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BOREHOLE: BHLRMUR-05

Project: Pioneer-Burdekin Pump Hydro Energy Storage

Location: Netherdale

Client: Queensland Hydro

Job No.: PS138693

Position: Lower Reservoir

Coords: 657773.5 m E 7661418.9 m N MGA2020-55

Surface RL: 206.1 m AHD

Contractor: Twin Hills Engineering & Drilling

Drill Rig: Hanjin D&B-8DTM

Inclination: -90° Direction: 000°

Sheet 1 of 4

Date Started: 3/4/2024

Date Completed: 8/4/2024

Logged: TH

Drilling					Sampling		Field Material Description								
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	GROUP SYMBOL	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS				
ADV	F		0	206.05	SPT 0.50-0.95 m 2,3,4 N=7 D 0.50-0.95 m		CL-CH	TOPSOIL Sandy CLAY: medium to high plasticity, pale grey brown to dark brown, sand is fine to coarse grained, well graded; grass rootlets. Gravelly Sandy CLAY: high plasticity, orange brown to dark brown, sand is fine to coarse grained, well graded pale brown; gravel is fine to coarse sub-angular, granite or granodiorite.	w>PL	F	TOPSOIL				
			205.85	COLLUVIAL SOIL											
			1										F - St		
			2	SPT 2.00-2.43 m 4,11,12/130mm HB N=R (refusal possibly occurred on a cobble or boulder) D 2.00-2.43 m									possible cobbles and boulders present in matrix supported colluvium - not recovered	w>PL	St - VSt
			3											VSt - H	
			4	SPT 3.50-3.95 m 3,15,19 HB N=34 D 3.50-3.95 m								MIXTURE OF BOULDERS AND SAND: boulders are up to 300mm diameter, green grey, matrix supported; sand is fine to medium grained, pale grey.	D	VD	
			4	3.85 202.20											
			5	4.30 201.75							CL-CH	Gravelly Sandy CLAY: medium to high plasticity, brown, sand is fine to coarse grained, well graded; gravel is fine grained, angular to sub-angular.	w>PL	VSt	
			6	5.00 201.05							SC	Gravelly Clayey SAND: fine to coarse grained, poorly graded, grey brown, clay is medium plasticity; gravel is fine to coarse grained, sub-angular to angular; with boulders.	W	MD - D	
			7									Continued as Cored Borehole			
8															
9															
10															

Comments

Checked GEM
Date 2/12/2024



Project:	Pioneer-Burdekin Pump Hydro Energy Storage	Position:	Lower Reservoir	Sheet	2 OF 4
Location:	Netherdale	Coords:	657773.5 m E 7661418.9 m N MGA2020-55	Date Started:	3/4/2024
Client:	Queensland Hydro	Surface RL:	206.1 m AHD	Date Completed:	8/4/2024
Job No.:	PS138693	Contractor:	Twin Hills Engineering & Drilling Drill Rig: Hanjin D&B-8DTM	Logged:	TH
		Inclination:	-90° Direction: 000°		

Drilling					Field Material Description				Defect Information				
METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)		AVERAGE DEFECT SPACING (mm)	
									■ - UCS				
					</								

Comments	Checked	GEM
	Date	2/12/2024



BOREHOLE: BHLRMUR-05

Project: Pioneer-Burdekin Pump Hydro Energy Storage Coords: 657773.5 m E 7661418.9 m N MGA2020-55
Location: Netherdale Surface RL: 206.1 m AHD
Client: Queensland Hydro Contractor: Twin Hills Engineering & Drilling Drill Rig: Hanjin D&B-8DTM
Job No.: PS138693 Inclination: -90° Direction: 000°

