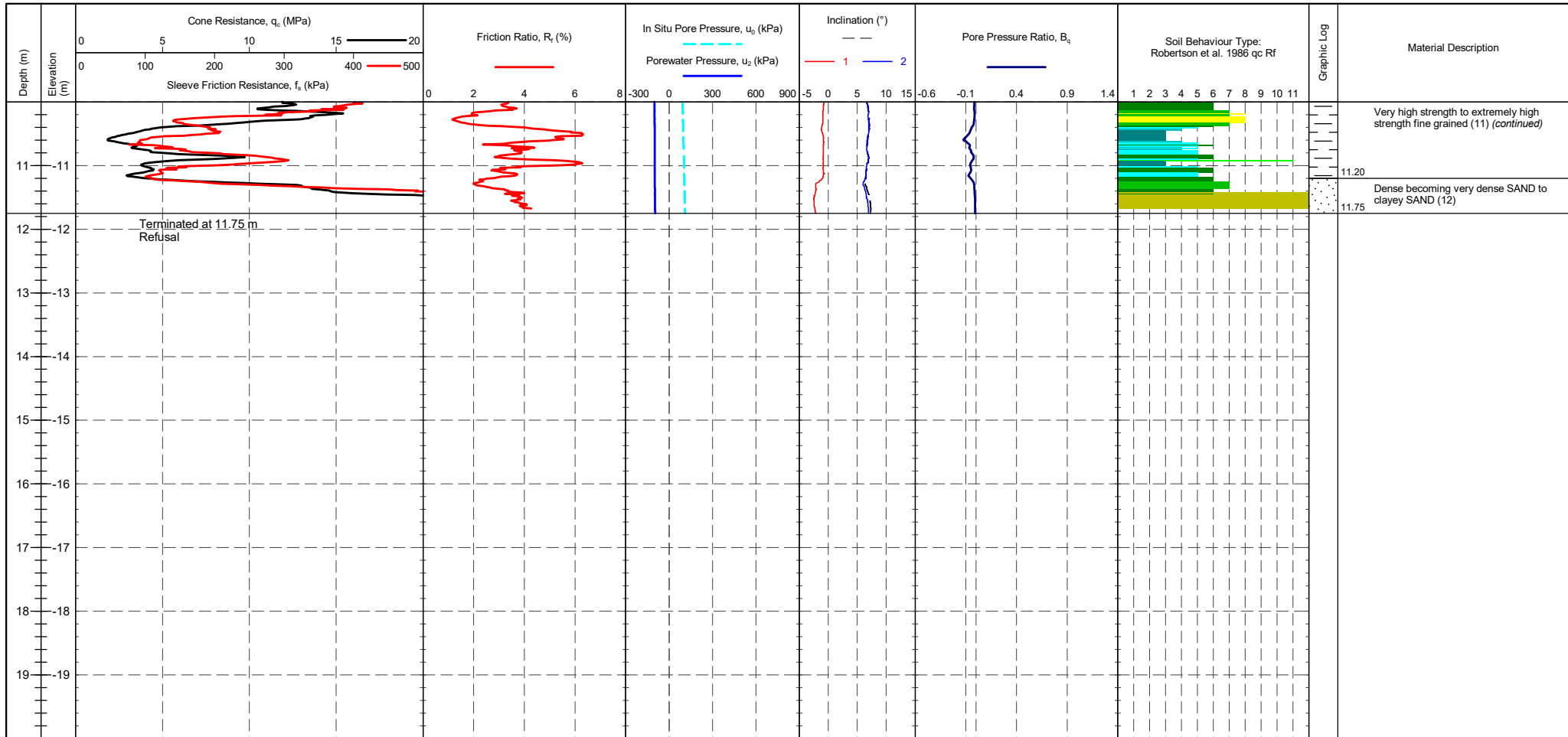
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 305 mV 302 mV -0.034 MPa Sleeve 305 mV 298 mV -0.005 kPa Pore Pressure 2 304 mV 5 mV -0.082 kPa X-Y Inclinometer 2480 mV 2481 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravely SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT09
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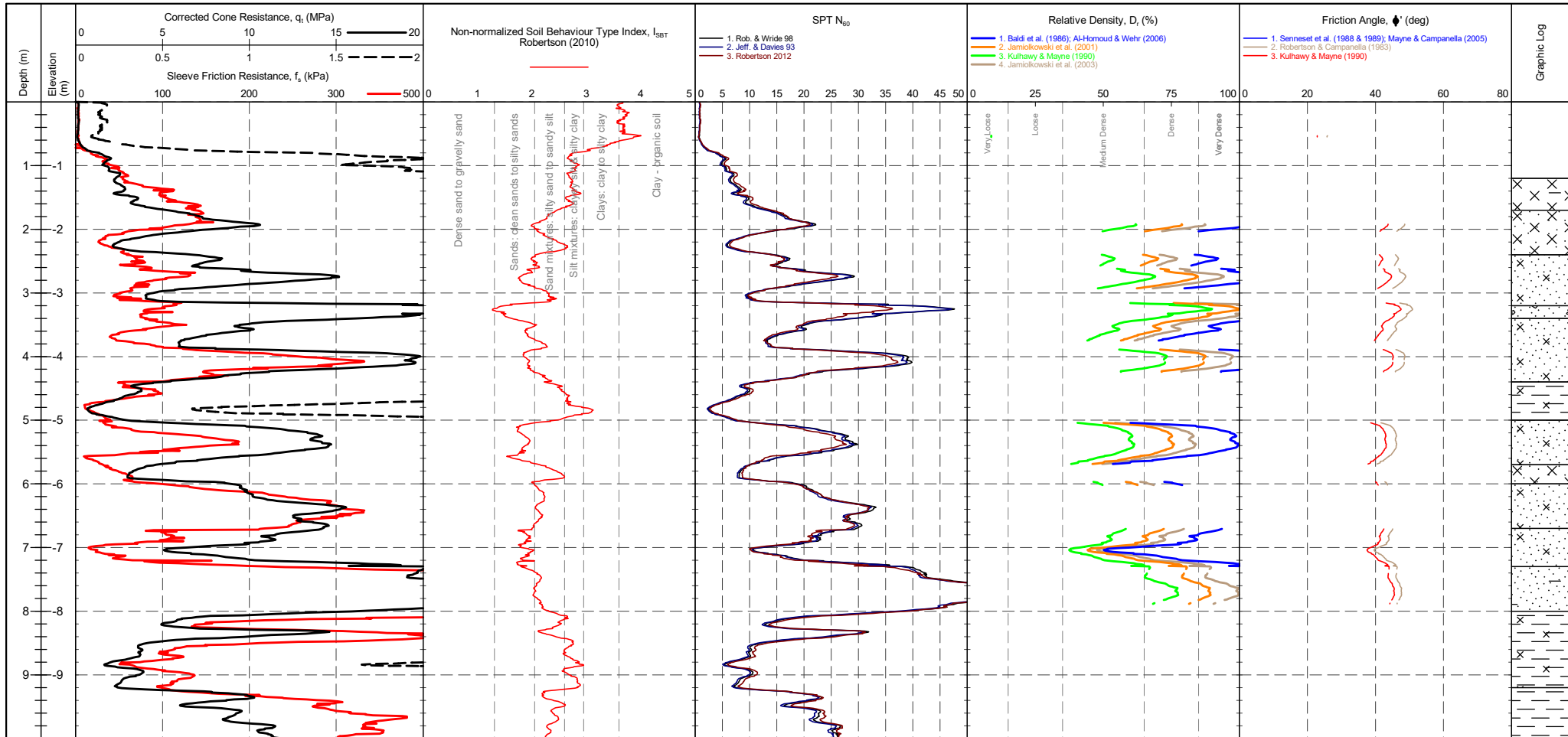
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S3CPT09

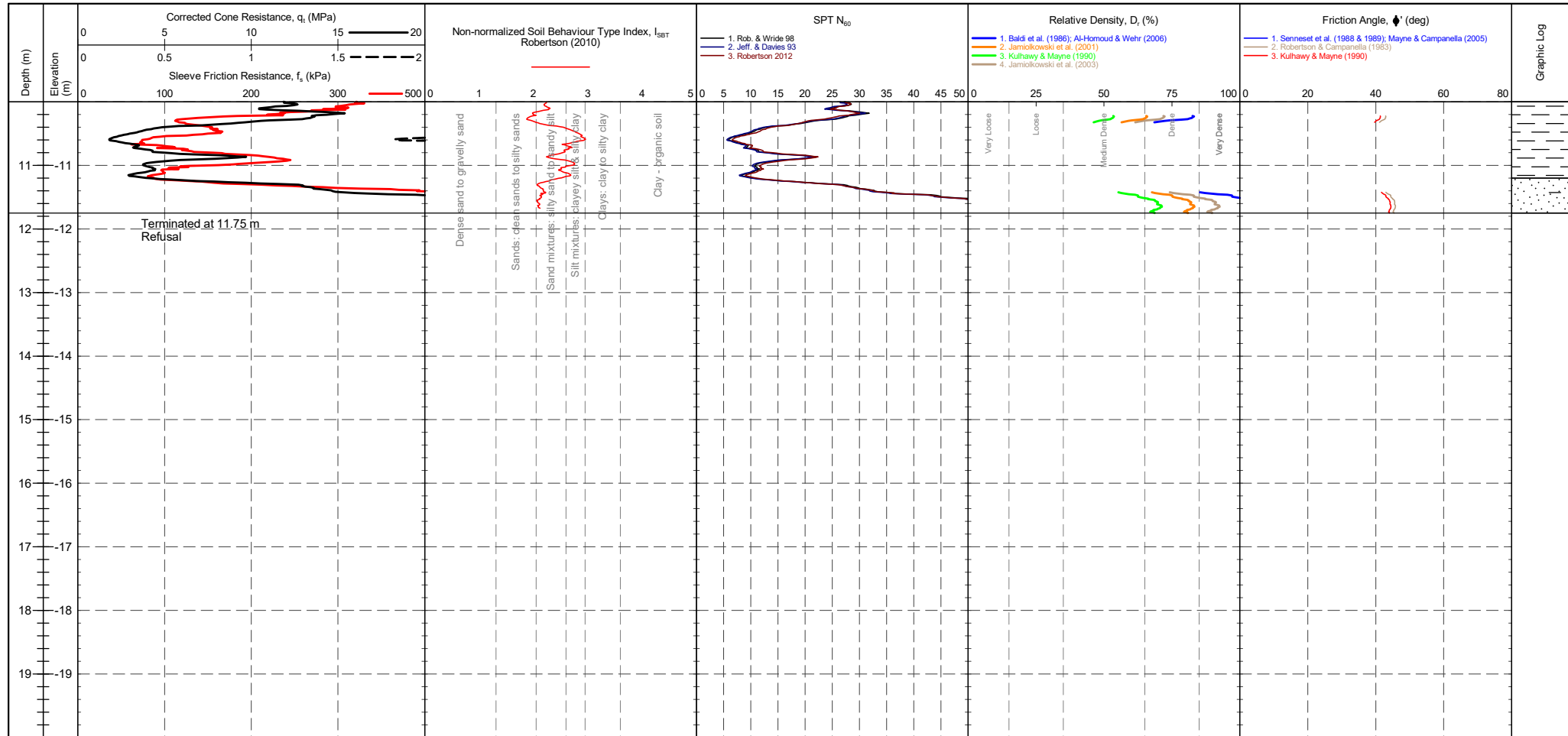
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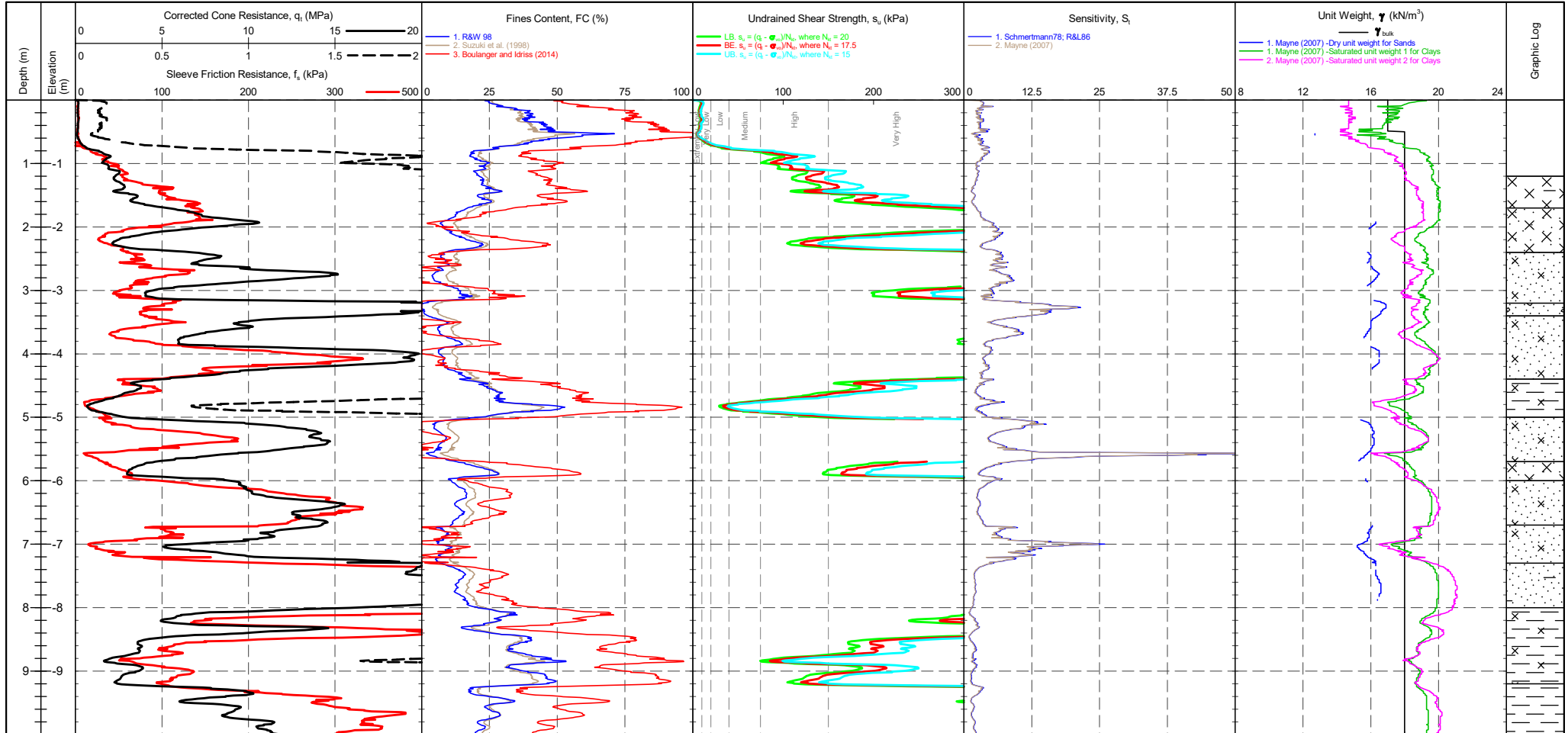
S3CPT09

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass - 2nd Visit
 LOCATION : A46 Newark Bypass
 PROJECT No. : 1230122

EASTING : 0.000 m
 NORTHING : 0.000 m
 ELEVATION : 0.000 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

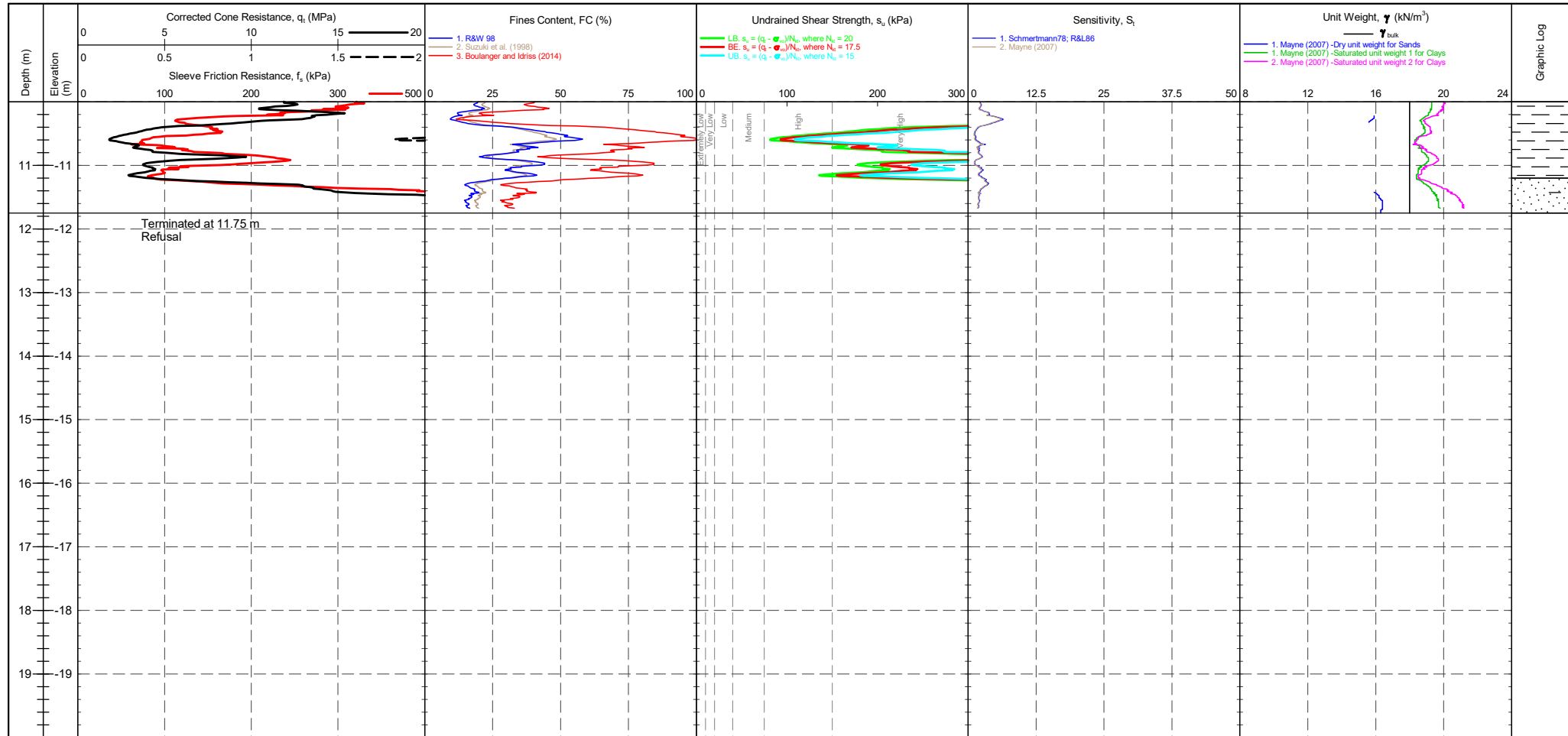
SHEET : 1 OF 2
 STATUS : Final
 TEST DATE : 20/01/2023
 PLOT DATE : 03/02/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICTION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES			COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 305 mV 305 mV 304 mV 2480 mV	Post 302 mV 298 mV 5 mV 2481 mV	Difference -0.034 MPa -0.005 kPa -0.082 kPa	Term based on measurement su (kPa)	Term based on measurement su (kPa)	Term based on measurement su (kPa)	

PointID
S3CPT09

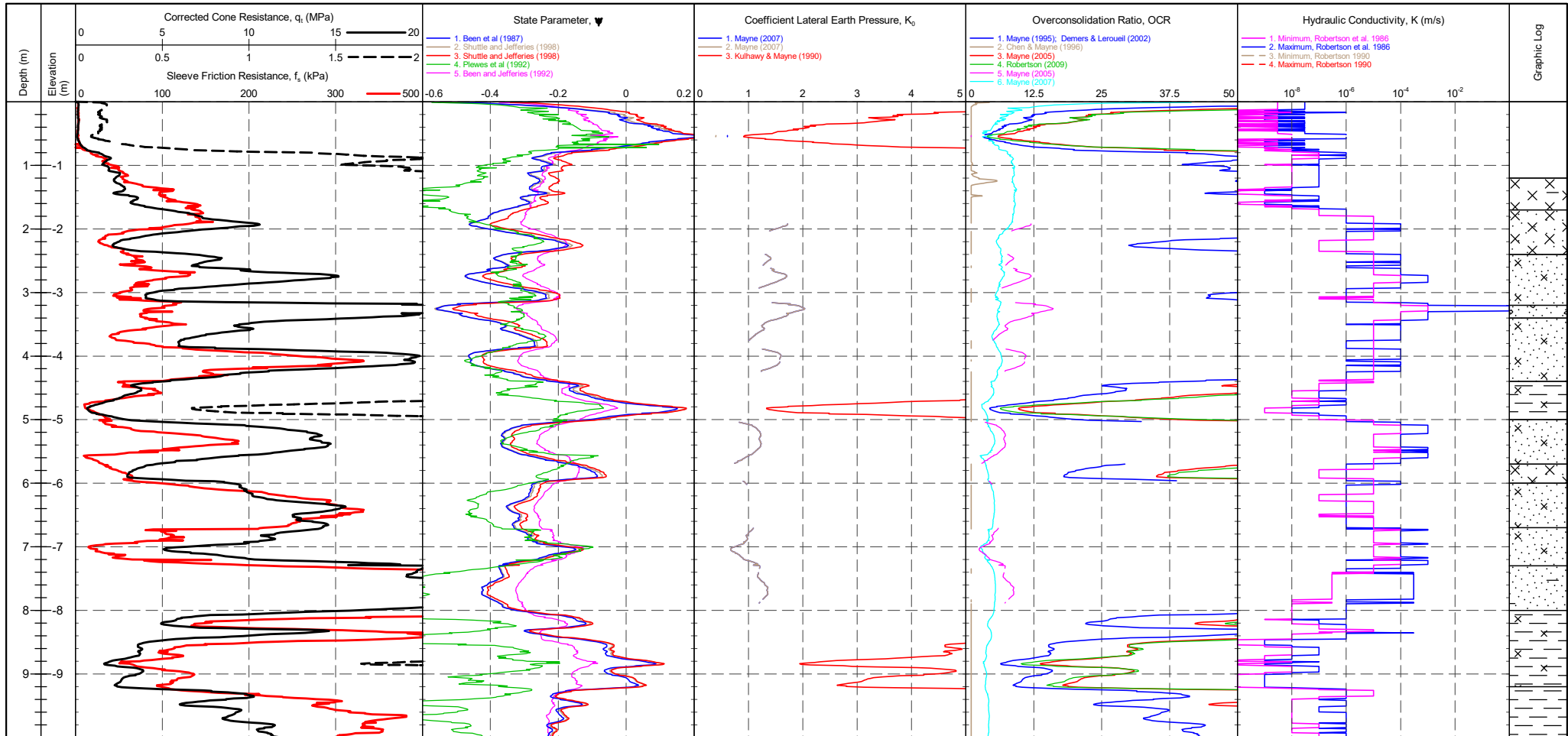
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>305 mV</td><td>302 mV</td><td>-0.034 MPa</td></tr> <tr><td>Sleeve</td><td>305 mV</td><td>298 mV</td><td>-0.005 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>304 mV</td><td>5 mV</td><td>-0.082 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2480 mV</td><td>2481 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	305 mV	302 mV	-0.034 MPa	Sleeve	305 mV	298 mV	-0.005 kPa	Pore Pressure 2	304 mV	5 mV	-0.082 kPa	X-Y Inclinator	2480 mV	2481 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>su (kPa)</th><th>Term based on measurement</th><th>su (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
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PointID
S3CPT09

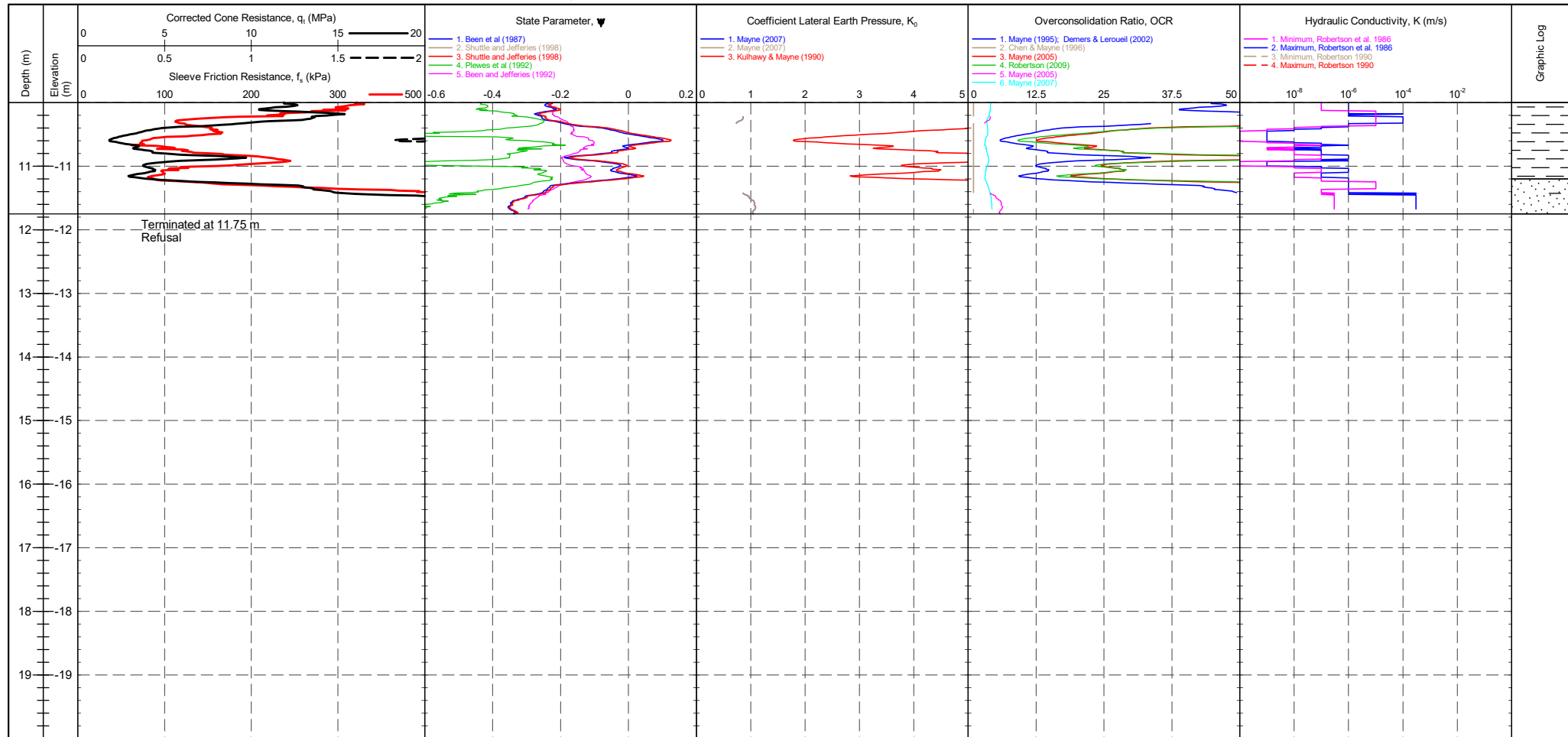
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>305 mV</td> <td>302 mV</td> <td>-0.034 MPa</td> </tr> <tr> <td>Sleeve</td> <td>305 mV</td> <td>298 mV</td> <td>-0.005 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>304 mV</td> <td>5 mV</td> <td>-0.082 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2480 mV</td> <td>2481 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	305 mV	302 mV	-0.034 MPa	Sleeve	305 mV	298 mV	-0.005 kPa	Pore Pressure 2	304 mV	5 mV	-0.082 kPa	X-Y Inclinator	2480 mV	2481 mV		Groundwater Level Dissipation Test
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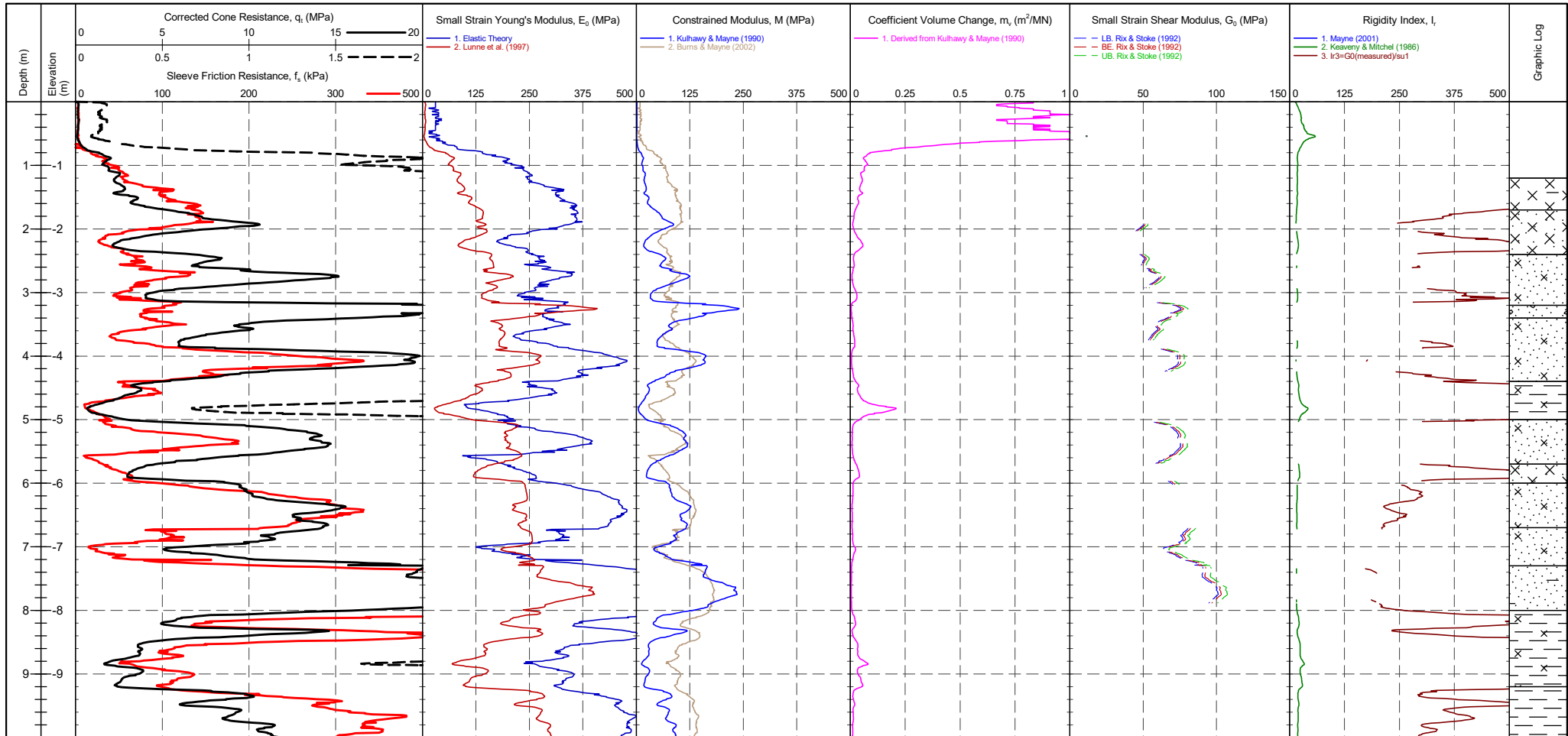
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>305 mV</td> <td>302 mV</td> <td>-0.034 MPa</td> </tr> <tr> <td>Sleeve</td> <td>305 mV</td> <td>298 mV</td> <td>-0.005 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>304 mV</td> <td>5 mV</td> <td>-0.082 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2480 mV</td> <td>2481 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	305 mV	302 mV	-0.034 MPa	Sleeve	305 mV	298 mV	-0.005 kPa	Pore Pressure 2	304 mV	5 mV	-0.082 kPa	X-Y Inclinator	2480 mV	2481 mV		Groundwater Level Dissipation Test
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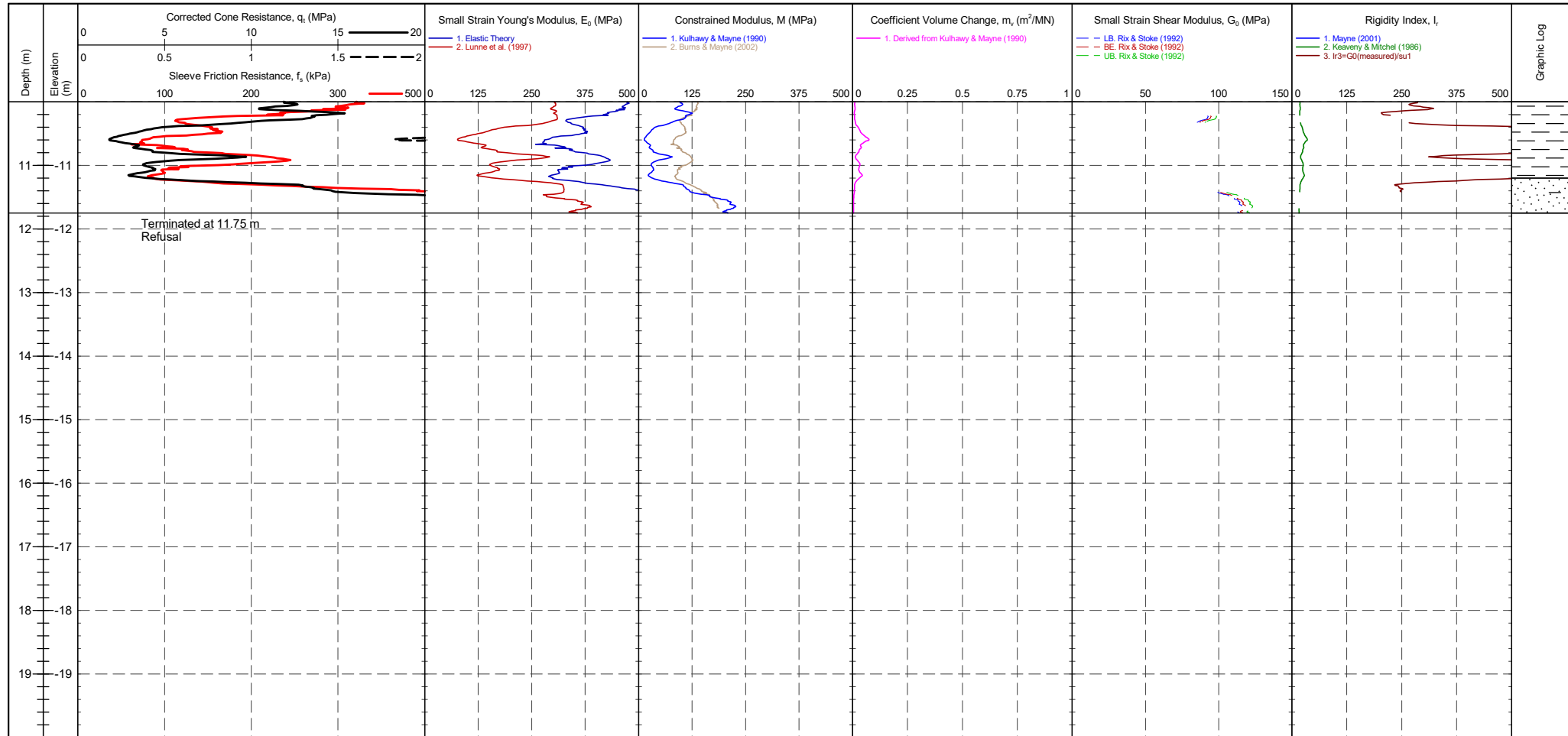
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><td>Transducer</td><td>Pre</td><td>Post</td><td>Difference</td></tr> <tr><td>Tip</td><td>305 mV</td><td>302 mV</td><td>-0.034 MPa</td></tr> <tr><td>Sleeve</td><td>305 mV</td><td>298 mV</td><td>-0.005 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>304 mV</td><td>5 mV</td><td>-0.082 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2480 mV</td><td>2481 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	305 mV	302 mV	-0.034 MPa	Sleeve	305 mV	298 mV	-0.005 kPa	Pore Pressure 2	304 mV	5 mV	-0.082 kPa	X-Y Inclinator	2480 mV	2481 mV		Groundwater Level Dissipation Test
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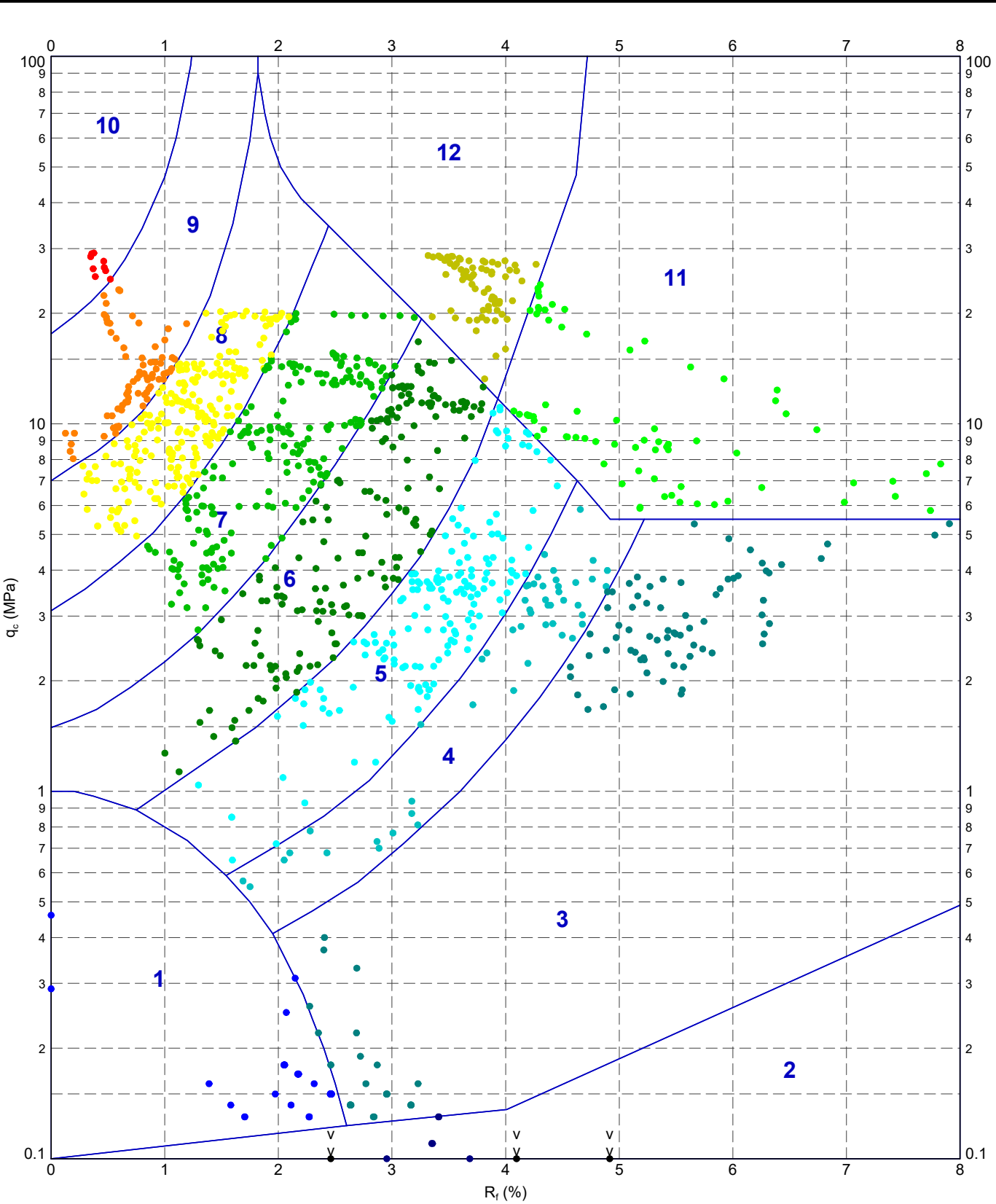
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>305 mV</td> <td>302 mV</td> <td>-0.034 MPa</td> </tr> <tr> <td>Sleeve</td> <td>305 mV</td> <td>298 mV</td> <td>-0.005 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>304 mV</td> <td>5 mV</td> <td>-0.082 kPa</td> </tr> <tr> <td>X-Y Inclinometer</td> <td>2480 mV</td> <td>2481 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	305 mV	302 mV	-0.034 MPa	Sleeve	305 mV	298 mV	-0.005 kPa	Pore Pressure 2	304 mV	5 mV	-0.082 kPa	X-Y Inclinometer	2480 mV	2481 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS. RF.AFP. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:26 10.03.0009 Dargel Lab and In Situ Tool - DGD Lib: In Situ SI 2.02.0 2017-07-10 Pjfi: In Situ SI 2.02.0 2017-07-10



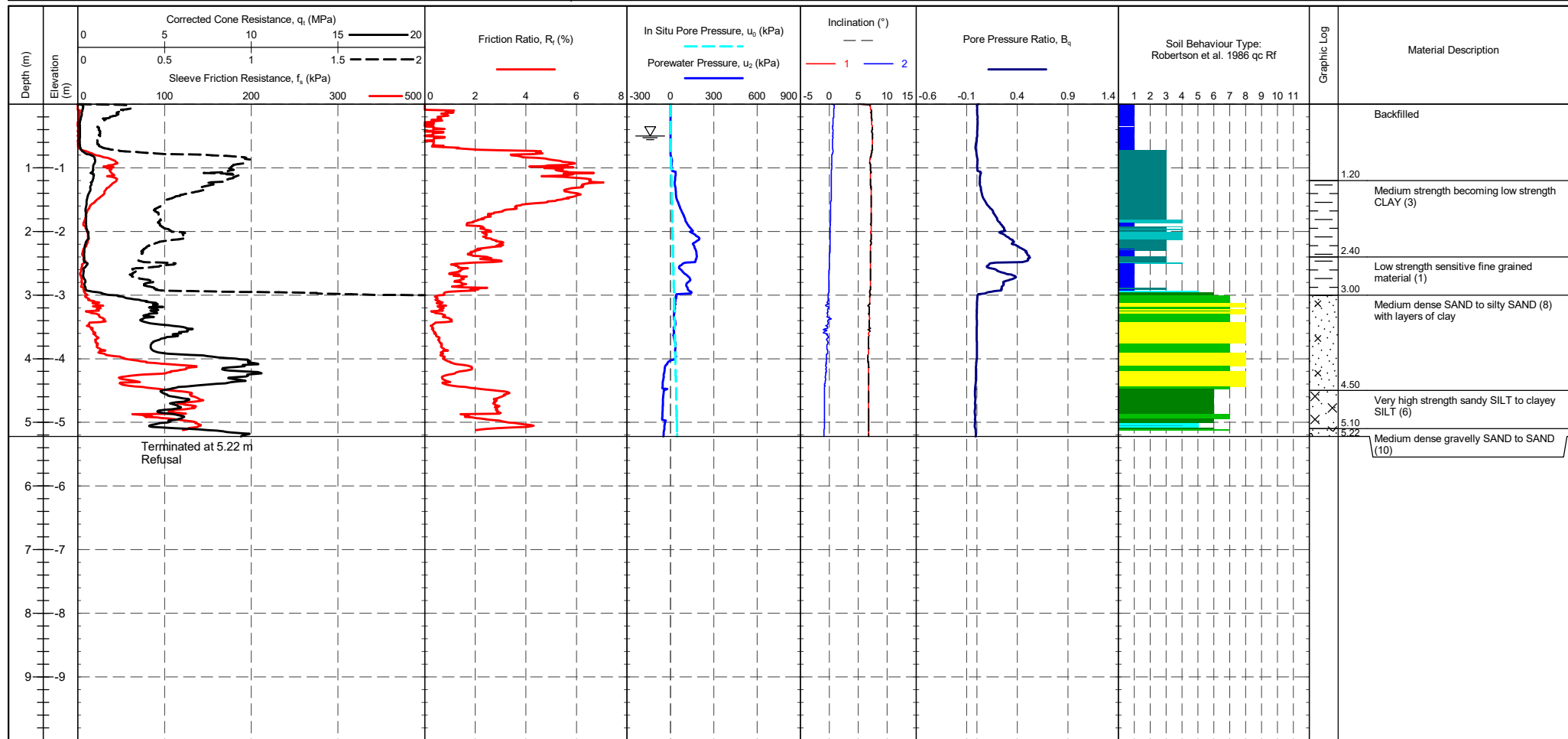
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics A46 Newark Bypass		CHECKED	DATE
	A46 Newark Bypass - 2nd Visit		SCALE	
	Robertson et al. 1986 qc vs. Rf - S3CPT09		Not To Scale	
		PROJECT No	FIGURE No	
		1230122		
		A4		

