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Suite 01, 20 Chandos Street
St Leonards NSW 2065
T: 02 9493 9500
F: 02 9493 9599

WATER MONITORING BORE LOG

Bore ID: MB12B

Client: Snowy Hydro Limited **Project:** Snowy 2.0

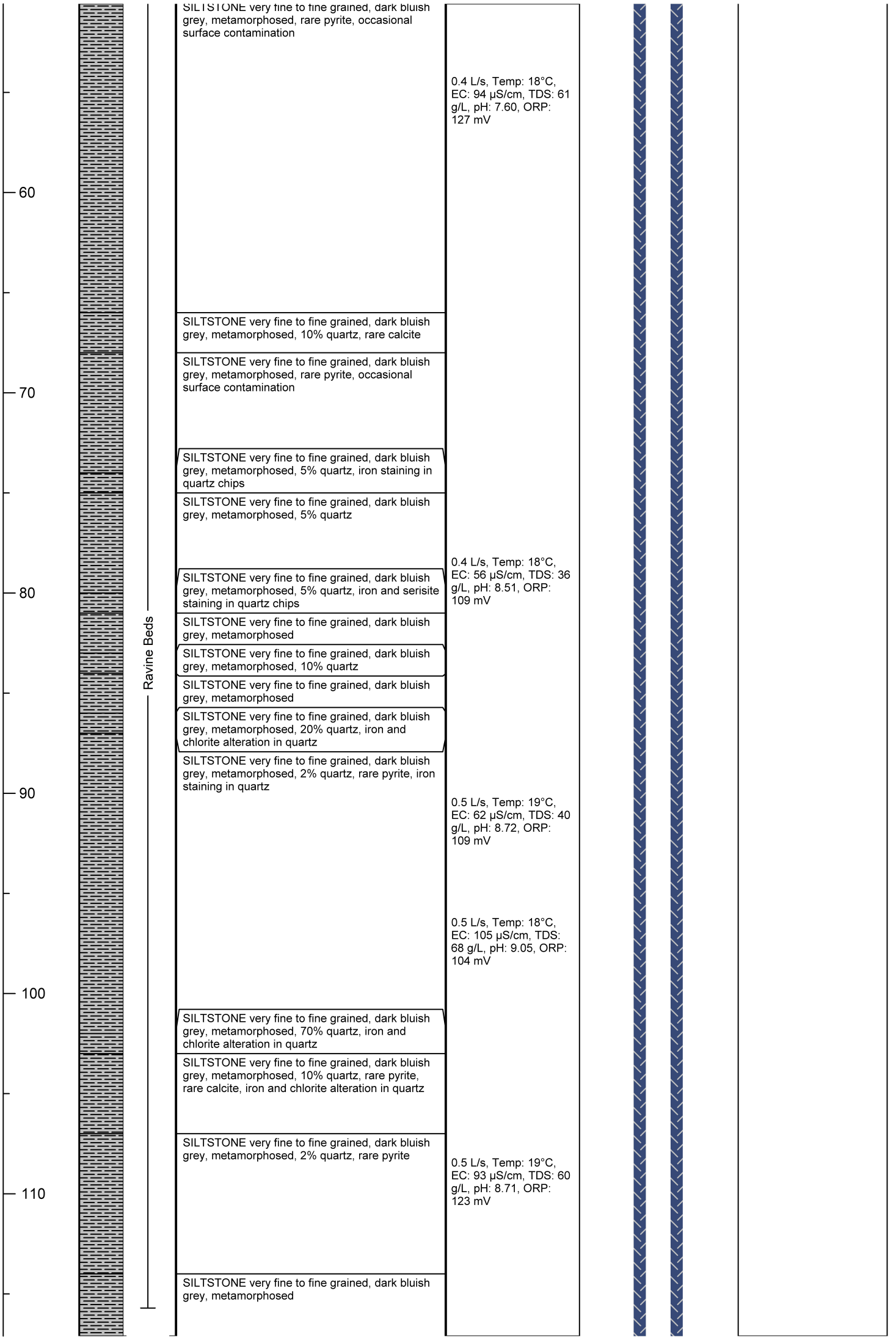
Date completed: 3/12/2018
Drilling contractor: Highland Drilling
Drilling method: Air Rotary
Hydrogeologist: Kaitlyn Brodie

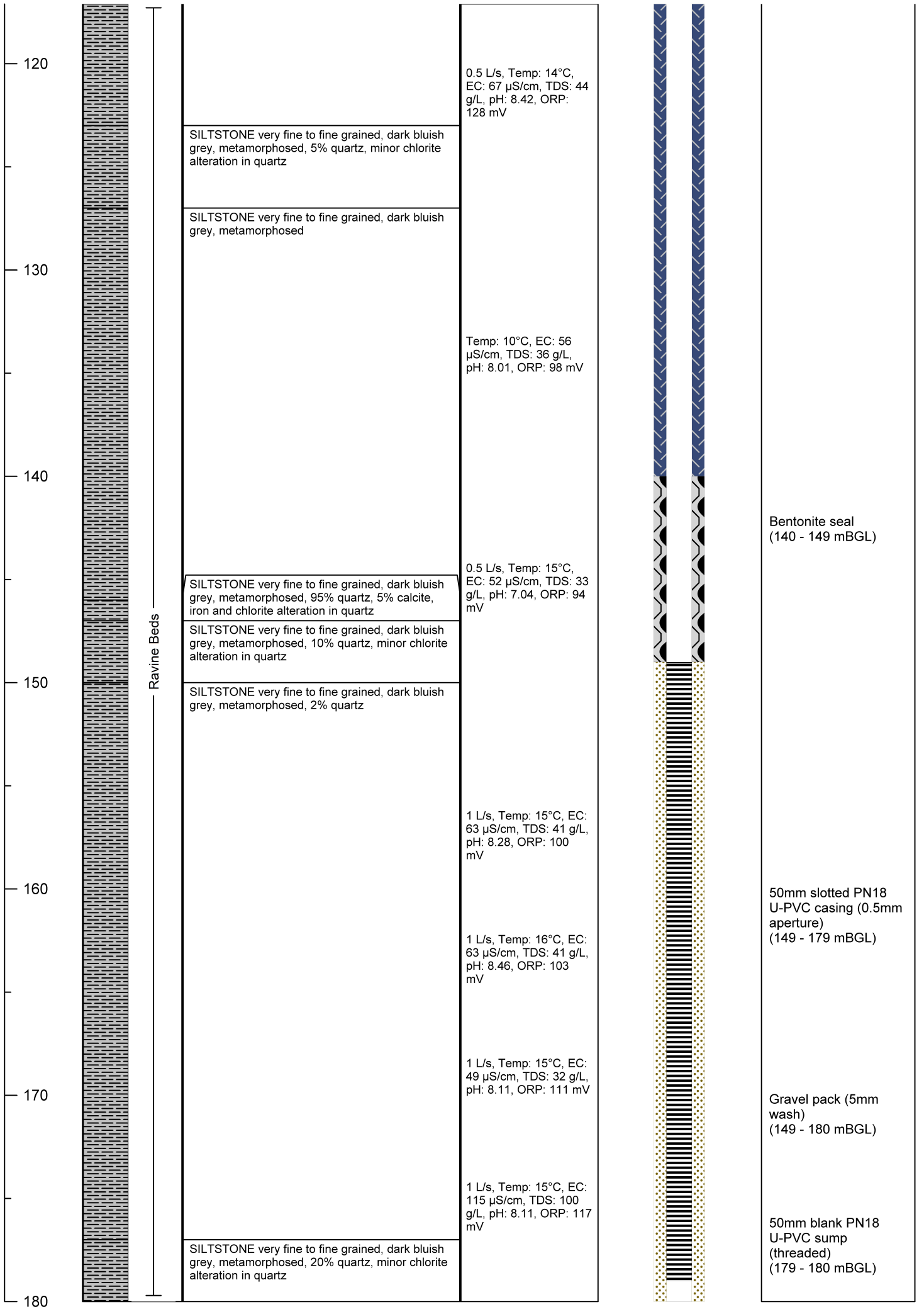
Project number: J17188
Elevation: 1330.5mAHD
Easting: 632514.8
Northing: 6038541.6

