

Samples / Tests			Water-Strikes ▼	Stratum Description	Depth m agl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly gravelly SILT with many fine rootlets. Gravel is subangular, fine to medium of sandstone. (TOPSOIL)	0.60	(0.60)	119.99	
				Soft orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone and coal fragments. (GLACIAL TILL)	1.80	(1.20)	118.79	
				Firm greyish brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of mudstone, siltstone, sandstone and coal fragments. (GLACIAL TILL)	3.65	(3.65)		
			▼		5.45		115.14	
				End of Borehole at 5.45m				
					10			

Samples / Tests			Water-Strikes	Stratum Description	Depth magl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy SILT with many fine rootlets. Gravel is angular to subangular, medium of coal. (TOPSOIL)	0.40	(0.40)	119.76	
				Soft brown mottled grey and orange slightly sandy slightly gravelly CLAY with some pockets of silt. Gravel is subrounded to rounded, fine of siltstone. (GLACIAL TILL)	1.20	(0.80)	118.96	
				Firm becoming stiff brown slightly sandy gravelly CLAY. Gravel is subangular to rounded, fine to coarse of siltstone, sandstone, mudstone and coal fragments. (GLACIAL TILL)	7.00	(5.80)	113.16	
				Extremely weak dark grey MUDSTONE, recovered as clayey gravel. (PENNINE LOWER COAL MEASURES)	8.00	(1.00)	112.16	
				End of Borehole at 8.00m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown SILT with many fine rootlets. (TOPSOIL)		(0.90)		
				Soft to firm orangish brown mottled grey slightly sandy slightly gravelly CLAY with some decayed rootlets. Gravel is subangular, fine to medium of coal fragments. (GLACIAL TILL)	0.90		118.63	
				Firm to stiff greyish brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of siltstone, sandstone and coal fragments. (GLACIAL TILL)	2.90		116.73	
				... Below 4.0m bgl: Stiff	4			
					7	(8.40)		
					10			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Firm to stiff greyish brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of siltstone, sandstone and coal fragments. (GLACIAL TILL)				
			▽		11			
				Extremely weak dark grey MUDSTONE, recovered as clayey gravel. (PENNINE LOWER COAL MEASURES)	11.20	108.33		
						(0.45)		
			 End of Borehole at 11.65m	11.65	107.88		
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown silty slightly gravelly fine to medium SAND with a low cobble content and some fine rootlets. Gravel is subangular to rounded medium to coarse of siltstone, sandstone, and coal. (TOPSOIL)	0.30	(0.30)	133.04	
				Soft to firm orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.50	(1.20)	131.84	
			▼	Brown very clayey angular to rounded fine to coarse GRAVEL of mudstone, siltstone, and sandstone with a high cobble and boulder content. (GLACIAL TILL)	2.20	(0.70)	131.14	
				Firm to stiff occasionally fissured greyish brown slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	2.80	(0.60)	130.54	
				----- Base of Excavation at 2.80m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is fine to medium of coal. (TOPSOIL)	0.40	(0.40)	132.45	
			▼	Firm orange to brown mottled grey slightly sandy slightly gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to subrounded, fine to coarse of mudstone, siltstone, sandstone and coal. (GLACIAL TILL)	1	(1.20)		
				Soft to firm greyish brown fissured slightly sandy gravelly CLAY with a medium boulder content and firm grained sand in fissures. Gravel is angular to subrounded, fine to coarse of mudstone, siltstone, sandstone and coal. (GLACIAL TILL)	1.60		131.25	
					2	(1.30)		
			▼	Loose grey slightly sandy clayey subrounded to rounded, fine to coarse GRAVEL with a high subrounded cobble and boulder content. (GLACIAL TILL)	2.90		129.95	
					3	(0.50)		
			 Base of Excavation at 3.40m	3.40		129.45	
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded, fine to coarse of sandstone. (TOPSOIL)	0.50	(0.50)	130.56	
				Very soft brown CLAY. (GLACIAL TILL)	1.00	(0.50)	130.06	
			▼	Soft mottled orange brown and grey sandy slightly gravelly CLAY with some decayed rootlets. Gravel is subangular to rounded, fine to coarse of mixed lithologies. (GLACIAL TILL)	1.30	(0.30)	129.76	
				Stiff greyish brown slightly sandy gravelly CLAY with a low cobble content and some silty sandy fissures. Gravel is angular to rounded, fine to coarse of mixed lithologies. (GLACIAL TILL)	2.00	(1.90)		
					3.00			
					3.20		127.86	
				Base of Excavation at 3.20m				
					4.00			
					5.00			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of sandstone and coal. (TOPSOIL)	0.40	(0.40)	134.17	
				Soft to firm fissured mottled orangish brown and grey sandy slightly gravelly CLAY with a low cobble content, and grey silty sand on fissures. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL) ... Below 0.80m bgl: Orangish brown mottled grey.	1	(1.20)		
				Light brown slightly silty gravelly fine to coarse SAND with a low cobble content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	1.60	(0.20)	132.97	
				Light brown slightly clayey slightly gravelly SILT. Gravel is subangular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	1.80	(0.20)	132.77	
				Base of Excavation at 2.20m	2	(0.40)		
					2.20		132.37	
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some rootlets. Gravel is subangular to subrounded, fine to medium of sandstone. (TOPSOIL)	0.30	(0.30)	134.81	
				Yellowish brown sandy slightly gravelly SILT with some decayed rootlets. Gravel is subrounded, medium to coarse of siltstone. (GLACIAL TILL)	0.70	(0.40)	134.41	
			▼	Firm brown mottled grey slightly sandy gravelly CLAY with a medium boulder content. Gravel is angular to subrounded, fine to coarse of mudstone, siltstone, sandstone and coal. (GLACIAL TILL)	1.90	(1.20)	133.21	
				Firm to stiff brownish grey slightly sandy gravelly CLAY with a low cobble to medium boulder content. Gravel is angular to rounded, fine to coarse of mudstone, siltstone, sandstone and coal. (GLACIAL TILL)	2	(1.70)		
			▼	... At 3.50m bgl: Band of subrounded to rounded cobbles and boulders, stable. Base of Excavation at 3.60m	3.60		131.51	
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	
Depth (m)	Type	Results							
				Dark brown slightly sandy slightly gravelly SILT with some rootlets. Gravel is subangular to subrounded, fine to coarse of sandstone and siltstone. (TOPSOIL)	0.30	(0.30)	135.54		
				Soft to firm light orange brown mottled grey slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse of siltstone, sandstone and coal fragments. (GLACIAL TILL)	1.70	(1.40)	134.14		
				Firm to stiff greyish brown friable sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded, fine to coarse of mudstone, siltstone, sandstone and coal fragments. (GLACIAL TILL)	3.20	(1.50)	132.64		
				----- Base of Excavation at 3.20m -----					
					5				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular medium to coarse of brick and ceramic fragments. (MADE GROUND)	0.40	(0.40)	133.46	
				Soft orangish brown mottled grey sandy slightly gravelly CLAY with a low boulder content and occasional grey silty sand fissures. Gravel is angular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.80	(1.40)	132.06	
				Firm to stiff friable greyish brown mottled grey slightly sandy gravelly CLAY with a medium to high cobble and boulder content. Gravel is subangular to rounded fine to coarse of mudstone, siltstone, and sandstone. Locally fissured in some places. (GLACIAL TILL)	3.20	(1.40)	130.66	
				... Below 2.50m bgl: mottling absent.				
				----- Base of Excavation at 3.20m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, quartz, and rare ceramic fragments. (TOPSOIL)	0.30	(0.30)	134.48	
				Soft to firm fissured orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble and boulder content, and some grey silty sand on fissures. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	1.40	(1.10)	133.38	
				Very soft brown slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	2.30	(0.90)	132.48	
				Very soft brown slightly clayey gravelly SILT with a low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL) ... At 2.50m bgl: sandy, and locally clayey.	3.30	(1.00)	131.48	
				Stiff greyish brown gravelly CLAY with a medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	3.80	(0.50)	130.98	
				----- Base of Excavation at 3.80m				
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular fine to coarse of brick fragments. (MADE GROUND)	0.40	(0.40)	135.73	
				Soft orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.60	(1.20)	134.53	
			▼	Firm to stiff fissured greyish brown very sandy gravelly CLAY with a low to medium cobble content and occasional silty sand on fissures. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	3.50	(1.90)	132.63	
				----- Base of Excavation at 3.50m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and brick fragments. (MADE GROUND)	0.40	(0.40)	133.71	
				Firm fissured mottled grey and orangish brown sandy slightly gravelly CLAY with a low cobble and boulder content, and grey silty sand on fissures. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 0.70m bgl: Brown mottled grey.	1.50	(1.10)	132.61	
				Firm greyish brown slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. Occasionally sandy in some places. (GLACIAL TILL)	3.50	(2.00)	130.61	
				----- Base of Excavation at 3.50m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular to subrounded medium to coarse of mudstone and coal. (TOPSOIL)		(0.40)		
					0.40		131.84	
				Brown silty gravelly fine to coarse SAND with a low to medium cobble content. Gravel is subangular to rounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)		(0.20)		
					0.60		131.64	
				Firm brown mottled grey and orange slightly sandy slightly gravelly CLAY with a medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, sandstone, and coal. Occasionally sandy. (GLACIAL TILL)	1	(1.20)		
					1.80		130.44	
				Soft brown sandy gravelly SILT with a high cobble and boulder content and some pockets of sandy clay. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	2	(0.40)		
					2.20		130.04	
				▼ Brown clayey slightly sandy subangular to rounded medium to coarse GRAVEL of mixed lithologies with a high cobble and boulder content, and some pockets (up to 100mm) of soft sandy gravelly clay. (GLACIAL TILL)		(0.50)		
					2.70		129.54	
			 Base of Excavation at 2.70m				
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subrounded to rounded medium to coarse of siltstone. (TOPSOIL)	0.35	(0.35)	136.47	
				Soft to firm orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.50	(1.15)	135.32	
				Firm to stiff occasionally fissured greyish brown sandy gravelly CLAY with a medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	2.00	(1.80)	133.52	
				... Below 2.10m bgl: sand absent, and a high boulder content.	3.30			
				----- Base of Excavation at 3.30m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular medium to coarse of concrete. (MADE GROUND)	0.40	(0.40)	137.00	
				Soft mottled orangish brown and grey slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.70	(1.30)	135.70	
				Firm to stiff greyish brown sandy gravelly CLAY with a medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	3.50	(1.80)	133.90	
				... Below 2.50m bgl: sand absent, and occasional pockets (up to 50mm) of soft light brown sandy silt.				
				Base of Excavation at 3.50m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slight gravelly SILT with a low cobble content and some fine rootlets. Gravel is subangular to rounded fine to coarse of siltstone, coal, and rare fragments of plastic. (MADE GROUND)	0.40	(0.40)	130.97	
				Firm orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 1.00m bgl: Brown mottled grey, slightly sandy.	1.80	(1.40)	129.57	
				Firm greyish brown slightly sandy gravelly CLAY with a medium to high cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL) ... At 2.50m bgl: stiff, very large boulders.	3.50	(1.70)	127.87	
				Base of Excavation at 3.50m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is angular medium to coarse of ceramic fragments. (TOPSOIL)	0.40	(0.40)	135.97	
				Soft to firm orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of siltstone and coal. (GLACIAL TILL)	2.50	(2.10)	133.87	
				Firm to stiff greyish brown slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	3.10	(0.60)	133.27	
			 Base of Excavation at 3.10m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular fine to coarse of brick fragments. (MADE GROUND)	0.40	(0.40)	131.45	
				Soft orangish brown mottled grey and yellow slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.00	(0.60)	130.85	
				Firm brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	2.30	(1.30)	129.55	
				Loose brown slightly sandy clayey angular to subrounded fine to coarse GRAVEL of mixed lithologies with a medium cobble and boulder content. (GLACIAL TILL)	3.00	(0.70)	128.85	
				Soft brown slightly sandy SILT with occasional bands of firm brown gravelly clay. (GLACIAL TILL)	3.50	(0.50)	128.35	
				----- Base of Excavation at 3.50m				
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular medium to coarse of sandstone. (TOPSOIL)	0.40	(0.40)	133.23	
				Soft orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to subangular fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.80	(1.40)	131.83	
				Firm to stiff occasionally fissured greyish brown slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mixed lithologies. Occasionally sandy. (GLACIAL TILL)	3.80	(2.00)	129.83	
				----- Base of Excavation at 3.80m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Brown silty gravelly fine to coarse SAND with a high boulder content. (TOPSOIL)	0.50	(0.50)	131.50	
				Soft orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is angular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.60	(1.10)	130.40	
				Firm to stiff greyish brown mottled grey slightly sandy gravelly CLAY with a medium cobble and boulder content, and occasional fissures of soft sandy silt. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	2.30	(1.70)		
			▼	... Below 2.30m bgl: sand and mottling absent.				
			 Base of Excavation at 3.30m	3.30		128.70	
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth (m)	Thickness (m)	Level (m OD)	Legend	
Depth (m)	Type	Results							
				Dark brown sandy gravelly SILT with some fine rootlets and a medium to high cobble content of brick. Gravel is angular to subrounded fine to coarse of sandstone, concrete, and brick fragments. (MADE GROUND)	0.40	(0.40)	135.13		
				Soft to firm orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.50	(1.10)	134.03		
				Firm friable occasionally fissured greyish brown sandy gravelly CLAY with a medium to high cobble and boulder content. Gravel is angular to subrounded fine to coarse f mixed lithologies. (GLACIAL TILL)	3.50	(2.00)	132.03		
				----- Base of Excavation at 3.50m					
					5				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown sandy slightly gravelly SILT with a low to medium cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, and rare brick fragments. (MADE GROUND)	0.40	(0.40)	130.03	
				Firm fissured mottled orangish brown and grey slightly sandy slightly gravelly CLAY with a low cobble content and grey silty sand on fissures. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 1.20m bgl: orangish brown mottled grey.	1.80	(1.40)	128.63	
				Firm greyish brown mottled grey slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 2.00m bgl: Motting absent.	3.50	(1.70)	126.93	
				Base of Excavation at 3.50m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is angular to subangular medium to coarse of brick and ceramic fragments. (MADE GROUND)	0.40	(0.40)	135.18	
				Soft to firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY with some decayed rootlets and a low cobble content. Gravel is subangular fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 1.00m bgl: Orangish brown mottled grey.	1.60	(1.20)	133.98	
				Firm to stiff greyish brown slightly sandy gravelly CLAY with a medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL) ... At 3.20m bgl: Band of brown slightly sandy silt.	3.50	(1.90)	132.08	
				----- Base of Excavation at 3.50m				
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and coal. (TOPSOIL)	0.35	(0.35)	127.24	
				Firm fissured orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low to medium cobble and boulder content, and some grey silty sand on fissures. Gravel is angular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1	(1.35)		
				... Below 1.50m bgl: Brown mottled orange and grey.	1.70		125.89	
				Firm becoming stiff greyish brown mottled grey slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	2			
				... Below 2.00m bgl: mottling absent, occasionally fissured, and occasional bands of silty sand.	3	(1.80)		
				... At 3.00m bgl: Very large boulder.	3.50		124.09	
				----- Base of Excavation at 3.50m	4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets and a low cobble content of brick. Gravel is angular to subangular fine to coarse of brick fragments. (MADE GROUND)	0.40	(0.40)	132.33	
				Soft yellowish brown mottled orange and grey sandy slightly gravelly CLAY with some decayed rootlets. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, and quartz. (GLACIAL TILL)	0.90	(0.50)	131.83	
				Firm brown mottled grey slightly sandy gravelly CLAY with a medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	1			
				... Below 1.50m bgl: Greyish brown.	2			
					3			
					3.80	(2.90)		
				Base of Excavation at 3.80m	4		128.93	
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is angular to rounded medium to coarse of siltstone, and rare ceramic fragments. (TOPSOIL)	0.40	(0.40)	126.50	
				Firm orangish brown mottled grey slightly sandy slightly gravelly CLAY with a high cobble and boulder content, and occasional fissures with grey medium to coarse sand on surfaces. Gravel is angular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.40	(1.00)	125.50	
			▼	Firm to stiff greyish brown mottled grey slightly sandy gravelly CLAY with a medium cobble and boulder content and occasional bands of brown slightly silty medium to coarse sand. Gravel is subangular to rounded medium to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	2.40	(1.80)		
				... Below 2.40m bgl: mottling absent.	3.20			
			▼	Greyish brown gravelly medium to coarse SAND with a low to medium cobble content. Gravel is subangular to rounded medium to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	3.40	(0.20)	123.70	
				Base of Excavation at 3.40m	3.40		123.50	
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy SILT with many fine rootlets. (TOPSOIL)	0.45	(0.45)	128.89	
				Soft becoming firm yellowish brown mottled grey slightly sandy slightly gravelly CLAY with a low boulder content. Gravel is angular to subrounded fine to coarse of siltsone, sandstone, and coal. (GLACIAL TILL) ... Below 0.80m bgl: Orangish brown mottled grey.	2.10	(1.65)	127.24	
				Firm greyish brown fissured slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mixed lithologies. (GLACIAL TILL)	3.20	(1.10)	126.14	
				----- Base of Excavation at 3.20m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (TOPSOIL)	0.40	(0.40)		
				Soft fissured orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble content and grey silty sand on fissures. Gravel is subrounded to rounded medium to coarse of siltstone and quartz. (GLACIAL TILL)	1.50	(1.10)		
				Firm brown mottled grey slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	3.50	(2.00)		
				<p>... Below 2.40m bgl: medium cobble and boulder content.</p> <p>... Below 2.50m bgl: Stiff, friable, and mottling absent.</p>				
				Base of Excavation at 3.50m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of siltstone. (TOPSOIL)	0.35	(0.35)	124.27	
				Soft mottled grey and orangish brown sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is angular to rounded medium to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.30	(0.95)		
				Firm to stiff occasionally slightly friable greyish brown mottled grey slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL) ... Below 1.60m bgl: mottling absent, occasionally slightly friable.	3.10	(1.80)	123.32	
				Loose brown slightly silty slightly gravelly fine to medium SAND with some pockets (up to 50mm) of clay. Gravel is subrounded to rounded medium to coarse of siltstone. (GLACIAL TILL)	3.30	(0.20)	121.52	
				Stiff greyish brown slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	3.70	(0.40)	121.32	
				----- Base of Excavation at 3.70m			120.92	
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy SILT with many fine rootlets and a low cobble content of brick. (MADE GROUND)	0.40	(0.40)	121.27	
				Soft to firm greyish brown mottled grey slightly sandy slightly gravelly CLAY with some decayed rootlets and a low boulder content. Gravel is subangular to subrounded fine to coarse of sandstone and coal. (GLACIAL TILL)	1.80	(1.40)	119.87	
			▼	Firm to stiff greyish brown slightly sandy gravelly CLAY with some bands of sand and a medium to high cobble and boulder content. Gravel is angular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	3.30	(1.50)	118.37	
				----- Base of Excavation at 3.30m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of siltstone. (TOPSOIL)	0.35	(0.35)	120.74	
				Soft grey mottled yellow sandy slightly gravelly CLAY with some decayed rootlets and a low cobble content. Gravel is angular to subrounded medium to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL) <i>... Below 0.60m bgl: Orangish brown mottled grey.</i>	1.20	(0.85)		
			▼	Firm to stiff greyish brown mottled grey slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded medium to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL) <i>... Below 1.80m bgl: mottling absent, occasionally friable and fissured.</i>	3.30	(2.10)	119.89	
			 Base of Excavation at 3.30m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy SILT with many fine rootlets. (TOPSOIL)	0.45	(0.45)	119.37	
				Firm mottled orange and grey sandy slightly gravelly CLAY with a low cobble content. Gravel is subrounded to rounded, medium to coarse of siltstone. (GLACIAL TILL)	1.00	(0.55)	118.82	
				Firm to stiff brown mottled grey slightly sandy gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to rounded, fine to coarse of mudstone, siltstone and coal. (GLACIAL TILL)	2	(2.00)		
				... Below 1.50m bgl: Brownish grey.	3			
				----- Base of Excavation at 3.00m	3.00		116.82	
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular, fine to medium of sandstone. (TOPSOIL)	0.40	(0.40)	118.98	
				Soft to firm mottled grey brown and orange slightly sandy slightly gravelly CLAY with some decayed rootlets. Gravel is subrounded, fine to medium of siltstone. (GLACIAL TILL)	1.20	(0.80)	118.18	
				Firm to stiff brownish grey fissured slightly sandy gravelly CLAY with a medium cobble and boulder content and a medium to coarse silty sand on fissures. Gravel is angular to rounded, fine to coarse of mixed lithologies. (GLACIAL TILL)	3.40	(2.20)	115.98	
			▼	Base of Excavation at 3.40m				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular, fine to medium of sandstone. (TOPSOIL)	0.50	(0.50)	119.01	
				Soft to firm brown mottled orange and grey slightly sandy slightly gravelly CLAY. Gravel is angular to rounded, fine to coarse of siltstone and sandstone. (GLACIAL TILL)	1.60	(1.10)	117.91	
				Firm to stiff brown slightly sandy gravelly CLAY with a low cobble and boulder content. Gravel is angular to rounded, fine to coarse of mixed lithologies. (GLACIAL TILL)	3.40	(1.80)	116.11	
			 Base of Excavation at 3.40m				
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content and many fine rootlets. Gravel is subrounded to rounded medium to coarse of siltstone. (TOPSOIL)	0.35	(0.35)	134.38	
				Soft to firm yellowish brown mottled grey sandy slightly gravelly CLAY with a medium cobble content. Gravel is subangular to subrounded medium to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 0.70m bgl: Brown mottled grey.	1.00	(0.65)	133.73	
				----- Base of Excavation at 1.00m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth (m)	Thickness (m)	Level (m)	Legend	
Depth (m)	Type	Results							
				Dark brown slightly sandy slightly gravelly SILT with some fine to coarse rootlets. Gravel is angular to subrounded fine to coarse of siltstone, rare brick fragments, and rare ceramic fragments. (MADE GROUND)	0.30	(0.30)	135.01		
				Soft to firm fissured yellowish brown mottled orange and grey slightly sandy slightly gravelly CLAY with a low cobble and boulder content, and some grey silty sand on fissures. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.20	(0.90)	134.11		
				----- Base of Excavation at 1.20m					
					2				
					3				
					4				
					5				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Brown slightly sandy gravelly SILT with a high cobble and boulder content of sandstone and brick, some pieces of plastic. Gravel is angular to subrounded fine to coarse of siltstone, quartz, brick fragments, and clay pipe fragments. (MADE GROUND)	0.70	(0.70)	134.46	
				Very soft dark grey sandy gravelly CLAY with a medum cobble and boulder content of sandstone, brick, and breeze block, much mottled black hay, some plastic bin liner, and rare wood fragments. Gravel is angular to subangular fine to coarse of sandstone, coal, brick fragments, and ceramic fragments. (MADE GROUND)	1			
				<i>... Below 1.50m bgl: Brown mottled grey, some rebar, an organic odour, and occasional bands of silty gravelly sand.</i>	2			
					3	(4.10)		
					4			
					4.80		130.36	
				Base of Excavation at 4.80m	5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a medium cobble content of brick and some fine rootlets. Gravel is angular to subangular fine to coarse of siltstone, coal, and brick fragments. (MADE GROUND)	0.40	(0.40)	134.29	
				Loose brown mottled orange and yellow very clayey slightly sandy subrounded to rounded medium to coarse GRAVEL of siltstone and sandstone with a high cobble and boulder content. (GLACIAL TILL)	1.10	(0.70)	133.59	
				----- Base of Excavation at 1.10m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content of brick. Gravel is angular to subrounded fine to coarse of mudstone, coal, brick fragments, rare ceramic fragments, and rare fragments of glass. (MADE GROUND)	0.20	(0.20)	133.35	
				Very soft brown sandy gravelly CLAY with a low to medium cobble and boulder content of brick, and rare pieces of fabric. Gravel is angular to subangular fine to coarse of siltstone, sandstone, and brick fragments. (MADE GROUND)		(0.50)		
				Very soft dark grey and brown slightly clayey slightly sandy gravelly SILT with a low to medium cobble content of brick, some hay, ash, wood, and metal, and a strong organic odour. Gravel is angular to subrounded fine to coarse of sandstone, coal, concrete, and brick fragments. Silty gravel in some places. (MADE GROUND)	0.70		132.85	
			▼	... At 1.50m bgl: Some large pieces of timber.	1	(1.30)		
				Stiff greyish brown slightly sandy gravelly CLAY. Gravel is subangular to rounded fine to coarse of mixed lithologies. (GLACIAL TILL)	2.00	(0.20)	131.55	
				Base of Excavation at 2.20m	2.20		131.35	
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with many fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, and coal. (TOPSOIL)	0.30	(0.30)	134.81	
				Soft to firm fissured orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble content and grey silty sand on fissures. Gravel is subangular to subrounded medium to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.00	(0.70)	134.11	
				----- Base of Excavation at 1.00m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low boulder content and some fine rootlets. Gravel is angular to subangular fine to coarse of sandstone, coal, brick and rare ceramic fragments. (MADE GROUND)	0.40	(0.40)	128.38	
				Firm occasionally fissured orangish brown mottled grey sandy slightly gravelly CLAY with a medium cobble and boulder content, grey silty sand on fissures, and occasional pockets of brown silty sand. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	1.70	(1.30)	127.08	
			 Base of Excavation at 1.70m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth (m)	Thickness (m)	Level (m OD)	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone, brick fragments, and rare ceramic fragments. (MADE GROUND)	0.30	(0.30)	128.06	
				Soft to firm occasionally fissured orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	1.10	(0.80)	127.26	
				----- Base of Excavation at 1.10m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	
Depth (m)	Type	Results							
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, and rare brick fragments. (MADE GROUND)	0.35	(0.35)	128.96		
				Light yellow slightly clayey slightly sandy slightly gravelly SILT with a low cobble content and some decayed rootlets. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	0.70	(0.35)	128.61		
				Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.10	(0.40)	128.21		
				----- Base of Excavation at 1.10m					
					2				
					3				
					4				
					5				

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy gravelly SILT with some fine rootlets. Gravel is subangular to rounded fine to coarse of siltstone and brick fragments. (MADE GROUND)	0.25	(0.25)	126.45	
				Orange slightly silty gravelly fine to medium SAND with rare fragments of string/fibre. Gravel is subangular to subrounded medium to coarse of siltstone, sandstone, and quartz. (MADE GROUND)	0.45	(0.20)	126.25	
				Soft orangish brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	0.90	(0.45)	125.80	
				----- Base of Excavation at 0.90m	1			
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of siltstone, sandstone, and rare ceramic fragments. (TOPSOIL)	0.35	(0.35)	125.66	
				Soft fissured orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble and boulder content. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.10	(0.75)	124.91	
				----- Base of Excavation at 1.10m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is angular to rounded medium to coarse of siltstone, coal, ceramic fragments, brick and rare glass. (MADE GROUND)	0.20	(0.20)	126.17	
				Soft fissured mottled orangish brown and grey sandy slightly gravelly CLAY with a low cobble content, grey silty sand on fissures, and some decayed rootlets. Gravel is angular to subrounded medium to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)		(0.60)		
				----- Base of Excavation at 0.80m	0.80		125.57	
					1			
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Greyish brown slightly sandy gravelly SILT with some fine rootlets. Gravel is angular to subangular medium to coarse of siltstone, coal, brick fragments, ceramic fragments, and rare glass. (MADE GROUND)	0.50	(0.50)	124.93	
				Brown clayey slightly gravelly silt with a low cobble content. Gravel is angular to rounded fine to coarse of siltstone, coal, rare brick fragments, and rare ceramic fragments. (MADE GROUND)	0.80	(0.30)	124.63	
				Soft orangish brown mottled yellow slightly sandy slightly gravelly CLAY with some decayed rootlets. Gravel is subangular to rounded medium to coarse of siltstone and sandstone. (GLACIAL TILL)	1.50	(0.70)	123.93	
				----- Base of Excavation at 1.50m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some rootlets. Gravel is angular to subrounded fine to coarse of quartz and rare ceramic fragments. (TOPSOIL)	0.35	(0.35)	127.47	
				Yellowish brown slightly clayey slightly sandy slightly gravelly SILT with some decayed rootlets. Gravel is subrounded to rounded medium to coarse of siltstone. (GLACIAL TILL)	0.55	(0.20)	127.27	
				Firm fissured brown mottled grey slightly sandy slightly gravelly CLAY with a low cobble and boulder content, and grey silty sand on fissures. Gravel is angular to subangular fine to coarse of siltstone and coal. (GLACIAL TILL)	1.20	(0.65)	126.62	
				----- Base of Excavation at 1.20m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown sandy gravelly SILT with a high cobble and boulder content of brick and concrete, and some large pieces of timber, and rare pieces of fabric, wire, metal, and plastic. Gravel is angular to subangular fine to coarse of siltstone, concrete, brick fragments, and ceramic fragments. (MADE GROUND)	0.60	(0.60)	130.29	
				Soft to firm orangish brown mottled grey sandy slightly gravelly CLAY with a low to medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.00	(0.40)	129.89	
				----- Base of Excavation at 1.00m				
					2			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a medium cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of mudstone, siltstone, and coal. (MADE GROUND)	0.45	(0.45)	129.10	
				Soft to firm brown sandy gravelly CLAY with a medium cobble content of sandstone, brick, and tarmacadam, and some large pieces of fabric, and rare pieces of burnt wood. Gravel is angular to subrounded fine to coarse of siltstone, coal, and brick fragments. (MADE GROUND)	1.00	(0.95)		
				... At 1.20m bgl: Some plastic netting.	1.40		128.15	
				Firm fissured orangish brown mottled grey slightly sandy slightly gravelly CLAY with grey silty sand on fissures. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	2.00	(0.60)	127.55	
				----- Base of Excavation at 2.00m	2.00			
					3.00			
					4.00			
					5.00			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with a low cobble content of brick and some rootlets. Gravel is angular to subangular medium to coarse of siltstone and brick fragments. (MADE GROUND)	0.30	(0.30)	131.09	
				Brown mottled grey sandy gravelly CLAY with a low to medium cobble and boulder content of siltstone and brick, some rare pieces of wood. Gravel is angular to subrounded fine to coarse of siltstone, tarmacadam, and brick fragments. (MADE GROUND)	1.60	(1.30)	129.79	
				Firm fissured yellowish brown mottled grey sandy slightly gravelly CLAY with a low cobble content, and grey silty sand on fissures. Gravel is subangular to rounded medium to coarse of siltstone, quartz, and coal. (GLACIAL TILL)	2.00	(0.40)	129.39	
				----- Base of Excavation at 2.00m	2.00			
					3			
					4			
					5			

Samples / Tests			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
				Dark brown slightly sandy slightly gravelly SILT with some fine rootlets. Gravel is angular to rounded fine to coarse of quartz, rare brick fragments, and rare glass fragments. (MADE GROUND)	0.30	(0.30)	133.23	
				Firm brown sandy gravelly CLAY with a high cobble and boulder content of brick, concrete, and tarmacadam. Gravel is angular to subangular fine to coarse of tarmac, brick fragments, and rare fragments of pottery. Some fragments of wood. (MADE GROUND)	0.90	(0.60)	132.63	
				Firm fissured mottled orangish brown and grey sandy slightly gravelly CLAY with a low cobble and boulder content, and grey silty sand on fissures. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (GLACIAL TILL)	1.50	(0.60)	132.03	
				----- Base of Excavation at 1.50m				
					2			
					3			
					4			
					5			

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m/bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, and coal. (TOPSOIL)	0.40	(0.40)	131.07	
2.00 - 3.00		100%					Soft orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble content. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (GLACIAL TILL) ... Below 1.60m bgl: brown mottled orange and grey.	2.00	(1.60)	129.47	
3.00 - 4.00		100%					Soft becoming firm greyish brown slightly sandy gravelly CLAY. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 3.00m bgl: Low to medium cobble content.	4.45	(2.45)	127.02	
End of Borehole at 4.45m											

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of siltstone and coal. (TOPSOIL)	0.40	(0.40)	134.02	
							Soft mottled grey, orange and yellow sandy slightly gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	1	(1.60)		
							... At 1.20m bgl: Band (up to 100mm) of brown fine to coarse sand.				
2.00 - 3.00		50%					Very loose brown gravelly medium to coarse SAND. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (GLACIAL TILL)	2		132.42	
							... Between 2.50 - 3.00m bgl: No recovery.				
3.00 - 4.00		100%					Soft greyish brown slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	3	(1.50)		
								3.50		130.92	
								4.00	(0.50)	130.42	
							End of Borehole at 4.00m	4			
								5			
								6			
								7			
								8			
								9			
								10			

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m agl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with a low cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (TOPSOIL)	0.40	(0.40)	135.67	
							Soft to firm mottled orangish brown and grey sandy slightly gravelly CLAY with occasional lenses (up to 50mm) of fine to coarse sand. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1.90	(1.50)	134.17	
2.00 - 3.00		100%					Soft greyish brown mottled grey slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)	2.30	(0.40)	133.77	
							Brown slightly clayey sandy subrounded to rounded fine to coarse GRAVEL of siltstone and sandstone. (GLACIAL TILL)	2.40	(0.10)	133.67	
3.00 - 4.00		100%					Firm greyish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	3.00	(2.05)		
								4.45		131.62	
End of Borehole at 4.45m											

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	63%					Dark brown sandy slightly gravelly SILT with some rootlets. Gravel is subangular to subrounded medium to coarse of siltstone and coal. (TOPSOIL)	0.40	(0.40)	134.51	
							Brown mottled orange slightly clayey sandy SILT. (GLACIAL TILL)	0.80	(0.40)	134.11	
							Very soft brown mottled grey and orange sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	1.50	(0.70)	133.41	
							Soft greyish brown mottled grey slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	1.70	(0.20)	133.21	
2.00 - 3.00		10%				Brown clayey gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL) ... Between 1.70 - 2.00m bgl: No recovery. ... Between 2.00 - 2.90m bgl: No recovery.	3.45	(1.75)	131.46		
							End of Borehole at 3.45m				

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness m	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%				Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of siltstone. (TOPSOIL)	0.40	(0.40)	132.30		
						Soft orangish brown mottled grey sandy slightly gravelly CLAY with a low cobble content. Gravel is subangular to rounded medium to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	1	(1.40)			
						Firm greyish brown mottled grey slightly sandy gravelly CLAY. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL) ... Below 2.00m bgl: Becoming firm and mottling absent.	1.80		130.90		
2.00 - 3.00		100%				... At 2.90m bgl: Band of sandy silt. ... Below 3.00m bgl: Sandy.	2				
3.00 - 4.00		50%				... Between 3.50 - 4.00m bgl: No recovery.	3	(2.65)			
						End of Borehole at 4.45m	4.45		128.25		
							5				
							6				
							7				
							8				
							9				
							10				

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is angular to subrounded medium to coarse of siltstone and ceramic fragments. (TOPSOIL)	0.40	(0.40)	134.89	
2.00 - 3.00		100%					Soft becoming firm mottled grey and yellowish brown sandy slightly gravelly CLAY with a low to medium cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	1.70	(1.30)	133.59	
3.00 - 4.00		80%					Firm greyish brown mottled grey sightly sandy gravelly CLAY with a low cobble content. Gravel is angular to rounded fine to coarse of mudstone, siltstone, sandstone, and coal. Occasionally sandy in some places. (GLACIAL TILL) ... Below 2.00m bgl: Mottling absent.				
							... Between 3.80 - 4.00m bgl: No recovery.				
							End of Borehole at 4.45m	4.45		130.84	

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					<p>Dark brown slightly sandy slightly gravelly SILT with some rootlets. Gravel is angular to subangular fine to coarse of siltstone and sandstone. (TOPSOIL)</p> <p>Soft to firm yellowish brown mottled grey sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)</p> <p>... At 1.70m bgl: Band (up to 50mm) of coarse sand.</p>	0.30	(0.30)	133.83	
2.00 - 3.00		100%					<p>Soft becoming firm greyish brown slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, sandstone, and coal. (GLACIAL TILL)</p> <p>... At 2.00m bgl: Brown, very sandy.</p>	2.00		132.13	
3.00 - 4.00		100%					<p>... Below 3.00m bgl: Firm</p>		(2.45)		
							End of Borehole at 4.45m	4.45		129.68	

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m ft	Thickness m ft	Level m ft	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown slightly sandy slightly gravelly SILT with a medium cobble content and some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (TOPSOIL)	0.40	(0.40)	131.46	
							Dark orangish brown slightly silty gravelly fine to coarse SAND with a high cobble and boulder content of sandstone. Gravel is angular to rounded fine to coarse of siltstone and sandstone. (GLACIAL TILL)	1.20	(0.80)	130.66	
2.00 - 3.00		100%					Firm orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	2.00	(0.80)	129.86	
3.00 - 4.00		100%					Firm brown slightly sandy gravelly CLAY with a low cobble content. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, sandstone, and coal. Occasionally very gravelly. (GLACIAL TILL)	3.00	(2.45)		
								4.45		127.41	
							End of Borehole at 4.45m				
								5			
								6			
								7			
								8			
								9			
								10			

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m/bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with some rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (TOPSOIL)	0.40	(0.40)	130.76	
2.00 - 3.00		70%					Very soft orangish brown mottled grey sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of siltstone, sandstone, and coal. (GLACIAL TILL)	2.20	(1.80)	128.96	
3.00 - 4.00		100%					Soft to firm greyish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL) ... Between 2.70 - 3.00m bgl: No recovery.	4.45	(2.25)	126.71	
							End of Borehole at 4.45m				

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded fine to coarse of siltstone and sandstone. (TOPSOIL)	0.40	(0.40)	131.52	
							Brown sandy gravelly CLAY with a high cobble and boulder content of sandstone. Gravel is angular to subangular fine to coarse of sandstone and coal. (GLACIAL TILL)	0.80	(0.40)	131.12	
							Soft orangish brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of siltstone and coal. (GLACIAL TILL)	1.60	(0.80)	130.32	
2.00 - 3.00		100%					Firm greyish brown slightly sandy gravelly CLAY. Gravel is angular to rounded fine to coarse of mudstone, siltstone, and coal. (GLACIAL TILL)	2			
3.00 - 4.00		100%						3	(2.85)		
								4			
								4.45		127.47	
							End of Borehole at 4.45m				
								5			
								6			
								7			
								8			
								9			
								10			

Sample Run Info			Testing			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
Sample Run	Run Ø	Recovery	Depth (m)	Type	Results						
1.20 - 2.00	110mm	100%					Dark brown sandy slightly gravelly SILT with some fine rootlets. Gravel is subangular to subrounded medium to coarse of siltstone. (TOPSOIL)	0.40	(0.40)	118.84	
							Very soft brown mottled grey and orange sandy slightly gravelly CLAY with a low cobble content. Gravel is subangular to subrounded fine to medium of siltstone and sandstone. (GLACIAL TILL)	1	(1.30)		
2.00 - 3.00		100%				▼	... At 1.40m bgl: Band (up to 10mm) of angular medium to coarse gravel of sandstone.	1.70		117.54	
							Very soft greyish brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone, siltstone, and sandstone. (GLACIAL TILL)	2			
3.00 - 4.00		60%					... At 2.75m bgl: Band (up to 10mm) of fine to coarse sand. ... Below 2.80m bgl: sandy.	3	(2.75)		
							... Between 3.60 - 4.00m bgl: No recovery.	4			
							End of Borehole at 4.45m	4.45		114.79	
								5			
								6			
								7			
								8			
								9			
								10			

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7	(7.50)	126.44	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	8 9 10 11	(3.50)	122.94	
								BROKEN GROUND (PENNINE LOWER COAL MEASURES) ... At 11.00 - 14.00m bgl: Broken ground - evidence of possible workings ... Below 11.0m bgl: No flush returns - evidence of possible workings	12 13 14	(3.00)	119.94	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	(15.00)	104.94	
								SOFT (PENNINE LOWER COAL MEASURES) ... At 29.00 - 29.50m bgl: Soft	29 30	(0.50)	104.44	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	31 32 33 34 35 36 37 38 39 40	(10.50)	93.94	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7 8 8.80	(8.80)	123.61	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30.00	(21.20)	102.41	
								COAL (PENNINE LOWER COAL MEASURES)	30	(1.00)	101.41	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	31 32 33 34 35 36 37 38 39 40.00	(9.00)	92.41	
								End of Borehole at 40.00m	40			

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7 8	(8.00)	123.85	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	(24.00)		
								COAL (PENNINE LOWER COAL MEASURES)	32	32.00	99.85	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	33	33.00	98.85	
									34 35 36 37 38 39	(7.00)		
								End of Borehole at 40.00m	40	40.00	91.85	

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	(6.00)		
									4			
									5			
									6	6.00	129.12	
								MUDSTONE (PENNINE LOWER COAL MEASURES)	7			
									8	(2.20)		
									8.20		126.92	
								COAL (PENNINE LOWER COAL MEASURES)	8.40	(0.20)	126.72	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	9			
									10			
									11			
									12	(7.10)		
									13			
									14			
									15			
									15.50		119.62	
								COAL (PENNINE LOWER COAL MEASURES)	16	(1.30)		
									16.80		118.32	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	17			
									18			
									19			
									20			
									21			
									22			
									23			
									24			
									25			
									26			
									27			
									28			
									29	(23.20)		
									30			
									31			
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	95.12	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7	(7.80)		
								SANDSTONE (PENNINE LOWER COAL MEASURES)	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39		125.05	
									40	(32.20)		
								End of Borehole at 40.00m	40.00		92.85	

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3			
									4	(7.80)		
									5			
									6			
									7			
									7.80		124.42	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	8			
									9	(2.20)		
									10	10.00	122.22	
								COAL (PENNINE LOWER COAL MEASURES)	11			
									11	11.00	121.22	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	12			
									13			
									14			
									15			
									16	(8.50)		
									17			
									18			
									19			
									19.50		112.72	
								COAL (PENNINE LOWER COAL MEASURES)	20			
									20	20.00	112.22	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	21			
									22			
									23			
									24			
									25			
									26			
									27			
									28			
									29			
									30	(20.00)		
									31			
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	92.22	
								End of Borehole at 40.00m	40			

