



PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY

ATTABAD LAKE HYDROPOWER PROJECT

FEASIBILITY STUDY



VOLUME – 5
BOREHOLE & TEST PIT LOGS

JUNE 2021

GENERAL MANAGER (HYDRO) PLANNING

WAPDA, SUNNY VIEW ESTATE, LAHORE ☎ 99202717 📠 99202722.

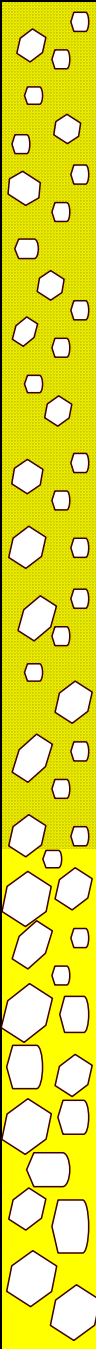
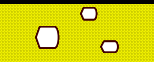
BOREHOLE LOGS

BH-01

HYDRO PLANNING WAPDA						GRAIN SIZE (ASTM D2487)						CONSISTENCY						Project :	ATTABAD LAKE HYDROPOWER PROJECT				
						Silt and clay			< 75 µm			CLAY / SILT		SAND / GRAVEL		Site:	Weir (L/S)						
												N Value				Easting :	484075.46m		Borehole No. : BH-01				
						Sand	Fine		75 µm - 425 µm		very soft	<2	<4	very loose	Northing:	4018100.45m		Page : 1 of 12					
							Medium		425 µm - 2 mm		Soft	2-4	4-10	Loose	Elevation :	2415.79m		Logged by: Toqeer/Jabbar/Nauman					
BOREHOLE NO.						BH-01			Gravels	Fine		4.75 m - 19 mm		Firm	4-8	10-30	Medium Dense	Dip : 90°		Checked By: Umer Tariq			
										Coarse		2 mm - 4.75 mm		Hard	>30			Drilling Co. : Drilling Division, WAPDA	Water Table: 6.40 m				
						Cobbles		75 mm -300 mm						Driller : Nawaz	RIG: Longyear								
						Boulders		> 300 mm															
DRILLING					RECOVERY		Standard Penetration Test / Cone Penetration Test							Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks		Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,					
			Open Pit													Overburden:			Borehole is stabilized with PW Casing from 0.00 to 5.00 m.				
1	1	0.50	Rotary Drilling method, 76 mm / NQ Diamond Bit with Single Tube Core barrel	NIL	NIL										It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.						1		
2	2	1.00		20	NIL													2 No. Wash samples (each of 15 cm) consist of light grey, very coarse to coarse grits are collected.			2		
3	3	1.00		30	40	3,3,6,5,7															3		
4	4	1.00		80	39	4,7,3,7	CPT-01	4	3	2	4	4	13									4	
5	5	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	78	10,4,25,12,16																5	
6	6	1.00		100	60	36,9	CPT-02	10/0						Refusal								6	
7	7	1.00		100	17	17															7		
LEGEND:			Standard Penetration Test					Cone Penetration Test					Gravelly Sand			Sandy Gravel/ Cobble/boulder			Boulder/ Gravel				

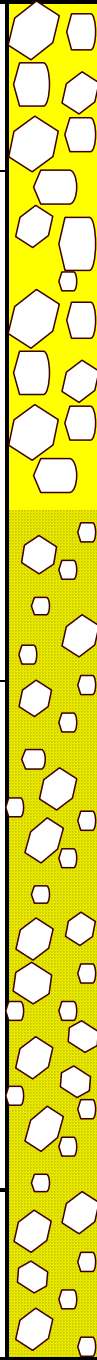
Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

				HYDRO PLANNING				BOREHOLE No.				BH-01				Project:		ATTABAD LAKE HYDROPOWER PROJECT						Page		2 of 12							
																Site:		Weir (L/S)															
DRILLING				RECOVERY				Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION				Remarks				Elevation (masl)	Depth (m)					
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																		
								6"	3"	3"	3"	3"																					
8	8	1.00	Rotary Drilling method, 76 mm/ NQ Diamond Bit with Double Tube Core barrel	100	40	5,7,3,13								CPT-03	5	4	4	5	5	18		Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.				Borehole is stabilized with HW Casing from 5.00 to 32.70 m.					8
9	9	1.00		100	29	23														9													
10	10	1.00		100	31	9,7,4															10												
11	11	1.00		100	30	19,7																11											
12	12	1.00		100	32	21,7	CPT-04	3	4	6	4	5	19											12									
13	13	1.00		100	12	2	CPT-05	3	4	3	3	3	13											13									
14	14	1.00		100	42	3,12,17																		14									
15	15	1.00		30	90	18,8,55	CPT-06	10	10/0				Refusal											15									
LEGEND:				Standard Penetration Test				Cone Penetration Test				Gravelly Sand						Sandy Gravel/ Cobble/boulder				Boulder/ Gravel											

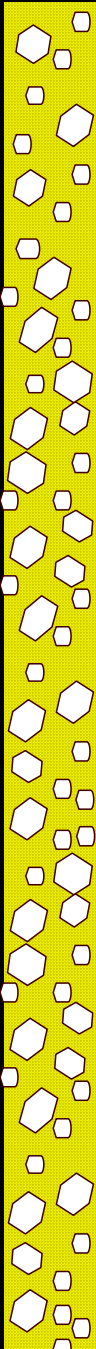
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								Site:								Weir (L/S)						
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks	Elevation (masl)	Depth (m)		
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure,	
16	16	1.00	Rotary Drilling method, 76 mm/ NQ Diamond Bit with Double Tube Core barrel	NIL	49	49									K=0.002858 cm/sec		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	A 25 cm wash sample composed of grey coloured sandy clayey silt found in core barrel.		16		
17	17	1.00		30	43	19,12																17
18	18	1.00		60	16	3,13	CPT-07	3	10/0				Refusal		K= 0.012294 cm/sec							18
19	19	1.00		10	96	6,90																
20	20	1.00		NIL	100	86,5,4																
21	21	2.00		100	90	170,6	CPT-08		10/0					Refusal								
22	22																					22
23	22	1.00	100													65	25,16,23					
LEGEND:		Standard Penetration Test		Cone Penetration Test		Gravelly Sand		Sandy Gravel/ Cobble/ boulder		Boulder/ Gravel												

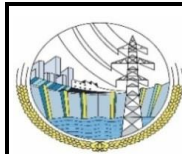
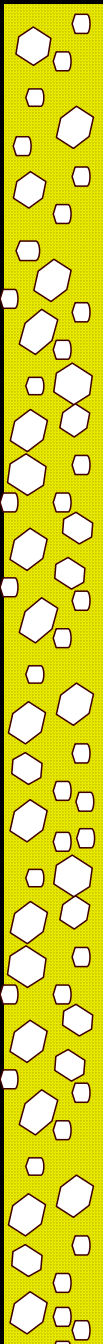
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																Site:		Weir (L/S)														
DRILLING				RECOVERY				Standard Penetration Test / Cone Penetration Test												Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION				Remarks				Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																	
								6"	3"	3"	3"	3"																				
24	23	2.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	98	49,146	CPT-09	10/0					Refusal		Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Head could not be maintained due to 100% water loss.		24												
25														25																		
26	24	1.00		100	33	23,4														26												
27	25	1.00		100	45	38,3	CPT-10	8	10/0				Refusal							27												
28	26	1.00		100	35	4,5,12,5														28												
29	27	1.00		100	55	50,2														29												
30	28	1.00		100	99	4,15,62, 12	CPT-11	10/0					Refusal							30												
31	29	1.00		100	100	100														31												
LEGEND:				Standard Penetration Test 				Cone Penetration Test 				Gravelly Sand 		Sandy Gravel /Cobble/boulder 						Boulder/ Gravel 												

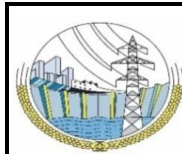
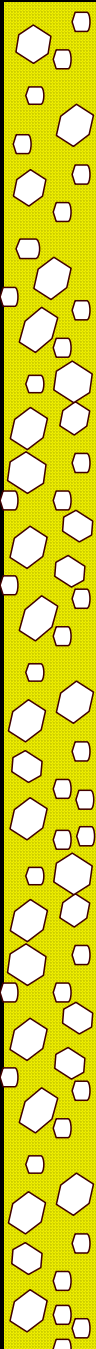
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								Site:								Weir (L/S)																
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	(m)											
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,										
								6"	3"	3"	3"	3"																				
32	30	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	62	7,8,42								CPT-07	3	10/0				Refusal		Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Head could not be maintained due to 100% water loss. Borehole is stabilized with HW Casing from 5.00 to 32.70 m. Borehole is stabilized with cement from 32.70 to 85.00 m.		32					
33	31	1.00		100	88	87																					33					
34	32	1.00		100	83	32,15																									34	
35	33	1.00		100	100	19,58,19																										35
36	34	1.00		100	70	5,4G,6,1 1,40,4G	CPT-07	3	10/0				Refusal																			36
37	35	1.00		100	78	3,2G,16, 57																										37
38	36	1.00		100	58	39,19																										38
39	37	1.00		100	69	5G,3,48, 3G																										39
LEGEND:		Standard Penetration Test		Cone Penetration Test		Gravelly Sand		Sandy Gravel /Cobble/boulder		Boulder/ Gravel																						

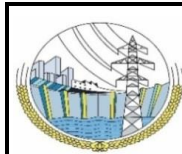
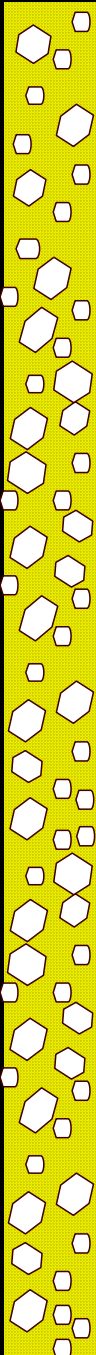
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DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test							Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)																																																																							
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows								N Value					Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																																																																					
								6"	3"	3"	3"	3"																																																																															
40	38	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	45	9,9,5G,6,16								Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		40																																																																								
41	39	1.00		100	46	6,21,19																									41																																																												
42	40	1.00		100	45	15G,14,6,7,3G																																					42																																																
43	41	1.00		100	53	11,8,7,4,5G,6,12																																																	43																																				
44	42	1.00		100	68	6G,5,8G,7,6,10,1G,10,12,3G																																																													44																								
45	43	1.00		100	81	41,8,9,5,4,10G																																																																									45												
46	44	1.00		100	56	3,40,13																																																																																					46
47	45	1.00		100	89	89																																																																																					
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel																																																																												

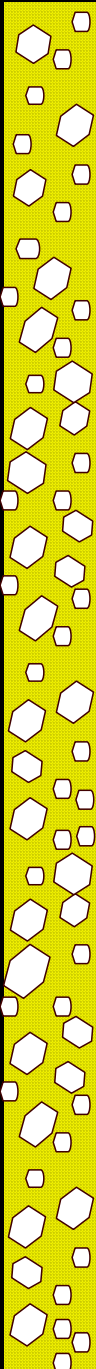
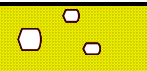
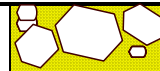
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		HYDRO PLANNING		BOREHOLE No.		BH-01		Project:	ATTABAD LAKE HYDROPOWER PROJECT				Page	7 of 12								
								Site:								Weir (L/S)						
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	(m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,
								6"	3"	3"	3"	3"										
48	46	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	65	26,9,6,6 G,18								Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		48			
49	47	1.00		100	58	19,7,3,5, 6G,10,8 G													49			
50	48	1.00		100	63	51,12G													50			
51	49	1.00		100	66	3,15,21, 27													51			
52	50	1.00		100	33	7,17,3G, 6													52			
53	51	1.00		100	28	23G,5													53			
54	52	1.00		100	68	12G,15, 4,10,8,1 6,3G													54			
55	53	1.00		100	56	14,11, 31													55			
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel							

