

Appendix D – 2019 Soil Laboratory Testing Results

Direct Shear Testing of Soils Under Consolidated Drained Conditions					Reference ASTM D3080	
Client:	Telkwa Coal Ltd.			Borehole:	19-21S	
Project:	Ref #017-318			Sample Number:	35035	
Location:	N/A			Depth (m):	15.2 - 15.8	
Project No.:	18109666/2000			Lab ID No:	B19-058	
Test Condition:	Saturated			Test parameters:	Peak and residual	
Visual Description:	SILTY CLAY, trace coarse sand, w > PL, redish brown, firm to stiff.			Soil Structure:	Intact / Reconstituted	
Remarks:	Area correction not applied to normal and shear stress calculation Test 1 and 3 were remolded based on the density of the intact Test 2 sample.					
Initial Sample Dimensions						
Test No.	1	2	3			
Shear box geometry	Circle	Circle	Circle			
Diameter (mm)	63.55	63.70	63.48			
Height (mm)	26.80	25.70	26.75			
Area (cm²)	31.72	31.87	31.65			
Volume (cm³)	85.01	81.90	84.66			
Weight Volume Relationships						
Sample Type	Bulk Sample					
Dry Mass (g)	126.9	124.7	126.7			
Initial γ_{wet} (kN/m³)	18.20	18.77	18.24			
Final γ_{wet} (kN/m³)	20.24	20.19	21.20			
Initial γ_{dry} (kN/m³)	14.64	14.93	14.68			
Final γ_{dry} (kN/m³)	17.06	16.77	17.94			
Initial water content (%)	24.3	25.7	24.3			
Final water content (%)	18.7	20.4	18.2			
Consolidation Results						
Normal Stress (kPa)	500	1000	1500			
t_{90} (Taylor Method) (min)	N/A	N/A	N/A			
Calculated t_{50} (min)	N/A	N/A	N/A			
Change in height ΔH_c (mm)	3.79	2.81	4.86			
Equipment Calibration						
Test Number	Machine Number	Normal Load Cell	Shear Load Cell	Vertical LPT		
Test -1	Digishear-1	720086	219231	LP-1138		
Test -2	Digishear-2	728499	689339	LP-567		
Test -3	Digishear-3	697437	728498	LP-985		
MM/LL	March 15, 2019		DL		April 10, 2019	
TESTED BY	DATE		CHECKED BY		DATE	



GOLDER

Golder Associates Ltd. - Burnaby Laboratory

#300-3811 North Fraser Way

Burnaby, B.C. Canada V5J 5J2

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.

Project: Ref #017-318

Location: N/A

Project No.: 18109666/2000

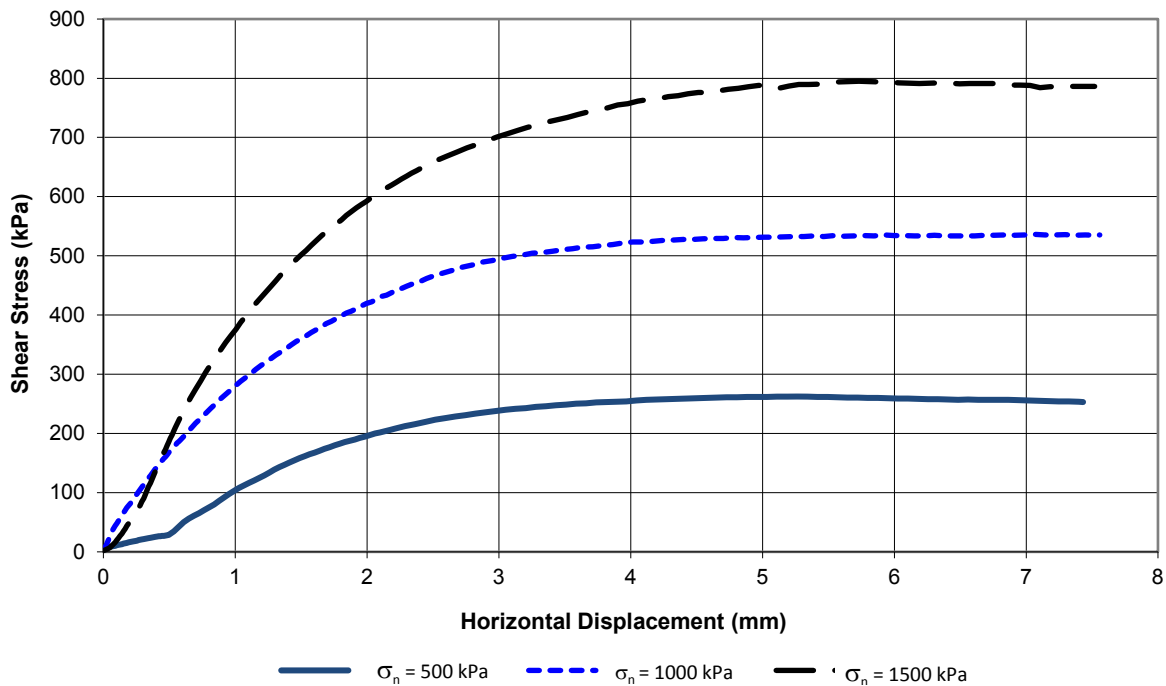
Borehole: 19-21S

Sample Number: 35035

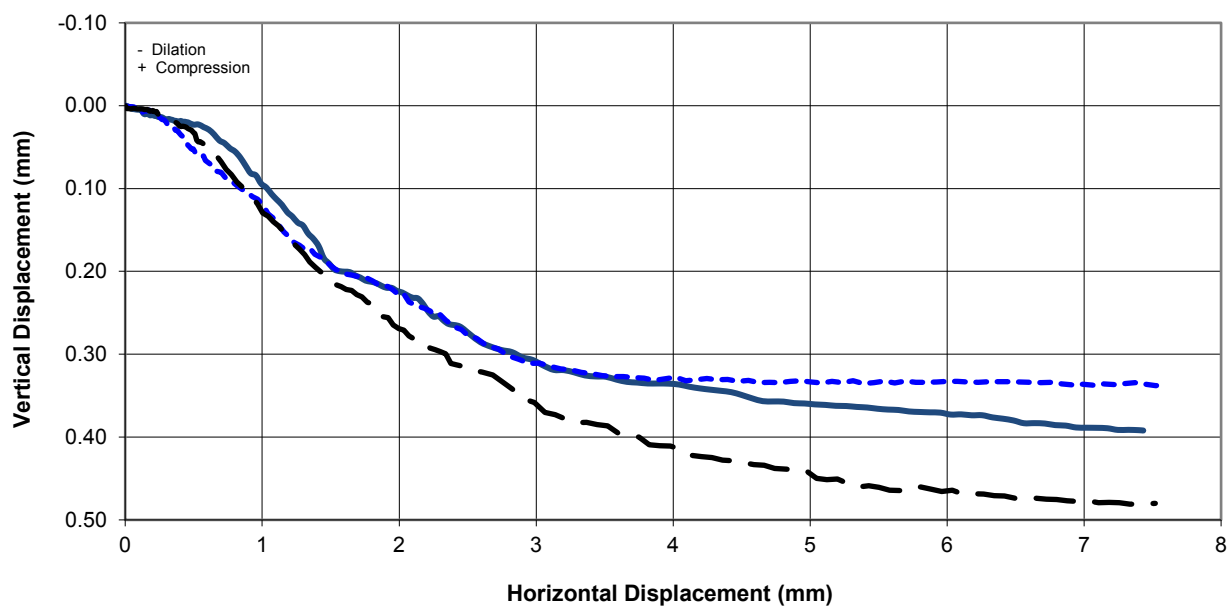
Depth (m): 15.2 - 15.8

Lab ID No: B19-058

Shear Stress (Peak)



Displacement (Peak)



MM/LL

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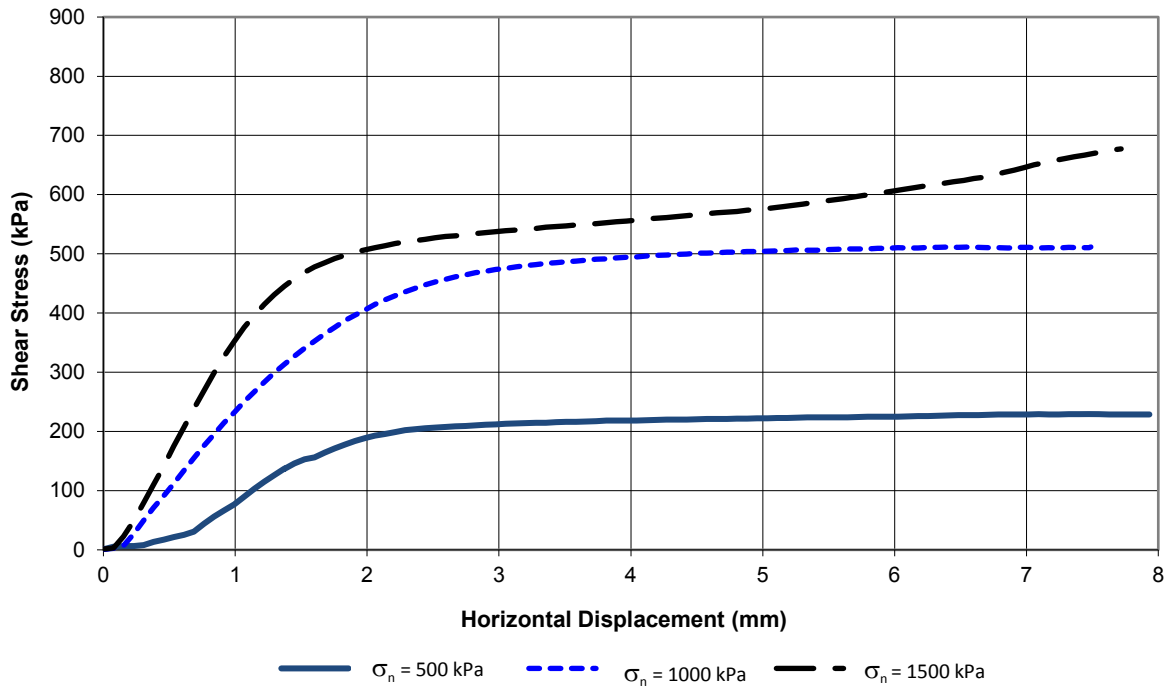
Borehole: 19-21S

Sample Number: 35035

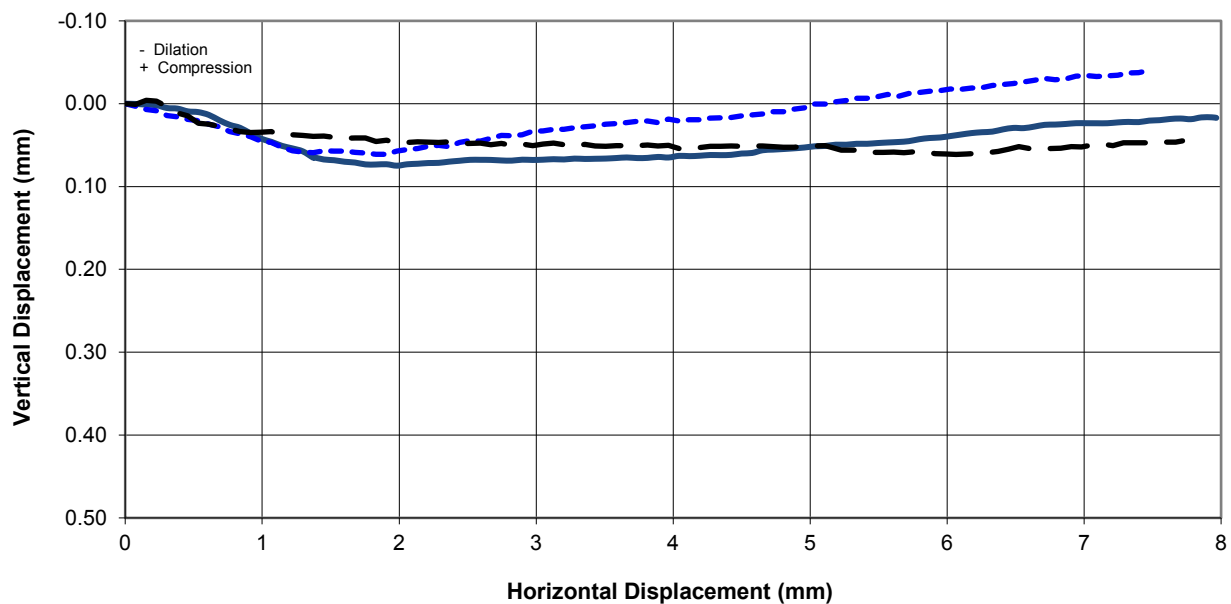
Depth (m): 15.2 - 15.8

Lab ID No: B19-058

Shear Stress (Residual)



Displacement (Residual)



MM/LL

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Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
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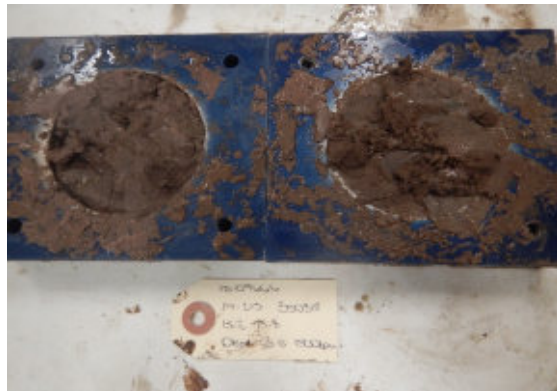
Borehole: 19-21S
Sample Number: 35035
Depth (m): 15.2 - 15.8
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Test 1 (After Shear)



Test 2 (After Shear)



Test 3 (After Shear)

Remarks:

MM/LL	March 15, 2019	DL	April 10, 2019
TESTED BY	DATE	CHECKED BY	DATE

MM/LL

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DL

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ASTM D3080

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Location:	N/A	Depth (m):	15.2 - 15.8
Project No.:	18109666/2000	Lab ID No:	B19-058

Peak 1		Peak 2		Peak 3			
Normal Stress , kPa	500	Normal Stress , kPa	1000	Normal Stress , kPa	1500	Normal Stress , kPa	
Disp Rate, mm/min	0.005	Disp Rate, mm/min	0.005	Disp Rate, mm/min	0.005	Disp Rate, mm/min	

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	2.9	0.000	0.00	5.5	0.000	0.00	2.1	0.000			
0.01	4.6	0.000	0.01	7.5	0.001	0.01	3.1	0.004			
0.03	6.2	0.002	0.03	13.0	0.001	0.03	4.4	0.004			
0.04	7.5	0.003	0.04	20.2	0.002	0.04	5.9	0.004			
0.05	8.3	0.004	0.05	27.8	0.001	0.05	7.6	0.003			
0.06	9.1	0.004	0.06	34.0	0.002	0.06	10.0	0.003			
0.08	9.7	0.004	0.08	39.1	0.003	0.08	12.8	0.004			
0.09	10.4	0.005	0.09	44.1	0.001	0.09	16.1	0.004			
0.10	11.1	0.005	0.10	47.8	0.004	0.10	19.7	0.004			
0.11	11.8	0.005	0.11	52.3	0.006	0.11	23.2	0.004			
0.13	12.5	0.008	0.13	56.8	0.008	0.13	27.2	0.004			
0.14	12.9	0.010	0.14	62.1	0.005	0.14	30.7	0.005			
0.15	13.8	0.010	0.15	66.1	0.006	0.15	34.9	0.005			
0.17	14.6	0.009	0.17	70.0	0.006	0.17	38.9	0.005			
0.18	15.1	0.011	0.18	74.3	0.005	0.18	43.5	0.007			
0.19	15.9	0.011	0.19	77.9	0.007	0.19	47.7	0.006			
0.20	16.6	0.011	0.20	81.7	0.007	0.20	51.7	0.006			
0.22	17.2	0.012	0.22	85.7	0.010	0.22	56.3	0.007			
0.23	17.9	0.012	0.23	90.1	0.010	0.23	60.3	0.007			
0.24	18.5	0.014	0.24	93.5	0.012	0.24	64.6	0.011			
0.25	19.1	0.014	0.25	97.7	0.014	0.25	68.8	0.011			
0.27	19.9	0.014	0.27	101.7	0.017	0.27	74.0	0.013			
0.28	20.5	0.015	0.28	105.2	0.017	0.28	79.0	0.013			
0.29	21.0	0.016	0.29	109.4	0.019	0.29	84.6	0.013			
0.31	21.5	0.017	0.31	113.4	0.022	0.31	90.4	0.014			
0.32	22.2	0.016	0.32	117.2	0.023	0.32	96.7	0.013			
0.33	22.7	0.017	0.33	121.0	0.025	0.33	103.6	0.015			
0.34	23.2	0.017	0.34	124.8	0.028	0.34	110.0	0.016			
0.36	23.8	0.018	0.36	128.9	0.027	0.36	116.4	0.020			
0.37	24.2	0.018	0.37	132.4	0.030	0.37	122.8	0.020			
0.38	24.6	0.019	0.38	136.3	0.030	0.38	129.3	0.022			
0.39	25.2	0.019	0.39	139.9	0.033	0.39	135.6	0.024			
0.41	25.7	0.018	0.41	143.6	0.036	0.41	141.9	0.025			
0.42	26.2	0.020	0.42	147.1	0.037	0.42	148.1	0.025			
0.43	26.5	0.019	0.43	150.6	0.041	0.43	154.3	0.025			
0.45	26.8	0.020	0.44	154.2	0.042	0.45	160.5	0.026			
0.46	27.1	0.020	0.46	157.3	0.047	0.46	166.9	0.028			

0.50	28.8	0.023	0.47	160.7	0.050	0.47	173.1	0.029			
0.53	34.7	0.023	0.48	164.0	0.052	0.48	179.3	0.029			
0.57	42.7	0.026	0.50	167.4	0.052	0.50	185.4	0.032			
0.61	50.1	0.029	0.51	170.6	0.056	0.51	191.7	0.034			
0.65	56.3	0.035	0.52	173.9	0.058	0.52	198.0	0.042			
0.69	60.8	0.042	0.53	176.7	0.058	0.53	204.1	0.044			
0.73	65.1	0.045	0.55	180.1	0.060	0.55	210.0	0.043			
0.76	70.0	0.051	0.56	183.6	0.061	0.58	228.3	0.048			
0.80	75.0	0.055	0.57	186.5	0.061	0.62	244.6	0.051			
0.84	80.0	0.062	0.58	189.2	0.066	0.66	260.0	0.059			
0.88	85.9	0.072	0.62	198.4	0.071	0.70	274.6	0.067			
0.92	92.0	0.082	0.66	207.4	0.079	0.74	288.8	0.077			
0.95	97.7	0.084	0.70	217.3	0.081	0.78	302.8	0.083			
0.99	103.0	0.094	0.74	225.4	0.088	0.81	316.5	0.092			
1.03	108.0	0.099	0.78	233.7	0.091	0.85	329.2	0.098			
1.07	112.5	0.107	0.81	242.0	0.096	0.89	341.9	0.104			
1.11	116.6	0.113	0.85	250.1	0.101	0.93	353.5	0.111			
1.14	120.3	0.120	0.89	258.3	0.104	0.97	364.8	0.119			
1.18	124.7	0.128	0.93	265.9	0.110	1.00	375.6	0.130			
1.22	129.2	0.134	0.97	273.4	0.113	1.04	387.4	0.133			
1.26	134.2	0.141	1.00	281.3	0.120	1.08	398.4	0.140			
1.30	139.2	0.145	1.04	288.0	0.130	1.12	409.4	0.145			
1.34	143.4	0.154	1.08	294.7	0.135	1.16	419.4	0.152			
1.37	147.2	0.161	1.12	301.4	0.144	1.20	429.5	0.163			
1.41	150.9	0.169	1.16	307.9	0.152	1.23	439.2	0.167			
1.45	154.6	0.184	1.19	314.8	0.158	1.27	448.7	0.173			
1.49	158.1	0.190	1.23	320.4	0.165	1.31	458.2	0.180			
1.53	161.4	0.198	1.27	326.8	0.169	1.35	468.0	0.189			
1.56	164.6	0.200	1.31	332.7	0.173	1.39	476.3	0.195			
1.60	167.7	0.200	1.35	337.8	0.172	1.42	485.0	0.200			
1.64	170.8	0.201	1.39	343.4	0.179	1.46	493.7	0.204			
1.68	173.9	0.205	1.42	349.5	0.183	1.50	501.5	0.213			
1.72	177.0	0.207	1.46	355.3	0.187	1.54	509.3	0.216			
1.75	180.0	0.211	1.50	359.9	0.193	1.58	517.4	0.218			
1.79	182.8	0.212	1.54	365.2	0.198	1.61	525.7	0.222			
1.83	185.6	0.214	1.58	370.4	0.200	1.65	533.5	0.223			
1.87	187.6	0.217	1.61	375.4	0.203	1.69	540.7	0.228			
1.91	190.0	0.220	1.65	379.6	0.205	1.73	547.4	0.231			
1.95	192.4	0.220	1.69	385.3	0.206	1.77	554.3	0.237			
1.98	194.7	0.224	1.73	389.3	0.206	1.81	560.9	0.239			
2.02	197.3	0.225	1.77	394.0	0.208	1.84	568.4	0.243			
2.06	199.8	0.229	1.81	398.4	0.211	1.88	575.0	0.255			
2.10	201.7	0.232	1.84	403.3	0.216	1.92	581.1	0.256			
2.14	203.8	0.233	1.88	406.5	0.217	1.96	586.9	0.265			
2.17	205.9	0.239	1.92	410.9	0.218	2.00	592.3	0.269			
2.21	208.3	0.249	1.96	415.4	0.223	2.03	598.5	0.271			
2.25	210.3	0.255	2.00	419.4	0.228	2.07	604.1	0.278			
2.29	212.4	0.254	2.03	422.4	0.227	2.11	609.6	0.282			
2.33	214.2	0.260	2.07	426.5	0.237	2.15	614.8	0.287			
2.37	215.9	0.264	2.11	431.3	0.240	2.19	619.4	0.287			
2.44	219.2	0.266	2.15	433.7	0.243	2.22	624.7	0.293			
2.52	223.1	0.276	2.19	438.0	0.245	2.26	630.0	0.295			
2.59	226.1	0.286	2.22	442.6	0.248	2.30	634.6	0.297			
2.67	228.7	0.291	2.26	444.9	0.253	2.34	639.6	0.299			
2.75	231.0	0.295	2.30	448.9	0.252	2.38	644.0	0.311			

2.82	233.7	0.297	2.34	452.0	0.259	2.42	648.6	0.313			
2.90	235.7	0.304	2.38	454.7	0.264	2.45	653.2	0.314			
2.98	237.6	0.307	2.42	457.9	0.268	2.53	661.1	0.319			
3.05	240.0	0.314	2.45	461.9	0.270	2.61	668.5	0.322			
3.13	241.6	0.319	2.49	464.8	0.276	2.68	675.4	0.325			
3.20	242.8	0.319	2.57	470.4	0.281	2.76	682.3	0.334			
3.28	244.6	0.322	2.64	475.1	0.290	2.83	688.2	0.343			
3.36	246.0	0.326	2.72	480.6	0.293	2.91	694.5	0.354			
3.43	247.4	0.327	2.80	484.7	0.302	2.99	700.6	0.358			
3.51	248.6	0.327	2.87	489.3	0.306	3.06	706.0	0.370			
3.59	250.2	0.331	2.95	492.3	0.311	3.14	711.6	0.373			
3.66	251.0	0.333	3.03	495.9	0.311	3.22	717.2	0.379			
3.74	252.2	0.334	3.10	498.8	0.314	3.29	721.3	0.383			
3.81	252.8	0.335	3.18	501.1	0.318	3.37	726.4	0.382			
3.89	253.5	0.335	3.25	504.4	0.319	3.44	730.0	0.385			
3.97	254.2	0.336	3.33	505.6	0.322	3.52	733.9	0.386			
4.04	255.7	0.337	3.41	507.8	0.324	3.60	738.4	0.395			
4.12	256.6	0.339	3.48	510.7	0.326	3.67	743.1	0.399			
4.20	257.3	0.341	3.56	512.2	0.327	3.75	746.2	0.400			
4.27	258.0	0.343	3.64	514.7	0.327	3.83	749.8	0.409			
4.35	258.4	0.344	3.71	515.5	0.328	3.90	754.8	0.410			
4.42	259.2	0.346	3.79	517.2	0.329	3.98	756.8	0.411			
4.50	259.7	0.349	3.86	519.3	0.331	4.05	761.4	0.415			
4.58	260.3	0.353	3.94	521.5	0.330	4.13	764.0	0.422			
4.65	260.5	0.357	4.02	523.2	0.328	4.21	765.3	0.424			
4.73	261.0	0.357	4.09	523.3	0.332	4.28	768.7	0.425			
4.81	261.3	0.357	4.17	524.5	0.331	4.36	770.6	0.428			
4.88	261.5	0.359	4.25	526.1	0.329	4.44	774.0	0.429			
4.96	261.5	0.359	4.32	526.8	0.331	4.51	775.7	0.431			
5.03	261.6	0.361	4.40	527.8	0.331	4.59	775.9	0.433			
5.11	262.0	0.361	4.47	527.7	0.333	4.66	778.9	0.434			
5.19	262.1	0.362	4.55	528.6	0.331	4.74	781.4	0.438			
5.26	262.3	0.363	4.63	529.2	0.334	4.82	782.8	0.439			
5.34	262.2	0.364	4.70	529.6	0.334	4.89	785.8	0.439			
5.42	261.6	0.364	4.78	531.1	0.334	4.97	787.8	0.441			
5.49	261.6	0.366	4.86	530.7	0.333	5.05	788.2	0.450			
5.57	261.3	0.367	4.93	531.2	0.332	5.12	783.0	0.451			
5.65	260.8	0.367	5.01	531.7	0.333	5.20	787.0	0.451			
5.72	260.3	0.369	5.08	531.4	0.335	5.28	789.3	0.456			
5.80	260.3	0.370	5.16	532.1	0.333	5.35	789.7	0.460			
5.87	259.9	0.370	5.24	532.7	0.334	5.43	790.2	0.459			
5.95	259.3	0.371	5.31	532.7	0.332	5.50	792.3	0.461			
6.03	259.0	0.373	5.39	533.6	0.335	5.58	793.5	0.464			
6.10	258.7	0.373	5.47	532.9	0.334	5.66	794.5	0.465			
6.18	258.2	0.374	5.54	534.1	0.332	5.73	794.9	0.460			
6.26	258.1	0.374	5.62	533.3	0.335	5.81	794.5	0.460			
6.33	257.8	0.376	5.69	533.7	0.332	5.89	793.9	0.463			
6.41	257.4	0.378	5.77	534.2	0.334	5.96	793.3	0.466			
6.48	257.1	0.380	5.85	534.0	0.334	6.04	792.3	0.464			
6.56	257.1	0.383	5.92	535.1	0.333	6.11	791.7	0.469			
6.64	256.7	0.383	6.00	534.2	0.333	6.19	791.1	0.469			
6.71	256.6	0.384	6.08	534.3	0.333	6.27	791.5	0.469			
6.79	256.6	0.386	6.15	533.5	0.334	6.34	792.4	0.471			
6.87	256.6	0.386	6.23	533.6	0.334	6.42	791.7	0.471			
6.94	256.2	0.388	6.30	535.0	0.333	6.50	790.6	0.474			

7.02	255.8	0.389	6.38	533.8	0.333	6.57	791.1	0.474			
7.09	255.4	0.389	6.46	533.9	0.333	6.65	790.9	0.474			
7.17	254.8	0.389	6.53	533.9	0.333	6.72	791.2	0.475			
7.25	254.0	0.391	6.61	533.8	0.334	6.80	790.9	0.476			
7.32	253.8	0.391	6.69	534.7	0.334	6.88	788.3	0.477			
7.40	253.4	0.392	6.76	534.9	0.334	6.95	788.2	0.478			
7.43	253.1	0.392	6.84	535.3	0.336	7.03	788.0	0.477			
			6.91	535.0	0.337	7.11	784.2	0.479			
			6.99	535.5	0.336	7.18	785.9	0.479			
			7.07	536.3	0.338	7.26	785.6	0.479			
			7.14	535.5	0.336	7.33	786.0	0.481			
			7.22	535.3	0.337	7.41	786.4	0.481			
			7.30	535.8	0.336	7.49	786.3	0.480			
			7.37	534.9	0.334	7.52	786.0	0.480			
			7.45	535.4	0.336						
			7.52	534.6	0.338						
			7.56	535.2	0.337						

MM/LL	March 15, 2019	DL	April 10, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-21S
Project:	Ref #017-318	Sample Number:	35035
Location:	N/A	Depth (m):	15.2 - 15.8
Project No.:	18109666/2000	Lab ID No:	B19-058

Residual 1			Residual 2			Residual 3					
Normal Stress , kPa	500		Normal Stress , kPa	1000		Normal Stress , kPa	1500		Normal Stress , kPa		
Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min		

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	0.9	0.000	0.00	0.7	0.000	0.00	1.3	0.000			
0.08	5.4	0.000	0.08	2.6	0.003	0.08	3.3	0.001			
0.15	6.3	0.001	0.15	7.0	0.007	0.15	22.6	-0.004			
0.23	6.6	0.002	0.23	27.2	0.008	0.23	49.2	-0.003			
0.31	8.1	0.005	0.31	49.8	0.014	0.31	79.4	0.003			
0.38	13.5	0.006	0.38	71.3	0.016	0.38	110.2	0.011			
0.46	17.3	0.009	0.46	91.5	0.019	0.46	141.8	0.015			
0.53	21.4	0.010	0.53	112.1	0.020	0.53	175.1	0.023			
0.61	25.5	0.013	0.61	134.1	0.025	0.61	207.2	0.025			
0.69	30.6	0.020	0.69	155.4	0.028	0.69	238.2	0.027			
0.76	44.2	0.026	0.76	176.0	0.034	0.76	269.3	0.031			
0.84	56.3	0.029	0.84	195.0	0.036	0.84	299.0	0.034			
0.92	66.3	0.036	0.92	214.7	0.040	0.92	326.5	0.035			
0.99	76.5	0.042	0.99	231.7	0.045	0.99	351.9	0.034			
1.07	89.8	0.046	1.07	250.2	0.047	1.07	375.5	0.033			
1.14	103.2	0.051	1.14	267.2	0.052	1.14	396.5	0.038			
1.22	115.1	0.054	1.22	283.5	0.057	1.22	414.9	0.038			
1.30	126.6	0.058	1.30	299.2	0.058	1.30	431.1	0.038			
1.37	137.0	0.065	1.37	313.5	0.059	1.37	445.5	0.039			
1.37	137.0	0.064	1.45	327.3	0.057	1.45	457.8	0.039			
1.45	146.0	0.067	1.53	340.8	0.057	1.53	468.8	0.041			
1.53	153.0	0.068	1.60	352.7	0.057	1.60	477.9	0.042			
1.60	156.3	0.070	1.68	365.0	0.059	1.68	485.2	0.041			
1.68	164.3	0.071	1.75	375.9	0.060	1.75	492.2	0.041			
1.75	171.3	0.073	1.83	387.1	0.061	1.83	497.5	0.046			
1.83	177.9	0.073	1.91	396.2	0.061	1.91	502.7	0.044			
1.91	183.7	0.073	1.98	405.1	0.057	1.98	506.9	0.048			
1.98	188.7	0.075	2.06	414.5	0.055	2.06	510.6	0.047			
2.06	193.1	0.073	2.14	422.2	0.054	2.14	513.7	0.046			
2.14	195.7	0.072	2.21	429.4	0.051	2.21	517.2	0.046			
2.21	199.1	0.072	2.29	435.6	0.050	2.29	520.1	0.047			
2.29	202.2	0.071	2.36	441.7	0.052	2.36	522.2	0.046			
2.36	203.9	0.070	2.44	447.8	0.047	2.44	524.5	0.048			
2.44	205.4	0.069	2.52	452.3	0.044	2.52	526.9	0.048			
2.52	206.5	0.068	2.59	457.0	0.045	2.59	529.1	0.048			
2.59	207.6	0.068	2.67	461.0	0.042	2.67	530.5	0.049			
2.67	208.5	0.068	2.75	464.3	0.038	2.75	532.3	0.048			

2.75	209.5	0.068	2.82	468.1	0.039	2.82	534.3	0.050			
2.82	210.3	0.069	2.90	470.4	0.037	2.90	535.9	0.049			
2.90	211.3	0.068	2.97	473.5	0.033	2.97	537.3	0.051			
2.97	211.9	0.068	3.05	475.3	0.033	3.05	539.0	0.049			
3.05	212.9	0.068	3.13	477.9	0.031	3.13	540.0	0.048			
3.13	213.3	0.067	3.20	480.1	0.031	3.20	541.4	0.049			
3.20	213.9	0.067	3.28	481.8	0.029	3.28	542.9	0.051			
3.28	214.6	0.066	3.36	483.8	0.028	3.36	545.0	0.049			
3.36	214.9	0.067	3.43	485.1	0.027	3.43	545.9	0.051			
3.43	215.6	0.066	3.51	486.9	0.025	3.51	547.3	0.051			
3.51	216.0	0.066	3.58	487.9	0.024	3.58	548.8	0.051			
3.58	216.5	0.066	3.66	489.3	0.023	3.66	550.1	0.051			
3.66	216.7	0.065	3.74	490.9	0.021	3.74	551.2	0.051			
3.74	217.4	0.066	3.81	491.6	0.021	3.81	552.9	0.050			
3.81	218.2	0.065	3.89	493.0	0.023	3.89	554.0	0.051			
3.89	218.5	0.064	3.97	494.3	0.019	3.97	555.3	0.050			
3.97	218.6	0.065	4.04	494.9	0.021	4.04	556.9	0.054			
4.04	218.6	0.063	4.12	496.5	0.019	4.12	558.9	0.053			
4.12	218.9	0.063	4.19	497.3	0.019	4.19	560.1	0.053			
4.20	219.5	0.063	4.27	498.1	0.018	4.27	561.2	0.052			
4.27	219.8	0.062	4.35	499.0	0.017	4.35	563.1	0.051			
4.35	220.0	0.062	4.42	499.7	0.016	4.42	564.5	0.051			
4.42	220.2	0.062	4.50	501.5	0.015	4.50	565.9	0.051			
4.50	220.6	0.060	4.58	501.5	0.014	4.58	567.7	0.051			
4.58	220.9	0.059	4.65	501.9	0.012	4.65	569.3	0.051			
4.65	220.9	0.056	4.73	502.9	0.010	4.73	570.6	0.052			
4.73	221.1	0.055	4.80	502.9	0.010	4.80	571.8	0.053			
4.81	221.4	0.055	4.88	504.0	0.006	4.88	573.7	0.052			
4.88	221.8	0.054	4.96	504.1	0.005	4.96	575.0	0.051			
4.96	222.1	0.053	5.03	504.6	0.000	5.03	576.6	0.051			
5.03	222.2	0.051	5.11	505.2	0.000	5.11	578.7	0.051			
5.11	222.7	0.051	5.19	505.7	-0.002	5.15	579.9	0.053			
5.19	222.7	0.049	5.26	506.6	-0.004	5.15	579.8	0.053			
5.26	223.3	0.050	5.34	506.2	-0.006	5.23	581.9	0.056			
5.34	224.0	0.048	5.41	506.3	-0.007	5.30	584.0	0.056			
5.42	223.9	0.048	5.49	507.0	-0.009	5.38	586.7	0.056			
5.49	223.9	0.047	5.57	507.5	-0.011	5.46	588.9	0.059			
5.57	224.0	0.047	5.64	508.3	-0.009	5.53	590.8	0.059			
5.64	224.1	0.046	5.72	508.1	-0.013	5.61	593.3	0.058			
5.72	224.6	0.045	5.80	508.2	-0.013	5.69	596.0	0.059			
5.80	224.7	0.043	5.87	509.1	-0.015	5.76	598.8	0.058			
5.87	225.0	0.041	5.95	509.4	-0.016	5.84	600.8	0.058			
5.95	225.0	0.041	6.02	510.3	-0.018	5.91	603.2	0.060			
6.03	225.2	0.039	6.10	509.8	-0.017	5.99	606.0	0.061			
6.10	225.7	0.037	6.18	510.1	-0.019	6.07	608.8	0.061			
6.18	225.8	0.035	6.25	510.8	-0.019	6.14	611.8	0.061			
6.25	226.1	0.034	6.33	510.7	-0.022	6.22	614.3	0.060			
6.33	226.7	0.034	6.41	511.6	-0.023	6.30	616.1	0.059			
6.41	226.9	0.031	6.48	511.0	-0.024	6.37	619.1	0.057			
6.48	227.4	0.029	6.56	511.4	-0.026	6.45	621.7	0.055			
6.56	227.6	0.029	6.63	511.0	-0.028	6.52	624.1	0.052			
6.64	227.9	0.028	6.71	510.7	-0.030	6.60	627.0	0.054			
6.71	228.1	0.026	6.79	510.5	-0.029	6.68	629.4	0.054			
6.79	228.4	0.025	6.86	510.1	-0.030	6.75	633.0	0.054			
6.86	228.6	0.024	6.94	511.0	-0.033	6.83	637.3	0.054			

6.94	228.5	0.024	7.02	510.7	-0.034	6.91	641.2	0.052			
7.02	228.7	0.024	7.09	509.9	-0.033	6.98	645.5	0.052			
7.09	229.0	0.024	7.17	510.3	-0.034	7.06	650.4	0.050			
7.17	228.9	0.024	7.24	510.0	-0.034	7.13	653.6	0.049			
7.25	228.8	0.023	7.32	511.1	-0.037	7.21	657.5	0.051			
7.32	229.0	0.022	7.40	510.5	-0.038	7.29	660.9	0.047			
7.40	229.2	0.022	7.47	510.6	-0.040	7.36	664.0	0.047			
7.47	229.3	0.020	7.49	511.6	-0.039	7.44	666.9	0.047			
7.55	229.2	0.020				7.52	670.1	0.047			
7.63	228.9	0.018				7.59	672.5	0.046			
7.70	228.8	0.018				7.67	675.7	0.046			
7.78	228.7	0.019				7.72	677.3	0.045			
7.86	228.7	0.017									
7.93	228.5	0.016									
7.96	228.40	0.0171									

MM/LL	March 15, 2019	DL	April 10, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions					Reference ASTM D3080	
Client:	Telkwa Coal Ltd.			Borehole:	19-19S	
Project:	Ref #017-318			Sample Number:	35096	
Location:	N/A			Depth (m):	34.4 - 35.1	
Project No.:	18109666/2000			Lab ID No:	B19-058	
Test Condition:	Saturated			Test parameters:	Peak and residual	
Visual Description:	CLAYEY SILT, some sand, some gravel, w < PL, red, very stiff.			Soil Structure:	Reconstituted	
Remarks:	Area correction not applied to normal and shear stress calculation Unit weight = 2248 kg/m3.					
Initial Sample Dimensions						
Test No.	1	2	3			
Shear box geometry	Circle	Circle	Circle			
Diameter (mm)	63.50	63.40	63.48			
Height (mm)	26.62	26.57	26.75			
Area (cm²)	31.67	31.57	31.65			
Volume (cm³)	84.30	83.88	84.66			
Weight Volume Relationships						
Sample Type	Bulk Sample					
Dry Mass (g)	170.5	169.4	170.9			
Initial γ_{wet} (kN/m³)	22.10	22.07	22.06			
Final γ_{wet} (kN/m³)	23.62	23.52	23.40			
Initial γ_{dry} (kN/m³)	19.84	19.82	19.80			
Final γ_{dry} (kN/m³)	21.31	21.26	21.24			
Initial water content (%)	11.4	11.4	11.4			
Final water content (%)	10.9	10.6	10.2			
Consolidation Results						
Normal Stress (kPa)	1000	1500	2000			
t_{90} (Taylor Method) (min)	N/A	N/A	N/A			
Calculated t_{50} (min)	N/A	N/A	N/A			
Change in height ΔH_c (mm)	1.83	1.81	1.81			
Equipment Calibration						
Test Number	Machine Number	Normal Load Cell	Shear Load Cell	Vertical LPT		
Test -1	Digishear-1	221643	266562	LP-567		
Test -2	Digishear-2	728499	689339	LP-567		
Test -3	Digishear-3	697437	410702	LP-985		
TM	March 29, 2019		DL		April 10, 2019	
TESTED BY	DATE		CHECKED BY		DATE	

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.

Project: Ref #017-318

Location: N/A

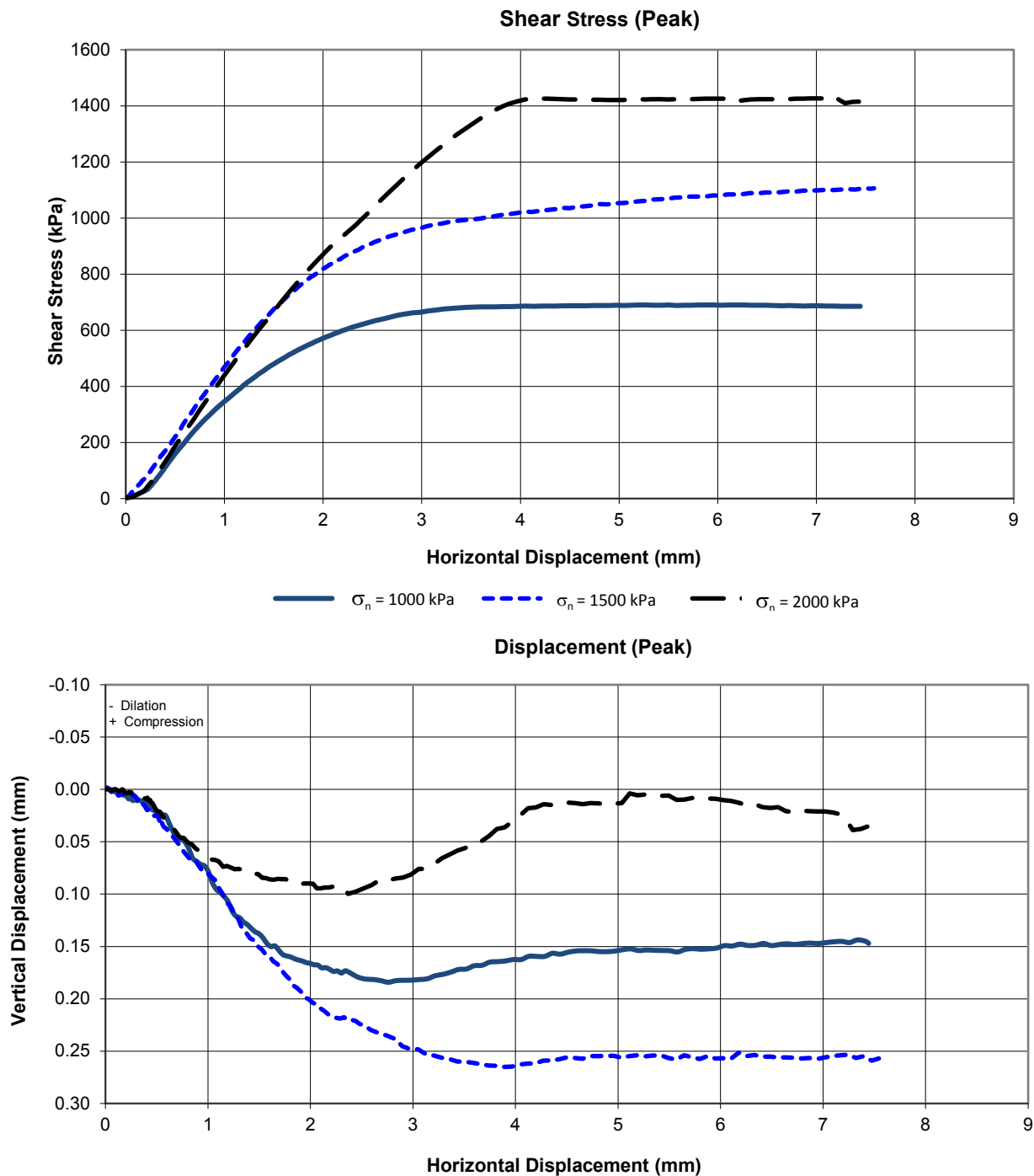
Project No.: 18109666/2000

Borehole: 19-19S

Sample Number: 35096

Depth (m): 34.4 - 35.1

Lab ID No: B19-058



TM

March 29, 2019

DL

April 10, 2019

TESTED BY

DATE

CHECKED BY

DATE



GOLDER

Golder Associates Ltd. - Burnaby Laboratory

#300-3811 North Fraser Way

Burnaby, B.C. Canada V5J 5J2

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.

Project: Ref #017-318

Location: N/A

Project No.: 18109666/2000

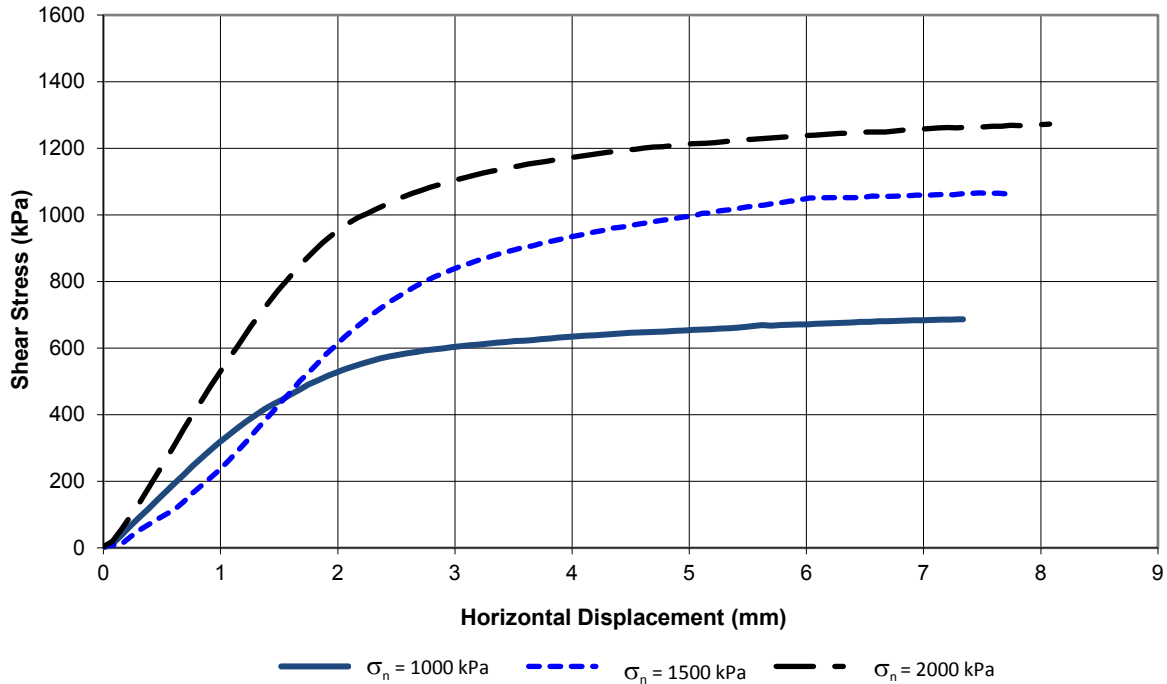
Borehole: 19-19S

Sample Number: 35096

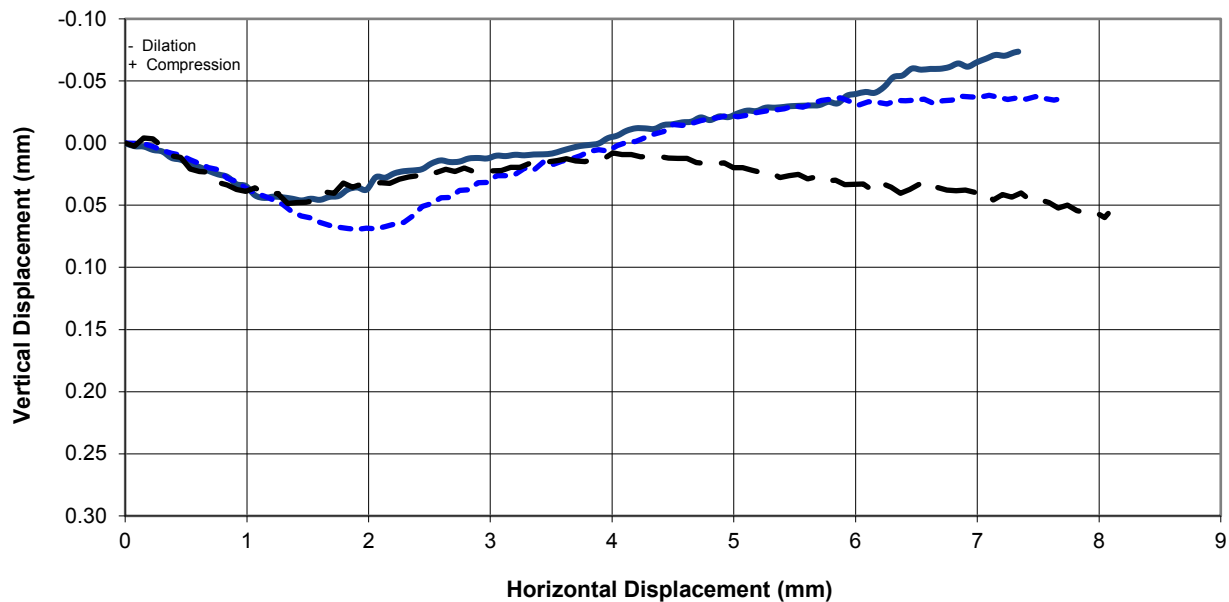
Depth (m): 34.4 - 35.1

Lab ID No: B19-058

Shear Stress (Residual)



Displacement (Residual)



TM

March 29, 2019

DL

April 10, 2019

TESTED BY

DATE

CHECKED BY

DATE



Burnaby, B.C. Canada V5J 5J2

Reference
ASTM D3080

Borehole:	19-19S
Sample Number:	35096
Depth (m):	34.4 - 35.1
Lab ID No:	B19-058

[illegible]

April 10, 2019

DATE _____

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-19S
Project:	Ref #017-318	Sample Number:	35096
Location:	N/A	Depth (m):	34.4 - 35.1
Project No.:	18109666/2000	Lab ID No:	B19-058

Peak 1		Peak 2		Peak 3			
Normal Stress , kPa	1000	Normal Stress , kPa	1500	Normal Stress , kPa	2000	Normal Stress , kPa	
Disp Rate, mm/min	0.005	Disp Rate, mm/min	0.005	Disp Rate, mm/min	0.005	Disp Rate, mm/min	

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	1.9	0.000	0.00	1.4	0.000	0.00	1.7	0.000			
0.01	3.8	-0.001	0.01	3.3	-0.002	0.01	2.4	-0.001			
0.03	5.8	-0.001	0.03	6.0	-0.001	0.03	3.2	0.000			
0.04	7.2	0.000	0.04	12.2	-0.001	0.04	3.7	0.000			
0.05	8.4	0.001	0.05	18.2	0.001	0.05	4.7	0.001			
0.06	9.9	0.001	0.06	24.3	0.004	0.06	6.0	0.000			
0.08	11.0	0.002	0.08	29.9	0.004	0.08	7.5	0.001			
0.09	12.2	0.002	0.09	36.2	0.004	0.09	9.4	0.000			
0.10	13.4	0.003	0.10	39.8	0.003	0.10	11.5	0.000			
0.11	15.1	0.002	0.11	43.7	0.005	0.12	13.7	0.001			
0.13	17.4	0.003	0.13	47.4	0.006	0.13	16.1	0.002			
0.14	19.5	0.002	0.14	51.7	0.005	0.14	18.5	0.001			
0.15	21.0	0.004	0.15	56.2	0.005	0.15	21.3	0.000			
0.17	22.6	0.004	0.17	63.1	0.003	0.17	22.6	0.000			
0.18	24.5	0.006	0.18	67.2	0.004	0.18	26.4	0.001			
0.19	26.9	0.006	0.19	71.4	0.003	0.19	30.7	0.003			
0.20	29.2	0.005	0.20	77.1	0.004	0.20	35.7	0.004			
0.22	31.9	0.008	0.22	81.6	0.003	0.22	41.1	0.004			
0.23	35.7	0.009	0.23	86.9	0.005	0.23	46.6	0.002			
0.24	40.3	0.009	0.24	92.8	0.004	0.24	52.6	0.004			
0.25	45.4	0.009	0.25	99.7	0.005	0.26	58.9	0.002			
0.27	50.4	0.011	0.27	107.5	0.005	0.27	64.7	0.004			
0.28	55.9	0.009	0.28	112.2	0.006	0.28	71.1	0.005			
0.29	61.3	0.008	0.29	119.2	0.007	0.29	77.5	0.007			
0.31	66.9	0.011	0.31	125.9	0.008	0.31	84.3	0.007			
0.32	72.7	0.010	0.32	132.6	0.011	0.32	90.8	0.008			
0.33	78.4	0.010	0.33	139.2	0.011	0.33	97.0	0.008			
0.34	84.4	0.011	0.34	145.1	0.014	0.35	103.7	0.008			
0.36	90.0	0.012	0.36	153.1	0.015	0.36	110.6	0.008			
0.37	96.4	0.013	0.37	156.9	0.014	0.37	116.6	0.008			
0.38	102.6	0.013	0.38	163.3	0.015	0.38	123.0	0.009			
0.39	109.1	0.013	0.39	167.5	0.018	0.40	129.9	0.009			
0.41	115.1	0.013	0.41	174.1	0.020	0.41	136.8	0.008			
0.42	121.6	0.016	0.42	178.2	0.019	0.42	143.4	0.011			
0.43	128.2	0.017	0.43	184.2	0.020	0.43	149.9	0.010			
0.44	134.3	0.018	0.45	190.6	0.021	0.45	157.0	0.013			
0.46	140.3	0.019	0.46	198.2	0.023	0.46	163.9	0.013			

0.47	146.3	0.020	0.47	204.9	0.025	0.50	185.3	0.020			
0.51	163.1	0.022	0.48	211.8	0.025	0.54	205.6	0.022			
0.55	179.3	0.025	0.50	217.4	0.024	0.57	226.0	0.028			
0.58	195.5	0.025	0.51	224.1	0.026	0.61	245.5	0.036			
0.62	212.2	0.033	0.52	231.4	0.028	0.65	264.7	0.036			
0.66	228.8	0.041	0.53	237.5	0.033	0.69	283.0	0.041			
0.70	244.4	0.046	0.55	244.1	0.030	0.73	303.5	0.046			
0.74	258.8	0.047	0.56	251.1	0.034	0.76	323.7	0.046			
0.78	272.7	0.050	0.57	258.7	0.036	0.80	343.5	0.051			
0.81	285.9	0.057	0.58	266.9	0.037	0.84	362.0	0.053			
0.85	299.3	0.066	0.60	273.5	0.038	0.88	380.1	0.056			
0.89	312.2	0.069	0.61	279.6	0.040	0.92	398.8	0.059			
0.93	324.8	0.072	0.65	297.1	0.044	0.96	417.8	0.061			
0.97	336.4	0.073	0.69	317.0	0.049	0.99	437.1	0.063			
1.00	347.7	0.079	0.72	337.9	0.054	1.03	455.4	0.067			
1.04	358.9	0.089	0.76	356.4	0.060	1.07	474.1	0.068			
1.08	370.0	0.095	0.80	374.2	0.064	1.11	491.8	0.069			
1.12	381.2	0.099	0.84	393.5	0.068	1.15	509.3	0.074			
1.16	392.5	0.102	0.88	410.1	0.068	1.19	526.8	0.073			
1.19	403.8	0.107	0.92	428.3	0.074	1.22	544.7	0.075			
1.23	413.8	0.116	0.95	446.3	0.079	1.26	562.8	0.076			
1.27	423.9	0.121	0.99	465.6	0.080	1.30	580.5	0.076			
1.31	433.9	0.123	1.03	482.5	0.083	1.34	597.7	0.077			
1.35	443.7	0.127	1.07	501.0	0.086	1.38	614.4	0.077			
1.39	453.1	0.129	1.11	518.0	0.094	1.41	630.6	0.079			
1.42	462.6	0.133	1.14	535.6	0.100	1.45	647.1	0.081			
1.46	471.5	0.136	1.18	550.2	0.108	1.49	663.8	0.081			
1.50	479.8	0.138	1.22	566.9	0.112	1.53	680.7	0.084			
1.54	487.9	0.142	1.26	583.8	0.119	1.57	697.2	0.085			
1.58	496.4	0.147	1.30	597.4	0.124	1.60	713.1	0.086			
1.61	504.1	0.150	1.33	613.2	0.133	1.64	729.2	0.086			
1.65	511.9	0.149	1.37	628.8	0.137	1.68	745.5	0.086			
1.69	519.4	0.154	1.41	642.9	0.142	1.72	761.4	0.086			
1.73	526.4	0.158	1.45	655.6	0.144	1.76	777.5	0.086			
1.77	533.2	0.159	1.49	671.0	0.150	1.80	792.6	0.088			
1.81	540.4	0.160	1.53	683.2	0.153	1.83	808.0	0.088			
1.84	546.7	0.162	1.56	695.8	0.158	1.87	822.8	0.088			
1.88	552.6	0.163	1.60	708.7	0.160	1.91	837.0	0.090			
1.92	559.5	0.164	1.64	722.0	0.164	1.95	851.7	0.090			
1.96	565.5	0.165	1.68	731.7	0.167	1.99	865.4	0.090			
2.00	570.7	0.166	1.72	743.7	0.172	2.02	879.6	0.090			
2.03	576.8	0.168	1.75	756.7	0.177	2.06	892.7	0.094			
2.07	581.8	0.168	1.79	766.6	0.181	2.10	905.3	0.094			
2.11	586.9	0.170	1.83	776.9	0.187	2.14	917.1	0.094			
2.15	592.2	0.170	1.87	788.4	0.189	2.18	928.6	0.094			
2.19	597.5	0.172	1.91	796.3	0.193	2.22	940.4	0.093			
2.22	602.0	0.174	1.94	805.1	0.198	2.25	951.8	0.093			
2.26	606.1	0.173	1.98	816.0	0.200	2.29	963.5	0.093			
2.30	611.1	0.175	2.02	823.2	0.204	2.33	975.2	0.094			
2.34	615.1	0.173	2.06	832.7	0.205	2.37	988.3	0.100			
2.38	618.9	0.175	2.10	839.3	0.209	2.44	1014.5	0.098			
2.45	627.1	0.179	2.14	848.5	0.212	2.52	1041.6	0.094			
2.53	634.1	0.181	2.17	853.9	0.215	2.60	1068.1	0.091			
2.61	640.5	0.182	2.21	863.3	0.217	2.67	1094.2	0.087			
2.68	647.2	0.183	2.25	870.0	0.218	2.75	1119.3	0.087			

2.76	653.2	0.184	2.29	876.7	0.219	2.83	1145.1	0.085			
2.83	658.0	0.183	2.33	882.5	0.218	2.90	1168.7	0.084			
2.91	662.6	0.182	2.36	888.7	0.220	2.98	1191.6	0.081			
2.99	664.5	0.182	2.40	896.7	0.220	3.05	1214.6	0.076			
3.06	668.6	0.182	2.44	901.8	0.221	3.13	1236.5	0.076			
3.14	672.3	0.181	2.48	907.3	0.224	3.21	1257.7	0.071			
3.22	675.6	0.178	2.52	914.5	0.225	3.28	1278.8	0.066			
3.29	677.6	0.177	2.59	923.9	0.230	3.36	1299.0	0.062			
3.37	679.4	0.175	2.67	933.9	0.233	3.44	1317.4	0.058			
3.44	681.1	0.172	2.75	942.3	0.235	3.51	1335.6	0.056			
3.52	682.5	0.172	2.82	949.9	0.238	3.59	1353.8	0.051			
3.60	683.1	0.168	2.90	958.2	0.246	3.66	1370.0	0.050			
3.67	683.5	0.168	2.97	962.4	0.248	3.74	1384.1	0.045			
3.75	683.2	0.165	3.05	971.3	0.248	3.82	1397.6	0.038			
3.83	683.9	0.164	3.13	976.4	0.253	3.89	1408.0	0.036			
3.90	684.5	0.164	3.20	980.7	0.254	3.97	1416.4	0.031			
3.98	685.6	0.162	3.28	986.7	0.256	4.05	1422.8	0.025			
4.05	685.9	0.163	3.36	990.1	0.258	4.12	1425.7	0.018			
4.13	685.5	0.159	3.43	993.0	0.260	4.20	1426.1	0.017			
4.21	686.6	0.160	3.51	994.6	0.260	4.27	1425.4	0.014			
4.28	686.0	0.160	3.58	997.7	0.261	4.35	1424.7	0.015			
4.36	686.7	0.157	3.66	1002.3	0.262	4.43	1423.5	0.013			
4.44	687.3	0.157	3.74	1006.7	0.264	4.50	1422.3	0.013			
4.51	687.0	0.155	3.81	1010.9	0.264	4.58	1422.3	0.013			
4.59	687.4	0.154	3.89	1013.8	0.265	4.66	1422.9	0.014			
4.66	687.6	0.154	3.97	1017.6	0.265	4.73	1422.1	0.013			
4.74	688.5	0.154	4.04	1022.5	0.263	4.81	1421.5	0.013			
4.82	688.0	0.155	4.12	1021.9	0.262	4.88	1421.0	0.014			
4.89	688.7	0.155	4.19	1026.1	0.262	4.96	1421.0	0.013			
4.97	689.0	0.154	4.27	1028.8	0.259	5.04	1421.2	0.013			
5.05	687.9	0.153	4.35	1031.3	0.259	5.11	1422.7	0.004			
5.12	689.1	0.152	4.42	1035.9	0.258	5.19	1423.2	0.005			
5.20	690.0	0.154	4.50	1035.4	0.256	5.27	1422.8	0.005			
5.28	689.7	0.153	4.58	1040.5	0.257	5.34	1423.6	0.006			
5.35	689.4	0.154	4.65	1041.6	0.257	5.42	1423.9	0.006			
5.43	689.2	0.154	4.73	1044.7	0.255	5.49	1423.1	0.006			
5.50	689.9	0.154	4.80	1049.2	0.255	5.57	1424.0	0.010			
5.58	688.5	0.155	4.88	1049.2	0.255	5.65	1424.1	0.010			
5.66	688.9	0.153	4.96	1052.8	0.255	5.72	1424.1	0.008			
5.73	689.3	0.152	5.03	1053.9	0.256	5.80	1425.0	0.009			
5.81	689.8	0.153	5.11	1055.0	0.255	5.88	1425.6	0.009			
5.89	690.0	0.152	5.19	1059.6	0.254	5.95	1425.9	0.009			
5.96	690.3	0.152	5.26	1061.7	0.255	6.03	1425.5	0.010			
6.04	689.6	0.149	5.34	1065.6	0.254	6.10	1425.2	0.011			
6.11	690.2	0.150	5.41	1067.1	0.254	6.18	1415.9	0.013			
6.19	690.0	0.148	5.49	1069.0	0.257	6.26	1420.2	0.015			
6.27	689.8	0.149	5.57	1073.2	0.258	6.33	1423.2	0.014			
6.34	689.4	0.149	5.64	1073.6	0.254	6.41	1423.4	0.017			
6.42	689.0	0.147	5.72	1076.7	0.256	6.49	1423.8	0.018			
6.50	689.6	0.149	5.80	1076.4	0.258	6.56	1423.8	0.017			
6.57	688.4	0.148	5.87	1077.1	0.255	6.64	1422.8	0.021			
6.65	687.7	0.147	5.95	1080.6	0.257	6.71	1424.0	0.022			
6.72	687.9	0.148	6.02	1080.5	0.257	6.79	1425.2	0.020			
6.80	686.9	0.147	6.10	1084.0	0.257	6.87	1425.9	0.021			
6.88	686.8	0.147	6.18	1084.2	0.251	6.94	1426.2	0.021			

6.95	687.0	0.147	6.25	1085.2	0.255	7.02	1426.8	0.021			
7.03	686.9	0.146	6.33	1089.5	0.254	7.10	1426.5	0.022			
7.11	686.4	0.146	6.41	1088.4	0.255	7.17	1427.4	0.024			
7.18	686.0	0.145	6.48	1090.8	0.255	7.21	1428.9	0.027			
7.26	685.7	0.146	6.56	1090.8	0.256	7.21	1424.9	0.027			
7.33	685.4	0.144	6.63	1091.6	0.256	7.29	1408.8	0.039			
7.41	685.6	0.145	6.71	1094.6	0.256	7.37	1413.6	0.038			
7.44	685.6	0.147	6.79	1094.1	0.257	7.43	1415.5	0.035			
			6.86	1097.9	0.256						
			6.94	1097.5	0.257						
			7.02	1098.4	0.256						
			7.09	1100.5	0.255						
			7.17	1099.6	0.254						
			7.24	1101.5	0.253						
			7.32	1102.3	0.257						
			7.40	1101.2	0.255						
			7.47	1106.0	0.259						
			7.55	1104.6	0.257						
			7.58	1106.1	0.259						

TM	March 29, 2019	DL	April 10, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-19S
Project:	Ref #017-318	Sample Number:	35096
Location:	N/A	Depth (m):	34.4 - 35.1
Project No.:	18109666/2000	Lab ID No:	B19-058

Residual 1			Residual 2			Residual 3					
Normal Stress , kPa	1000		Normal Stress , kPa	1500		Normal Stress , kPa	2000		Normal Stress , kPa		
Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min		

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	1.2	0.000	0.00	4.1	0.000	0.00	4.0	0.000			
0.08	11.6	0.002	0.08	8.1	0.000	0.08	19.5	0.002			
0.15	37.4	0.003	0.15	10.4	0.000	0.15	54.7	-0.004			
0.23	65.1	0.005	0.23	32.9	0.003	0.23	93.7	-0.003			
0.31	90.8	0.007	0.31	52.6	0.006	0.31	133.9	0.003			
0.38	116.7	0.012	0.38	69.3	0.008	0.38	177.8	0.010			
0.46	143.5	0.013	0.46	85.2	0.010	0.46	222.2	0.012			
0.53	169.4	0.017	0.53	100.8	0.013	0.53	266.4	0.021			
0.61	195.1	0.019	0.61	116.4	0.016	0.61	310.9	0.023			
0.69	220.4	0.022	0.69	137.9	0.020	0.69	356.5	0.023			
0.76	246.2	0.025	0.76	163.8	0.021	0.76	400.4	0.031			
0.84	270.1	0.027	0.84	187.1	0.028	0.84	442.1	0.034			
0.92	293.6	0.033	0.92	210.6	0.031	0.92	485.2	0.037			
0.99	316.9	0.035	0.99	234.5	0.036	0.99	525.3	0.039			
1.07	338.5	0.042	1.07	261.7	0.040	1.07	566.2	0.036			
1.14	359.4	0.044	1.14	290.4	0.043	1.14	605.0	0.041			
1.22	379.6	0.043	1.22	319.3	0.046	1.22	645.0	0.041			
1.30	398.2	0.044	1.30	351.0	0.049	1.26	665.3	0.041			
1.37	415.8	0.045	1.37	380.5	0.055	1.26	665.2	0.041			
1.45	431.2	0.046	1.45	410.1	0.059	1.34	701.6	0.049			
1.53	445.1	0.045	1.53	441.5	0.060	1.41	737.6	0.048			
1.60	461.1	0.046	1.60	470.3	0.064	1.49	771.6	0.048			
1.68	476.0	0.043	1.68	500.7	0.066	1.56	802.8	0.046			
1.75	490.8	0.042	1.75	527.1	0.068	1.64	834.2	0.039			
1.83	503.2	0.037	1.83	554.5	0.069	1.72	863.5	0.040			
1.91	514.7	0.036	1.91	583.5	0.069	1.79	890.5	0.032			
1.98	525.9	0.037	1.98	607.8	0.069	1.87	915.7	0.035			
2.06	536.1	0.027	2.06	633.5	0.069	1.95	938.6	0.033			
2.14	545.2	0.028	2.14	656.3	0.067	2.02	959.2	0.033			
2.21	553.8	0.024	2.21	678.0	0.065	2.10	976.6	0.032			
2.29	561.8	0.023	2.29	700.1	0.064	2.17	991.9	0.032			
2.36	568.5	0.022	2.36	718.9	0.058	2.25	1003.6	0.029			
2.44	574.4	0.021	2.44	738.4	0.051	2.33	1016.6	0.027			
2.52	579.7	0.016	2.52	754.3	0.049	2.40	1029.5	0.026			
2.59	584.8	0.014	2.59	771.0	0.044	2.48	1041.7	0.023			
2.67	588.5	0.015	2.67	786.3	0.044	2.56	1053.4	0.024			
2.75	593.1	0.015	2.75	799.4	0.038	2.63	1063.8	0.021			

2.82	596.0	0.012	2.82	813.5	0.037	2.71	1073.0	0.023			
2.90	599.3	0.012	2.90	824.0	0.032	2.78	1082.6	0.020			
2.97	602.4	0.012	2.97	835.3	0.032	2.86	1090.1	0.023			
3.05	605.3	0.010	3.05	846.2	0.026	2.94	1097.9	0.021			
3.13	608.5	0.010	3.13	854.3	0.026	3.01	1105.0	0.022			
3.20	610.6	0.009	3.20	864.2	0.025	3.09	1112.2	0.022			
3.28	613.5	0.010	3.28	871.7	0.020	3.17	1119.3	0.020			
3.36	616.0	0.009	3.36	880.6	0.022	3.24	1125.4	0.019			
3.43	618.2	0.009	3.43	888.6	0.015	3.32	1131.0	0.016			
3.51	620.9	0.008	3.51	895.2	0.018	3.39	1136.5	0.015			
3.58	622.2	0.006	3.58	902.2	0.015	3.47	1142.1	0.015			
3.66	624.2	0.004	3.66	906.6	0.013	3.55	1147.2	0.014			
3.74	626.9	0.002	3.74	914.4	0.010	3.62	1152.1	0.012			
3.81	628.7	0.001	3.81	920.2	0.007	3.70	1156.4	0.014			
3.89	631.2	0.000	3.89	926.2	0.005	3.78	1160.8	0.015			
3.97	633.1	-0.004	3.97	932.8	0.006	3.85	1165.0	0.013			
4.04	635.0	-0.006	4.04	937.1	0.002	3.93	1169.3	0.013			
4.12	637.1	-0.010	4.12	943.5	-0.001	4.00	1172.6	0.008			
4.19	638.7	-0.012	4.19	948.9	-0.001	4.08	1176.3	0.009			
4.27	640.2	-0.012	4.27	953.5	-0.004	4.16	1180.1	0.009			
4.35	641.7	-0.011	4.35	960.3	-0.007	4.23	1184.6	0.011			
4.42	643.6	-0.015	4.42	963.2	-0.009	4.31	1187.7	0.011			
4.50	645.6	-0.015	4.50	967.9	-0.015	4.39	1191.1	0.011			
4.58	646.4	-0.017	4.58	972.6	-0.014	4.46	1194.5	0.012			
4.65	648.2	-0.017	4.65	976.6	-0.016	4.54	1197.2	0.012			
4.73	649.2	-0.021	4.73	981.8	-0.018	4.62	1200.5	0.012			
4.80	650.1	-0.019	4.80	984.9	-0.020	4.69	1203.3	0.016			
4.88	651.7	-0.022	4.88	989.1	-0.021	4.77	1204.8	0.016			
4.96	653.0	-0.021	4.96	993.6	-0.023	4.84	1207.3	0.017			
5.03	654.5	-0.024	5.03	995.8	-0.021	4.92	1210.3	0.016			
5.11	655.7	-0.026	5.11	1004.3	-0.023	5.00	1212.7	0.020			
5.19	656.4	-0.026	5.19	1005.9	-0.025	5.07	1213.9	0.020			
5.26	658.8	-0.029	5.26	1012.0	-0.026	5.15	1215.4	0.022			
5.34	659.0	-0.029	5.34	1015.4	-0.027	5.23	1217.2	0.024			
5.41	661.0	-0.029	5.41	1019.0	-0.028	5.30	1220.3	0.023			
5.47	663.0	-0.030	5.49	1023.6	-0.030	5.38	1222.7	0.028			
5.62	668.8	-0.030	5.57	1026.3	-0.029	5.45	1225.4	0.026			
5.70	667.4	-0.031	5.64	1030.0	-0.032	5.53	1226.9	0.025			
5.78	668.9	-0.033	5.72	1034.3	-0.034	5.61	1229.0	0.029			
5.85	670.1	-0.032	5.80	1037.5	-0.035	5.68	1230.9	0.027			
5.93	670.6	-0.038	5.87	1042.5	-0.036	5.76	1232.7	0.031			
6.01	671.4	-0.040	5.88	1041.2	-0.036	5.84	1234.8	0.030			
6.08	672.9	-0.041	6.03	1050.6	-0.031	5.91	1235.8	0.033			
6.16	673.7	-0.041	6.11	1050.5	-0.033	5.99	1238.3	0.033			
6.23	674.9	-0.045	6.18	1051.9	-0.033	6.06	1238.9	0.033			
6.31	675.6	-0.053	6.26	1051.3	-0.031	6.14	1241.2	0.038			
6.39	676.6	-0.055	6.33	1051.5	-0.034	6.22	1243.3	0.032			
6.46	678.2	-0.060	6.41	1051.8	-0.034	6.29	1245.3	0.035			
6.54	678.7	-0.059	6.49	1052.4	-0.035	6.37	1244.8	0.040			
6.62	680.3	-0.060	6.56	1056.0	-0.035	6.45	1246.4	0.037			
6.69	680.5	-0.060	6.64	1055.5	-0.032	6.52	1249.1	0.033			
6.77	681.9	-0.061	6.72	1055.5	-0.034	6.60	1248.6	0.038			
6.84	682.4	-0.064	6.79	1056.5	-0.035	6.67	1249.1	0.036			
6.92	683.5	-0.062	6.87	1057.3	-0.038	6.75	1251.5	0.038			
7.00	683.6	-0.065	6.94	1059.2	-0.037	6.83	1254.1	0.038			

7.07	684.7	-0.068	7.02	1058.8	-0.037	6.90	1255.7	0.038			
7.15	684.9	-0.071	7.10	1060.1	-0.038	6.98	1257.5	0.040			
7.23	685.3	-0.070	7.17	1061.0	-0.037	7.06	1258.9	0.039			
7.30	686.3	-0.073	7.25	1060.0	-0.035	7.13	1261.7	0.046			
7.34	686.3	-0.074	7.33	1063.3	-0.036	7.21	1262.7	0.041			
			7.40	1063.9	-0.035	7.28	1261.4	0.043			
			7.48	1066.0	-0.038	7.36	1263.3	0.040			
			7.55	1064.5	-0.036	7.44	1263.3	0.046			
			7.63	1065.0	-0.035	7.51	1264.5	0.046			
			7.70	1063.6	-0.036	7.59	1265.8	0.048			
						7.67	1266.3	0.052			
						7.74	1268.9	0.050			
						7.82	1267.7	0.054			
						7.89	1268.6	0.056			
						7.97	1271.0	0.055			
						8.05	1272.2	0.060			
						8.08	1272.6	0.057			

TM	March 29, 2019	DL	April 10, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions					Reference ASTM D3080	
Client:	Telkwa Coal Ltd.			Borehole:	19-22S	
Project:	Ref #017-318			Sample Number:	29665	
Location:	N/A			Depth (m):	16.2 - 16.8	
Project No.:	18109666/2000			Lab ID No:	B19-058	
Test Condition:	Saturated			Test parameters:	Peak and residual	
Visual Description:	CLAYEY SILT, some sand, some gravel, w < PL, red, stiff.			Soil Structure:	Reconstituted	
Remarks:	Area correction not applied to normal and shear stress calculation Unit weight = 2292 kg/m3.					
Initial Sample Dimensions						
Test No.	1	2	3			
Shear box geometry	Circle	Circle	Circle			
Diameter (mm)	63.48	63.50	63.40			
Height (mm)	26.75	26.62	26.57			
Area (cm²)	31.65	31.67	31.57			
Volume (cm³)	84.66	84.30	83.88			
Weight Volume Relationships						
Sample Type	Bulk Sample					
Dry Mass (g)	178.2	177.5	177.1			
Initial γ_{wet} (kN/m³)	22.50	22.50	22.56			
Final γ_{wet} (kN/m³)	23.12	24.32	24.61			
Initial γ_{dry} (kN/m³)	20.65	20.66	20.71			
Final γ_{dry} (kN/m³)	20.88	22.12	22.43			
Initial water content (%)	8.9	8.9	8.9			
Final water content (%)	10.7	10.0	9.7			
Consolidation Results						
Normal Stress (kPa)	500	1000	1500			
t₉₀ (Taylor Method) (min)	N/A	N/A	N/A			
Calculated t₅₀ (min)	N/A	N/A	N/A			
Change in height ΔH_c (mm)	0.29	1.76	2.03			
Equipment Calibration						
Test Number	Machine Number	Normal Load Cell	Shear Load Cell	Vertical LPT		
Test -1	Digishear-1	720086	219231	LP-1138		
Test -2	Digishear-2	221643	266562	LP-567		
Test -3	Digishear-3	728499	689339	LP-567		
TM	April 4, 2019		DL		April 16, 2019	
TESTED BY	DATE		CHECKED BY		DATE	

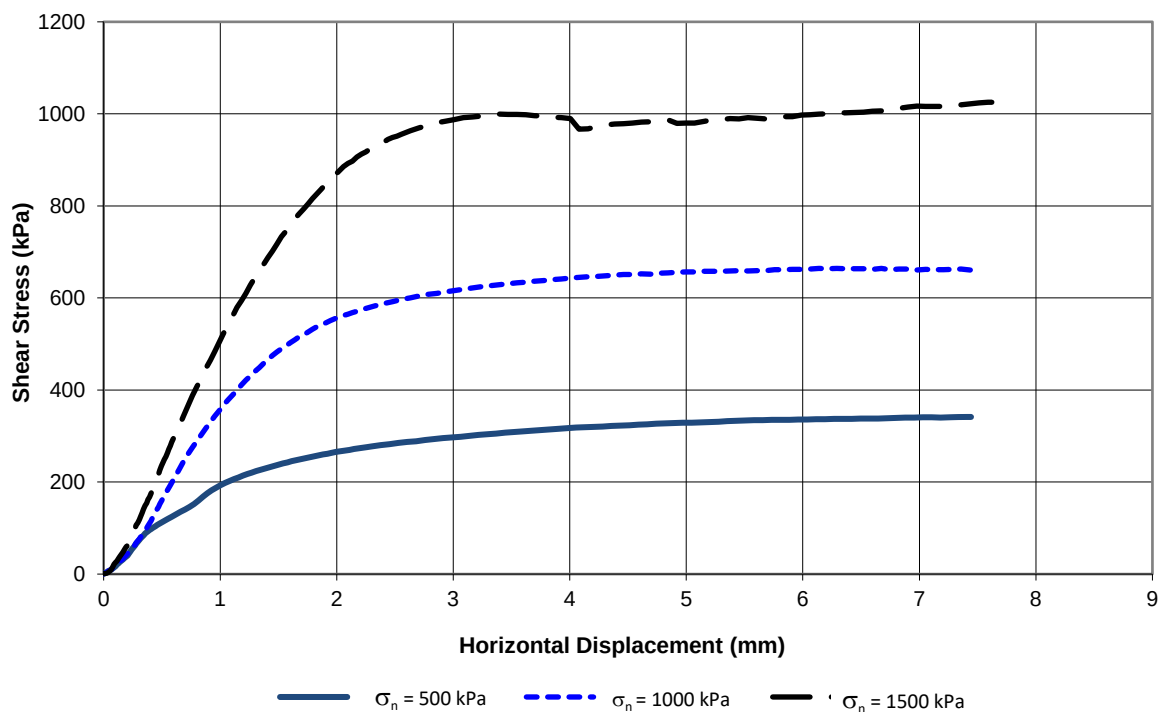
Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

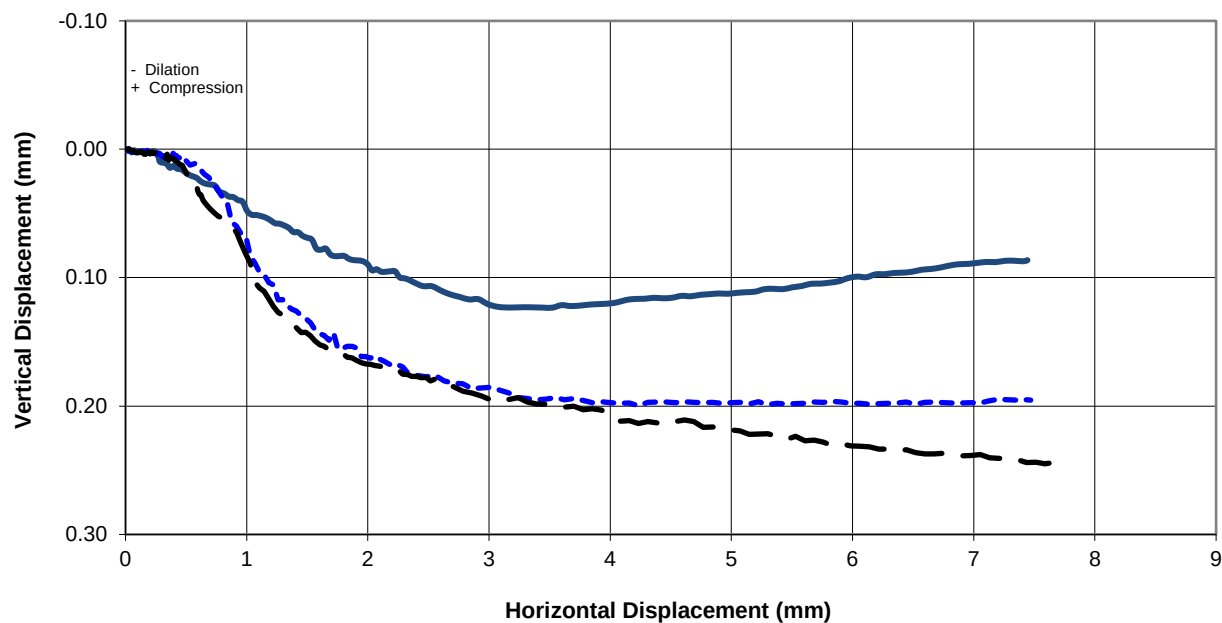
Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
Project No.: 18109666/2000

Borehole: 19-22S
Sample Number: 29665
Depth (m): 16.2 - 16.8
Lab ID No: B19-058

Shear Stress (Peak)



Displacement (Peak)



TM

April 4, 2019

DL

April 16, 2019

TESTED BY

DATE

CHECKED BY

DATE



GOLDER

Golder Associates Ltd. - Burnaby Laboratory

#300-3811 North Fraser Way

Burnaby, B.C. Canada V5J 5J2

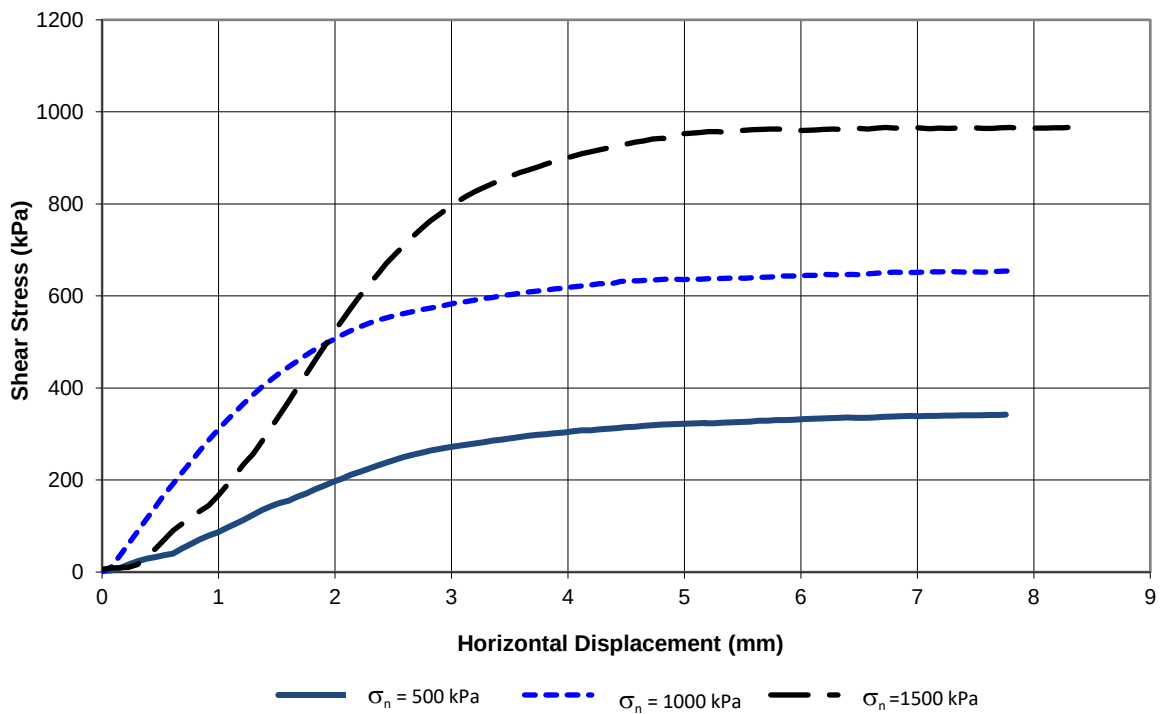
Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

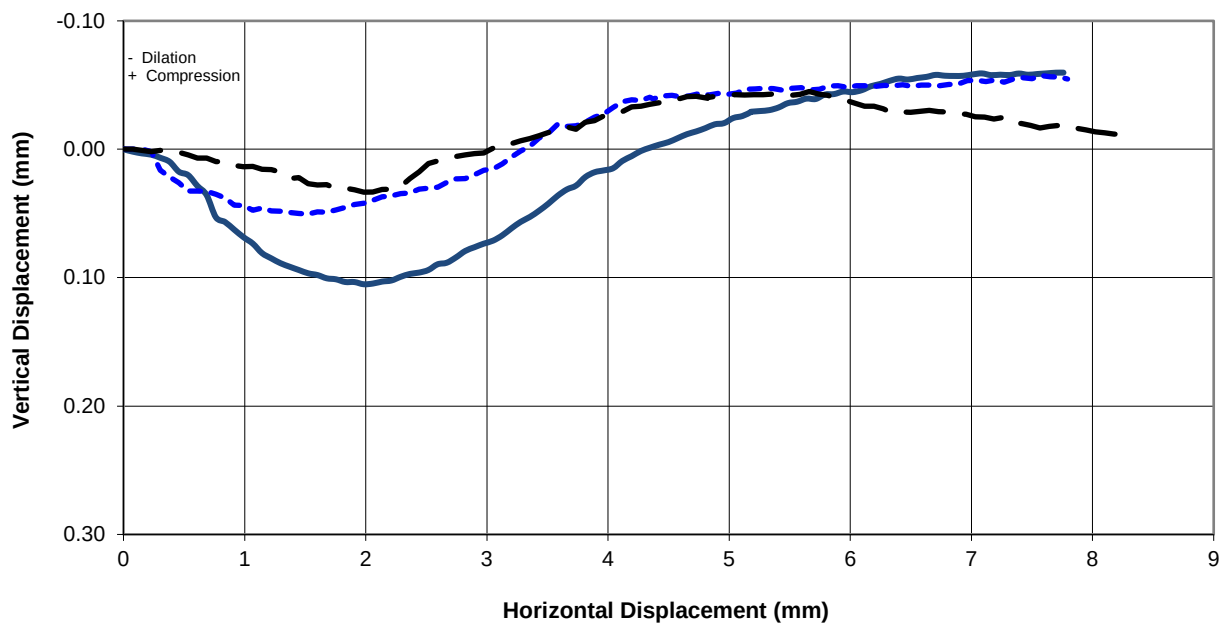
Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
Project No.: 18109666/2000