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend	
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs							
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7	(7.80)			
								SANDSTONE (PENNINE LOWER COAL MEASURES) ... At 8.00m bgl: traces of coal.	8 9 10 11 12 13 14 15 16		126.27		
								COAL (PENNINE LOWER COAL MEASURES)	17	17.00		117.07	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	18	17.50	(0.50)	116.57	
									19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	(22.50)			
								End of Borehole at 40.00m	40	40.00		94.07	

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	(6.50)		
									4			
									5			
									6			
									6.50		125.56	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	7			
									8	(3.50)		
									9			
									10	10.00	122.06	
								COAL (PENNINE LOWER COAL MEASURES)	10.80	(0.80)	121.26	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	11			
									12			
									13			
									14	(6.70)		
									15			
									16			
									17	17.50	114.56	
								COAL (PENNINE LOWER COAL MEASURES)	18	(0.50)	114.06	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	18.00			
									19			
									20			
									21			
									22			
									23			
									24			
									25			
									26			
									27			
									28			
									29	(22.00)		
									30			
									31			
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	92.06	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m	Thicknes s (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	(6.00)		
									4			
									5			
									6	6.00	126.21	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	7			
									8	(2.70)		
									9	8.70	123.51	
								COAL (PENNINE LOWER COAL MEASURES)	9	8.00	(0.30)	123.21
								SANDSTONE (PENNINE LOWER COAL MEASURES)	10			
									11			
									12			
									13	(7.50)		
									14			
									15			
									16	16.50	115.71	
								COAL (PENNINE LOWER COAL MEASURES)	17	17.20	(0.70)	115.01
								SANDSTONE (PENNINE LOWER COAL MEASURES)	18			
									19			
									20			
									21			
									22			
									23			
									24			
									25			
									26			
									27			
									28			
									29	(22.80)		
									30			
									31			
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	92.21	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7 8 8.80	(8.80)	117.51	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	9 10 11 12 13 14 15 15.00	(6.20)	111.31	
								MUDSTONE (PENNINE LOWER COAL MEASURES)	16 16.00	(1.00)	110.31	
								COAL (PENNINE LOWER COAL MEASURES)	17 17.00	(1.00)	109.31	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	18 19 20 21 22 23 24 25 26 27 28 29 30 30.00	(13.00)	96.31	
								SOFT (PENNINE LOWER COAL MEASURES) ... At 30.00 - 30.40m bgl: Soft	30 30.40	(0.40)	95.91	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	31 32 33 34 35 36 37 38 39 40 40.00	(9.60)	86.31	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	(6.50)		
									4			
									5			
									6			
									6.50		130.18	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	7	0.50	129.68	
								COAL (PENNINE LOWER COAL MEASURES)	7.30	0.30	129.38	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	8			
									9			
									10	(5.70)		
									11			
									12			
									13	13.00	123.68	
								COAL (PENNINE LOWER COAL MEASURES)	13.80	0.80	122.88	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	14			
									15			
									16			
									17	(7.20)		
									18			
									19			
									20			
									21	21.00	115.68	
								COAL (PENNINE LOWER COAL MEASURES)	22	1.00	114.68	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	22.00			
									23			
									24			
									25			
									26			
									27			
									28			
									29			
									30			
									31	(18.00)		
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	96.68	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	(6.20)		
									4			
									5			
									6	6.20	131.19	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	7			
									8			
									9	(5.30)		
									10			
									11	11.50	125.89	
								COAL (PENNINE LOWER COAL MEASURES)	12	11.80	(0.30)	125.59
								SANDSTONE (PENNINE LOWER COAL MEASURES)	13			
									14			
									15			
									16	(9.20)		
									17			
									18			
									19			
									20			
									21	21.00	116.39	
								COAL (PENNINE LOWER COAL MEASURES)	22	21.50	(0.50)	115.89
								SANDSTONE (PENNINE LOWER COAL MEASURES)	23	22.00	(0.50)	115.39
								COAL (PENNINE LOWER COAL MEASURES)	24	22.26	(0.26)	115.13
								SANDSTONE (PENNINE LOWER COAL MEASURES)	25			
									26			
									27			
									28			
									29			
									30			
									31	(17.80)		
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	97.39	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7 8 8.90	(8.90)	126.09	
								SANDSTONE (PENNINE LOWER COAL MEASURES) ... At 9.00m bgl: traces of coal.	9 10 11 12 13 14 15 16 17 18 19 20 21 21.00	(12.10)	113.99	
								COAL (PENNINE LOWER COAL MEASURES)	22 22.20	(1.20)	112.79	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 40.00	(17.80)	94.99	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3			
									4			
									5	(10.00)		
									6			
									7			
									8			
									9			
									10	10.00	124.08	
								SANDSTONE (PENNINE LOWER COAL MEASURES) ... At 10.00m bgl: traces of coal.	11			
									12			
									13			
									14	(7.80)		
									15			
									16			
									17			
									17.80		116.28	
								COAL (PENNINE LOWER COAL MEASURES)	18		(1.20)	
									19	19.00	115.08	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	20		(1.00)	
									20	20.00	114.08	
								SOFT (PENNINE LOWER COAL MEASURES) ... At 20.00 - 21.00m bgl: Soft	21		(1.00)	
									21	21.00	113.08	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	22			
									23			
									24			
									25			
									26			
									27			
									28			
									29			
									30			
									31	(19.00)		
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	94.08	
								End of Borehole at 40.00m	40			

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m bgl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1 2 3 4 5 6 7	(7.00)	124.59	
								SANDSTONE (PENNINE LOWER COAL MEASURES) ... At 7.00m bgl: traces of coal.	8 9 10 11 12 13 14 15 16 17 18 19	(12.50)	112.09	
								COAL (PENNINE LOWER COAL MEASURES)	20	(1.00)	111.09	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	(19.50)	91.59	
								End of Borehole at 40.00m	40			

Run (m)	Samples / Tests			Drilling Record			Water- Strikes	Stratum Description	Depth m	Depth m	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs							
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1				
									2				
									3		(6.00)		
									4				
									5				
									6	6.00		124.25	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	7				
									8				
									9				
									10				
									11				
									12		(13.00)		
									13				
									14				
									15				
									16				
									17				
									18				
									19	19.00		111.25	
								COAL (PENNINE LOWER COAL MEASURES)	20	20.00	(1.00)	110.25	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	21				
									22				
									23				
									24				
									25				
									26				
									27				
									28				
									29				
									30		(20.00)		
									31				
									32				
									33				
									34				
									35				
									36				
									37				
									38				
									39				
									40	40.00		90.25	
								End of Borehole at 40.00m					

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth magl	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	3.00	130.75	
								MUDSTONE (PENNINE LOWER COAL MEASURES)	4	4.00	129.75	
								COAL (PENNINE LOWER COAL MEASURES)	5	5.00	128.75	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	6			
									7			
									8	(5.00)		
									9			
									10	10.00	123.75	
								COAL (PENNINE LOWER COAL MEASURES)	11	11.00	122.75	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	12	12.00	121.75	
								COAL (PENNINE LOWER COAL MEASURES)	13	12.30	121.45	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	14			
									15			
									16	(7.70)		
									17			
									18			
									19			
									20	20.00	113.75	
								COAL (PENNINE LOWER COAL MEASURES)	21	20.80	112.95	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	22			
									23			
									24			
									25			
									26			
									27			
									28			
									29			
									30			
									31	(19.20)		
									32			
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	93.75	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs						
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1			
									2			
									3	(6.00)		
									4			
									5			
									6	6.00	127.38	
								MUDSTONE (PENNINE LOWER COAL MEASURES)	7	7.00	126.38	
								COAL (PENNINE LOWER COAL MEASURES)	8	7.60	125.78	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	9			
									10	(3.90)		
									11			
									11.50		121.88	
								COAL (PENNINE LOWER COAL MEASURES)	12	12.00	121.38	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	13	13.00	120.38	
								COAL (PENNINE LOWER COAL MEASURES)	14	14.00	119.38	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	15			
									16			
									17	(7.00)		
									18			
									19			
									20			
									21	21.00	112.38	
								COAL (PENNINE LOWER COAL MEASURES)	22			
									23	(2.00)		
								SANDSTONE (PENNINE LOWER COAL MEASURES)	24	23.00	110.38	
									25			
									26			
									27			
									28			
									29			
									30			
									31			
									32	(17.00)		
									33			
									34			
									35			
									36			
									37			
									38			
									39			
									40	40.00	93.38	
								End of Borehole at 40.00m				

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Depth m	Thickness (m)	Level m OD	Legend
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs							
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1				
									2				
									3		(7.00)		
									4				
									5				
									6				
									7	7.00		118.32	
								MUDSTONE (PENNINE LOWER COAL MEASURES)	7.80	(0.80)		117.52	
								COAL (PENNINE LOWER COAL MEASURES)	8.80	(1.00)		117.32	
								MUDSTONE (PENNINE LOWER COAL MEASURES)	9.00	(1.20)		116.32	
								COAL (PENNINE LOWER COAL MEASURES)	10.20	(0.80)		115.12	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	11.00	(0.50)		114.32	
								COAL (PENNINE LOWER COAL MEASURES)	11.50	(0.50)		113.82	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	12				
								COAL (PENNINE LOWER COAL MEASURES)	13				
								SANDSTONE (PENNINE LOWER COAL MEASURES)	14				
									15		(7.50)		
									16				
									17				
									18				
									19	19.00		106.32	
								COAL (PENNINE LOWER COAL MEASURES)	20.00	(1.00)		105.32	
								SANDSTONE (PENNINE LOWER COAL MEASURES)	21				
									22				
									23				
									24				
									25				
									26				
									27				
									28				
									29				
									30		(20.00)		
									31				
									32				
									33				
									34				
									35				
									36				
									37				
									38				
									39				
									40	40.00		85.32	
								End of Borehole at 40.00m					

Run (m)	Samples / Tests			Drilling Record			Water-Strikes	Stratum Description	Depth m	Thickness m	Level m OD	Legend	
	Depth (m)	Type	Results	Weight (Kg)	Mins	Secs							
								Overburden' (drillers discription) - Superficial Deposits (GLACIAL TILL)	1				
									2				
									3				
									4	(7.50)			
									5				
									6				
									7				
									7.50		117.43		
								SANDSTONE (PENNINE LOWER COAL MEASURES)	8				
									9				
									10	(5.00)			
									11				
									12				
									12.50		112.43		
								COAL (PENNINE LOWER COAL MEASURES)	13	(0.70)	111.73		
									13.20				
								SANDSTONE (PENNINE LOWER COAL MEASURES)	14				
									15				
									16				
									17	(7.30)			
									18				
									19				
									20				
									20.50		104.43		
								COAL (PENNINE LOWER COAL MEASURES)	21	(1.00)	103.43		
									21.50				
								SANDSTONE (PENNINE LOWER COAL MEASURES)	22				
									23				
									24				
									25				
									26				
									27				
									28				
									29				
									30				
									31	(18.50)			
									32				
									33				
									34				
									35				
									36				
									37				
									38				
									39				
									40				
								End of Borehole at 40.00m	40.00		84.93		

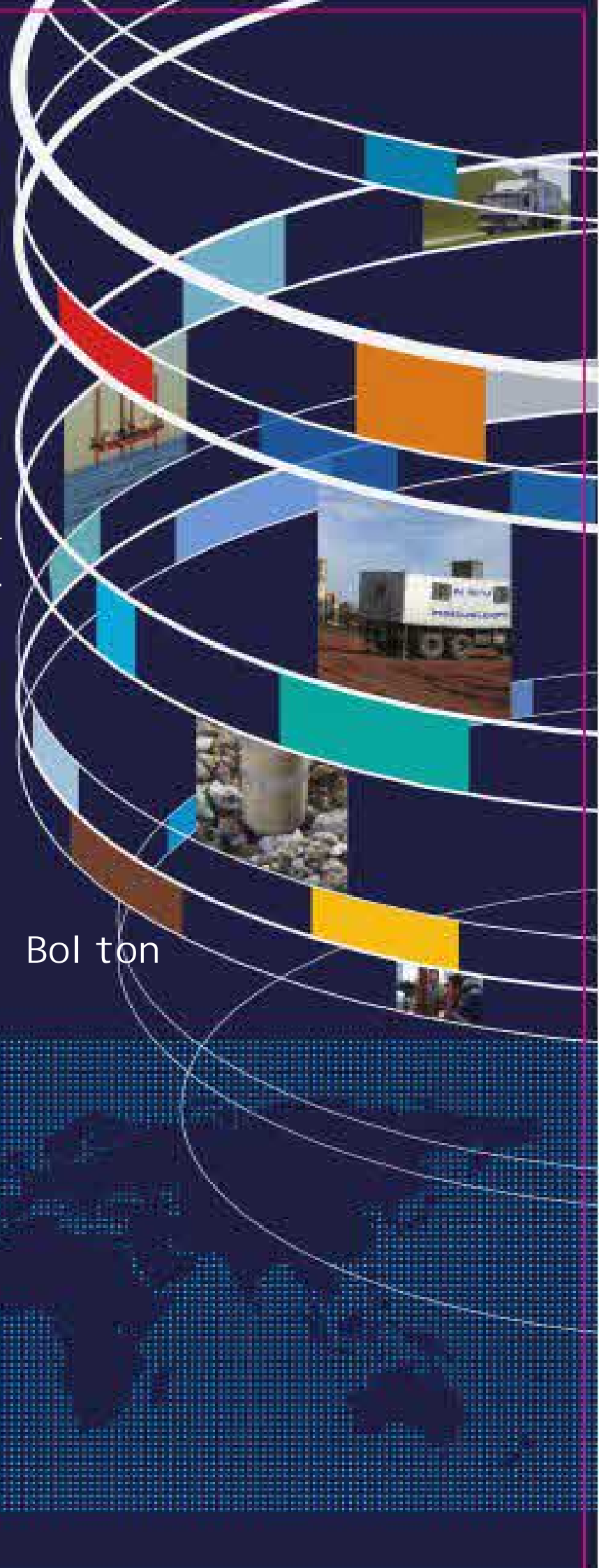
IN SITU

SITE INVESTIGATION

STATIC CONE PENETRATION TEST FACTUAL REPORT

CLIENT: Hydrock

PROJECT: Wingham, Bolton



Project	Wingates, Bolton
Project No.	1210298
Client	Hydrock
Address	Northern Assurance Buildings, 9-21 Princess St, Albert Square, Manchester, M2 4DN

Attention: Mr Jason Bradley

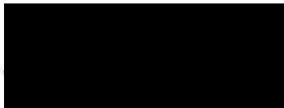
Dear Mr Bradley,

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	10/06/2021	Chloe Donovan		Luisa Dhimitri		Darren Ward	

Table of Contents

1.0 INTRODUCTION.....	4
2.0 FIELDWORK.....	5
2.1 CONE PENETRATION TESTS.....	5
2.1.1 Rig Information	5
2.1.2 CPTU Cone	5
2.1.3 CPTU Cone Calibration	6
2.1.4 CPTU Cone Saturation	6
2.1.5 Test Procedure	6
2.1.6 In Situ Pore Pressure (u_0)	6
2.2 POSITIONING.....	7
3.0 CONE PENETRATION MEASURED PARAMETERS	8
3.1 DATA PROCESSING.....	8
3.1.1 Zero Measurements	8
3.2 MEASURED PARAMETERS	8
3.2.1 Cone Resistance (q_c).....	8
3.2.2 Sleeve Friction (f_s).....	8
3.2.3 Porewater pressure (u_2).....	9
3.2.4 Inclination (I_x, I_y).....	9
3.3 ESTIMATED SOIL BEHAVIOUR TYPE.....	9
3.3.1 Friction Ratio (R_f).....	9
3.3.2 Estimated Soil Behaviour Type (SBT).....	9
3.3.3 Pore Pressure Ratio (B_q).....	10
3.4 APPLIED CORRECTIONS.....	11
3.4.1 Corrected Cone Resistance (q_t).....	11
3.4.2 Depth Correction.....	11
4.0 GEOTECHNICAL DERIVED PARAMETERS	12
4.1 SOIL BEHAVIOUR TYPE INDEX (I_c).....	12
4.2 N VALUE OF STANDARD PENETRATION TEST (SPT) (N_{60}).....	14
4.3 RELATIVE DENSITY (D_r).....	14

4.4	FRICTION ANGLE (ϕ').....	15
4.5	FINES CONTENT (FC).....	16
4.6	UNDRAINED SHEAR STRENGTH (s_u).....	17
4.7	SENSITIVITY (S_i).....	17
4.8	SOIL UNIT WEIGHT (γ).....	18
5.0	REFERENCES.....	19
	APPENDIX A.....	22
	APPENDIX A1 – Project Summary Sheet.....	23
	<i>Piezococone Tests Summary Sheet</i>	23
	APPENDIX A2 – CPT Rig Datasheet.....	25
	APPENDIX A3 – Cone Datasheet.....	26
	APPENDIX A4 – Cone Calibration Certificate.....	28
	APPENDIX A5 – Symbol List.....	30
	<i>English</i> 30	
	<i>Greek</i> 31	
	APPENDIX A6 – Abbreviations.....	32
	APPENDIX A7 – Glossary.....	33
	APPENDIX A8 – Soils Description Tables.....	35
	APPENDIX A9 – Site Map.....	36
	APPENDIX B.....	37
	Cone Penetration Measured Parameters and Geotechnical Derived Parameters.....	37

1.0 INTRODUCTION

In Situ Site Investigation Limited (In Situ) was engaged in a geotechnical site investigation at Wingates, Bolton at the request of Hydrock. The site investigation consisted of completing 56 Static Piezocone Penetration Tests (CPTU) to provide information on the soil conditions and derived geotechnical parameters at:

Chorley Road,
Westhoughton,
Bolton,
BL5 3NS

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 27th May 2021 to 4th June 2021 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 *BS EN ISO 22476-1:2012*.

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	Jamie Egbuniwe
Date Started	27 th May 2021
Date Finished	4 th June 2021
In Situ S.I. Project Manager	Darren Ward
Main Contractor's Site Manager	Nick Clark

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
CPT017	20 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.1360	15cm ²	U ₂
S10-CFIP.768	10cm 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
56 CPTU to a maximum depth of 13.16m. 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.
<i>Provision of factual report with estimated soil type, derived geotechnical parameters & AGS data file.</i>

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 22476-1:2012* 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 22476-1:2012)*.

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 2.00 m 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. The site map and position of the tests are presented in *Appendix A.9*.

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, I_x , I_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 *Lunne et al. (1997)*, *Robertson (2015)* and *BS EN ISO 22476-1:2012*. 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*).

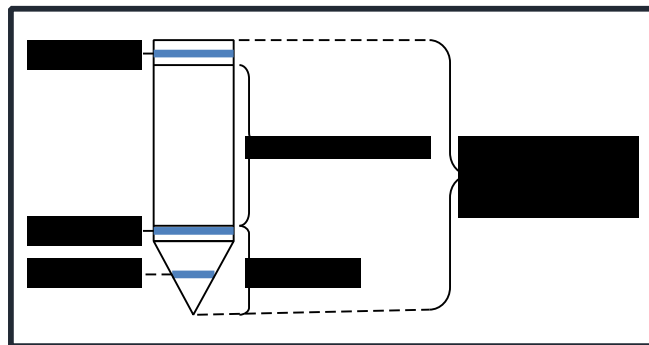


Figure 3.1: Diagram showing pore pressure filter locations (after Lunne et al., 1997)

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).

$$= \frac{(\quad)}{(\quad)} \times 100$$

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*.

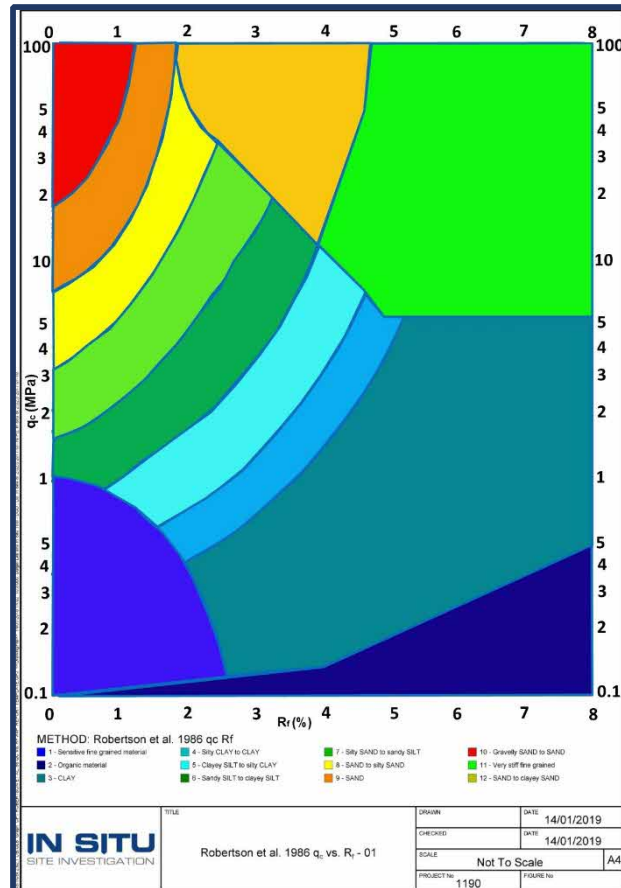


Figure 3.2: *Robertson et al., 1986 soil behaviour type chart.*

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:

$$q_t = q_c + [\sigma_v \cdot (1 - \alpha)]$$

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:

$$z_c = z \cdot C_{inc}$$

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:

$$C_{inc} = \frac{1}{(1 + \sin^2 \beta_1 + \sin^2 \beta_2)}$$

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*).

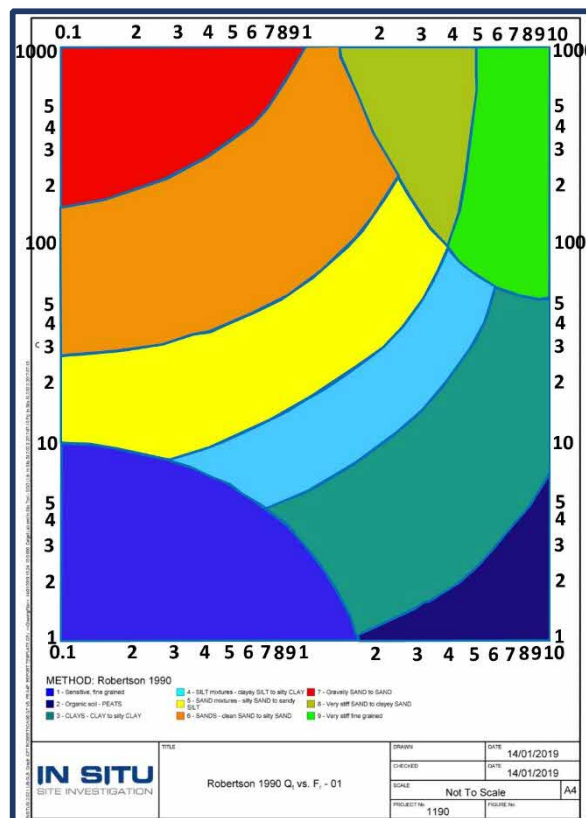


Figure 4.1: Robertson 1990 soil behaviour type chart.

The soil behaviour type index, I_c , can then be defined using *Robertson (2010)* formula, given below:

$$I_c = ((3.47 - \frac{Q_t}{\sigma_{vm}})^2 + (\frac{F_R}{\sigma_{vm}} + 1.22)^2)^{0.5}$$

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)* and *Jefferies and Davies (1998)*

- 1) *Robertson & Wride (1998)*

$$N_{60} = \frac{q_c}{8.5 \cdot (1 - I_c)^{4.6}}$$

- 2) *Jefferies and Davies (1993)*

$$N_{60} = \frac{q_c}{0.85 \cdot (1 - I_c)^{4.75}}$$

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 this method provides a better estimation of the N value than the actual *SPT* test, due to its poor repeatability. But in fine grained soil with high sensitivity these methods of estimating N_{60} may overestimate it (*Jefferies and Davies, 1991*).

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)*

$$D_r = \frac{1}{2} \cdot \frac{h}{1 \cdot (0)^{0.55}} \cdot 100$$

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)

$$= 100 \cdot 0.268 \cdot \frac{q_t}{\sigma_{atm}} + 1$$

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)

$$= \frac{1}{305 \cdot C_1 \cdot 0.18 \cdot 1.2 + 0.05 \cdot (q_t/100)}^{0.5} \cdot 100$$

where

q_{c1} is the cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{c1} = \frac{q_c}{1 + C_1 \cdot \sigma'_{v0}}$$

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)

$$\phi' = 29.5^\circ \cdot 0.121 \cdot 0.256 + 0.336 \cdot B_q +$$

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)

$$\phi' = \tan^{-1} (0.1 + 0.38 \cdot \frac{q_c}{\sigma'_{v0}})$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

3) Kulhawy and Mayne, (1990)

$$\phi' = 17.6^\circ + 11.0^\circ \cdot \left(\frac{1}{1 + \frac{q_{t1}}{\sigma'_{v0}}} \right)$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{t1} = \frac{q_t - \sigma'_{v0}}{1 + \frac{\sigma'_{v0}}{q_t}}$$

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)

$$\begin{aligned}
 &< 1.26: &&= 0 \\
 1.26 \leq &\leq 3.5: &&(\%) = 1.75^{3.25} - 3.7 \\
 3.5 < &: &&= 100\%
 \end{aligned}$$

2) Suzuki et al. (1998)

$$(\%) = 2.8^{2.6}$$

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)*:

$$= \left(\frac{N_{kt}}{10} - 0 \right)$$

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*)

v_o = 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)

$$= \frac{1}{()} = \frac{1}{()}$$

where

$S_{u(rem)}$ is the remoulded undrained shear strength. It can be assumed equal to the sleeve resistance, f_s .

2) Mayne (2007)

$$= \frac{0.073 \cdot ()}{()}$$

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:

1) Mayne (2007)

Dry unit weight for sands:

$$= 1.89 \cdot () + 11.82$$

Saturated unit weight for clays method 1

$$= 8.32 \cdot () - 1.61 \cdot ()$$

Saturated unit for clays method 2

$$= 2.60 \cdot () + 15 \cdot () - 26.5$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula:

$$q_{t1} = \frac{q_t}{()}$$

z is the depth

V_s is the shear wave velocity, calculated as $V_s = 118.8 \cdot () + 18.5$

G_s is the specific gravity of solids, typically between 2.40 and 2.90

5.0 REFERENCES

- ASTM D7400-14 (2015)*, "Standard and ISSMGE TC10 guideline", by *Butcher, A. P. et al.*
- Baldi et al. (1986) / Al-Hamoud and Wehr (2006)*, "Interpretation of CPTs and CPTUs; 2nd part: drained penetration of sands / Experience of vibrocompaction in calcareous sand of UAE"
- Been et al. (1987)*, "Cone Penetration Test Calibration for Erksak (Beaufort Sea) Sand", Canadian Geotechnical Journal, 24, 4, pp. 601-610
- Been and Jefferies (1992)*, "Towards Systematic CPT Interpretation", Proceedings Wroth Memorial Symposium, Thomas Telford, London, pp. 121–134
- Boulanger and Idriss (2014)*, "CPT and SPT Based Liquefaction Triggering Procedures", Report No. UCD/CGM-14/01, Centre of Geotechnical Modelling, Department of Civil and Environmental Engineering, College of Engineering, University of California at Davis
- British Standard BS5930:1999*, "Code of practice for site investigations". BSI, 1999
- British Standard BS EN ISO 22476-1:2012*
- Burns and Mayne (2002)*, "Analytical Cavity Expansion Critical State Model for Piezocone Dissipation in Fine Grained Soils, Soils and Foundations", Vol. 42, No. 2, 2002
- Houlsby and Teh (1998)*, "Analysis of the piezocone in clay". Proceedings of the International Symposium on Penetration Testing, ISOPT-1, Orlando, 2, 777-83, Balkema Pub., Rotterdam
- Idriss and Boulanger (2008)*, "Soil liquefaction during earthquakes", Earthquake Engineering Research Institute, MNO-12
- International Standard for Electrical Cone and Piezocone Penetration Test*, ISO 22476-1:2012
- International Standard*, "Geotechnical Investigation and testing- field testing – part 1: electrical cone and piezocone penetration test", ISO/ FDIS 22476-1.
- Jamiolkowski et al. (2001)*, Evaluation of relative density in shear strength of sands from cone penetration tests (CPT) and flat dilatometer (DMT), Soil Behaviour and Soft Ground Construction (GSP 119), American Society of Civil Engineers, Reston, Va., 2001, pp. 201-238

- Jefferies and Davies (1991)*, "Soil classification by the cone penetration test": Discussion. Canadian Geotechnical Journal, 28(1), 173-6
- Jefferies and Been (2006)*, "Soil liquefaction: a critical state approach", Taylor and Francis.
- Jones and Rust (1995)*, "Piezocone settlement prediction parameters for embankments on alluvium". Proceedings of the International Symposium on Cone Penetration Testing, CPT '95, Linköping, Sweden, 2, 501-8, Swedish Geotechnical Society
- Kulhawy and Mayne (1990)* "Manual on estimating soil properties for foundation design". Electric Power Research Institute, EPRI, August, 1990.
- Keaveny and Mitchell (1986)*, "Strength of Fine-Grained Soils Using the Piezocone," Use of In Situ Tests in Geotechnical Engineering (GSP 6), American Society of Civil Engineers, Reston, Va., 1986, pp. 668–699
- Lord, Clayton and Mortimore (2002)*, "Engineering in chalk". Ciria Guide C574.
- Lunne and Kleven (1981)*, "Role of CPT in North Sea foundation engineering". Session at the ASCE National Convention: Cone Penetration Testing and Materials, St. Louis, 76-107, American Society of Engineers (ASCE).
- Lunne and Christophersen (1983)*, "Interpretation of cone penetrometer data for offshore sands". Proceedings of the Offshore Technology conference, Richardson, Texas, Paper No. 4464.
- Lunne, Robertson and Powell (1997)*, "Cone Penetration testing in Geotechnical Practice". Blackie.
- Mayne and Rix (1995) / Lunne et al. (1997)*, "Gmax-qc relationships for clays", Geotechnical Testing Journal, ASTM, 16 (1), pp. 54-60/ CPT in Geotechnical Practice (1997)
- Mayne (2001)*, "Stress-Strain-Strength-Flow Parameters from Enhanced In-Situ Tests", International Conference on In-Situ Measurement of Soil Properties and Case Histories, Indonesia, 2001, pp. 27–48
- Mayne and Campanella (2005)*, "National Cooperative Highway Research Program", Synthesis 368 (2007)
- Mayne (2007)*, "National Cooperative Highway Research Program", Synthesis 368 (2007)
- Mitchell and Gardner (1975)*, "In situ measurement of volume change characteristics". Proceedings of the ASCE Specialty Conference on In Situ Measurements of Soil Properties, Raleigh, North Carolina, 2, 279-345, American Society of Engineers (ASCE)

- Rix and Stokoe (1992)*, "Correlation of Initial Tangent Modulus and Cone Resistance", Proceedings of the International Symposium on Calibration Chamber Testing, Potsdam, New York, 1991, pp. 351-362, Elsevier
- Robertson and Campanella (1983)* "Interpretation of cone penetrometer test: Part 1: Sand". Canadian Geotechnical Journal, 20(4), 718-33
- Robertson Campanella, Gillespie and Greig (1986)*, "Use of piezometer cone data". Proceedings of the ASCE Specialty Conference In Situ '86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, 1263-80, American Society of Engineers (ACE)
- Robertson (1990)*, "Soil classification using the cone penetration test". Canadian Geotechnical Journal, 27(1), 151
- Robertson and Fear (1995)*, "Liquefaction of sands and its evaluation. IS TOKYO '95". First International Conference on Earthquake Geotechnical Engineering, Keynote Lecture, November, 1995
- Robertson and Wride (1998)*, "Evaluating cyclic liquefaction potential using the cone penetration test". Can. Geotech. J. Vol. 35
- Robertson (2010)*, "Soil behaviour type from the CPT: an update", Gregg Drilling and Testing Inc. Signal Hill, California, USA, CPT 10, paper 2-56
- Robertson (2015)*, "Guide to Cone Penetration Testing", 6th Edition (2015)
- Senneset and Janbu (1985)*, "Shear strength parameters obtained from static cone penetration tests. Strength Testing of Marine Sediments; Laboratory and In Situ Measurements". Symposium, San Diego, 1984, ASTM Special technical publication, STP 883, 41-54
- Senneset, Sandven and Janbu (1989)*, "The evaluation of soil parameters from piezocone tests". Transportation Research Record, No. 1235, 24-37
- Schmertmann (1978)*, "Guidelines for cone penetration test, performance and design", US Federal Highway Administration, Washington, DC, Report, FHWA-TS-78-209, 145
- Shuttle and Jefferies (1998)*, "Dimensionless and unbiased CPT interpretation in sand", International Journal for Numerical and Analytical Methods in Geomechanics, 22, pp. 351-391.
- Suzuki, Tokimatsu, Taya, and Kubota (1995)*, "Correlation between CPT data and dynamic properties of in situ frozen samples". Proceedings of the Third International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, 1, 249-52, University of Missouri Rolla.

APPENDIX A

APPENDIX A1 – Project Summary Sheet

Piezocene Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Cone Used	Test Remarks
HYDCPT01	7.23	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT02	5.75	04/06/2021	S10-CFIP.768	Test refused on inclination.
HYDCPT03	10.87	04/06/2021	S10-CFIP.768	Test refused on total pressure.
HYDCPT04	6.70	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT05	7.68	04/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT06	9.55	04/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT07	9.07	04/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT08	7.80	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT09	6.45	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT10	9.70	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT11	5.75	04/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT12	4.21	03/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT13	6.29	03/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT14	7.08	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT15	2.38	03/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT15a	8.44	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT16	5.55	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT17	7.52	02/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT18	8.34	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT19	8.67	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT20	6.81	03/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT21	9.47	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT22	8.71	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT23	8.59	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT24	8.56	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT25	9.76	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT26	8.28	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT27	6.40	01/06/2021	S15-CFIP.1360	Test refused on total pressure.

HYDCPT28	9.13	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT29	9.14	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT30	10.72	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT31	11.39	02/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT32	10.98	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT33	10.05	02/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT34	5.73	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT35	10.64	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT36	4.25	01/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT37	4.58	01/06/2021	S15-CFIP.1360	Test refused on inclination.
HYDCPT38	8.40	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT39	7.44	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT40	9.25	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT41	8.96	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT42	6.33	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT43	7.93	01/06/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT44	7.59	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT45	10.01	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT46	7.82	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT47	9.71	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT48	13.16	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT49	8.27	28/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT50	5.30	27/05/2021	S15-CFIP.1360	Test stopped due to technical
HYDCPT50a	10.85	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT51	11.41	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT52	10.01	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT53	11.04	27/05/2021	S15-CFIP.1360	Test refused on total pressure.
HYDCPT54	8.96	28/05/2021	S15-CFIP.1360	Test refused on total pressure.

APPENDIX A2 – CPT Rig Datasheet

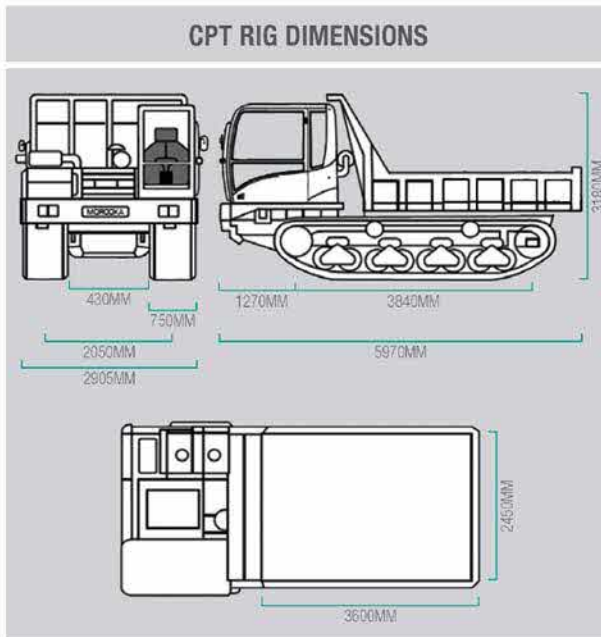
RIGS

20 TONNE CPT TRACK MOUNTED RIG (CPT017)

We have a variety of rigs giving us the capacity to meet our clients' needs and specifications for each individual project.

This rubber tracked rig weighs 20 tonnes and is able to push up to a depth of 40 metres, depending on the ground conditions. It has low ground bearing pressure and is ideal for soft, boggy sites which are inaccessible for our wheeled rigs.

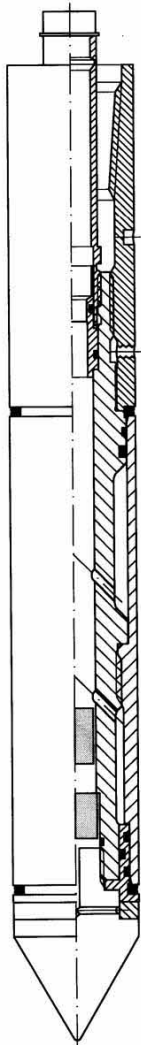
CPT RIG DETAILS	
DRIVE SYSTEM	RUBBER TRACKED
TOTAL WEIGHT	20 TONNES
GROUND BEARING PRESSURE	35kPA
CPT RAM THRUST CAPACITY	20 TONNES
MAXIMUM PENETRATION	30-40M DEPENDING ON THE GROUND CONDITIONS.
PERFORMANCE RATES	100-150M OF TESTING A DAY, DEPENDING ON ACCESS TO POSITIONS.
TYPICAL SITES FOR THIS RIG	SOFT, BOGGY SITES. THE RIG HAS LOW GROUND BEARING PRESSURE.