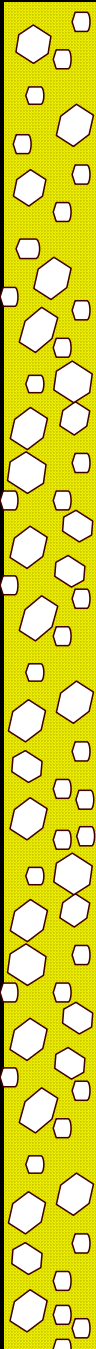
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							Site:												Weir (L/S)				
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,					
								6"	3"	3"	3"	3"											
56	54	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	100	7,93								Head could not be maintained.		Overburden It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		56				
57	55	1.00		100	47	37,3G,7													57				
58	56	1.00		100	50	5G,15,30													58				
59	57	1.00		100	23	7G,12,4													59				
60	58	1.00		100	53	3G,4,9,7,30G													60				
61	59	1.00		100	44	7G,17,16,4G													61				
62	60	1.00		100	54	3G,7,9,6G,26,3													62				
63	61	1.00	100	44	28,16								Head could not be maintained.					63					
LEGEND:			Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder			Boulder/ Gravel						

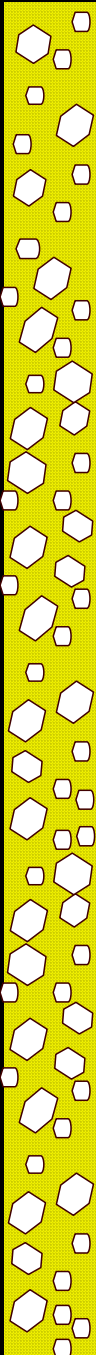
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										Site:	Weir (L/S)										
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks	Elevation (masl)	(m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,			
								6"	3"	3"	3"	3"									
64	62	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	55	5G,50								Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		64		
65	63	1.00		100	31	5,3,8,15													65		
66	64	1.00		100	32	12,4,4,6,6G													66		
67	65	1.00		30	44	9G,10,25,17													67		
68	66	1.00		30	45	18,11G,13,3													68		
69	67	1.00		100	88	10G,16,3G,23,9G,21													69		
70	68	1.00		100	61	9G,6,11G,7,16,7,5													70		
71	69	1.00		100	56	9G,14,8,11G,12,2G													71		
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel						

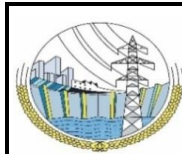
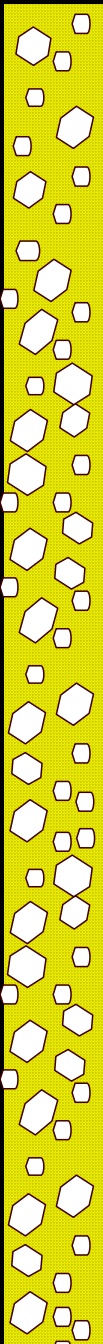
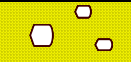
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- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

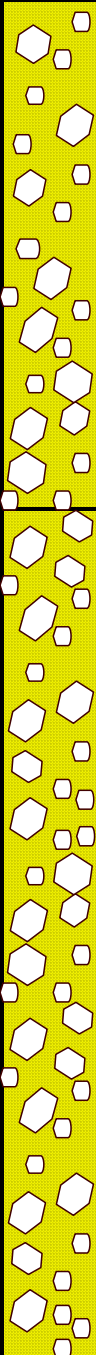
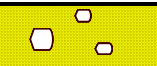
		HYDRO PLANNING		BOREHOLE No.		BH-01		Project:	ATTABAD LAKE HYDROPOWER PROJECT				Page	10 of 12								
								Site:								Weir (L/S)						
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,
								6"	3"	3"	3"	3"										
72	70	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	53	42,4,7								Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		72			
73	71	1.00		100	65	14,2,13, 23,13														73		
74	72	1.00		100	65	4,22,39														74		
75	73	1.00		100	77	5G,18, 1G,6,3G ,6,38														75		
76	74	1.00		100	87	7G,11,6, 12,20, 6G,6,13, 2														76		
77	75	2.00		100	87	125,22,2 7														77		
78	76	1.00		100	64	11,8,10, 23,6,6G														78		
79	76	1.00																79				
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder			Boulder/ Gravel						

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.		BH-01		Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	11 of 12				
										Site:										Weir (L/S)		
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,
								6"	3"	3"	3"	3"										
80	77	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	37	10,15G, 11								Head could not be maintained.		Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		80			
81	78	1.00		100	89	11G,69, 9													81			
82	79	1.00		100	57	8,2G,27, 20													82			
83	80	1.00		100	32	30,2G													83			
84	81	1.00		100	45	32,3G, 10													84			
85	82	1.00		100	38	4,13,21													85			
86	83	1.00		100	56	11,22,5, 4,7G,7													86			
87	84	1.00		100	66	13,6,8,6, 6,24,3													87			
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel							

Note: 1 Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
2 Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

	HYDRO PLANNING				BOREHOLE No.		BH-01		Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	12 of 12				
									Site:										Weir (L/S)		
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)				
								6"	3"	3"	3"	3"									
88	85	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	59	21G,10,9,8,11								Head could not be maintained.		<u>Overburden:</u> It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 32.70 to 85.00 m.		88		
89	86	1.00		100	55	33,8,11,3													89		
90	87	1.00		100	59	34,4G,21													90		
91																			91		
92																			92		
93																			93		
94																			94		
95																			95		
LEGEND:	Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel							

Note:

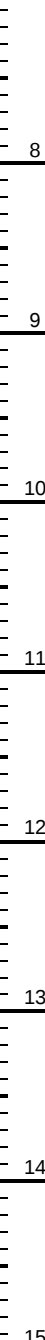
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

BH-02

HYDRO PLANNING WAPDA						GRAIN SIZE (ASTM D2487)						CONSISTENCY						Project :		ATTABAD LAKE HYDROPOWER PROJECT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
						Silt and clay			< 75 µm			CLAY / SILT		SAND / GRAVEL				Site:		SEDIMENT FLUSHING CHANNEL (INLET)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
												N Value						Easting :		484089.59m		Borehole No. : BH-02																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
						Sand		Fine		75 µm - 425 µm		very soft		<2		<4		very loose		Northing:		4017996.26m		Page : 1 of 8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
								Medium		425 µm - 2 mm		Soft		2-4		4-10		Loose		Elevation :		2452.81m		Logged by: Nauman/Naseer																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
BOREHOLE NO.						BH-02			Gravels			Fine		4.75 m - 19 mm		Stiff		8-15		30-50		Dense		Dip : 90°		Checked By: Umer Tariq																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
												Coarse		19 mm - 75 mm		Very Stiff		15-30		>50		Very Dense		Final Depth : 60 m		Date Started: 08.12.2020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
									Cobbles			75 mm -300 mm			Hard		>30						Drilling Co. : Drilling Division, WAPDA		Water Table: NIL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
									Boulders			> 300 mm											Driller : Mr. Imran		RIG: Acker																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
									DRILLING						RECOVERY		Standard Penetration Test / Cone Penetration Test						Field Test		Permeability test Result		Profile		GENERAL DESCRIPTION				Remarks				Elevation (masl)		Depth (m)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Depth (m)		Run #		Drill run (m)		Drilling method		Water Loss %		Core Recovery %		Solid Core pieces (cm)		Test #		Penetration Blows					N Value																				Sample length (cm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

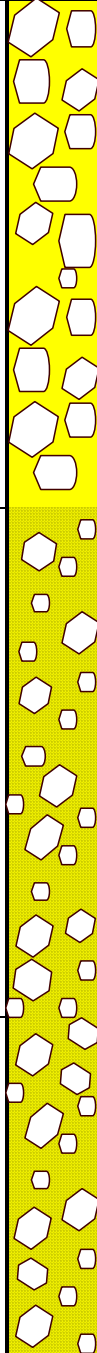
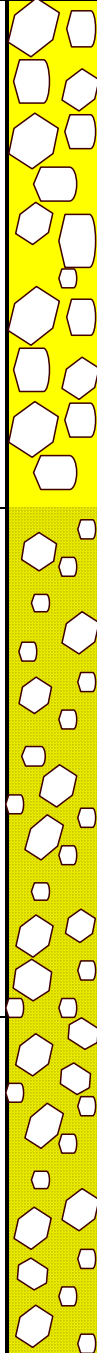
Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b) 100 blows for 12 inches or N=100 (c) 10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.			BH-02			Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	2 of 8					
												Site:	SEDIMENT FLUSHING CHANNEL (INLET)												
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks			Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,							
								6"	3"	3"	3"	3"													
8	8	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	21	13G,8								Head could not be maintained.		<u>Overburden:</u> It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with HW casing from 0.00 to 35.00 m.								
9	9	1.00		100	29	29G																			
10	10	1.00		100	55	13G,42		CPT-03	10/0												Refusal				
11	11	1.00		100	47	47																			
12	12	1.00		100	29	11,3,8,7								Head could not be maintained.											
13	13	1.00		100	24	6,2G,11,5	CPT-04	10/0					Refusal												
14	14	1.00		100	42	13,22G,7																			
15	15	1.00		100	29	10G,5,3,11																			
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand				Sandy Gravel/ Cobble/boulder				Boulder/ Gravel							

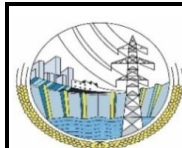
Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

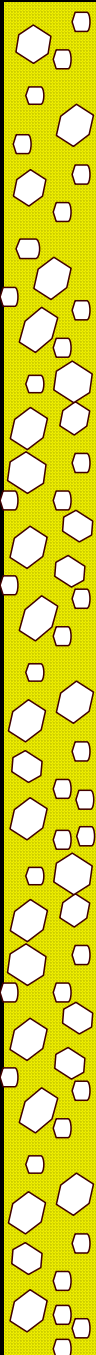
		HYDRO PLANNING		BOREHOLE No.		BH-02		Project:	ATTABAD LAKE HYDROPOWER PROJECT				Page	3 of 8								
								Site:	SEDIMENT FLUSHING CHANNEL (INLET)													
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test							Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)		
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows								N Value					Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,
16	16	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	39	10G,6,2 3	CPT-05	10/0					Refusal		Head could not be maintained.		<u>Overburden:</u>	Borehole is stabilized with HW casing from 0.00 to 35.00 m.			16	
	17	17		1.00	100	25	13,7,5															17
18	18	2.00		100	65	130															18	
19	19	1.00		100	27	13G,14	CPT-06	10/0					Refusal									19
20	20	1.00		100	36	9,6,21G															20	
21	21	1.00		100	42	6,6,14, 16G															21	
22	22	1.00		100	60	60	CPT-07	10/0					Refusal									22
23	22	1.00		100	60	60																23
LEGEND:		Standard Penetration Test		Cone Penetration Test		Gravelly Sand		Sandy Gravel/ Cobble/ boulder		Boulder/ Gravel												