Borehole: 19-22S
Sample Number: 29665
Depth (m): 16.2 - 16.8
Lab ID No: B19-058

Shear Stress (Residual)



Displacement (Residual)



TM

April 4, 2019

DL

April 16, 2019

TESTED BY

DATE

CHECKED BY

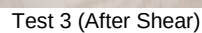
DATE



Burnaby, B.C. Canada V5J 5J2

Reference
ASTM D3080

Borehole:	19-22S
Sample Number:	29665
Depth (m):	16.2 - 16.8
Lab ID No:	B19-058

[illegible]

April 16, 2019

DATE _____

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-22S
Project:	Ref #017-318	Sample Number:	29665
Location:	N/A	Depth (m):	16.2 - 16.8
Project No.:	18109666/2000	Lab ID No:	B19-058

Peak 1			Peak 2			Peak 3					
Normal Stress , kPa	500		Normal Stress , kPa	1000		Normal Stress , kPa	1500		Normal Stress , kPa		
Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min		
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	1.1	0.000	0.00	0.3	0.000	0.00	0.9	0.000			
0.01	2.3	0.001	0.01	2.2	0.001	0.01	1.2	0.001			
0.03	4.2	0.001	0.03	4.3	0.000	0.03	2.0	-0.001			
0.04	5.9	0.001	0.04	6.3	0.002	0.04	3.6	0.001			
0.05	7.8	0.001	0.05	8.4	0.003	0.05	6.1	0.001			
0.06	9.7	0.001	0.06	9.8	0.002	0.06	9.9	0.001			
0.08	11.9	0.001	0.08	12.1	0.000	0.08	14.8	0.002			
0.09	14.2	0.003	0.09	15.1	0.001	0.09	21.2	0.002			
0.10	17.4	0.001	0.10	18.6	0.002	0.10	25.6	0.003			
0.11	20.7	0.002	0.11	22.2	0.002	0.11	28.6	0.002			
0.13	23.6	0.001	0.13	25.5	0.001	0.13	34.1	0.002			
0.14	26.6	0.001	0.14	28.1	0.002	0.14	37.8	0.003			
0.15	29.3	0.002	0.15	30.6	0.001	0.15	42.9	0.004			
0.17	32.0	0.002	0.17	33.4	0.002	0.17	48.2	0.004			
0.18	34.5	0.002	0.18	36.6	0.001	0.18	53.1	0.003			
0.19	37.1	0.002	0.19	40.3	0.003	0.19	58.5	0.002			
0.20	40.4	0.002	0.20	44.2	0.002	0.20	62.8	0.004			
0.22	44.6	0.002	0.22	47.8	0.003	0.22	68.5	0.002			
0.23	48.9	0.001	0.23	51.7	0.005	0.23	74.6	0.003			
0.24	53.3	0.002	0.24	55.5	0.003	0.24	82.3	0.003			
0.25	57.6	0.002	0.25	58.9	0.004	0.25	90.9	0.005			
0.27	61.9	0.004	0.27	63.2	0.003	0.27	97.9	0.002			
0.28	66.0	0.009	0.28	67.7	0.003	0.28	106.0	0.005			
0.29	70.1	0.010	0.29	72.1	0.004	0.29	111.3	0.005			
0.31	74.0	0.010	0.31	76.6	0.006	0.31	118.0	0.004			
0.32	77.8	0.010	0.32	80.9	0.005	0.32	124.9	0.005			
0.33	81.5	0.011	0.33	85.4	0.005	0.33	133.1	0.007			
0.34	85.0	0.011	0.34	89.8	0.005	0.34	140.8	0.004			
0.36	88.0	0.013	0.36	94.8	0.005	0.36	148.7	0.008			
0.37	90.7	0.014	0.37	99.8	0.004	0.37	154.5	0.007			
0.38	93.4	0.014	0.38	104.9	0.005	0.38	162.2	0.007			
0.39	95.9	0.013	0.39	110.3	0.003	0.39	167.7	0.007			
0.41	98.1	0.013	0.41	116.2	0.005	0.41	175.6	0.009			
0.42	100.3	0.015	0.42	122.0	0.005	0.42	184.4	0.009			
0.43	102.3	0.015	0.43	128.0	0.007	0.43	192.8	0.010			

0.45	104.3	0.015	0.44	134.3	0.007	0.44	201.8	0.012			
0.46	106.4	0.016	0.46	140.2	0.008	0.46	208.8	0.012			
0.47	108.3	0.016	0.47	146.3	0.006	0.47	216.6	0.013			
0.51	114.1	0.019	0.48	152.4	0.006	0.48	226.1	0.015			
0.55	119.4	0.021	0.50	158.6	0.009	0.50	234.7	0.017			
0.58	124.7	0.022	0.53	176.4	0.012	0.51	242.5	0.020			
0.62	130.1	0.025	0.57	193.2	0.011	0.52	248.8	0.019			
0.66	135.4	0.027	0.61	210.4	0.015	0.53	255.4	0.022			
0.70	140.7	0.027	0.65	228.0	0.019	0.55	263.6	0.023			
0.74	146.3	0.028	0.69	244.7	0.022	0.56	271.2	0.024			
0.78	152.5	0.033	0.72	260.5	0.027	0.57	279.0	0.028			
0.81	160.1	0.034	0.76	275.1	0.032	0.58	286.3	0.028			
0.85	168.1	0.037	0.80	289.1	0.037	0.60	293.9	0.032			
0.89	175.7	0.037	0.84	303.2	0.042	0.61	301.6	0.035			
0.93	182.0	0.040	0.88	316.9	0.057	0.62	309.0	0.036			
0.97	187.7	0.041	0.92	330.4	0.060	0.64	317.3	0.039			
1.00	193.0	0.048	0.95	343.5	0.066	0.65	321.9	0.041			
1.04	197.9	0.051	0.99	355.7	0.068	0.69	343.3	0.045			
1.08	202.2	0.051	1.03	367.2	0.083	0.72	365.5	0.049			
1.12	206.3	0.052	1.07	378.4	0.088	0.76	388.3	0.052			
1.16	210.2	0.053	1.11	389.0	0.096	0.80	407.3	0.054			
1.20	213.9	0.055	1.14	399.4	0.098	0.84	426.4	0.057			
1.23	217.4	0.058	1.18	411.2	0.104	0.88	447.4	0.060			
1.27	220.5	0.058	1.22	421.1	0.106	0.92	464.7	0.065			
1.31	223.7	0.059	1.26	430.7	0.117	0.95	484.3	0.073			
1.35	226.6	0.061	1.30	439.9	0.117	0.99	503.9	0.082			
1.39	229.4	0.065	1.33	448.7	0.122	1.03	522.7	0.089			
1.42	232.2	0.065	1.37	457.5	0.125	1.07	541.8	0.103			
1.46	235.1	0.067	1.41	466.3	0.126	1.11	560.2	0.108			
1.50	237.9	0.069	1.45	474.8	0.129	1.14	579.1	0.111			
1.54	240.4	0.070	1.49	482.6	0.132	1.18	594.2	0.116			
1.58	242.9	0.078	1.53	489.6	0.135	1.22	610.2	0.122			
1.61	245.2	0.078	1.56	496.2	0.141	1.26	628.3	0.127			
1.65	247.4	0.077	1.60	503.0	0.144	1.30	644.1	0.129			
1.69	249.6	0.082	1.64	509.1	0.145	1.33	658.0	0.132			
1.73	251.8	0.083	1.68	515.9	0.149	1.37	672.7	0.136			
1.77	253.9	0.083	1.72	519.7	0.143	1.41	687.9	0.139			
1.81	256.1	0.083	1.75	525.7	0.156	1.45	701.6	0.143			
1.84	258.1	0.085	1.79	532.2	0.155	1.49	717.3	0.143			
1.88	259.8	0.086	1.83	537.4	0.153	1.53	733.1	0.145			
1.92	261.7	0.087	1.87	541.7	0.153	1.56	744.8	0.149			
1.96	263.6	0.087	1.91	545.8	0.155	1.60	757.7	0.152			
2.00	265.3	0.089	1.94	550.9	0.161	1.64	771.9	0.154			
2.03	267.2	0.094	1.98	554.8	0.161	1.68	782.2	0.156			
2.07	268.6	0.093	2.02	558.5	0.163	1.72	792.9	0.157			
2.11	270.0	0.095	2.06	562.0	0.161	1.75	804.2	0.159			
2.15	271.5	0.095	2.10	564.8	0.164	1.79	815.9	0.159			
2.19	273.0	0.095	2.14	568.2	0.165	1.83	826.3	0.162			
2.22	274.6	0.095	2.17	571.2	0.167	1.87	836.5	0.162			
2.26	276.2	0.100	2.21	574.5	0.169	1.91	848.2	0.164			
2.30	277.3	0.100	2.25	577.2	0.168	1.94	857.6	0.166			
2.34	278.7	0.102	2.29	580.1	0.170	1.98	866.4	0.167			
2.38	280.0	0.104	2.33	582.6	0.174	2.02	876.1	0.167			

2.45	282.6	0.107	2.36	584.8	0.176	2.06	885.2	0.168			
2.53	284.8	0.107	2.40	587.4	0.176	2.10	892.1	0.169			
2.61	287.0	0.110	2.48	592.2	0.177	2.14	897.4	0.170			
2.68	288.8	0.113	2.55	596.6	0.176	2.17	906.3	0.169			
2.76	291.1	0.115	2.63	599.9	0.180	2.21	912.3	0.170			
2.83	293.4	0.117	2.71	604.5	0.182	2.25	917.6	0.172			
2.91	295.2	0.117	2.78	607.9	0.183	2.29	924.4	0.175			
2.99	297.1	0.121	2.86	610.3	0.186	2.33	930.2	0.175			
3.06	298.6	0.123	2.94	613.4	0.186	2.36	934.5	0.177			
3.14	300.3	0.123	3.01	616.4	0.185	2.40	938.6	0.177			
3.22	302.3	0.123	3.09	619.1	0.188	2.44	944.3	0.178			
3.29	303.6	0.123	3.17	621.7	0.190	2.48	948.7	0.178			
3.37	305.1	0.123	3.24	624.3	0.193	2.52	951.7	0.180			
3.44	307.0	0.123	3.32	626.6	0.194	2.55	955.8	0.179			
3.52	308.9	0.123	3.39	628.5	0.195	2.63	963.2	0.184			
3.60	310.3	0.121	3.47	630.9	0.195	2.71	969.6	0.185			
3.67	311.4	0.122	3.55	632.6	0.193	2.78	974.9	0.188			
3.75	313.1	0.122	3.62	634.3	0.195	2.86	980.6	0.190			
3.83	314.5	0.121	3.70	636.6	0.194	2.94	984.2	0.192			
3.90	315.4	0.121	3.78	638.0	0.196	3.01	987.4	0.195			
3.98	317.0	0.120	3.85	639.9	0.197	3.09	991.9	0.193			
4.06	318.2	0.119	3.93	641.5	0.197	3.16	993.0	0.195			
4.13	318.9	0.117	4.00	643.1	0.197	3.24	995.7	0.193			
4.21	319.8	0.117	4.08	644.6	0.198	3.32	998.4	0.197			
4.28	320.9	0.116	4.16	645.8	0.198	3.39	999.8	0.198			
4.36	321.7	0.116	4.23	647.2	0.200	3.47	999.0	0.199			
4.44	322.7	0.116	4.31	648.5	0.197	3.55	998.6	0.199			
4.51	323.4	0.116	4.39	649.5	0.197	3.62	998.5	0.201			
4.59	325.1	0.114	4.46	651.0	0.197	3.70	996.0	0.200			
4.67	325.3	0.114	4.54	651.0	0.197	3.77	995.5	0.203			
4.74	326.8	0.113	4.61	652.5	0.197	3.85	992.5	0.202			
4.82	327.7	0.113	4.69	651.7	0.197	3.93	991.6	0.203			
4.89	328.1	0.112	4.77	653.7	0.197	4.00	989.5	0.207			
4.97	328.7	0.113	4.84	654.3	0.197	4.08	967.1	0.212			
5.05	329.2	0.112	4.92	655.5	0.198	4.16	967.3	0.211			
5.12	329.7	0.111	5.00	656.6	0.197	4.23	972.7	0.214			
5.20	330.2	0.111	5.07	656.8	0.197	4.31	976.0	0.212			
5.28	331.3	0.109	5.15	658.0	0.198	4.39	978.2	0.213			
5.35	332.3	0.109	5.22	657.7	0.197	4.46	978.9	0.211			
5.43	332.9	0.109	5.30	658.1	0.199	4.54	979.9	0.212			
5.50	334.0	0.107	5.38	658.7	0.198	4.61	982.2	0.211			
5.58	334.6	0.107	5.45	659.5	0.198	4.69	982.9	0.212			
5.66	334.2	0.105	5.53	658.6	0.198	4.77	985.0	0.216			
5.73	334.9	0.105	5.61	659.3	0.198	4.84	987.0	0.216			
5.81	335.0	0.104	5.68	659.5	0.197	4.92	979.3	0.216			
5.89	335.4	0.103	5.76	661.5	0.197	5.00	979.8	0.218			
5.96	335.7	0.100	5.83	661.7	0.196	5.07	980.0	0.219			
6.04	336.0	0.099	5.91	662.4	0.197	5.15	983.5	0.222			
6.11	336.3	0.100	5.99	662.5	0.198	5.22	986.7	0.222			
6.19	336.6	0.097	6.06	662.8	0.198	5.30	987.8	0.222			
6.27	337.0	0.097	6.14	664.2	0.199	5.38	989.9	0.224			
6.34	337.5	0.096	6.22	663.8	0.198	5.45	989.4	0.226			
6.42	337.3	0.096	6.29	664.2	0.198	5.53	991.8	0.224			

6.50	337.7	0.095	6.37	663.5	0.198	5.61	990.3	0.227			
6.57	338.2	0.094	6.44	663.7	0.197	5.68	988.9	0.227			
6.65	338.2	0.093	6.52	663.8	0.199	5.76	990.8	0.228			
6.72	338.3	0.092	6.60	662.2	0.197	5.83	994.0	0.231			
6.80	339.0	0.091	6.67	663.9	0.197	5.91	994.1	0.230			
6.88	339.9	0.090	6.75	661.4	0.197	5.99	997.2	0.231			
6.95	340.2	0.089	6.83	662.8	0.198	6.06	998.5	0.231			
7.03	340.8	0.089	6.90	663.0	0.198	6.14	999.6	0.232			
7.11	340.7	0.088	6.98	660.9	0.197	6.22	1000.0	0.233			
7.18	340.1	0.088	7.05	661.9	0.198	6.29	1002.1	0.234			
7.26	340.9	0.087	7.13	661.2	0.196	6.37	1002.1	0.235			
7.33	341.3	0.087	7.21	661.5	0.195	6.44	1003.1	0.234			
7.41	341.1	0.087	7.28	662.0	0.195	6.52	1003.6	0.236			
7.44	341.1	0.086	7.36	662.6	0.195	6.60	1005.8	0.237			
			7.44	661.0	0.195	6.67	1006.8	0.237			
			7.47	661.4	0.195	6.75	1009.2	0.237			
						6.83	1011.7	0.237			
						6.90	1014.8	0.239			
						6.98	1017.2	0.238			
						7.05	1016.0	0.238			
						7.13	1016.4	0.240			
						7.21	1016.2	0.241			
						7.28	1019.2	0.240			
						7.36	1019.9	0.242			
						7.44	1022.1	0.244			
						7.51	1024.0	0.244			
						7.59	1025.2	0.245			
						7.62	1025.3	0.245			

TM	April 4, 2019	DL	April 16, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions				Reference ASTM D3080	
Client:	Telkwa Coal Ltd.		Borehole:	19-22S	
Project:	Ref #017-318		Sample Number:	29665	
Location:	N/A		Depth (m):	16.2 - 16.8	
Project No.:	18109666/2000		Lab ID No:	B19-058	

Residual 1		Residual 2		Residual 3			
Normal Stress , kPa	500	Normal Stress , kPa	1000	Normal Stress , kPa	1500	Normal Stress , kPa	
Disp Rate, mm/min	0.005	Disp Rate, mm/min	0.005	Disp Rate, mm/min	0.005	Disp Rate, mm/min	

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	2.5	0.000	0.00	0.6	0.000	0.00	6.1	0.000			
0.08	3.0	0.002	0.08	10.6	0.000	0.08	9.0	0.000			
0.15	8.7	0.003	0.15	36.3	0.000	0.15	9.7	0.001			
0.23	16.5	0.004	0.23	61.9	0.002	0.23	10.1	0.002			
0.31	23.6	0.007	0.31	88.2	0.016	0.31	16.8	0.001			
0.38	28.9	0.010	0.38	115.2	0.022	0.38	34.2	0.001			
0.46	32.6	0.017	0.46	141.4	0.026	0.46	50.9	0.002			
0.53	36.9	0.020	0.53	168.1	0.032	0.53	69.9	0.004			
0.61	40.2	0.029	0.61	192.2	0.033	0.61	90.0	0.007			
0.69	51.6	0.036	0.69	216.4	0.033	0.69	105.2	0.007			
0.76	61.1	0.053	0.76	240.1	0.035	0.76	119.5	0.010			
0.84	71.0	0.057	0.84	263.6	0.038	0.84	131.8	0.010			
0.92	78.9	0.063	0.92	286.7	0.043	0.92	144.4	0.013			
0.99	86.3	0.069	0.99	308.0	0.044	0.99	164.4	0.014			
1.07	95.7	0.073	1.07	328.8	0.048	1.07	187.9	0.013			
1.14	104.6	0.081	1.14	348.3	0.046	1.14	210.7	0.016			
1.22	113.7	0.085	1.22	367.5	0.048	1.22	235.5	0.016			
1.30	124.4	0.089	1.30	385.2	0.048	1.30	256.6	0.018			
1.37	134.6	0.092	1.37	402.5	0.049	1.37	284.5	0.023			
1.45	143.4	0.094	1.45	418.2	0.050	1.45	313.3	0.022			
1.53	150.0	0.097	1.53	432.7	0.050	1.53	341.3	0.027			
1.60	155.0	0.098	1.60	446.0	0.049	1.60	370.8	0.028			
1.68	163.9	0.101	1.68	459.2	0.049	1.68	401.4	0.027			
1.75	171.2	0.101	1.75	471.9	0.047	1.75	431.2	0.031			
1.83	179.8	0.103	1.83	483.8	0.045	1.83	460.2	0.030			
1.91	187.8	0.103	1.91	494.8	0.043	1.91	489.7	0.031			
1.98	195.8	0.105	1.98	505.2	0.042	1.98	518.6	0.033			
2.06	203.1	0.105	2.06	515.4	0.040	2.06	546.7	0.033			
2.14	211.1	0.103	2.14	524.6	0.037	2.14	573.2	0.031			
2.21	217.8	0.102	2.21	532.7	0.036	2.21	599.6	0.031			
2.29	224.8	0.099	2.29	540.7	0.035	2.29	623.6	0.029			
2.36	231.9	0.097	2.36	547.5	0.034	2.36	646.7	0.023			
2.44	238.1	0.096	2.44	552.6	0.031	2.44	670.2	0.018			
2.52	244.1	0.094	2.52	557.6	0.030	2.52	690.5	0.011			
2.59	250.4	0.090	2.59	562.0	0.030	2.59	710.3	0.009			

2.67	255.3	0.088	2.67	566.2	0.026	2.67	729.4	0.007			
2.75	259.6	0.084	2.75	570.1	0.023	2.75	746.9	0.006			
2.82	264.1	0.079	2.82	573.8	0.023	2.82	763.6	0.004			
2.90	267.7	0.076	2.90	577.6	0.020	2.90	777.8	0.003			
2.97	270.9	0.074	2.97	581.3	0.016	2.97	792.5	0.003			
3.05	274.1	0.071	3.05	585.3	0.015	3.05	804.8	-0.001			
3.13	277.1	0.067	3.13	588.0	0.011	3.13	816.5	-0.001			
3.20	279.6	0.062	3.20	591.1	0.006	3.20	827.0	-0.004			
3.28	282.6	0.057	3.28	594.5	0.001	3.28	836.0	-0.007			
3.36	285.4	0.053	3.36	597.0	-0.002	3.36	844.7	-0.008			
3.43	287.9	0.048	3.43	600.8	-0.009	3.43	853.4	-0.011			
3.51	290.6	0.042	3.51	603.0	-0.013	3.51	860.6	-0.013			
3.58	293.5	0.036	3.58	605.9	-0.020	3.58	868.0	-0.016			
3.66	296.0	0.031	3.66	608.5	-0.018	3.66	873.6	-0.017			
3.74	298.0	0.028	3.74	610.8	-0.018	3.74	880.2	-0.016			
3.81	299.9	0.022	3.81	612.9	-0.021	3.81	887.2	-0.021			
3.89	301.8	0.018	3.89	615.5	-0.025	3.89	892.8	-0.022			
3.97	303.2	0.016	3.97	616.8	-0.027	3.97	898.2	-0.026			
4.04	305.9	0.015	4.04	619.4	-0.033	4.04	903.4	-0.029			
4.12	307.7	0.009	4.12	621.9	-0.037	4.12	909.3	-0.029			
4.19	308.1	0.005	4.19	624.1	-0.039	4.19	913.5	-0.033			
4.27	310.0	0.001	4.27	626.4	-0.038	4.27	917.6	-0.033			
4.35	311.4	-0.001	4.35	626.8	-0.041	4.35	921.9	-0.035			
4.42	313.1	-0.004	4.38	627.0	-0.039	4.42	925.4	-0.036			
4.50	314.8	-0.006	4.38	626.4	-0.039	4.50	930.3	-0.036			
4.58	315.8	-0.009	4.45	631.8	-0.042	4.58	933.9	-0.039			
4.65	317.6	-0.012	4.53	633.1	-0.042	4.65	937.1	-0.041			
4.73	319.1	-0.014	4.60	633.1	-0.041	4.73	940.9	-0.041			
4.80	320.3	-0.016	4.68	634.1	-0.042	4.80	942.4	-0.040			
4.88	321.3	-0.019	4.76	634.8	-0.043	4.82	942.7	-0.040			
4.96	322.0	-0.020	4.83	636.1	-0.042	4.82	942.3	-0.041			
5.03	322.7	-0.024	4.91	636.3	-0.044	4.82	942.1	-0.042			
5.11	323.6	-0.026	4.99	635.9	-0.043	4.82	942.1	-0.040			
5.18	323.7	-0.029	5.06	636.6	-0.044	4.90	952.3	-0.042			
5.18	323.7	-0.029	5.14	636.1	-0.047	4.98	952.2	-0.042			
5.26	323.3	-0.030	5.21	637.6	-0.047	5.05	953.5	-0.042			
5.33	324.4	-0.030	5.29	637.9	-0.047	5.13	955.3	-0.042			
5.41	325.5	-0.033	5.37	638.6	-0.047	5.20	957.0	-0.042			
5.48	326.0	-0.036	5.44	639.5	-0.046	5.28	957.0	-0.043			
5.56	327.0	-0.037	5.52	638.8	-0.048	5.36	955.6	-0.043			
5.64	328.7	-0.039	5.59	639.8	-0.048	5.43	957.8	-0.042			
5.71	328.8	-0.039	5.67	640.5	-0.046	5.51	959.8	-0.042			
5.79	330.3	-0.043	5.75	641.3	-0.047	5.59	960.9	-0.043			
5.87	330.5	-0.043	5.82	643.3	-0.049	5.66	961.7	-0.045			
5.94	331.2	-0.045	5.90	643.0	-0.049	5.74	962.5	-0.043			
6.02	332.3	-0.044	5.98	643.7	-0.048	5.81	963.0	-0.042			
6.09	333.3	-0.046	6.05	644.8	-0.050	5.89	958.4	-0.039			
6.17	333.8	-0.049	6.13	644.9	-0.049	5.97	959.3	-0.038			
6.25	334.2	-0.051	6.20	646.5	-0.049	6.04	959.9	-0.036			
6.32	335.3	-0.053	6.28	646.2	-0.050	6.12	960.3	-0.034			
6.40	335.6	-0.055	6.36	645.9	-0.050	6.19	961.8	-0.034			
6.48	334.9	-0.054	6.43	646.5	-0.050	6.27	962.6	-0.032			
6.55	335.0	-0.056	6.51	646.2	-0.049	6.35	962.2	-0.028			

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-34S
Project:	Ref #017-318	Sample Number:	29622
Location:	N/A	Depth (m):	29.9 - 33.5
Project No.:	18109666/2000	Lab ID No:	B19-058

Test Condition:	Saturated	Test parameters:	Peak and residual
Visual Description:	CLAYEY SILT, some sand, some gravel, w < PL, red, very stiff.	Soil Structure:	Reconstituted

Remarks:	Area correction not applied to normal and shear stress calculation Unit weight = 2204 kg/m ³ . Sample was scalped over the #4 sieve.
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Initial Sample Dimensions

Test No.	1	2	3			
Shear box geometry	Circle	Circle	Circle			
Diameter (mm)	63.50	63.40	63.48			
Height (mm)	26.52	26.57	26.75			
Area (cm²)	31.67	31.57	31.65			
Volume (cm³)	83.99	83.88	84.66			

Weight Volume Relationships

Sample Type	Bulk Sample					
Dry Mass (g)	168.9	168.2	170.3			
Initial γ_{wet} (kN/m³)	21.70	21.63	21.69			
Final γ_{wet} (kN/m³)	22.97	23.80	23.21			
Initial γ_{dry} (kN/m³)	19.73	19.67	19.73			
Final γ_{dry} (kN/m³)	20.55	21.23	20.86			
Initial water content (%)	10.0	10.0	10.0			
Final water content (%)	11.8	12.1	11.3			

Consolidation Results

Normal Stress (kPa)	1000	1500	2000			
t₉₀ (Taylor Method) (min)	N/A	N/A	N/A			
Calculated t₅₀ (min)	N/A	N/A	N/A			
Change in height ΔH_c (mm)	1.05	1.95	1.45			

Equipment Calibration

Test Number	Machine Number	Normal Load Cell	Shear Load Cell	Vertical LPT
Test -1	Digishear-1	221643	266562	LP-567
Test -2	Digishear-2	728499	689339	LP-567
Test -3	Digishear-3	697437	728498	LP-985

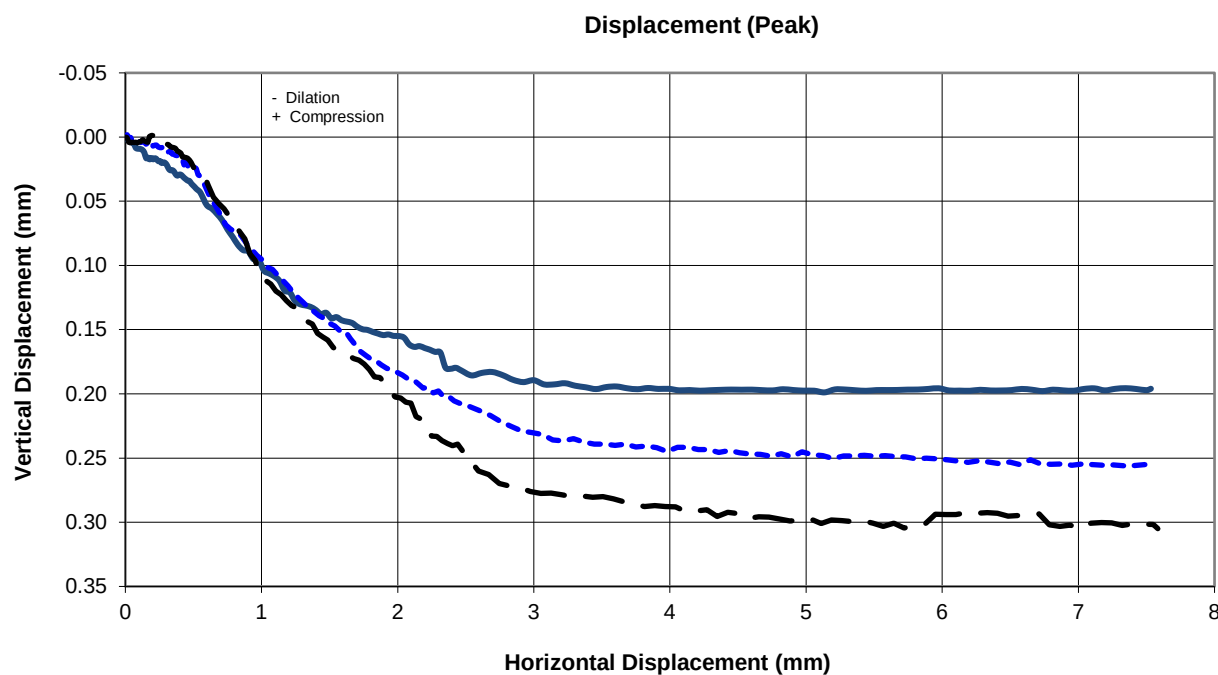
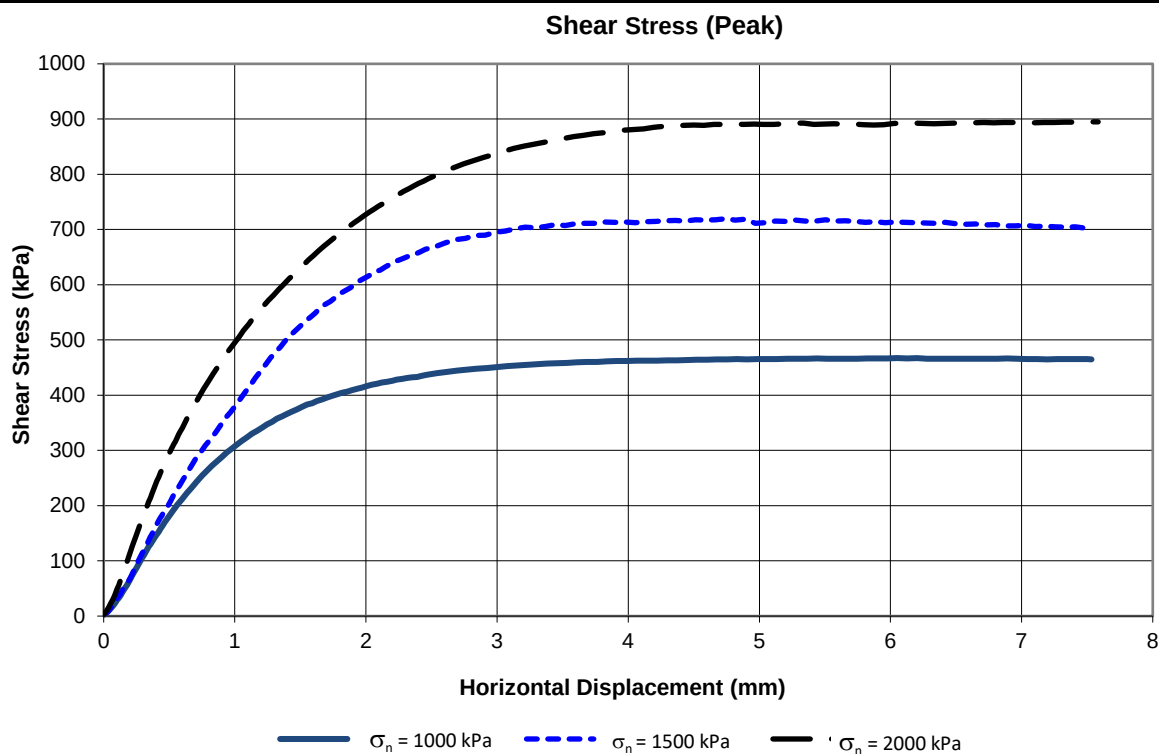
TM	April 11, 2019	DL	April 17, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
Project No.: 18109666/2000

Borehole: 19-34S
Sample Number: 29622
Depth (m): 29.9 - 33.5
Lab ID No: B19-058



TM

April 11, 2019

DL

April 17, 2019

TESTED BY

DATE

CHECKED BY

DATE



GOLDER

Golder Associates Ltd. - Burnaby Laboratory

#300-3811 North Fraser Way

Burnaby, B.C. Canada V5J 5J2

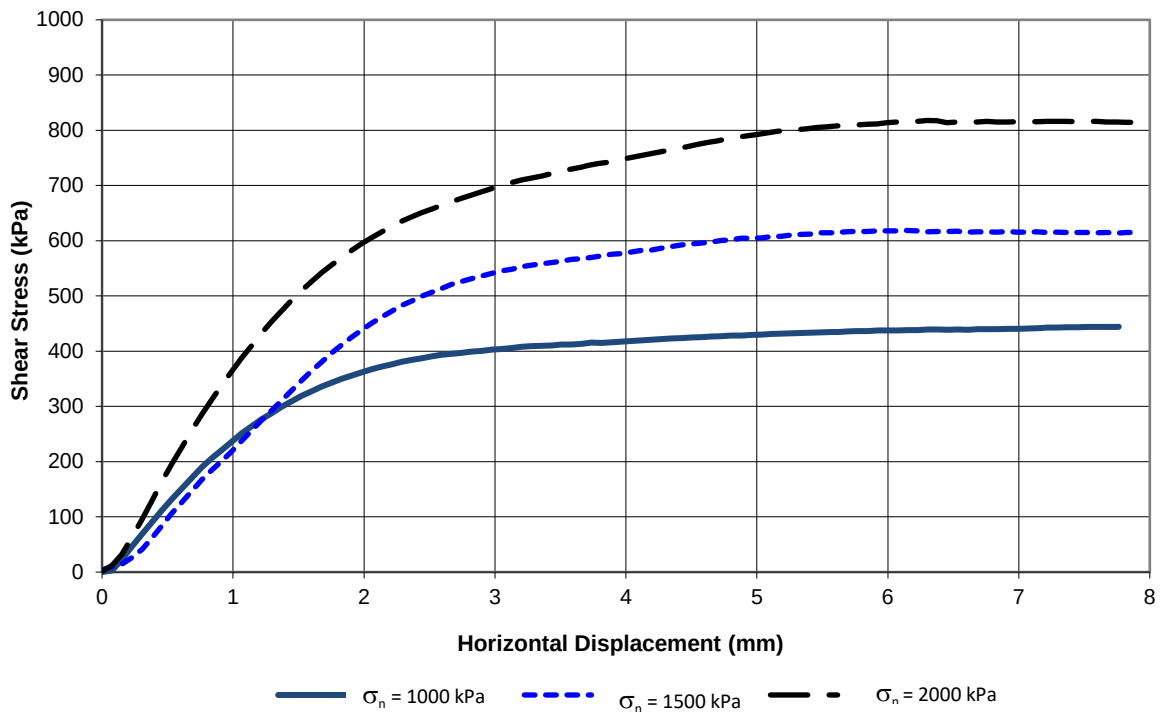
Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
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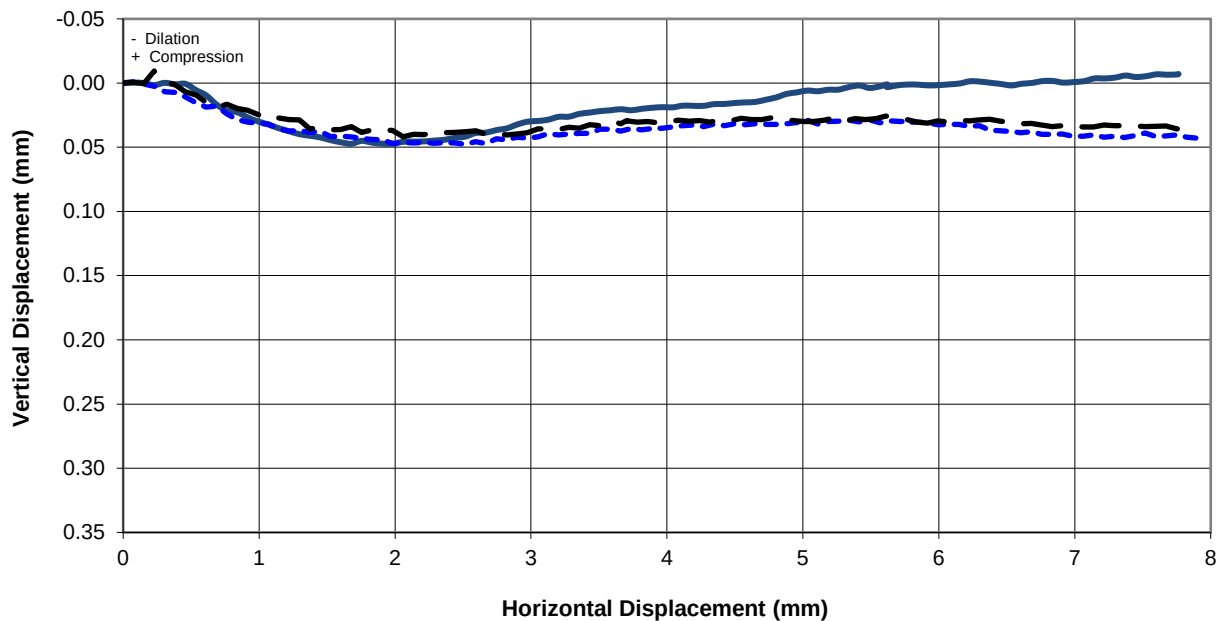
Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
Project No.: 18109666/2000

Borehole: 19-34S
Sample Number: 29622
Depth (m): 29.9 - 33.5
Lab ID No: B19-058

Shear Stress (Residual)



Displacement (Residual)



TM

April 11, 2019

DL

April 17, 2019

TESTED BY

DATE

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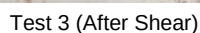
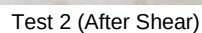
DATE



Burnaby, B.C. Canada V5J 5J2

Reference
ASTM D3080

Lab ID No:	B19-058
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DATE _____

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-34S
Project:	Ref #017-318	Sample Number:	29622
Location:	N/A	Depth (m):	29.9 - 33.5
Project No.:	18109666/2000	Lab ID No:	B19-058

Peak 1			Peak 2			Peak 3					
Normal Stress , kPa	1000		Normal Stress , kPa	1500		Normal Stress , kPa	2000		Normal Stress , kPa		
Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min		

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	2.6	0.000	0.00	3.7	0.000	0.00	2.5	0.000			
0.01	4.5	0.002	0.01	4.4	-0.002	0.01	6.4	0.001			
0.03	6.7	0.003	0.03	6.3	0.001	0.03	11.0	0.004			
0.04	9.5	0.004	0.04	8.9	0.000	0.04	15.8	0.004			
0.05	12.8	0.004	0.05	14.1	0.003	0.05	21.3	0.004			
0.06	16.4	0.005	0.06	17.3	0.003	0.06	27.5	0.004			
0.08	20.2	0.008	0.08	23.2	0.004	0.08	33.8	0.004			
0.09	24.3	0.009	0.09	29.3	0.002	0.09	40.6	0.004			
0.10	28.6	0.009	0.10	31.8	0.003	0.10	48.5	0.004			
0.11	32.7	0.009	0.11	36.3	0.004	0.11	56.3	0.003			
0.13	37.0	0.010	0.13	40.7	0.002	0.13	64.6	0.002			
0.14	42.0	0.012	0.14	46.0	0.004	0.14	73.3	0.003			
0.15	46.6	0.016	0.15	50.7	0.005	0.15	81.9	0.004			
0.17	51.5	0.016	0.17	54.2	0.005	0.17	90.4	0.004			
0.18	56.8	0.017	0.18	58.8	0.005	0.18	98.9	-0.001			
0.19	61.9	0.016	0.19	64.5	0.003	0.19	107.7	-0.001			
0.20	67.4	0.017	0.20	69.3	0.007	0.20	116.4	-0.001			
0.22	73.2	0.016	0.22	75.4	0.006	0.22	125.0	-0.001			
0.23	78.2	0.017	0.23	81.8	0.006	0.23	133.4	-0.001			
0.24	83.7	0.019	0.24	89.2	0.008	0.24	142.3	0.001			
0.25	89.2	0.019	0.25	94.9	0.008	0.25	150.7	0.000			
0.27	94.5	0.020	0.27	101.1	0.008	0.27	158.9	0.000			
0.28	99.8	0.020	0.28	107.3	0.007	0.28	167.2	0.003			
0.29	104.9	0.020	0.29	112.8	0.009	0.29	175.1	0.002			
0.31	110.2	0.022	0.31	118.8	0.012	0.31	183.1	0.006			
0.32	115.4	0.025	0.32	124.6	0.012	0.32	190.7	0.006			
0.33	120.6	0.026	0.33	130.6	0.011	0.33	198.8	0.007			
0.34	125.6	0.026	0.34	136.9	0.013	0.34	206.6	0.008			
0.36	130.0	0.027	0.36	142.9	0.014	0.36	214.2	0.008			
0.37	134.9	0.029	0.37	149.0	0.014	0.37	222.3	0.009			
0.38	139.6	0.030	0.38	156.1	0.015	0.38	230.2	0.011			
0.39	144.0	0.029	0.39	161.0	0.016	0.39	237.8	0.012			
0.41	148.5	0.029	0.41	166.8	0.018	0.41	244.9	0.012			
0.42	153.1	0.030	0.42	173.2	0.017	0.42	252.3	0.015			
0.43	157.9	0.032	0.43	178.3	0.022	0.43	259.4	0.016			

0.45	162.4	0.033	0.44	182.6	0.020	0.45	266.2	0.016			
0.46	166.7	0.034	0.46	188.6	0.022	0.46	273.1	0.017			
0.47	171.2	0.034	0.47	192.6	0.026	0.47	279.5	0.018			
0.48	176.0	0.036	0.48	197.0	0.025	0.48	285.9	0.020			
0.50	180.1	0.037	0.50	202.5	0.023	0.50	292.4	0.023			
0.51	184.4	0.039	0.51	207.7	0.024	0.51	298.8	0.025			
0.52	188.5	0.040	0.52	213.3	0.024	0.52	305.0	0.027			
0.53	192.6	0.041	0.53	219.1	0.029	0.53	310.9	0.028			
0.55	196.8	0.043	0.55	224.2	0.030	0.55	316.7	0.028			
0.56	200.9	0.045	0.58	238.6	0.038	0.56	322.9	0.029			
0.60	212.2	0.053	0.62	254.5	0.047	0.57	329.0	0.029			
0.64	223.0	0.056	0.66	269.4	0.053	0.58	334.5	0.031			
0.67	233.6	0.060	0.70	284.2	0.061	0.60	340.3	0.035			
0.71	244.1	0.065	0.74	296.0	0.068	0.61	346.1	0.038			
0.75	254.1	0.072	0.78	308.9	0.072	0.65	363.9	0.047			
0.79	263.5	0.078	0.81	320.0	0.073	0.69	380.5	0.052			
0.83	272.4	0.084	0.85	332.2	0.077	0.72	396.4	0.056			
0.86	280.2	0.088	0.89	344.9	0.083	0.76	411.4	0.062			
0.90	288.4	0.089	0.93	358.8	0.087	0.80	425.8	0.068			
0.94	296.4	0.095	0.97	369.1	0.092	0.84	440.1	0.074			
0.98	303.6	0.095	1.00	380.5	0.095	0.88	454.1	0.079			
1.02	310.8	0.104	1.04	393.7	0.101	0.92	468.0	0.091			
1.06	317.4	0.106	1.08	405.5	0.103	0.95	480.5	0.096			
1.09	323.7	0.108	1.12	418.1	0.108	0.99	492.7	0.107			
1.13	330.2	0.112	1.16	431.6	0.112	1.03	505.1	0.112			
1.17	335.6	0.120	1.19	442.8	0.116	1.07	517.5	0.114			
1.21	341.4	0.121	1.23	455.0	0.121	1.11	528.7	0.120			
1.25	347.0	0.128	1.27	467.5	0.125	1.14	540.7	0.123			
1.28	352.0	0.130	1.31	477.7	0.129	1.18	551.5	0.127			
1.32	357.3	0.131	1.35	487.6	0.133	1.22	562.0	0.131			
1.36	361.7	0.132	1.39	498.3	0.136	1.26	572.0	0.133			
1.40	366.3	0.135	1.42	508.6	0.139	1.30	581.5	0.138			
1.44	370.4	0.138	1.46	516.8	0.141	1.33	591.5	0.144			
1.47	374.6	0.137	1.50	525.4	0.145	1.37	600.3	0.146			
1.51	378.9	0.141	1.54	534.2	0.147	1.41	610.1	0.153			
1.55	382.8	0.140	1.58	541.6	0.151	1.45	619.0	0.156			
1.59	385.6	0.143	1.61	549.0	0.151	1.49	627.6	0.158			
1.63	389.4	0.144	1.65	558.5	0.157	1.53	636.3	0.164			
1.67	392.2	0.145	1.69	564.8	0.162	1.56	644.9	0.167			
1.70	395.8	0.148	1.73	570.0	0.167	1.60	653.2	0.168			
1.74	398.7	0.150	1.77	577.3	0.170	1.64	661.7	0.170			
1.78	401.5	0.150	1.80	584.2	0.173	1.68	669.6	0.173			
1.82	404.3	0.152	1.84	589.7	0.175	1.72	677.1	0.174			
1.86	406.5	0.153	1.88	594.9	0.178	1.75	684.3	0.177			
1.89	409.1	0.154	1.92	602.4	0.180	1.79	691.4	0.181			
1.93	411.6	0.154	1.96	607.8	0.182	1.83	698.5	0.187			
1.97	413.7	0.155	2.00	612.6	0.183	1.87	705.0	0.187			
2.01	416.8	0.155	2.03	617.6	0.185	1.91	712.0	0.192			
2.05	418.9	0.156	2.07	623.8	0.188	1.95	718.4	0.198			
2.08	420.9	0.162	2.11	626.6	0.189	1.98	724.6	0.202			
2.12	422.9	0.163	2.15	632.3	0.192	2.02	730.8	0.203			
2.16	424.3	0.163	2.19	637.5	0.196	2.06	736.9	0.206			
2.20	426.0	0.164	2.22	641.9	0.195	2.10	742.4	0.207			

2.24	428.1	0.166	2.26	645.5	0.199	2.14	747.6	0.218			
2.28	429.7	0.167	2.30	648.9	0.198	2.17	753.5	0.220			
2.31	431.5	0.168	2.34	653.5	0.203	2.21	758.5	0.229			
2.35	432.6	0.180	2.38	655.4	0.202	2.25	763.7	0.233			
2.39	433.1	0.180	2.42	659.3	0.205	2.29	769.3	0.233			
2.43	435.2	0.180	2.45	664.3	0.207	2.33	774.1	0.236			
2.47	436.7	0.182	2.53	669.2	0.210	2.36	778.9	0.239			
2.54	439.8	0.186	2.61	675.9	0.213	2.40	783.7	0.240			
2.62	442.1	0.184	2.68	681.4	0.217	2.44	787.5	0.239			
2.69	444.3	0.183	2.76	683.9	0.222	2.48	792.1	0.245			
2.77	446.3	0.185	2.83	688.9	0.226	2.52	796.3	0.250			
2.85	447.9	0.189	2.91	690.0	0.229	2.59	805.1	0.260			
2.92	449.0	0.191	2.99	694.7	0.230	2.67	812.2	0.263			
3.00	451.0	0.189	3.06	697.5	0.232	2.75	818.9	0.270			
3.08	452.7	0.193	3.14	701.2	0.236	2.82	824.7	0.272			
3.15	453.7	0.193	3.22	704.3	0.237	2.90	830.9	0.273			
3.23	454.9	0.192	3.29	703.3	0.235	2.97	836.0	0.276			
3.30	456.4	0.194	3.37	705.4	0.238	3.05	841.9	0.278			
3.38	457.2	0.195	3.44	708.6	0.239	3.13	846.8	0.277			
3.46	457.8	0.196	3.52	707.1	0.239	3.20	851.1	0.279			
3.53	458.7	0.195	3.60	710.4	0.240	3.28	854.3	0.280			
3.61	459.5	0.194	3.67	710.9	0.239	3.36	857.8	0.279			
3.69	460.0	0.196	3.75	711.4	0.241	3.43	861.4	0.281			
3.76	460.5	0.196	3.83	713.5	0.241	3.51	864.8	0.280			
3.84	461.1	0.195	3.90	712.9	0.242	3.58	868.0	0.282			
3.92	462.1	0.196	3.98	713.6	0.245	3.66	870.8	0.284			
3.99	461.9	0.196	4.05	712.2	0.242	3.74	873.6	0.286			
4.07	462.3	0.197	4.13	713.8	0.242	3.81	875.4	0.288			
4.14	462.3	0.197	4.21	714.4	0.243	3.89	877.8	0.287			
4.22	462.5	0.198	4.28	715.6	0.243	3.97	880.0	0.288			
4.30	463.1	0.197	4.36	716.6	0.246	4.04	881.1	0.288			
4.37	462.9	0.197	4.44	715.2	0.244	4.12	882.3	0.292			
4.45	463.6	0.197	4.51	717.6	0.246	4.19	885.0	0.291			
4.53	464.4	0.197	4.59	717.0	0.247	4.27	886.6	0.290			
4.60	464.2	0.197	4.66	717.7	0.247	4.35	887.6	0.295			
4.68	464.9	0.197	4.74	719.4	0.249	4.42	888.4	0.292			
4.75	464.9	0.197	4.82	717.1	0.247	4.50	888.9	0.293			
4.83	465.4	0.196	4.89	718.8	0.249	4.58	888.9	0.297			
4.91	465.1	0.197	4.97	711.3	0.245	4.65	890.3	0.296			
4.98	465.3	0.198	5.05	712.6	0.247	4.73	890.3	0.296			
5.06	465.6	0.198	5.12	715.1	0.248	4.80	891.0	0.298			
5.14	465.6	0.199	5.20	714.6	0.250	4.88	890.4	0.299			
5.21	466.1	0.197	5.27	717.3	0.248	4.96	891.0	0.298			
5.29	466.0	0.197	5.35	715.5	0.248	5.03	890.2	0.298			
5.36	465.8	0.197	5.43	715.2	0.248	5.11	890.4	0.301			
5.44	466.3	0.198	5.50	717.4	0.249	5.19	891.7	0.298			
5.52	465.9	0.197	5.58	715.4	0.248	5.26	892.5	0.299			
5.59	466.0	0.197	5.66	716.1	0.249	5.34	892.6	0.300			
5.67	466.1	0.197	5.73	714.8	0.249	5.41	890.6	0.299			
5.75	466.0	0.197	5.81	712.8	0.251	5.49	890.9	0.301			
5.82	466.8	0.197	5.88	714.0	0.250	5.57	891.5	0.303			
5.90	466.6	0.196	5.96	712.4	0.251	5.64	890.8	0.301			
5.97	466.7	0.196	6.04	713.4	0.251	5.72	890.9	0.305			

Direct Shear Testing of Soils Under Consolidated Drained Conditions							Reference ASTM D3080				
Client:		Telkwa Coal Ltd.			Borehole:		19-34S				
Project:		Ref #017-318			Sample Number:		29622				
Location:		N/A			Depth (m):		29.9 - 33.5				
Project No.:		18109666/2000			Lab ID No:		B19-058				
Residual 1			Residual 2			Residual 3					
Normal Stress , kPa		1000	Normal Stress , kPa		1500	Normal Stress , kPa		2000	Normal Stress , kPa		
Disp Rate, mm/min		0.005	Disp Rate, mm/min		0.005	Disp Rate, mm/min		0.005	Disp Rate, mm/min		
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	0.1	0.000	0.00	4.1	0.000	0.00	1.3	0.000			
0.08	3.0	0.000	0.08	9.9	-0.001	0.08	12.0	-0.001			
0.15	23.1	0.000	0.15	14.2	0.001	0.15	32.3	0.000			
0.23	46.9	0.002	0.23	26.3	0.003	0.23	63.9	-0.009			
0.31	68.7	0.000	0.31	40.8	0.007	0.30	95.4	-0.001			
0.38	90.6	0.001	0.38	61.7	0.007	0.38	129.2	0.001			
0.46	112.0	0.001	0.46	83.9	0.011	0.46	163.7	0.007			
0.53	132.0	0.005	0.53	106.5	0.015	0.53	195.7	0.009			
0.61	151.6	0.010	0.61	127.1	0.019	0.61	226.8	0.015			
0.69	171.1	0.017	0.69	147.2	0.018	0.69	257.1	0.019			
0.76	189.8	0.021	0.76	167.1	0.024	0.76	285.6	0.016			
0.84	206.0	0.023	0.84	184.8	0.028	0.84	312.5	0.020			
0.92	221.3	0.027	0.92	201.5	0.030	0.92	339.4	0.021			
0.99	236.5	0.030	0.99	219.2	0.031	0.99	364.1	0.025			
1.07	251.2	0.032	1.07	238.4	0.032	1.07	388.3	0.028			
1.14	264.5	0.035	1.14	256.9	0.036	1.14	410.4	0.027			
1.22	276.9	0.037	1.22	275.5	0.037	1.22	433.1	0.028			
1.30	288.3	0.040	1.30	293.4	0.037	1.30	454.2	0.029			
1.37	299.4	0.041	1.37	311.3	0.039	1.37	473.6	0.036			
1.45	309.3	0.042	1.45	329.0	0.038	1.45	492.4	0.035			
1.53	319.5	0.044	1.53	347.4	0.042	1.53	510.1	0.036			
1.60	327.7	0.046	1.60	364.3	0.041	1.60	526.4	0.036			
1.68	335.9	0.047	1.68	380.8	0.042	1.68	542.3	0.034			
1.75	343.1	0.045	1.75	396.8	0.043	1.75	556.6	0.038			
1.83	349.9	0.046	1.83	411.4	0.044	1.83	569.4	0.036			
1.91	355.9	0.047	1.91	425.4	0.044	1.91	582.4	0.036			
1.98	361.8	0.047	1.98	438.0	0.047	1.98	594.6	0.037			
2.06	367.4	0.046	2.06	451.2	0.046	2.06	605.6	0.042			
2.14	372.2	0.046	2.14	461.9	0.047	2.14	616.0	0.040			
2.21	376.4	0.045	2.21	472.1	0.046	2.21	625.8	0.040			
2.29	380.6	0.045	2.29	482.8	0.047	2.29	635.0	0.038			
2.36	384.3	0.044	2.36	491.1	0.046	2.36	643.6	0.039			
2.44	387.2	0.043	2.44	499.6	0.047	2.44	650.6	0.038			
2.52	390.4	0.042	2.52	506.8	0.048	2.52	657.5	0.038			
2.59	393.2	0.039	2.59	513.8	0.046	2.59	664.1	0.037			

2.67	395.3	0.039	2.67	520.8	0.047	2.67	670.4	0.040			
2.75	397.3	0.037	2.75	526.5	0.044	2.75	677.1	0.040			
2.82	399.5	0.035	2.82	531.8	0.044	2.82	683.0	0.040			
2.90	400.6	0.032	2.90	536.2	0.042	2.90	688.8	0.040			
2.97	403.0	0.030	2.97	541.0	0.043	2.97	694.6	0.039			
3.05	404.2	0.030	3.05	545.1	0.042	3.05	700.0	0.036			
3.13	405.7	0.029	3.13	548.1	0.040	3.13	705.2	0.036			
3.20	407.8	0.026	3.20	552.7	0.040	3.20	709.9	0.036			
3.28	409.0	0.026	3.28	555.6	0.040	3.28	713.7	0.035			
3.36	409.5	0.024	3.36	558.3	0.039	3.36	717.2	0.035			
3.43	410.2	0.023	3.43	560.7	0.039	3.43	721.9	0.032			
3.51	412.2	0.022	3.51	562.9	0.036	3.51	726.6	0.033			
3.58	411.9	0.021	3.58	566.3	0.036	3.58	729.8	0.029			
3.66	413.2	0.020	3.66	567.5	0.037	3.66	733.4	0.032			
3.74	415.4	0.021	3.74	569.9	0.036	3.71	735.9	0.029			
3.81	415.1	0.020	3.81	572.5	0.036	3.71	735.9	0.029			
3.89	416.0	0.019	3.89	575.5	0.035	3.78	739.3	0.030			
3.97	417.2	0.019	3.97	576.7	0.035	3.86	742.2	0.030			
4.04	418.7	0.019	4.04	579.5	0.034	3.93	745.5	0.031			
4.12	419.7	0.018	4.12	582.5	0.033	4.01	749.5	0.030			
4.19	420.8	0.018	4.19	583.3	0.033	4.09	752.8	0.029			
4.27	422.1	0.018	4.27	586.4	0.034	4.16	756.5	0.030			
4.35	423.1	0.016	4.35	589.3	0.032	4.24	760.1	0.029			
4.42	423.5	0.016	4.42	592.2	0.033	4.32	763.6	0.030			
4.50	425.0	0.016	4.50	594.2	0.032	4.39	767.1	0.029			
4.58	425.7	0.015	4.58	596.0	0.033	4.47	770.5	0.029			
4.65	426.4	0.015	4.65	597.9	0.032	4.54	774.5	0.027			
4.73	426.9	0.013	4.73	600.3	0.032	4.62	777.6	0.028			
4.80	428.2	0.011	4.80	601.5	0.032	4.70	781.0	0.028			
4.88	428.2	0.008	4.88	604.4	0.032	4.77	784.6	0.027			
4.96	429.3	0.007	4.96	604.5	0.031	4.85	787.3	0.028			
5.03	430.3	0.006	5.03	605.2	0.029	4.93	790.1	0.029			
5.11	431.0	0.006	5.11	607.6	0.032	5.00	792.6	0.030			
5.19	432.0	0.005	5.19	608.3	0.030	5.08	795.3	0.030			
5.26	432.4	0.005	5.26	610.3	0.030	5.15	798.0	0.029			
5.34	432.8	0.003	5.34	611.5	0.029	5.23	799.8	0.027			
5.41	433.4	0.002	5.41	612.4	0.030	5.31	801.0	0.029			
5.49	433.9	0.004	5.49	614.7	0.029	5.38	803.0	0.028			
5.57	434.7	0.003	5.57	614.6	0.031	5.46	805.0	0.029			
5.62	434.9	0.001	5.64	615.4	0.029	5.54	806.5	0.028			
5.62	434.4	0.003	5.72	616.5	0.030	5.61	808.0	0.026			
5.70	435.8	0.002	5.76	616.5	0.030	5.69	808.8	0.027			
5.77	436.4	0.001	5.76	616.5	0.030	5.77	809.9	0.028			
5.85	436.5	0.001	5.84	616.9	0.030	5.84	810.7	0.030			
5.92	437.5	0.002	5.92	617.7	0.031	5.92	811.4	0.031			
6.00	437.3	0.002	5.99	618.0	0.032	5.99	813.6	0.030			
6.08	437.7	0.001	6.07	617.9	0.032	6.07	814.8	0.030			
6.15	437.9	0.000	6.15	618.6	0.032	6.15	815.9	0.029			
6.23	438.2	-0.001	6.22	617.9	0.034	6.22	816.4	0.029			
6.31	439.2	-0.001	6.30	616.3	0.033	6.30	817.8	0.029			
6.38	439.3	0.000	6.37	616.9	0.037	6.38	817.4	0.028			
6.46	438.8	0.001	6.45	617.0	0.037	6.45	813.8	0.030			
6.53	439.4	0.002	6.53	617.4	0.038	6.53	814.7	0.031			

6.61	438.7	0.001	6.60	615.7	0.039	6.60	814.8	0.032			
6.69	439.9	0.000	6.68	616.1	0.038	6.68	815.0	0.031			
6.76	439.9	-0.002	6.76	616.1	0.040	6.76	816.0	0.033			
6.84	439.9	-0.002	6.83	615.4	0.040	6.83	815.0	0.034			
6.92	440.4	0.000	6.91	616.6	0.040	6.91	815.3	0.033			
6.99	440.3	-0.001	6.98	615.7	0.042	6.99	815.3	0.034			
7.07	440.8	-0.001	7.06	615.3	0.042	7.06	815.4	0.034			
7.14	441.9	-0.004	7.14	616.0	0.040	7.14	815.5	0.034			
7.22	442.7	-0.004	7.21	615.1	0.042	7.21	816.1	0.033			
7.30	443.0	-0.004	7.29	615.3	0.041	7.29	816.2	0.033			
7.37	443.1	-0.006	7.37	615.1	0.043	7.37	816.1	0.033			
7.45	443.2	-0.005	7.44	614.8	0.041	7.44	815.8	0.033			
7.53	443.8	-0.005	7.52	614.9	0.039	7.52	816.3	0.034			
7.60	443.8	-0.007	7.59	614.3	0.042	7.60	816.0	0.034			
7.68	443.8	-0.007	7.67	615.0	0.041	7.67	815.2	0.034			
7.75	444.0	-0.007	7.75	613.8	0.040	7.75	815.1	0.036			
7.76	444.3	-0.007	7.82	615.1	0.042	7.82	814.4	0.035			
			7.90	614.8	0.043	7.86	814.2	0.035			
			7.91	614.9	0.044						

TM	April 11, 2019	DL	April 17, 2019
TESTED BY	DATE	CHECKED BY	DATE

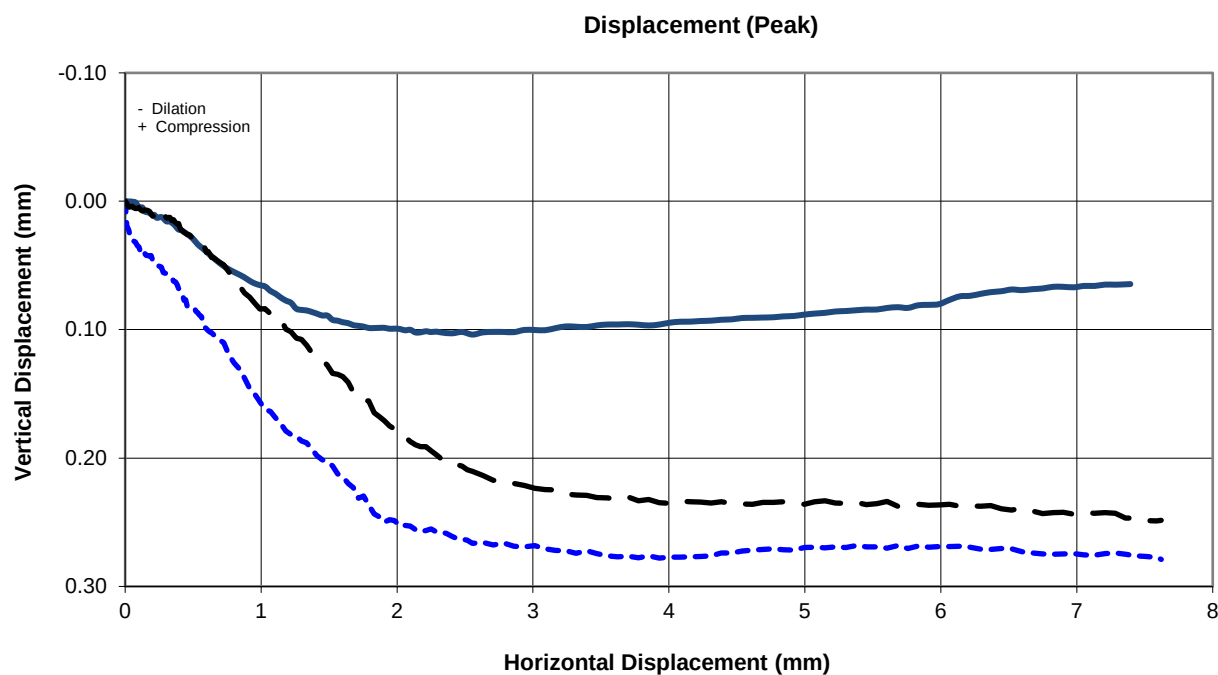
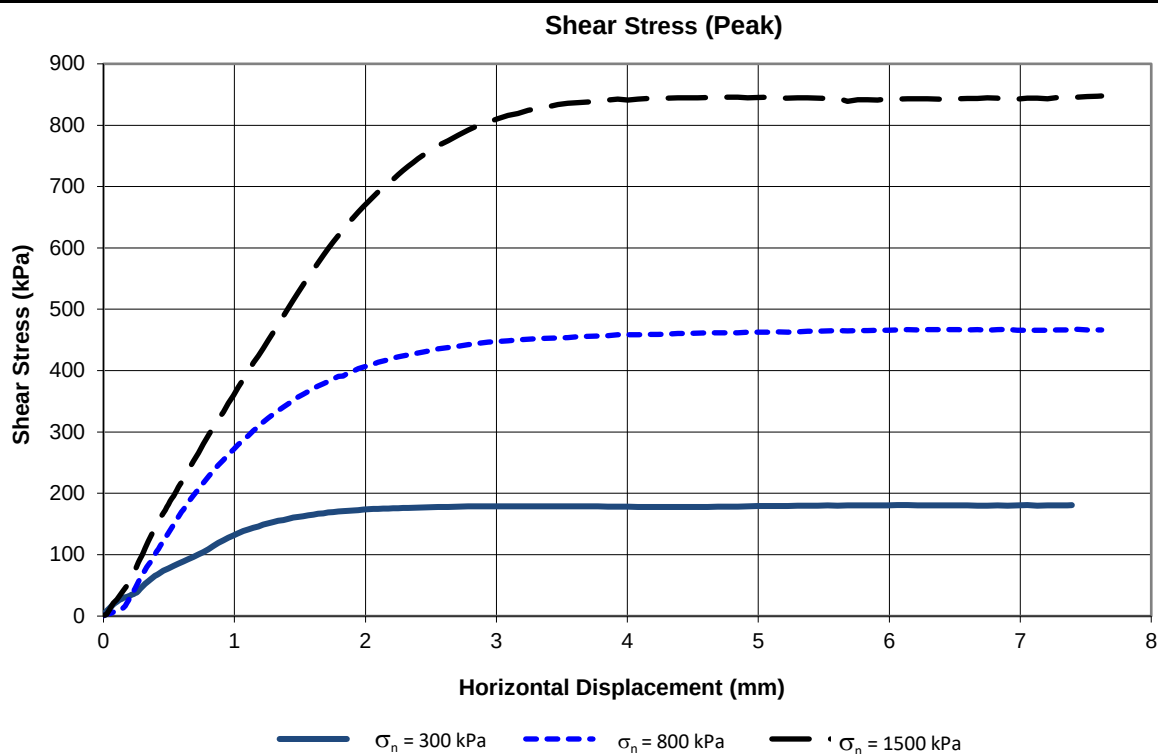
Direct Shear Testing of Soils Under Consolidated Drained Conditions					Reference ASTM D3080	
Client:	Telkwa Coal Ltd.			Borehole:	19-35S	
Project:	Ref #017-318			Sample Number:	29624	
Location:	N/A			Depth (m):	5.5 - 6.1	
Project No.:	18109666/2000			Lab ID No:	B19-058	
Test Condition:	Saturated			Test parameters:	Peak and residual	
Visual Description:	SILTY CLAY, some sand, some gravel, w > PL, red, very stiff.			Soil Structure:	Reconstituted	
Remarks:	Area correction not applied to normal and shear stress calculation Unit weight = 2257 kg/m ³ . Sample was scalped over the #4 sieve.					
Initial Sample Dimensions						
Test No.	1	2	3			
Shear box geometry	Circle	Circle	Circle			
Diameter (mm)	63.48	63.50	63.40			
Height (mm)	26.75	26.52	26.57			
Area (cm²)	31.65	31.67	31.57			
Volume (cm³)	84.66	83.99	83.88			
Weight Volume Relationships						
Sample Type	Bulk Sample					
Dry Mass (g)	170.9	170.3	169.8			
Initial γ_{wet} (kN/m³)	22.13	22.24	22.19			
Final γ_{wet} (kN/m³)	22.97	23.46	23.91			
Initial γ_{dry} (kN/m³)	19.80	19.90	19.85			
Final γ_{dry} (kN/m³)	20.34	21.06	21.57			
Initial water content (%)	11.8	11.8	11.8			
Final water content (%)	12.9	11.4	10.8			
Consolidation Results						
Normal Stress (kPa)	300	800	1500			
t₉₀ (Taylor Method) (min)	N/A	N/A	N/A			
Calculated t₅₀ (min)	N/A	N/A	N/A			
Change in height ΔH_c (mm)	0.72	1.46	2.11			
Equipment Calibration						
Test Number	Machine Number	Normal Load Cell	Shear Load Cell	Vertical LPT		
Test -1	Digishear-1	720086	219231	LP-1138		
Test -2	Digishear-2	221643	266562	LP-567		
Test -3	Digishear-3	728499	689339	LP-567		
TM	April 7, 2019		DL		April 17, 2019	
TESTED BY	DATE		CHECKED BY		DATE	

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
Project No.: 18109666/2000

Borehole: 19-35S
Sample Number: 29624
Depth (m): 5.5 - 6.1
Lab ID No: B19-058



TM

April 7, 2019

DL

April 17, 2019

TESTED BY

DATE

CHECKED BY

DATE



GOLDER

Golder Associates Ltd. - Burnaby Laboratory

#300-3811 North Fraser Way

Burnaby, B.C. Canada V5J 5J2

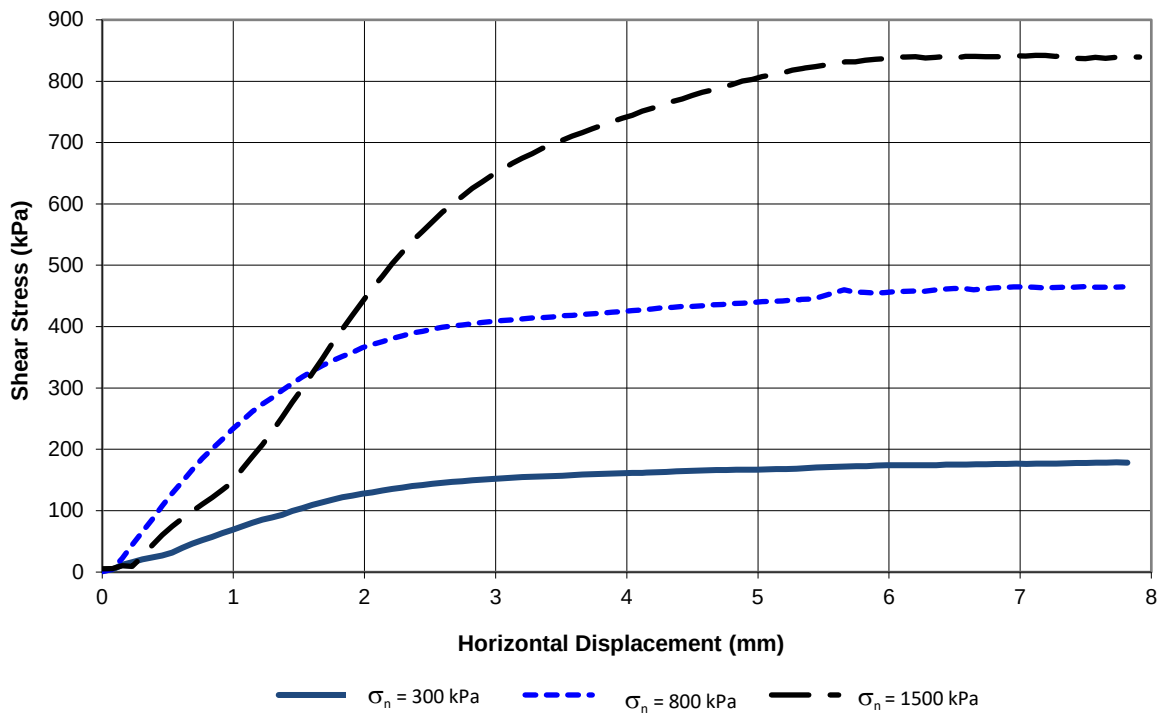
Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

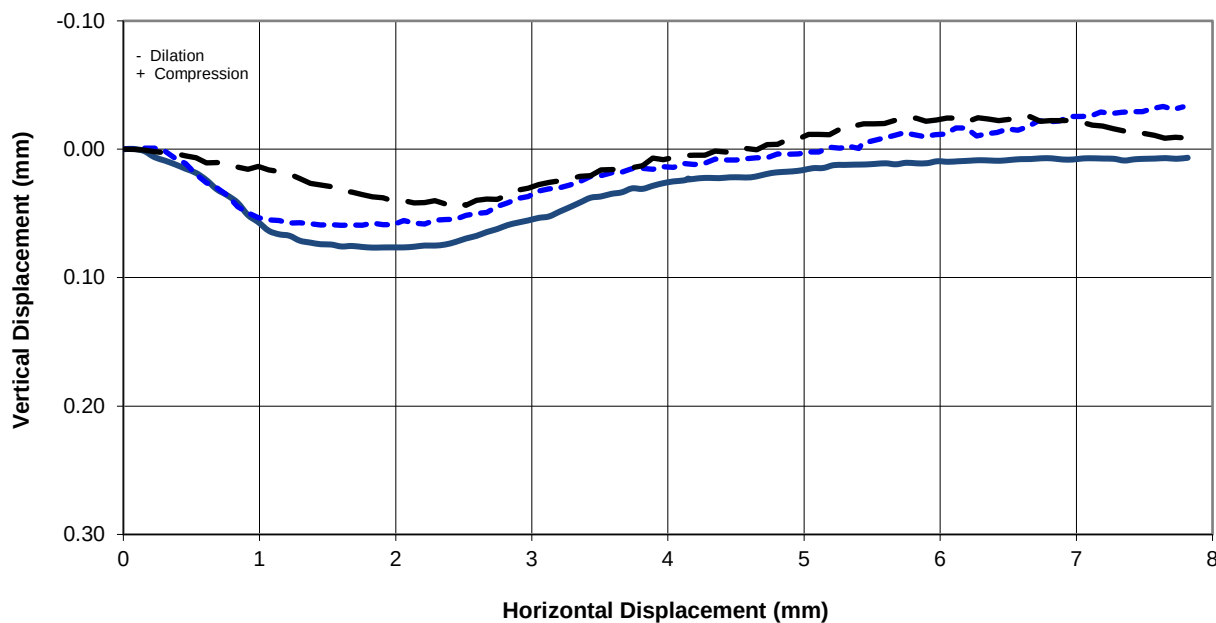
Client: Telkwa Coal Ltd.
Project: Ref #017-318
Location: N/A
Project No.: 18109666/2000

Borehole: 19-35S
Sample Number: 29624
Depth (m): 5.5 - 6.1
Lab ID No: B19-058

Shear Stress (Residual)



Displacement (Residual)



TM

April 7, 2019

DL

April 17, 2019

TESTED BY

DATE

CHECKED BY

DATE



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Golder Associates Ltd. - Burnaby Laboratory

#300-3811 North Fraser Way

Burnaby, B.C. Canada V5J 5J2

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D3080

Client: Telkwa Coal Ltd.

