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BOREHOLE: BHUA-24

Project: Pioneer-Burdekin PHES

Location: Netherdale/Dalrymple Heights

Client: Queensland Hydro

Job No.: PS138693

Position: Upper Reservoir

Coords: 658169.1 m E 7668009.8 m N MGA2020-55

Surface RL: 903.27 m AHD

Contractor: Twin Hills Drilling Drill Rig: Desco 4450

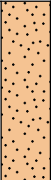
Inclination: -70° Direction: 248° 223°

Sheet 1 of 6

Date Started: 28/5/2024

Date Completed: 10/6/2024

Logged: NW

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-H		0	903.27			SM	Silty SAND: fine to medium grained, pale-brown, silt is low plasticity; with organic matter.	M	L - MD	RESIDUAL SOIL
			1	1.00 904.21 1.20			With fine gravel; trace low to medium plasticity clay; organic matter and fragments of rock. Continued as Cored Borehole				
			2								
			3								
			4								
			5								
			6								
			7								
			8								
			9								
			10								

Comments

Checked GEM
Date 3/12/2024



Sheet 2 OF 6

Coords: 658169.1 m E 7668009.8 m N MGA2020-55

Date Started: 28/5/2024

Date Completed: 10/6/2024

Logged: NW

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 -5 M -10 H -20 VH -30 EH		10 30 100 300 1000 3000			
				0										
				1	1.20		Continuation from non-cored borehole							
				1.30	904.49		METAGRANITE: medium to coarse grained, pale brown and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation. NO CORE 1.90m (1.30-3.20)	HW - MW						
		13	0	2										
		0	0	3										
		67	0	3.20	906.28		METAGRANITE: medium to coarse grained, pale brown and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	HW - MW		3.20-3.60: FZ, recovered as angular medium to coarse grained gravel, Fe stained				
				3.60	906.65		NO CORE 0.40m (3.60-4.00)							
		100	0	4.00	907.03		METAGRANITE: medium to coarse grained, pale brown and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	HW - MW		4.00-5.20: FZ, recovered as angular medium to coarse grained gravel, Fe stained				
		86	0	5.20										
		75	0	5.30	908.25		METAGRANITE: medium to coarse grained, pale brown and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	HW - MW		5.30-5.90: FZ, recovered as angular medium to coarse grained gravel, Fe stained				
				5.90	908.81		NO CORE 1.80m (5.90-7.70)							
		0	0	7										
		100	0	7.70	910.51		METAGRANITE: medium to coarse grained, pale brown and grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	HW - MW		7.70-8.00: FZ, recovered as angular medium to coarse grained gravel, Fe stained				
				8.00	910.79		Pale grey and dark grey, brown, with some black phenocrysts.	MW - SW		8.04-8.30: J, 35°, yl, PR, 5 mm 8.20: J, 25°, rd br iron oxide SN, PR, RF 8.33: J, 20°, rd br iron oxide SN, UN, RF 8.38: J, 35°, rd br iron oxide SN, PR, RF 8.44: J, 80°, SN, UN, RF 8.50: J, 10°, rd br iron oxide SN, UN, RF, 8 mm 8.82: J, 10°, rd br iron oxide SN, PR, RF 8.72-8.94: J, 45°, 5 mm 8.84: J, 30°, rd br iron oxide SN, PR, RF				
		100	100	9										
		100	100	10.00						9.72: J, 25°, rd br iron oxide SN, UN, RF				