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

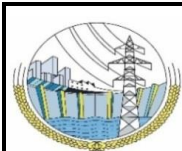
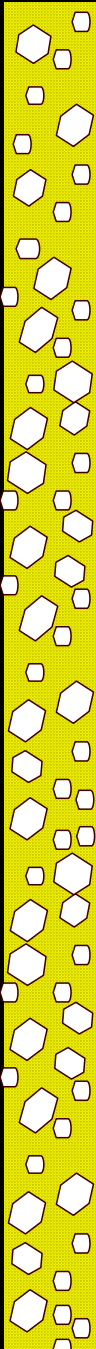
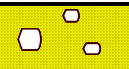
		HYDRO PLANNING				BOREHOLE No.		BH-02		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	4 of 8								
										Site:										SEDIMENT FLUSHING CHANNEL (INLET)					
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)				
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,			
								6"	3"	3"	3"	3"													
24	23	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	23	16G,7											Borehole is stabilized with HW casing from 0.00 to 35.00 m.								
25	24	1.00		100	9	9G																			
26	25	1.00		100	16	9G,7																			
27	26	1.00		100	15	15G														CPT-08	10/0				Refusal
28	27	1.00		100	32	4G,28																			
29	28	1.00		100	22	11G,9, 2G																			
30	29	1.00		100	22	4G,6,9,3 G														CPT-09	10/0				Refusal
31	30	1.00		100	34	21,13G																			
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel										

Note: 1 Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
2 Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

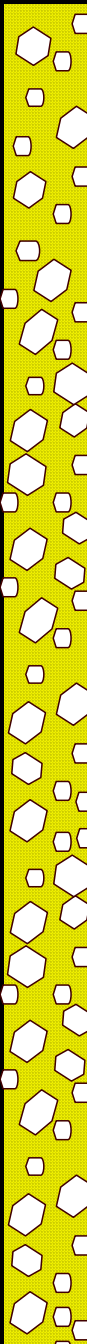
		HYDRO PLANNING				BOREHOLE No.		BH-02		Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	5 of 8					
										Site:	SEDIMENT FLUSHING CHANNEL (INLET)												
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,					
								6"	3"	3"	3"	3"											
32	31	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	28	28G								Head could not be maintained.		<u>Overburden:</u> It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with HW casing from 0.00 to 35.00 m.			32			
33	32	1.00		100	33	33G															33		
34	33	1.00		100	23	6,17G								34									
35	34	1.00		100	27	18,9G															35		
36	35	1.00		100	21	15,6G								36									
37	36	1.00		100	24	14G,10															37		
38	37	1.00		100	25	22,3G								38									
39	38	1.00		100	12	12G															39		
LEGEND:		Standard Penetration Test				Cone Penetration Test																Gravelly Sand	

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

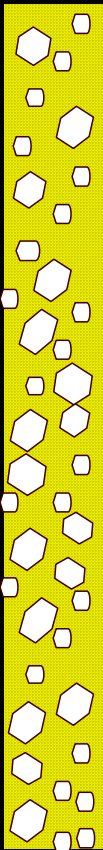
	HYDRO PLANNING		BOREHOLE No.		BH-02		Project:		ATTABAD LAKE HYDROPOWER PROJECT		Page	6 of 8											
							Site:		SEDIMENT FLUSHING CHANNEL (INLET)														
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks	Elevation (masl)	Depth (m)		
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,					
								6"	3"	3"	3"	3"											
39	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	15	9,3,3G											Overburden: It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.	Borehole is stabilized with cement from 35.00 to 57.00 m.		40				
40	1.00		100	44	38,6G															41			
41	1.00		100	30	30G																42		
42	1.00		100	28	22G,6																43		
43	1.00		100	37	18,19G																44		
44	1.00		100	27	12,15G																45		
45	1.00		100	25	10,15G																46		
46	1.00		100	41	10,11,8,12G																47		
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand				Sandy Gravel /Cobble/boulder				Boulder/ Gravel					

Note: 1 Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
2 Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

	HYDRO PLANNING		BOREHOLE No.		BH-02		Project:		ATTABAD LAKE HYDROPOWER PROJECT				Page		7 of 8								
							Site:		SEDIMENT FLUSHING CHANNEL (INLET)														
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,					
								6"	3"	3"	3"	3"											
48	47	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	27	14,13G										<u>Overburden:</u> It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.		Borehole is stabilized with cement from 35.00 to 57.00 m.		48			
49	48	1.00		100	24	24G														49			
50	49	1.00		100	25	6,19G														50			
51	50	1.00		100	29	8,21G														51			
52	51	1.00		100	36	15G,21														52			
53	52	1.00		100	21	14,7G														53			
54	53	1.00		100	25	25G														54			
55	54	1.00		100	36	8,16, 12G														55			
LEGEND:		Standard Penetration Test		Cone Penetration Test		Gravelly Sand				Sandy Gravel /Cobble/boulder				Boulder/ Gravel									

Note:

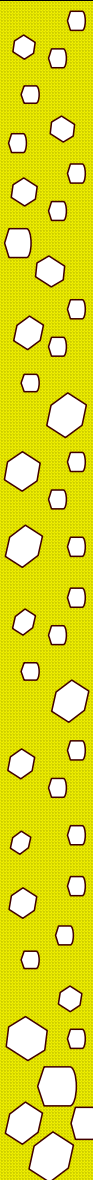
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.		BH-02		Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	8 of 8									
										Site:	SEDIMENT FLUSHING CHANNEL (INLET)																
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test							Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)						
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows								N Value	Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,					
								6"	3"	3"	3"	3"															
56	55	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	22	7,15G										<u>Overburden:</u> It consists of Angular Boulder Gravels of slided mass, light grey to grey in color, mostly of Granodiorite and Granitic Gneiss.		Borehole is stabilized with cement from 35.00 to 57.00 m.		56							
57	56	1.00		100	27	14,5,5,3														57							
58	57	1.00		100	27	4,6,7G,8,2														58							
59	58	1.00		100	39	6,9,24														59							
60	59	1.00		100	24	4,11,5,1,3														60							
BOTTOM OF THE HOLE																											
61																					61						
62																					62						
63																					63						
LEGEND:		Standard Penetration Test						Cone Penetration Test						Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel								

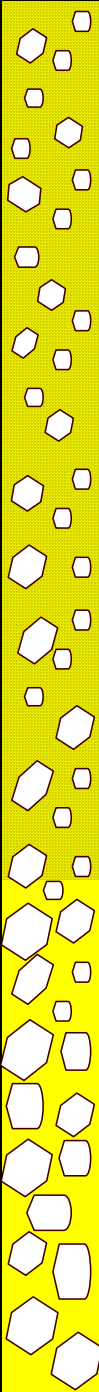
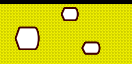
Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

BH-03

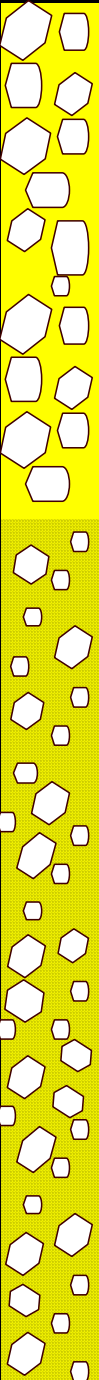
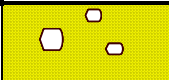
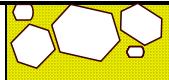
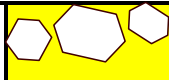
HYDRO PLANNING WAPDA						GRAIN SIZE (ASTM D2487)						CONSISTENCY						Project :	ATTABAD LAKE HYDROPOWER PROJECT																						
						Silt and clay			< 75 µm			CLAY / SILT			SAND / GRAVEL			Site:	Sediment Flushing Channel																						
												N Value						Easting :		483541.73		Borehole No. :		BH-03																	
						Sand		Fine		75 µm - 425 µm		very soft		<2		<4		very loose		Northing:		4018061.58		Page :		1 of 8															
								Medium		425 µm - 2 mm		Soft		2-4		4-10		Loose		Elevation :		2456.92 m		Logged by:		Toqeer/Jabbar/Nauman															
BOREHOLE NO.						BH-03			Gravels		Fine		4.75 m - 19 mm		Firm		4-8		10-30		Medium Dense		Dip :		90°		Checked By		Umar Tariq												
											Coarse		19 mm - 75 mm		Stiff		8-15		30-50		Dense		Final Depth :		61 m		Date Started:		26.10.2020												
									Cobbles			75 mm -300 mm			Very Stiff		15-30		>50		Very Dense		Bearing :		Nil		Date Completed:		04.12.2020												
									Boulders			> 300 mm			Hard		>30						Drilling Co. :		DD, WAPDA		Water Table:		NIL												
																							Driller :		Mr. Maqbool		RIG:		Longyear												
DRILLING					RECOVERY		Standard Penetration Test / Cone Penetration Test							Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION				Remarks				Elevation (masl)	Depth (m)															
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																							
								6"	3"	3"	3"	3"																													
1	1	1.00	Rotary Drilling method, 96 mm / HQ Bit with Single Tube Core barrel	NIL		16,17											Overburden/ Sandy Gravels (0.00-26.00 m): It consists of light grey to grey, fine to medium grained sand with occasionally silt and angular to sub angular gravels of variegated origin.				17 cm wash sample is collected comprising of grey fine sand, trace coarse quartz and fine gravels.																				
2	2	1.00		30	70	22,7,16,9,6																																			
3	3	1.00		30	32	15,16																																			
4	4	2.00		100	24	3,10,4																																			
5	5	3.00	100	34	2,5																																				
6	6	4.00	60	83																																					
7	7	5.00	100	51	42,3																																				
LEGEND:			Standard Penetration Test					Cone Penetration Test					Gravelly Sand				Sandy Gravel/ Cobble/boulder				Boulder/ Gravel																				

- Note:**
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
 - SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

				HYDRO PLANNING				BOREHOLE No.				BH-03				Project:		ATTABAD LAKE HYDROPOWER PROJECT								Page		2 of 8											
																Site:		Sediment Flushing Channel																					
DRILLING					RECOVERY			Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks	Elevation (masl)	Depth (m)															
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																								
								6"	3"	3"	3"	3"																											
8	8	1.00	Rotary Drilling method, 96 mm / HQ Bit with Double Tube Core barrel	100	25	4,8											Overburden/ Sandy Gravels (0.00-26.00 m): It consists of light grey to grey, fine to medium grained sand with occasionally silt and angular to sub angular gravels of variegated origin.	10 cm wash sample is collected comprising of white medium silty sand and rock cuttings.	10 cm wash sample is collected comprising of white medium silty sand and rock cuttings.	12 cm wash sample is collected comprising of brownish grey, silty medium to fine sand and rock cuttings.	15 cm wash sample is collected comprising of grey plastic clayey silt.		8																
9	9	1.00		40	23																																	9	
10	10	1.00		40	27	5																																	10
11	11	1.00		30	20	3,6																																	11
12	12	1.00		20	62	18,40																																	12
13	13	2.00		100	59	20,20																																	13
14	14	1.00		100	46																																		14
15	15	1.00		100	37																																		15
LEGEND:				Standard Penetration Test								Cone Penetration Test								Gravelly Sand				Sandy Gravel/ Cobble/boulder				Boulder/ Gravel											

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

				HYDRO PLANNING				BOREHOLE No.				BH-03				Project:		ATTABAD LAKE HYDROPOWER PROJECT						Page		3 of 8			
																Site:		Sediment Flushing Channel											
DRILLING				RECOVERY				Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION				Remarks				Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,														
								6"	3"	3"	3"	3"																	
16	16	1.00	Rotary Drilling method, 96 mm / HQ Bit with Double Tube Core barrel	100	35										k1=Head could not be maintained.		Overburden/ Sandy Gravels (0.00-26.00 m): It consists of light grey to grey, fine to medium grained sand with occasionally silt and angular to sub angular gravels of variegated origin.									16			
17	17	1.00		100	15	3,10																				17			
18	18	1.00		100	37	94																				18			
19	19	1.00		100	96	9,36,9																				19			
20	20	1.00		100	79																					20			
21	21	1.00		100	77	25,40																				21			
22	22	1.00		100	41	10																				22			
23	23	1.00	100	48	3	CPT-01	14	12/0			Refusal		23																
LEGEND:				Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel/ Cobble/ boulder			Boulder/ Gravel											