Project: Ref #017-318

Location: N/A

Project No.: 18109666/2000

Borehole: 19-35S

Sample Number: 29624

Depth (m): 5.5 - 6.1

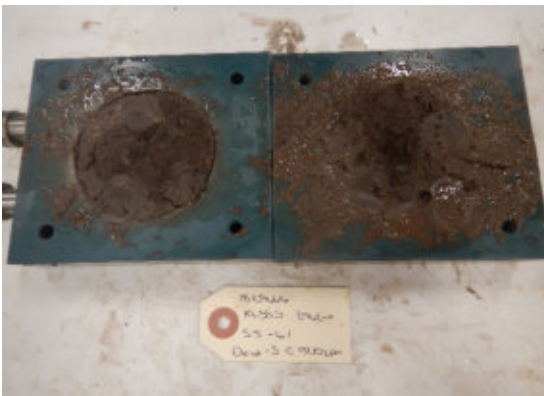
Lab ID No: B19-058



Test 1 (After Shear)



Test 2 (After Shear)



Test 3 (After Shear)

Remarks:

TM	April 7, 2019	DL	April 17, 2019
TESTED BY	DATE	CHECKED BY	DATE

TM

April 7, 2019

DL

April 17, 2019

TESTED BY

DATE

CHECKED BY

DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions
Reference
ASTM D3080

Client:	Telkwa Coal Ltd.	Borehole:	19-35S
Project:	Ref #017-318	Sample Number:	29624
Location:	N/A	Depth (m):	5.5 - 6.1
Project No.:	18109666/2000	Lab ID No:	B19-058

Peak 1			Peak 2			Peak 3					
Normal Stress , kPa	300		Normal Stress , kPa	800		Normal Stress , kPa	1500		Normal Stress , kPa		
Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min		

Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	3.7	0.000	0.00	0.4	0.000	0.00	1.7	0.000			
0.01	5.6	0.000	0.01	1.8	0.019	0.01	1.6	0.002			
0.03	8.4	0.001	0.03	3.1	0.022	0.03	2.9	0.005			
0.04	11.3	0.000	0.04	4.0	0.028	0.04	8.1	0.004			
0.05	14.2	0.000	0.05	4.2	0.031	0.05	12.3	0.004			
0.06	16.8	0.000	0.06	5.2	0.031	0.06	16.9	0.005			
0.08	19.2	0.001	0.08	6.9	0.032	0.08	21.1	0.006			
0.09	21.4	0.003	0.09	8.3	0.034	0.09	24.1	0.006			
0.10	23.4	0.004	0.10	9.3	0.036	0.10	26.9	0.005			
0.11	25.3	0.005	0.11	10.9	0.040	0.11	30.8	0.007			
0.13	26.8	0.005	0.13	10.8	0.038	0.13	34.4	0.008			
0.14	28.2	0.007	0.14	11.6	0.040	0.14	37.9	0.007			
0.15	29.4	0.008	0.15	13.5	0.042	0.15	41.7	0.007			
0.17	30.4	0.009	0.17	16.8	0.042	0.17	45.7	0.007			
0.18	31.3	0.009	0.18	21.2	0.043	0.18	49.6	0.008			
0.19	32.0	0.010	0.19	25.5	0.042	0.19	54.4	0.010			
0.20	33.4	0.011	0.20	30.6	0.046	0.20	58.7	0.012			
0.22	34.7	0.011	0.22	35.5	0.049	0.22	63.7	0.011			
0.23	36.0	0.013	0.23	40.4	0.049	0.23	69.3	0.010			
0.24	37.4	0.013	0.24	45.4	0.050	0.24	75.0	0.011			
0.25	38.7	0.012	0.25	50.5	0.051	0.25	81.3	0.014			
0.27	41.2	0.012	0.27	55.8	0.051	0.27	87.4	0.012			
0.28	44.3	0.013	0.28	60.9	0.055	0.28	92.6	0.013			
0.29	47.2	0.015	0.29	66.0	0.056	0.29	98.4	0.011			
0.31	50.0	0.016	0.30	70.6	0.056	0.31	104.0	0.013			
0.32	52.6	0.016	0.32	75.1	0.057	0.32	110.6	0.013			
0.33	54.9	0.016	0.33	79.5	0.058	0.33	116.1	0.013			
0.34	56.9	0.017	0.34	83.6	0.059	0.34	121.8	0.015			
0.36	59.1	0.018	0.36	87.8	0.062	0.36	128.1	0.014			
0.37	61.2	0.019	0.37	92.1	0.063	0.37	133.3	0.016			
0.38	63.5	0.021	0.38	96.5	0.065	0.38	138.4	0.018			
0.39	65.5	0.022	0.39	100.8	0.068	0.39	143.1	0.017			
0.41	67.5	0.022	0.41	105.2	0.069	0.41	148.0	0.022			
0.42	68.9	0.023	0.42	109.6	0.072	0.42	153.1	0.023			
0.46	73.9	0.026	0.43	114.1	0.077	0.43	157.9	0.024			

0.50	77.5	0.029	0.44	118.2	0.077	0.44	163.7	0.025			
0.53	81.6	0.034	0.46	122.5	0.082	0.46	167.7	0.026			
0.57	85.3	0.037	0.47	127.0	0.082	0.47	172.4	0.026			
0.61	89.2	0.041	0.48	131.3	0.082	0.48	177.6	0.027			
0.65	92.6	0.044	0.50	135.7	0.082	0.50	181.9	0.030			
0.69	96.6	0.047	0.51	139.8	0.083	0.51	187.0	0.030			
0.72	100.8	0.050	0.52	144.1	0.086	0.52	191.3	0.031			
0.76	104.3	0.053	0.53	148.3	0.087	0.53	195.7	0.033			
0.80	109.0	0.055	0.55	152.7	0.089	0.55	200.1	0.034			
0.84	114.1	0.057	0.56	157.2	0.090	0.56	205.1	0.036			
0.88	119.2	0.059	0.57	161.8	0.094	0.57	210.4	0.036			
0.92	123.6	0.062	0.58	166.0	0.098	0.58	214.5	0.036			
0.95	127.8	0.064	0.60	170.0	0.099	0.60	219.0	0.040			
0.99	131.5	0.065	0.61	173.8	0.101	0.61	223.9	0.039			
1.03	135.2	0.066	0.62	178.0	0.102	0.62	229.5	0.041			
1.07	138.4	0.070	0.64	181.6	0.102	0.64	233.1	0.044			
1.11	141.2	0.072	0.65	185.4	0.104	0.65	238.0	0.044			
1.14	143.8	0.075	0.69	196.5	0.108	0.69	252.3	0.047			
1.18	146.2	0.077	0.72	206.9	0.110	0.72	266.0	0.050			
1.22	148.9	0.079	0.76	217.2	0.120	0.76	280.5	0.055			
1.26	151.0	0.084	0.80	227.5	0.126	0.80	294.5	0.061			
1.30	153.3	0.085	0.84	236.8	0.130	0.84	307.8	0.065			
1.33	155.2	0.085	0.88	246.0	0.138	0.88	320.5	0.071			
1.37	156.7	0.086	0.92	254.6	0.146	0.92	333.0	0.075			
1.41	158.6	0.088	0.95	263.3	0.150	0.95	346.9	0.080			
1.45	160.4	0.089	0.99	271.3	0.156	0.99	359.5	0.084			
1.49	161.6	0.089	1.03	279.4	0.162	1.03	373.0	0.084			
1.53	162.6	0.092	1.07	286.8	0.164	1.07	385.9	0.088			
1.56	164.0	0.093	1.11	294.3	0.169	1.11	398.3	0.089			
1.60	165.5	0.094	1.14	301.8	0.173	1.14	412.4	0.091			
1.64	166.6	0.095	1.18	308.7	0.179	1.18	424.1	0.100			
1.68	167.5	0.096	1.22	315.9	0.182	1.22	436.2	0.102			
1.72	168.9	0.097	1.26	323.0	0.183	1.26	449.5	0.107			
1.75	169.7	0.098	1.30	329.1	0.187	1.30	462.5	0.107			
1.79	170.5	0.099	1.33	334.8	0.188	1.33	475.9	0.112			
1.83	171.0	0.099	1.37	340.4	0.193	1.37	488.7	0.118			
1.87	171.4	0.099	1.41	345.6	0.198	1.41	502.2	0.120			
1.91	172.0	0.099	1.45	351.4	0.201	1.45	515.1	0.123			
1.94	172.7	0.099	1.49	357.1	0.203	1.49	528.1	0.128			
1.98	173.5	0.099	1.53	361.7	0.206	1.53	539.9	0.134			
2.02	174.2	0.099	1.56	366.3	0.212	1.56	552.9	0.135			
2.06	174.5	0.101	1.60	370.7	0.214	1.60	564.4	0.137			
2.10	174.5	0.100	1.64	374.8	0.220	1.64	576.0	0.141			
2.14	175.0	0.102	1.68	378.5	0.223	1.68	588.0	0.149			
2.17	175.2	0.102	1.72	382.2	0.231	1.72	598.9	0.152			
2.21	175.6	0.101	1.75	386.5	0.229	1.75	609.8	0.155			
2.25	175.8	0.102	1.79	390.5	0.236	1.79	620.2	0.156			
2.29	176.1	0.102	1.83	391.3	0.244	1.83	630.4	0.165			
2.33	176.5	0.102	1.87	396.5	0.246	1.87	640.8	0.168			
2.40	176.8	0.103	1.91	399.0	0.250	1.91	649.1	0.171			
2.48	177.3	0.102	1.94	403.1	0.248	1.94	658.5	0.175			
2.55	177.8	0.104	1.98	406.0	0.249	1.98	667.1	0.177			
2.63	178.0	0.102	2.02	408.2	0.253	2.02	674.9	0.183			

2.71	178.2	0.102	2.06	410.3	0.252	2.06	683.5	0.184			
2.78	179.0	0.102	2.10	413.5	0.253	2.10	691.1	0.187			
2.86	178.8	0.102	2.14	415.8	0.256	2.14	698.9	0.190			
2.94	178.7	0.100	2.17	417.8	0.257	2.17	705.1	0.191			
3.01	179.0	0.100	2.21	420.4	0.256	2.21	711.4	0.191			
3.09	178.6	0.100	2.25	422.3	0.255	2.25	719.2	0.194			
3.17	179.0	0.099	2.29	424.2	0.257	2.29	726.0	0.197			
3.24	179.0	0.097	2.33	425.9	0.258	2.33	732.8	0.201			
3.32	178.9	0.098	2.36	427.4	0.259	2.36	739.1	0.203			
3.39	178.7	0.098	2.40	428.8	0.261	2.40	745.5	0.204			
3.47	178.9	0.097	2.44	430.2	0.263	2.44	751.1	0.205			
3.55	179.0	0.096	2.48	432.0	0.263	2.48	756.4	0.206			
3.62	178.6	0.096	2.52	433.6	0.264	2.52	762.0	0.209			
3.70	178.8	0.096	2.55	435.4	0.267	2.55	766.9	0.210			
3.78	178.6	0.096	2.63	437.4	0.266	2.63	774.6	0.213			
3.85	178.4	0.097	2.71	439.8	0.268	2.71	783.7	0.217			
3.93	178.1	0.096	2.78	442.1	0.266	2.78	791.9	0.218			
4.00	178.1	0.095	2.86	444.7	0.269	2.86	799.7	0.220			
4.08	177.9	0.094	2.94	446.3	0.269	2.94	804.9	0.221			
4.16	177.8	0.094	3.01	447.7	0.268	3.01	810.7	0.224			
4.23	178.0	0.093	3.09	448.8	0.271	3.09	816.1	0.224			
4.31	177.9	0.093	3.16	450.1	0.272	3.16	819.2	0.225			
4.39	177.7	0.092	3.24	451.3	0.272	3.24	824.5	0.228			
4.46	178.0	0.092	3.32	452.3	0.274	3.32	827.1	0.229			
4.54	177.9	0.091	3.39	453.0	0.272	3.39	830.1	0.229			
4.61	177.9	0.091	3.47	453.4	0.274	3.47	833.5	0.231			
4.69	178.3	0.091	3.55	453.9	0.276	3.55	835.8	0.231			
4.77	178.5	0.090	3.62	455.4	0.277	3.62	836.9	0.232			
4.84	178.6	0.090	3.70	455.8	0.276	3.70	837.7	0.230			
4.92	178.7	0.089	3.78	456.6	0.278	3.78	839.7	0.233			
5.00	179.1	0.088	3.85	457.2	0.276	3.85	841.1	0.232			
5.07	179.3	0.087	3.93	458.3	0.278	3.93	842.8	0.235			
5.15	179.3	0.087	4.00	458.4	0.277	4.00	841.1	0.235			
5.22	179.4	0.086	4.08	458.6	0.277	4.08	842.7	0.234			
5.30	179.7	0.085	4.16	459.1	0.277	4.16	843.4	0.234			
5.38	179.9	0.085	4.23	459.2	0.277	4.23	843.6	0.234			
5.45	180.0	0.084	4.31	459.4	0.276	4.31	844.2	0.235			
5.53	180.4	0.084	4.39	460.7	0.274	4.39	844.6	0.234			
5.61	180.1	0.083	4.46	460.4	0.274	4.46	844.8	0.235			
5.68	180.2	0.083	4.54	461.0	0.273	4.54	844.5	0.236			
5.76	180.3	0.083	4.61	461.7	0.272	4.61	845.1	0.236			
5.83	180.5	0.081	4.69	461.5	0.271	4.69	845.1	0.235			
5.91	180.7	0.081	4.77	461.5	0.271	4.77	845.5	0.234			
5.99	180.6	0.080	4.84	461.8	0.271	4.84	845.7	0.234			
6.06	180.7	0.077	4.92	462.5	0.272	4.92	844.5	0.235			
6.14	180.8	0.074	5.00	462.6	0.270	5.00	844.9	0.236			
6.22	180.6	0.074	5.07	462.9	0.270	5.07	845.5	0.234			
6.29	180.6	0.072	5.15	463.4	0.270	5.15	844.3	0.233			
6.37	180.3	0.071	5.22	462.7	0.269	5.22	843.9	0.235			
6.44	180.4	0.070	5.30	463.5	0.270	5.30	844.5	0.235			
6.52	180.6	0.069	5.38	464.4	0.268	5.38	844.6	0.235			
6.60	180.3	0.069	5.45	464.1	0.269	5.45	844.0	0.236			
6.67	179.9	0.068	5.53	464.6	0.269	5.53	843.5	0.236			

6.75	180.0	0.068	5.61	465.1	0.270	5.61	844.2	0.234			
6.83	180.3	0.067	5.68	464.9	0.268	5.68	838.9	0.238			
6.90	180.1	0.067	5.76	465.2	0.270	5.76	841.2	0.236			
6.98	180.3	0.067	5.83	465.5	0.268	5.83	841.6	0.236			
7.05	180.7	0.066	5.91	465.9	0.269	5.91	840.8	0.237			
7.13	180.0	0.066	5.99	466.1	0.269	5.99	842.9	0.237			
7.21	180.4	0.065	6.06	466.4	0.269	6.06	842.3	0.236			
7.28	180.6	0.065	6.14	466.8	0.269	6.14	842.9	0.238			
7.36	180.6	0.065	6.22	466.5	0.270	6.22	843.0	0.237			
7.39	180.8	0.065	6.29	466.7	0.271	6.29	842.8	0.238			
			6.37	466.7	0.271	6.37	842.6	0.237			
			6.44	466.8	0.271	6.44	841.9	0.240			
			6.52	466.7	0.271	6.52	843.1	0.241			
			6.60	466.2	0.273	6.60	843.5	0.239			
			6.67	466.7	0.274	6.67	843.6	0.241			
			6.75	466.1	0.275	6.75	844.5	0.243			
			6.83	466.8	0.275	6.83	843.9	0.243			
			6.90	467.2	0.275	6.90	841.6	0.242			
			6.98	465.7	0.274	6.98	842.6	0.244			
			7.05	465.7	0.275	7.05	843.9	0.242			
			7.13	465.8	0.276	7.13	844.3	0.243			
			7.21	466.0	0.274	7.21	843.3	0.243			
			7.28	466.3	0.274	7.28	845.0	0.243			
			7.36	466.6	0.275	7.36	846.1	0.247			
			7.44	467.2	0.276	7.44	845.5	0.247			
			7.51	466.4	0.277	7.51	846.8	0.249			
			7.59	466.6	0.277	7.59	847.3	0.249			
			7.62	466.2	0.279	7.62	847.7	0.249			

TM	April 7, 2019	DL	April 17, 2019
TESTED BY	DATE	CHECKED BY	DATE

Direct Shear Testing of Soils Under Consolidated Drained Conditions				Reference ASTM D3080	
Client:	Telkwa Coal Ltd.		Borehole:	19-35S	
Project:	Ref #017-318		Sample Number:	29624	
Location:	N/A		Depth (m):	5.5 - 6.1	
Project No.:	18109666/2000		Lab ID No:	B19-058	

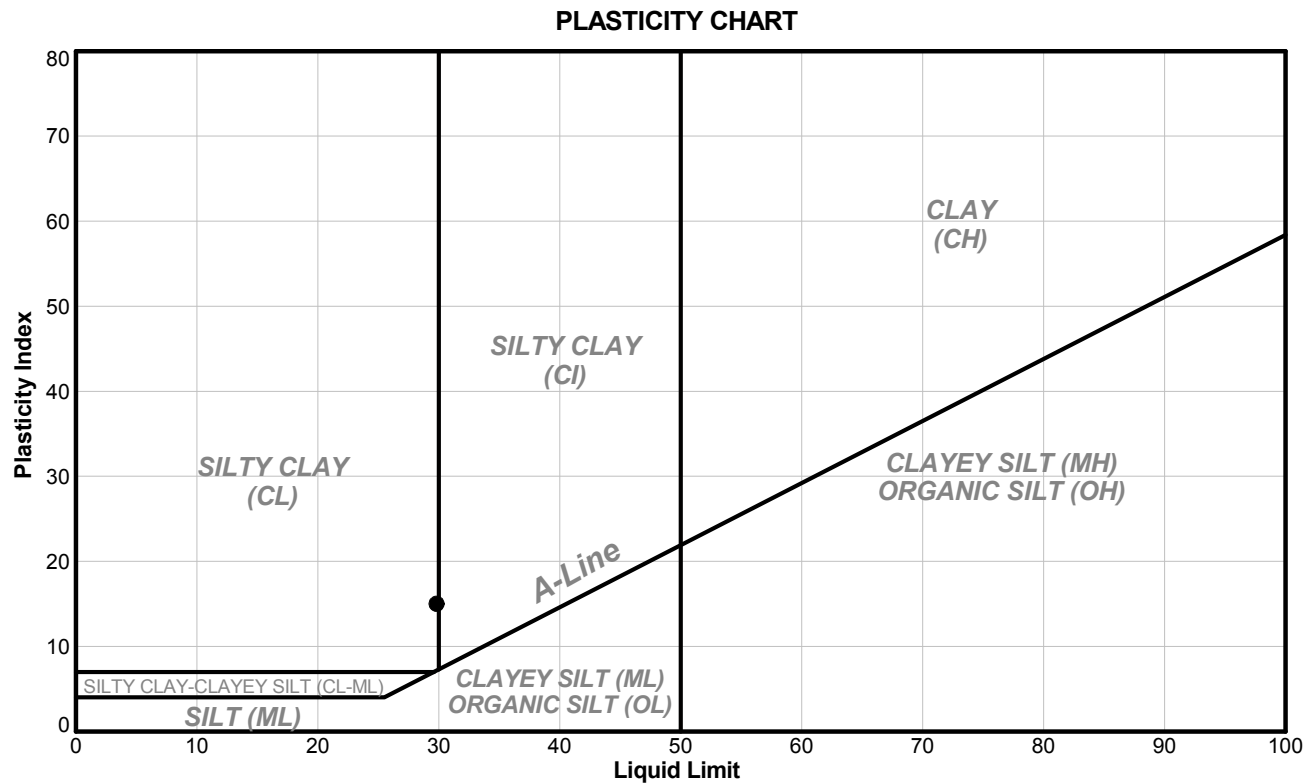
Residual 1			Residual 2			Residual 3					
Normal Stress , kPa	300		Normal Stress , kPa	800		Normal Stress , kPa	1500		Normal Stress , kPa		
Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min	0.005		Disp Rate, mm/min		
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	2.2	0.000	0.00	0.7	0.000	0.00	5.4	0.000			
0.08	3.9	0.000	0.08	4.5	0.000	0.08	5.8	0.000			
0.15	11.6	0.001	0.15	22.4	-0.001	0.15	10.4	0.001			
0.23	16.3	0.006	0.23	44.1	-0.001	0.23	9.4	0.002			
0.31	20.8	0.009	0.31	65.5	0.001	0.31	25.4	0.003			
0.38	24.0	0.012	0.38	86.1	0.007	0.38	43.5	0.003			
0.46	27.0	0.015	0.46	107.9	0.011	0.46	60.2	0.005			
0.53	31.7	0.018	0.53	128.3	0.020	0.53	74.8	0.007			
0.61	39.6	0.024	0.61	147.5	0.026	0.61	87.7	0.011			
0.69	46.2	0.031	0.69	166.8	0.030	0.69	99.1	0.010			
0.76	52.1	0.036	0.76	184.9	0.036	0.76	110.6	0.011			
0.84	57.5	0.042	0.84	200.7	0.045	0.84	121.4	0.014			
0.92	63.5	0.051	0.92	216.7	0.050	0.92	133.8	0.016			
0.99	69.0	0.057	0.99	232.4	0.053	0.99	146.4	0.013			
1.07	74.4	0.063	1.07	246.7	0.055	1.07	167.9	0.016			
1.14	80.3	0.066	1.14	261.1	0.055	1.14	187.7	0.017			
1.22	85.4	0.067	1.22	273.9	0.057	1.22	207.7	0.019			
1.30	89.2	0.071	1.30	284.4	0.057	1.30	229.6	0.023			
1.37	93.5	0.073	1.37	296.2	0.058	1.37	252.7	0.027			
1.45	99.4	0.074	1.45	307.3	0.059	1.45	276.3	0.028			
1.53	104.1	0.074	1.53	318.3	0.059	1.53	299.6	0.029			
1.60	109.3	0.076	1.60	327.4	0.059	1.60	323.9	0.033			
1.68	113.7	0.075	1.68	336.3	0.059	1.68	347.5	0.033			
1.75	118.0	0.076	1.75	344.4	0.059	1.75	372.3	0.035			
1.83	121.8	0.077	1.83	351.4	0.058	1.83	395.8	0.037			
1.91	124.4	0.076	1.91	357.6	0.059	1.91	418.3	0.038			
1.98	127.6	0.076	1.98	365.5	0.059	1.98	440.3	0.040			
2.06	129.8	0.076	2.06	370.8	0.056	2.06	462.0	0.040			
2.14	132.8	0.076	2.14	375.7	0.057	2.14	482.1	0.042			
2.21	135.3	0.075	2.21	380.7	0.058	2.21	502.9	0.041			
2.29	137.9	0.075	2.29	385.1	0.055	2.29	521.0	0.040			
2.36	140.1	0.074	2.36	389.4	0.055	2.36	539.1	0.042			
2.44	142.0	0.072	2.44	392.5	0.055	2.44	555.1	0.041			
2.52	143.8	0.069	2.52	396.1	0.051	2.52	570.7	0.044			
2.59	145.4	0.067	2.59	399.0	0.050	2.59	586.5	0.040			

2.67	147.0	0.064	2.67	401.2	0.049	2.67	599.6	0.039			
2.75	148.2	0.062	2.75	402.6	0.045	2.75	612.6	0.039			
2.82	149.4	0.059	2.82	404.8	0.042	2.82	625.4	0.036			
2.90	150.8	0.057	2.90	406.7	0.038	2.90	635.7	0.032			
2.97	151.9	0.055	2.97	408.4	0.037	2.97	646.9	0.030			
3.05	152.8	0.053	3.05	410.1	0.033	3.05	656.5	0.027			
3.13	153.8	0.052	3.13	411.2	0.031	3.13	666.3	0.026			
3.20	154.6	0.049	3.20	412.4	0.030	3.20	674.6	0.025			
3.28	155.1	0.045	3.28	414.1	0.028	3.28	682.1	0.023			
3.36	156.1	0.041	3.36	414.9	0.025	3.36	690.9	0.021			
3.43	156.5	0.038	3.43	415.7	0.021	3.43	696.6	0.021			
3.51	157.2	0.037	3.51	418.0	0.021	3.51	703.6	0.016			
3.58	157.9	0.035	3.58	418.5	0.018	3.58	710.8	0.016			
3.66	159.0	0.034	3.66	419.8	0.018	3.66	716.5	0.015			
3.74	159.7	0.030	3.74	420.7	0.015	3.74	722.3	0.014			
3.81	160.3	0.031	3.81	422.1	0.015	3.81	728.4	0.013			
3.89	160.6	0.028	3.89	423.6	0.015	3.89	734.1	0.007			
3.97	161.2	0.026	3.97	424.5	0.014	3.97	739.8	0.008			
4.04	161.4	0.025	4.04	426.1	0.014	4.04	744.7	0.006			
4.12	161.8	0.024	4.12	427.2	0.011	4.12	751.2	0.005			
4.15	162.3	0.023	4.19	428.7	0.012	4.19	755.8	0.005			
4.15	162.2	0.024	4.27	430.7	0.011	4.27	761.7	0.005			
4.23	162.6	0.023	4.35	431.6	0.008	4.35	767.0	0.001			
4.30	163.4	0.022	4.42	432.8	0.008	4.42	771.1	0.002			
4.38	164.2	0.022	4.50	433.0	0.008	4.50	776.9	0.003			
4.45	164.8	0.022	4.58	434.1	0.007	4.58	782.0	-0.001			
4.53	165.2	0.022	4.65	435.3	0.006	4.65	785.8	0.000			
4.61	165.8	0.022	4.73	436.2	0.006	4.73	790.4	-0.004			
4.68	166.4	0.020	4.80	437.6	0.004	4.80	794.5	-0.004			
4.76	166.4	0.019	4.88	438.2	0.004	4.88	800.2	-0.008			
4.84	166.9	0.018	4.96	439.3	0.004	4.96	802.7	-0.008			
4.91	167.1	0.017	5.03	440.8	0.002	5.03	807.3	-0.011			
4.99	167.0	0.016	5.11	441.4	0.002	5.11	810.3	-0.012			
5.06	167.2	0.015	5.19	441.9	-0.002	5.19	813.2	-0.011			
5.14	167.7	0.015	5.26	443.3	-0.001	5.26	817.8	-0.016			
5.22	167.8	0.012	5.33	444.0	-0.002	5.34	820.6	-0.016			
5.29	168.4	0.012	5.33	444.3	-0.002	5.36	821.8	-0.017			
5.37	169.4	0.012	5.40	445.0	-0.001	5.36	821.8	-0.018			
5.45	170.3	0.012	5.43	445.5	-0.005	5.44	823.6	-0.020			
5.52	170.9	0.011	5.66	460.1	-0.010	5.51	826.5	-0.020			
5.60	171.6	0.011	5.73	456.4	-0.013	5.59	828.1	-0.020			
5.67	171.9	0.012	5.81	455.8	-0.011	5.67	831.3	-0.023			
5.75	172.5	0.011	5.89	454.8	-0.010	5.74	831.4	-0.022			
5.83	172.7	0.011	5.96	455.5	-0.011	5.82	833.9	-0.024			
5.90	173.4	0.011	6.04	456.9	-0.012	5.90	835.7	-0.022			
5.98	173.9	0.009	6.11	457.5	-0.016	5.97	836.7	-0.023			
6.06	173.9	0.010	6.19	457.9	-0.017	6.05	839.4	-0.024			
6.13	174.0	0.009	6.27	457.7	-0.010	6.12	839.5	-0.024			
6.21	174.3	0.009	6.34	459.6	-0.012	6.20	839.9	-0.021			
6.28	174.2	0.009	6.42	461.1	-0.013	6.28	837.8	-0.025			
6.36	174.4	0.009	6.49	462.3	-0.016	6.35	838.7	-0.024			
6.44	175.0	0.009	6.57	462.1	-0.015	6.43	840.4	-0.022			
6.51	175.0	0.008	6.65	460.0	-0.018	6.51	837.7	-0.023			

6.59	175.3	0.008	6.72	461.9	-0.022	6.58	840.6	-0.023			
6.67	175.6	0.008	6.80	463.1	-0.021	6.66	840.6	-0.025			
6.74	175.9	0.007	6.88	463.9	-0.022	6.73	840.0	-0.022			
6.82	176.3	0.007	6.95	464.7	-0.026	6.81	840.0	-0.022			
6.89	176.4	0.008	7.03	464.9	-0.026	6.89	840.0	-0.022			
6.97	176.5	0.008	7.10	464.2	-0.026	6.96	841.3	-0.022			
7.05	176.5	0.007	7.18	463.3	-0.029	7.04	840.7	-0.021			
7.12	176.7	0.007	7.26	463.7	-0.028	7.12	842.1	-0.019			
7.20	176.8	0.007	7.33	464.3	-0.029	7.19	841.8	-0.018			
7.28	176.9	0.007	7.41	464.3	-0.029	7.27	840.6	-0.016			
7.35	177.1	0.009	7.49	465.2	-0.029	7.34	841.7	-0.014			
7.43	177.7	0.008	7.56	464.2	-0.032	7.42	837.4	-0.012			
7.50	177.9	0.007	7.64	464.0	-0.033	7.50	836.7	-0.012			
7.58	178.1	0.007	7.71	464.3	-0.031	7.57	839.0	-0.011			
7.66	178.3	0.007	7.78	464.9	-0.033	7.65	837.3	-0.009			
7.73	178.9	0.007				7.73	838.8	-0.009			
7.81	178.3	0.007				7.80	839.5	-0.009			
7.82	178.5	0.007				7.88	839.6	-0.009			
						7.91	839.3	-0.009			

TM	April 7, 2019	DL	April 17, 2019
TESTED BY	DATE	CHECKED BY	DATE

Client:	Telkwa Coal Ltd.	ID:	19-18S
Project:	Explore 0112	Sample No.:	35077
Location:		Depth Interval (m):	6.30 to 6.50
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



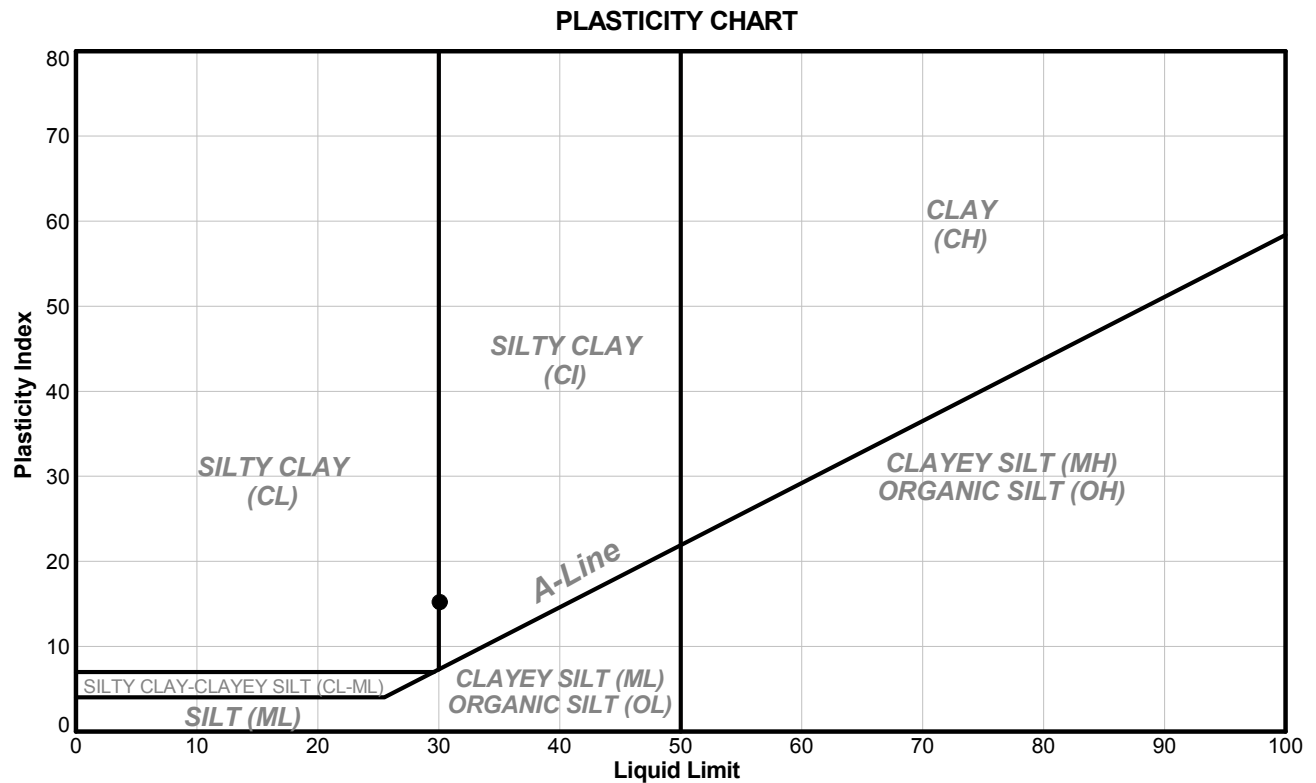
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-18S	35077	6.30	6.50	80	30	15	15.0	13.9	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	3/21/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-18S
Project:	Explore 0112	Sample No.:	35080
Location:		Depth Interval (m):	15.40 to 15.80
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-18S	35080	15.40	15.80	78	30	15	15.0	13.3	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	3/21/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

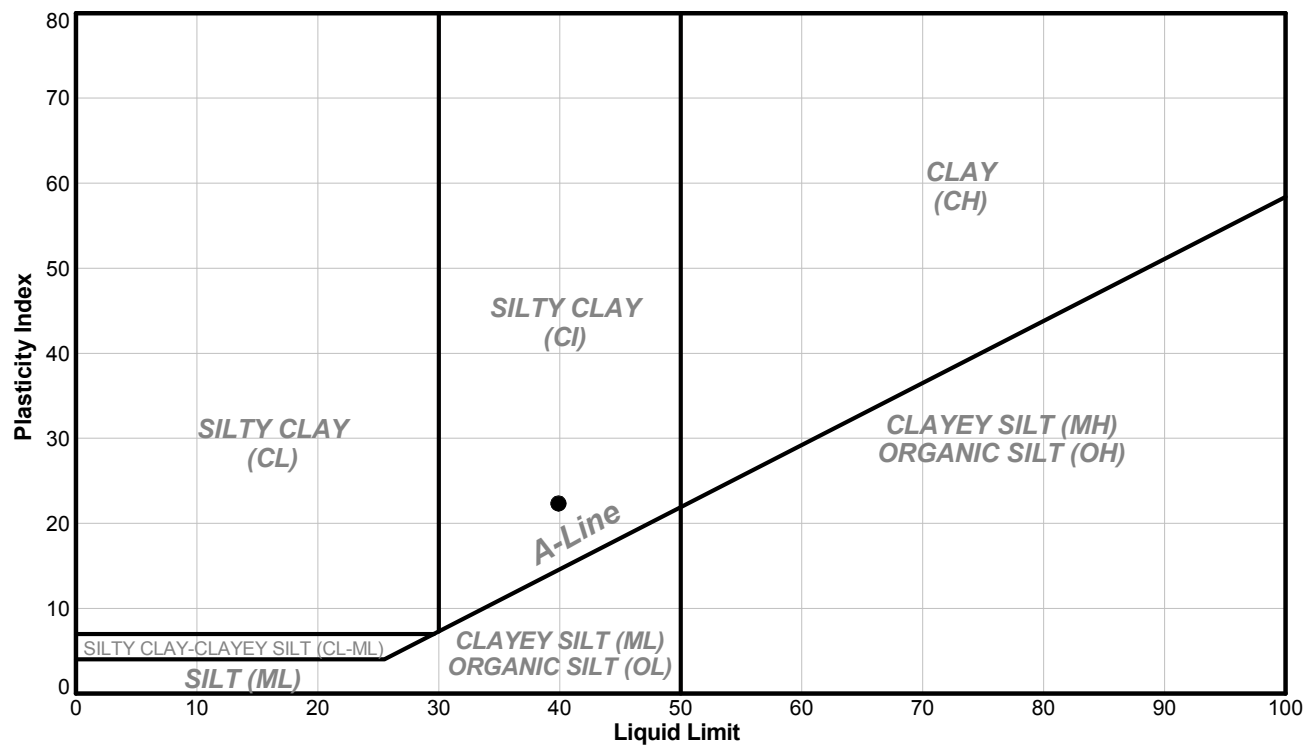
ID: 19-18S
Sample No.: 35086
Depth Interval (m): 42.20 to 42.70
Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-18S	35086	42.20	42.70	76	40	18	22.0	14.2	-0.2

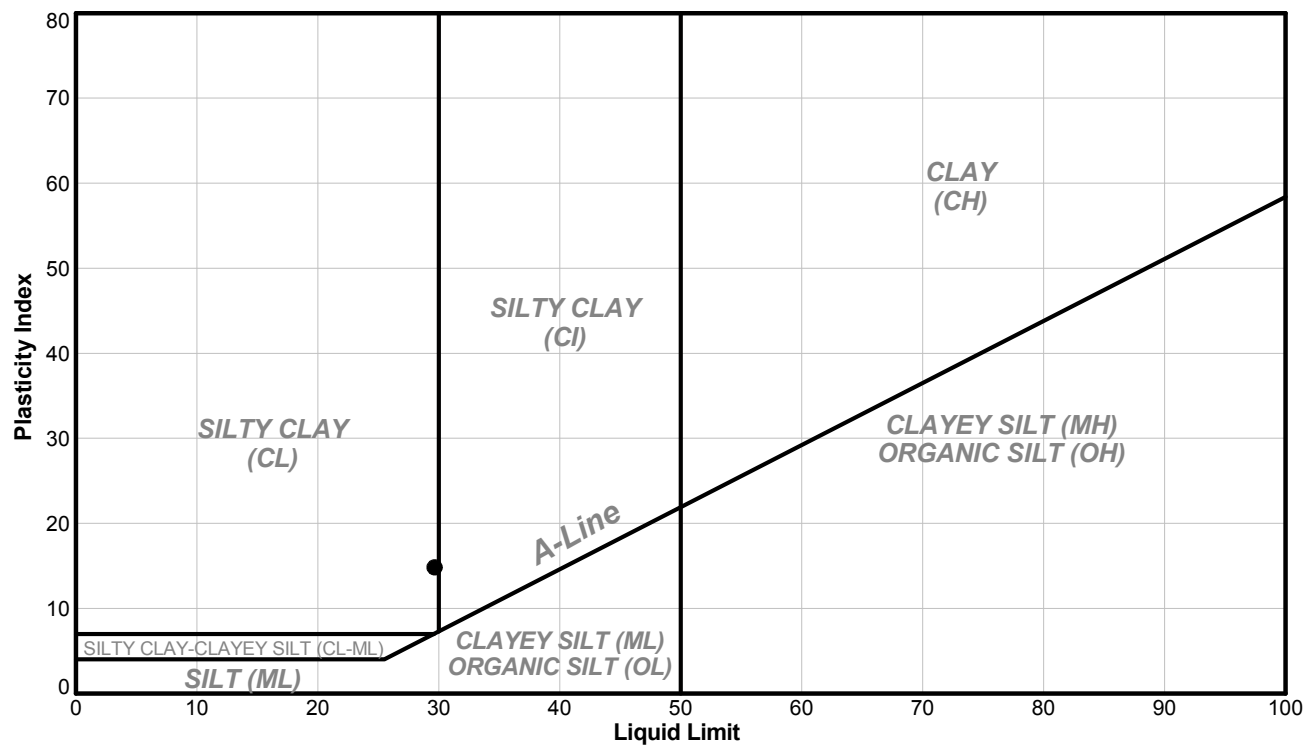
NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/21/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-19S
Project:	Explore 0112	Sample No.:	35087
Location:		Depth Interval (m):	3.00 to 3.50
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried

PLASTICITY CHART



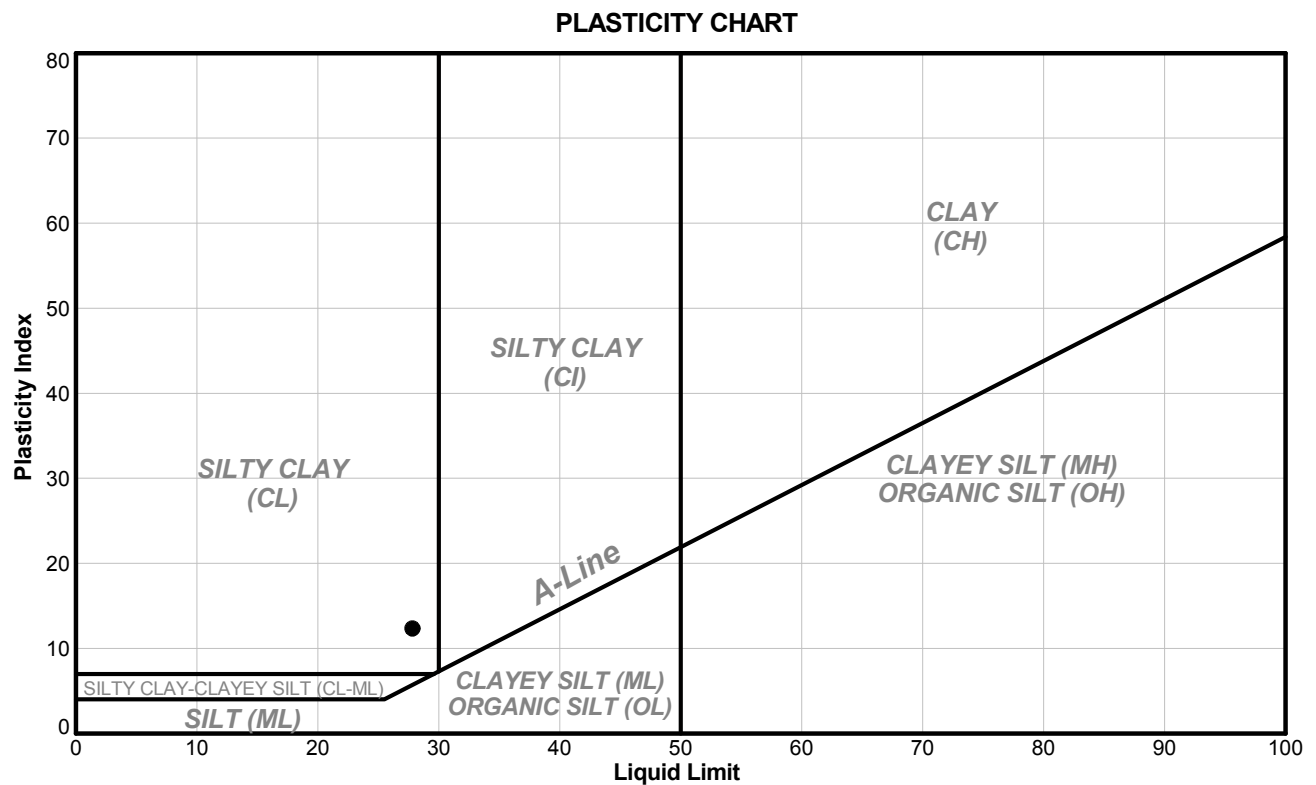
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-19S	35087	3.00	3.50	63	30	15	15.0	8.7	-0.4

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/13/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-19S
Project:	Explore 0112	Sample No.:	35096
Location:		Depth Interval (m):	34.40 to 35.10
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



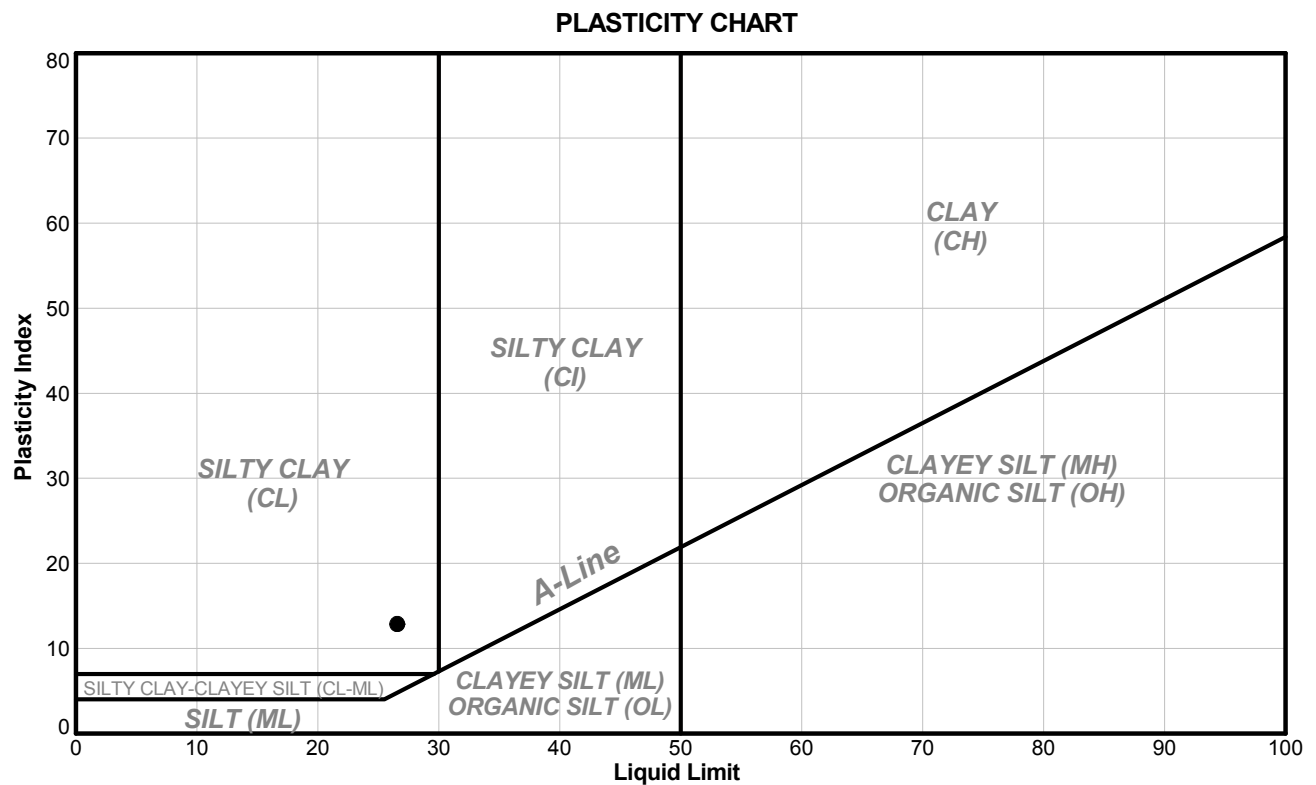
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-19S	35096	34.40	35.10	75	28	15	13.0	11.0	-0.3

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/13/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-19S
Project:	Explore 0112	Sample No.:	35097
Location:		Depth Interval (m):	41.80 to 42.40
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



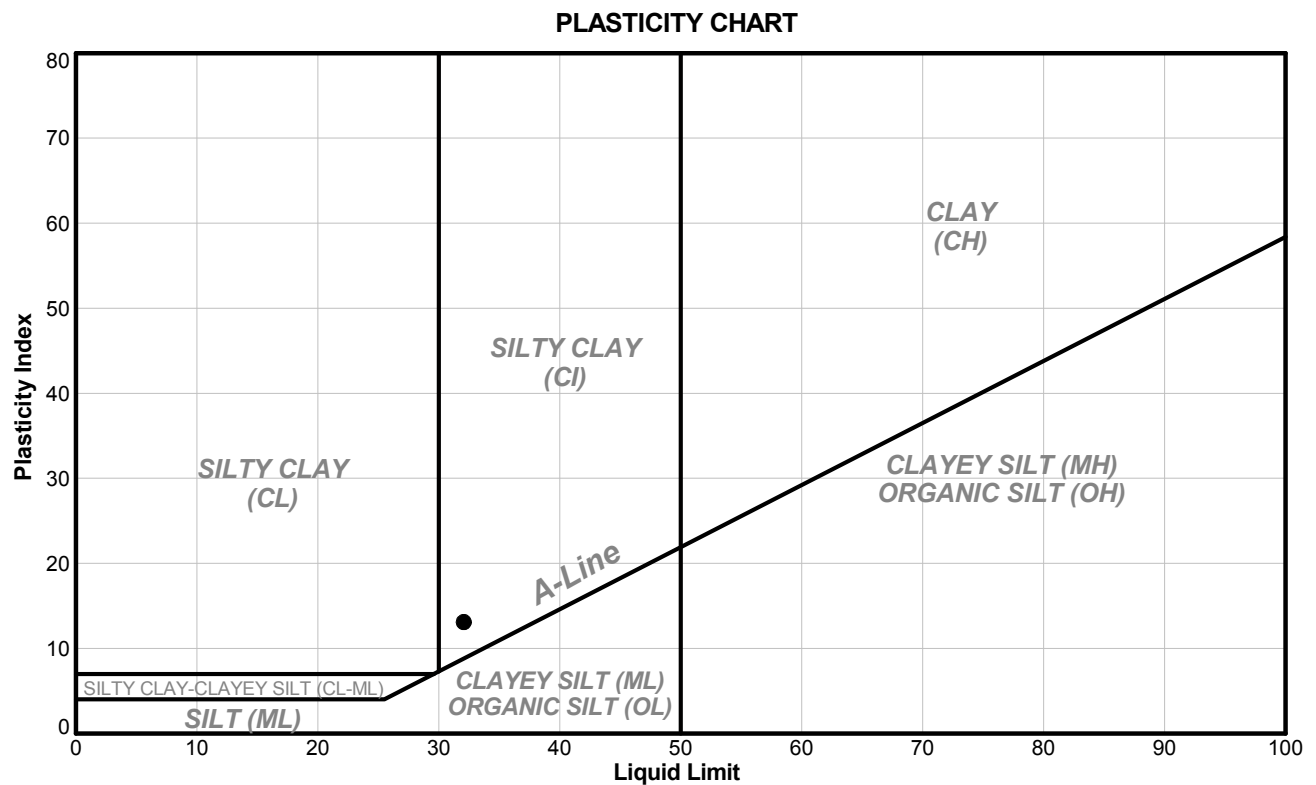
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-19S	35097	41.80	42.40	65	27	14	13.0	8.1	-0.5

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/13/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-21S
Project:	Explore 0112	Sample No.:	35034
Location:		Depth Interval (m):	10.70 to 11.30
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



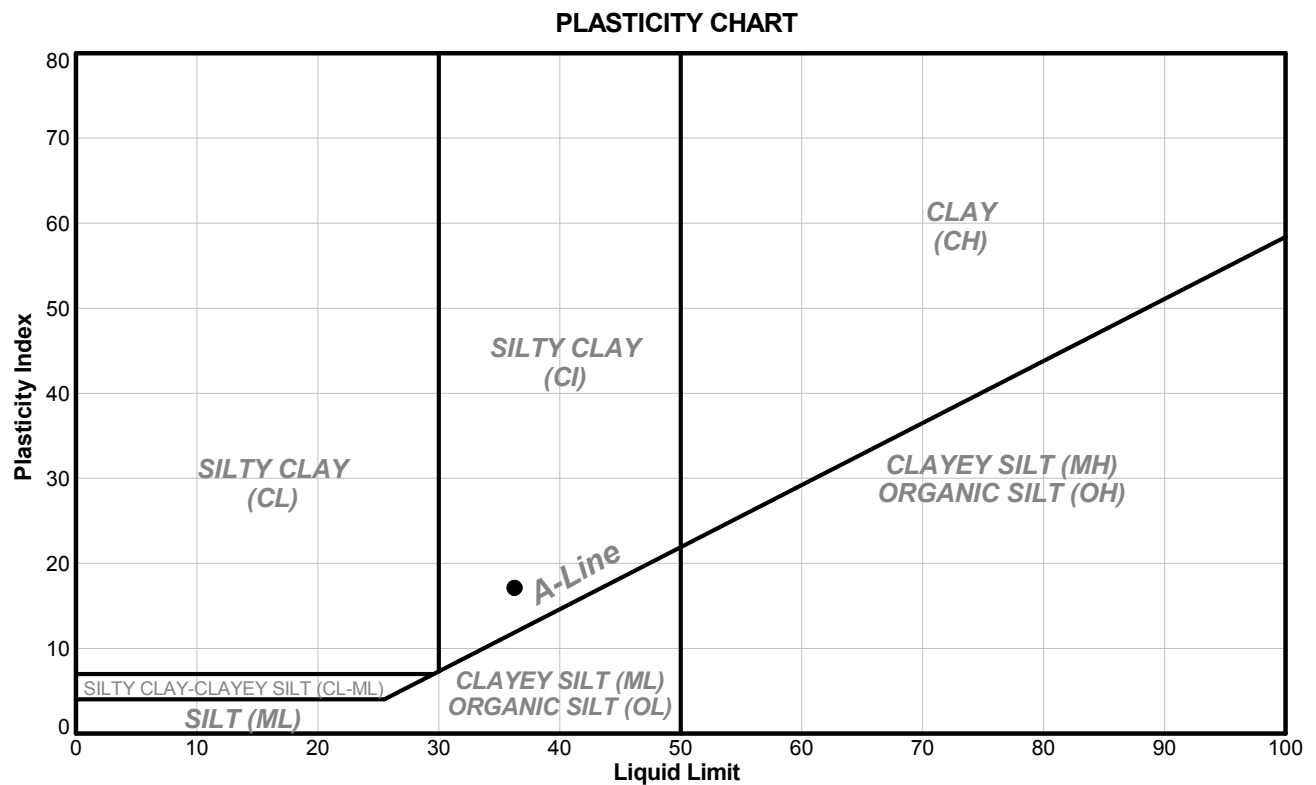
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-21S	35034	10.70	11.30	99	32	19	13.0	22.1	0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RG	3/8/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-21S
Project:	Explore 0112	Sample No.:	35035
Location:		Depth Interval (m):	15.20 to 15.80
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-21S	35035	15.20	15.80	83	36	19	17.0	20.8	0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/19/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
 Project: Explore 0112
 Location:
 Project No.: 18109666 Phase: 2000

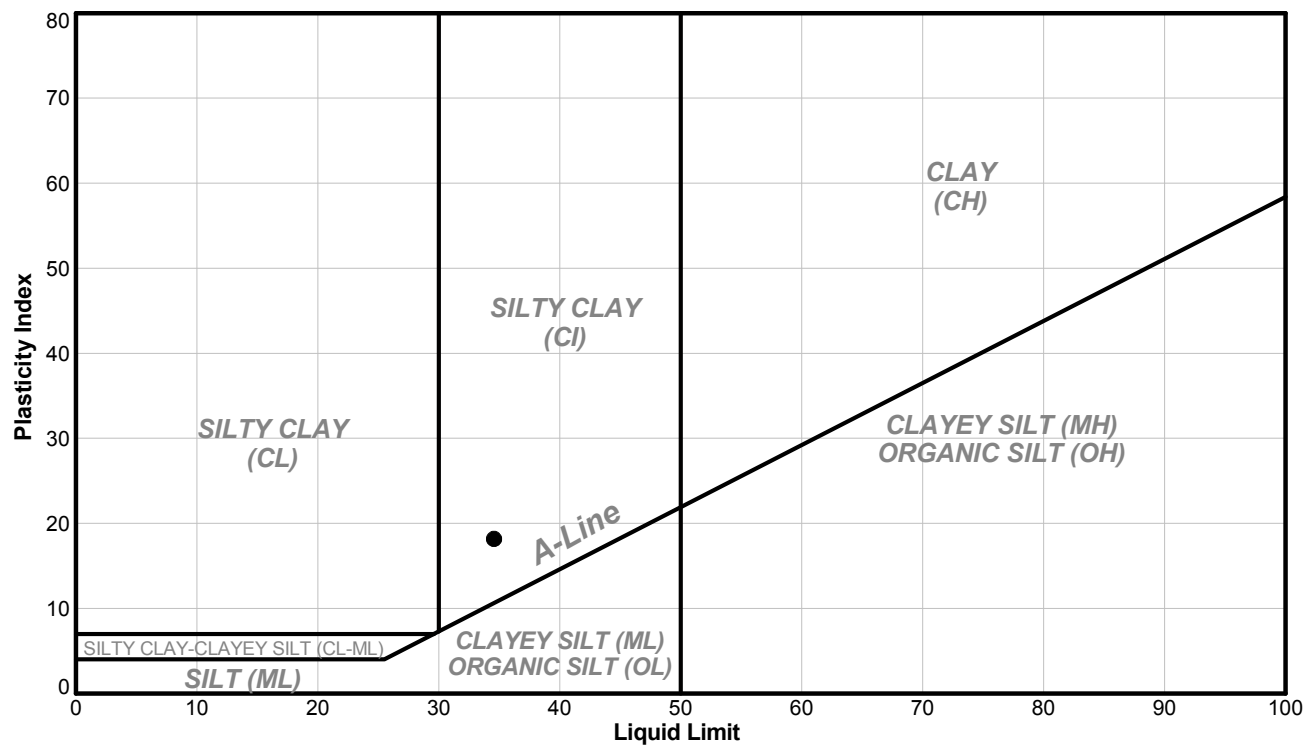
ID: 19-21S
 Sample No.: 35041
 Depth Interval (m): 30.00 to 30.50
 Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-21S	35041	30.00	30.50	82	35	16	19.0	14.9	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/13/2019	LP	3/27/2019
Tech	Date	Checked	Date

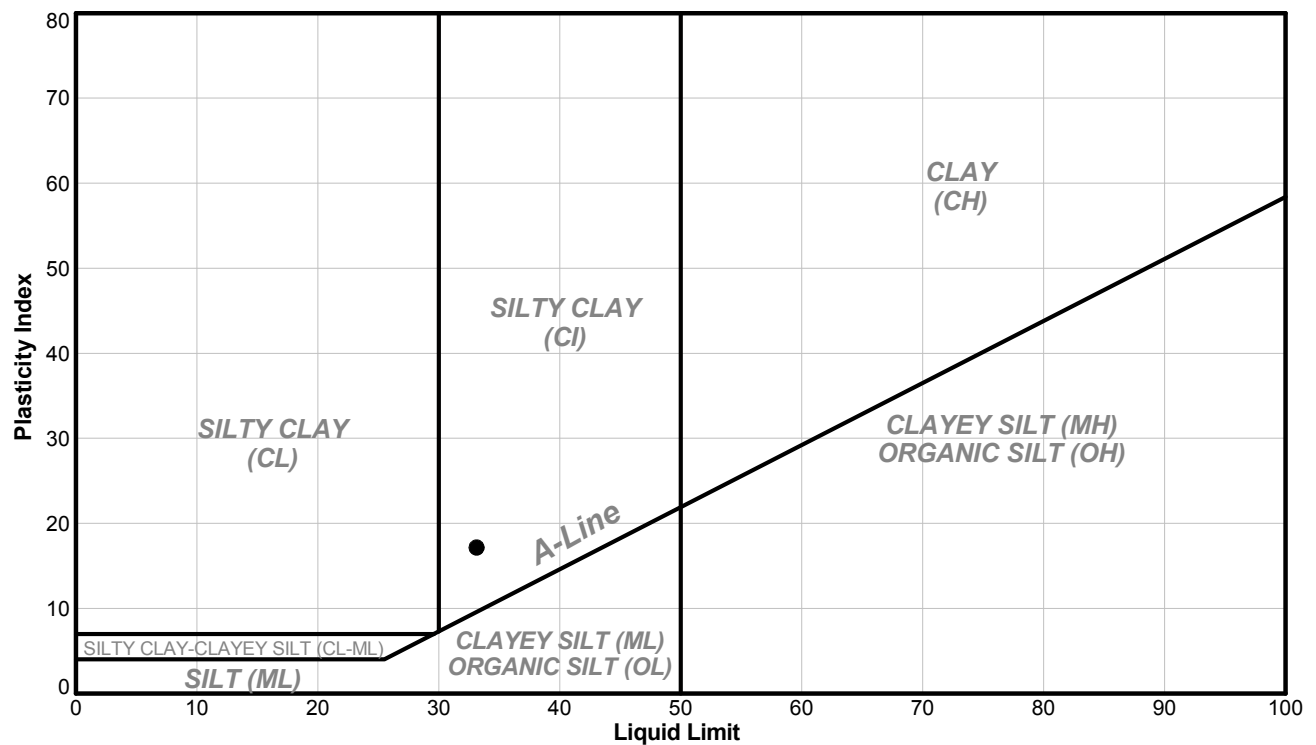
Client: Telkwa Coal Ltd.	ID: 19-21S
Project: Explore 0112	Sample No.: 35043
Location:	Depth Interval (m): 38.70 to 39.30
Project No.: 18109666 Phase: 2000	Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



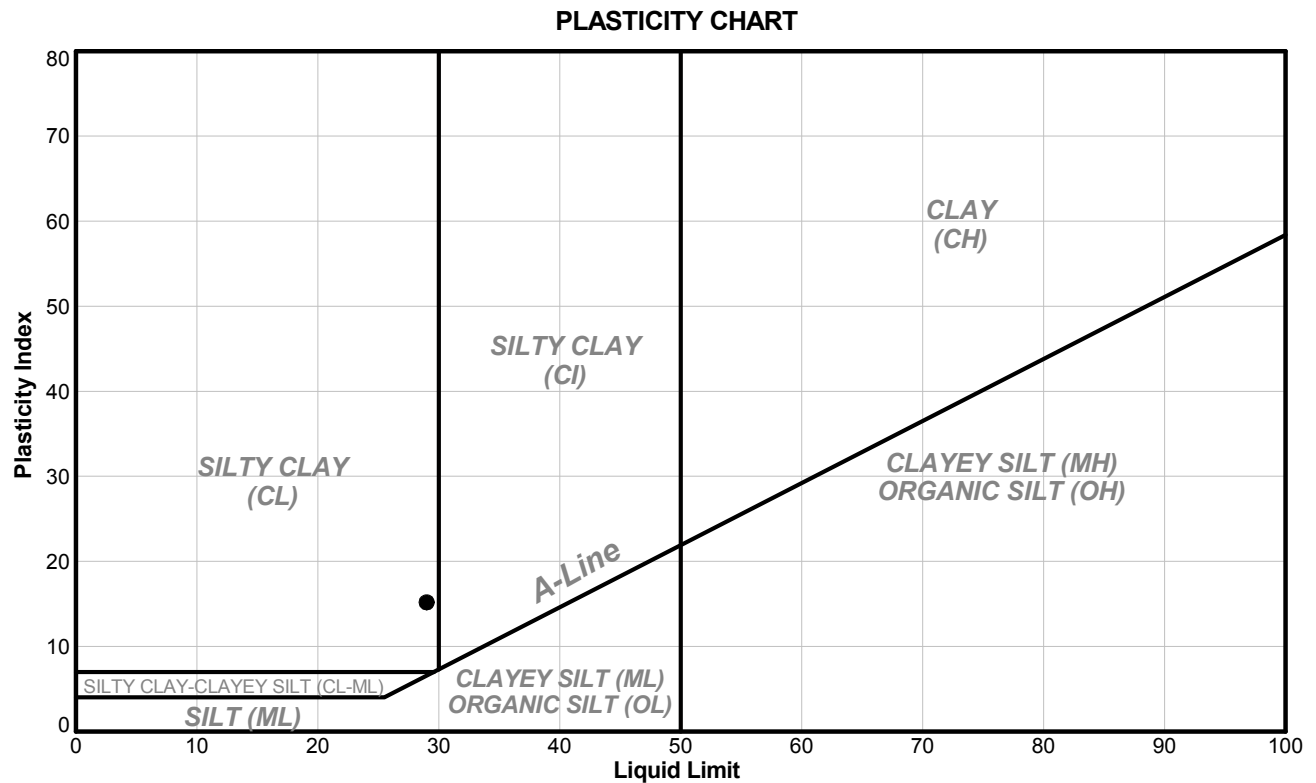
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-21S	35043	38.70	39.30	72	33	16	17.0	10.5	-0.3

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/14/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-21S
Project:	Explore 0112	Sample No.:	35045
Location:		Depth Interval (m):	50.00 to 50.90
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



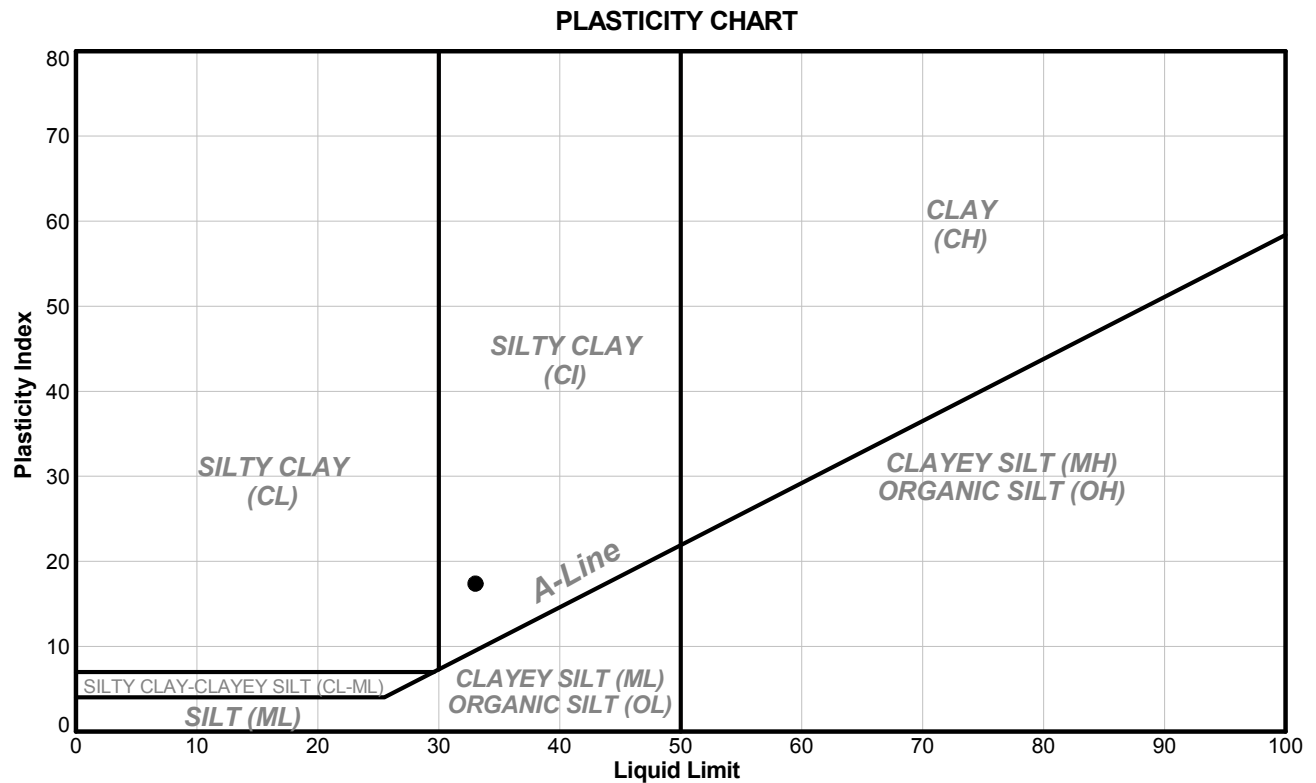
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-21S	35045	50.00	50.90	58	29	14	15.0	6.4	-0.5

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/13/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-22S
Project:	Explore 0112	Sample No.:	29661
Location:		Depth Interval (m):	3.00 to 3.70
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-22S	29661	3.00	3.70	72	33	16	17.0	12.2	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/14/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

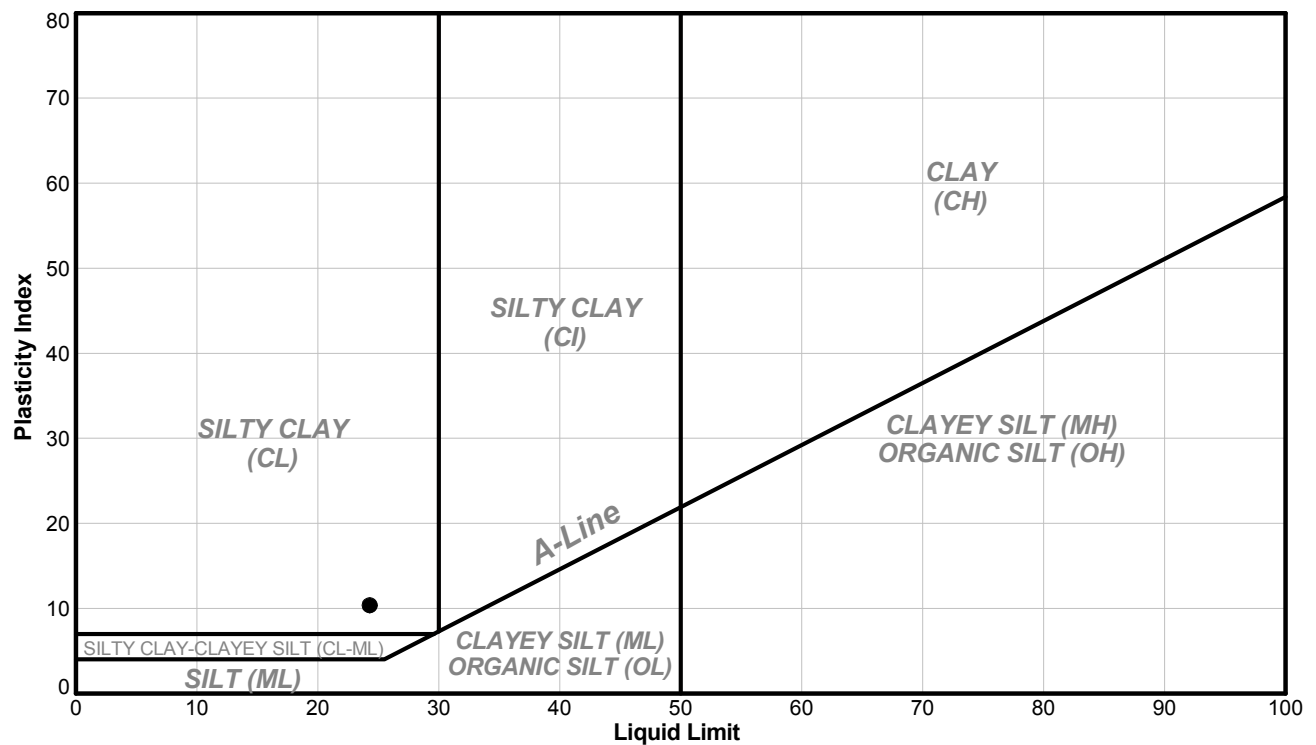
ID: 19-22S
Sample No.: 29665
Depth Interval (m): 16.20 to 16.80
Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-22S	29665	16.20	16.80	68	24	14	10.0	8.8	-0.5

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/14/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

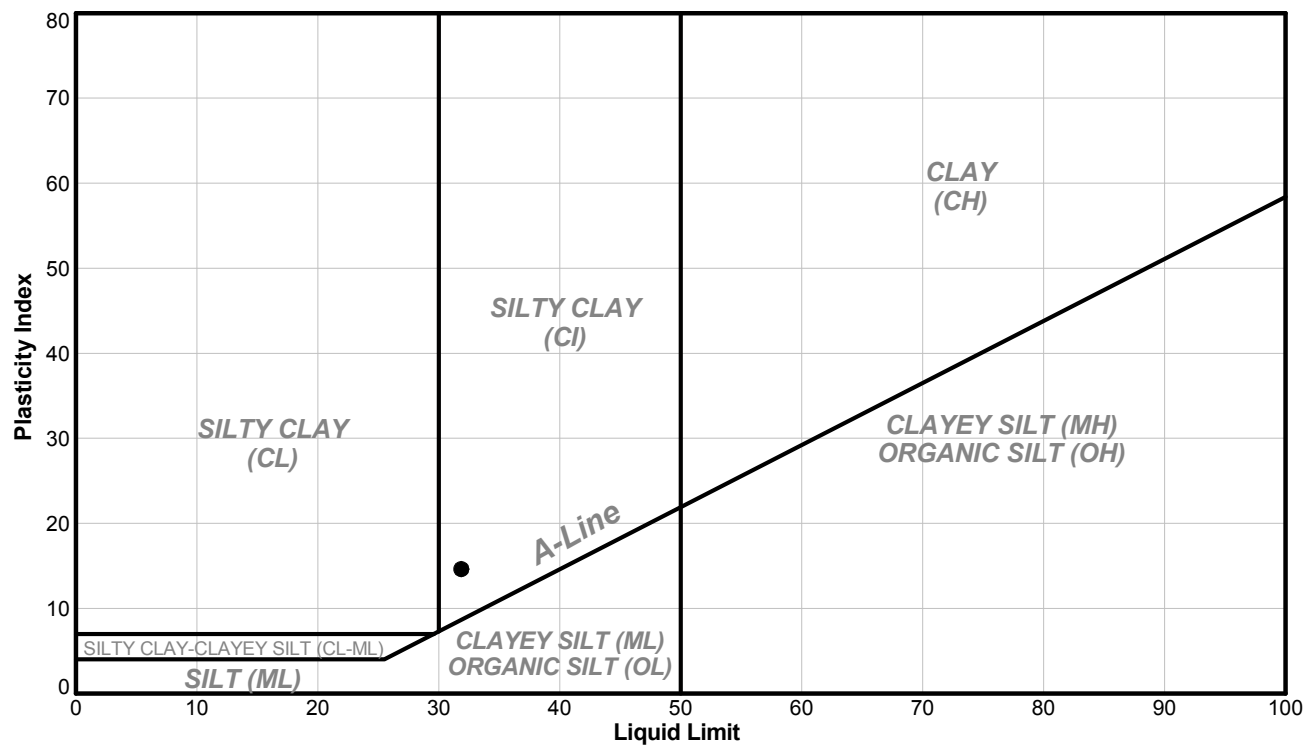
ID: 19-22S
Sample No.: 29668
Depth Interval (m): 26.20 to 26.80
Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-22S	29668	26.20	26.80	97	32	17	15.0	11.7	-0.4

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/14/2019	LP	3/27/2019
Tech	Date	Checked	Date

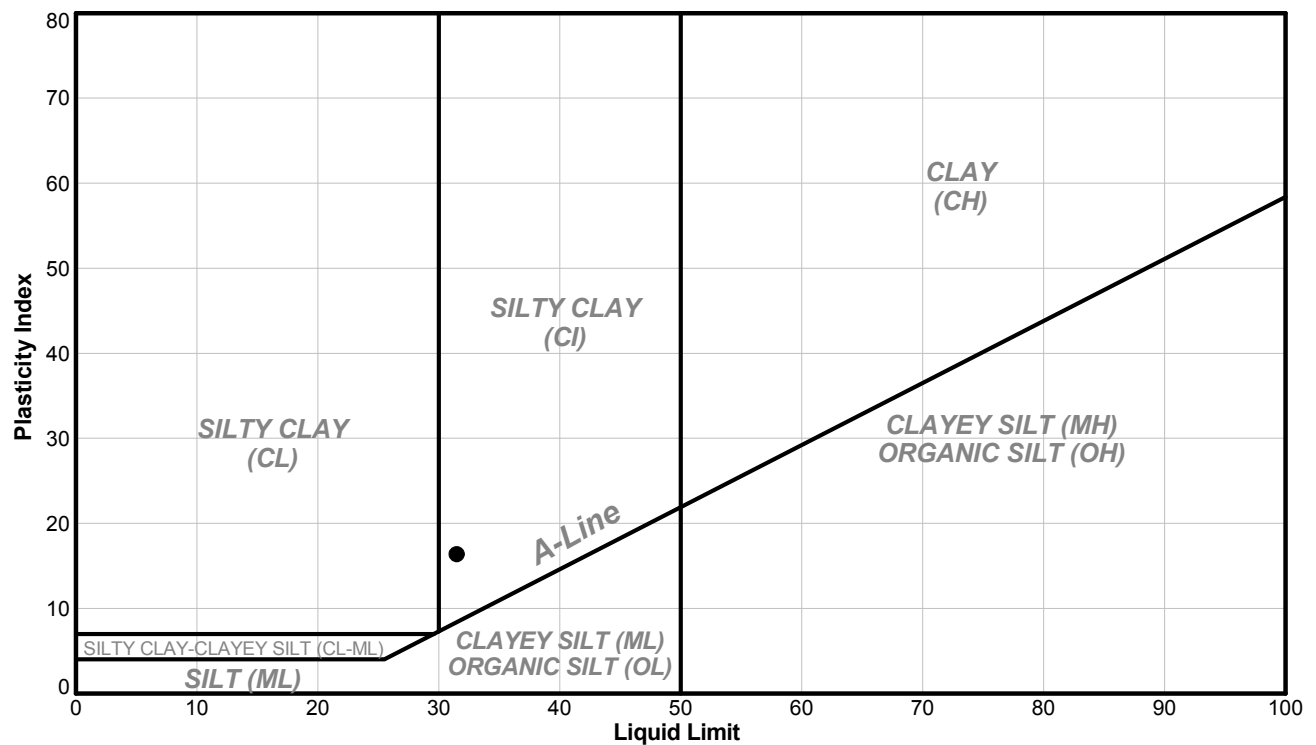
Client: Telkwa Coal Ltd.	ID: 19-34S
Project: Explore 0112	Sample No.: 29612
Location:	Depth Interval (m): 4.00 to 4.60
Project No.: 18109666 Phase: 2000	Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-34S	29612	4.00	4.60	65	31	15	16.0	12.1	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/19/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
 Project: Explore 0112
 Location:
 Project No.: 18109666 Phase: 2000

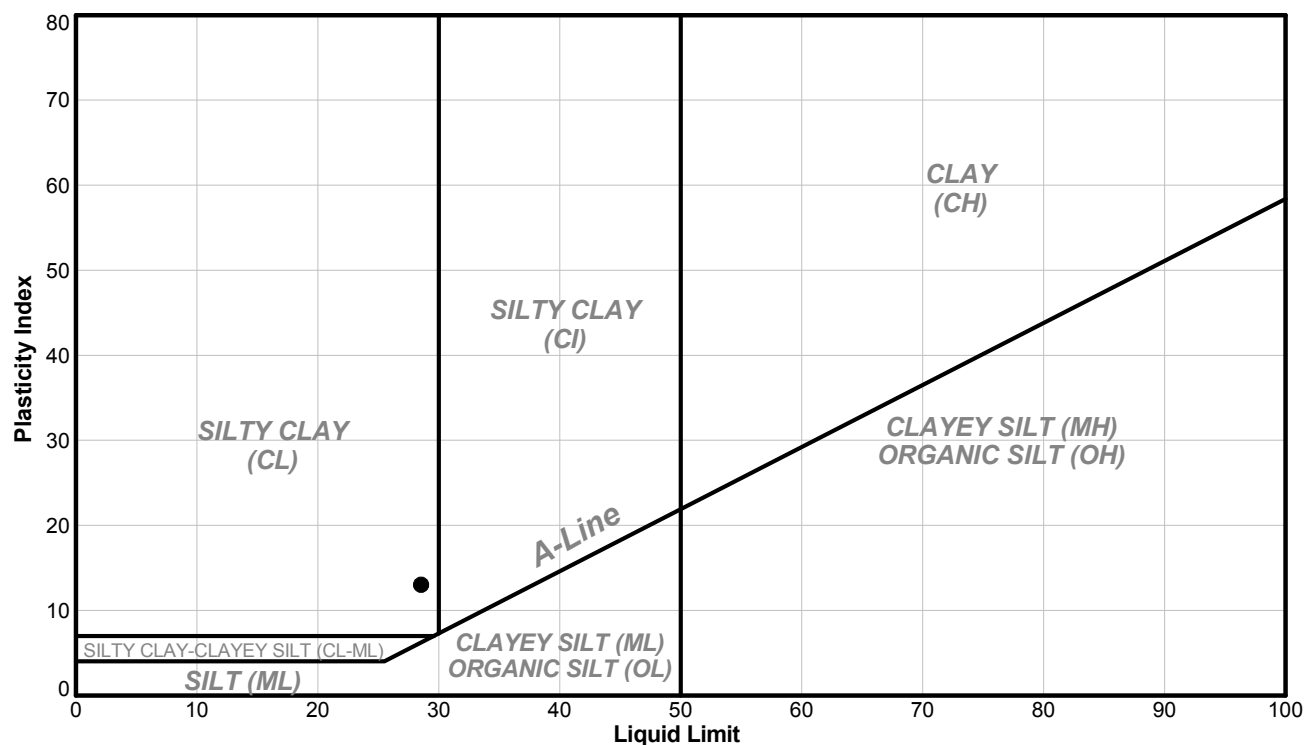
ID: 19-34S
 Sample No.: 29613
 Depth Interval (m): 8.70 to 9.10
 Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-34S	29613	8.70	9.10	82	29	16	13.0	11.4	-0.4

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	3/20/2019	LP	3/27/2019
Tech	Date	Checked	Date

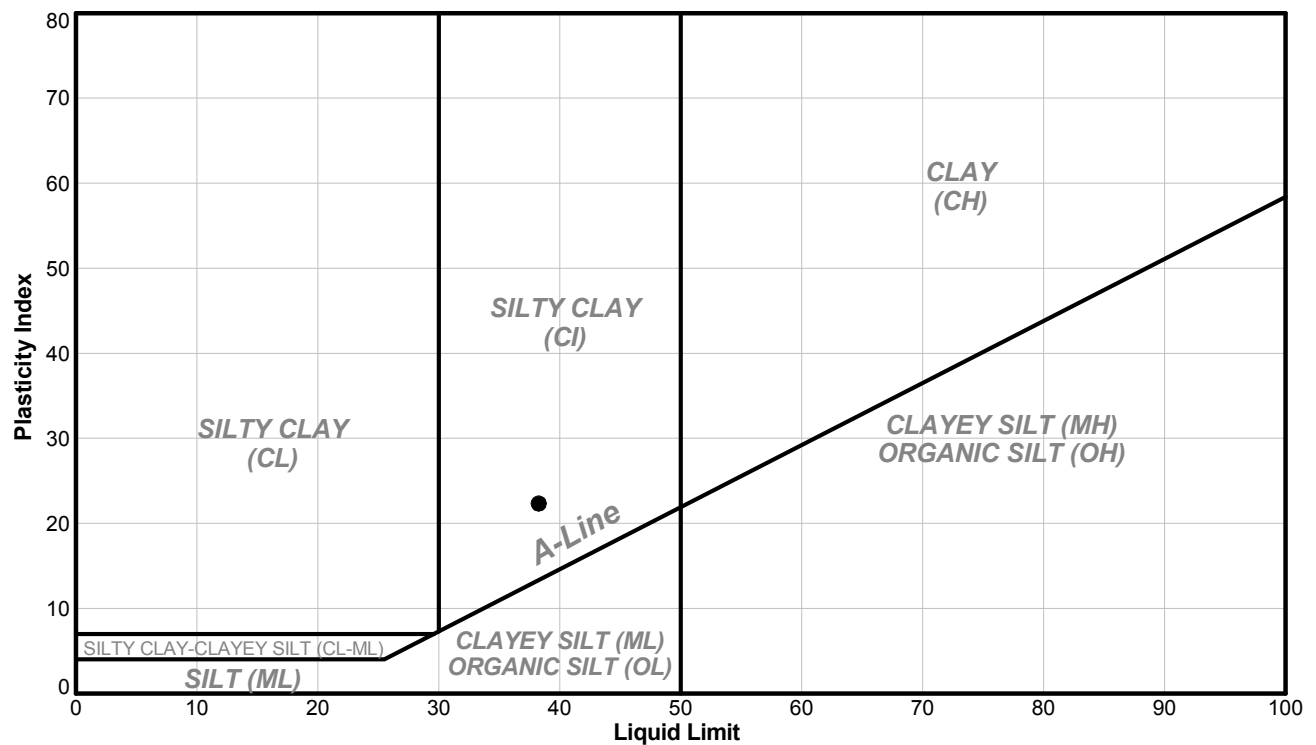
Client: Telkwa Coal Ltd.	ID: 19-34S
Project: Explore 0112	Sample No.: 29622
Location:	Depth Interval (m): 29.90 to 33.50
Project No.: 18109666 Phase: 2000	Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



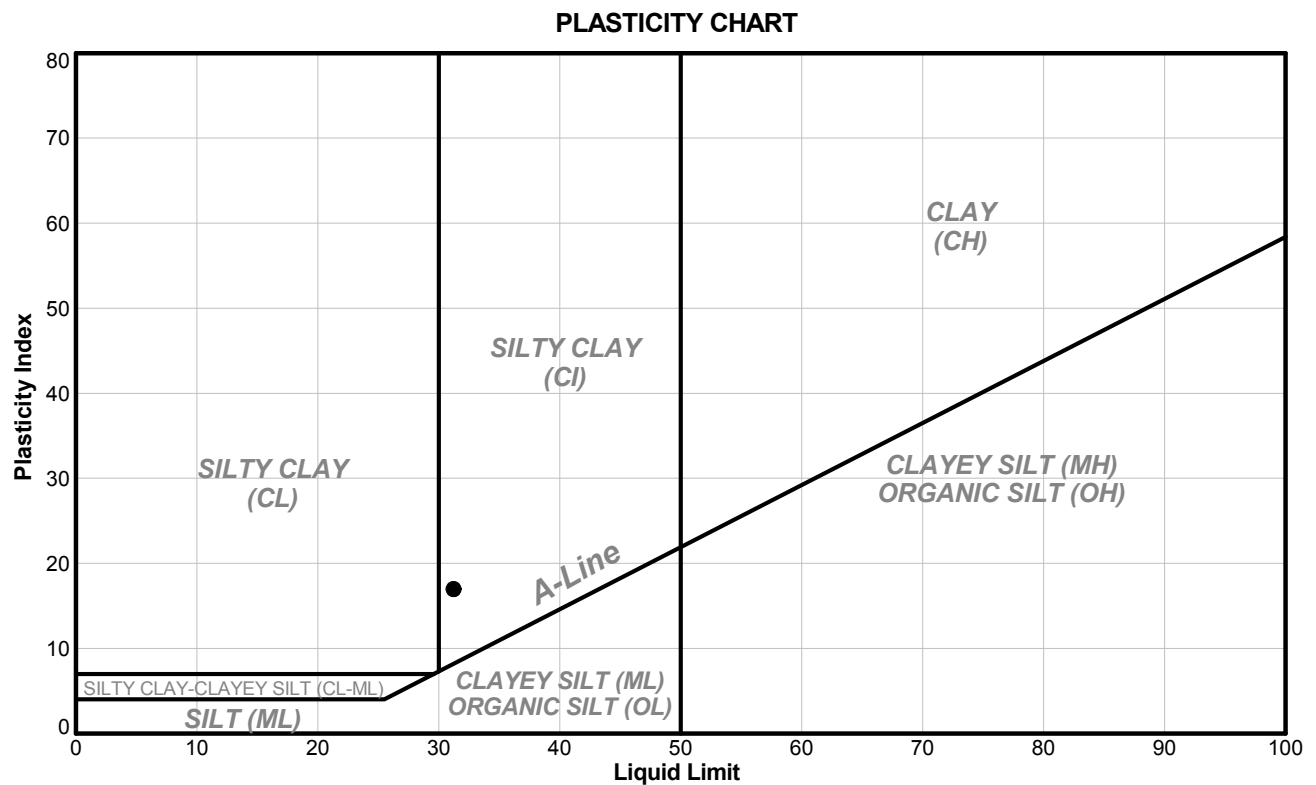
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-34S	29622	29.90	33.50	75	38	16	22.0	10.4	-0.3

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	3/19/2019	LP	3/27/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-35S
Project:	Explore 0112	Sample No.:	29624
Location:		Depth Interval (m):	5.50 to 6.10
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



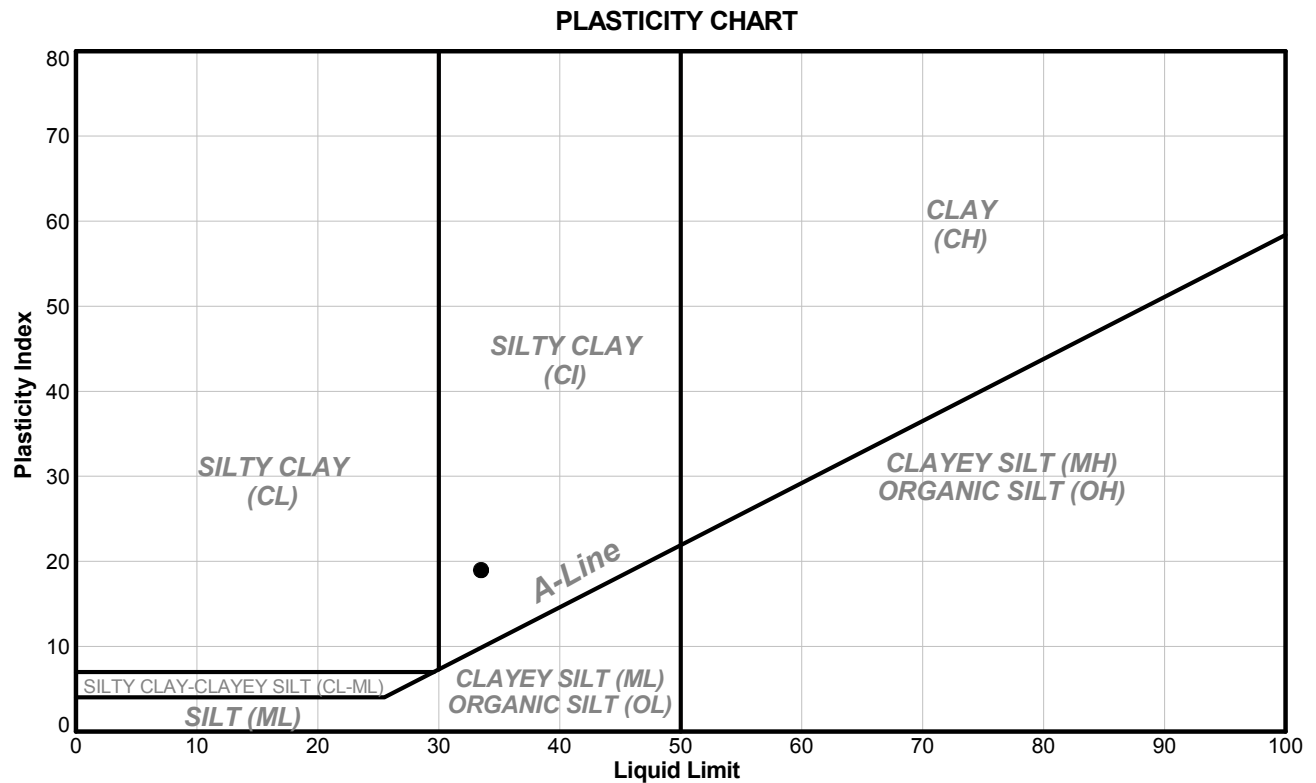
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-35S	29624	5.50	6.10	75	31	14	17.0	12.4	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RZ	3/20/2019	LP	3/28/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-35S
Project:	Explore 0112	Sample No.:	35143
Location:		Depth Interval (m):	22.30 to 22.90
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



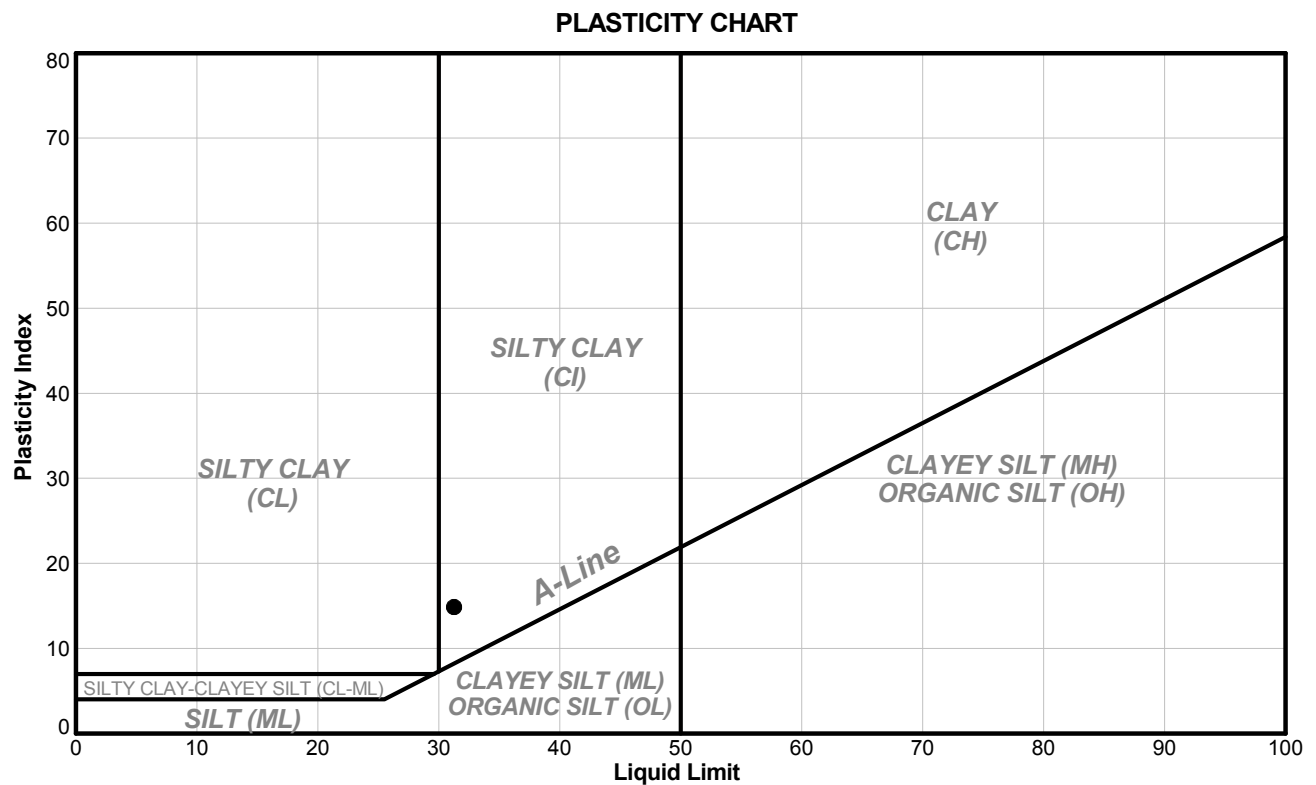
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-35S	35143	22.30	22.90	75	33	15	18.0	10.2	-0.3

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RZ	3/20/2019	LP	3/28/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-20S
Project:	Explore 0112	Sample No.:	35057
Location:		Depth Interval (m):	19.80 to 20.40
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



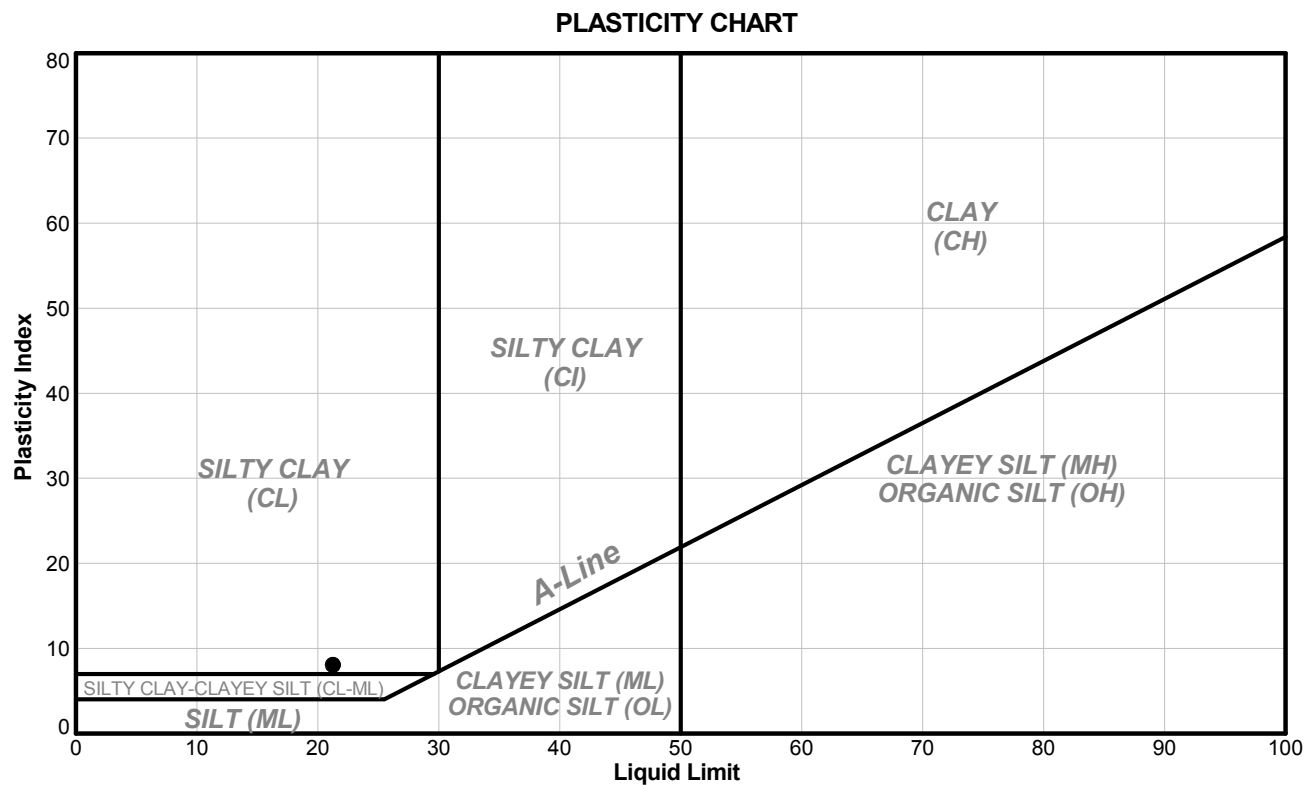
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-20S	35057	19.80	20.40	70	31	16	15.0	12.8	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RG	4/29/2019	LP	5/1/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-20S
Project:	Explore 0112	Sample No.:	35059
Location:		Depth Interval (m):	24.40 to 25.00
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



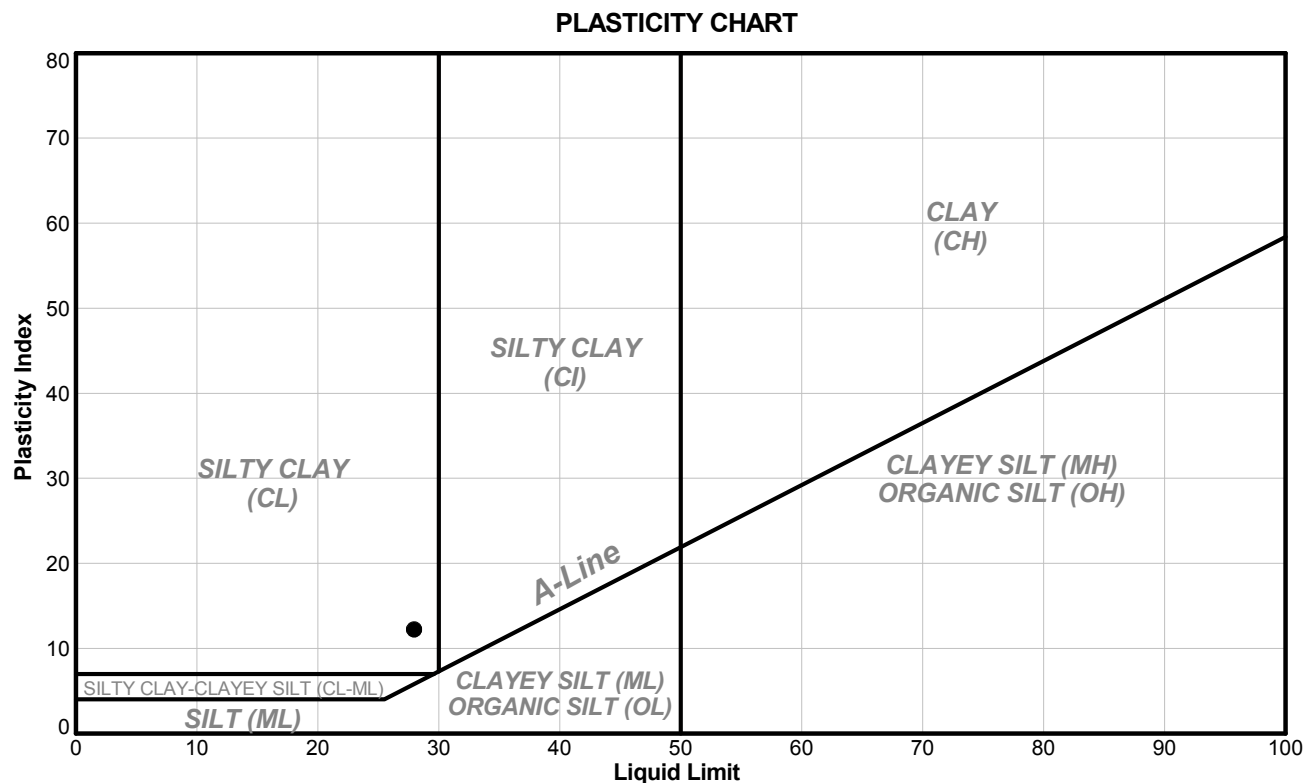
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-20S	35059	24.40	25.00	94	21	13	8.0	16.9	0.5