PointID
S3CPT10

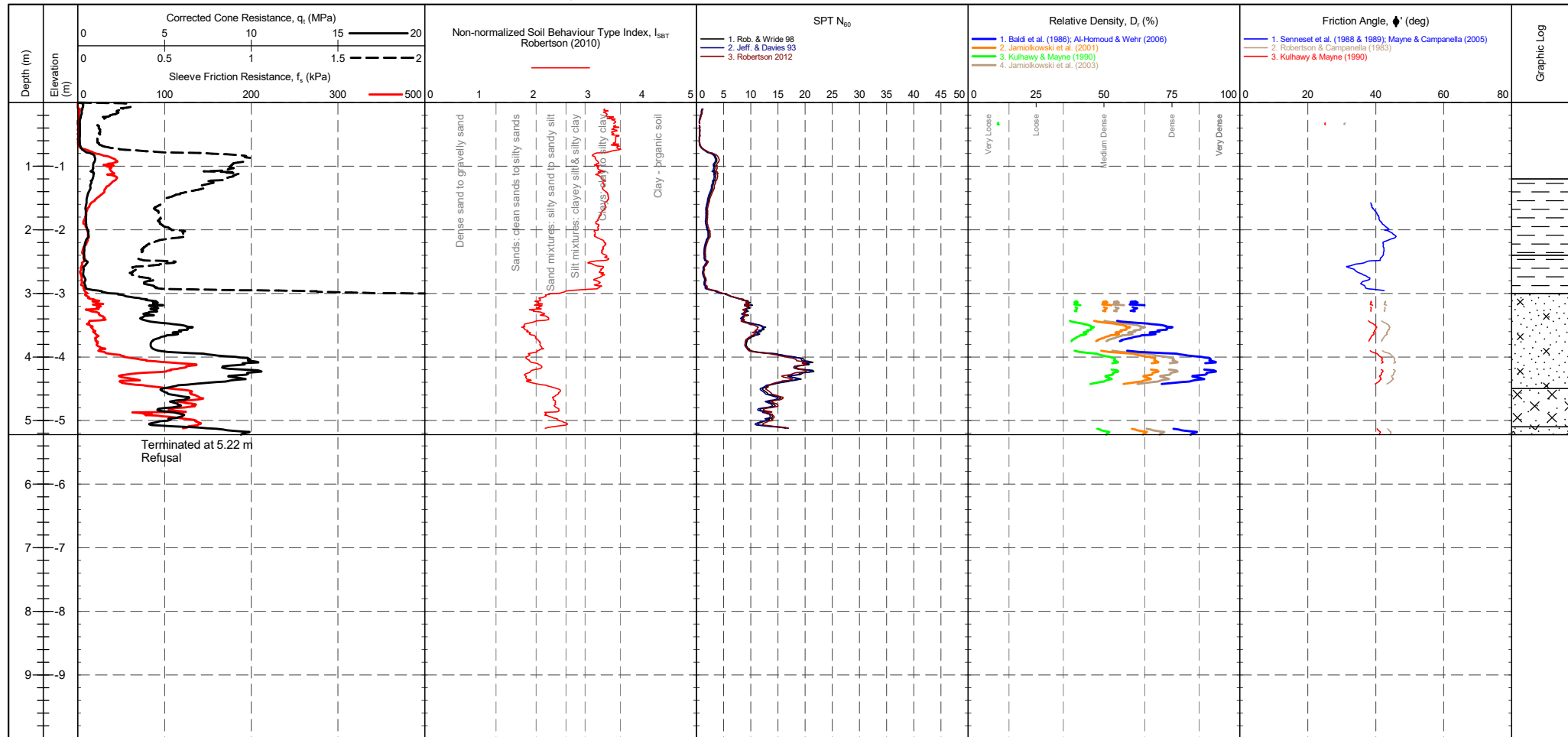
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CALIBRATION DATE : 10/12/2021 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.138</td> <td>0.149</td> <td>-0.0105</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0340</td> <td>0.0368</td> <td>-0.0028</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0222</td> <td>-0.0250</td> <td>0.0028</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>5.06</td> <td>5.74</td> <td>-0.679</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.337</td> <td>0.428</td> <td>-0.0915</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.138	0.149	-0.0105	Sleeve (kPa)	0.0340	0.0368	-0.0028	u2 (kPa)	-0.0222	-0.0250	0.0028	Inclinometer 1 (°)	5.06	5.74	-0.679	Inclinometer 2 (°)	0.337	0.428	-0.0915	METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
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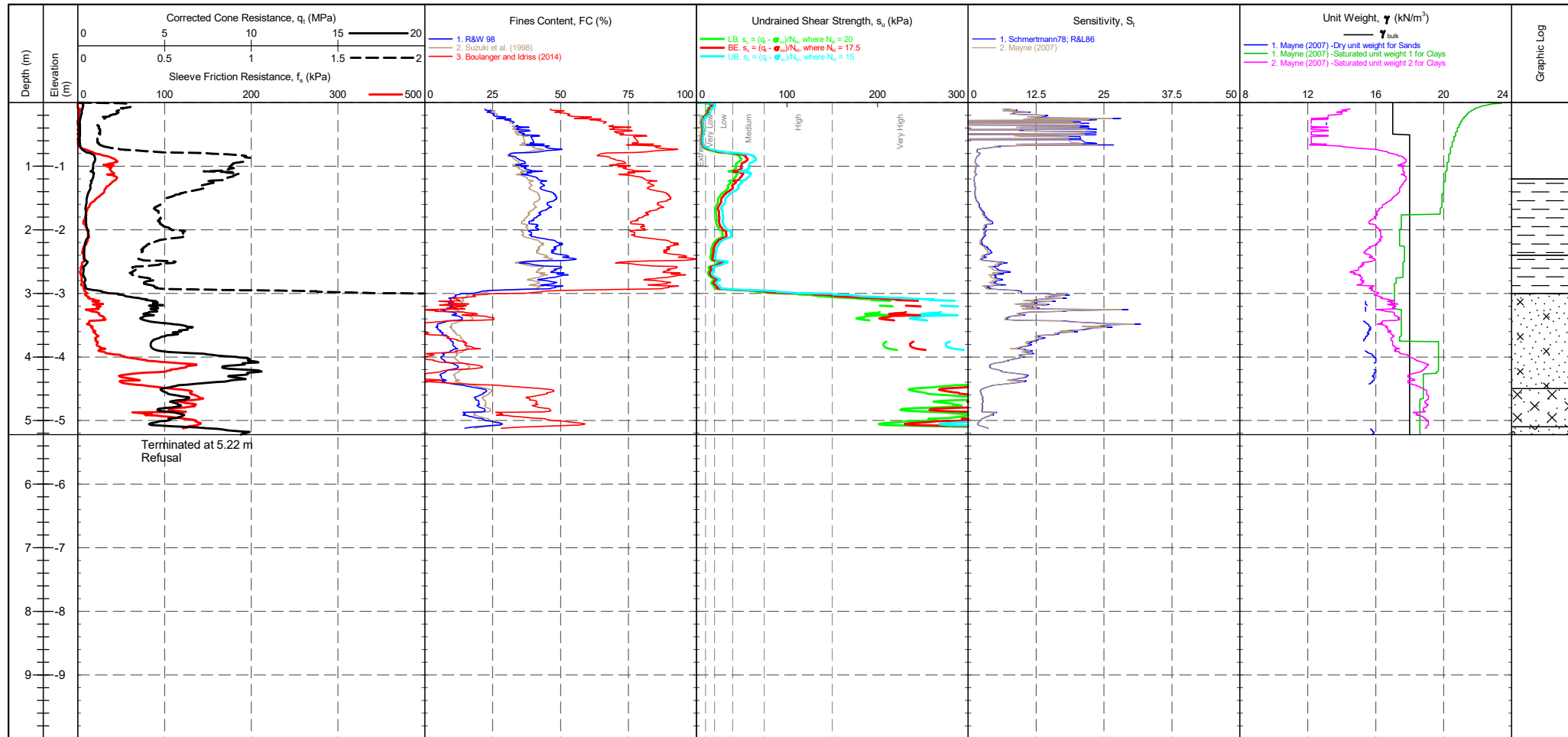
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.138</td> <td>0.149</td> <td>-0.0105</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0340</td> <td>0.0368</td> <td>-0.0028</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0222</td> <td>-0.0250</td> <td>0.0028</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>5.06</td> <td>5.74</td> <td>-0.679</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.337</td> <td>0.428</td> <td>-0.0915</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.138	0.149	-0.0105	Sleeve (kPa)	0.0340	0.0368	-0.0028	u2 (kPa)	-0.0222	-0.0250	0.0028	Inclinometer 1 (°)	5.06	5.74	-0.679	Inclinometer 2 (°)	0.337	0.428	-0.0915	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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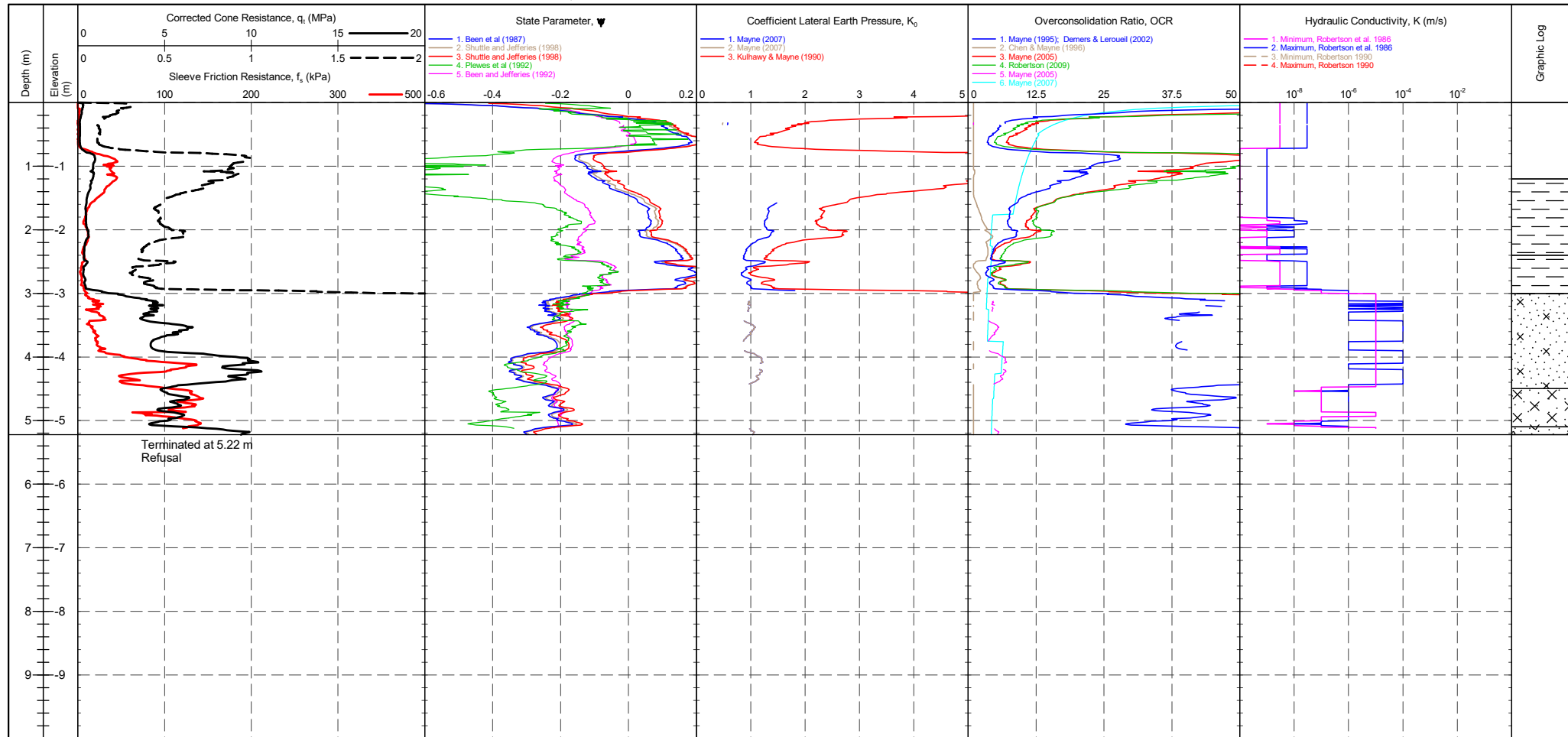
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.138</td> <td>0.149</td> <td>-0.0105</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0340</td> <td>0.0368</td> <td>-0.0028</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0222</td> <td>-0.0250</td> <td>0.0028</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>5.06</td> <td>5.74</td> <td>-0.679</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.337</td> <td>0.428</td> <td>-0.0915</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.138	0.149	-0.0105	Sleeve (kPa)	0.0340	0.0368	-0.0028	u2 (kPa)	-0.0222	-0.0250	0.0028	Inclinometer 1 (°)	5.06	5.74	-0.679	Inclinometer 2 (°)	0.337	0.428	-0.0915	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>s_u (kPa)</th> <th>Term based on measurement</th> <th>s_u (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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PointID
S3CPT10

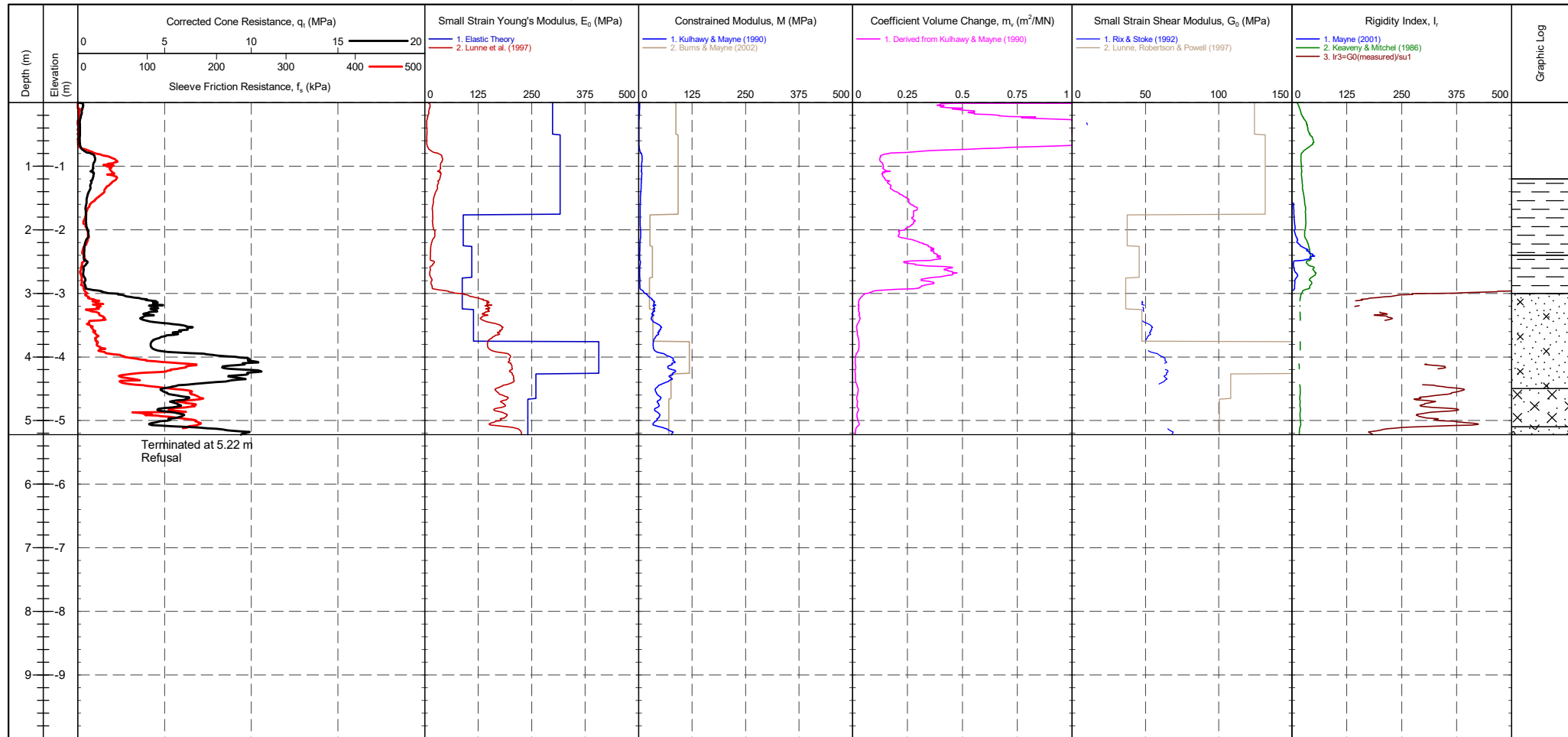
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.138</td> <td>0.149</td> <td>-0.0105</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0340</td> <td>0.0368</td> <td>-0.0028</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0222</td> <td>-0.0250</td> <td>0.0028</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>5.06</td> <td>5.74</td> <td>-0.679</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.337</td> <td>0.428</td> <td>-0.0915</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.138	0.149	-0.0105	Sleeve (kPa)	0.0340	0.0368	-0.0028	u2 (kPa)	-0.0222	-0.0250	0.0028	Inclinometer 1 (°)	5.06	5.74	-0.679	Inclinometer 2 (°)	0.337	0.428	-0.0915	Groundwater Level Dissipation Test
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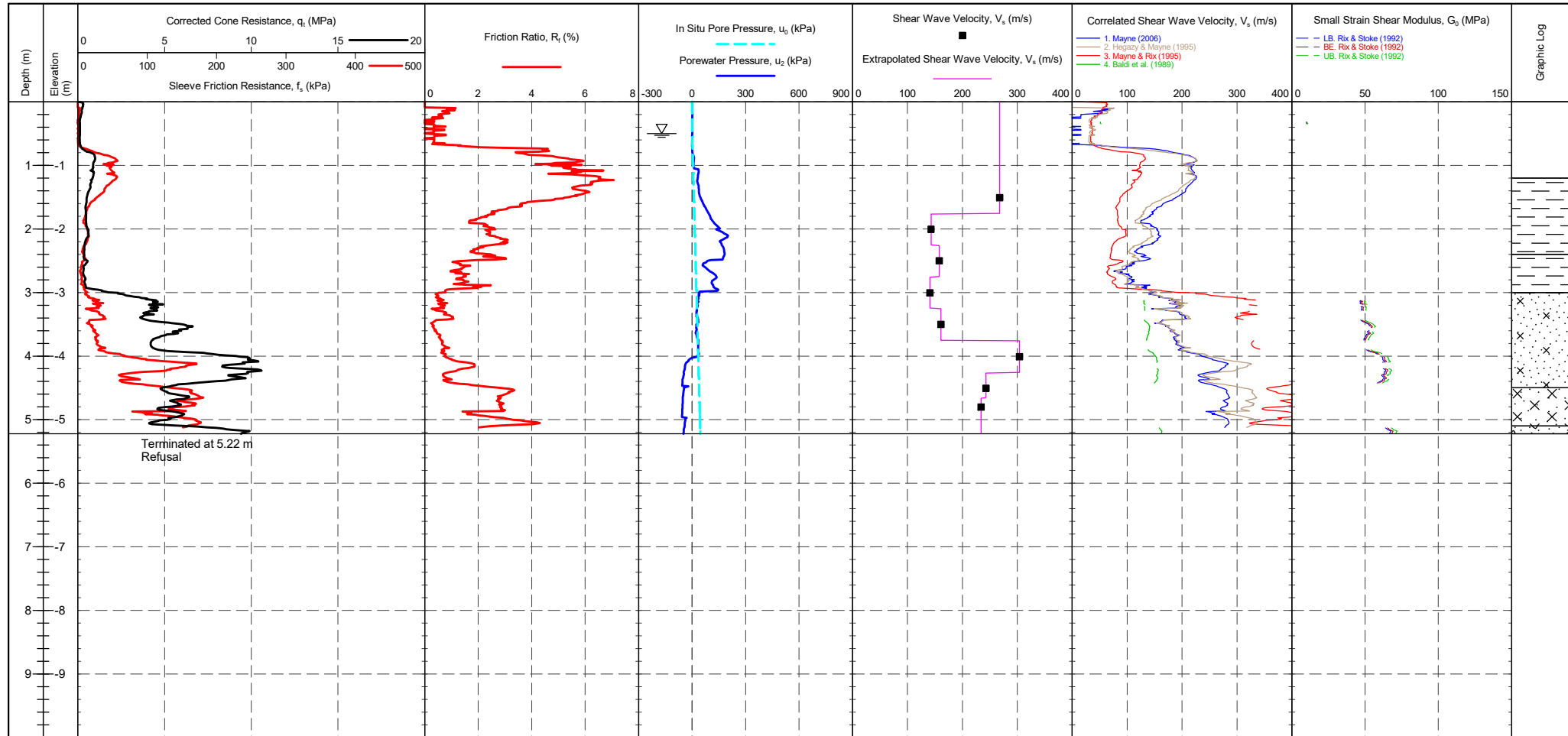
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.138</td> <td>0.149</td> <td>-0.0105</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0340</td> <td>0.0368</td> <td>-0.0028</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0222</td> <td>-0.0250</td> <td>0.0028</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>5.06</td> <td>5.74</td> <td>-0.679</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.337</td> <td>0.428</td> <td>-0.0915</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.138	0.149	-0.0105	Sleeve (kPa)	0.0340	0.0368	-0.0028	u2 (kPa)	-0.0222	-0.0250	0.0028	Inclinometer 1 (°)	5.06	5.74	-0.679	Inclinometer 2 (°)	0.337	0.428	-0.0915	Groundwater Level Dissipation Test
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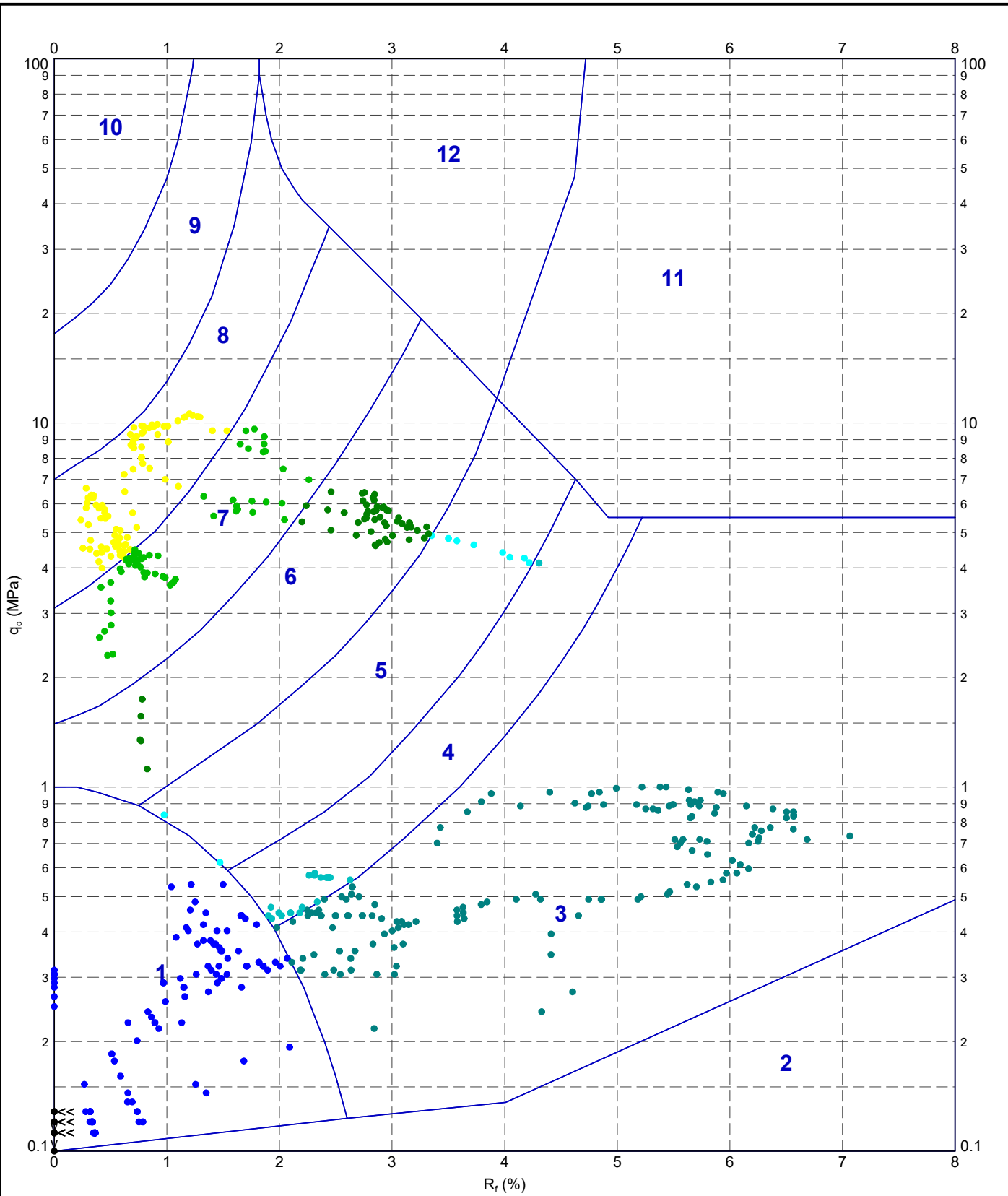
PointID	S3CPT10
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test stopped due to buckling rods.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.138</td> <td>0.149</td> <td>-0.0105</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0340</td> <td>0.0368</td> <td>-0.0028</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0222</td> <td>-0.0250</td> <td>0.0028</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>5.06</td> <td>5.74</td> <td>-0.679</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>0.337</td> <td>0.428</td> <td>-0.0915</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.138	0.149	-0.0105	Sleeve (kPa)	0.0340	0.0368	-0.0028	u2 (kPa)	-0.0222	-0.0250	0.0028	Inclinometer 1 (°)	5.06	5.74	-0.679	Inclinometer 2 (°)	0.337	0.428	-0.0915	Groundwater Level Dissipation Test
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220629-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VIS. RF.AMP. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:37 10.03.00.09 Dajugel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10]



METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

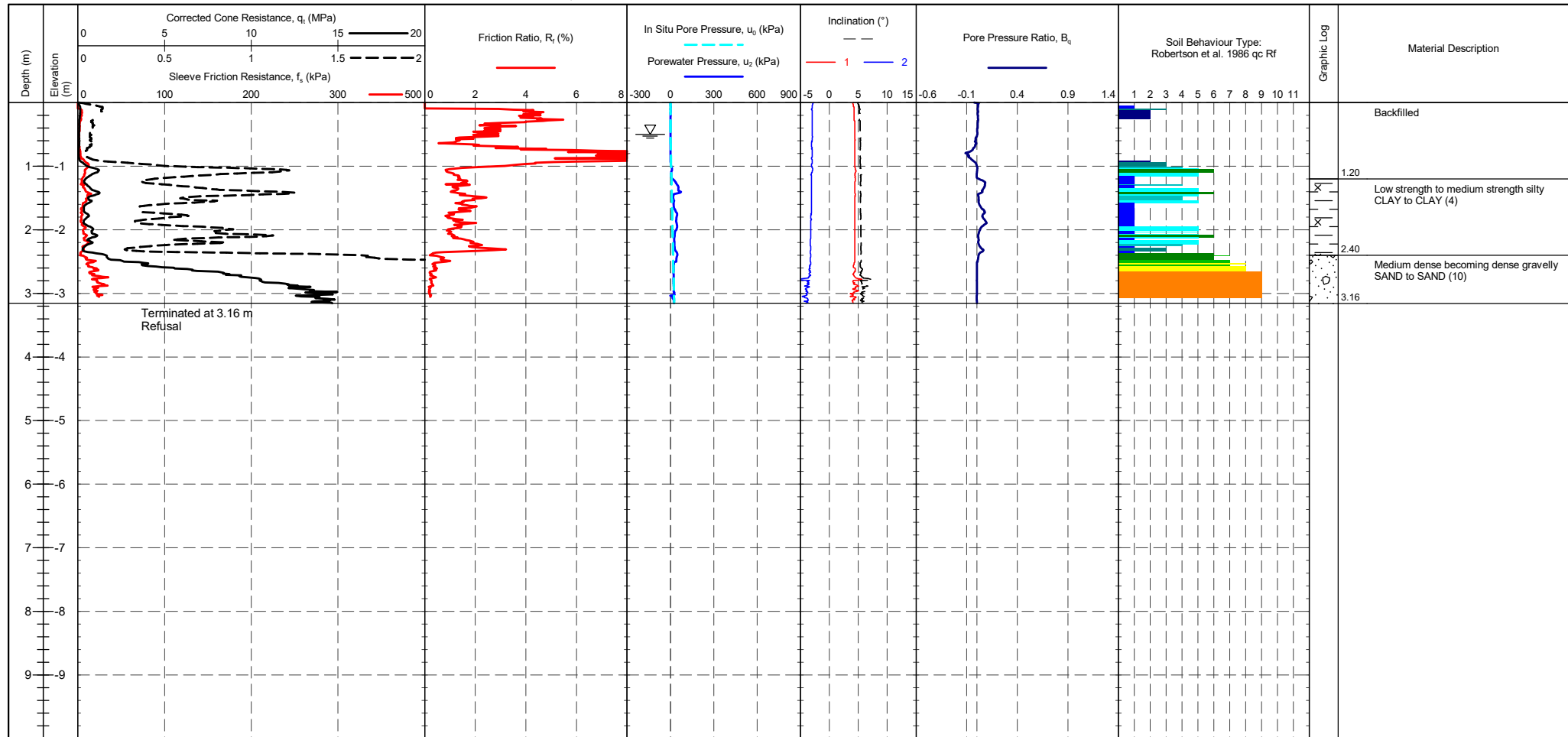


TITLE
Strata Geotechnics
A46 Newark Bypass
A46 Newark Bypass - 2nd Visit
Robertson et al. 1986 qc vs. Rf - S3CPT10

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CHECKED	DATE	03/02/2023
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PROJECT No	FIGURE No	1230122

PointID
S3CPT11

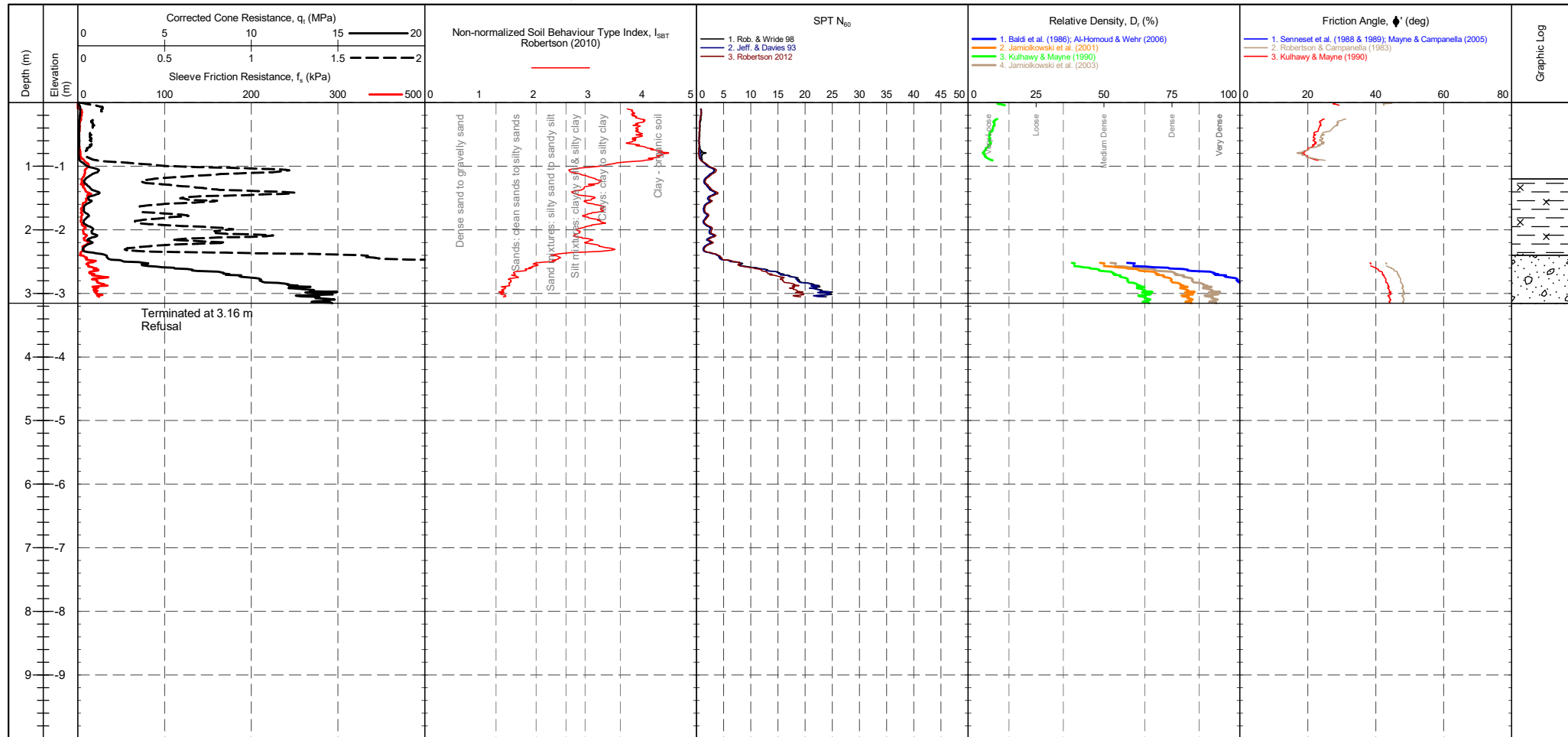
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CALIBRATION DATE : 10/12/2021 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <td>Transducer</td> <td>Pre</td> <td>Post</td> <td>Difference</td> </tr> <tr> <td>Tip (MPa)</td> <td>0.149</td> <td>0.140</td> <td>0.0089</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0352</td> <td>0.0362</td> <td>-0.001</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0223</td> <td>-0.0187</td> <td>-0.0037</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>4.16</td> <td>4.10</td> <td>0.0579</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>-2.71</td> <td>-2.99</td> <td>0.2778</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.149	0.140	0.0089	Sleeve (kPa)	0.0352	0.0362	-0.001	u2 (kPa)	-0.0223	-0.0187	-0.0037	Inclinometer 1 (°)	4.16	4.10	0.0579	Inclinometer 2 (°)	-2.71	-2.99	0.2778	METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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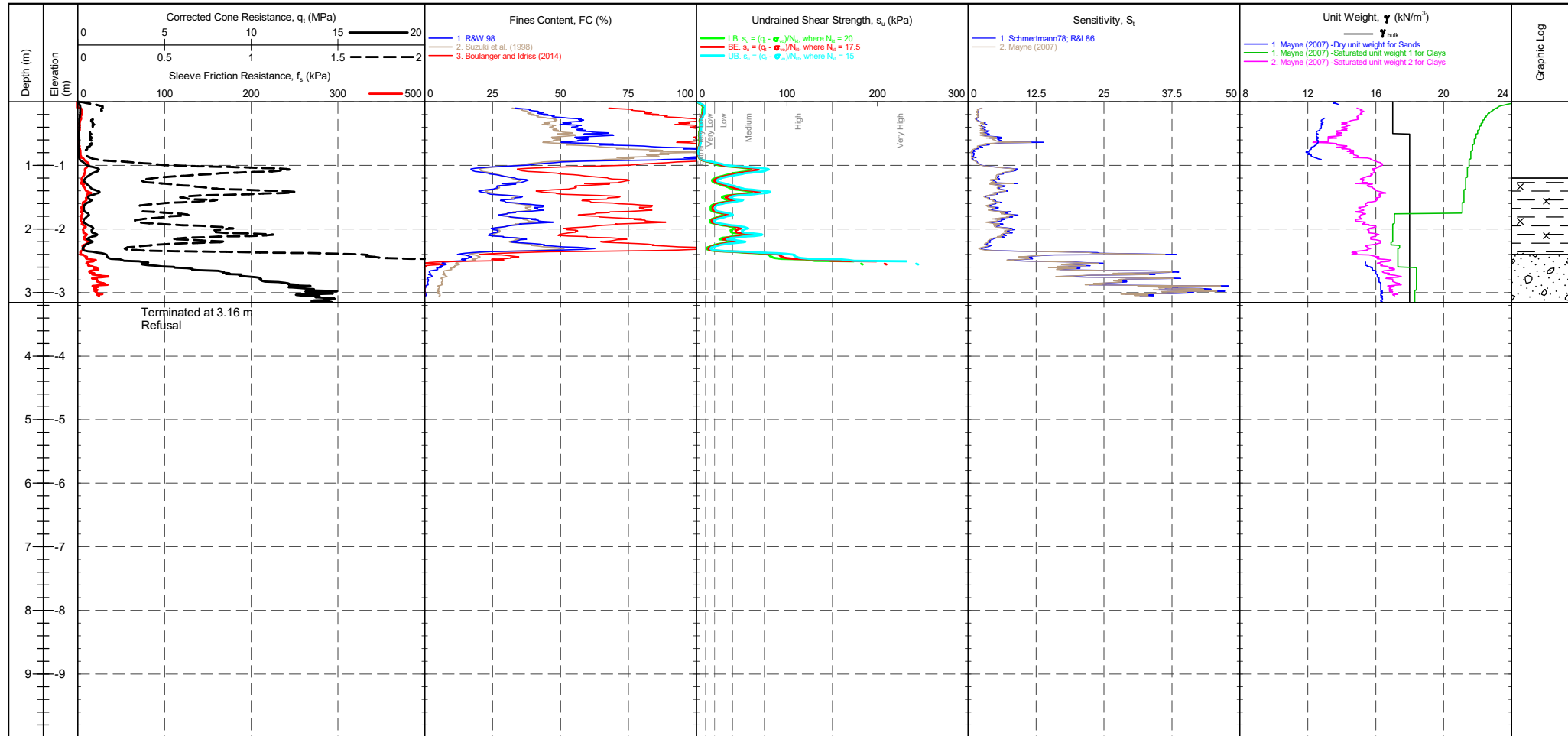
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip (MPa)</td><td>0.149</td><td>0.140</td><td>0.0089</td></tr> <tr><td>Sleeve (kPa)</td><td>0.0352</td><td>0.0362</td><td>-0.001</td></tr> <tr><td>u2 (kPa)</td><td>-0.0223</td><td>-0.0187</td><td>-0.0037</td></tr> <tr><td>Inclinometer 1 (°)</td><td>4.16</td><td>4.10</td><td>0.0579</td></tr> <tr><td>Inclinometer 2 (°)</td><td>-2.71</td><td>-2.99</td><td>0.2778</td></tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.149	0.140	0.0089	Sleeve (kPa)	0.0352	0.0362	-0.001	u2 (kPa)	-0.0223	-0.0187	-0.0037	Inclinometer 1 (°)	4.16	4.10	0.0579	Inclinometer 2 (°)	-2.71	-2.99	0.2778	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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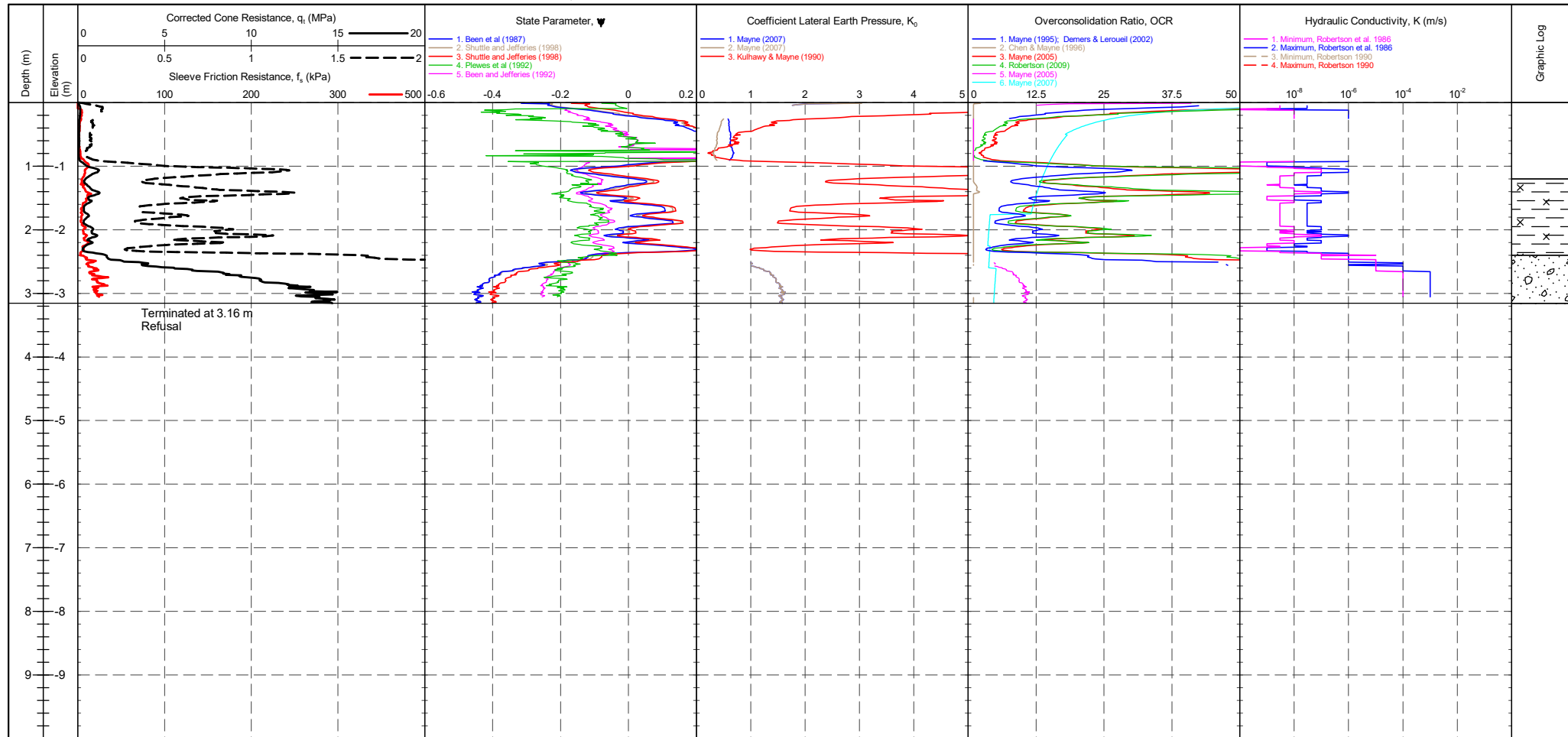
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.149</td> <td>0.140</td> <td>0.0089</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0352</td> <td>0.0362</td> <td>-0.001</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0223</td> <td>-0.0187</td> <td>-0.0037</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>4.16</td> <td>4.10</td> <td>0.0579</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>-2.71</td> <td>-2.99</td> <td>0.2778</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.149	0.140	0.0089	Sleeve (kPa)	0.0352	0.0362	-0.001	u2 (kPa)	-0.0223	-0.0187	-0.0037	Inclinometer 1 (°)	4.16	4.10	0.0579	Inclinometer 2 (°)	-2.71	-2.99	0.2778	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>su (kPa)</th> <th>Term based on measurement</th> <th>su (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	su (kPa)	Term based on measurement	su (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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PointID
S3CPT11

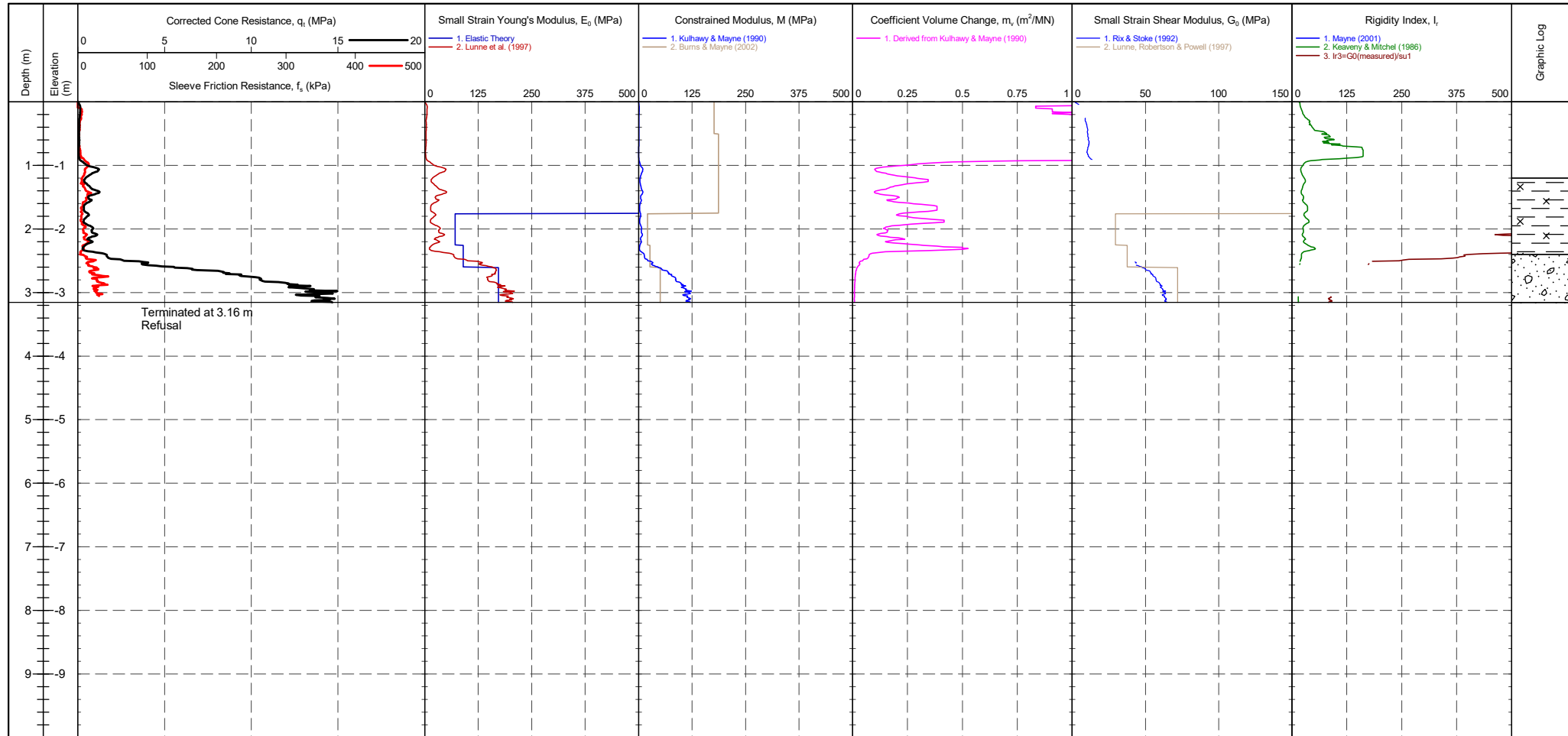
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.149</td> <td>0.140</td> <td>0.0089</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0352</td> <td>0.0362</td> <td>-0.001</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0223</td> <td>-0.0187</td> <td>-0.0037</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>4.16</td> <td>4.10</td> <td>0.0579</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>-2.71</td> <td>-2.99</td> <td>0.2778</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.149	0.140	0.0089	Sleeve (kPa)	0.0352	0.0362	-0.001	u2 (kPa)	-0.0223	-0.0187	-0.0037	Inclinometer 1 (°)	4.16	4.10	0.0579	Inclinometer 2 (°)	-2.71	-2.99	0.2778	Groundwater Level Dissipation Test
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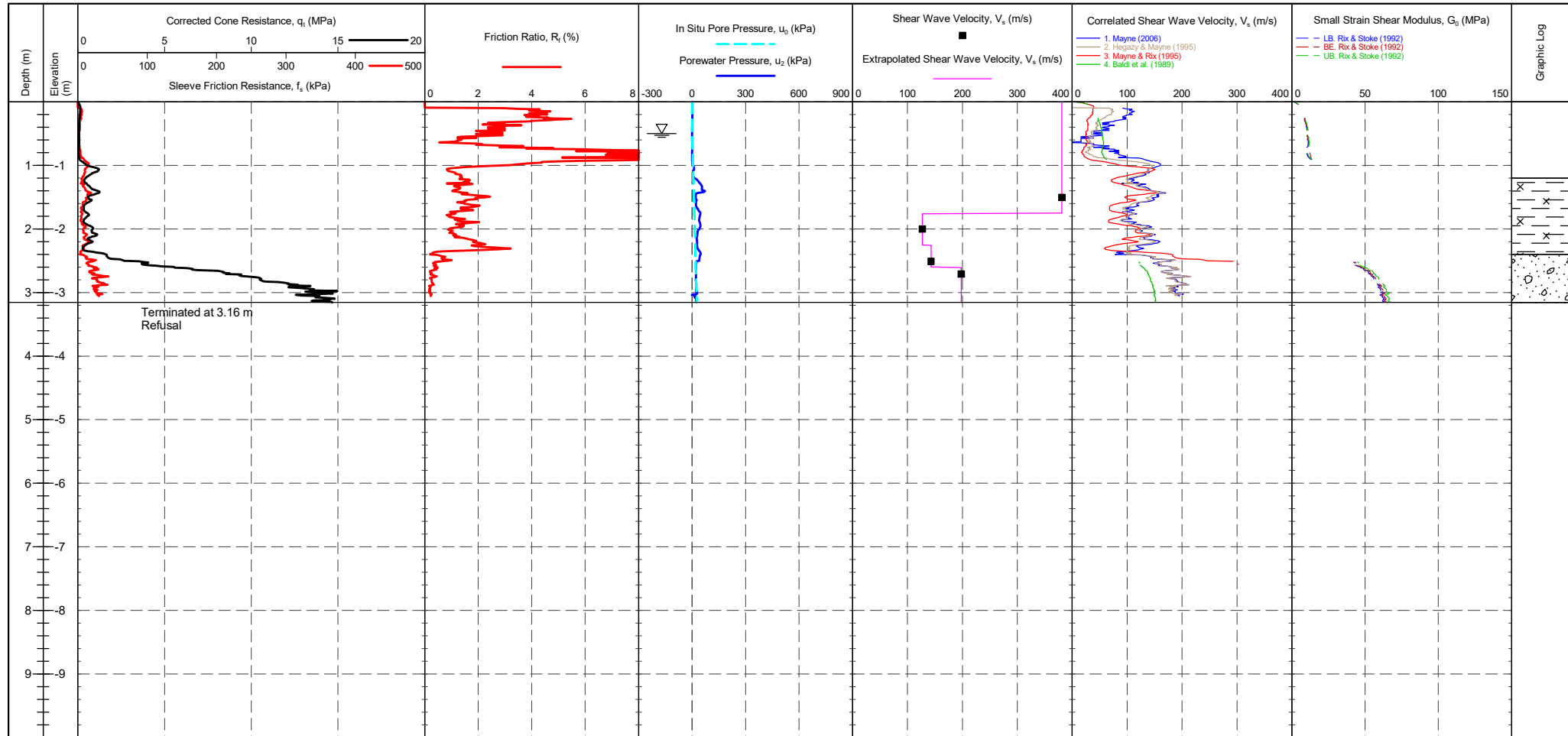
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.149</td> <td>0.140</td> <td>0.0089</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0352</td> <td>0.0362</td> <td>-0.001</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0223</td> <td>-0.0187</td> <td>-0.0037</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>4.16</td> <td>4.10</td> <td>0.0579</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>-2.71</td> <td>-2.99</td> <td>0.2778</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.149	0.140	0.0089	Sleeve (kPa)	0.0352	0.0362	-0.001	u2 (kPa)	-0.0223	-0.0187	-0.0037	Inclinometer 1 (°)	4.16	4.10	0.0579	Inclinometer 2 (°)	-2.71	-2.99	0.2778	Groundwater Level Dissipation Test
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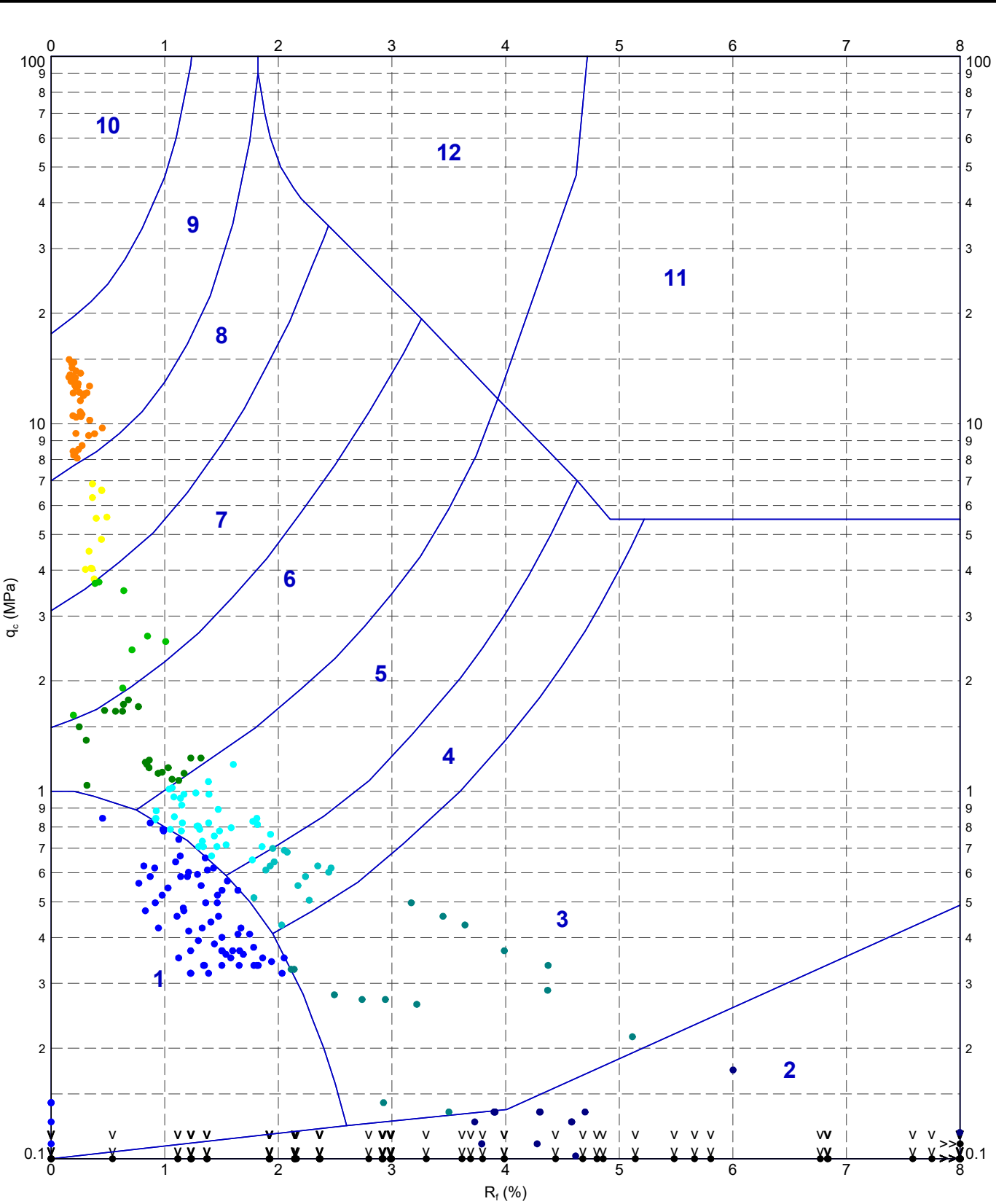
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 24/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : DP15-CFPTxy.71212 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.75 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC & CM FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip (MPa)</td> <td>0.149</td> <td>0.140</td> <td>0.0089</td> </tr> <tr> <td>Sleeve (kPa)</td> <td>0.0352</td> <td>0.0362</td> <td>-0.001</td> </tr> <tr> <td>u2 (kPa)</td> <td>-0.0223</td> <td>-0.0187</td> <td>-0.0037</td> </tr> <tr> <td>Inclinometer 1 (°)</td> <td>4.16</td> <td>4.10</td> <td>0.0579</td> </tr> <tr> <td>Inclinometer 2 (°)</td> <td>-2.71</td> <td>-2.99</td> <td>0.2778</td> </tr> </table>	Transducer	Pre	Post	Difference	Tip (MPa)	0.149	0.140	0.0089	Sleeve (kPa)	0.0352	0.0362	-0.001	u2 (kPa)	-0.0223	-0.0187	-0.0037	Inclinometer 1 (°)	4.16	4.10	0.0579	Inclinometer 2 (°)	-2.71	-2.99	0.2778	Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS.RF.AMP. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:38 10.03.00.09 Dajugel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