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

				HYDRO PLANNING			BOREHOLE No.			BH-03			Project:		ATTABAD LAKE HYDROPOWER PROJECT						Page		4 of 8							
													Site:		Sediment Flushing Channel															
DRILLING				RECOVERY			Standard Penetration Test / Cone Penetration Test								Field Test		Permeability test Result		Profile		GENERAL DESCRIPTION		Remarks		Elevation (masl)		Depth (m)			
Depth (m)		Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows				N Value	Sample length (cm)							SOIL: Soil Type: Colour, Consistency, Structure,									
24		24	1.00	HQ Bit with Double Tube Core barrel	100	29	2												Overburden/ Sandy Gravels (0.00-26.00 m): It consists of light grey to grey, fine to medium grained sand with occasionally silt and angular to sub angular gravels of variegated origin.		17 cm wash sample is collected comprising of grey medium to coarse sand.		24							
25		25	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	60	3,14,3,2,5																							
26		26	1.00		100	73	27,28,7																							
27		27	1.00		25	36	12,10	CPT-02	10/0																Overburden/ Sandy Gravels (26.00-30.00 m): It consists of light grey to grey, coarse to medium grained sand with angular to sub angular gravels of variegated origin.		17 cm wash sample is collected comprising of grey medium to coarse sand.		27	
28		28	1.00		35	34	12																							
29		29	1.00		100	75	15,7,11,28																							
30		30	1.00		30	30	3,2,3	CPT-03	10/0																	Overburden/ Sandy Gravels (30.00-41.00 m): It consists of light grey to grey, fine to medium grained sand with angular to sub angular gravels of variegated origin.		2 No. wash samples (each of 15 cm) comprising of grey medium sand are collected.		30
31		31	1.00	30	20	5																								
LEGEND:				Standard Penetration Test			Cone Penetration Test			Gravelly Sand			Sandy Gravel /Cobble/boulder		Boulder/ Gravel															

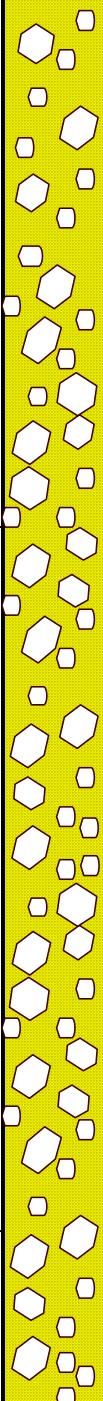
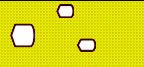
Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.		BH-03		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	5 of 8						
										Site:	Sediment Flushing Channel												
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,					
			Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	40	30	15,13										Overburden/ Sandy Gravels (30.00-41.00 m): It consists of light grey to grey, fine to medium grained sand with angular to sub angular gravels of variegated origin.		2 No. wash samples (each of 16 cm) comprising of grey medium sand are collected.					
				50	12	4																	
				50	40	4,15	CPT-04	21	40/0				Refusal										
				40	54	3,38,11																	
				40	29	3,3																	
				40	20	2	CPT-05	20	11	23/0			Refusal										
				100	45	25,14																	
				100	100	100	CPT-06	20/0					Refusal										
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand		Sandy Gravel /Cobble/boulder	Boulder/ Gravel										

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.			BH-03			Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	6 of 8							
												Site:	Sediment Flushing Channel														
DRILLING				RECOVERY			Standard Penetration Test / Cone Penetration Test										Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks			Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,												
40	40	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	98	3,9,14,4,38,15,15										k7=0.002813 cm/sec		Overburden/ Sandy Gravels (30.00-41.00 m): It consists of light grey to grey, fine to medium grained sand with angular to sub angular gravels variegated origin.			17 cm wash sample is collected comprising of grey medium to coarse sand. 16 cm wash sample is collected comprising of grey medium to coarse sand. 16 cm wash sample is collected comprising of grey medium to coarse sand. 16 cm wash sample is collected comprising of grey medium to coarse sand. 34 cm wash sample is collected comprising of grey to dark grey coarse sand. 34 cm wash sample is collected comprising of grey medium to fine sand.				40		
41	41	1.00		100	66	13,7,9,9,8,20												41									
42	42	1.00		40	31	18,8,5												42									
43	43	1.00		50	27	6,9,3,9	CPT-07	20	15	10/0	?	?	Refusal			43											
44	44	1.00		50	34	5,13,6,10										44											
45	45	1.00		50	30	9,2,7,2,2,3,5										45											
46	46	1.00		40	25	11,6,2,6	CPT-08	16	18	20/0			Refusal			46											
47	47	1.00		40	27	8,19										47											
LEGEND:			Standard Penetration Test					Cone Penetration Test					Gravelly Sand			Sandy Gravel /Cobble/boulder			Boulder/ Gravel								

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.		BH-03		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	7 of 8					
										Site:	Sediment Flushing Channel											
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows				N Value	Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure,					
48	48	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	50	41	5,24,3,9									k9=0.002621 cm/sec		Overburden/ Sandy Gravels (46.00-54.00 m): It consists of light grey to grey, fine to medium grained sand with gravels of rounded to sub rounded and variegated origin.		17 cm wash sample is collected comprising of grey medium to fine sand.			48
49	49	1.00		50	37	6,6,20,5																
50	50	1.00		50	23	23	CPT-09	14	10	15	19	?	Refusal				50					
51	51	1.00		50	24	8,8,8											51					
52	52	1.00		30	66	45,4,7,8,2	CPT-10	4	7	6	8	8	29				52					
53	53	1.00		30	75	45,20,10											53					
54	54	1.00		40	45	6,4,8,2,17,8											54					
55	55	1.00		30	78	9,2,4,2,11,14,36											55					
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand			Sandy Gravel /Cobble/boulder			Boulder/ Gravel						

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.			BH-03			Project:		ATTABAD LAKE HYDROPOWER PROJECT						Page		8 of 8			
												Site:		Sediment Flushing Channel											
DRILLING					RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)		
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Solid Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure,							
			Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel				CPT-11	6"	3"	3"	3"	3"	N Value	Sample length (cm)		k11=0.001436 cm/sec	Overburden/ Sandy Gravels (54.00-61.00 m): It consists of light grey to grey, coarse grained sand with angular to sub angular gravels of variegated origin.	17 cm wash sample is collected comprising of grey coarse sand.	17 cm wash sample is collected comprising of grey coarse sand.	17 cm wash sample is collected comprising of grey coarse sand.	17 cm wash sample is collected comprising of grey coarse sand.	34 cm wash sample is collected comprising of grey coarse sand.	34 cm wash sample is collected comprising of grey coarse sand.	Bottom of borehole at 61.00 m.	
56	56	1.00		30	56	17,23,10,6		11	9	13	10/0		Refusal												
57	57	1.00		40	49	12,2,14,16,5																			
58	58	1.00		30	68	12,47,9																			
59	59	1.00		30	68	13,14,33,8	CPT-12	20	10/0				Refusal												
60	60	1.00		30	59	6,8,12,6,9,12,6																			
61	61	1.00	60	23	6,7,10																				
62																									
63																									
LEGEND:			Standard Penetration Test					Cone Penetration Test					Gravelly Sand		Sandy Gravel /Cobble/boulder		Boulder/ Gravel								