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RG	4/29/2019	LP	5/1/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-20S
Project:	Explore 0112	Sample No.:	35063
Location:		Depth Interval (m):	42.10 to 42.70
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



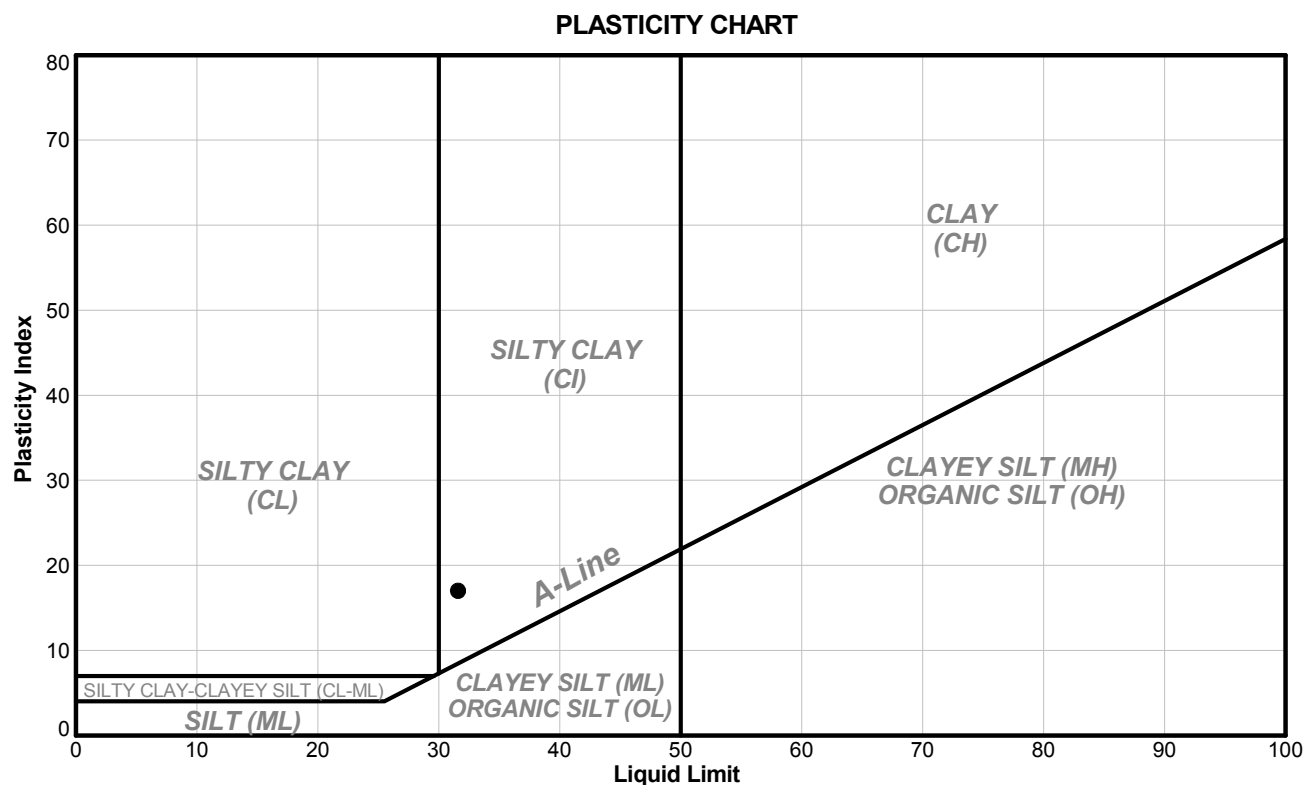
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-20S	35063	42.10	42.70	30	28	16	12.0	12.5	-0.3

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RG	4/30/2019	LP	5/1/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-23S
Project:	Explore 0112	Sample No.:	29676
Location:		Depth Interval (m):	1.10 to 1.50
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



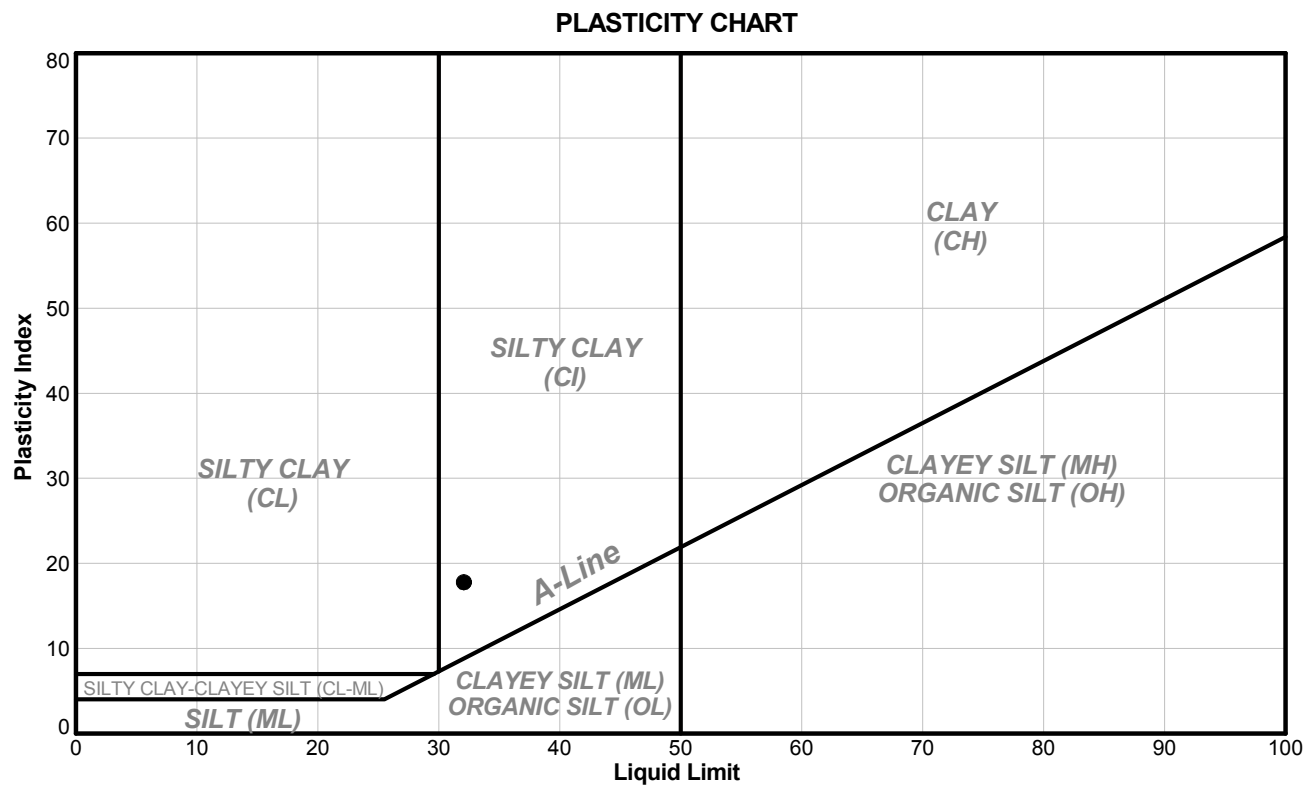
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-23S	29676	1.10	1.50	65	32	15	17.0	12.5	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-24S
Project:	Explore 0112	Sample No.:	29682
Location:		Depth Interval (m):	7.00 to 7.60
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



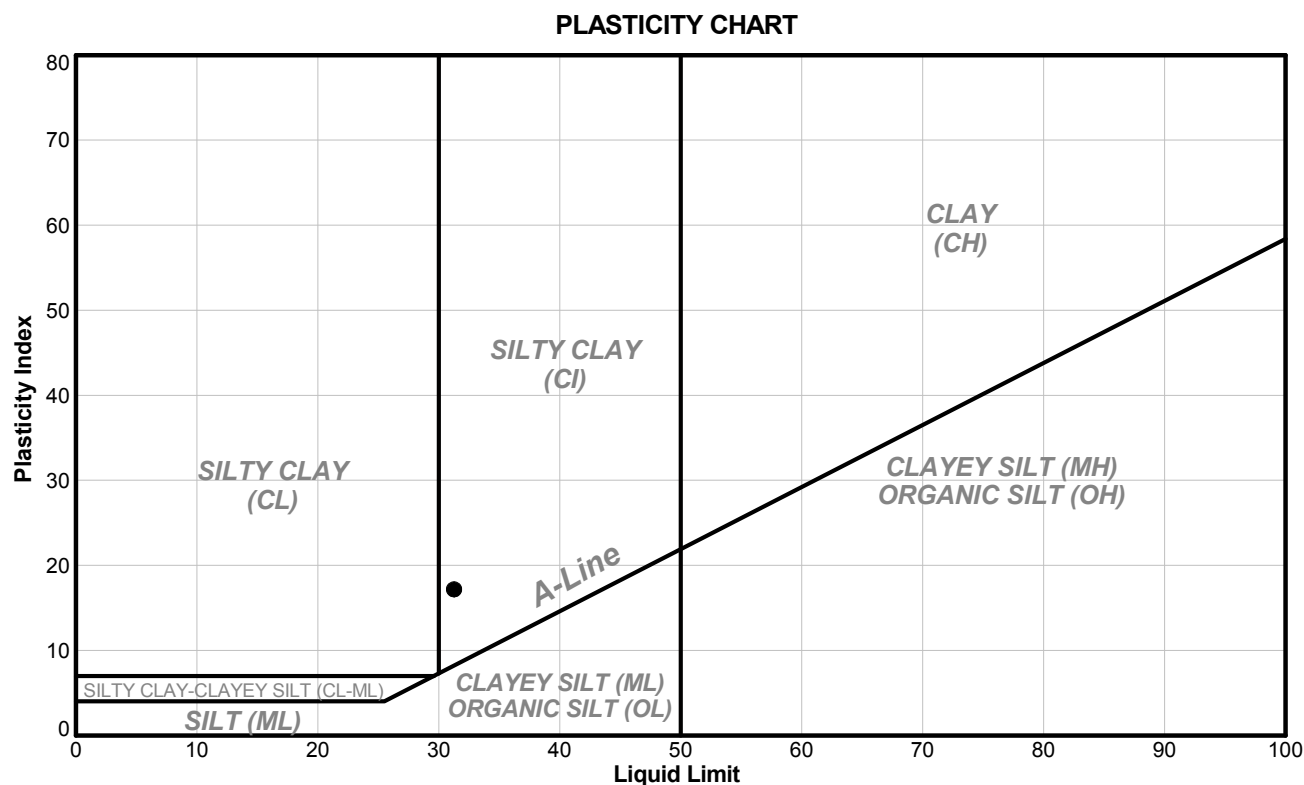
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-24S	29682	7.00	7.60	65	32	14	18.0	12.5	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-24S
Project:	Explore 0112	Sample No.:	29685
Location:		Depth Interval (m):	16.20 to 16.80
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



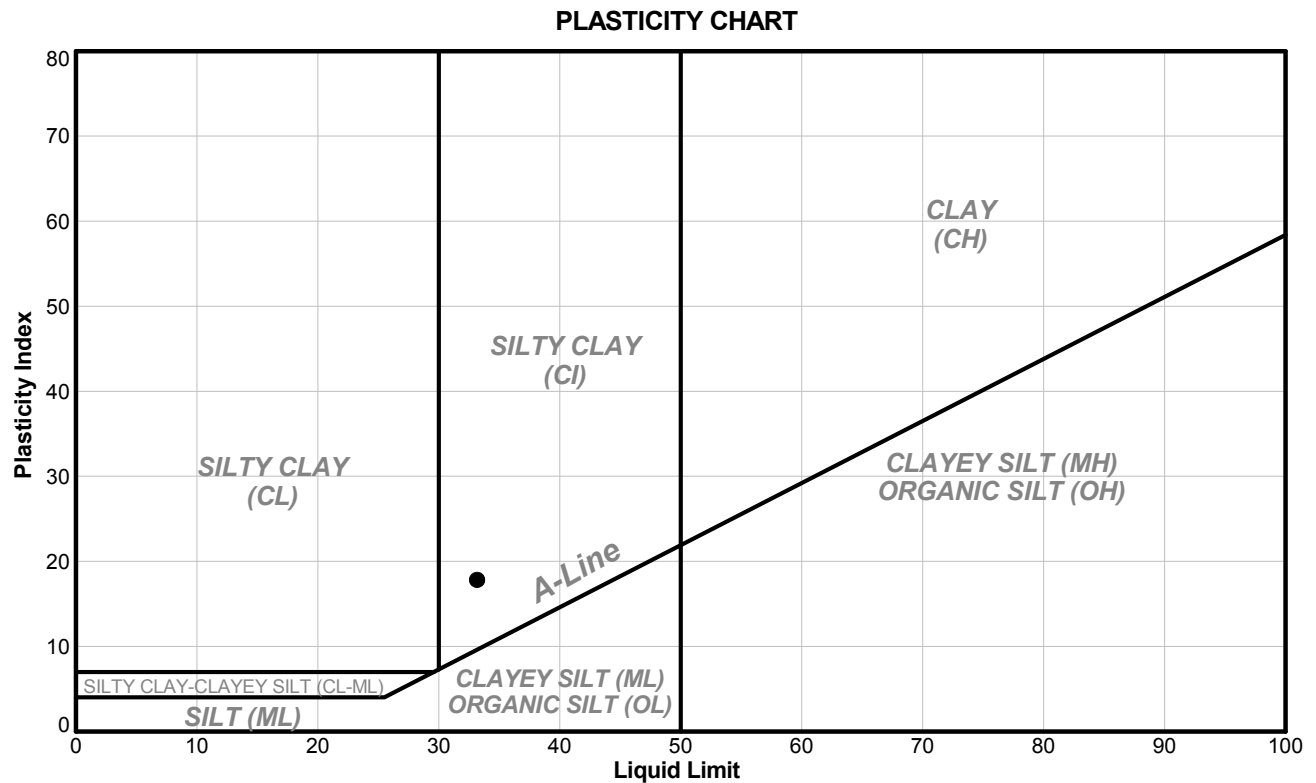
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-24S	29685	16.20	16.80	68	31	14	17.0	11.3	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-25S
Project:	Explore 0112	Sample No.:	29689
Location:		Depth Interval (m):	8.20 to 8.80
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



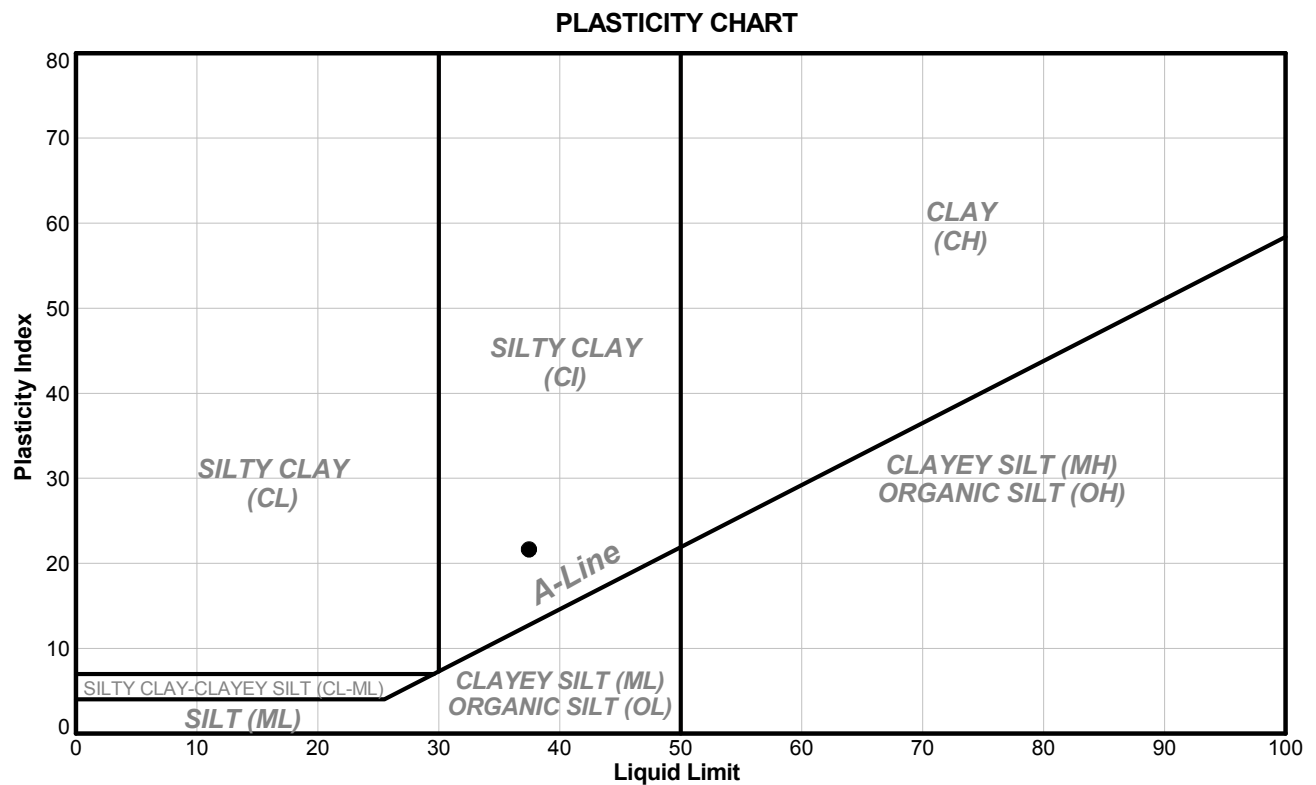
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-25S	29689	8.20	8.80	65	33	15	18.0	11.7	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/2/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-49TP
Project:	Explore 0112	Sample No.:	29674
Location:		Depth Interval (m):	2.90 to 3.10
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



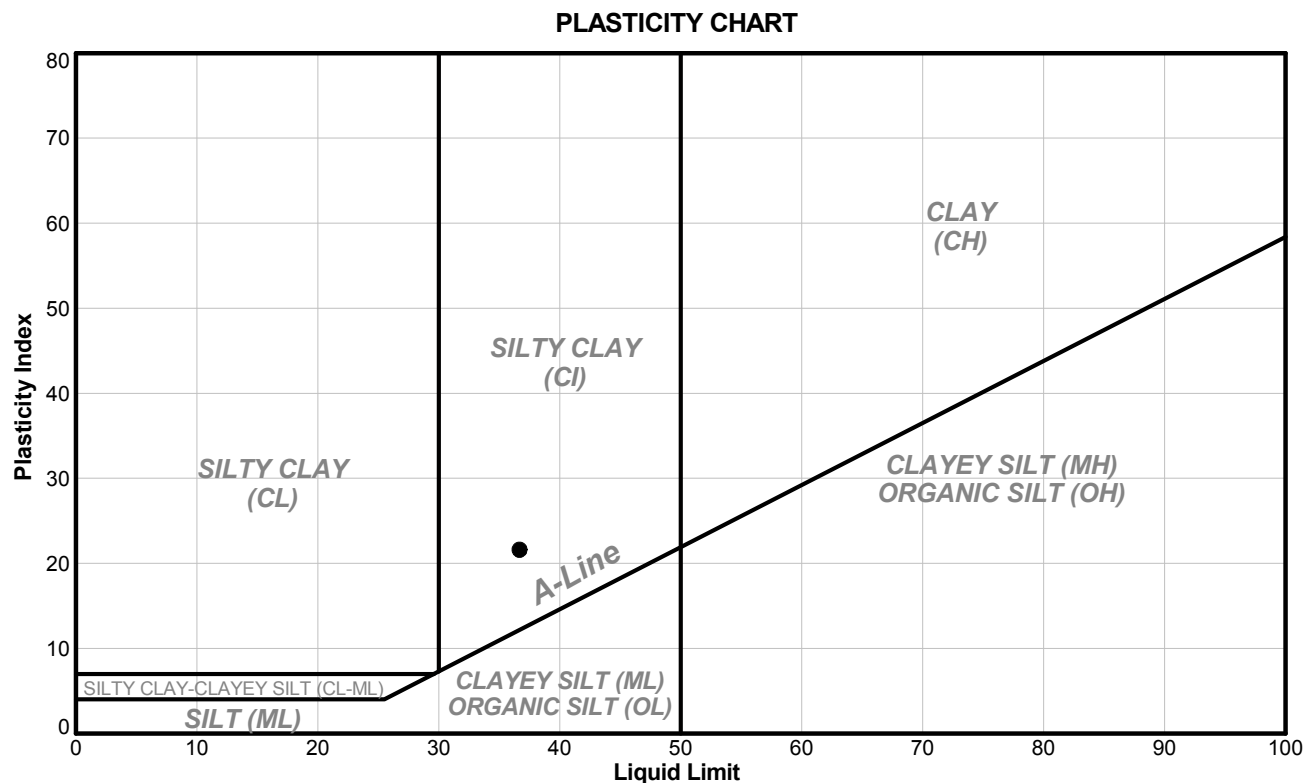
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-49TP	29674	2.90	3.10	68	37	16	21.0	12.6	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-50TP
Project:	Explore 0112	Sample No.:	35047
Location:		Depth Interval (m):	3.50 to 3.70
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



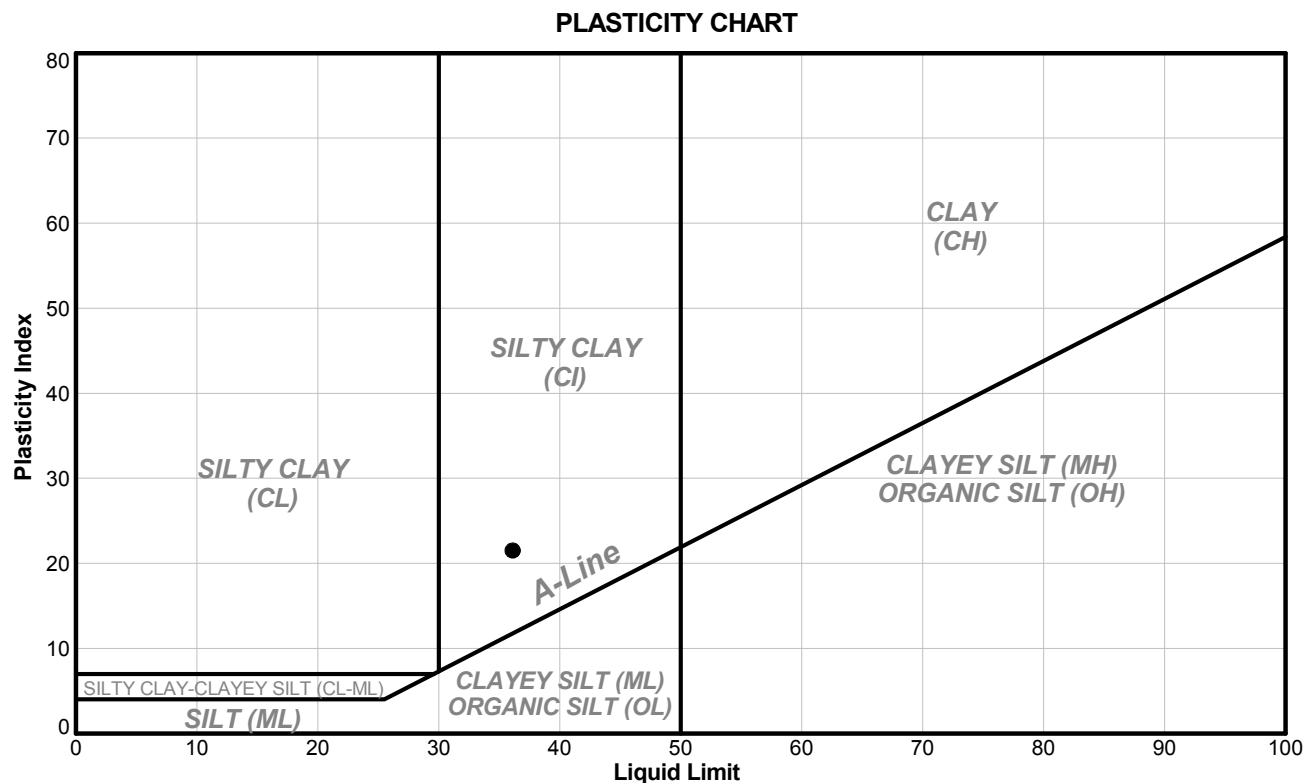
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-50TP	35047	3.50	3.70	ND	37	15	22.0	11.4	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-51TP
Project:	Explore 0112	Sample No.:	35049
Location:		Depth Interval (m):	2.30 to 2.50
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-51TP	35049	2.30	2.50	ND	36	15	21.0	10.3	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

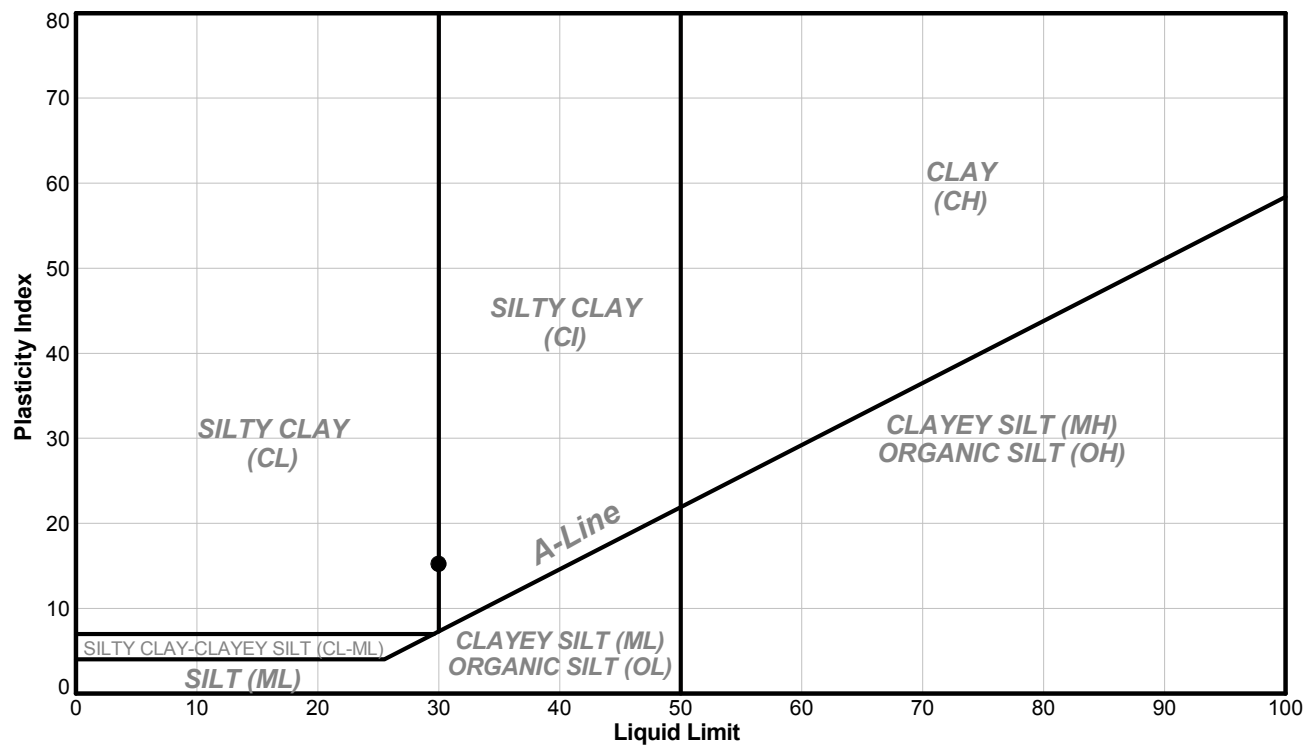
ID: 19-52TP
Sample No.: 29690
Depth Interval (m): 1.10 to 1.30
Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



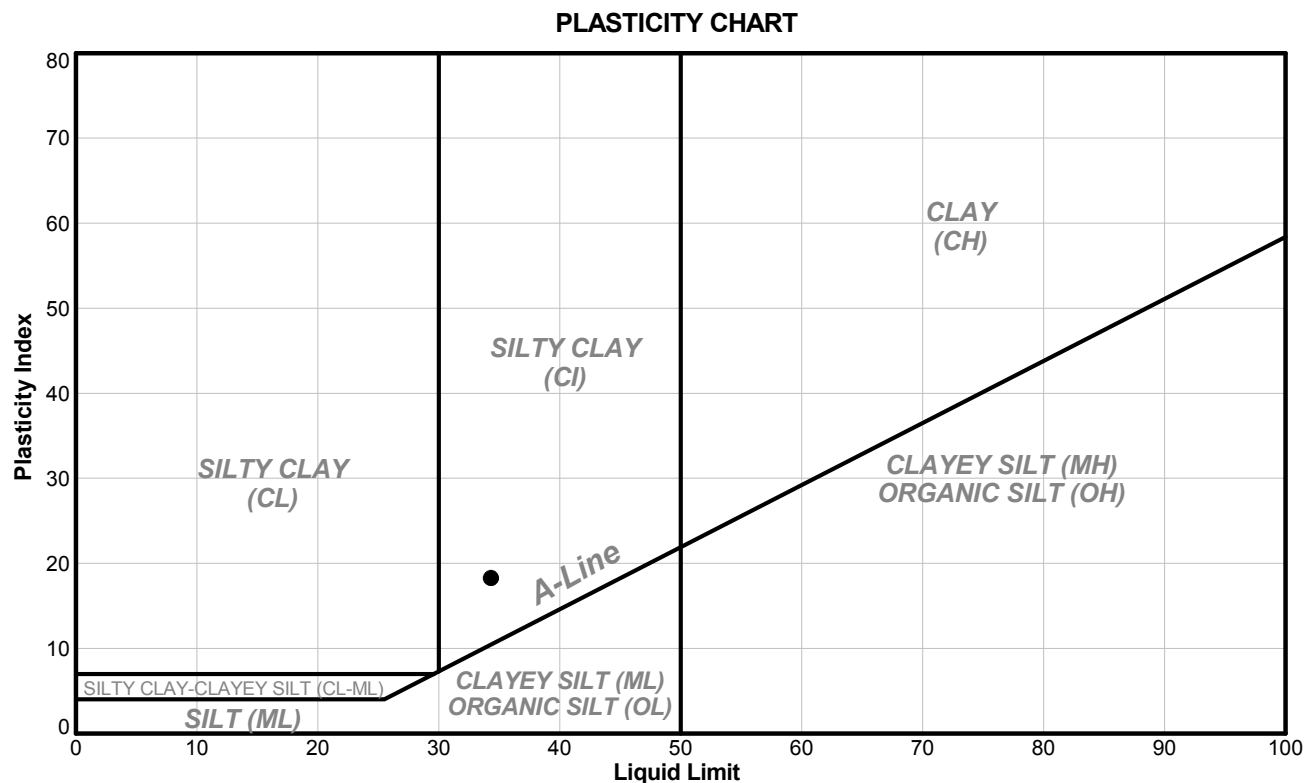
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-52TP	29690	1.10	1.30	56	30	15	15.0	12.6	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/1/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-53TP
Project:	Explore 0112	Sample No.:	29692
Location:		Depth Interval (m):	0.50 to 0.70
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



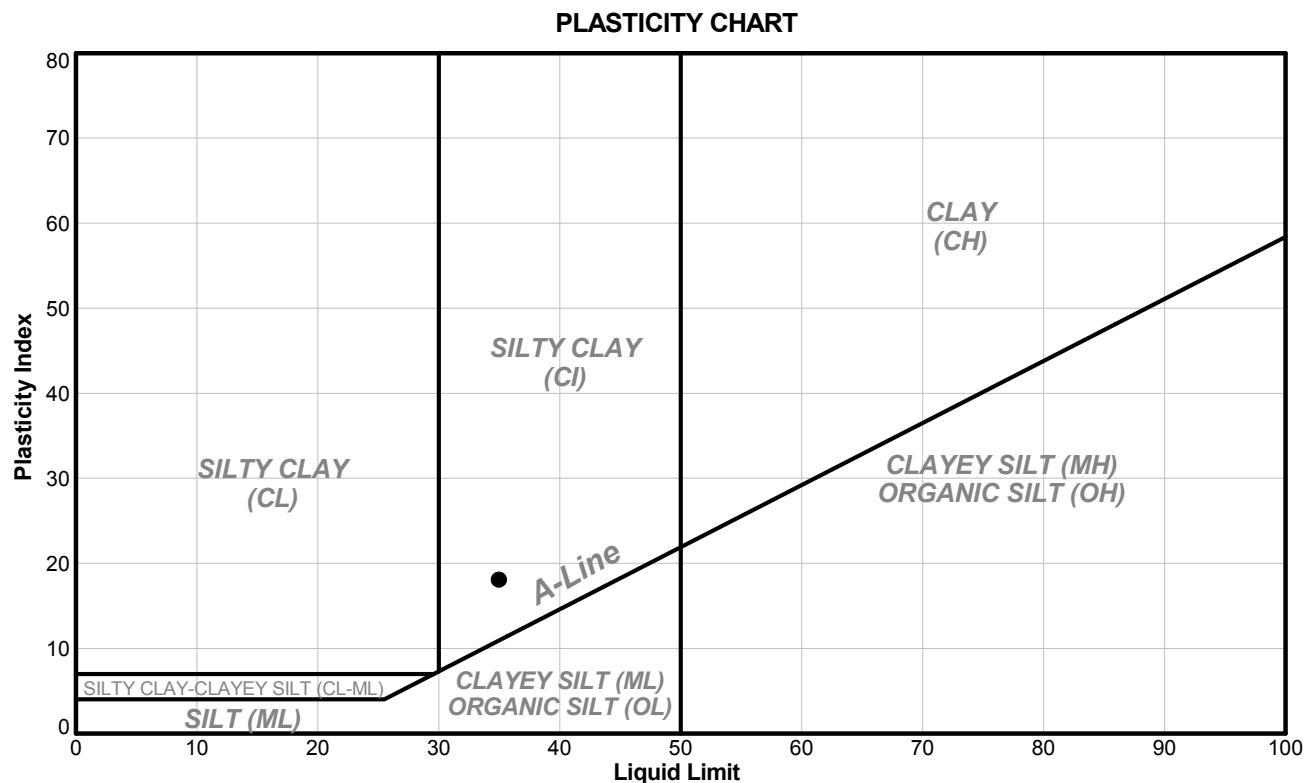
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-53TP	29692	0.50	0.70	49	34	16	18.0	10.1	-0.3

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/2/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-53TP
Project:	Explore 0112	Sample No.:	29693
Location:		Depth Interval (m):	1.70 to 1.90
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried



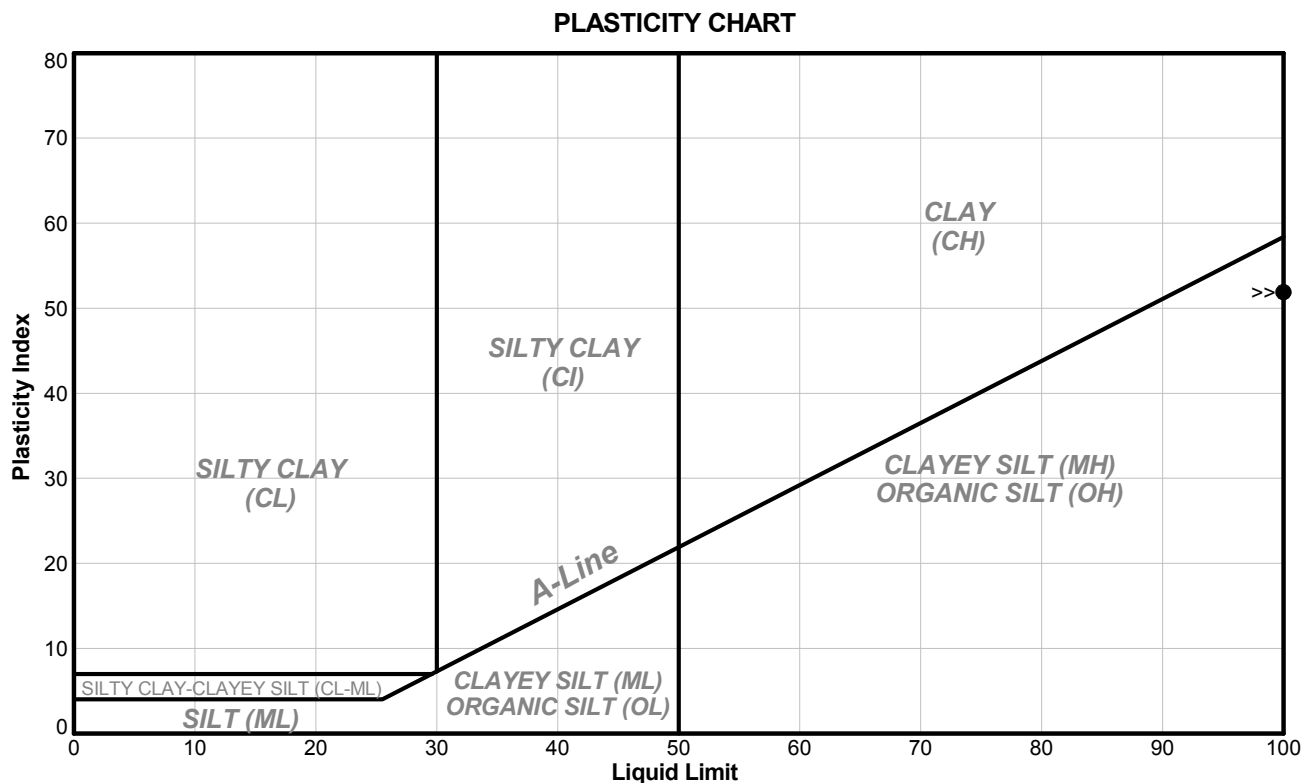
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-53TP	29693	1.70	1.90	60	35	17	18.0	14.1	-0.2

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

FF	5/2/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-55TP
Project:	Explore 0112	Sample No.:	29696
Location:		Depth Interval (m):	0.00 to 0.20
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Wet



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-55TP	29696	0.00	0.20	ND	180	128	52.0	157.3	0.6

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

RG	4/30/2019	LP	5/1/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
 Project: Explore 0112
 Location:
 Project No.: 18109666 Phase: 2000

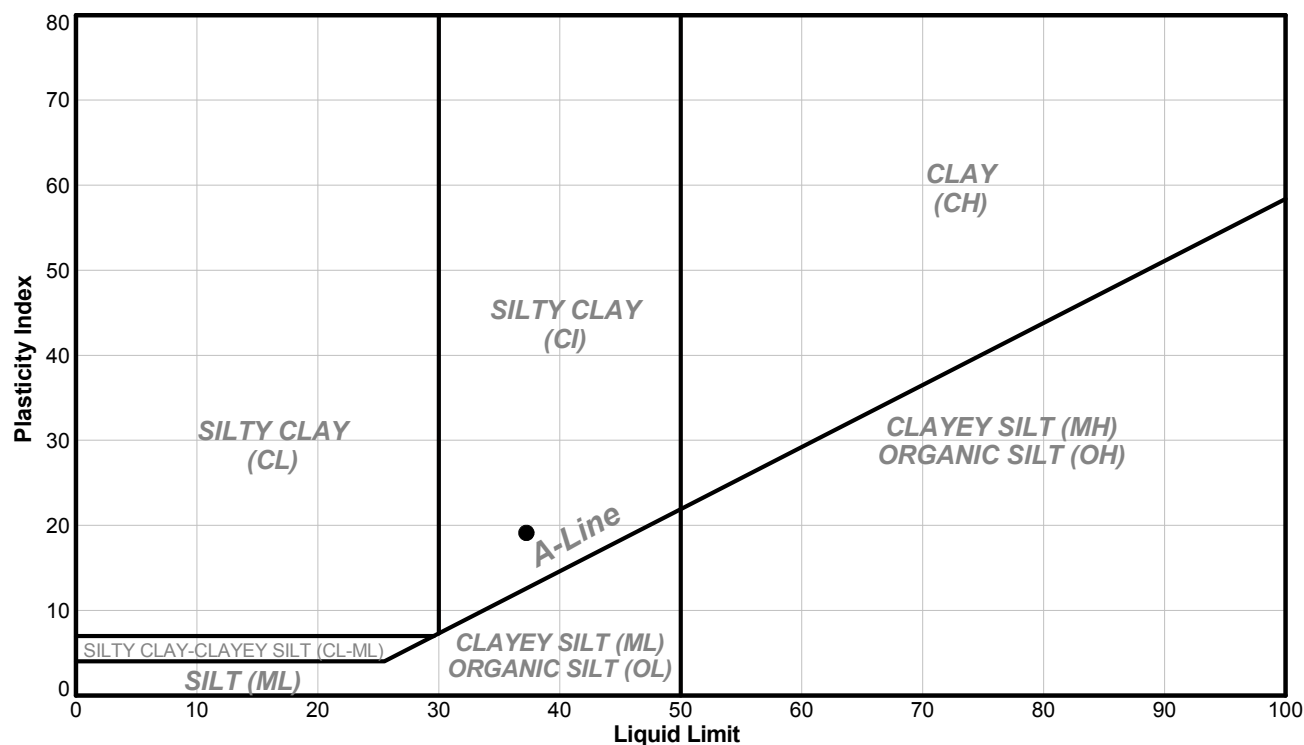
ID: 19-55TP
 Sample No.: 29697
 Depth Interval (m): 1.10 to 1.30
 Lab Schedule No.:

Other Remarks: N/A

Test Method: A-Multi Point

Preparation Method: Air Dried

PLASTICITY CHART



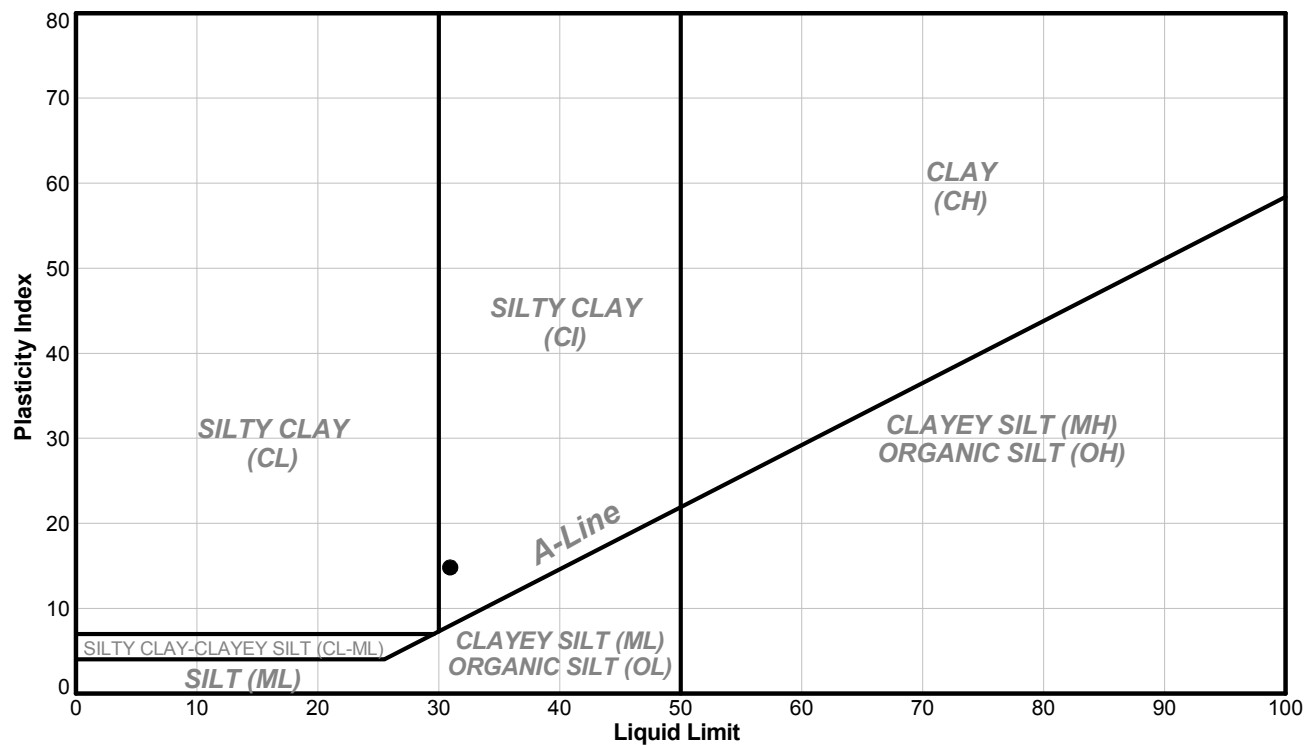
Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-55TP	29697	1.10	1.30	49	37	18	19.0	15.6	-0.1

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/2/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client:	Telkwa Coal Ltd.	ID:	19-57TP
Project:	Explore 0112	Sample No.:	35023
Location:		Depth Interval (m):	1.10 to 1.30
Project No.:	18109666 Phase: 2000	Lab Schedule No.:	
Other Remarks:	N/A		
Test Method:	A-Multi Point	Preparation Method:	Air Dried

PLASTICITY CHART


Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	19-57TP	35023	1.10	1.30	58	31	16	15.0	11.5	-0.3

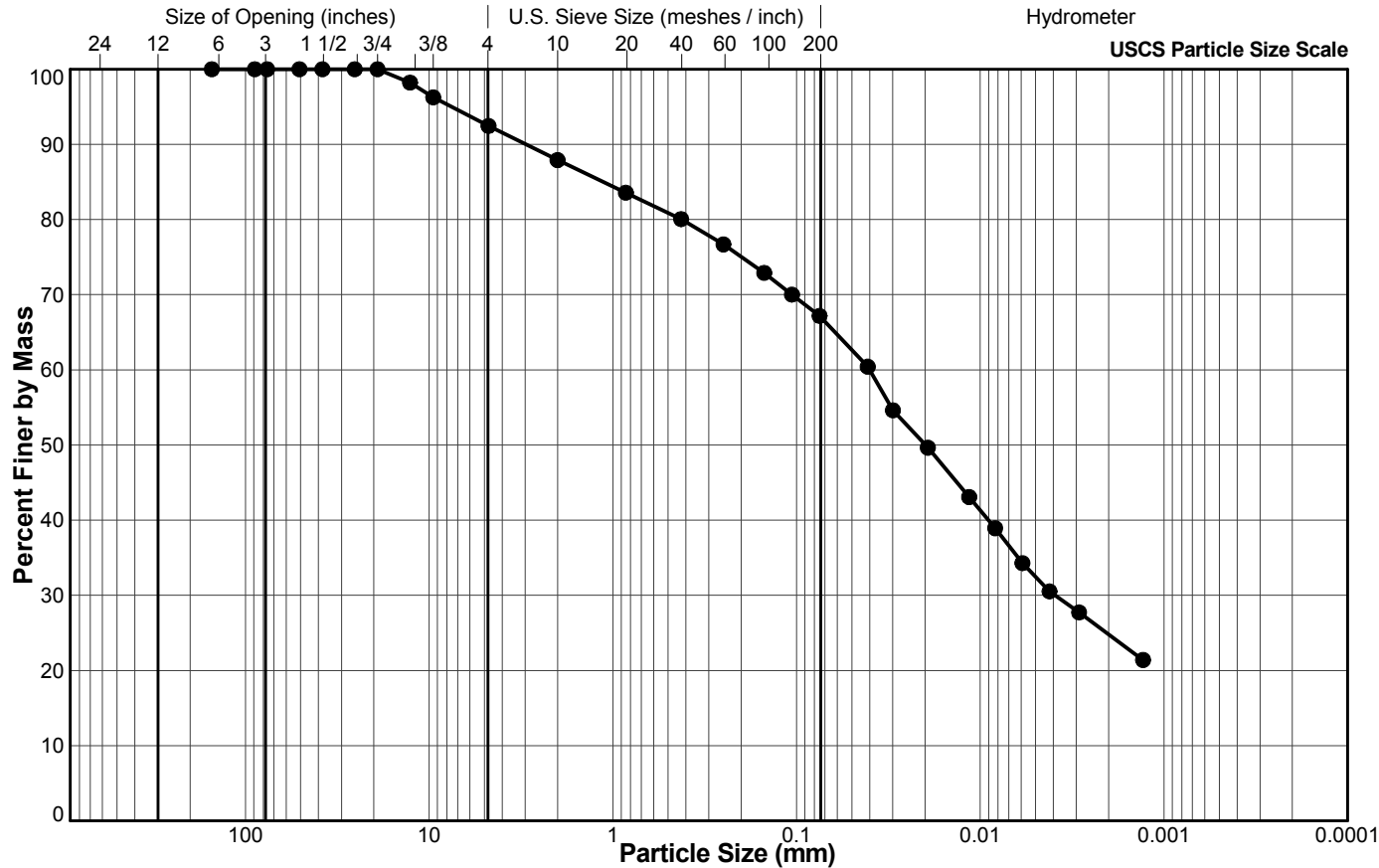
NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

BJ	5/2/2019	LP	5/3/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-18S
Sample No.: 35077
Depth Interval (m): 6.30 to 6.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	98.2
3/8"	9.5	96.3
#4 US MESH	4.75	92.5
#10 US MESH	2	87.9
#20 US MESH	0.85	83.6
#40 US MESH	0.425	80.1
#60 US MESH	0.25	76.7
#100 US MESH	0.15	72.9
#140 US MESH	0.106	70.0
#200 US MESH	0.075	67.2
	0.0410	60.4
	0.0299	54.6
	0.0193	49.6
	0.0115	43.1
	0.0083	38.9
	0.0059	34.3
	0.0042	30.5
	0.0029	27.7
	0.0013	21.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/21/2019

LP

3/27/2019

Tech

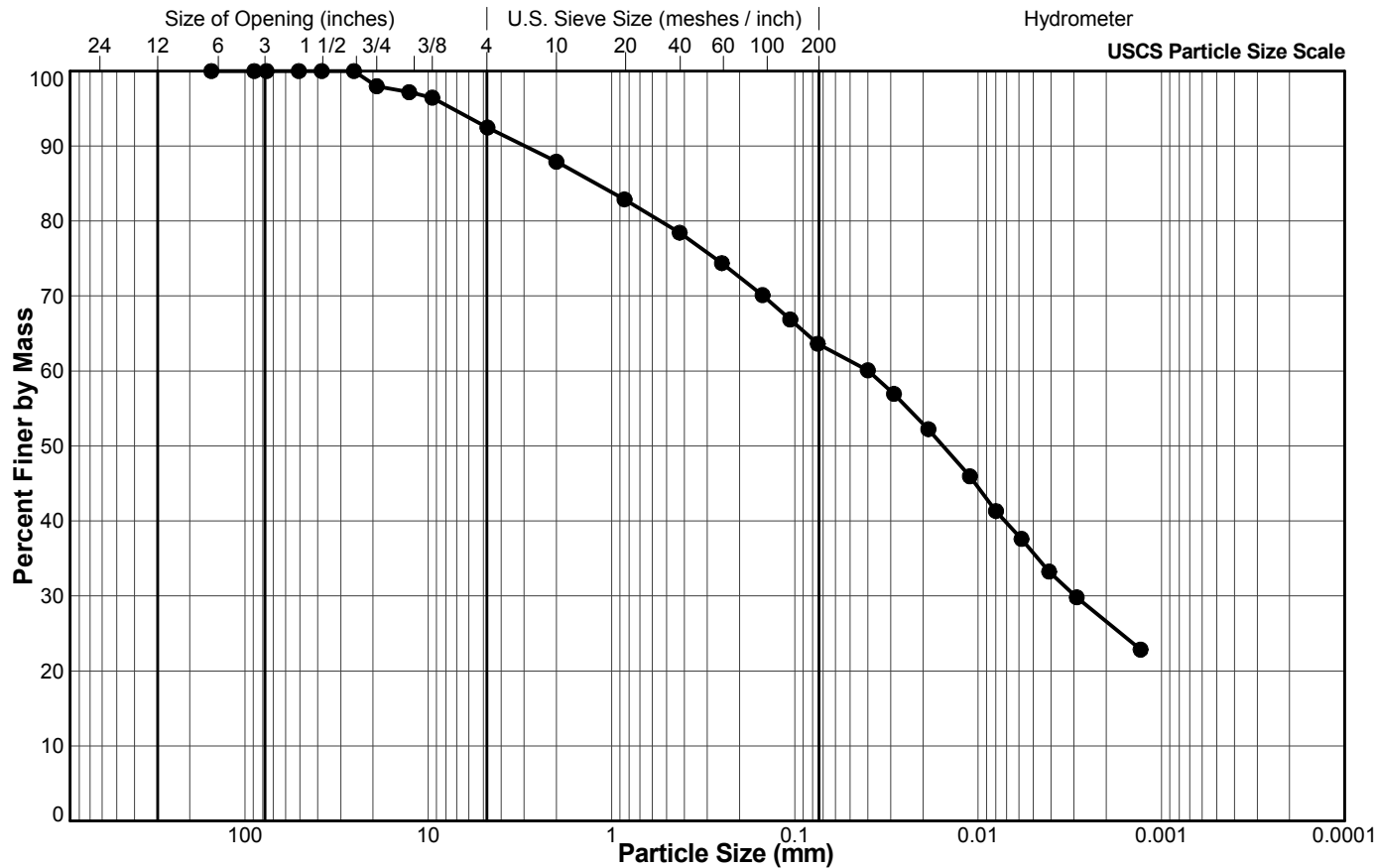
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-18S
Sample No.: 35080
Depth Interval (m): 15.40 to 15.80
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	98.0
1/2"	12.7	97.2
3/8"	9.5	96.5
#4 US MESH	4.75	92.5
#10 US MESH	2	87.9
#20 US MESH	0.85	82.9
#40 US MESH	0.425	78.4
#60 US MESH	0.25	74.4
#100 US MESH	0.15	70.1
#140 US MESH	0.106	66.9
#200 US MESH	0.075	63.6
	0.0400	60.1
	0.0288	56.9
	0.0187	52.2
	0.0111	46.0
	0.0080	41.3
	0.0058	37.6
	0.0041	33.2
	0.0029	29.8
	0.0013	22.8

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/21/2019

LP

3/27/2019

Tech

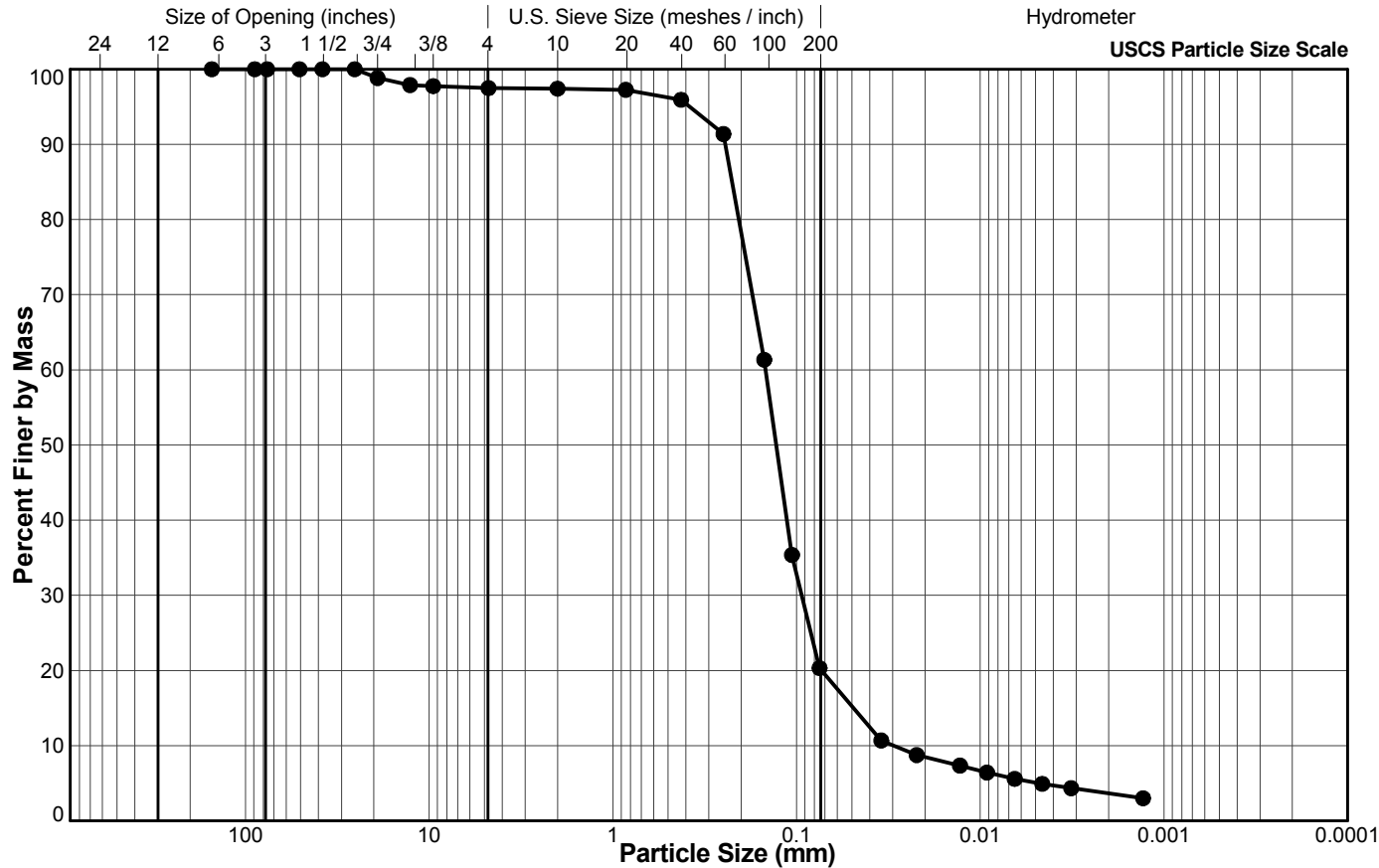
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-18S
Sample No.: 35084
Depth Interval (m): 29.00 to 29.60
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	98.8
1/2"	12.7	97.9
3/8"	9.5	97.7
#4 US MESH	4.75	97.5
#10 US MESH	2	97.4
#20 US MESH	0.85	97.3
#40 US MESH	0.425	95.9
#60 US MESH	0.25	91.4
#100 US MESH	0.15	61.3
#140 US MESH	0.106	35.4
#200 US MESH	0.075	20.3
	0.0346	10.7
	0.0222	8.7
	0.0129	7.3
	0.0092	6.4
	0.0065	5.6
	0.0046	4.9
	0.0032	4.3
	0.0013	3.0

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/21/2019

LH

3/27/2019

Tech

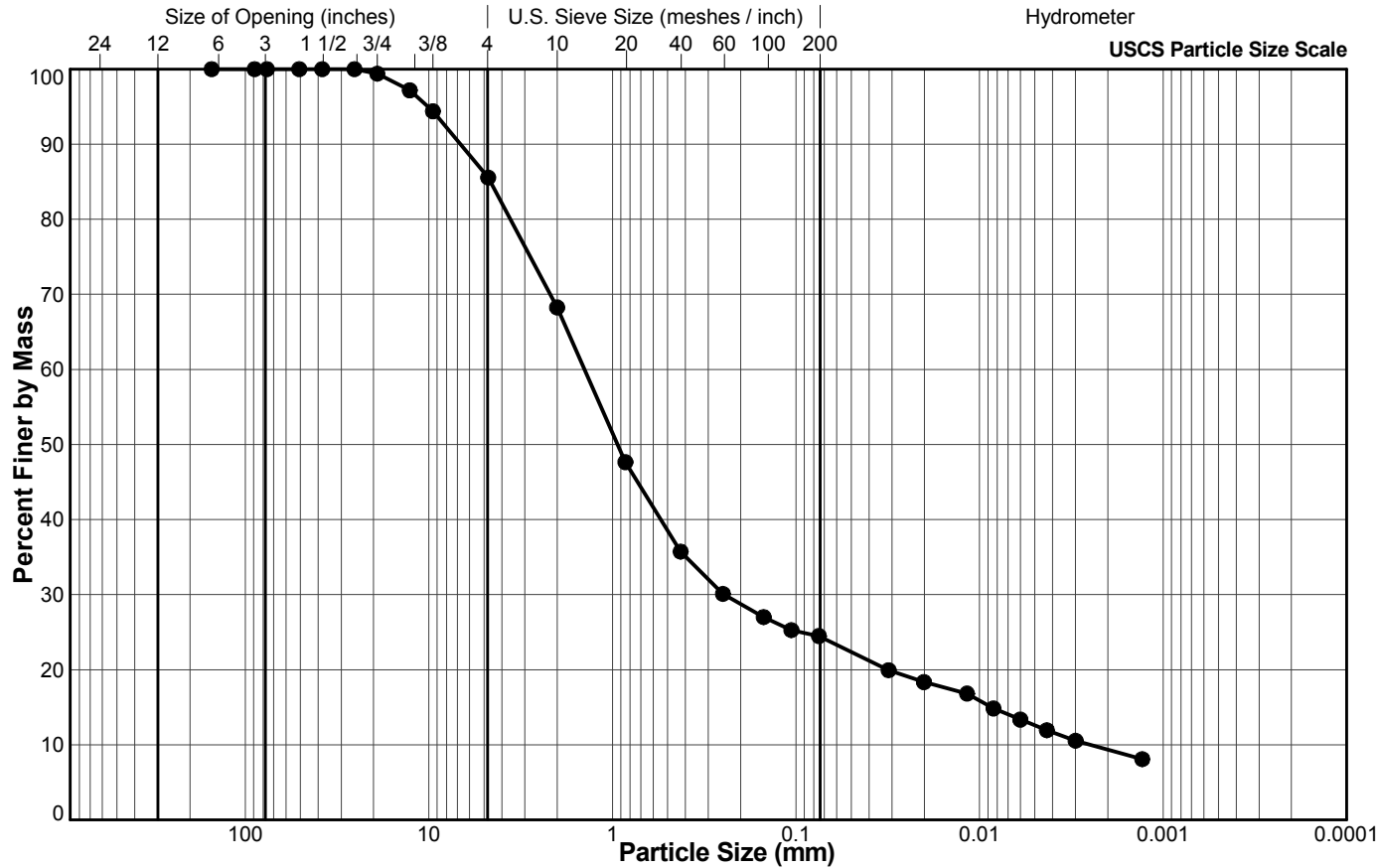
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-18S
Sample No.: 35085
Depth Interval (m): 34.70 to 35.40
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.4
1/2"	12.7	97.2
3/8"	9.5	94.4
#4 US MESH	4.75	85.6
#10 US MESH	2	68.3
#20 US MESH	0.85	47.7
#40 US MESH	0.425	35.7
#60 US MESH	0.25	30.1
#100 US MESH	0.15	27.0
#140 US MESH	0.106	25.3
#200 US MESH	0.075	24.5
	0.0313	19.9
	0.0201	18.4
	0.0117	16.8
	0.0084	14.8
	0.0060	13.4
	0.0043	11.9
	0.0030	10.5
	0.0013	8.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/21/2019

LP

3/27/2019

Tech

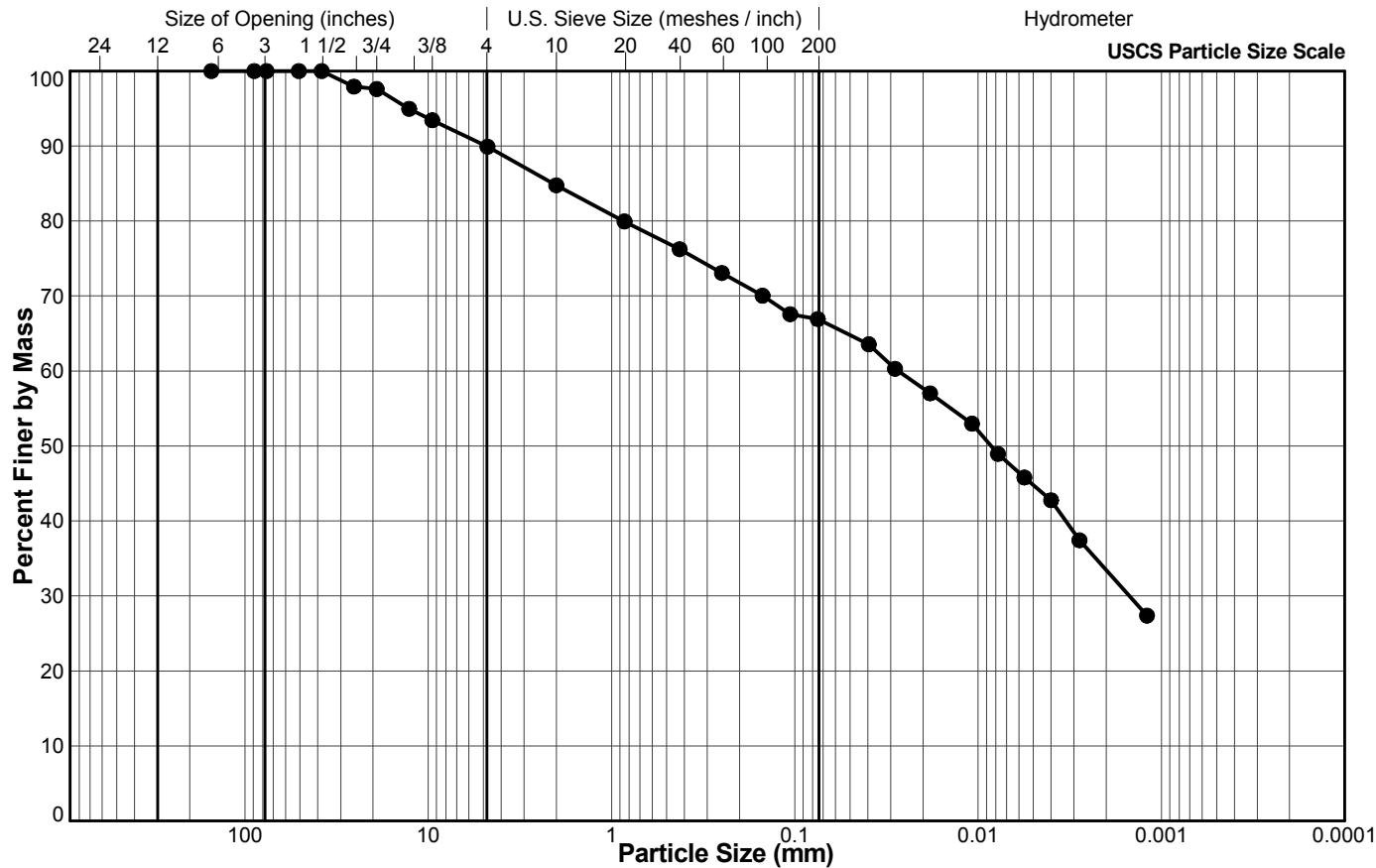
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-18S
Sample No.: 35086
Depth Interval (m): 42.20 to 42.70
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	97.9
3/4"	19.1	97.6
1/2"	12.7	95.0
3/8"	9.5	93.4
#4 US MESH	4.75	89.9
#10 US MESH	2	84.8
#20 US MESH	0.85	79.9
#40 US MESH	0.425	76.2
#60 US MESH	0.25	73.1
#100 US MESH	0.15	70.0
#140 US MESH	0.106	67.6
#200 US MESH	0.075	66.9
	0.0395	63.6
	0.0284	60.3
	0.0183	57.0
	0.0108	53.0
	0.0078	48.9
	0.0056	45.8
	0.0040	42.8
	0.0028	37.4
	0.0012	27.4

BOULDER		COBBLE		GRAVEL		SAND			FINES (Silt, Clay)
				Coarse	Fine	Coarse	Medium	Fine	

DC

3/21/2019

LP

3/27/2019

Tech

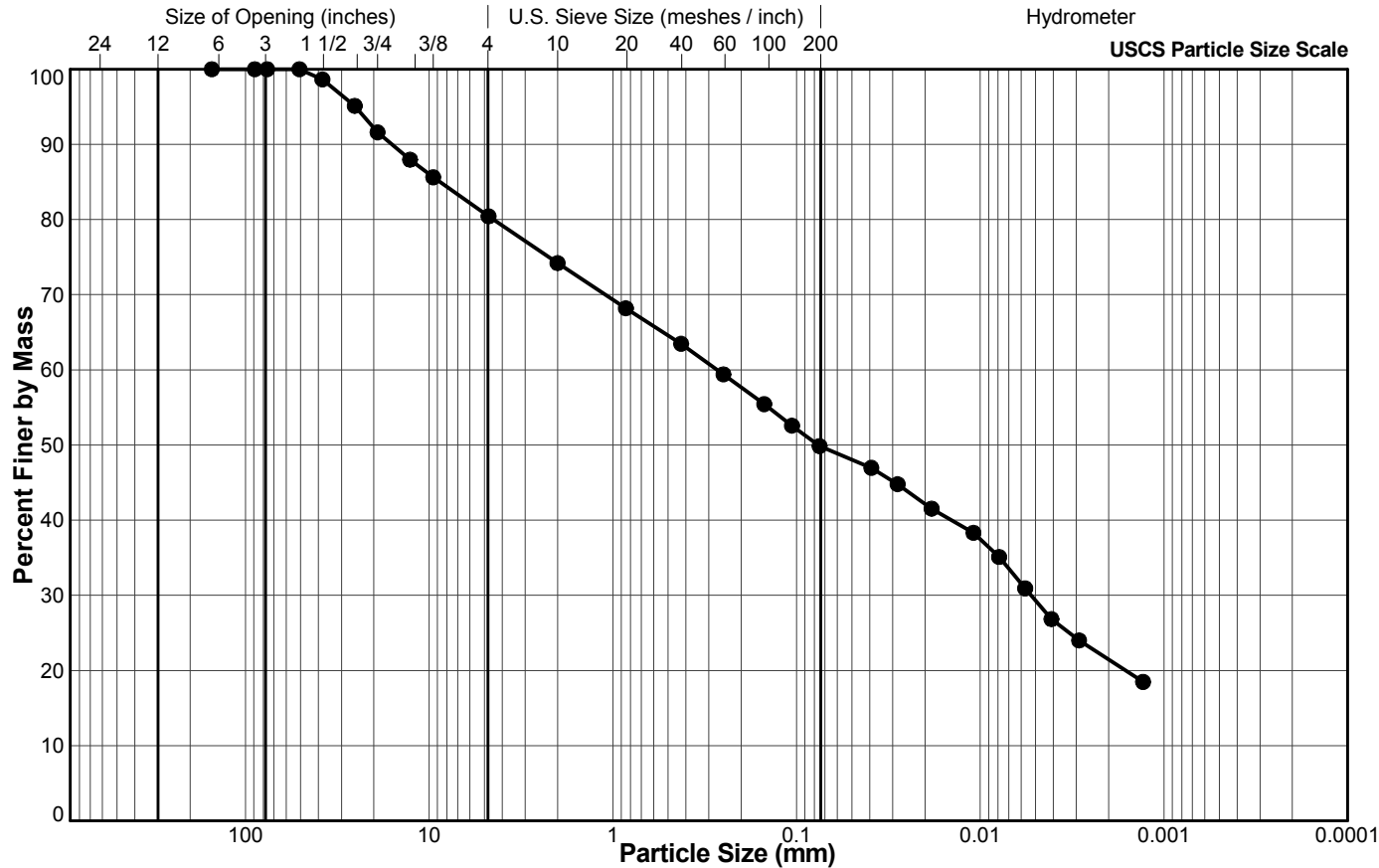
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35087
Depth Interval (m): 3.00 to 3.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	98.6
1"	25.4	95.1
3/4"	19.1	91.6
1/2"	12.7	88.0
3/8"	9.5	85.6
#4 US MESH	4.75	80.4
#10 US MESH	2	74.2
#20 US MESH	0.85	68.2
#40 US MESH	0.425	63.5
#60 US MESH	0.25	59.4
#100 US MESH	0.15	55.4
#140 US MESH	0.106	52.6
#200 US MESH	0.075	49.9
	0.0392	47.0
	0.0282	44.8
	0.0184	41.5
	0.0109	38.3
	0.0079	35.1
	0.0057	30.9
	0.0041	26.8
	0.0029	24.0
	0.0013	18.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

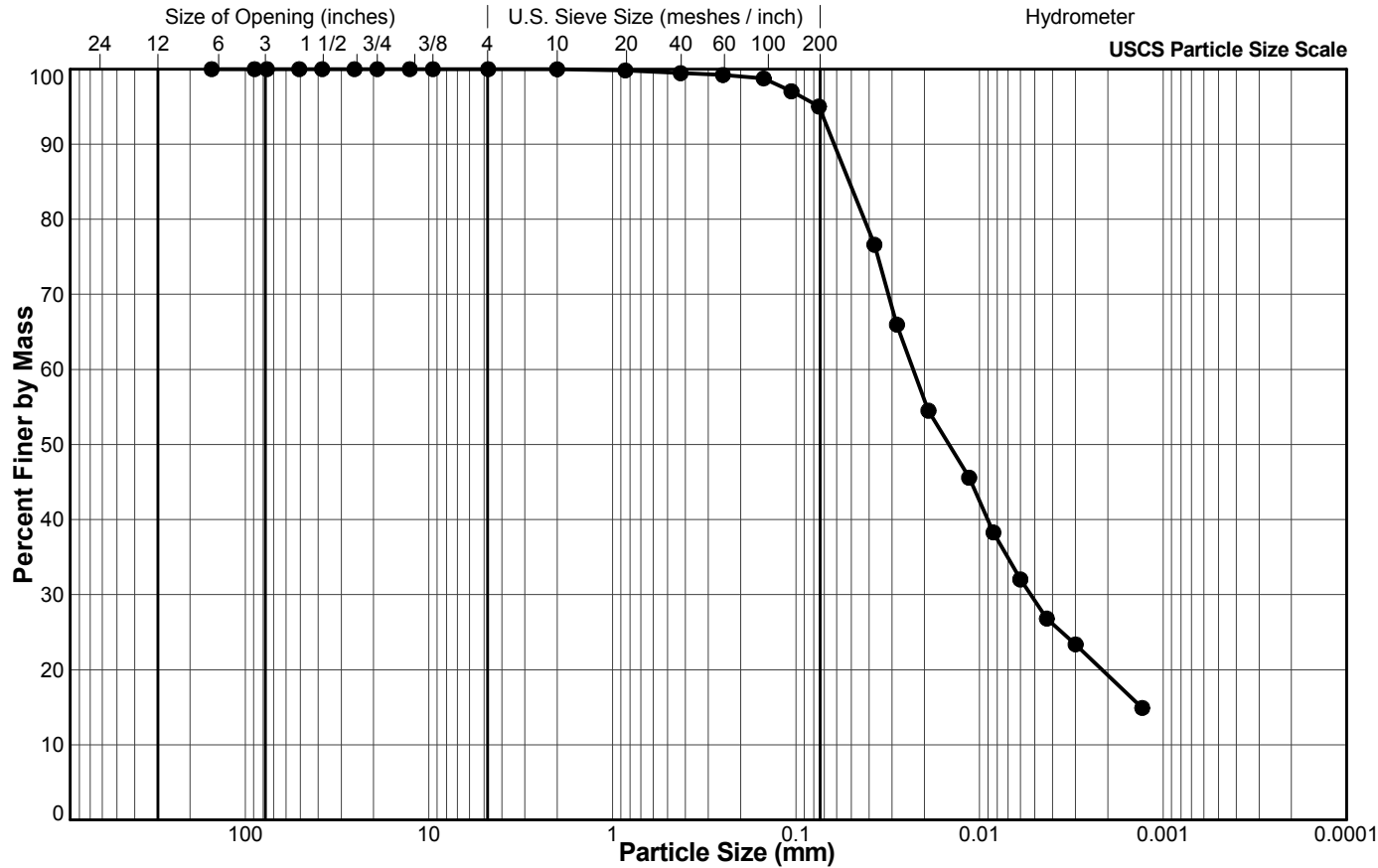
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35089
Depth Interval (m): 11.60 to 12.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	99.8
#40 US MESH	0.425	99.5
#60 US MESH	0.25	99.2
#100 US MESH	0.15	98.8
#140 US MESH	0.106	97.1
#200 US MESH	0.075	95.0
	0.0374	76.6
	0.0282	66.0
	0.0190	54.5
	0.0114	45.6
	0.0084	38.3
	0.0060	32.0
	0.0043	26.8
	0.0030	23.4
	0.0013	14.9

BOULDER	COBBLE	GRAVEL	SAND	FINES (Silt, Clay)
		Coarse	Coarse	
		Fine	Medium	
			Fine	

DC

3/12/2019

LP

3/27/2019

Tech

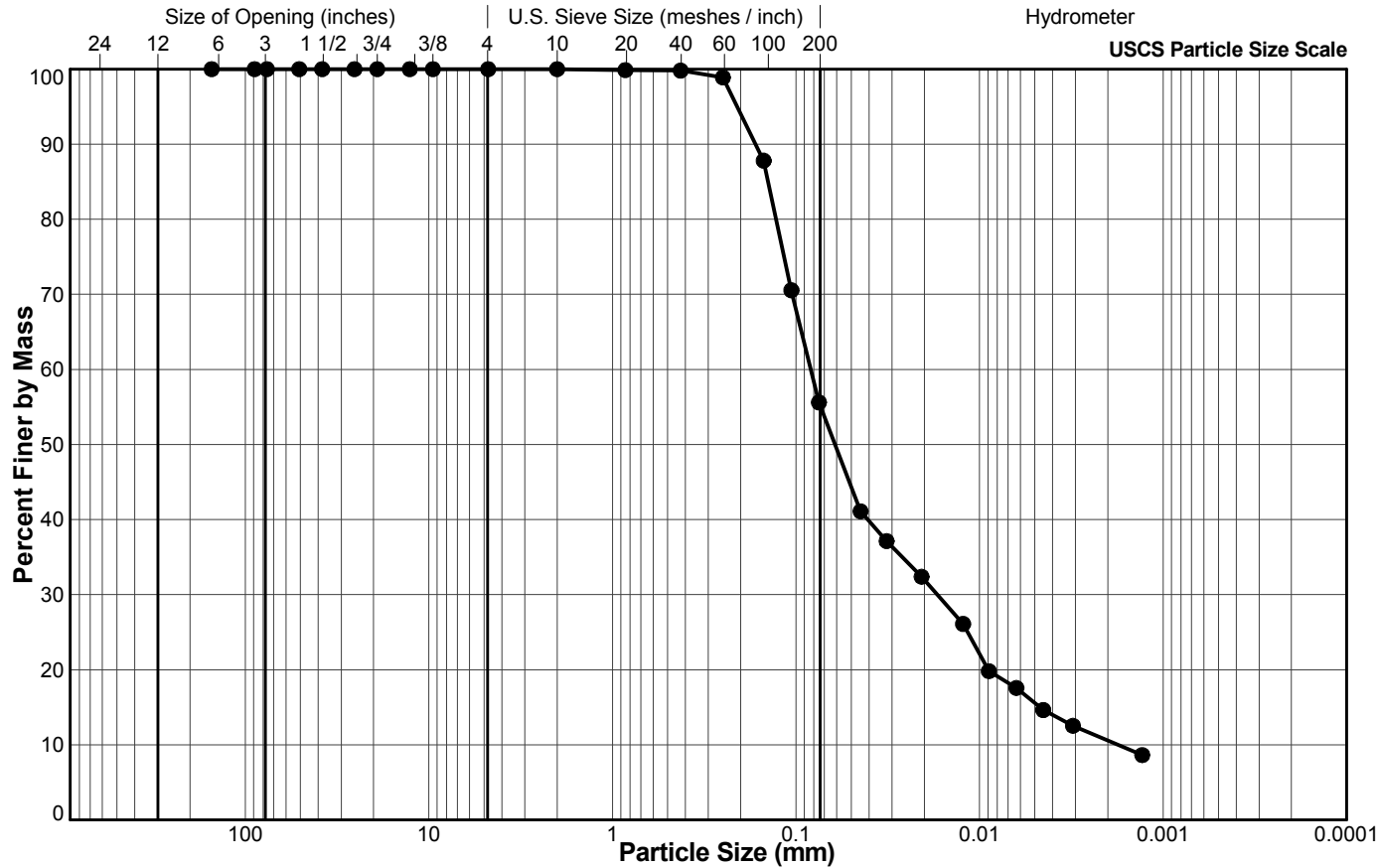
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35090
Depth Interval (m): 14.30 to 14.90
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	99.9
#40 US MESH	0.425	99.8
#60 US MESH	0.25	98.9
#100 US MESH	0.15	87.8
#140 US MESH	0.106	70.5
#200 US MESH	0.075	55.6
	0.0445	41.1
	0.0321	37.1
	0.0207	32.4
	0.0123	26.1
	0.0089	19.8
	0.0063	17.6
	0.0045	14.6
	0.0031	12.5
	0.0013	8.6

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

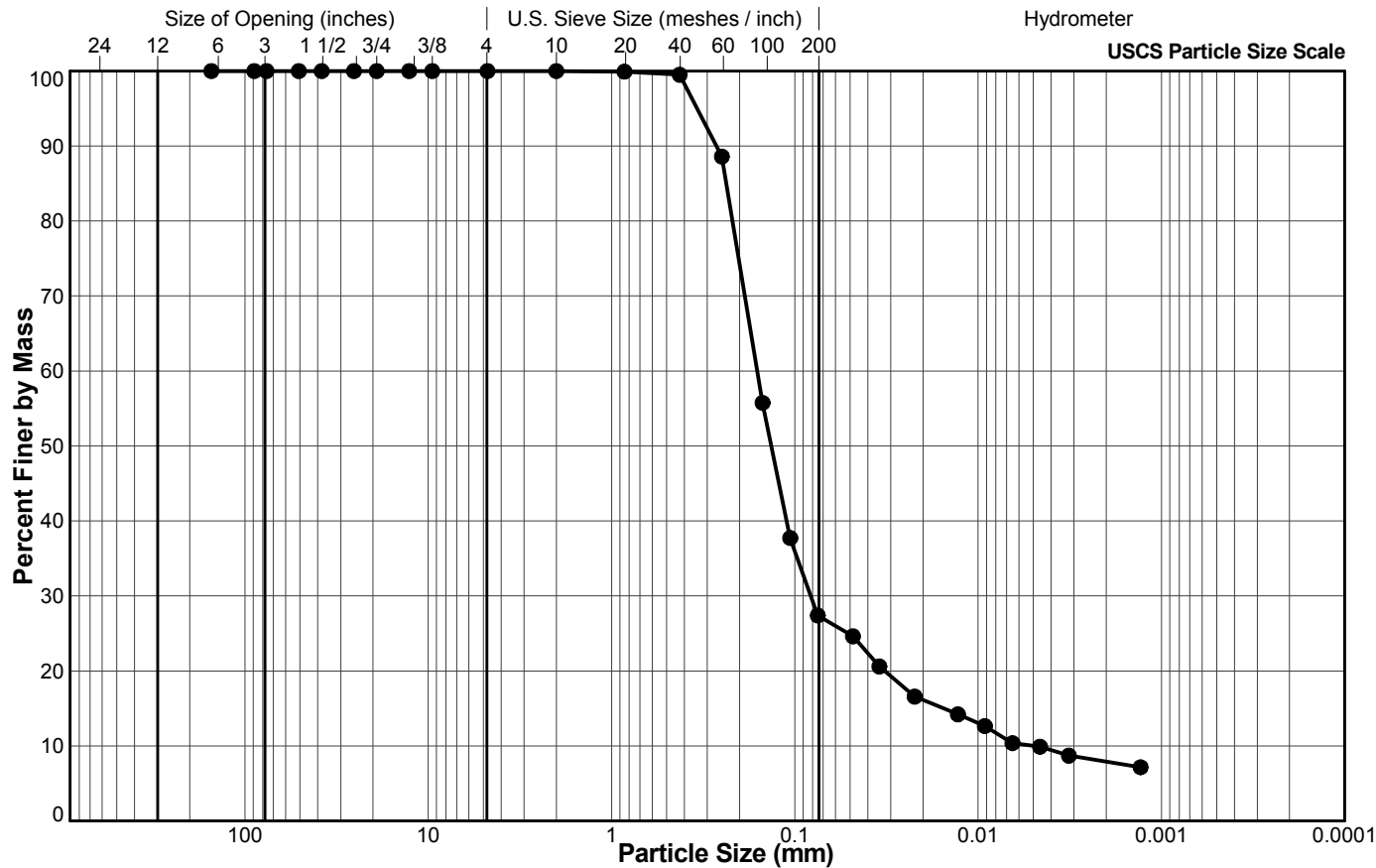
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35091
Depth Interval (m): 18.30 to 18.70
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	99.9
#40 US MESH	0.425	99.5
#60 US MESH	0.25	88.6
#100 US MESH	0.15	55.8
#140 US MESH	0.106	37.7
#200 US MESH	0.075	27.4
	0.0482	24.6
	0.0346	20.6
	0.0222	16.6
	0.0129	14.2
	0.0092	12.6
	0.0065	10.4
	0.0046	9.9
	0.0032	8.7
	0.0013	7.2