Static Water Level: 32.53mBGL **Screened Formation:** Ravine Beds **Date:** 20/12/2018
Total depth: 180m **Screened depth:** 149 - 179mBGL **Casing:** 50mm threaded PVC

Depth (mbgl)	Lithology Graphic	Description	Drilling Notes	Bore Completion: Diagram	Bore Completion: Design notes
0		SOIL fine to coarse grained, medium orangey brown, highly oxidised			Cement grout (0 - 1 mBGL)
		SILTSTONE very fine to fine grained, medium bluish grey, highly oxidised, 5% quartz			
		SILTSTONE very fine to fine grained, medium brownish grey, highly oxidised, large chips			7.5 inch diameter borehole (0 - 30 mBGL)
10		SILTSTONE very fine to fine grained, medium bluish grey, slightly oxidised			
					6 inch PVC surface casing (0 - 30 mBGL)
20					
		SILTSTONE very fine to fine grained, medium bluish grey, slightly oxidised, 40% quartz			Blue metal gravel backfill (5-8mm wash) (1 - 140 mBGL)
		SILTSTONE very fine to fine grained, medium brownish grey, slightly oxidised, 5% quartz			
30		SILTSTONE very fine to fine grained, medium brownish grey, slightly oxidised			5.5 inch diameter borehole (30 - 180 mBGL)
		SILTSTONE very fine to fine grained, medium brownish grey, water cut			
		SILTSTONE very fine to fine grained, medium brownish grey, 20% quartz	0.4 L/s, Temp: 27°C, EC: 34 µS/cm, TDS: 22 g/L, pH: 8.16, ORP: 46 mV		50mm blank PN18 U-PVC casing (0 - 149 mBGL)
40		SILTSTONE very fine to fine grained, medium brownish grey, 5% quartz, rare pyrite, iron staining in quartz chips			
		SILTSTONE very fine to fine grained, medium brownish grey, 20% quartz, iron staining in quartz chips			
		SILTSTONE very fine to fine grained, medium brownish grey, rare quartz			
50		SILTSTONE very fine to fine grained, dark bluish			

Ravine Beds


SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, rare pyrite, occasional surface contamination
0.4 L/s, Temp: 18°C, EC: 94 µS/cm, TDS: 61 g/L, pH: 7.60, ORP: 127 mV
60
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 10% quartz, rare calcite
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, rare pyrite, occasional surface contamination
70
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 5% quartz, iron staining in quartz chips
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 5% quartz
0.4 L/s, Temp: 18°C, EC: 56 µS/cm, TDS: 36 g/L, pH: 8.51, ORP: 109 mV
80
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 5% quartz, iron and serisite staining in quartz chips
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 10% quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 20% quartz, iron and chlorite alteration in quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 2% quartz, rare pyrite, iron staining in quartz
90
0.5 L/s, Temp: 19°C, EC: 62 µS/cm, TDS: 40 g/L, pH: 8.72, ORP: 109 mV
0.5 L/s, Temp: 18°C, EC: 105 µS/cm, TDS: 68 g/L, pH: 9.05, ORP: 104 mV
100
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 70% quartz, iron and chlorite alteration in quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 10% quartz, rare pyrite, rare calcite, iron and chlorite alteration in quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 2% quartz, rare pyrite
0.5 L/s, Temp: 19°C, EC: 93 µS/cm, TDS: 60 g/L, pH: 8.71, ORP: 123 mV
110
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed
Ravine Beds


120
130
140
150
160
170
180
Ravine Beds
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 5% quartz, minor chlorite alteration in quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 95% quartz, 5% calcite, iron and chlorite alteration in quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 10% quartz, minor chlorite alteration in quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 2% quartz
SILTSTONE very fine to fine grained, dark bluish grey, metamorphosed, 20% quartz, minor chlorite alteration in quartz
0.5 L/s, Temp: 14°C, EC: 67 µS/cm, TDS: 44 g/L, pH: 8.42, ORP: 128 mV
Temp: 10°C, EC: 56 µS/cm, TDS: 36 g/L, pH: 8.01, ORP: 98 mV
0.5 L/s, Temp: 15°C, EC: 52 µS/cm, TDS: 33 g/L, pH: 7.04, ORP: 94 mV
1 L/s, Temp: 15°C, EC: 63 µS/cm, TDS: 41 g/L, pH: 8.28, ORP: 100 mV
1 L/s, Temp: 16°C, EC: 63 µS/cm, TDS: 41 g/L, pH: 8.46, ORP: 103 mV
1 L/s, Temp: 15°C, EC: 49 µS/cm, TDS: 32 g/L, pH: 8.11, ORP: 111 mV
1 L/s, Temp: 15°C, EC: 115 µS/cm, TDS: 100 g/L, pH: 8.11, ORP: 117 mV
Bentonite seal (140 - 149 mBGL)
50mm slotted PN18 U-PVC casing (0.5mm aperture) (149 - 179 mBGL)
Gravel pack (5mm wash) (149 - 180 mBGL)
50mm blank PN18 U-PVC sump (threaded) (179 - 180 mBGL)