Checked GEM

Date 3/12/2024



BOREHOLE: BHUA-24

Project: Pioneer-Burdekin PHES

Location: Netherdale/Dalrymple Heights

Client: Queensland Hydro

Job No.: PS138693

Position: Upper Reservoir

Coords: 658169.1 m E 7668009.8 m N MGA2020-55

Surface RL: 903.27 m AHD

Contractor: Twin Hills Drilling Drill Rig: Desco 4450

Inclination: -70° Direction: 248°

Sheet 3 OF 6

Date Started: 28/5/2024

Date Completed: 10/6/2024

Logged: NW

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)	
				10	912.67	+	METAGRANITE: medium to coarse grained, pale grey and dark grey, brown, crystalline, massive, fabric shows metamorphic crystal reorientation.	MW		10.44: J, 10°, or, PR, 5 mm			
		100	100							10.45: J, 10°, rd br iron oxide SN, UN, RF			
				10.80						10.65-10.70: FZ, recovered as gravel			
				11	913.42	+	Pale grey to dark grey and brown, iron oxide staining along joints.			10.97: J, 40°, rd br iron oxide SN, UN, RF			
		100	75				mafic minerals as a result of alteration - Black			11.18: J, 30°, rd br iron oxide SN, UN, RF			
										11.20: J, 45°, or, RF, 5 mm			
										11.25: J, 55°, rd br iron oxide VN, UN, RF			
		89	83							11.46: J, 45°, SN, PR, RF			
										11.48: J, 30°, SN, PR, RF			
										11.68: J, 10°, PR, RF			
				12	12.00	+				11.95: J, 20°, rd br iron oxide SN, PR, RF			
					914.55	+	NO CORE 0.30m (12.00-12.30)			12.00: J, 30°, rd br iron oxide SN, UN, RF			
					12.30	+							
					914.83	+	METAGRANITE: medium to coarse grained, white, pale grey, pale brown and orange, crystalline, massive, fabric shows metamorphic crystal reorientation.	HW		12.30-12.70: FZ, recovered as gravel			
					12.70	+				12.71: J, 10°, rd br iron oxide SN, PR, RF			
					12.85	+	Grey, brown and dark grey, massive.	MW		12.79: J, 10°, rd br iron oxide SN, PR, RF			
				13	13.00	+	White, pale grey, pale brown and orange.	SW					
					915.49	+	Grey, brown and dark grey.	HW		13.10: J, 60°, rd br iron oxide SN, IR, RF			
					13.40	+				13.20: J, 45°, rd br iron oxide SN, PR, RF			
					13.60	+	White, pale grey, pale brown and orange.	MW		13.35-13.50: FZ/ J, 50°, rd br iron oxide SN, UN, RF, 5 mm			
					916.05	+							
							NO CORE 0.50m (13.60-14.10)	HW					
				14	14.10	+							
					916.52	+	METAGRANITE: medium to coarse grained, grey, brown and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	MW		14.20: J, 45°, or, mi, UN			
		64	36							14.21: J, 40°, rd br iron oxide SN, IR, RF			
										14.10-14.34: FZ, 10°, staining orange, black.			
										14.27: J, 60°, rd br iron oxide SN, UN, RF			
										14.30: J, 35°, rd br iron oxide SN, UN, RF			
										14.38: J, 10°, rd br iron oxide SN, PR, RF			
										14.47: J, 5°, SN, PR, RF			
				15	15.00	+				14.40-14.60: EW, 50°, or, mi, 12 mm			
					917.37	+	NO CORE 1.00m (15.00-16.00)			14.52: J, 45°, rd br iron oxide SN, PR, RF			
										14.55: J, 45°, bl, or, 5 mm			
										14.65-14.80: J, 75°, rd br iron oxide SN, PR, RF			
										14.86: J, 15°, rd br iron oxide SN, PR, RF			
										14.86-15.00: AZ, 35°, or, bl, 10 mm			
		33	0										
				16	16.00	+							
					918.31	+	SC Silty Clayey SAND: medium to coarse grained, pale-brown, clay is medium plasticity. loose.	XW		16.00-16.30: EW			
					16.30	+							
					16.50	+	METAGRANITE: medium to coarse grained, pale brown and grey, crystalline, massive, fabric shows metamorphic crystal reorientation	HW		16.30-16.50: FZ, 10 - 25°, rd br iron oxide SN, IR, VR, extremely altered			
					16.60	+	fabric shows metamorphic crystal reorientation, recovered as gravel.	HW					
		86	0		918.87	+							
				17	17.00	+	NO CORE 0.10m (16.50-16.60)	MW		16.60-17.20: SZ, IR, strongly deformed, extremely fractured zone			
					17.20	+	METAGRANITE: medium to coarse grained, pale brown and grey, crystalline, massive, fabric shows metamorphic crystal reorientation.						
					919.43	+	NO CORE 0.70m (17.20-17.90)						
					17.90	+							
		46	0		920.09	+	METAGRANITE: medium to coarse grained, pale grey, brown with pink, crystalline, massive, fabric shows metamorphic crystal reorientation.	HW		17.90: J, 30°, rd br iron oxide SN, IR, RF, multiples fractures			
										18.00: J, 20°, rd br iron oxide SN, PR, RF			
										18.10: J, 40°, rd br iron oxide SN, PR, RF			
										18.18-18.21: FZ, rd br iron oxide SN, PR, RF			
										18.31: J, 40°, rd br iron oxide SN, PR, RF			
										18.36: J, 50°, rd br iron oxide SN, PR, RF			
										18.45: J, 65°, rd br iron oxide SN, PR, RF			
										18.52: J, 30°, rd br iron oxide SN, PR, RF			
										18.52-18.60: FZ, recovered as gravel			
										18.65: J, 10°, rd br iron oxide SN, PR, RF			
										18.70: Js x2, 70°, rd br iron oxide SN, PR, RF			
										18.77: J, 45°, rd br iron oxide SN, PR, RF			
										19.00-19.14: Js x3, 30°, rd br iron oxide SN, PR, RF			
										19.27: J, 60°, rd br iron oxide SN, PR, RF			
										19.40: J, 60°, bl			
										19.42: J, 10°, rd br iron oxide SN, PR, RF			
										19.46: J, 30°, rd br iron oxide SN, PR, RF			
		100	20										
				19									
		93	87										
				20	19.80	+							
					20.00	+	Pale grey and dark grey.	SW					