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

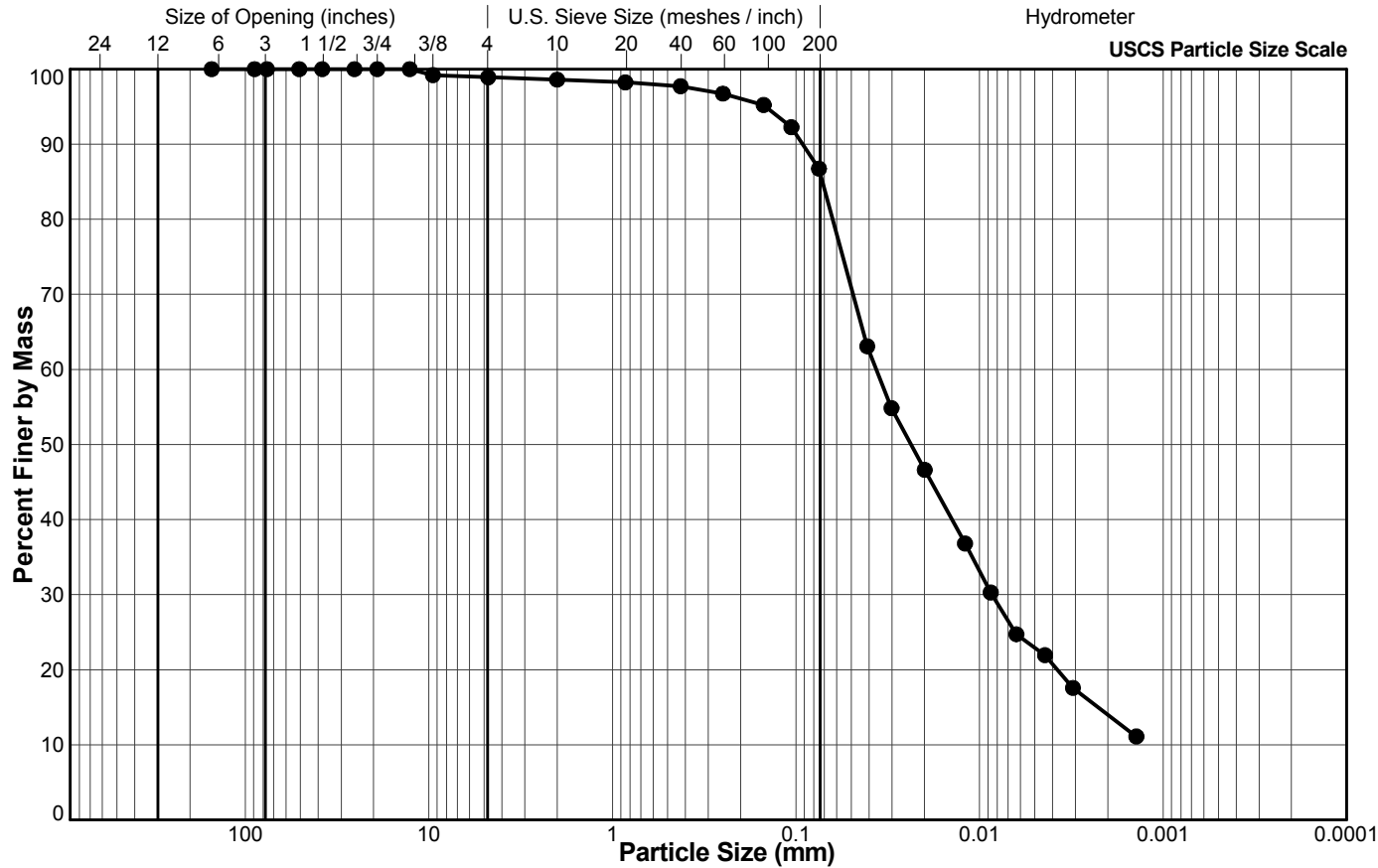
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35093
Depth Interval (m): 21.30 to 21.80
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	99.2
#4 US MESH	4.75	98.9
#10 US MESH	2	98.6
#20 US MESH	0.85	98.2
#40 US MESH	0.425	97.7
#60 US MESH	0.25	96.7
#100 US MESH	0.15	95.2
#140 US MESH	0.106	92.3
#200 US MESH	0.075	86.7
	0.0409	63.1
	0.0302	54.9
	0.0199	46.6
	0.0120	36.8
	0.0087	30.3
	0.0063	24.7
	0.0044	21.9
	0.0031	17.6
	0.0014	11.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

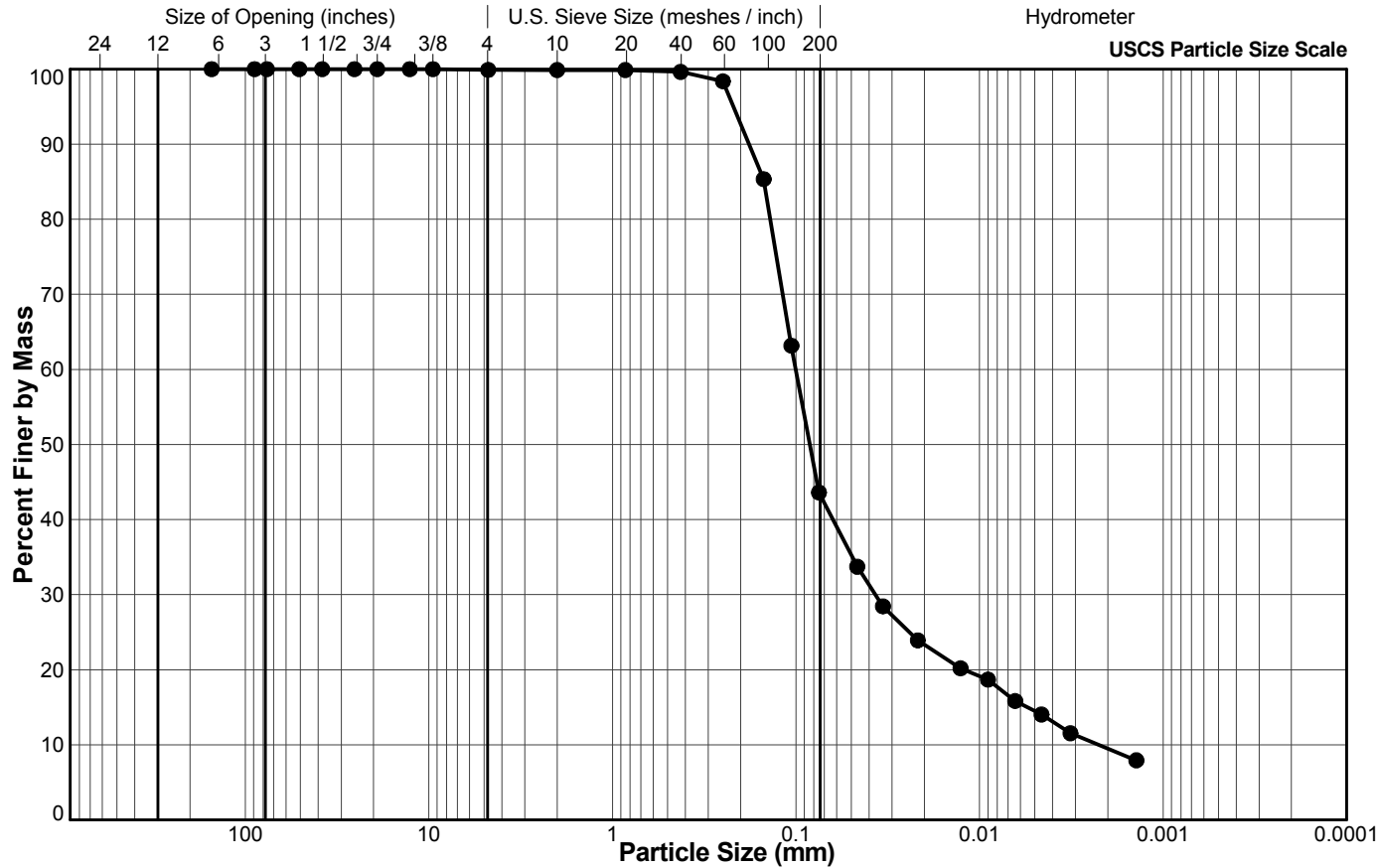
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35094
Depth Interval (m): 25.90 to 26.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	99.9
#10 US MESH	2	99.9
#20 US MESH	0.85	99.9
#40 US MESH	0.425	99.6
#60 US MESH	0.25	98.4
#100 US MESH	0.15	85.4
#140 US MESH	0.106	63.2
#200 US MESH	0.075	43.6
	0.0464	33.7
	0.0336	28.4
	0.0217	23.9
	0.0127	20.2
	0.0090	18.7
	0.0064	15.8
	0.0046	14.0
	0.0032	11.5
	0.0014	7.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

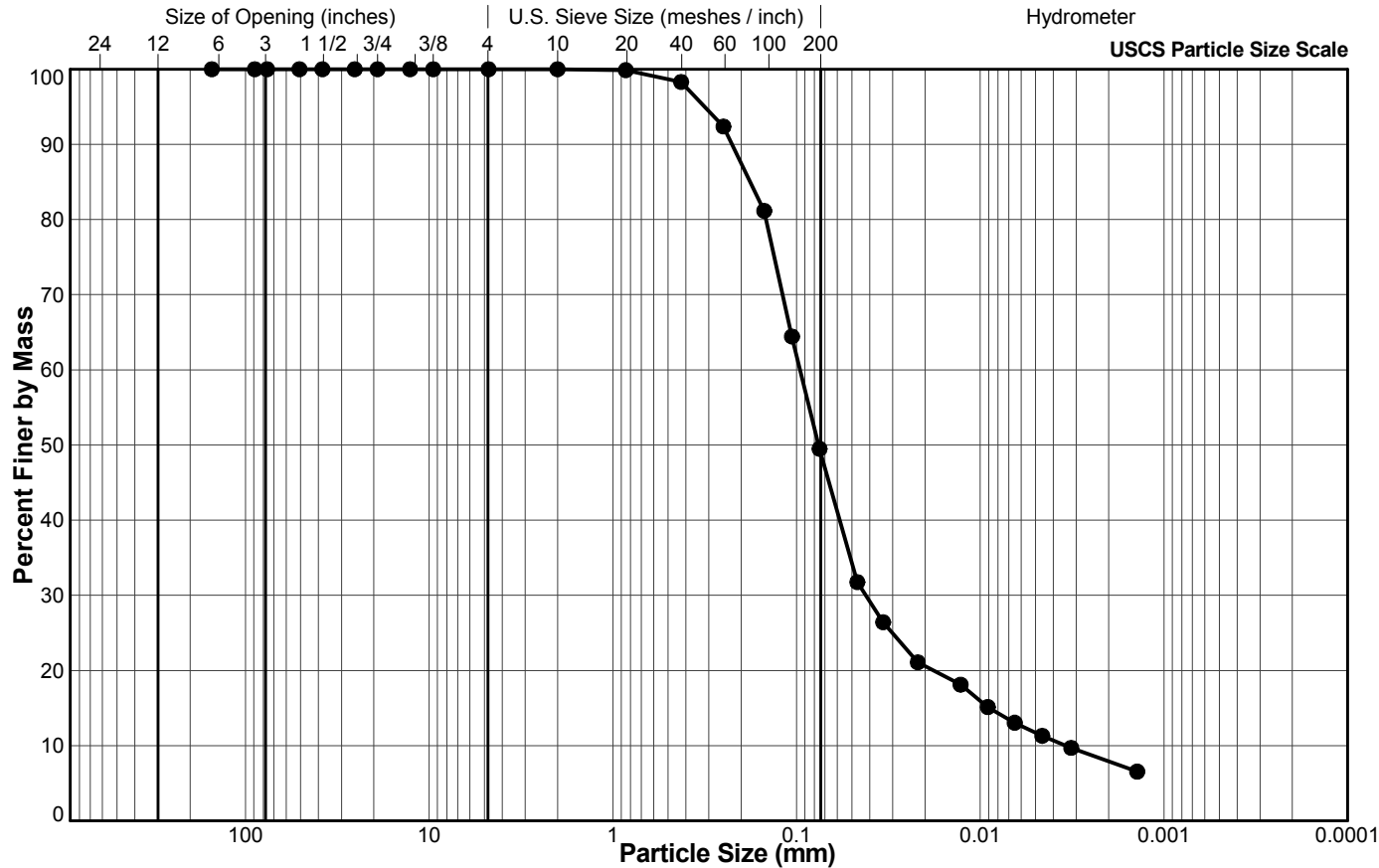
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35095
Depth Interval (m): 29.90 to 30.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	99.9
#40 US MESH	0.425	98.3
#60 US MESH	0.25	92.4
#100 US MESH	0.15	81.2
#140 US MESH	0.106	64.4
#200 US MESH	0.075	49.5
	0.0467	31.8
	0.0338	26.4
	0.0219	21.1
	0.0128	18.1
	0.0091	15.1
	0.0065	13.0
	0.0046	11.3
	0.0032	9.7
	0.0014	6.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

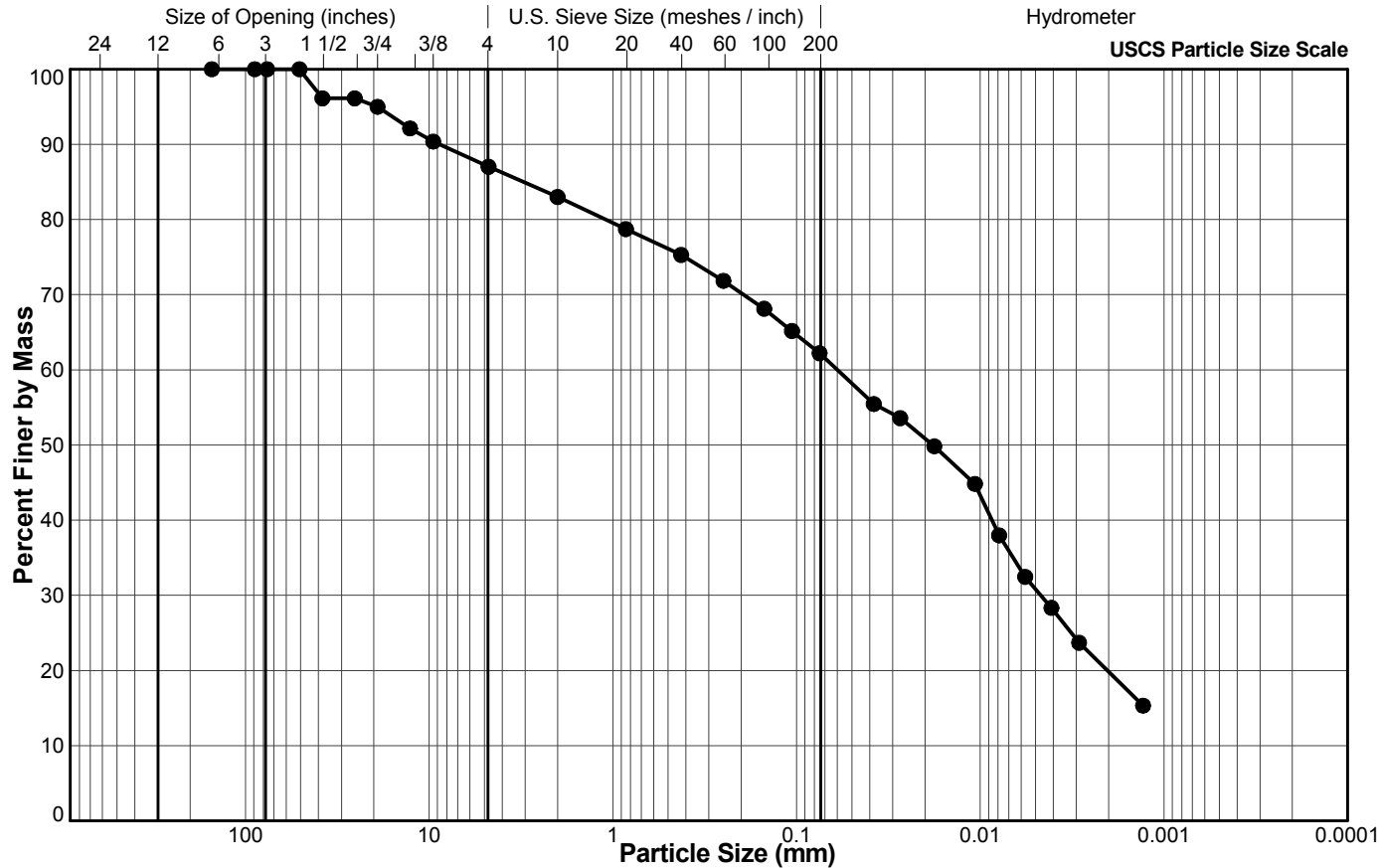
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35096
Depth Interval (m): 34.40 to 35.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	96.1
1"	25.4	96.1
3/4"	19.1	95.0
1/2"	12.7	92.1
3/8"	9.5	90.4
#4 US MESH	4.75	87.0
#10 US MESH	2	83.0
#20 US MESH	0.85	78.7
#40 US MESH	0.425	75.3
#60 US MESH	0.25	71.8
#100 US MESH	0.15	68.1
#140 US MESH	0.106	65.2
#200 US MESH	0.075	62.2
	0.0380	55.5
	0.0273	53.6
	0.0178	49.8
	0.0107	44.8
	0.0079	38.0
	0.0057	32.5
	0.0041	28.3
	0.0029	23.7
	0.0013	15.3

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

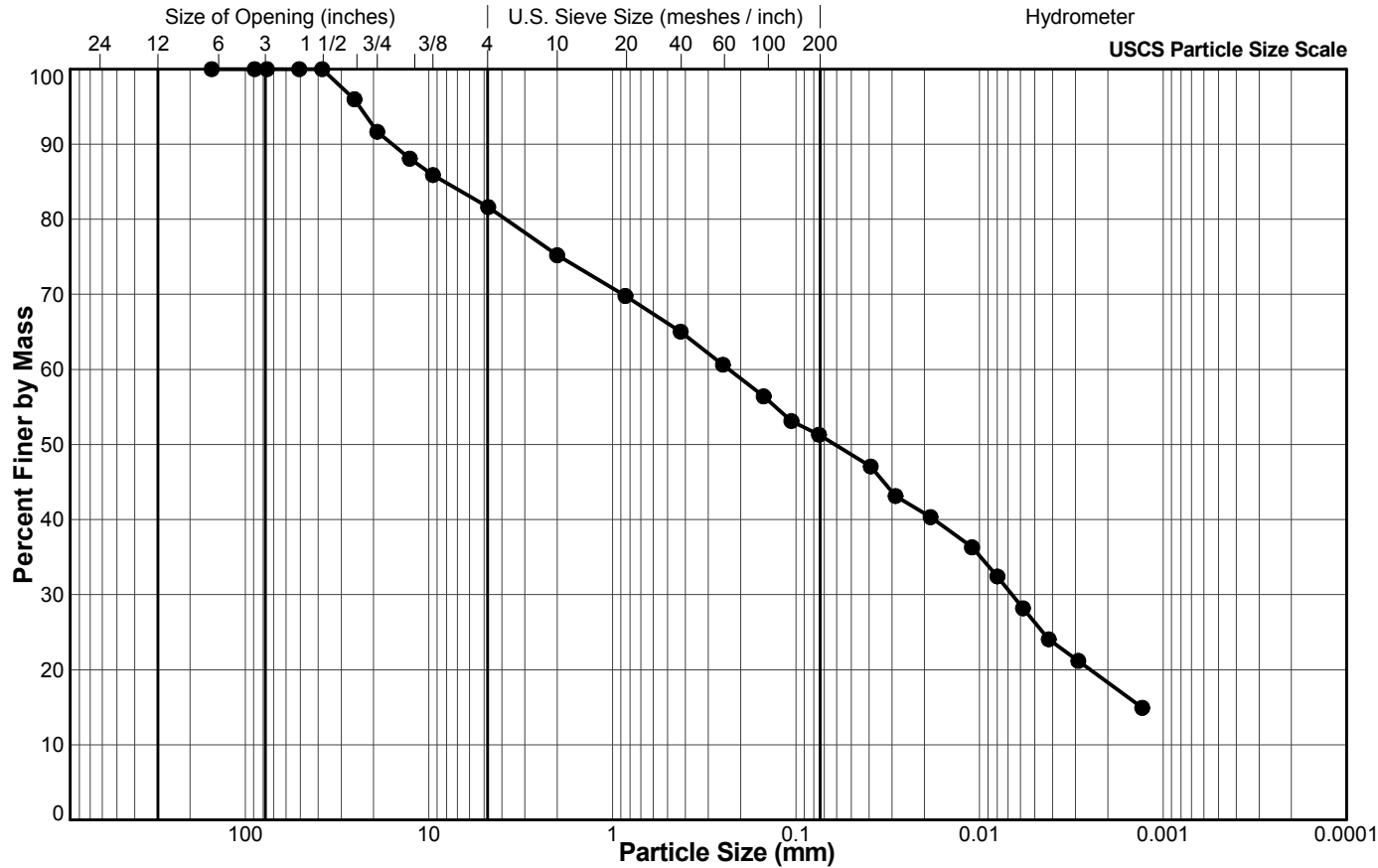
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35097
Depth Interval (m): 41.80 to 42.40
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	96.0
3/4"	19.1	91.7
1/2"	12.7	88.1
3/8"	9.5	85.9
#4 US MESH	4.75	81.6
#10 US MESH	2	75.2
#20 US MESH	0.85	69.8
#40 US MESH	0.425	65.0
#60 US MESH	0.25	60.6
#100 US MESH	0.15	56.4
#140 US MESH	0.106	53.1
#200 US MESH	0.075	51.3
	0.0392	47.1
	0.0287	43.1
	0.0185	40.3
	0.0110	36.3
	0.0080	32.4
	0.0058	28.2
	0.0042	24.0
	0.0029	21.2
	0.0013	14.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

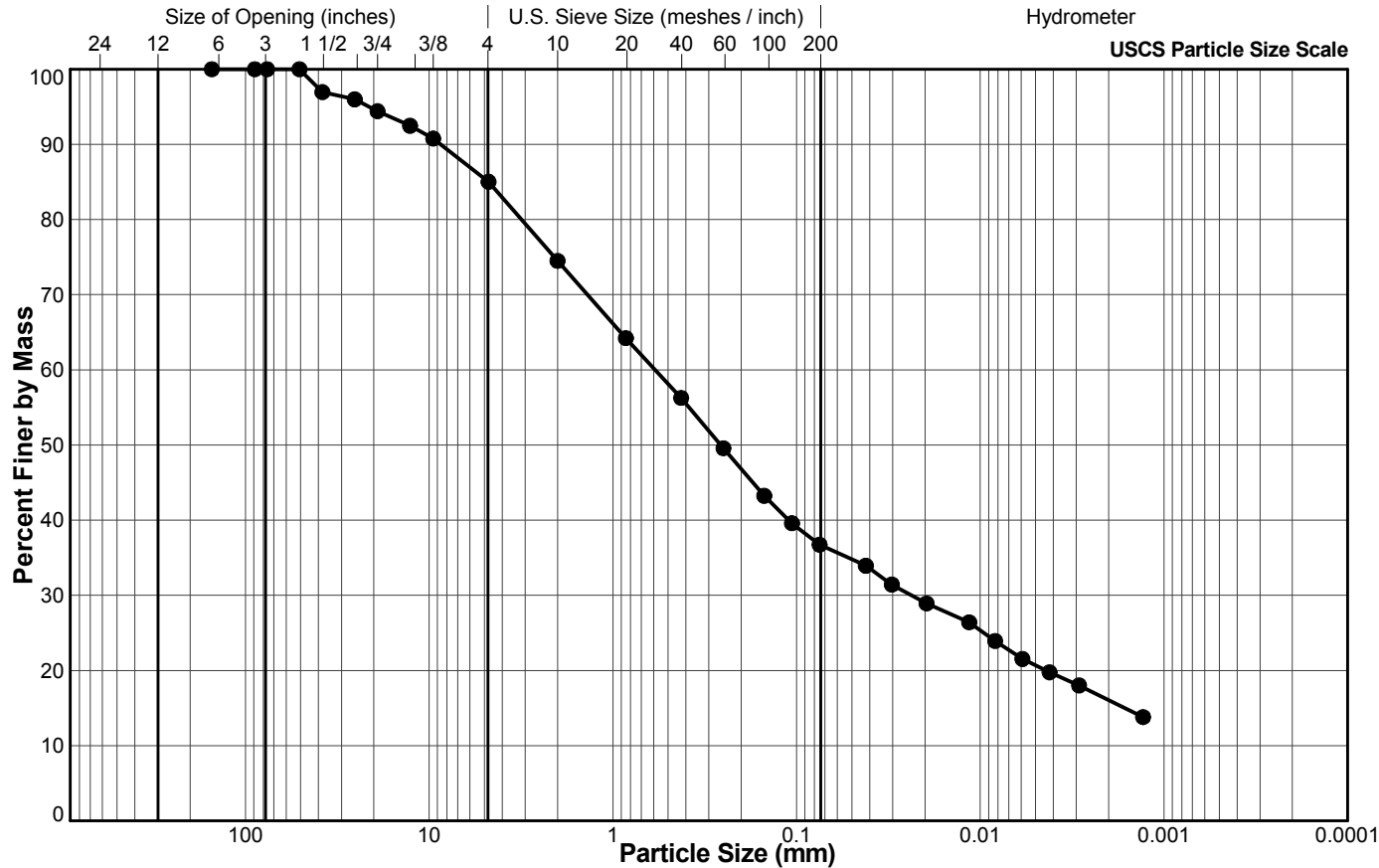
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-19S
Sample No.: 35098
Depth Interval (m): 44.00 to 44.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	97.0
1"	25.4	96.0
3/4"	19.1	94.4
1/2"	12.7	92.5
3/8"	9.5	90.8
#4 US MESH	4.75	85.0
#10 US MESH	2	74.5
#20 US MESH	0.85	64.2
#40 US MESH	0.425	56.3
#60 US MESH	0.25	49.6
#100 US MESH	0.15	43.2
#140 US MESH	0.106	39.6
#200 US MESH	0.075	36.7
	0.0420	33.9
	0.0303	31.4
	0.0196	28.9
	0.0115	26.4
	0.0083	23.9
	0.0059	21.5
	0.0042	19.8
	0.0029	18.0
	0.0013	13.8

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/12/2019

LP

3/27/2019

Tech

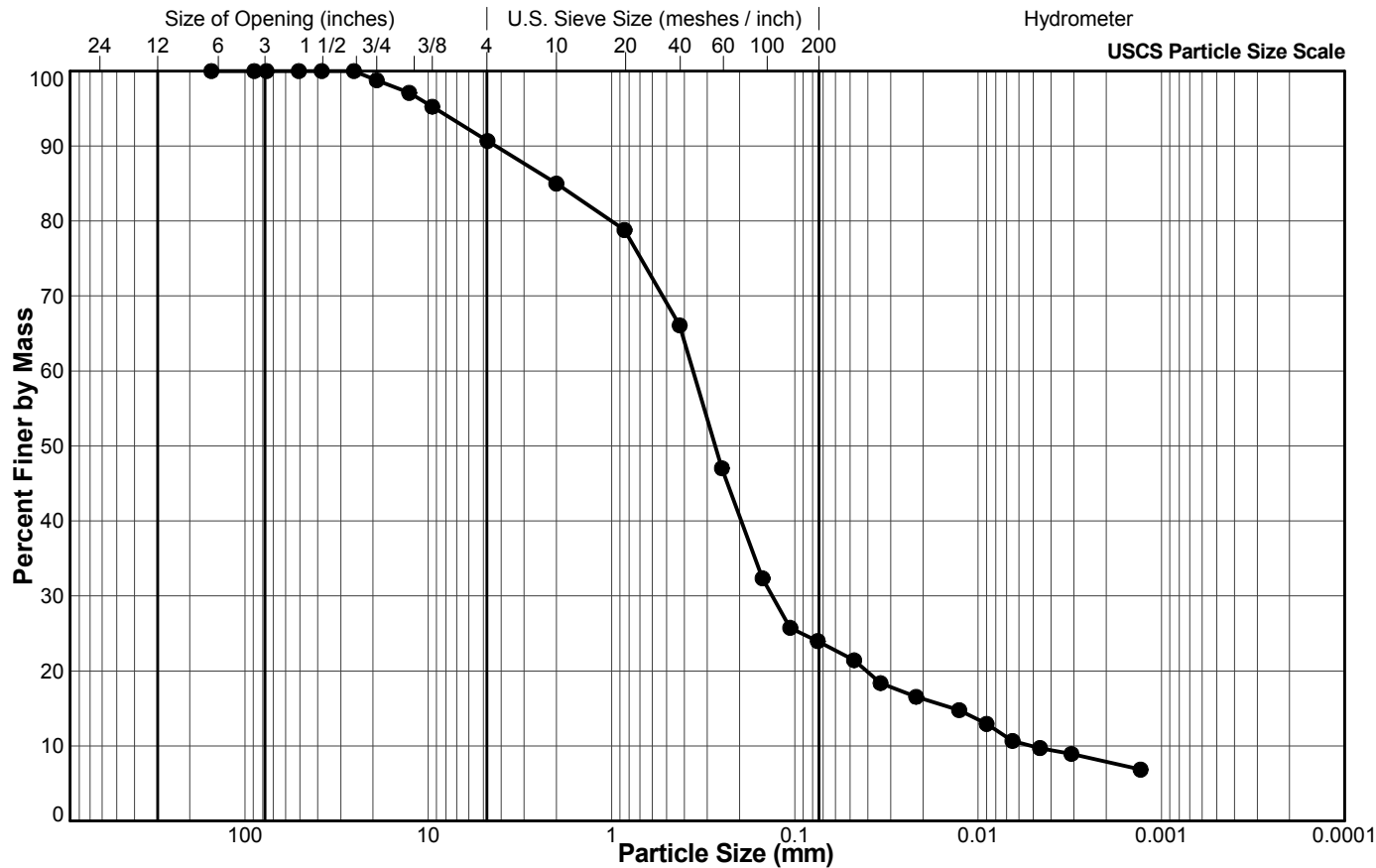
Date

Checked

Date

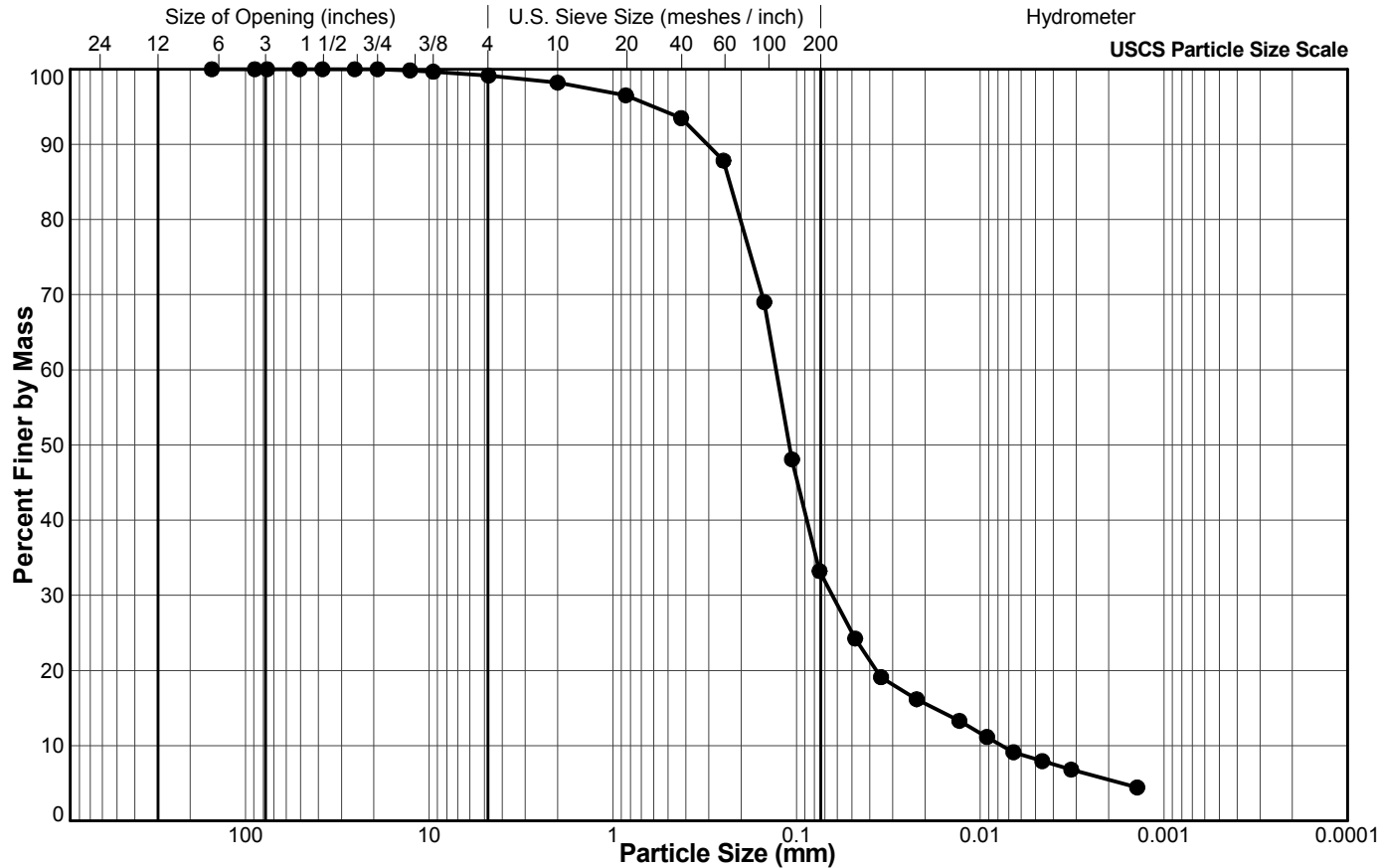
Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35032
Depth Interval (m): 2.40 to 3.00
Lab Schedule No.:



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35033
Depth Interval (m): 6.10 to 6.70
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.8
3/8"	9.5	99.7
#4 US MESH	4.75	99.1
#10 US MESH	2	98.2
#20 US MESH	0.85	96.5
#40 US MESH	0.425	93.5
#60 US MESH	0.25	87.8
#100 US MESH	0.15	69.0
#140 US MESH	0.106	48.1
#200 US MESH	0.075	33.2
	0.0480	24.2
	0.0347	19.1
	0.0222	16.2
	0.0130	13.3
	0.0092	11.2
	0.0066	9.1
	0.0046	7.9
	0.0032	6.8
	0.0014	4.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

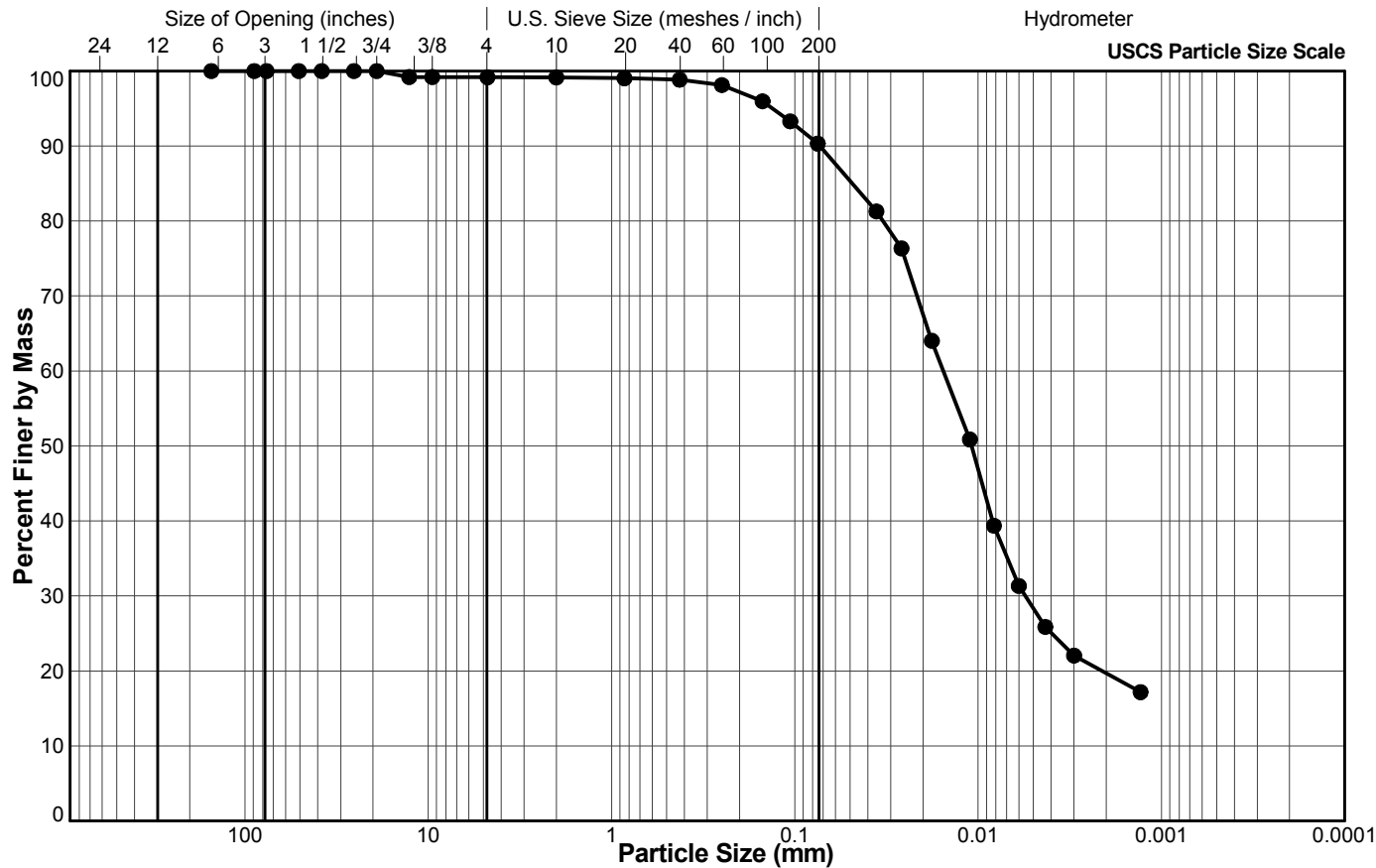
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35034
Depth Interval (m): 10.70 to 11.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.2
3/8"	9.5	99.2
#4 US MESH	4.75	99.2
#10 US MESH	2	99.1
#20 US MESH	0.85	99.0
#40 US MESH	0.425	98.8
#60 US MESH	0.25	98.1
#100 US MESH	0.15	96.0
#140 US MESH	0.106	93.3
#200 US MESH	0.075	90.3
	0.0359	81.3
	0.0262	76.3
	0.0179	64.0
	0.0111	50.9
	0.0082	39.4
	0.0060	31.3
	0.0043	25.9
	0.0030	22.0
	0.0013	17.2

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

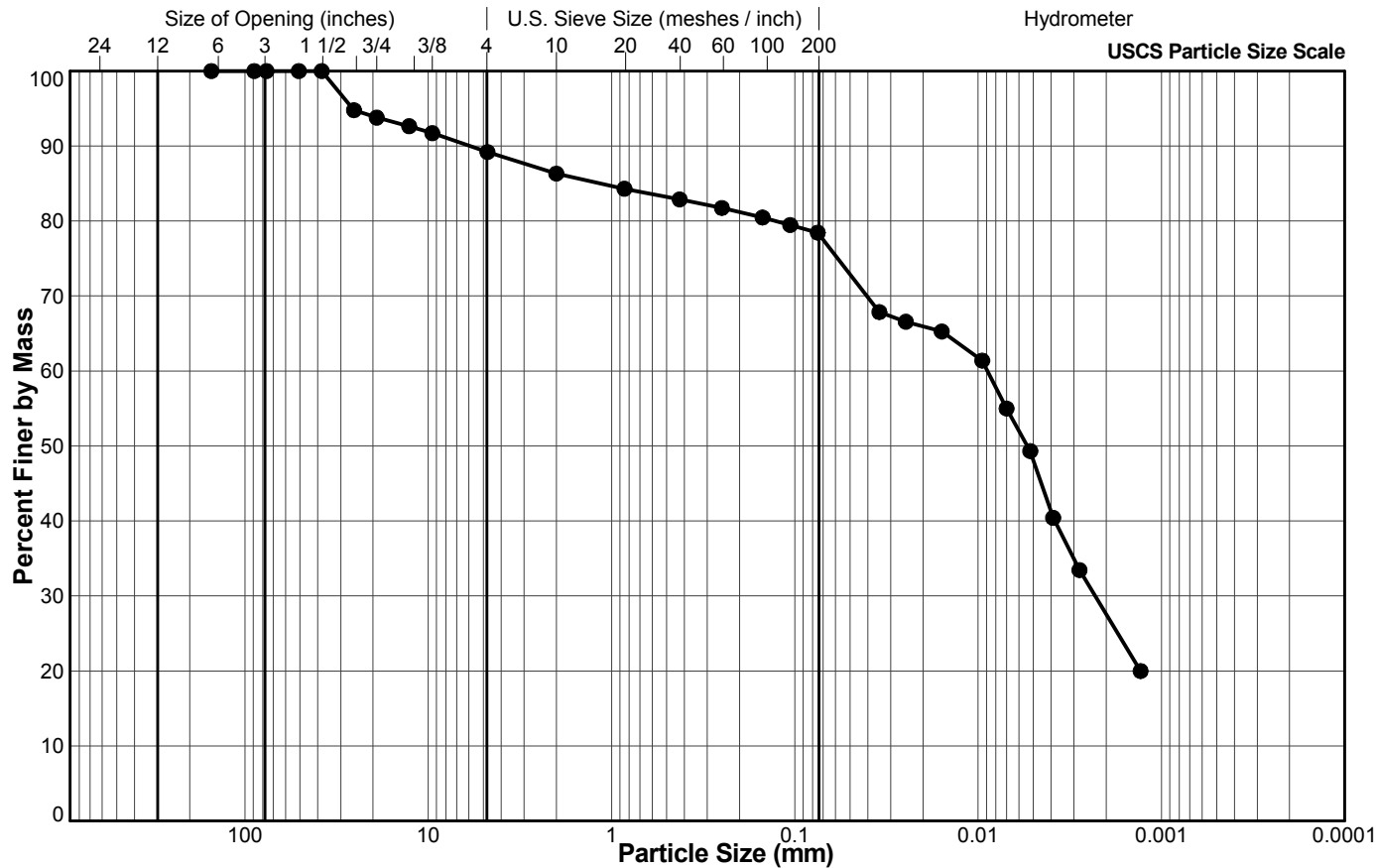
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35035
Depth Interval (m): 15.20 to 15.80
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	94.8
3/4"	19.1	93.8
1/2"	12.7	92.6
3/8"	9.5	91.7
#4 US MESH	4.75	89.2
#10 US MESH	2	86.3
#20 US MESH	0.85	84.3
#40 US MESH	0.425	82.9
#60 US MESH	0.25	81.7
#100 US MESH	0.15	80.5
#140 US MESH	0.106	79.5
#200 US MESH	0.075	78.4
	0.0346	67.9
	0.0248	66.6
	0.0158	65.3
	0.0095	61.4
	0.0070	55.0
	0.0052	49.3
	0.0039	40.4
	0.0028	33.4
	0.0013	20.0

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

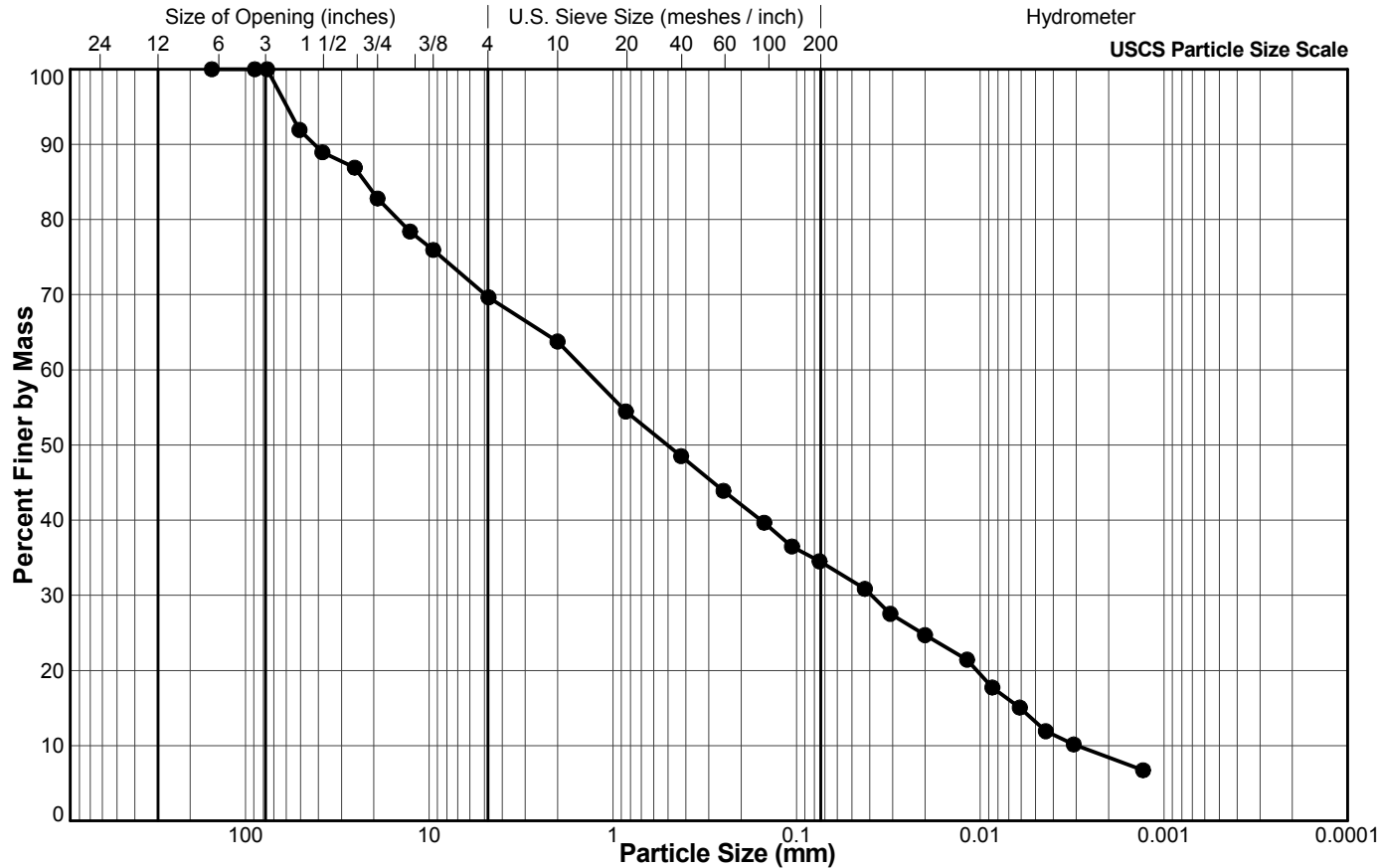
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35039
Depth Interval (m): 23.70 to 24.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	91.9
1 1/2"	38.1	89.0
1"	25.4	86.9
3/4"	19.1	82.8
1/2"	12.7	78.4
3/8"	9.5	76.0
#4 US MESH	4.75	69.6
#10 US MESH	2	63.8
#20 US MESH	0.85	54.5
#40 US MESH	0.425	48.5
#60 US MESH	0.25	43.9
#100 US MESH	0.15	39.7
#140 US MESH	0.106	36.5
#200 US MESH	0.075	34.5
	0.0425	30.9
	0.0309	27.5
	0.0200	24.7
	0.0118	21.4
	0.0086	17.7
	0.0061	15.1
	0.0044	11.9
	0.0031	10.2
	0.0013	6.7

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

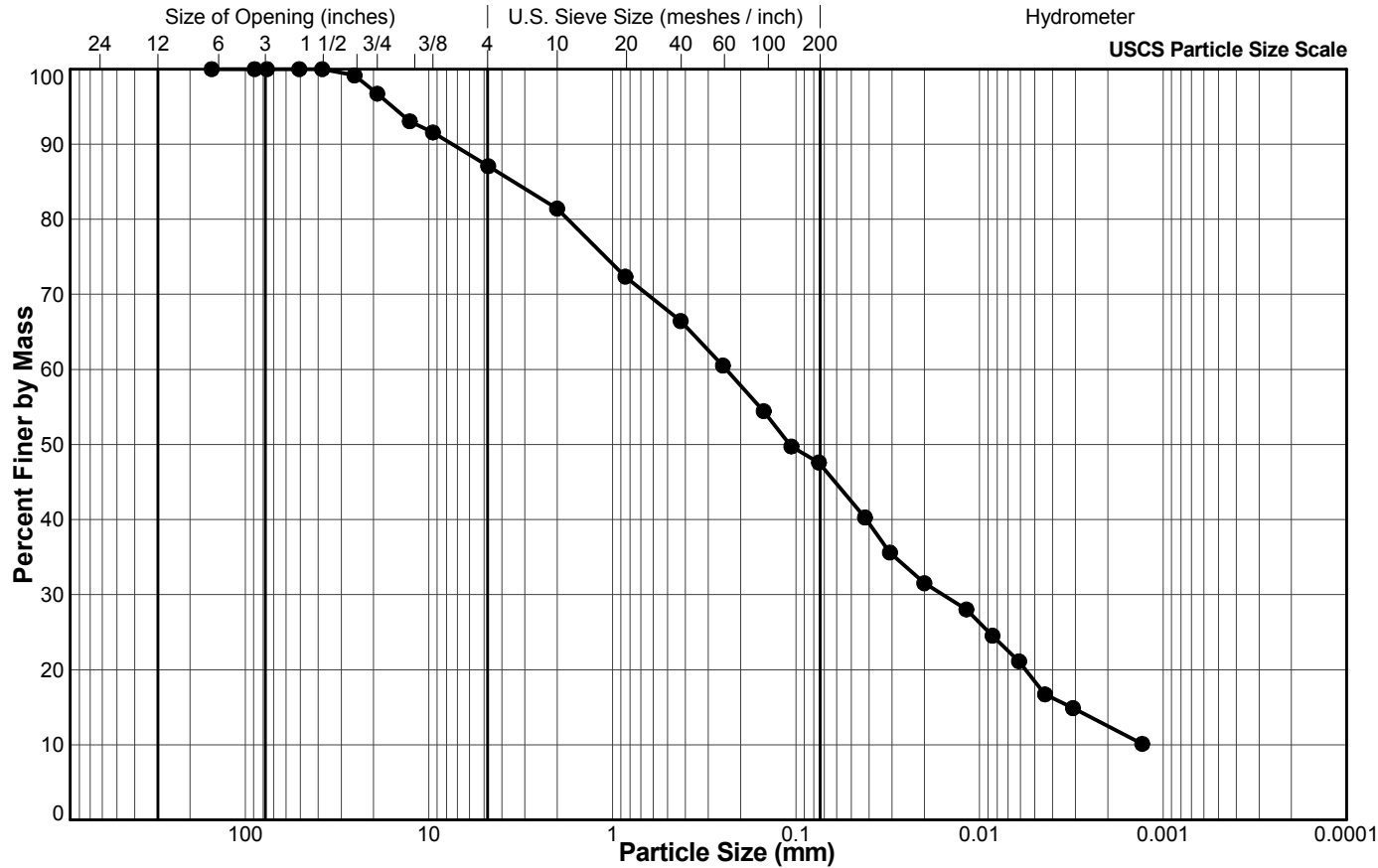
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35040
Depth Interval (m): 26.50 to 27.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	99.2
3/4"	19.1	96.7
1/2"	12.7	93.1
3/8"	9.5	91.6
#4 US MESH	4.75	87.1
#10 US MESH	2	81.4
#20 US MESH	0.85	72.4
#40 US MESH	0.425	66.4
#60 US MESH	0.25	60.5
#100 US MESH	0.15	54.4
#140 US MESH	0.106	49.7
#200 US MESH	0.075	47.6
	0.0421	40.3
	0.0308	35.6
	0.0200	31.5
	0.0118	28.0
	0.0085	24.5
	0.0061	21.1
	0.0044	16.7
	0.0031	14.9
	0.0013	10.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

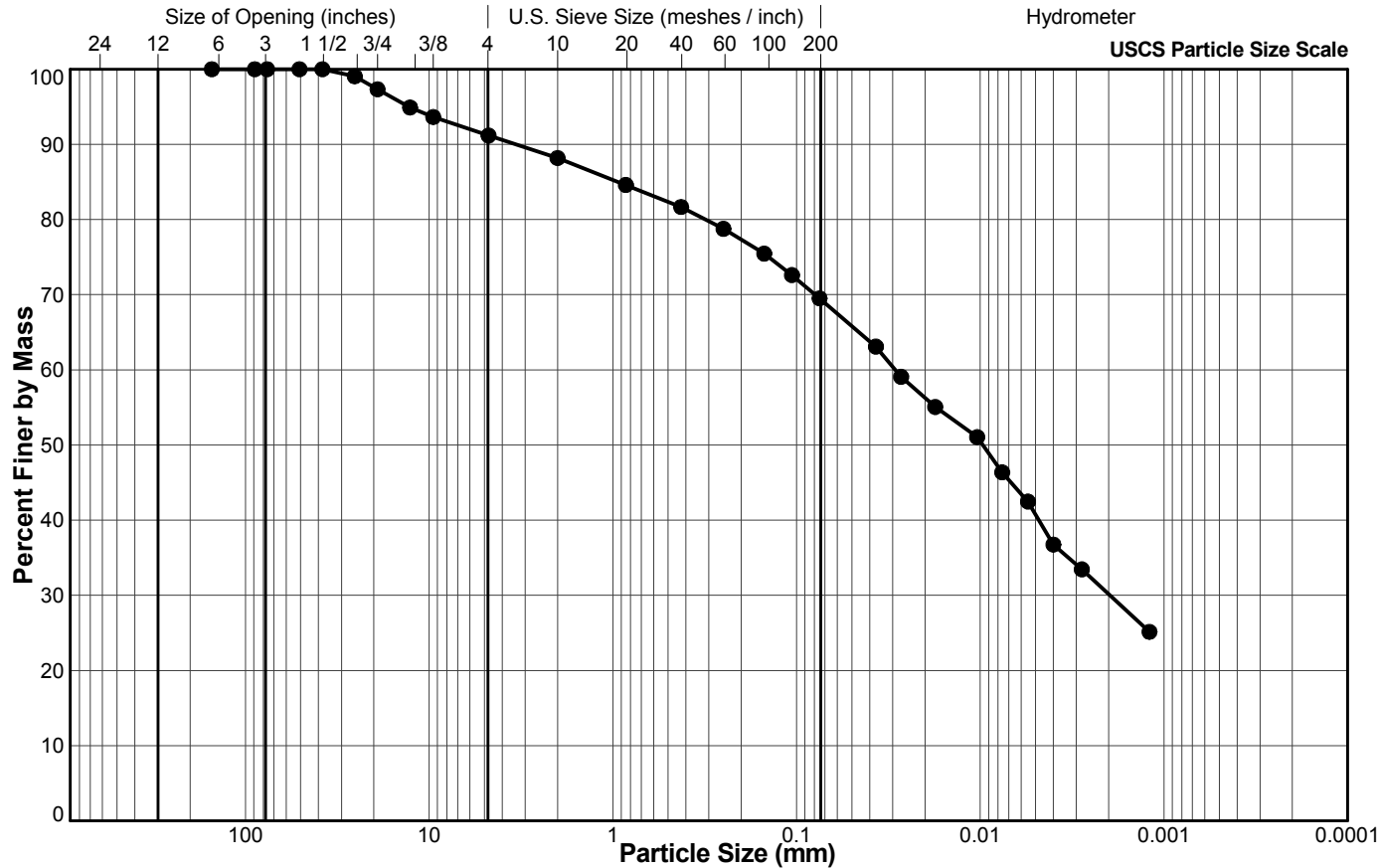
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35041
Depth Interval (m): 30.00 to 30.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	99.1
3/4"	19.1	97.3
1/2"	12.7	94.9
3/8"	9.5	93.6
#4 US MESH	4.75	91.2
#10 US MESH	2	88.2
#20 US MESH	0.85	84.6
#40 US MESH	0.425	81.7
#60 US MESH	0.25	78.8
#100 US MESH	0.15	75.5
#140 US MESH	0.106	72.6
#200 US MESH	0.075	69.5
	0.0370	63.1
	0.0270	59.1
	0.0176	55.1
	0.0104	51.1
	0.0076	46.4
	0.0055	42.5
	0.0040	36.8
	0.0028	33.5
	0.0012	25.1

BOULDER		COBBLE		GRAVEL		SAND			FINES (Silt, Clay)
				Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

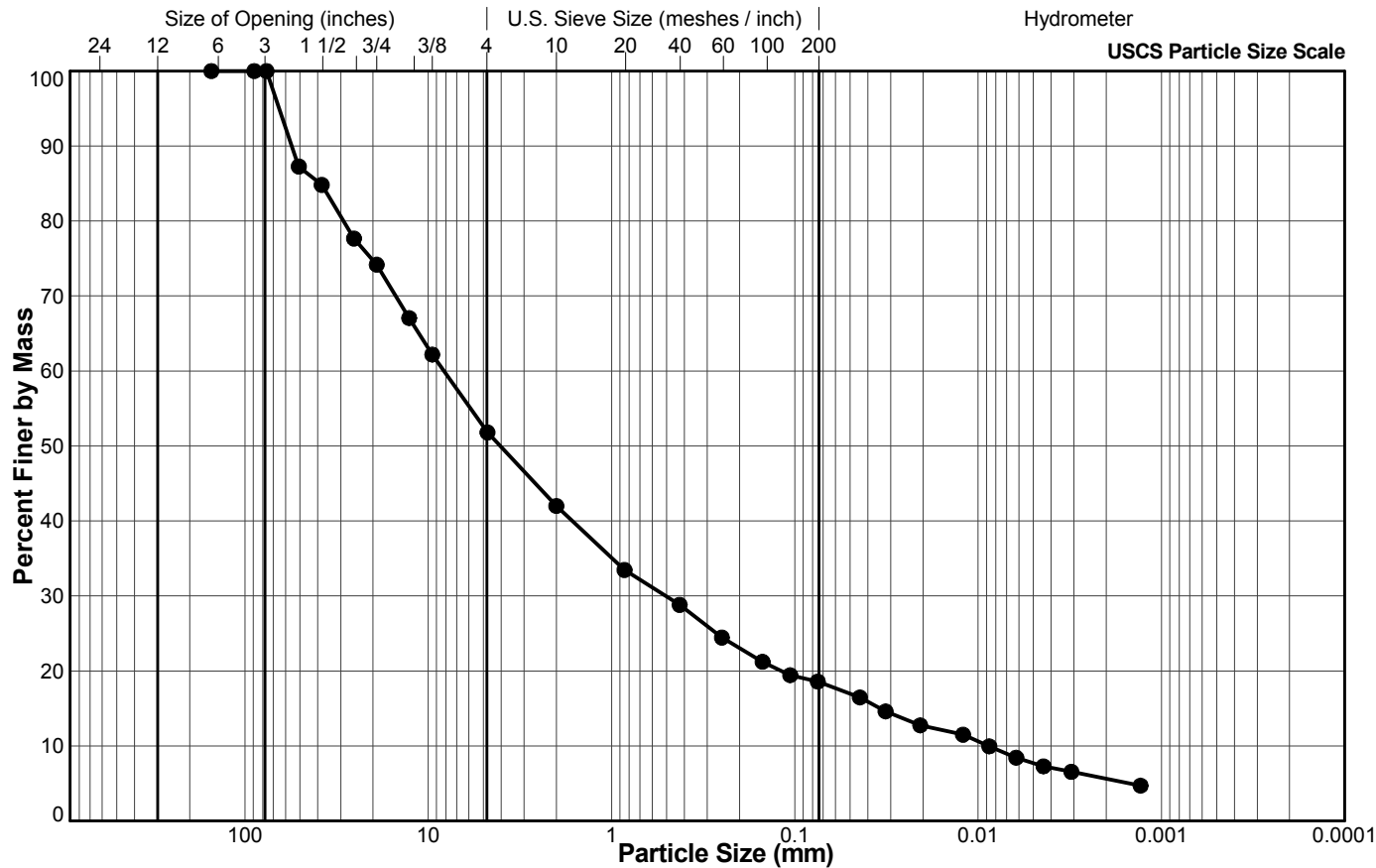
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35042
Depth Interval (m): 31.40 to 32.00
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	87.3
1 1/2"	38.1	84.8
1"	25.4	77.7
3/4"	19.1	74.2
1/2"	12.7	67.1
3/8"	9.5	62.2
#4 US MESH	4.75	51.8
#10 US MESH	2	42.0
#20 US MESH	0.85	33.5
#40 US MESH	0.425	28.8
#60 US MESH	0.25	24.5
#100 US MESH	0.15	21.2
#140 US MESH	0.106	19.4
#200 US MESH	0.075	18.6
	0.0442	16.5
	0.0320	14.6
	0.0207	12.7
	0.0121	11.5
	0.0087	9.9
	0.0062	8.4
	0.0044	7.3
	0.0031	6.5
	0.0013	4.7

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

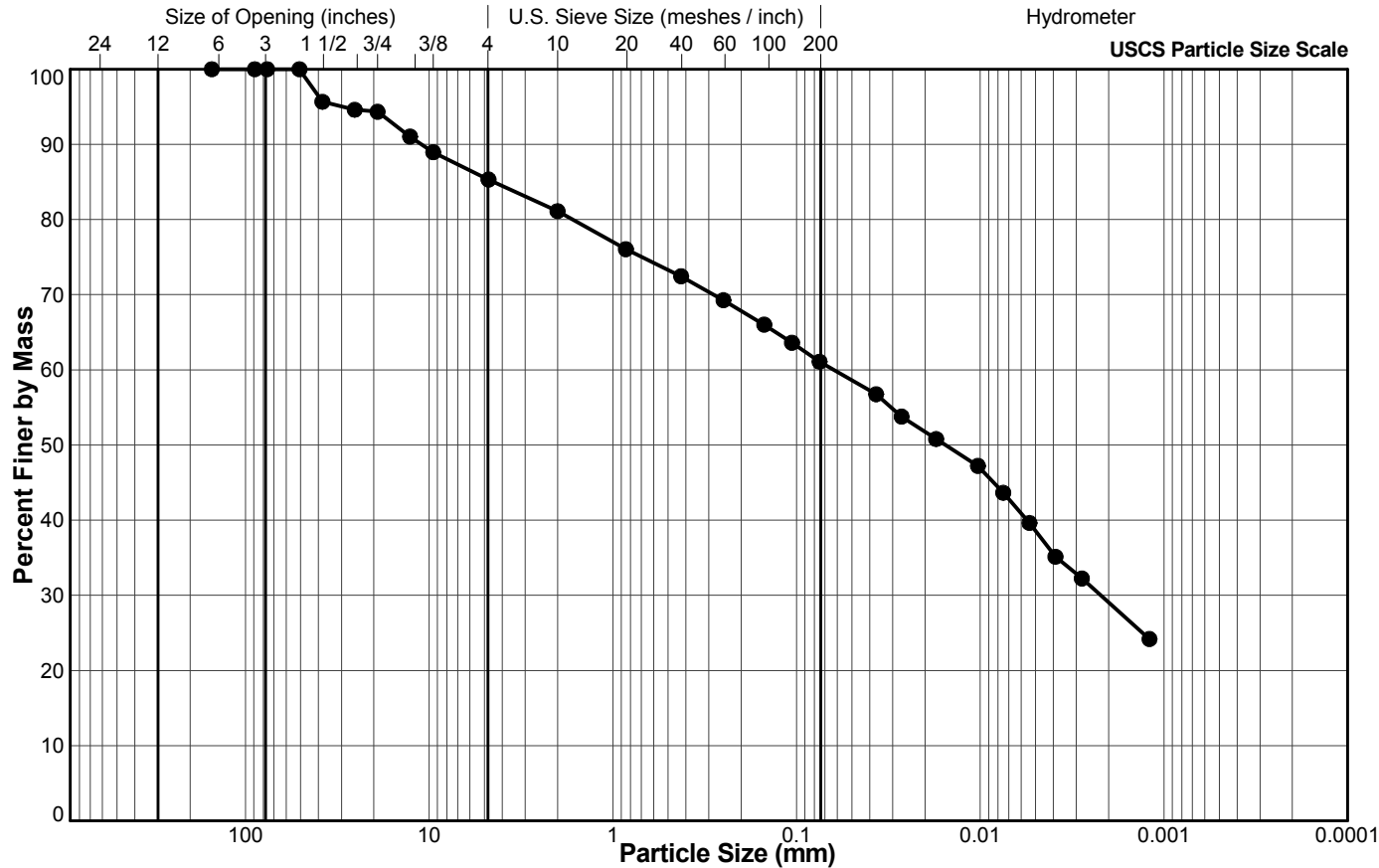
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35043
Depth Interval (m): 38.70 to 39.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	95.7
1"	25.4	94.6
3/4"	19.1	94.3
1/2"	12.7	91.0
3/8"	9.5	89.0
#4 US MESH	4.75	85.3
#10 US MESH	2	81.1
#20 US MESH	0.85	76.1
#40 US MESH	0.425	72.4
#60 US MESH	0.25	69.3
#100 US MESH	0.15	66.0
#140 US MESH	0.106	63.6
#200 US MESH	0.075	61.1
	0.0369	56.8
	0.0268	53.8
	0.0174	50.8
	0.0103	47.2
	0.0075	43.6
	0.0054	39.6
	0.0039	35.1
	0.0028	32.2
	0.0012	24.2

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

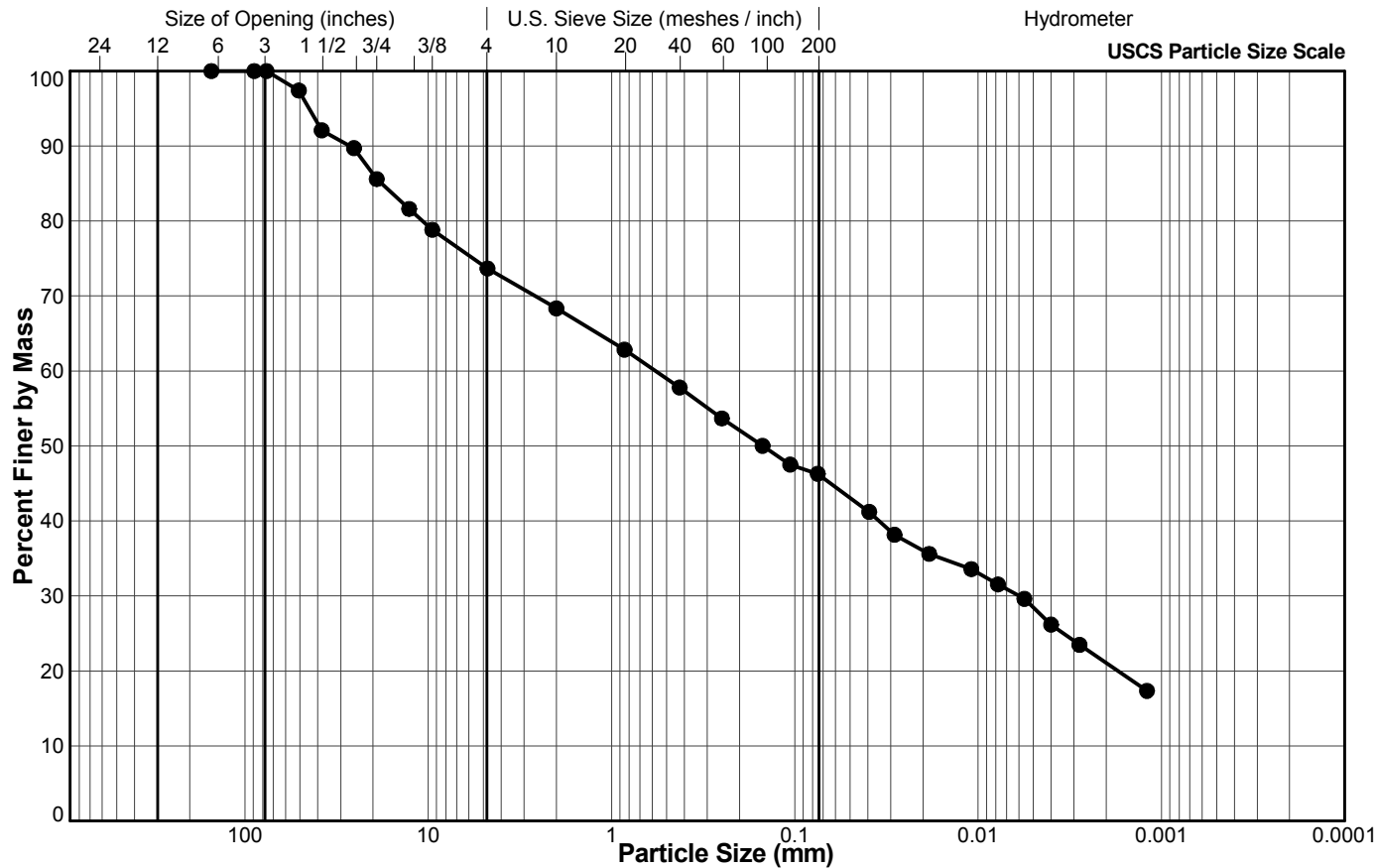
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-21S
Sample No.: 35045
Depth Interval (m): 50.00 to 50.90
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	97.4
1 1/2"	38.1	92.1
1"	25.4	89.7
3/4"	19.1	85.6
1/2"	12.7	81.6
3/8"	9.5	78.8
#4 US MESH	4.75	73.7
#10 US MESH	2	68.3
#20 US MESH	0.85	62.8
#40 US MESH	0.425	57.8
#60 US MESH	0.25	53.7
#100 US MESH	0.15	50.0
#140 US MESH	0.106	47.5
#200 US MESH	0.075	46.3
	0.0393	41.2
	0.0286	38.2
	0.0185	35.6
	0.0109	33.6
	0.0078	31.5
	0.0056	29.6
	0.0040	26.2
	0.0028	23.5
	0.0012	17.3

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/11/2019

LP

3/27/2019

Tech

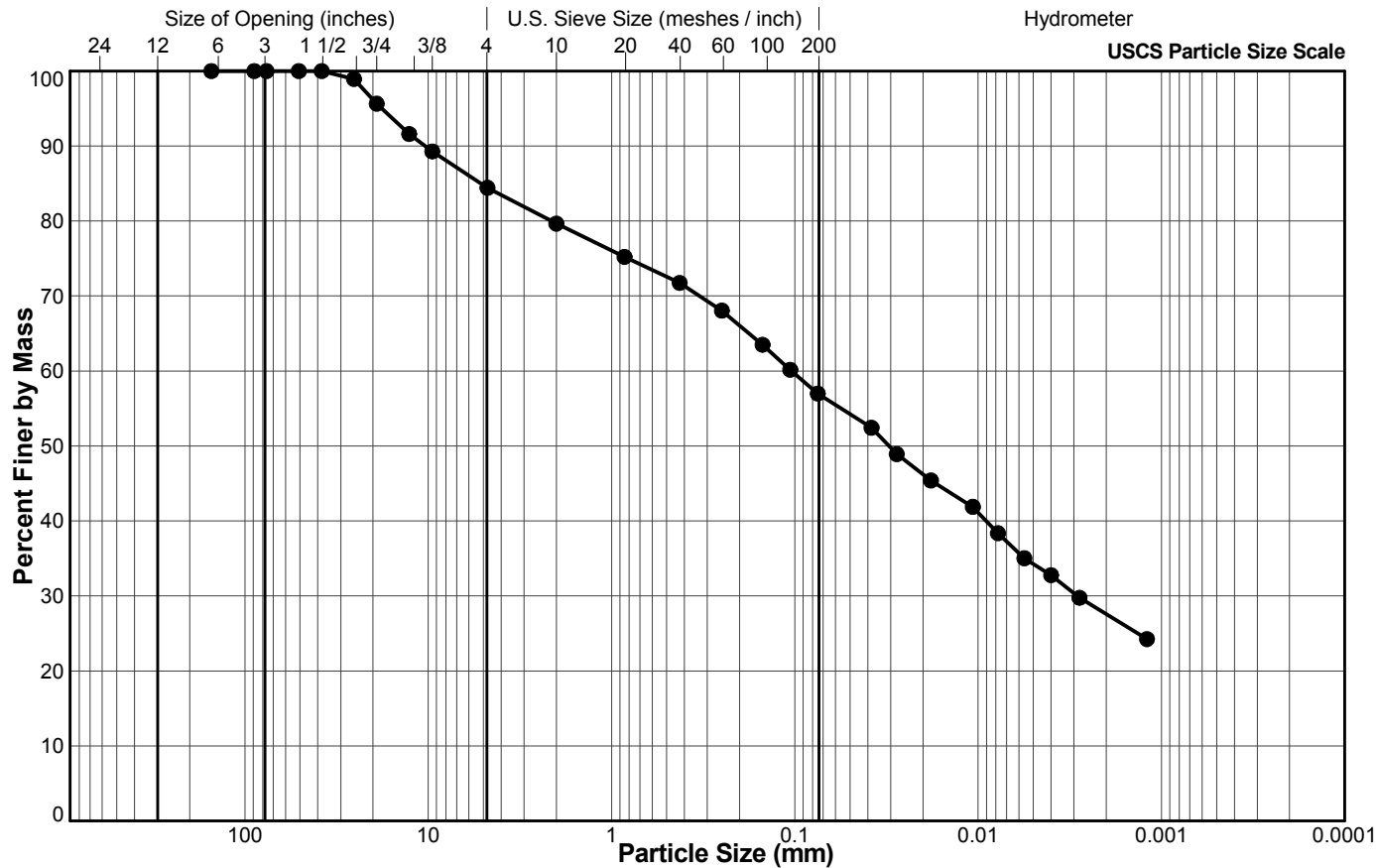
Date

Checked

Date

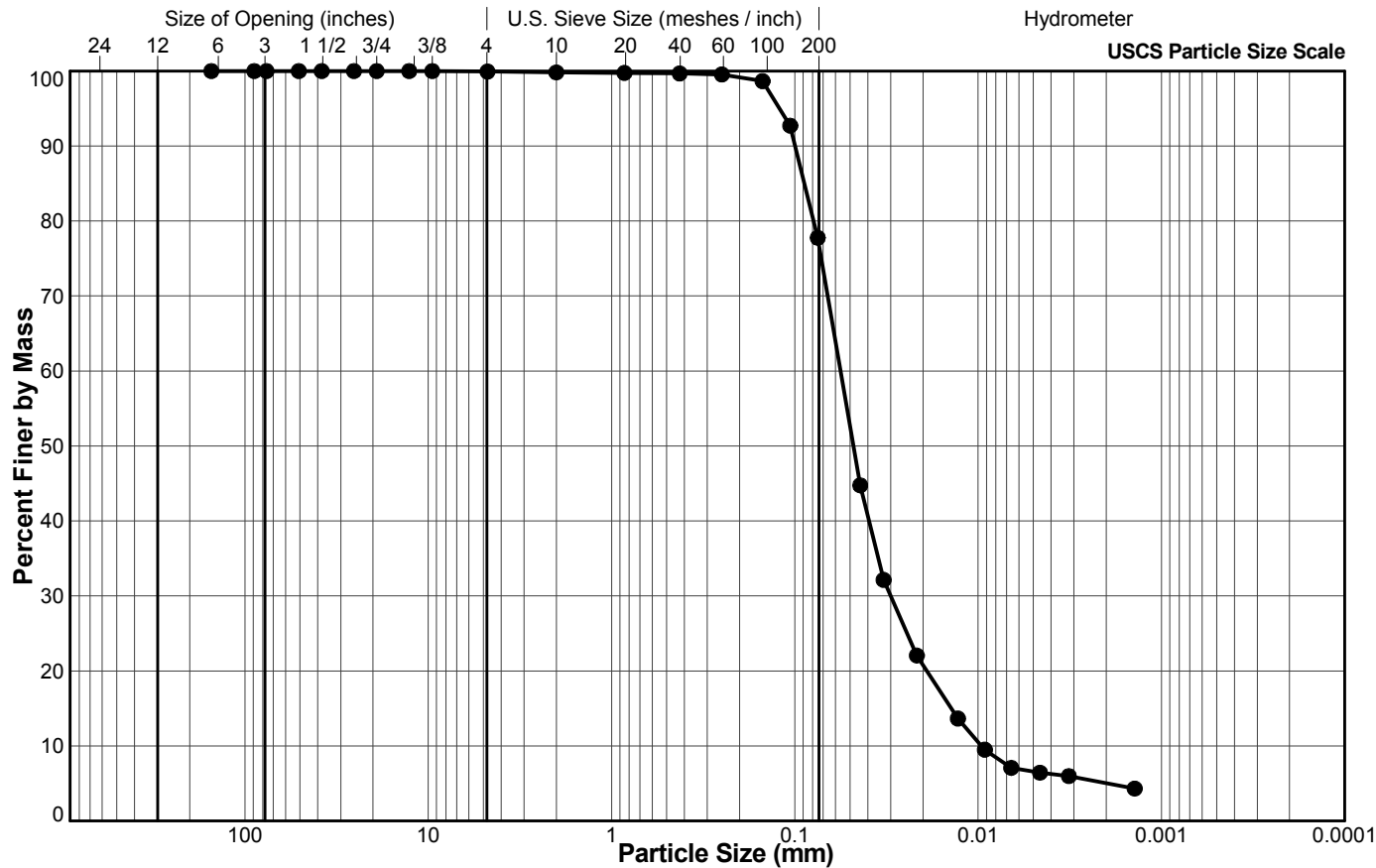
Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-22S
Sample No.: 29661
Depth Interval (m): 3.00 to 3.70
Lab Schedule No.:



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-22S
Sample No.: 29663
Depth Interval (m): 10.70 to 11.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	99.9
#10 US MESH	2	99.8
#20 US MESH	0.85	99.7
#40 US MESH	0.425	99.7
#60 US MESH	0.25	99.5
#100 US MESH	0.15	98.7
#140 US MESH	0.106	92.7
#200 US MESH	0.075	77.8
	0.0440	44.7
	0.0328	32.1
	0.0216	22.1
	0.0129	13.7
	0.0092	9.5
	0.0066	7.1
	0.0046	6.4
	0.0032	6.0
	0.0014	4.3

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/13/2019

LP

3/27/2019

Tech

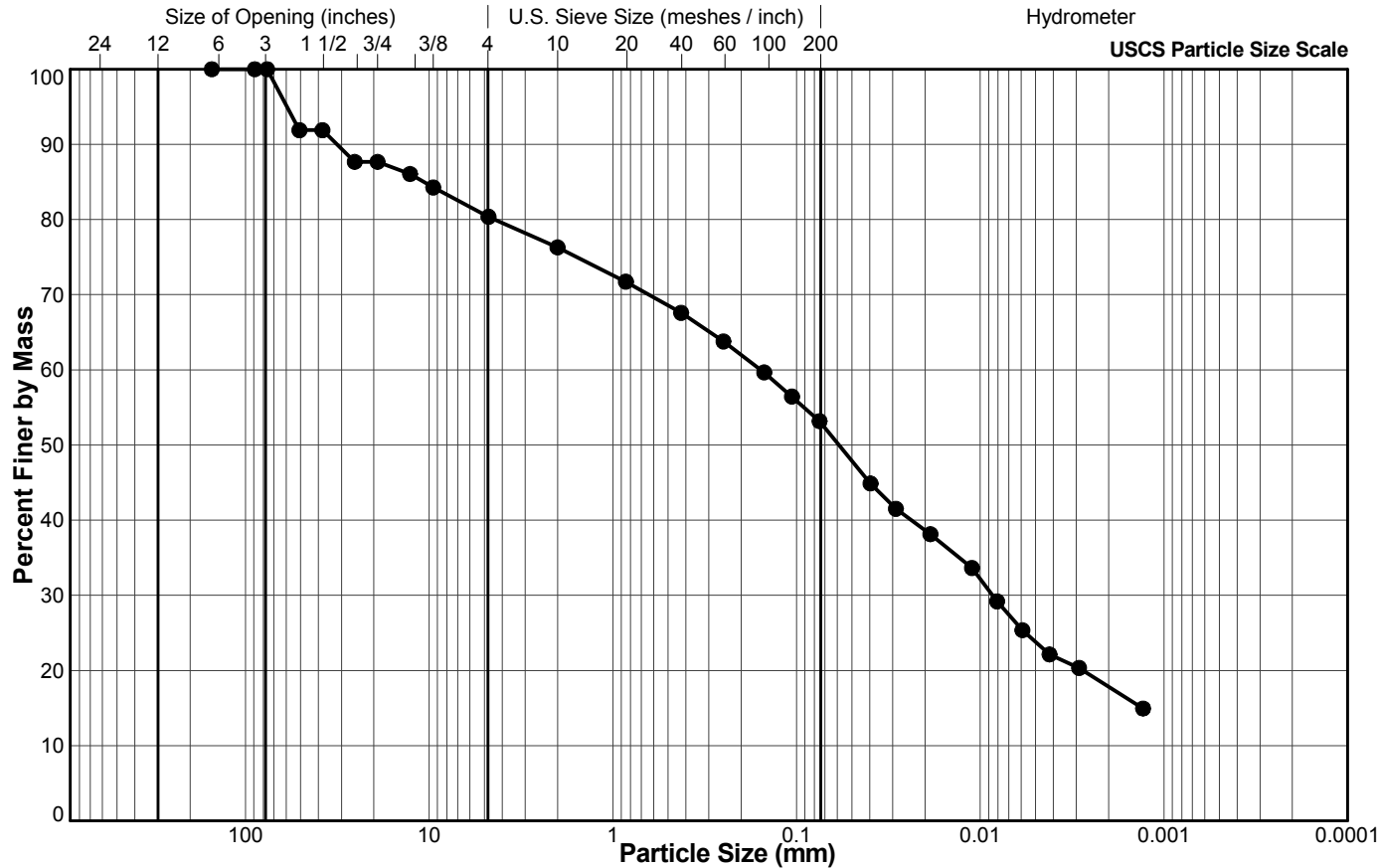
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-22S
Sample No.: 29665
Depth Interval (m): 16.20 to 16.80
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	91.9
1 1/2"	38.1	91.9
1"	25.4	87.7
3/4"	19.1	87.7
1/2"	12.7	86.1
3/8"	9.5	84.3
#4 US MESH	4.75	80.4
#10 US MESH	2	76.3
#20 US MESH	0.85	71.7
#40 US MESH	0.425	67.6
#60 US MESH	0.25	63.8
#100 US MESH	0.15	59.7
#140 US MESH	0.106	56.4
#200 US MESH	0.075	53.2
	0.0396	44.9
	0.0288	41.5
	0.0187	38.1
	0.0111	33.6
	0.0081	29.2
	0.0059	25.4
	0.0042	22.1
	0.0029	20.3
	0.0013	14.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/13/2019

LP

3/27/2019

Tech

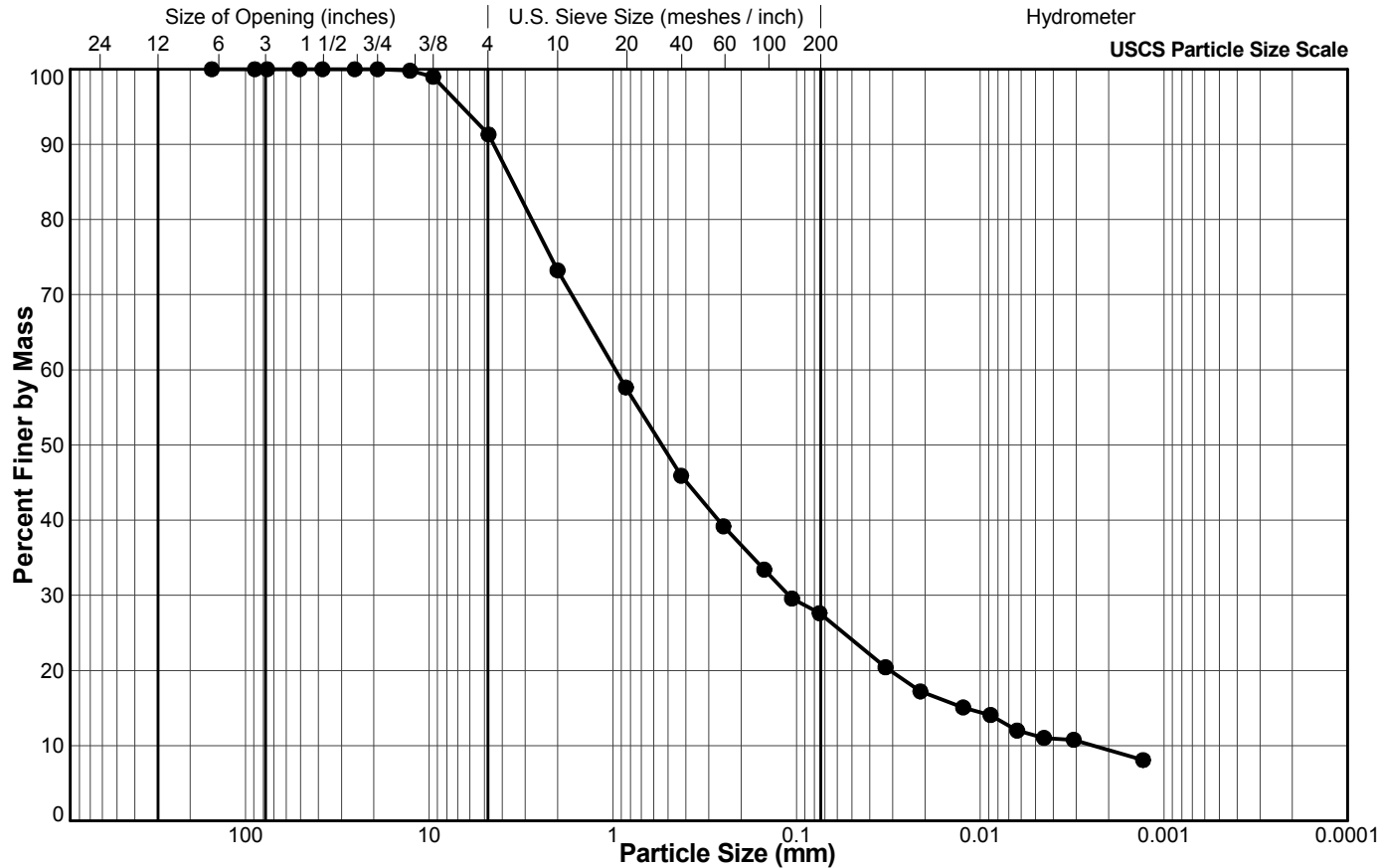
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-22S
Sample No.: 29666
Depth Interval (m): 18.90 to 19.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.8
3/8"	9.5	99.0
#4 US MESH	4.75	91.3
#10 US MESH	2	73.2
#20 US MESH	0.85	57.7
#40 US MESH	0.425	45.9
#60 US MESH	0.25	39.2
#100 US MESH	0.15	33.4
#140 US MESH	0.106	29.6
#200 US MESH	0.075	27.6
	0.0328	20.4
	0.0212	17.2
	0.0124	15.1
	0.0088	14.1
	0.0063	12.0
	0.0045	11.0
	0.0031	10.8
	0.0013	8.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/13/2019