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F: 02 9493 9599

WATER MONITORING BORE LOG

Bore ID: PB09

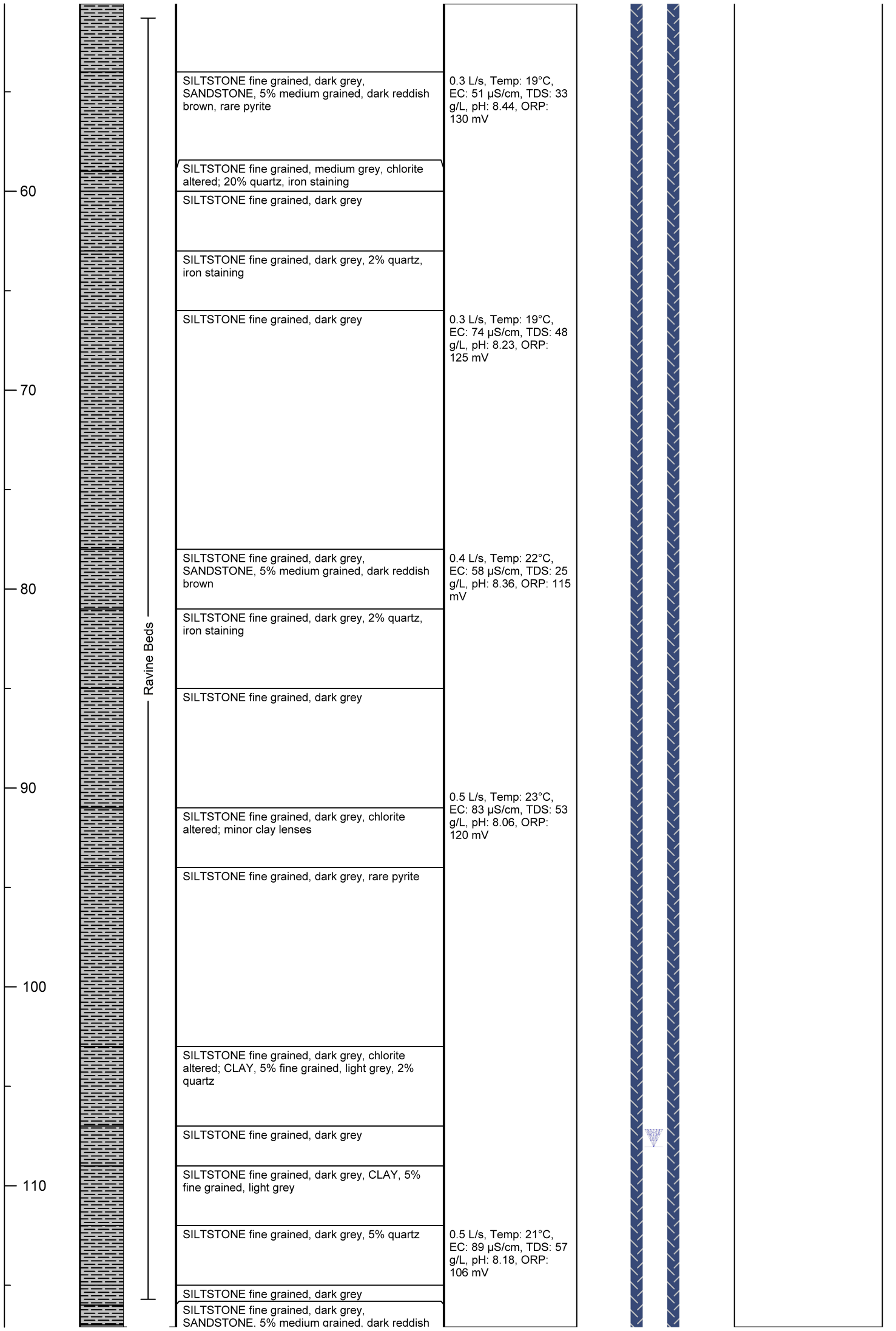
Client: Snowy Hydro Limited **Project:** Snowy 2.0

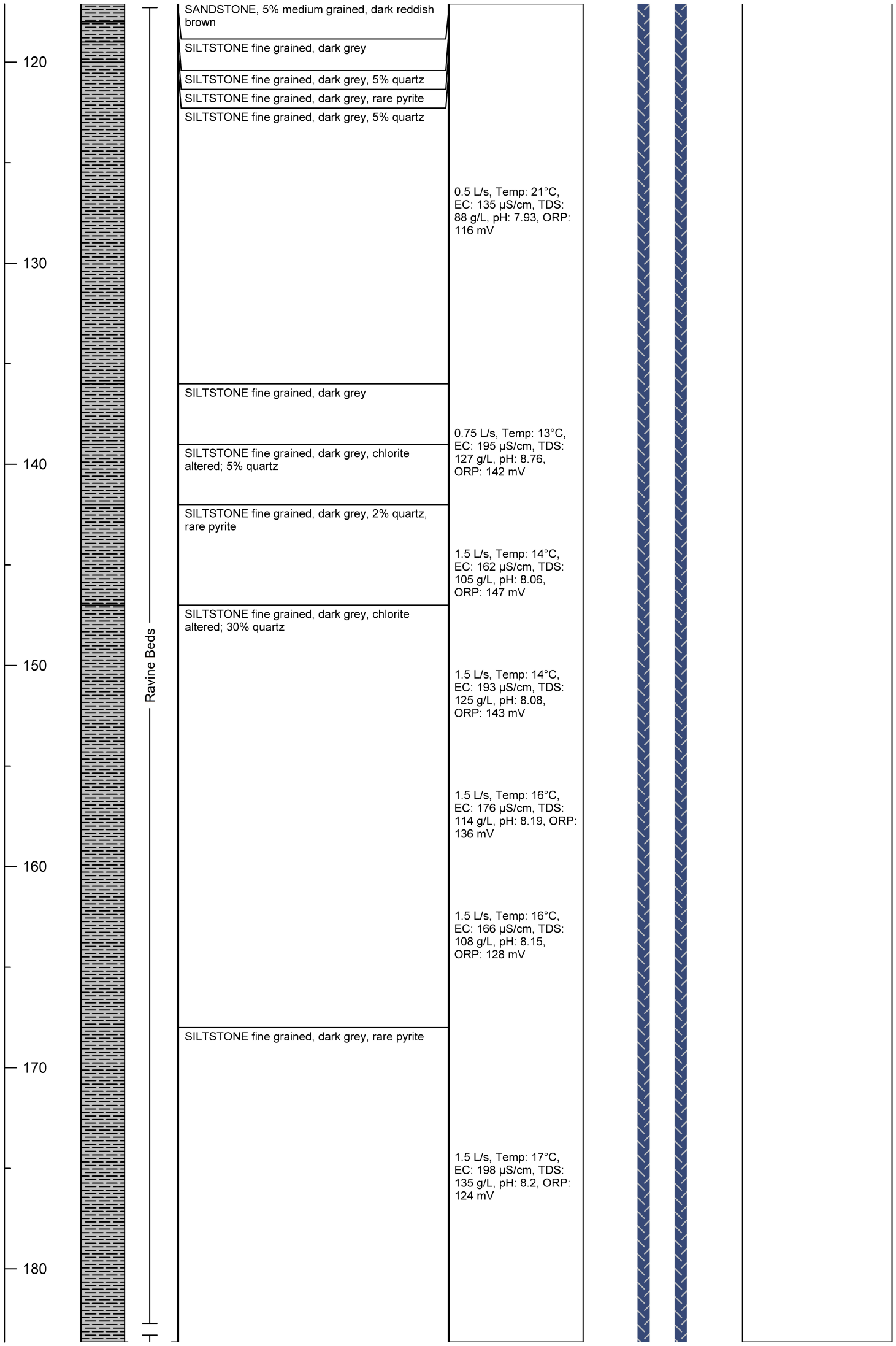
Date completed: 14/12/2018
Drilling contractor: Highland Drililng
Drilling method: Air Rotary
Hydrogeologist: Kaitlyn Brodie