Comments

Checked GEM

Date 3/12/2024



Sheet 4 OF 6

Coords: 658169.1 m E 7668009.8 m N MGA2020-55

Date Started: 28/5/2024

Date Completed: 10/6/2024

Logged: NW

Drilling					Field Material Description					Defect Information				
METHOD	WATER	TCR	RQD	DEPTH (metres)	DEPTH RL	GRAPHIC LOG	ROCK / SOIL MATERIAL DESCRIPTION	WEATHERING	INFERRED STRENGTH (MPa) ■ UCS	DEFECT DESCRIPTION & Additional Observations (Core partings shown - refer to Detailed Defect Descriptions table for all logged features)	AVERAGE DEFECT SPACING (mm)			
HQ3		93	87	20	922.06		METAGRANITE: medium to coarse grained, pale grey and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	SW		19.65: J, 50°, rd br iron oxide SN, PR, RF, 5 mm 19.70: J, 60°, rd br iron oxide SN, PR, RF 20.15: J, 45°, rd br iron oxide SN, UN, RF 20.20: J, 20° 20.21: J, 20°, SN, UN, RF				
				20.91						20.81: J, 10°, rd br iron oxide SN, UN, RF 20.83: J, 30°				
				21	922.92		NO CORE 0.29m (20.91-21.20)							
				21.20										
		94	69	22	923.19		METAGRANITE: medium to coarse grained, pale grey and dark grey, crystalline, massive, fabric shows metamorphic crystal reorientation.	MW - SW		21.21: J, 20°, rd br iron oxide SN, UN, RF 21.45-21.60: AZ, 45°, or, 3 mm 21.73: J, 15°, SN, UN, RF, 5 mm 21.83: J, 20°, rd br iron oxide SN, UN, RF 21.94: VN, 35°, bl, 5 mm				
				22.25										
				22.41										
				22.50			Pale brown and grey.	HW		22.26: J, 30°, rd br iron oxide SN, IR, RF, highly altered 22.33: J, 20°, rd br iron oxide SN, IR, RF 22.40-22.50: CZ, strongly deformed				
				22.50										
		0	0	23	924.41		NO CORE 0.80m (22.50-23.30)							
				23.30										
		100	0	24	925.16		LAMPROPHYRE: fine to medium grained, pale-brown pale orange, porphyritic, numerous healed microfractures, phenocrysts to 2mm diameter.	HW		23.40: J, 45°, rd br iron oxide SN, UN, RF 23.43-23.45: Js x2, 20°, rd br iron oxide SN, UN, RF 23.57-23.65: FZ/ MB, disturbed by drilling 23.72: J, 20°, rd br iron oxide SN, IR, RF, 5 mm 23.75: J, 20°, rd br iron oxide SN, IR, RF 23.80: J, 80°, rd br iron oxide SN, UN, RF 23.82: J, 25°, rd br iron oxide SN, UN, RF 24.00-24.30: EW 24.20-24.50: FZ /hJ, 30 - 60°, rd br iron oxide SN, IR, numerous intersecting healed microfractures 24.47: J, 60°, rd br iron oxide SN, UN				
				24.90						24.90: J, 55°, rd br iron oxide SN, UN				
		81	0	25	25.30					25.00-25.28: CZ, recovered sandy gravel				
				25.30										
				25.60										
		100	0	26	927.33		LAMPROPHYRE: fine to medium grained, pale-brown pale orange, porphyritic, phenocrysts to 2mm diameter.			25.64: J, 40°, rd SN, UN, RF, 5 mm 25.69: J, 40°, SN, PR, RF, fracture zone staining (red-orange) 25.85: J, 70° 25.85-26.08: AZ, rd, 5 mm 26.09: J, 30°, rd br iron oxide SN, PR, RF 26.13-26.17: Js x2, 30°, rd br iron oxide SN, PR, RF 26.22: J, 70°, rd br iron oxide SN, PR, RF				
				26.63						26.63: J, 30°, rd br iron oxide SN, UN, RF 26.55-26.80: FZ, 45°, IR, Clay on the joints, orange and red colours. Alteration. 26.80: J, 20°, rd br iron oxide SN, PR, RF 26.90: J, 80°, rd br iron oxide SN, PR, RF 27.03: J, 20°, rd br iron oxide SN, PR, RF 27.10-27.25: J, 45°, SN, PR 27.27: J, 45°, rd br iron oxide SN, PR, RF 27.43-27.46: Js x2, 30°, rd br iron oxide SN, PR, RF 27.55: J, 85°, rd br iron oxide SN, PR, RF				
		100	37	27	27.35				MW		27.62-28.00: Js x3, 40 - 50°, rd br iron oxide SN, PR, RF, 5 mm 28.10: J, 65°, rd br iron oxide SN, UN, RF 28.00-28.60: Js x10, 20 - 30°, rd br iron oxide SN, PR, RF, Fracture zone with predominately 45-degree Jns			
				27.60			Dark green grey brown, and white.							
			27.97			Grey and dark green.								
			28.00											
	100	0	28	28.70										
			28.80											
			28.90											
			29	930.33				SW		28.60-28.85: CS, recovered as gravel in clay matrix 28.85-29.00: SZ, 40°, recovered as gravel				
	100	0	29							29.00-29.46: Jsx 8, 20 - 30°, rd br iron oxide SN, UN, RF 29.42: J, 45°, rd br iron oxide SN, UN, RF				
			29.70							29.70: J, 60°, SN, UN, RF 29.75: J, 10°, SN, UN, RF				
			30	30.00			minerals nodules in anastomosed zone. Dark red and purple							

Comments

Checked
Date

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3/12/2024



BOREHOLE: BHUA-24

Project: Pioneer-Burdekin PHES

Location: Netherdale/Dalrymple Heights

Client: Queensland Hydro

Job No.: PS138693

Position: Upper Reservoir

Coords: 658169.1 m E 7668009.8 m N MGA2020-55

Surface RL: 903.27 m AHD

Contractor: Twin Hills Drilling Drill Rig: Desco 4450

Inclination: -70° Direction: 248°

Sheet 5 OF 6

Date Started: 28/5/2024

Date Completed: 10/6/2024

Logged: NW

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 J M H VH-200 EH				0 20 100 300 1000 3000	
HO3				30	931.46		LAMPROPHYRE: fine to medium grained, dark green, grey, brown, and white, porphyritic, phenocrysts to 2mm diameter.	SW		29.80: J, 50°, SN, UN, RF			
										30.10-30.35: Js x5, 10 - 30°, SN, UN, RF			
			100	8						30.60-30.65: Js x2, 50°, rd br iron oxide SN, PR, RF			
				31						30.67: J, 40°, rd br iron oxide SN, PR, RF			
										30.83: J, 60°, rd br iron oxide SN, PR, RF			
					31.60					31.10: J, 30°, rd br iron oxide SN, PR, RF			
					932.96					31.12-31.15: Js x2, 60°, rd br iron oxide SN, PR, RF			
					31.85					31.16-31.30: Js x4, 20 - 30°, rd br iron oxide SN, PR, RF			
					933.20					31.45: J, 50°, SN, PR, RF			
										31.48: J, 10°, rd br iron oxide SN, PR, RF			
				32			METAGRANITE: medium to coarse grained, pale grey, brown, pink, dark grey, crystalline, massive, highly altered granite, brown, pink alteration, fabric shows metamorphic crystal reorientation.	FR		31.67-31.77: AZ, bl, CU			
			100	60			LAMPROPHYRE: fine to medium grained, grey, porphyritic, phenocrysts to 2mm diameter. multiple microfaults, showing at a 45-degree angle			32.00: VN, 45°, Qtz, rd, 5 mm			
										32.50: VN, 50°, Qtz, PR, 5 mm			
				33						32.80: J, 40°, SN, PR, RF			
					33.10					32.90-33.10: FZ/ DB, 45°, rd, wh, linear reliefs some Clay			
					934.37		METAGRANITE: medium to coarse grained, pale grey mottled, crystalline, massive, highly altered granite, brown, pink alteration, fabric shows metamorphic crystal reorientation.						
			100	100						34.45: J, 65°			
				34						34.95: J, 45°, SM			
					34.65					35.27: J, 45°, SN, PR, RF			
					935.83		LAMPROPHYRE: fine to medium grained, grey, porphyritic, phenocrysts to 2mm diameter.			35.30: J, 45°, RF			
			100	90						35.45: J, 45°, or, UN			
				35						35.89: J, 45°			
				36						36.60: J, 5°			
			100	100						36.70-36.75: Jsx4, 45°, RF			
				37						37.22: J, 20°			
				38						38.15: J, 20°			
			100	100						38.43-38.50: J, 70°			
				39						38.77: J, 20°			
										38.93: J, 20°			
			100	100						39.20: J, 40°, wh mi, PR			
				40						39.53: J, 45°, PR			
										39.80: J, 30°, PR			