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

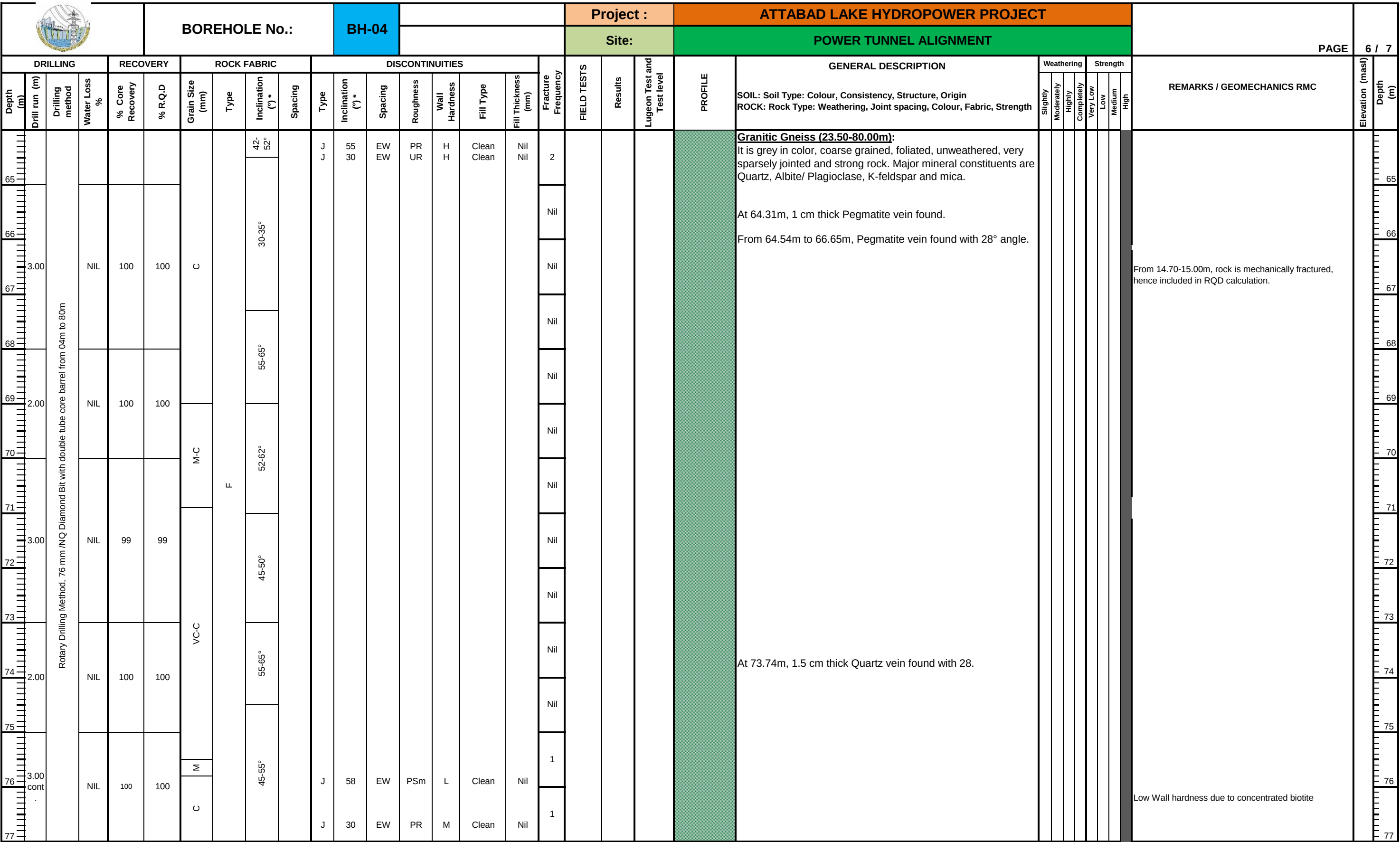
BH-04

HYDRO PLANNING, WAPDA				ROCK FABRIC TYPE		GRAIN SIZE		mm	ROUGHNESS			DISCONT. SPACING			WEATHERING			ROCK STRENGTH - MPa			Project :	ATTABAD LAKE HYDROPOWER PROJECT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
				M	Massive	V F	Very Fine	<0.06	SI	Slickensided		EC	E. Closely	<0.02m	T	Transported Soil		and DISCONTINUITY WALL HARDNESS			Site:	POWER TUNNEL ALIGNMENT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
				B	Bedded / Banded	F	Fine	0.06-0.2	Sm	Smooth		VC	V. Closely	0.02-0.06m							Easting:	482609.57	BOREHOLE No. :	BH-04																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
				CB	Cross-bedded	M	Medium	0.2-0.6	SR	Slightly Rough		C	Closely	0.06-0.2m	R	Residual Soil					Northing:	4017721.34	Page :	1 / 7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
				L	Laminated	C	Coarse	0.6-2.0	M	Medium Rough		M	Medium	0.2-0.6m	C	Completely					Elevation :	2445.37 m	Logged by:	Toqeer Ahmad																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
				F	Foliated	VC	Very Coarse	>2.0	R	Rough		W	Widely	0.6-2.0m	H	Highly					Dip : 90°	Bearing :	N/A	Checked By:	Umar Tariq																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
BOREHOLE No.:		BH-04		C	Cleaved	Beds / Laminations		mm	VR	Very Rough		VW	V. Widely	2.0 -6.0m	M	Moderately		M	Medium	50-100	Final Depth :		80 m	Date Started:		10-10-2020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
				S	Schistose	tn	Thin	<100	P	Planar	St	Stepped	EW	E. Widely	>6m	S	Slightly		H	High	100-200	Drilling Co. :		DID, WAPDA	Date Completed:		29-10-2020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
				G	Gneissose	tk	Thick	>300	U	Undulating		V	Very	E	Extremely	U	Unweathered		VH	Very High	>200	Driller :		Nawaz	RIG:		Longyear																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
DRILLING			RECOVERY		ROCK FABRIC				DISCONTINUITIES								Fracture Frequency	FIELD TESTS	Results	Lugeon Test and Test level	PROFILE	GENERAL DESCRIPTION						Weathering			Strength			REMARKS	Elevation (masl)	Depth (m)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Depth (m)	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	% R.Q.D	Grain Size (mm)	Type	Inclination (°) *	Spacing (mm)	Type	Inclination (°) *	Spacing	Roughness	Wall Hardness	Fill Type	Fill Thickness (mm)						Slightly	Moderately	Highly	Completely	Very Low	Low	Medium	High																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
1	Open pit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

Legend: Overburden Granitic Gneiss

				BOREHOLE No.:		BH-04			Project :	ATTABAD LAKE HYDROPOWER PROJECT						PAGE		3 / 7																												
DRILLING				RECOVERY		ROCK FABRIC			DISCONTINUITIES						Fracture Frequency	FIELD TESTS	Results	Lugeon Test and Test level	PROFILE	GENERAL DESCRIPTION		Weathering			Strength			REMARKS / GEOMECHANICS RMC		Elevation (masl)	Depth (m)															
Depth (m)	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	% R.Q.D	Grain Size (mm)	Type	Inclination (°) *	Spacing	Roughness	Wall Hardness	Fill Type	Fill Thickness (mm)							SOIL: Soil Type: Colour, Consistency, Structure, Origin ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength	Slightly	Moderately	Highly	Completely	Very Low	Low	Medium	High																		
26	2.00	Rotary Drilling Method, 76 mm /NQ Diamond Bit with double tube core barrel from 04m to 80m	10	96	94	C-M	F	50-60°	1-4	J	45	C	UR	H	Stained	Nil	Nil			Granitic Gneiss (23.50-80.00m): It is grey in color, medium to coarse grained, foliated, unweathered, moderately jointed and moderately strong to strong rock. Major mineral constituents are Quartz, Albite/ Plagioclase, K-feldspar and mica. At 25.60m,1 cm thick Quartz vein found with 60° angle. At 25.75m,1 cm thick Quartz vein found with 60° angle.											26															
27										J	40	C	PR	H	Stained	Nil	5				1.33 2 Bar																				27					
28										J	40	VW	PR	H	Clean	Nil	2				1.68 3 Bar																				28					
29			3.00		10	96		91		C		45-55°		J	60	C	PR				StR	L	Stained	Nil	1	1.42 2 Bar												29								
30														J	60	C	Stained				Nil	Nil	1.11 1 Bar																			30				
31														J	62	VW	PR				H	Stained	Nil	3	0.56 2 Bar																			31		
32			2.50		60	95		76		F		50-60°		SJ	70	C	PR				L	Stained	Nil	2	0.69 3 Bar													32								
33														SJ	70	C	PR				L	Stained	Nil	9	0.64 5 Bar																	33				
34														SJ	70	VC	PR				L	Stained	Nil	3	0.66 3 Bar																				34	
35			2.50		50	96		83		M		35-40°		J	50	M	PR				M	Stained	Nil	4	0.46 2 Bar														35							
36														J	40	W	PR				M	Clean	Nil	3	0.66 3 Bar																			36		
37														J	45	C	PR				H	Clean	Nil	4	2.1 2 Bar																					37
38			3.00		50	94		91		M-C		50-60°		J	25	EW	PR				M	Stained	Nil	4	2.42 3 Bar															38						
														J	70	W	PR				M	Stained	Nil	1	2.61 5 Bar																					
														J	50	W	PR				M	Stained	Nil	1	2.61 5 Bar																					

Legend: Overburden Granitic Gneiss



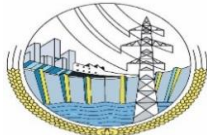
Overburden		Granitic Gneiss	
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[illegible]

Legend:

Overburden		Granitic Gneiss	
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BH-05

HYDRO PLANNING WAPDA					GRAIN SIZE							CONSISTENCY					Project :	ATTABAD LAKE HYDROPOWER PROJECT							
					Silt and clay			< 75 µm		CLAY / SILT		SAND / GRAVEL			Site:	Power House									
										N Value					Easting :	481690.72m		BOREHOLE No. : BH-05							
					Sand		Fine	75 µm - 425 µm		very soft	<2	<4	very loose		Northing:	4017906.942m		Page : 1 of 7							
							Medium	425 µm - 2 mm		Soft	2-4	4-10	Loose		Elevation :	2318.04m		Logged by: Nauman Nazir/Naseer Ahmad							
BOREHOLE NO.					BH-05					Gravels		Fine	4.75 m - 19 mm		Firm	4-8	10-30	Medium Dense		Dip :	90		Checked By: Umar Tariq		
												Coarse	2 mm - 4.75 mm		Stiff	8-15	30-50	Dense		Final Depth : 50 m		Date Started: 23.09.2020			
										Cobbles		19 m - 75 mm		Very Stiff	15-30	>50	Very Dense		Bearing :	Nil		Date Completed: 05.10.2020			
												75 mm -300 mm		Hard	>30				Drilling Co. :	DID, WAPDA		Ware Table 16.5 m			
										Boulders		> 300 mm								Driller :	Nawaz		RIG: Longyear		
DRILLING					RECOVERY		Standard Penetration / Cone Penetration Test							Field Test	Permeability test Result	PROFILE	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)			
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	Core pieces (cm)	Test #	Standard Penetration Blows per					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,							
								6"	3"	3"	3"	3"													
1		Open Pit															Overburden(0.00-4.00 m): It consists of rounded to sub rounded cobble, pebble and gravels of granite gneiss, granodiorite, slate,and marble embeded into clayey silty sand.		Borehole is stabilized with HW casing from 0.00 to 33.30 m.			1			
2	1	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Single Tube.	20	10	10G											A 36 cm wash sample consists of light grey to brownish grey, very coarse sand is collected.			2					
3	2	1.00		15	9	9G												A 18 cm wash sample consists of light grey to brwonish grey, very coarse sand is collected.			3				
4	3	1.00		NIL	9	9G												A 36 cm wash sample consists of light grey to grey, very coarse silty sand is collected.			4				
5	4	1.00		NIL	NIL													A 18 cm wash sample consists of light grey to brownish grey, very coarse sand is collected. A 18 cm wash sample consists of light grey to brownish grey, fine grained sandy silt is collected.			5				
6	5	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	NIL	NIL		SPT-01	2	1	2	1	1	5	45			Grey to brownish grey, firm, fine to very fine clayey Silt.	A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is collected.			6				
7	6	1.00		NIL	NIL		SPT-02	2	1	1	1	2	5	45			Grey to brownish grey, firm, fine to very fine clayey Silt.	A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is collected.			7				
LEGEND:			Standard Penetration Test					Cone Penetration Test					Clayey Silt		Sandy Gravel/ /Cobbles/boulder										

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b) 100 blows for 12 inches or N=100 (c) 10 blows for zero penetration

				HYDRO PLANNING				BOREHOLE No.				BH-05				Project:		ATTABAD LAKE HYDROPOWER PROJECT						Page		2 of 7			
																Site:		Power House											
DRILLING						RECOVERY		Standard Penetration / Cone Penetration Test										Field Test	Permeability test Result	PROFILE	GENERAL DESCRIPTION		Remarks	Elevation (masl)	Depth (m)				
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	Core pieces (cm)	Test #	Standard Penetration Blows per					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure, ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength														
								6"	3"	3"	3"	3"																	
8	7	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	NIL	NIL											<													

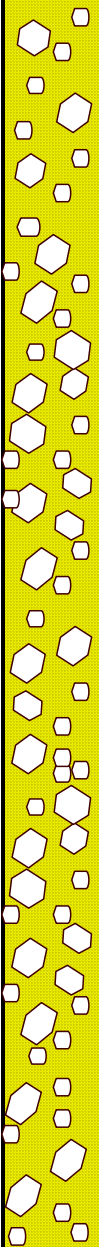
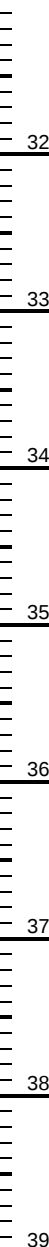
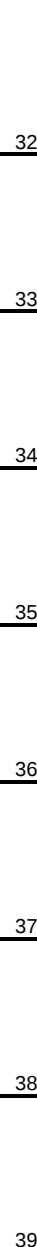
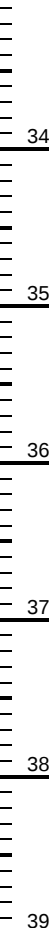
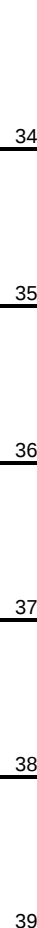
- Note:
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
 - SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING			BOREHOLE No.		BH-05		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	3 of 7										
									Site:		Power House															
DRILLING				RECOVERY		Standard Penetration / Cone Penetration Test								Field Test	Permeability test Result	PROFILE	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)				
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	Core pieces (cm)	Test #	Standard Penetration Blows per					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure, ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength								
								6"	3"	3"	3"	3"														
15	15	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	NIL	NIL		SPT-05	4	3	3	4	3	13	27				Grey to brownish grey, stiff, fine to very fine clayey Silt.		Borehole is stabilized with HW casing from 0.00 to 33.30 m.			16			
16	16	1.00		NIL	NIL														<u>Overburden/ Clayey Silt (05.00-24.00 m):</u> It is consists of fine to very fine grained, light grey to brownish grey clayey silty.		18cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained. A 24 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained. Water table encountered at 16.50 m.					
17	17	1.00		NIL	NIL														A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.							
18	18	1.00		NIL	NIL														A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.							
19	19	1.00		NIL	NIL		SPT-06	4	3	3	3	2	11	21							Grey to brownish grey, stiff, fine to very fine clayey Silt.			A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.		
20	20	1.00		NIL	NIL																A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.					
21	21	1.00		NIL	NIL																			A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.		
22	22	1.00		NIL	NIL		SPT-07	8	6	5	5	5	21	37							Grey to brownish grey, very stiff, fine to very fine clayey Silt.			A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.		
23	23	1.00	NIL	NIL											A 18 cm wash sample consists of light grey to brownish grey, very fine to fine clayey silt is obtained.											
LEGEND:			Standard Penetration Test					Cone Penetration Test					Clayey Silt			Sandy Gravel/ /Cobbles/boulder										

- Note:**
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
 - Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