LP

3/27/2019

Tech

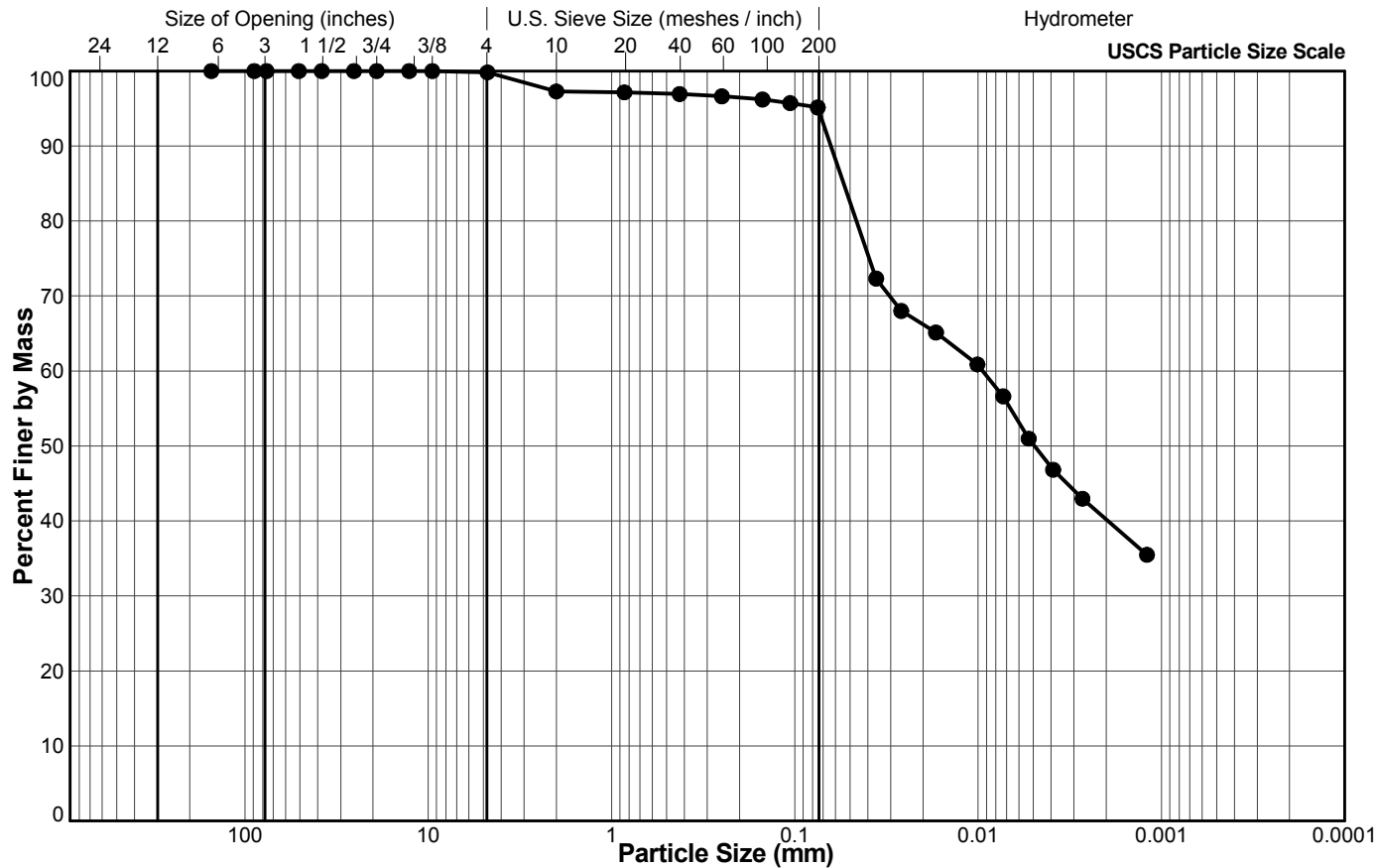
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-22S
Sample No.: 29668
Depth Interval (m): 26.20 to 26.80
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	99.8
#10 US MESH	2	97.3
#20 US MESH	0.85	97.2
#40 US MESH	0.425	96.9
#60 US MESH	0.25	96.6
#100 US MESH	0.15	96.2
#140 US MESH	0.106	95.7
#200 US MESH	0.075	95.1
	0.0360	72.3
	0.0263	68.0
	0.0170	65.1
	0.0101	60.9
	0.0073	56.6
	0.0053	51.0
	0.0039	46.8
	0.0027	43.0
	0.0012	35.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC

3/13/2019

LP

3/27/2019

Tech

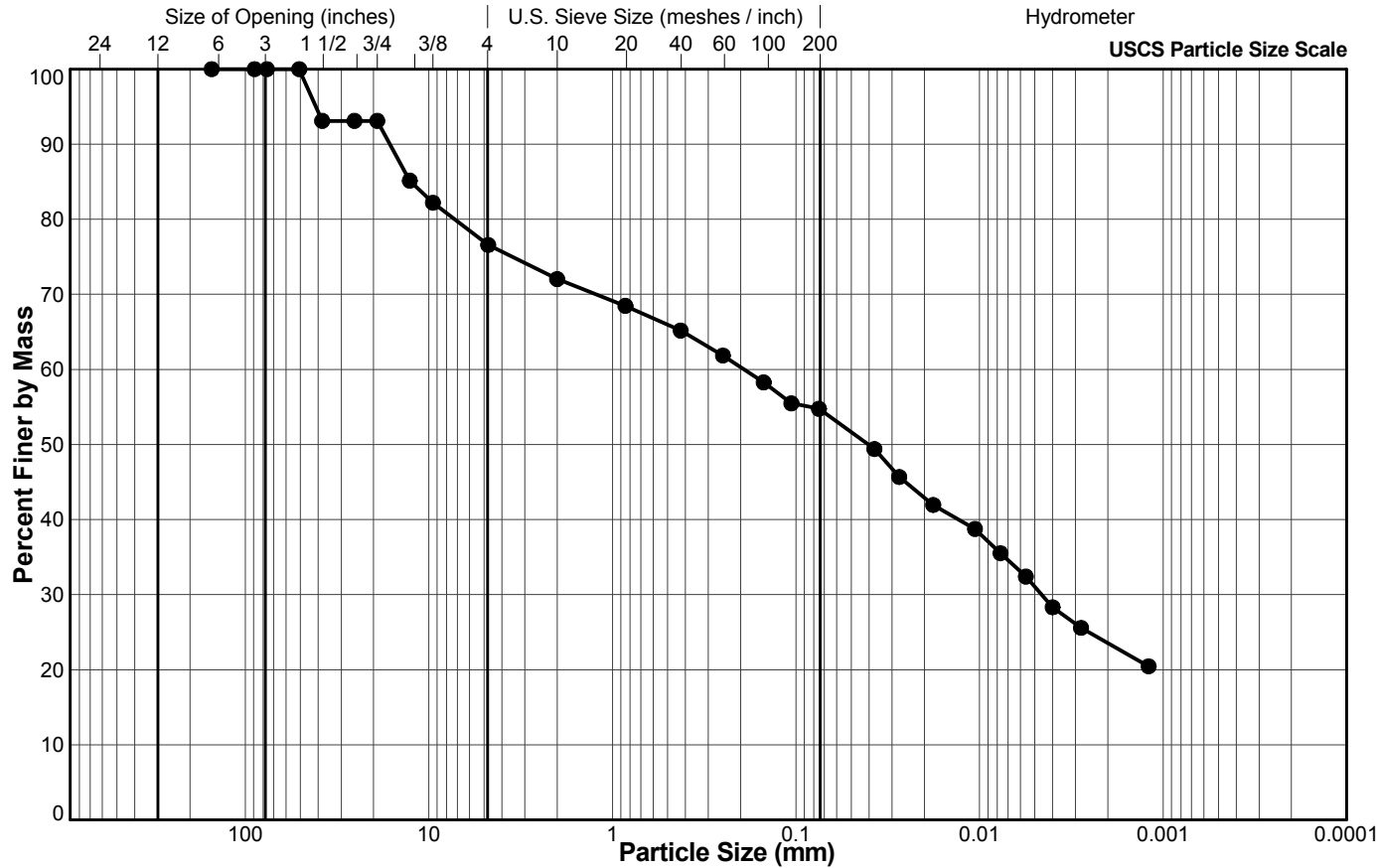
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29612
Depth Interval (m): 4.00 to 4.60
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	93.1
1"	25.4	93.1
3/4"	19.1	93.1
1/2"	12.7	85.1
3/8"	9.5	82.2
#4 US MESH	4.75	76.6
#10 US MESH	2	72.0
#20 US MESH	0.85	68.5
#40 US MESH	0.425	65.2
#60 US MESH	0.25	61.9
#100 US MESH	0.15	58.3
#140 US MESH	0.106	55.5
#200 US MESH	0.075	54.8
	0.0374	49.4
	0.0274	45.7
	0.0179	41.9
	0.0106	38.8
	0.0077	35.5
	0.0056	32.4
	0.0040	28.3
	0.0028	25.6
	0.0012	20.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

BJ/DC

3/18/2019

LP

3/28/2019

Tech

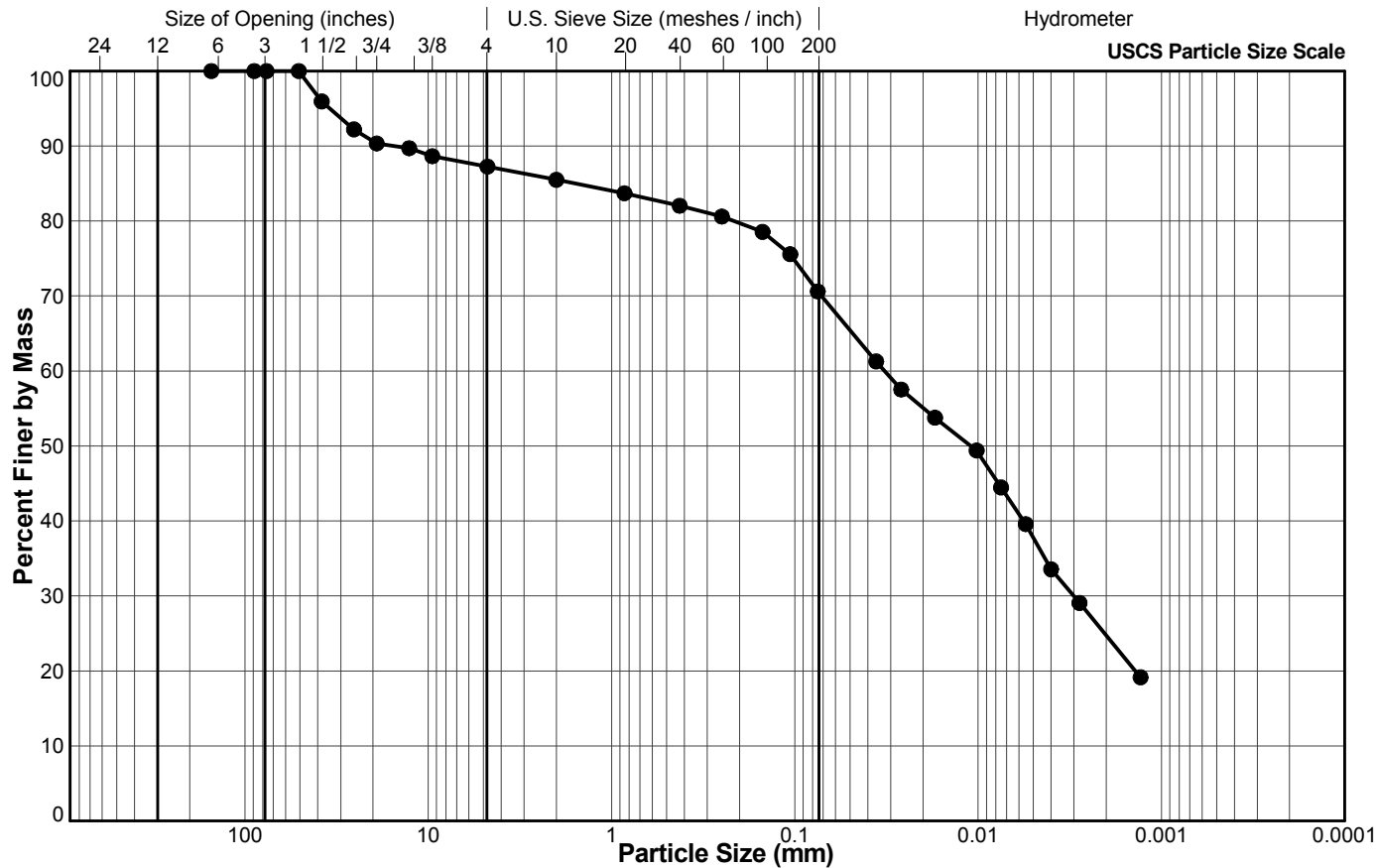
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29613
Depth Interval (m): 8.70 to 9.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	95.9
1"	25.4	92.2
3/4"	19.1	90.3
1/2"	12.7	89.7
3/8"	9.5	88.6
#4 US MESH	4.75	87.3
#10 US MESH	2	85.5
#20 US MESH	0.85	83.7
#40 US MESH	0.425	82.0
#60 US MESH	0.25	80.6
#100 US MESH	0.15	78.6
#140 US MESH	0.106	75.6
#200 US MESH	0.075	70.6
	0.0360	61.3
	0.0263	57.5
	0.0172	53.8
	0.0102	49.4
	0.0075	44.5
	0.0055	39.6
	0.0040	33.6
	0.0028	29.1
	0.0013	19.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

BJ/DC

3/18/2019

LP

3/28/2019

Tech

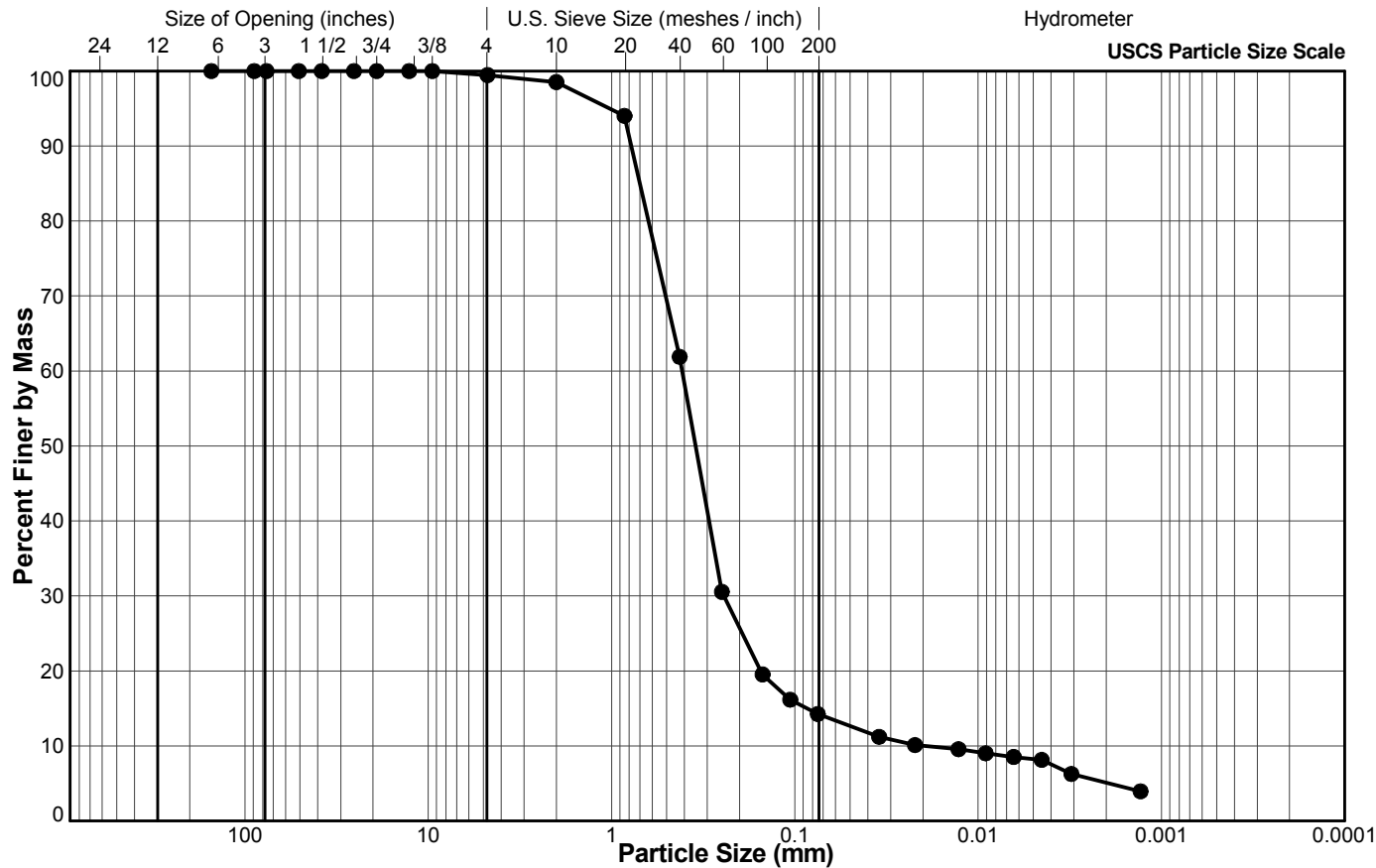
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29615
Depth Interval (m): 13.40 to 14.00
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	99.5
#10 US MESH	2	98.5
#20 US MESH	0.85	94.0
#40 US MESH	0.425	61.9
#60 US MESH	0.25	30.6
#100 US MESH	0.15	19.5
#140 US MESH	0.106	16.2
#200 US MESH	0.075	14.3
	0.0347	11.2
	0.0221	10.1
	0.0128	9.6
	0.0091	9.0
	0.0064	8.5
	0.0045	8.1
	0.0031	6.3
	0.0013	3.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

FF/DC

3/18/2019

LP

3/28/2019

Tech

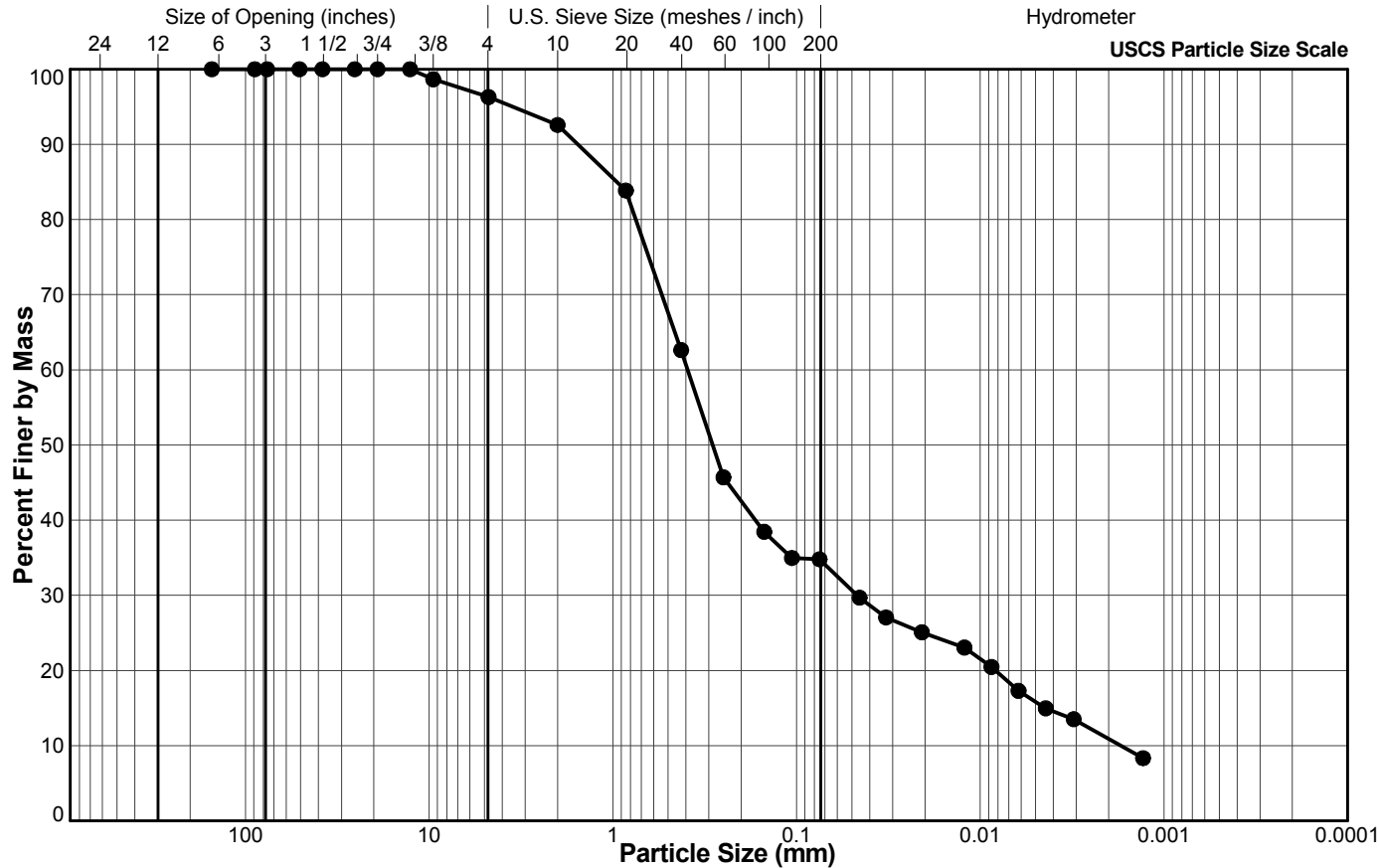
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29616
Depth Interval (m): 14.60 to 15.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	98.7
#4 US MESH	4.75	96.3
#10 US MESH	2	92.6
#20 US MESH	0.85	83.9
#40 US MESH	0.425	62.6
#60 US MESH	0.25	45.7
#100 US MESH	0.15	38.5
#140 US MESH	0.106	35.0
#200 US MESH	0.075	34.8
	0.0454	29.7
	0.0326	27.1
	0.0208	25.1
	0.0122	23.0
	0.0087	20.5
	0.0062	17.3
	0.0044	15.0
	0.0031	13.5
	0.0013	8.3

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

FF/DC

3/18/2019

LP

3/28/2019

Tech

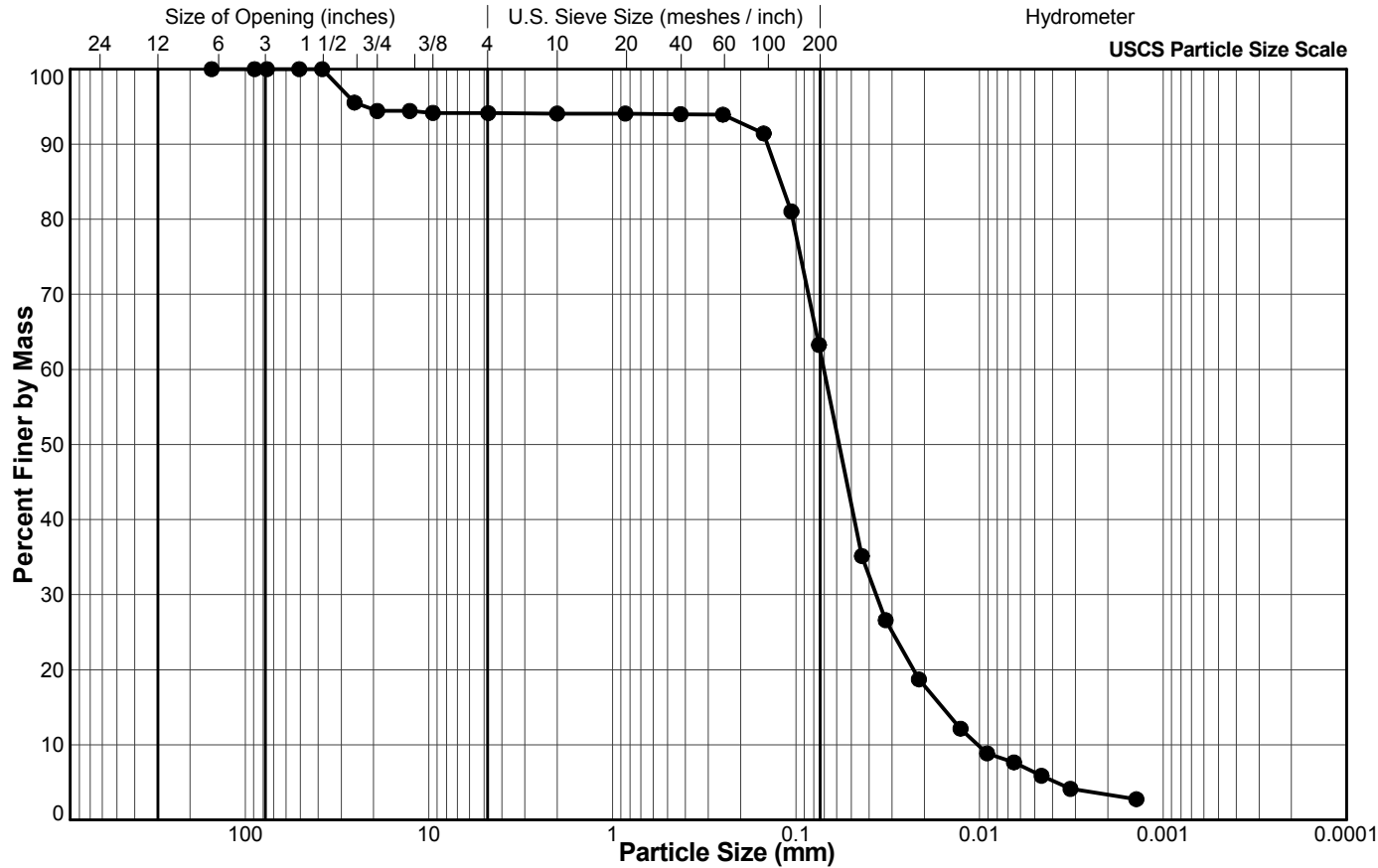
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29617
Depth Interval (m): 17.40 to 18.00
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	95.5
3/4"	19.1	94.4
1/2"	12.7	94.4
3/8"	9.5	94.2
#4 US MESH	4.75	94.1
#10 US MESH	2	94.1
#20 US MESH	0.85	94.1
#40 US MESH	0.425	94.0
#60 US MESH	0.25	93.9
#100 US MESH	0.15	91.4
#140 US MESH	0.106	81.0
#200 US MESH	0.075	63.3
	0.0438	35.1
	0.0325	26.6
	0.0214	18.7
	0.0127	12.1
	0.0091	8.9
	0.0065	7.7
	0.0046	5.9
	0.0032	4.1
	0.0014	2.8

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

BJ/DC

3/18/2019

LP

3/28/2019

Tech

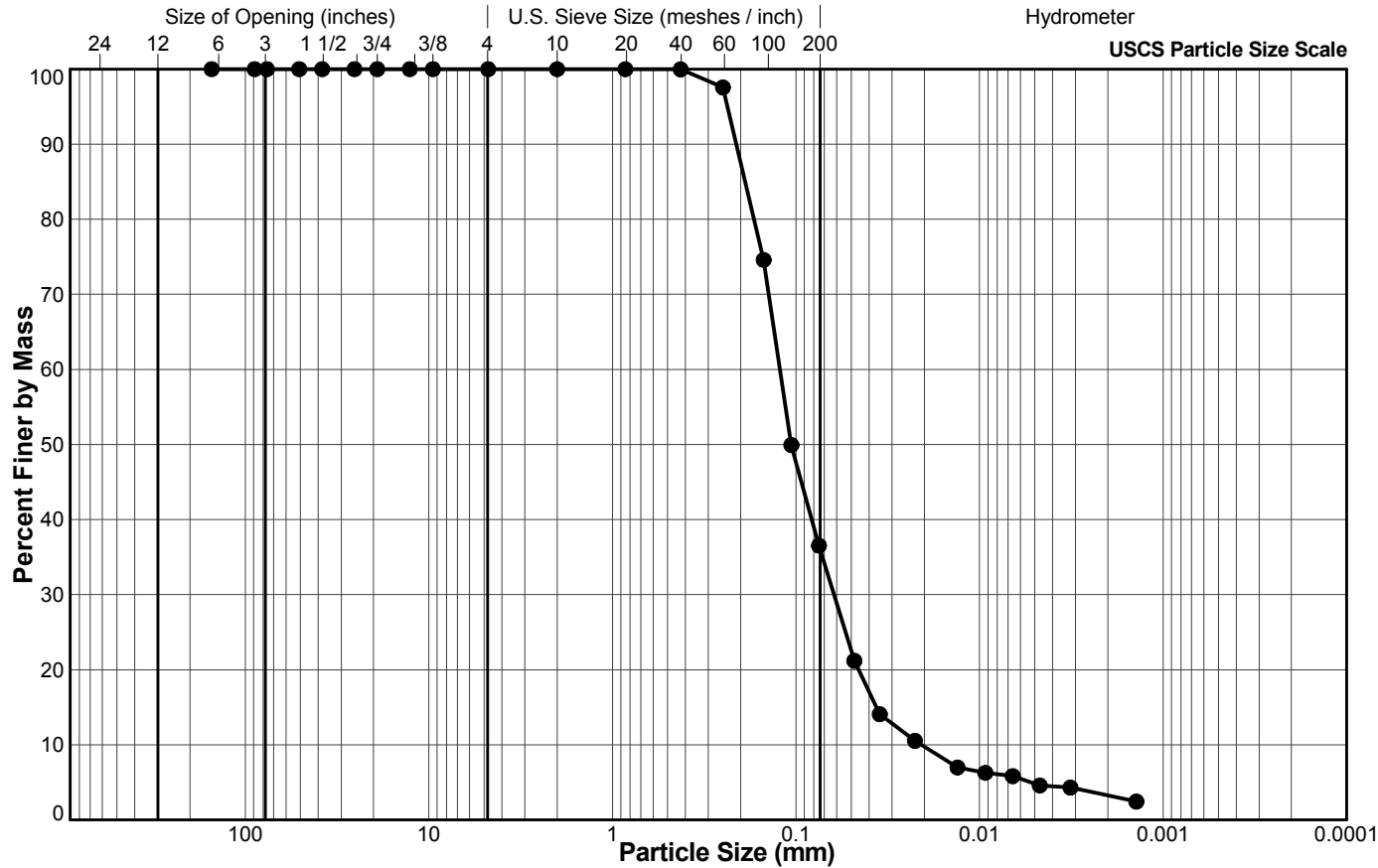
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29618
Depth Interval (m): 19.80 to 20.40
Lab Schedule No.:


Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	100.0
#40 US MESH	0.425	100.0
#60 US MESH	0.25	97.6
#100 US MESH	0.15	74.6
#140 US MESH	0.106	49.9
#200 US MESH	0.075	36.5
	0.0481	21.2
	0.0350	14.1
	0.0225	10.5
	0.0132	7.0
	0.0093	6.3
	0.0066	5.8
	0.0047	4.6
	0.0032	4.3
	0.0014	2.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ
3/18/2019
LP
3/28/2019

Tech

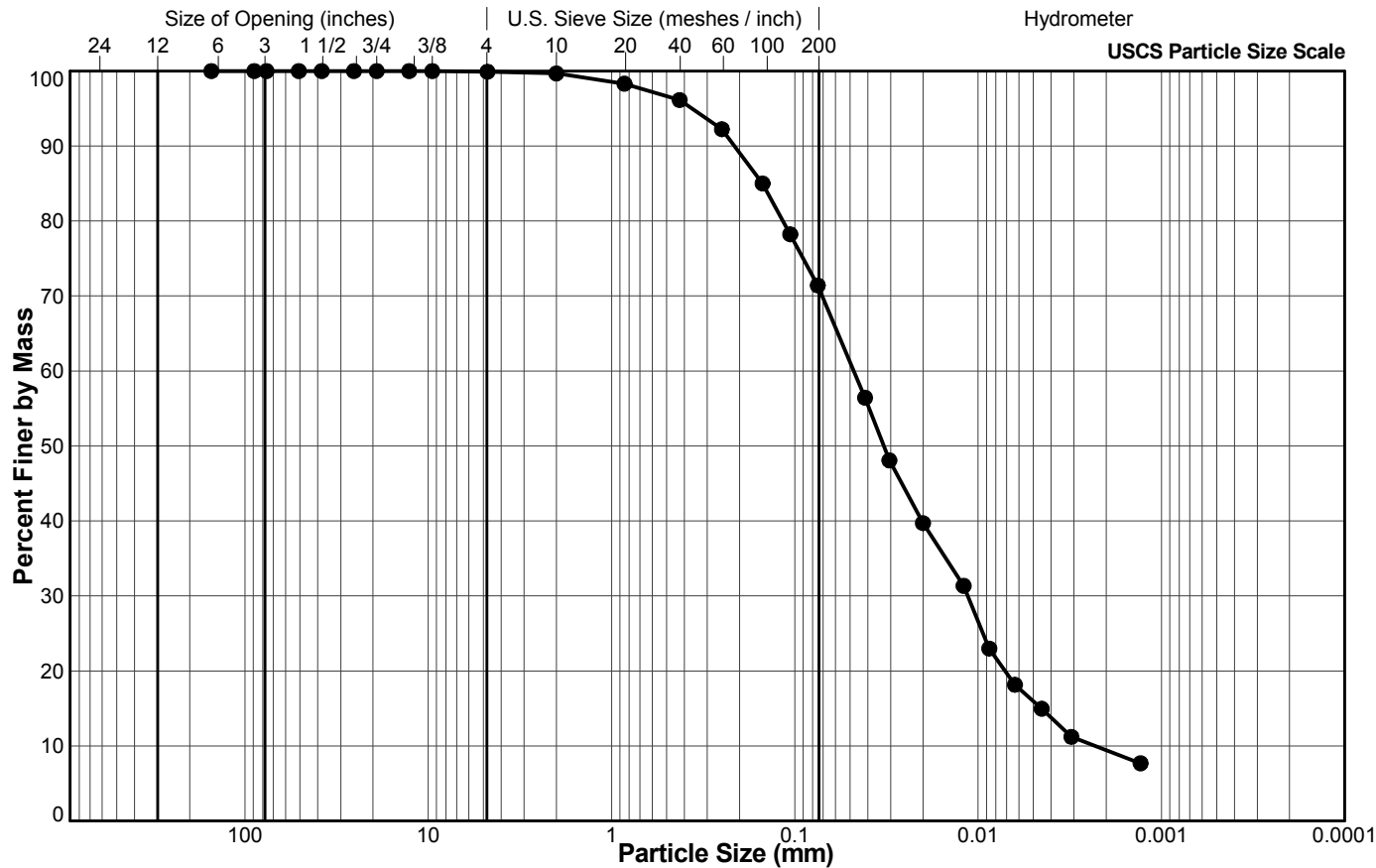
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29619
Depth Interval (m): 23.80 to 24.40
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	99.9
#10 US MESH	2	99.7
#20 US MESH	0.85	98.3
#40 US MESH	0.425	96.1
#60 US MESH	0.25	92.2
#100 US MESH	0.15	85.0
#140 US MESH	0.106	78.2
#200 US MESH	0.075	71.4
	0.0414	56.4
	0.0305	48.1
	0.0200	39.7
	0.0120	31.3
	0.0087	23.0
	0.0063	18.2
	0.0045	15.0
	0.0031	11.2
	0.0013	7.7

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ

3/18/2019

LP

3/28/2019

Tech

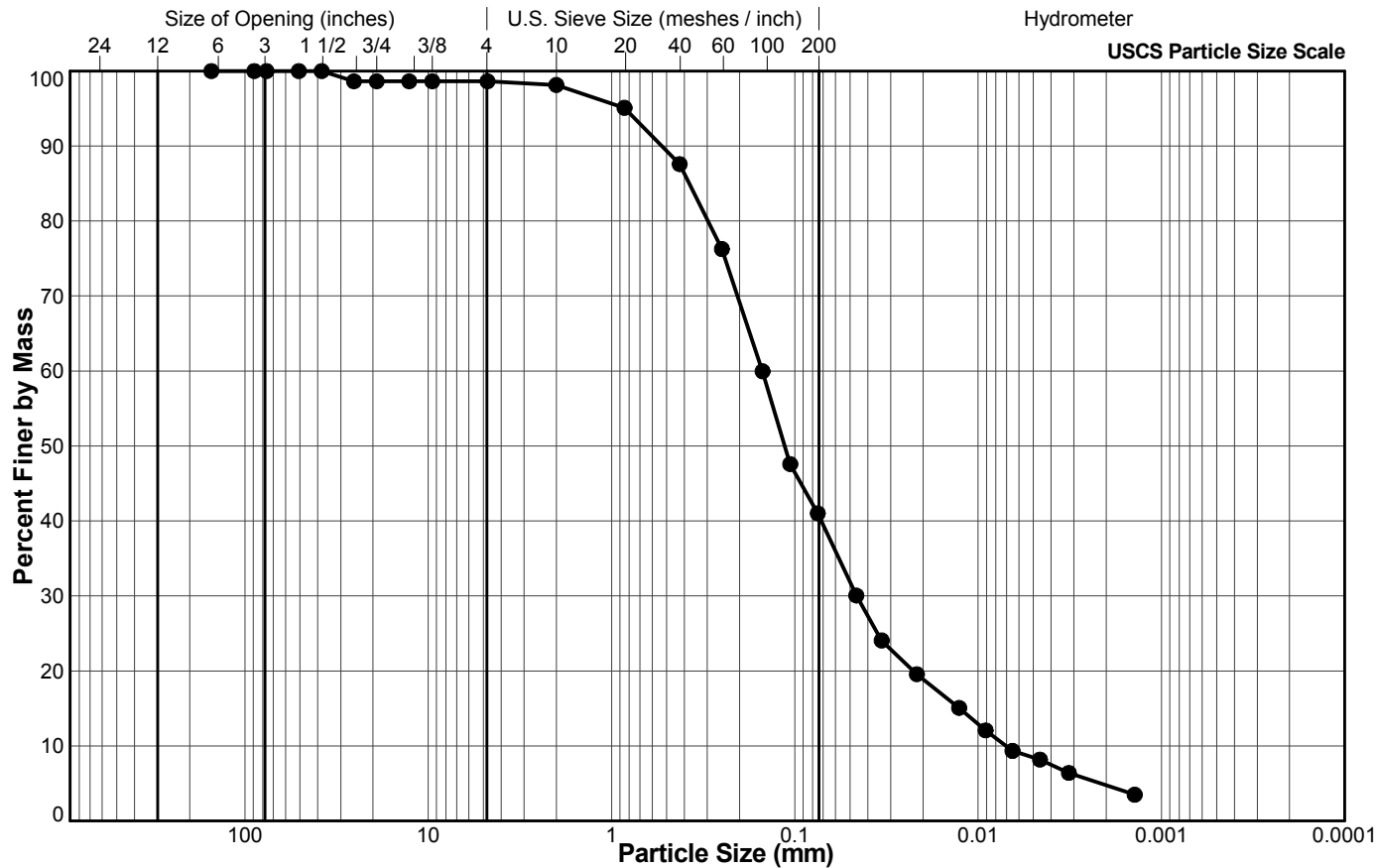
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29620
Depth Interval (m): 25.90 to 26.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	98.6
3/4"	19.1	98.6
1/2"	12.7	98.6
3/8"	9.5	98.6
#4 US MESH	4.75	98.6
#10 US MESH	2	98.1
#20 US MESH	0.85	95.1
#40 US MESH	0.425	87.6
#60 US MESH	0.25	76.3
#100 US MESH	0.15	60.0
#140 US MESH	0.106	47.6
#200 US MESH	0.075	41.0
	0.0462	30.1
	0.0336	24.1
	0.0216	19.6
	0.0127	15.1
	0.0091	12.1
	0.0065	9.3
	0.0046	8.2
	0.0032	6.4
	0.0014	3.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ

3/18/2019

LP

3/28/2019

Tech

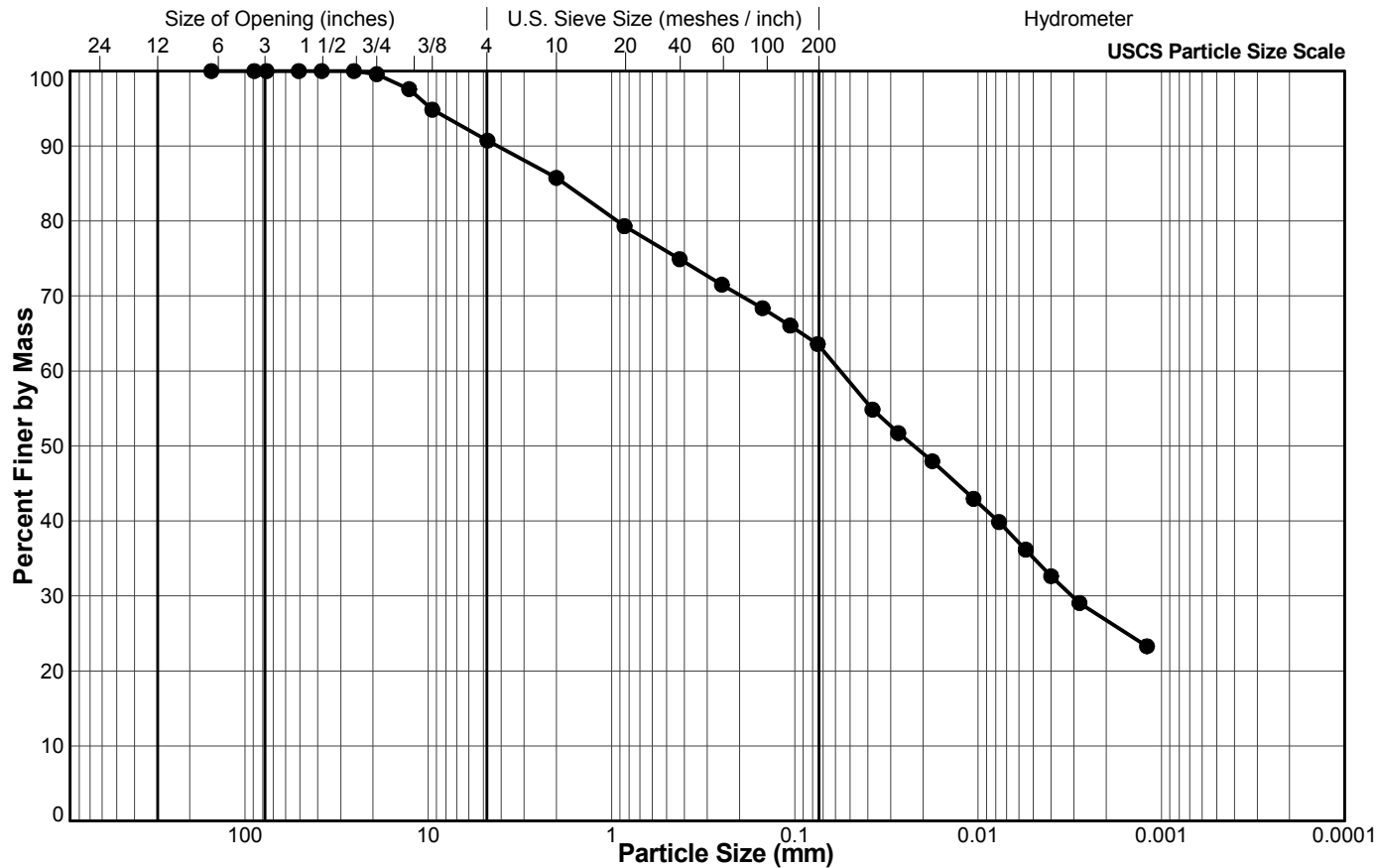
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-34S
Sample No.: 29622
Depth Interval (m): 29.90 to 33.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.6
1/2"	12.7	97.6
3/8"	9.5	94.8
#4 US MESH	4.75	90.7
#10 US MESH	2	85.8
#20 US MESH	0.85	79.3
#40 US MESH	0.425	74.9
#60 US MESH	0.25	71.5
#100 US MESH	0.15	68.4
#140 US MESH	0.106	66.1
#200 US MESH	0.075	63.6
	0.0377	54.9
	0.0273	51.7
	0.0178	48.0
	0.0106	43.0
	0.0077	39.9
	0.0055	36.2
	0.0040	32.6
	0.0028	29.1
	0.0012	23.3

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

BJ/DC

3/18/2019

LP

3/28/2019

Tech

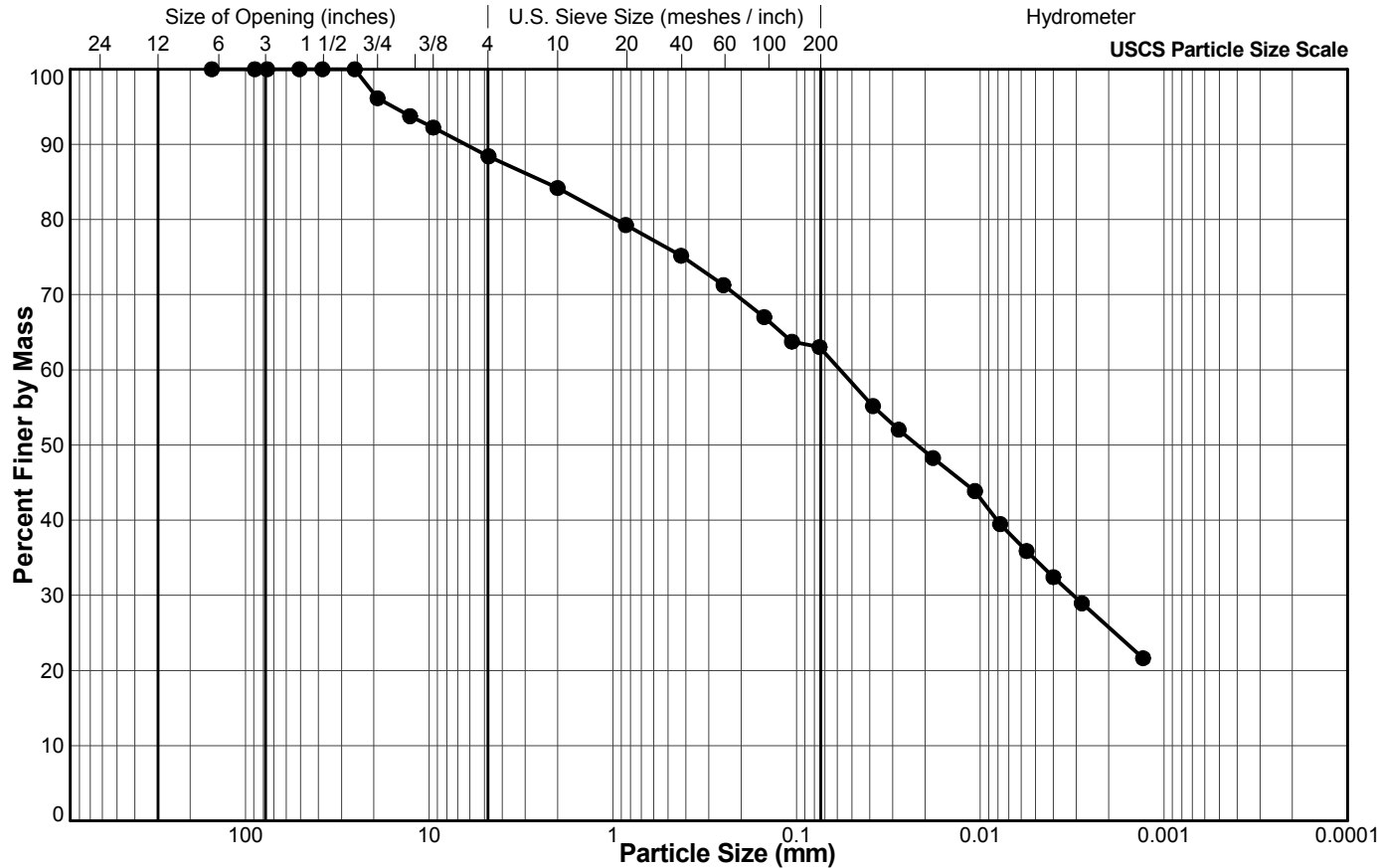
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-35S
Sample No.: 29624
Depth Interval (m): 5.50 to 6.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	96.1
1/2"	12.7	93.8
3/8"	9.5	92.2
#4 US MESH	4.75	88.4
#10 US MESH	2	84.2
#20 US MESH	0.85	79.3
#40 US MESH	0.425	75.2
#60 US MESH	0.25	71.3
#100 US MESH	0.15	67.0
#140 US MESH	0.106	63.7
#200 US MESH	0.075	63.0
	0.0384	55.2
	0.0278	52.0
	0.0181	48.3
	0.0107	43.9
	0.0078	39.5
	0.0056	35.9
	0.0040	32.4
	0.0028	28.9
	0.0013	21.6

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

BJ/DC

3/18/2019

LP

3/29/2019

Tech

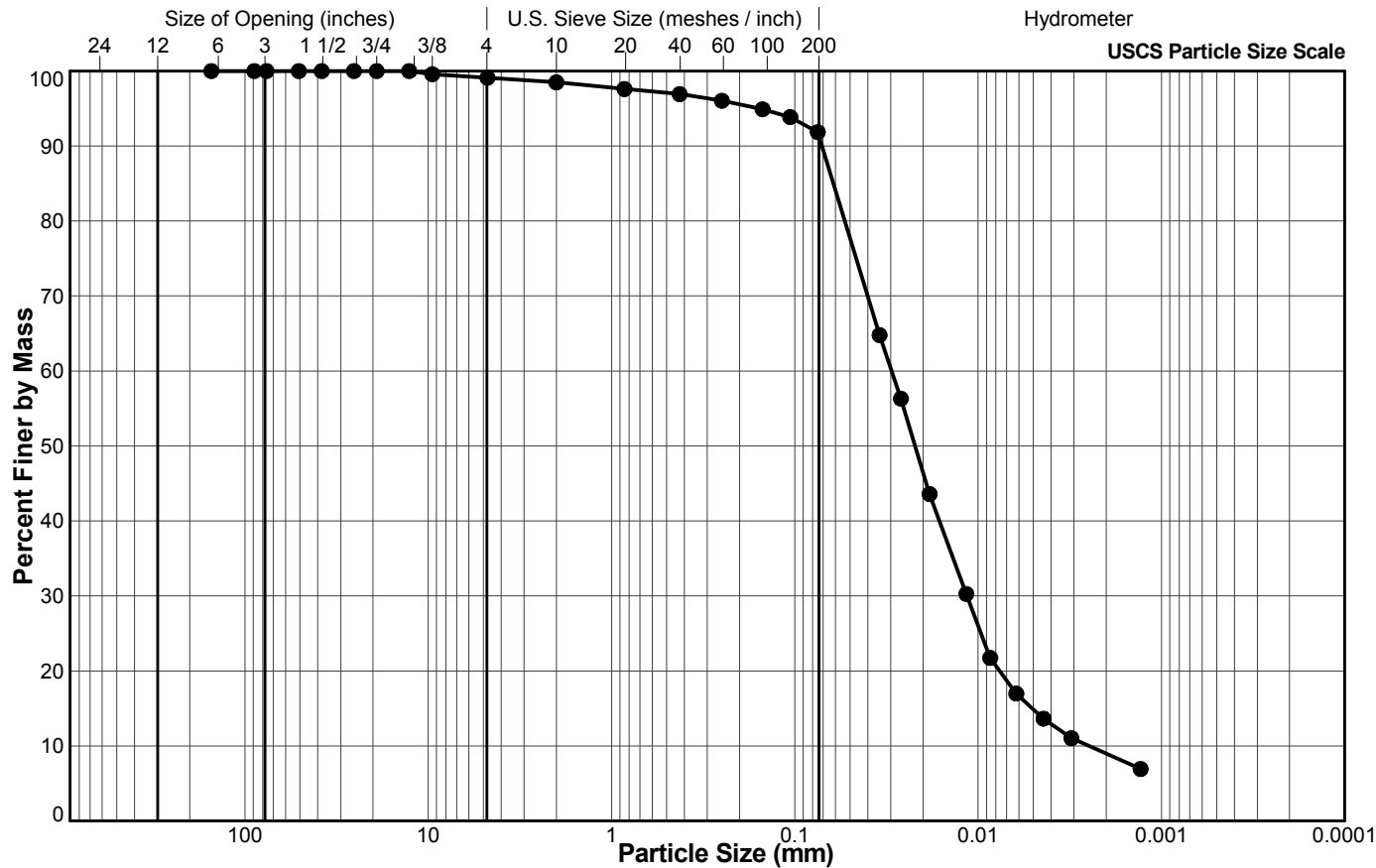
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-35S
Sample No.: 35139
Depth Interval (m): 14.60 to 15.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	99.6
#4 US MESH	4.75	99.1
#10 US MESH	2	98.5
#20 US MESH	0.85	97.6
#40 US MESH	0.425	96.9
#60 US MESH	0.25	96.0
#100 US MESH	0.15	94.9
#140 US MESH	0.106	93.9
#200 US MESH	0.075	91.9
	0.0345	64.8
	0.0264	56.3
	0.0184	43.6
	0.0116	30.3
	0.0086	21.7
	0.0062	17.0
	0.0044	13.6
	0.0031	11.0
	0.0013	6.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ

3/21/2019

LP

3/29/2019

Tech

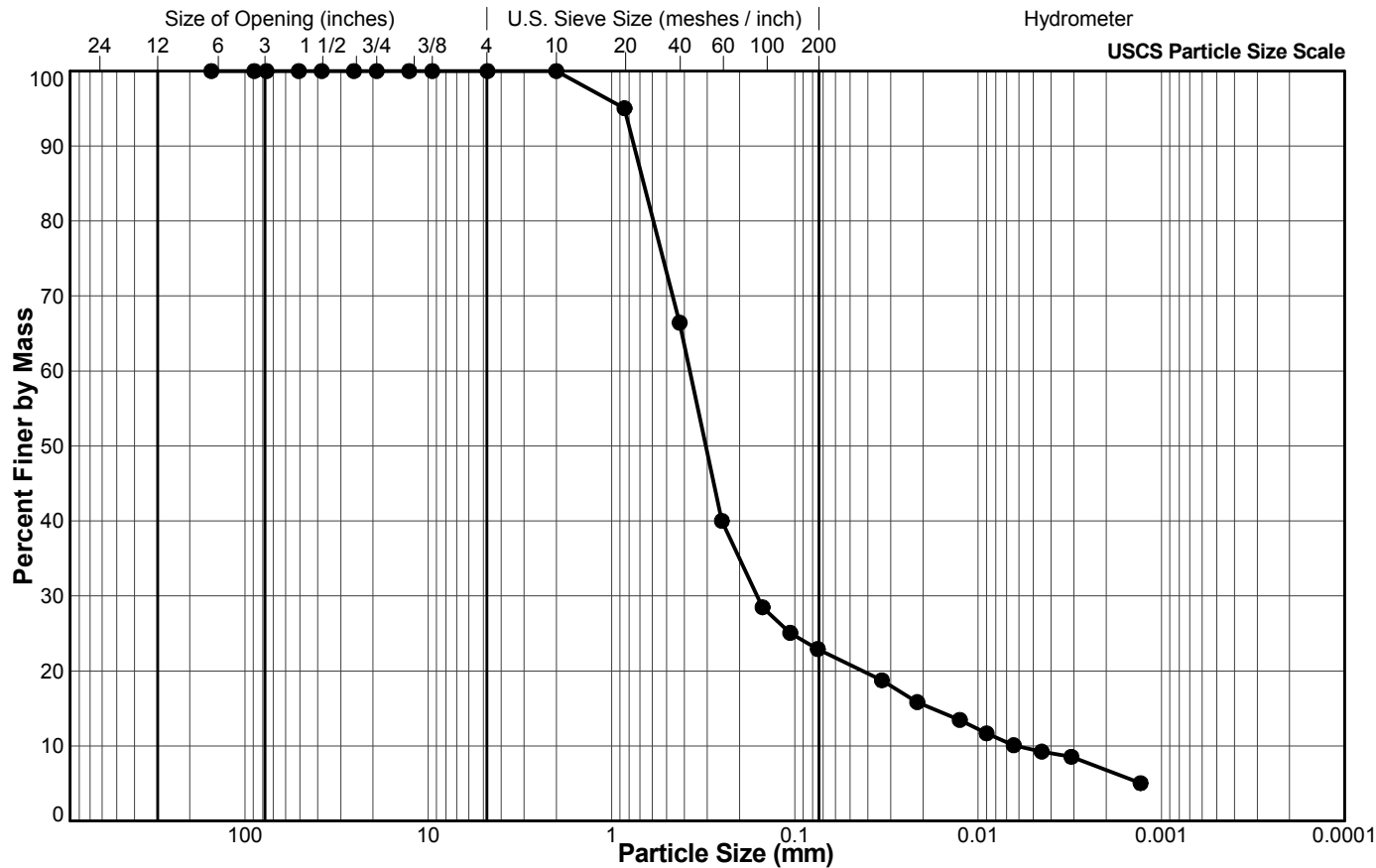
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-35S
Sample No.: 35140
Depth Interval (m): 16.80 to 17.40
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	95.0
#40 US MESH	0.425	66.4
#60 US MESH	0.25	40.0
#100 US MESH	0.15	28.5
#140 US MESH	0.106	25.1
#200 US MESH	0.075	22.9
	0.0335	18.7
	0.0215	15.8
	0.0126	13.5
	0.0090	11.7
	0.0064	10.1
	0.0045	9.2
	0.0031	8.5
	0.0013	5.0

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ

3/21/2019

LP

3/29/2019

Tech

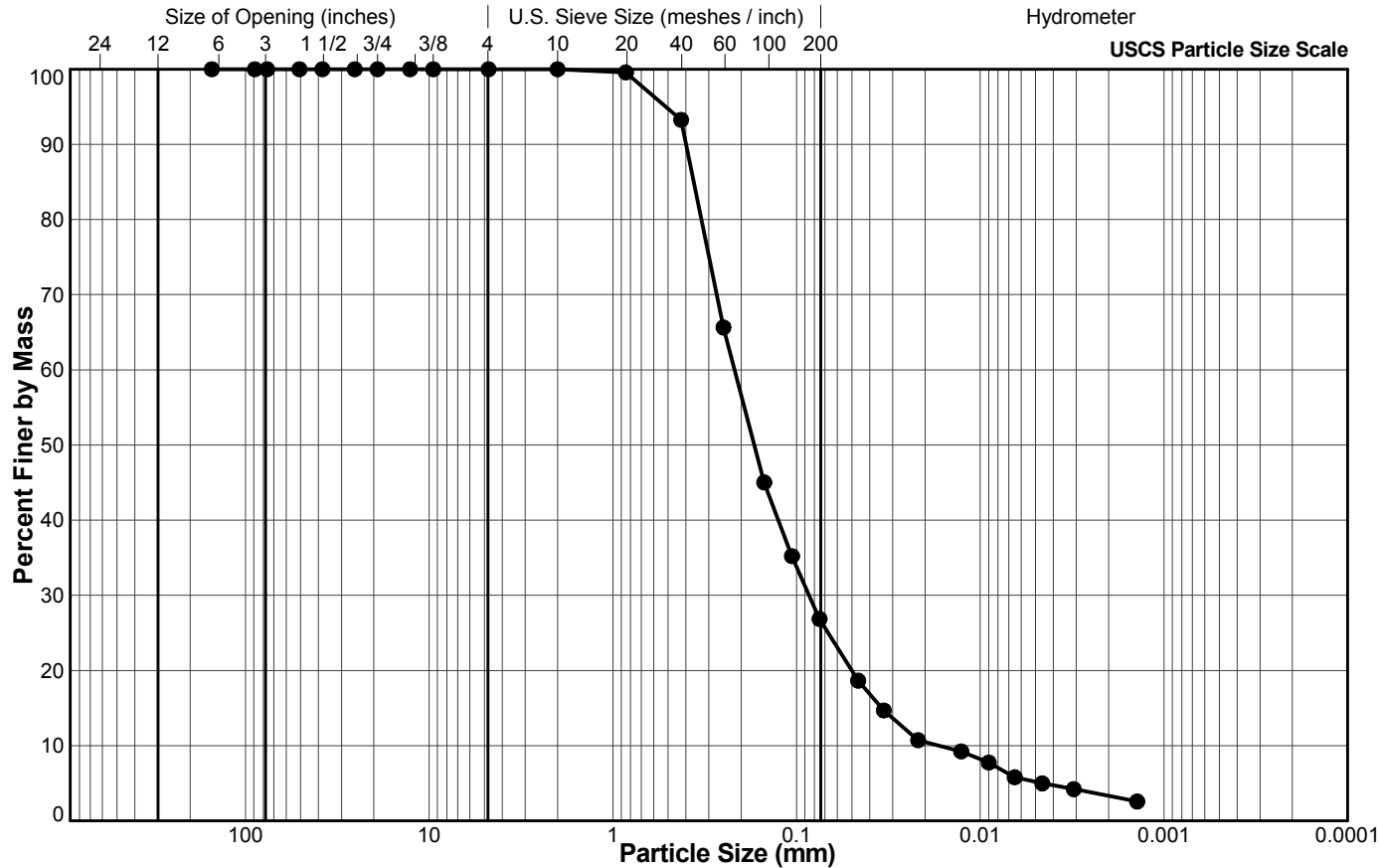
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-35S
Sample No.: 35141
Depth Interval (m): 18.00 to 18.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	99.6
#40 US MESH	0.425	93.3
#60 US MESH	0.25	65.6
#100 US MESH	0.15	45.0
#140 US MESH	0.106	35.2
#200 US MESH	0.075	26.9
	0.0462	18.6
	0.0335	14.7
	0.0218	10.7
	0.0127	9.2
	0.0090	7.7
	0.0065	5.8
	0.0046	5.0
	0.0031	4.2
	0.0014	2.6

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ

3/21/2019

LP

3/29/2019

Tech

Date

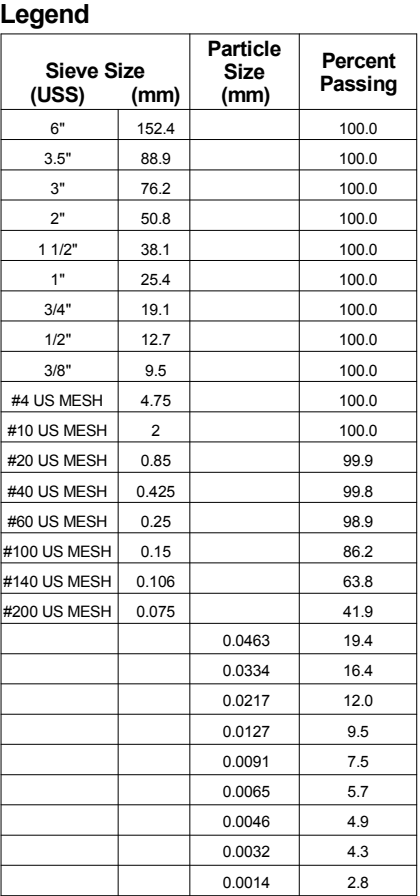
Checked

Date



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

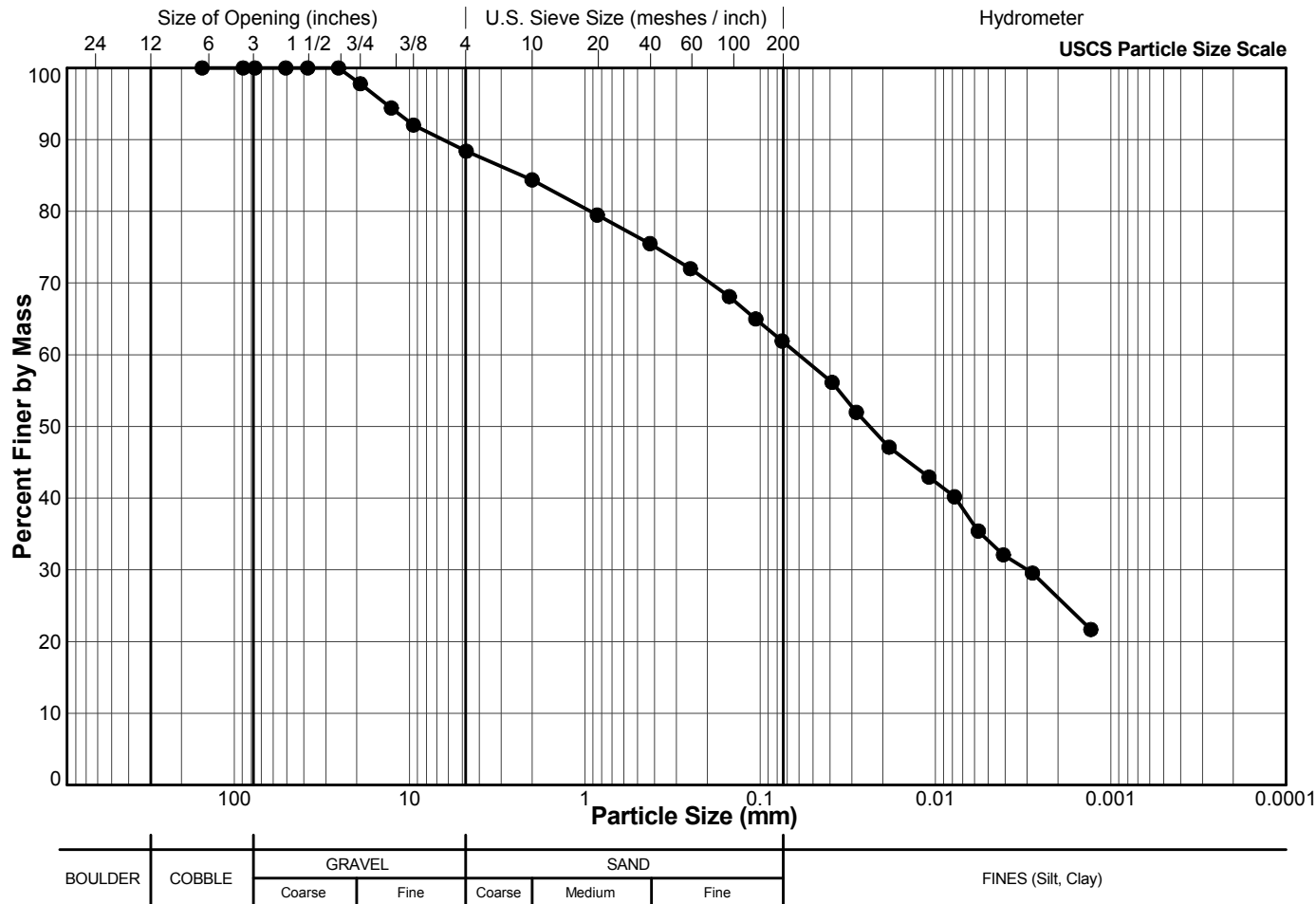
Sample Location: 19-35S
Sample No.: 35142
Depth Interval (m): 19.20 to 19.80
Lab Schedule No.:



DC/BJ	3/21/2019	LP	3/29/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-35S
Sample No.: 35143
Depth Interval (m): 22.30 to 22.90
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	97.8
1/2"	12.7	94.4
3/8"	9.5	92.0
#4 US MESH	4.75	88.4
#10 US MESH	2	84.4
#20 US MESH	0.85	79.5
#40 US MESH	0.425	75.5
#60 US MESH	0.25	72.0
#100 US MESH	0.15	68.1
#140 US MESH	0.106	65.0
#200 US MESH	0.075	61.9
	0.0389	56.1
	0.0283	52.0
	0.0184	47.1
	0.0109	42.9
	0.0078	40.2
	0.0057	35.4
	0.0041	32.1
	0.0028	29.6
	0.0013	21.7

DC/BJ

3/21/2019

LP

3/29/2019

Tech

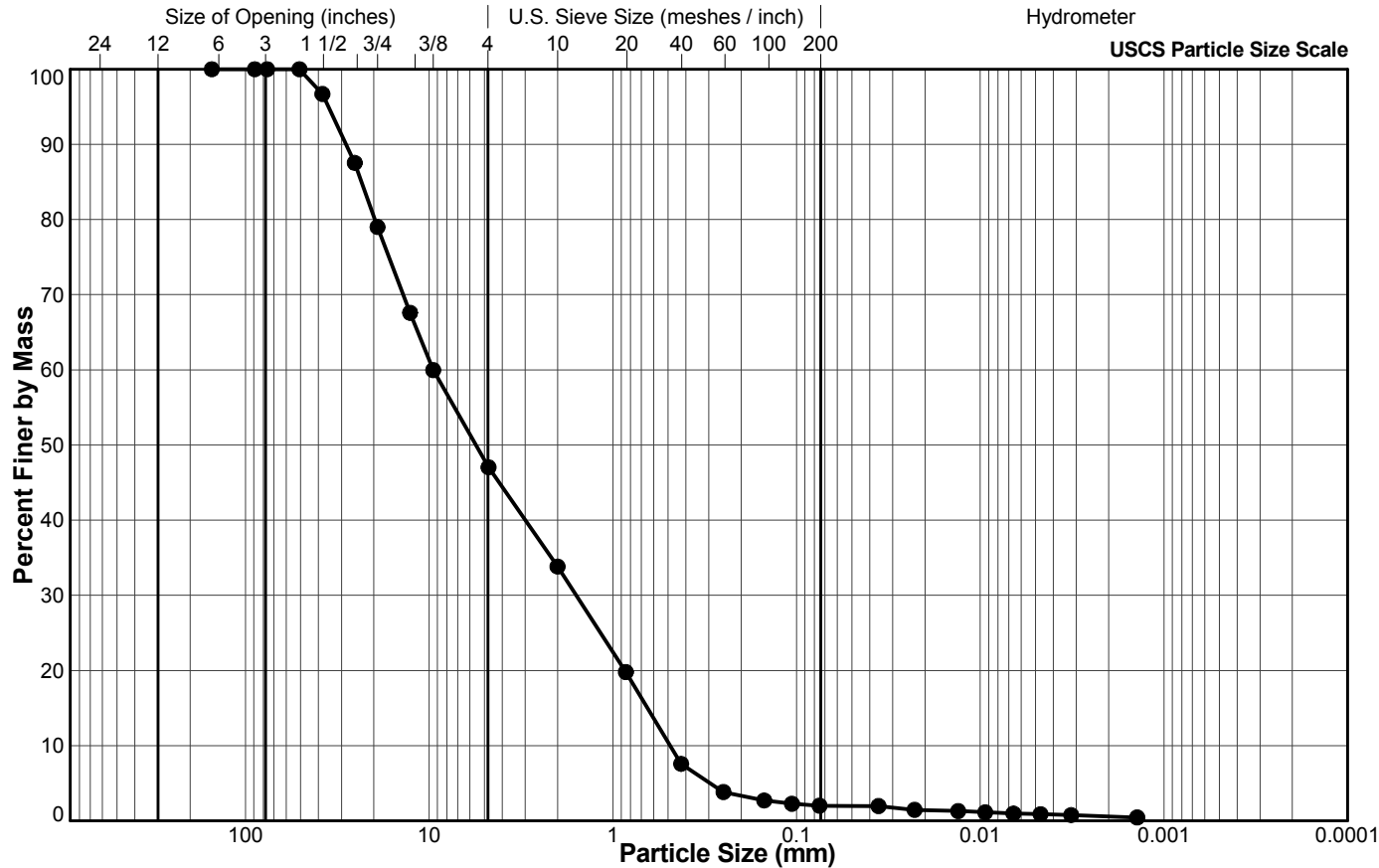
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-36S
Sample No.: 23628
Depth Interval (m): 1.37 to 1.60
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	96.7
1"	25.4	87.5
3/4"	19.1	79.0
1/2"	12.7	67.6
3/8"	9.5	60.0
#4 US MESH	4.75	47.0
#10 US MESH	2	33.8
#20 US MESH	0.85	19.8
#40 US MESH	0.425	7.6
#60 US MESH	0.25	3.8
#100 US MESH	0.15	2.7
#140 US MESH	0.106	2.3
#200 US MESH	0.075	2.0
	0.0358	2.0
	0.0228	1.5
	0.0132	1.3
	0.0094	1.1
	0.0066	1.0
	0.0047	0.9
	0.0032	0.8
	0.0014	0.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/KS

3/26/2019

LP

3/28/2019

Tech

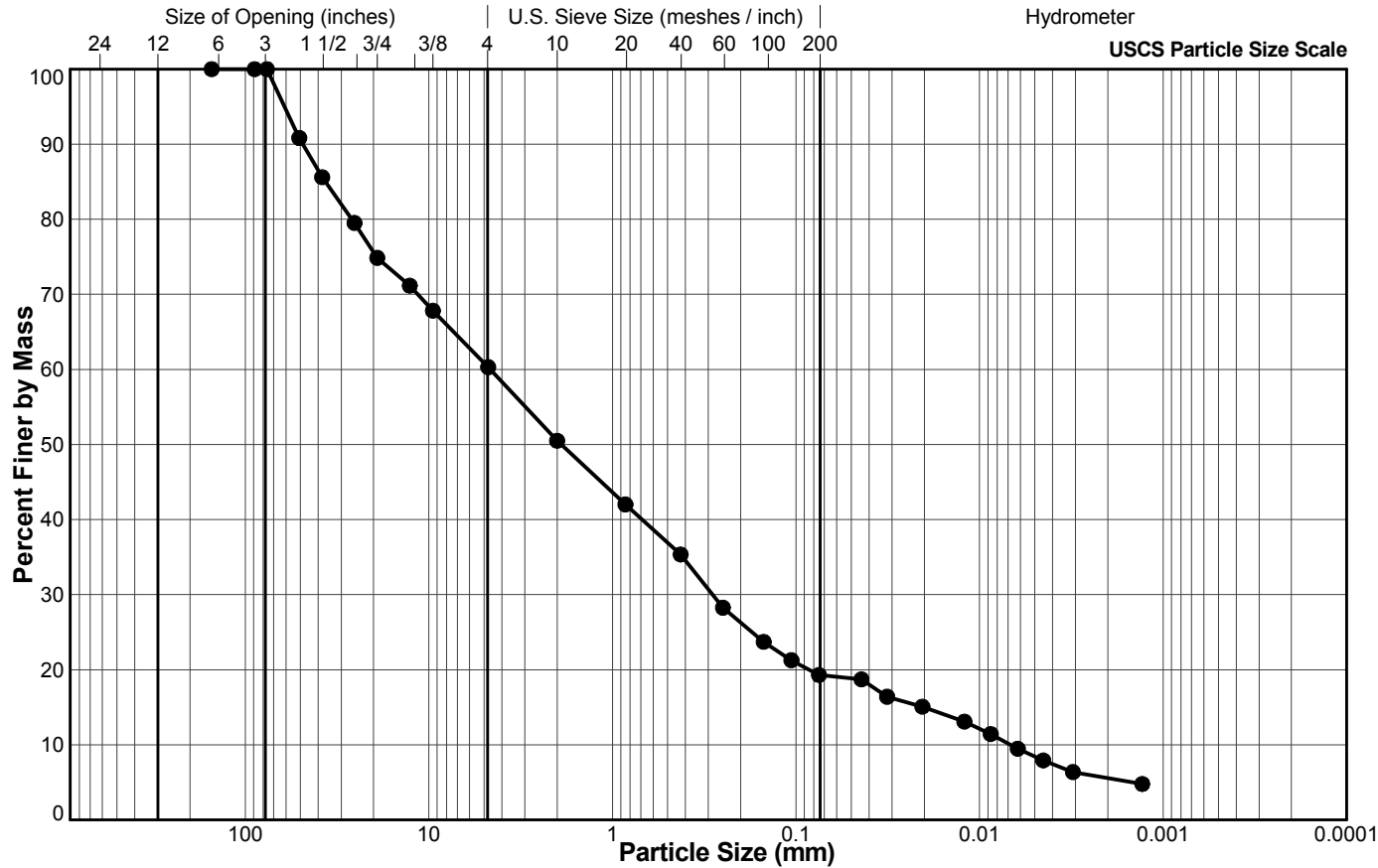
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-36S
Sample No.: 23627
Depth Interval (m): 2.44 to 3.05
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	90.8
1 1/2"	38.1	85.6
1"	25.4	79.5
3/4"	19.1	74.9
1/2"	12.7	71.2
3/8"	9.5	67.8
#4 US MESH	4.75	60.3
#10 US MESH	2	50.5
#20 US MESH	0.85	42.0
#40 US MESH	0.425	35.4
#60 US MESH	0.25	28.3
#100 US MESH	0.15	23.7
#140 US MESH	0.106	21.3
#200 US MESH	0.075	19.3
	0.0440	18.7
	0.0319	16.4
	0.0205	15.1
	0.0121	13.1
	0.0087	11.4
	0.0062	9.5
	0.0045	7.9
	0.0031	6.4
	0.0013	4.8

BOULDER		COBBLE		GRAVEL		SAND			FINES (Silt, Clay)
				Coarse	Fine	Coarse	Medium	Fine	

DC/KS

3/26/2019

LP

3/28/2019

Tech

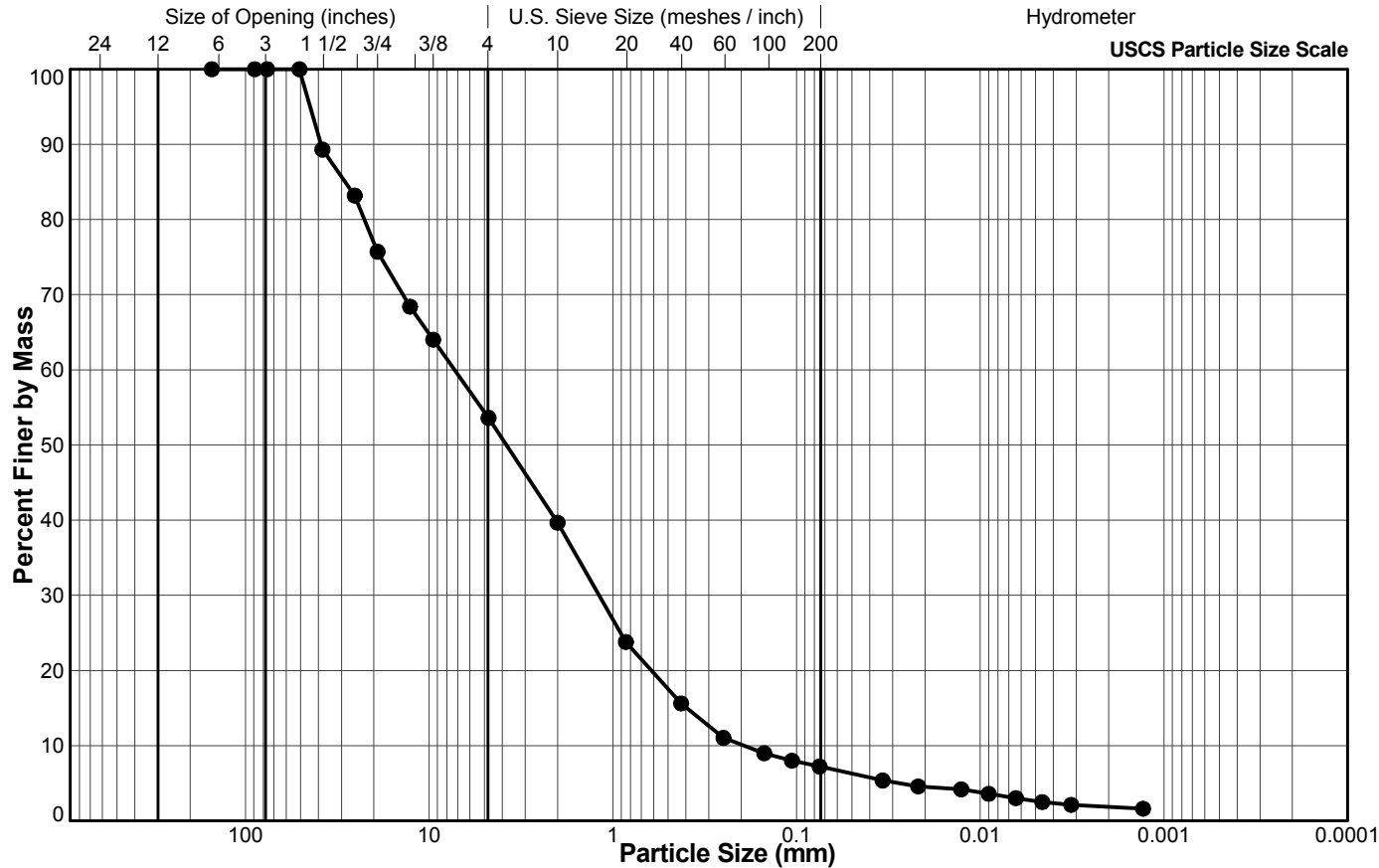
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-37S
Sample No.: 23634
Depth Interval (m): 3.96 to 4.57
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	89.3
1"	25.4	83.2
3/4"	19.1	75.7
1/2"	12.7	68.4
3/8"	9.5	64.0
#4 US MESH	4.75	53.6
#10 US MESH	2	39.7
#20 US MESH	0.85	23.8
#40 US MESH	0.425	15.6
#60 US MESH	0.25	11.0
#100 US MESH	0.15	9.0
#140 US MESH	0.106	8.0
#200 US MESH	0.075	7.2
	0.0340	5.4
	0.0218	4.6
	0.0127	4.2
	0.0090	3.6
	0.0064	3.0
	0.0046	2.5
	0.0032	2.1
	0.0013	1.6

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/KS

3/26/2019

LP

3/28/2019

Tech

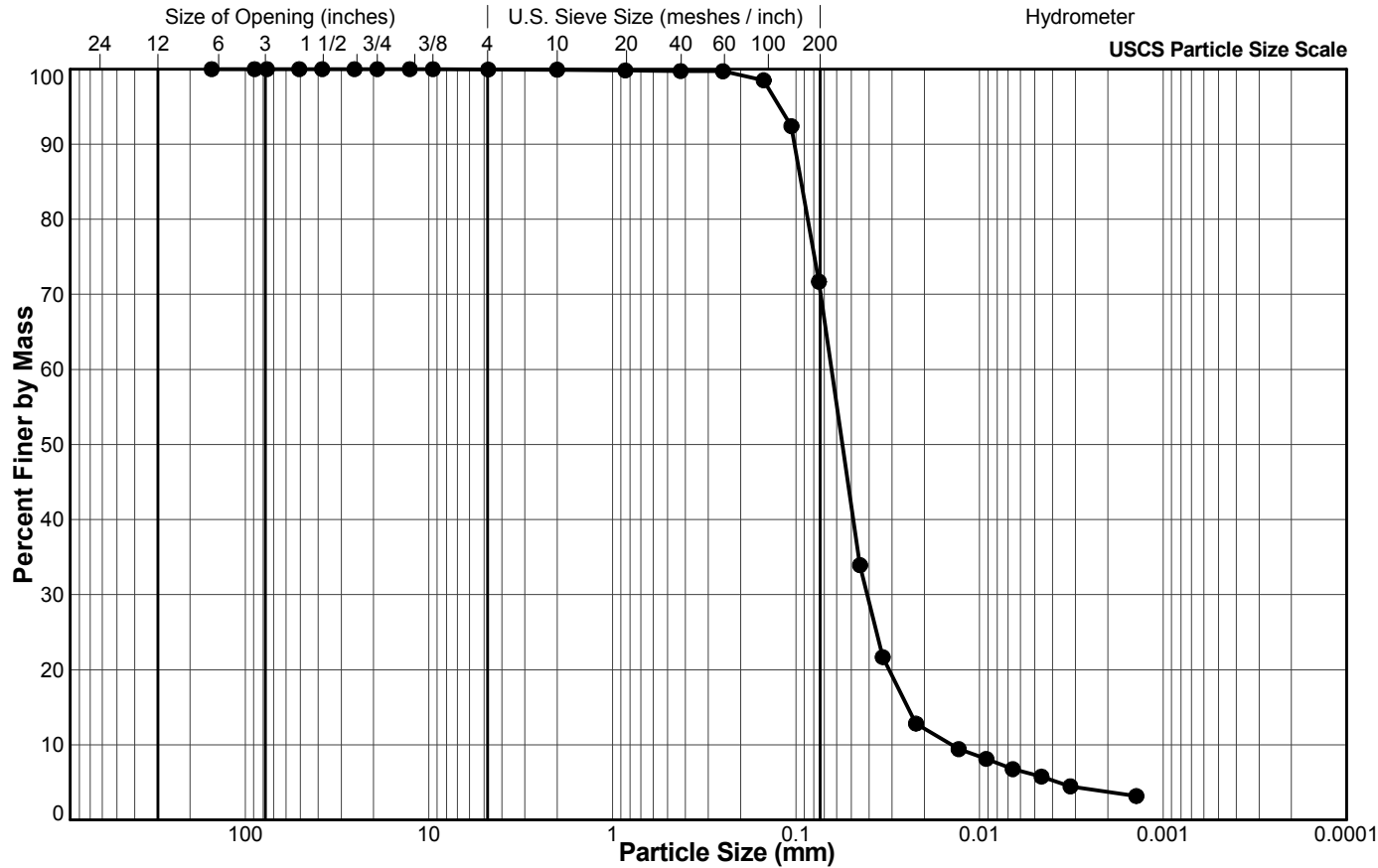
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-37S
Sample No.: 23635
Depth Interval (m): 4.57 to 5.18
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	99.9
#20 US MESH	0.85	99.8
#40 US MESH	0.425	99.7
#60 US MESH	0.25	99.7
#100 US MESH	0.15	98.5
#140 US MESH	0.106	92.4
#200 US MESH	0.075	71.7
	0.0448	33.9
	0.0337	21.7
	0.0222	12.8
	0.0130	9.4
	0.0092	8.1
	0.0066	6.8
	0.0046	5.8
	0.0032	4.5
	0.0014	3.2

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/KS

3/26/2019

LP

3/28/2019

Tech

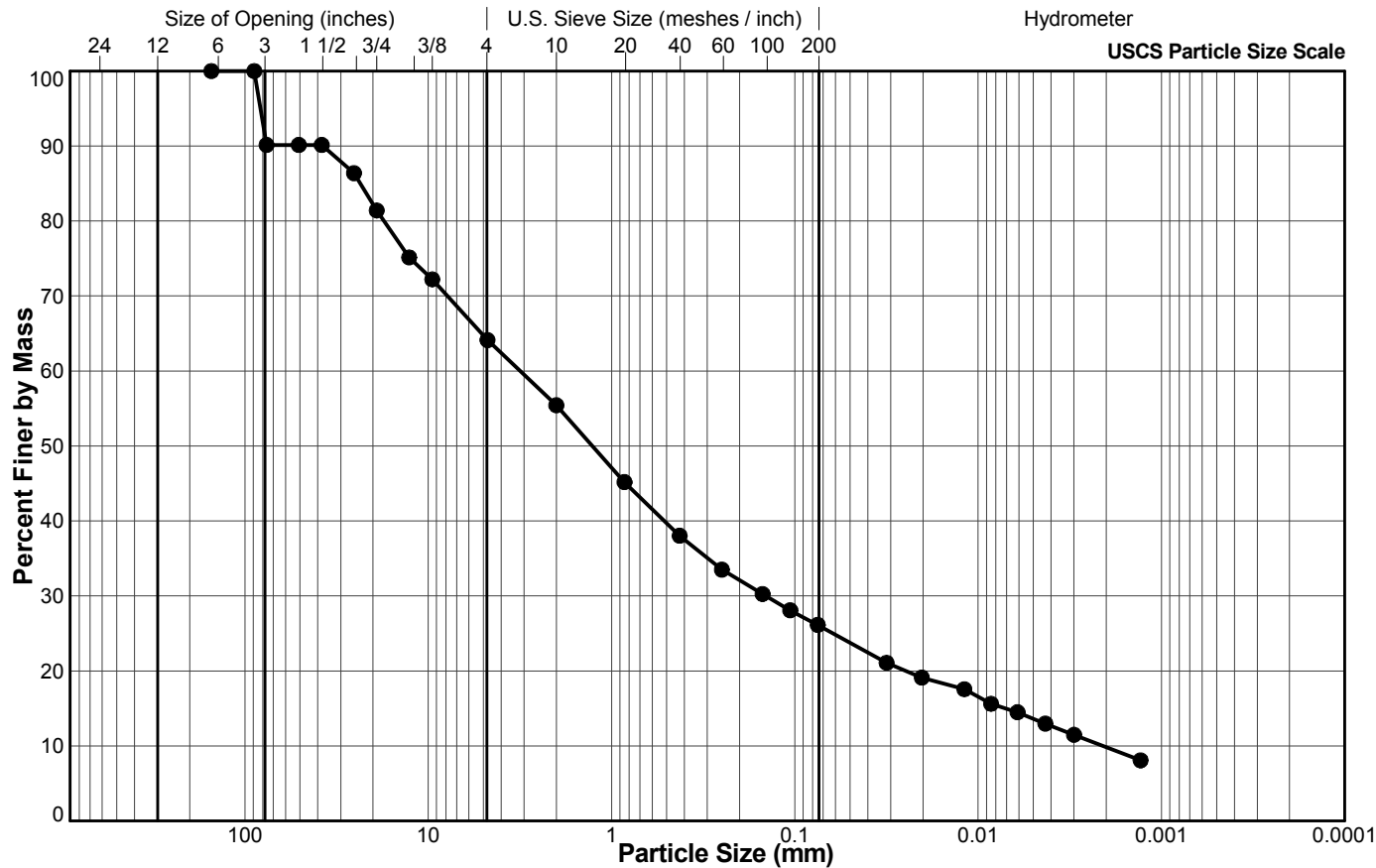
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35052
Depth Interval (m): 5.60 to 6.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	90.1
2"	50.8	90.1
1 1/2"	38.1	90.1
1"	25.4	86.4
3/4"	19.1	81.4
1/2"	12.7	75.2
3/8"	9.5	72.2
#4 US MESH	4.75	64.1
#10 US MESH	2	55.4
#20 US MESH	0.85	45.2
#40 US MESH	0.425	38.0
#60 US MESH	0.25	33.5
#100 US MESH	0.15	30.3
#140 US MESH	0.106	28.1
#200 US MESH	0.075	26.1
	0.0316	21.1
	0.0203	19.1
	0.0119	17.6
	0.0085	15.6
	0.0061	14.5
	0.0043	13.0
	0.0030	11.5
	0.0013	8.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/RG