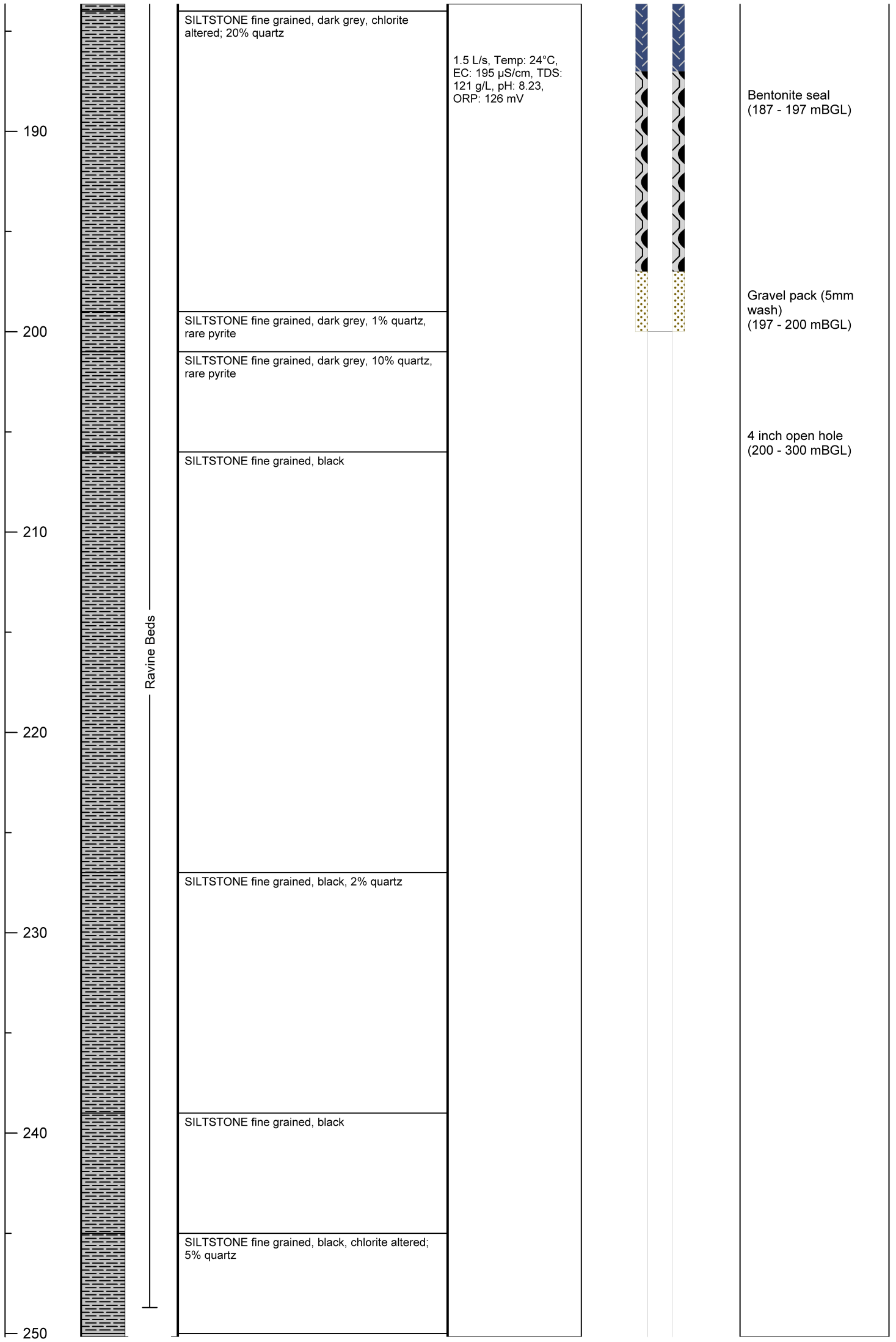
Project number: J17188
Elevation: 1330.0 mAHD
Easting: 632503.2
Northing: 6038542.1