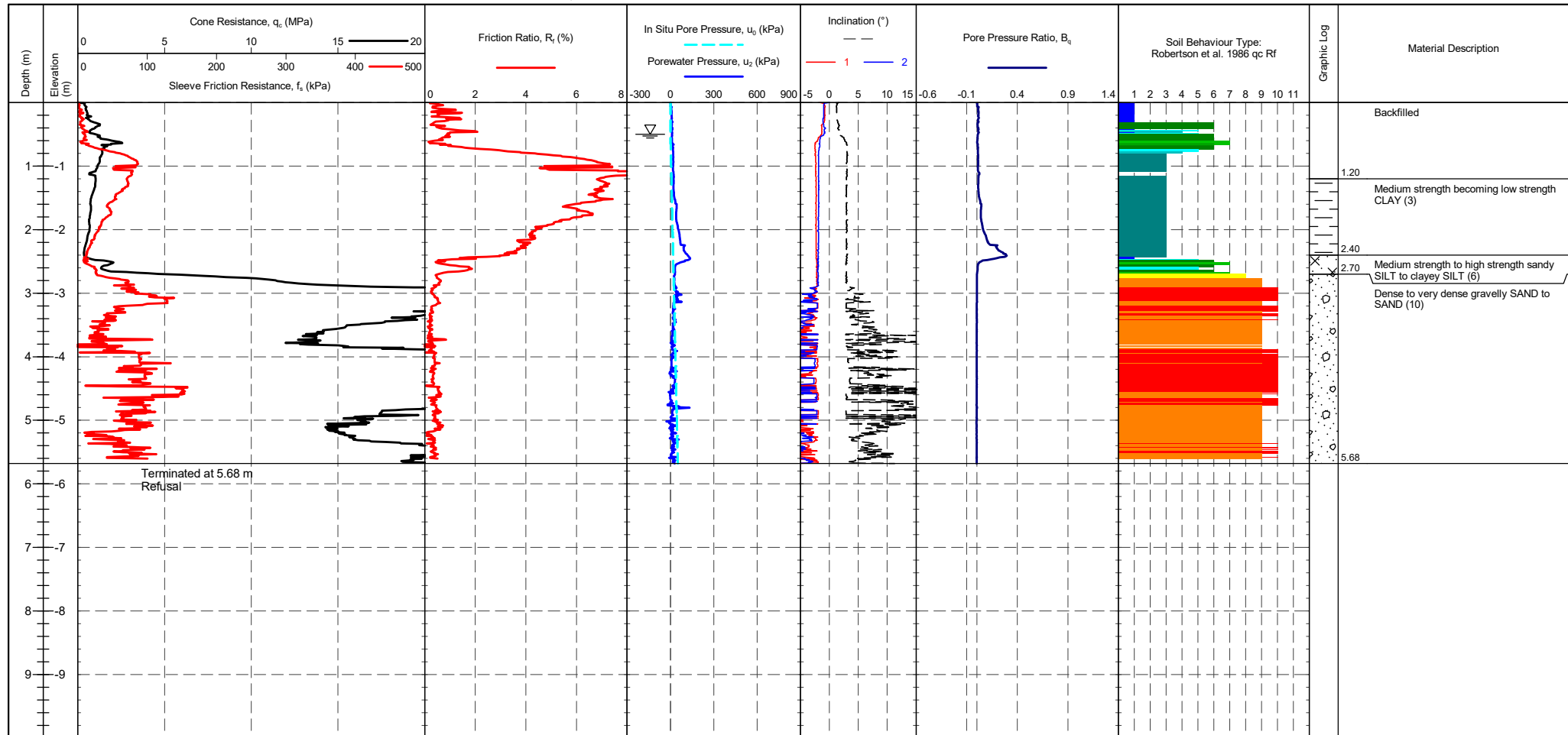
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	<p>TITLE</p> <p>Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 qc vs. Rf - S3CPT11</p>	DRAWN	DATE	03/02/2023	
		CHECKED	DATE	03/02/2023	
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		PROJECT No	FIGURE No		
	1230122				

PointID	S3CPT19
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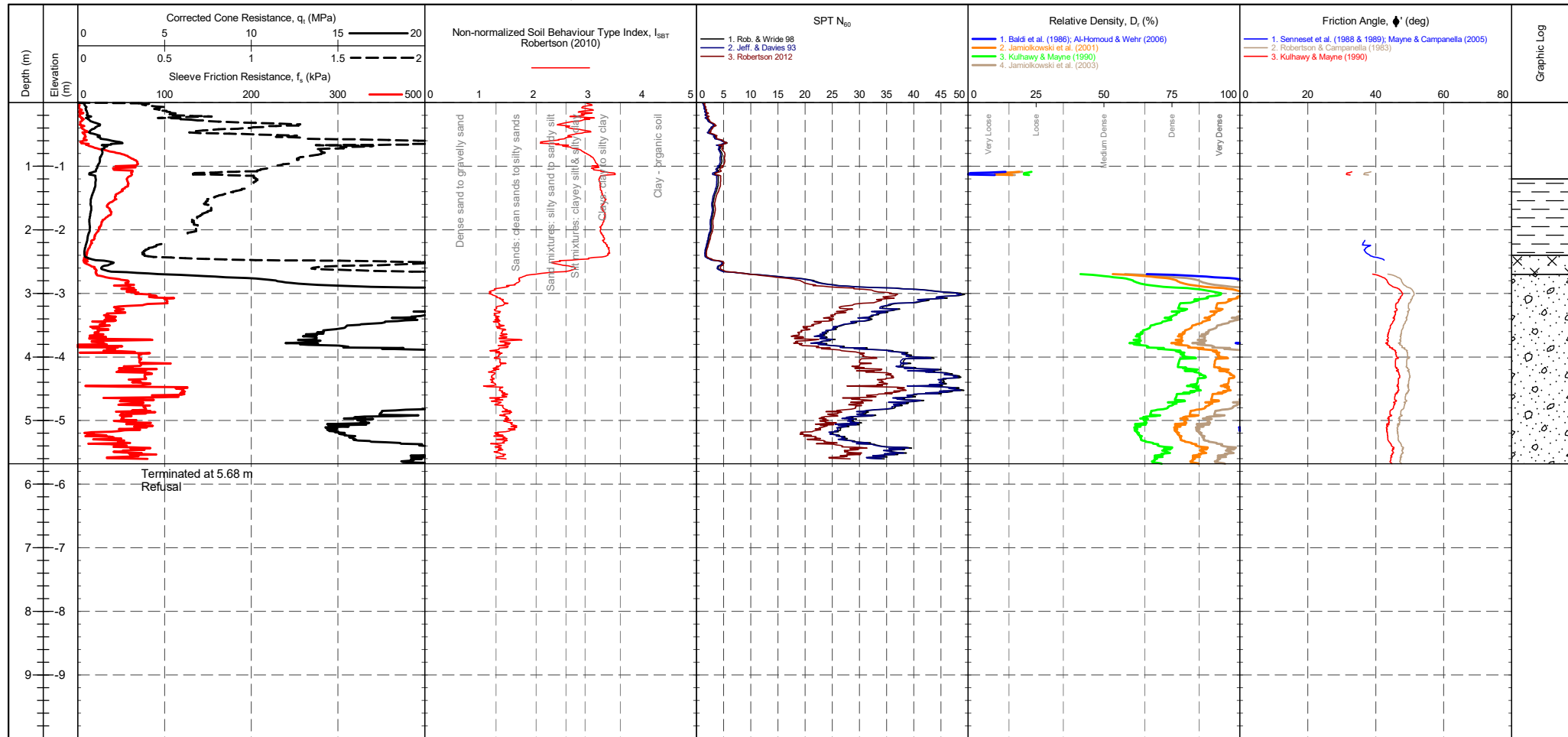
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CALIBRATION DATE : 02/01/2023 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: Pre 356 mV, Post 352 mV, Difference -0.044 MPa Sleeve: Pre 303 mV, Post 300 mV, Difference -0.002 kPa Pore Pressure 2: Pre 308 mV, Post 275 mV, Difference -0.009 kPa X-Y Inclinator: Pre 2318 mV, Post 2346 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT19

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES Transducer Tip: Pre 356 mV, Post 352 mV, Difference -0.044 MPa Sleeve: Pre 303 mV, Post 300 mV, Difference -0.002 kPa Pore Pressure 2: Pre 308 mV, Post 275 mV, Difference -0.009 kPa X-Y Inclinator: Pre 2318 mV, Post 2346 mV	GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I_c	Description	SPT N value, NSPT	Description	Relative Density D_r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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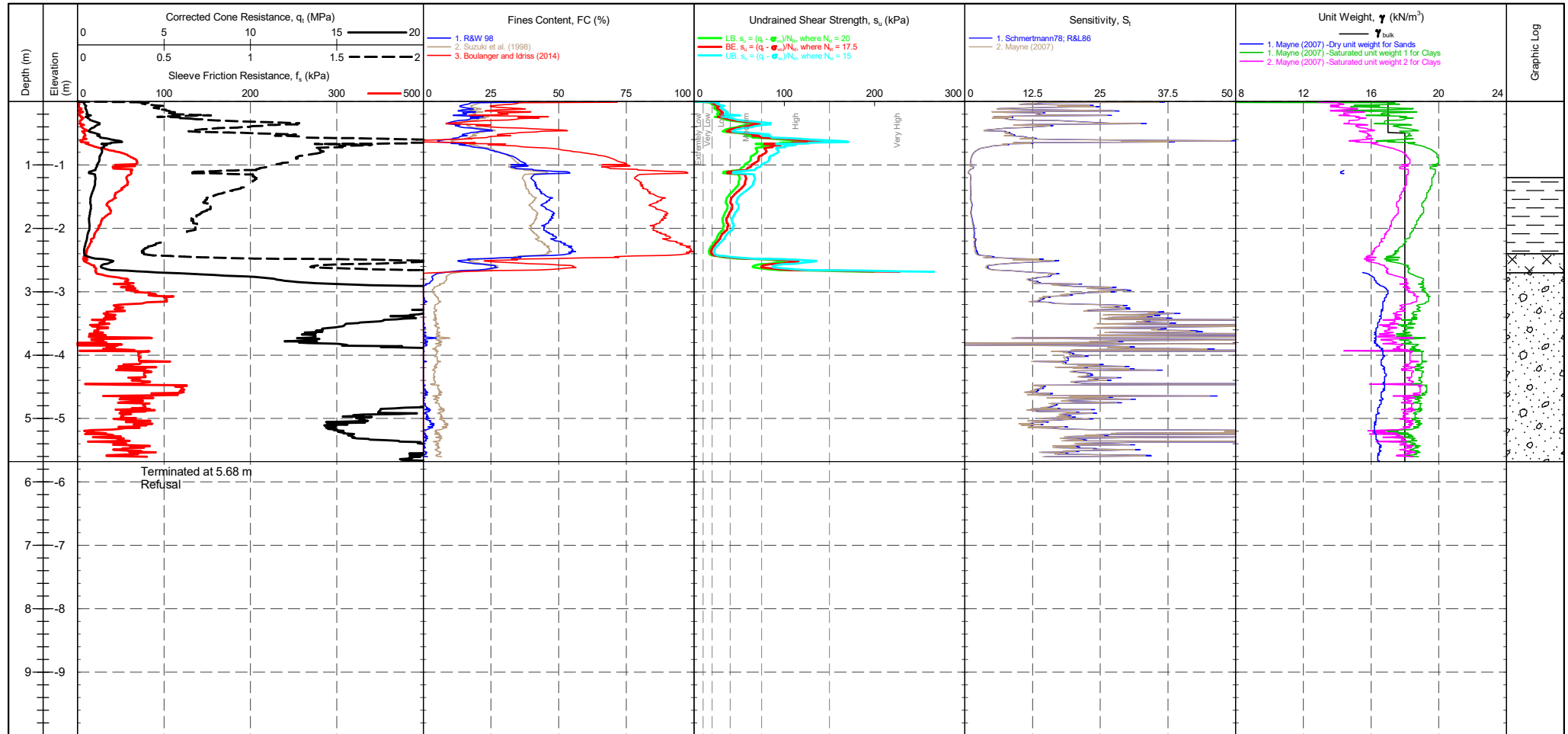
S3CPT19

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass - 2nd Visit
 LOCATION : A46 Newark Bypass
 PROJECT No. : 1230122

EASTING : 0.000 m
 NORTHING : 0.000 m
 ELEVATION : 0.000 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

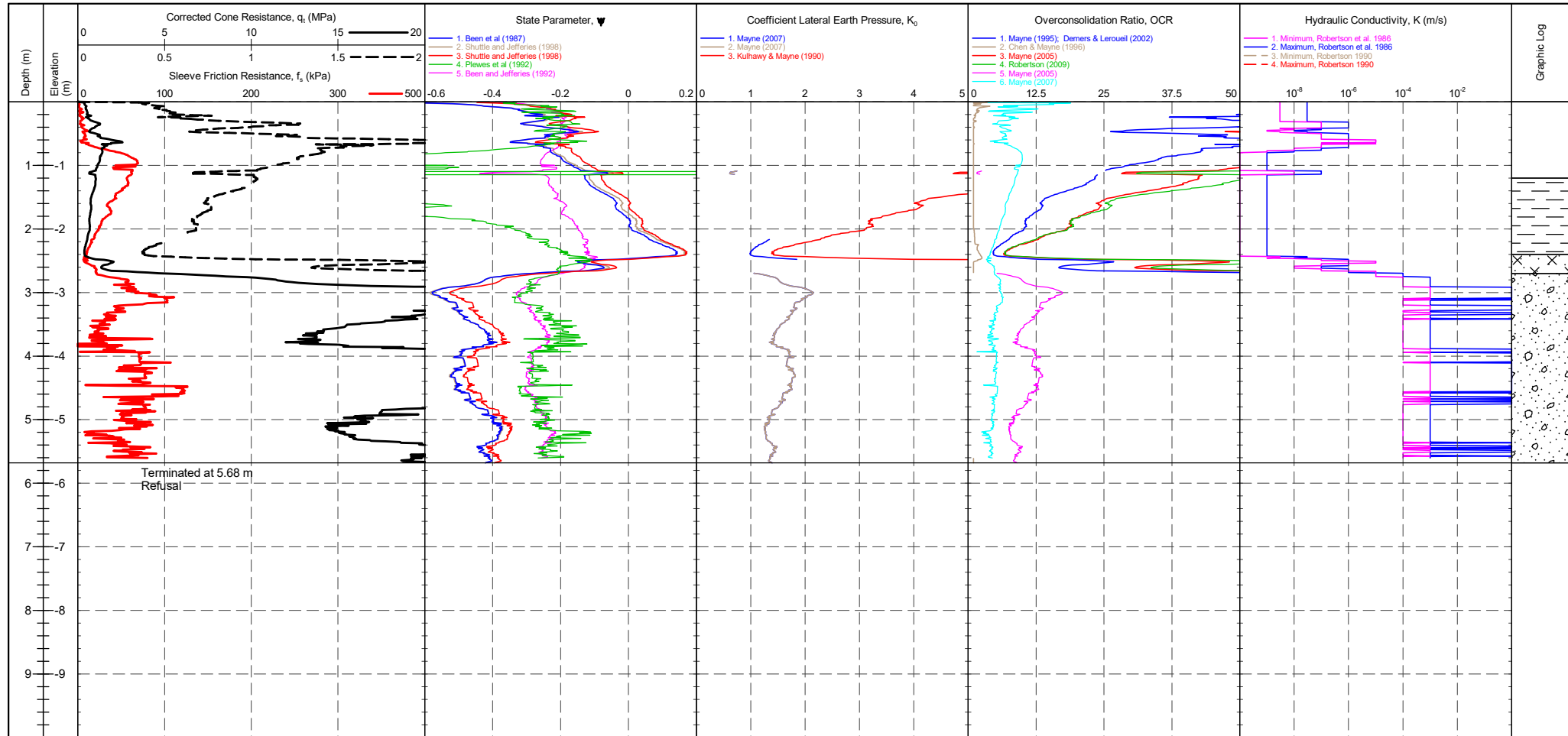
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 25/01/2023
 PLOT DATE : 03/02/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICTION REDUCER : None WEATHER : Sunny & Cold	Transducer Tip Sleeve Pore Pressure 2 X-Y inclinometer	CPTU ZERO VALUES Pre Post Difference 356 mV 352 mV -0.044 MPa 303 mV 300 mV -0.002 kPa 308 mV 275 mV -0.009 kPa 2318 mV 2346 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) Extremely low strength <10 Very low strength 10-20 Low strength 20-40	Term based on measurement su (kPa) Medium strength 40-75 High strength 75-150 Very high strength 150-300 Extremely high strength >300	Groundwater Level Dissipation Test
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PointID
S3CPT19

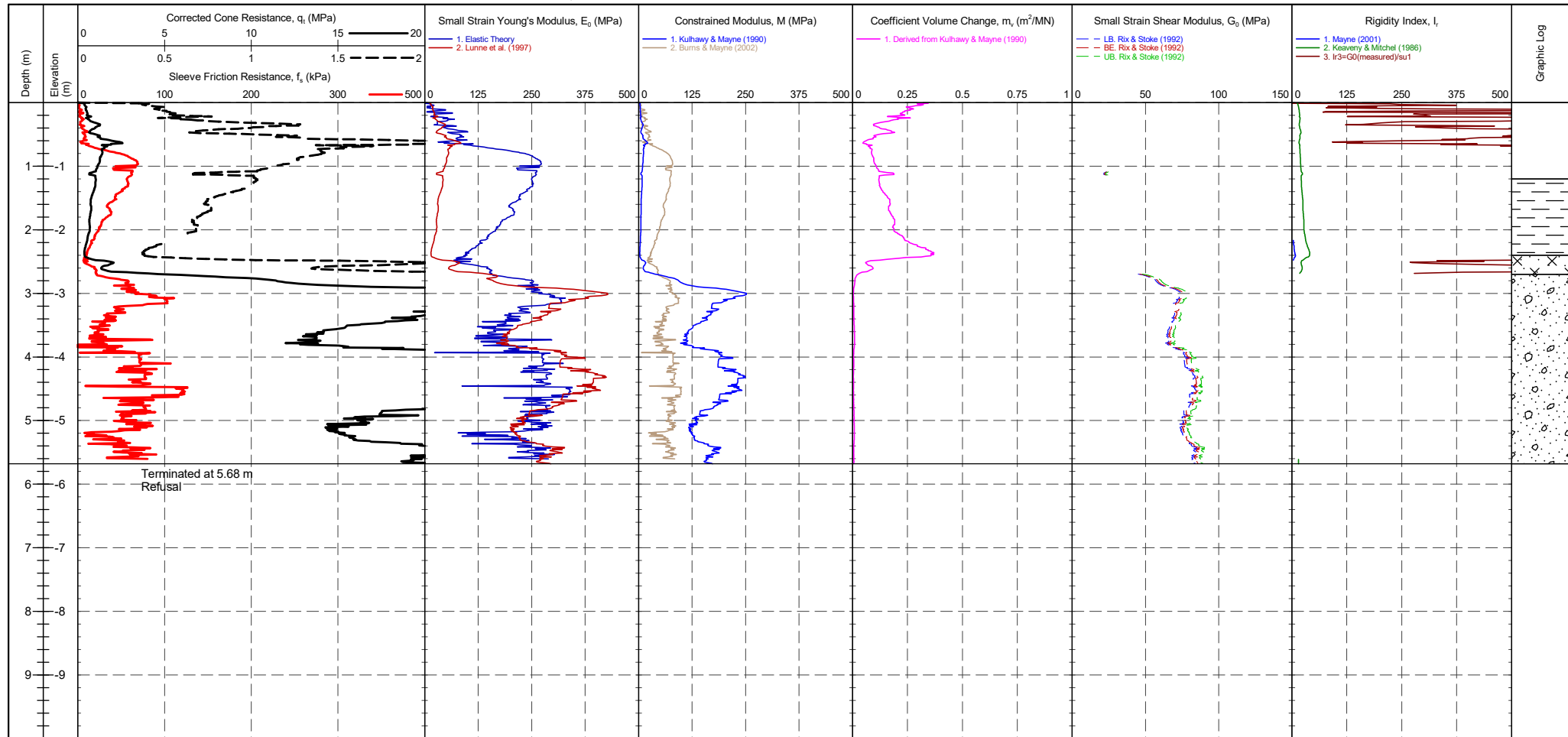
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>356 mV</td> <td>352 mV</td> <td>-0.044 MPa</td> </tr> <tr> <td>Sleeve</td> <td>303 mV</td> <td>300 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>308 mV</td> <td>275 mV</td> <td>-0.009 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2318 mV</td> <td>2346 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	356 mV	352 mV	-0.044 MPa	Sleeve	303 mV	300 mV	-0.002 kPa	Pore Pressure 2	308 mV	275 mV	-0.009 kPa	X-Y Inclinator	2318 mV	2346 mV		Groundwater Level Dissipation Test
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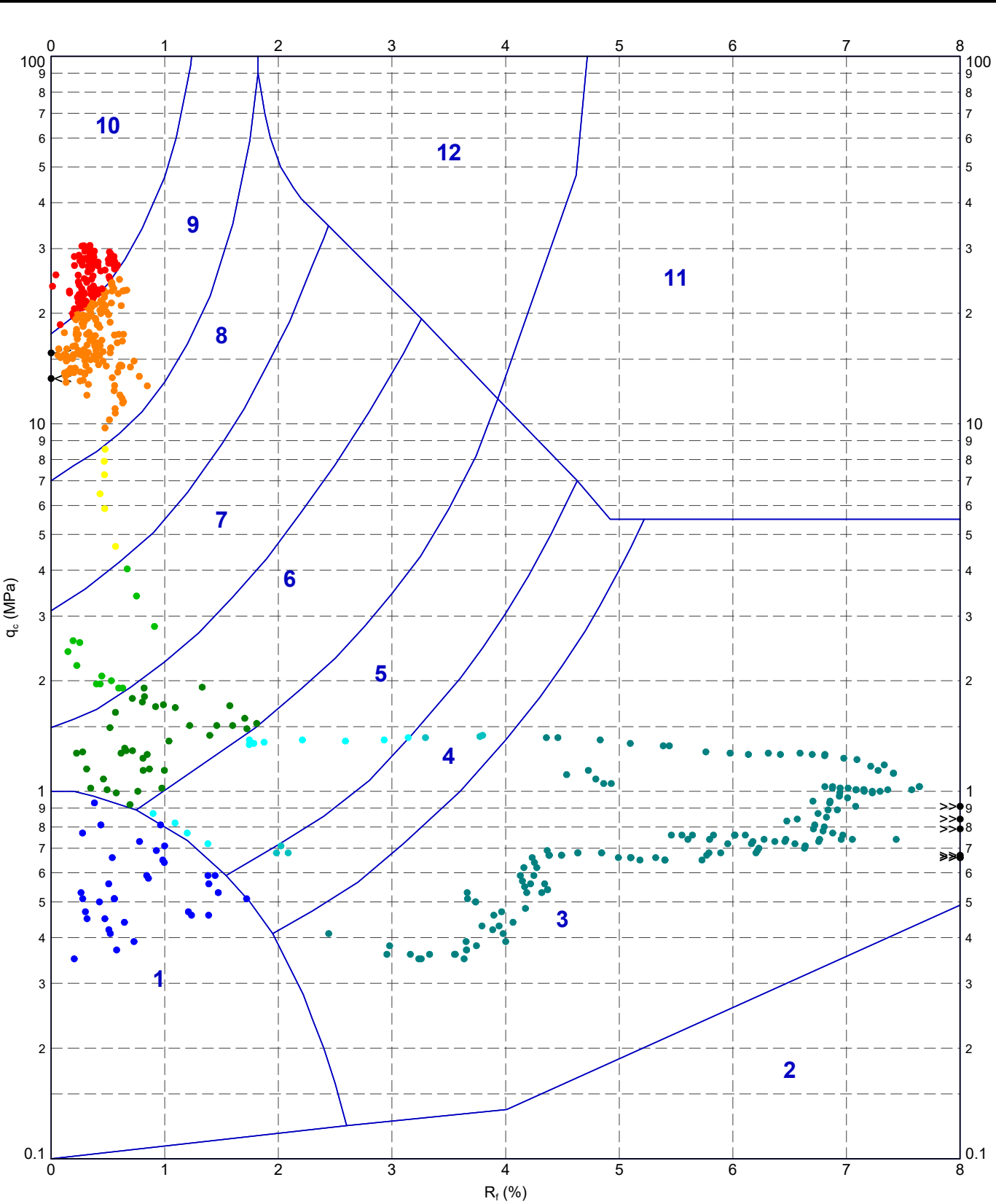
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>356 mV</td> <td>352 mV</td> <td>-0.044 MPa</td> </tr> <tr> <td>Sleeve</td> <td>303 mV</td> <td>300 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>308 mV</td> <td>275 mV</td> <td>-0.009 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2318 mV</td> <td>2346 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	356 mV	352 mV	-0.044 MPa	Sleeve	303 mV	300 mV	-0.002 kPa	Pore Pressure 2	308 mV	275 mV	-0.009 kPa	X-Y Inclinator	2318 mV	2346 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS.RF.AMP. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:27 10.03.00.09 Dagele Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



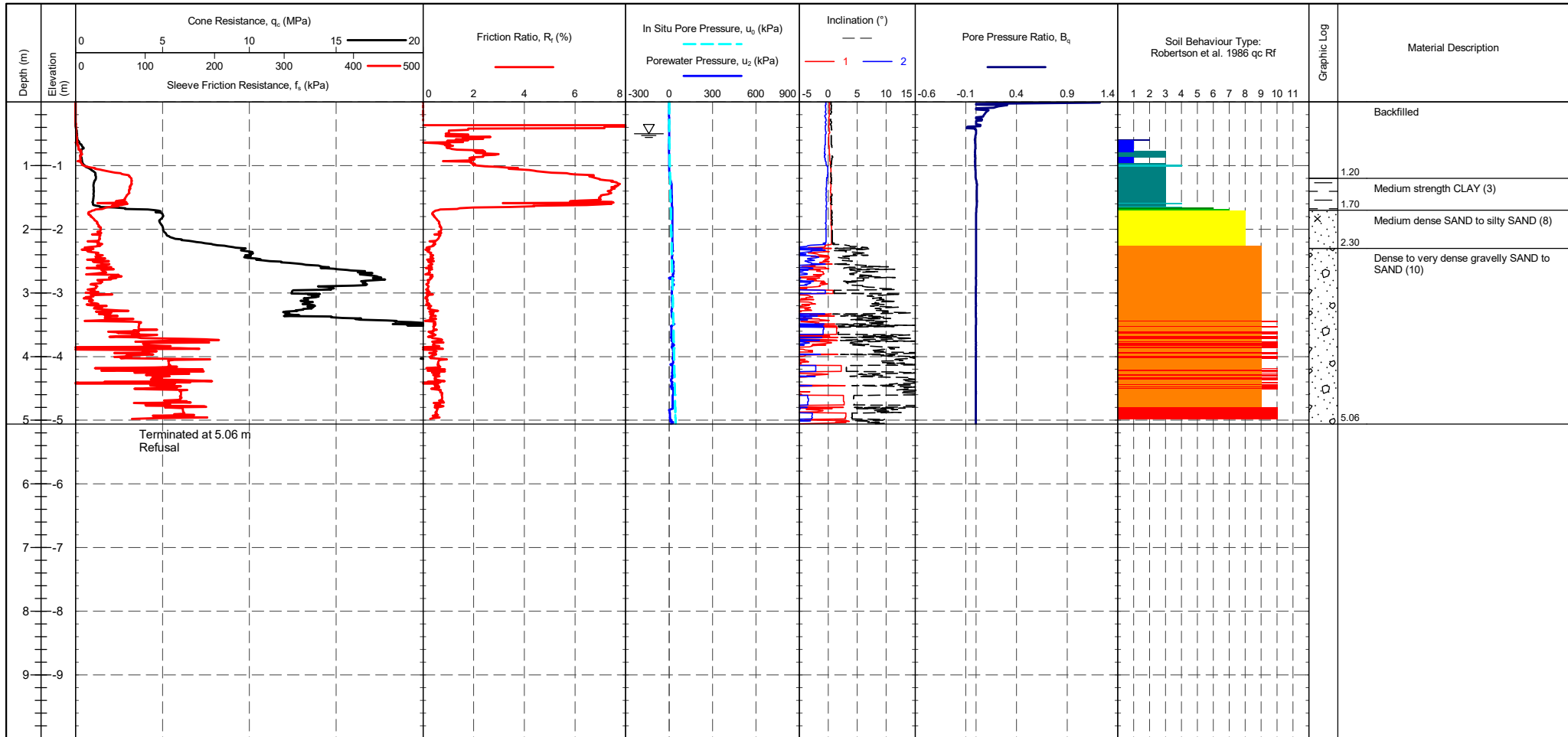
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics A46 Newark Bypass		CHECKED	DATE
	A46 Newark Bypass - 2nd Visit		SCALE	
	Robertson et al. 1986 qc vs. Rf - S3CPT19		Not To Scale	
		PROJECT No	FIGURE No	
		1230122	A4	

PointID	S3CPT20
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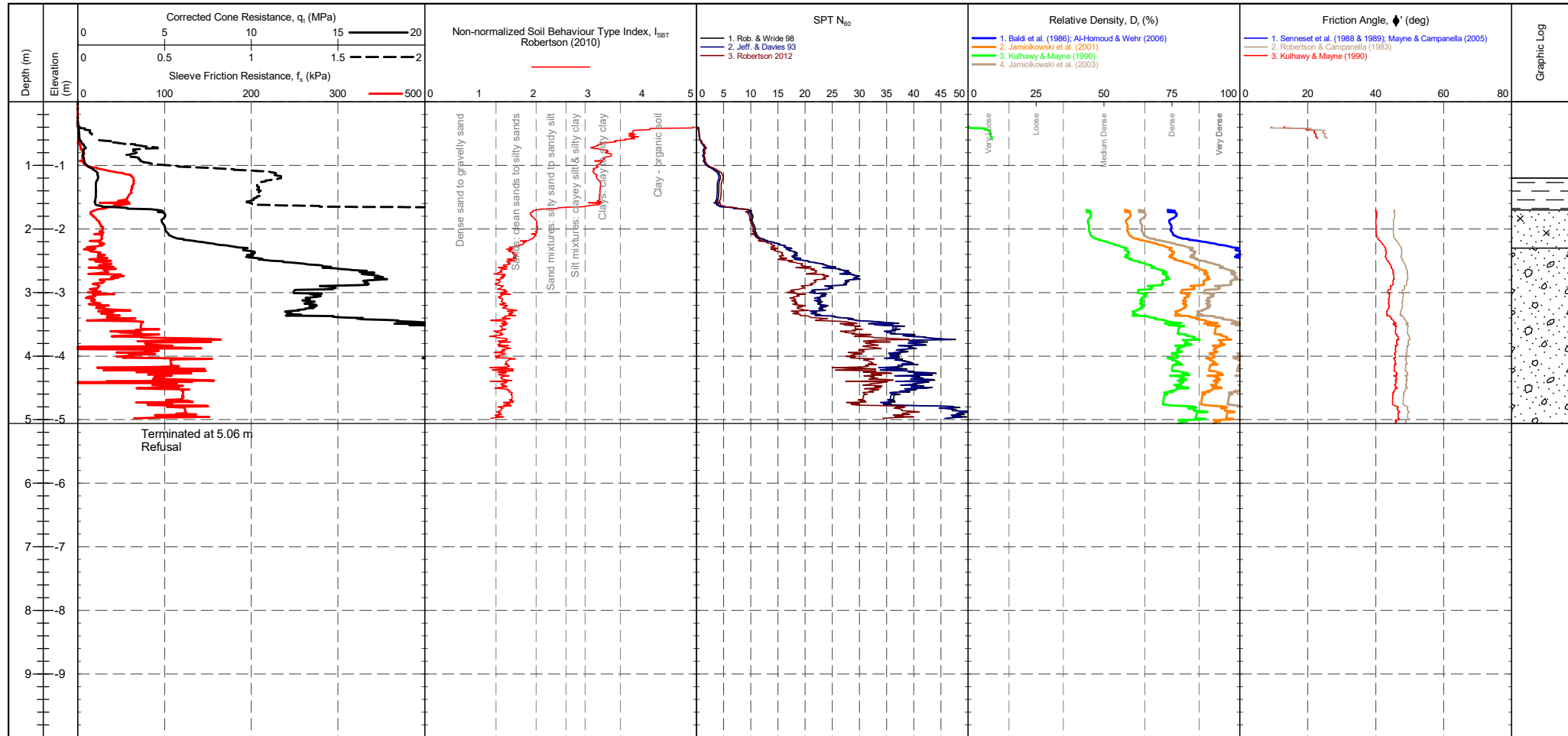
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CALIBRATION DATE : 02/01/2023 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 356 mV 353 mV -0.033 MPa Sleeve 303 mV 301 mV -0.001 kPa Pore Pressure 2 281 mV 287 mV 0.002 kPa X-Y Inclinator 2501 mV 2501 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID
S3CPT20

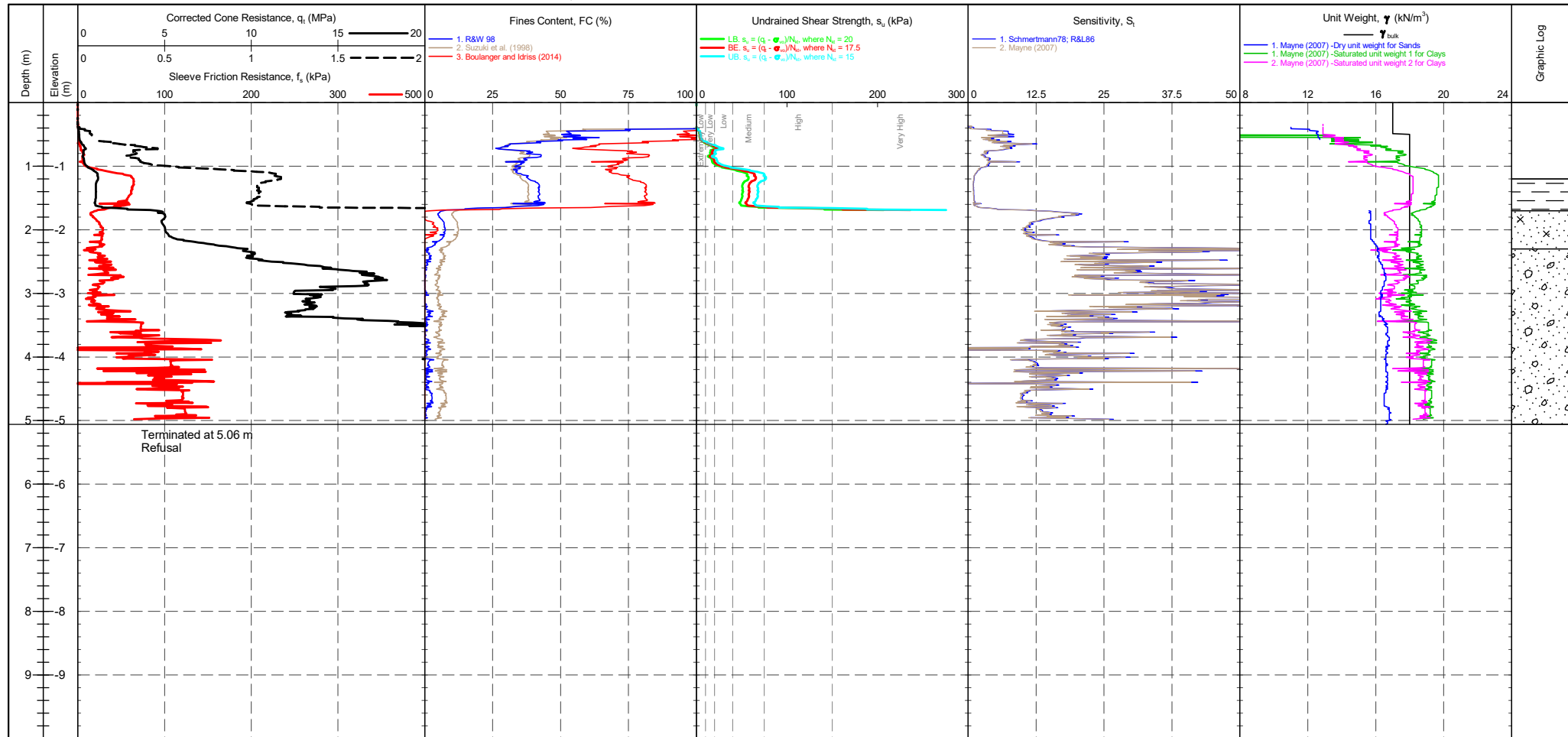
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>356 mV</td><td>353 mV</td><td>-0.033 MPa</td></tr> <tr><td>Sleeve</td><td>303 mV</td><td>301 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>281 mV</td><td>287 mV</td><td>0.002 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2501 mV</td><td>2501 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	356 mV	353 mV	-0.033 MPa	Sleeve	303 mV	301 mV	-0.001 kPa	Pore Pressure 2	281 mV	287 mV	0.002 kPa	X-Y Inclinator	2501 mV	2501 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density D_r (%)</th> </tr> </thead> <tbody> <tr><td>Clays</td><td>2.95-3.60</td><td>Very Loose</td><td>0 - 4</td><td>Very Loose</td><td>0 - 15</td></tr> <tr><td>Silt mixtures</td><td>2.60-2.95</td><td>Loose</td><td>4 - 10</td><td>Loose</td><td>15 - 35</td></tr> <tr><td>Sand mixtures</td><td>2.05-2.60</td><td>Medium Dense</td><td>10 - 30</td><td>Medium Dense</td><td>35 - 65</td></tr> <tr><td>Sands</td><td>1.31-2.05</td><td>Dense</td><td>30 - 50</td><td>Dense</td><td>65 - 85</td></tr> <tr><td>Gravelly sand</td><td><1.31</td><td>Very Dense</td><td>>50</td><td>Very Dense</td><td>>85</td></tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density D _r (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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PointID	S3CPT20
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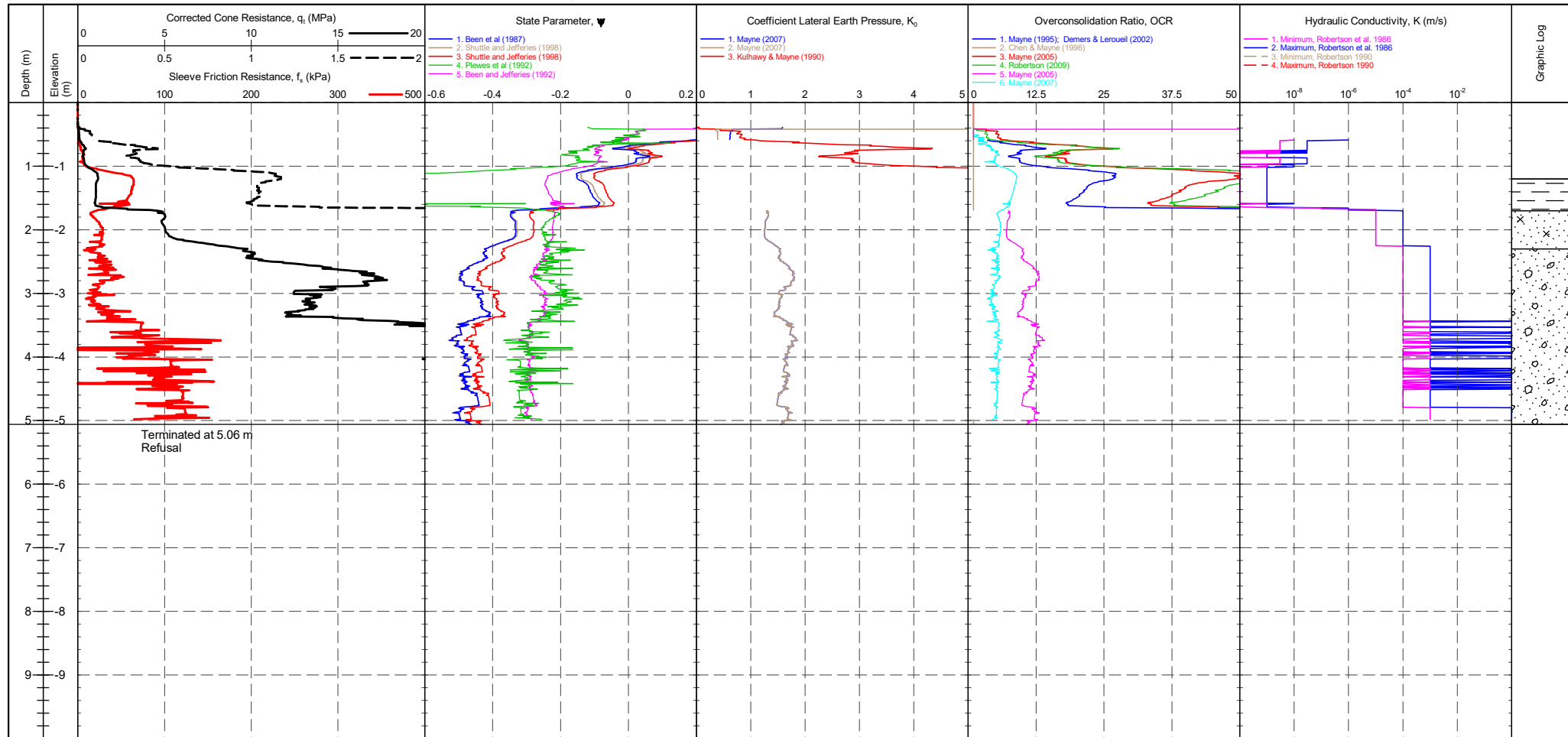
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>356 mV</td> <td>353 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>303 mV</td> <td>301 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>281 mV</td> <td>287 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2501 mV</td> <td>2501 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	356 mV	353 mV	-0.033 MPa	Sleeve	303 mV	301 mV	-0.001 kPa	Pore Pressure 2	281 mV	287 mV	0.002 kPa	X-Y Inclinator	2501 mV	2501 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>s_u (kPa)</th> <th>Term based on measurement</th> <th>s_u (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▬ Dissipation Test
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PointID
S3CPT20