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

S10 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	1,000 mm ²
Friction Sleeve Surface	15,000 mm ²
Total Length	285 mm
Weight	2800 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	10/50/100* kN
Accuracy	0.25 % FS
Maximum Load	150 % of range
Cone Area Ratio	0.8

LOCAL SLEEVE FRICTION

Range	10/25/50* 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
Filter position	u1 & u2

INCLINATION

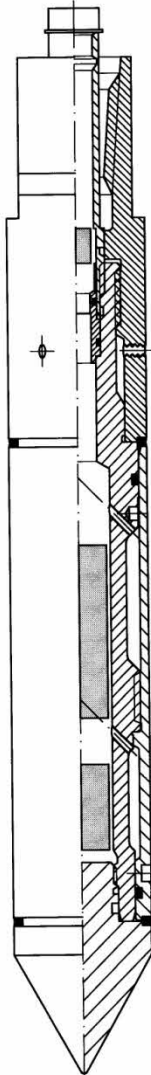
Range	25 ° (biaxial)
Accuracy	1.0 % FS

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.*



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.*

APPENDIX A4 – Cone Calibration Certificate

Certificate Number: S10-CFIIP.768-04.03.21					
CPT CONE CALIBRATION CERTIFICATE					
Cone No.	S10-CFIIP.768	Date of Calibration	04 March 2021		
Manufacturer	Geopoint	Reference Standards	BS 1377 : 1990 Part 9		
Compression/ Subtraction	Subtraction	Reference Equipment	Pressure meter	LTR01	
Pore Pressure Channel (Y/N)	Y		Vernier callipers	GCV4	
			Load cell	22541	
			Voltmeter	6402486	
Cone end area ratio (by dimension measurement), a	0.80	Sleeve end area ratio (by dimension measurement), b	1.0		
Expanded Combined Uncertainty (U) C1	12.228 mV	Expanded Combined Uncertainty (U) C2	1.82076 mV	Expanded Combined Uncertainty (U) C3	281.713 mV
Note: Calibration Zero taken as no load in free air, Output taken as slope of linear regression line x maximum load.					
Temperature differential during calibration					0 °C
Cone Type (S/ C/ M/ D/ T)		S		Ch 3 (P/ C/ T/ N/ F)	
		P			
Channel 1	Output	Input	Zero	Area	Alarm
Channel 2	3690 mV	50 kN	267 mV	10 cm ²	40 kN
Channel 3	3719 mV	50 kN	307 mV	150 cm ²	40 kN
	8080 mV	20 Bar	278 mV		12 Bar
Inclination					Alarm
X	-20°	0°	20°		12 °
Y	391 mV	2443 mV	4398 mV	Extra Channels	N
	291 mV	2384 mV	4451 mV		
CHANNEL 1 - TIP			CHANNEL 2 - FRICTION SLEEVE		
CHANNEL 3 - PORE PRESSURE			CHANNEL 4 - INCLINATION		
Calibration Manual Calibration Sheet No. NNN-CP201 Issue Number: 2020-10 Issue Date: 26/10/2020 Calibration Procedure: CP201		Cone calibrated by: db		Authorised for use by: Craig Curtis (In Situ Testing Manager)	
This certificate relates to the item calibrated only		Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. © Copyright 2020 SOCOTEC UK Limited			

Cone Calibration Certificate

Certificate: **GS-1360-012**
 Instrument Type: Electric Subtraction Cone
 Model: S15-CFIIP
 Serial number: 1360
 Calibration date: 16-02-2021
 Client: Insitu
 Calibrated by: H.Smit
Calibration instruments
 Manufacturer: Hottinger Baldwin Messtechnik GmbH
 HBM certificate NMI certificate: 2461165.00501
Calibration conditions
 Ambient temperature: 21.1 °C
 Atmospheric pressure: 1011 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): 50 %
 Cone area ratio (a): 0.79
 Max. Inaccuracy, relative to measurement value: 1.0 %

Zero points:	Tip:		Sleeve:		Pore Pressure:		Inclinometer:		
	qc in kN	mV	fs in kN	mV	MPa	mV	Degrees	X (mV)	Y (mV)
	0236		0270			0281			
0	0	0	0	0	0	0	0	2424	2477
5	0306	5	0314	0.4	1439	-20	0419	0461	
10	0611	10	0626	0.8	2871	20	4419	4440	
15	0915	15	0938	1.2	4298				
20	1223	20	1253	1.6	5715				
25	1528	25	1565	2	7141				
30	1834	30	1878						
35	2136	35	2189						
40	2441	40	2501						
45	2745	45	2812						
50	3048	50	3123						
75	4569	75	4679						
100	6085	100	6233						

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: 16-02-2021



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

APPENDIX A5 – Symbol List

English

a	is area ratio of the cone (=)
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 (= ($z - z_0$) ($z - z_0$))
C _h	is horizontal coefficient of consolidation
C _v	is vertical coefficient of consolidation
D	is diameter
D _r	is relative density (= $\frac{G_s - G}{G_s} \cdot 100\%$)
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 (= ($z - z_0$))
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 (=)
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 _{Δu}	is cone factor
p _a	is reference stress (= 100)
q _c	is measured cone resistance
q _e	is effective cone resistance (= $q_c - u$)
q _n	is net cone resistance (= $q_c - q_{t0}$)
q _t	is corrected cone resistance (= $q_c - (1 - K_0) u$)
Q _c	is total force acting on the cone
Q _t	is normalized cone resistance (= $\frac{Q_c}{A_n} - u$)

R_f	is friction ratio (= 100% or alternatively = 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 = 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_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 vertical 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
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 . =

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*, $= \frac{Q_c}{\sigma_{v0}}$, or when the *corrected cone resistance* is used $= \frac{Q_t}{\sigma'_{v0}}$. 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. = $q_t - \sigma_{v0}$

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 . =

APPENDIX A8 – Soils Description Tables

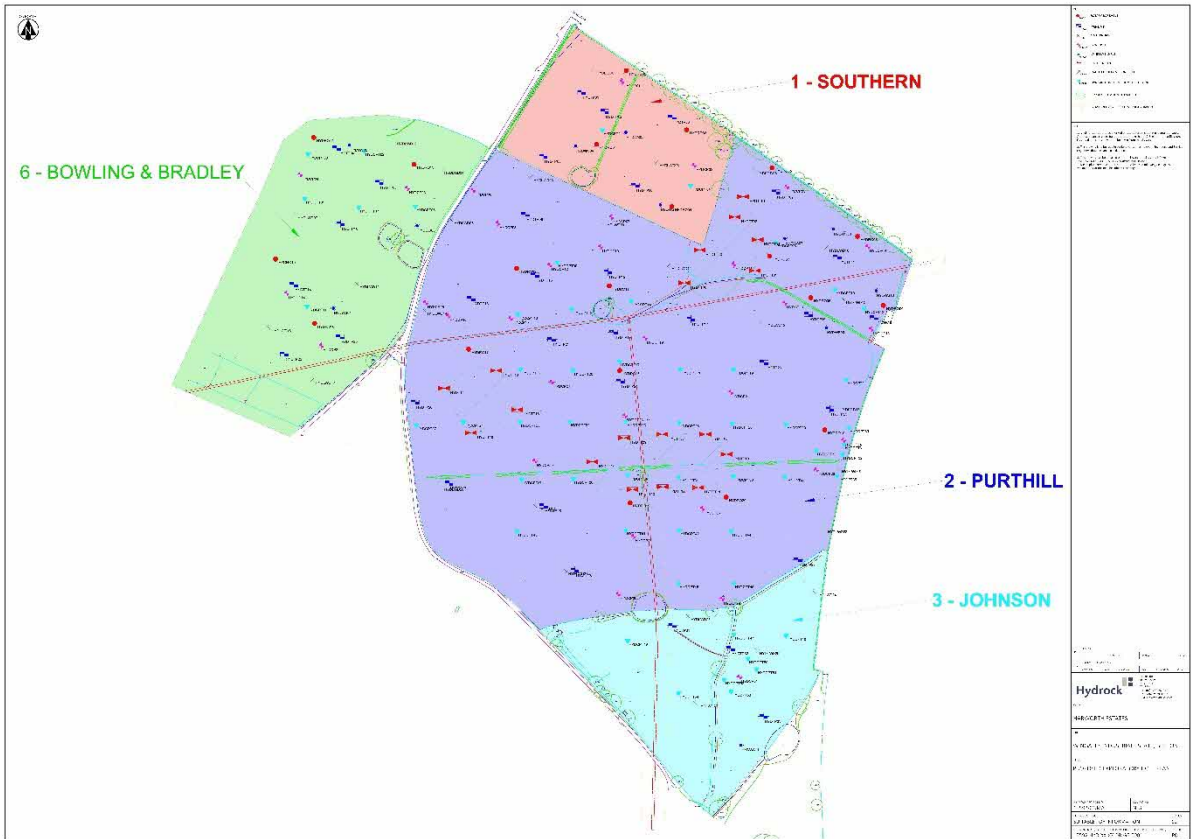
GRANULAR SOILS (Sands and Gravels)

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 A9 – Site Map

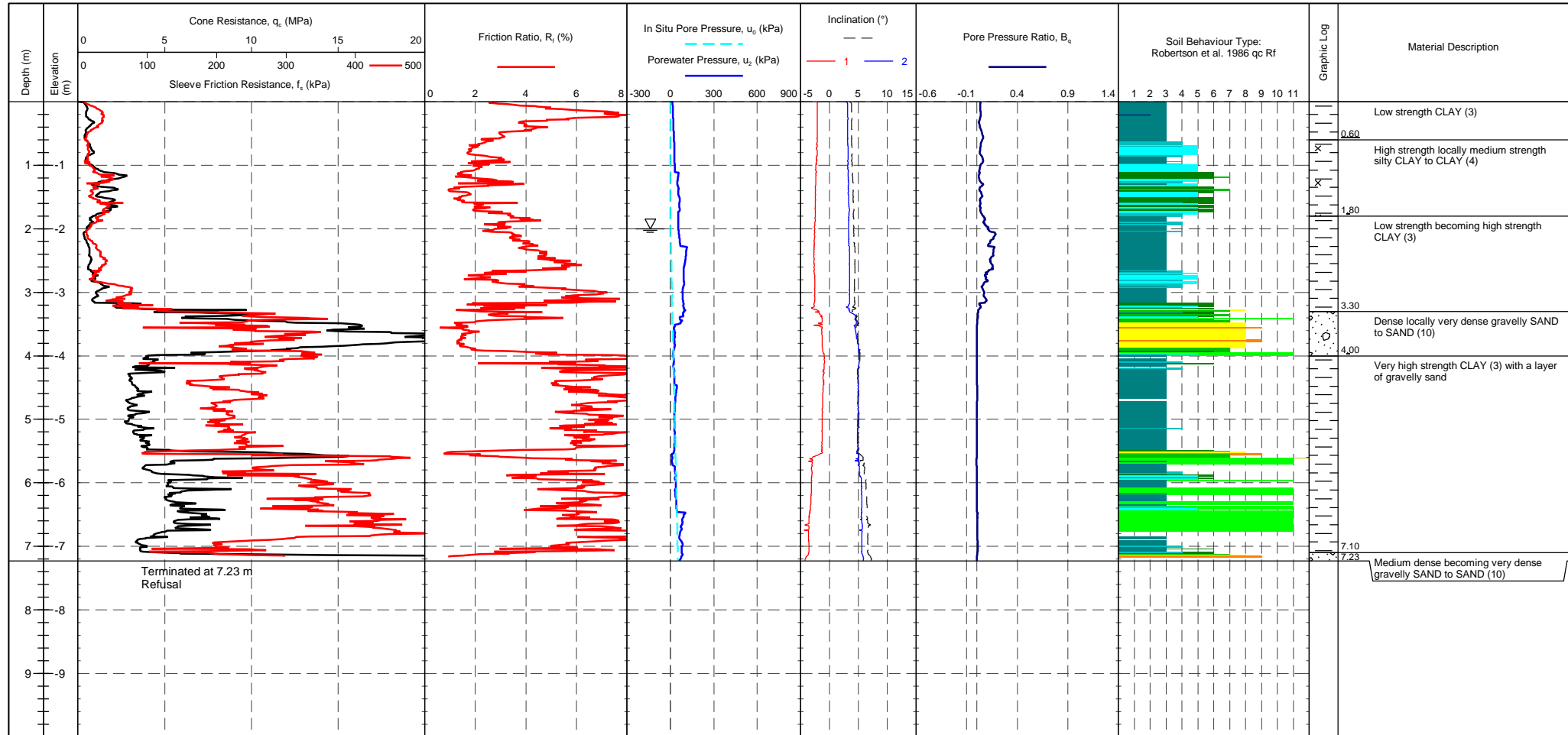


APPENDIX B

Cone Penetration Measured Parameters and Geotechnical Derived Parameters

PointID	HYDCPT01
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 27/05/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: 237 mV / 234 mV / -0.033 MPa Sleeve: 261 mV / 263 mV / 0.001 kPa Pore Pressure 2: 437 mV / 516 mV / 0.022 kPa X-Y Inclinator: 2240 mV / 2249 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
--	--	--	---	---------------------------------------

PointID

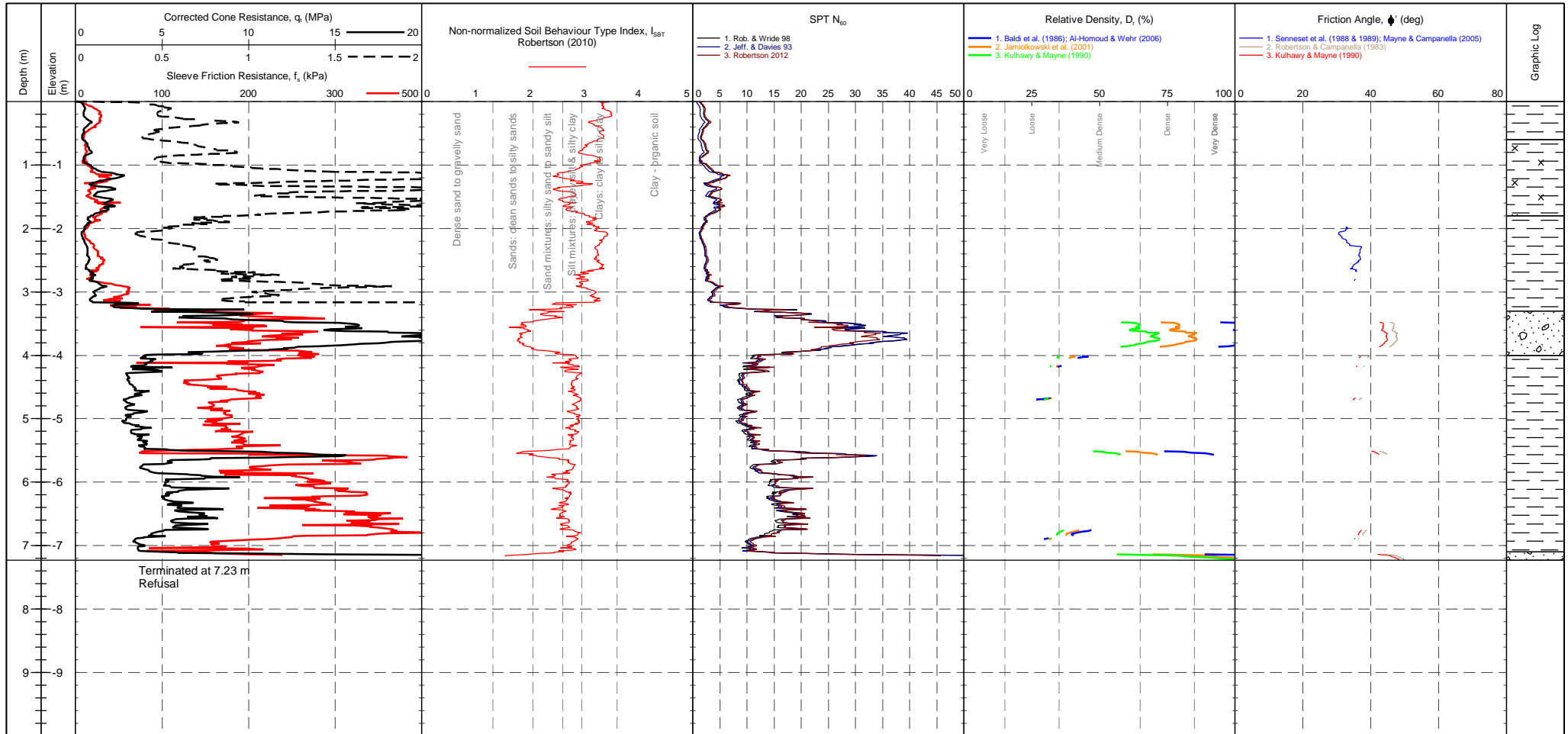
HYDCPT01

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 0.0 m
NORTHING : 0.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

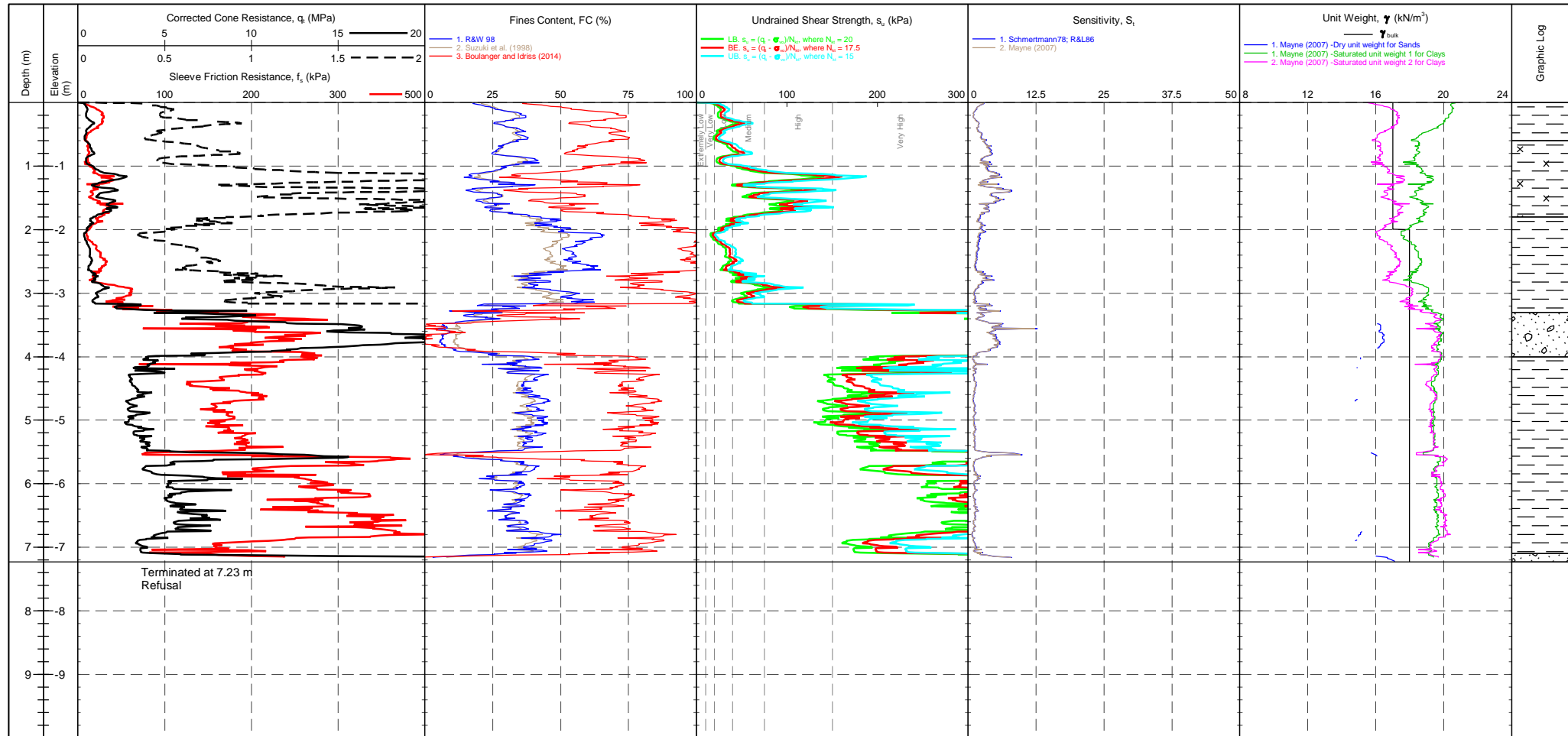
SHEET : 1 OF 1
STATUS : Final
TEST DATE : 27/05/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinometer	CPTU ZERO VALUES Pre Post Difference 237 mV 234 mV -0.033 MPa 261 mV 263 mV 0.001 kPa 437 mV 516 mV 0.022 kPa 2240 mV 2249 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																																				

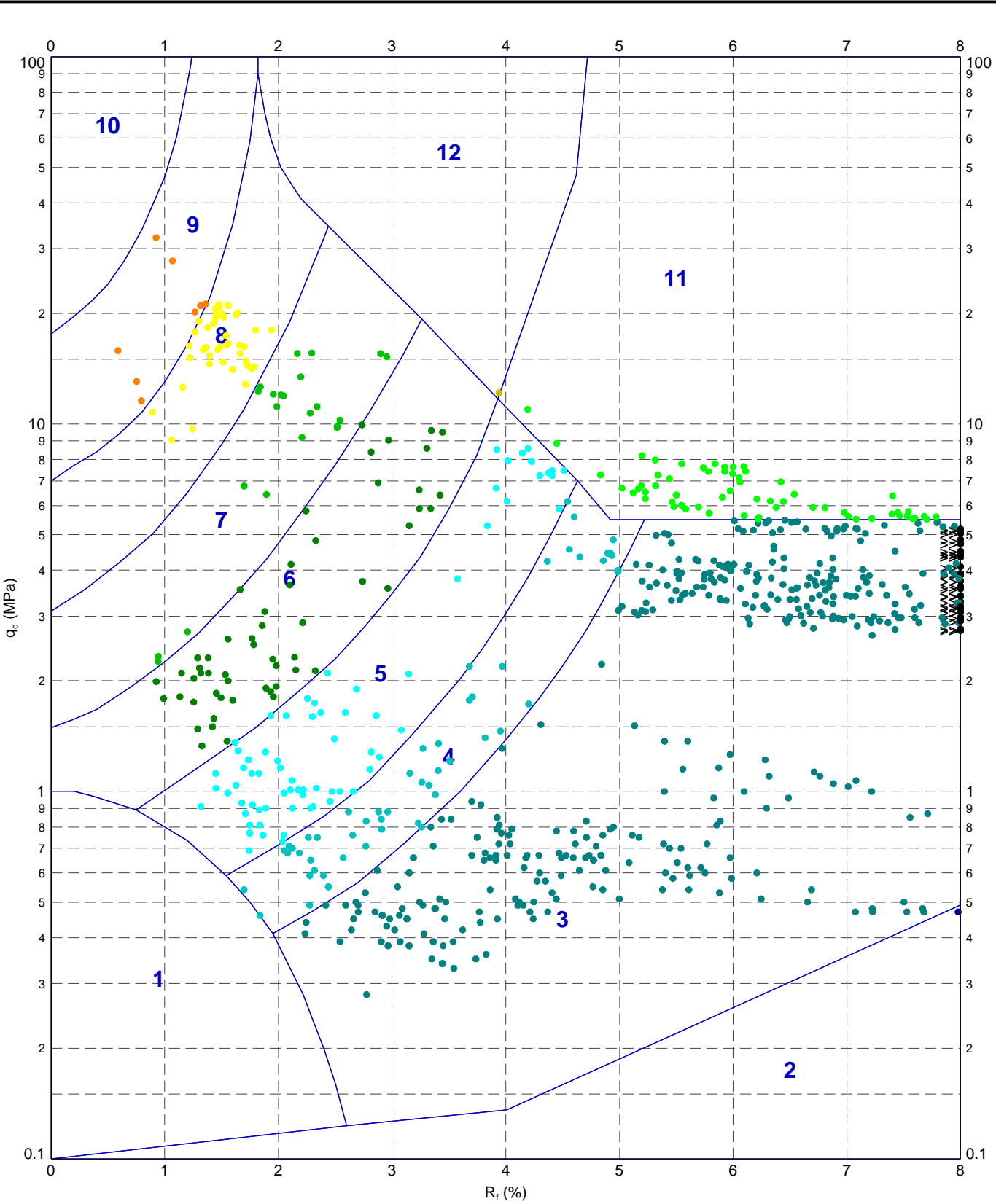
PointID	HYDCPT01
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 27/05/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 237 mV Sleeve : 261 mV Pore Pressure 2 : 437 mV X-Y Inclinator : 2240 mV	CPTU ZERO VALUES Post : 234 mV Difference : -0.033 MPa 263 mV 0.001 kPa 516 mV 0.022 kPa 2249 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
--	---	--	--	---	--	--	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP 1210298 - WINGATES - BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 21:13 10.02.00.04 Dajdel 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



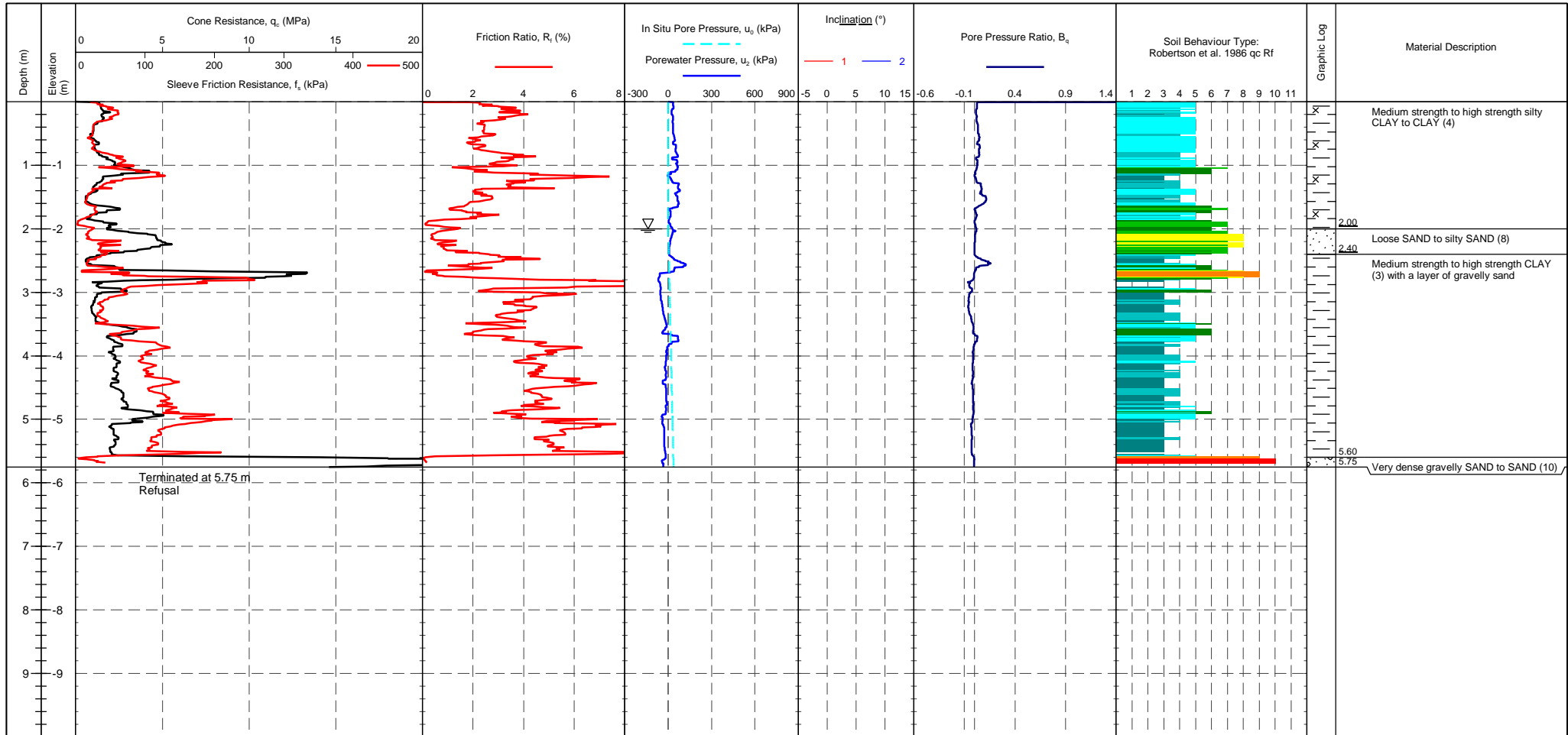
METHOD: Robertson et al. 1986 qc Rf

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	Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. Rf - HYDCPT01	
	DRAWN	DATE	09/06/2021
	CHECKED	DATE	09/06/2021
	SCALE	Not To Scale	
	PROJECT No 1210298	FIGURE No	A4

PointID	HYDCPT02
---------	-----------------

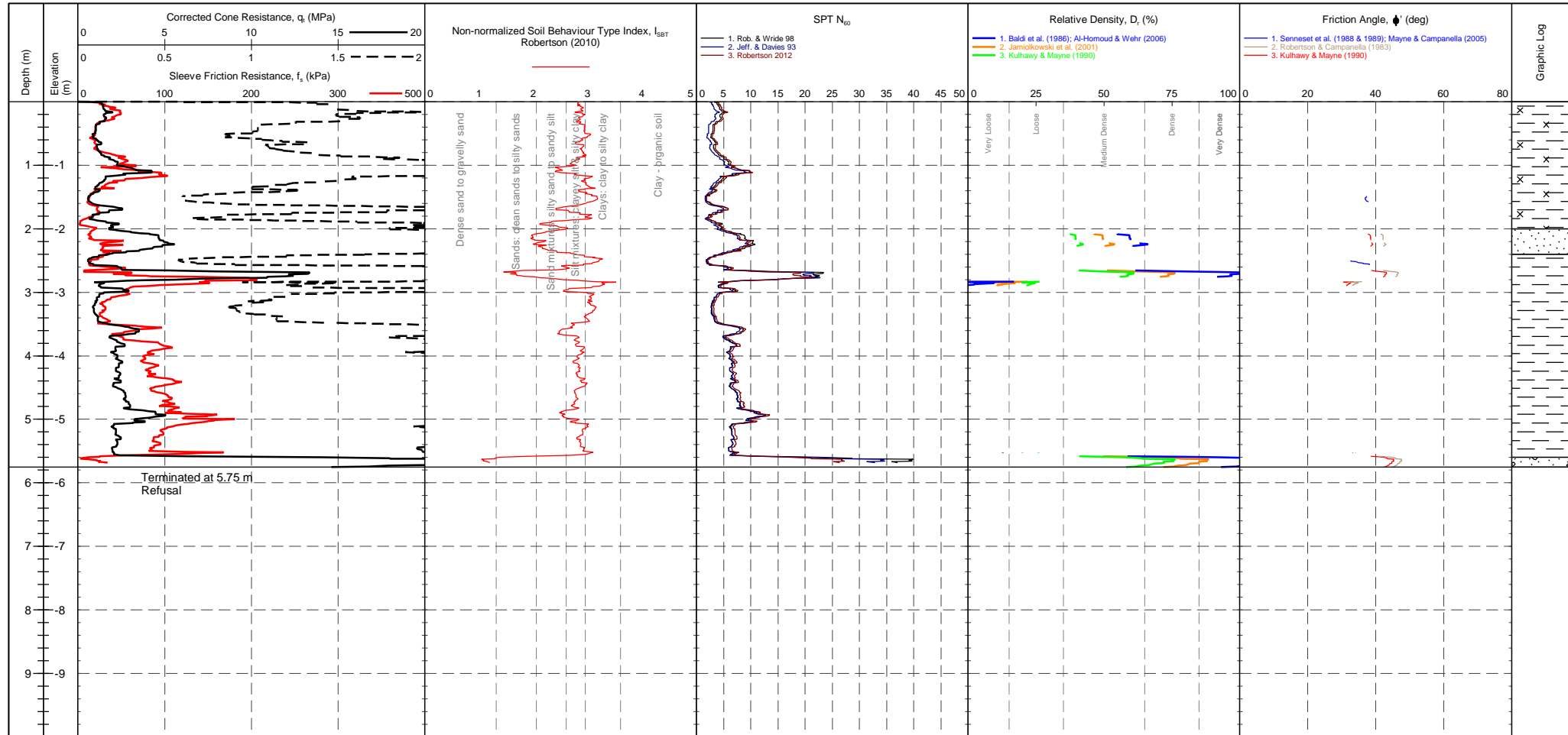
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	---	---



CONE ID : S10-CFIP.768 CALIBRATION DATE : 04/03/2021 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	Transducer Tip : 275 mV / 274 mV / -0.013 MPa Sleeve : 299 mV / 297 mV / -0.002 kPa Pore Pressure 2 : 248 mV / 231 mV / -0.004 kPa X-Y Inclinator : 2058 mV / 2408 mV	CPTU ZERO VALUES Pre Post Difference Tip : 275 mV 274 mV -0.013 MPa Sleeve : 299 mV 297 mV -0.002 kPa Pore Pressure 2 : 248 mV 231 mV -0.004 kPa X-Y Inclinator : 2058 mV 2408 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
---	--	---	--	--	---------------------------------------

PointID	HYDCPT02
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	--	--



CONE ID : S10-CFIP.768 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 275 mV 274 mV -0.013 MPa Sleeve 299 mV 297 mV -0.002 kPa Pore Pressure 2 248 mV 231 mV -0.004 kPa X-Y Inclinator 2058 mV 2408 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																																			

PointID

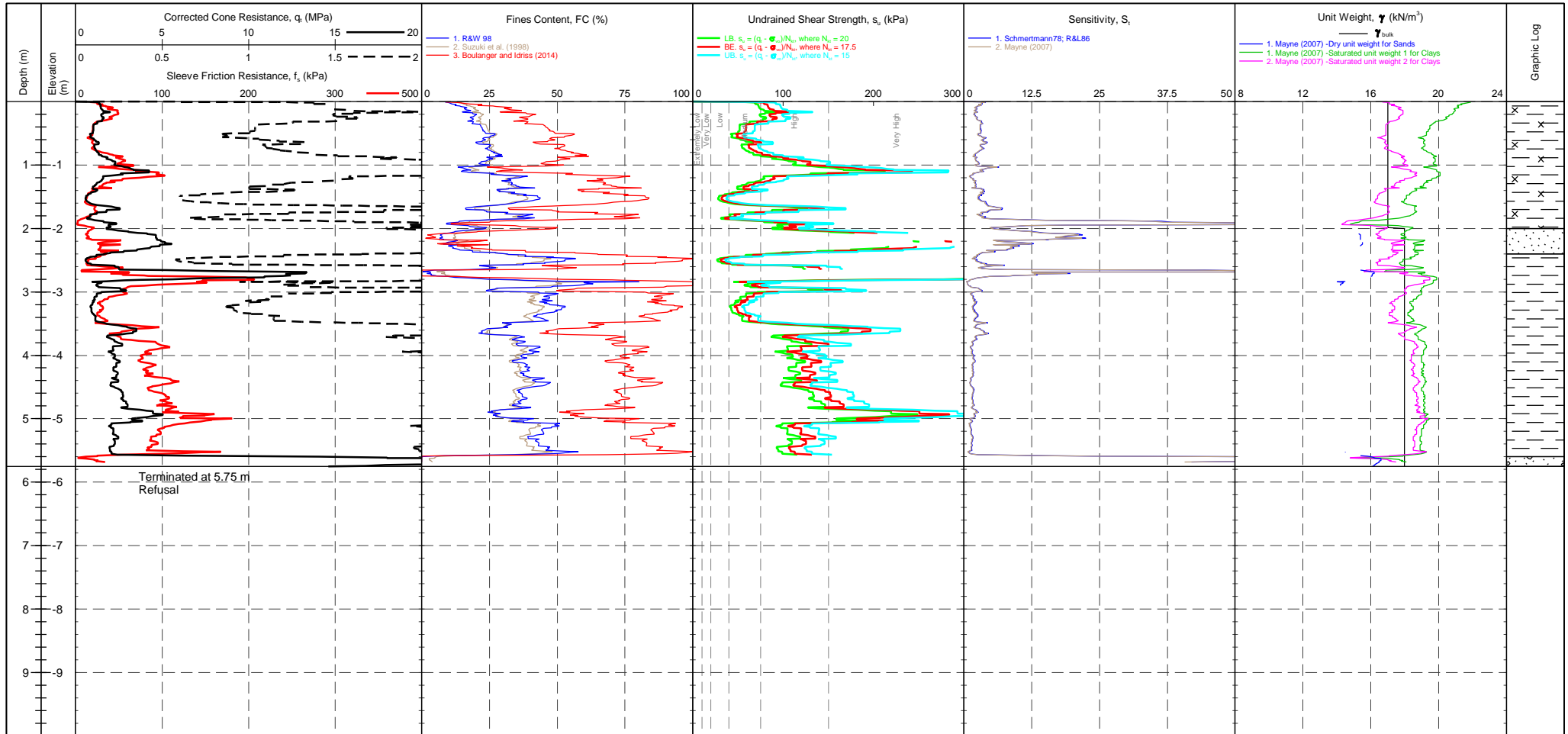
HYDCPT02

CLIENT : Hydrock
 PROJECT : Wingates, Bolton
 LOCATION : Wingate, Bolton
 PROJECT No. : 1210298

EASTING : 0.0 m
 NORTHING : 0.0 m
 ELEVATION : 0.00 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

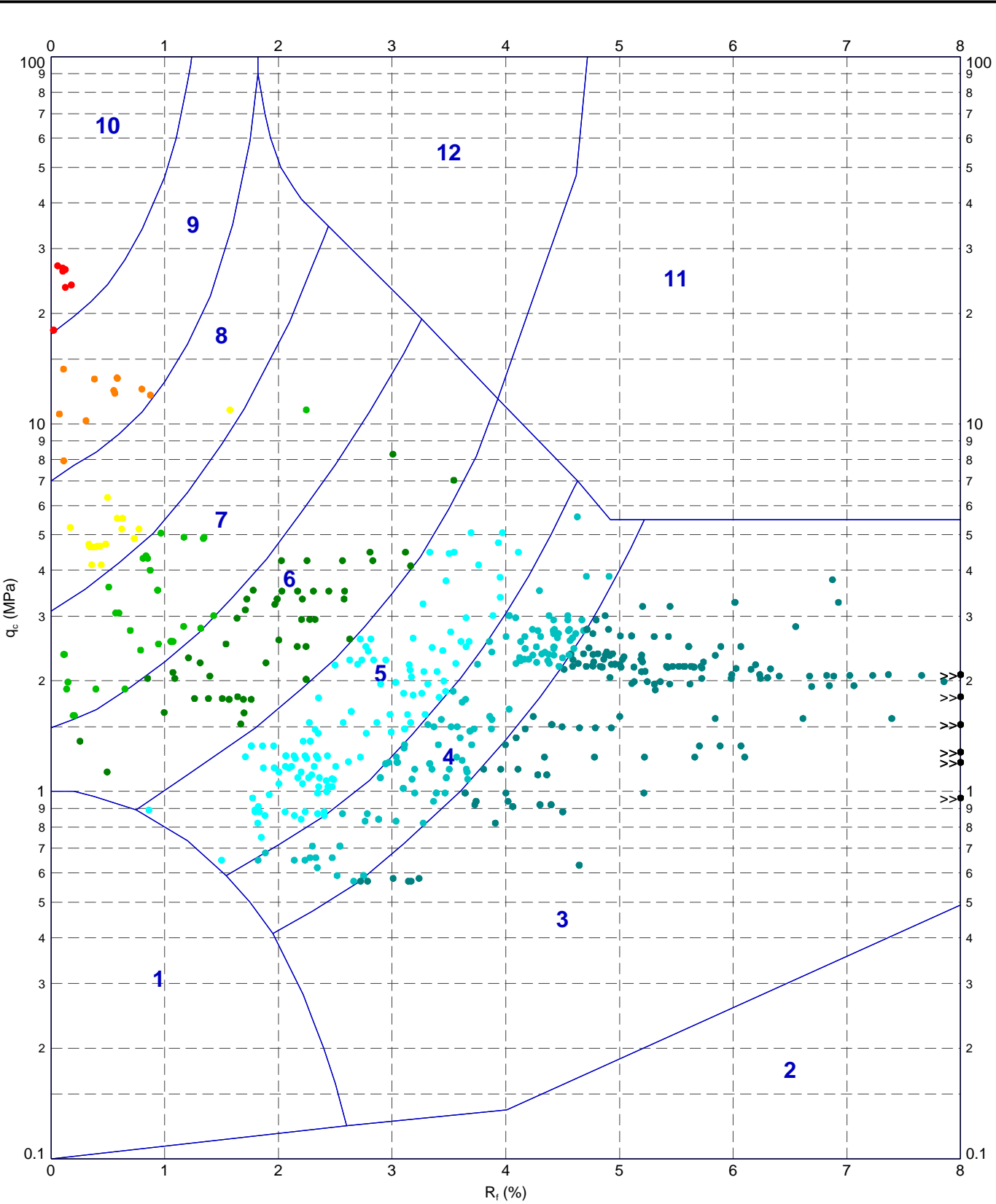
Remark:
 Test refused on inclination.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 04/06/2021
 PLOT DATE : 09/06/2021
 METHOD : ISO 22476-1:2012



CONE ID : S10-CFIP.768 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild	Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	CPTU ZERO VALUES Pre Post Difference 275 mV 274 mV -0.013 MPa 299 mV 297 mV -0.002 kPa 248 mV 231 mV -0.004 kPa 2058 mV 2408 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
--	--	--	---	--	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI.2.02.1.LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP. 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 21:14 10.02.00.04 Dajdel 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



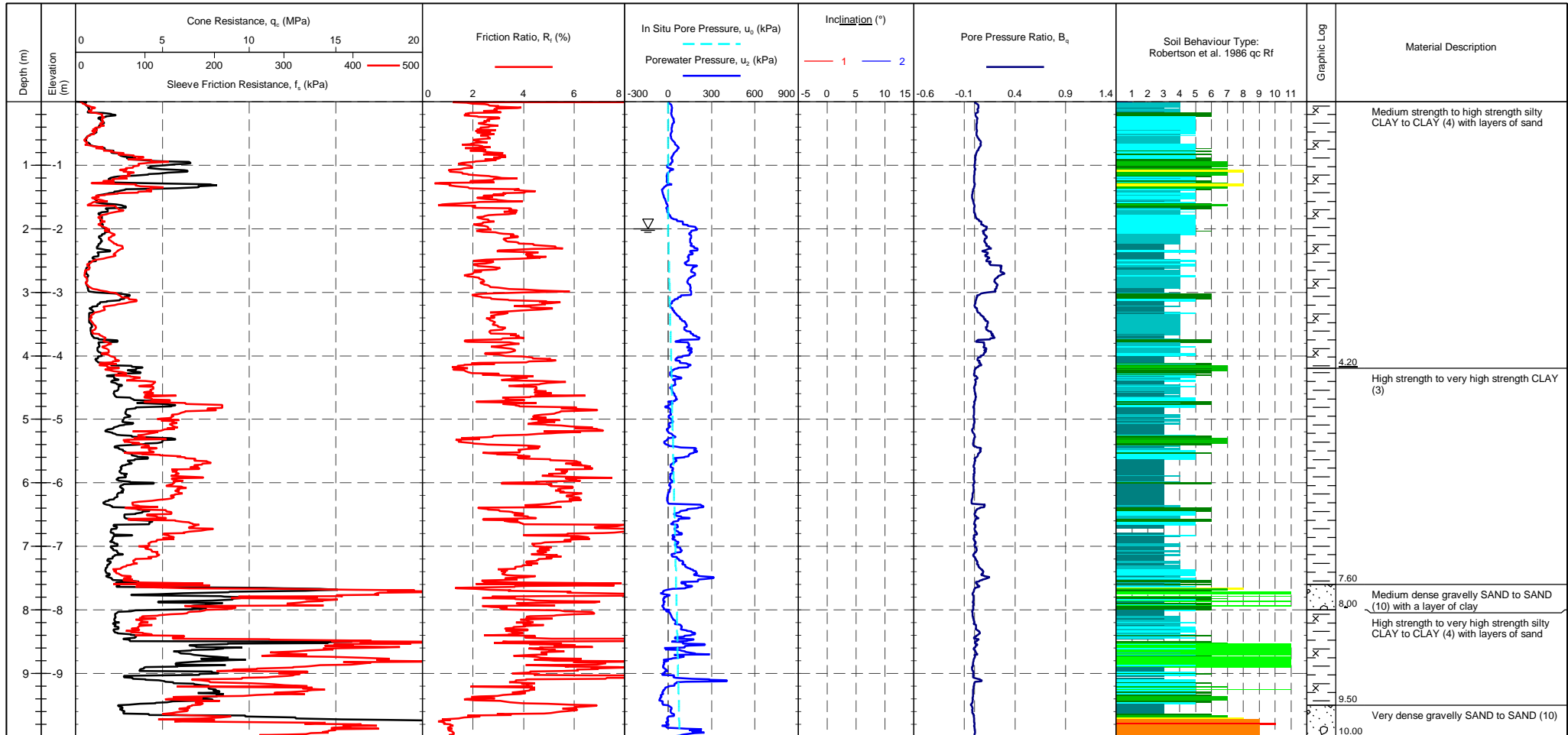
METHOD: Robertson et al. 1986 qc Rf

- 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>Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. Rf - HYDCPT02</p>	DRAWN	DATE	09/06/2021	
		CHECKED	DATE	09/06/2021	
		SCALE	Not To Scale		A4
		PROJECT No	1210298		
			FIGURE No		