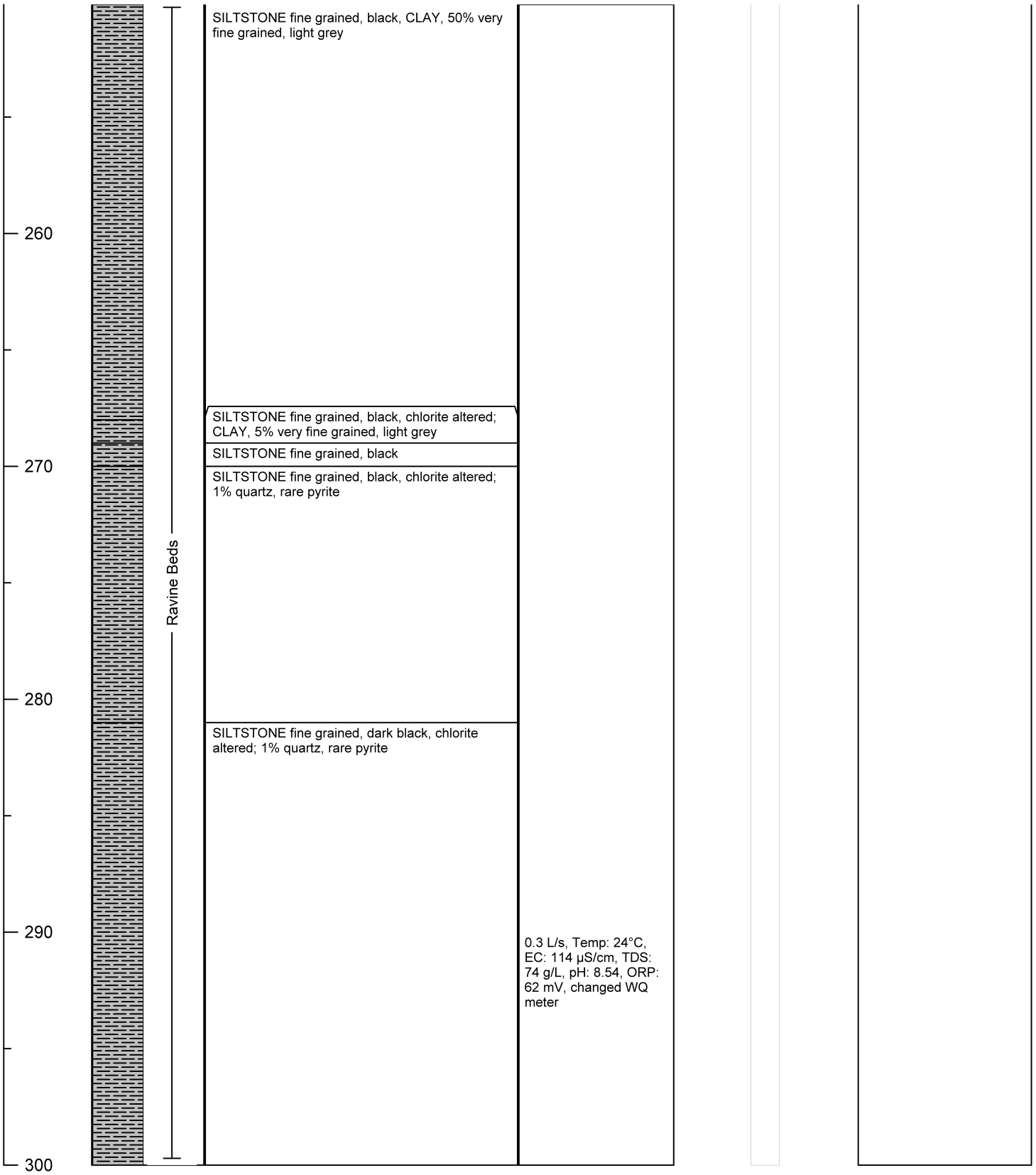
Static Water Level: 107.6 mBGL **Screened Formation:** Ravine Beds **Date:** 20/12/2018
Total depth: 300m **Screened depth:** 200 - 300m open hole **Casing:** 5.5 inch steel casing

Depth (mbgl)	Lithology Graphic	Description	Drilling Notes	Bore Completion: Diagram	Bore Completion: Design notes
0	Ravine Beds	SILTSTONE fine grained, medium brownish grey, moderately oxidised			Cement grout (0 - 1 mBGL)
10					10 inch diameter borehole (0 - 30 mBGL)
20		SILTSTONE fine grained, medium grey, slightly oxidised			8 inch steel surface casing (0 - 30 mBGL)
		SILTSTONE fine grained, medium brownish grey, slightly oxidised, 5% quartz			Blue metal gravel backfill (5-8mm wash) (1 - 187 mBGL)
		SILTSTONE fine grained, medium brownish grey, slightly oxidised			
30		SILTSTONE fine grained, medium brownish grey, slightly oxidised, 10% quartz			7.5 inch diameter borehole (30 - 200 mBGL)
		SILTSTONE fine grained, medium brownish grey	0.3 L/s, Temp: 20°C, EC: 132 µS/cm, TDS: 86 g/L, pH: 9.57, ORP: 68 mV		
40		SILTSTONE fine grained, dark grey, iron staining			5.5 inch steel casing (0 - 200 mBGL)
		SILTSTONE fine grained, dark grey, rare pyrite	0.3 L/s, Temp: 18°C, EC: 45 µS/cm, TDS: 29 g/L, pH: 8.34, ORP: 129 mV		
50			0.3 L/s, Temp: 17°C, EC: 45 µS/cm, TDS: 29 g/L, pH: 8.48, ORP: 145 mV		


60
70
80
90
100
110
Ravine Beds
SILTSTONE fine grained, dark grey, SANDSTONE, 5% medium grained, dark reddish brown, rare pyrite
SILTSTONE fine grained, medium grey, chlorite altered; 20% quartz, iron staining
SILTSTONE fine grained, dark grey
SILTSTONE fine grained, dark grey, 2% quartz, iron staining
SILTSTONE fine grained, dark grey
SILTSTONE fine grained, dark grey, SANDSTONE, 5% medium grained, dark reddish brown
SILTSTONE fine grained, dark grey, 2% quartz, iron staining
SILTSTONE fine grained, dark grey
SILTSTONE fine grained, dark grey, chlorite altered; minor clay lenses
SILTSTONE fine grained, dark grey, rare pyrite
SILTSTONE fine grained, dark grey, chlorite altered; CLAY, 5% fine grained, light grey, 2% quartz
SILTSTONE fine grained, dark grey
SILTSTONE fine grained, dark grey, CLAY, 5% fine grained, light grey
SILTSTONE fine grained, dark grey, 5% quartz
SILTSTONE fine grained, dark grey
SILTSTONE fine grained, dark grey, SANDSTONE, 5% medium grained, dark reddish
0.3 L/s, Temp: 19°C, EC: 51 µS/cm, TDS: 33 g/L, pH: 8.44, ORP: 130 mV
0.3 L/s, Temp: 19°C, EC: 74 µS/cm, TDS: 48 g/L, pH: 8.23, ORP: 125 mV
0.4 L/s, Temp: 22°C, EC: 58 µS/cm, TDS: 25 g/L, pH: 8.36, ORP: 115 mV
0.5 L/s, Temp: 23°C, EC: 83 µS/cm, TDS: 53 g/L, pH: 8.06, ORP: 120 mV
0.5 L/s, Temp: 21°C, EC: 89 µS/cm, TDS: 57 g/L, pH: 8.18, ORP: 106 mV