4/26/2019

LP

5/1/2019

Tech

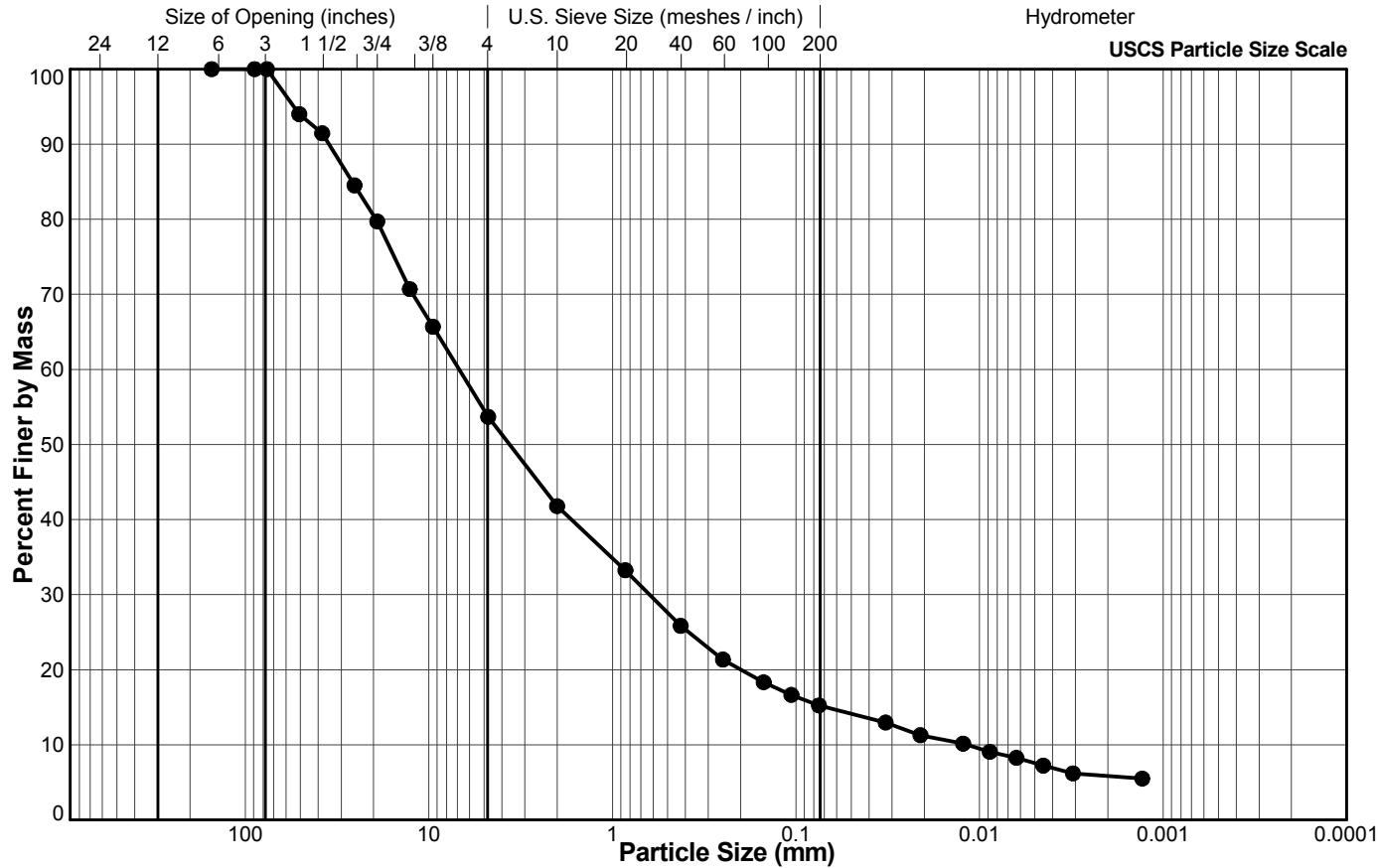
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35053
Depth Interval (m): 8.50 to 9.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	94.0
1 1/2"	38.1	91.5
1"	25.4	84.5
3/4"	19.1	79.7
1/2"	12.7	70.7
3/8"	9.5	65.7
#4 US MESH	4.75	53.7
#10 US MESH	2	41.8
#20 US MESH	0.85	33.2
#40 US MESH	0.425	25.8
#60 US MESH	0.25	21.4
#100 US MESH	0.15	18.3
#140 US MESH	0.106	16.6
#200 US MESH	0.075	15.2
	0.0325	13.0
	0.0210	11.3
	0.0123	10.1
	0.0088	9.1
	0.0063	8.3
	0.0045	7.2
	0.0031	6.2
	0.0013	5.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/29/2019

LP

5/1/2019

Tech

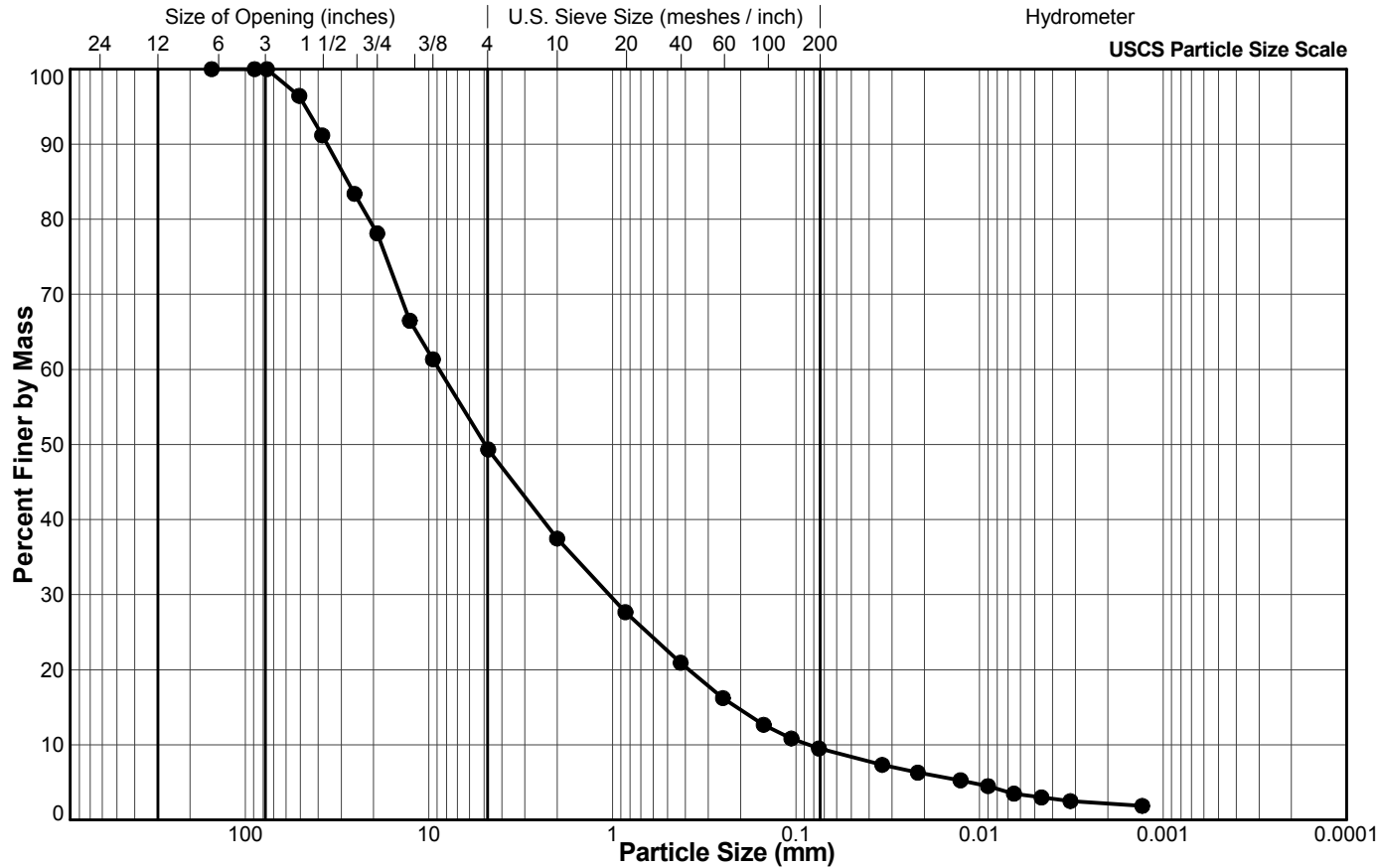
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35054
Depth Interval (m): 11.60 to 12.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	96.4
1 1/2"	38.1	91.2
1"	25.4	83.4
3/4"	19.1	78.1
1/2"	12.7	66.5
3/8"	9.5	61.3
#4 US MESH	4.75	49.3
#10 US MESH	2	37.5
#20 US MESH	0.85	27.7
#40 US MESH	0.425	20.9
#60 US MESH	0.25	16.2
#100 US MESH	0.15	12.7
#140 US MESH	0.106	10.8
#200 US MESH	0.075	9.5
	0.0339	7.3
	0.0217	6.3
	0.0127	5.3
	0.0090	4.5
	0.0065	3.5
	0.0046	3.0
	0.0032	2.5
	0.0013	1.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/26/2019

LP

5/1/2019

Tech

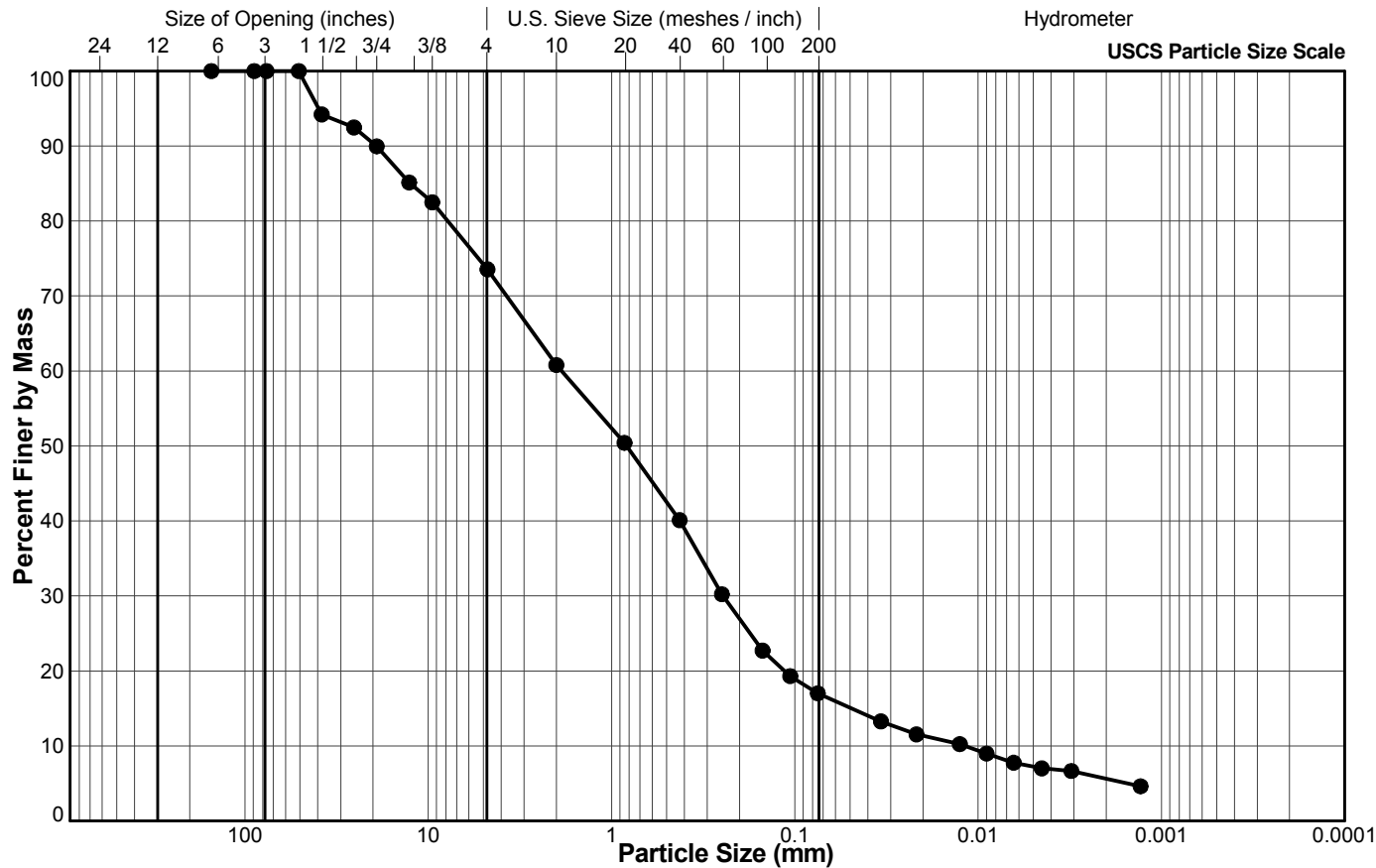
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35055
Depth Interval (m): 14.30 to 14.60
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	94.2
1"	25.4	92.5
3/4"	19.1	90.0
1/2"	12.7	85.1
3/8"	9.5	82.5
#4 US MESH	4.75	73.5
#10 US MESH	2	60.8
#20 US MESH	0.85	50.4
#40 US MESH	0.425	40.1
#60 US MESH	0.25	30.2
#100 US MESH	0.15	22.7
#140 US MESH	0.106	19.3
#200 US MESH	0.075	17.0
	0.0339	13.3
	0.0217	11.5
	0.0126	10.2
	0.0090	9.0
	0.0064	7.8
	0.0045	7.0
	0.0031	6.7
	0.0013	4.6

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/26/2019

LP

5/1/2019

Tech

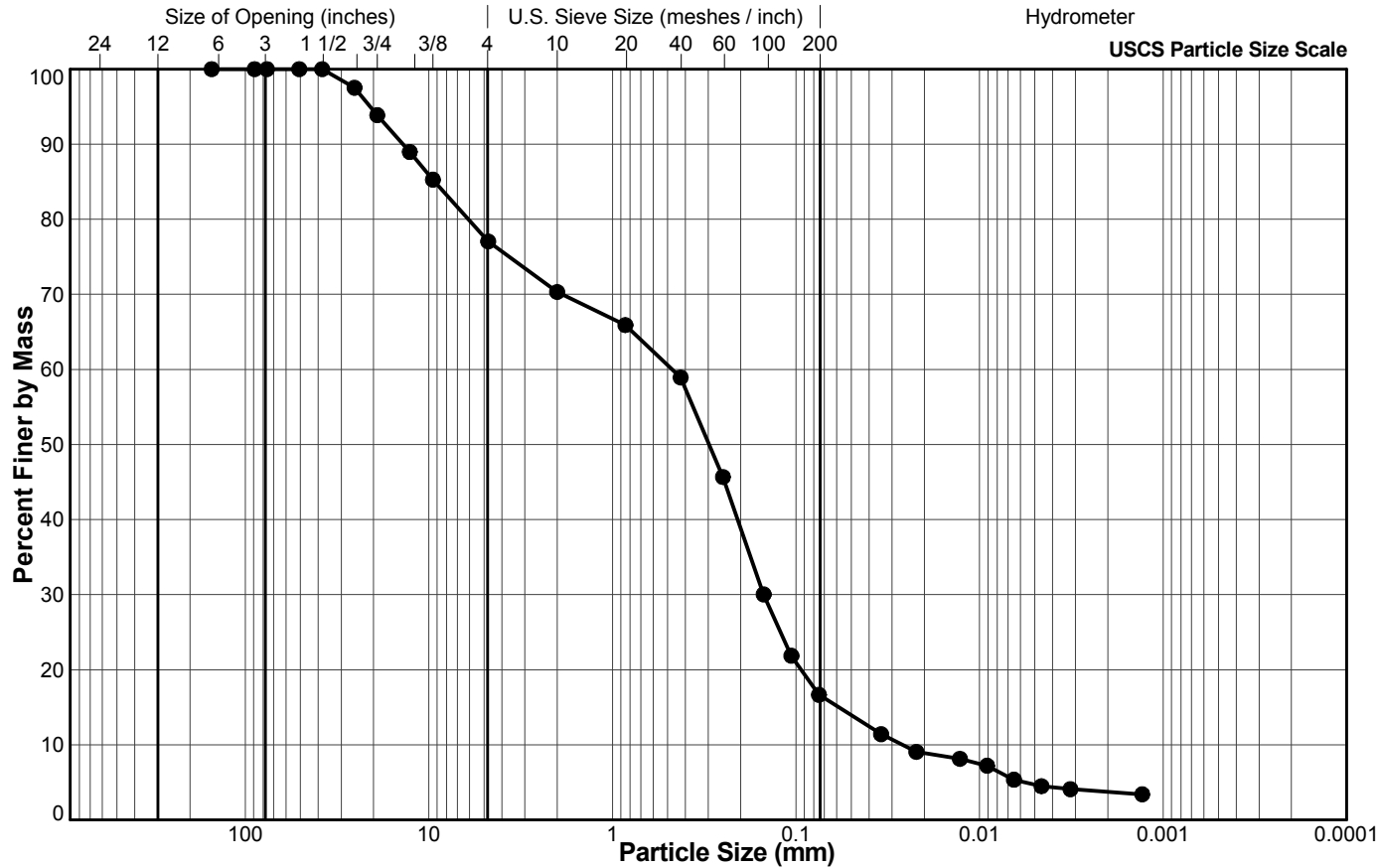
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35056
Depth Interval (m): 16.80 to 17.40
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	97.5
3/4"	19.1	93.9
1/2"	12.7	89.0
3/8"	9.5	85.3
#4 US MESH	4.75	77.0
#10 US MESH	2	70.3
#20 US MESH	0.85	65.9
#40 US MESH	0.425	58.9
#60 US MESH	0.25	45.7
#100 US MESH	0.15	30.0
#140 US MESH	0.106	21.9
#200 US MESH	0.075	16.7
	0.0344	11.4
	0.0221	9.1
	0.0128	8.1
	0.0091	7.2
	0.0065	5.3
	0.0046	4.5
	0.0032	4.1
	0.0013	3.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/FF

4/26/2019

LP

5/1/2019

Tech

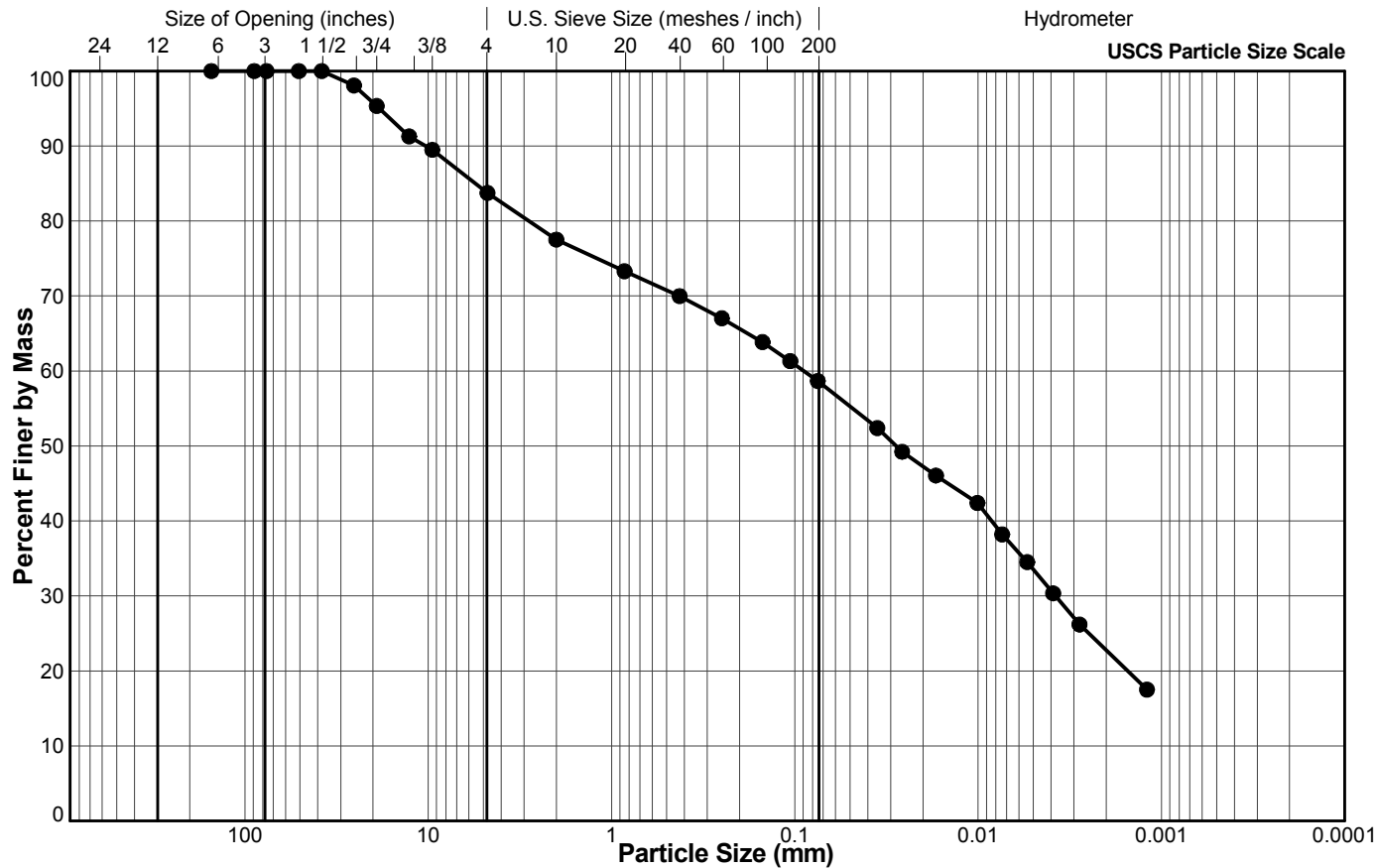
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35057
Depth Interval (m): 19.80 to 20.40
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	98.1
3/4"	19.1	95.3
1/2"	12.7	91.3
3/8"	9.5	89.5
#4 US MESH	4.75	83.7
#10 US MESH	2	77.5
#20 US MESH	0.85	73.3
#40 US MESH	0.425	70.0
#60 US MESH	0.25	67.0
#100 US MESH	0.15	63.9
#140 US MESH	0.106	61.3
#200 US MESH	0.075	58.7
	0.0355	52.4
	0.0260	49.2
	0.0170	46.1
	0.0101	42.4
	0.0074	38.2
	0.0054	34.5
	0.0039	30.4
	0.0028	26.2
	0.0012	17.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/26/2019

LP

5/1/2019

Tech

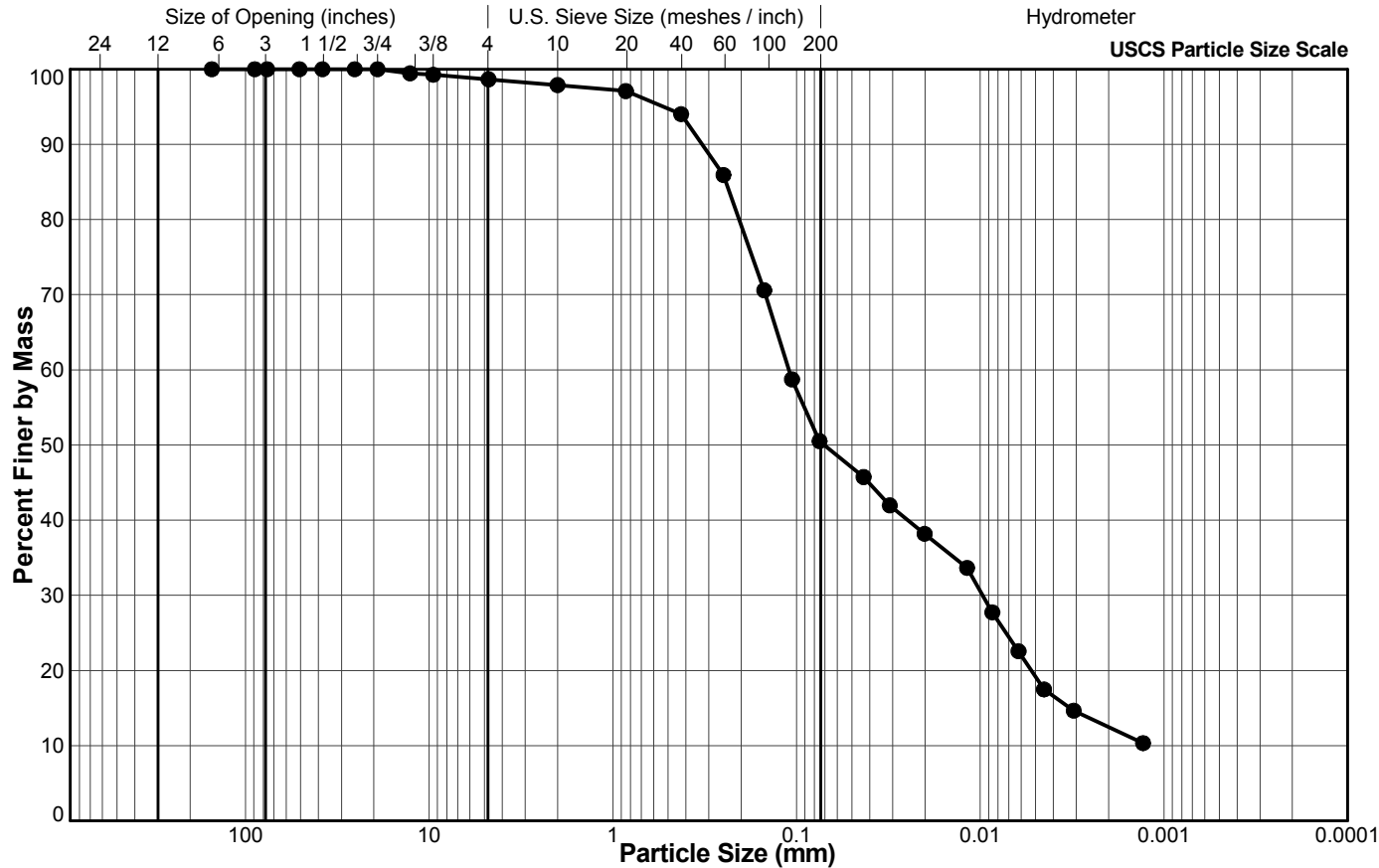
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35059
Depth Interval (m): 24.40 to 25.00
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.5
3/8"	9.5	99.3
#4 US MESH	4.75	98.7
#10 US MESH	2	97.9
#20 US MESH	0.85	97.1
#40 US MESH	0.425	94.0
#60 US MESH	0.25	85.9
#100 US MESH	0.15	70.6
#140 US MESH	0.106	58.7
#200 US MESH	0.075	50.5
	0.0432	45.7
	0.0311	42.0
	0.0201	38.2
	0.0118	33.6
	0.0086	27.7
	0.0062	22.6
	0.0045	17.5
	0.0031	14.7
	0.0013	10.3

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/RG

4/26/2019

LP

5/1/2019

Tech

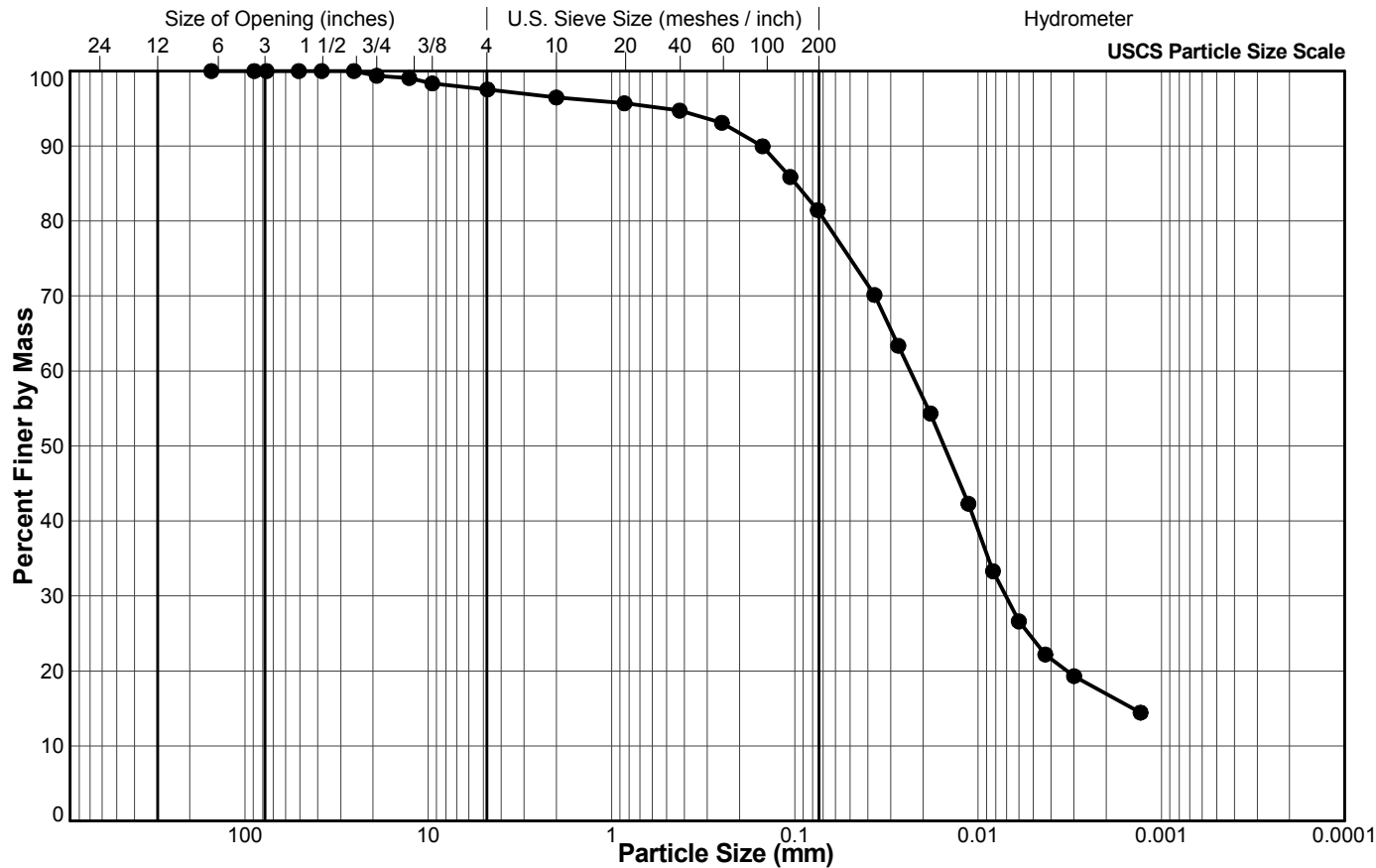
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35060
Depth Interval (m): 27.40 to 28.00
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.4
1/2"	12.7	99.1
3/8"	9.5	98.4
#4 US MESH	4.75	97.5
#10 US MESH	2	96.5
#20 US MESH	0.85	95.7
#40 US MESH	0.425	94.7
#60 US MESH	0.25	93.1
#100 US MESH	0.15	90.0
#140 US MESH	0.106	85.9
#200 US MESH	0.075	81.5
	0.0368	70.1
	0.0273	63.4
	0.0182	54.3
	0.0113	42.3
	0.0083	33.3
	0.0060	26.6
	0.0043	22.2
	0.0030	19.3
	0.0013	14.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/FF

4/26/2019

LP

5/1/2019

Tech

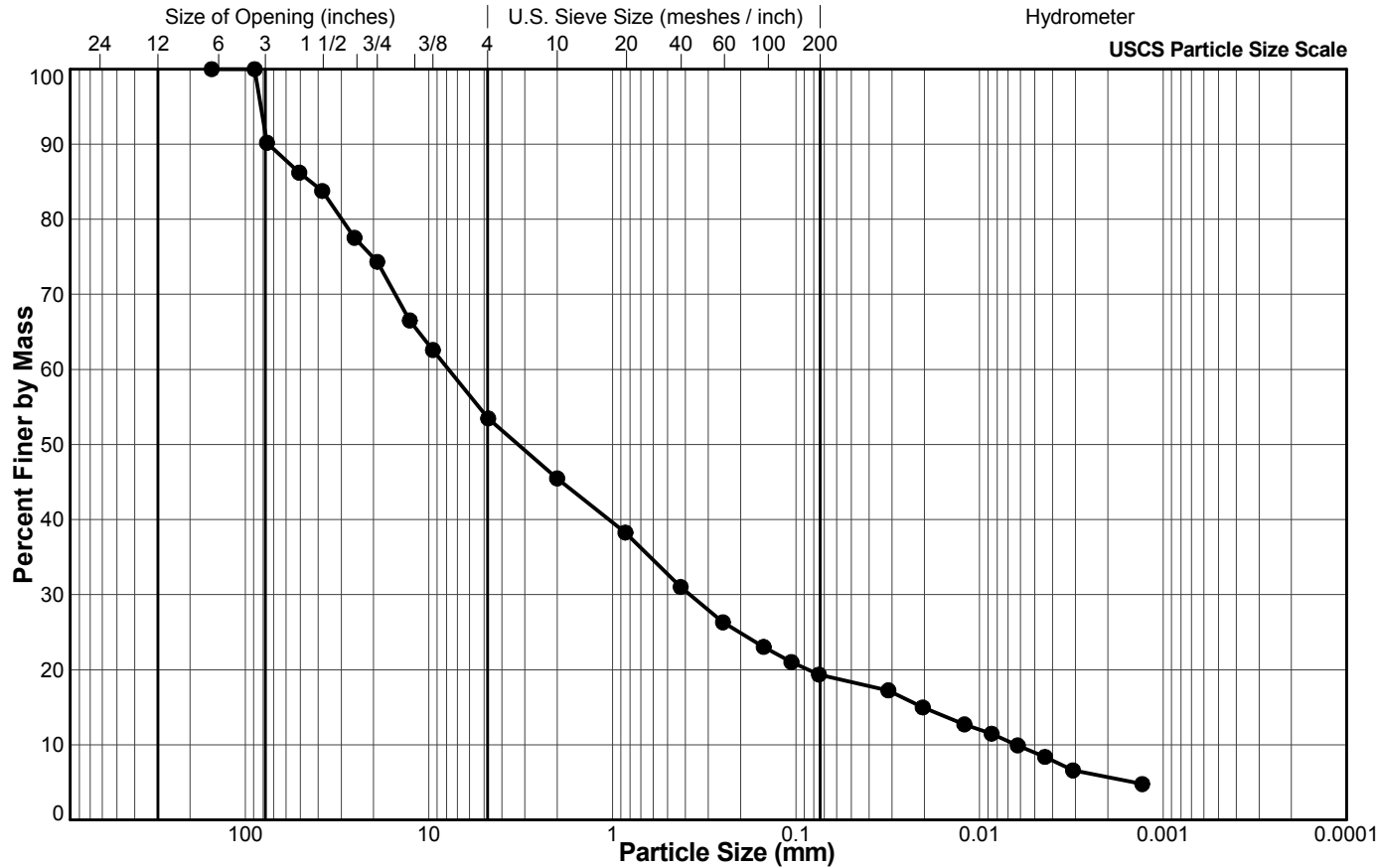
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35061
Depth Interval (m): 32.60 to 33.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	90.2
2"	50.8	86.2
1 1/2"	38.1	83.8
1"	25.4	77.5
3/4"	19.1	74.3
1/2"	12.7	66.5
3/8"	9.5	62.6
#4 US MESH	4.75	53.5
#10 US MESH	2	45.5
#20 US MESH	0.85	38.3
#40 US MESH	0.425	31.0
#60 US MESH	0.25	26.3
#100 US MESH	0.15	23.0
#140 US MESH	0.106	21.0
#200 US MESH	0.075	19.3
	0.0314	17.2
	0.0204	15.0
	0.0121	12.7
	0.0086	11.5
	0.0062	9.9
	0.0044	8.4
	0.0031	6.6
	0.0013	4.8

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/29/2019

LP

5/1/2019

Tech

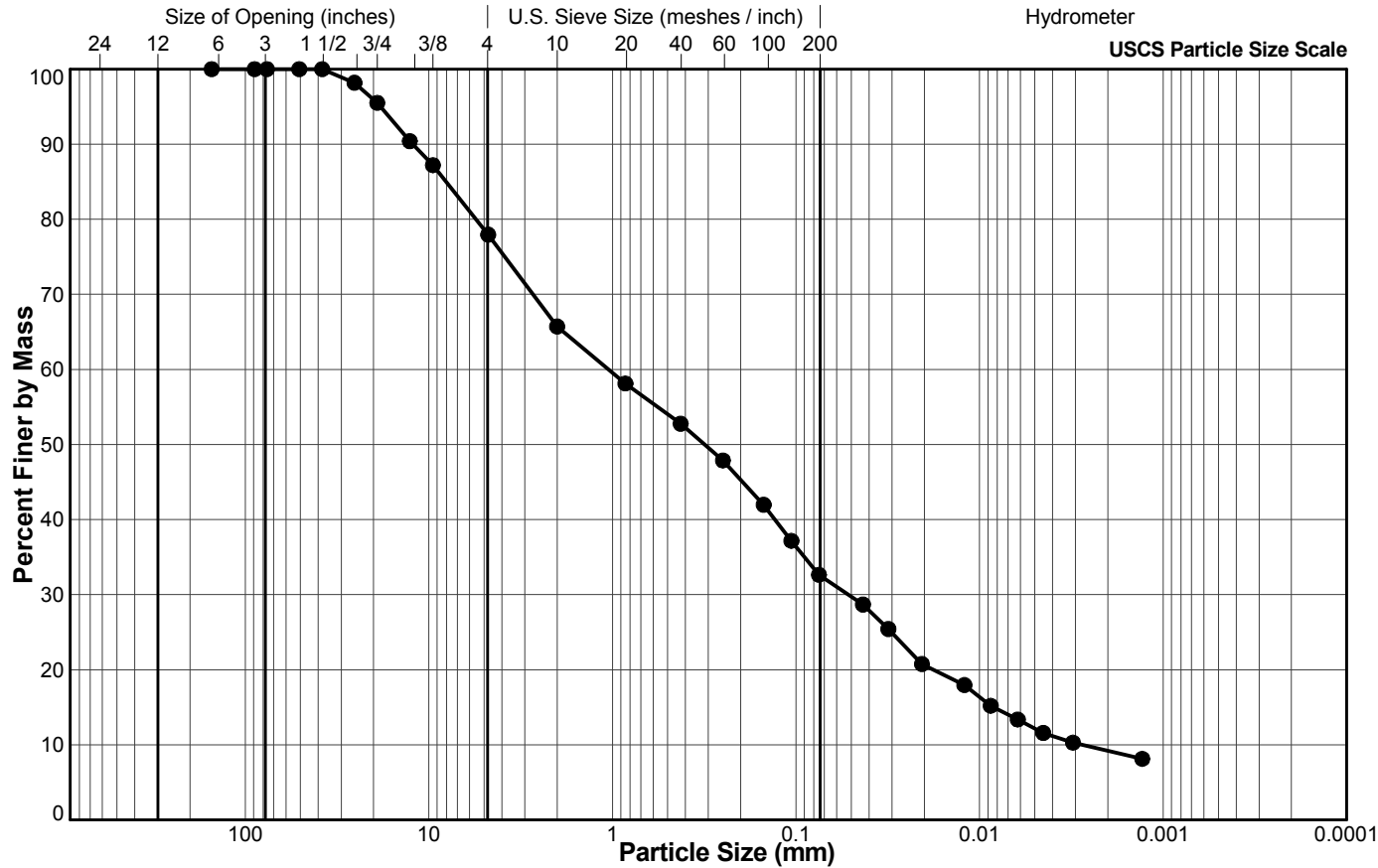
Date

Checked

Date

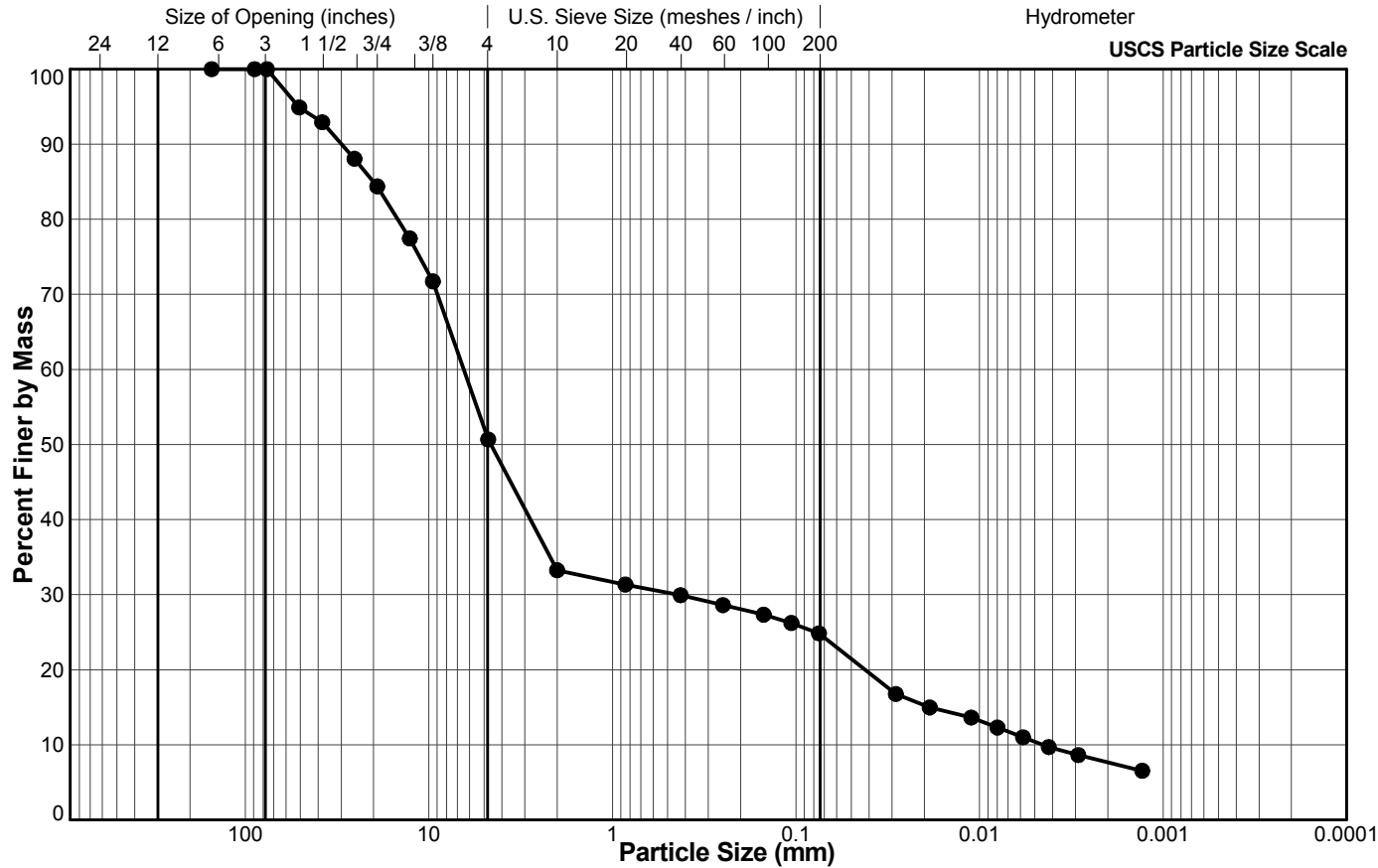
Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35062
Depth Interval (m): 35.70 to 36.30
Lab Schedule No.:



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-20S
Sample No.: 35063
Depth Interval (m): 42.10 to 42.70
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	94.9
1 1/2"	38.1	92.9
1"	25.4	88.1
3/4"	19.1	84.4
1/2"	12.7	77.4
3/8"	9.5	71.7
#4 US MESH	4.75	50.7
#10 US MESH	2	33.2
#20 US MESH	0.85	31.3
#40 US MESH	0.425	29.9
#60 US MESH	0.25	28.6
#100 US MESH	0.15	27.3
#140 US MESH	0.106	26.2
#200 US MESH	0.075	24.8
	0.0286	16.8
	0.0187	15.0
	0.0111	13.6
	0.0080	12.3
	0.0058	11.0
	0.0042	9.7
	0.0029	8.6
	0.0013	6.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/29/2019

LP

5/1/2019

Tech

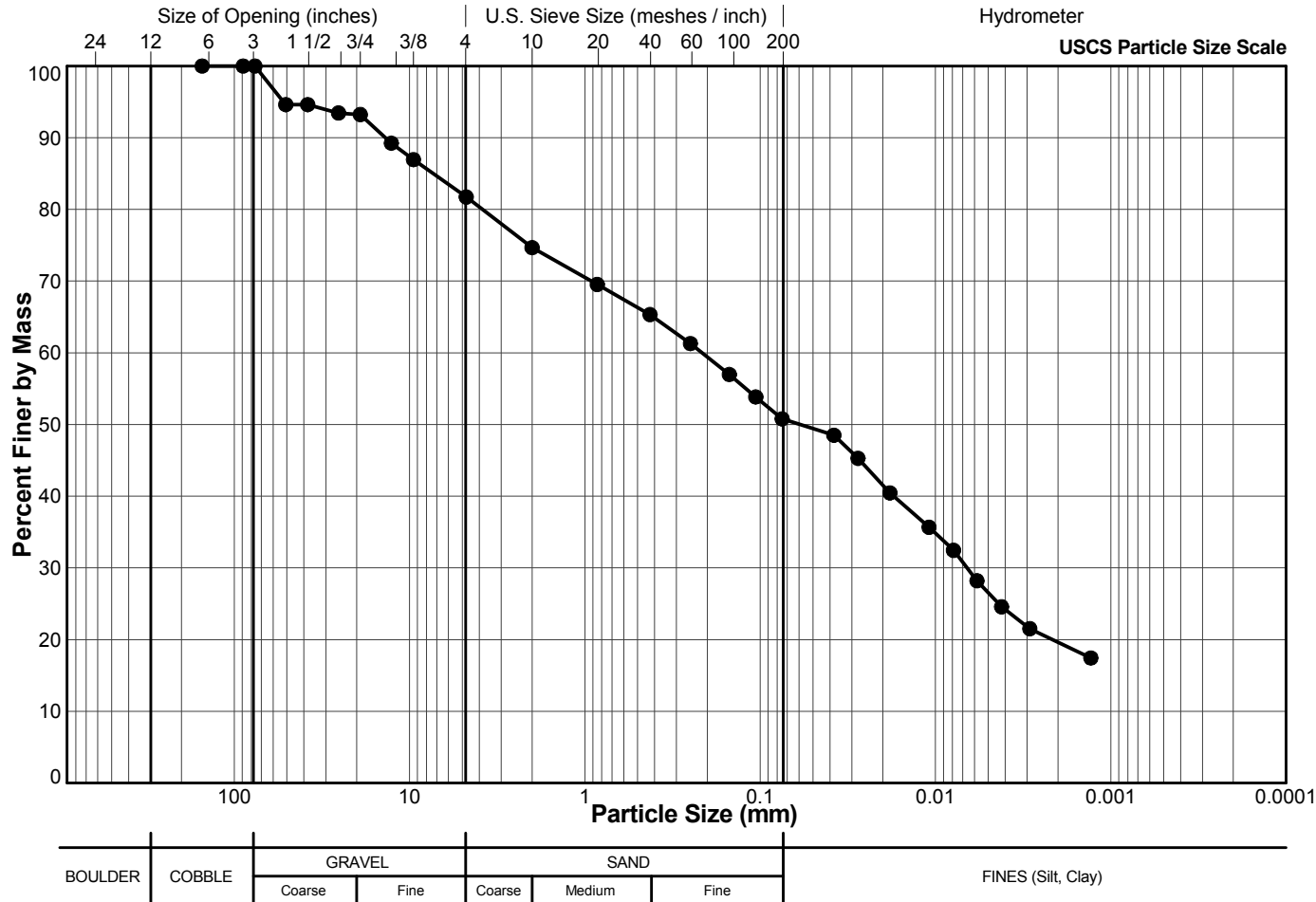
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-23S
Sample No.: 29676
Depth Interval (m): 1.10 to 1.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	94.6
1 1/2"	38.1	94.6
1"	25.4	93.5
3/4"	19.1	93.2
1/2"	12.7	89.2
3/8"	9.5	86.9
#4 US MESH	4.75	81.7
#10 US MESH	2	74.7
#20 US MESH	0.85	69.5
#40 US MESH	0.425	65.3
#60 US MESH	0.25	61.3
#100 US MESH	0.15	57.0
#140 US MESH	0.106	53.8
#200 US MESH	0.075	50.8
	0.0380	48.5
	0.0277	45.3
	0.0182	40.5
	0.0109	35.7
	0.0079	32.5
	0.0058	28.2
	0.0042	24.6
	0.0029	21.5
	0.0013	17.4

DC/PE

4/30/2019

LP

5/1/2019

Tech

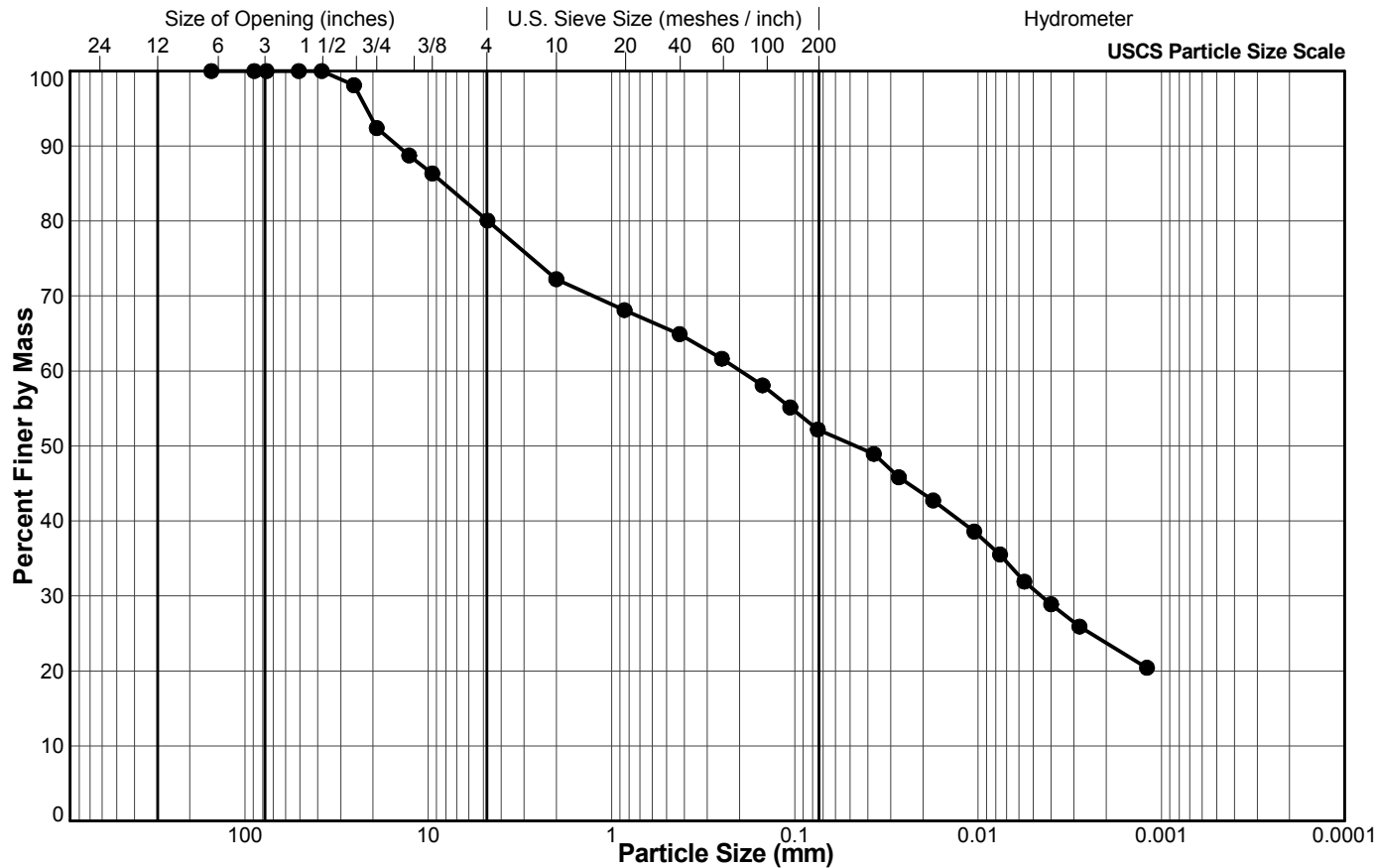
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-24S
Sample No.: 29682
Depth Interval (m): 7.00 to 7.60
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	98.1
3/4"	19.1	92.4
1/2"	12.7	88.7
3/8"	9.5	86.3
#4 US MESH	4.75	80.1
#10 US MESH	2	72.2
#20 US MESH	0.85	68.1
#40 US MESH	0.425	64.9
#60 US MESH	0.25	61.6
#100 US MESH	0.15	58.1
#140 US MESH	0.106	55.1
#200 US MESH	0.075	52.2
	0.0371	48.9
	0.0271	45.8
	0.0176	42.7
	0.0105	38.6
	0.0076	35.5
	0.0056	31.9
	0.0040	28.9
	0.0028	25.9
	0.0012	20.4

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/30/2019

LP

5/1/2019

Tech

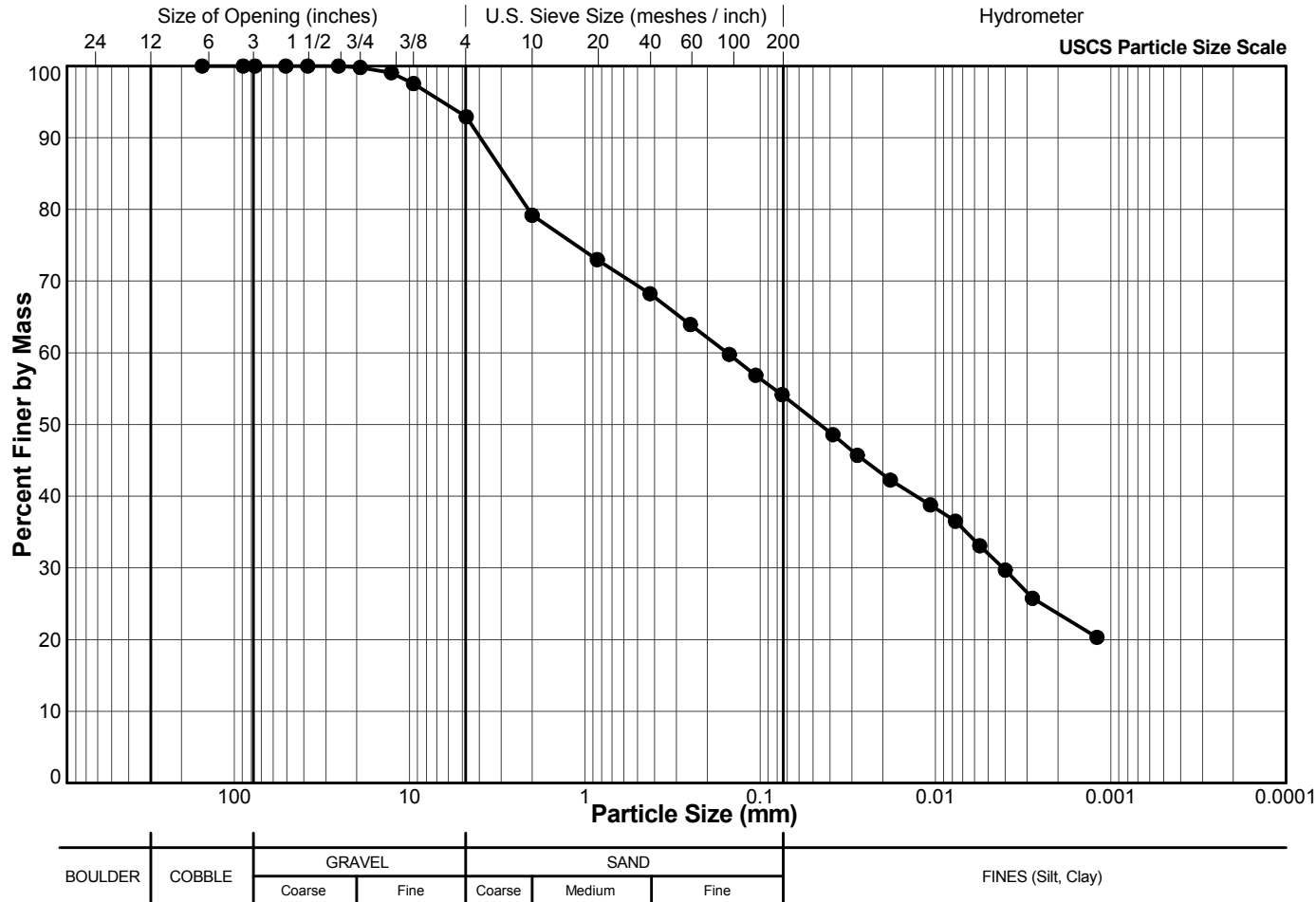
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-24S
Sample No.: 29685
Depth Interval (m): 16.20 to 16.80
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	99.8
1/2"	12.7	99.1
3/8"	9.5	97.6
#4 US MESH	4.75	92.9
#10 US MESH	2	79.2
#20 US MESH	0.85	73.0
#40 US MESH	0.425	68.2
#60 US MESH	0.25	63.9
#100 US MESH	0.15	59.8
#140 US MESH	0.106	56.9
#200 US MESH	0.075	54.2
	0.0385	48.6
	0.0279	45.7
	0.0181	42.2
	0.0107	38.8
	0.0077	36.5
	0.0056	33.1
	0.0040	29.7
	0.0028	25.8
	0.0012	20.3

DC/PE

4/30/2019

LP

5/1/2019

Tech

Date

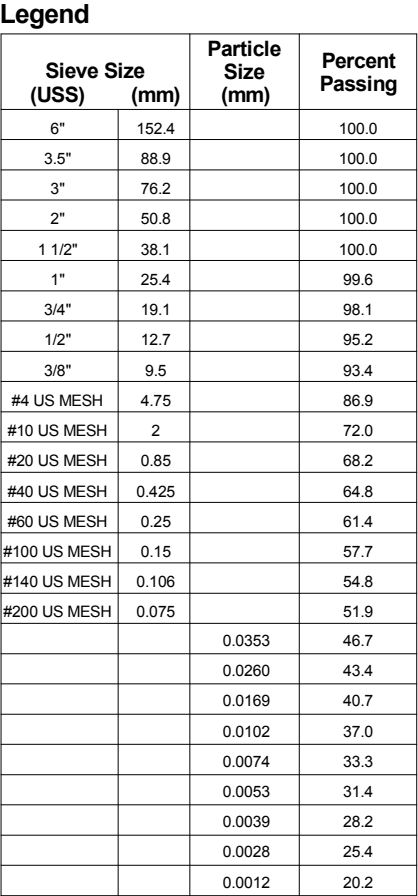
Checked

Date



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

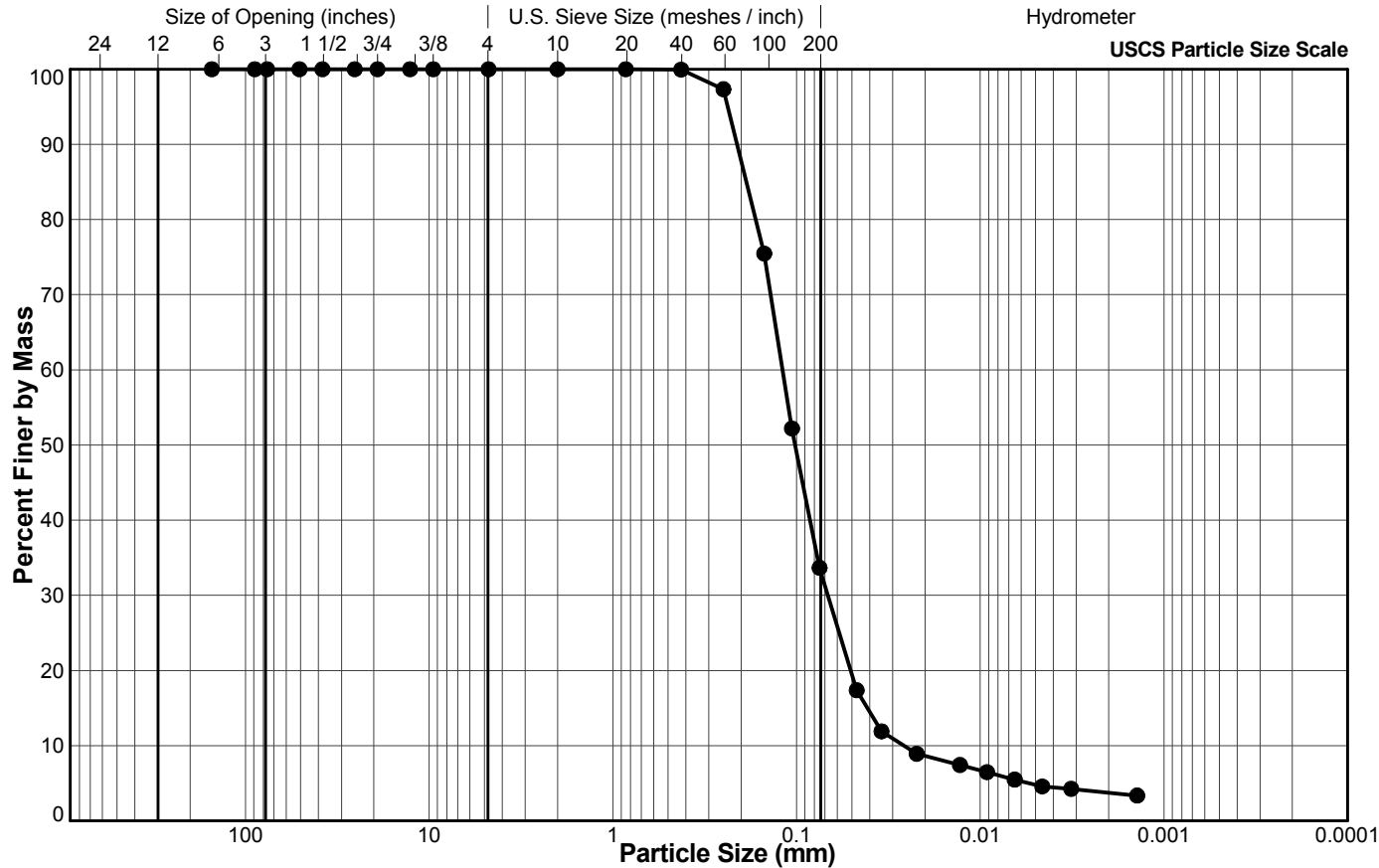
Sample Location: 19-25S
Sample No.: 29689
Depth Interval (m): 8.20 to 8.80
Lab Schedule No.:



DC/PE	5/2/2019	LP	5/6/2019
Tech	Date	Checked	Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-27S
Sample No.: 29603
Depth Interval (m): 29.60 to 30.20
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.5	100.0
#4 US MESH	4.75	100.0
#10 US MESH	2	100.0
#20 US MESH	0.85	100.0
#40 US MESH	0.425	99.9
#60 US MESH	0.25	97.3
#100 US MESH	0.15	75.5
#140 US MESH	0.106	52.2
#200 US MESH	0.075	33.7
	0.0471	17.4
	0.0345	11.9
	0.0222	8.9
	0.0129	7.4
	0.0092	6.5
	0.0065	5.5
	0.0046	4.6
	0.0032	4.3
	0.0014	3.4

BOULDER	COBBLE	GRAVEL	SAND	FINES (Silt, Clay)
		Coarse	Coarse	
		Fine	Medium	
			Fine	

DC/KS

4/30/2019

LP

5/1/2019

Tech

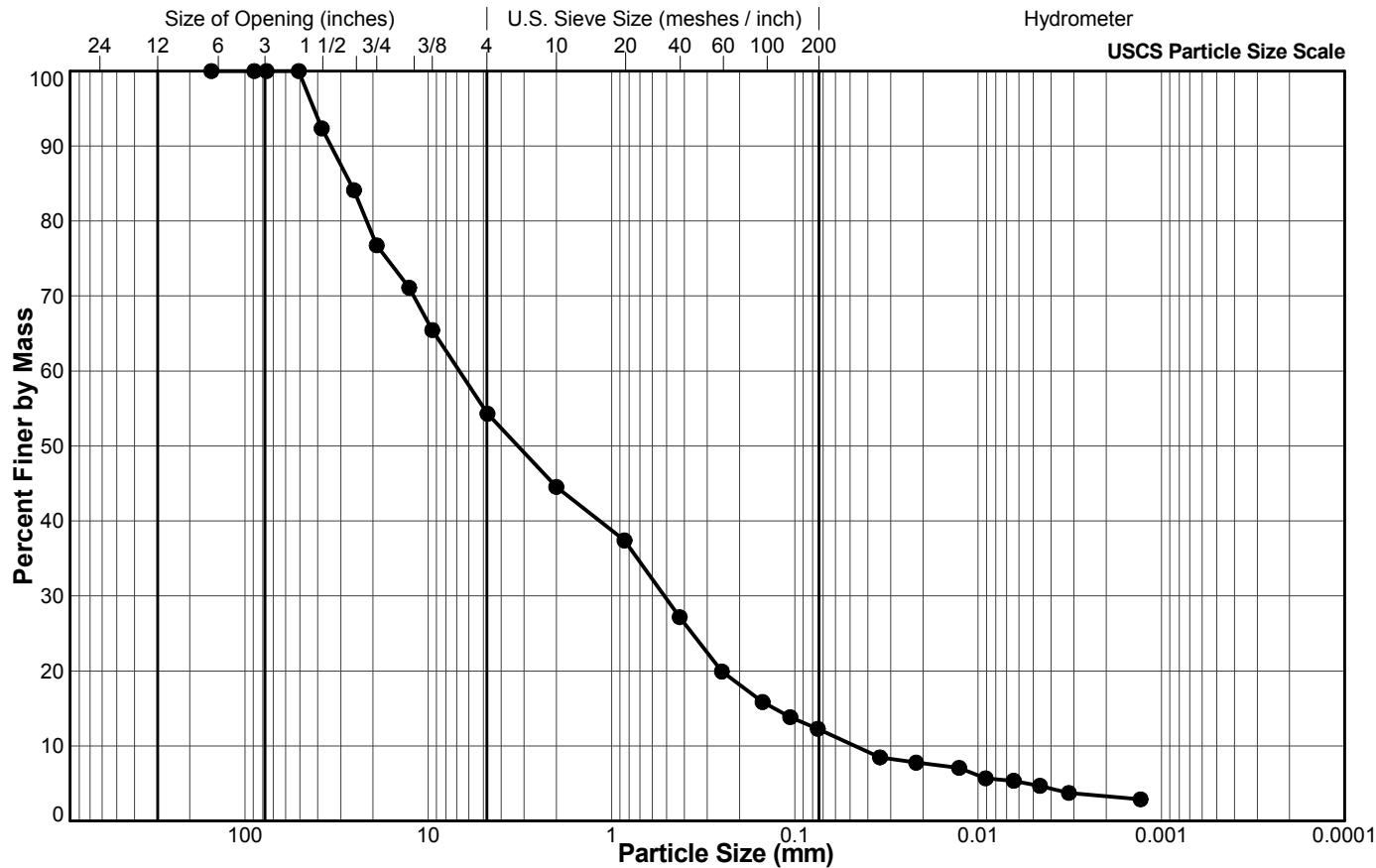
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-27S
Sample No.: 29604
Depth Interval (m): 32.90 to 33.50
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	92.4
1"	25.4	84.1
3/4"	19.1	76.8
1/2"	12.7	71.1
3/8"	9.5	65.5
#4 US MESH	4.75	54.3
#10 US MESH	2	44.5
#20 US MESH	0.85	37.4
#40 US MESH	0.425	27.2
#60 US MESH	0.25	19.9
#100 US MESH	0.15	15.9
#140 US MESH	0.106	13.8
#200 US MESH	0.075	12.3
	0.0343	8.5
	0.0218	7.8
	0.0127	7.1
	0.0091	5.7
	0.0064	5.4
	0.0046	4.7
	0.0032	3.7
	0.0013	2.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/30/2019

LP

5/1/2019

Tech

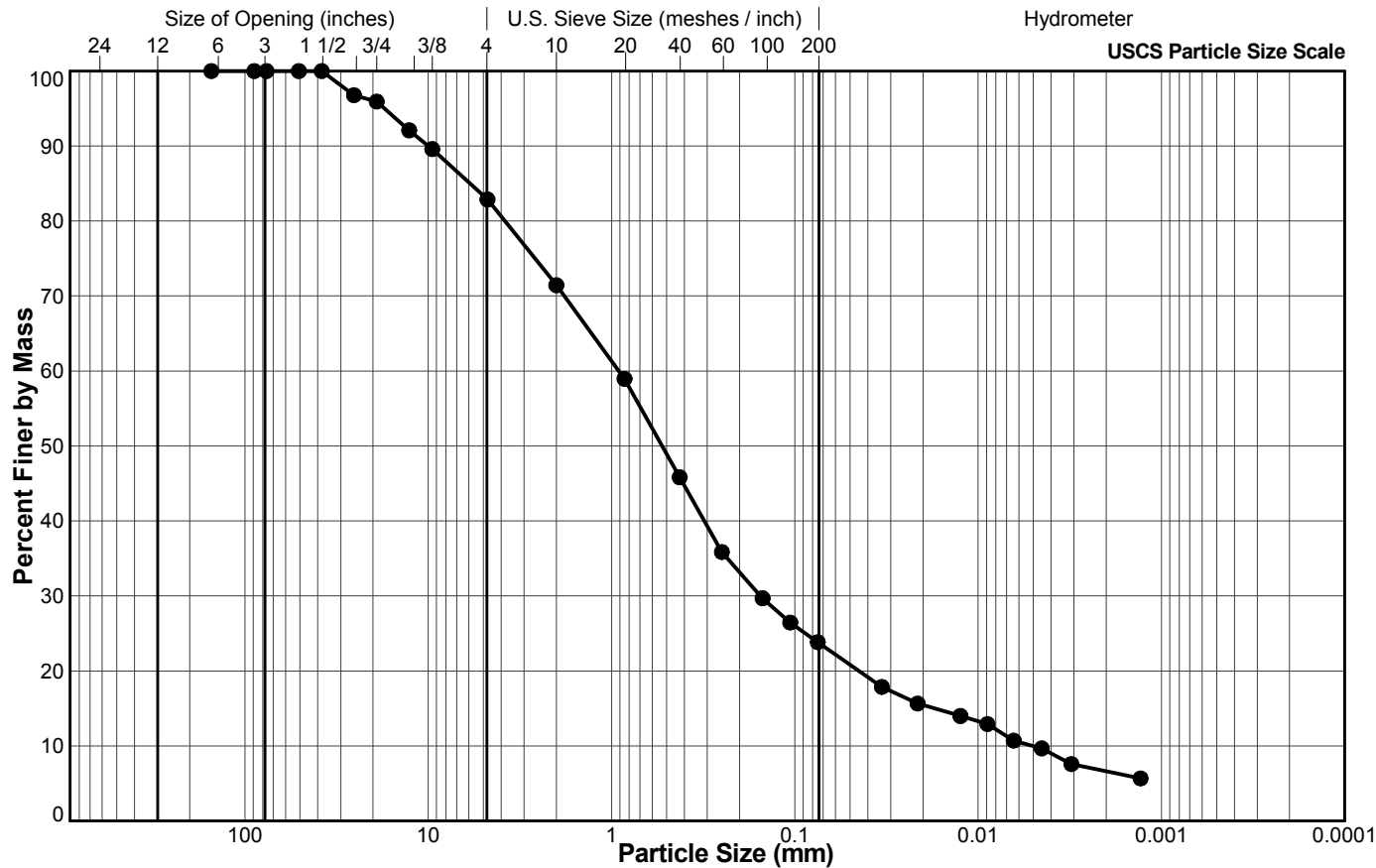
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-27S
Sample No.: 29605
Depth Interval (m): 35.70 to 36.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	96.8
3/4"	19.1	95.9
1/2"	12.7	92.1
3/8"	9.5	89.6
#4 US MESH	4.75	82.9
#10 US MESH	2	71.4
#20 US MESH	0.85	59.0
#40 US MESH	0.425	45.8
#60 US MESH	0.25	35.9
#100 US MESH	0.15	29.7
#140 US MESH	0.106	26.5
#200 US MESH	0.075	23.8
	0.0335	17.9
	0.0214	15.7
	0.0125	14.0
	0.0089	12.9
	0.0064	10.7
	0.0045	9.7
	0.0031	7.6
	0.0013	5.7

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/30/2019

LP

5/1/2019

Tech

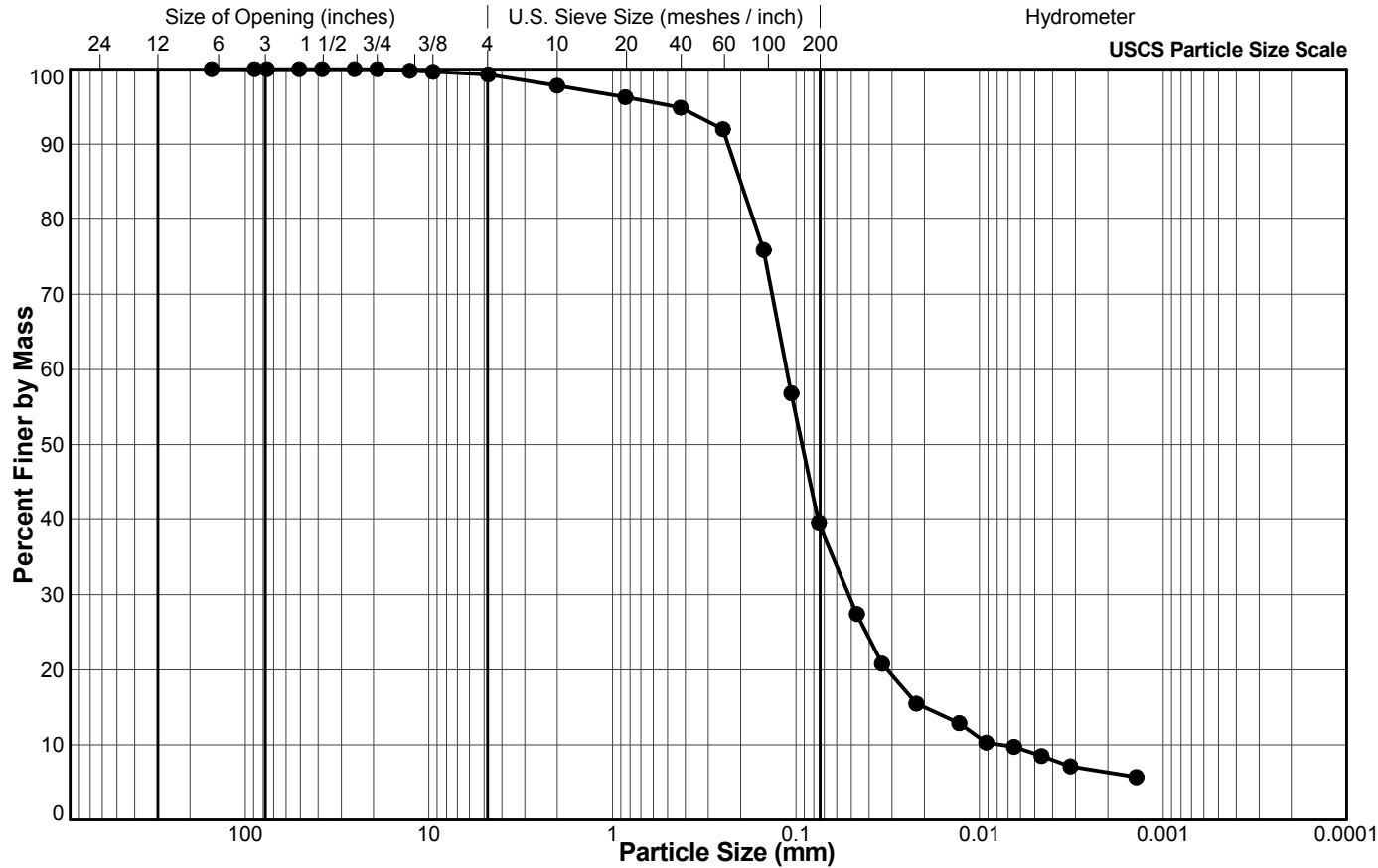
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-27S
Sample No.: 29606
Depth Interval (m): 41.50 to 42.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.8
3/8"	9.5	99.6
#4 US MESH	4.75	99.3
#10 US MESH	2	97.8
#20 US MESH	0.85	96.3
#40 US MESH	0.425	94.9
#60 US MESH	0.25	92.0
#100 US MESH	0.15	75.9
#140 US MESH	0.106	56.8
#200 US MESH	0.075	39.5
	0.0466	27.4
	0.0340	20.8
	0.0221	15.5
	0.0129	12.9
	0.0092	10.3
	0.0065	9.7
	0.0046	8.5
	0.0032	7.1
	0.0014	5.7

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

5/2/2019

LP

5/6/2019

Tech

Date

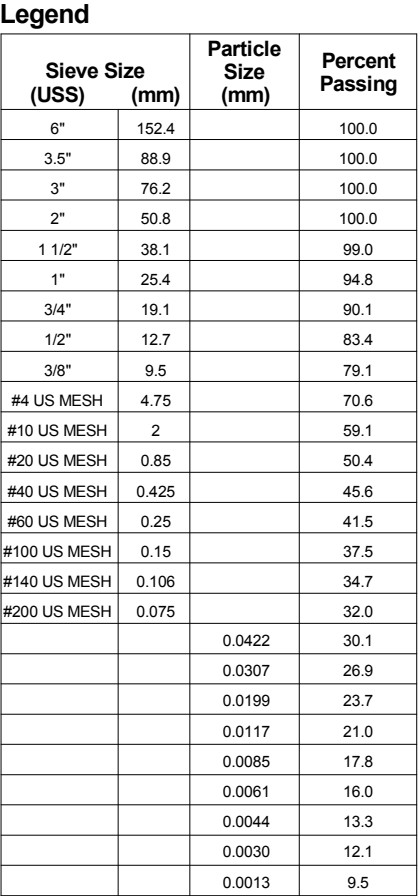
Checked

Date



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

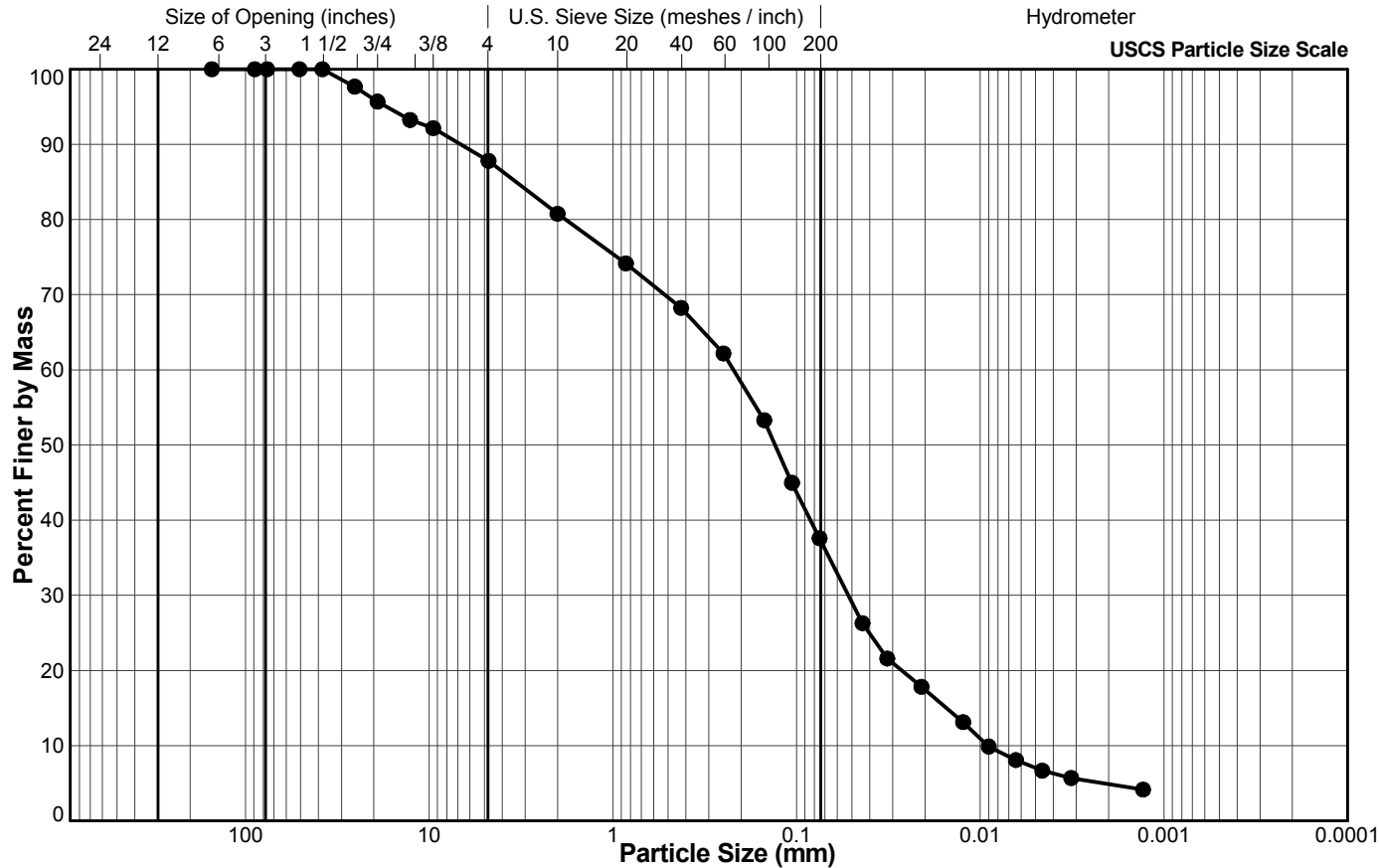
Sample Location: 19-48TP
Sample No.: 29669
Depth Interval (m): 0.50 to 0.70
Lab Schedule No.:



DC/PE	4/30/2019	LP	5/1/2019
Tech	Date	Checked	Date

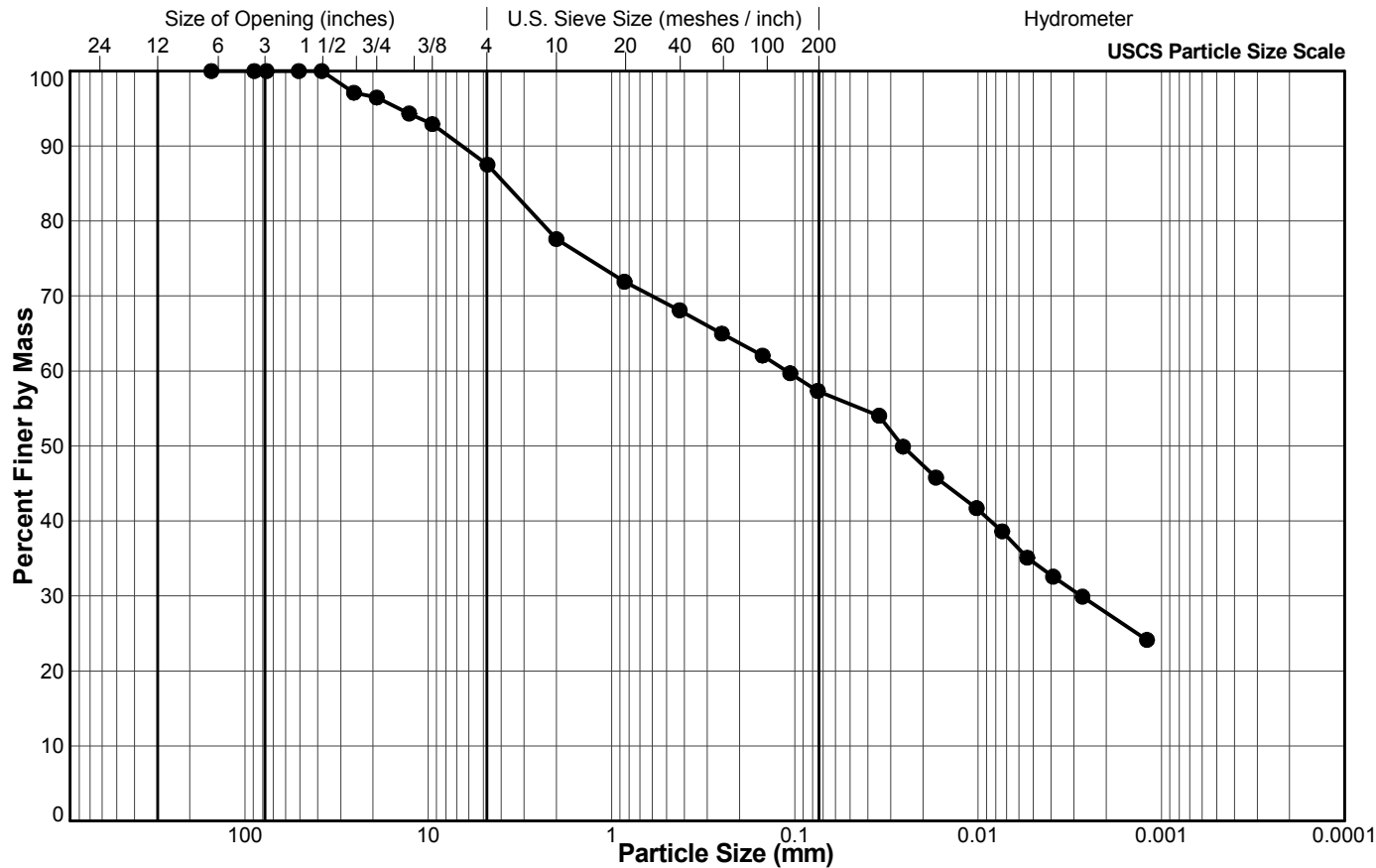
Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-49TP
Sample No.: 29672
Depth Interval (m): 0.00 to 0.20
Lab Schedule No.:



Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-49TP
Sample No.: 29674
Depth Interval (m): 2.90 to 3.10
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	97.1
3/4"	19.1	96.5
1/2"	12.7	94.3
3/8"	9.5	92.9
#4 US MESH	4.75	87.5
#10 US MESH	2	77.6
#20 US MESH	0.85	71.9
#40 US MESH	0.425	68.1
#60 US MESH	0.25	65.0
#100 US MESH	0.15	62.1
#140 US MESH	0.106	59.7
#200 US MESH	0.075	57.3
	0.0347	54.0
	0.0257	49.9
	0.0170	45.8
	0.0102	41.7
	0.0074	38.6
	0.0054	35.1
	0.0039	32.6
	0.0027	29.9
	0.0012	24.1