PointID	HYDCPT03
---------	-----------------

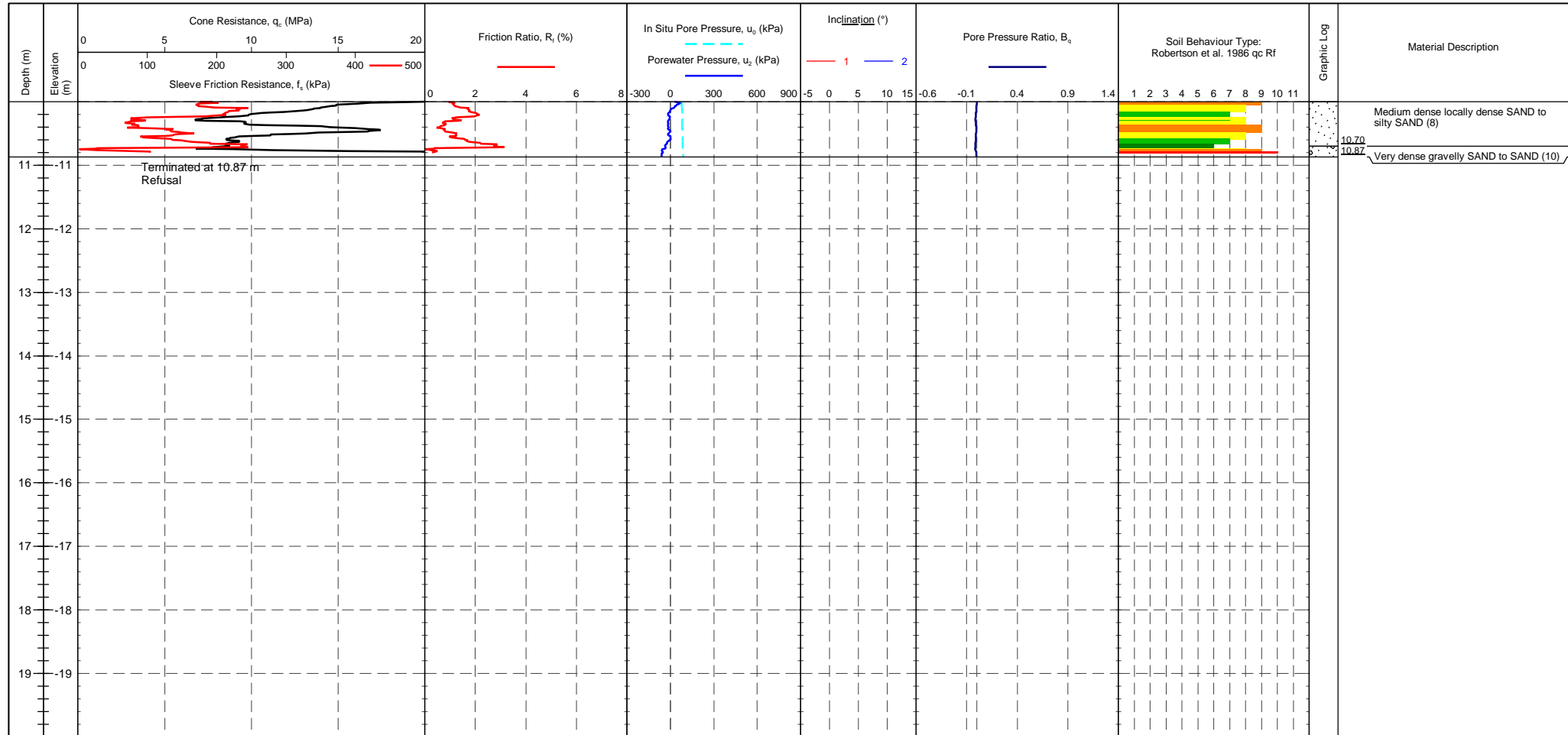
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S10-CFIP.768 CALIBRATION DATE : 04/03/2021 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	Transducer : Tip : 271 mV / 276 mV / 0.066 MPa Sleeve : 297 mV / 299 mV / 0.002 kPa Pore Pressure 2 : 242 mV / 254 mV / 0.003 kPa X-Y Inclinator : 2159 mV / 2052 mV	CPTU ZERO VALUES Pre : Post : Difference Tip : 271 mV / 276 mV / 0.066 MPa Sleeve : 297 mV / 299 mV / 0.002 kPa Pore Pressure 2 : 242 mV / 254 mV / 0.003 kPa X-Y Inclinator : 2159 mV / 2052 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
---	--	--	---	--	---------------------------------------

PointID	HYDCPT03
---------	-----------------

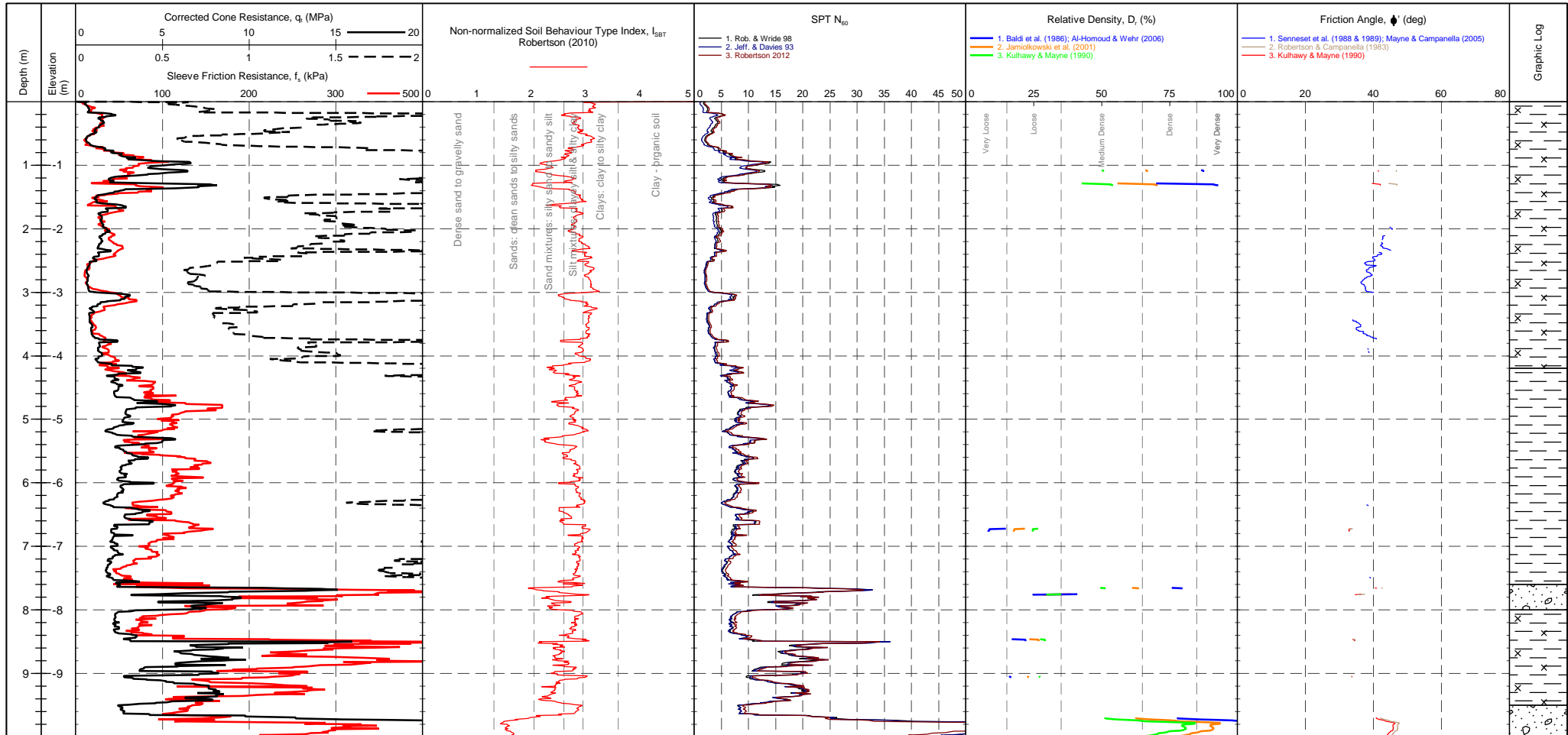
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S10-CFIP.768 CALIBRATION DATE : 04/03/2021 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip : 271 mV / 276 mV / 0.066 MPa Sleeve : 297 mV / 299 mV / 0.002 kPa Pore Pressure 2 : 242 mV / 254 mV / 0.003 kPa X-Y Inclinometer : 2159 mV / 2052 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
---	--	---	---	---------------------------------------

PointID	HYDCPT03
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S10-CFIP.768 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 271 mV 276 mV 0.066 MPa Sleeve 297 mV 299 mV 0.002 kPa Pore Pressure 2 242 mV 254 mV 0.003 kPa X-Y Inclinator 2159 mV 2052 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																																			

PointID

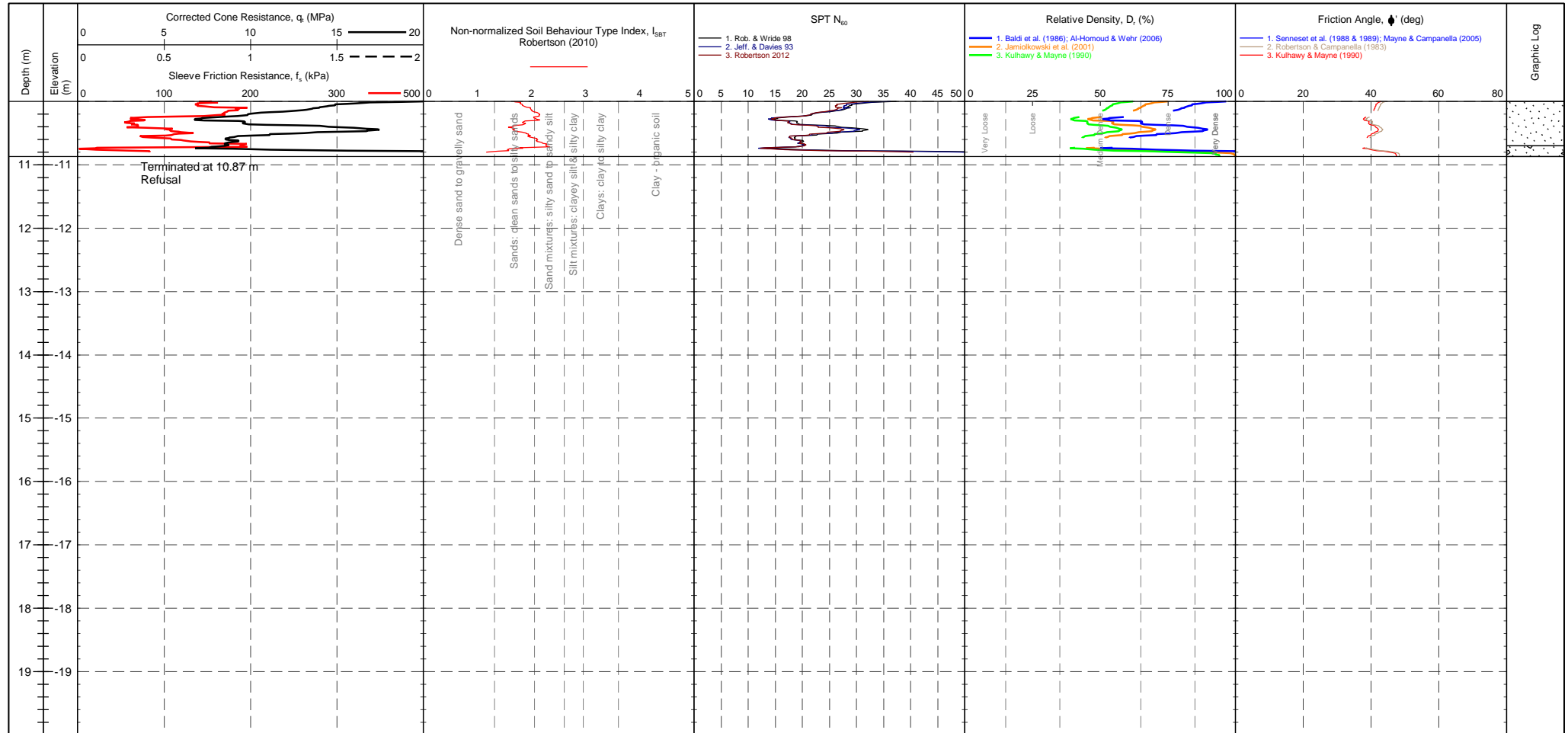
HYDCPT03

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 0.0 m
NORTHING : 0.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 2 OF 2
STATUS : Final
TEST DATE : 04/06/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S10-CFIP.768
CONE MODEL : Subtraction
CONE AREA : 10cm²
CONE AREA RATIO : 0.8
FILTER POSITION : u2
FILTER TYPE : HDPE

TEST TYPE : TE2
APPLICATION CLASS : 2
RIG : CPT 017 - Griffen
OPERATOR : JE
FRICION REDUCER : Ring
WEATHER : Overcast & Mild

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	271 mV	276 mV	0.066 MPa
Sleeve	297 mV	299 mV	0.002 kPa
Pore Pressure 2	242 mV	254 mV	0.003 kPa
X-Y Inclinator	2159 mV	2052 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
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense
Sands	1.31-2.05	Dense	30 - 50	Dense
Gravelly sand	<1.31	Very Dense	>50	Very Dense

Groundwater Level
 Dissipation Test

PointID

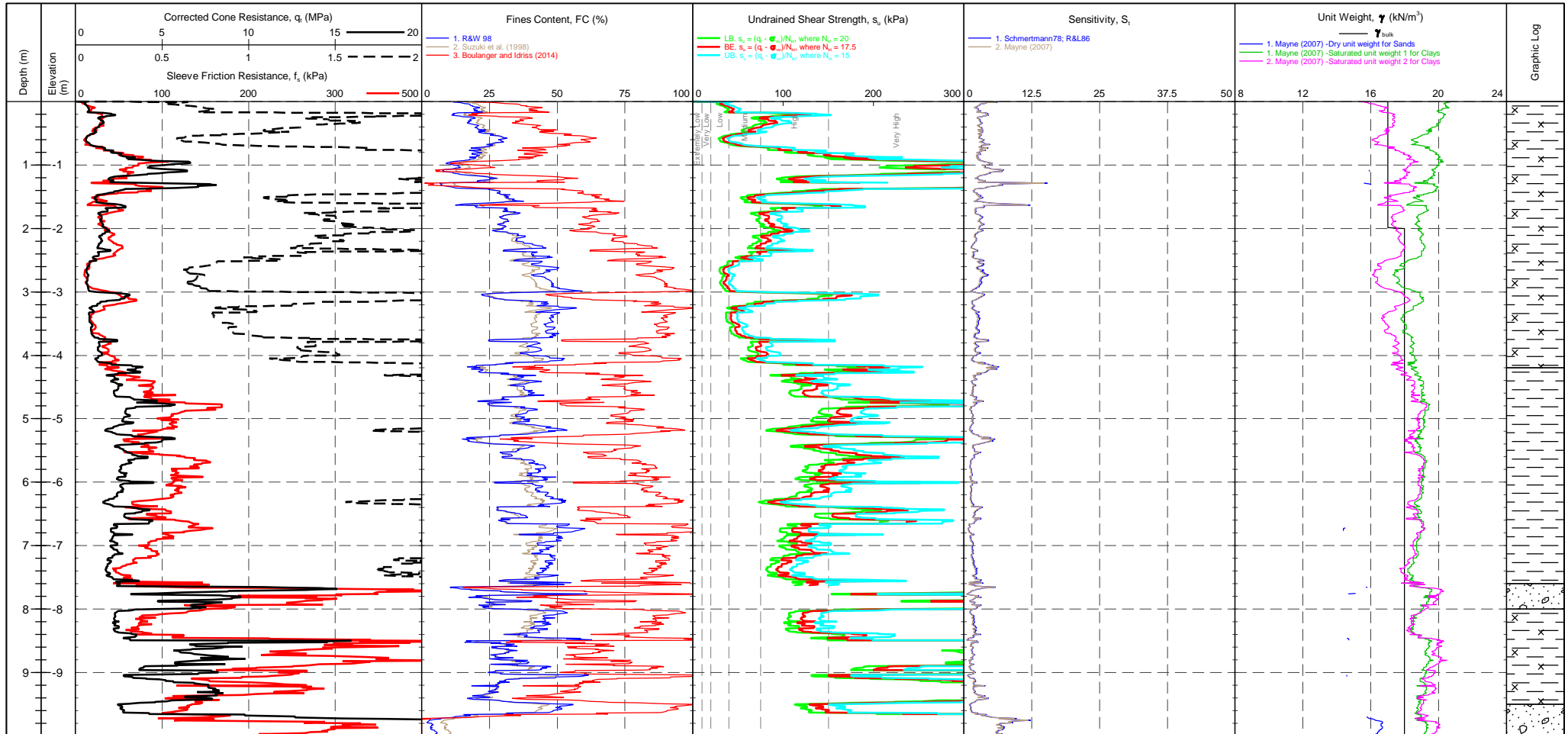
HYDCPT03

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 0.0 m
NORTHING : 0.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

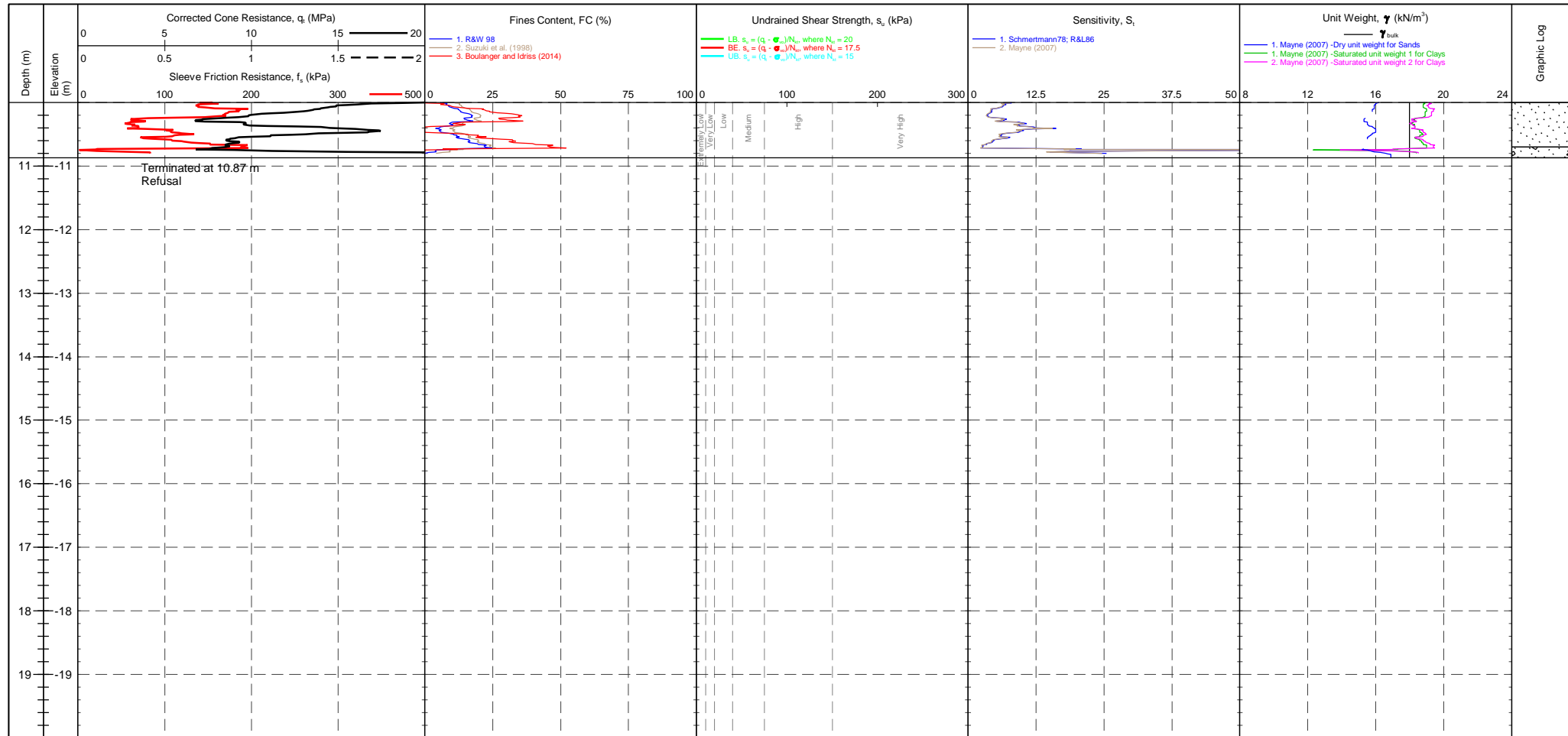
SHEET : 1 OF 2
STATUS : Final
TEST DATE : 04/06/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S10-CFIP.768 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild	Transducer Tip : 271 mV / 276 mV / 0.066 MPa Sleeve : 297 mV / 299 mV / 0.002 kPa Pore Pressure 2 : 242 mV / 254 mV / 0.003 kPa X-Y Inclinator : 2159 mV / 2052 mV	CPTU ZERO VALUES	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11		Groundwater Level Dissipation Test
				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	

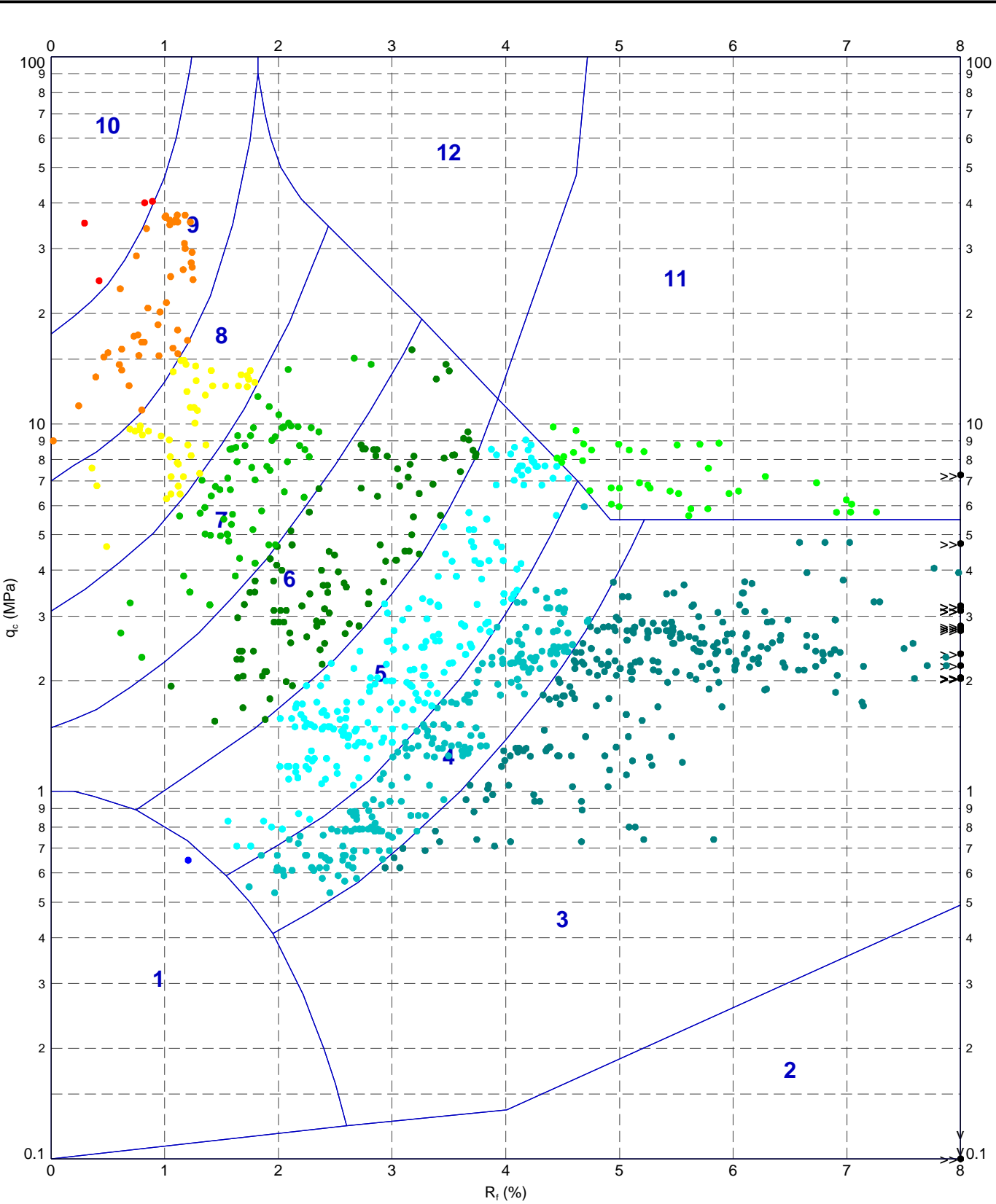
PointID	HYDCPT03
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S10-CFIP.768 CONE MODEL : Subtraction CONE AREA : 10cm ² CONE AREA RATIO : 0.8 FILTER POSITION : u2 FILTER TYPE : HDPE	TEST TYPE : TE2 APPLICATION CLASS : 2 RIG : CPT 017 - Griffen OPERATOR : JE FRICTION REDUCER : Ring WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 271 mV 276 mV 0.066 MPa Sleeve 297 mV 299 mV 0.002 kPa Pore Pressure 2 242 mV 254 mV 0.003 kPa X-Y Inclinator 2159 mV 2052 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
--	--	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LUB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf APF 1210298 - WINGATES - WINGATES, BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 21:15 10.02.00.04 Daignel Lab and In Situ Tool - In Situ SI 2.02.0 2017-07-10 Proj. In Situ SI 2.02.0 2017-07-10



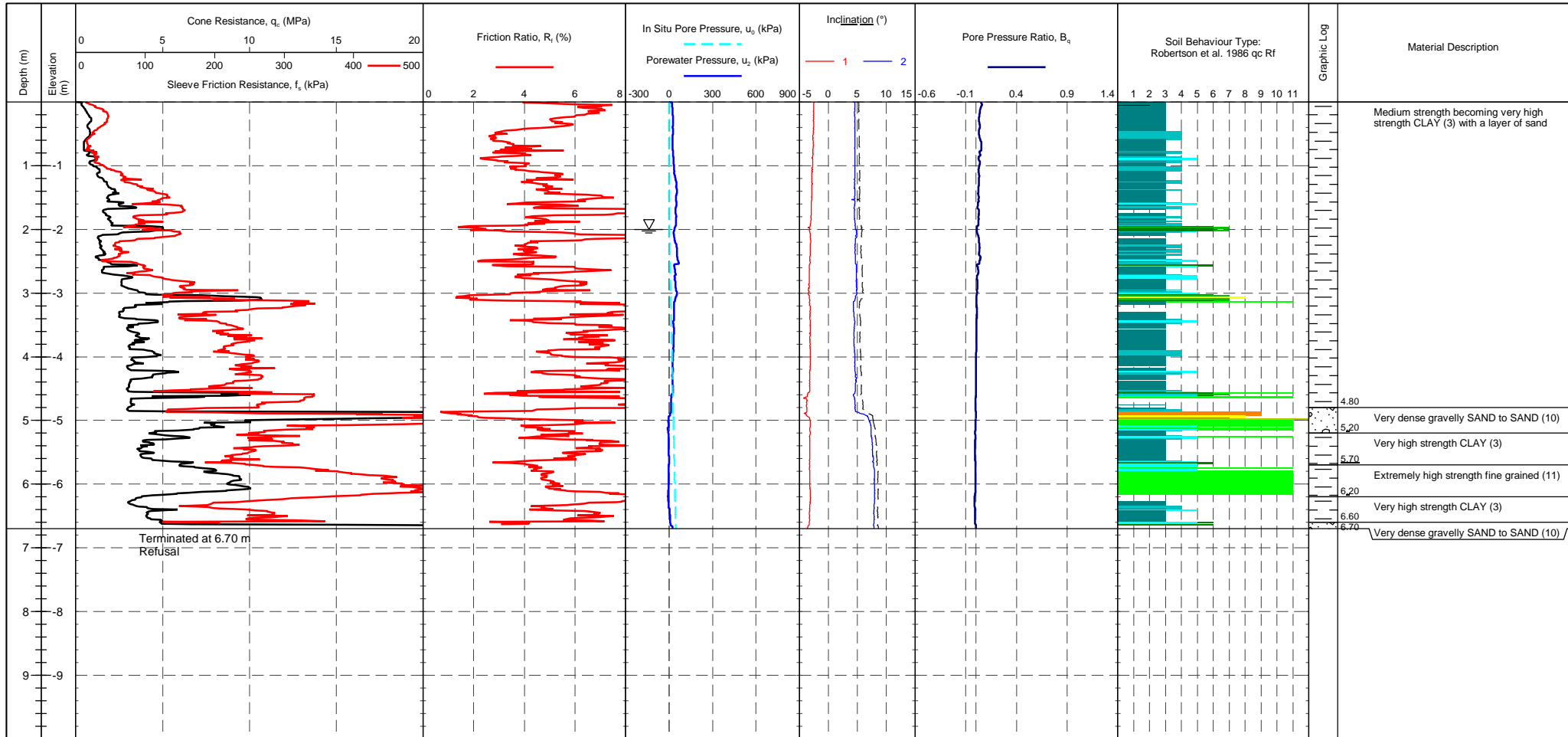
METHOD: Robertson et al. 1986 qc Rf

- 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>Hydrock Wingate, Bolton Wingates, Bolton</p> <p>Robertson et al. 1986 qc vs. Rf - HYDCPT03</p>	DRAWN	DATE	09/06/2021	
		CHECKED	DATE	09/06/2021	
		SCALE	Not To Scale		A4
		PROJECT No	1210298		
		FIGURE No			

PointID	HYDCPT04
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 27/05/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinometer	CPTU ZERO VALUES Pre Post Difference 234 mV 262 mV 478 mV 2195 mV 231 mV 257 mV 481 mV 2202 mV -0.033 MPa -0.004 kPa 0.001 kPa	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
---	--	--	--	---	---------------------------------------

PointID

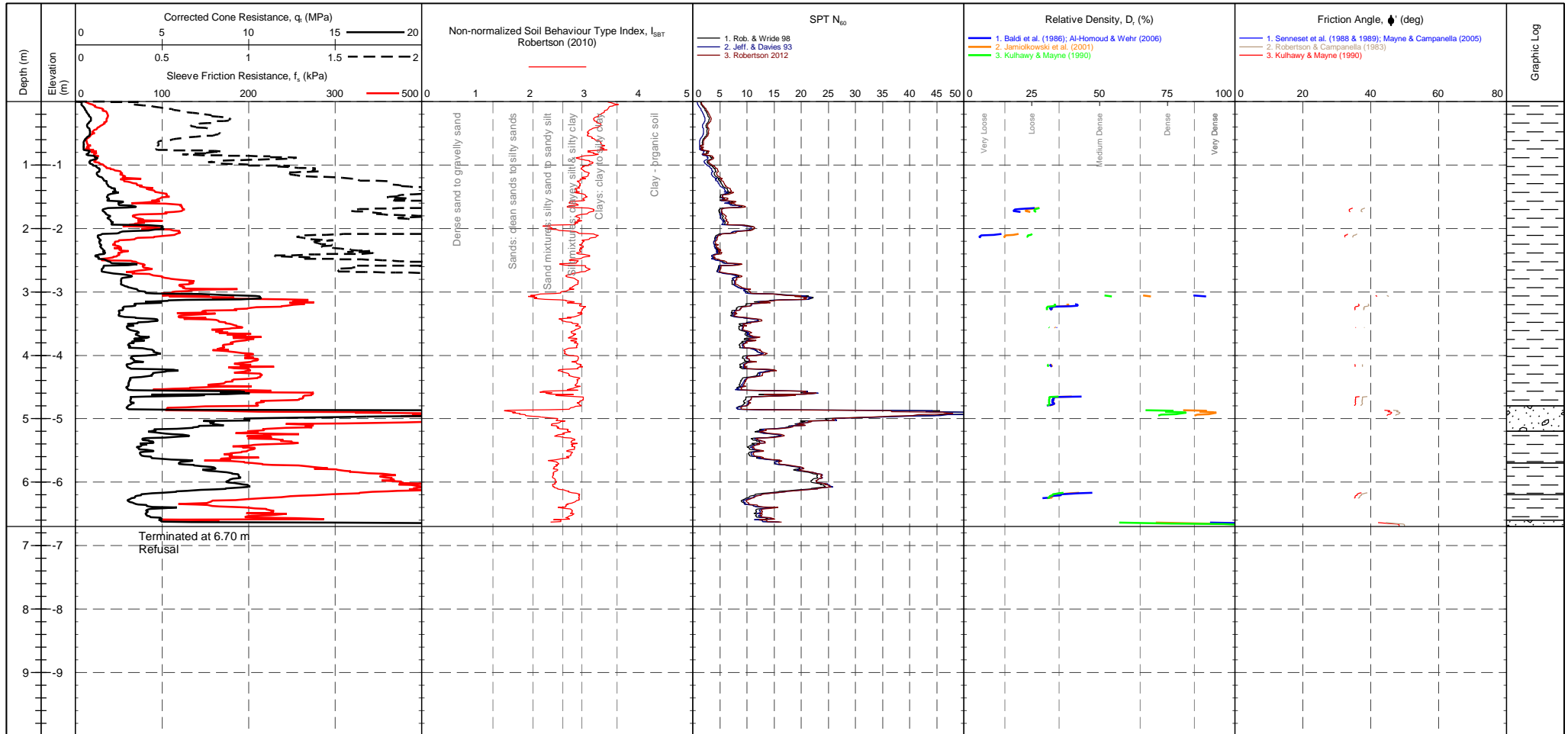
HYDCPT04

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 0.0 m
NORTHING : 0.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

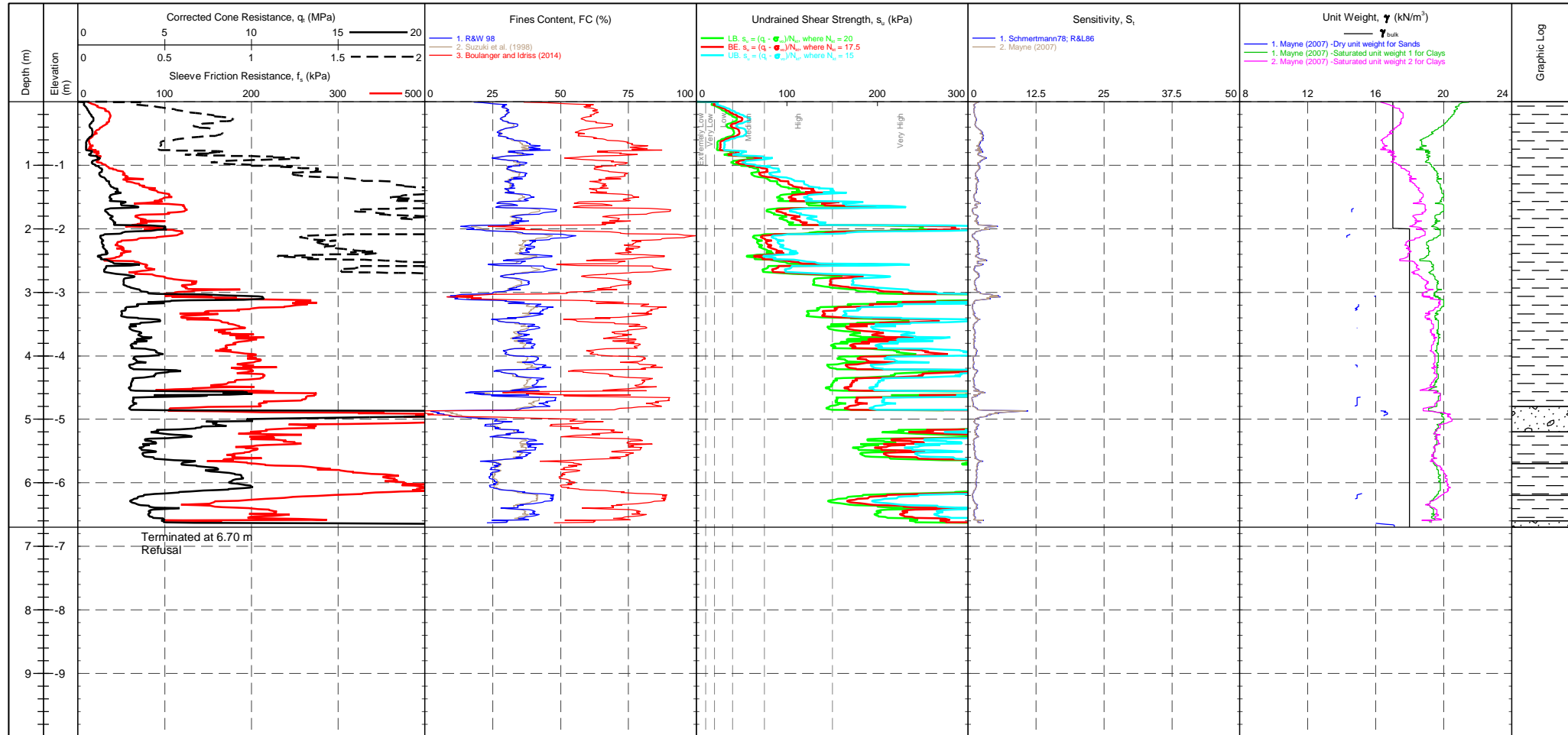
SHEET : 1 OF 1
STATUS : Final
TEST DATE : 27/05/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinometer	CPTU ZERO VALUES Pre Post Difference 234 mV 231 mV -0.033 MPa 262 mV 257 mV -0.004 kPa 478 mV 481 mV 0.001 kPa 2195 mV 2202 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																																				

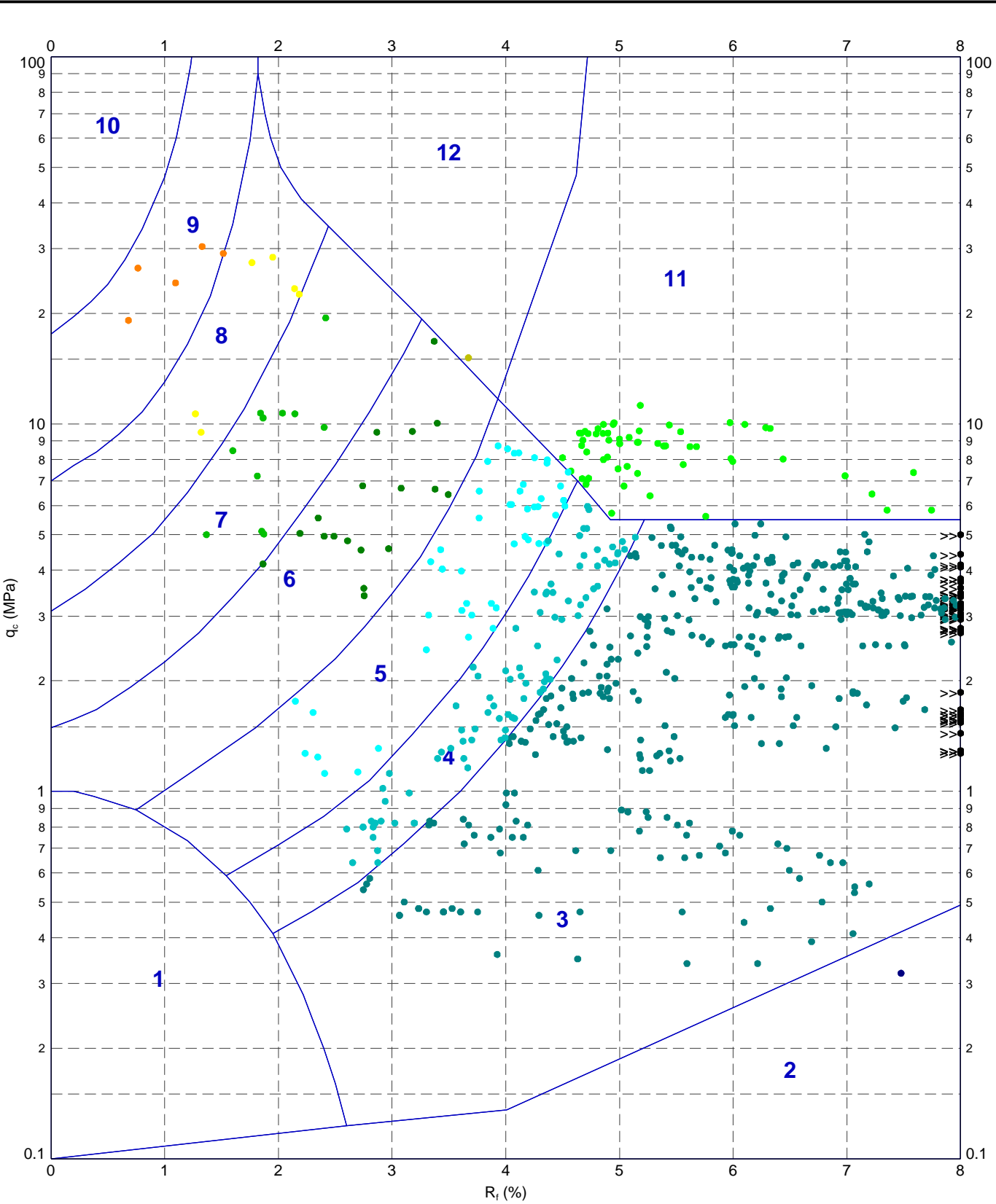
PointID	HYDCPT04
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 27/05/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 234 mV Sleeve : 262 mV Pore Pressure 2 : 478 mV X-Y Inclinator : 2195 mV	CPTU ZERO VALUES Post : 231 mV Difference : -0.033 MPa 257 mV -0.004 kPa 481 mV 0.001 kPa 2202 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
--	--	---	--	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LUB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP. 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 21:17 10.02.00.04 Dajal 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