120
130
140
150
160
170
180
Ravine Beds
SANDSTONE, 5% medium grained, dark reddish brown
SILTSTONE fine grained, dark grey
SILTSTONE fine grained, dark grey, 5% quartz
SILTSTONE fine grained, dark grey, rare pyrite
SILTSTONE fine grained, dark grey, 5% quartz
0.5 L/s, Temp: 21°C, EC: 135 µS/cm, TDS: 88 g/L, pH: 7.93, ORP: 116 mV
SILTSTONE fine grained, dark grey
0.75 L/s, Temp: 13°C, EC: 195 µS/cm, TDS: 127 g/L, pH: 8.76, ORP: 142 mV
SILTSTONE fine grained, dark grey, chlorite altered; 5% quartz
SILTSTONE fine grained, dark grey, 2% quartz, rare pyrite
1.5 L/s, Temp: 14°C, EC: 162 µS/cm, TDS: 105 g/L, pH: 8.06, ORP: 147 mV
SILTSTONE fine grained, dark grey, chlorite altered; 30% quartz
1.5 L/s, Temp: 14°C, EC: 193 µS/cm, TDS: 125 g/L, pH: 8.08, ORP: 143 mV
1.5 L/s, Temp: 16°C, EC: 176 µS/cm, TDS: 114 g/L, pH: 8.19, ORP: 136 mV
1.5 L/s, Temp: 16°C, EC: 166 µS/cm, TDS: 108 g/L, pH: 8.15, ORP: 128 mV
SILTSTONE fine grained, dark grey, rare pyrite
1.5 L/s, Temp: 17°C, EC: 198 µS/cm, TDS: 135 g/L, pH: 8.2, ORP: 124 mV


190
200
210
220
230
240
250
Ravine Beds
SILTSTONE fine grained, dark grey, chlorite altered; 20% quartz
SILTSTONE fine grained, dark grey, 1% quartz, rare pyrite
SILTSTONE fine grained, dark grey, 10% quartz, rare pyrite
SILTSTONE fine grained, black
SILTSTONE fine grained, black, 2% quartz
SILTSTONE fine grained, black
SILTSTONE fine grained, black, chlorite altered; 5% quartz
1.5 L/s, Temp: 24°C, EC: 195 µS/cm, TDS: 121 g/L, pH: 8.23, ORP: 126 mV
Bentonite seal (187 - 197 mBGL)
Gravel pack (5mm wash) (197 - 200 mBGL)
4 inch open hole (200 - 300 mBGL)


260
270
280
290
300
Ravine Beds
SILTSTONE fine grained, black, CLAY, 50% very fine grained, light grey
SILTSTONE fine grained, black, chlorite altered; CLAY, 5% very fine grained, light grey
SILTSTONE fine grained, black
SILTSTONE fine grained, black, chlorite altered; 1% quartz, rare pyrite
SILTSTONE fine grained, dark black, chlorite altered; 1% quartz, rare pyrite
0.3 L/s, Temp: 24°C, EC: 114 µS/cm, TDS: 74 g/L, pH: 8.54, ORP: 62 mV, changed WQ meter

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T: 02 9493 9500
F: 02 9493 9599

WATER MONITORING BORE LOG

Bore ID: MB13A

Client: Snowy Hydro Limited **Project:** Snowy 2.0

Date completed: 25/10/2018
Drilling contractor: Watson Drilling
Drilling method: Air Rotary
Hydrogeologist: Jake Turi

Project number: J17188
Elevation: 1382.2 mAHD
Easting: 641298.6
Northing: 6038411.3

Static Water Level: 6.75 mBGL **Screened Formation:** Temperance Formation **Date:** 10/12/2018
Total depth: 60m **Screened depth:** 50 - 59 mBGL **Casing:** 50mm threaded PVC

Depth (mbgl)	Lithology Graphic	Description	Drilling Notes	Bore Completion: Diagram	Bore Completion: Design notes
0		CLAY light creamy orange, weathered, gravelly			Cement grout (0 - 1 mBGL)
5		CLAY light creamy cream, iron stained, gravelly			7.5 inch diameter borehole (0 - 12 mBGL)
		CLAY medium orange, iron stained, gravelly			
		CLAY medium orange, highly weathered, gravelly, water cut			6 inch PVC surface casing (0 - 12 mBGL)
		SILTSTONE light cream, highly weathered			
10		SILTSTONE medium grey, highly weathered			
15		SILTSTONE medium to dark grey, epidote veining	1 L/s, Temp: 10°C, EC: 77 µS/cm, pH: 6.68, ORP: 73 mV, water cut 6 mBGL		Blue metal gravel backfill (5-8mm wash) (1 - 40 mBGL)
					5.5 inch diameter borehole (12 - 60 mBGL)
20		SILTSTONE medium to dark grey, epidote veining			
25		SILTSTONE dark grey, moderate quartz, moderate epidote	1 L/s, Temp: 6°C, EC: 72 µS/cm, pH: 7.29, ORP: -15 mV, water cut 25 mBGL		50mm blank PN18 U-PVC casing (threaded) (0 - 48 mBGL)
30		SILTSTONE dark grey, epidote decreasing in abundance			
35					
40					Bentonite seal (40 - 45 mBGL)
45					Gravel pack (5mm wash) (45 - 60 mBGL)
50		SILTSTONE dark grey	1 L/s, Temp: 16°C, EC: 107 µS/cm, pH: 9.66, ORP: -59 mV		50mm slotted PN18 U-PVC casing (0.5mm aperture) (48 - 59 mBGL)
55		SILTSTONE dark grey, minor quartz, minor calcite			50mm blank PN18 U-PVC sump (threaded) (59 - 60 mBGL)
60					