Comments

Checked GEM
Date 3/12/2024

PEPHES LIB - REV0 GLB Log IS AU CORED BOREHOLE 3 BHUA-24_GEM_BHPACK 01112024.GPJ <<DrawingFile>> 3/12/2024 10:41 10.03.00.09 Datagel Lab and In Situ Tool - DGD | Lib: WSP 5.07.2 2023-10-30 Proj: WSP 5.04.1 2023-06-14



BOREHOLE: BHUA-24

Project:	Pioneer-Burdekin PHES	Position:	Upper Reservoir	Sheet	6 OF 6
Location:	Netherdale/Dalrymple Heights	Coords:	658169.1 m E 7668009.8 m N MGA2020-55	Date Started:	28/5/2024
Client:	Queensland Hydro	Surface RL:	903.27 m AHD	Date Completed:	10/6/2024
Job No.:	PS138693	Contractor:	Twin Hills Drilling Drill Rig: Desco 4450	Logged:	NW
		Inclination:	-70° Direction: 248°		

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 J M H VH EH	■ UCS -2 -6 -30 -60 -100 -200		0 100 200 300 1000 3000
HQ3		100	100	40			LAMPROPHYRE: fine to medium grained, grey, porphyritic, phenocrysts to 2mm diameter.	FR		40.22: J, 45°, PR 40.40: J, 45°, PR, RF 40.60: FZ 40.60-40.66: FZ, recovered as gravel 40.70: J, 70°, SN, UN, RF	
				41	41.30 942.08		METAGRANITE: medium to coarse grained, pink mottled pale grey, crystalline, massive, highly altered granite, brown, pink alteration, fabric shows metamorphic crystal reorientation.			41.10: J, 30° 41.12: J, 60°, SN, PR, RF 41.15: J, 45°, CN, PR, RF 41.22: J, 50°, PR, RF 41.25-41.31: FZ/SS, 45°, rd, sheared seam, recovered as gravel 41.32: J, 45°, VN, CU, RF 41.70: J, 45°, or SN, PR, RF 41.80: J, 45°, or, PR, RF, 8 mm 41.86: J, 50°, or, bl SN, PR, RF, 5 mm 42.10: J, 20°, SN, UN, RF 42.22: J, 10°, SN, UN, RF 42.23: J, 10°, SN, UN, RF 42.34: VN, 10°, or, wh SN, IR, RF, 12 mm 42.40: J, 50°, rd SN, PR, RF 42.52: J, 15°, or SN, PR, RF 42.55: J, 20°, or SN, ST, RF	
		100	93							43.45: J, 30°, or, ST 43.46: AZ, 20°, bl VN, UN	
				42						44.10: J, 35°, or SN, PR, RF	
				43						44.60: J, 45°, PR, RF 44.65: J, 45°, PR, RF 44.64-44.75: FZ/SS, 45°, bl, wh 44.75: J, 45°, SN, PR, RF 44.70-44.95: Js x2, 45°, or, bl SN, PR, RF 44.85: J, 45°, SN, PR, RF 45.30: J, 45°, PR, RF	
		100	100								
				44							
				45							
		100	100								
				46	46.60 947.06						
				47			Hole Terminated at 46.60 m Target depth. Backfilled with grout.				
				48							
				49							
				50							

Comments	Checked	GEM
	Date	3/12/2024

PEPHES LIB_REV0 GLB Log IS AU CORED BOREHOLE 3 BHUA-24_GEM_BHPACK 01112024.GPJ <<DrawingFile>> 3/12/2024 10:41 10.03.00.09 Datagel Lab and In Situ Tool -DGD | Lib: WSP 5.07.2 2023-10-30 Proj: WSP 5.04.1 2023-05-14



Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BHUA-24
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
BHUA-24	1.20	1.30															recovered as angular medium to coarse grained gravel, Fe stained
BHUA-24	3.20	3.60			FZ												recovered as angular medium to coarse grained gravel, Fe stained
BHUA-24	4.00	5.20			FZ												recovered as angular medium to coarse grained gravel, Fe stained
BHUA-24	5.30	5.90			FZ												recovered as angular medium to coarse grained gravel, Fe stained
BHUA-24	7.70	8.00			FZ												recovered as angular medium to coarse grained gravel, Fe stained
BHUA-24	8.04	8.30			J		35		yl		PR			5			
BHUA-24	8.20				J		25		rd br iron oxide	SN	PR	RF					
BHUA-24	8.33				J		20		rd br iron oxide	SN	UN	RF					
BHUA-24	8.38				J		35		rd br iron oxide	SN	PR	RF					
BHUA-24	8.44				J		80			SN	UN	RF					
BHUA-24	8.50				J		10		rd br iron oxide	SN	UN	RF		8			
BHUA-24	8.52				hJ		60		gy mi		PR			5			
BHUA-24	8.60				hJ		60		gy mi		PR						
BHUA-24	8.65				hJ		75		gy mi		UN						
BHUA-24	8.72	8.94			J		45							5			
BHUA-24	8.82				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	8.84				J		30		rd br iron oxide	SN	PR	RF					
BHUA-24	9.10				DB												
BHUA-24	9.20	9.30			hJ		40		or					5			
BHUA-24	9.70	9.90			hJ		80		bl					5			
BHUA-24	9.72				J		25		rd br iron oxide	SN	UN	RF					
BHUA-24	10.44				J		10		or		PR			5			
BHUA-24	10.45				J		10		rd br iron oxide	SN	UN	RF					
BHUA-24	10.65	10.70			FZ												recovered as gravel
BHUA-24	10.66	10.80			MB						IR						mechanical failure
BHUA-24	10.80				hJ		25		or					5			
BHUA-24	10.97				J		40		rd br iron oxide	SN	UN	RF					
BHUA-24	11.18				J		30		rd br iron oxide	SN	UN	RF					
BHUA-24	11.20				J		45		or			RF		5			
BHUA-24	11.25				J		55		rd br iron oxide	VN	UN	RF					
BHUA-24	11.46				J		45			SN	PR	RF					
BHUA-24	11.48				J		30			SN	PR	RF					
BHUA-24	11.68				J		10				PR	RF					
BHUA-24	11.80				hJ		70		or					5			
BHUA-24	11.95				J		20		rd br iron oxide	SN	PR	RF					
BHUA-24	12.00				J		30		rd br iron oxide	SN	UN	RF					
BHUA-24	12.30	12.70			FZ												reovered as gravel
BHUA-24	12.71				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	12.79				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	13.10				J		60		rd br iron oxide	SN	IR	RF					
BHUA-24	13.20				J		45		rd br iron oxide	SN	PR	RF					
BHUA-24	13.35	13.50			FZ	/ J	50		rd br iron oxide	SN	UN	RF		5			
BHUA-24	14.10	14.34			FZ		10										staining orange, black.
BHUA-24	14.20				J		45		or, mi		UN						
BHUA-24	14.20	14.80			hJ		45		or, mi					5			
BHUA-24	14.21				J		40		rd br iron oxide	SN	IR	RF					
BHUA-24	14.27				J		60		rd br iron oxide	SN	UN	RF					
BHUA-24	14.30				J		35		rd br iron oxide	SN	UN	RF					
BHUA-24	14.38				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	14.40	14.60			EW		50		or, mi					12			
BHUA-24	14.47				J		5			SN	PR	RF					
BHUA-24	14.52				J		45		rd br iron oxide	SN	PR	RF					
BHUA-24	14.55				J		45		bl, or					5			
BHUA-24	14.65	14.80			J		75		rd br iron oxide	SN	PR	RF					
BHUA-24	14.86				J		15		rd br iron oxide	SN	PR	RF					
BHUA-24	14.86	15.00			AZ		35		or, bl					10			
BHUA-24	16.00	16.30			EW												
BHUA-24	16.30	16.50			FZ		10	25	rd br iron oxide	SN	IR	VR					extremely altered
BHUA-24	16.60	17.20			SZ						IR						strongly deformed, extremely fractured zone
BHUA-24	17.90				J		30		rd br iron oxide	SN	IR	RF					multples fractures
BHUA-24	18.00				J		20		rd br iron oxide	SN	PR	RF					
BHUA-24	18.10				J		40		rd br iron oxide	SN	PR	RF					
BHUA-24	18.18	18.21			FZ				rd br iron oxide	SN	PR	RF					
BHUA-24	18.31				J		40		rd br iron oxide	SN	PR	RF					
BHUA-24	18.36				J		50		rd br iron oxide	SN	PR	RF					
BHUA-24	18.45				J		65		rd br iron oxide	SN	PR	RF					
BHUA-24	18.52				J		30		rd br iron oxide	SN	PR	RF					
BHUA-24	18.52	18.60			FZ												recovered as gravel
BHUA-24	18.65				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	18.70				Js	x2	70		rd br iron oxide	SN	PR	RF					
BHUA-24	18.77				J		45		rd br iron oxide	SN	PR	RF					
BHUA-24	19.00	19.14			Js	x3	30		rd br iron oxide	SN	PR	RF					
BHUA-24	19.27				J		60		rd br iron oxide	SN	PR	RF					
BHUA-24	19.40				J		60		bl								
BHUA-24	19.42				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	19.46				J		30		rd br iron oxide	SN	PR	RF					
BHUA-24	19.65				J		50		rd br iron oxide	SN	PR	RF		5			
BHUA-24	19.70				J		60		rd br iron oxide	SN	PR	RF					
BHUA-24	20.15				J		45		rd br iron oxide	SN	UN	RF					



Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BHUA-24
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
BHUA-24	20.18				hJ		30		gy mi		UN	RF					
BHUA-24	20.20				J		20										
BHUA-24	20.21				J		20			SN	UN	RF					
BHUA-24	20.40	20.50			hJ		80	90	rd br iron oxide		UN	RF					
BHUA-24	20.81				J		10		rd br iron oxide	SN	UN	RF					
BHUA-24	20.83				J		30										
BHUA-24	21.00	21.80			hJ		15	30			IR						fragments of rock
BHUA-24	21.18	22.22			hJ		30		yl, rd					5			
BHUA-24	21.20				hJ		10				UN						
BHUA-24	21.21				J		20		rd br iron oxide	SN	UN	RF					
BHUA-24	21.25				hJ		45				UN						
BHUA-24	21.37				hJ		45				UN						
BHUA-24	21.45	21.60			AZ		45		or					3			
BHUA-24	21.73				J		15			SN	UN	RF		5			
BHUA-24	21.83				J		20		rd br iron oxide	SN	UN	RF					
BHUA-24	21.94				VN		35		bl					5			
BHUA-24	22.26				J		30		rd br iron oxide	SN	IR	RF					highly altered
BHUA-24	22.33				J		20		rd br iron oxide	SN	IR	RF					
BHUA-24	22.40	22.50			CZ												strongly deformed
BHUA-24	23.40				J		45		rd br iron oxide	SN	UN	RF					
BHUA-24	23.43	23.45			Js	x2	20		rd br iron oxide	SN	UN	RF					
BHUA-24	23.57	23.65			FZ	/ MB											disturbed by drilling
BHUA-24	23.70	25.20			hJ		70		bl					5			
BHUA-24	23.72				J		20		rd br iron oxide	SN	IR	RF		5			
BHUA-24	23.75				J		20		rd br iron oxide	SN	IR	RF					
BHUA-24	23.80				J		80		rd br iron oxide	SN	UN	RF					
BHUA-24	23.82				J		25		rd br iron oxide	SN	UN	RF					
BHUA-24	24.00	24.30			EW												
BHUA-24	24.20	24.50			FZ	/hJ	30	60	rd br iron oxide	SN	IR						numerous intrsecting healed microfractures
BHUA-24	24.47				J		60		rd br iron oxide	SN	UN						
BHUA-24	24.61				hJ		30		rd br iron oxide		UN						
BHUA-24	24.62				hJ		45		rd br iron oxide		UN						
BHUA-24	24.82				hJ		60		rd br iron oxide		UN						
BHUA-24	24.90				J		55		rd br iron oxide	SN	UN						
BHUA-24	25.00	25.28			CZ												recovered sandy gravel
BHUA-24	25.60				MB												drilling break
BHUA-24	25.64				J		40		rd	SN	UN	RF		5			
BHUA-24	25.69				J		40			SN	PR	RF					fracture zone staining (red-orange)
BHUA-24	25.85				J		70										
BHUA-24	25.85	26.08			AZ				rd					5			
BHUA-24	26.09				J		30		rd br iron oxide	SN	PR	RF					
BHUA-24	26.13	26.17			Js	x2	30		rd br iron oxide	SN	PR	RF					
BHUA-24	26.22				J		70		rd br iron oxide	SN	PR	RF					
BHUA-24	26.25	26.53			hJs	x5	30	40	rd br iron oxide		PR						
BHUA-24	26.45				hJs	x2	85		rd br iron oxide		PR						
BHUA-24	26.55	26.80			FZ		45				IR						Clay on the joints, orange and red colours. Alteration.
BHUA-24	26.63				J		30		rd br iron oxide	SN	UN	RF					
BHUA-24	26.80				J		20		rd br iron oxide	SN	PR	RF					
BHUA-24	26.90				J		80		rd br iron oxide	SN	PR	RF					
BHUA-24	27.03				J		20		rd br iron oxide	SN	PR	RF					
BHUA-24	27.10	27.25			J		45			SN	PR						
BHUA-24	27.27				J		45		rd br iron oxide	SN	PR	RF					
BHUA-24	27.35	27.45			hJs	x3	45		rd br iron oxide		PR	RF					
BHUA-24	27.43	27.46			Js	x2	30		rd br iron oxide	SN	PR	RF					
BHUA-24	27.55				J		85		rd br iron oxide	SN	PR	RF					
BHUA-24	27.62	28.00			Js	x3	40	50	rd br iron oxide	SN	PR	RF		5			
BHUA-24	28.00	28.60			Js	x10	20	30	rd br iron oxide	SN	PR	RF					Fracture zone with predominately 45-degree Jns
BHUA-24	28.10				J		65		rd br iron oxide	SN	UN	RF					
BHUA-24	28.60	28.85			CS												recovered as gravel in clay matrix
BHUA-24	28.85	29.00			SZ		40										recovered as gravel
BHUA-24	29.00	29.46			Js	x 8	20	30	rd br iron oxide	SN	UN	RF					
BHUA-24	29.42				J		45		rd br iron oxide	SN	UN	RF					
BHUA-24	29.50	29.65			hJs	x3	10	20	rd br iron oxide / wh min		PR	RF					
BHUA-24	29.70				J		60			SN	UN	RF					
BHUA-24	29.75				J		10			SN	UN	RF					
BHUA-24	29.80				J		50			SN	UN	RF					
BHUA-24	30.10	30.35			Js	x5	10	30		SN	UN	RF					
BHUA-24	30.35	30.60			hJs	x4	80	90			UN						
BHUA-24	30.60	30.65			Js	x2	50		rd br iron oxide	SN	PR	RF					
BHUA-24	30.67				J		40		rd br iron oxide	SN	PR	RF					
BHUA-24	30.83				J		60		rd br iron oxide	SN	PR	RF					
BHUA-24	31.10				J		30		rd br iron oxide	SN	PR	RF					
BHUA-24	31.12	31.15			Js	x2	60		rd br iron oxide	SN	PR	RF					
BHUA-24	31.16	31.30			Js	x4	20	30	rd br iron oxide	SN	PR	RF					
BHUA-24	31.30	31.45			V		60		wh		PR	SM		5			
BHUA-24	31.30	31.60			hJ		90		wh, rd					5			quartz
BHUA-24	31.45				J		50			SN	PR	RF					
BHUA-24	31.48				J		10		rd br iron oxide	SN	PR	RF					
BHUA-24	31.55				V	/ J	50		wh, Qtz		PR	RF					



Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BHUA-24
Defects List

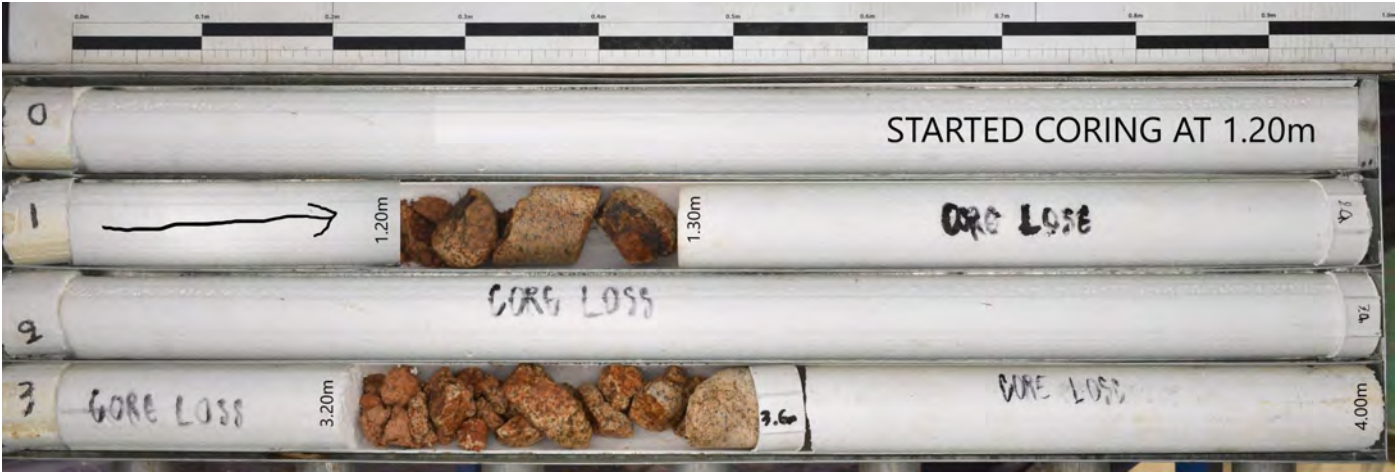
PointID	Depth	Bottom	Fracture Set	Defect Number	Type	Type Suffix	Dip Minimum (degrees)	Dip Maximum (degrees)	Infilling Material	Aperture Observation	Planarity	Roughness	Aperture Measurement Sign	Aperture Measurement	Aperture	Spacing	Remark
BHUA-24	31.67	31.77			AZ				bl		CU						
BHUA-24	32.00				VN		45		Qtz, rd					5			
BHUA-24	32.00	32.55			hJ		45		wh					5			
BHUA-24	32.22				hJ		55				UN						
BHUA-24	32.30				hJ		60		wh		UN			10			
BHUA-24	32.40				hJ		20				UN						
BHUA-24	32.40	32.50			hJ		60	70			UN						
BHUA-24	32.50				VN		50		Qtz		PR			5			
BHUA-24	32.65	32.75			hJs	x5	50	60	wh mi		UN						
BHUA-24	32.80				J		40			SN	PR	RF					
BHUA-24	32.90	33.10			FZ	/ DB	45		rd, wh								linear reliefs some Clay
BHUA-24	33.10				hJ		45		or					5			
BHUA-24	33.15	33.23			hJ		45		wh mi	SN	PR						
BHUA-24	33.52				hJ		60		bl								
BHUA-24	34.10				hJ		30		or		UN						
BHUA-24	34.45				J		65										
BHUA-24	34.65				CO		45				IR						Contact granite and porphyritic andesite
BHUA-24	34.70				hJ		45		wh								
BHUA-24	34.95				J		45					SM					
BHUA-24	35.10				hJ		45			SN	PR	RF					
BHUA-24	35.27				J		45			SN	PR	RF					
BHUA-24	35.30				J		45					RF					
BHUA-24	35.35				hJ		45		wh					5			
BHUA-24	35.45				J		45		or		UN						
BHUA-24	35.53				hJ		25		wh		CU						
BHUA-24	35.75	35.95			hJs	x4	45		or	SN	PR	RF					
BHUA-24	35.89				J		45										
BHUA-24	36.01	36.70			hJs	x7	45					RF					
BHUA-24	36.15	36.35			hJs	x3	30		wh					5			
BHUA-24	36.40				hJ		30		wh		CU	SM		8			
BHUA-24	36.50				hJ		50		wh, gr			SM		5			
BHUA-24	36.60				J		5										
BHUA-24	36.70	36.75			Js	x4	45					RF					
BHUA-24	37.22				J		20										
BHUA-24	37.65				DB												
BHUA-24	37.96				HB												
BHUA-24	38.15				J		20										
BHUA-24	38.43	38.50			J		70										
BHUA-24	38.44	38.95			hJ		80		rd, wh					5			
BHUA-24	38.77				J		20										
BHUA-24	38.93				J		20										
BHUA-24	39.20				J		40		wh mi		PR						
BHUA-24	39.53				J		45				PR						
BHUA-24	39.80				J		30				PR						
BHUA-24	40.22				J		45				PR						
BHUA-24	40.40				J		45				PR	RF					
BHUA-24	40.45				hJ		45				PR						
BHUA-24	40.50				hJ		60				PR						
BHUA-24	40.60				FZ												
BHUA-24	40.60	40.66			FZ												recovered as gravel
BHUA-24	40.70				J		70			SN	UN	RF					
BHUA-24	40.75	40.85			hJ		45		wh, or								
BHUA-24	40.90				DB	/J	30			CN	UN	RF					
BHUA-24	41.10				J		30										
BHUA-24	41.12				J		60			SN	PR	RF					
BHUA-24	41.15				J		45			CN	PR	RF					
BHUA-24	41.22				J		50				PR	RF					
BHUA-24	41.25	41.31			FZ	/SS	45		rd								sheared seam, recovered as gravel
BHUA-24	41.32				J		45			VN	CU	RF					
BHUA-24	41.34				V	/ SS	50		wh		CU	RF		5			
BHUA-24	41.58				hJ		45				PR	SM					
BHUA-24	41.65				hJ		80		bl		PR	RF					
BHUA-24	41.70				J		45		or	SN	PR	RF					
BHUA-24	41.70	41.80			hJ		80		bl		PR	RF					
BHUA-24	41.70	42.10			hJ		45		or		PR	RF					
BHUA-24	41.80				J		45		or		PR	RF		8			
BHUA-24	41.86				J		50		or, bl	SN	PR	RF		5			
BHUA-24	42.10				J		20			SN	UN	RF					
BHUA-24	42.22				J		10			SN	UN	RF					
BHUA-24	42.23				J		10			SN	UN	RF					
BHUA-24	42.24				hJ		60		wh or		PR						
BHUA-24	42.34				VN		10		or, wh	SN	IR	RF		12			
BHUA-24	42.40				J		50		rd	SN	PR	RF					
BHUA-24	42.52				J		15		or	SN	PR	RF					
BHUA-24	42.55				J		20		or	SN	ST	RF					
BHUA-24	43.45				J		30		or		ST						
BHUA-24	43.46				AZ		20		bl	VN	UN						
BHUA-24	43.60				hJ		30		or		PR	RF					
BHUA-24	43.75				hJ		45				PR						