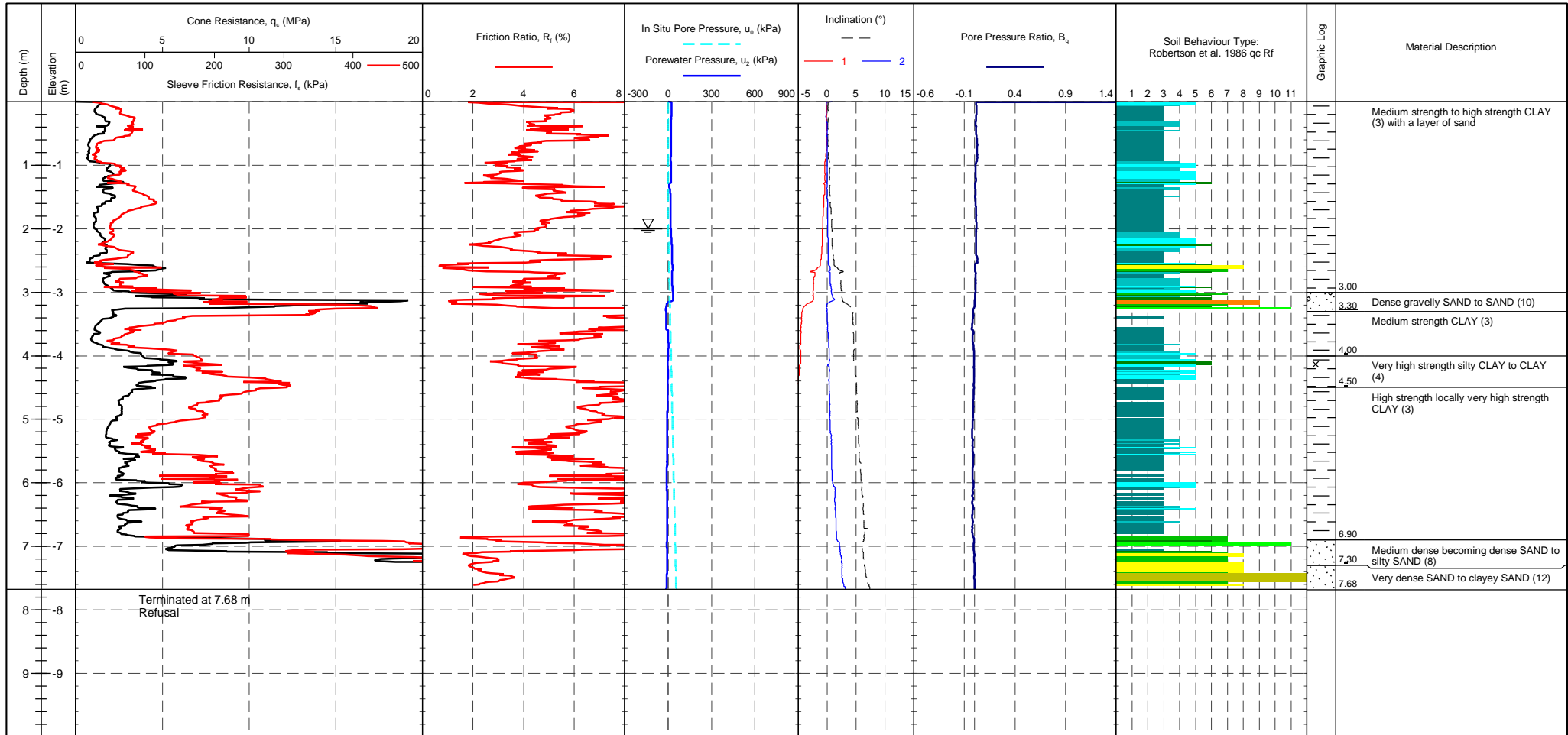
METHOD: Robertson et al. 1986 qc Rf

- 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>Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. Rf - HYDCPT04</p>	DRAWN	DATE	09/06/2021	
		CHECKED	DATE	09/06/2021	
		SCALE	Not To Scale		A4
		PROJECT No	FIGURE No		
		1210298			

PointID	HYDCPT05
---------	-----------------

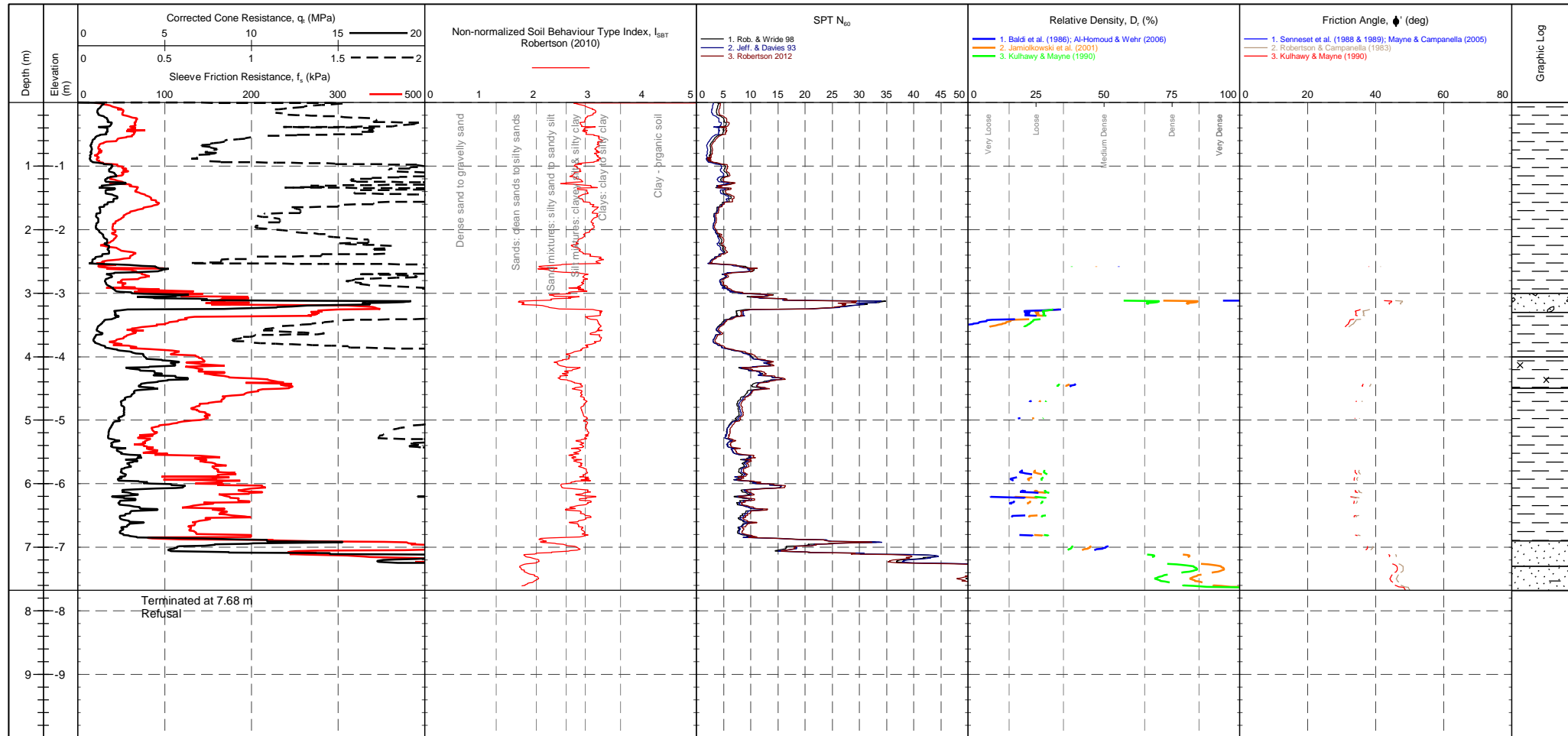
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 232 mV 237 mV 0.055 MPa Sleeve 247 mV 250 mV 0.002 kPa Pore Pressure 2 462 mV 460 mV -0.001 kPa X-Y Inclinator 2467 mV 2153 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
---	--	---	--	---------------------------------------

PointID	HYDCPT05
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 232 mV 237 mV 0.055 MPa Sleeve 247 mV 250 mV 0.002 kPa Pore Pressure 2 462 mV 460 mV -0.001 kPa X-Y Inclinator 2467 mV 2153 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																																			

PointID

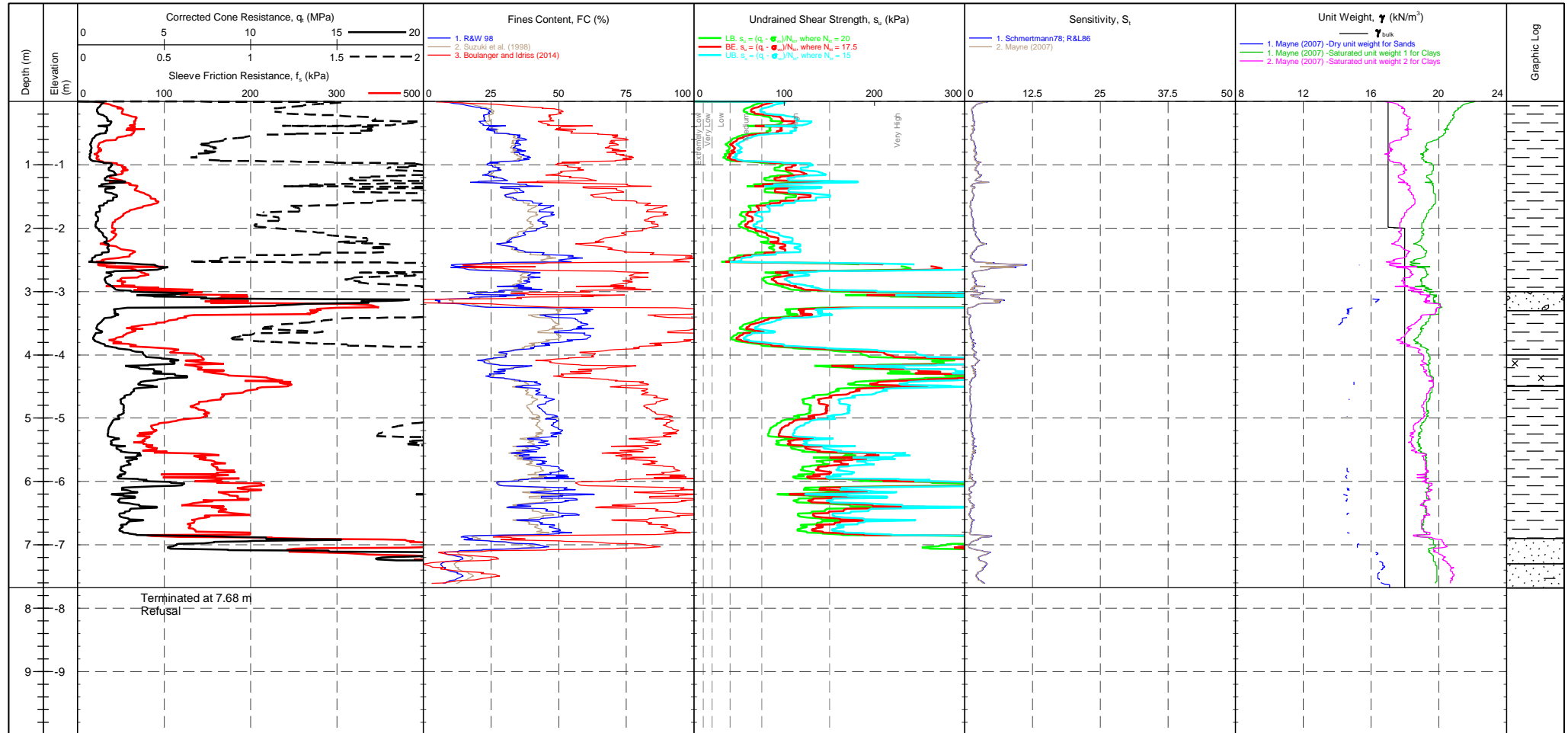
HYDCPT05

CLIENT : Hydrock
 PROJECT : Wingates, Bolton
 LOCATION : Wingate, Bolton
 PROJECT No. : 1210298

EASTING : 0.0 m
 NORTHING : 0.0 m
 ELEVATION : 0.00 m OD
 CHECKED BY : LD
 TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
 STATUS : Final
 TEST DATE : 04/06/2021
 PLOT DATE : 09/06/2021
 METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1360
 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 017 - Griffen
 OPERATOR : JE
 FRICTION REDUCER : None
 WEATHER : Overcast & Mild

Transducer
 Tip
 Sleeve
 Pore Pressure 2
 X-Y Inclinator

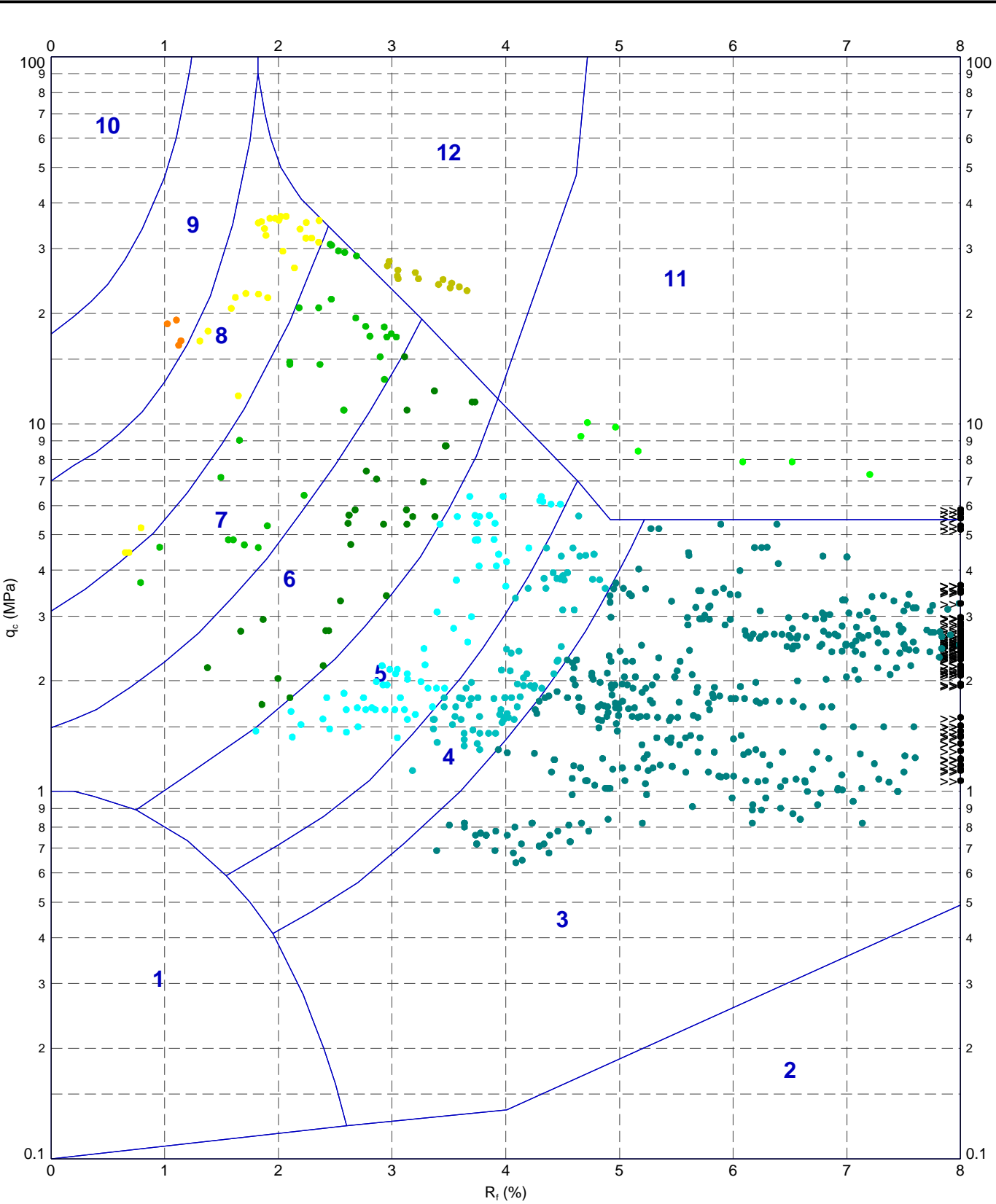
Pre	Post	Difference
232 mV	237 mV	0.055 MPa
247 mV	250 mV	0.002 kPa
462 mV	460 mV	-0.001 kPa
2467 mV	2153 mV	

CPTU ZERO VALUES
 Term based on measurement su (kPa)
 Extremely low strength <10
 Very low strength 10-20
 Low strength 20-40

COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11
 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

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf APT 1210298 - WINGATES - WINGATES, BOLTON - HYDROCK.GPJ --DrawingFile-- 09/06/2021 21:18 10.02.00.04 Dajdel 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



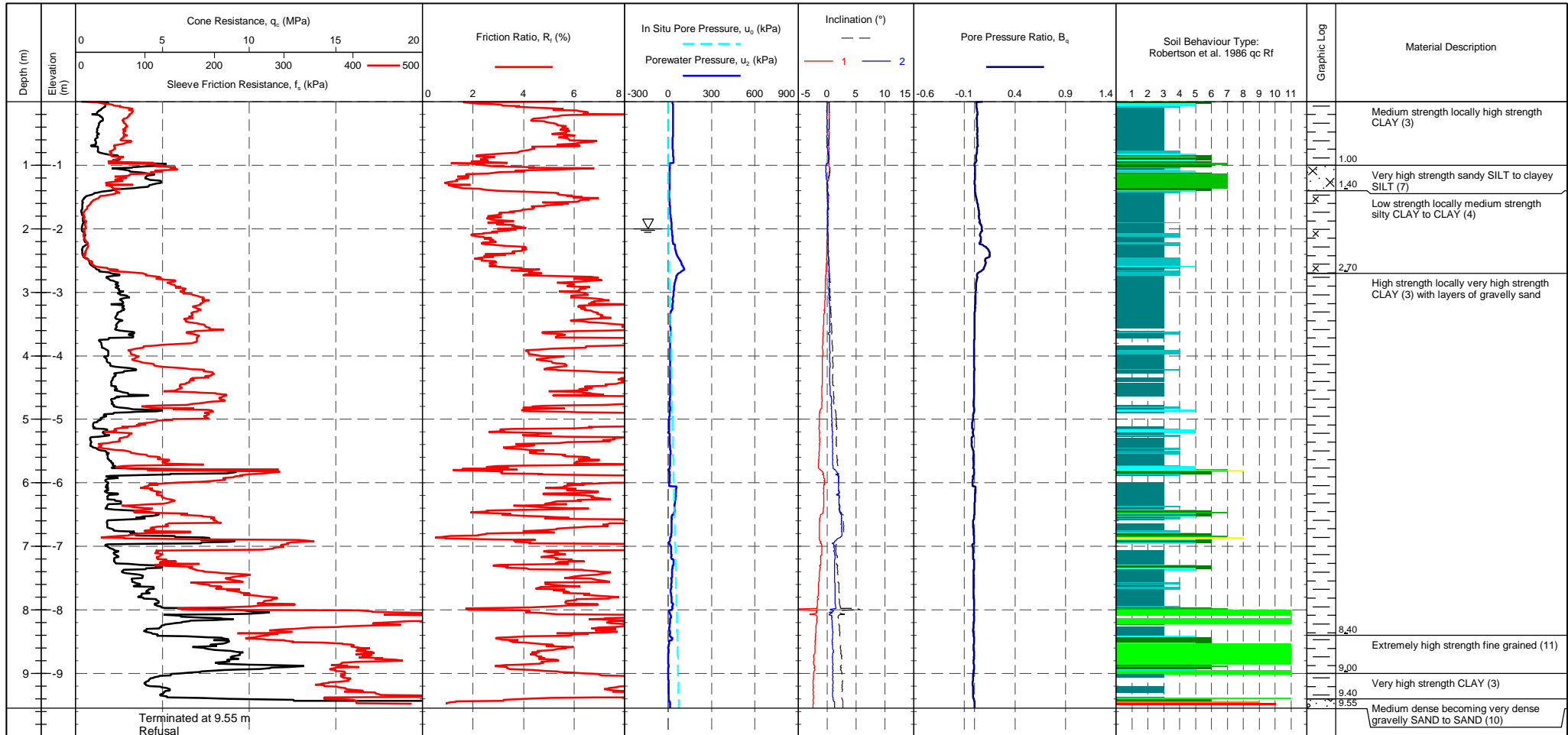
METHOD: Robertson et al. 1986 qc Rf

- 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
	Hydrock Wingate, Bolton Wingates, Bolton	CHECKED	DATE
	Robertson et al. 1986 qc vs. Rf - HYDCPT05	SCALE	FIGURE No
		PROJECT No 1210298	A4

PointID	HYDCPT06
---------	-----------------

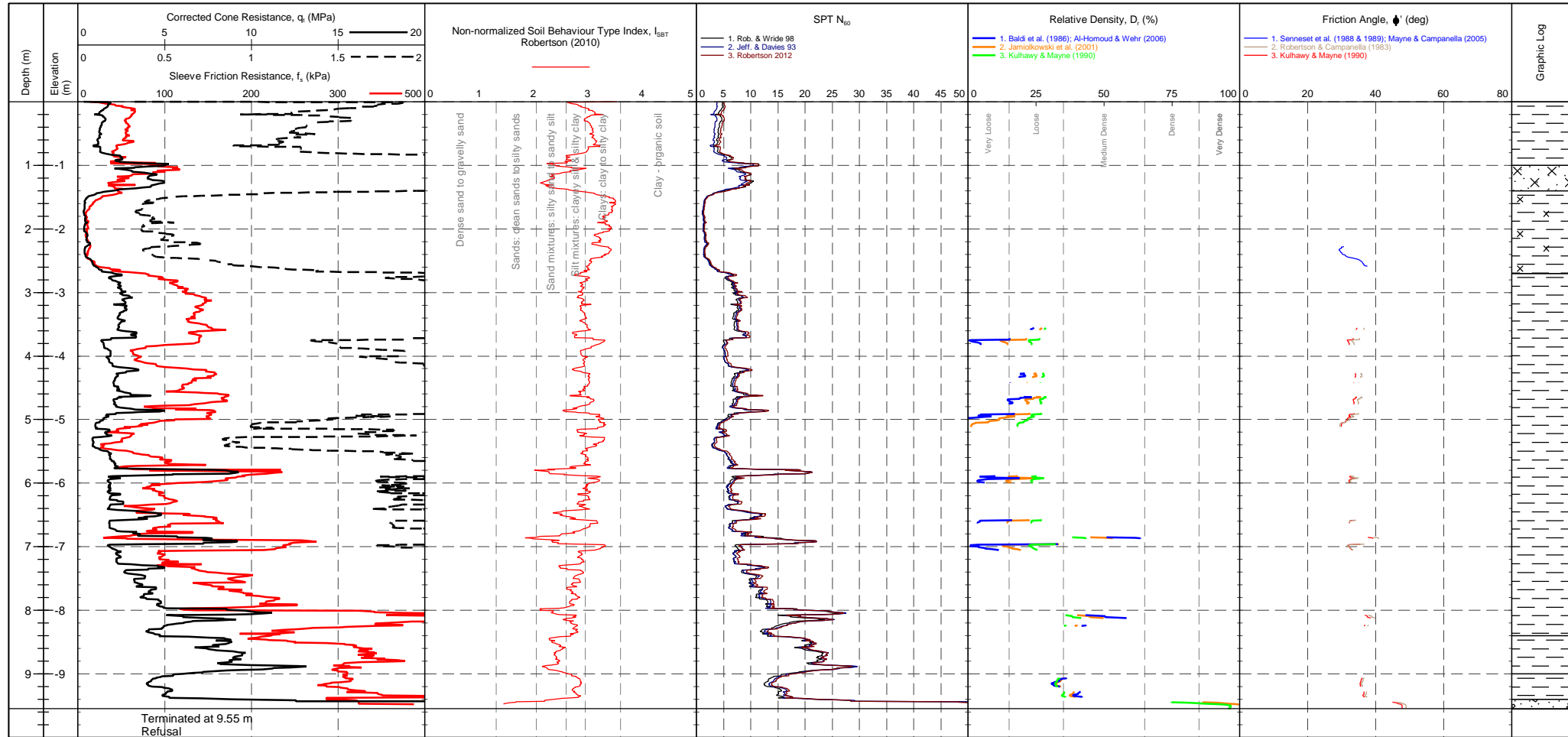
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	Transducer : Tip : 237 mV Sleeve : 252 mV Pore Pressure 2 : 476 mV X-Y Inclinator : 2444 mV	CPTU ZERO VALUES Post : 233 mV Difference : -0.044 MPa Post : 248 mV Difference : -0.003 kPa Post : 503 mV Difference : 0.008 kPa Post : 2452 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
---	--	---	---	--	---------------------------------------

PointID	HYDCPT06
---------	-----------------

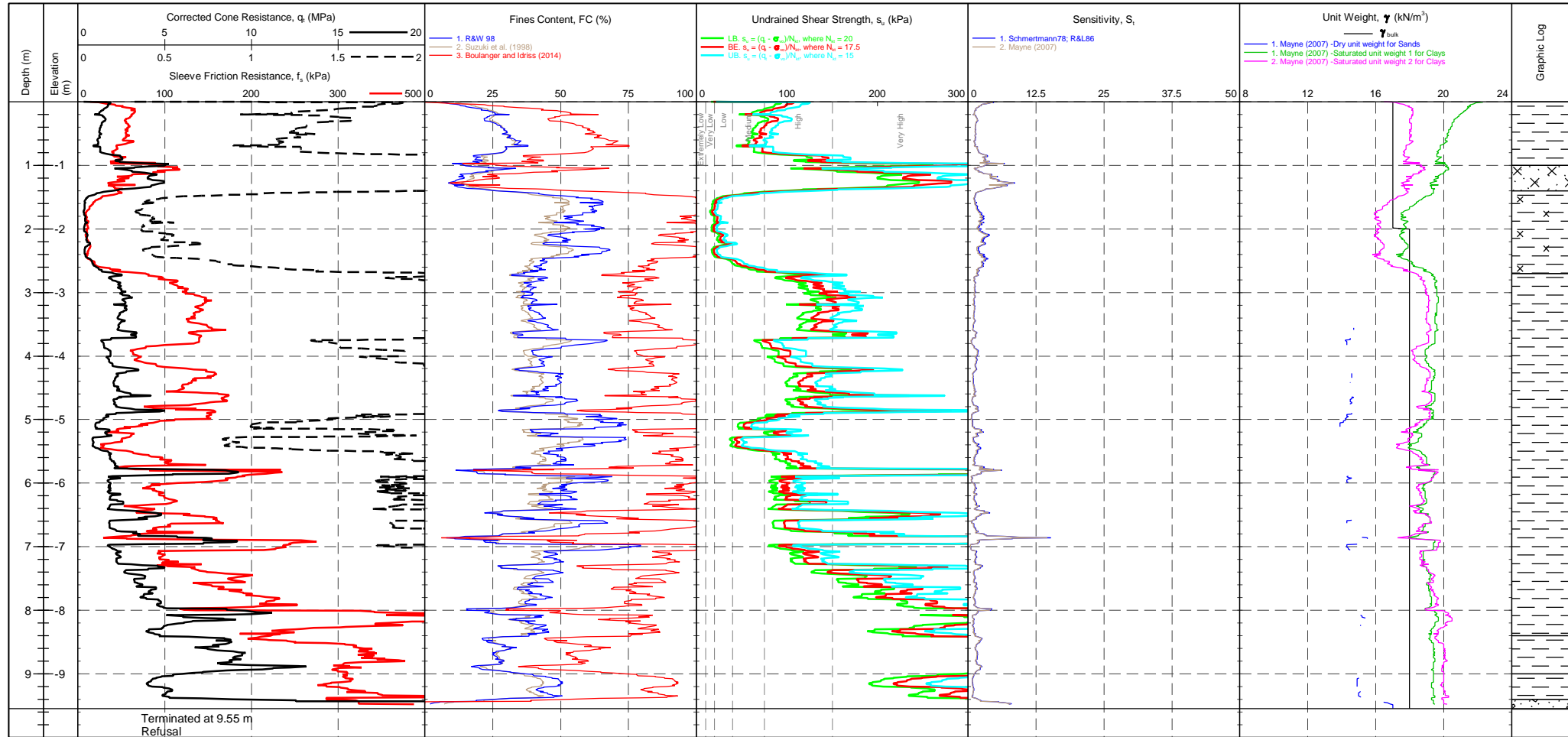
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 237 mV 233 mV -0.044 MPa Sleeve 252 mV 248 mV -0.003 kPa Pore Pressure 2 476 mV 503 mV 0.008 kPa X-Y Inclinator 2444 mV 2452 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																																			

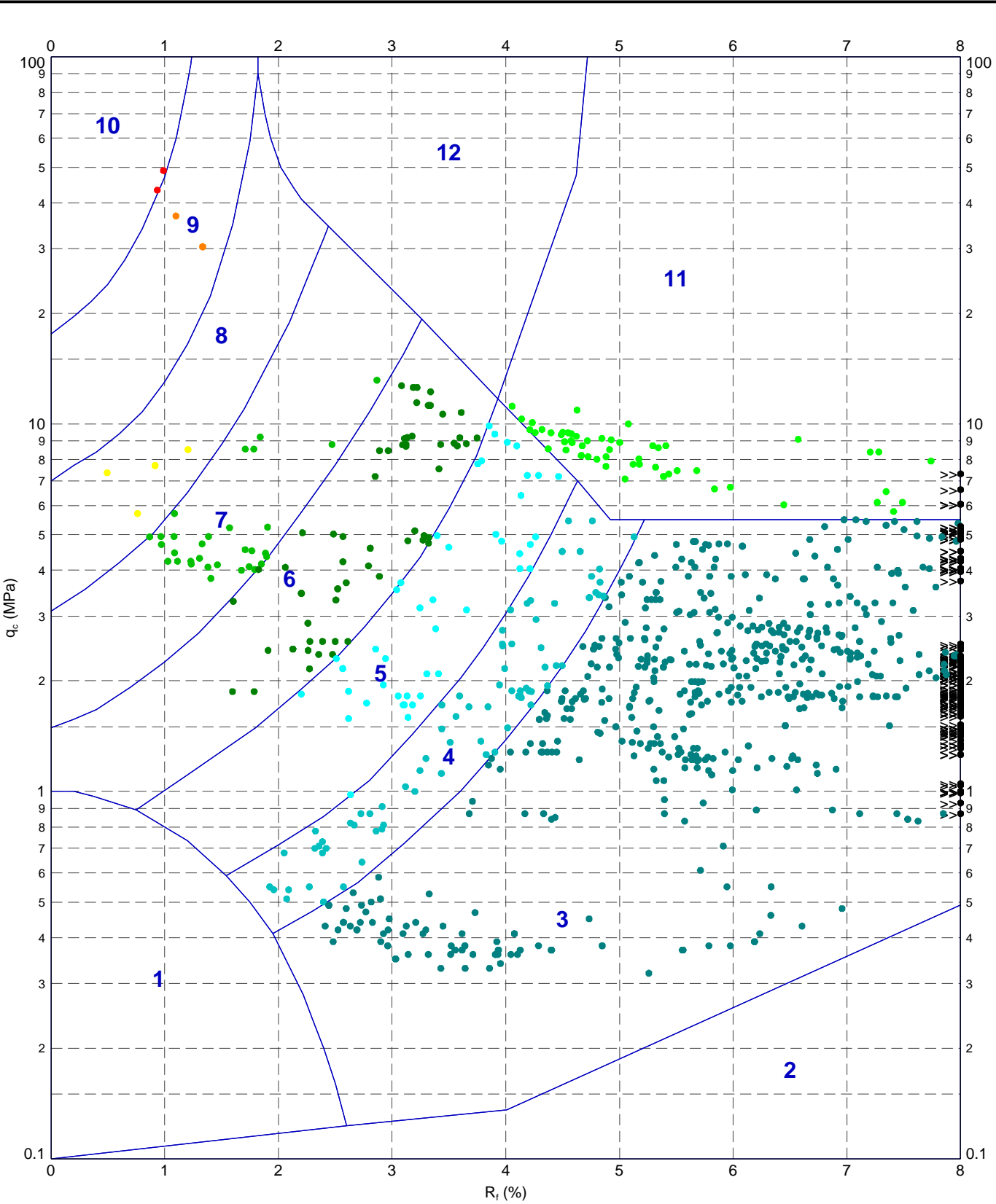
PointID	HYDCPT06
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--




CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 237 mV Sleeve: 252 mV Pore Pressure 2: 476 mV X-Y Inclinator: 2444 mV	CPTU ZERO VALUES Post: 233 mV Difference: -0.044 MPa 248 mV -0.003 kPa 503 mV 0.008 kPa 2452 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
--	---	--	---	--	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --DrawingFile-- 09/06/2021 21:19 10.02.00.04 Dajdel 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



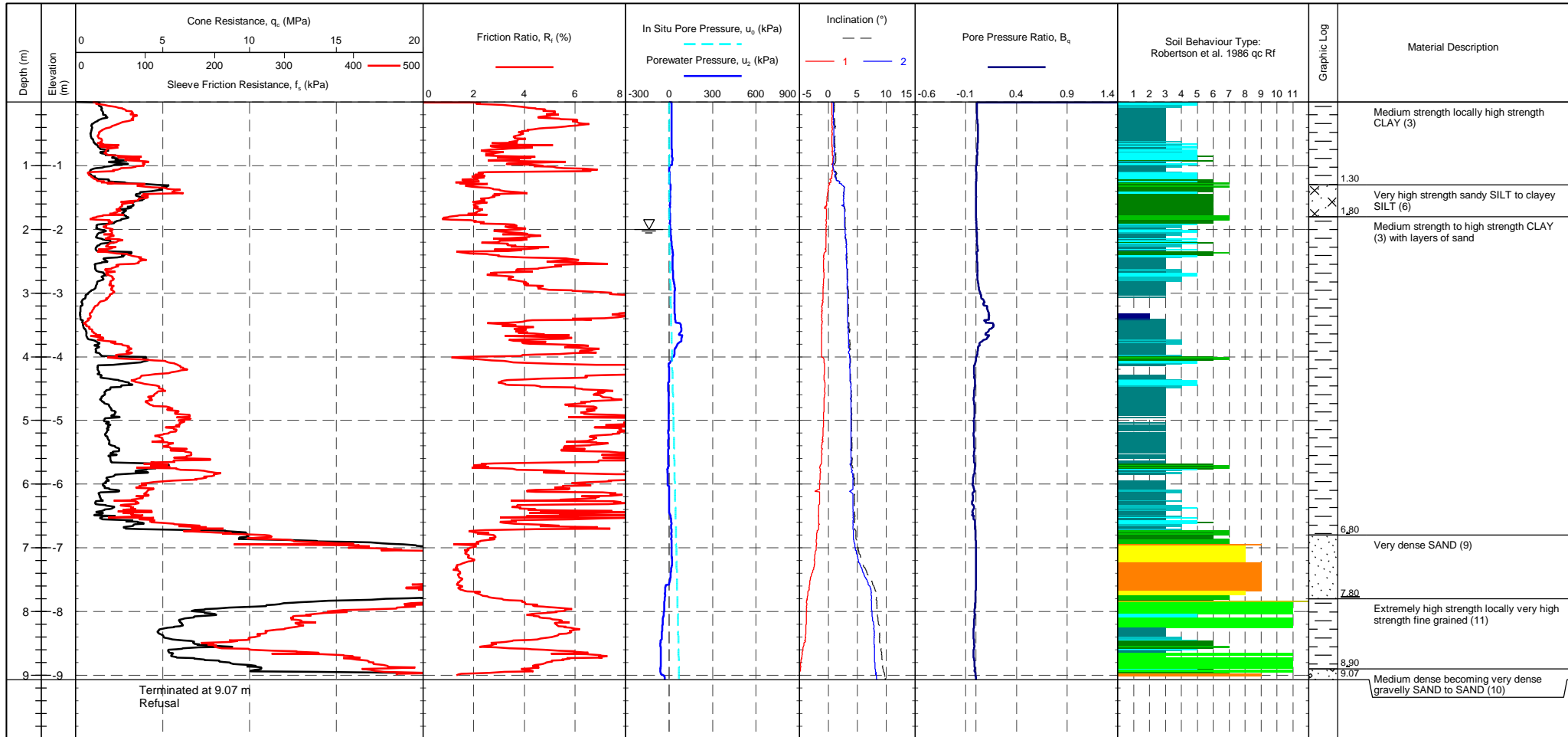
METHOD: Robertson et al. 1986 qc Rf

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	Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. Rf - HYDCPT06	
	DRAWN	DATE	09/06/2021
	CHECKED	DATE	09/06/2021
	SCALE	Not To Scale	
PROJECT No	1210298		FIGURE No

PointID	HYDCPT07
---------	-----------------

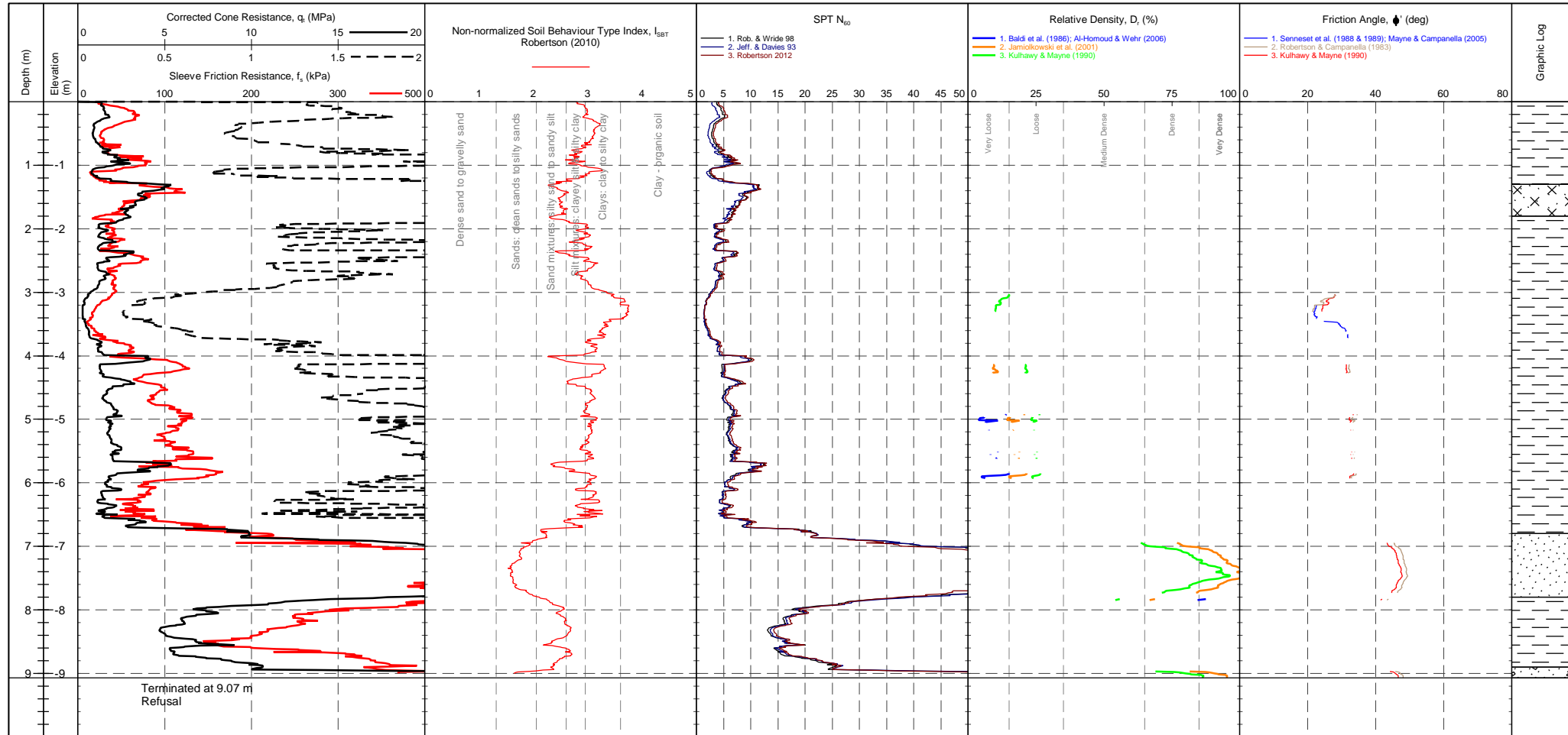
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer : Pre 235 mV, Post 231 mV, Difference -0.044 MPa Tip : Pre 251 mV, Post 246 mV, Difference -0.004 kPa Sleeve : Pre 490 mV, Post 462 mV, Difference -0.008 kPa Pore Pressure 2 : Pre 2466 mV, Post 2471 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
---	--	---	---	---------------------------------------

PointID	HYDCPT07
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 235 mV Sleeve : 251 mV / 246 mV Pore Pressure 2 : 490 mV / 462 mV X-Y Inclinator : 2466 mV / 2471 mV	CPTU ZERO VALUES Pre Post Difference Tip 235 mV 231 mV -0.044 MPa Sleeve 251 mV 246 mV -0.004 kPa Pore Pressure 2 490 mV 462 mV -0.008 kPa X-Y Inclinator 2466 mV 2471 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

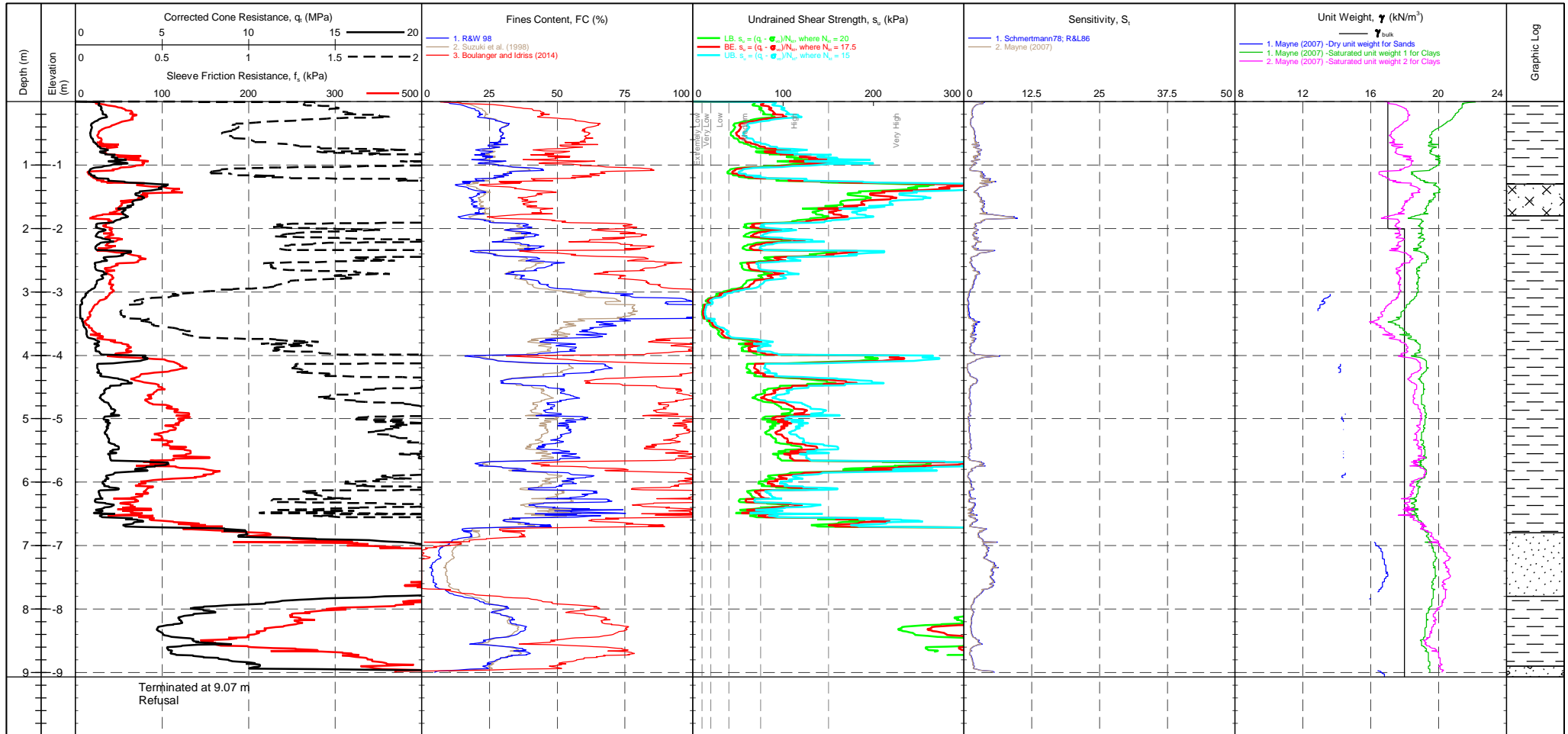
HYDCPT07

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 0.0 m
NORTHING : 0.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
STATUS : Final
TEST DATE : 04/06/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1360
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 017 - Griffen
OPERATOR : JE
FRICITION REDUCER : None
WEATHER : Overcast & Mild