				HYDRO PLANNING				BOREHOLE No.				BH-05				Project:		ATTABAD LAKE HYDROPOWER PROJECT						Page		4 of 7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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DRILLING				RECOVERY				Standard Penetration / Cone Penetration Test												Field Test		Permeability test Result		PROFILE		GENERAL DESCRIPTION				Remarks				Elevation (masl)		Depth (m)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Depth (m)		Run #		Drill run (m)		Drilling method		Water Loss %		% Core Recovery		Core pieces (cm)		Test #		Standard Penetration Blows per										N Value		Sample length (cm)										SOIL: Soil Type: Colour, Consistency, Structure, ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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23		23		1.00		Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel		10		NIL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

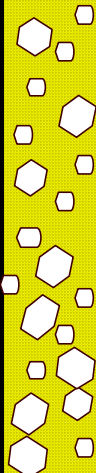
- Note:**
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 - Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.		BH-05		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	5 of 7																						
										Site:	Power House																												
DRILLING				RECOVERY		Standard Penetration / Cone Penetration Test								Field Test	Permeability test Result	PROFILE	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)																	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	Core pieces (cm)	Test #	Standard Penetration Blows per					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure, ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength																					
								6"	3"	3"	3"	3"																											
31	31	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	93	2G,6,18,38,29		CPT-02	10	10/0				Refusal			<u>Overburden (30.00-50.00 m):</u> It consists of angular to sub-angular pebble, cobble and boulders of granodiorite, granite gneiss, embeded into clayey silty sand	Borehole is stabilized with HW casing from 0.00 to 33.30 m.																					
32	32	1.00		100	36	16,3G,7,4,6G																					32												
33	33	1.00		100	43	6,25,12																					33												
34	33	1.00		100	43	6,25,12																		Borehole is stabilized with cement from 33.30 to 48.00 m.															
35	34	1.00		100	40	11G,7,4,10,8G																																34	
36	35	1.00		100	49	13G,6,2,3,3,5,5,4,6,2																																35	
37	36	1.00		100	47	13,9,8,17																																	36
38	37	1.00		100	41	3G,6,6,22,1,3																																	37
39	38	1.00		100	90	32,31,4G,23																				38													
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand				Sandy Gravel/ Cobbles/boulder																									

- Note:**
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
 - Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING			BOREHOLE No.		BH-05		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	6 of 7							
									Site:	Power House													
DRILLING				RECOVERY		Standard Penetration / Cone Penetration Test								Field Test	Permeability test Result	PROFILE	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	Core pieces (cm)	Test #	Standard Penetration Blows per					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure, ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength					
								6"	3"	3"	3"	3"											

- Note:**
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
 - Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING		BOREHOLE No.		BH-05		Project:		ATTABAD LAKE HYDROPOWER PROJECT			Page		7 of 7						
								Site:									Power House				
DRILLING				RECOVERY		Standard Penetration / Cone Penetration Test							Field Test	Permeability test Result	PROFILE	GENERAL DESCRIPTION		Remarks	Elevation (masl)	Depth (m)	
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	% Core Recovery	Core pieces (cm)	Test #	Standard Penetration Blows per								N Value	Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure, ROCK: Rock Type: Weathering, Joint spacing, Colour, Fabric, Strength
47	47	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	8	8G											Overburden (30.00-50.00 m): It consists of angular to sub-angular pebble, cobble and boulders of granodiorite, granite gneiss, embedded into clayey silty sand	Borehole is stabilized with cement from 33.30 to 48.00 m.		48	
48	48	1.00		100	13	13G															49
49	49	1.00		100	7	7G															
50																	Bottom of Borehole at 50.00 m.			50	
51																				51	
52																				52	
53																				53	
54																				54	
55																				55	
LEGEND:		Standard Penetration Test				Cone Penetration Test				Gravelly Sand				Sandy Gravel/ /Cobbles/boulder							

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

BH-06

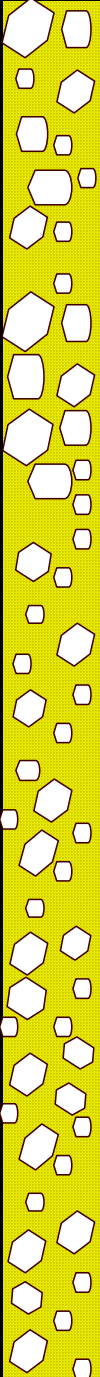
HYDRO PLANNING WAPDA					GRAIN SIZE (ASTM D2487)							CONSISTENCY				Project :	ATTABAD LAKE HYDROPOWER PROJECT																																																																																																																																																																																																																																																																																																																																																																																										
					Silt and clay			< 75 µm		CLAY / SILT		SAND / GRAVEL		Site:	Power House																																																																																																																																																																																																																																																																																																																																																																																												
										N Value																																																																																																																																																																																																																																																																																																																																																																																																	
					Sand	Fine		75 µm - 425 µm		very soft	<2	<4	very loose	Easting :	481605.02		Borehole No. :	BH-06																																																																																																																																																																																																																																																																																																																																																																																									
						Medium		425 µm - 2 mm		Soft	2-4	4-10	Loose	Northing:	4017906.55		Page :	1 of 8																																																																																																																																																																																																																																																																																																																																																																																									
Coarse		2 mm - 4.75 mm		Firm		4-8	10-30	Medium Dense	Elevation :	2313.84 m		Logged by:	Nauman Nazir/Naseer Ahmad																																																																																																																																																																																																																																																																																																																																																																																														
BOREHOLE NO.		BH-06		Gravels	Fine		4.75 m - 19 mm		Stiff	8-15	30-50	Dense	Dip :	90°		Checked By:	Umar Tariq																																																																																																																																																																																																																																																																																																																																																																																										
					Coarse		19 mm - 75 mm		Very Stiff	15-30	>50	Very Dense	Final Depth :	60 m		Date Started:	22-09-2020																																																																																																																																																																																																																																																																																																																																																																																										
					Cobbles		75 mm -300 mm		Hard	>30			Drilling Co. :	DD, WAPDA		Water Table:	15.50 m																																																																																																																																																																																																																																																																																																																																																																																										
				Boulders		> 300 mm				Driller :			Mr. Maqbool		RIG:	Longyear																																																																																																																																																																																																																																																																																																																																																																																											
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test							Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks		Elevation (masl)	Depth (m)																																																																																																																																																																																																																																																																																																																																																																																					
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows								N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																																																																																																																																																																																																																																																																																																																																																																																									
								6"	3"	3"	3"	3"																																																																																																																																																																																																																																																																																																																																																																																															
1	1	1.00	Rotary Drilling method, 96 mm / HQ Diamond Bit with Single Tube Core barrel	Nil	NIL																																																																																																																																																																																																																																																																																																																																																																																																						

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING			BOREHOLE No.			BH-06			Project:		ATTABAD LAKE HYDROPOWER PROJECT					Page		2 of 8		
											Site:		Power House									
DRILLING					RECOVERY		Standared Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks	Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure, Overburden/ Clayey Silt (00.00-15.00 m): It consists grey to brownish grey, fine to very fine grained, clayey Silt.				
								6"	3"	3"	3"	3"										
8	8	1.00	Rotary Drilling method, 96 mm / HQ Diamond Bit with Double Tube Core barrel	100	NIL													Borehole is stabilized with HW casing from 0.00 to 15.12 m.		8		
9	9	1.00		100	NIL																	
10	10	1.00		100	NIL		SPT-3	6	5	4	5	7	21	12		Grey to brownish grey, very stiff, fine to very fine clayey Silt.	10					
11	11	1.00		100	NIL														11			
12	12	1.00		100	NIL																	
13	13	1.00		100	NIL		SPT-4	6	4	5	5	6	20	27		Grey to brownish grey, very stiff, fine to very fine clayey Silt.	13					
14	14	1.00		100	NIL														14			
15	15	1.00		100	NIL																	
LEGEND:				Standard Penetration Test 					Cone Penetration Test 					Clayey Silt			Sandy Gravel/ Cobble/boulder 	Boulder/ Gravel 				

- Note:**
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
 - SOP for Refusal criteria: (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING		BOREHOLE No.		BH-06		Project:	ATTABAD LAKE HYDROPOWER PROJECT				Page	3 of 8										
								Site:								Power House								
DRILLING			RECOVERY		Standard Penetration Test / Cone Penetration Test						Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)					
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows						N Value	Sample length (cm)					SOIL: Soil Type: Colour, Consistency, Structure,				
								6"	3"	3"												3"	3"	
16	16	0.50	Rotary Drilling method, 96 mm / HQ Diamond Bit with Double Tube Core barrel	100	27	5,5,7G,8,26	CPT-1	10	10/0					Refusal		Overburden/ Gravels (15.00-60.00 m): It consists of light grey to grey coloured, angular to sub-angular pebble, cobble and boulders of granite gneiss, granodiorite, and marble embeded into silty sand.		Borehole is stabilized with NW casing from 15.12 to 30.0m. Water Table at 15.50 m			16			
17	17	1.00		100	77	13,22,12,14G,14,2G															17			
18	18	1.40		100	71	24G,47,9G																18		
19	19	1.60		100	74	96,22	CPT-2	10	10/0					Refusal									19	
20	20	1.00		100	60	60G																	20	
21	21	1.00		100	67	11,5G,25,7G,19	CPT-3	8	10	10/0											Refusal			21
22	22	1.00		100	41	34,7G																	22	
23	23	1.00		100	41	34,7G																	23	
LEGEND:		Standard Penetration Test		Cone Penetration Test		Clayey Silt		Sandy Gravel/ Cobble/ boulder		Boulder/ Gravel														

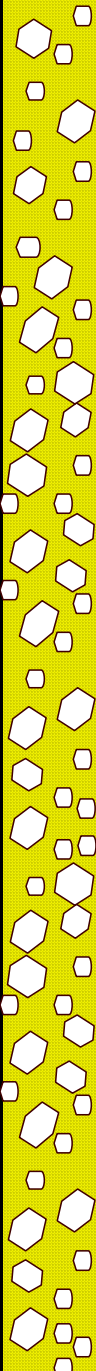
Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.			BH-06			Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	4 of 8				
												Site:	Power House											
DRILLING					RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks			Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure,						
								6"	3"	3"	3"	3"												
</																								

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

				HYDRO PLANNING				BOREHOLE No.				BH-06				Project:		ATTABAD LAKE HYDROPOWER PROJECT								Page		5 of 8					
																Site:		Power House															
DRILLING					RECOVERY			Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks	Elevation (masl)	Depth (m)									
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																		
								6"	3"	3"	3"	3"																					
32	31	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	13	4G,3,6									K=0.00338 cm/sec		Overburden/ Gravels (15.00-60.00 m): It is consists of light grey to grey coloured, angular to sub-angular pebble, cobble and boulders of granite gneiss, granodiorite and marble embeded into silty sand.			Borehole is stabilized with cement from 30.0 to 58.0m.		32											
33	32	1.00		100	23	12,11																33											
34	33	1.00		100	24	4,11,5,4																34											
35	34	1.00		100	69	2,9,13G, 13,7,4,7, 14																35											
36	35	1.00		100	40	15G,9, 16																36											
37	36	1.00		100	34	22G,6,6																37											
38	37	1.00		100	86	3G,5,62, 8,4G,4																38											
39	38	1.00		100	83	5,21G,4, 7,9,9,4,3 ,3,2																39											
LEGEND:				Standard Penetration Test 																		Cone Penetration Test 				Clayey Silt			Sandy Gravel /Cobble/boulder			Boulder/ Gravel	

Note:

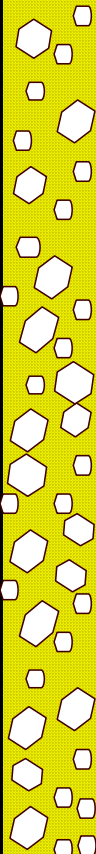
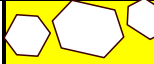
- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