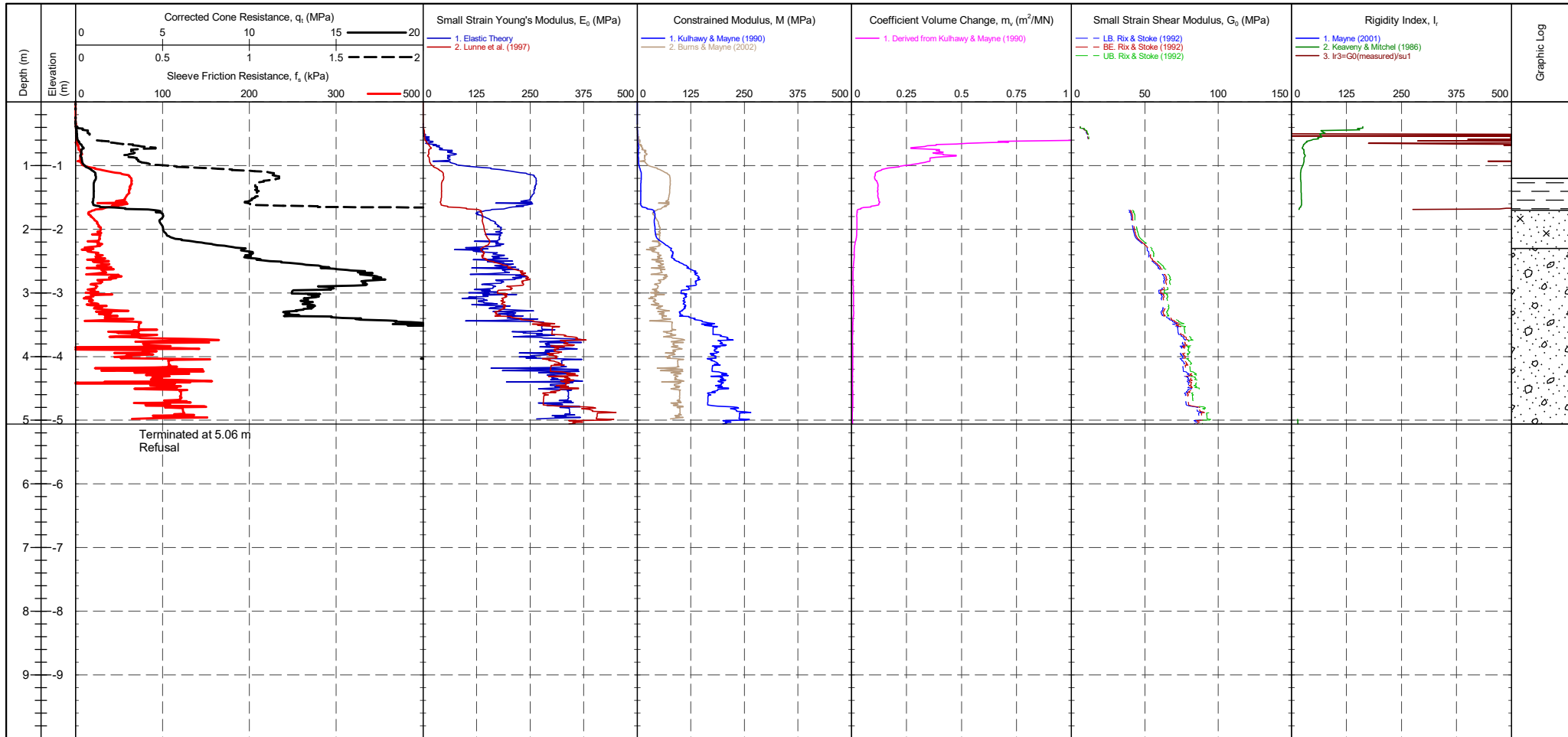
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>356 mV</td> <td>353 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>303 mV</td> <td>301 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>281 mV</td> <td>287 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2501 mV</td> <td>2501 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	356 mV	353 mV	-0.033 MPa	Sleeve	303 mV	301 mV	-0.001 kPa	Pore Pressure 2	281 mV	287 mV	0.002 kPa	X-Y Inclinator	2501 mV	2501 mV		Groundwater Level Dissipation Test
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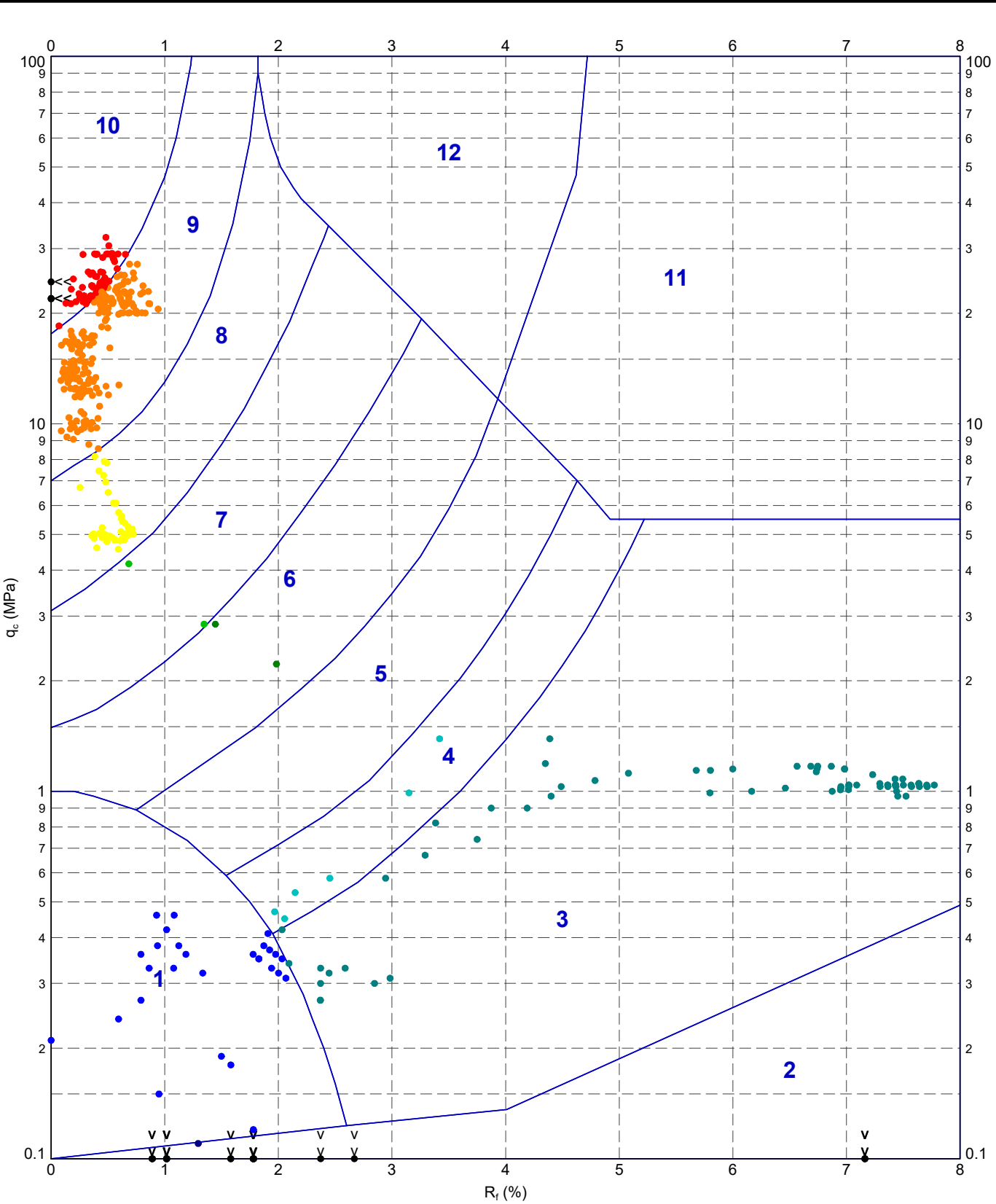
PointID
S3CPT20

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>356 mV</td> <td>353 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>303 mV</td> <td>301 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>281 mV</td> <td>287 mV</td> <td>0.002 kPa</td> </tr> <tr> <td>X-Y inclinometer</td> <td>2501 mV</td> <td>2501 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	356 mV	353 mV	-0.033 MPa	Sleeve	303 mV	301 mV	-0.001 kPa	Pore Pressure 2	281 mV	287 mV	0.002 kPa	X-Y inclinometer	2501 mV	2501 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS.RF.A4P. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:28 10.03.00.09 Dajjal Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



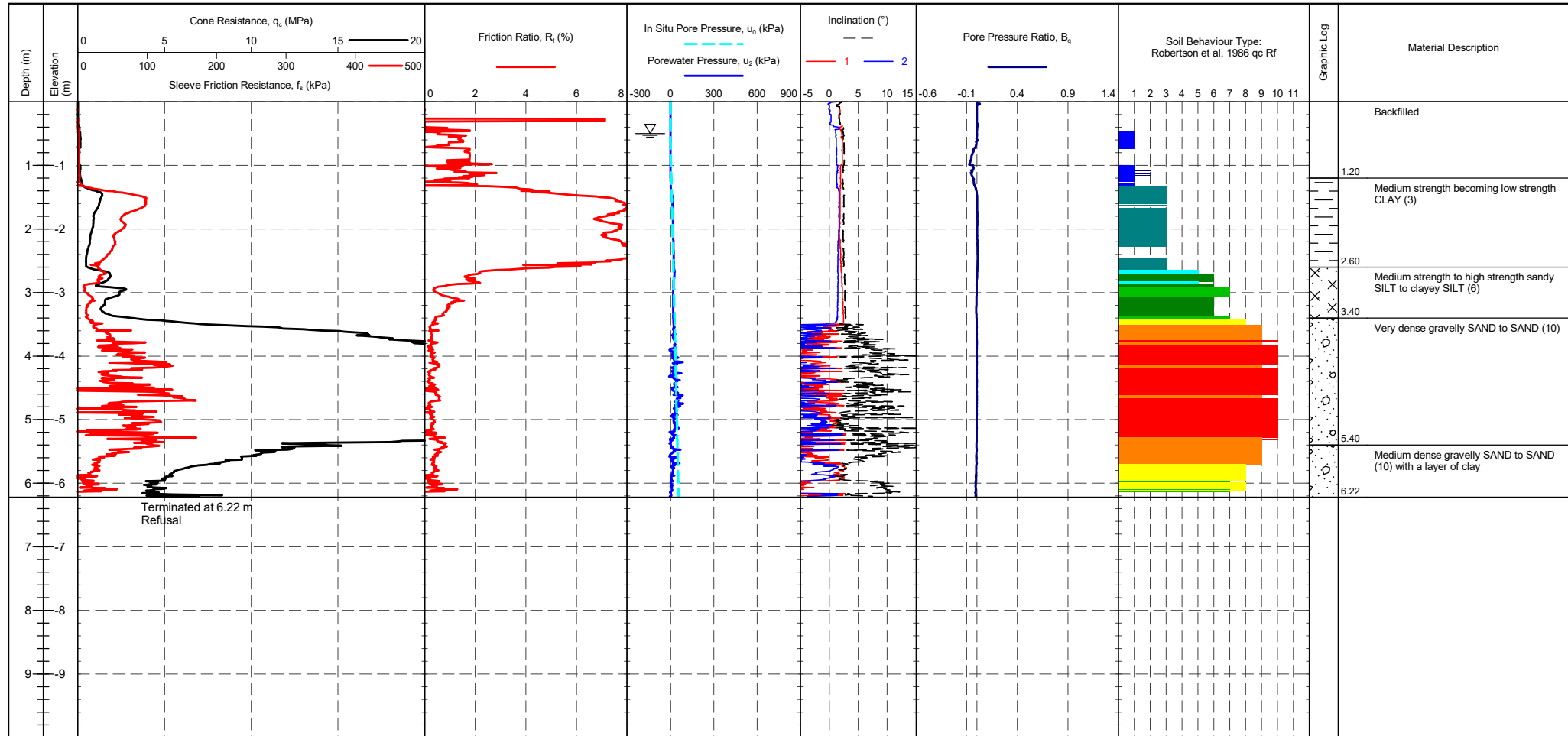
METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
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	TITLE	Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 qc vs. Rf - S3CPT20	
	DRAWN	DATE	03/02/2023
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PROJECT No	1230122		FIGURE No

PointID	S3CPT21
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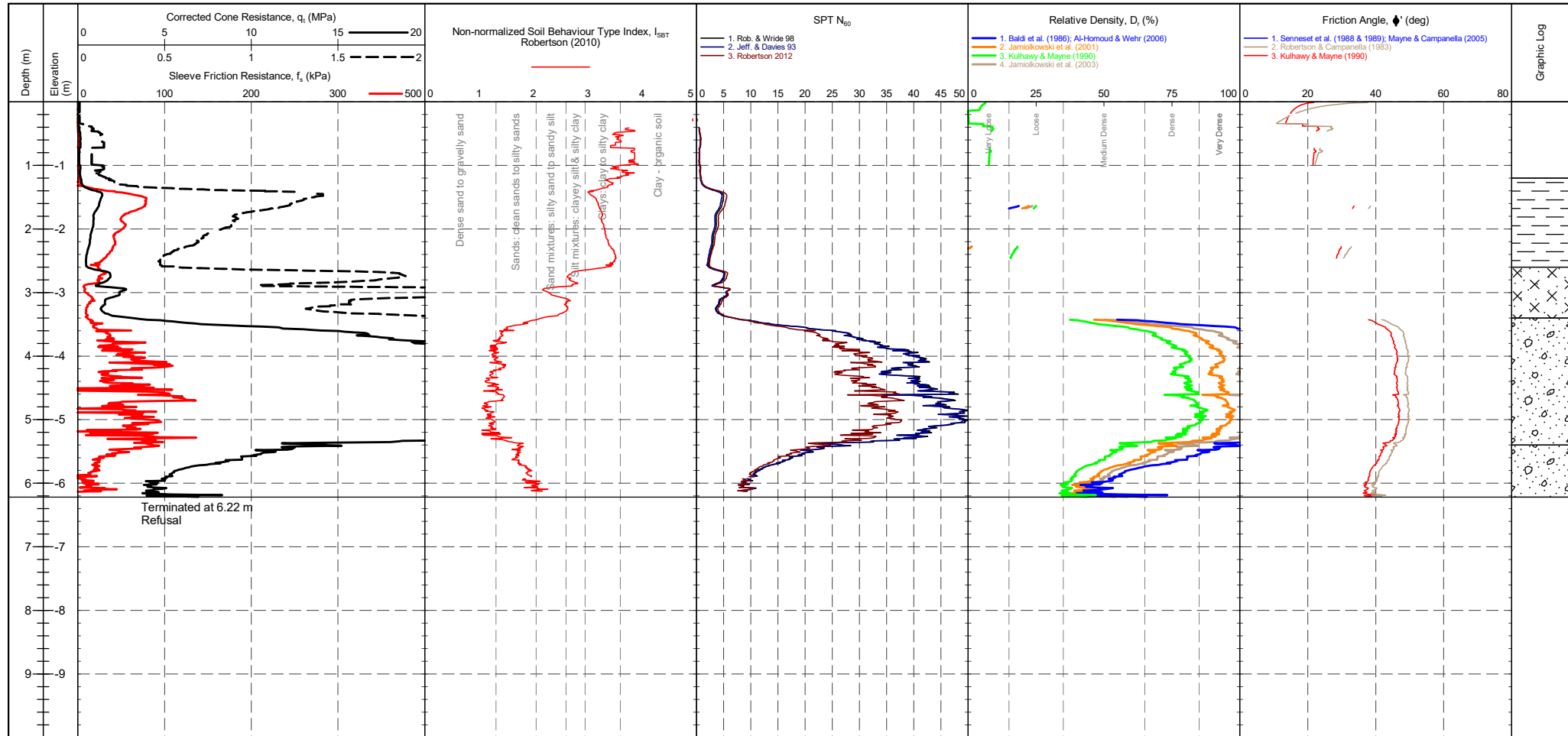
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CALIBRATION DATE : 02/01/2023 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: Pre 355 mV, Post 352 mV, Difference -0.033 MPa Sleeve: Pre 302 mV, Post 299 mV, Difference -0.002 kPa Pore Pressure 2: Pre 276 mV, Post 294 mV, Difference 0.005 kPa X-Y Inclinometer: Pre 2600 mV, Post 2628 mV	METHOD : Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT21
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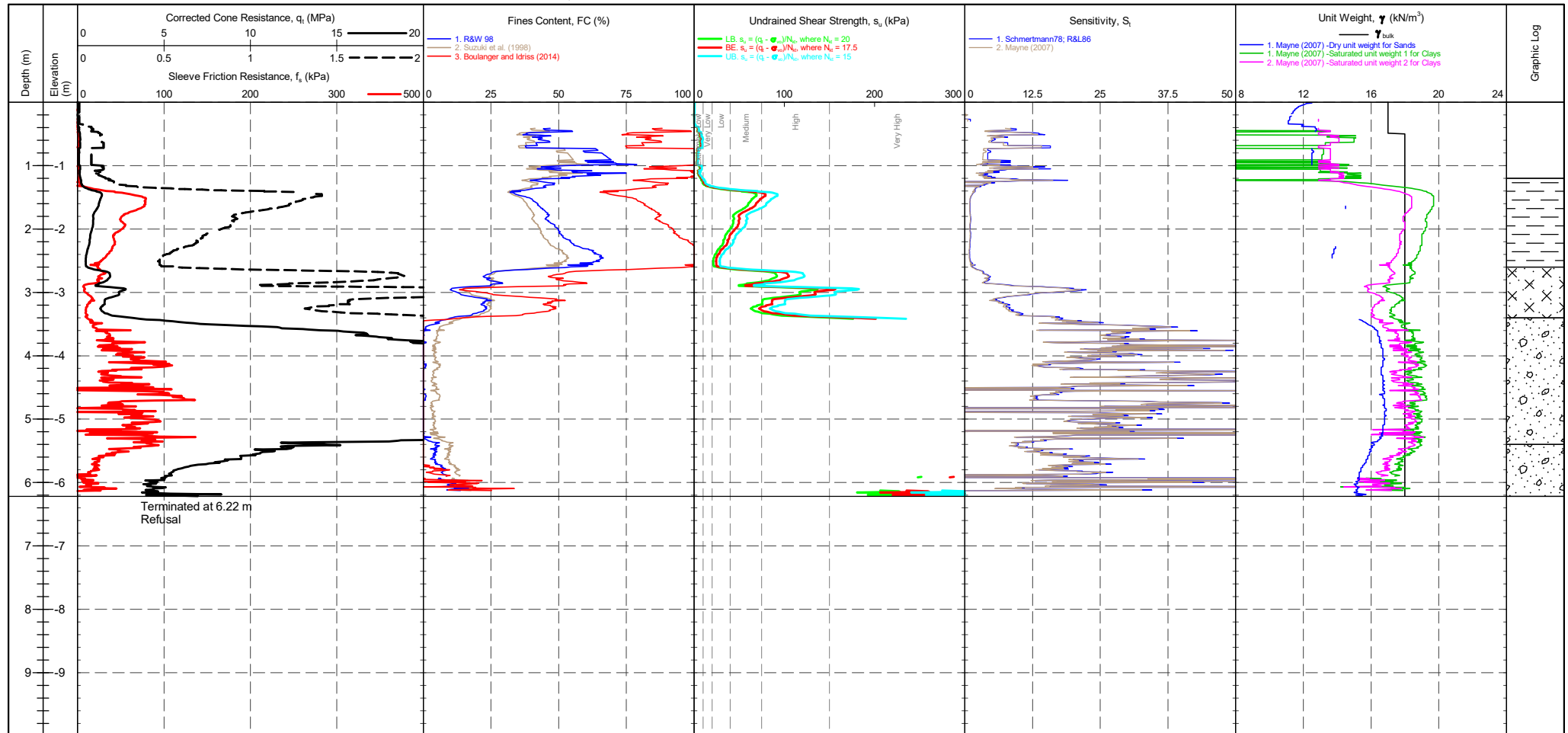


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PointID

S3CPT21

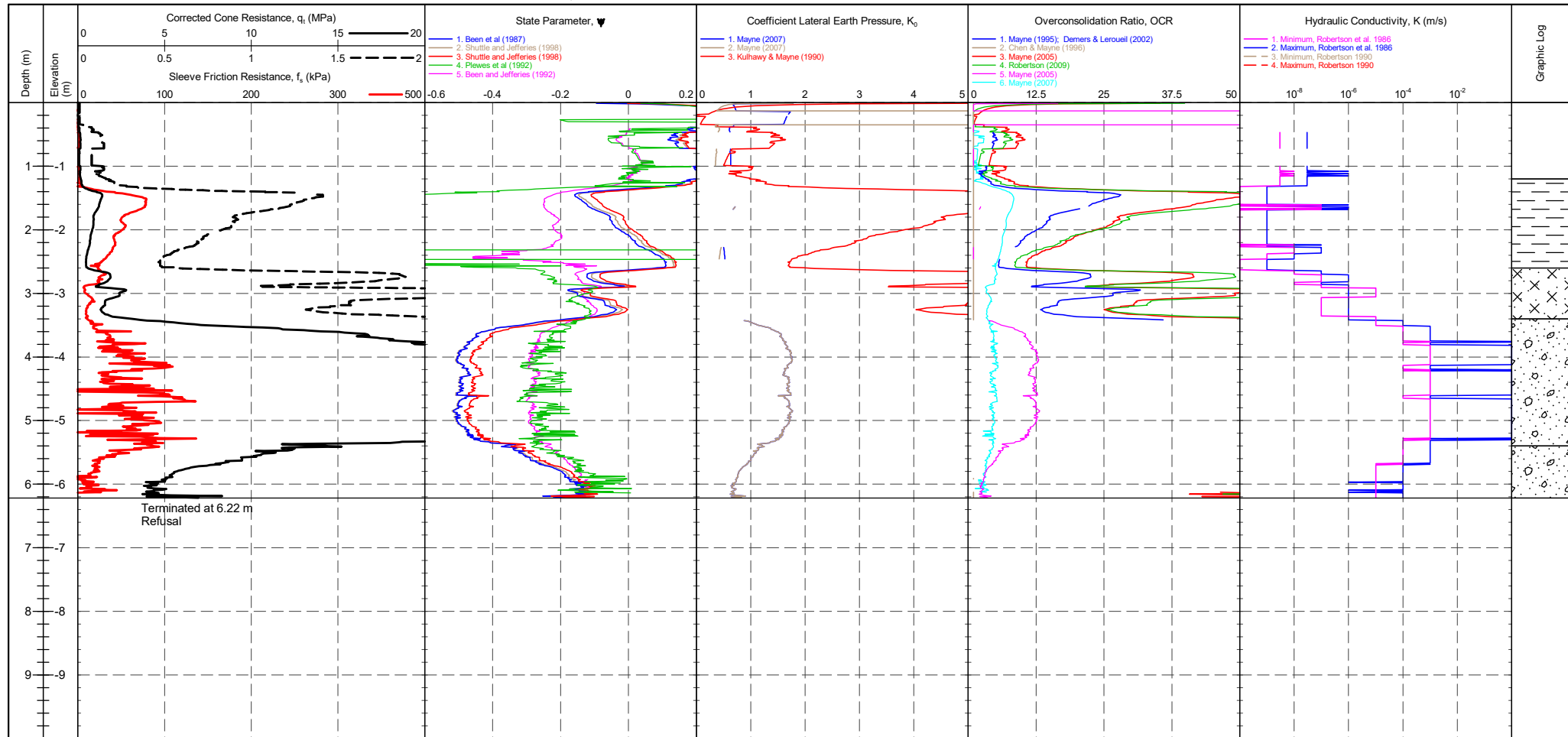
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>355 mV</td><td>352 mV</td><td>-0.033 MPa</td></tr> <tr><td>Sleeve</td><td>302 mV</td><td>299 mV</td><td>-0.002 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>276 mV</td><td>294 mV</td><td>0.005 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2600 mV</td><td>2628 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	355 mV	352 mV	-0.033 MPa	Sleeve	302 mV	299 mV	-0.002 kPa	Pore Pressure 2	276 mV	294 mV	0.005 kPa	X-Y Inclinator	2600 mV	2628 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>s_u (kPa)</th><th>Term based on measurement</th><th>s_u (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
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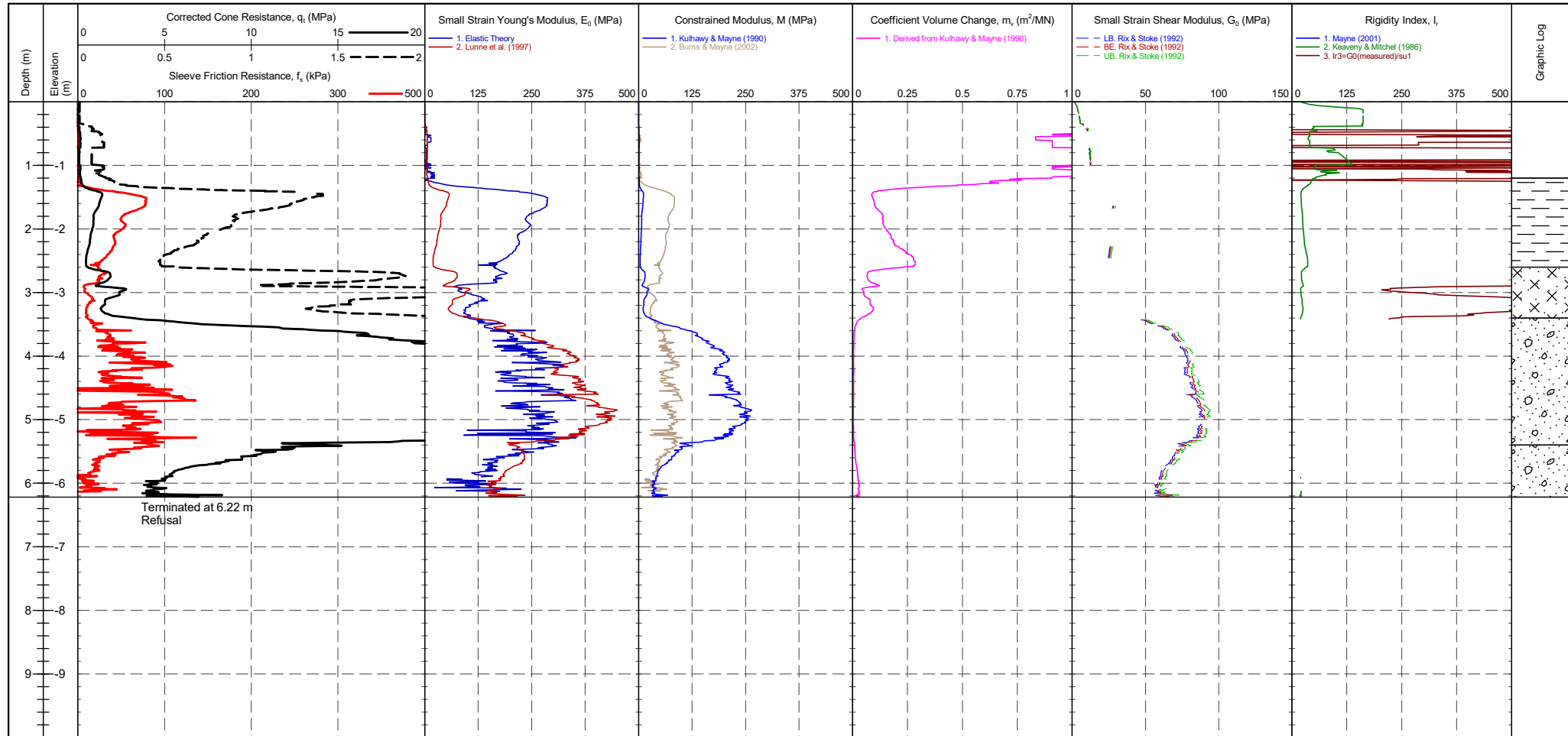
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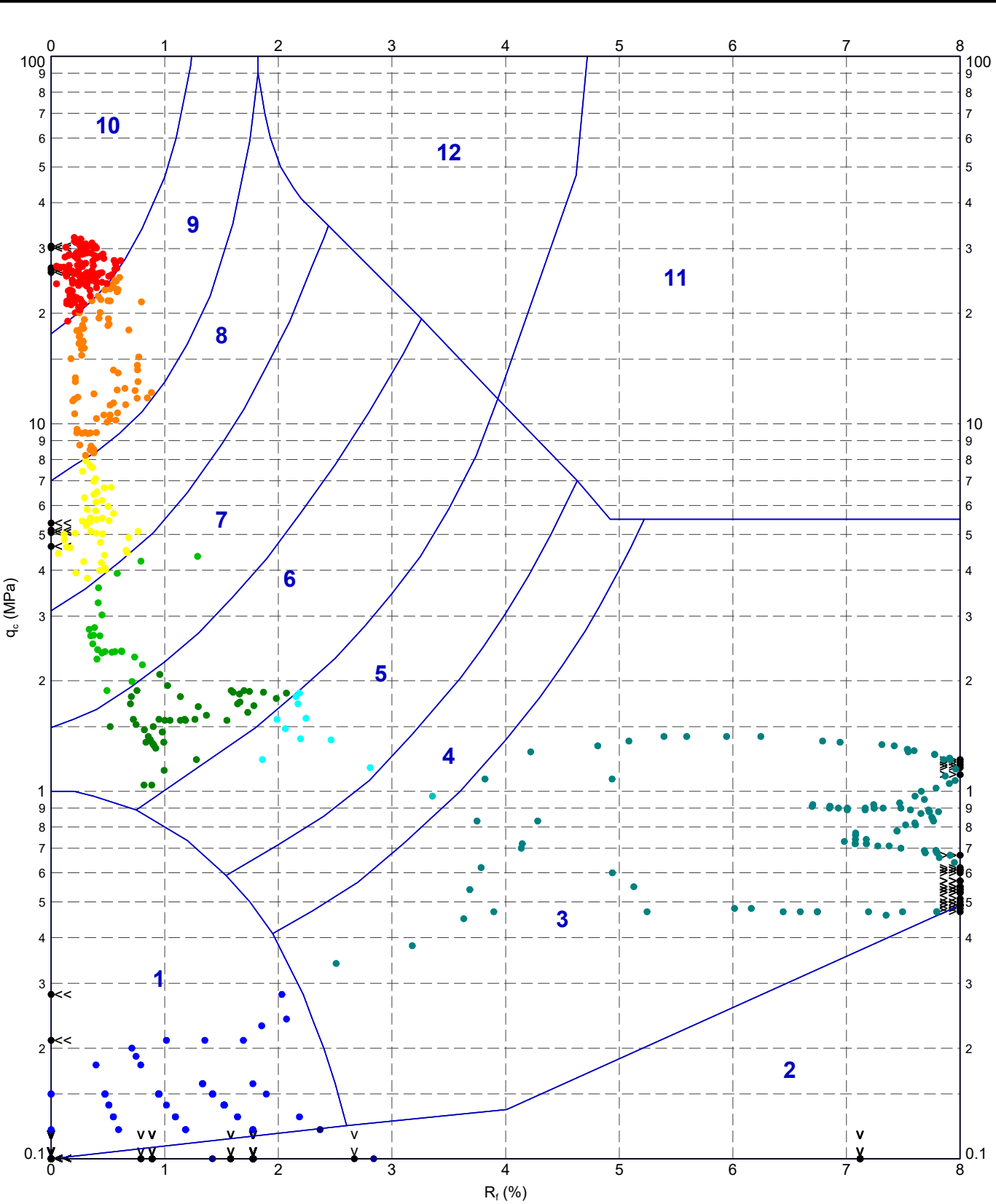
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220629-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS.RF.AFP. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:29 10.03.00.09 Dargel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



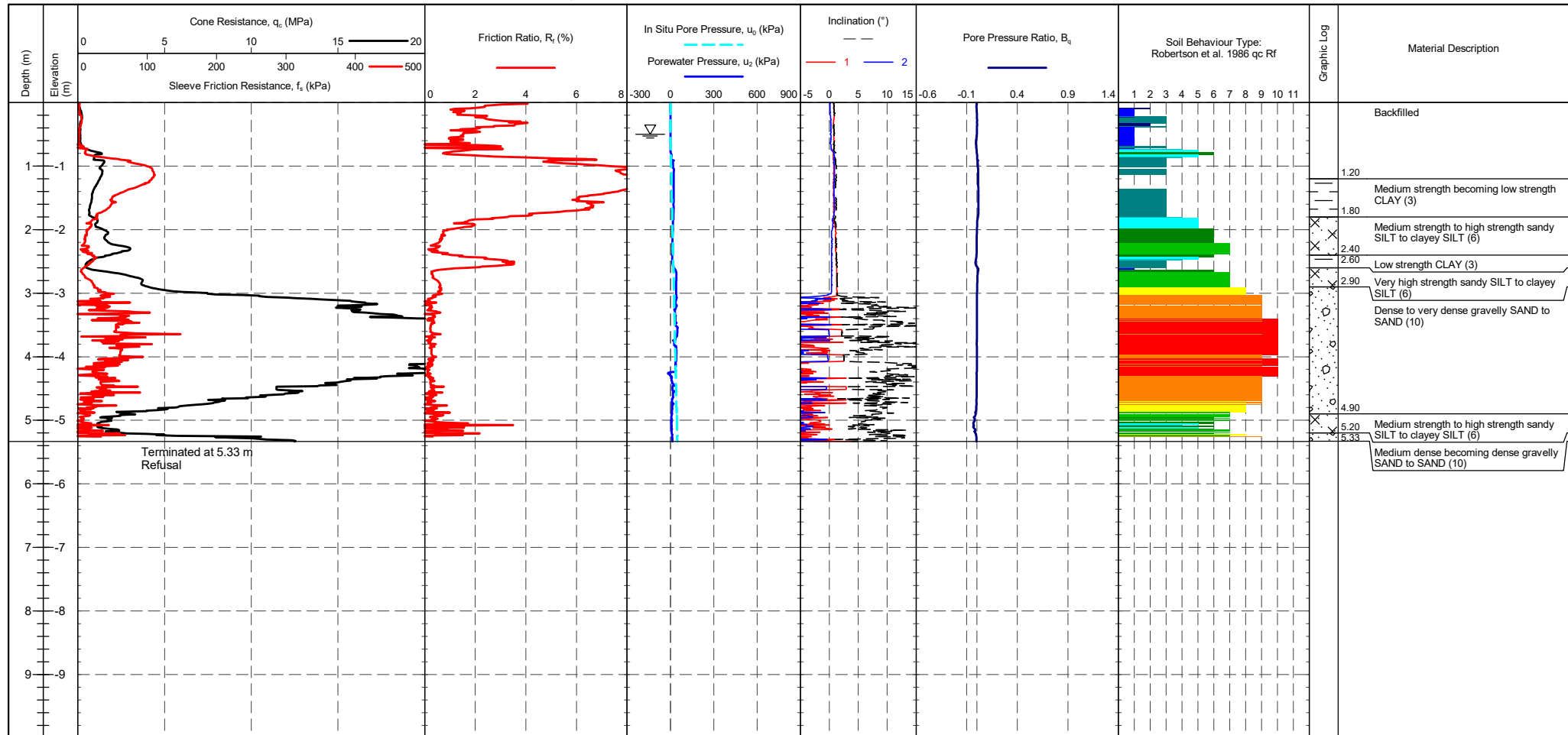
METHOD: Robertson et al. 1986 q_c R_f

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

	TITLE	DRAWN	DATE
	Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 q_c vs. R_f - S3CPT21	CHECKED	DATE
		SCALE	FIGURE No
		PROJECT No	
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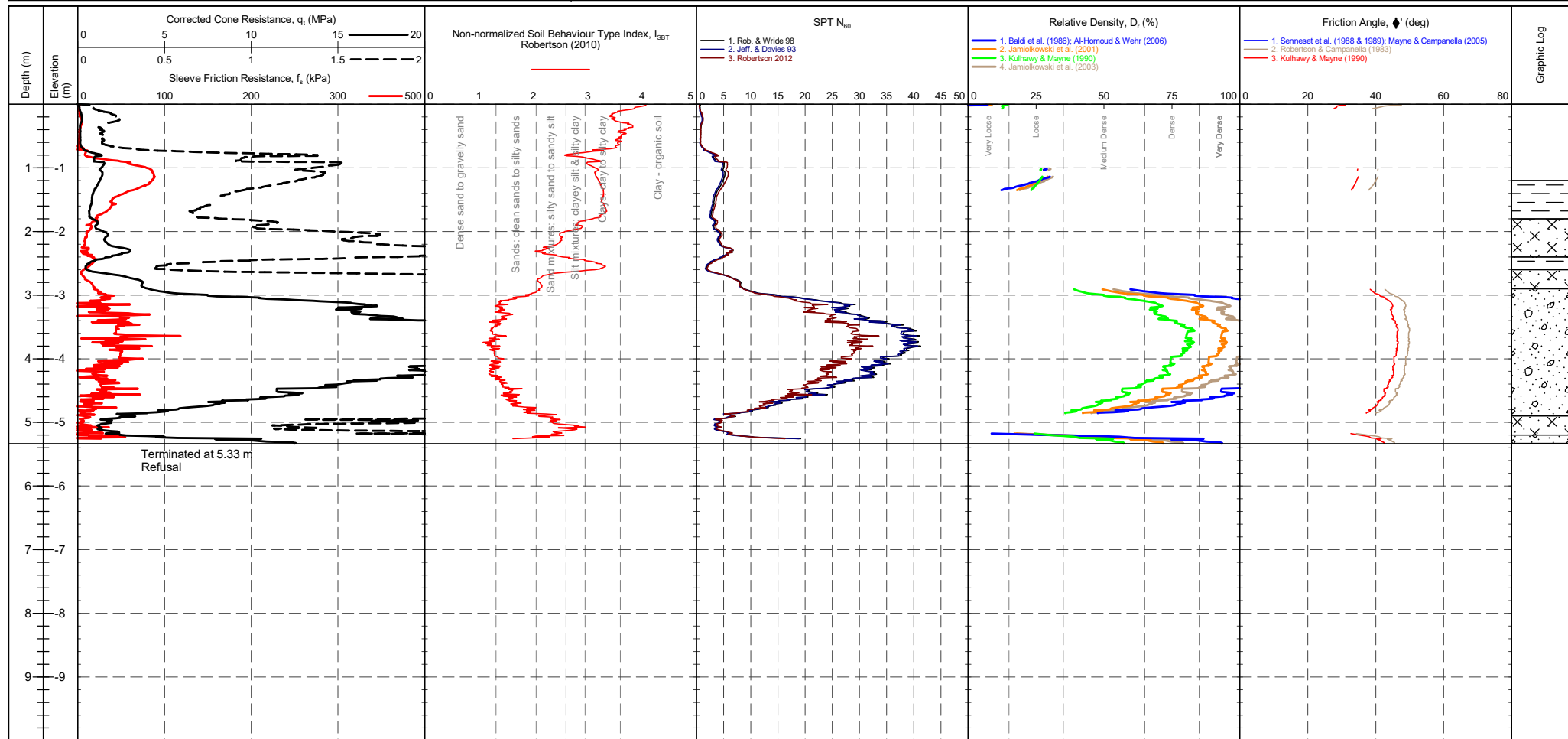
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CONE ID : S15-CFIP.1488 CALIBRATION DATE : 02/01/2023 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>355 mV</td> <td>355 mV</td> <td>0 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>302 mV</td> <td>0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>277 mV</td> <td>309 mV</td> <td>0.009 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2526 mV</td> <td>2139 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	355 mV	355 mV	0 MPa	Sleeve	301 mV	302 mV	0.001 kPa	Pore Pressure 2	277 mV	309 mV	0.009 kPa	X-Y Inclinator	2526 mV	2139 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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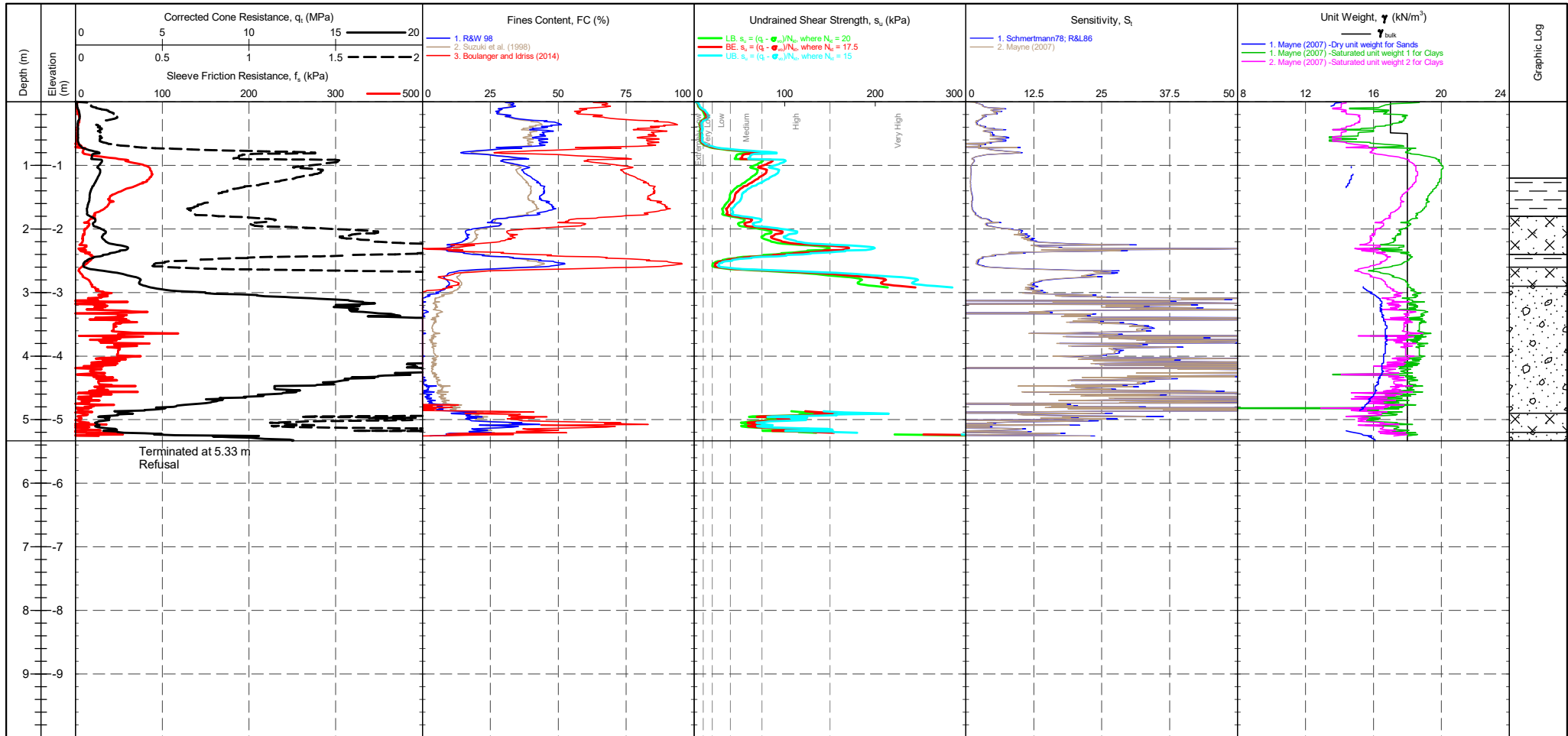
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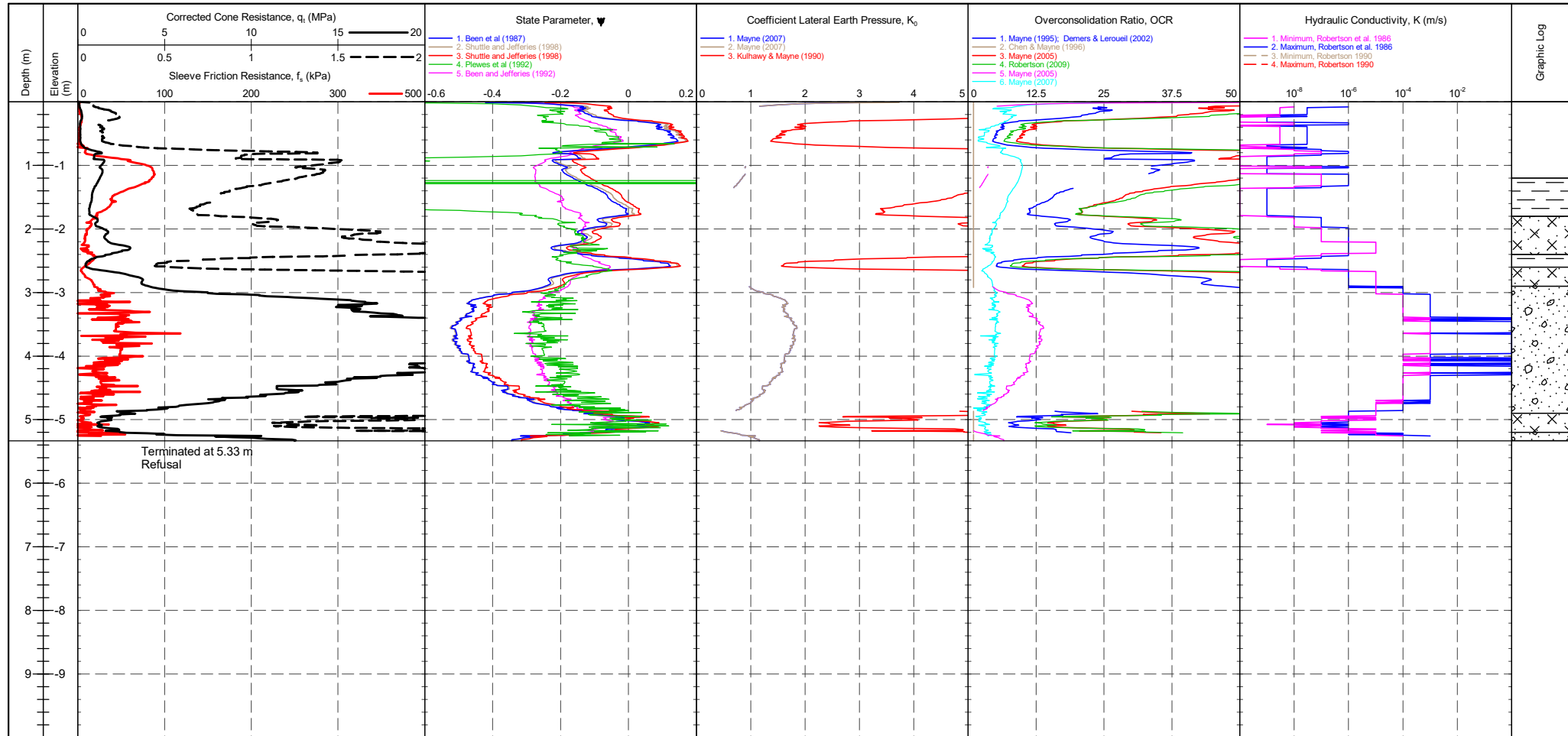
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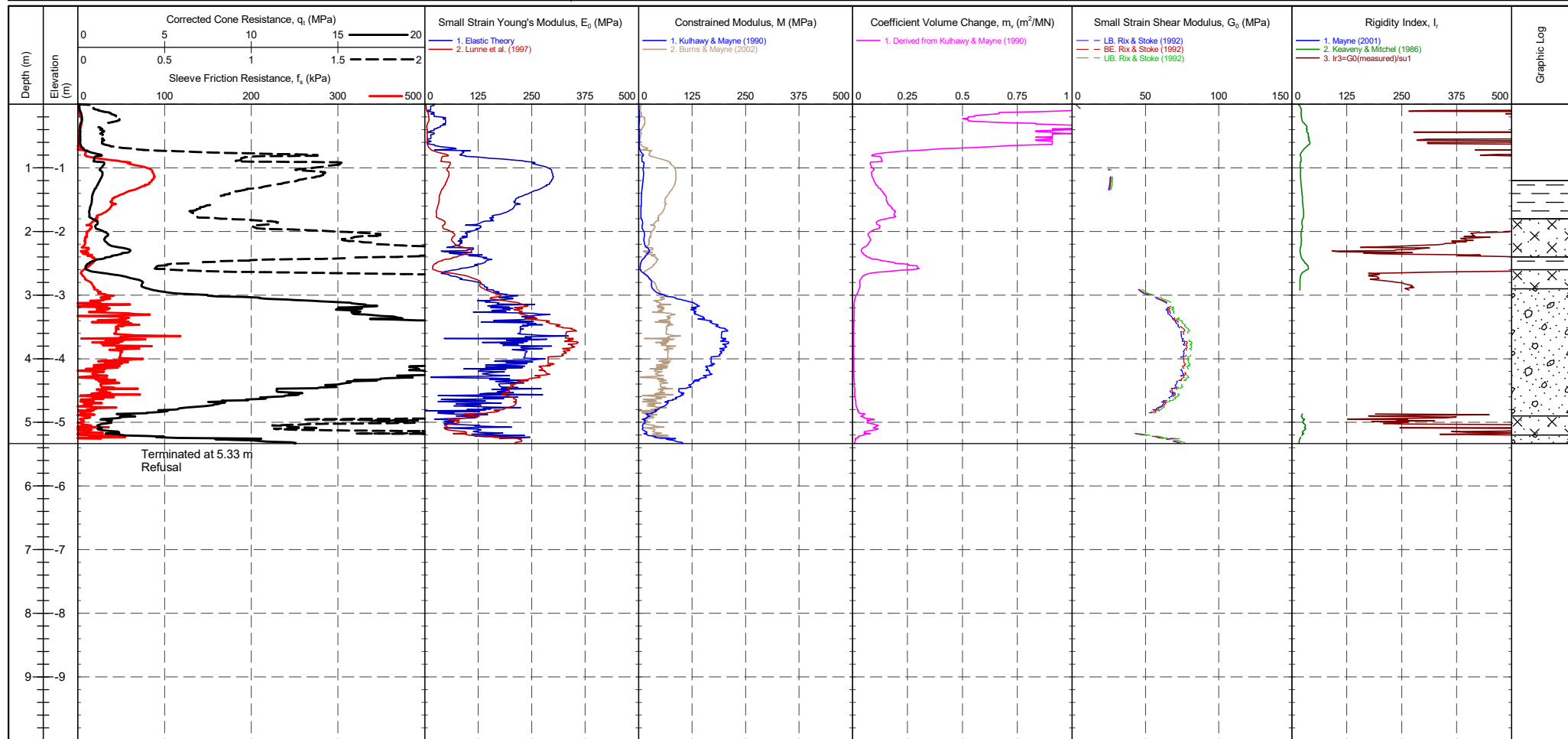
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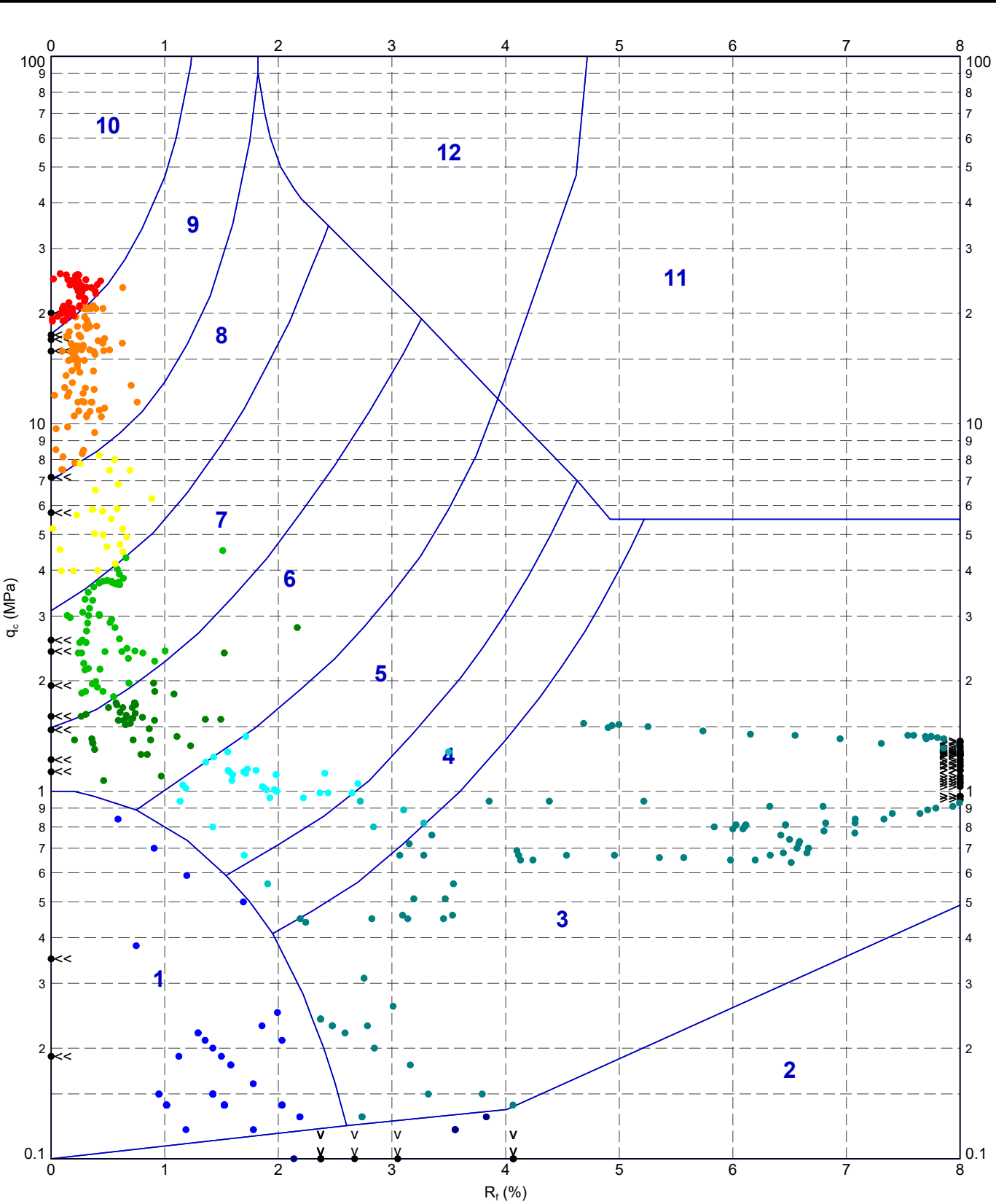
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Pore Pressure 2	277 mV	309 mV	0.009 kPa																				
X-Y Inclinator	2526 mV	2139 mV																					