Sheet 3 OF 4
Date Started: 3/4/2024
Date Completed: 8/4/2024
Logged: TH

Drilling					Field Material Description					Defect Information				
METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)			AVERAGE DEFECT SPACING (mm)	
									VL-2 L 2 L 4 M 2-30 H 40-200 VH 200 EH				10 30 100 300 1000 3000	
HQ3		80	0	10	10.20		MIXTURE OF GP SAND AND COBBLES: sand is fine to medium grained, pale grey-brown; cobbles are dark grey aphanitic basalt, matrix supported, gravel is fine to coarse grained, poorly graded, sub-rounded to angular, dark grey; trace low to medium plasticity clay; (COLLUVIUM)	RS						
				195.85	10.50		NO CORE 0.30m (10.20-10.50)							
SPT		80	0	11	11.10		SC Clayey SAND: fine to coarse grained, well graded, dark brown to grey, clay is medium plasticity; trace fine grained, sub-angular to angular gravel; very dense; dry - moist.	XW			SPT 11.70-11.90m: 19,30/100mm, HB, N=R			
				194.95	11.70		Pale brown and grey.							
HQ3		16	0	12	11.95		SP Gravelly SAND: fine to coarse grained, poorly graded, dark brown, gravel is fine grained, sub-angular; with medium plasticity clay; very dense; dry to moist.	XW						
				194.10	12.75		NO CORE 0.80m (11.95-12.75)							
SPT				13	13.30		SP SAND: fine to coarse grained, poorly graded, dark brown and grey, with medium plasticity clay; trace fine grained, sub-angular gravel; very dense; dry - moist.	XW			SPT 13.20-13.30m: 30/100mm, HB, N=R			
				192.75	14.10		NO CORE 0.80m (13.30-14.10)							
HQ3		38	25	14	14.10		GW Sandy GRAVEL: fine to coarse, well graded, dark brown and grey to white, sand is fine to coarse grained; trace medium plasticity clay; very dense; dry - moist.	XW						
				191.85	14.57		GRANODIORITE: fine to medium grained, dark brown and grey to white, crystalline, massive; dry to moist.							
SPT		13	0	15	14.70		GW Sandy GRAVEL: fine to coarse, well graded, dark brown and grey to white, sand is fine to coarse grained; trace medium plasticity clay; very dense; dry to moist.	XW						
				191.35	16.00		NO CORE 1.30m (14.70-16.00)							
HQ3		100	40	16	16.00		SP SAND: fine to coarse grained, poorly graded, dark brown and dark grey, with fine grained, sub-angular gravel; trace medium plasticity clay; very dense; dry - moist.	XW			SPT 16.20-16.28m: 31/80mm, HB, N=R			
				189.75	16.70		GRANODIORITE: fine to coarse grained, black, brown and pale brown with grey, crystalline, massive; dry to moist.							
SPT				17	17.00		GW Sandy GRAVEL: fine to coarse, well graded, dark brown and grey to white, sand is fine to coarse grained; trace medium plasticity clay.	XW						
				189.05	17.23		GRANODIORITE: fine to medium grained, brown and grey to white, crystalline, massive.							
HQ3		100	100	18	17.55		GW Sandy GRAVEL: fine to medium, well graded, dark brown and grey to white, sand is fine to coarse grained; with medium plasticity clay.	SW			17.55: J, 45°, Fe SN, CU, RF			
				188.82	18		GRANODIORITE: fine to coarse grained, pale grey, dark grey and black, crystalline, massive.							
SPT				19				FR						
				188.50	19									
HQ3		100	100	20							19.55: J, 20°, Fe SN, IR, RF			

Comments

Checked
Date

GEM
2/12/2024



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Position: Lower Reservoir

Coords: 657773.5 m E 7661418.9 m N MGA2020-55

Surface RL: 206.1 m AHD

Contractor: Twin Hills Engineering & Drilling

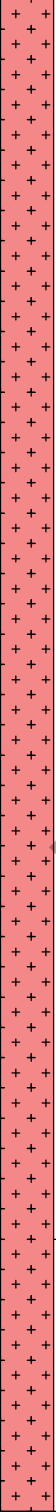
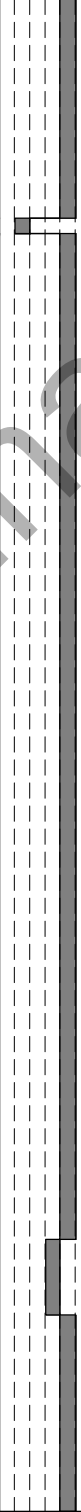
Inclination: -90° Direction: 000°

Sheet 4 OF 4

Date Started: 3/4/2024

Date Completed: 8/4/2024

Logged: TH

Drilling						Field Material Description				Defect Information		
METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa)	DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)	AVERAGE DEFECT SPACING (mm)	
HO3		100	100	20			GRANODIORITE: fine to coarse grained, pale grey, dark grey and black, crystalline, massive.	FR		20.50: J, 45°, Fe SN, PR, RF		
		100	95	21						21.45: J, 45°, SN, PR, RF 21.50: J, 50°, SN, PR, RF 21.53: J, 45°, SN, PR, RF		
				22						21.95: J, 50°, gn mi SN, PR, RF		
				23						22.51: J, 50°, gn mi SN, PR, RF		
		100	100	24						23.07: J, 30°, clay CT, PR, RF 23.09: J, 25°, gn mi SN, PR, RF		
				25						23.83: J, 45°, wh mi, PR, RF 23.95: J, 25°, CN, PR, RF		
		100	100	26						24.93: J, 25°, CN, PR, RF 24.96: J, 25°, CN, PR, RF 25.05: J, 50°, clay CT, UN, RF		
				27						27.42: J, 30°, CN, PR, RF		
		100	97	28						27.81: J, 60°, gn mi VN, PR, RF 27.86: J, 60°, CN, PR, RF		
				29						28.25: J, 60°, CN, PR, RF 28.32: J, 65°, CN, PR, RF 28.55-28.57: J, 60°, sand CT, PR, RF, 10 mm, pi-or alt halo 50mm		
		96	92	30	30.00		Pale grey, pale pink alteration halo around some defects.			29.09: J, 50°, CN, PR, RF 29.78: J, 40°, CN, PR, RF		

CommentsHole Terminated at 30.00 m
Target depth. Standpipe Piezometer Installed.