Transducer
 Pre Post Difference
 Tip 235 mV 231 mV -0.044 MPa
 Sleeve 251 mV 246 mV -0.004 kPa
 Pore Pressure 2 490 mV 462 mV -0.008 kPa
 X-Y Inclinator 2466 mV 2471 mV

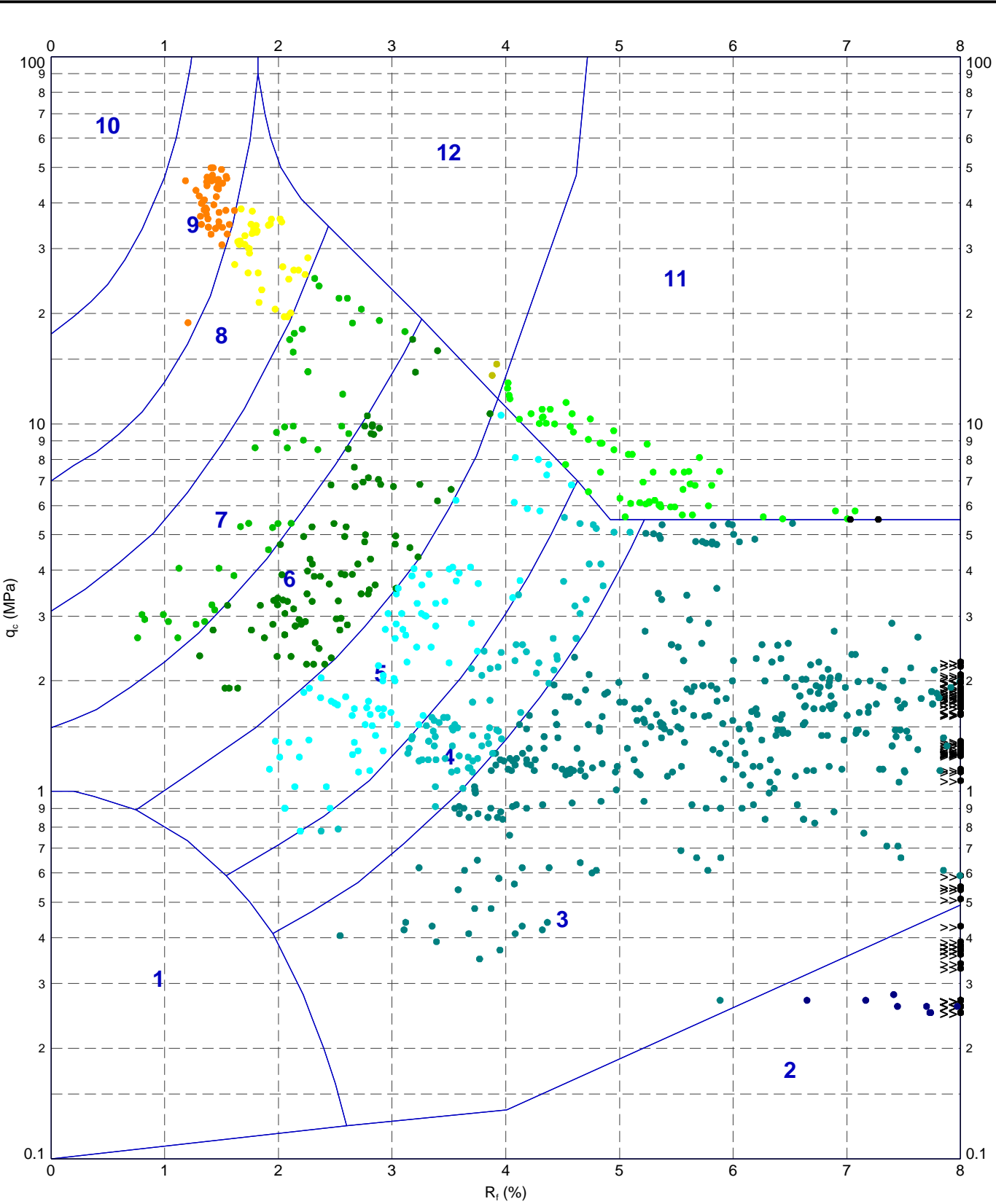
CPTU ZERO VALUES

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

2:10526-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP. 1210298 - WINGATES, BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 12:20 10.02.00.04 Dajdel 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



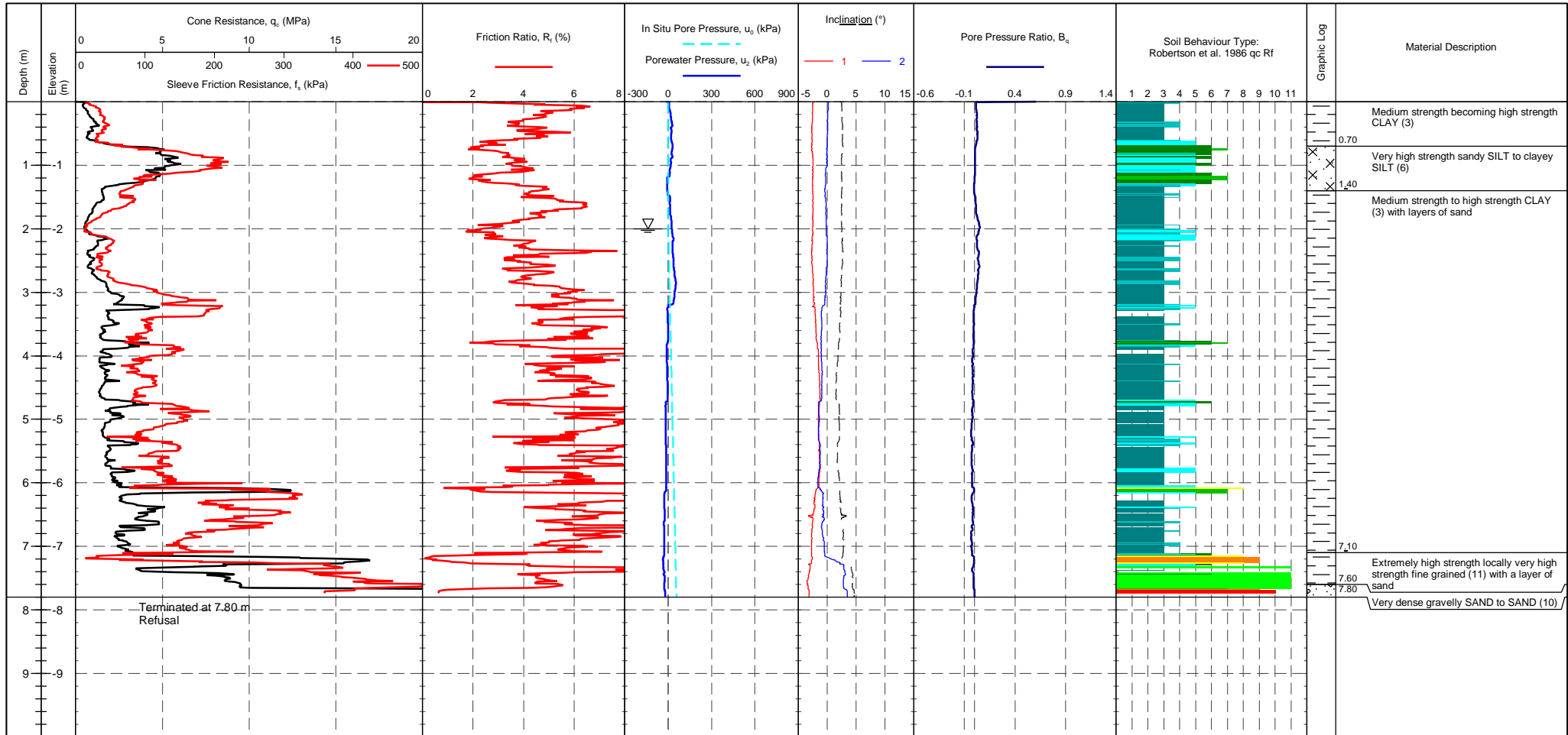
METHOD: Robertson et al. 1986 qc Rf

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	Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. R _f - HYDCPT07	
	DRAWN	DATE	09/06/2021
	CHECKED	DATE	09/06/2021
	SCALE	Not To Scale	A4
	PROJECT No 1210298	FIGURE No	

PointID	HYDCPT08
---------	-----------------

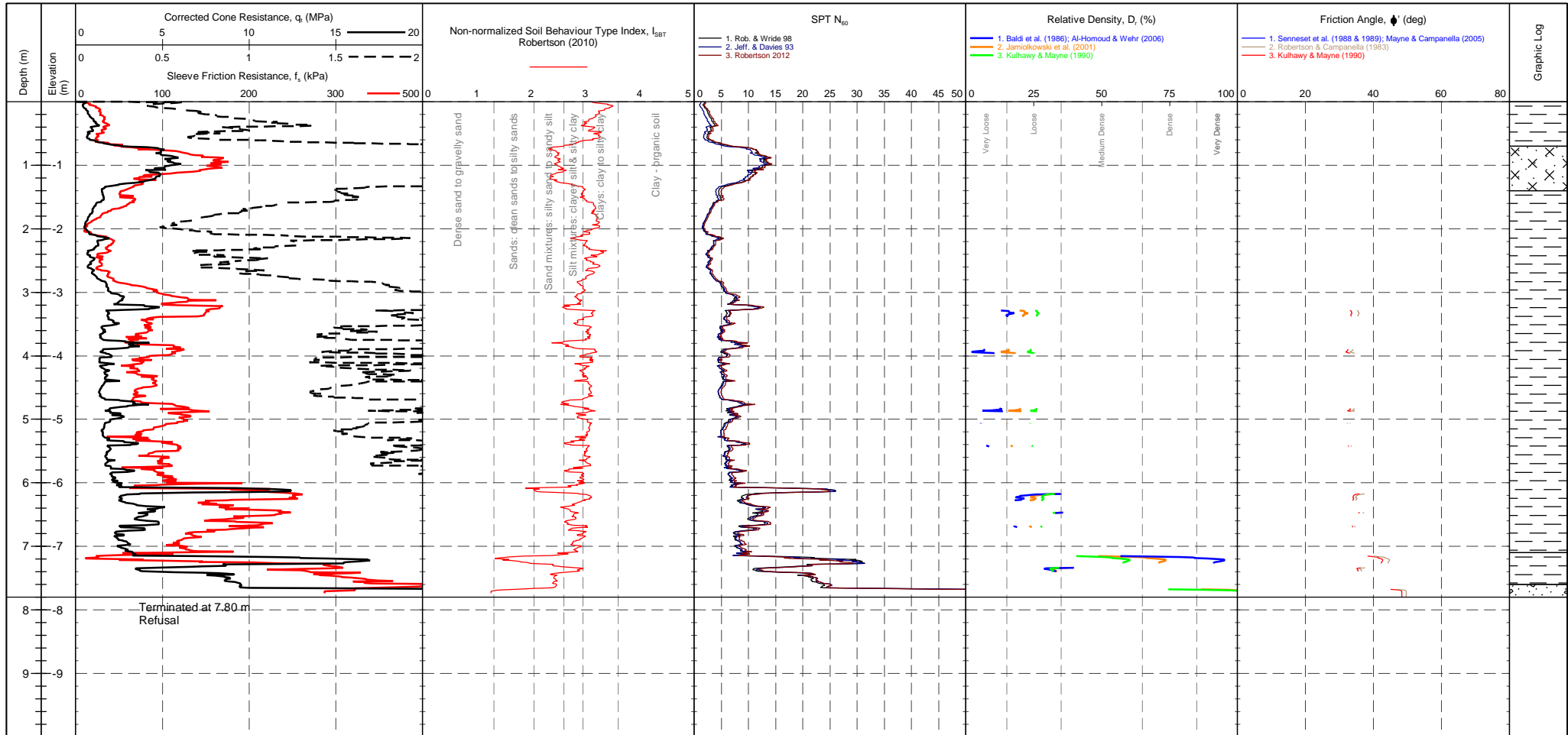
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	Transducer Tip : 233 mV Sleeve : 253 mV Pore Pressure 2 : 577 mV X-Y Inclinator : 2177 mV	CPTU ZERO VALUES Post : 229 mV Difference : -0.044 MPa Post : 249 mV Difference : -0.003 kPa Post : 536 mV Difference : -0.011 kPa Post : 2215 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
---	--	---	--	--	---------------------------------------

PointID	HYDCPT08
---------	-----------------

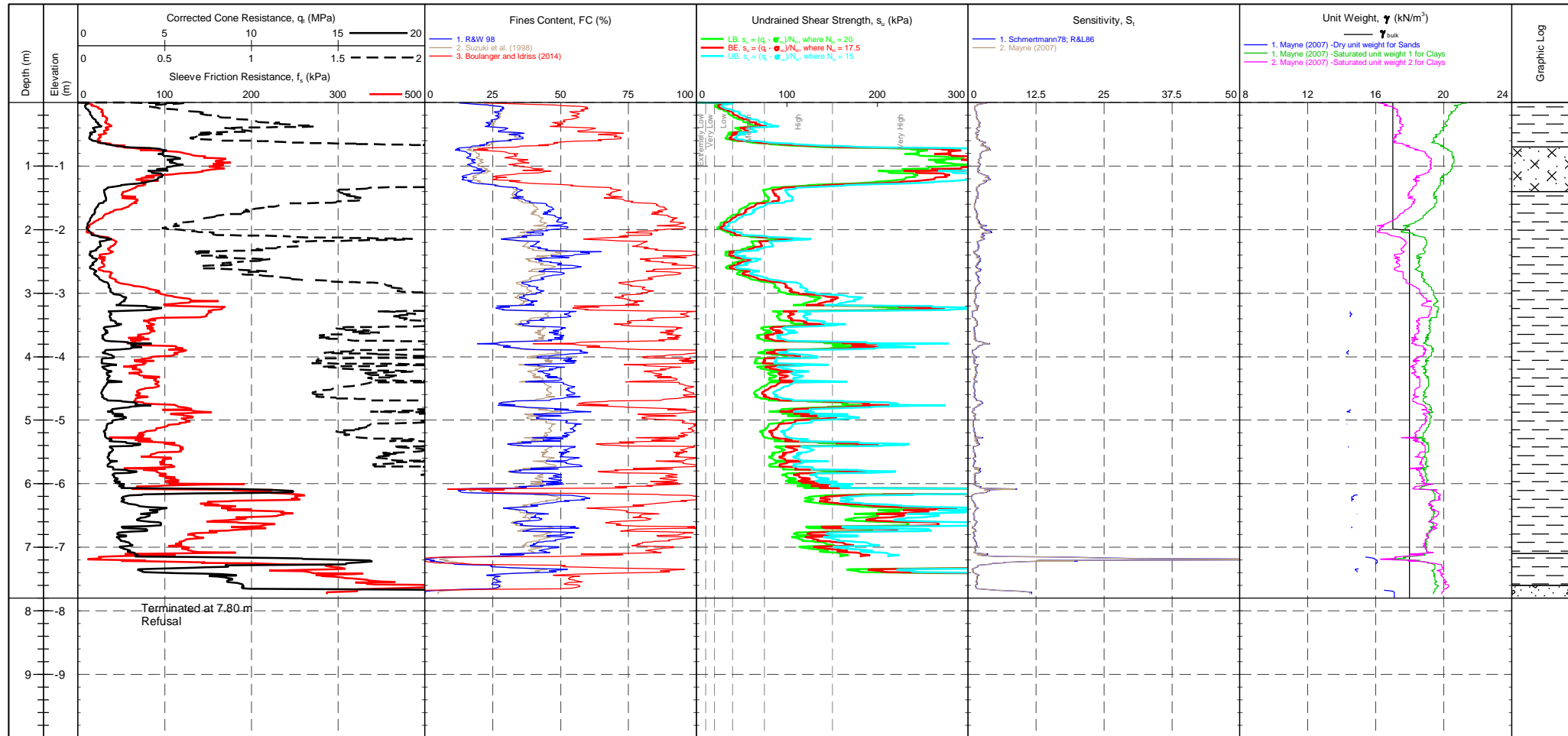
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 233 mV 229 mV -0.044 MPa Sleeve 253 mV 249 mV -0.003 kPa Pore Pressure 2 577 mV 536 mV -0.011 kPa X-Y Inclinometer 2177 mV 2215 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																																			

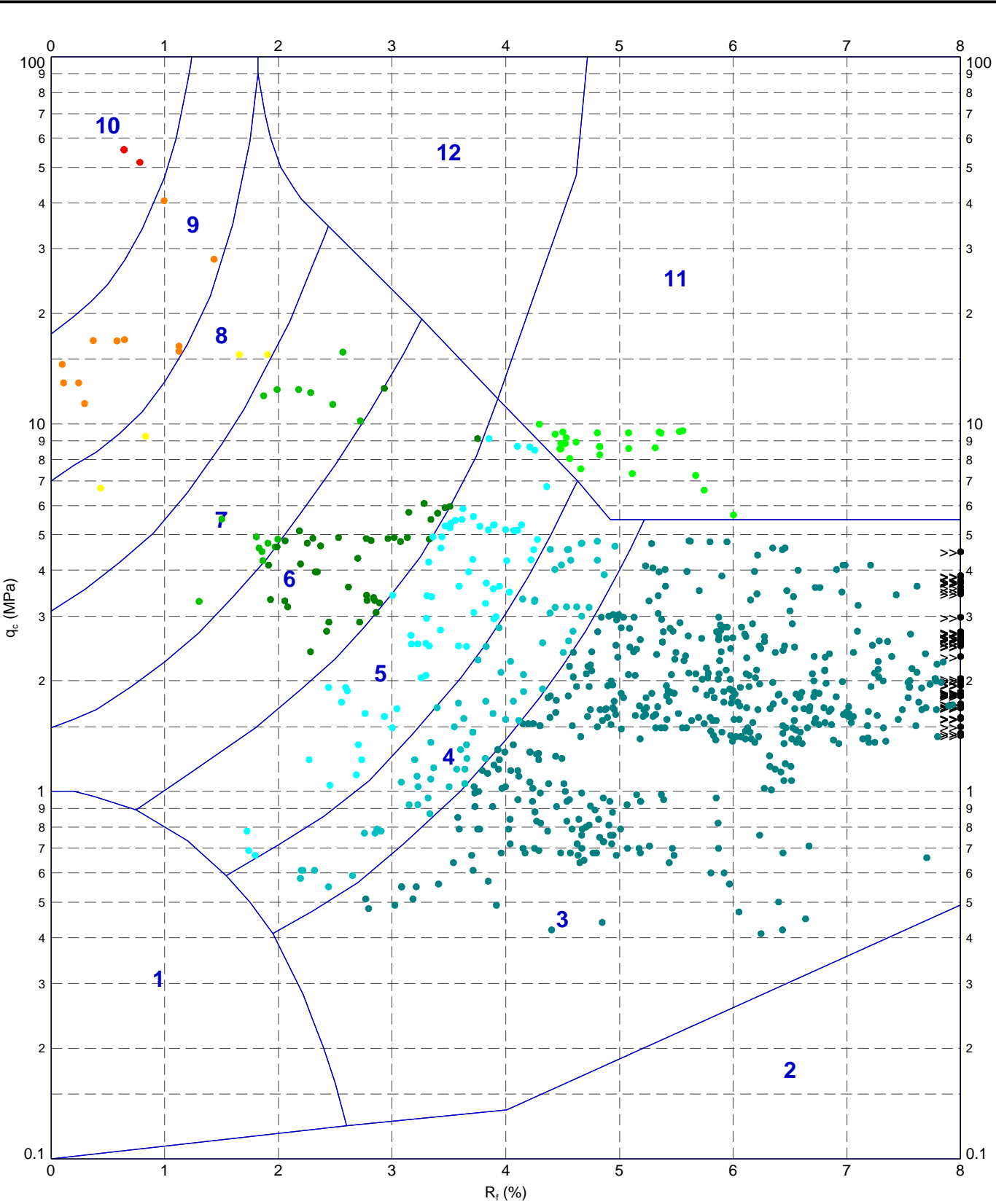
PointID	HYDCPT08
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 233 mV Sleeve : 253 mV Pore Pressure 2 : 577 mV X-Y Inclinator : 2177 mV	CPTU ZERO VALUES Post : 229 mV Difference : -0.044 MPa Post : 249 mV Difference : -0.003 kPa Post : 536 mV Difference : -0.011 kPa Post : 2215 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
--	--	---	--	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP 1210298 - WINGATES, BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 12:22 10.02.00.04 Dajed 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



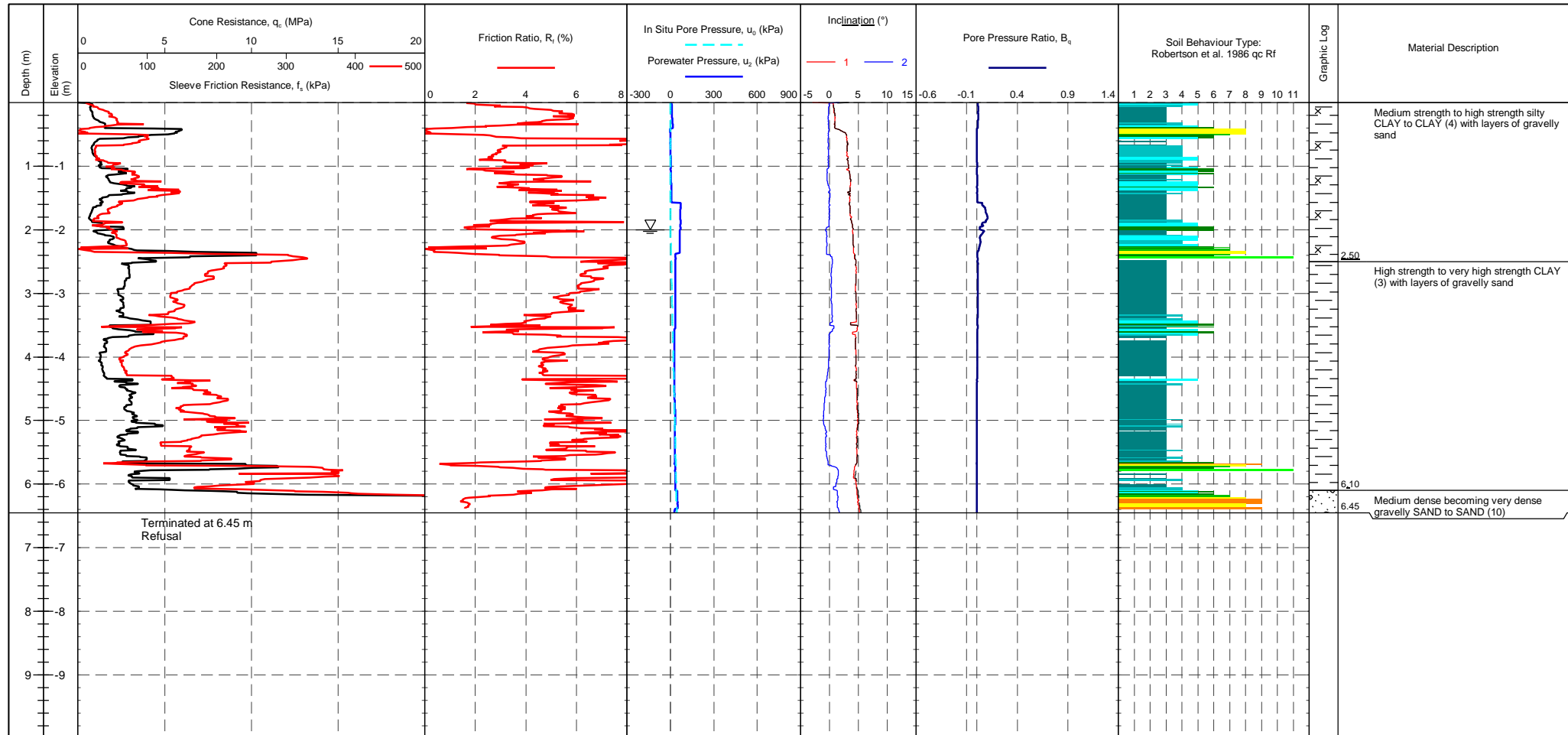
METHOD: Robertson et al. 1986 qc Rf

- 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>Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. R_f - HYDCPT08</p>	DRAWN	DATE	09/06/2021	
		CHECKED	DATE	09/06/2021	
		SCALE		Not To Scale	A4
		PROJECT No	FIGURE No		
		1210298			

PointID	HYDCPT09
---------	-----------------

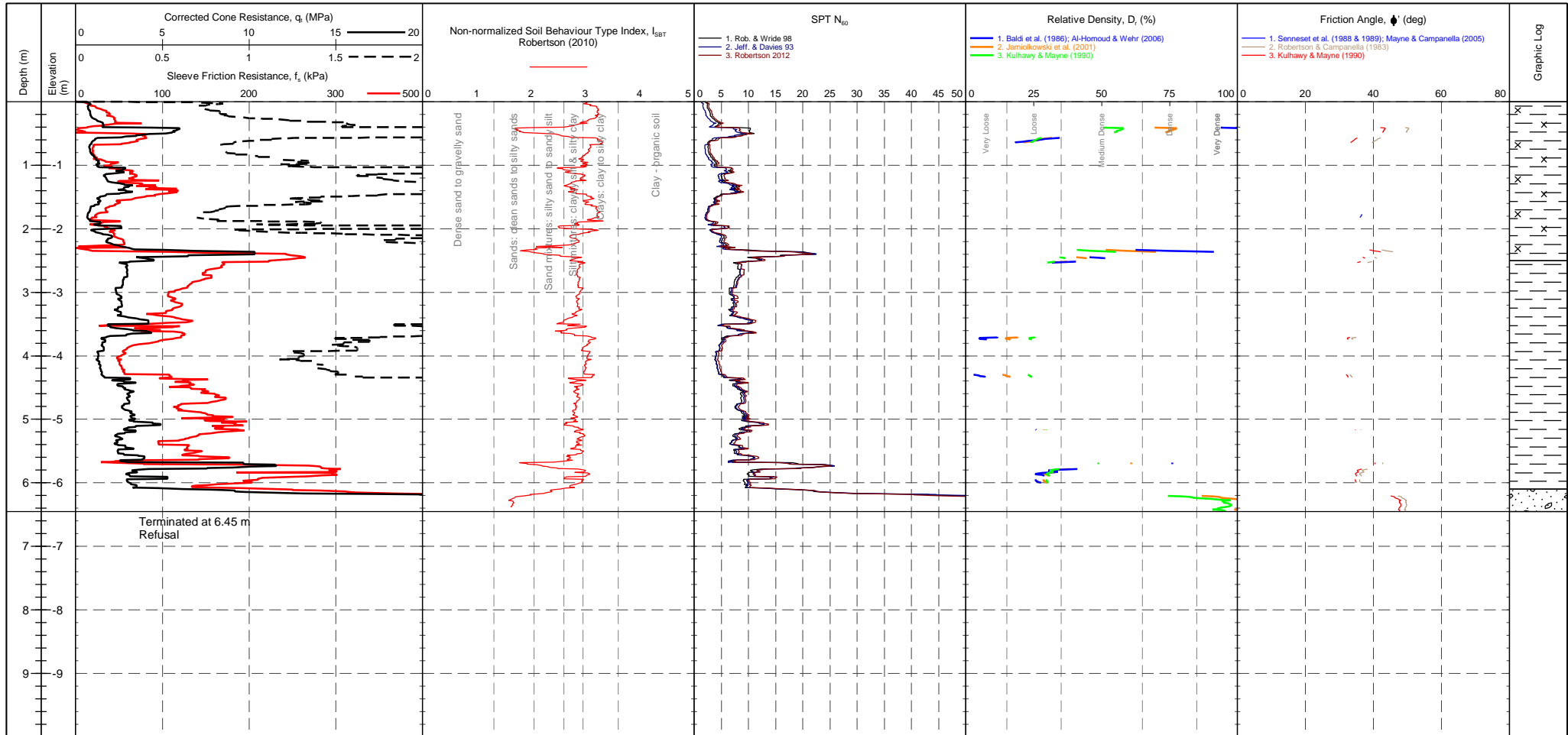
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: Pre 231 mV, Post 232 mV, Difference 0.011 MPa Sleeve: Pre 252 mV, Post 253 mV, Difference 0.001 kPa Pore Pressure 2: Pre 546 mV, Post 579 mV, Difference 0.009 kPa X-Y Inclinator: Pre 2135 mV, Post 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
--	--	---	---	---------------------------------------

PointID	HYDCPT09
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 231 mV 232 mV 0.011 MPa Sleeve 252 mV 253 mV 0.001 kPa Pore Pressure 2 546 mV 579 mV 0.009 kPa X-Y Inclinometer 2135 mV 2466 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																																			

PointID

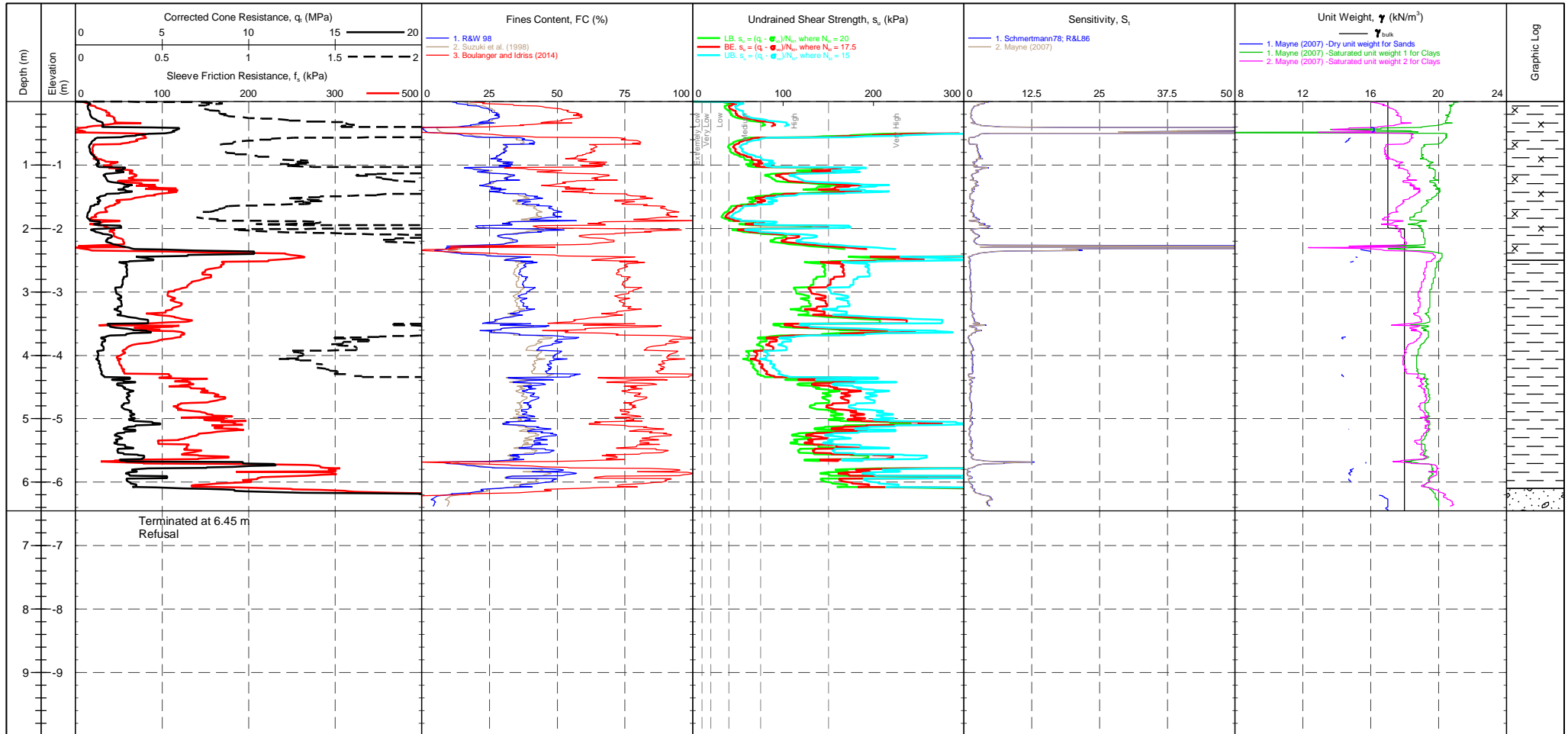
HYDCPT09

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 53.0 m
NORTHING : 25.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

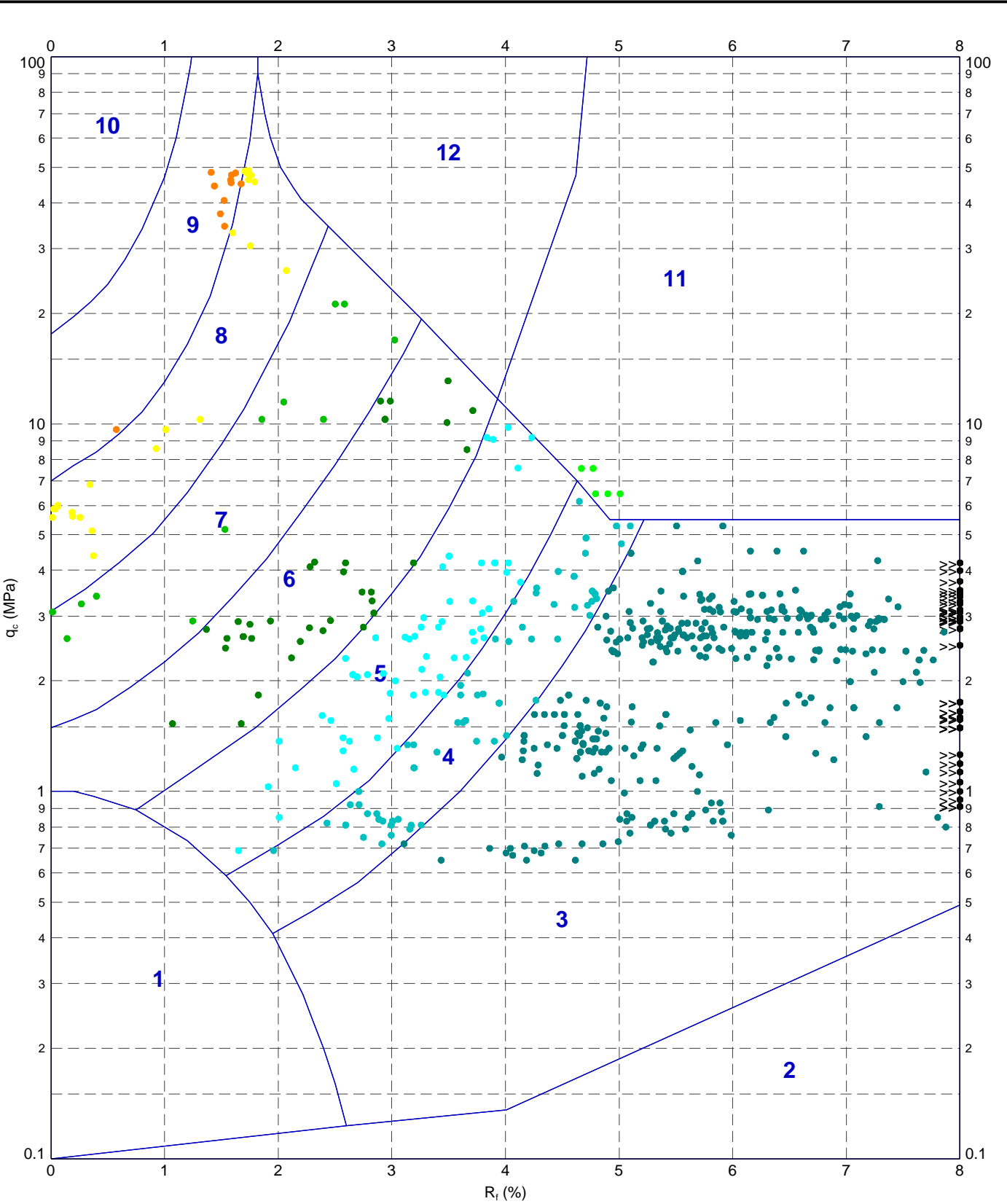
Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
STATUS : Final
TEST DATE : 03/06/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 231 mV Sleeve : 252 mV Pore Pressure 2 : 546 mV X-Y Inclinator : 2135 mV	CPTU ZERO VALUES Pre : 232 mV Post : 253 mV Difference : 0.011 MPa 0.001 kPa 0.009 kPa 2466 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
--	--	---	--	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf A4P. 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --DrawingFile-- 09/06/2021 12:23 10.02.00.04 Dajdel 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



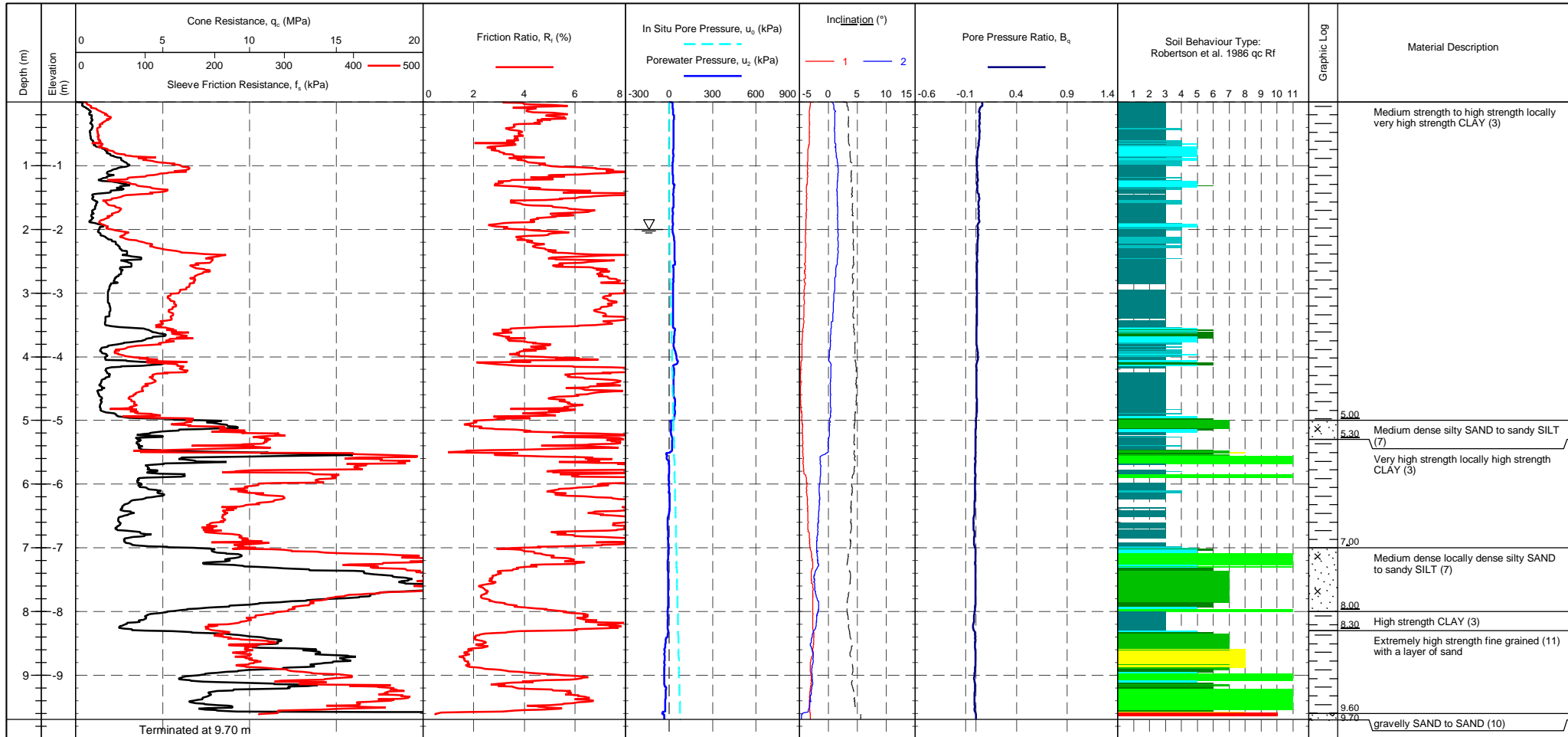
METHOD: Robertson et al. 1986 qc Rf

- 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 Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. Rf - HYDCPT09	DRAWN	DATE 09/06/2021
		CHECKED	DATE 09/06/2021
		SCALE Not To Scale	A4
		PROJECT No 1210298	FIGURE No