22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS.RF.A4P. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:30 10.03.00.09 Dajugel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



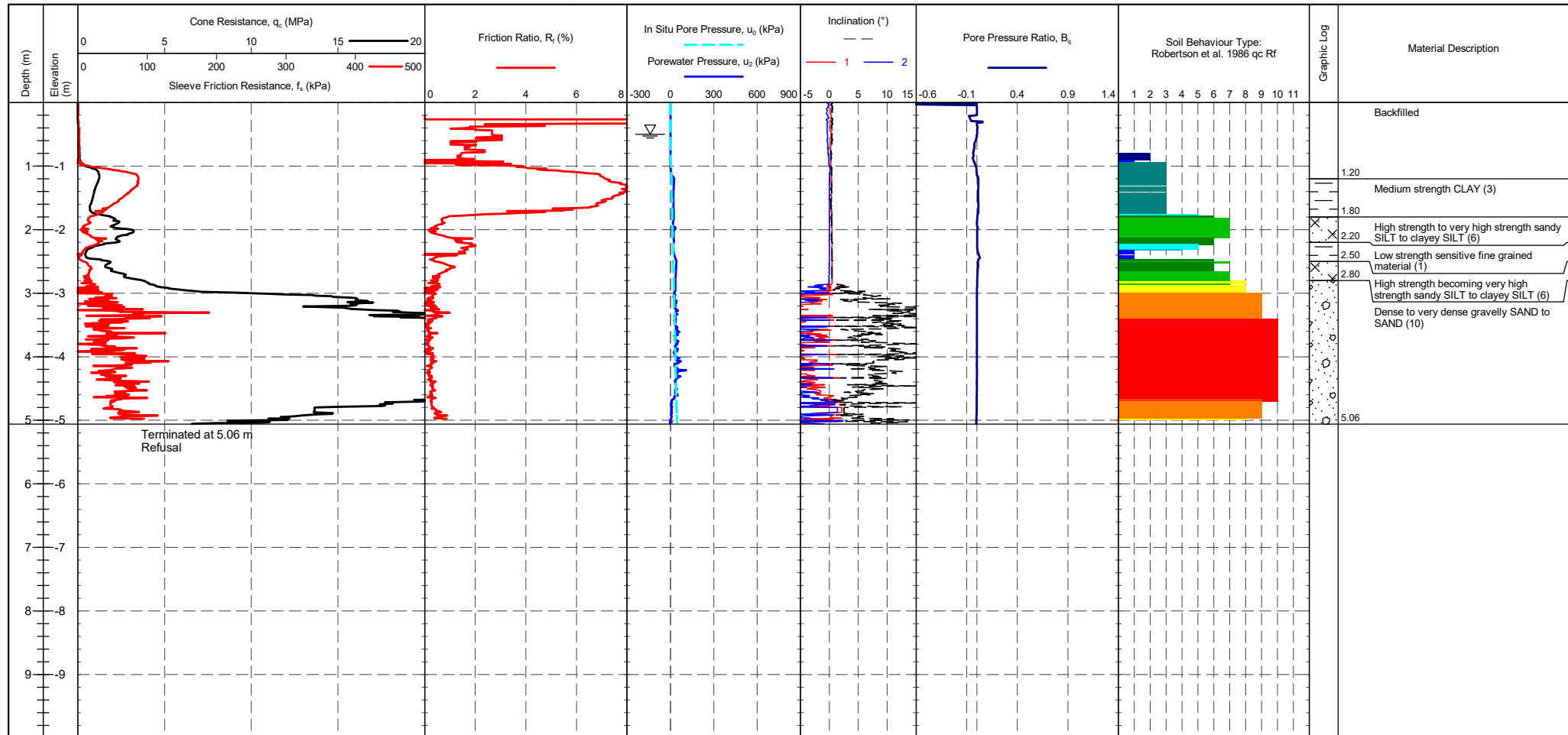
METHOD: Robertson et al. 1986 qc Rf

1 - Sensitive fine grained material	4 - Silty CLAY to CLAY	7 - Silty SAND to sandy SILT	10 - Gravelly SAND to SAND
2 - Organic material	5 - Clayey SILT to silty CLAY	8 - SAND to silty SAND	11 - Very stiff fine grained
3 - CLAY	6 - Sandy SILT to clayey SILT	9 - SAND	12 - SAND to clayey SAND

	TITLE	Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 qc vs. Rf - S3CPT22	
	DRAWN	DATE	03/02/2023
	CHECKED	DATE	03/02/2023
	SCALE	Not To Scale	
PROJECT No	1230122		A4
	FIGURE No		

PointID	S3CPT23
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CALIBRATION DATE : 02/01/2023 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>355 mV</td> <td>352 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>299 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>291 mV</td> <td>285 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2503 mV</td> <td>2514 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	355 mV	352 mV	-0.033 MPa	Sleeve	301 mV	299 mV	-0.001 kPa	Pore Pressure 2	291 mV	285 mV	-0.002 kPa	X-Y Inclinator	2503 mV	2514 mV		METHOD : Robertson et al. 1986 qc Rf <table border="1"> <tr> <td>1 - Sensitive fine grained material</td> <td>5 - Clayey SILT to silty CLAY</td> <td>9 - SAND</td> </tr> <tr> <td>2 - Organic material</td> <td>6 - Sandy SILT to clayey SILT</td> <td>10 - Gravelly SAND to SAND</td> </tr> <tr> <td>3 - CLAY</td> <td>7 - Silty SAND to sandy SILT</td> <td>11 - Very stiff fine grained</td> </tr> <tr> <td>4 - Silty CLAY to CLAY</td> <td>8 - SAND to silty SAND</td> <td>12 - SAND to clayey SAND</td> </tr> </table>	1 - Sensitive fine grained material	5 - Clayey SILT to silty CLAY	9 - SAND	2 - Organic material	6 - Sandy SILT to clayey SILT	10 - Gravelly SAND to SAND	3 - CLAY	7 - Silty SAND to sandy SILT	11 - Very stiff fine grained	4 - Silty CLAY to CLAY	8 - SAND to silty SAND	12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID

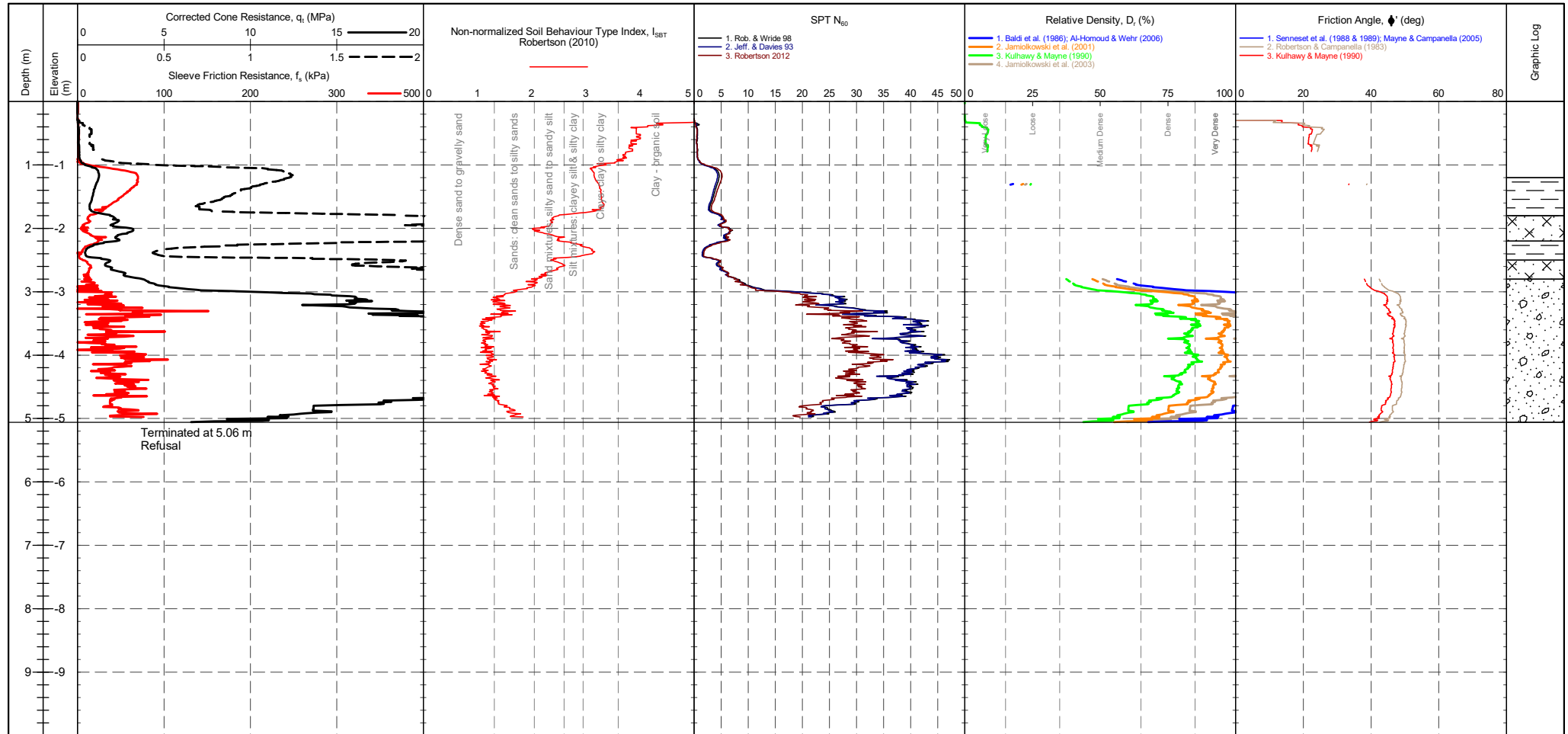
S3CPT23

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass - 2nd Visit
 LOCATION : A46 Newark Bypass
 PROJECT No. : 1230122

EASTING : 0.000 m
 NORTHING : 0.000 m
 ELEVATION : 0.000 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on inclination.

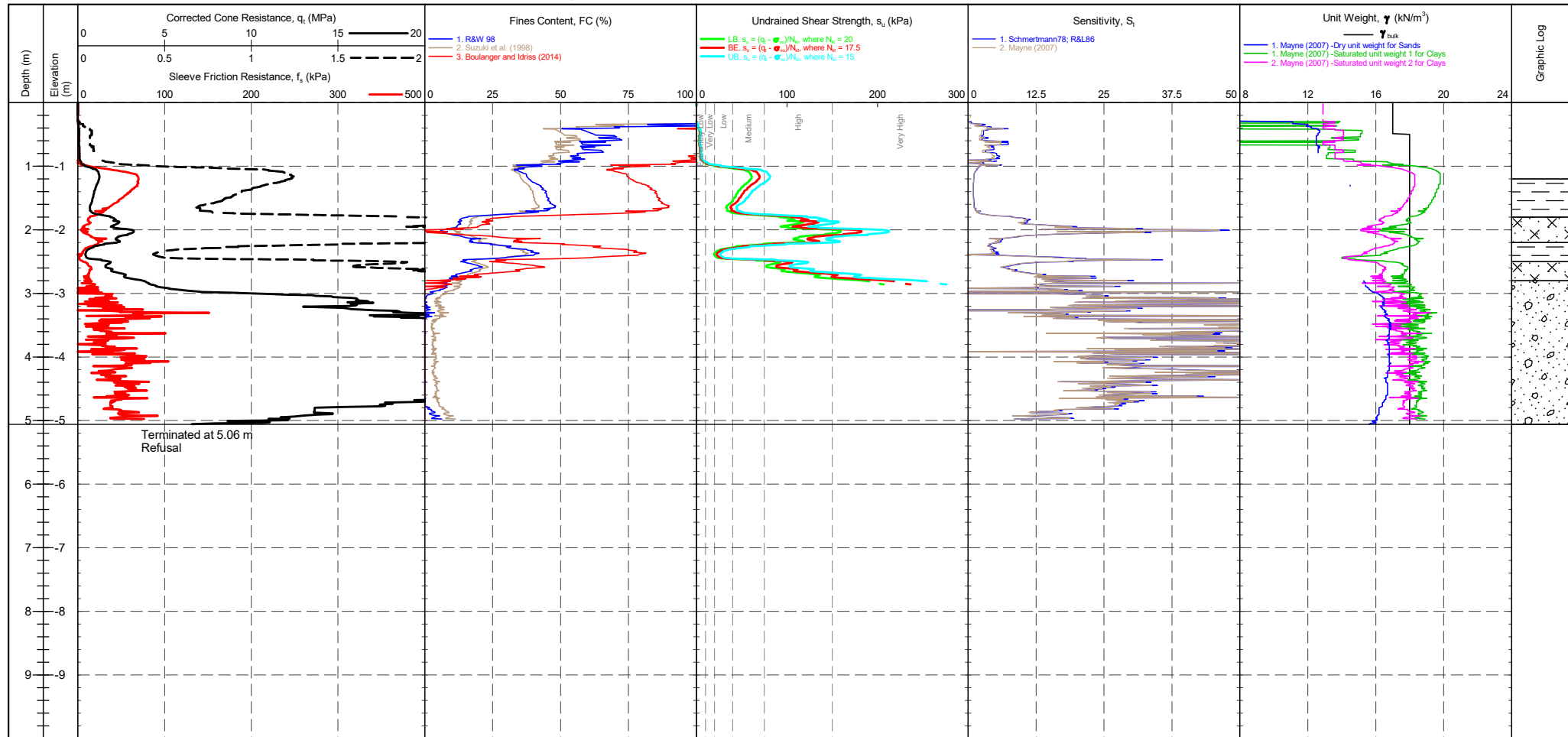
SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 25/01/2023
 PLOT DATE : 03/02/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICTION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES			GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12				Groundwater Level Dissipation Test
		Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	Pre 355 mV 301 mV 291 mV 2503 mV	Post 352 mV 299 mV 285 mV 2514 mV	Difference -0.033 MPa -0.001 kPa -0.002 kPa	Description Clays Silt mixtures Sand mixtures Sands Gravelly sand	SBT Index, I _c 2.95-3.60 2.60-2.95 2.05-2.60 1.31-2.05 <1.31	Description Very Loose Loose Medium Dense Dense Very Dense	

PointID	S3CPT23
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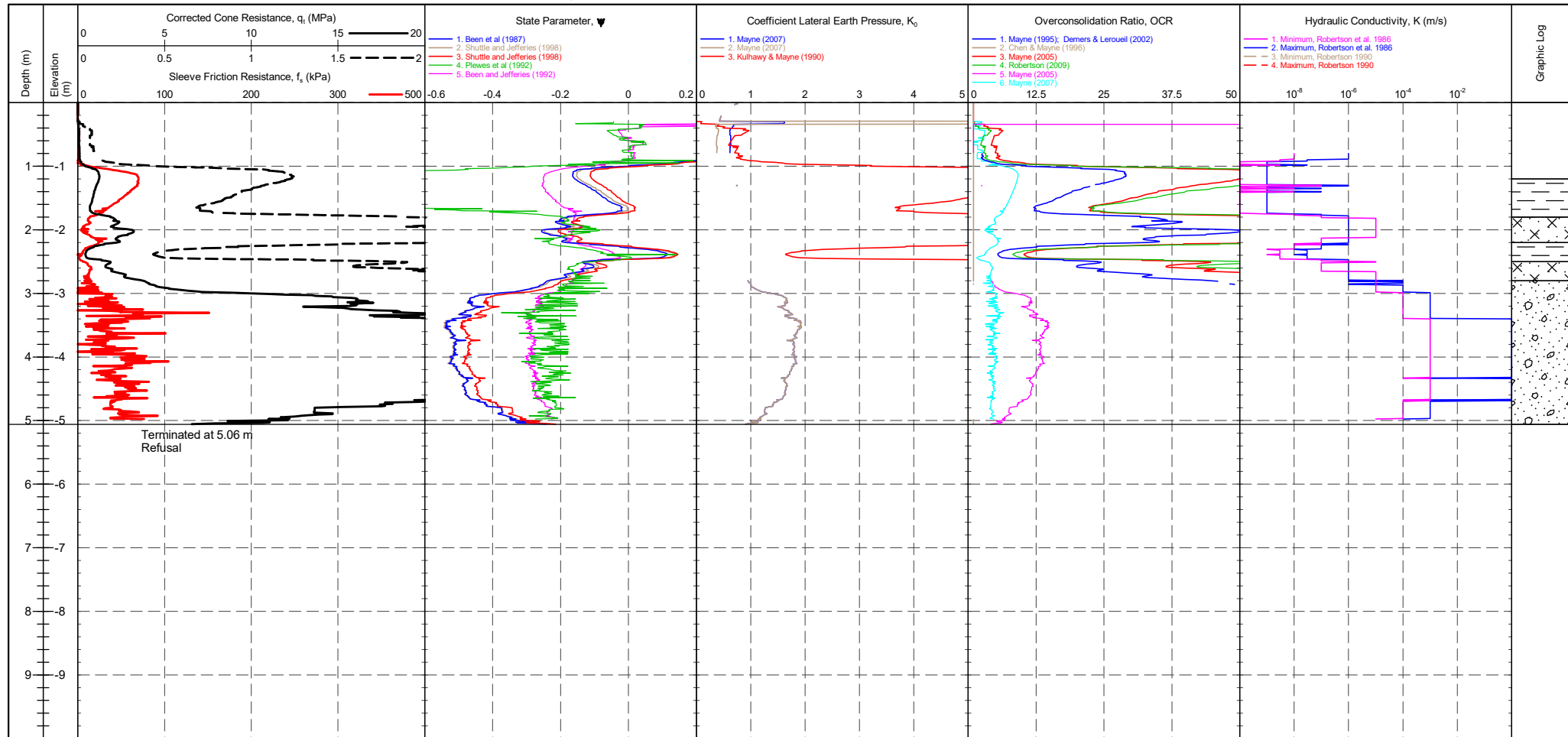
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>355 mV</td> <td>352 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>299 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>291 mV</td> <td>285 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2503 mV</td> <td>2514 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	355 mV	352 mV	-0.033 MPa	Sleeve	301 mV	299 mV	-0.001 kPa	Pore Pressure 2	291 mV	285 mV	-0.002 kPa	X-Y Inclinator	2503 mV	2514 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr> <th>Term based on measurement</th> <th>s_u (kPa)</th> <th>Term based on measurement</th> <th>s_u (kPa)</th> </tr> <tr> <td>Extremely low strength</td> <td><10</td> <td>Medium strength</td> <td>40-75</td> </tr> <tr> <td>Very low strength</td> <td>10-20</td> <td>High strength</td> <td>75-150</td> </tr> <tr> <td>Low strength</td> <td>20-40</td> <td>Very high strength</td> <td>150-300</td> </tr> <tr> <td></td> <td></td> <td>Extremely high strength</td> <td>>300</td> </tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																																									
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PointID
S3CPT23

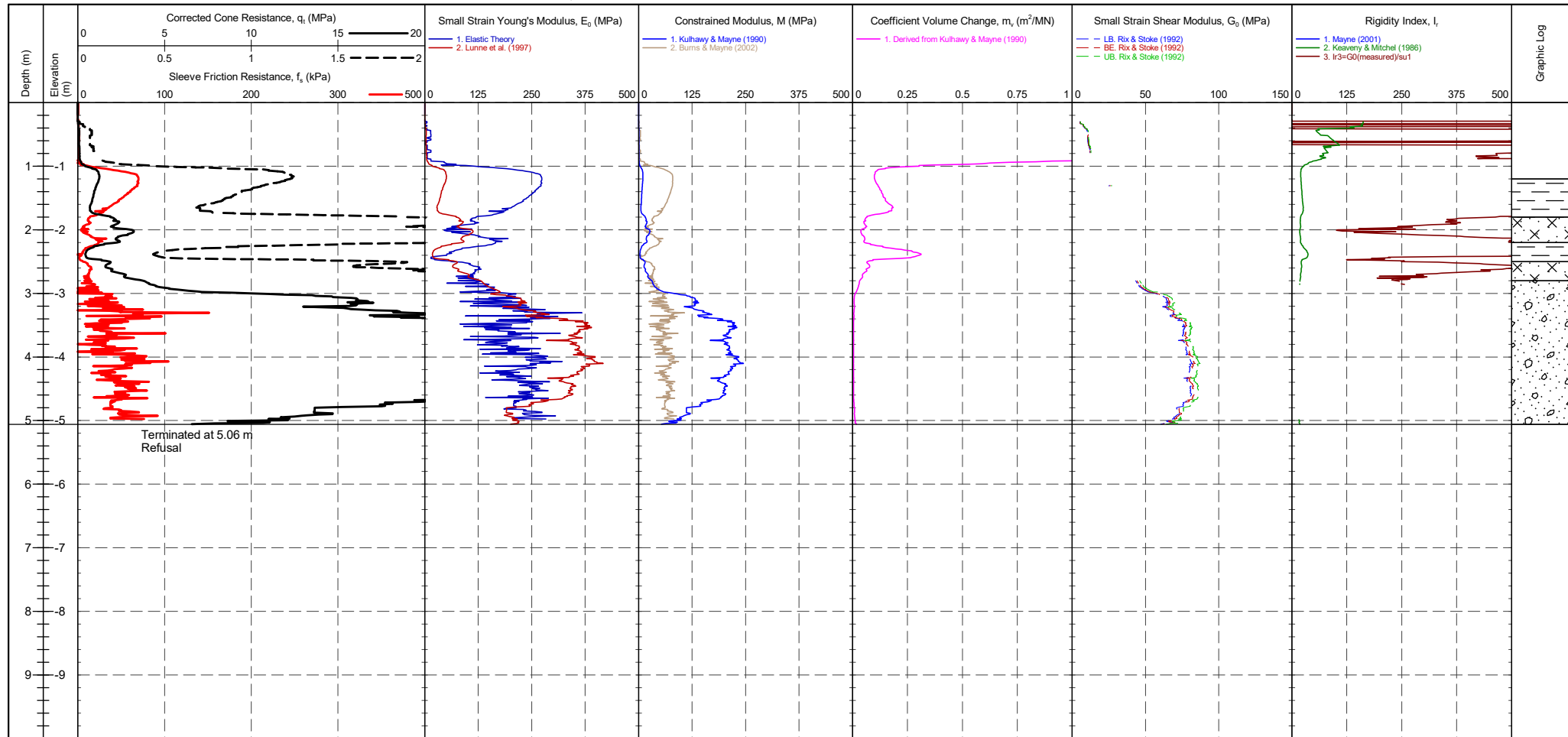
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>355 mV</td> <td>352 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>299 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>291 mV</td> <td>285 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2503 mV</td> <td>2514 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	355 mV	352 mV	-0.033 MPa	Sleeve	301 mV	299 mV	-0.001 kPa	Pore Pressure 2	291 mV	285 mV	-0.002 kPa	X-Y Inclinator	2503 mV	2514 mV		Groundwater Level Dissipation Test
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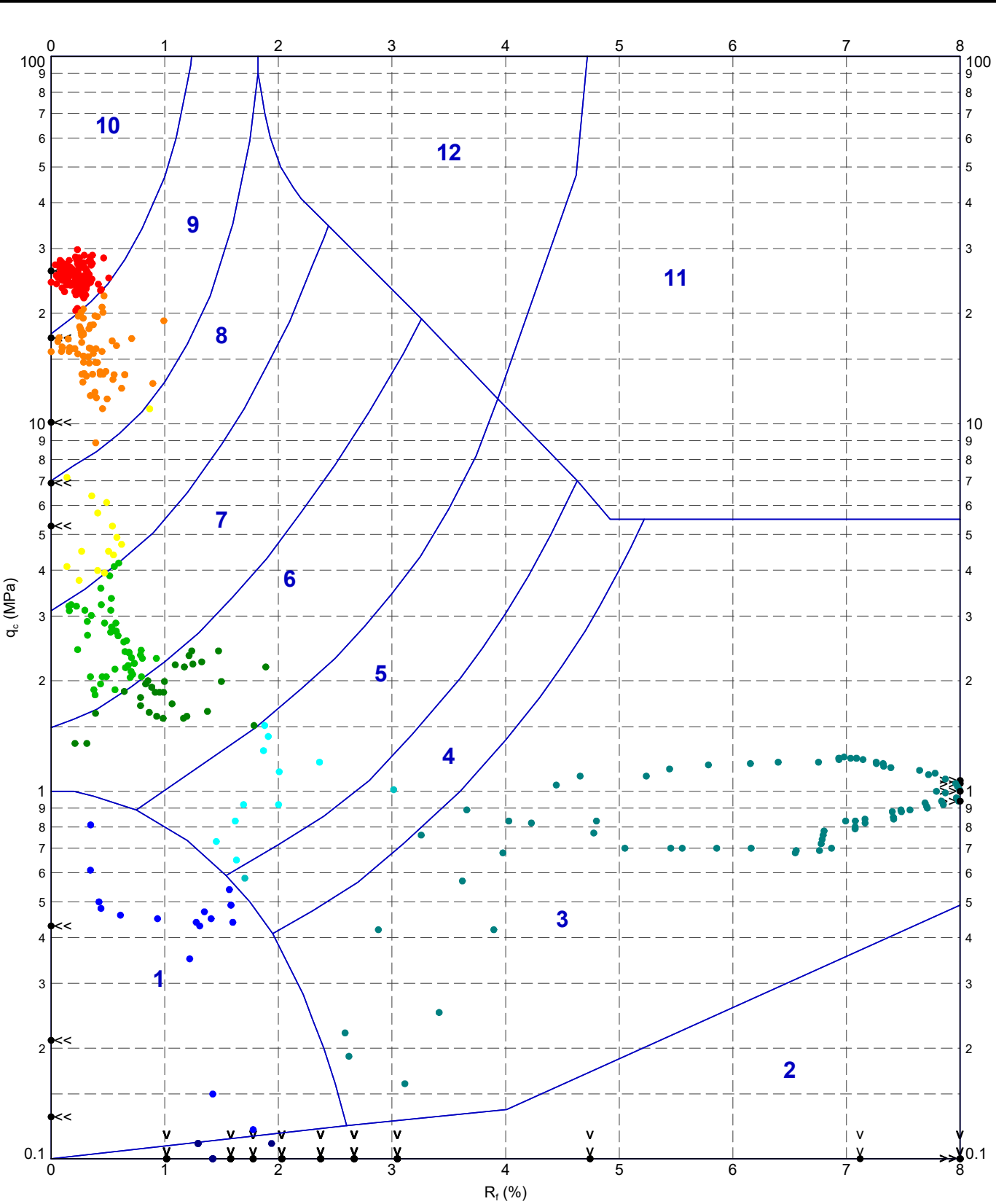
PointID
S3CPT23

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 25/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.1488 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : J Cougle FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>355 mV</td> <td>352 mV</td> <td>-0.033 MPa</td> </tr> <tr> <td>Sleeve</td> <td>301 mV</td> <td>299 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>291 mV</td> <td>285 mV</td> <td>-0.002 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2503 mV</td> <td>2514 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	355 mV	352 mV	-0.033 MPa	Sleeve	301 mV	299 mV	-0.001 kPa	Pore Pressure 2	291 mV	285 mV	-0.002 kPa	X-Y Inclinator	2503 mV	2514 mV		Groundwater Level Dissipation Test
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22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86 QC VS. RF MPF. 1230122 A46 NEWARK BYPASS 2ND VISIT STRATA GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:31 10.03.0009 Dajugel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



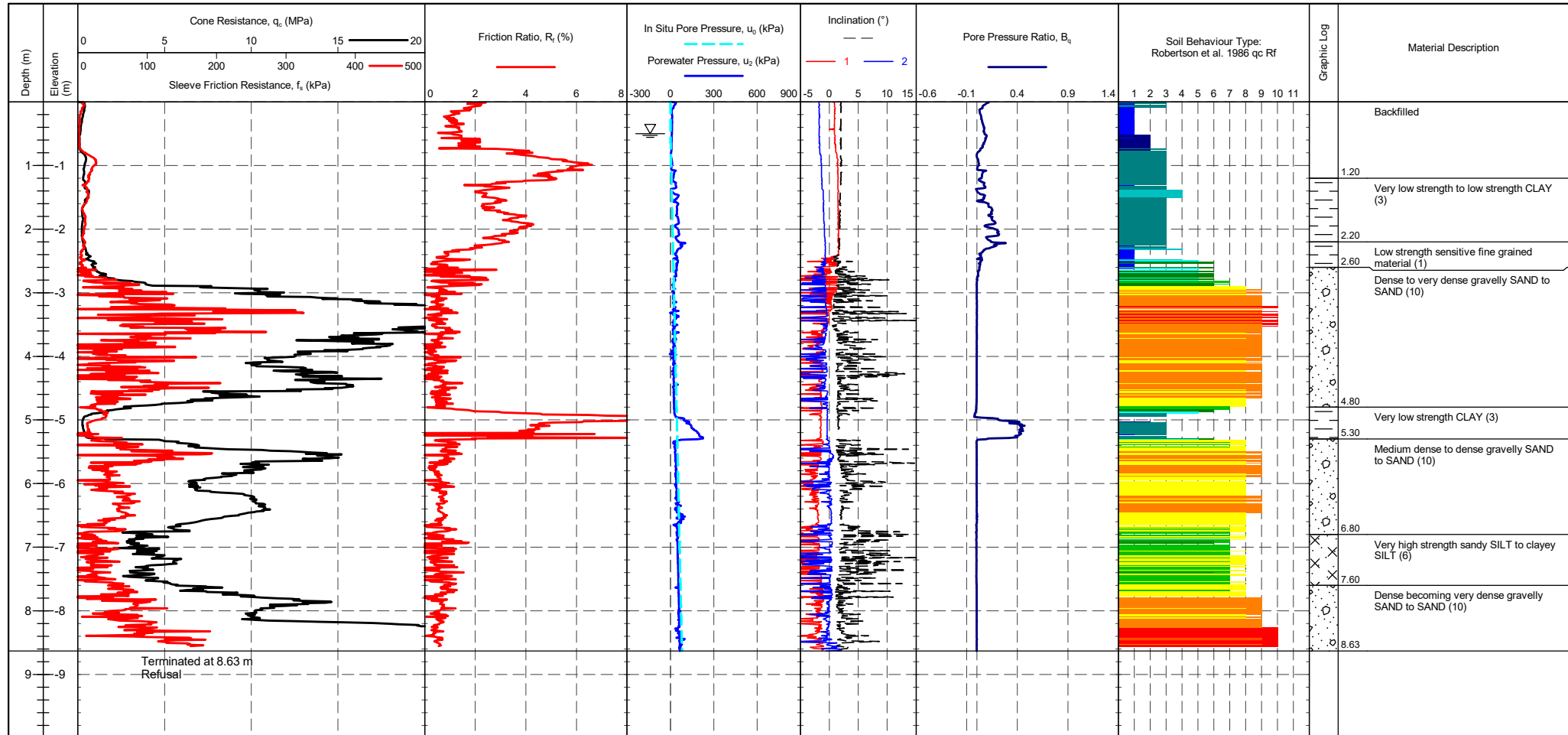
METHOD: Robertson et al. 1986 qc Rf

- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 qc vs. Rf - S3CPT23			03/02/2023
			CHECKED	DATE
				03/02/2023
		SCALE	Not To Scale	
		PROJECT No	A4	
		1230122	FIGURE No	

PointID	S3CPT39
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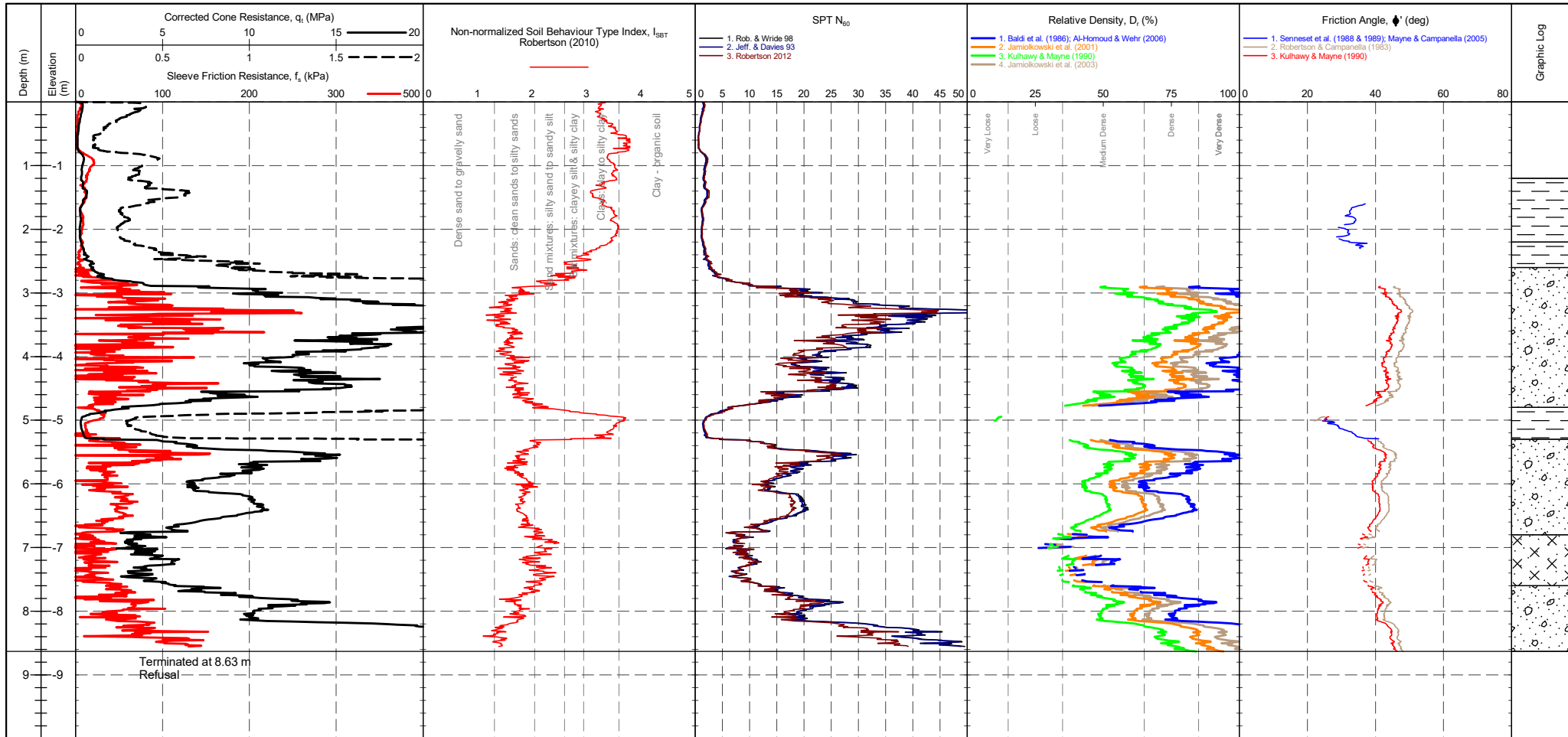
CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CALIBRATION DATE : 24/02/2022 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip 307 mV 305 mV -0.023 MPa Sleeve 306 mV 304 mV -0.001 kPa Pore Pressure 2 293 mV 264 mV -0.008 kPa X-Y Inclinator 2590 mV 2594 mV	METHOD: Robertson et al. 1986 qc Rf 1 - Sensitive fine grained material 2 - Organic material 3 - CLAY 4 - Silty CLAY to CLAY 5 - Clayey SILT to silty CLAY 6 - Sandy SILT to clayey SILT 7 - Silty SAND to sandy SILT 8 - SAND to silty SAND 9 - SAND 10 - Gravelly SAND to SAND 11 - Very stiff fine grained 12 - SAND to clayey SAND	Groundwater Level Dissipation Test
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PointID	S3CPT39
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CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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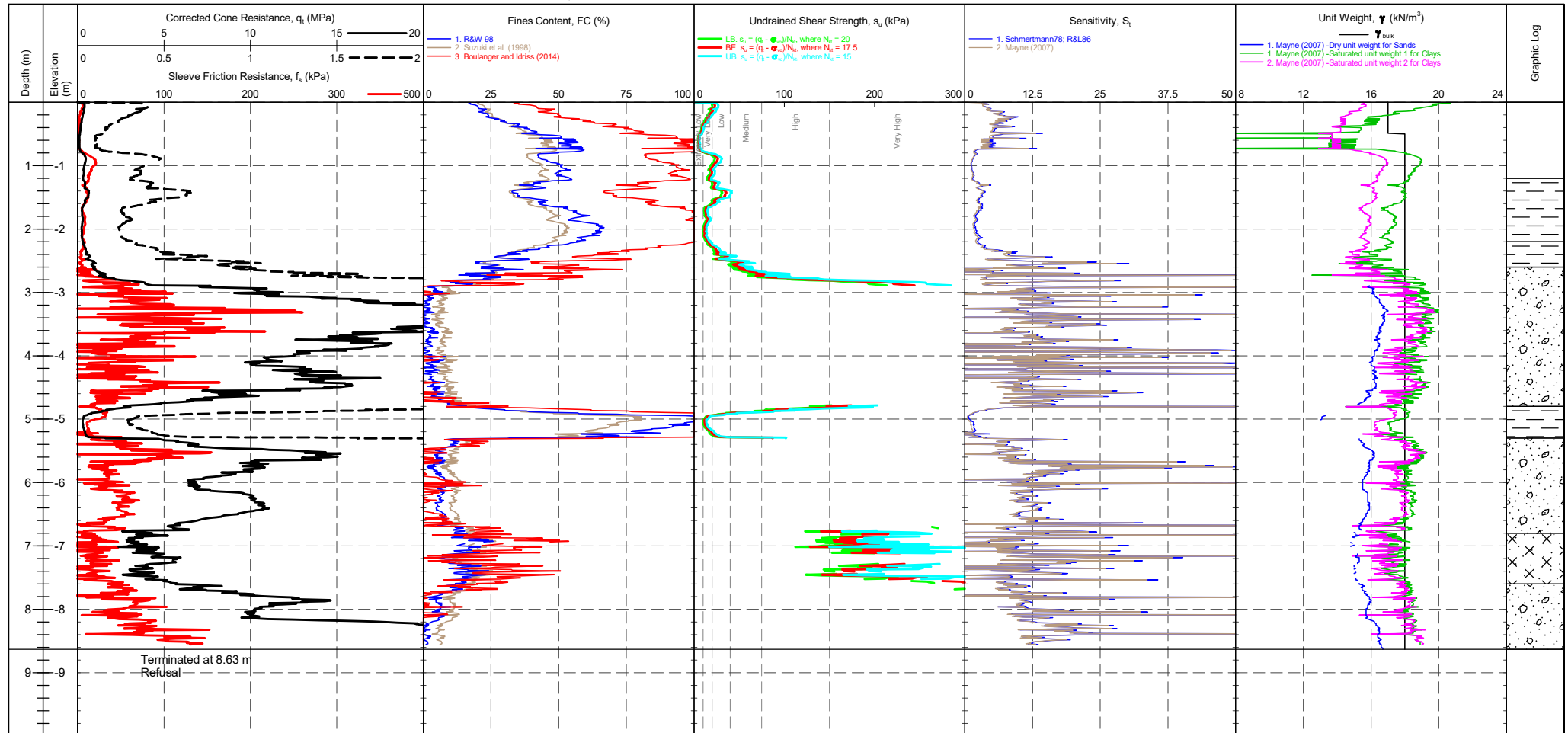


CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>307 mV</td> <td>305 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>306 mV</td> <td>304 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>293 mV</td> <td>264 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2590 mV</td> <td>2594 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	307 mV	305 mV	-0.023 MPa	Sleeve	306 mV	304 mV	-0.001 kPa	Pore Pressure 2	293 mV	264 mV	-0.008 kPa	X-Y Inclinator	2590 mV	2594 mV		GRANULAR SOILS (Sands & Gravels) Robertson et al. 1986 Zones 7-10 and Zone 12 <table border="1"> <thead> <tr> <th>Description</th> <th>SBT Index, I_c</th> <th>Description</th> <th>SPT N value, NSPT</th> <th>Description</th> <th>Relative Density Dr (%)</th> </tr> </thead> <tbody> <tr> <td>Clays</td> <td>2.95-3.60</td> <td>Very Loose</td> <td>0 - 4</td> <td>Very Loose</td> <td>0 - 15</td> </tr> <tr> <td>Silt mixtures</td> <td>2.60-2.95</td> <td>Loose</td> <td>4 - 10</td> <td>Loose</td> <td>15 - 35</td> </tr> <tr> <td>Sand mixtures</td> <td>2.05-2.60</td> <td>Medium Dense</td> <td>10 - 30</td> <td>Medium Dense</td> <td>35 - 65</td> </tr> <tr> <td>Sands</td> <td>1.31-2.05</td> <td>Dense</td> <td>30 - 50</td> <td>Dense</td> <td>65 - 85</td> </tr> <tr> <td>Gravelly sand</td> <td><1.31</td> <td>Very Dense</td> <td>>50</td> <td>Very Dense</td> <td>>85</td> </tr> </tbody> </table>	Description	SBT Index, I _c	Description	SPT N value, NSPT	Description	Relative Density Dr (%)	Clays	2.95-3.60	Very Loose	0 - 4	Very Loose	0 - 15	Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35	Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65	Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85	Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85	Groundwater Level Dissipation Test
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Silt mixtures	2.60-2.95	Loose	4 - 10	Loose	15 - 35																																																							
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense	35 - 65																																																							
Sands	1.31-2.05	Dense	30 - 50	Dense	65 - 85																																																							
Gravelly sand	<1.31	Very Dense	>50	Very Dense	>85																																																							

PointID

S3CPT39

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
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CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr><th>Transducer</th><th>Pre</th><th>Post</th><th>Difference</th></tr> <tr><td>Tip</td><td>307 mV</td><td>305 mV</td><td>-0.023 MPa</td></tr> <tr><td>Sleeve</td><td>306 mV</td><td>304 mV</td><td>-0.001 kPa</td></tr> <tr><td>Pore Pressure 2</td><td>293 mV</td><td>264 mV</td><td>-0.008 kPa</td></tr> <tr><td>X-Y Inclinator</td><td>2590 mV</td><td>2594 mV</td><td></td></tr> </table>	Transducer	Pre	Post	Difference	Tip	307 mV	305 mV	-0.023 MPa	Sleeve	306 mV	304 mV	-0.001 kPa	Pore Pressure 2	293 mV	264 mV	-0.008 kPa	X-Y Inclinator	2590 mV	2594 mV		COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 <table border="1"> <tr><th>Term based on measurement</th><th>s_u (kPa)</th><th>Term based on measurement</th><th>s_u (kPa)</th></tr> <tr><td>Extremely low strength</td><td><10</td><td>Medium strength</td><td>40-75</td></tr> <tr><td>Very low strength</td><td>10-20</td><td>High strength</td><td>75-150</td></tr> <tr><td>Low strength</td><td>20-40</td><td>Very high strength</td><td>150-300</td></tr> <tr><td></td><td></td><td>Extremely high strength</td><td>>300</td></tr> </table>	Term based on measurement	s_u (kPa)	Term based on measurement	s_u (kPa)	Extremely low strength	<10	Medium strength	40-75	Very low strength	10-20	High strength	75-150	Low strength	20-40	Very high strength	150-300			Extremely high strength	>300	▽ Groundwater Level ▮ Dissipation Test
Transducer	Pre	Post	Difference																																									
Tip	307 mV	305 mV	-0.023 MPa																																									
Sleeve	306 mV	304 mV	-0.001 kPa																																									
Pore Pressure 2	293 mV	264 mV	-0.008 kPa																																									
X-Y Inclinator	2590 mV	2594 mV																																										
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Very low strength	10-20	High strength	75-150																																									
Low strength	20-40	Very high strength	150-300																																									
		Extremely high strength	>300																																									