Temperance Formation

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WATER MONITORING BORE LOG

Bore ID: MB13B

Client: Snowy Hydro Limited **Project:** Snowy 2.0

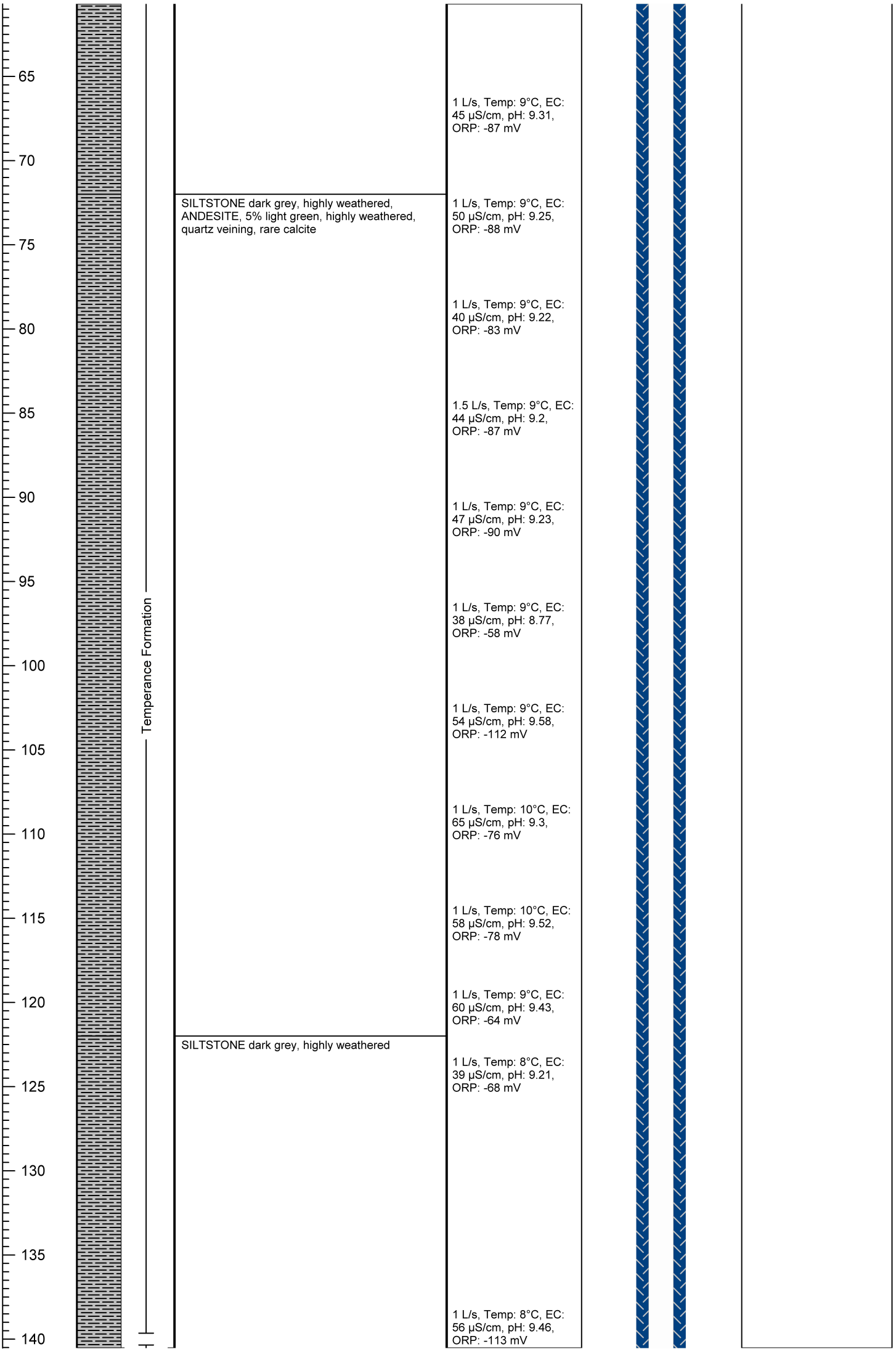
Date completed: 25/10/2018
Drilling contractor: Watson Drilling
Drilling method: Air Rotary
Hydrogeologist: Jake Turi

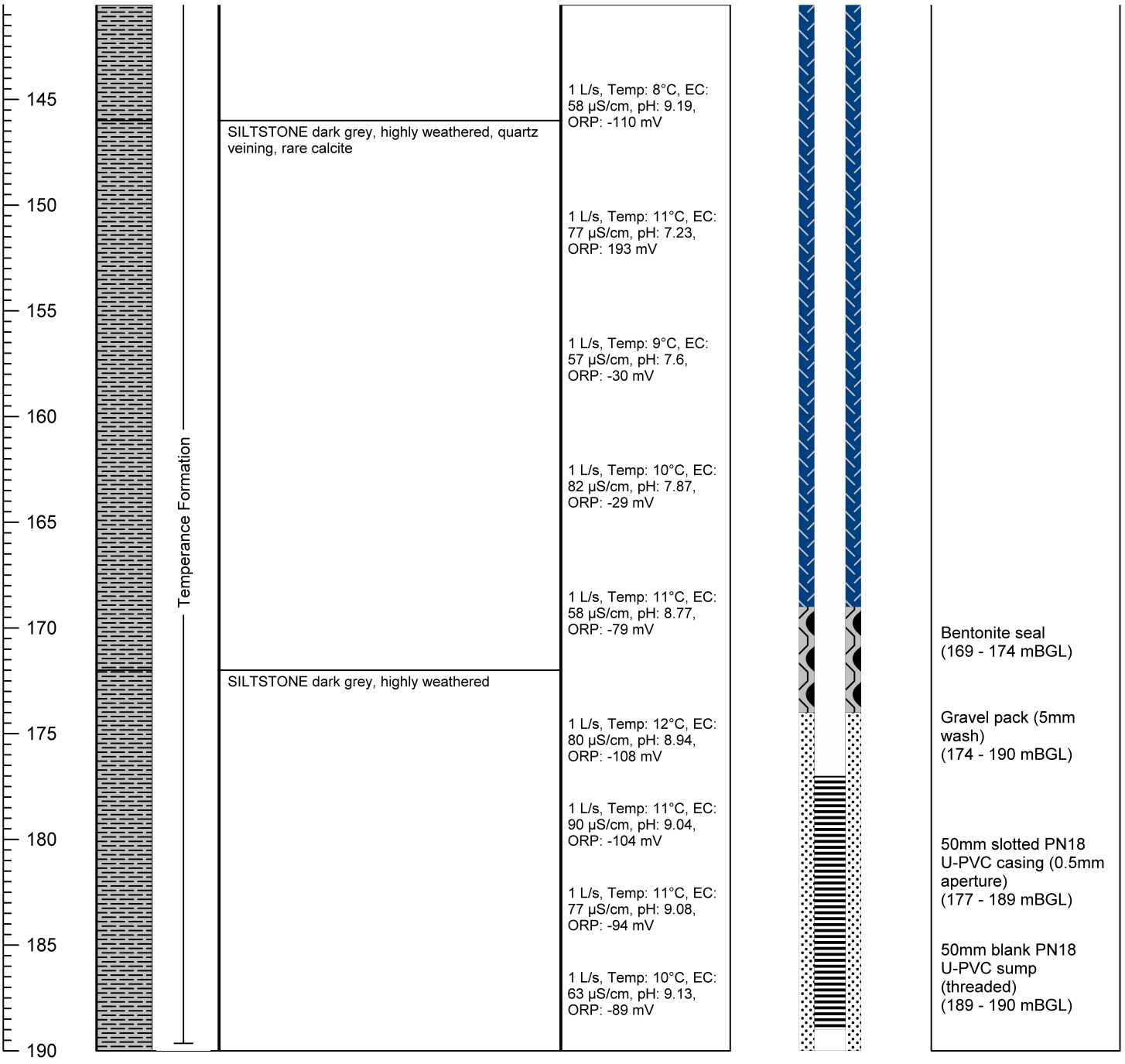
Project number: J17188
Elevation: 1381.5 mAHD
Easting: 641310.2
Northing: 6038405.7