PointID	HYDCPT10
---------	-----------------

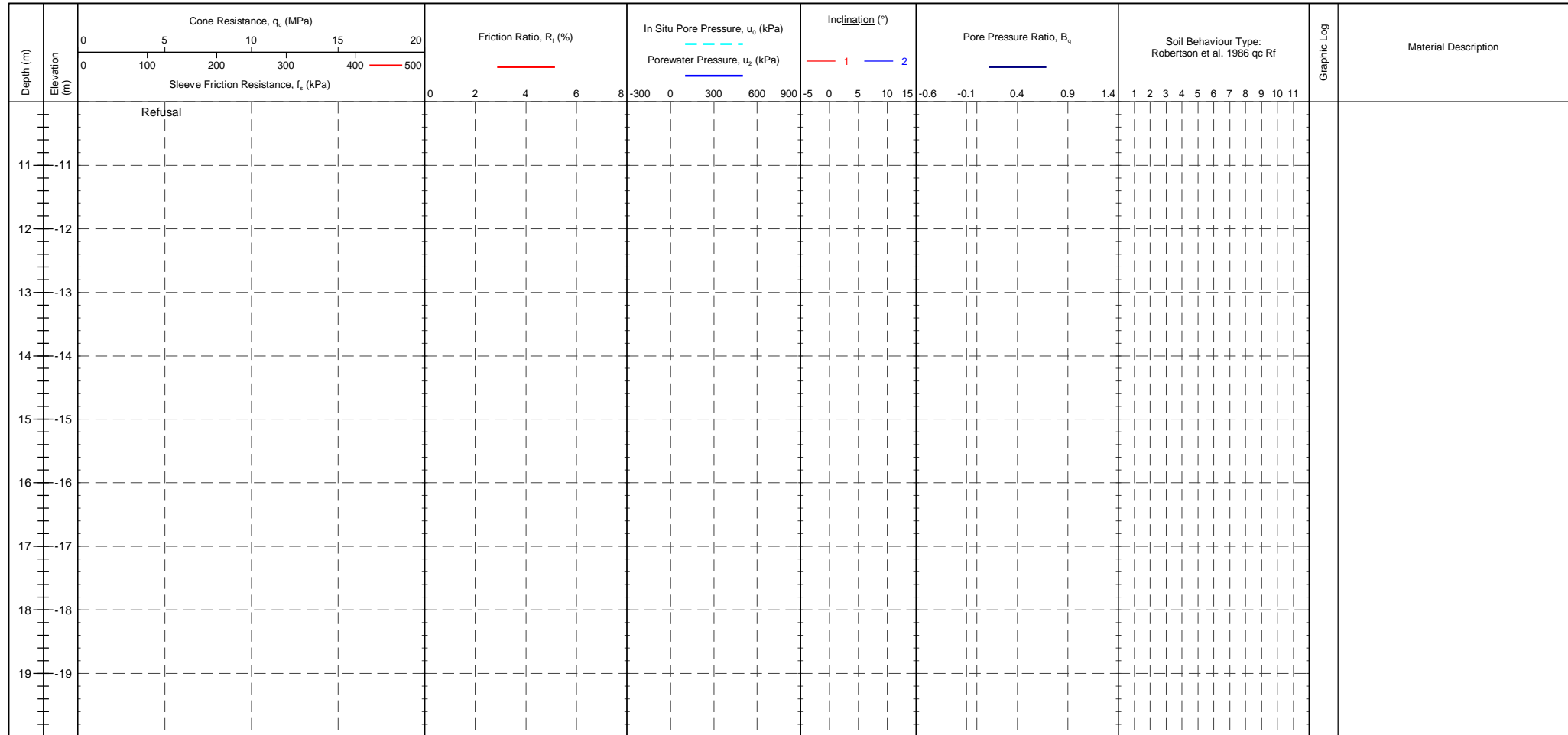
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: Pre 232 mV, Post 232 mV, Difference 0 MPa Sleeve: Pre 250 mV, Post 252 mV, Difference 0.001 kPa Pore Pressure 2: Pre 481 mV, Post 595 mV, Difference 0.032 kPa X-Y Inclinator: Pre 2181 mV, Post 2171 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
--	--	---	--	---------------------------------------

PointID	HYDCPT10
---------	-----------------

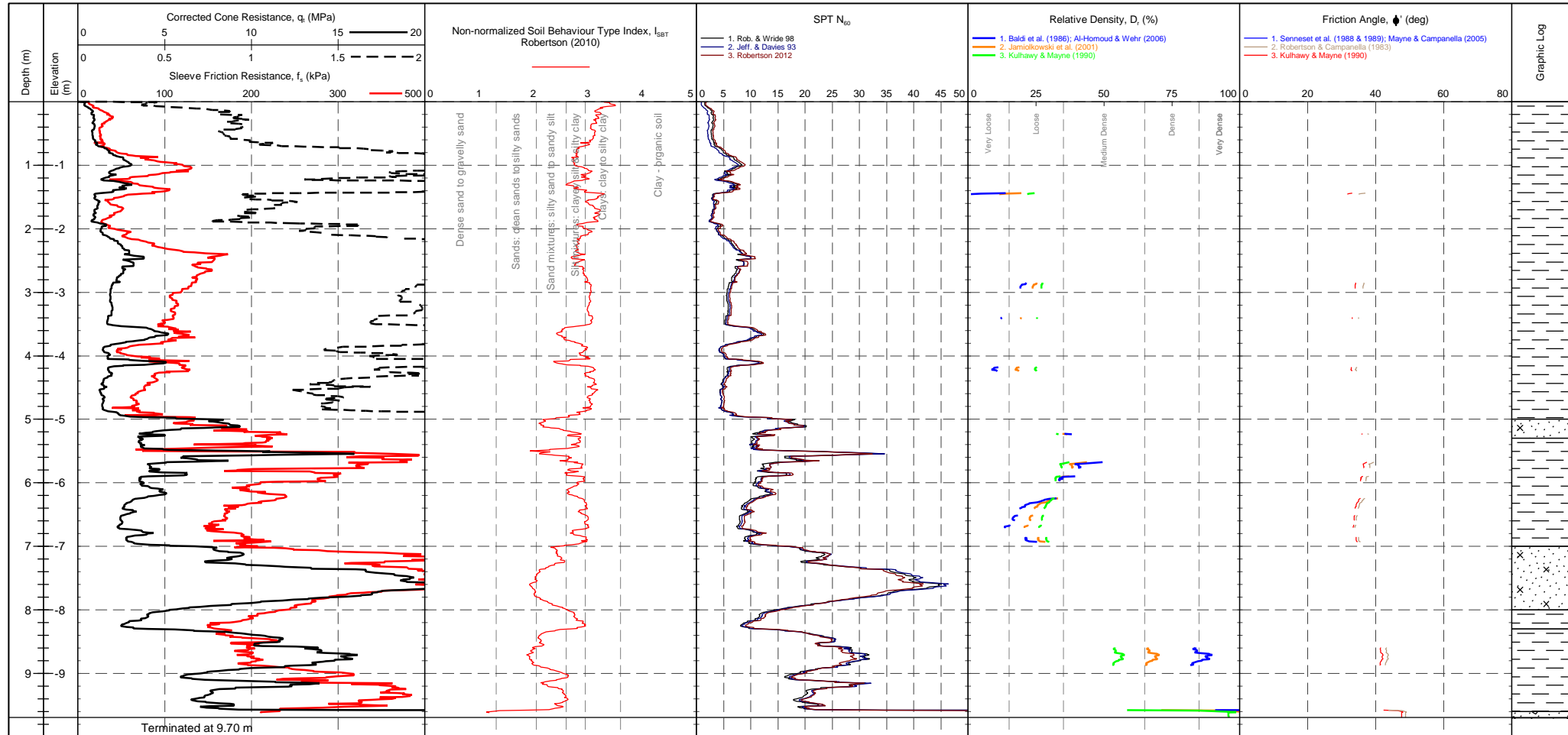
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes.	Transducer Tip : 232 mV Sleeve : 250 mV Pore Pressure 2 : 481 mV X-Y Inclinometer : 2181 mV	CPTU ZERO VALUES Post : 232 mV Difference : 0 MPa 0.001 kPa 595 mV 0.032 kPa 2171 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
---	---	---	--	--	---------------------------------------

PointID	HYDCPT10
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip: 232 mV Sleeve: 250 mV Pore Pressure 2: 481 mV X-Y Inclinometer: 2181 mV	CPTU ZERO VALUES Pre: 232 mV Post: 252 mV Difference: 0 MPa 0.001 kPa 0.032 kPa 2171 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																																				

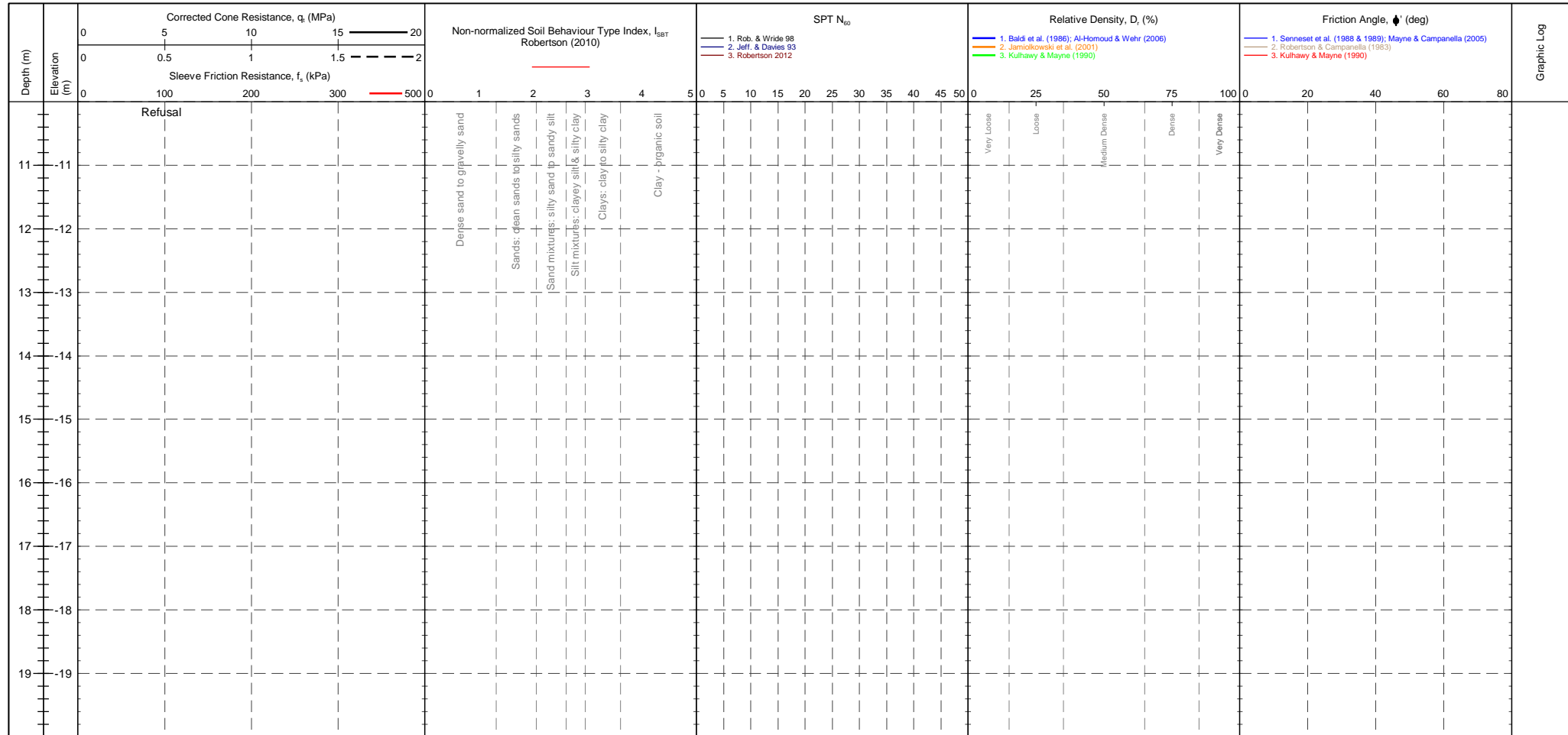


NOITAEITSEVINI SITE INVESTIGATION Working with:



PointID
HYDCPT10

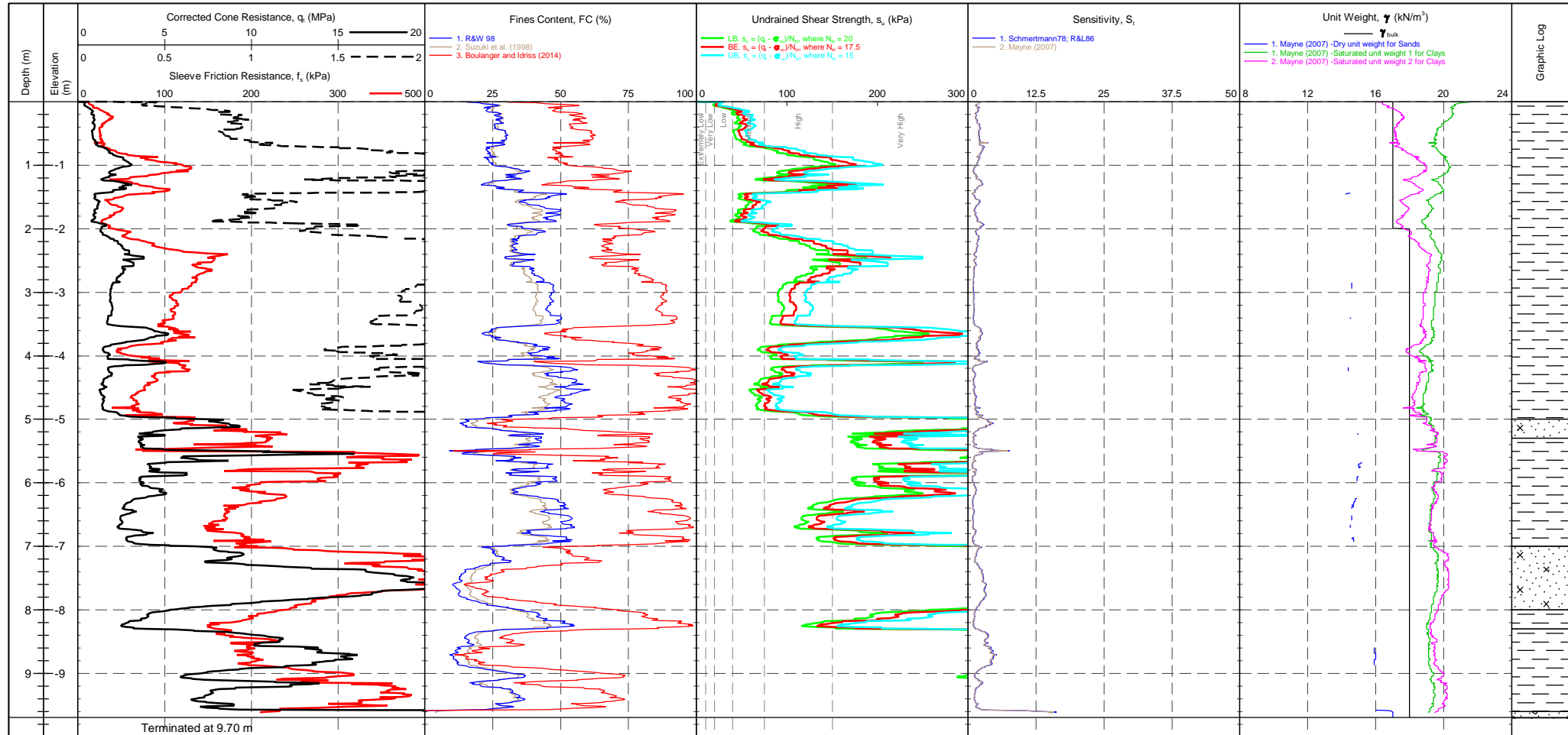
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 232 mV Sleeve : 250 mV / 252 mV Pore Pressure 2 : 481 mV / 595 mV X-Y Inclinator : 2181 mV / 2171 mV	CPTU ZERO VALUES Pre : 232 mV Post : 252 mV Difference : 0 MPa / 0.001 kPa / 0.032 kPa	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	HYDCPT10
---------	----------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 2 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 232 mV Sleeve : 250 mV Pore Pressure 2 : 481 mV X-Y Inclinometer : 2181 mV	CPTU ZERO VALUES Post : 232 mV Difference : 0 MPa 252 mV 0.001 kPa 595 mV 0.032 kPa 2171 mV	COHESIVE SOILS (Clays & Silts) Robertson et al. 1986 Zones 1-6 and Zone 11 Term based on measurement su (kPa) <10 10-20 20-40	Term based on measurement su (kPa) 40-75 75-150 150-300 >300	Groundwater Level Dissipation Test
--	--	---	--	--	---	---------------------------------------



NOITAEITSEVNI SITE INVESTIGATION Working with:



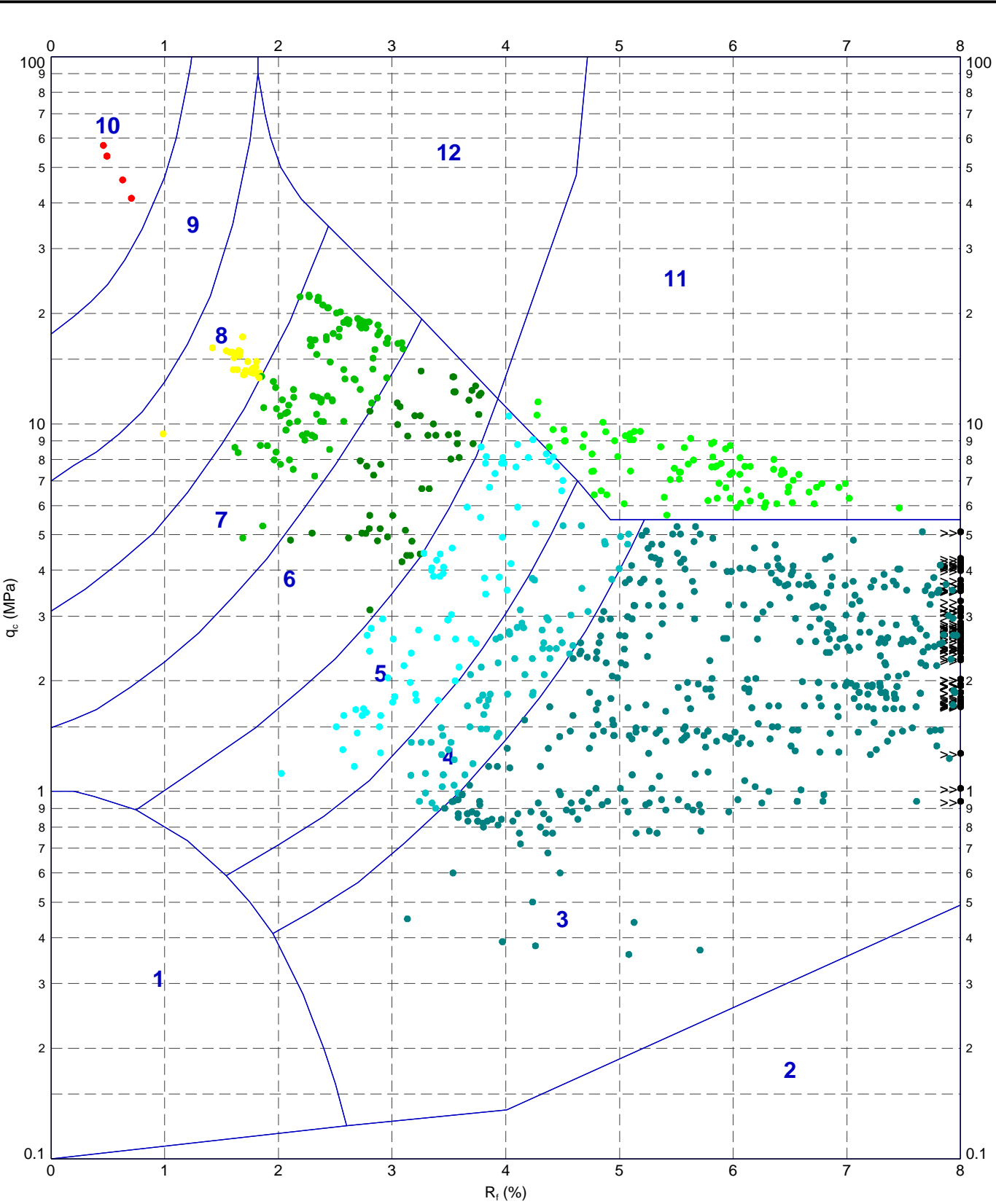
PointID
HYDCPT10

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 2 OF 2 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 232 mV 232 mV 0 MPa Sleeve 250 mV 252 mV 0.001 kPa Pore Pressure 2 481 mV 595 mV 0.032 kPa X-Y Inclinator 2181 mV 2171 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
--	--	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf APF 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 12:25 10.02.00.04 Dajdel 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



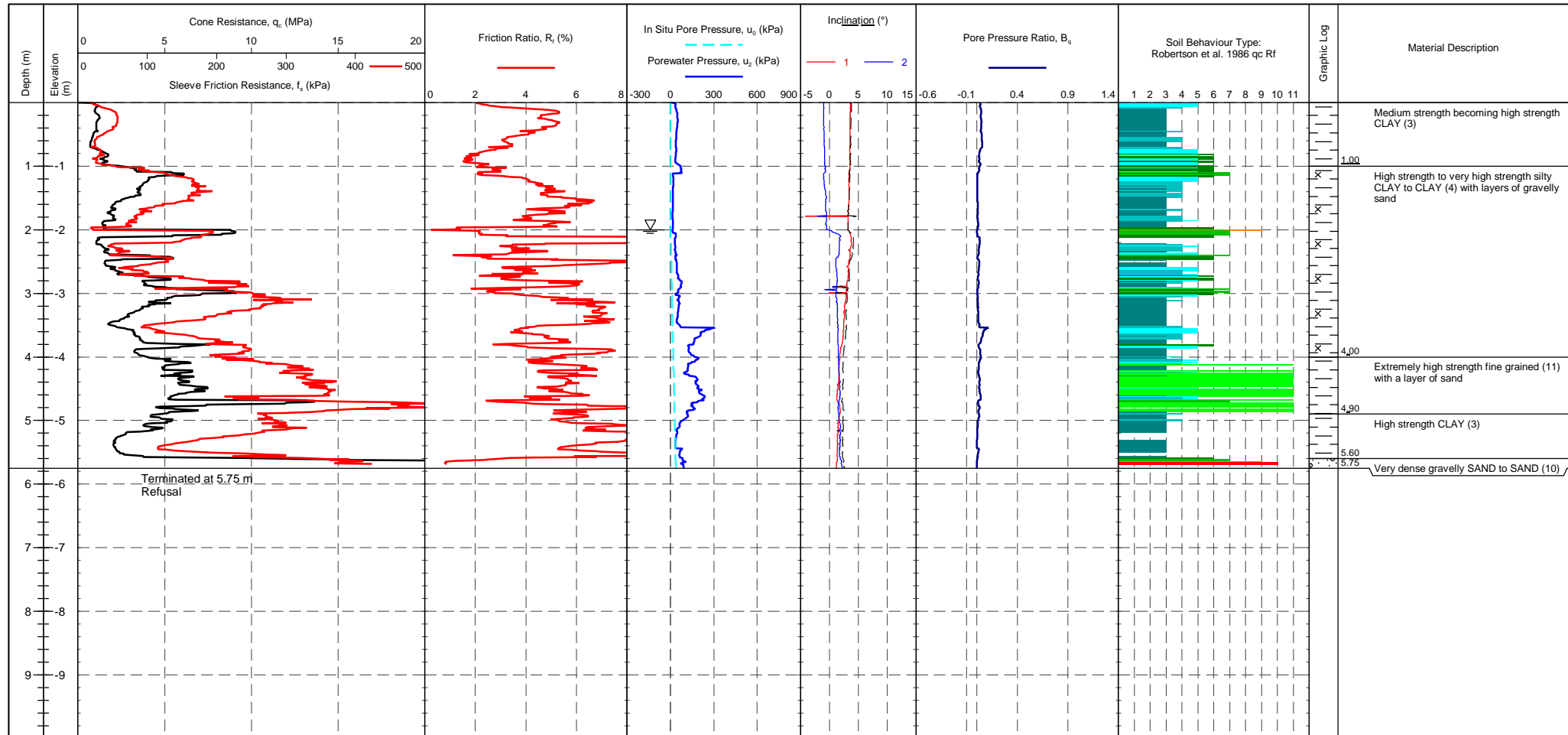
METHOD: Robertson et al. 1986 qc Rf

- 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 Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. Rf - HYDCPT10	DRAWN	DATE 09/06/2021
		CHECKED	DATE 09/06/2021
		SCALE Not To Scale	A4
		PROJECT No 1210298	FIGURE No

PointID	HYDCPT11
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	Transducer Tip : 238 mV Sleeve : 253 mV Pore Pressure 2 : 464 mV X-Y Inclinometer : 2762 mV	CPTU ZERO VALUES Post : 237 mV Difference : -0.011 MPa Post : 252 mV Difference : -0.001 kPa Post : 504 mV Difference : 0.011 kPa Post : 2792 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
---	--	---	---	--	---------------------------------------

PointID

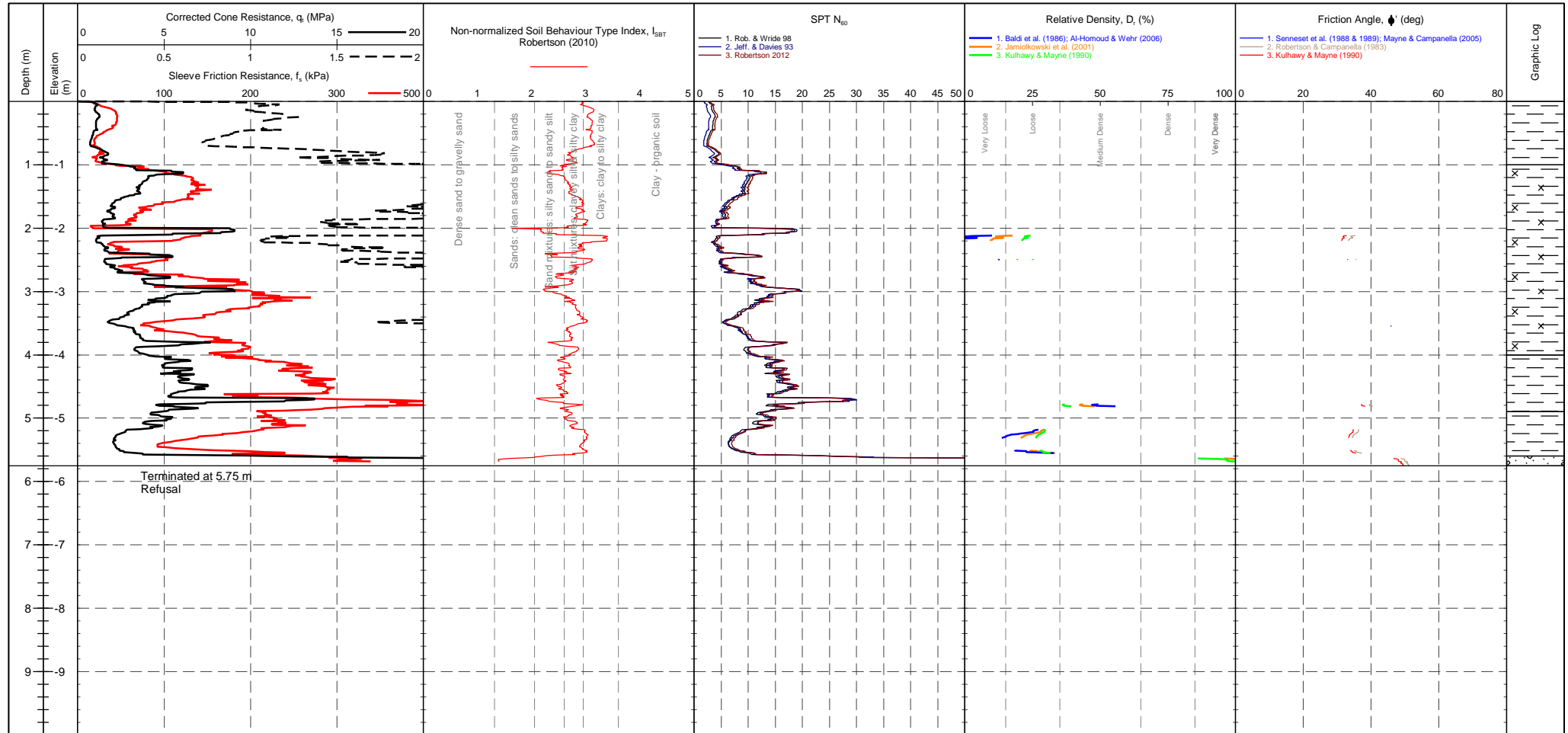
HYDCPT11

CLIENT : Hydrock
PROJECT : Wingates, Bolton
LOCATION : Wingate, Bolton
PROJECT No. : 1210298

EASTING : 0.0 m
NORTHING : 0.0 m
ELEVATION : 0.00 m OD
CHECKED BY : LD
TERMINATION REASON : Refusal

Remark:
 Test refused on total pressure.

SHEET : 1 OF 1
STATUS : Final
TEST DATE : 04/06/2021
PLOT DATE : 09/06/2021
METHOD : ISO 22476-1:2012



CONE ID : S15-CFIP.1360
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 017 - Griffen
OPERATOR : JE
FRICION REDUCER : None
WEATHER : Overcast & Mild

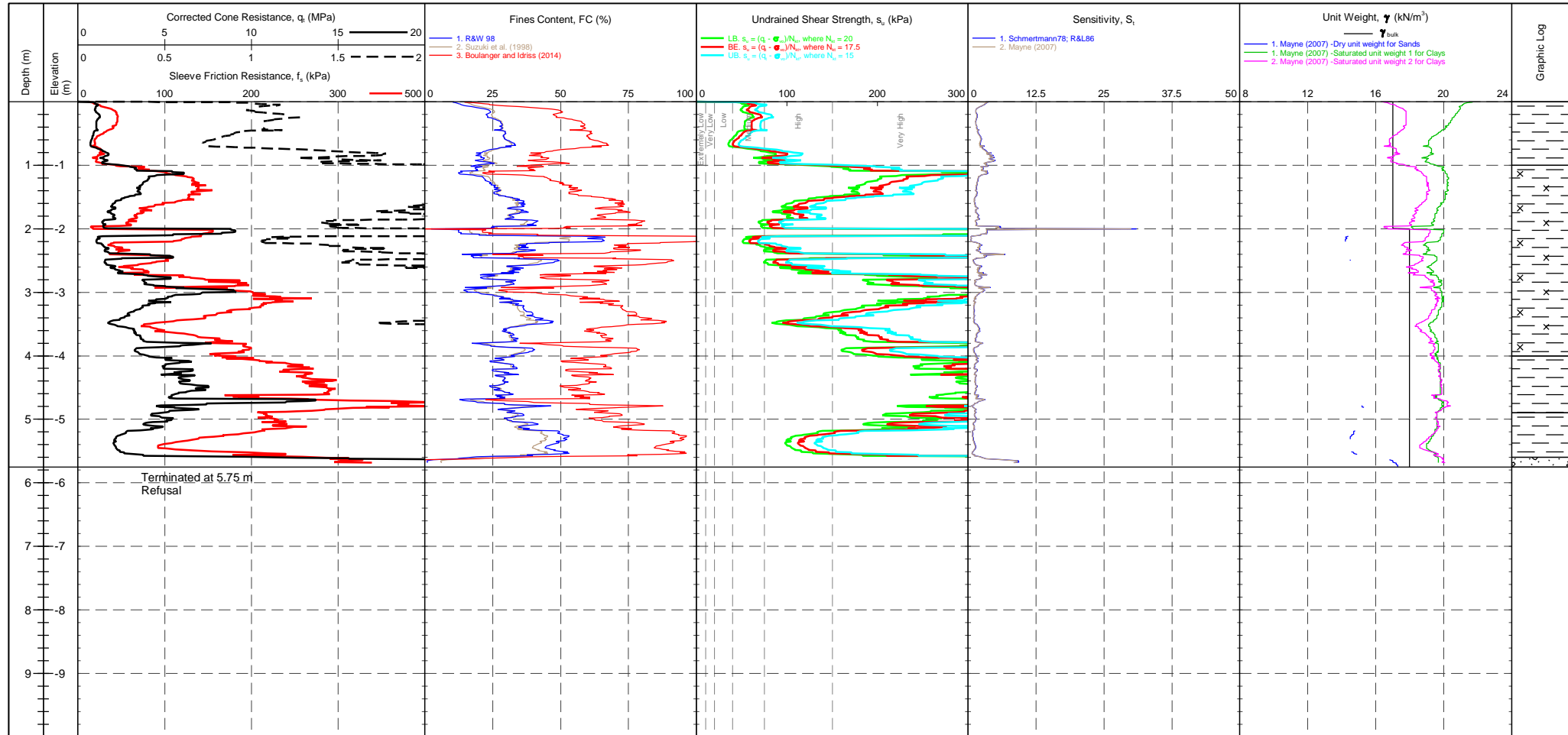
CPTU ZERO VALUES
 Transducer Pre Post Difference
 Tip 238 mV 237 mV -0.011 MPa
 Sleeve 253 mV 252 mV -0.001 kPa
 Pore Pressure 2 464 mV 504 mV 0.011 kPa
 X-Y Inclinator 2762 mV 2792 mV

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
Clays	2.95-3.60	Very Loose	0 - 4	Very Loose
Silt mixtures	2.60-2.95	Loose	4 - 10	Loose
Sand mixtures	2.05-2.60	Medium Dense	10 - 30	Medium Dense
Sands	1.31-2.05	Dense	30 - 50	Dense
Gravelly sand	<1.31	Very Dense	>50	Very Dense

Groundwater Level
 Dissipation Test

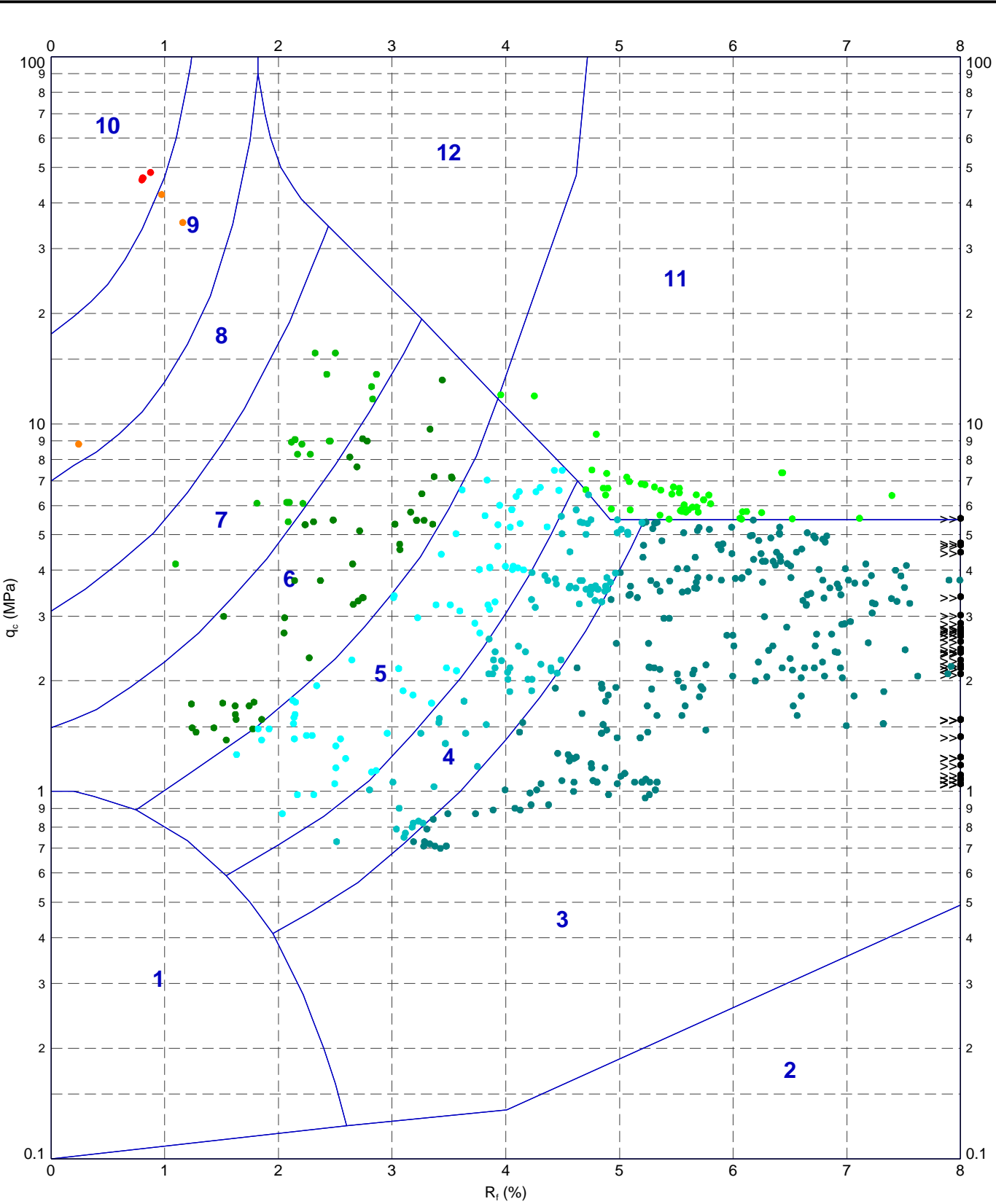
PointID	HYDCPT11
---------	-----------------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 0.0 m NORTHING : 0.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 04/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 238 mV Sleeve : 253 mV Pore Pressure 2 : 464 mV X-Y Inclinator : 2762 mV	CPTU ZERO VALUES Post : 237 mV Difference : -0.011 MPa Post : 252 mV Difference : -0.001 kPa Post : 504 mV Difference : 0.011 kPa Post : 2792 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
--	--	---	---	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf MAP. 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --DrawingFile-- 09/06/2021 12:26 10.02.00.04 Dajal 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



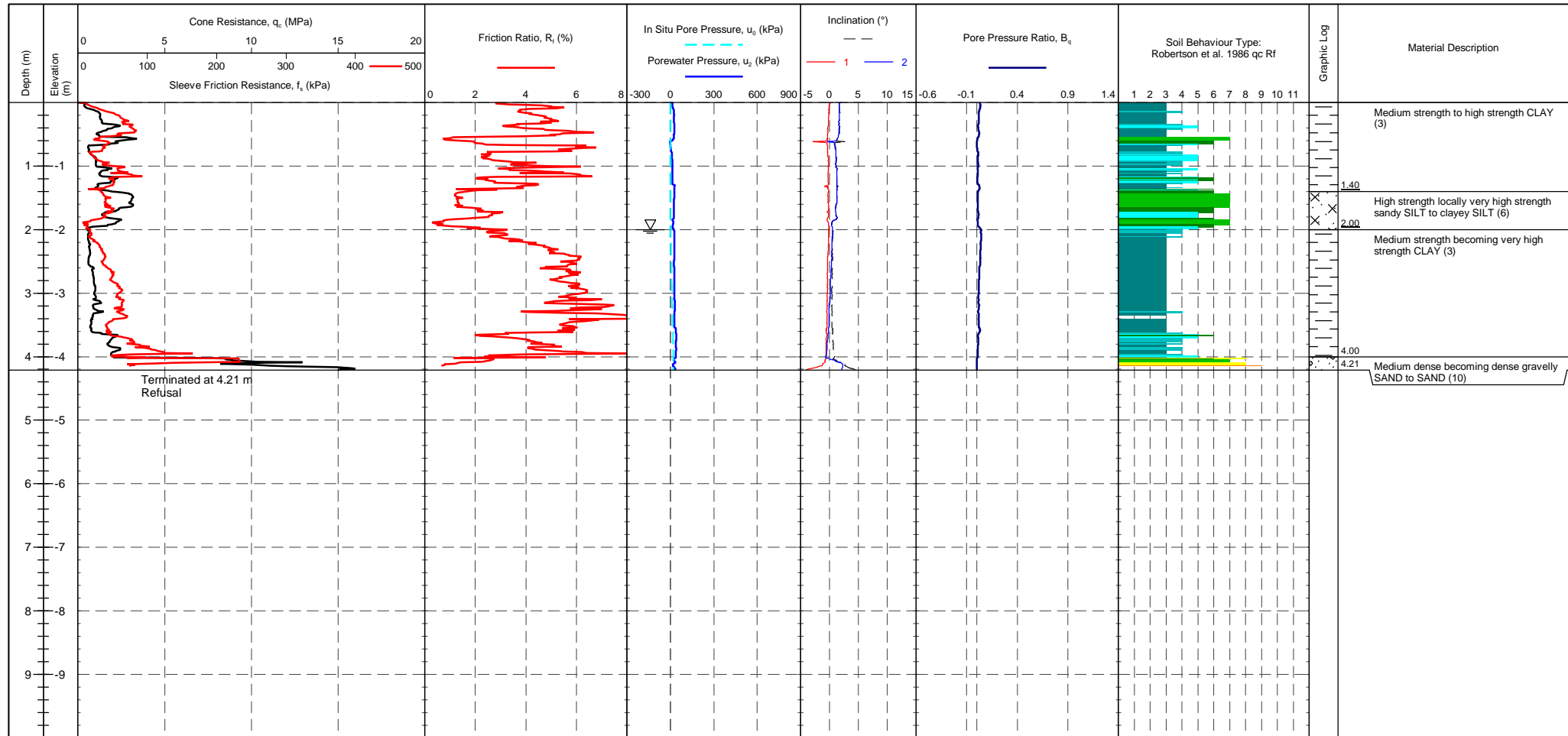
METHOD: Robertson et al. 1986 qc Rf

- 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>Hydrock Wingate, Bolton Wingates, Bolton</p> <p>Robertson et al. 1986 qc vs. R_f - HYDCPT11</p>	DRAWN	DATE 09/06/2021	
		CHECKED	DATE 09/06/2021	
		SCALE	Not To Scale	
		PROJECT No 1210298	FIGURE No	
			A4	