PointID

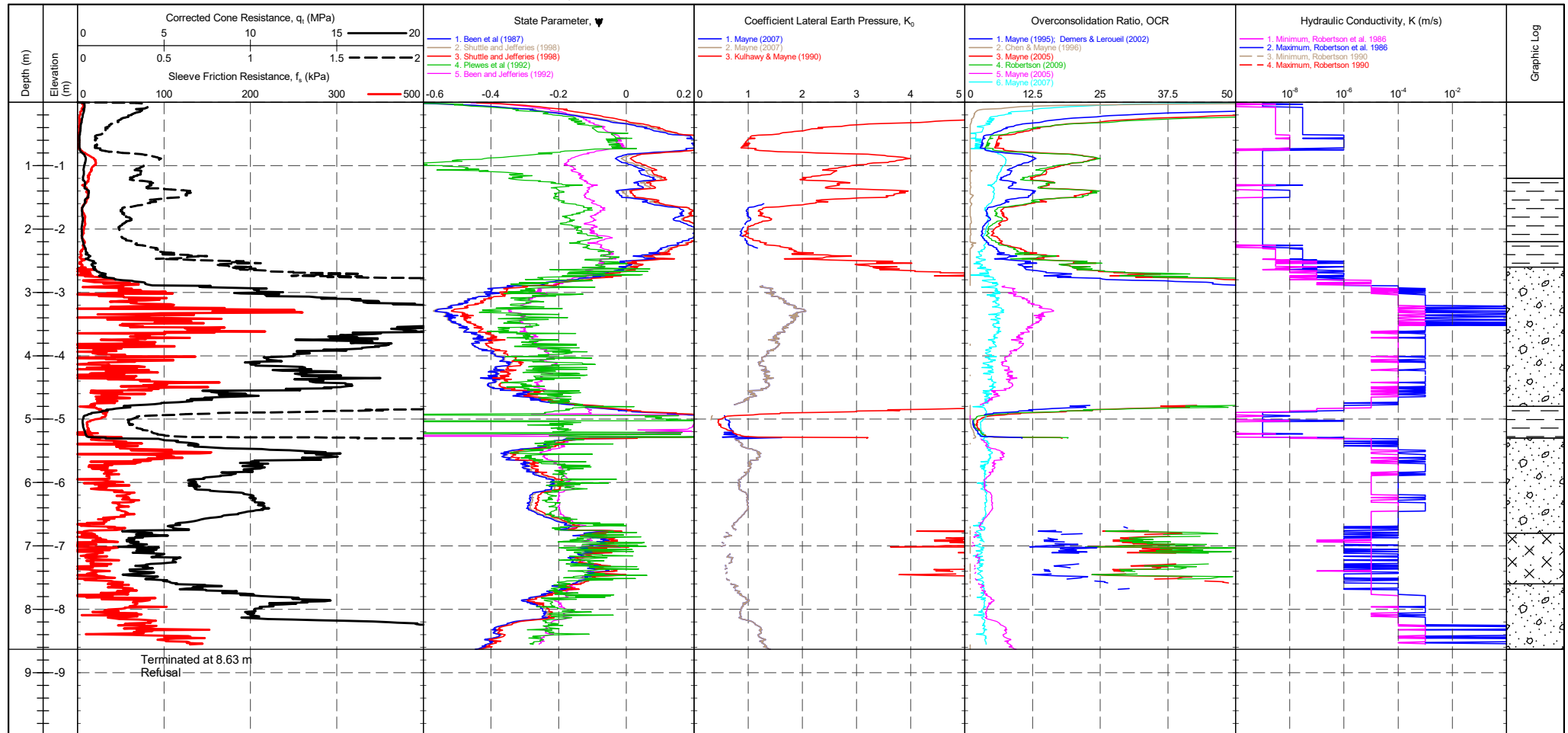
S3CPT39

CLIENT : Strata Geotechnics
 PROJECT : A46 Newark Bypass - 2nd Visit
 LOCATION : A46 Newark Bypass
 PROJECT No. : 1230122

EASTING : 0.000 m
 NORTHING : 0.000 m
 ELEVATION : 0.000 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 20/01/2023
 PLOT DATE : 03/02/2023
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.2089
 CONE MODEL : Subtraction
 CONE AREA : 15cm²
 CONE AREA RATIO : 0.79
 FILTER POSITION : u2
 FILTER TYPE : HDPE

TEST TYPE : TE2
 APPLICATION CLASS : 2
 RIG : CPT 006 - Zoe
 OPERATOR : JC
 FRICTION REDUCER : None
 WEATHER : Sunny & Cold

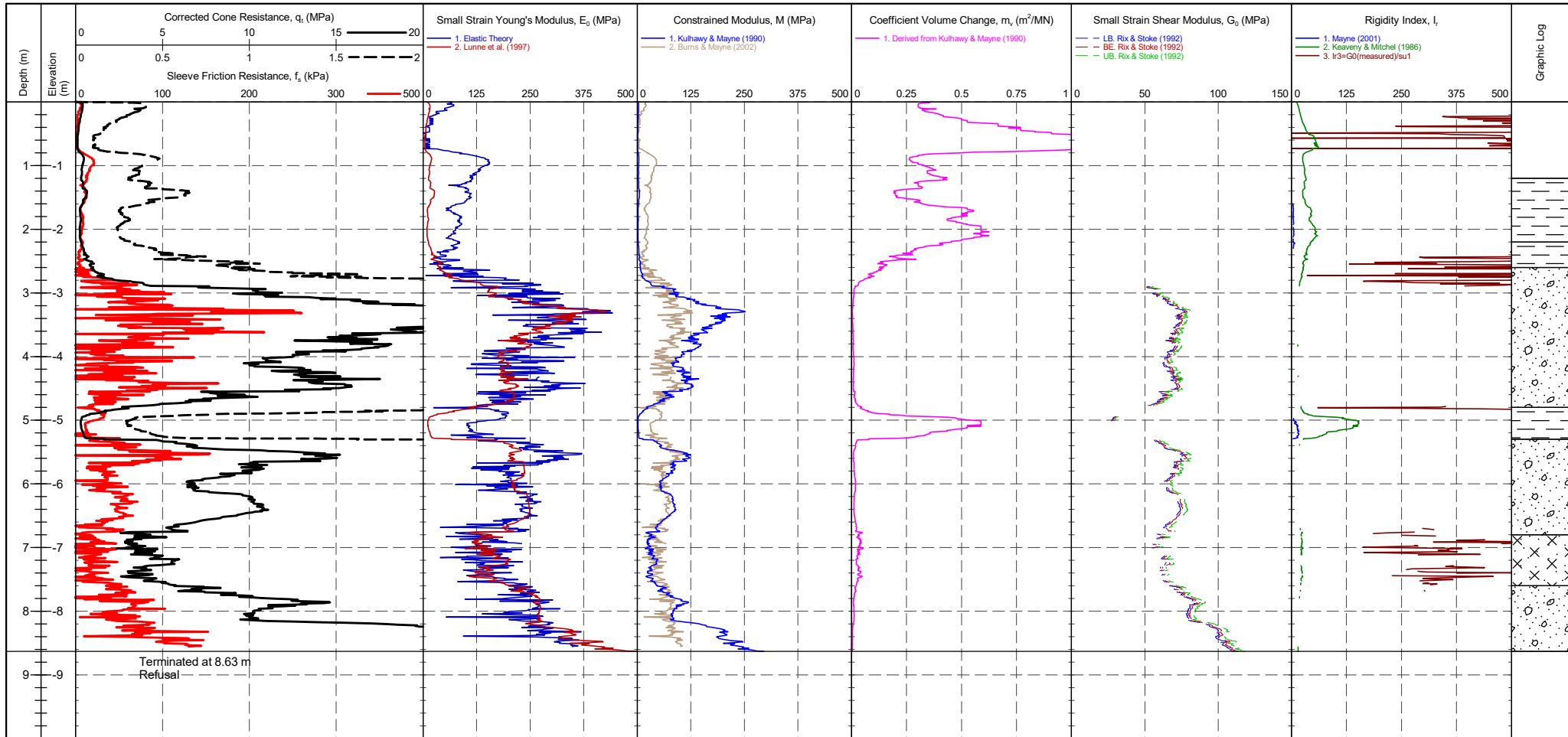
CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	307 mV	305 mV	-0.023 MPa
Sleeve	306 mV	304 mV	-0.001 kPa
Pore Pressure 2	293 mV	264 mV	-0.008 kPa
X-Y Inclinator	2590 mV	2594 mV	

Groundwater Level
 Dissipation Test

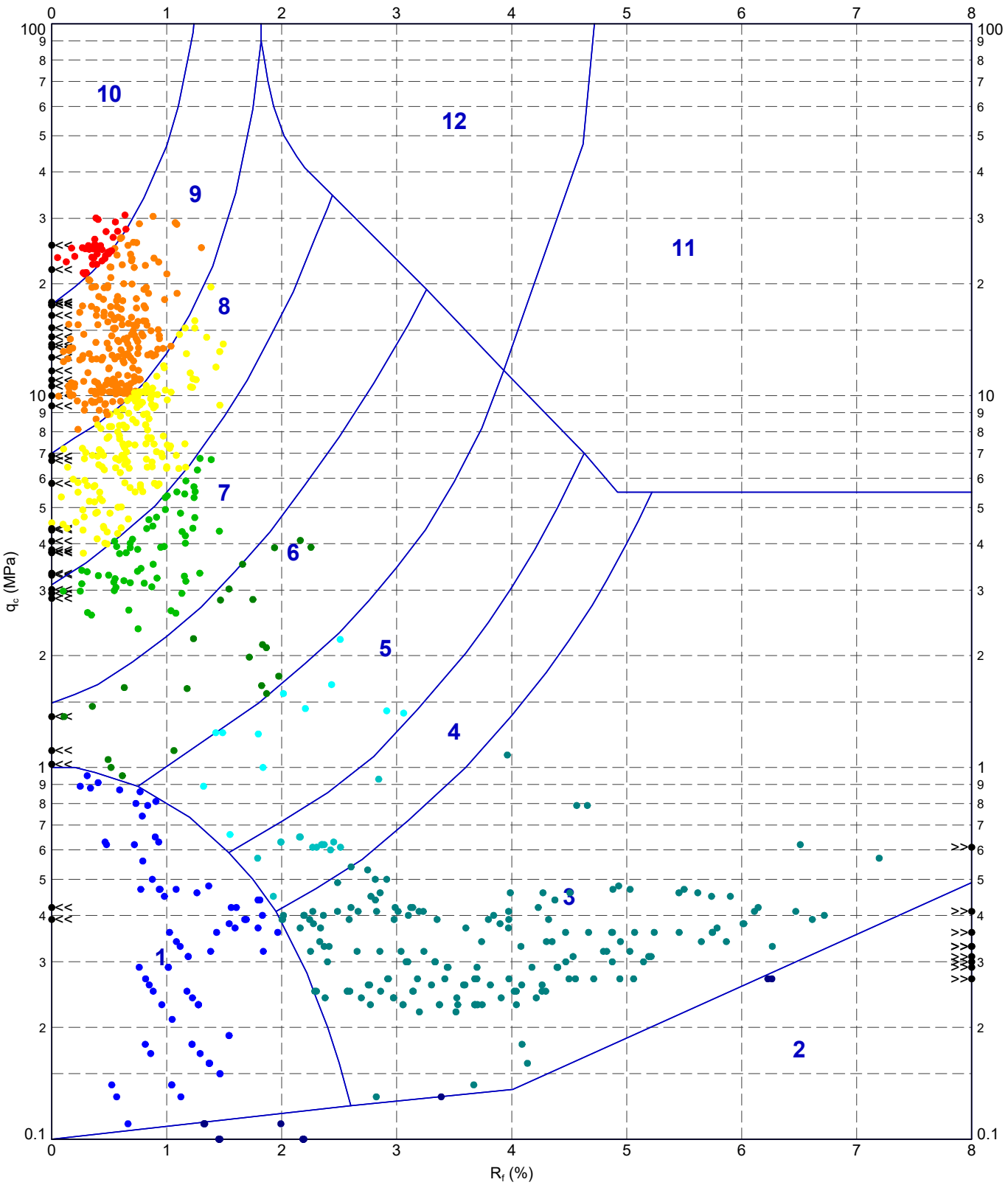
PointID
S3CPT39

CLIENT : Strata Geotechnics PROJECT : A46 Newark Bypass - 2nd Visit LOCATION : A46 Newark Bypass PROJECT No. : 1230122	EASTING : 0.000 m NORTHING : 0.000 m ELEVATION : 0.000 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 20/01/2023 PLOT DATE : 03/02/2023 METHOD : ISO 22476-1:2012
---	---	---	--



CONE ID : S15-CFIP.2089 CONE MODEL : Subtraction CONE AREA : 15cm ² CONE AREA RATIO : 0.79 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 006 - Zoe OPERATOR : JC FRICITION REDUCER : None WEATHER : Sunny & Cold	CPTU ZERO VALUES <table border="1"> <tr> <th>Transducer</th> <th>Pre</th> <th>Post</th> <th>Difference</th> </tr> <tr> <td>Tip</td> <td>307 mV</td> <td>305 mV</td> <td>-0.023 MPa</td> </tr> <tr> <td>Sleeve</td> <td>306 mV</td> <td>304 mV</td> <td>-0.001 kPa</td> </tr> <tr> <td>Pore Pressure 2</td> <td>293 mV</td> <td>264 mV</td> <td>-0.008 kPa</td> </tr> <tr> <td>X-Y Inclinator</td> <td>2590 mV</td> <td>2594 mV</td> <td></td> </tr> </table>	Transducer	Pre	Post	Difference	Tip	307 mV	305 mV	-0.023 MPa	Sleeve	306 mV	304 mV	-0.001 kPa	Pore Pressure 2	293 mV	264 mV	-0.008 kPa	X-Y Inclinator	2590 mV	2594 mV		Groundwater Level Dissipation Test
Transducer	Pre	Post	Difference																				
Tip	307 mV	305 mV	-0.023 MPa																				
Sleeve	306 mV	304 mV	-0.001 kPa																				
Pore Pressure 2	293 mV	264 mV	-0.008 kPa																				
X-Y Inclinator	2590 mV	2594 mV																					

22069-ADVANCED REPORT INSTITUSI 2.02.1 LIB - ZOE.GLB Graph: CPT ROBERTSON ET AL. 86.QC.VS.RF.AMF. 1230122.A46.NEWARK.BYPASS.2ND.VISIT.STRATA.GEOTECHNICS.GPJ <<DrawingFile>> 03/02/2023 12:32 10.03.00.09 Dageel Lab and In Situ Tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10]



METHOD: Robertson et al. 1986 qc Rf

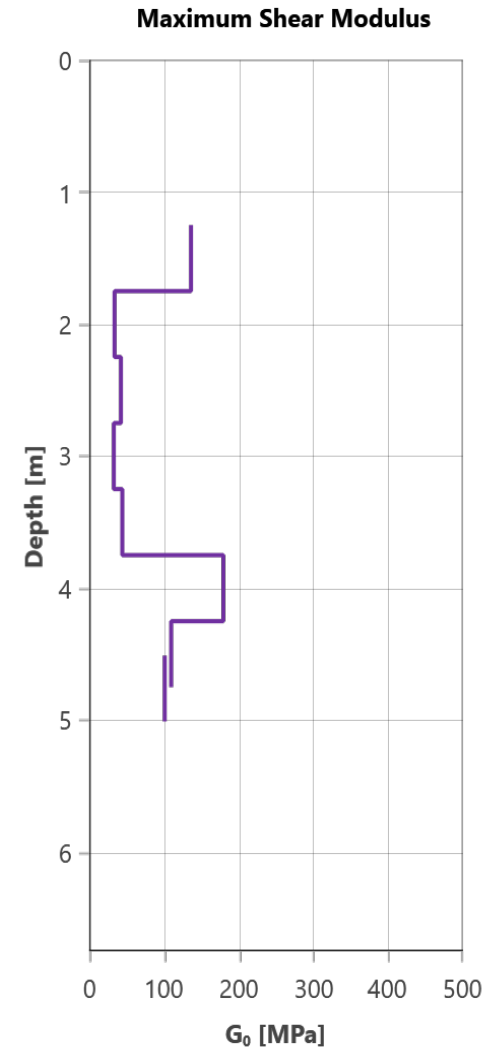
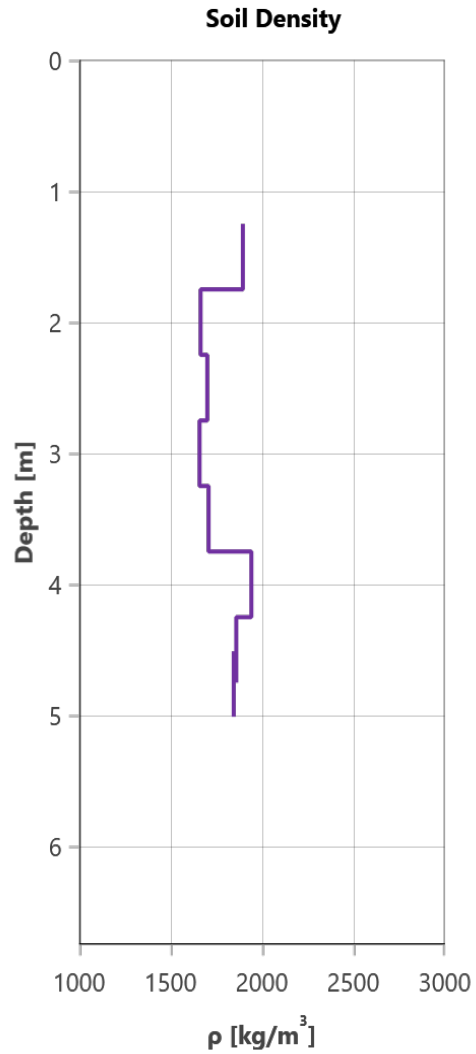
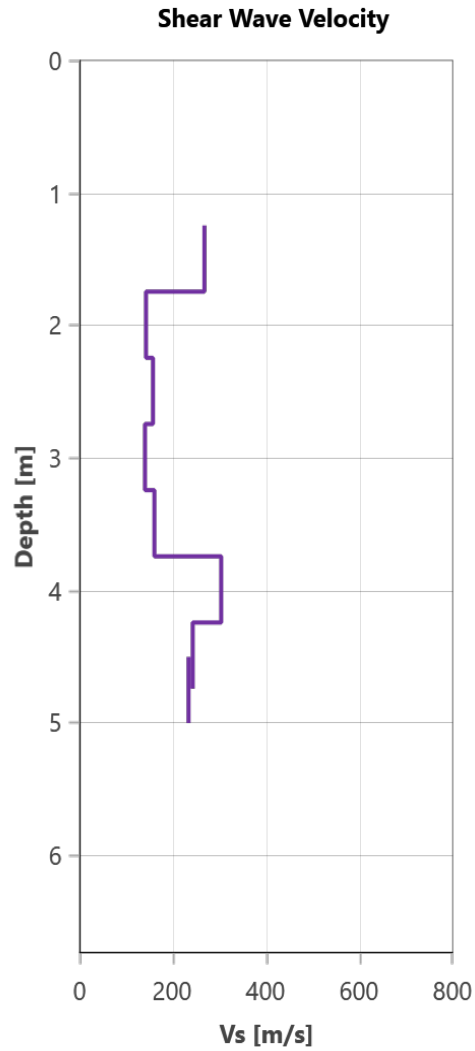
- 1 - Sensitive fine grained material
- 4 - Silty CLAY to CLAY
- 7 - Silty SAND to sandy SILT
- 10 - Gravelly SAND to SAND
- 2 - Organic material
- 5 - Clayey SILT to silty CLAY
- 8 - SAND to silty SAND
- 11 - Very stiff fine grained
- 3 - CLAY
- 6 - Sandy SILT to clayey SILT
- 9 - SAND
- 12 - SAND to clayey SAND

	TITLE		DRAWN	DATE
	Strata Geotechnics A46 Newark Bypass A46 Newark Bypass - 2nd Visit Robertson et al. 1986 qc vs. Rf - S3CPT39			03/02/2023
			CHECKED	DATE
			Not To Scale	
		PROJECT No 1230122	FIGURE No	

APPENDIX C

Seismic Dilatometer Marchetti (SDMT) Measurements

S-wave



S3CPT10

S-wave

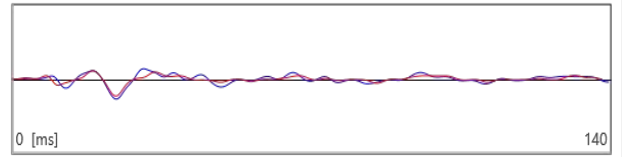
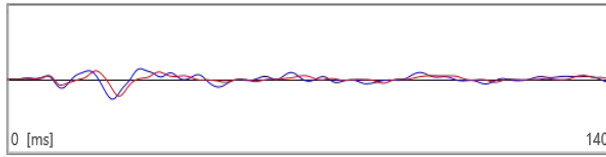
24/01/2023

Project: A46 Newark

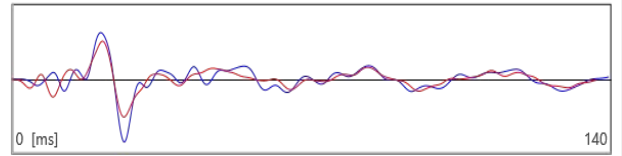
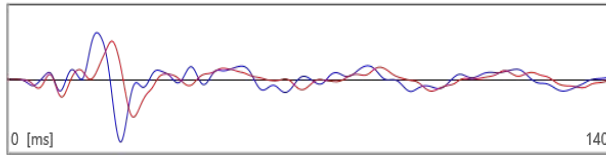
Recorded Signals

Rephased Signals

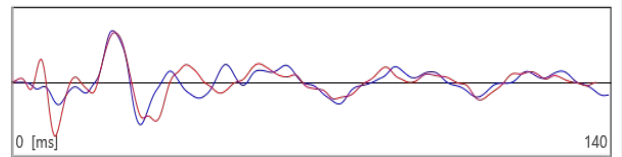
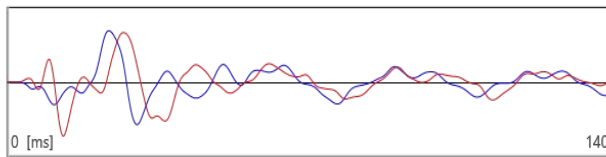
Z = 1.5 m
Ds = 0.41 m
Dt = 1.63 ms
Vs = 254 m/s
24/01/2023
11:04:21



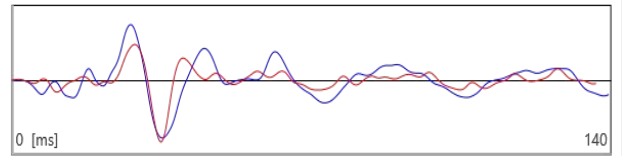
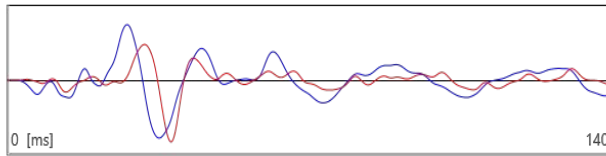
Z = 2.0 m
Ds = 0.45 m
Dt = 3.04 ms
Vs = 147 m/s
24/01/2023
11:07:37



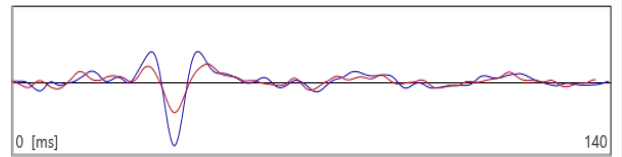
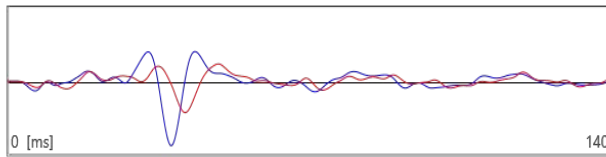
Z = 2.5 m
Ds = 0.46 m
Dt = 2.90 ms
Vs = 160 m/s
24/01/2023
11:09:07



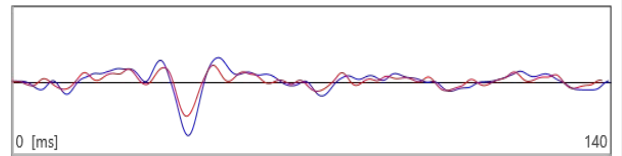
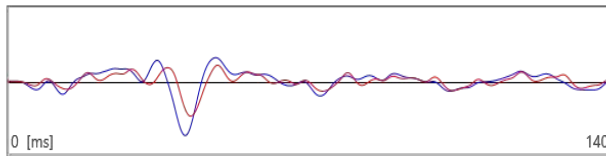
Z = 3.0 m
Ds = 0.47 m
Dt = 3.08 ms
Vs = 154 m/s
24/01/2023
11:11:49



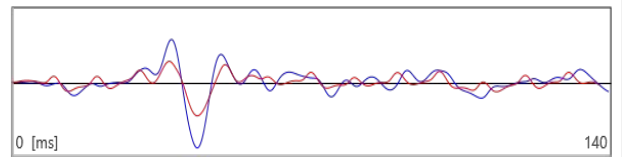
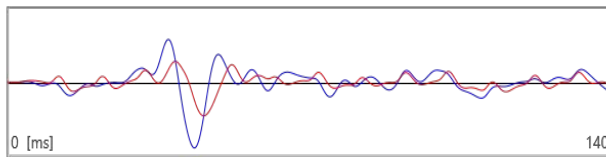
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Ds = 0.48 m
Dt = 3.16 ms
Vs = 152 m/s
24/01/2023
11:14:03



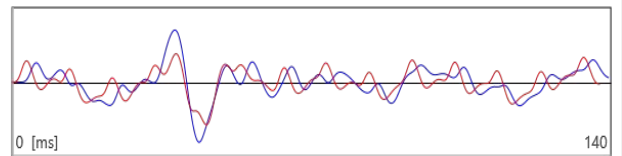
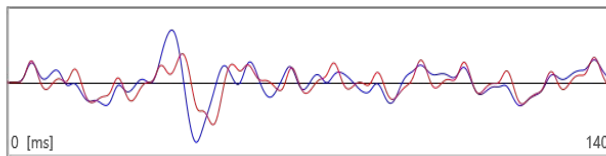
Z = 4.0 m
Ds = 0.49 m
Dt = 1.63 ms
Vs = 297 m/s
24/01/2023
11:16:54



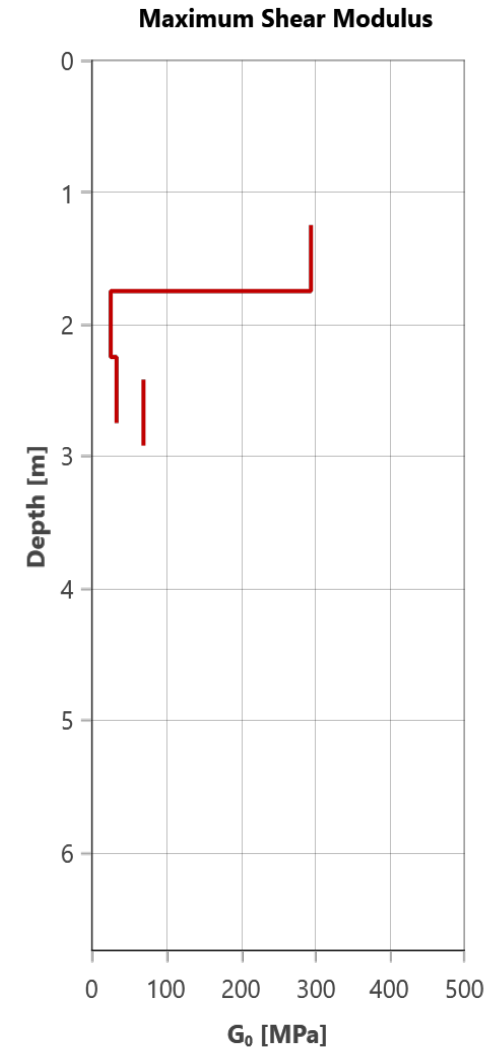
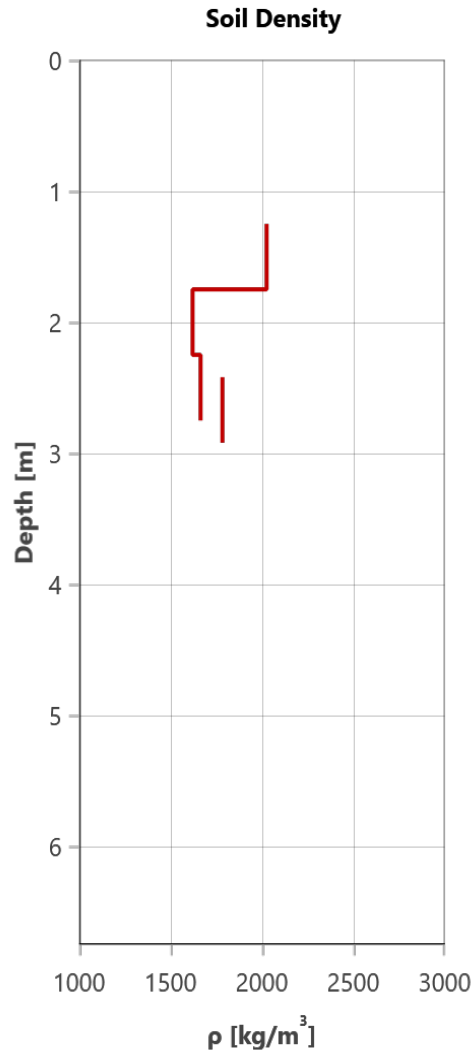
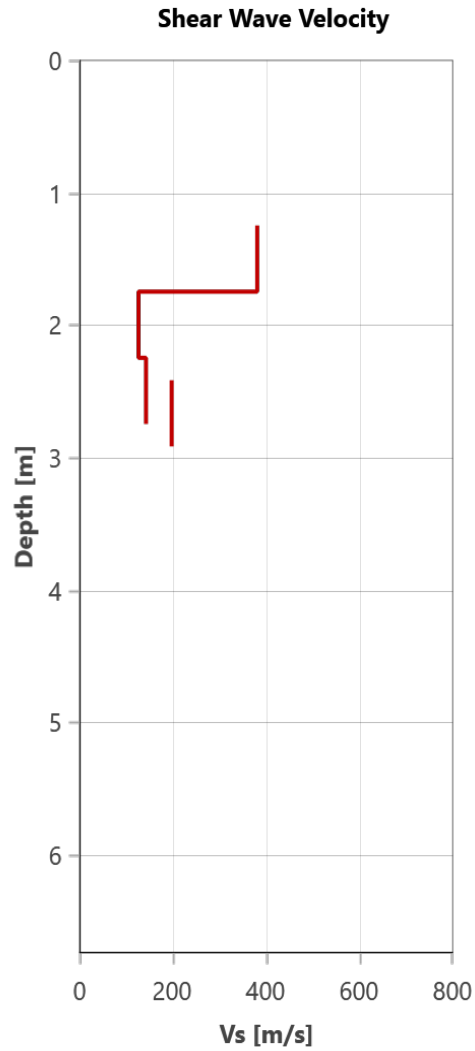
Z = 4.5 m
Ds = 0.49 m
Dt = 2.14 ms
Vs = 228 m/s
24/01/2023
11:19:58



Z = 4.8 m
Ds = 0.49 m
Dt = 2.17 ms
Vs = 225 m/s
24/01/2023
11:22:39



S-wave



S3CPT11

S-wave

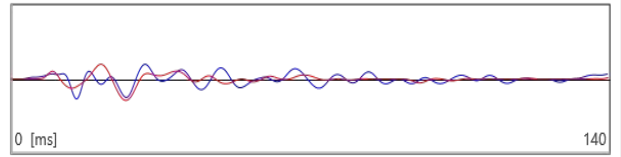
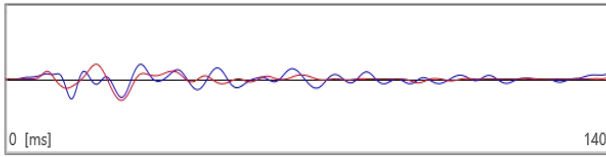
24/01/2023

Project: A46 Newark

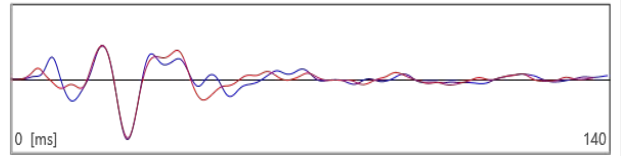
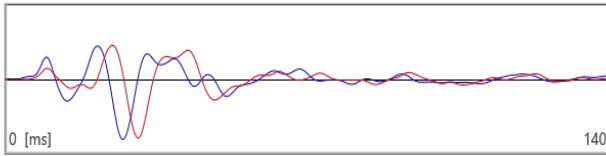
Recorded Signals

Rephased Signals

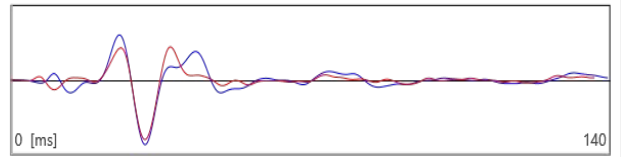
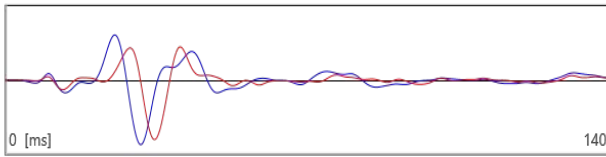
Z = 1.5 m
Ds = 0.41 m
Dt = ms
Vs = m/s
24/01/2023
11:52:36



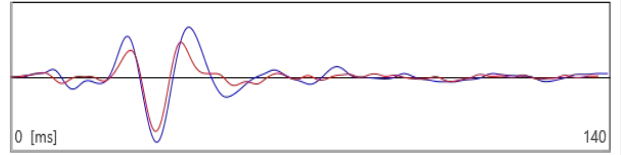
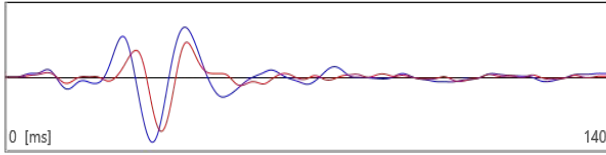
Z = 2.0 m
Ds = 0.45 m
Dt = 3.46 ms
Vs = 129 m/s
24/01/2023
11:54:11



Z = 2.5 m
Ds = 0.46 m
Dt = 3.22 ms
Vs = 144 m/s
24/01/2023
11:56:33

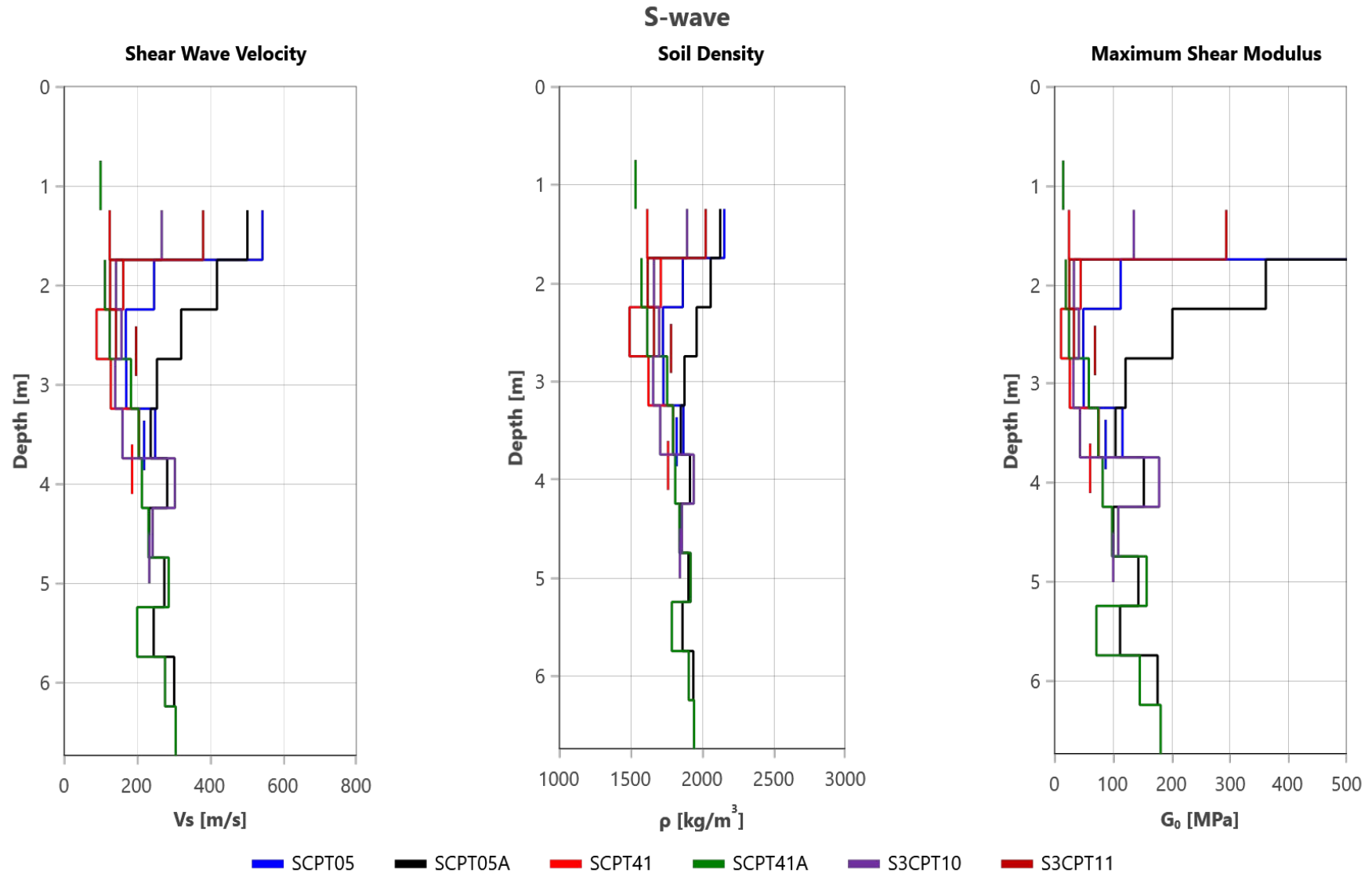


Z = 2.7 m
Ds = 0.47 m
Dt = 2.31 ms
Vs = 203 m/s
24/01/2023
11:58:43



Overlay plots

Project: A46 Newark



Project: A46 Newark

Overlay plots





IN SITU SITE INVESTIGATION

Unit 23 Hastings Innovation
Centre,
Highfield Drive
St. Leonards on Sea, East Sussex,
TN38 9UH, U.K.

Company No.: 6339499
VAT No.: 922 3561 41

Appendix J: Water Monitoring and Sampling

Job Name:	A46		Date:	25/01/2023						
Job Number:	221209		Visit:	1						
Weather, Temp.:	Clear, Cool		Eng:	IL						
Pressure Trend:	NA		Client:	National Highways		Key:	DTW - Depth to Water PP - Post Purge TFP - Thickness Free Product DTB - Depth to Base			
Time Start (hh:mm)	09:20	11:10	13:15	14:30	16:10					
Monitoring Location	S3WS04	S3WS06	S3WS05	S3WS01	S3WS07					
GROUNDWATER SAMPLING										
Measured DTW (m bgl)	2.5	1.15	1.66	1.15	1.56					
Measured DTB (m bgl)	3.5	3.06	2.49	2.94	3.6					
Water Column (m) Base Depth - Water Depth =	1.0	1.9	0.8	1.8	2.0					
Vol. to purge (l)	NA	NA	NA	NA	NA					
Sample taken (Y/N)	N	Y	Y	Y	Y					
Method Purging		Lowflow	Lowflow	Lowflow	Lowflow					
Vol. water purged (l)										
Clarity (Clear - Opaque)		Slightly opaque	Opaque	Opaque	Slightly opaque					
Odour		N	N	N	N					
Sediment (Size, Colour)		N	N	N	N					
Iridescence (None - Heavy)		N	N	N	N					
Preservatives used?		N	N	N	N					
Water Level PP (m bgl)		1.41	1.58	1.72	1.88					
Parameters logged via probe? N/A or pH, DO, RDX, EC, Temp, Turbidity?	N	Y	Y	Y	Y					
INSTALLED INSTRUMENTS	Y	Y	Y	N	Y					
(Baro/Diver/VWP/Inclino etc)	Baro/ Diver	Diver	Diver		Diver					
Notes:	Diver installed at 3m	Diver installed at 2.5m	Diver installed at 2m	Diver installed in WS04 instead. To be added on next round.	Diver installed at 3m					
Measured TFP (m bgl)										
TFP is above/below water?	N	N	N	N	N					
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) ± 0.3 l/tr		Instrument Used Date Last Calibrated Date Next Calibration Due	Gas Data GFM 436-1 18/08/2020 18/08/2021	Serial Number:	12166	
Notes/Comments:										

Job Name:	A46		Date:	26/01/2023						
Job Number:	221209		Visit:	1						
Weather, Temp.:	Clear, Cool		Eng:	IL						
Pressure Trend:	NA		Client:	National Highways		Key: DTW - Depth to Water PP - Post Purge TFP - Thickness Free Product DTB - Depth to Base				
Time Start (hh:mm)	09:20	10:50	11:30	12:12	12:18	12:23	12:55	13:55	15:00	
Monitoring Location	BH07	BH15	BH17	S3BH05	S3BH07	S3BH06	BH09	WS31	BH03A	
GROUNDWATER SAMPLING										
Measured DTW (m bgl)	1.4	1.06	1.36	2.54	2.38	Dry	1.09	0.93	0.55	
Measured DTB (m bgl)	5.0	3.52	16.95	3	3.1	2.44	4.17	3.9	4.18	
Water Column (m) Base Depth - Water Depth	=									
	3.6	2.5	15.6	0.5	0.7	0.0	3.1	3.0	3.6	
Vol. to purge (l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Sample taken (Y/N)	N	N	N	N	N	N	N	N	N	
Method Purging										
Vol. water purged (l)										
Clarity (Clear - Opaque)										
Odour										
Sediment (Size, Colour)										
Iridescence (None - Heavy)										
Preservatives used?										
Water Level PP (m bgl)										
Parameters logged via probe? N/A or pH, DO, RDX, EC, Temp, Turbidity?	N	N	N	N	N	N	N	N	N	
INSTALLED INSTRUMENTS	Y	Y	Y	N	N	N	N	Y	Y	
(Baro/Diver/VWP/Inclino etc)	Diver	Diver	Diver					Diver	Diver	
Notes:	Diver installed at 4.5m	Diver installed at 3m	Diver installed at 8m				No Diver due to damaged flush cover	Diver installed at 3.5m	Diver installed at 3.5m	
Measured TFP (m bgl)										
TFP is above/below water?	0	0	0	0	0	0	0	0	0	
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) ± 0.3 l/hr	Instrument Used Gas Data GFM 436-1		Date Last Calibrated 18/08/2020		Serial Number: 12166	
					Date Next Calibration Due 18/08/2021					
Notes/Comments:										

Low-Flow Test Report:

Test Date / Time: 25/01/2023 15:26:42

Project: A46 (2)

Operator Name: II

Location Name: A46 S3WS01 Initial Depth to Water: 1.15 m Well Diameter: 50cm Casing Type: HDPE Total Depth: 2.94m	Flow Cell Volume: 130 ml Final Flow Rate: 600 ml/min Final Estimated Total Volume Pumped: 3000 ml Draw Down: 1.45 m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
--	--	---

Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5
25/01/2023 15:26	00:00	7.02 pH	9.19 °C	1,713.3 µS/cm	0.28 mg/L	1,285.1 NTU	223.8 mV	
25/01/2023 15:27	00:30	7.02 pH	9.21 °C	1,715.8 µS/cm	0.27 mg/L	1,139.1 NTU	223.5 mV	
25/01/2023 15:27	01:00	7.02 pH	9.22 °C	1,723.7 µS/cm	0.23 mg/L	1,030.6 NTU	222.9 mV	
25/01/2023 15:28	01:30	7.02 pH	9.23 °C	1,725.9 µS/cm	0.22 mg/L	853.72 NTU	222.0 mV	
25/01/2023 15:28	02:00	7.01 pH	9.24 °C	1,729.5 µS/cm	0.20 mg/L	798.96 NTU	221.6 mV	
25/01/2023 15:29	02:30	7.01 pH	9.24 °C	1,734.1 µS/cm	0.19 mg/L	675.12 NTU	220.9 mV	
25/01/2023 15:29	03:00	7.01 pH	9.26 °C	1,735.4 µS/cm	0.18 mg/L	608.94 NTU	220.2 mV	
25/01/2023 15:30	03:30	7.00 pH	9.26 °C	1,740.2 µS/cm	0.17 mg/L	661.38 NTU	219.6 mV	
25/01/2023 15:30	04:00	7.00 pH	9.26 °C	1,743.1 µS/cm	0.16 mg/L	526.98 NTU	218.8 mV	
25/01/2023 15:31	04:30	7.00 pH	9.28 °C	1,747.6 µS/cm	0.15 mg/L	427.66 NTU	218.0 mV	
25/01/2023 15:31	05:00	6.99 pH	9.28 °C	1,745.8 µS/cm	0.15 mg/L	441.30 NTU	217.3 mV	
25/01/2023 15:32	05:30	6.99 pH	9.28 °C	1,749.9 µS/cm	0.14 mg/L	392.85 NTU	216.5 mV	
25/01/2023 15:32	06:00	6.99 pH	9.29 °C	1,751.8 µS/cm	0.14 mg/L	336.42 NTU	215.9 mV	
25/01/2023 15:33	06:30	6.99 pH	9.24 °C	1,745.0 µS/cm	0.14 mg/L	347.35 NTU	214.8 mV	
25/01/2023 15:33	07:00	7.00 pH	9.22 °C	1,736.5 µS/cm	0.17 mg/L	361.23 NTU	213.9 mV	

25/01/2023 15:34	07:30	6.99 pH	9.24 °C	1,738.4 µS/cm	0.18 mg/L	372.48 NTU	213.3 mV	
25/01/2023 15:34	08:00	6.99 pH	9.26 °C	1,747.2 µS/cm	0.15 mg/L	298.32 NTU	212.6 mV	
25/01/2023 15:35	08:30	6.98 pH	9.28 °C	1,751.9 µS/cm	0.14 mg/L	250.25 NTU	211.8 mV	
25/01/2023 15:35	09:00	6.98 pH	9.29 °C	1,756.1 µS/cm	0.13 mg/L	224.10 NTU	211.2 mV	
25/01/2023 15:36	09:30	6.98 pH	9.30 °C	1,757.8 µS/cm	0.12 mg/L	192.90 NTU	210.2 mV	
25/01/2023 15:36	10:00	6.98 pH	9.31 °C	1,760.5 µS/cm	0.11 mg/L	145.00 NTU	209.2 mV	

Samples

Sample ID:	Description:
Ws01	

Low-Flow Test Report:

Test Date / Time: 25/01/2023 13:25:19

Project: A46

Operator Name: II

Location Name: A46 S3WS05 Initial Depth to Water: 1.66 m Well Diameter: 50cm Casing Type: HDPE BH Depth: 2.49m	Pump Type: Bladder Flow Cell Volume: 130 ml Final Flow Rate: 600 ml/min Final Estimated Total Volume Pumped: 4000 ml Draw Down: 1.72 m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	
25/01/2023 13:25	00:00	6.48 pH	6.86 °C	934.63 µS/cm	6.96 mg/L	2,442.5 NTU	227.2 mV	166.00 cm	
25/01/2023 13:25	00:30	6.50 pH	6.88 °C	931.45 µS/cm	6.85 mg/L	3,071.9 NTU	227.7 mV	166.00 cm	
25/01/2023 13:26	01:00	6.50 pH	6.86 °C	925.17 µS/cm	6.77 mg/L	3,176.9 NTU	228.5 mV	166.00 cm	
25/01/2023 13:26	01:30	6.50 pH	6.90 °C	923.02 µS/cm	6.79 mg/L	4,036.5 NTU	229.0 mV	166.00 cm	
25/01/2023 13:27	02:00	6.49 pH	6.91 °C	921.77 µS/cm	6.81 mg/L	4,058.8 NTU	229.8 mV	166.00 cm	
25/01/2023 13:27	02:30	6.50 pH	6.92 °C	921.69 µS/cm	6.79 mg/L	4,507.8 NTU	230.3 mV	166.00 cm	
25/01/2023 13:28	03:00	6.49 pH	6.93 °C	922.14 µS/cm	6.78 mg/L	4,282.5 NTU	231.0 mV	166.00 cm	
25/01/2023 13:28	03:30	6.50 pH	6.91 °C	918.75 µS/cm	6.75 mg/L	4,655.7 NTU	231.2 mV	166.00 cm	
25/01/2023 13:29	04:00	6.49 pH	6.91 °C	919.67 µS/cm	6.74 mg/L	4,815.4 NTU	232.0 mV	166.00 cm	
25/01/2023 13:29	04:30	6.50 pH	6.92 °C	917.89 µS/cm	6.72 mg/L	5,189.7 NTU	232.2 mV	166.00 cm	
25/01/2023 13:30	05:00	6.49 pH	6.93 °C	918.83 µS/cm	6.75 mg/L	5,174.0 NTU	232.9 mV	166.00 cm	
25/01/2023 13:30	05:30	6.49 pH	6.94 °C	917.59 µS/cm	6.76 mg/L	5,481.8 NTU	233.4 mV	166.00 cm	
25/01/2023 13:31	06:00	6.49 pH	6.96 °C	917.80 µS/cm	6.77 mg/L	5,656.5 NTU	233.7 mV	166.00 cm	
25/01/2023 13:31	06:30	6.49 pH	6.95 °C	917.26 µS/cm	6.79 mg/L	5,702.1 NTU	234.2 mV	166.00 cm	
25/01/2023 13:32	07:00	6.49 pH	6.97 °C	916.99 µS/cm	6.82 mg/L	6,681.3 NTU	234.5 mV	166.00 cm	

25/01/2023 13:32	07:30	6.49 pH	6.96 °C	916.87 µS/cm	6.85 mg/L	5,861.9 NTU	234.9 mV	166.00 cm	
25/01/2023 13:33	08:00	6.49 pH	6.99 °C	917.64 µS/cm	6.87 mg/L	6,599.1 NTU	235.2 mV	166.00 cm	
25/01/2023 13:33	08:30	6.49 pH	6.97 °C	919.67 µS/cm	6.90 mg/L	4,450.2 NTU	235.9 mV	166.00 cm	
25/01/2023 13:34	09:00	6.49 pH	7.02 °C	927.76 µS/cm	6.74 mg/L	3,388.7 NTU	236.1 mV	166.00 cm	
25/01/2023 13:34	09:30	6.49 pH	7.04 °C	925.32 µS/cm	6.74 mg/L	3,673.6 NTU	236.6 mV	166.00 cm	
25/01/2023 13:35	10:00	6.49 pH	7.09 °C	921.03 µS/cm	6.79 mg/L	4,215.4 NTU	236.4 mV	166.00 cm	
25/01/2023 13:35	10:30	6.48 pH	7.14 °C	919.38 µS/cm	6.80 mg/L	4,230.6 NTU	237.4 mV	166.00 cm	
25/01/2023 13:36	11:00	6.49 pH	7.15 °C	919.66 µS/cm	6.77 mg/L	4,712.2 NTU	237.3 mV	166.00 cm	
25/01/2023 13:36	11:30	6.48 pH	7.19 °C	921.38 µS/cm	6.78 mg/L	5,021.8 NTU	237.9 mV	166.00 cm	
25/01/2023 13:37	12:00	6.46 pH	7.21 °C	920.79 µS/cm	6.85 mg/L	5,633.0 NTU	239.0 mV	166.00 cm	600.00 ml/min
25/01/2023 13:37	12:30	6.46 pH	7.22 °C	920.62 µS/cm	6.93 mg/L	6,671.0 NTU	239.5 mV	166.00 cm	600.00 ml/min
25/01/2023 13:38	13:00	6.46 pH	7.22 °C	921.16 µS/cm	6.97 mg/L	6,198.0 NTU	239.7 mV	166.00 cm	600.00 ml/min

Samples

Sample ID:	Description:
Ws05	

Low-Flow Test Report:

Test Date / Time: 25/01/2023 11:45:00

Project: A46

Operator Name: II

Location Name: A46 S3WS06 Initial Depth to Water: 1.15m Well Diameter: 50cm Casing Type: HDPE Total Depth: 3.06m	Pump Type: Bladder Flow Cell Volume: 130 ml Final Flow Rate: 600 ml/min Estimated Total Volume Pumped: 8000 ml Final Draw Down: 1.10m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	
25/01/2023 11:45	00:00	5.91 pH	6.92 °C	1,109.6 µS/cm	10.18 mg/L	5,141.4 NTU	246.0 mV		
25/01/2023 11:45	00:30	5.93 pH	6.84 °C	1,135.1 µS/cm	10.18 mg/L	5,364.6 NTU	246.4 mV		
25/01/2023 11:46	01:00	5.91 pH	6.88 °C	1,149.3 µS/cm	10.17 mg/L	5,357.1 NTU	247.6 mV		
25/01/2023 11:46	01:30	5.89 pH	6.83 °C	1,178.7 µS/cm	10.15 mg/L	4,938.1 NTU	248.7 mV		
25/01/2023 11:47	02:00	5.89 pH	6.86 °C	1,199.8 µS/cm	10.10 mg/L	5,855.0 NTU	249.1 mV		
25/01/2023 11:47	02:30	5.87 pH	6.84 °C	1,224.2 µS/cm	10.11 mg/L	5,038.5 NTU	250.4 mV		
25/01/2023 11:48	03:00	5.87 pH	6.83 °C	1,248.2 µS/cm	10.10 mg/L	5,351.3 NTU	250.8 mV		
25/01/2023 11:48	03:30	5.86 pH	6.88 °C	1,255.3 µS/cm	10.06 mg/L	5,025.6 NTU	251.9 mV		
25/01/2023 11:49	04:00	5.85 pH	6.88 °C	1,285.6 µS/cm	10.03 mg/L	4,839.0 NTU	252.9 mV		
25/01/2023 11:49	04:30	5.86 pH	6.90 °C	1,305.2 µS/cm	10.00 mg/L	4,109.0 NTU	253.0 mV		
25/01/2023 11:50	05:00	5.84 pH	6.91 °C	1,316.9 µS/cm	9.98 mg/L	3,453.0 NTU	254.2 mV		
25/01/2023 11:50	05:30	5.83 pH	6.89 °C	1,331.3 µS/cm	9.96 mg/L	3,524.7 NTU	255.3 mV		
25/01/2023 11:51	06:00	5.83 pH	6.92 °C	1,332.8 µS/cm	9.95 mg/L	3,796.0 NTU	255.4 mV		600.00 ml/min
25/01/2023 11:51	06:30	5.83 pH	6.91 °C	1,335.6 µS/cm	9.93 mg/L	3,821.5 NTU	255.9 mV		600.00 ml/min
25/01/2023 11:52	07:00	5.84 pH	6.92 °C	1,354.3 µS/cm	9.91 mg/L	3,466.7 NTU	255.9 mV		600.00 ml/min
25/01/2023 11:52	07:30	5.83 pH	6.93 °C	1,359.0 µS/cm	9.90 mg/L	3,295.8 NTU	256.9 mV		600.00 ml/min

25/01/2023 11:53	08:00	5.82 pH	6.91 °C	1,365.5 µS/cm	9.91 mg/L	2,436.3 NTU	257.4 mV		600.00 ml/min
25/01/2023 11:53	08:30	5.82 pH	6.94 °C	1,366.9 µS/cm	9.90 mg/L	2,445.3 NTU	257.7 mV		600.00 ml/min
25/01/2023 11:54	09:00	5.82 pH	6.92 °C	1,366.4 µS/cm	9.92 mg/L	2,129.6 NTU	258.1 mV		600.00 ml/min
25/01/2023 11:54	09:30	5.82 pH	6.91 °C	1,371.1 µS/cm	9.90 mg/L	2,617.8 NTU	258.0 mV		600.00 ml/min
25/01/2023 11:55	10:00	5.81 pH	6.93 °C	1,372.3 µS/cm	9.90 mg/L	2,203.7 NTU	258.9 mV		600.00 ml/min
25/01/2023 11:55	10:30	5.81 pH	6.92 °C	1,377.1 µS/cm	9.89 mg/L	1,988.2 NTU	259.4 mV		600.00 ml/min
25/01/2023 11:56	11:00	5.81 pH	6.94 °C	1,377.2 µS/cm	9.87 mg/L	2,037.9 NTU	259.7 mV		600.00 ml/min
25/01/2023 11:56	11:30	5.81 pH	6.93 °C	1,372.5 µS/cm	9.88 mg/L	2,074.3 NTU	260.1 mV		600.00 ml/min
25/01/2023 11:57	12:00	5.81 pH	6.93 °C	1,386.3 µS/cm	9.89 mg/L	1,898.4 NTU	259.9 mV		600.00 ml/min
25/01/2023 11:57	12:30	5.80 pH	6.95 °C	1,380.9 µS/cm	9.87 mg/L	1,722.4 NTU	260.8 mV		600.00 ml/min
25/01/2023 11:58	13:00	5.80 pH	6.94 °C	1,386.0 µS/cm	9.87 mg/L	1,696.5 NTU	261.2 mV		600.00 ml/min
25/01/2023 11:58	13:57	5.77 pH	6.94 °C	1,374.3 µS/cm	9.90 mg/L	1,434.8 NTU	261.8 mV		600.00 ml/min
25/01/2023 11:59	14:33	5.77 pH	6.94 °C	1,389.6 µS/cm	9.87 mg/L	1,409.9 NTU	262.3 mV		600.00 ml/min
25/01/2023 12:02	17:34	5.76 pH	6.93 °C	1,390.7 µS/cm	9.89 mg/L	1,202.2 NTU	264.1 mV		600.00 ml/min
25/01/2023 12:03	18:04	5.77 pH	6.93 °C	1,384.7 µS/cm	9.88 mg/L	1,275.7 NTU	264.3 mV		600.00 ml/min
25/01/2023 12:03	18:51	5.75 pH	6.95 °C	1,393.7 µS/cm	9.87 mg/L	1,162.2 NTU	264.9 mV		600.00 ml/min
25/01/2023 12:04	19:36		6.93 °C	1,370.5 µS/cm	9.88 mg/L	1,257.4 NTU	265.1 mV		
25/01/2023 12:09	24:40	5.74 pH	6.95 °C	1,394.8 µS/cm	9.89 mg/L	1,024.0 NTU	267.6 mV		
25/01/2023 12:10	25:10	5.74 pH	6.96 °C	1,391.5 µS/cm	9.87 mg/L	911.92 NTU	267.8 mV		
25/01/2023 12:10	25:40	5.74 pH	6.95 °C	1,384.5 µS/cm	9.88 mg/L	809.49 NTU	268.0 mV		
25/01/2023 12:11	26:10	5.75 pH	6.93 °C	1,379.4 µS/cm	9.89 mg/L	763.71 NTU	267.5 mV		
25/01/2023 12:11	26:52	5.72 pH	6.95 °C	1,379.2 µS/cm	9.89 mg/L	855.31 NTU	268.5 mV		
25/01/2023 12:12	27:22	5.73 pH	6.94 °C	1,384.3 µS/cm	9.89 mg/L	744.23 NTU	268.6 mV		
25/01/2023 12:15	30:25	5.71 pH	6.94 °C	1,381.6 µS/cm	9.89 mg/L	698.69 NTU	269.7 mV		

Samples

Sample ID:	Description:
Ws06	

Low-Flow Test Report:

Test Date / Time: 25/01/2023 16:35:55

Project: A46 (3)

Operator Name: II

Location Name: A46 S3WS07 Initial Depth to Water: 1.56m Well Diameter: 50cm Casing Type: HDPE Total Depth: 3.6m	Pump Type: Bladder Flow Cell Volume: 130ml Final Flow Rate: 600ml/min Final Estimated Total Volume Pumped: 7400ml Draw Down: 1.58m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:


Low-Flow Readings:


Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5
25/01/2023 16:35	00:00	7.14 pH	8.80 °C	3,138.3 µS/cm	2.00 mg/L	6,823.6 NTU	213.2 mV	
25/01/2023 16:36	00:30	7.16 pH	8.81 °C	3,166.2 µS/cm	2.06 mg/L	6,357.2 NTU	211.8 mV	
25/01/2023 16:36	01:00	7.16 pH	8.82 °C	3,190.3 µS/cm	2.12 mg/L	6,179.4 NTU	210.5 mV	
25/01/2023 16:37	01:30	7.16 pH	8.82 °C	3,211.7 µS/cm	2.17 mg/L	5,195.0 NTU	209.3 mV	
25/01/2023 16:37	02:00	7.16 pH	8.83 °C	3,231.2 µS/cm	2.21 mg/L	4,840.7 NTU	208.1 mV	
25/01/2023 16:38	02:30	7.16 pH	8.83 °C	3,249.0 µS/cm	2.25 mg/L	4,503.5 NTU	206.9 mV	
25/01/2023 16:38	03:00	7.16 pH	8.84 °C	3,272.1 µS/cm	2.27 mg/L	4,150.9 NTU	205.7 mV	
25/01/2023 16:39	03:30	7.16 pH	8.85 °C	3,258.2 µS/cm	2.31 mg/L	3,384.8 NTU	204.6 mV	
25/01/2023 16:39	04:00	7.16 pH	8.85 °C	3,286.2 µS/cm	2.32 mg/L	2,839.8 NTU	203.5 mV	
25/01/2023 16:40	04:30	7.16 pH	8.85 °C	3,298.2 µS/cm	2.35 mg/L	3,074.9 NTU	202.5 mV	
25/01/2023 16:40	05:00	7.16 pH	8.85 °C	3,308.8 µS/cm	2.38 mg/L	2,872.4 NTU	201.3 mV	
25/01/2023 16:41	05:30	7.16 pH	8.85 °C	3,314.2 µS/cm	2.41 mg/L	2,558.4 NTU	200.2 mV	
25/01/2023 16:41	06:00	7.16 pH	8.85 °C	3,320.1 µS/cm	2.44 mg/L	2,510.5 NTU	199.2 mV	
25/01/2023 16:42	06:30	7.16 pH	8.85 °C	3,328.1 µS/cm	2.47 mg/L	1,916.7 NTU	198.2 mV	
25/01/2023 16:42	07:00	7.16 pH	8.86 °C	3,337.2 µS/cm	2.51 mg/L	1,761.2 NTU	197.2 mV	
25/01/2023 16:43	07:30	7.16 pH	8.86 °C	3,344.6 µS/cm	2.54 mg/L	1,776.9 NTU	196.1 mV	
25/01/2023 16:43	08:00	7.16 pH	8.87 °C	3,361.8 µS/cm	2.55 mg/L	1,456.5 NTU	195.1 mV	


25/01/2023 16:44	08:43	7.14 pH	8.88 °C	3,364.1 µS/cm	2.59 mg/L	1,405.0 NTU	193.7 mV	
25/01/2023 16:45	09:13	7.16 pH	8.89 °C	3,368.5 µS/cm	2.62 mg/L	1,197.0 NTU	192.9 mV	
25/01/2023 16:45	09:43	7.16 pH	8.90 °C	3,374.8 µS/cm	2.65 mg/L	1,299.0 NTU	191.9 mV	
25/01/2023 16:46	10:15	7.16 pH	8.89 °C	3,380.8 µS/cm	2.68 mg/L	1,203.7 NTU	190.9 mV	
25/01/2023 16:46	10:45	7.16 pH	8.87 °C	3,382.3 µS/cm	2.71 mg/L	1,115.1 NTU	190.1 mV	
25/01/2023 16:47	11:15	7.16 pH	8.86 °C	3,382.0 µS/cm	2.71 mg/L	979.18 NTU	189.2 mV	
25/01/2023 16:51	15:40	7.14 pH	8.82 °C	3,422.3 µS/cm	2.89 mg/L	471.67 NTU	184.6 mV	
25/01/2023 16:52	16:29	7.14 pH	8.80 °C	3,423.2 µS/cm	2.92 mg/L	451.64 NTU	185.2 mV	
25/01/2023 16:53	17:31	7.15 pH	8.77 °C	3,423.6 µS/cm	2.94 mg/L	425.43 NTU	186.1 mV	
25/01/2023 16:54	18:18	7.15 pH	8.24 °C	3,405.6 µS/cm	2.94 mg/L	404.20 NTU	186.7 mV	

Samples

Sample ID:	Description:
Ws07	

Job Name:	A46 Newark		Date:	27.02.2023							
Job Number:	221209		Visit:	2							
Weather, Temp.:	Overcast		Eng:	JSW							
Pressure Trend:	N/A		Client:	Skanska			Key: DTW - Depth to Water PP - Post Purge Thickness Free Product DTB - Depth to Base TFP				
Time Start (hh:mm)	08:00:00	08:10:00	08:25:00	09:35:00	11:45:00	13:20:00					
Monitoring Location	S3BH05	S3BH07	S3BH06	S3WS01	BH07	S3WS05					
GROUNDWATER SAMPLING											
Measured DTW (m bgl)	DRY	2.98	DRY	1.72	1.44	1.91					
Measured DTB (m bgl)	3.14	3.07	2.5	4.74	4.95	2.48					
Water Column (m) Base Depth - Water Depth	=	0	0.09	0	3.02	3.51	0.57				
Vol. to purge (l)	0	0	0	0	0	0					
Sample taken (Y/N)	N	Y	N	Y	N	Y					
Method Purging	N/A	N/A	N/A	N/A	N/A	N/A					
Vol. water purged (l)	N/A	N/A	N/A	N/A	N/A	N/A					
Clarity (Clear - Opaque)	N/A	Opaque	N/A	Opaque	Opaque	Opaque					
Odour	N/A		N/A								
Sediment (Size, Colour)	N/A	Brown	N/A	Brown	Brown	Brown					
Iridescence (None - Heavy)	N/A	None	N/A	None	None	None					
Preservatives used?	N/A	None	N/A	None	None	None					
Water Level PP (m bgl)											
Parameters logged via probe? N/A or pH, DO, RDX, EC, Temp, Turbidity?	N	N	N	/	Y	Y					
INSTALLED INSTRUMENTS	N	N	N	Y	Y	Y					
(Baro/Diver/VWP/Inclino etc)	N/A	N/A	N/A	Diver	Diver	Diver					
Notes:		Limited water sample		Diver installed today.							
Measured TFP (m bgl)											
TFP is above/below water?											
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) ± 0.3 l/hr	Instrument Used Gas Data GFM 436-1	Date Last Calibrated 18/08/2020	Date Next Calibration Due 18/08/2021	Serial Number:	12166		
Notes/Comments:											

Job Name:	A46 Newark		Date:	28.02.2023					
Job Number:	221209		Visit:	2					
Weather, Temp.:	Overcast/Raining		Eng:	JSW					
Pressure Trend:	N/A		Client:	Skanska					
						Key: DTW - Depth to Water PP - Post Purge Thickness Free Product DTB - Depth to Base TFP			
Time Start (hh:mm)	08:45:00	11:40:00	12:20:00	13:30:00					
Monitoring Location	BH09	S3WS04	S3WS06	S3WS07					
GROUNDWATER SAMPLING									
Measured DTW (m bgl)	1.31	DRY	1.51	2.26					
Measured DTB (m bgl)	4.13	3.51	3.04	3.62					
Water Column (m) Base Depth - Water Depth	=								
	2.82	0	1.53	1.36					
Vol. to purge (l)	0	0	0	0					
Sample taken (Y/N)	N	N	Y	Y					
Method Purging	N/A	N/A	N/A	N/A					
Vol. water purged (l)	0	0	0	0					
Clarity (Clear - Opaque)	Opaque	Opaque	Opaque	Opaque					
Odour	None	None	None	None					
Sediment (Size, Colour)	Brown	Brown	Brown	Brown					
Iridescence (None - Heavy)	None	None	None	None					
Preservatives used?	N/A	N/A	N/A	N/A					
Water Level PP (m bgl)									
Parameters logged via probe?	N/A								
	Installed	Download	Download	Download					
INSTALLED INSTRUMENTS	Y	Y	Y	Y					
(Baro/Diver/VWP/Inclino etc)	Diver	Diver + Ba	Diver	Diver					
Notes:	Installed today								
Measured TFP (m bgl)									
TFP is above/below water?									
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) ± 0.3 l/hr	Instrument Used	Gas Data GFM 436-1	Serial Number:	12166	
					Date Last Calibrated	18/08/2020			
					Date Next Calibration Due	18/08/2021			
Notes/Comments:									

Job Name:	A46 Newark		Date:	02.03.2023						
Job Number:	221209		Visit:	2						
Weather, Temp.:	Overcast		Eng:	JSW						
Pressure Trend:	N/A		Client:	Skanska		Key: DTW - Depth to Water PP - Post Purge Thickness Free Product DTB - Depth to Base TFP				
Time Start (hh:mm)	10:10:00	12:30:00	12:50:00	13:25:00	13:40:00					
Monitoring Location	BH17	WS31	BH15	BH03A	WS08					
GROUNDWATER SAMPLING										
Measured DTW (m bgl)	2.27	1.31	1.65	0.73	0.98					
Measured DTB (m bgl)	17.32	3.91	4.9	4.19	4.94					
Water Column (m) Base Depth - Water Depth =	15.05	2.6	3.25	4.18	3.96					
Vol. to purge (l)	N/A	N/A	N/A	N/A	N/A					
Sample taken (Y/N)	N	N	N	N	N					
Method Purging	N/A	N/A	N/A	N/A	N/A					
Vol. water purged (l)	N/A	N/A	N/A	N/A	N/A					
Clarity (Clear - Opaque)	N/A	N/A	N/A	N/A	N/A					
Odour	N/A	N/A	N/A	N/A	N/A					
Sediment (Size, Colour)	N/A	N/A	N/A	N/A	N/A					
Iridescence (None - Heavy)	N/A	N/A	N/A	N/A	N/A					
Preservatives used?	N/A	N/A	N/A	N/A	N/A					
Water Level PP (m bgl)										
Parameters logged via probe? N/A										
	Download	Download	Download	Download	Installed					
INSTALLED INSTRUMENTS	Y	Y	Y	Y	Y					
(Baro/Diver/VWP/Inclino etc)	Diver	Diver	Diver	Diver	Diver					
Notes:					Installed today					
Measured TFP (m bgl)										
TFP is above/below water?										
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) ± 0.3 l/hr	Instrument Used Date Last Calibrated Date Next Calibration Due	Gas Data GFM 436-1 18/08/2020 18/08/2021	Serial Number:	12166		
Notes/Comments:										
Could not locate BH16.										

Low-Flow Test Report:

Test Date / Time: 27/02/2023 10:03:19

Project: A46 Newark

Operator Name: Jack Wilden

Location Name: A46 S3WS01 Initial Depth to Water: 1.72m Well Diameter: 50cm Casing Type: HDPE BH Depth: 2.94m	Flow Cell Volume: 130 ml Final Flow Rate: 400ml/min Final Estimated Total Volume Pumped: 3200ml Final Draw Down: 1.7m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	
27/02/2023 10:03	00:00	7.80 pH	11.03 °C	2.51 µS/cm	10.75 mg/L	4,330.9 NTU	313.1 mV	172.00 cm	400.00 ml/min
27/02/2023 10:03	00:35	7.78 pH	10.91 °C	2.51 µS/cm	10.79 mg/L	3,675.2 NTU	312.3 mV	172.00 cm	400.00 ml/min
27/02/2023 10:04	01:10	7.75 pH	10.80 °C	2.51 µS/cm	10.81 mg/L	3,195.5 NTU	311.6 mV	172.00 cm	400.00 ml/min
27/02/2023 10:05	01:45	7.70 pH	10.73 °C	2.49 µS/cm	10.82 mg/L	2,614.6 NTU	310.7 mV	172.00 cm	400.00 ml/min
27/02/2023 10:05	02:20	7.67 pH	10.61 °C	2.45 µS/cm	10.75 mg/L	2,039.2 NTU	309.6 mV	172.00 cm	400.00 ml/min
27/02/2023 10:06	02:55	7.63 pH	10.54 °C	2.42 µS/cm	10.78 mg/L	1,646.7 NTU	308.6 mV	172.00 cm	400.00 ml/min
27/02/2023 10:06	03:30	7.60 pH	10.50 °C	2.43 µS/cm	10.87 mg/L	1,149.6 NTU	307.5 mV	172.00 cm	400.00 ml/min
27/02/2023 10:07	04:05	7.57 pH	10.45 °C	2.43 µS/cm	10.93 mg/L	933.80 NTU	306.5 mV	172.00 cm	400.00 ml/min
27/02/2023 10:07	04:40	7.53 pH	10.39 °C	2.40 µS/cm	10.82 mg/L	777.83 NTU	305.3 mV	172.00 cm	400.00 ml/min
27/02/2023 10:08	05:15	7.51 pH	10.34 °C	2.40 µS/cm	10.84 mg/L	820.34 NTU	304.2 mV	172.00 cm	400.00 ml/min
27/02/2023 10:09	05:50	7.49 pH	10.29 °C	2.40 µS/cm	10.83 mg/L	764.80 NTU	303.2 mV	172.00 cm	400.00 ml/min
27/02/2023 10:09	06:25	7.47 pH	10.23 °C	2.39 µS/cm	10.88 mg/L	696.90 NTU	302.1 mV	172.00 cm	400.00 ml/min
27/02/2023 10:10	07:00	7.45 pH	10.16 °C	2.38 µS/cm	10.88 mg/L	882.15 NTU	301.2 mV	172.00 cm	400.00 ml/min
27/02/2023 10:10	07:35	7.44 pH	10.09 °C	2.40 µS/cm	10.91 mg/L	569.84 NTU	300.2 mV	172.00 cm	400.00 ml/min
27/02/2023 10:11	08:10	7.43 pH	10.03 °C	2.38 µS/cm	10.89 mg/L	554.00 NTU	299.6 mV	172.00 cm	400.00 ml/min

Samples

Sample ID:	Description:
Sam1	2 jars 2 vials

Created using VuSitu from In-Situ, Inc.

Low-Flow Test Report:

Test Date / Time: 27/02/2023 13:38:39

Project: A46 Newark

Operator Name: Jack Wilden

Location Name: A46 S3BH05 Initial Depth to Water: 1.91m Well Diameter: 50cm Casing Type: HDPE Total Depth: 3.00m	Flow Cell Volume: 130ml Final Flow Rate: 400ml/min Final Estimated Total Volume Pumped: 4600ml Final Draw Down: 1.93m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	
27/02/2023 13:38	00:00	8.09 pH	12.73 °C	3.96 µS/cm	10.37 mg/L	5.97 NTU	225.7 mV	191.00 cm	400.00 ml/min
27/02/2023 13:38	00:20	8.08 pH	12.69 °C	3.99 µS/cm	10.38 mg/L	6.15 NTU	226.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:39	00:40	8.06 pH	12.65 °C	4.02 µS/cm	10.37 mg/L	6.98 NTU	226.5 mV	191.00 cm	400.00 ml/min
27/02/2023 13:39	01:00	8.05 pH	12.59 °C	4.04 µS/cm	10.39 mg/L	6.29 NTU	226.9 mV	191.00 cm	400.00 ml/min
27/02/2023 13:39	01:20	8.03 pH	12.53 °C	4.06 µS/cm	10.39 mg/L	6.32 NTU	227.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:40	01:40	8.02 pH	12.46 °C	4.16 µS/cm	10.40 mg/L	6.35 NTU	227.6 mV	191.00 cm	400.00 ml/min
27/02/2023 13:40	02:00	8.06 pH	12.35 °C	5.15 µS/cm	10.42 mg/L	12.25 NTU	227.8 mV	191.00 cm	400.00 ml/min
27/02/2023 13:40	02:20	8.00 pH	12.23 °C	4.25 µS/cm	10.47 mg/L	11.48 NTU	228.1 mV	191.00 cm	400.00 ml/min
27/02/2023 13:41	02:40	8.02 pH	10.69 °C	660.86 µS/cm	11.20 mg/L	1,131.7 NTU	228.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:41	03:00	8.00 pH	10.70 °C	636.36 µS/cm	11.08 mg/L	1,228.3 NTU	228.5 mV	191.00 cm	400.00 ml/min
27/02/2023 13:41	03:20	7.96 pH	10.71 °C	217.50 µS/cm	11.01 mg/L	15.16 NTU	228.9 mV	191.00 cm	400.00 ml/min
27/02/2023 13:42	03:40	7.93 pH	10.60 °C	654.93 µS/cm	11.07 mg/L	1,256.0 NTU	229.4 mV	191.00 cm	400.00 ml/min
27/02/2023 13:42	04:00	7.87 pH	10.87 °C	3.54 µS/cm	10.88 mg/L	1,336.9 NTU	230.0 mV	191.00 cm	400.00 ml/min
27/02/2023 13:42	04:20	7.87 pH	10.63 °C	613.89 µS/cm	10.95 mg/L	1,453.9 NTU	230.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:43	04:40	7.85 pH	10.65 °C	668.44 µS/cm	10.93 mg/L	1,345.7 NTU	230.6 mV	191.00 cm	400.00 ml/min
27/02/2023 13:43	05:00	7.82 pH	10.64 °C	181.93 µS/cm	10.92 mg/L	14.62 NTU	230.9 mV	191.00 cm	400.00 ml/min
27/02/2023 13:43	05:20	7.81 pH	10.53 °C	658.72 µS/cm	10.90 mg/L	1,388.6 NTU	231.2 mV	191.00 cm	400.00 ml/min

27/02/2023 13:44	05:40	7.77 pH	10.71 °C	3.33 µS/cm	10.85 mg/L	1,283.5 NTU	231.6 mV	191.00 cm	400.00 ml/min
27/02/2023 13:44	06:00	7.78 pH	10.49 °C	601.75 µS/cm	10.90 mg/L	1,550.4 NTU	231.7 mV	191.00 cm	400.00 ml/min
27/02/2023 13:44	06:20	7.77 pH	10.47 °C	640.86 µS/cm	10.97 mg/L	1,400.6 NTU	231.7 mV	191.00 cm	400.00 ml/min
27/02/2023 13:45	06:40	7.76 pH	10.46 °C	620.47 µS/cm	10.86 mg/L	1,354.2 NTU	231.9 mV	191.00 cm	400.00 ml/min
27/02/2023 13:45	07:00	7.75 pH	10.50 °C	275.83 µS/cm	10.98 mg/L	2,541.8 NTU	232.0 mV	191.00 cm	400.00 ml/min
27/02/2023 13:45	07:20	7.73 pH	10.53 °C	176.24 µS/cm	10.95 mg/L	1,530.2 NTU	232.1 mV	191.00 cm	400.00 ml/min
27/02/2023 13:46	07:40	7.73 pH	10.47 °C	308.49 µS/cm	11.09 mg/L	2,392.5 NTU	232.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:46	08:00	7.72 pH	10.45 °C	288.70 µS/cm	11.11 mg/L	2,529.3 NTU	232.4 mV	191.00 cm	400.00 ml/min
27/02/2023 13:46	08:20	7.71 pH	10.41 °C	283.14 µS/cm	11.05 mg/L	2,635.8 NTU	232.6 mV	191.00 cm	400.00 ml/min
27/02/2023 13:47	08:40	7.70 pH	10.27 °C	276.15 µS/cm	11.05 mg/L	2,491.2 NTU	232.8 mV	191.00 cm	400.00 ml/min
27/02/2023 13:47	09:00	7.68 pH	10.24 °C	163.29 µS/cm	11.03 mg/L	3,045.7 NTU	233.0 mV	191.00 cm	400.00 ml/min
27/02/2023 13:47	09:20	7.67 pH	10.01 °C	309.57 µS/cm	11.19 mg/L	3,193.2 NTU	233.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:48	09:40	7.67 pH	9.76 °C	629.36 µS/cm	11.24 mg/L	3,246.5 NTU	233.4 mV	191.00 cm	400.00 ml/min
27/02/2023 13:48	10:00	7.66 pH	9.74 °C	611.88 µS/cm	11.26 mg/L	1,514.0 NTU	233.6 mV	191.00 cm	400.00 ml/min
27/02/2023 13:48	10:20	7.64 pH	9.70 °C	394.63 µS/cm	11.30 mg/L	5,241.5 NTU	233.8 mV	191.00 cm	400.00 ml/min
27/02/2023 13:49	10:40	7.63 pH	9.84 °C	81.39 µS/cm	11.18 mg/L	5,298.8 NTU	234.0 mV	191.00 cm	400.00 ml/min
27/02/2023 13:49	11:00	7.63 pH	9.51 °C	573.01 µS/cm	11.39 mg/L	5,439.4 NTU	234.2 mV	191.00 cm	400.00 ml/min
27/02/2023 13:49	11:20	7.62 pH	9.44 °C	381.00 µS/cm	11.36 mg/L	6,620.5 NTU	234.4 mV	191.00 cm	400.00 ml/min

Samples

Sample ID:	Description:
Samp1	2jars 2vials

Low-Flow Test Report:

Test Date / Time: 28/02/2023 12:30:27

Project: A46 Newark

Operator Name: Jack Wilden

Location Name: A46 S3WS06 Initial Depth to Water: 1.51 m Well Diameter: 50cm Casing Type: HDPE Total Depth: 3.06m	Flow Cell Volume: 130 ml Final Flow Rate: 400 ml/min Final Estimated Total Volume Pumped: 9800ml Final Draw Down:1.55m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:

Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	
28/02/2023 12:30	00:00	8.42 pH	9.37 °C	86.14 µS/cm	11.39 mg/L	14.34 NTU	355.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:30	00:20	8.38 pH	9.31 °C	95.07 µS/cm	11.38 mg/L	14.47 NTU	355.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:31	00:40	8.34 pH	9.28 °C	95.78 µS/cm	11.37 mg/L	14.19 NTU	356.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:31	01:00	8.32 pH	9.31 °C	94.03 µS/cm	11.34 mg/L	14.25 NTU	356.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:31	01:20	8.31 pH	9.20 °C	103.60 µS/cm	11.38 mg/L	13.79 NTU	356.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:32	01:40	8.28 pH	9.27 °C	109.74 µS/cm	11.31 mg/L	14.20 NTU	356.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:32	02:00	8.33 pH	9.28 °C	168.88 µS/cm	11.34 mg/L	10.49 NTU	354.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:32	02:20	8.40 pH	9.01 °C	564.49 µS/cm	11.71 mg/L	26.43 NTU	353.5 mV	151.00 cm	400.00 ml/min
28/02/2023 12:33	02:40	8.38 pH	9.09 °C	550.97 µS/cm	11.11 mg/L	22.67 NTU	353.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:33	03:00	8.35 pH	8.91 °C	562.81 µS/cm	11.36 mg/L	24.32 NTU	355.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:33	03:20	8.55 pH	8.60 °C	845.69 µS/cm	11.94 mg/L	59.16 NTU	346.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:34	03:40	8.31 pH	8.62 °C	644.76 µS/cm	11.28 mg/L	43.91 NTU	355.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:34	04:00	8.29 pH	8.33 °C	645.57 µS/cm	11.65 mg/L	49.03 NTU	355.8 mV	151.00 cm	400.00 ml/min
28/02/2023 12:34	04:20	8.27 pH	8.40 °C	641.29 µS/cm	11.36 mg/L	7,938.7 NTU	355.8 mV	151.00 cm	400.00 ml/min
28/02/2023 12:35	04:40	8.25 pH	8.33 °C	648.53 µS/cm	11.36 mg/L	51.12 NTU	356.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:35	05:00	8.23 pH	8.20 °C	650.56 µS/cm	11.77 mg/L	84.27 NTU	356.5 mV	151.00 cm	400.00 ml/min
28/02/2023 12:35	05:20	8.22 pH	8.27 °C	647.25 µS/cm	11.28 mg/L	75.76 NTU	356.5 mV	151.00 cm	400.00 ml/min

28/02/2023 12:36	05:40	8.20 pH	8.18 °C	643.16 µS/cm	11.47 mg/L	67.46 NTU	356.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:36	06:00	8.20 pH	8.18 °C	638.06 µS/cm	11.35 mg/L	5,802.6 NTU	356.7 mV	151.00 cm	400.00 ml/min
28/02/2023 12:36	06:20	8.18 pH	8.01 °C	616.48 µS/cm	11.74 mg/L	125.56 NTU	356.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:37	06:40	8.17 pH	8.05 °C	622.35 µS/cm	11.36 mg/L	116.06 NTU	356.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:37	07:00	8.16 pH	8.09 °C	623.82 µS/cm	11.22 mg/L	152.65 NTU	356.5 mV	151.00 cm	400.00 ml/min
28/02/2023 12:37	07:20	8.15 pH	7.96 °C	617.95 µS/cm	11.80 mg/L	122.90 NTU	356.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:38	07:40	8.14 pH	8.02 °C	618.34 µS/cm	11.33 mg/L	114.52 NTU	356.8 mV	151.00 cm	400.00 ml/min
28/02/2023 12:38	08:00	8.14 pH	8.06 °C	604.38 µS/cm	11.27 mg/L	4,000.0 NTU	356.7 mV	151.00 cm	400.00 ml/min
28/02/2023 12:38	08:20	8.12 pH	7.91 °C	615.38 µS/cm	11.43 mg/L	75.37 NTU	357.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:39	08:40	8.11 pH	7.86 °C	598.06 µS/cm	11.89 mg/L	118.55 NTU	355.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:39	09:00	8.10 pH	7.91 °C	626.35 µS/cm	11.35 mg/L	148.92 NTU	357.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:39	09:20	8.09 pH	7.85 °C	615.72 µS/cm	11.77 mg/L	108.37 NTU	357.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:40	09:40	8.09 pH	7.84 °C	596.60 µS/cm	11.38 mg/L	311.88 NTU	357.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:40	10:00	8.07 pH	7.84 °C	628.93 µS/cm	11.53 mg/L	131.27 NTU	357.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:40	10:20	8.06 pH	7.83 °C	617.41 µS/cm	11.82 mg/L	95.68 NTU	357.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:41	10:40	8.07 pH	7.84 °C	777.94 µS/cm	11.74 mg/L	291.61 NTU	357.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:41	11:00	8.06 pH	7.85 °C	602.58 µS/cm	11.39 mg/L	546.94 NTU	357.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:41	11:20	8.05 pH	7.87 °C	608.93 µS/cm	11.40 mg/L	164.40 NTU	358.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:42	11:40	8.04 pH	7.83 °C	610.65 µS/cm	11.70 mg/L	148.43 NTU	358.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:42	12:00	8.05 pH	7.84 °C	744.46 µS/cm	11.69 mg/L	1,779.0 NTU	357.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:42	12:20	8.03 pH	7.82 °C	605.51 µS/cm	11.44 mg/L	478.01 NTU	357.8 mV	151.00 cm	400.00 ml/min
28/02/2023 12:43	12:40	8.02 pH	7.85 °C	629.72 µS/cm	11.49 mg/L	139.21 NTU	358.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:43	13:00	8.01 pH	7.83 °C	615.09 µS/cm	11.84 mg/L	197.57 NTU	358.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:43	13:20	8.00 pH	7.87 °C	607.89 µS/cm	11.41 mg/L	174.43 NTU	358.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:44	13:40	8.00 pH	7.87 °C	619.59 µS/cm	11.28 mg/L	171.56 NTU	358.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:44	14:00	8.00 pH	7.90 °C	619.61 µS/cm	11.18 mg/L	3,510.3 NTU	358.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:44	14:20	8.00 pH	7.89 °C	620.46 µS/cm	11.35 mg/L	167.49 NTU	358.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:45	14:40	7.99 pH	7.87 °C	614.54 µS/cm	11.27 mg/L	537.75 NTU	357.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:45	15:00	8.00 pH	7.90 °C	815.70 µS/cm	11.65 mg/L	659.38 NTU	357.4 mV	151.00 cm	400.00 ml/min

28/02/2023 12:45	15:20	7.99 pH	7.90 °C	616.16 µS/cm	11.32 mg/L	320.51 NTU	358.0 mV	151.00 cm	400.00 ml/min
28/02/2023 12:46	15:40	7.98 pH	7.91 °C	625.29 µS/cm	11.29 mg/L	734.81 NTU	357.9 mV	151.00 cm	400.00 ml/min
28/02/2023 12:46	16:00	7.98 pH	7.92 °C	620.19 µS/cm	11.83 mg/L	407.04 NTU	359.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:46	16:20	7.97 pH	7.95 °C	622.01 µS/cm	11.19 mg/L	886.39 NTU	358.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:47	16:40	7.97 pH	7.98 °C	628.07 µS/cm	11.33 mg/L	779.63 NTU	358.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:47	17:00	7.96 pH	8.00 °C	619.16 µS/cm	11.45 mg/L	341.14 NTU	358.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:47	17:20	7.95 pH	8.02 °C	629.14 µS/cm	11.24 mg/L	855.16 NTU	358.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:48	17:40	8.03 pH	8.05 °C	857.50 µS/cm	11.67 mg/L	707.89 NTU	355.5 mV	151.00 cm	400.00 ml/min
28/02/2023 12:48	18:00	7.94 pH	8.08 °C	619.83 µS/cm	11.20 mg/L	290.51 NTU	358.8 mV	151.00 cm	400.00 ml/min
28/02/2023 12:48	18:20	7.94 pH	8.09 °C	633.31 µS/cm	11.26 mg/L	792.44 NTU	358.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:49	18:40	7.93 pH	8.10 °C	660.75 µS/cm	11.60 mg/L	1,507.7 NTU	359.2 mV	151.00 cm	400.00 ml/min
28/02/2023 12:49	19:00	7.93 pH	8.12 °C	674.48 µS/cm	11.23 mg/L	1,668.8 NTU	359.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:49	19:20	7.92 pH	8.14 °C	675.40 µS/cm	11.30 mg/L	3,279.2 NTU	359.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:50	19:40	7.92 pH	8.13 °C	700.25 µS/cm	11.34 mg/L	2,543.2 NTU	359.5 mV	151.00 cm	400.00 ml/min
28/02/2023 12:50	20:00	7.91 pH	8.15 °C	722.22 µS/cm	11.25 mg/L	2,789.3 NTU	359.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:50	20:20	7.90 pH	8.10 °C	709.51 µS/cm	11.70 mg/L	2,882.0 NTU	359.7 mV	151.00 cm	400.00 ml/min
28/02/2023 12:51	20:40	7.89 pH	8.11 °C	725.16 µS/cm	11.30 mg/L	2,825.2 NTU	359.7 mV	151.00 cm	400.00 ml/min
28/02/2023 12:51	21:00	7.91 pH	8.09 °C	746.29 µS/cm	11.75 mg/L	3,603.0 NTU	360.0 mV	151.00 cm	400.00 ml/min
28/02/2023 12:51	21:20	7.89 pH	8.10 °C	752.11 µS/cm	11.30 mg/L	2,908.6 NTU	359.5 mV	151.00 cm	400.00 ml/min
28/02/2023 12:52	21:40	8.00 pH	8.12 °C	924.73 µS/cm	11.64 mg/L	2,760.0 NTU	355.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:52	22:00	7.89 pH	8.10 °C	757.18 µS/cm	11.31 mg/L	2,897.0 NTU	359.4 mV	151.00 cm	400.00 ml/min
28/02/2023 12:52	22:20	7.88 pH	8.13 °C	813.73 µS/cm	11.43 mg/L	2,327.4 NTU	359.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:53	22:40	7.89 pH	8.10 °C	790.53 µS/cm	11.40 mg/L	2,266.4 NTU	359.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:53	23:00	7.88 pH	8.07 °C	767.66 µS/cm	11.38 mg/L	2,204.5 NTU	359.6 mV	151.00 cm	400.00 ml/min
28/02/2023 12:53	23:20	7.86 pH	8.06 °C	767.17 µS/cm	11.35 mg/L	2,874.9 NTU	360.0 mV	151.00 cm	400.00 ml/min
28/02/2023 12:54	23:40	7.85 pH	8.08 °C	774.76 µS/cm	11.32 mg/L	2,628.8 NTU	360.1 mV	151.00 cm	400.00 ml/min
28/02/2023 12:54	24:00	7.85 pH	8.10 °C	773.42 µS/cm	11.32 mg/L	2,491.0 NTU	360.3 mV	151.00 cm	400.00 ml/min
28/02/2023 12:54	24:20	7.85 pH	8.12 °C	772.43 µS/cm	11.30 mg/L	2,403.3 NTU	360.4 mV	151.00 cm	400.00 ml/min

Samples

Sample ID:	Description:
Samp1	2jars 2 vials

Low-Flow Test Report:

Test Date / Time: 28/02/2023 13:32:55

Project: A46 Newark

Operator Name: Jack Wilden

Location Name: S3WS07 Initial Depth to Water: 2.26 m Well Diameter: 50cm Casing Type: HDPE Total Depth: 3.6m	Flow Cell Volume: 130ml Final Flow Rate: 400ml/min Estimated Total Volume Pumped: 3000ml Final Draw Down: 2.26m	Instrument Used: Aqua TROLL 500 Serial Number: 898454 Pump Type: Bladder Tubing Type: HDPE
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Test Notes:


Low-Flow Readings:


Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	Turbidity	ORP	Depth to Water	Flow
		+/- 0.1	+/- 0.5	+/- 3 %	+/- 0.3	+/- 10	+/- 10	+/- 5	
28/02/2023 13:32	00:00	7.12 pH	8.38 °C	2,356.7 µS/cm	12.02 mg/L	2,917.7 NTU	376.0 mV	226.00 cm	400.00 ml/min
28/02/2023 13:33	00:20	7.10 pH	8.32 °C	2,625.0 µS/cm	12.01 mg/L	2,958.7 NTU	377.2 mV	226.00 cm	400.00 ml/min
28/02/2023 13:33	00:40	7.09 pH	8.29 °C	2,784.4 µS/cm	12.01 mg/L	2,845.3 NTU	377.6 mV	226.00 cm	400.00 ml/min
28/02/2023 13:33	01:00	7.08 pH	8.27 °C	2,856.5 µS/cm	12.02 mg/L	2,673.9 NTU	377.7 mV	226.00 cm	400.00 ml/min
28/02/2023 13:34	01:20	7.06 pH	8.26 °C	2,760.2 µS/cm	11.79 mg/L	2,662.9 NTU	378.2 mV	226.00 cm	400.00 ml/min
28/02/2023 13:34	01:40	7.06 pH	8.27 °C	2,782.2 µS/cm	11.68 mg/L	2,454.1 NTU	378.1 mV	226.00 cm	400.00 ml/min
28/02/2023 13:34	02:00	7.05 pH	8.25 °C	2,809.5 µS/cm	11.75 mg/L	2,741.3 NTU	378.2 mV	226.00 cm	400.00 ml/min
28/02/2023 13:35	02:20	7.05 pH	8.26 °C	2,802.0 µS/cm	11.59 mg/L	2,486.5 NTU	378.0 mV	226.00 cm	400.00 ml/min
28/02/2023 13:35	02:40	7.03 pH	8.22 °C	2,804.1 µS/cm	11.72 mg/L	2,362.0 NTU	378.8 mV	226.00 cm	400.00 ml/min
28/02/2023 13:35	03:00	7.03 pH	8.26 °C	2,814.7 µS/cm	11.51 mg/L	2,185.4 NTU	378.5 mV	226.00 cm	400.00 ml/min
28/02/2023 13:36	03:20	7.02 pH	8.24 °C	2,787.7 µS/cm	11.56 mg/L	2,377.9 NTU	378.9 mV	226.00 cm	400.00 ml/min
28/02/2023 13:36	03:40	7.01 pH	8.22 °C	2,707.4 µS/cm	11.71 mg/L	2,278.8 NTU	379.3 mV	226.00 cm	400.00 ml/min
28/02/2023 13:36	04:00	7.01 pH	8.26 °C	2,787.2 µS/cm	11.42 mg/L	2,207.3 NTU	378.9 mV	226.00 cm	400.00 ml/min
28/02/2023 13:37	04:20	7.00 pH	8.24 °C	2,689.4 µS/cm	11.45 mg/L	1,820.0 NTU	379.3 mV	226.00 cm	400.00 ml/min
28/02/2023 13:37	04:40	7.04 pH	8.22 °C	2,643.4 µS/cm	11.78 mg/L	2,340.1 NTU	378.2 mV	226.00 cm	400.00 ml/min
28/02/2023 13:37	05:00	6.99 pH	8.24 °C	2,701.1 µS/cm	11.40 mg/L	1,357.6 NTU	379.5 mV	226.00 cm	400.00 ml/min
28/02/2023 13:38	05:20	6.98 pH	8.23 °C	2,773.0 µS/cm	11.40 mg/L	2,048.2 NTU	379.7 mV	226.00 cm	400.00 ml/min