Static Water Level: 3.79 mBGL **Screened Formation:** Temperance Formation **Date:** 10/12/2018
Total depth: 190 m **Screened depth:** 180 - 189 mBGL **Casing:** 50mm threaded PVC

Depth (mbgl)	Lithology Graphic	Description	Drilling Notes	Bore Completion: Diagram	Bore Completion: Design notes
0		CLAY light creamy orange, weathered, gravelly			Cement grout (0 - 1 mBGL)
		CLAY medium orange, iron stained, gravelly			
		CLAY medium orange, iron stained, gravelly			
5		CLAY medium orange, iron stained, gravelly, water cut			7.5 inch diameter borehole (0 - 36 mBGL)
		CLAY medium orange, iron stained, gravelly	0.5 L/s, Temp: 19°C, EC: 23 µS/cm, pH: 7.20, ORP: -16 mV		6 inch PVC surface casing (0 - 36 mBGL)
10		CLAY medium to dark orangey brown, highly weathered, gravelly, SILTSTONE, 30% dark grey, highly weathered			
		SILTSTONE medium to dark grey, highly weathered, CLAY, 5% medium orange, weathered	1 L/s, Temp: 12°C, EC: 24 µS/cm, pH: 6.98, ORP: -27 mV, water cut 7mBGL		Blue metal gravel backfill (5-8mm wash) (1 - 169 mBGL)
15					
20					
25		SILTSTONE dark grey, highly weathered, ANDESITE, 10% light green, highly weathered, rare pyrite, quartz and andesite veining	1.5 L/s, Temp: 8°C, EC: 39 µS/cm, pH: 7.24, ORP: -80 mV, water cut 24 mBGL		
30			1 L/s, Temp: 9°C, EC: 51 µS/cm, pH: 8.35, ORP: -65 mV		
35			1 L/s, Temp: 9°C, EC: 35 µS/cm, pH: 8.32, ORP: -57 mV		5.5 inch diameter borehole (36 - 190 mBGL)
40			1 L/s, Temp: 9.°C, EC: 33 µS/cm, pH: 8.26, ORP: -52 mV		
45		SILTSTONE dark grey, highly weathered, ANDESITE, 5% light green, highly weathered, quartz veining	1 L/s, Temp: 10°C, EC: 35 µS/cm, pH: 8.14, ORP: -60 mV		50mm blank PN18 U-PVC casing (threaded) (0 - 177 mBGL)
50			1 L/s, Temp: 9°C, EC: 34 µS/cm, pH: 8.47, ORP: -63 mV		
55					
60			1 L/s, Temp: 10°C, EC:		

Temperance Formation


65
70
75
80
85
90
95
100
105
110
115
120
125
130
135
140
Temperance Formation
SILTSTONE dark grey, highly weathered, ANDESITE, 5% light green, highly weathered, quartz veining, rare calcite
SILTSTONE dark grey, highly weathered
1 L/s, Temp: 9°C, EC: 45 µS/cm, pH: 9.31, ORP: -87 mV
1 L/s, Temp: 9°C, EC: 50 µS/cm, pH: 9.25, ORP: -88 mV
1 L/s, Temp: 9°C, EC: 40 µS/cm, pH: 9.22, ORP: -83 mV
1.5 L/s, Temp: 9°C, EC: 44 µS/cm, pH: 9.2, ORP: -87 mV
1 L/s, Temp: 9°C, EC: 47 µS/cm, pH: 9.23, ORP: -90 mV
1 L/s, Temp: 9°C, EC: 38 µS/cm, pH: 8.77, ORP: -58 mV
1 L/s, Temp: 9°C, EC: 54 µS/cm, pH: 9.58, ORP: -112 mV
1 L/s, Temp: 10°C, EC: 65 µS/cm, pH: 9.3, ORP: -76 mV
1 L/s, Temp: 10°C, EC: 58 µS/cm, pH: 9.52, ORP: -78 mV
1 L/s, Temp: 9°C, EC: 60 µS/cm, pH: 9.43, ORP: -64 mV
1 L/s, Temp: 8°C, EC: 39 µS/cm, pH: 9.21, ORP: -68 mV
1 L/s, Temp: 8°C, EC: 56 µS/cm, pH: 9.46, ORP: -113 mV


145
150
155
160
165
170
175
180
185
190
Temperance Formation
SILTSTONE dark grey, highly weathered, quartz veining, rare calcite
SILTSTONE dark grey, highly weathered
1 L/s, Temp: 8°C, EC: 58 µS/cm, pH: 9.19, ORP: -110 mV
1 L/s, Temp: 11°C, EC: 77 µS/cm, pH: 7.23, ORP: 193 mV
1 L/s, Temp: 9°C, EC: 57 µS/cm, pH: 7.6, ORP: -30 mV
1 L/s, Temp: 10°C, EC: 82 µS/cm, pH: 7.87, ORP: -29 mV
1 L/s, Temp: 11°C, EC: 58 µS/cm, pH: 8.77, ORP: -79 mV
1 L/s, Temp: 12°C, EC: 80 µS/cm, pH: 8.94, ORP: -108 mV
1 L/s, Temp: 11°C, EC: 90 µS/cm, pH: 9.04, ORP: -104 mV
1 L/s, Temp: 11°C, EC: 77 µS/cm, pH: 9.08, ORP: -94 mV
1 L/s, Temp: 10°C, EC: 63 µS/cm, pH: 9.13, ORP: -89 mV
Bentonite seal (169 - 174 mBGL)
Gravel pack (5mm wash) (174 - 190 mBGL)
50mm slotted PN18 U-PVC casing (0.5mm aperture) (177 - 189 mBGL)
50mm blank PN18 U-PVC sump (threaded) (189 - 190 mBGL)