		HYDRO PLANNING				BOREHOLE No.			BH-06			Project:	ATTABAD LAKE HYDROPOWER PROJECT						Page	6 of 8							
												Site:	Power House														
DRILLING					RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION			Remarks			Elevation (masl)	Depth (m)		
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows					N Value	Sample length (cm)				SOIL: Soil Type: Colour, Consistency, Structure,									
								6"	3"	3"	3"	3"															
39 1.00			Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	100	68	7,6,4,29,14,6,2											<u>Overburden/ Gravels (15.00-60.00 m):</u> It consists of light grey to grey coloured, angular to sub-angular pebble, cobble and boulders of granite gneiss, granodiorite, and marble embeded into silty sand.			Hole is stabilized with cement from 30.0 to 58.0m.				40			
40 1.00				100	16	16G												No wsah sample is collected from 39.0 to 50.0m due to 100% water loss.		41							
41 1.00				100	61	19,21,11,10													42								
42 1.00				100	29	7,22													43								
43 1.00				20	68	6,10G,13,18,21													44								
44 1.00				20	43	14,18,6,5													45								
45 1.00				15	47	14,13G,20													46								
46 1.00				20	39	8,3,6,20G													47								
LEGEND:		Standard Penetration Test				Cone Penetration Test				Clayey Silt				Sandy Gravel /Cobble/boulder					Boulder/ Gravel								

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

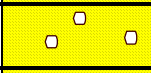
	HYDRO PLANNING				BOREHOLE No.		BH-06		Project:	ATTABAD LAKE HYDROPOWER PROJECT					Page	7 of 8																																																																																																																																																																																																																																																																																																																																											
									Site:										Power House																																																																																																																																																																																																																																																																																																																																								
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION		Remarks		Elevation (masl)	Depth (m)																																																																																																																																																																																																																																																																																																																																					
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)	SOIL: Soil Type: Colour, Consistency, Structure,																																																																																																																																																																																																																																																																																																																																									
48	47	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	20	42	42G																																																																																																																																																																																																																																																																																																																																																					

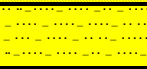
		HYDRO PLANNING				BOREHOLE No.		BH-06		Project:	ATTABAD LAKE HYDROPOWER PROJECT							Page	8 of 8		
										Site:	Power House										
DRILLING				RECOVERY		Standard Penetration Test / Cone Penetration Test								Field Test	Permeability test Result	Profile	GENERAL DESCRIPTION	Remarks		Elevation (masl)	Depth (m)
Depth (m)	Run #	Drill run (m)	Drilling method	Water Loss %	Core Recovery %	Core pieces (cm)	Test #	Penetration Blows					N Value				Sample length (cm)				
								6"	3"	3"	3"	3"									
56	55	1.00	Rotary Drilling method, 76 mm / NQ Diamond Bit with Double Tube Core barrel	30	80	12,50,3,15								K=0.00298 cm/sec		<u>Overburden/ Gravels (15.00-60.00 m):</u> It is consists of light grey to grey coloured, angular to sub-angular pebble, cobble and boulders of granite gneiss, granodiorite, and marble embeded into silty sand.	Hole is stabilized with cement from 30.0 to 58.0m.			56	
57	56	1.00		30	52	5,5,3,6,6G,17,6G,4										A 18 cm wash sample consists of light grey, micaceous, medium to fine sand is obtained.	57				
58	57	1.00		35	59	4G,17,38										A 20 cm wash sample consists of light grey, micaceous, medium to fine sand is obtained.	58				
59	58	1.00		NIL	100	100												59			
60	59	1.00		NIL	100	100										Bottom of Borehole at 60.00 m.		60			
61																			61		
62																			62		
63																			63		
LEGEND:		Standard Penetration Test				Cone Penetration Test				Clayey Silt			Sandy Gravel /Cobble/boulder		Boulder/ Gravel						

Note:

- Core recoveries are measured in addition to gravel recovered in Split Spoon Sampler if applicable
- Refusal criteria is adopted as (a) 50 blows for any 6 inches penetration (b)100 blows for 12 inches or N=100 (c)10 blows for zero penetration

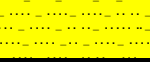
TEST PIT LOGS

HYDRO PLANNING WAPDA				Grain Size (ASTM D2487)			Project :	ATTABAD LAKE HYDROPOWER PROJECT			
				Boulders		≥ 300 mm	Site:	Shishkat Bridge (Sand Aggregate)			
				Cobbles		<300 mm - ≥75 mm					
				Gravel	Coarse	<75 mm - ≥19 mm	Easting:	487919.20m	Page :	1 of 1	
					Fine	<19 mm - ≥4.75 mm	Northing:	4025427.54m	Water Table	1.30m	
TEST PIT #		1		Sand	Coarse	<4.75 mm - ≥2 mm	Elevation:	2414.09m	Date Started:	15.12.2020	
					Medium	<2 mm - ≥425 µm	Final Depth:	3.0 m	Date Completed:	15.12.2020	
					Fine	<425 µm - ≥75 µm	Logged by:	Naseer/Nauman	Operating Agency:	DD, WAPDA	
				Silt / Clay		< 75 µm	Checked By:	Umar Tariq	Excavation Method:	Manual	
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION				Remarks		
1					SAND with subordinate Gravels (0.0-0.50 m): It is light grey to grey coloured, loose, moist, unconsolidated coarse to very coarse grained, SAND with subordinate cobble, pebble of varigated origin. A 3cm seem 50 cm to 53 cm of very fine grained, smooth, semi consolidated moist Clayey SILT is present. SAND (0.50-3.0 m): It is light grey to grey coloured, loose, very moist, unconsolidated coarse grained, SAND.				Soil is easy to excavate.		
									Water Table encountered		
2					BOTTOM OF PIT						
3											
LEGEND:	Sand										
	Gravelly Sand										
	Sandy Silt		Undisturbed Sample		Bulk Sample		Block Sample				

HYDRO PLANNING WAPDA				Grain Size (ASTM D2487)			Project :	ATTABAD LAKE HYDROPOWER PROJECT			
				Boulders		≥ 300 mm	Site:	Power House Area (Aggregate)			
				Cobbles		<300 mm - ≥75 mm					
				Gravel	Coarse	<75 mm - ≥19 mm	Easting:	481753.897m	Page :	1 of 1	
					Fine	<19 mm - ≥4.75 mm	Northing:	4017946.520m	Water Table	NIL	
TEST PIT #		2		Sand	Coarse	<4.75 mm - ≥2 mm	Elevation:	2338.10m	Date Started:	16.12.2020	
					Medium	<2 mm - ≥425 µm	Final Depth:	3.0 m	Date Completed:	16.12.2020	
					Fine	<425 µm - ≥75 µm	Logged by:	Naseer/Nauman	Operating Agency:	DD, WAPDA	
				Silt / Clay		< 75 µm	Checked By:	Umar Tariq	Excavation Method:	Excavator	
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION				Remarks		
1					RBGM (0.00-2.00 m): It consist of Boulders, Gravels, Cobble and Pebbles of varigated origin, embedded into SAND of grey to dark grey in color, moist and loose. first 0.0 to 0.50m is moderately moist with some Silty SAND.				Bulk composite sample is collected.		
2											
3					Clayey SILT (2.0 to 3.00): It is grey to brownish grey in color, damped/highly moist, fine grained, flocculated, and smooth.				Bulk composite sample is collected.		
LEGEND:	Sand										
	Clayey Silty										
	Silty Sand		Undisturbed Sample		Bulk Sample		Block Sample				

HYDRO PLANNING WAPDA				Grain Size (ASTM D2487)		Project : ATTABAD LAKE HYDROPOWER PROJECT					
				Boulders		≥ 300 mm					
				Cobbles		<300 mm - ≥75 mm					
				Gravel	Coarse	<75 mm - ≥19 mm		Easting:	481677.321m	Page :	1 of 1
					Fine	<19 mm - ≥4.75 mm		Northing:	4017944.585m	Water Table	NIL
TEST PIT #				3							
				Sand	Coarse	<4.75 mm - ≥2 mm		Elevation:	2337.31m	Date Started:	16.12.2020
					Medium	<2 mm - ≥425 µm		Final Depth:	3.0 m	Date Completed:	16.12.2020
				Fine	<425 µm - ≥75 µm		Logged by:	Naseer/Nauman	Operating Agency:	DD, WAPDA	
				Silt / Clay		< 75 µm		Checked By:	Umar Tariq	Excavation Method:	Excavator

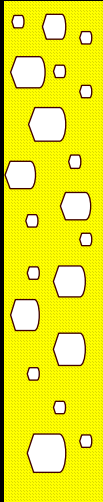
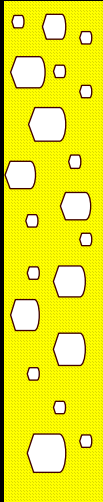
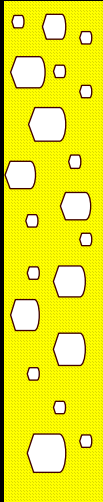
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION	Remarks
1					Clayey SILT (0.0-3.0 m): It is light grey to brownish grey in colour, loose, moist, fine to very fine grained, Clayey SILT with plant roots.	
					From 0.50 to 1.20m, it is light grey, soft, loose, highly moist, moderately plastic with plant roots.	
2					From 1.20 to 3.0m, it is light grey, soft to stiff, highly moist.	
3						

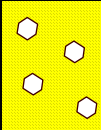
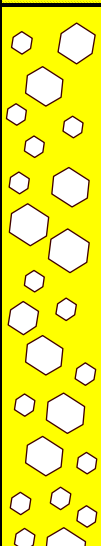
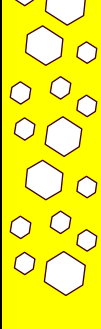
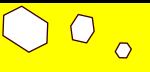
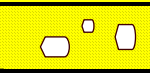
LEGEND:	Sand							
	Clayey Silty							
	Block Sample		Undisturbed Sample		Bulk Sample			

HYDRO PLANNING WAPDA				Grain Size (ASTM D2487)		Project : ATTABAD LAKE HYDROPOWER PROJECT					
				Boulders		≥ 300 mm					
				Cobbles		<300 mm - ≥75 mm					
				Gravel	Coarse	<75 mm - ≥19 mm		Easting:	481727.344m	Page :	1 of 1
					Fine	<19 mm - ≥4.75 mm		Northing:	4017728.434m	Water Table	NIL
TEST PIT #				2							
				Sand	Coarse	<4.75 mm - ≥2 mm		Elevation:	2388.99m	Date Started:	16.12.2020
					Medium	<2 mm - ≥425 µm		Final Depth:	3.0 m	Date Completed:	16.12.2020
				Fine	<425 µm - ≥75 µm		Logged by:	Naseer/Nauman	Operating Agency:	DD, WAPDA	
				Silt / Clay		< 75 µm		Checked By:	Umar Tariq	Excavation Method:	Excavator

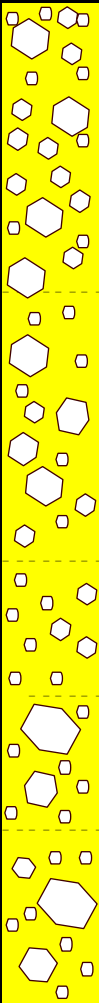
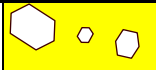
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION	Remarks
1					SAND (0.00-0.7m): It consist of light grey to grey, medium to coarse grained, dry, very loose SAND with plant roots.	
					Clayey Sandy SILT (0.7 to 3.0m): It is grey to brownish grey in color, dry, fine to very fine grained, unconsolidated.	
2						
3						Bulk composite sample is collected.