28/02/2023 13:38	05:40	6.98 pH	8.25 °C	2,887.5 µS/cm	11.48 mg/L	1,790.1 NTU	379.4 mV	226.00 cm	400.00 ml/min
28/02/2023 13:38	06:00	6.98 pH	8.22 °C	2,765.7 µS/cm	11.33 mg/L	1,636.4 NTU	379.9 mV	226.00 cm	400.00 ml/min
28/02/2023 13:39	06:20	6.97 pH	8.18 °C	2,833.4 µS/cm	11.53 mg/L	1,923.1 NTU	380.1 mV	226.00 cm	400.00 ml/min
28/02/2023 13:39	06:40	6.97 pH	8.21 °C	2,799.1 µS/cm	11.35 mg/L	1,543.6 NTU	380.0 mV	226.00 cm	400.00 ml/min
28/02/2023 13:39	07:00	6.97 pH	8.18 °C	2,843.8 µS/cm	11.43 mg/L	1,714.7 NTU	380.3 mV	226.00 cm	400.00 ml/min
28/02/2023 13:40	07:20	6.97 pH	8.20 °C	2,800.6 µS/cm	11.21 mg/L	1,564.0 NTU	380.2 mV	226.00 cm	400.00 ml/min


Samples

Sample ID:	Description:
Samp1	2 jars 2 vials

Job Name:	A46 Newark		Date:	27/03/2023						
Job Number:	221209		Visit:	3						
Weather, Temp.:	Overcast		Eng:	JSW						
Pressure Trend:	N/A		Client:	Skanska						Key:
Time Start (hh:mm)	08:29	08:43	09:10							
Monitoring Location	S3BH05	S3BH06	S3BH07							
GROUNDWATER SAMPLING										
Measured DTW (m bgl)	Dry	Dry	2.87							
Measured DTB (m bgl)	3.14	2.5	3.07							
Water Column (m) Base Depth - Water Depth	=									
	NA	NA	0.2							
Vol. to purge (l)										
	NA	NA	1							
Sample taken (Y/N)	N	N	Y							
Method Purging										
Vol. water purged (l)										
Clarity (Clear - Opaque)										
Odour										
Sediment (Size, Colour)										
Iridescence (None - Heavy)										
Preservatives used?										
Water Level PP (m bgl)										
Parameters logged via probe? or pH, DO, RDX, EC, Temp, Turbidity?	N/A									
	N	N	N							
INSTALLED INSTRUMENTS	Y	Y	Y							
(Baro/Diver/VWP/Inclino etc)	Baro/ Diver	Diver	Diver							
Notes:										
			Insufficient water for low flow							
Measured TFP (m bgl)	N	N	N							
TFP is above/below water?	N	N	N							
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) 0.3 l/hr	Instrument Used Gas Data GFM 436-1	Date Last Calibrated 18/08/2020	Date Next Calibration Due 18/08/2021	Serial Number:	12166	
Notes/Comments:										
BH07 Access was blocked										

Job Name:	A46 Newark		Date:	03/04/2023						
Job Number:	221209		Visit:	3						
Weather, Temp.:	Overcast		Eng:	JSW						
Pressure Trend:	N/A		Client:	Skanska		Key: DTW - Depth to Water PP - Post Purge TFP - Thickness Free Product DTB - Depth to Base				
Time Start (hh:mm)	08:29	08:43	09:10	09:29	09:53	10:07	11:38	12:14	12:30	
Monitoring Location	BH09	BH15	WS31	WS04	S3WS06	S3WS05	BH07	S3WS07	BH17	
GROUNDWATER SAMPLING										
Measured DTW (m bgl)	0.97	1.28	0.97	2.62	1.23	1.77		1.71	1.55	
Measured DTB (m bgl)	4.24	3.55	3.87	3.5	3.04	2.47		3.56	16.95	
Water Column (m) Base Depth - Water Depth =	3.3	2.3	2.9	0.9	1.8	0.7		1.9	15.4	
Vol. to purge (l)	NA	NA	NA	NA	NA	NA		NA	NA	
Sample taken (Y/N)	N	N	N	N	N	N		N	N	
Method Purging										
Vol. water purged (l)										
Clarity (Clear - Opaque)										
Odour										
Sediment (Size, Colour)										
Iridescence (None - Heavy)										
Preservatives used?										
Water Level PP (m bgl)										
Parameters logged via probe? N/A or pH, DO, RDX, EC, Temp, Turbidity?	N	N	N	N	N	N		N	N	
INSTALLED INSTRUMENTS	Y	Y	Y	Y	Y	Y		Y	Y	
(Baro/Diver/VWP/Inclino etc)	Baro/ Diver	Diver	Diver	Diver	Diver	Diver		Diver	Diver	
Notes:	Access Blocked									
Measured TFP (m bgl)	N	N	N	N	N	N		N	N	N
TFP is above/below water?	N	N	N	N	N	N		N	N	N
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) 0.3 l/hr	Instrument Used Date Last Calibrated Date Next Calibration Due		Gas Data GFM 436-1 18/08/2020 18/08/2021		Serial Number:	12166
Notes/Comments:										
BH07 Access was blocked										

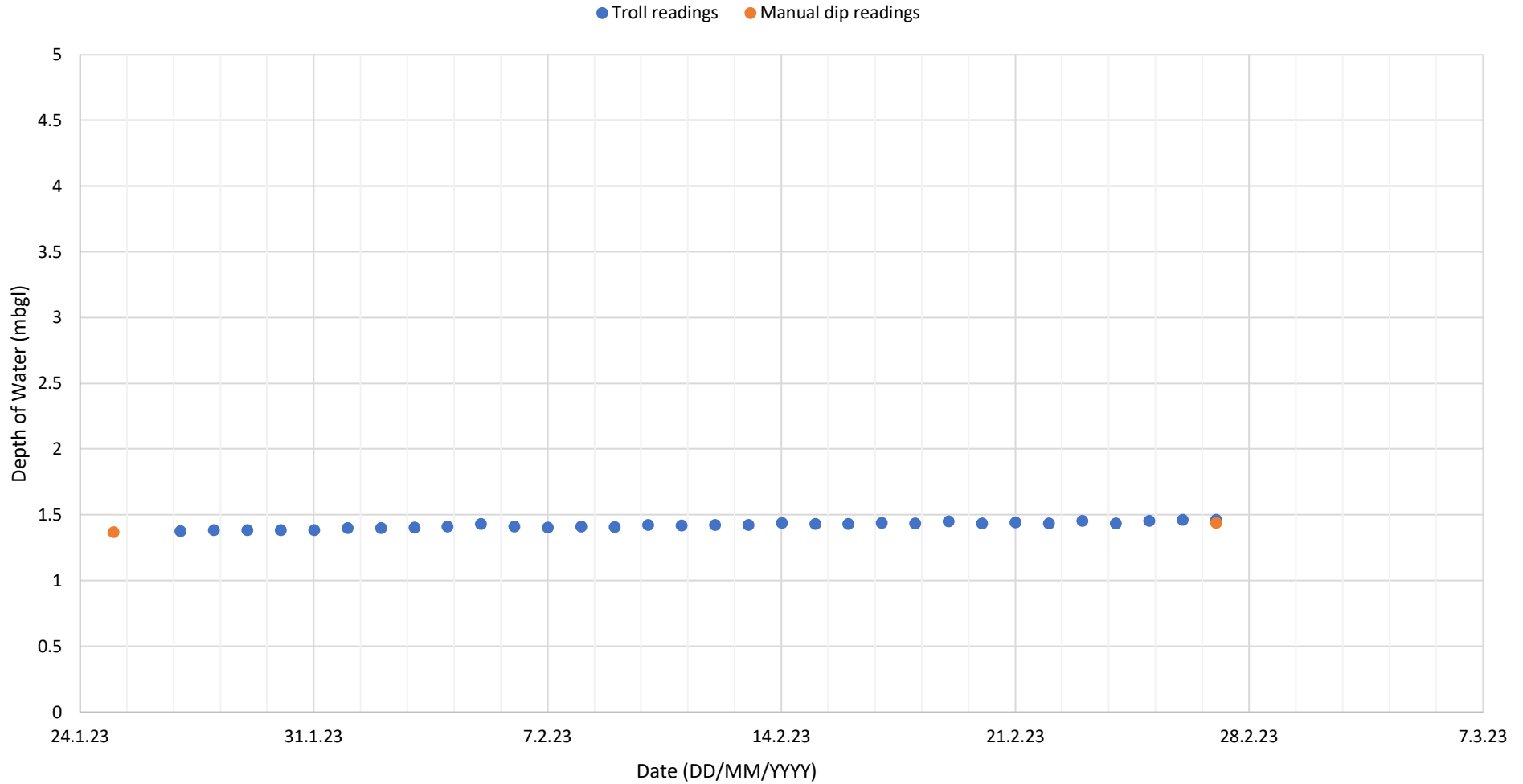
Job Name:	A46 Newark		Date:	04/04/2023					
Job Number:	221209		Visit:	3					
Weather, Temp.:	Sunny		Eng:	JSW					
Pressure Trend:	N/A		Client:	Skanska					
Time Start (hh:mm)	08:36	08:51	09:02	09:27					
Monitoring Location	S3WS01	WS08	BH03A	BH56					
GROUNDWATER SAMPLING									
Measured DTW (m bgl)	1.6	0.15	0.51	0.66					
Measured DTB (m bgl)	4.7	4.88	4.18	3.57					
Water Column (m) Base Depth - Water Depth	=								
	3.1	4.7	3.7	2.9					
Vol. to purge (l)	NA	NA	NA	NA					
Sample taken (Y/N)	N	N	N	N					
Method Purging									
Vol. water purged (l)									
Clarity (Clear - Opaque)									
Odour									
Sediment (Size, Colour)									
Iridescence (None - Heavy)									
Preservatives used?									
Water Level PP (m bgl)									
Parameters logged via probe? or pH, DO, RDX, EC, Temp, Turbidity?	N/A								
	Y	Y	Y	N					
INSTALLED INSTRUMENTS	Y	Y	Y	N					
(Baro/Diver/VWP/Inclino etc)	Diver	Diver	Diver						
Notes:									
Measured TFP (m bgl)	N	N	N	N					
TFP is above/below water?	N	N	N	N					
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) 0.3 l/hr	Instrument Used Gas Data GFM 436-1	Date Last Calibrated 18/08/2020	Date Next Calibration Due 18/08/2021	Serial Number:	12166
Notes/Comments:									

Job Name:	A46 Newark		Date:	19/05/2023					
Job Number:	221209		Visit:	3.5					
Weather, Temp.:	Overcast		Eng:	WG					
Pressure Trend:	N/A		Client:	Skanska					
Time Start (hh:mm)	08:40	09:01	09:29						
Monitoring Location	S3BH16	S3BH17	BH56						
GROUNDWATER SAMPLING									
Measured DTW (m bgl)	2.01	0.99	0.85						
Measured DTB (m bgl)	8.63	6.05	3.65						
Water Column (m) Base Depth - Water Depth =	6.6	5.1	2.8						
Vol. to purge (l)	NA	NA	NA						
Sample taken (Y/N)	N	N	N						
Method Purging									
Vol. water purged (l)									
Clarity (Clear - Opaque)									
Odour									
Sediment (Size, Colour)									
Iridescence (None - Heavy)									
Preservatives used?									
Water Level PP (m bgl)									
Parameters logged via probe? or pH, DO, RDX, EC, Temp, Turbidity?	N	N	N						
INSTALLED INSTRUMENTS	Y	Y	Y						
(Baro/Diver/VWP/Inclino etc)	Diver	Diver	Diver						
Notes:	Diver Installed at 7.6m	Diver Installed at 5.0m	Diver Installed at 2.7m						
Measured TFP (m bgl)	N	N	N						
TFP is above/below water?	N	N	N						
Accuracy of Instrument	0-5% vol ± 0.5 (vol)	5-15% vol ± 1.0% (vol)	15%-FS ± 3.0% (vol)	(Flow) 0.3 l/hr	Instrument Used	Gas Data GFM 436-1	Serial Number:	12166	
					Date Last Calibrated	18/08/2020			
					Date Next Calibration Due	18/08/2021			
Notes/Comments:									



Continuous Water Monitoring

Client:	Skanska	Location:	BH07	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	4.95
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



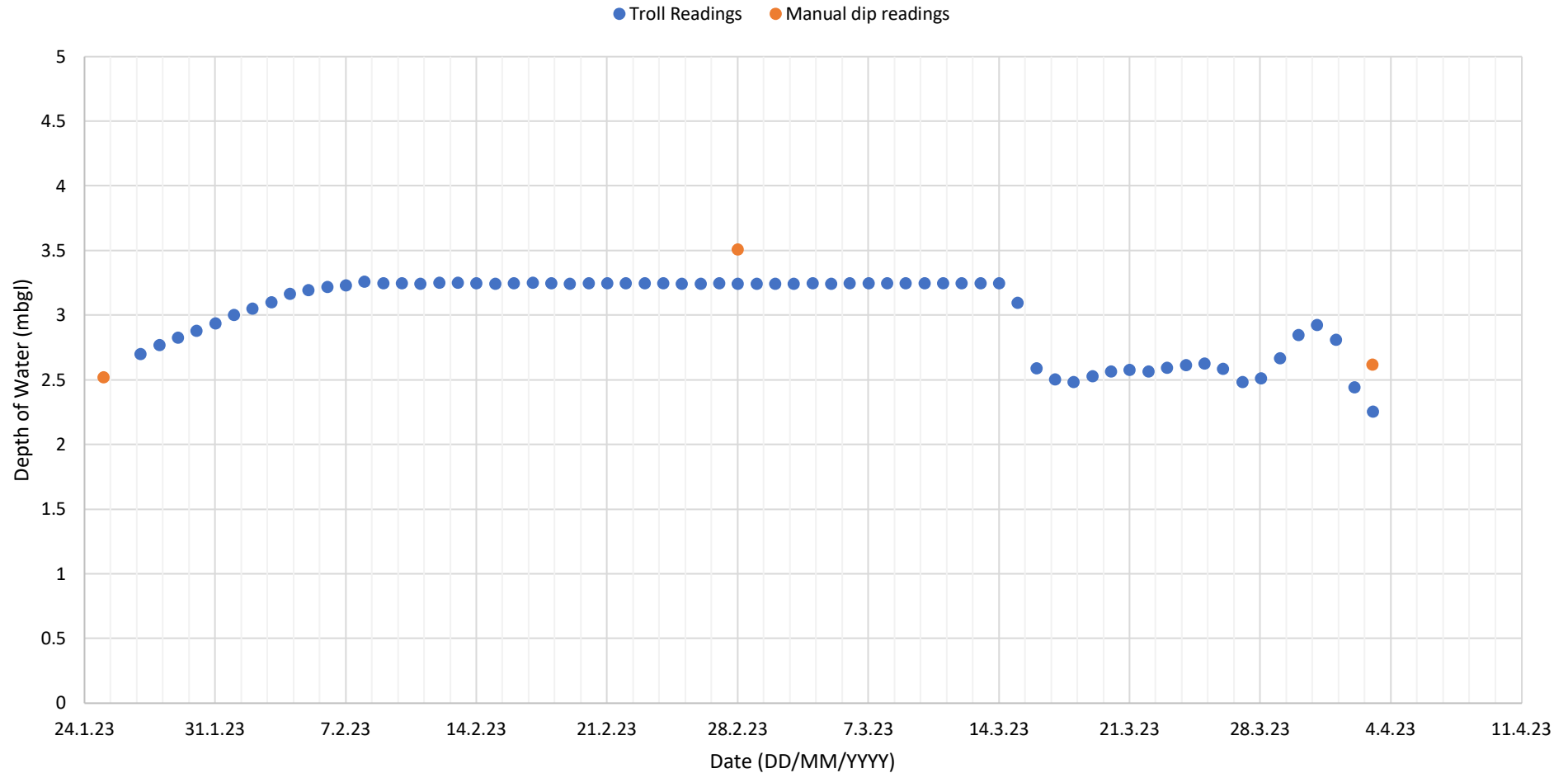
Notes:

Continuous water monitoring diver installed on 25/01/2023. Position blocked on visit 3, no new data to report.



Continuous Water Monitoring

Client:	Skanska	Location:	S3WS04	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	3.51
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



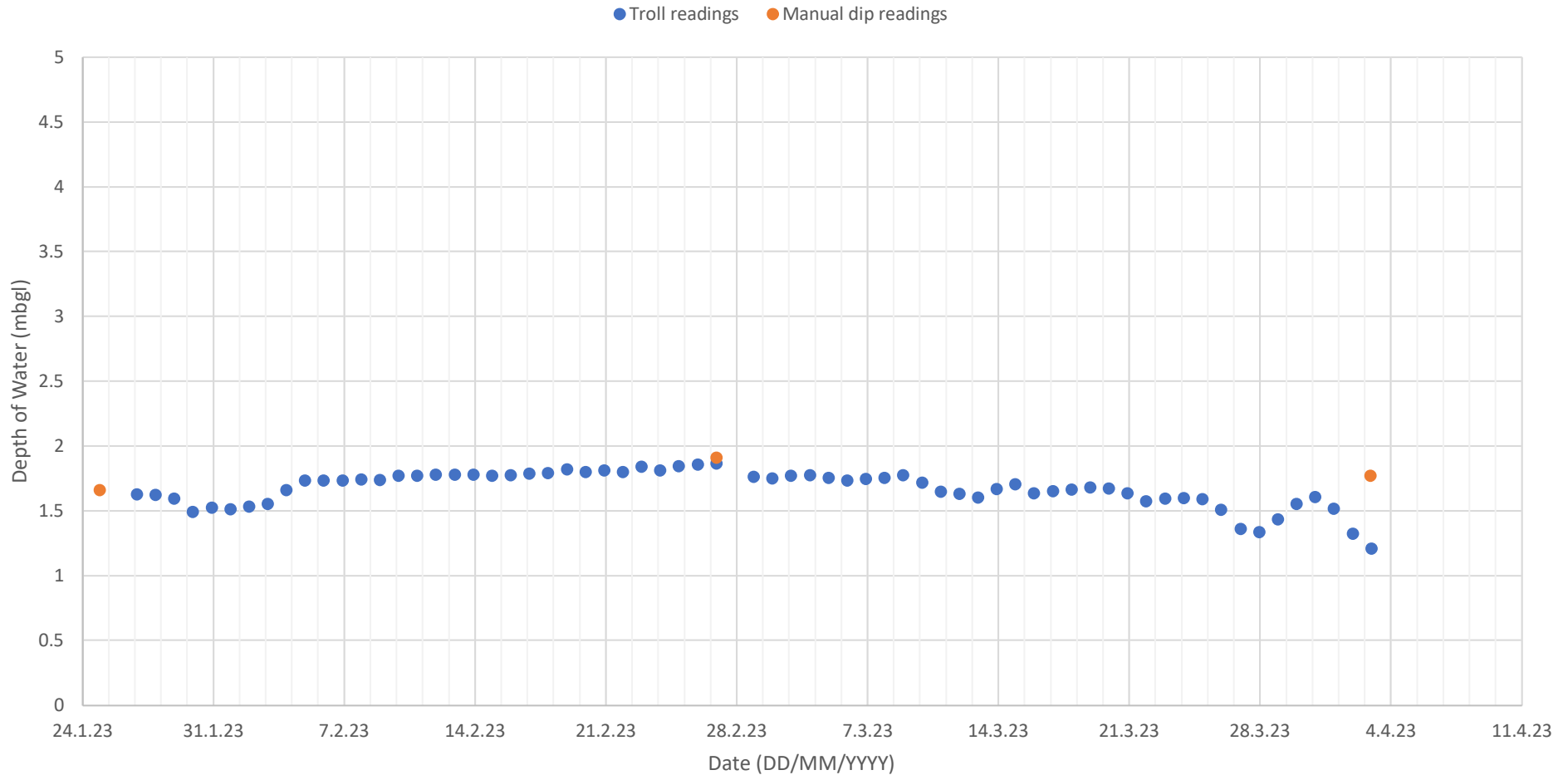
Notes:

Continuous water monitoring diver installed on 25/01/2023. Water level dropped below 3.25m and was not detectable by the Rugged Troll



Continuous Water Monitoring

Client:	Skanska	Location:	WS05	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	2.49
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



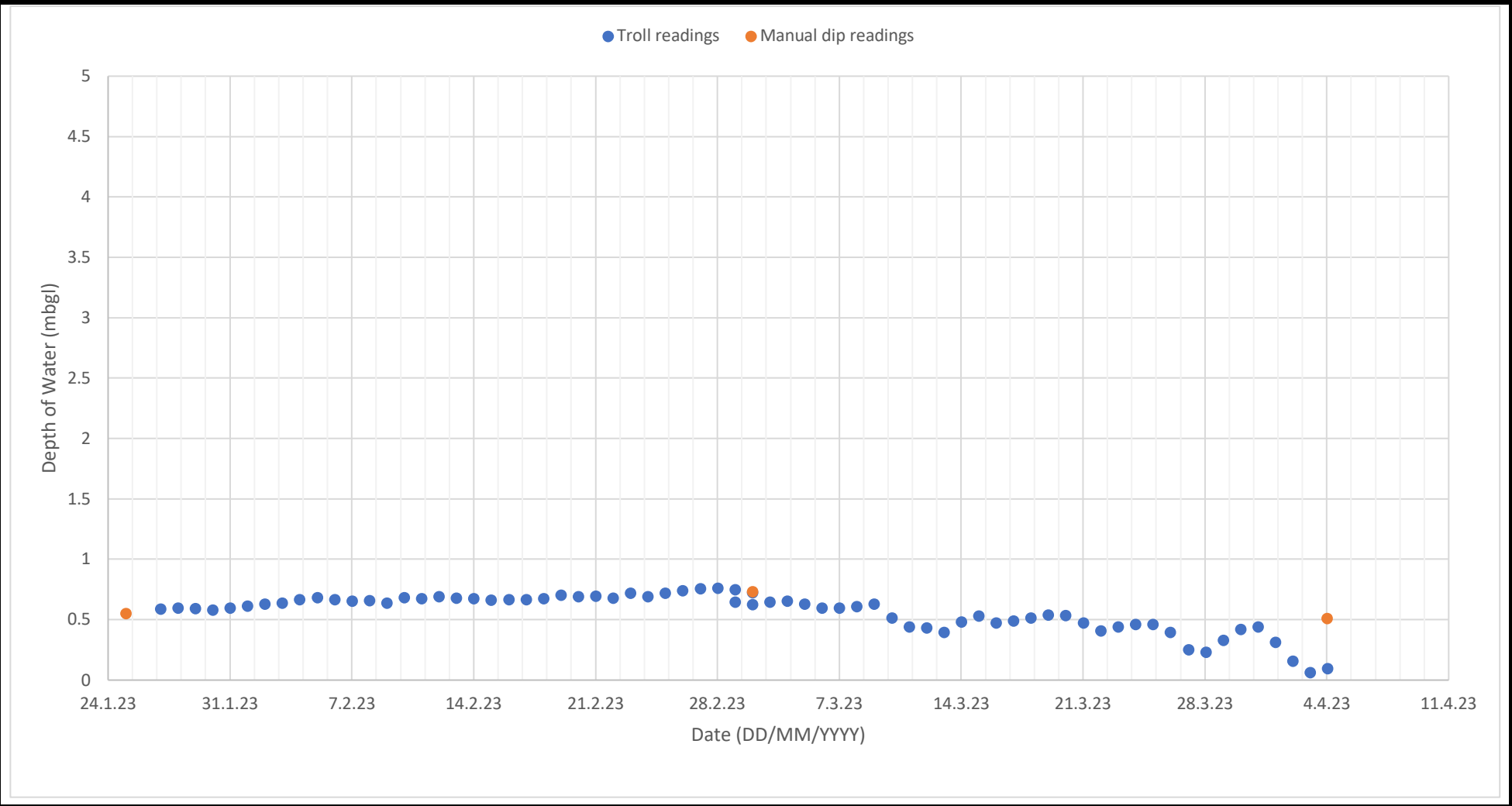
Notes:

Continuous water monitoring diver installed on 25/01/2023



Continuous Water Monitoring

Client:	Skanska	Location:	BH03A	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	4.18
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



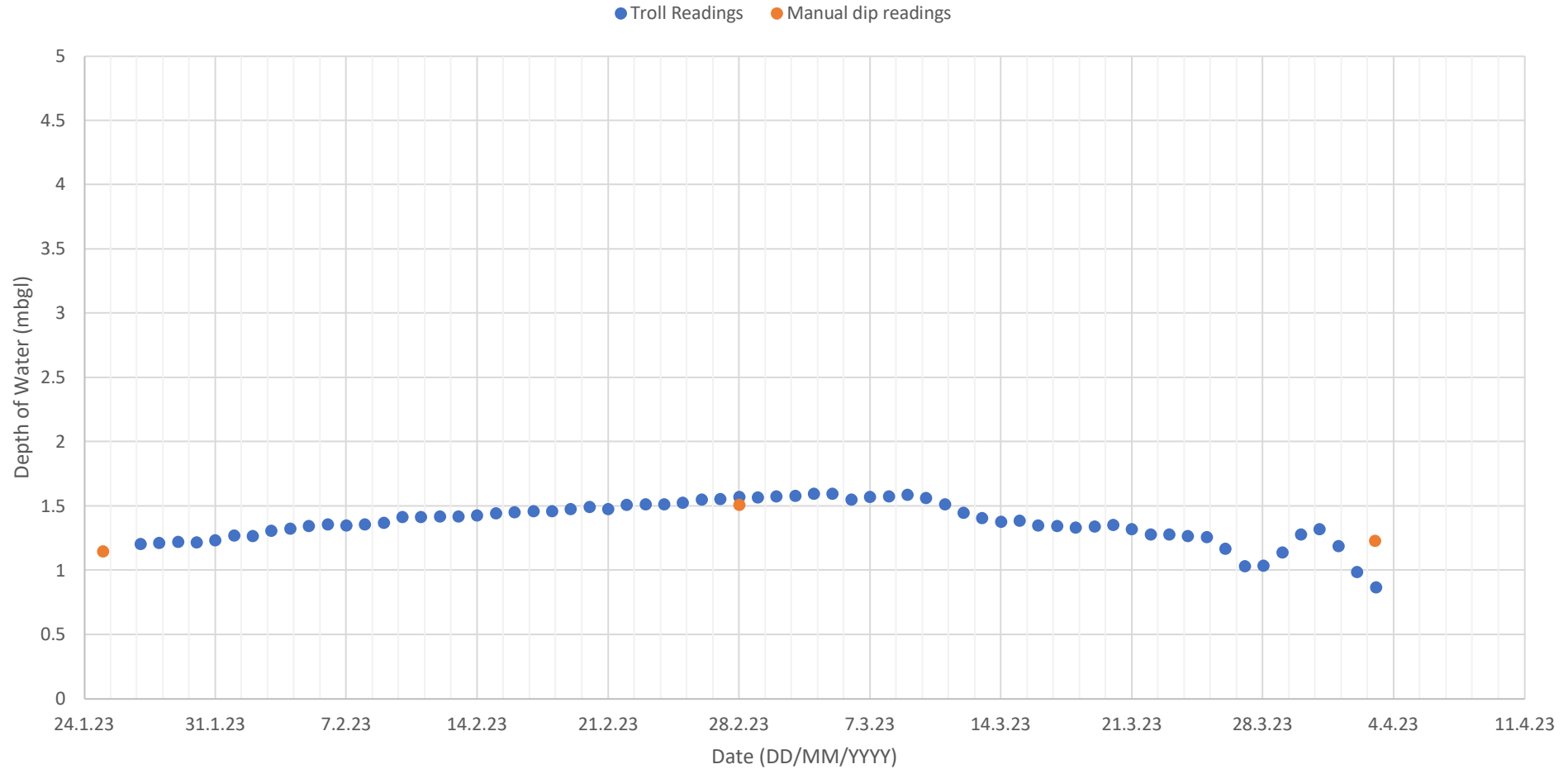
Notes:

Continuous water monitoring diver installed on 12/11/2021



Continuous Water Monitoring

Client:	Skanska	Location:	S3WS06	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	3.06
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



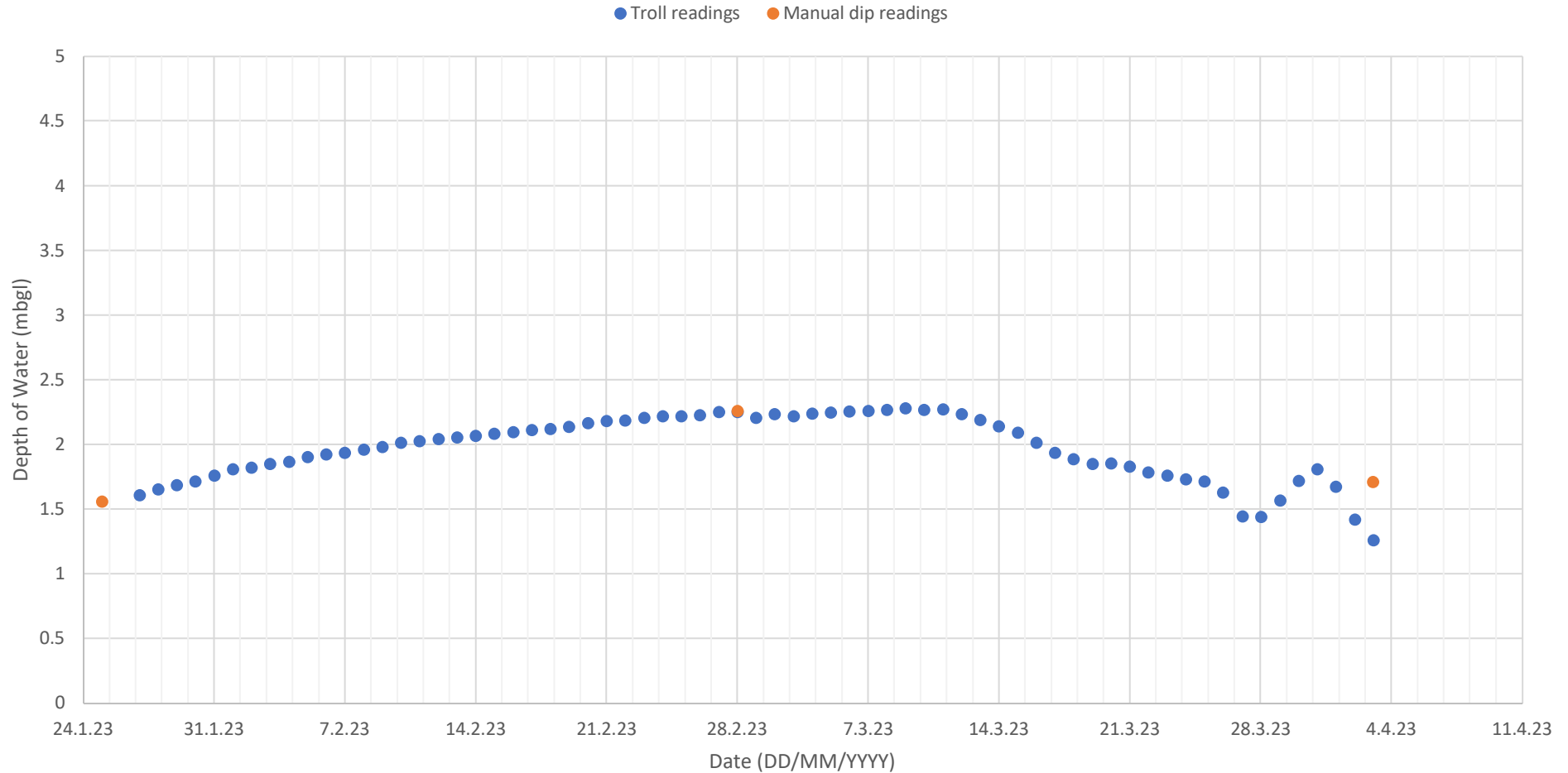
Notes:

Continuous water monitoring diver installed on 25/01/2023



Continuous Water Monitoring

Client:	Skanska	Location:	S3WS07	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	3.6
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



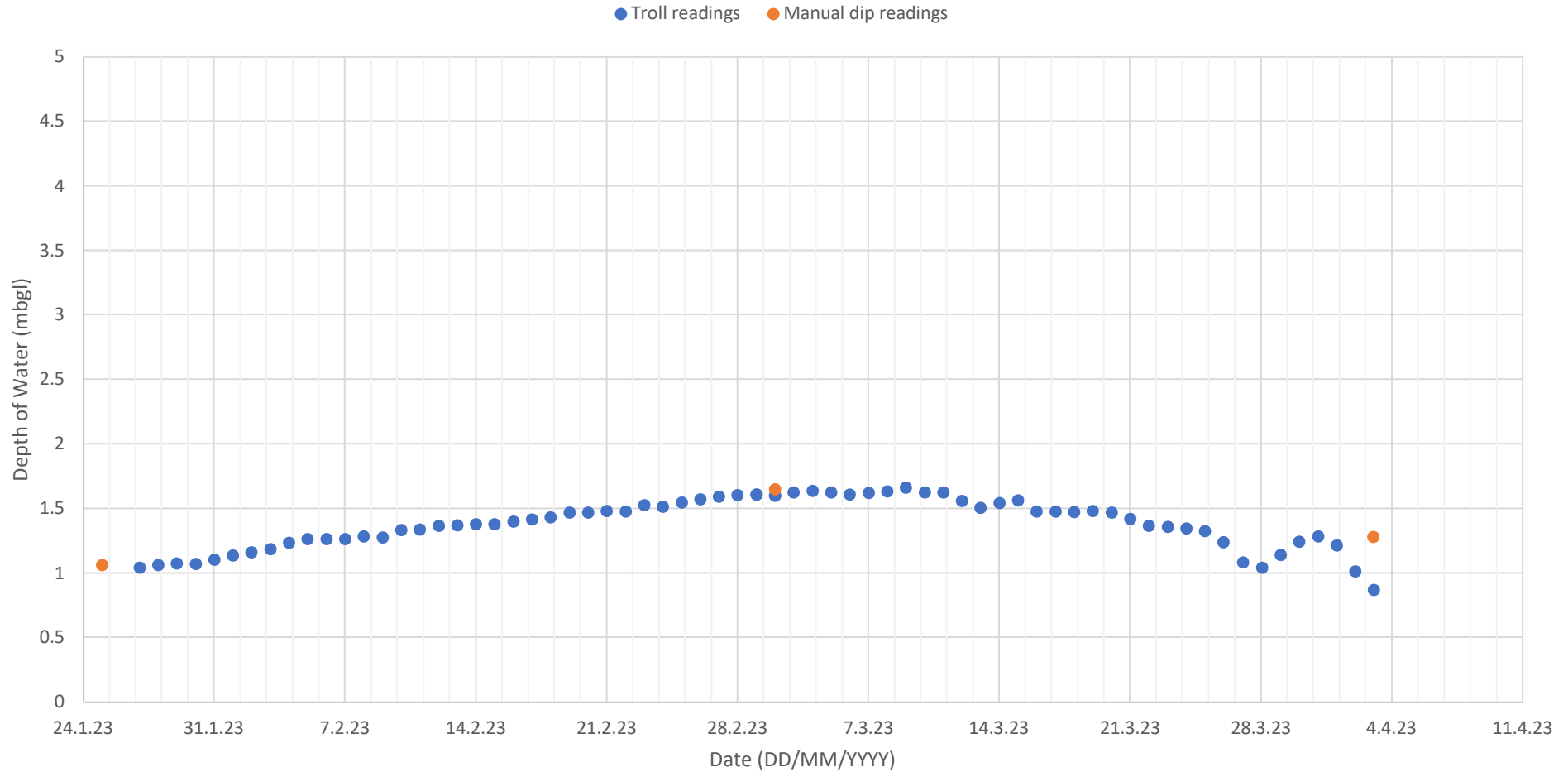
Notes:

Continuous water monitoring diver installed on 11/11/2021



Continuous Water Monitoring

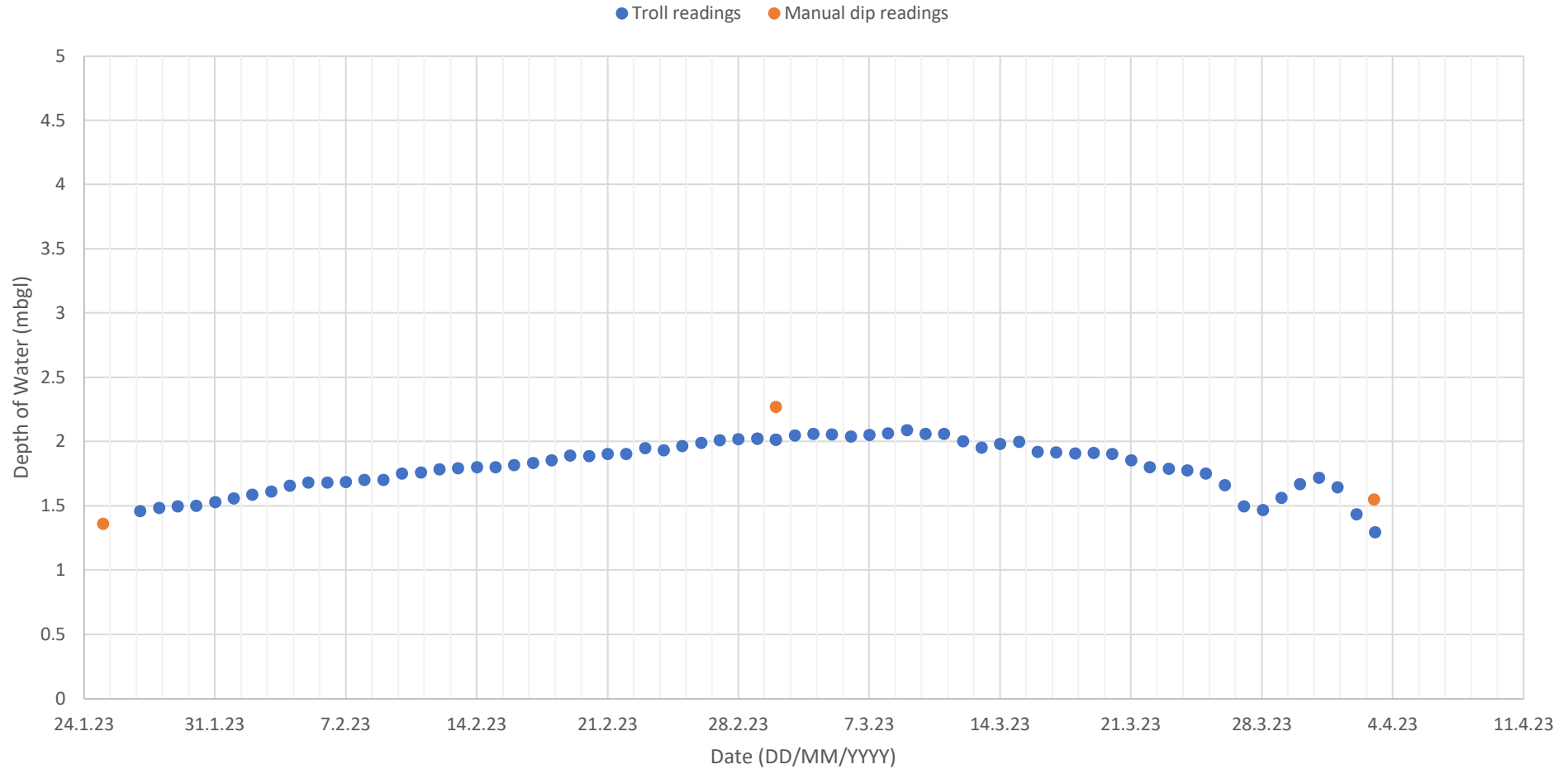
Client:	Skanska	Location:	BH15	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	3.52
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100





Continuous Water Monitoring

Client:	Skanska	Location:	BH17	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	3.1
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100

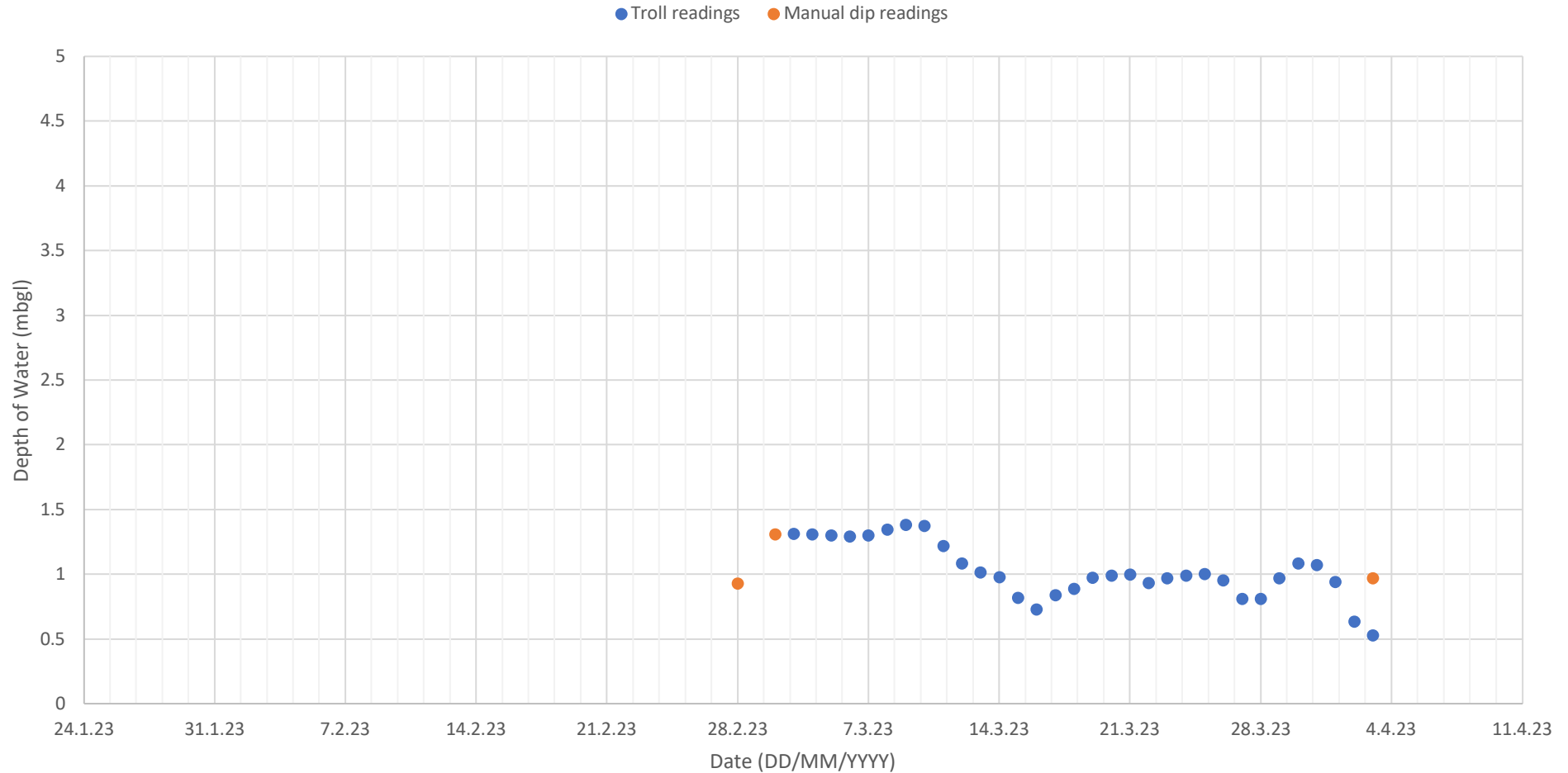


Notes: Continuous water monitoring diver installed on 25/01/2023



Continuous Water Monitoring

Client:	Skanska	Location:	WS31	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	25/01/2023	Borehole Depth:	3.9
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



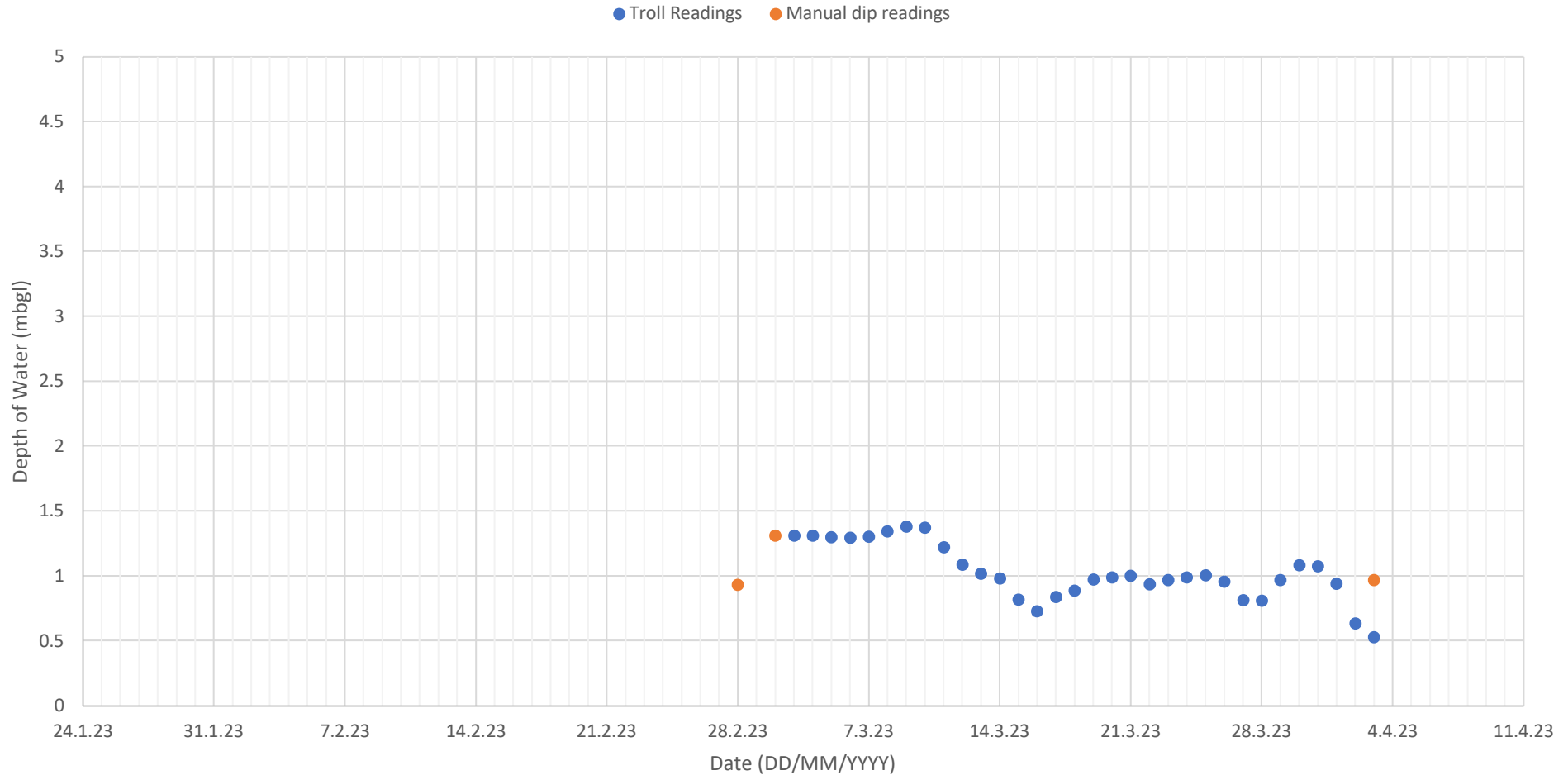
Notes:

Continuous water monitoring diver installed on 25/01/2023.



Continuous Water Monitoring

Client:	Skanska	Location:	BH09	Engineer:	JSW
Job Location:	A46 Newark	Start Date:	02/03/2023	Borehole Depth:	4.24
Job No:	221209	End Date:	Ongoing	Installed Equipment:	Rugged Troll 100



Notes:

Continuous water monitoring diver installed on 02/03/2023