PointID	HYDCPT12
---------	-----------------

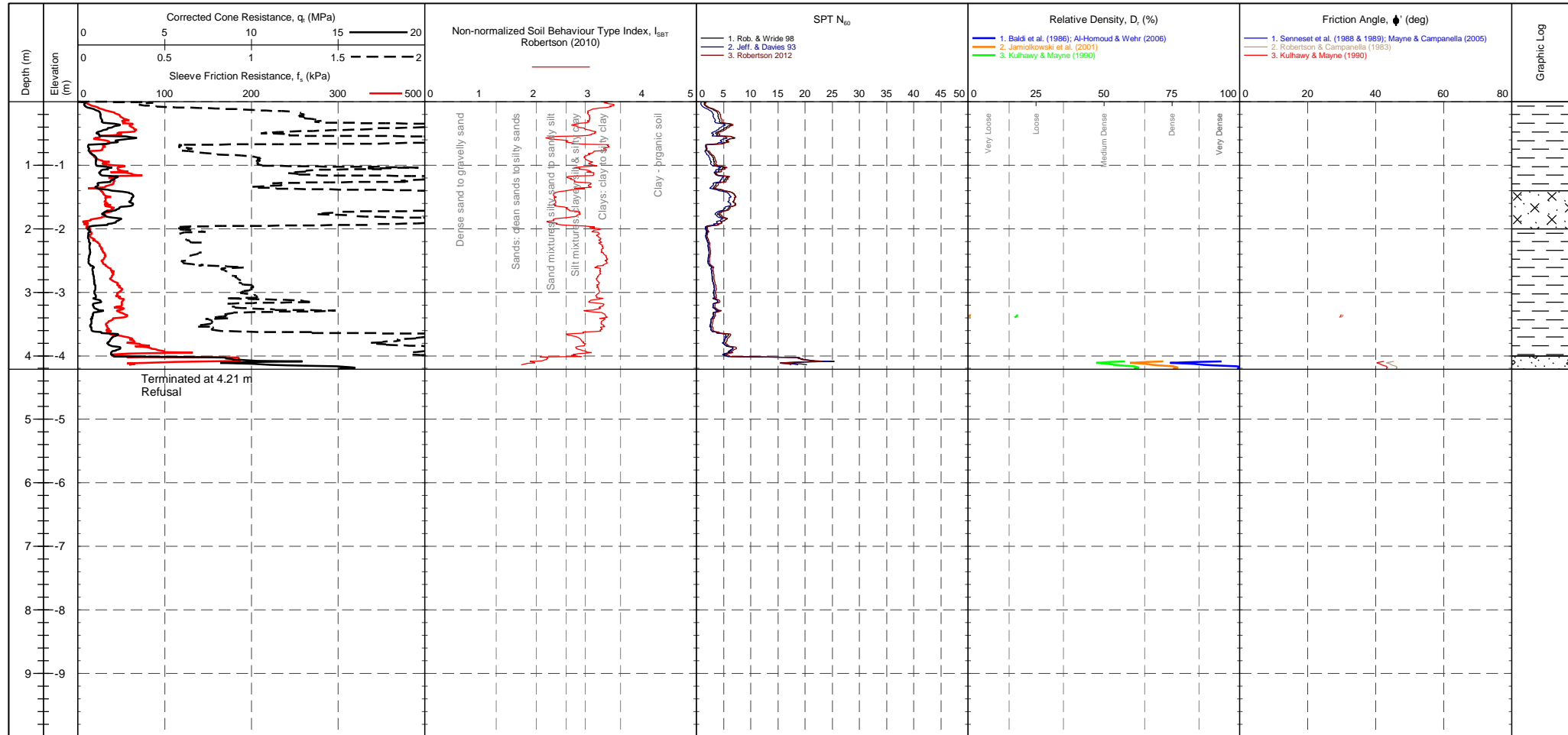
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	---	---



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip : 234 mV / 235 mV / 0.011 MPa Sleeve : 251 mV / 253 mV / 0.001 kPa Pore Pressure 2 : 458 mV / 501 mV / 0.012 kPa X-Y Inclinator : 2482 mV / 2462 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
---	--	--	--	---------------------------------------

PointID	HYDCPT12
---------	-----------------

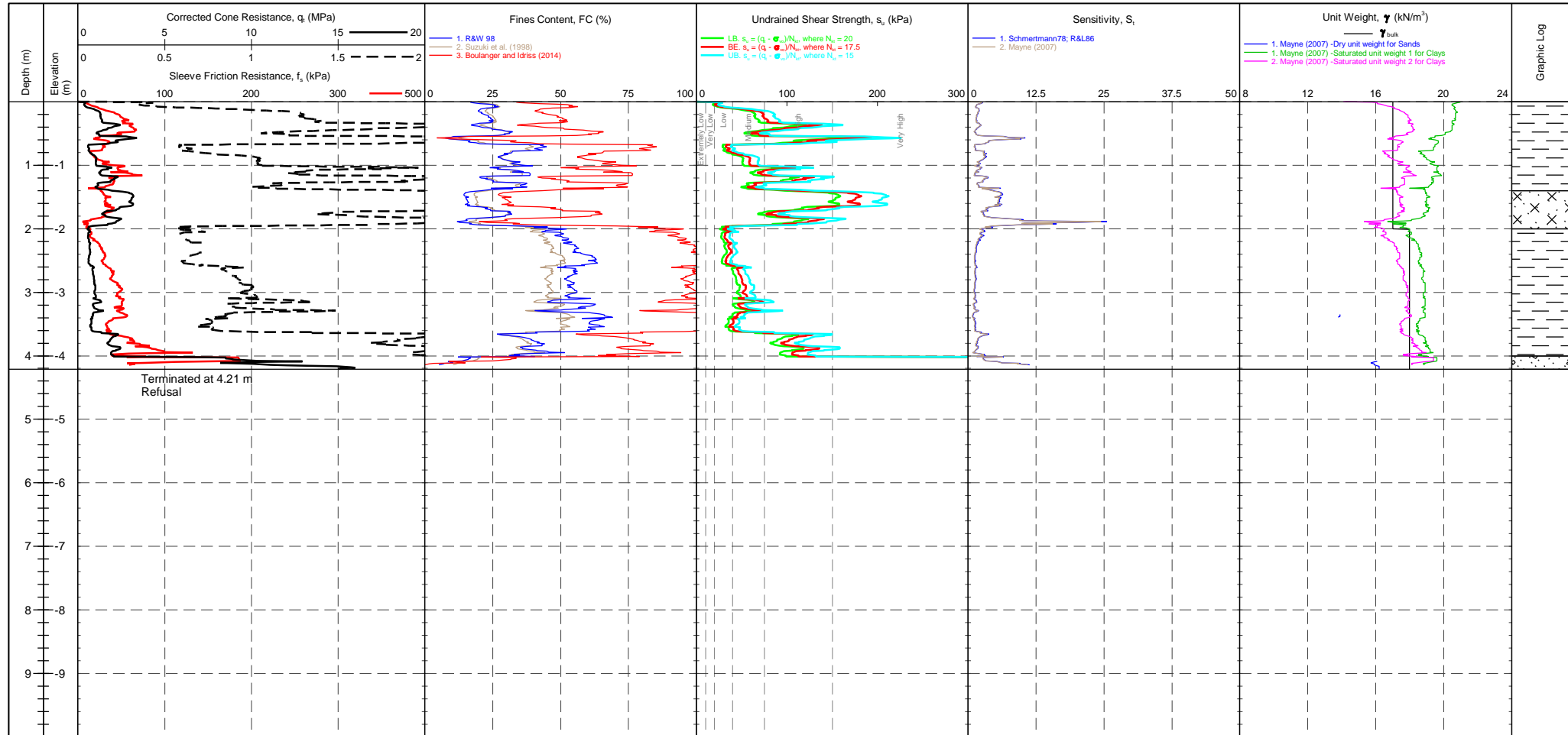
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	--	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Tip : 234 mV 235 mV Sleeve : 251 mV 253 mV 0.011 MPa Pore Pressure 2 : 458 mV 501 mV 0.012 kPa X-Y Inclinator : 2482 mV 2462 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																																			

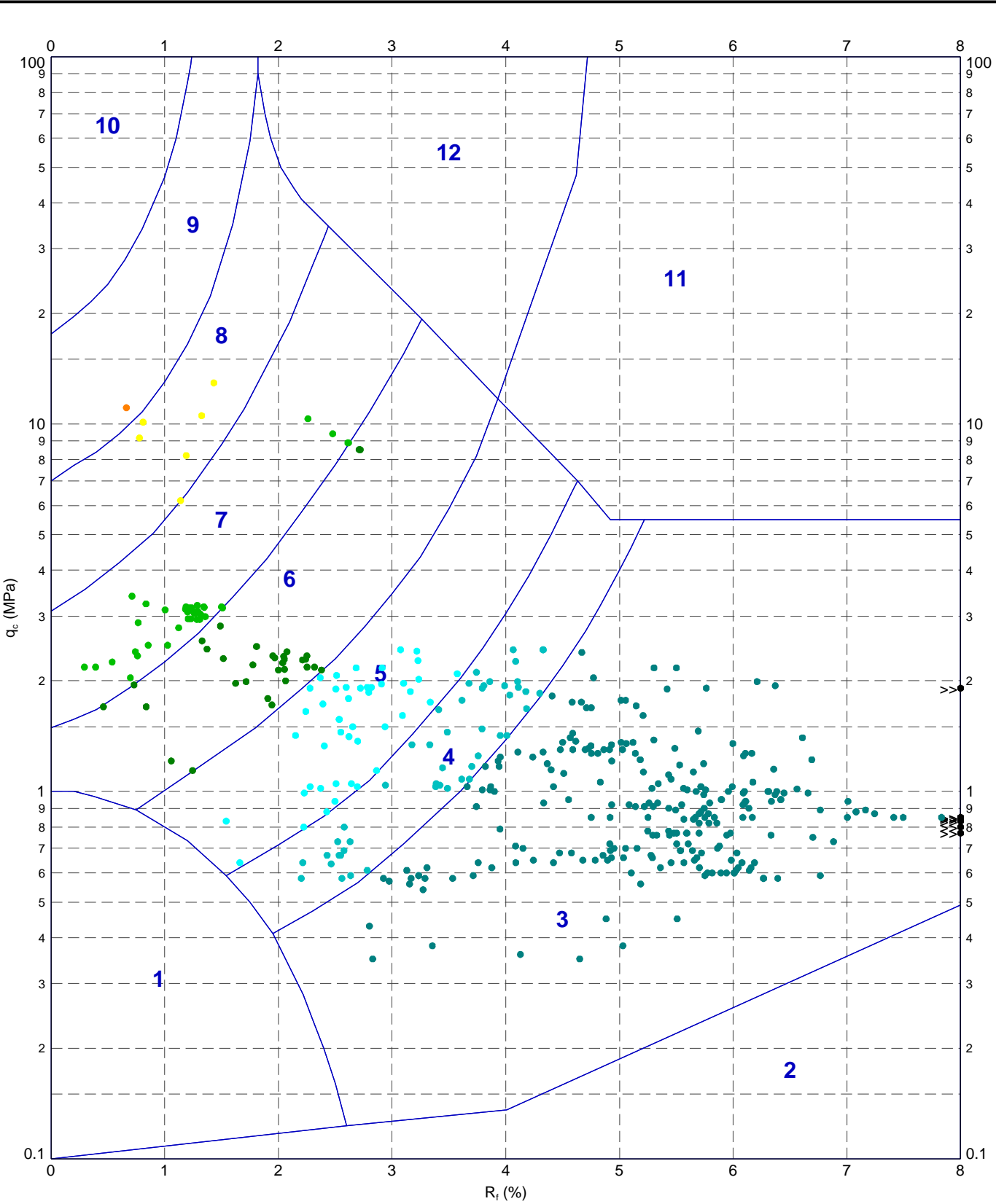
PointID	HYDCPT12
---------	----------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	---	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip Sleeve Pore Pressure 2 X-Y Inclinator	CPTU ZERO VALUES Pre Post Difference 234 mV 235 mV 0.011 MPa 251 mV 253 mV 0.001 kPa 458 mV 501 mV 0.012 kPa 2482 mV 2462 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
--	--	--	--	---	--	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LUB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf APT 1210298 - WINGATES, BOLTON - HYDROCK.GPJ --drawingFile-- 09/06/2021 12:27 10.02.00.04 D:\git\lab\in\stau\tool - DGD [Lib: In Situ SI 2.02.0 2017-07-10 Proj: In Situ SI 2.02.0 2017-07-10



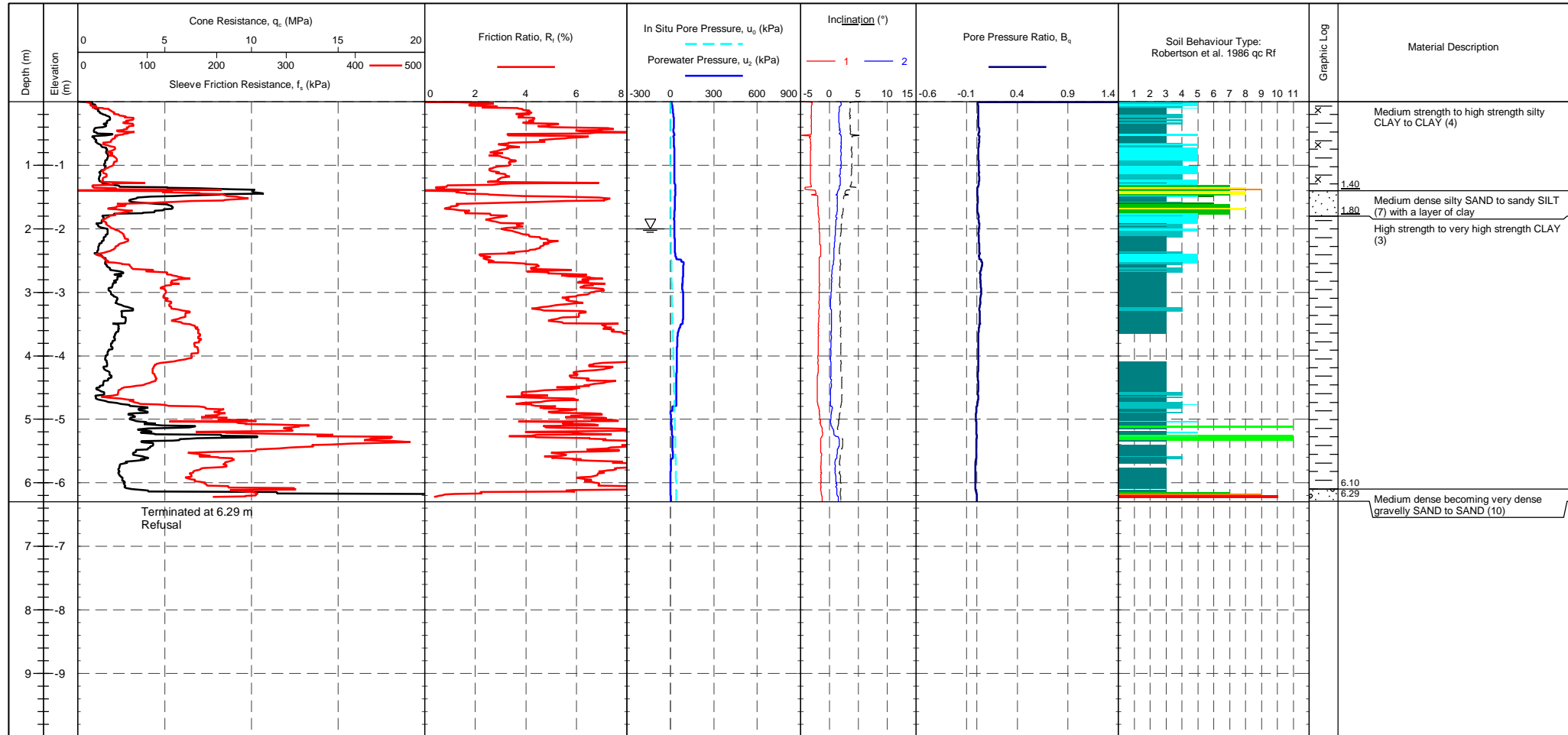
METHOD: Robertson et al. 1986 qc Rf

- 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>Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 qc vs. R_f - HYDCPT12</p>	DRAWN	DATE	09/06/2021	
		CHECKED	DATE	09/06/2021	
		SCALE	Not To Scale		A4
		PROJECT No	FIGURE No		
		1210298			

PointID	HYDCPT13
---------	-----------------

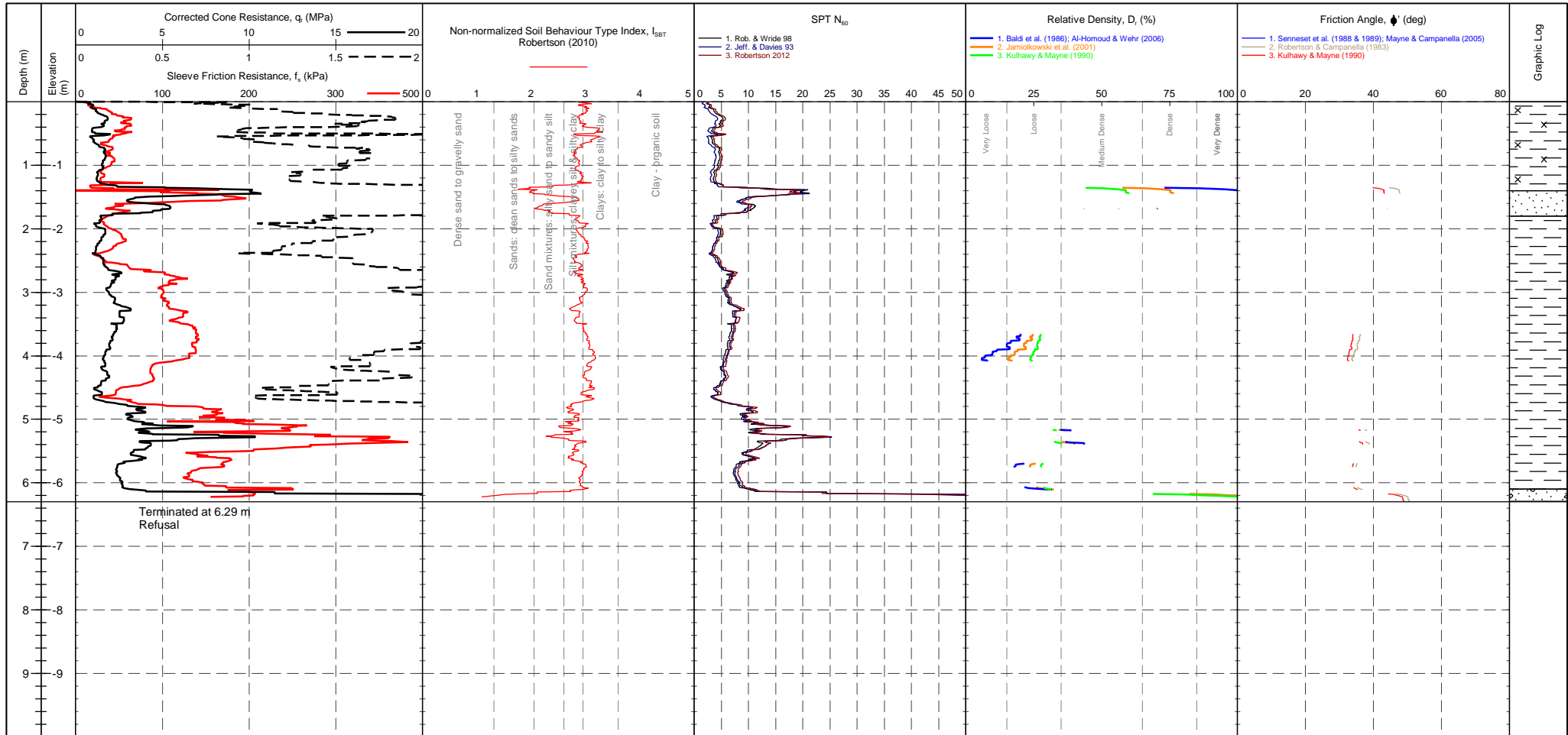
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	--	--



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Pre Post Difference Tip 231 mV 230 mV -0.011 MPa Sleeve 250 mV 251 mV 0.001 kPa Pore Pressure 2 582 mV 548 mV -0.01 kPa X-Y Inclinator 2122 mV 2125 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
---	--	--	--	---------------------------------------

PointID	HYDCPT13
---------	-----------------

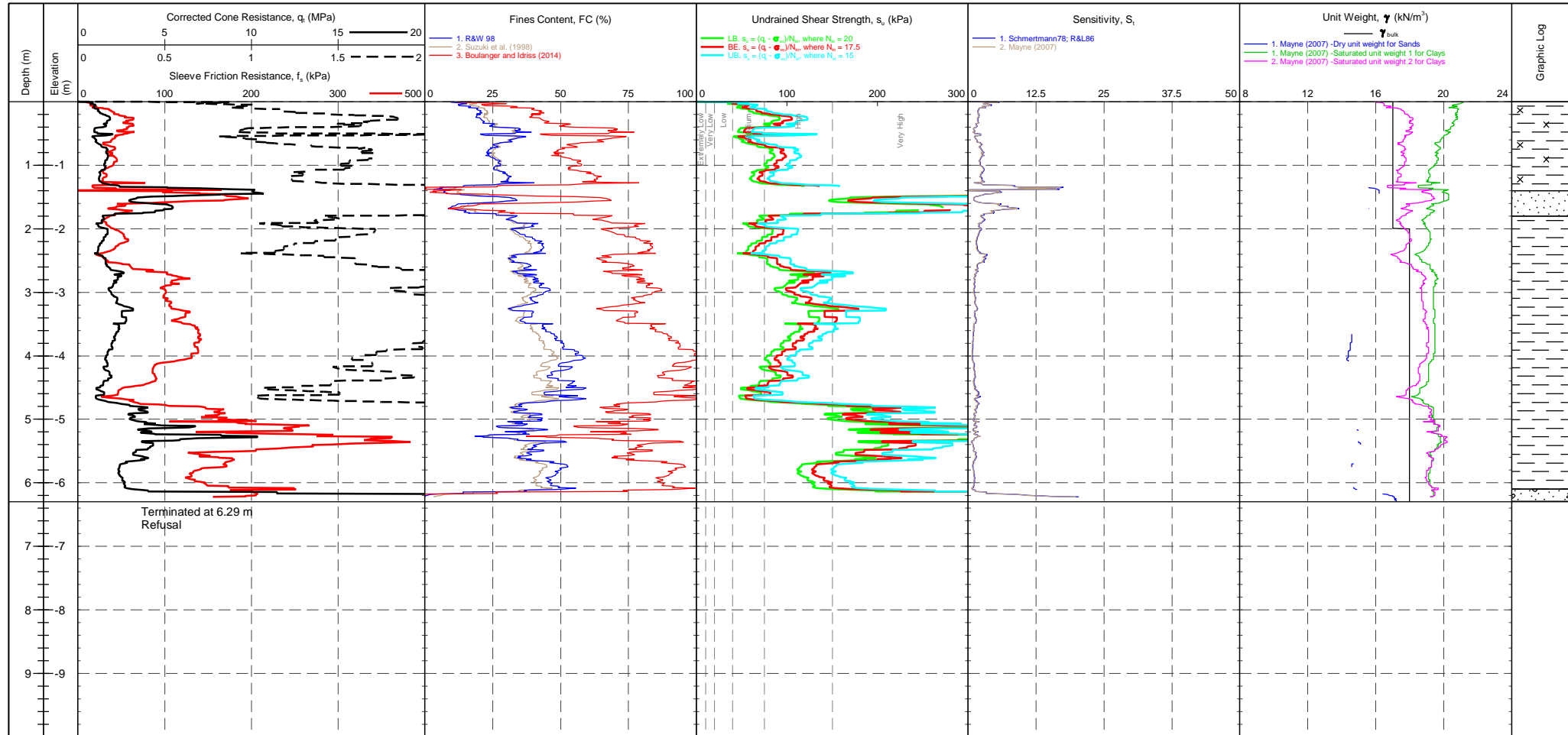
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	--	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Tip : 231 mV / 230 mV / -0.011 MPa Sleeve : 250 mV / 251 mV / 0.001 kPa Pore Pressure 2 : 582 mV / 548 mV / -0.01 kPa X-Y Inclinator : 2122 mV / 2125 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																																			

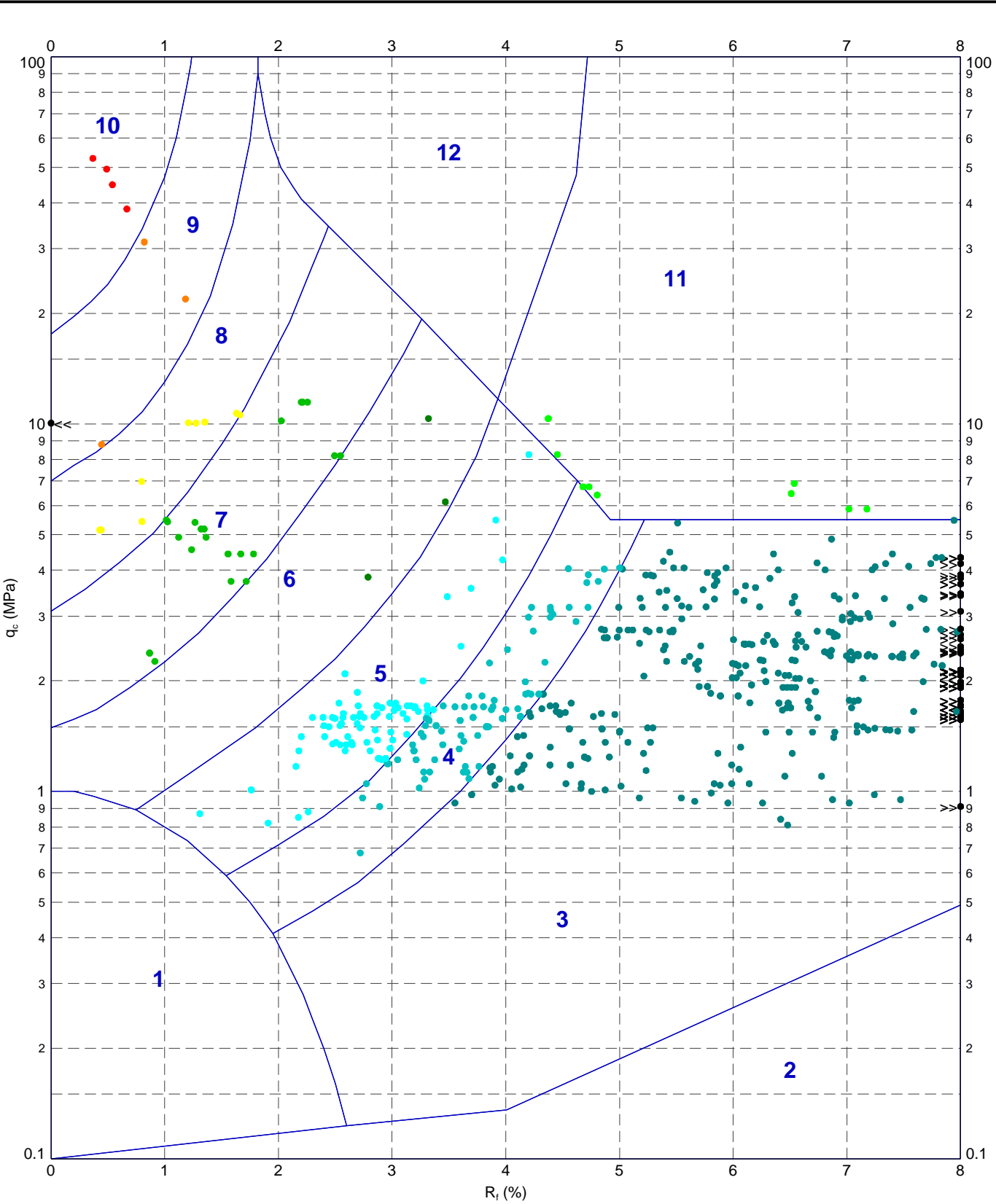
PointID	HYDCPT13
---------	----------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on inclination.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	---	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 231 mV Sleeve : 250 mV Pore Pressure 2 : 582 mV X-Y Inclinator : 2122 mV	CPTU ZERO VALUES Post : 230 mV Difference : -0.011 MPa 251 mV 0.001 kPa 548 mV -0.01 kPa 2125 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
--	--	---	---	---	---	---------------------------------------

2:10586-ADVANCED REPORT INSTIUSI 2.02.1 LIB - ZOE.GLB Graph CPT ROBERTSON ET AL. 86 QC VS. Rf A4P. 1210298 - WINGATES - WINGATES.BOLTON - HYDROCK.GPJ --DrawingFile-- 09/06/2021 12:28 10.02.00.04 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



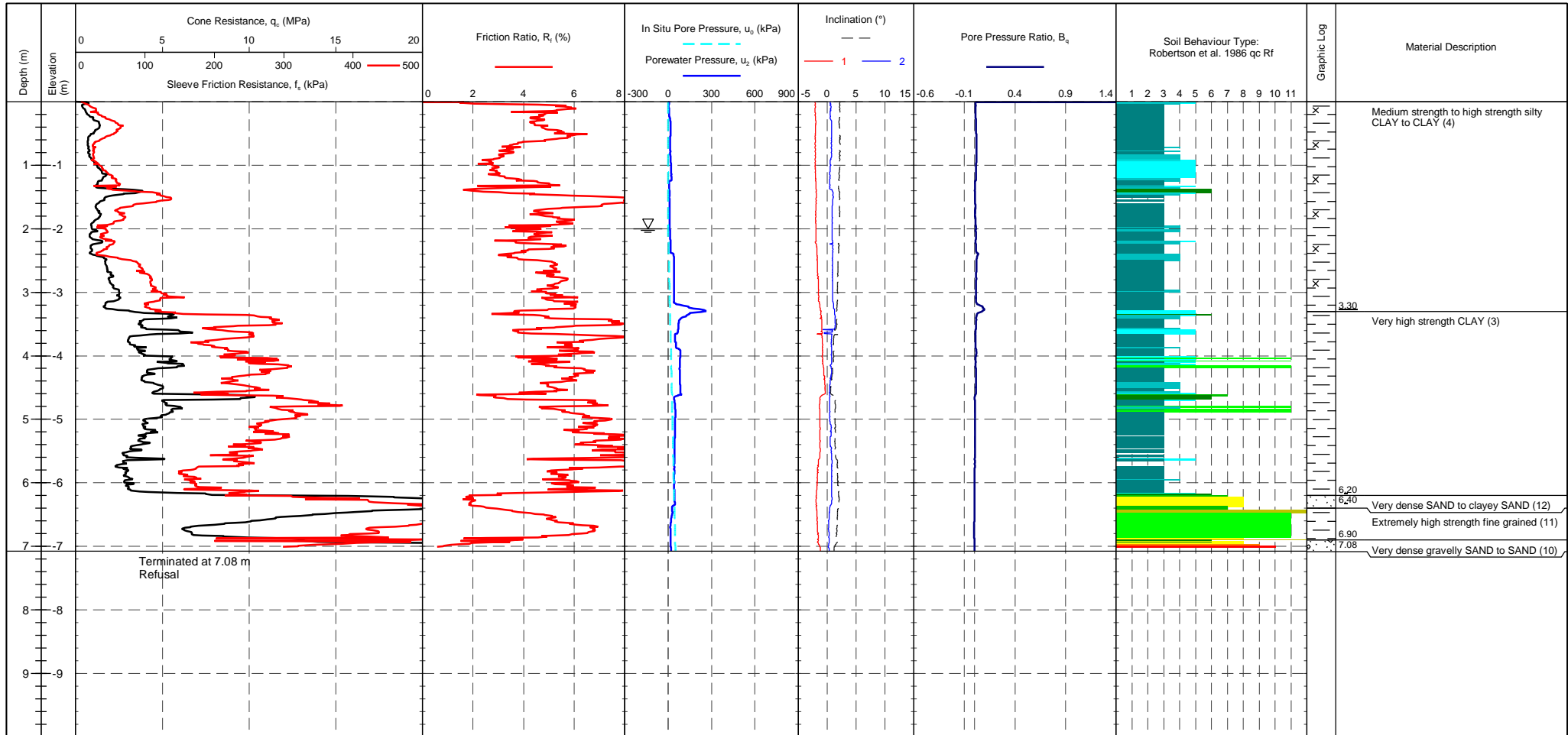
METHOD: Robertson et al. 1986 q_c R_f

- 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 Hydrock Wingate, Bolton Wingates, Bolton Robertson et al. 1986 q_c vs. R_f - HYDCPT13	DRAWN	DATE 09/06/2021	
		CHECKED	DATE 09/06/2021	
		SCALE Not To Scale		A4
		PROJECT No 1210298	FIGURE No	

PointID	HYDCPT14
---------	-----------------

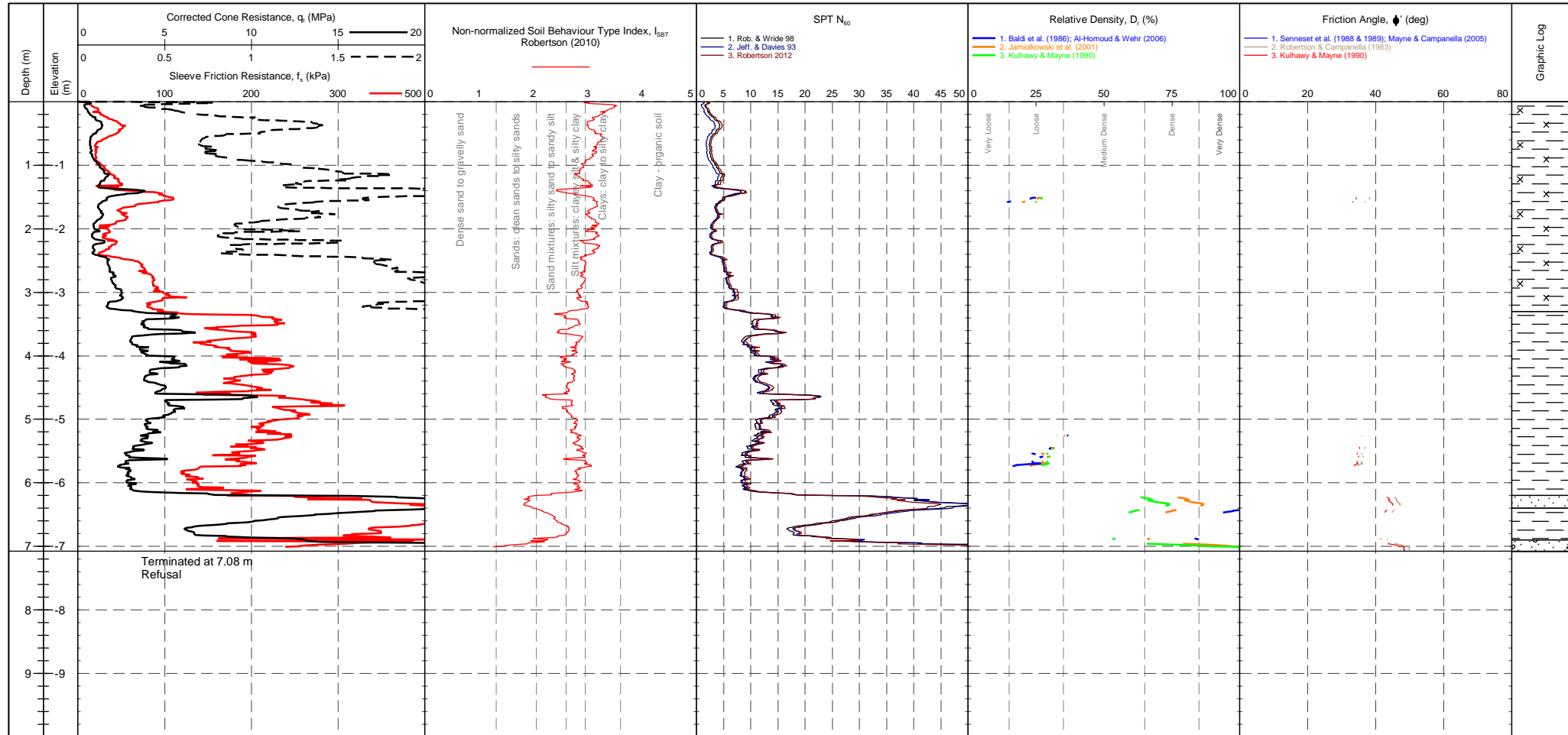
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 CALIBRATION DATE : 16/02/2021 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 017 - Griffen OPERATOR : JE FRICITION REDUCER : None WEATHER : Overcast & Mild GROUNDWATER DEPTH : Assumed for calculation purposes	CPTU ZERO VALUES Transducer Tip: 231 mV / 230 mV / -0.011 MPa Sleeve: 250 mV / 247 mV / -0.002 kPa Pore Pressure 2: 455 mV / 616 mV / 0.045 kPa X-Y Inclinator: 2284 mV / 2266 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
--	--	---	---	---------------------------------------

PointID	HYDCPT14
---------	-----------------

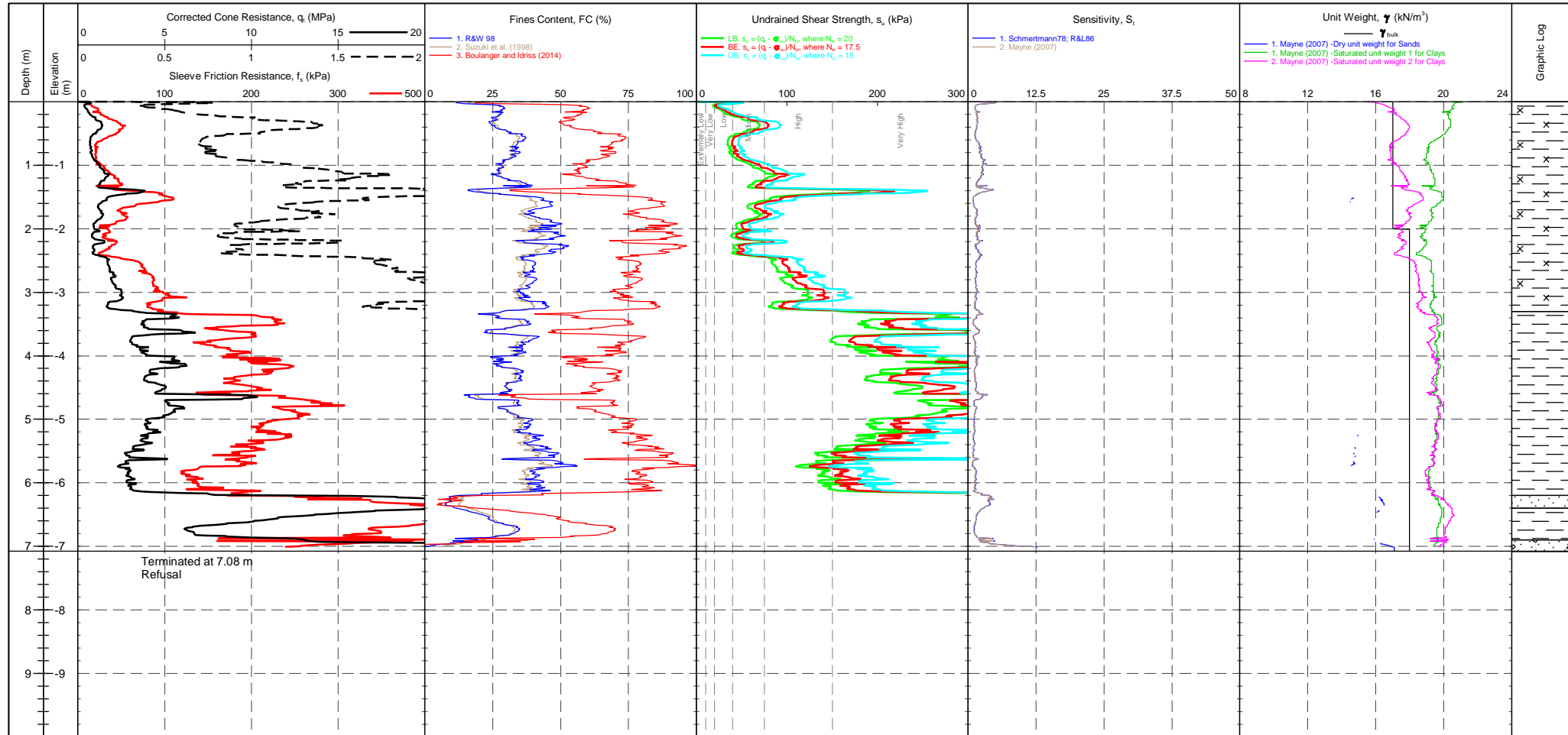
CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	--	---	--



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	CPTU ZERO VALUES Transducer Pre Post Difference Tip 231 mV 230 mV -0.011 MPa Sleeve 250 mV 247 mV -0.002 kPa Pore Pressure 2 455 mV 616 mV 0.045 kPa X-Y Inclinometer 2284 mV 2266 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																																			

PointID	HYDCPT14
---------	----------

CLIENT : Hydrock PROJECT : Wingates, Bolton LOCATION : Wingate, Bolton PROJECT No. : 1210298	EASTING : 53.0 m NORTHING : 25.0 m ELEVATION : 0.00 m OD CHECKED BY : LD TERMINATION REASON : Refusal	Remark: Test refused on total pressure.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 03/06/2021 PLOT DATE : 09/06/2021 METHOD : ISO 22476-1:2012
---	---	--	---



CONE ID : S15-CFIP.1360 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 017 - Griffen OPERATOR : JE FRICTION REDUCER : None WEATHER : Overcast & Mild	Transducer Tip : 231 mV Sleeve : 250 mV Pore Pressure 2 : 455 mV X-Y Inclinator : 2284 mV	CPTU ZERO VALUES Post : 230 mV Difference : -0.011 MPa Post : 247 mV Difference : -0.002 kPa Post : 616 mV Difference : 0.045 kPa Post : 2266 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
--	--	---	---	---	---	---------------------------------------