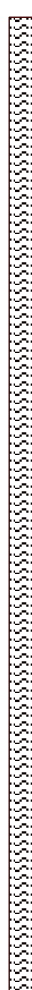
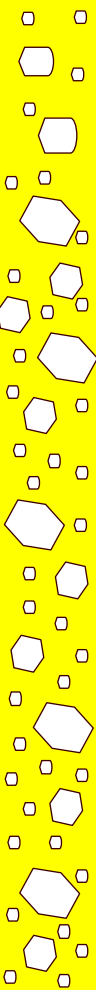
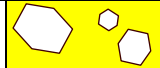
LEGEND:	Sand							
	Clayey Silty							
	Block Sample		Undisturbed Sample		Bulk Sample			

TP- 5,6				Grain Size (ASTM D2487)		Project :	ATTABAD LAKE HYDROPOWER PROJECT																																			
				Boulders		≥ 300 mm		Site:	OUTLET OF SEDIMENT FLUSHING CHANNEL ALIGNMENT (Left Side)																																	
				Cobbles		<300 mm - ≥75 mm																																				
				Gravel	Coarse	<75 mm - ≥19 mm		Easting:	483433.611m	Page :	1 of 1																															
					Fine	<19 mm - ≥4.75 mm		Northing:	4018077.262m	Water Table	NIL																															
				Sand	Coarse	<4.75 mm - ≥2 mm		Elevation:	2443.0m	Date Started:	16.12.2020																															
Medium	<2 mm - ≥425 µm		Final Depth:		3.0 m	Date Completed:	16.12.2020																																			
Fine	<425 µm - ≥75 µm		Logged by:		Naseer/Nauman	Operating Agency:	DD, WAPDA																																			
TEST PIT #		5		Silt / Clay		< 75 µm		Checked By:	Umar Tariq	Excavation Method:	Excavator																															
<table><tr><th>Depth (m)</th><th>Elevation (masl)</th><th>Cobble/ Boulder size (cmxcmxcm)</th><th>Sample Type</th><th>Profile</th><th>GENERAL DESCRIPTION</th><th>Remarks</th></tr><tr><td>1</td><td></td><td></td><td rowspan="3"></td><td rowspan="3"></td><td>Clayey Silty SAND with Gravels (0.0-0.20 m): It is brownish coloured, loose to very loose, dry, unconsolidated Clayey Silty SAND with subordinate cobble, pebble of varigated origin with plant roots.</td><td rowspan="3">Bulk composite sample is collected.</td></tr><tr><td>2</td><td></td><td></td><td>From 0.20m to 1.50m, it is grey to brownish grey in color, fine grained , having RBGM and ABGM embeded into Clayey Silty Sand. The RBGM and ABGM are of varigated origin. It is low to moderately moist, unconsolidated and soft.</td></tr><tr><td>3</td><td></td><td></td><td>Clayey SITY (1.50 to 3.0)m: It is grey to brownish grey in color, fine to very fine grained damped/highly moist, flocculated, and smooth.</td></tr></table>												Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION	Remarks	1					Clayey Silty SAND with Gravels (0.0-0.20 m): It is brownish coloured, loose to very loose, dry, unconsolidated Clayey Silty SAND with subordinate cobble, pebble of varigated origin with plant roots.	Bulk composite sample is collected.	2			From 0.20m to 1.50m , it is grey to brownish grey in color, fine grained , having RBGM and ABGM embeded into Clayey Silty Sand. The RBGM and ABGM are of varigated origin. It is low to moderately moist, unconsolidated and soft.	3			Clayey SITY (1.50 to 3.0)m: It is grey to brownish grey in color, fine to very fine grained damped/highly moist, flocculated, and smooth.									
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION	Remarks																																				
1					Clayey Silty SAND with Gravels (0.0-0.20 m): It is brownish coloured, loose to very loose, dry, unconsolidated Clayey Silty SAND with subordinate cobble, pebble of varigated origin with plant roots.	Bulk composite sample is collected.																																				
2					From 0.20m to 1.50m , it is grey to brownish grey in color, fine grained , having RBGM and ABGM embeded into Clayey Silty Sand. The RBGM and ABGM are of varigated origin. It is low to moderately moist, unconsolidated and soft.																																					
3					Clayey SITY (1.50 to 3.0)m: It is grey to brownish grey in color, fine to very fine grained damped/highly moist, flocculated, and smooth.																																					
<table><tr><td rowspan="3">LEGEND:</td><td>Sand</td><td></td><td>Clayey Silty Sand with Gravel</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Clayey Silt</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Block Sample</td><td></td><td>Undisturbed Sample</td><td></td><td>Bulk Sample</td><td></td><td></td><td></td><td></td><td></td></tr></table>												LEGEND:	Sand		Clayey Silty Sand with Gravel								Clayey Silt										Block Sample		Undisturbed Sample		Bulk Sample					
LEGEND:	Sand		Clayey Silty Sand with Gravel																																							
	Clayey Silt																																									
	Block Sample		Undisturbed Sample		Bulk Sample																																					

HYDRO PLANNING WAPDA				Grain Size (ASTM D2487)		Project :	ATTABAD LAKE HYDROPOWER PROJECT				
				Boulders		≥ 300 mm		Site:	FLUSHING CHANNEL SLOPE ALIGNMENT (Left Side)		
				Cobbles		<300 mm - ≥75 mm					
				Gravel	Coarse	<75 mm - ≥19 mm		Easting:	483661.468m	Page :	1 of 1
					Fine	<19 mm - ≥4.75 mm		Northing:	4018060.061m	Water Table	NIL
				Sand	Coarse	<4.75 mm - ≥2 mm		Elevation:	2514.80m	Date Started:	16.12.2020
Medium	<2 mm - ≥425 µm		Final Depth:		3.0 m	Date Completed:	16.12.2020				
Fine	<425 µm - ≥75 µm		Logged by:		Naseer/Nauman	Operating Agency:	DD, WAPDA				
TEST PIT #		6		Silt / Clay		< 75 µm		Checked By:	Umar Tariq	Excavation Method:	Excavator
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION				Remarks		
1		2×1.2×1.5 0.64×.72×.55 0.8×0.6×0.4 0.47×.53×.35 1.6×0.5×0.6 2.5×1×0.80			Gravelly Sand (0.0-0.4 m): It consist of greyish brown Silty SAND with boulders and Gravels. It is loose, unconsolidated and dry. ABGM (0.4-3.00 m): It consist of Boulder and Gravels mostly of Granodiorite, with subordinate clay and silt. it is loose, unconsolidated, dry with cavities. It is excavated into slided mass.				Bulk composite sample is collected.		
2											
3											
LEGEND:	Sand										
	Gravelly Sand										
	Block Sample		Undisturbed Sample		Bulk Sample						

[illegible]

HYDRO PLANNING WAPDA				Grain Size (ASTM D2487)		Project :	ATTABAD LAKE HYDROPOWER PROJECT				
				Boulders		≥ 300 mm		Site:		SLOPE AREA ABOVE SPILLWAY (Right Side)	
				Cobbles		<300 mm - ≥75 mm					
				Gravel		Coarse	<75 mm - ≥19 mm	Easting:	484038.170m	Page :	1 of 1
						Fine	<19 mm - ≥4.75 mm	Northing:	4018352.560m	Water Table	NIL
				TEST PIT #		8		Sand		Coarse	<4.75 mm - ≥2 mm
Medium	<2 mm - ≥425 µm	Final Depth:	3.0 m							Date Completed:	18.12.2020
Fine	<425 µm - ≥75 µm	Logged by:	Naseer/Nauman							Operating Agency:	DD, WAPDA
				Silt / Clay		< 75 µm		Checked By:	Umar Tariq	Excavation Method:	Manual
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION				Remarks		
1		0.3×0.8×0.2 0.4×0.3×0.4 1×0.4×0.3 0.3×0.4×0.4 0.4×1×0.7 0.6×0.7×0.9 0.3×0.25×0.4			ABGM (0.00-3.00 m): It consist of angular Boulders, Gravels, Cobble and Pebbles mostly of granodiorite, some crushed rock grinded to Silty/Sandy mateial.				Bulk composite sample is collected.		
2											
3											
LEGEND:	ABGM										
	Block Sample		Undisturbed Sample		Bulk Sample						

				Grain Size (ASTM D2487)		Project :	ATTABAD LAKE HYDROPOWER PROJECT				
				Boulders		≥ 300 mm	Site:	SLOPE AREA ABOVE SPILLWAY (Right Side)			
				Cobbles		<300 mm - ≥75 mm					
				Gravel	Coarse	<75 mm - ≥19 mm		Easting:	483755.940m	Page :	1 of 1
Fine	<19 mm - ≥4.75 mm	Northing:	4018415.090m		Water Table	NIL					
TEST PIT #		9		Sand	Coarse	<4.75 mm - ≥2 mm	Elevation:	2504.980m	Date Started:	17.12.2020	
					Medium	<2 mm - ≥425 μm	Final Depth:	3.0 m	Date Completed:	18.12.2020	
				Fine	<425 μm - ≥75 μm	Logged by:	Naseer/Nauman	Operating Agency:	DD, WAPDA		
				Silt / Clay	< 75 μm	Checked By:	Umar Tariq	Excavation Method:	Manual		
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION				Remarks		
1		0.3×0.8×0.5 0.4×0.5×0.4 0.3×0.6×0.3 0.3×0.5×0.4 0.4×0.5×0.7 0.4×0.7×0.5			ABGM (0.00-3.00 m): It consist of angular Boulders, Gravels, Cobble and Pebbles mostly of granodiorite, some crushed rock grinded to Silty/Sandy mateial.				A Bulk composite sample was collected.		
2		0.3×0.2×0.5 0.5×0.4×0.2 0.2×0.2×0.3 0.6×0.3×0.5									
3											
LEGEND:	ABGM										
	Block Sample		Undisturbed Sample		Bulk Sample						

HYDRO PLANNING WAPDA 				Grain Size (ASTM D2487)		Project :	ATTABAD LAKE HYDROPOWER PROJECT					
				Boulders		≥ 300 mm	Site:	SLOPE AREA ABOVE SPILLWAY (Right Side)				
				Cobbles		<300 mm - ≥75 mm						
				Gravel	Coarse	<75 mm - ≥19 mm						
Fine	<19 mm - ≥4.75 mm	Easting:	471821.13m		Page :	1 of 1						
TEST PIT #		10		Sand	Coarse	<4.75 mm - ≥2 mm	Northing:	4018520.38m <th>Water Table</th> <td colspan="2">NIL</td>	Water Table	NIL		
					Medium	<2 mm - ≥425 μm	Elevation:	2185.25m <th>Date Started:</th> <td colspan="2">17.12.2020</td>	Date Started:	17.12.2020		
					Fine	<425 μm - ≥75 μm	Final Depth:	3.0 m <th>Date Completed:</th> <td colspan="2">17.12.2020</td>	Date Completed:	17.12.2020		
				Silt / Clay		< 75 μm	Logged by:	Naseer/Nauman <th>Operating Agency:</th> <td colspan="2">DD, WAPDA</td>	Operating Agency:	DD, WAPDA		
								Checked By:	Umar Tariq <th>Excavation Method:</th> <td colspan="2">Excavator</td>	Excavation Method:	Excavator	
Depth (m)	Elevation (masl)	Cobble/ Boulder size (cmxcmxcm)	Sample Type	Profile	GENERAL DESCRIPTION				Remarks			
1					Clayey SILT (0.0 to 3.0m): It is light brown to brownish grey in color, fine to very fine grained, dry, Loose, flocculated, smooth and unconsolidated Clayey SILT.				Bulk composite sample is collected. Block Sample is collected. Block Sample is collected.			
2												
3												
LEGEND:	Clayey Silt											
	Block Sample		Undisturbed Sample		Bulk Sample							