CheckedGEM
Date2/12/2024



Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BHLRMUR-05 Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BHLRMUR-05	17.55				J		45		Fe	SN	CU	RF					
BHLRMUR-05	17.63				DB												
BHLRMUR-05	18.00				HB												
BHLRMUR-05	18.17				DB												
BHLRMUR-05	19.55				J		20		Fe	SN	IR	RF					
BHLRMUR-05	20.50				J		45		Fe	SN	PR	RF					
BHLRMUR-05	21.45				J		45			SN	PR	RF					
BHLRMUR-05	21.50				J		50			SN	PR	RF					
BHLRMUR-05	21.53				J		45			SN	PR	RF					
BHLRMUR-05	21.95				J		50		gn mi	SN	PR	RF					
BHLRMUR-05	22.51				J		50		gn mi	SN	PR	RF					
BHLRMUR-05	22.63				DB												
BHLRMUR-05	23.07				J		30		clay	CT	PR	RF					
BHLRMUR-05	23.09				J		25		gn mi	SN	PR	RF					
BHLRMUR-05	23.60				DB												
BHLRMUR-05	23.83				J		45		wh mi		PR	RF			tight		
BHLRMUR-05	23.93				DB												
BHLRMUR-05	23.95				J		25			CN	PR	RF					
BHLRMUR-05	24.05				DB												
BHLRMUR-05	24.53				DB												
BHLRMUR-05	24.93				J		25			CN	PR	RF					
BHLRMUR-05	24.96				J		25								tight		
BHLRMUR-05	25.05				J		50		clay	CT	UN	RF					
BHLRMUR-05	25.90				hJ		85			CN	PR	RF			tight		
BHLRMUR-05	26.30				hJ		35			SN	UN	RF					
BHLRMUR-05	26.34				hJ		40			SN	UN	RF					
BHLRMUR-05	26.96	27.00			HB	x2											
BHLRMUR-05	27.42				J		30			CN	PR	RF					
BHLRMUR-05	27.81				J		60		gn mi	VN	PR	RF					
BHLRMUR-05	27.86				J		60			CN	PR	RF					
BHLRMUR-05	28.00				HB												
BHLRMUR-05	28.13				DB												
BHLRMUR-05	28.25				J		60			CN	PR	RF			tight		
BHLRMUR-05	28.32				J		65			CN	PR	RF			tight		
BHLRMUR-05	28.55	28.57			J		60		sand	CT	PR	RF		10	moderately narrow		pi-or alt halo 50mm
BHLRMUR-05	28.62				hJ		70		wh mi		PR			1			
BHLRMUR-05	29.09				J		50			CN	PR	RF					
BHLRMUR-05	29.40				hJ		70		gn mi		PR			2			pi-or alt halo 20mm
BHLRMUR-05	29.52				hJ		80		gn mi		CU	RF		1			pi-or alt halo 15mm



Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BHLRMUR-05 Defects List

PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BHLRMUR-05	29.55				DB												
BHLRMUR-05	29.71				hJ		47		wh mi	SN	PR			2	tight		
BHLRMUR-05	29.78				J		40			CN	PR	RF			tight		

Preliminary

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PointID : BHLRMUR-05 Depth Range: 6.00 - 10.00 m



PointID : BHLRMUR-05 Depth Range: 10.00 - 14.00 m

	TITLE Queensland Hydro Netherdale Pioneer-Burdekin Pump Hydro Energy Storage Core photo - BHLRMUR-05	DRAWN RC	DATE 11/11/2024
		CHECKED GEM	DATE 18/11/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 1/3

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PointID : BHLRMUR-05 Depth Range: 14.00 - 18.00 m



PointID : BHLRMUR-05 Depth Range: 18.00 - 22.00 m

	TITLE Queensland Hydro Netherdale Pioneer-Burdekin Pump Hydro Energy Storage Core photo - BHLRMUR-05	DRAWN RC	DATE 11/11/2024
		CHECKED GEM	DATE 18/11/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 2/3



PointID : BHLRMUR-05 Depth Range: 22.00 - 26.00 m



PointID : BHLRMUR-05 Depth Range: 26.00 - 30.00 m

	TITLE Queensland Hydro Netherdale Pioneer-Burdekin Pump Hydro Energy Storage Core photo - BHLRMUR-05	DRAWN RC	DATE 11/11/2024
		CHECKED GEM	DATE 18/11/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 3/3