Pioneer Burdekin Pumped Hydro Energy Storage: Tranche 2 – BHUA-24
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
BHUA-24	44.10				J		35		or	SN	PR	RF					
BHUA-24	44.60				J		45				PR	RF					
BHUA-24	44.64	44.75			FZ	/ SS	45		bl, wh								
BHUA-24	44.65				J		45				PR	RF					
BHUA-24	44.70	44.95			Js	x2	45		or, bl	SN	PR	RF					
BHUA-24	44.75				J		45			SN	PR	RF					
BHUA-24	44.85				J		45			SN	PR	RF					
BHUA-24	45.10	45.80			hJs	x2	30		bl		PR						
BHUA-24	45.30				J		45				PR	RF					
BHUA-24	45.60				hJ		60		or, bl		PR						
BHUA-24	45.70	46.10			hJs	x6	45		or		UN	RF					
BHUA-24	45.75	46.15			hJs	x5	45		or		IR			12			
BHUA-24	46.10	46.30			hJs	x10	70		or, bl		PR						
BHUA-24	46.40	46.60			hJs	x5	20		gn, or, bl		PR			40			

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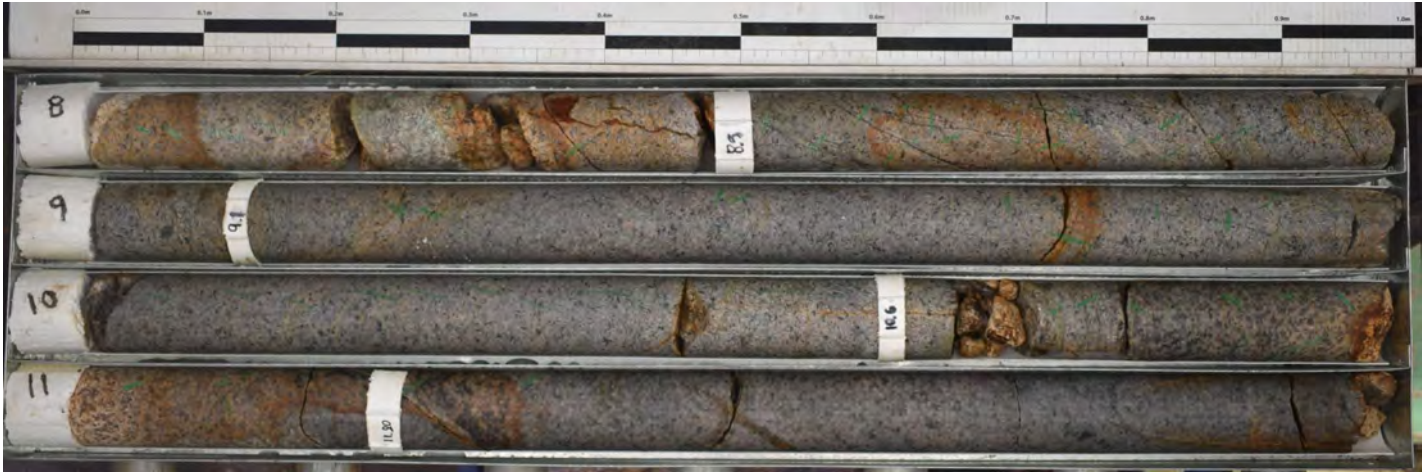
PointID : BHUA-24 Depth Range: 0.00 - 4.00 m



PointID : BHUA-24 Depth Range: 4.00 - 8.00 m

	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BHUA-24	DRAWN RC	DATE 19/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 1/6

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PointID : BHUA-24 Depth Range: 8.00 - 12.00 m



PointID : BHUA-24 Depth Range: 12.00 - 16.00 m

	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BHUA-24	DRAWN RC	DATE 19/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 2/6

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PointID : BHUA-24 Depth Range: 16.00 - 20.00 m



PointID : BHUA-24 Depth Range: 20.00 - 24.00 m



TITLE
Queensland Hydro
Netherdale/Dalrymple Heights
Pioneer-Burdekin PHES
Core photo - BHUA-24

DRAWN	RC	DATE	19/11/2024
CHECKED	GEM	DATE	4/12/2024
SCALE	Not To Scale		A4
PROJECT No	PS138693		FIGURE No 3/6



PointID : BHUA-24 Depth Range: 24.00 - 28.00 m



PointID : BHUA-24 Depth Range: 28.00 - 32.00 m

	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BHUA-24	DRAWN RC	DATE 19/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 4/6



PointID : BHUA-24 Depth Range: 32.00 - 36.00 m



PointID : BHUA-24 Depth Range: 36.00 - 40.00 m



TITLE

Queensland Hydro
Netherdale/Dalrymple Heights
Pioneer-Burdekin PHES
Core photo - BHUA-24

DRAWN	RC	DATE	19/11/2024
CHECKED	GEM	DATE	4/12/2024
SCALE	Not To Scale		A4
PROJECT No	PS138693	FIGURE No	5/6

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PointID : BHUA-24 Depth Range: 40.00 - 44.00 m



PointID : BHUA-24 Depth Range: 44.00 - 46.60 m

	TITLE Queensland Hydro Netherdale/Dalrymple Heights Pioneer-Burdekin PHES Core photo - BHUA-24	DRAWN RC	DATE 19/11/2024
		CHECKED GEM	DATE 4/12/2024
		SCALE Not To Scale	A4
		PROJECT No PS138693	FIGURE No 6/6