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/BJ

4/30/2019

LP

5/1/2019

Tech

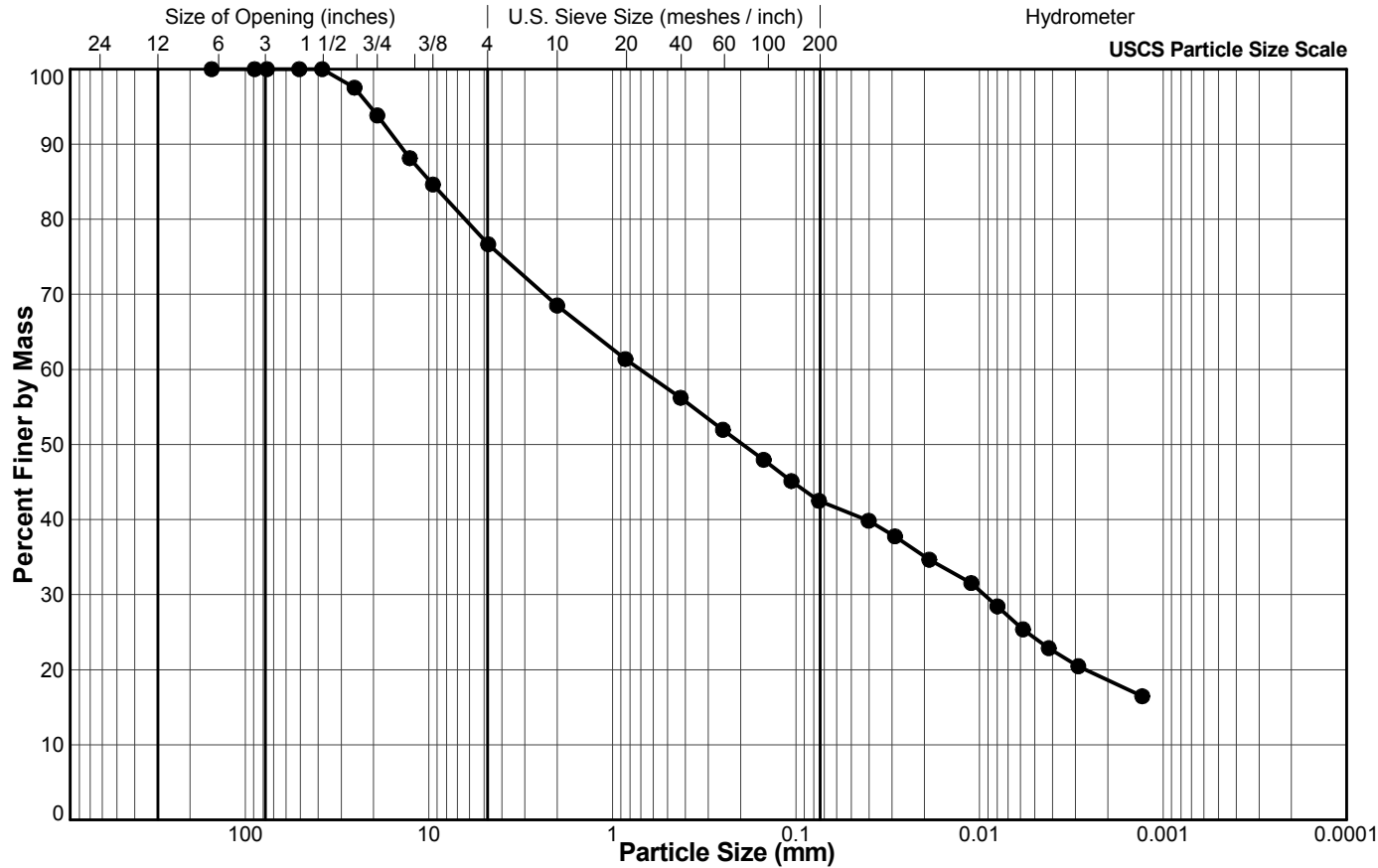
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-52TP
Sample No.: 29690
Depth Interval (m): 1.10 to 1.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	97.5
3/4"	19.1	93.8
1/2"	12.7	88.1
3/8"	9.5	84.6
#4 US MESH	4.75	76.7
#10 US MESH	2	68.5
#20 US MESH	0.85	61.4
#40 US MESH	0.425	56.2
#60 US MESH	0.25	52.0
#100 US MESH	0.15	48.0
#140 US MESH	0.106	45.1
#200 US MESH	0.075	42.5
	0.0402	39.8
	0.0289	37.8
	0.0188	34.7
	0.0111	31.5
	0.0080	28.4
	0.0058	25.4
	0.0042	22.9
	0.0029	20.5
	0.0013	16.5

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

4/30/2019

LP

5/1/2019

Tech

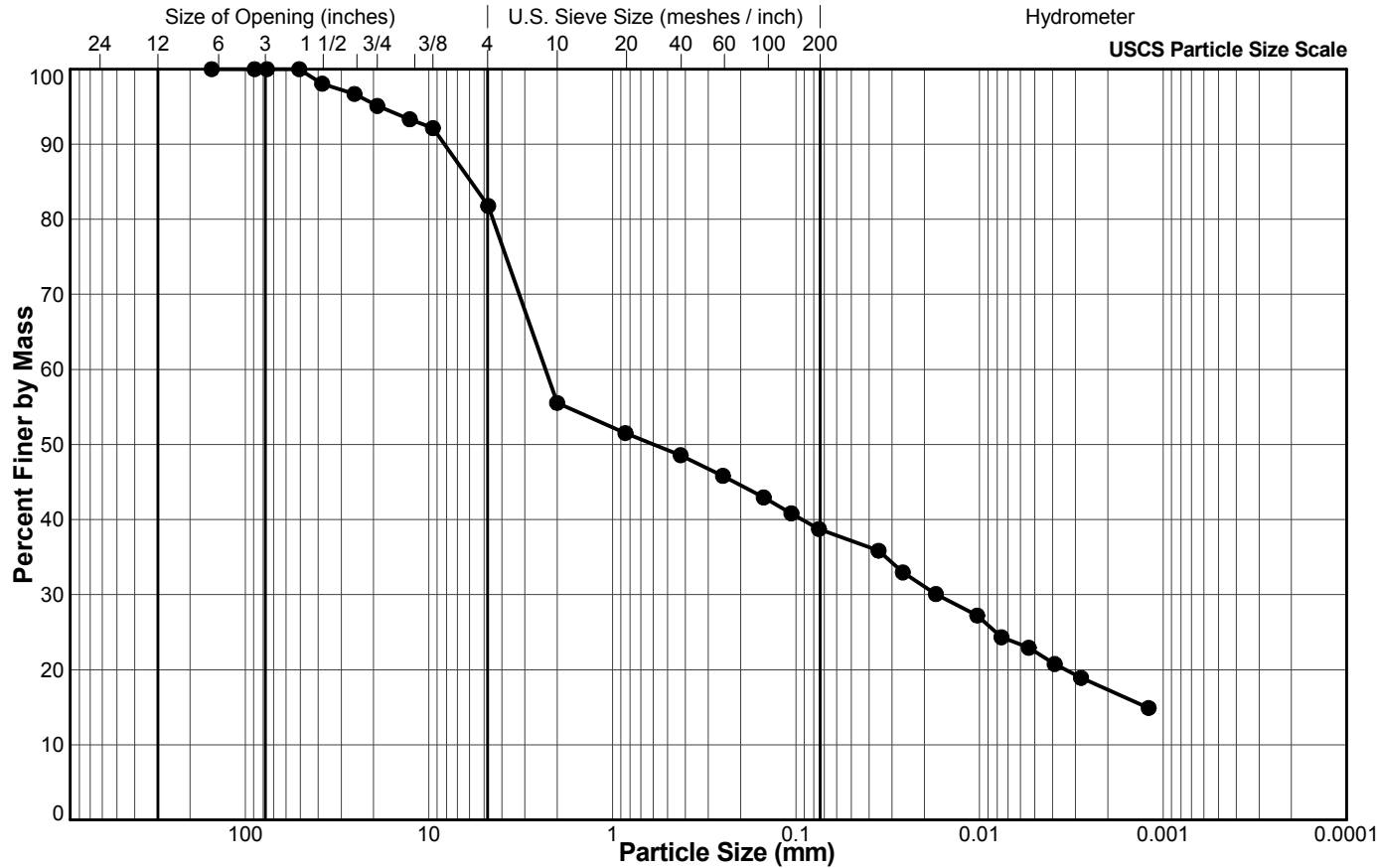
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-53TP
Sample No.: 29692
Depth Interval (m): 0.50 to 0.70
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	98.1
1"	25.4	96.7
3/4"	19.1	95.1
1/2"	12.7	93.3
3/8"	9.5	92.1
#4 US MESH	4.75	81.8
#10 US MESH	2	55.5
#20 US MESH	0.85	51.5
#40 US MESH	0.425	48.6
#60 US MESH	0.25	45.8
#100 US MESH	0.15	43.0
#140 US MESH	0.106	40.8
#200 US MESH	0.075	38.7
	0.0355	35.9
	0.0262	33.0
	0.0173	30.1
	0.0103	27.2
	0.0076	24.3
	0.0054	22.9
	0.0039	20.8
	0.0028	18.9
	0.0012	14.9

BOULDER	COBBLE	GRAVEL		SAND			FINES (Silt, Clay)
		Coarse	Fine	Coarse	Medium	Fine	

DC/PE

5/2/2019

LP

5/6/2019

Tech

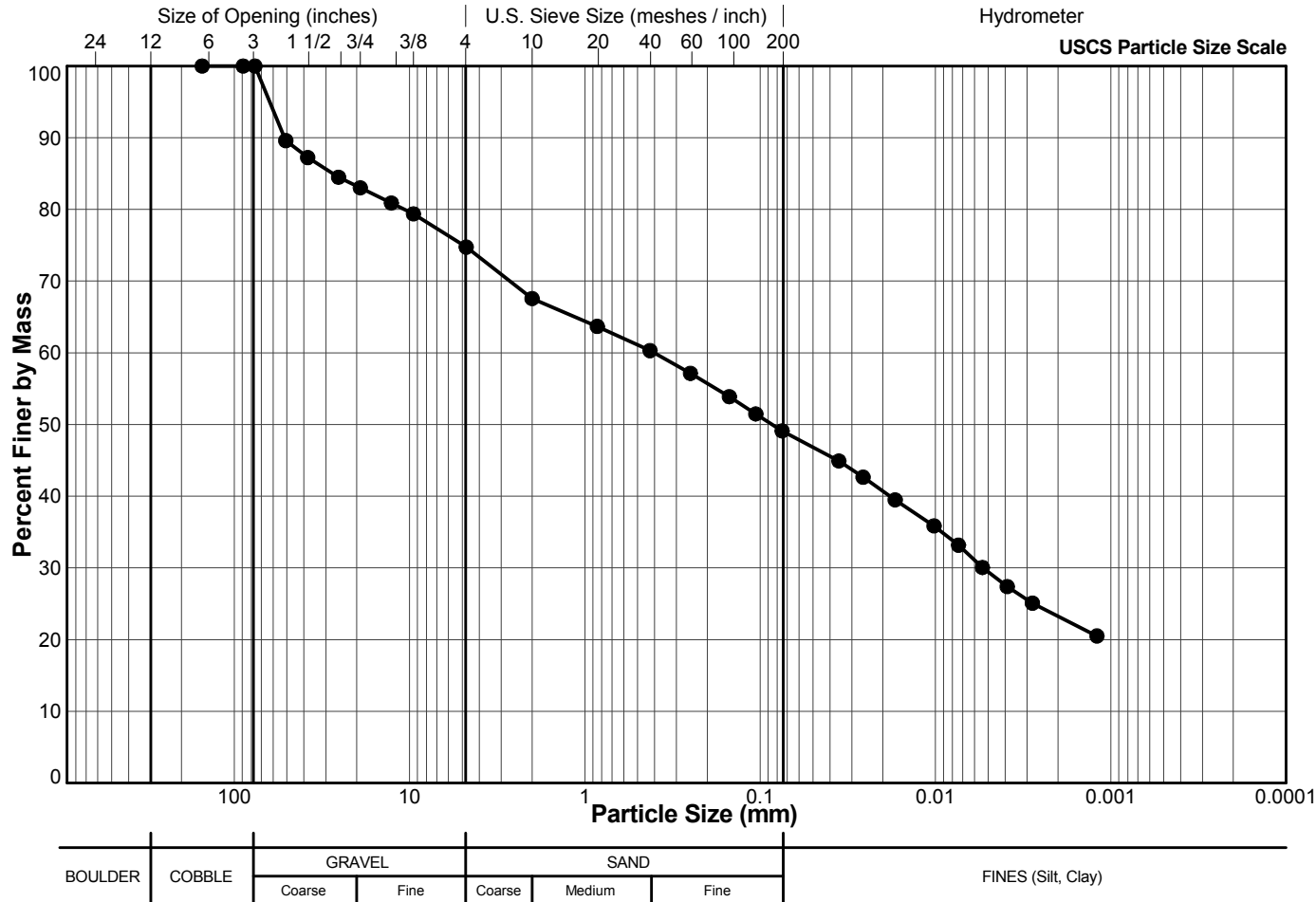
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-53TP
Sample No.: 29693
Depth Interval (m): 1.70 to 1.90
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	89.6
1 1/2"	38.1	87.2
1"	25.4	84.5
3/4"	19.1	83.0
1/2"	12.7	80.9
3/8"	9.5	79.4
#4 US MESH	4.75	74.7
#10 US MESH	2	67.6
#20 US MESH	0.85	63.7
#40 US MESH	0.425	60.3
#60 US MESH	0.25	57.1
#100 US MESH	0.15	53.9
#140 US MESH	0.106	51.5
#200 US MESH	0.075	49.1
	0.0356	44.9
	0.0259	42.7
	0.0170	39.5
	0.0102	35.9
	0.0074	33.2
	0.0054	30.1
	0.0039	27.4
	0.0028	25.1
	0.0012	20.5

DC/PE

5/2/2019

LP

5/6/2019

Tech

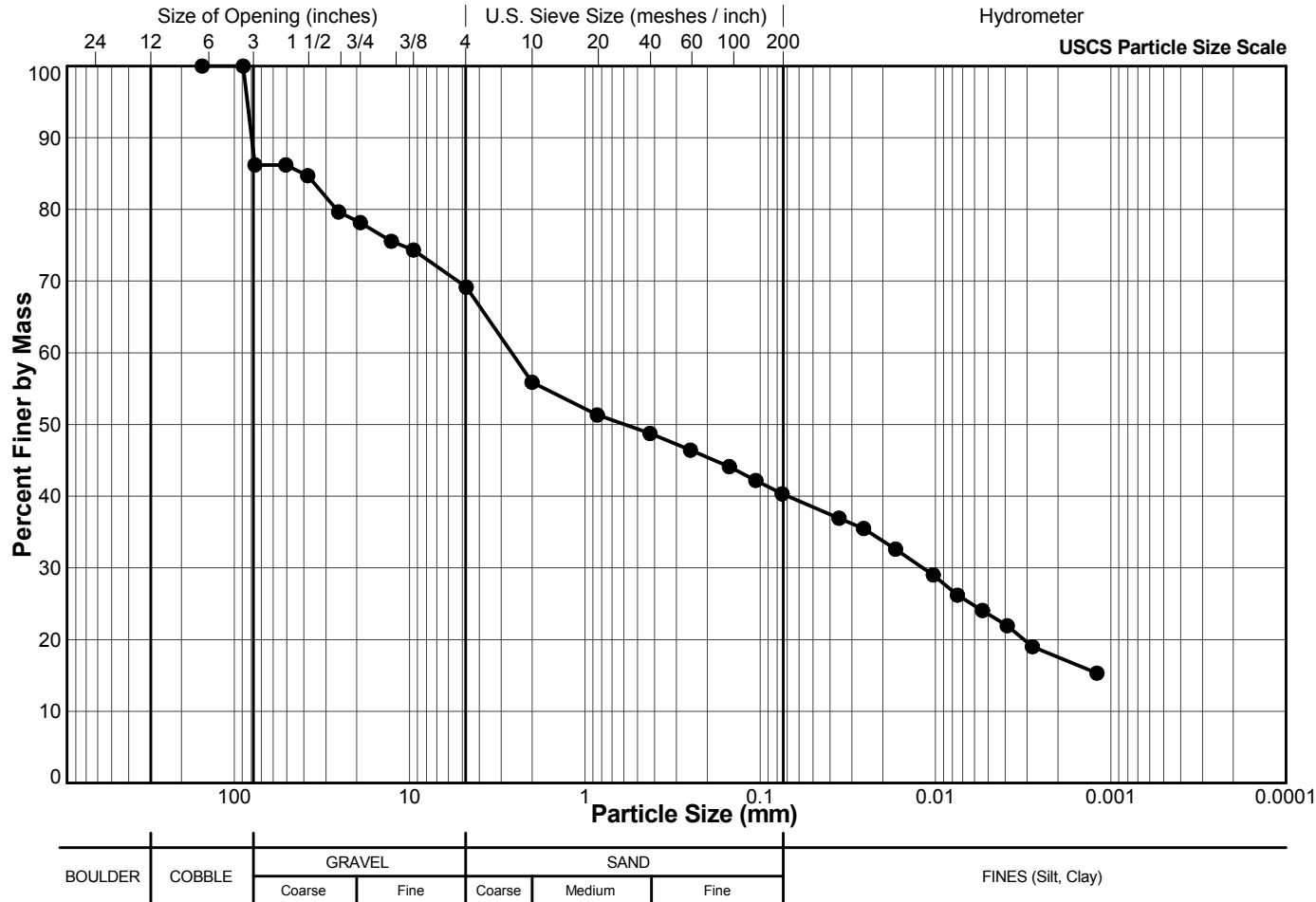
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-55TP
Sample No.: 29697
Depth Interval (m): 1.10 to 1.30
Lab Schedule No.:



DC/PE

5/2/2019

LP

5/6/2019

Tech

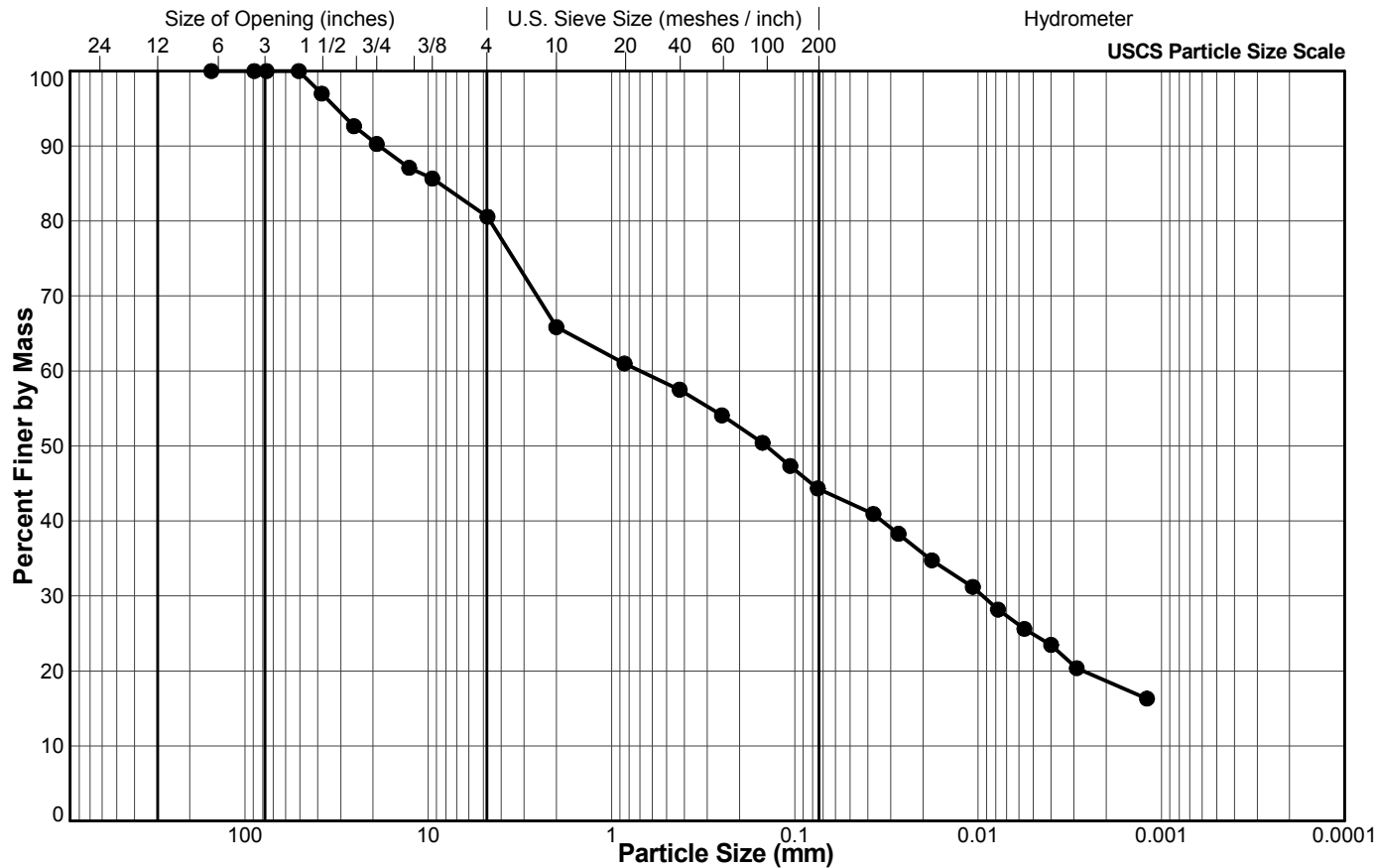
Date

Checked

Date

Client: Telkwa Coal Ltd.
Project: Explore 0112
Location:
Project No.: 18109666 **Phase:** 2000

Sample Location: 19-57TP
Sample No.: 35023
Depth Interval (m): 1.10 to 1.30
Lab Schedule No.:



Legend

Sieve Size (USS)	Particle Size (mm)	Percent Passing
6"	152.4	100.0
3.5"	88.9	100.0
3"	76.2	100.0
2"	50.8	100.0
1 1/2"	38.1	97.0
1"	25.4	92.7
3/4"	19.1	90.3
1/2"	12.7	87.1
3/8"	9.5	85.7
#4 US MESH	4.75	80.6
#10 US MESH	2	65.9
#20 US MESH	0.85	61.0
#40 US MESH	0.425	57.5
#60 US MESH	0.25	54.1
#100 US MESH	0.15	50.4
#140 US MESH	0.106	47.3
#200 US MESH	0.075	44.3
	0.0373	40.9
	0.0272	38.3
	0.0179	34.7
	0.0107	31.2
	0.0078	28.2
	0.0056	25.6
	0.0040	23.5
	0.0029	20.4
	0.0012	16.3

BOULDER		COBBLE		GRAVEL		SAND			FINES (Silt, Clay)
				Coarse	Fine	Coarse	Medium	Fine	

DC/PE

5/2/2019

LP

5/6/2019

Tech

Date

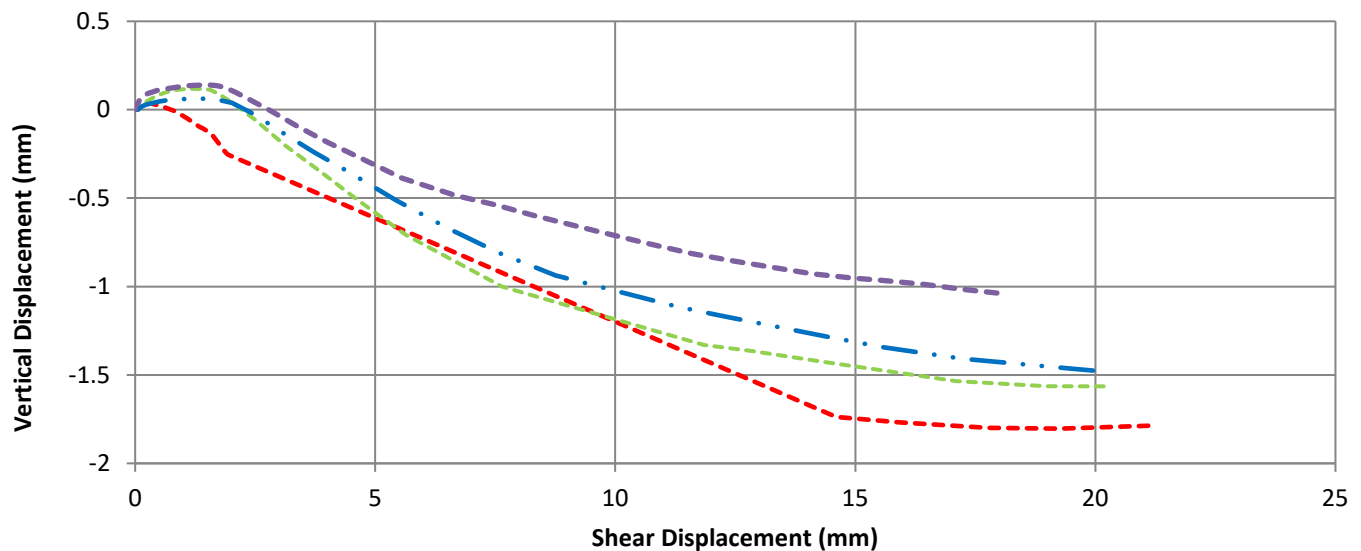
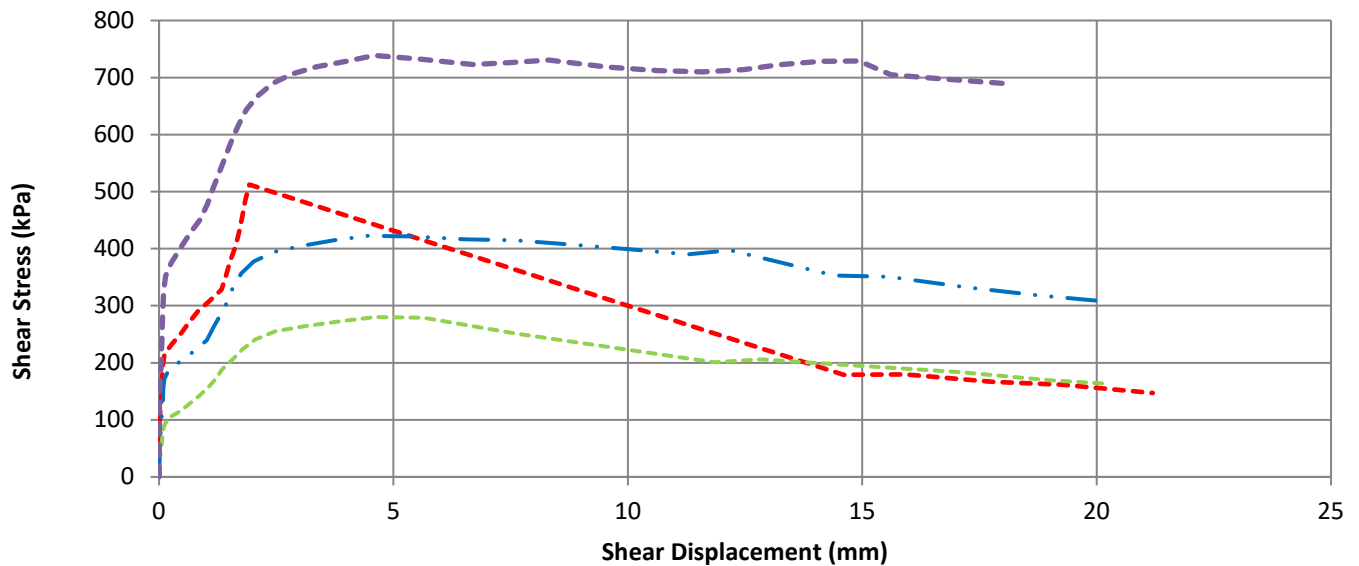
Checked

Date

Appendix E – 2019 Rock Laboratory Testing Results

Project No.:	18109666/2000	Sample No.:	19-09D
Project:	PO# EXPLORE 0112	Test ID:	35004
Location:	NOT PROVIDED	Depth (m):	33.0-33.3
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	SST BEDDING@3532	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 22.5° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

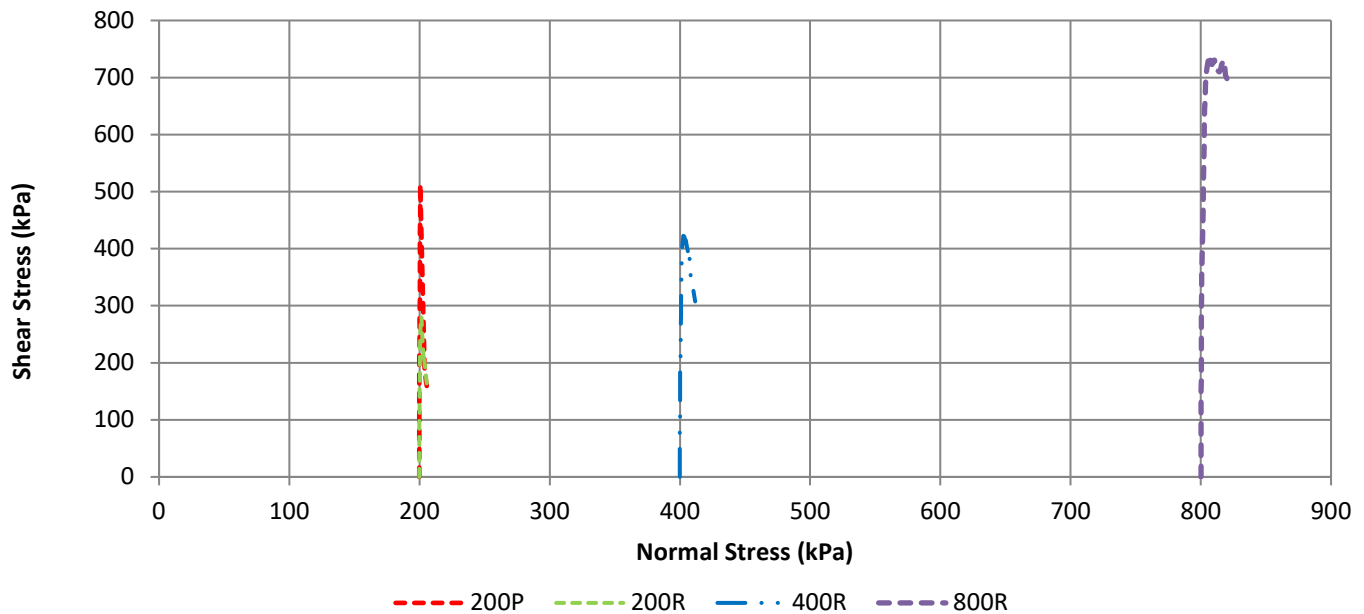
April 4, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Project No.:	18109666/2000	Sample No.:	19-09D
Project:	PO# EXPLORE 0112	Test ID:	35004
Location:	NOT PROVIDED	Depth (m):	33.0-33.3
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	SST BEDDING@3532	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 22.5° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey	April 4,2019	D.Lim	April 9,2019
TESTED BY	DATE	CHECKED BY	DATE

Project No.:	18109666/2000	Sample No.:	19-09D
Project:	PO# EXPLORE 0112	Test ID:	35004
Location:	NOT PROVIDED	Depth (m):	33.0-33.3
Client:	TELKWA	Lab ID No:	B19-058



Before Shear



After Shear

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 4,2019
DATE

D.Lim
CHECKED BY

April 9,2019
DATE

Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.:	18109666/2000	Sample No.:	19-09D
Project:	PO# EXPLORE 0112	Test ID:	35004
Location:	NOT PROVIDED	Depth (m):	33.0-33.3
Client:	TELKWA	Lab ID No:	B19-058

PEAK + RESIDUAL			RESIDUAL 1			RESIDUAL 2			RESIDUAL 3		
σ_n Stress, kPa		200	σ_n Stress, kPa		200	σ_n Stress, kPa		400	σ_n Stress, kPa		800
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.75	0.00	0.00	2.36	0.00	0.00	3.56	0.00	0.00	1.97	0.00
0.00	3.99	0.00	0.00	5.96	0.00	0.00	8.56	0.00	0.00	8.10	0.00
0.00	6.70	0.00	0.01	10.31	0.00	0.00	13.99	0.00	0.00	14.71	0.00
0.00	9.66	0.00	0.01	15.00	0.00	0.01	20.04	0.00	0.00	22.20	0.01
0.00	12.70	0.00	0.01	20.19	0.00	0.01	26.62	0.00	0.00	30.02	0.01
0.00	15.88	0.00	0.01	25.80	0.00	0.01	33.86	0.00	0.00	38.57	0.01
0.00	19.64	0.00	0.01	32.01	0.00	0.01	41.41	0.00	0.00	48.17	0.01
0.00	23.60	0.00	0.03	38.86	0.00	0.01	49.63	0.00	0.01	58.70	0.01
0.00	28.01	0.00	0.04	45.98	0.00	0.02	58.67	0.00	0.01	70.59	0.01
0.00	32.45	0.01	0.05	53.74	0.00	0.03	68.83	0.00	0.01	83.66	0.02
0.00	37.54	0.01	0.06	62.38	0.00	0.03	79.99	0.00	0.01	98.07	0.02
0.00	42.79	0.01	0.07	71.86	0.00	0.04	92.02	0.00	0.01	113.96	0.02
0.00	48.13	0.01	0.09	81.91	0.01	0.06	105.34	0.00	0.01	131.28	0.02
0.00	54.25	0.01	0.12	92.65	0.03	0.06	119.65	0.00	0.01	150.41	0.02
0.01	60.21	0.01	0.22	104.23	0.04	0.08	135.57	0.01	0.02	170.94	0.03
0.01	66.94	0.01	0.45	115.21	0.08	0.09	153.14	0.01	0.04	192.92	0.03
0.01	73.81	0.01	0.64	127.70	0.10	0.11	171.37	0.01	0.05	216.58	0.04
0.01	81.75	0.01	0.84	141.15	0.11	0.21	188.52	0.03	0.07	241.70	0.04
0.01	90.23	0.02	1.03	155.69	0.12	0.49	204.48	0.05	0.07	268.85	0.04
0.01	99.63	0.02	1.20	171.30	0.12	0.77	221.68	0.06	0.08	296.44	0.05
0.02	109.47	0.02	1.35	188.49	0.12	1.02	239.86	0.06	0.10	324.55	0.06
0.03	120.34	0.03	1.56	205.50	0.11	1.15	261.47	0.06	0.14	351.86	0.07
0.04	132.00	0.03	1.78	223.54	0.08	1.31	284.64	0.06	0.26	375.71	0.09
0.05	146.43	0.03	2.05	240.70	0.04	1.46	307.68	0.06	0.46	401.07	0.11
0.07	162.84	0.04	2.49	255.20	-0.06	1.58	332.99	0.06	0.65	425.90	0.12
0.07	179.75	0.04	3.12	264.43	-0.20	1.75	356.74	0.06	0.87	450.23	0.13
0.08	197.56	0.05	3.82	272.39	-0.34	2.02	377.94	0.04	1.03	477.96	0.13
0.12	215.60	0.05	4.60	280.08	-0.50	2.46	394.38	-0.02	1.15	505.35	0.14

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L. Peerey
TESTED BY

April 4, 2019
DATE

D. Lim
CHECKED BY

April 9, 2019
DATE



Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.: 18109666/2000

Sample No.: 19-09D

Project: PO# EXPLORE 0112

Test ID: 35004

Location: NOT PROVIDED

Depth (m): 33.0-33.3

Client: TELKWA

Lab ID No: B19-058

[illegible]

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

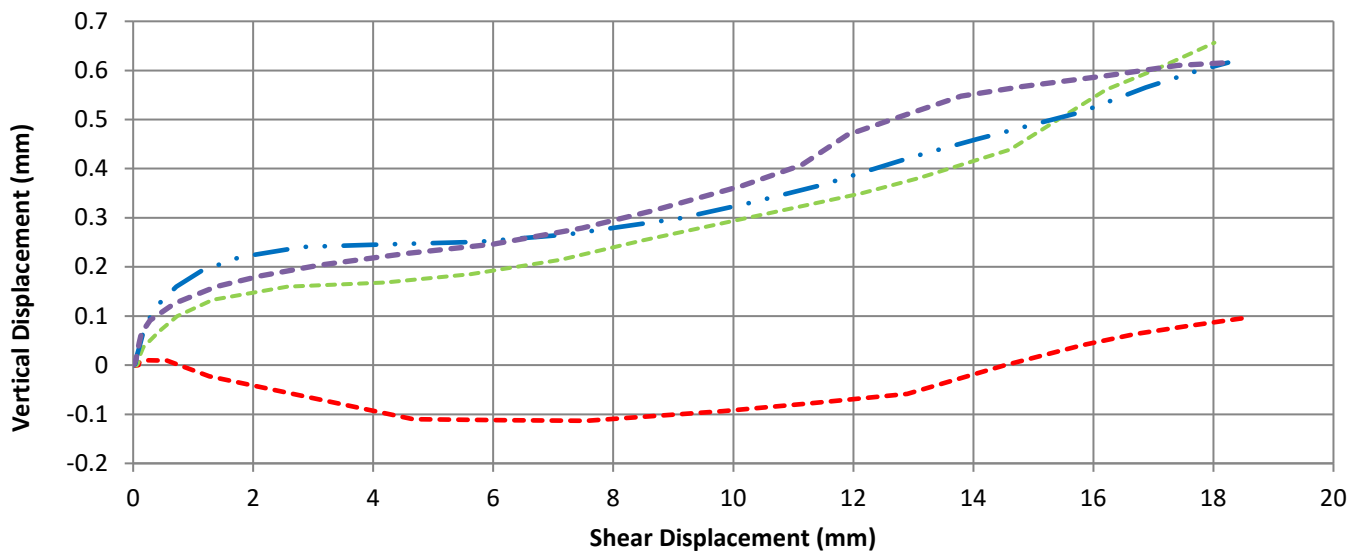
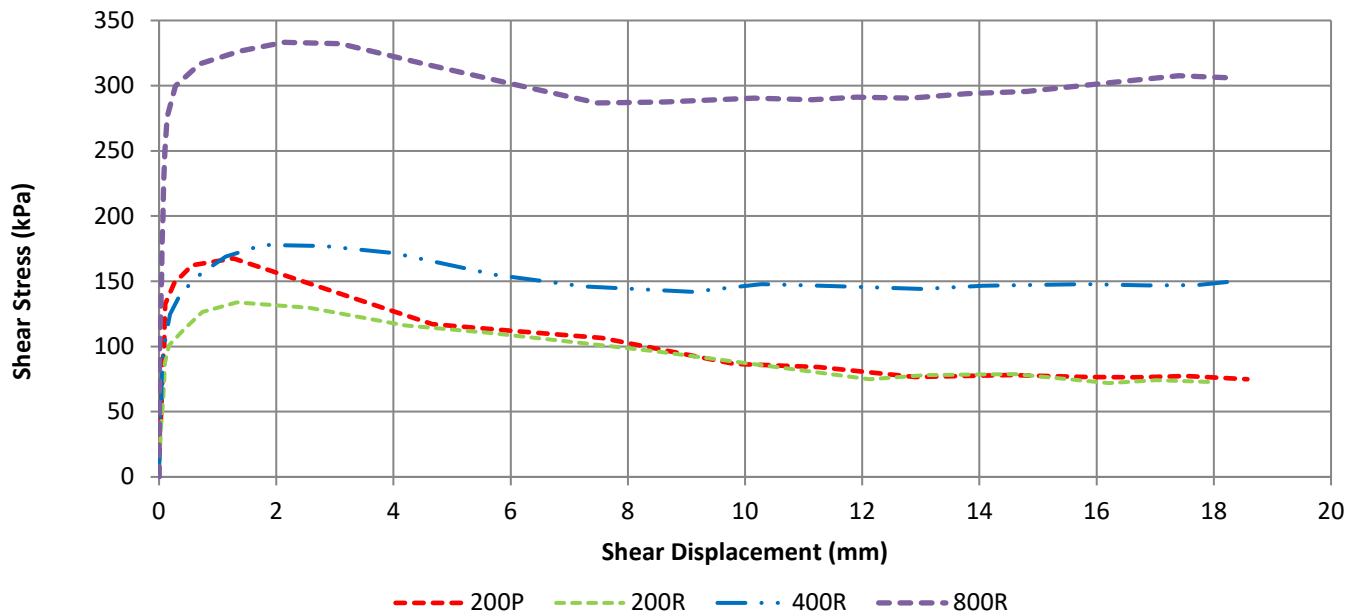
April 4, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Project No.:	18109666/2000	Sample No.:	19-16D
Project:	PO# EXPLORE 0112	Test ID:	35011
Location:	NOT PROVIDED	Depth (m):	67.8-68.0
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	MDST+COAL BEDDING@3521	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 9.0° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound

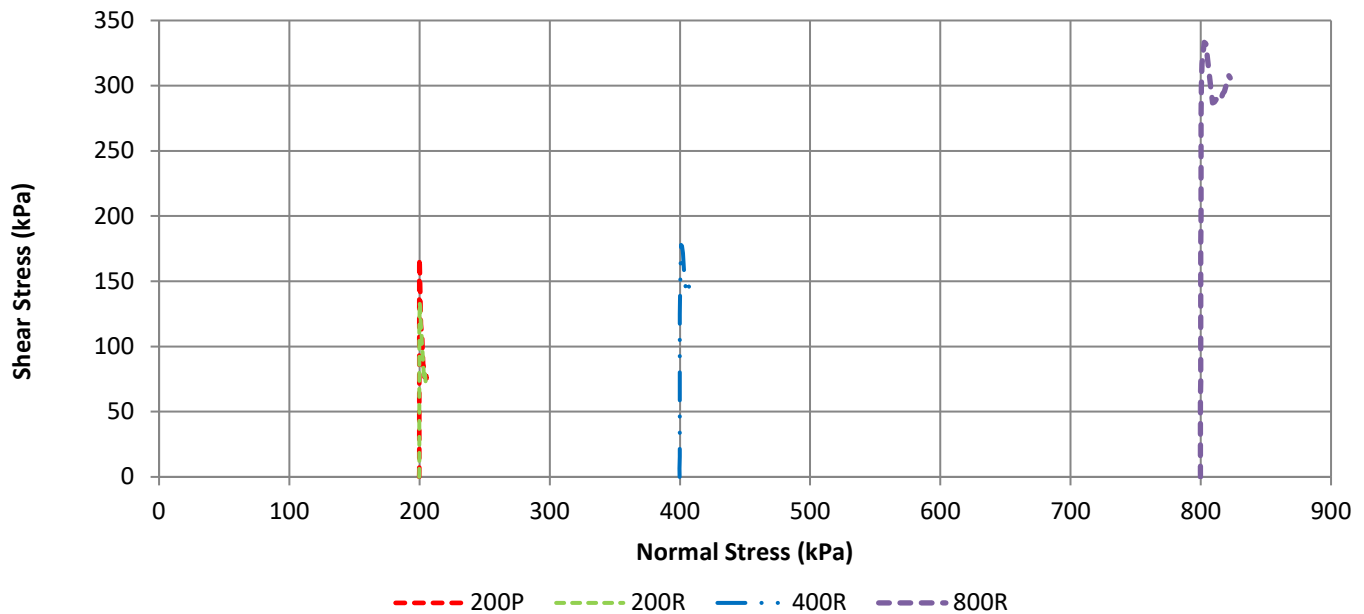


The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey	April 4, 2019	D.Lim	April 9, 2019
TESTED BY	DATE	CHECKED BY	DATE

Project No.:	18109666/2000	Sample No.:	19-16D
Project:	PO# EXPLORE 0112	Test ID:	35011
Location:	NOT PROVIDED	Depth (m):	67.8-68.0
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	MDST+COAL BEDDING@3521	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 9.0° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 4,2019
DATE

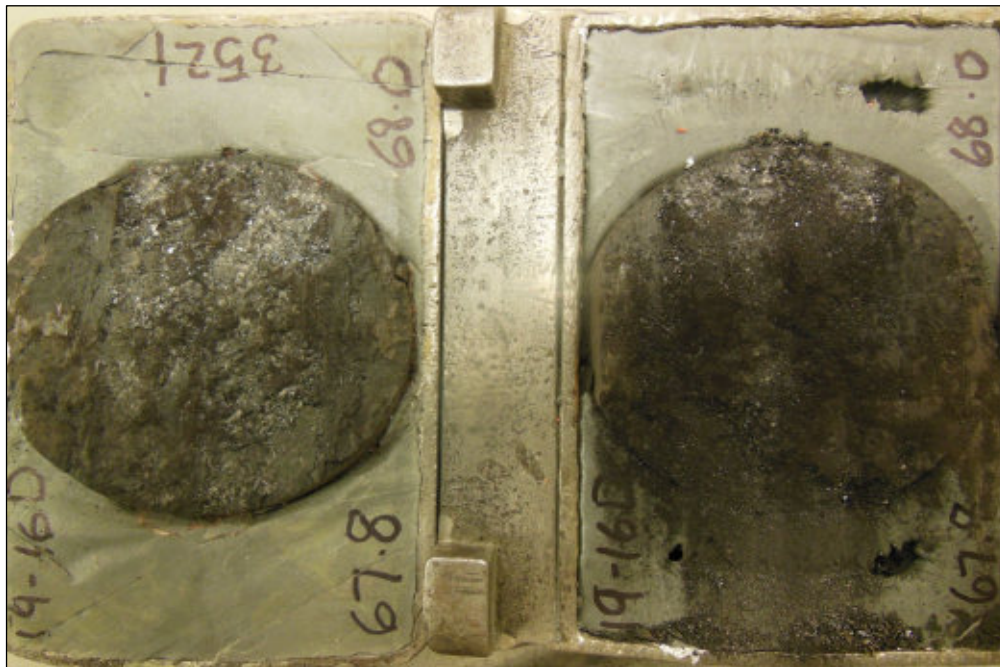
D.Lim
CHECKED BY

April 9,2019
DATE

Project No.:	18109666/2000	Sample No.:	19-16D
Project:	PO# EXPLORE 0112	Test ID:	35011
Location:	NOT PROVIDED	Depth (m):	67.8-68.0
Client:	TELKWA	Lab ID No:	B19-058



Before Shear



After Shear

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 4,2019
DATE

D.Lim
CHECKED BY

April 9,2019
DATE

Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.:	18109666/2000	Sample No.:	19-16D
Project:	PO# EXPLORE 0112	Test ID:	35011
Location:	NOT PROVIDED	Depth (m):	67.8-68.0
Client:	TELKWA	Lab ID No:	B19-058

PEAK + RESIDUAL			RESIDUAL 1			RESIDUAL 2			RESIDUAL 3		
σ_n Stress, kPa		200	σ_n Stress, kPa		200	σ_n Stress, kPa		400	σ_n Stress, kPa		800
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4.68	0.00	0.00	5.27	0.00	0.00	6.41	0.00	0.00	4.84	0.00
0.00	10.86	0.00	0.01	12.63	0.00	0.00	15.47	0.00	0.00	11.76	0.00
0.01	17.63	0.00	0.02	20.95	0.00	0.01	25.35	0.00	0.00	19.83	0.00
0.01	25.33	0.00	0.02	29.91	0.00	0.02	36.15	0.00	0.00	28.36	0.00
0.01	33.45	0.00	0.03	39.63	0.00	0.02	47.99	0.00	0.00	38.12	0.00
0.03	42.53	0.00	0.05	50.05	0.00	0.04	61.10	0.00	0.01	48.89	0.00
0.04	51.76	0.00	0.07	61.55	0.00	0.04	75.56	0.01	0.01	60.38	0.00
0.05	62.66	0.00	0.09	74.20	0.01	0.06	91.24	0.02	0.01	72.91	0.00
0.06	74.46	0.00	0.10	87.36	0.02	0.11	107.79	0.04	0.01	86.51	0.00
0.06	87.30	0.00	0.17	100.88	0.04	0.19	124.66	0.08	0.01	101.23	0.00
0.09	101.29	0.00	0.43	113.44	0.07	0.37	140.92	0.12	0.02	117.90	0.00
0.09	116.31	0.00	0.74	126.37	0.10	0.72	155.92	0.16	0.03	136.09	0.01
0.10	132.63	0.01	1.33	133.85	0.13	1.13	169.03	0.19	0.05	155.62	0.01
0.26	148.53	0.01	2.57	129.59	0.16	1.77	177.93	0.22	0.05	177.07	0.01
0.56	162.35	0.01	4.20	116.05	0.17	2.82	177.15	0.24	0.07	199.97	0.02
1.27	167.54	-0.02	5.62	110.59	0.19	4.01	171.62	0.24	0.08	224.61	0.03
4.66	117.09	-0.11	7.12	103.08	0.21	5.75	154.97	0.25	0.10	249.66	0.05
6.10	111.80	-0.11	8.48	96.21	0.25	7.24	145.99	0.27	0.14	275.93	0.07
7.55	106.53	-0.11	12.12	75.02	0.35	9.10	141.92	0.30	0.28	299.74	0.09
9.81	86.76	-0.09	13.09	78.11	0.38	10.29	147.77	0.33	0.69	316.73	0.13
11.25	84.34	-0.08	14.61	78.94	0.44	11.49	146.24	0.37	1.38	326.47	0.16
12.90	76.68	-0.06	16.21	71.93	0.56	13.02	144.24	0.42	2.13	333.25	0.18
14.51	78.01	0.00	17.02	74.26	0.60	14.06	146.65	0.46	3.10	332.10	0.20
15.81	76.64	0.04	18.02	72.68	0.66	15.79	147.70	0.52	4.52	316.82	0.23
16.69	76.43	0.06				16.87	146.79	0.57	6.01	301.61	0.25
17.53	77.36	0.08				17.71	147.12	0.60	7.48	286.77	0.28
18.57	75.00	0.10				18.24	149.44	0.62	8.63	287.46	0.31
									10.15	290.36	0.37

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L. Peerey
TESTED BY

April 4, 2019
DATE

D. Lim
CHECKED BY

April 9, 2019
DATE



Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.: 18109666/2000

Sample No.: 19-16D

Project: PO# EXPLORE 0112

Test ID: 35011

Location: NOT PROVIDED

Depth (m): 67.8-68.0

Client: TELKWA

Lab ID No: B19-058

PEAK + RESIDUAL		RESIDUAL 1		RESIDUAL 2		RESIDUAL 3	
σ_n Stress, kPa	200	σ_n Stress, kPa	200	σ_n Stress, kPa	400	σ_n Stress, kPa	800

[illegible]

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 4, 2019
DATE

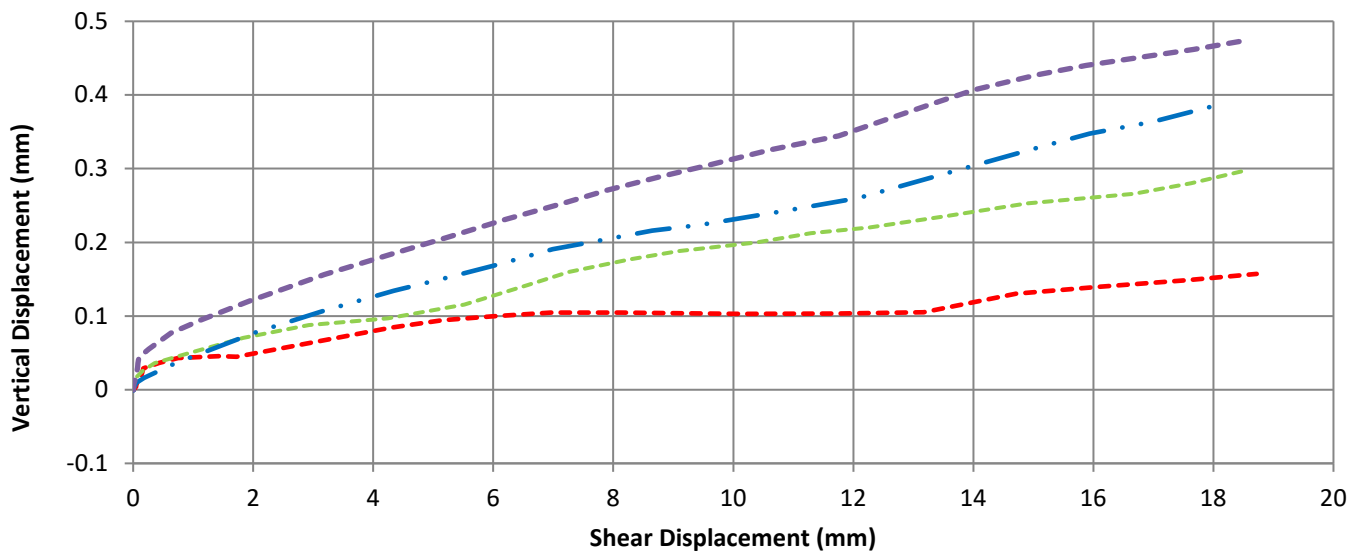
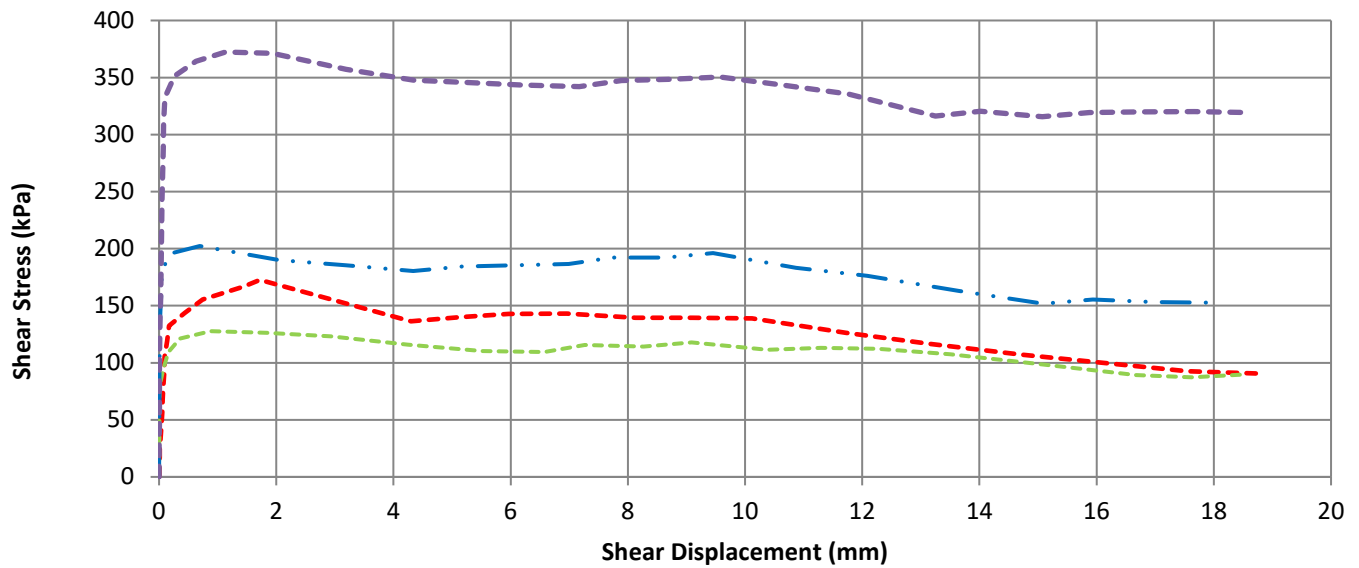
D.Lim
CHECKED BY

April 9, 2019
DATE

Golder Associates Ltd.
300, 3811 North Fraser Way, Burnaby, British Columbia, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35013
Location:	NOT PROVIDED	Depth (m):	42.8-43.0
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	SLST BEDDING@2535	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 33.5° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

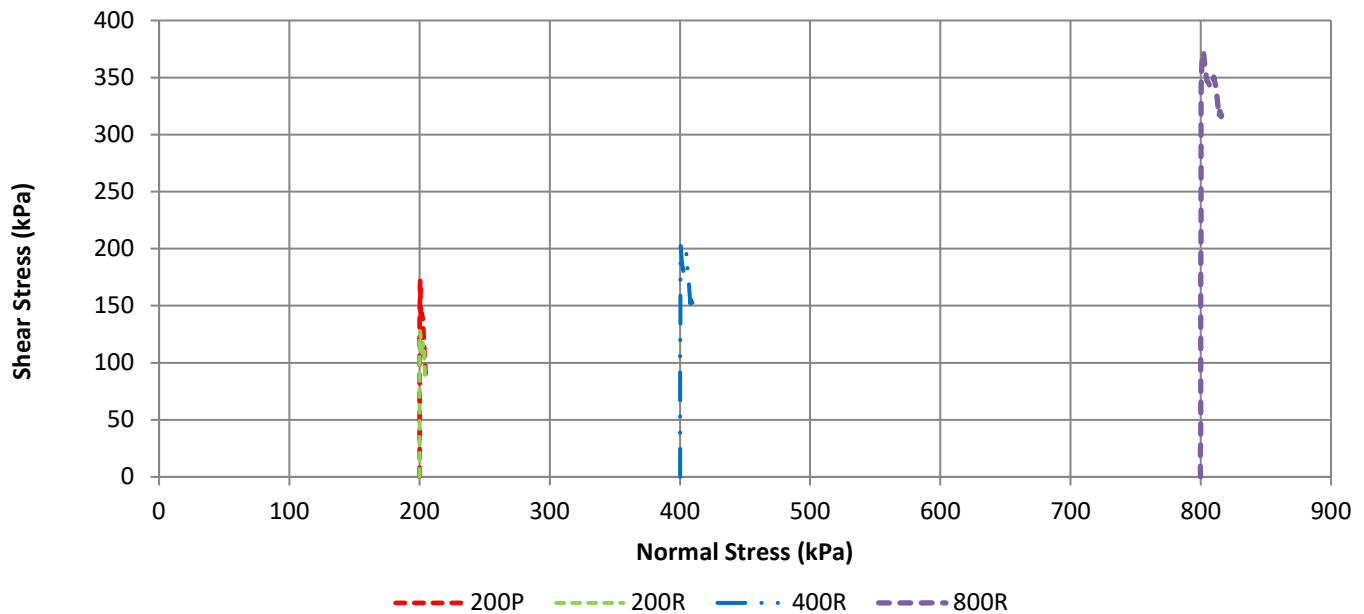
April 5, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35013
Location:	NOT PROVIDED	Depth (m):	42.8-43.0
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	SLST BEDDING@2535	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 33.5° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

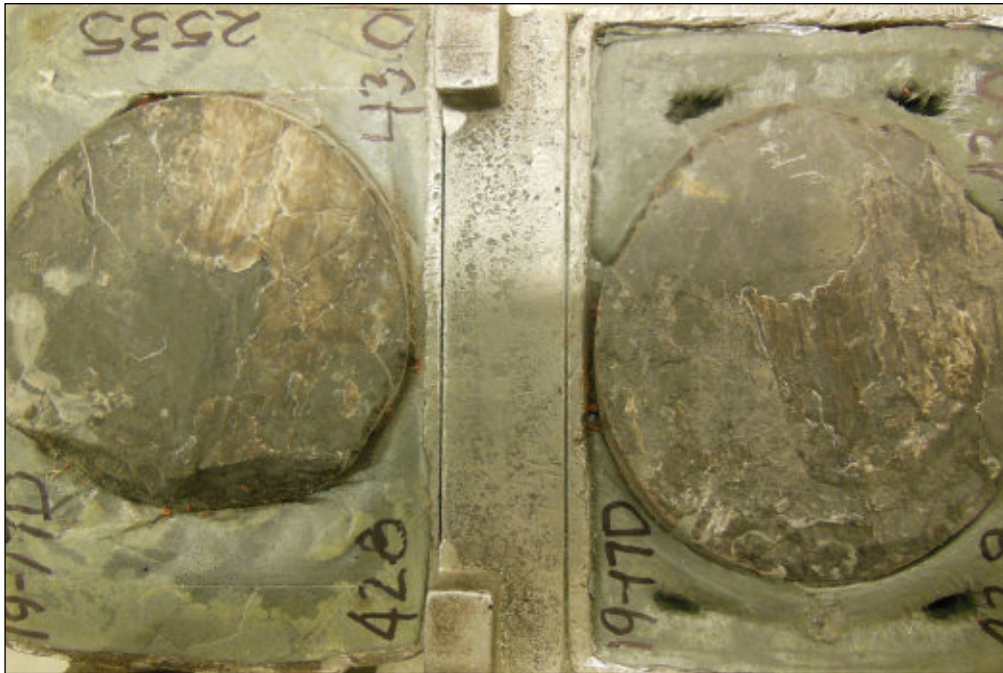
L.Peerey
TESTED BY

April 5, 2019
DATE

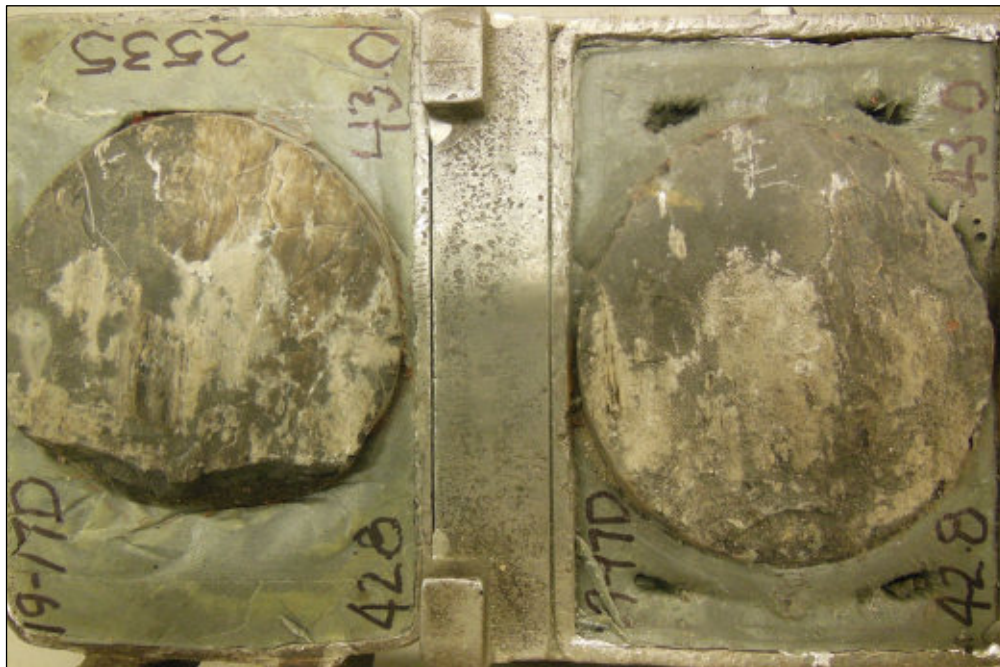
D.Lim
CHECKED BY

April 9, 2019
DATE

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35013
Location:	NOT PROVIDED	Depth (m):	42.8-43.0
Client:	TELKWA	Lab ID No:	B19-058



Before Shear



After Shear

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 5, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35013
Location:	NOT PROVIDED	Depth (m):	42.8-43.0
Client:	TELKWA	Lab ID No:	B19-058

PEAK + RESIDUAL			RESIDUAL 1			RESIDUAL 2			RESIDUAL 3		
σ_n Stress, kPa		200	σ_n Stress, kPa		200	σ_n Stress, kPa		400	σ_n Stress, kPa		800
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.73	0.00	0.00	2.45	0.00	0.00	2.64	0.00	0.00	4.66	0.00
0.01	6.57	0.00	0.00	8.26	0.00	0.00	8.32	0.00	0.00	13.30	0.00
0.01	18.39	0.00	0.00	14.22	0.00	0.00	14.71	0.00	0.00	23.10	0.00
0.01	25.13	0.00	0.00	20.76	0.00	0.00	21.31	0.00	0.00	33.94	0.00
0.02	31.85	0.00	0.00	27.43	0.00	0.00	28.43	0.00	0.00	45.57	0.00
0.04	39.75	0.00	0.00	34.93	0.00	0.00	35.71	0.00	0.01	58.24	0.00
0.05	48.39	0.00	0.01	43.06	0.00	0.00	44.02	0.00	0.01	71.80	0.00
0.05	57.62	0.01	0.01	52.07	0.01	0.00	52.99	0.00	0.01	87.28	0.00
0.06	68.00	0.01	0.01	61.67	0.01	0.01	62.83	0.00	0.01	103.59	0.01
0.07	79.13	0.01	0.01	72.55	0.01	0.01	73.71	0.00	0.01	120.88	0.01
0.09	91.34	0.01	0.03	84.07	0.02	0.01	85.83	0.00	0.02	139.27	0.01
0.10	104.99	0.01	0.08	96.54	0.02	0.01	98.83	0.00	0.03	158.20	0.01
0.14	119.01	0.02	0.16	109.49	0.03	0.01	113.24	0.00	0.03	177.99	0.01
0.17	132.40	0.03	0.35	121.30	0.04	0.01	128.70	0.00	0.04	220.74	0.02
0.44	143.66	0.04	0.88	127.72	0.05	0.02	145.08	0.00	0.05	242.91	0.02
0.75	155.43	0.04	1.83	126.22	0.07	0.04	162.04	0.01	0.06	265.78	0.03
1.44	166.80	0.05	2.93	123.15	0.09	0.05	179.52	0.01	0.07	287.99	0.03
1.72	172.65	0.04	4.24	115.92	0.10	0.18	195.62	0.02	0.08	310.72	0.04
4.30	136.46	0.08	5.52	110.37	0.12	0.69	202.34	0.04	0.10	332.42	0.04
5.14	140.14	0.09	6.57	109.33	0.14	2.05	190.01	0.08	0.26	351.27	0.05
5.97	142.81	0.10	7.26	115.65	0.16	3.18	185.61	0.11	0.63	364.19	0.08
6.96	143.19	0.10	8.27	114.29	0.18	4.34	180.53	0.13	1.13	372.34	0.09
8.13	139.51	0.10	9.09	117.97	0.19	5.17	184.46	0.15	1.93	371.12	0.12
9.10	139.58	0.10	10.38	111.43	0.20	6.08	185.49	0.17	3.19	357.33	0.16
10.12	138.90	0.10	11.29	113.09	0.21	6.99	186.67	0.19	4.35	347.53	0.18
11.72	126.32	0.10	12.27	112.23	0.22	7.74	192.19	0.20	5.24	345.79	0.21
13.17	116.58	0.11	13.50	107.55	0.24	8.65	192.17	0.22	6.18	343.53	0.23
14.71	107.32	0.13	14.89	99.70	0.25	9.45	196.06	0.22	7.17	342.15	0.25

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L. Peerey
TESTED BY

April 5, 2019
DATE

D. Lim
CHECKED BY

April 9, 2019
DATE



Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.: 18109666/2000

Sample No.: 19-17D

Project: PO# EXPLORE 0112

Test ID: 35013

Location: NOT PROVIDED

Depth (m): 42.8-43.0

Client: TELKWA

Lab ID No: B19-058

PEAK + RESIDUAL			RESIDUAL 1			RESIDUAL 2			RESIDUAL 3		
σ _n Stress,	kPa	200	σ _n Stress,	kPa	200	σ _n Stress,	kPa	400	σ _n Stress,	kPa	800

[illegible]

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 5, 2019
DATE

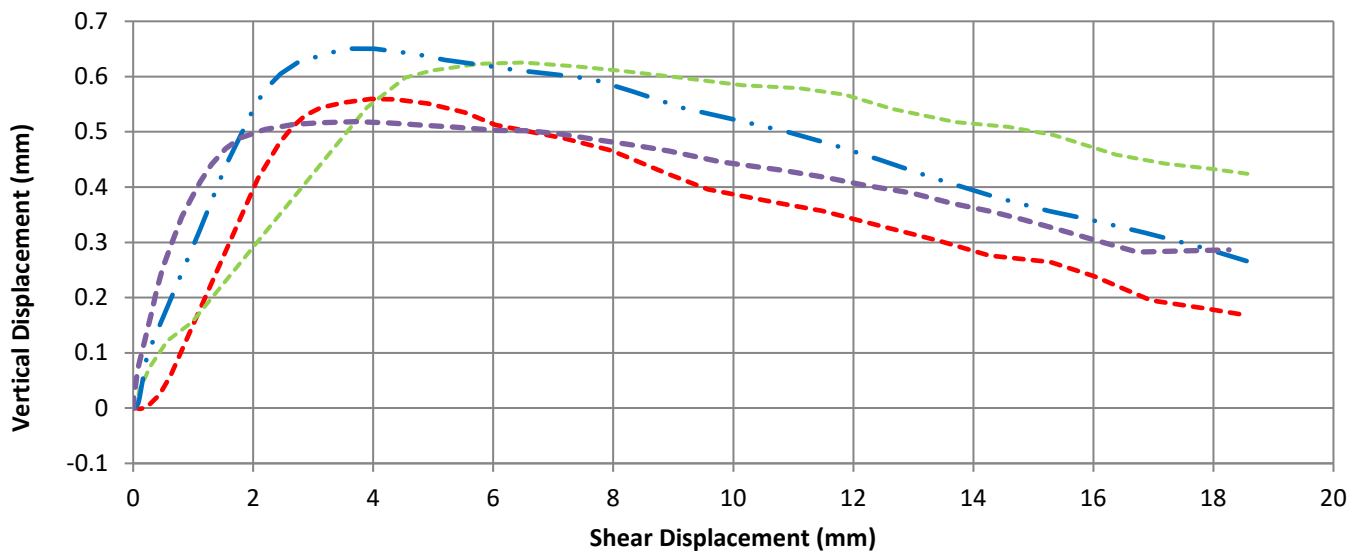
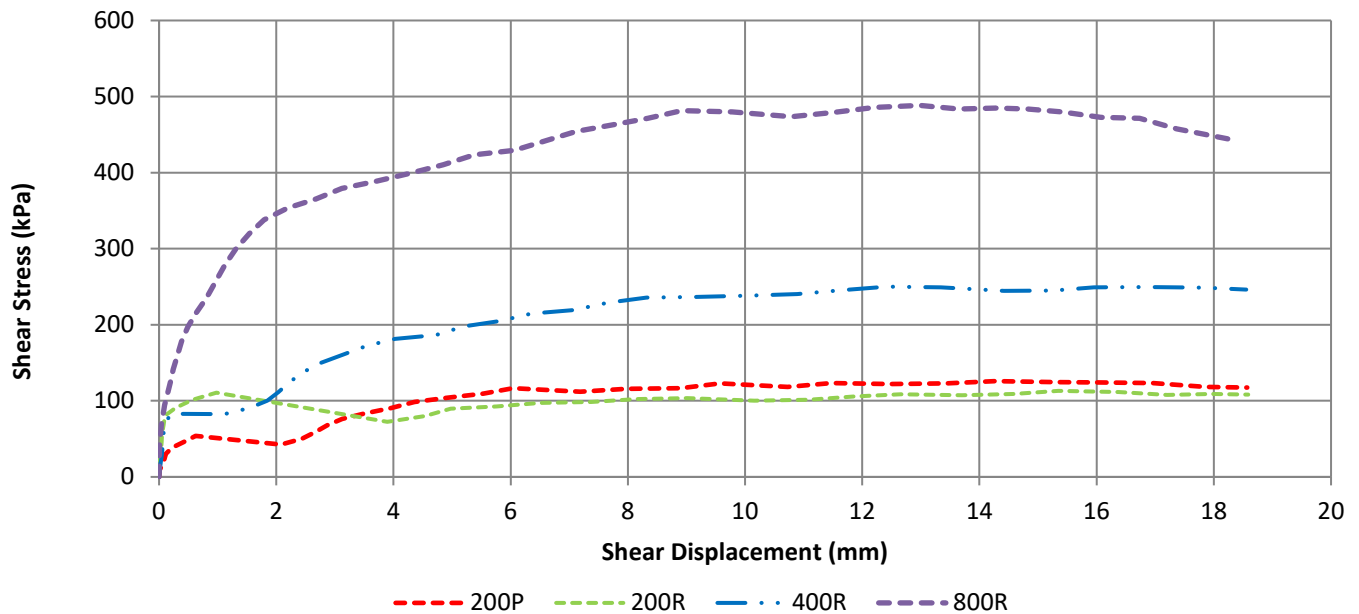
D.Lim
CHECKED BY

April 9, 2019
DATE

Golder Associates Ltd.
300, 3811 North Fraser Way, Burnaby, British Columbia, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35015
Location:	NOT PROVIDED	Depth (m):	45.4-45.7
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	SST + COAL BEDDING@2521	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 12.5° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

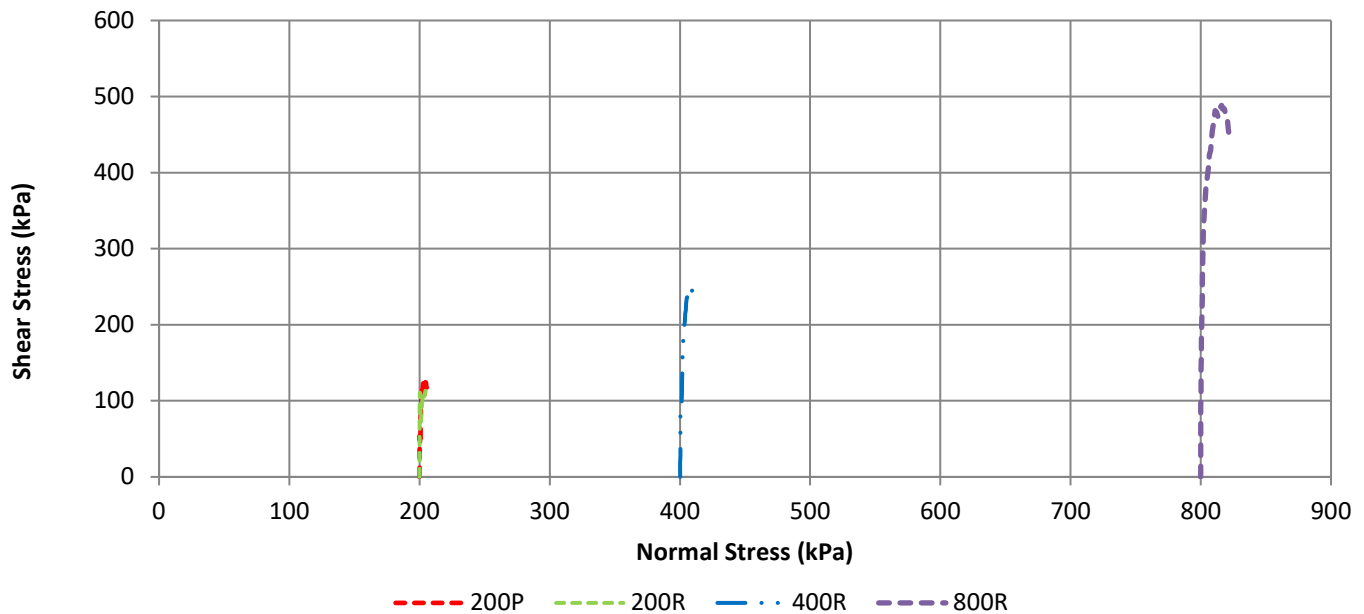
April 5, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35015
Location:	NOT PROVIDED	Depth (m):	45.4-45.7
Client:	TELKWA	Lab ID No:	B19-058

Test Condition:	Open	Moisture Condition:	As-received
Lithology:	SST + COAL BEDDING@2521	Sample Geometry	Elliptical
Discontinuity Orientation	Alpha Angle 12.5° to core axis.	Joint Roughness Coefficient	6-8
		Encapsulating Material	Capping Compound



The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

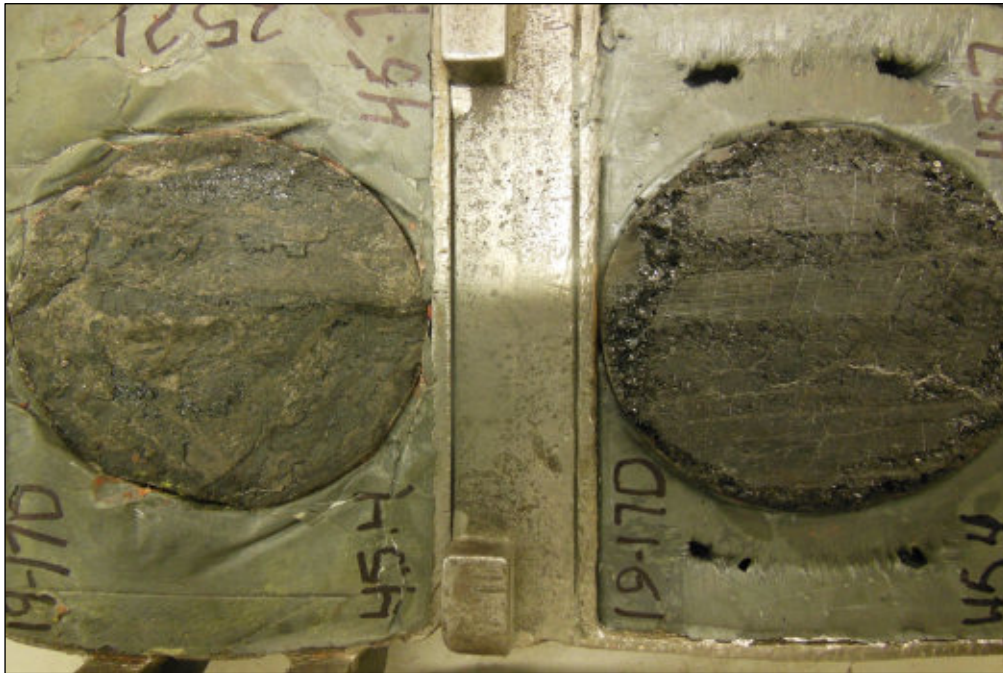
L.Peerey
TESTED BY

April 5, 2019
DATE

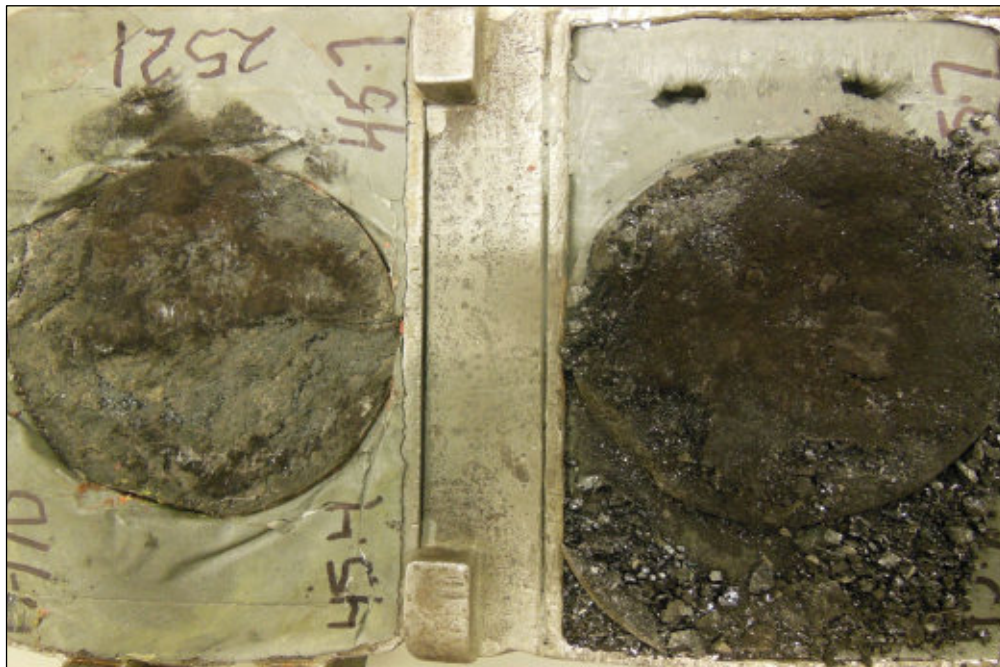
D.Lim
CHECKED BY

April 9, 2019
DATE

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35015
Location:	NOT PROVIDED	Depth (m):	45.4-45.7
Client:	TELKWA	Lab ID No:	B19-058



Before Shear



After Shear

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 5, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.:	18109666/2000	Sample No.:	19-17D
Project:	PO# EXPLORE 0112	Test ID:	35015
Location:	NOT PROVIDED	Depth (m):	45.4-45.7
Client:	TELKWA	Lab ID No:	B19-058

PEAK + RESIDUAL			RESIDUAL 1			RESIDUAL 2			RESIDUAL 3		
σ_n Stress, kPa		200	σ_n Stress, kPa		200	σ_n Stress, kPa		400	σ_n Stress, kPa		800
Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert	Horz	Shear	Vert
Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp	Disp	Stress	Disp
mm	kPa	mm	mm	kPa	mm	mm	kPa	mm	mm	kPa	mm
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4.09	0.00	0.00	3.71	0.00	0.00	5.57	0.00	0.00	4.38	0.00
0.01	9.82	0.00	0.01	11.27	0.00	0.02	12.26	0.00	0.01	19.62	0.00
0.06	15.88	0.00	0.01	19.21	0.00	0.03	19.03	0.00	0.01	28.07	0.00
0.09	22.84	0.00	0.02	27.30	0.00	0.04	26.90	0.00	0.01	37.38	0.01
0.12	30.35	0.00	0.03	36.34	0.00	0.05	35.34	0.00	0.01	47.03	0.02
0.22	38.30	0.00	0.04	46.31	0.00	0.06	43.94	0.01	0.03	57.31	0.03
0.43	46.52	0.02	0.05	56.95	0.01	0.07	53.00	0.01	0.04	68.71	0.04
0.62	54.05	0.06	0.08	68.30	0.02	0.08	63.13	0.01	0.07	80.94	0.06
2.08	42.40	0.42	0.10	80.45	0.03	0.11	73.89	0.02	0.10	94.22	0.08
2.44	49.98	0.48	0.28	91.14	0.07	0.23	82.97	0.10	0.14	108.88	0.10
2.66	58.89	0.51	0.57	101.67	0.12	1.11	82.57	0.32	0.19	124.17	0.12
2.87	67.74	0.53	0.98	110.52	0.16	1.54	90.35	0.44	0.24	141.35	0.14
3.12	76.29	0.54	3.89	72.57	0.54	1.85	100.27	0.51	0.31	159.43	0.17
3.51	83.52	0.55	4.54	79.80	0.60	2.04	111.77	0.55	0.38	178.01	0.21
3.96	90.64	0.56	4.97	89.81	0.61	2.23	124.92	0.58	0.49	197.33	0.25
4.36	98.40	0.56	5.76	92.55	0.62	2.46	137.72	0.60	0.64	216.25	0.30
4.91	104.09	0.55	6.50	97.37	0.63	2.76	149.68	0.63	0.81	235.38	0.35
5.53	109.32	0.53	7.38	98.59	0.62	3.54	172.22	0.65	0.97	257.20	0.38
6.04	116.48	0.51	8.14	102.50	0.61	4.03	181.49	0.65	1.12	278.24	0.41
7.19	111.93	0.49	9.02	103.60	0.60	4.73	186.49	0.64	1.31	299.43	0.44
7.97	115.90	0.47	10.16	100.00	0.58	5.20	197.88	0.63	1.54	319.74	0.47
8.90	116.69	0.42	11.09	101.32	0.58	5.82	205.07	0.62	1.79	338.05	0.49
9.57	122.79	0.40	11.85	105.85	0.57	6.35	214.73	0.61	2.20	353.65	0.50
10.73	118.20	0.37	12.65	108.59	0.54	7.07	219.18	0.60	2.68	365.45	0.51
11.47	123.30	0.36	13.70	107.16	0.52	7.66	228.98	0.60	3.12	379.31	0.52
12.47	122.26	0.33	14.59	108.84	0.51	8.32	235.85	0.57	3.72	389.00	0.52
13.43	122.95	0.30	15.34	113.12	0.49	9.15	236.58	0.54	4.30	399.50	0.52
14.27	125.91	0.28	16.38	111.59	0.46	10.04	238.04	0.52	4.85	410.47	0.51

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L. Peerey
TESTED BY

April 5, 2019
DATE

D. Lim
CHECKED BY

April 9, 2019
DATE



Direct Shear Strength Testing Under Constant Normal Force

ASTM D5607

Project No.: 18109666/2000

Sample No.: 19-17D

Project: PO# EXPLORE 0112

Test ID: 35015

Location: NOT PROVIDED

Depth (m): 45.4-45.7

Client: TELKWA

Lab ID No: B19-058

PEAK + RESIDUAL		RESIDUAL 1		RESIDUAL 2		RESIDUAL 3	
σ_n Stress, kPa	200	σ_n Stress, kPa	200	σ_n Stress, kPa	400	σ_n Stress, kPa	800

[illegible]

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

L.Peerey
TESTED BY

April 5, 2019
DATE

D.Lim
CHECKED BY

April 9, 2019
DATE

Golder Associates Ltd.
300, 3811 North Fraser Way, Burnaby, British Columbia, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Laboratory Determination of Uniaxial Compressive Strength of Intact Rock Core Specimens

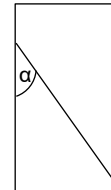
Summary of Test Results

ASTM D7012 Method C

Project No.: 18109666/2000
Project: Explore #0112
Location: Not Provided
Client: Telkwa
Lab ID No: B19-058

Failure Modes (5) Single Shear
 (1) Simple Extension (6) Spalling
 (2) Multiple Extension (7) Other
 (3) Multiple Fracturing
 (4) Multiple Shear * Wet density based on as received moisture

Note: Alpha angle, α , measured relative to the core axis



No.	Borehole #	Sample #	Depth (m)	Dia (mm)	Ht (mm)	Area (cm ²)	Volume (cm ³)	Mass (g)	* Wet Density (kg/m ³)	Moisture (%)	Dry Density (kg/m ³)	Maximum Load (kN)	Stress σ_u (MPa)	Rock Type	Failure Mode	
															Type	α (deg)
1	19-09D	35003	31.2-31.4	84.84	177.91	56.53	1005.77	2574.50	2560	2.27	2503	101.30	17.9	Siltstone	6	N/A
2	19-09D	35005	48.7-48.9	84.85	178.15	56.55	1007.43	2675.90	2656	1.83	2608	275.90	48.8	Sandstone	3/6	N/A
3	19-16D	35009	57.6-57.9	84.80	164.14	56.47	926.98	2398.40	2587	1.76	2543	152.60	27.0	Siltstone	3	N/A
4	19-16D	35010	61.9-62.1	84.84	148.13	56.53	837.32	2109.30	2519	2.08	2468	229.60	40.6	Mudstone	6	N/A
5	19-16D	35012	72.2-73.2	84.88	177.88	56.58	1006.47	2599.70	2583	2.72	2515	60.10	10.6	Siltstone	7	N/A
6	19-17D	35014	45.1-45.4	84.80	180.21	56.48	1017.88	2655.90	2609	1.45	2572	195.80	34.7	Sandstone	6	N/A
7	19-17D	35016	51.3-51.5	84.69	174.50	56.33	982.89	2730.80	2778	1.10	2748	87.20	15.5	Siltstone	6	N/A
8	19-18D	35017	24.3-24.5	84.88	180.41	56.58	1020.85	2646.90	2593	1.23	2561	155.60	27.5	Siltstone	6	N/A

Note:

Test No.3, Sample does not conform to ASTM requirements and results may differ from those obtained from test specimens that meet requirements.

-ASTM D7012; Section 8.1.1 Desirable specimen length to diameter ratios are between 2.0:1 and 2.5:1. Specimen length to diameter ratios of less than 2.0:1 are unacceptable.

Test No.4, Sample does not conform to ASTM requirements and results may differ from those obtained from test specimens that meet requirements.

-ASTM D7012; Section 8.1.1 Desirable specimen length to diameter ratios are between 2.0:1 and 2.5:1. Specimen length to diameter ratios of less than 2.0:1 are unacceptable.

Test No.5, Top half sample shattered during testing while the bottom half remained intact.

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson
TESTED BY

March 19, 2019
DATE

G. Patton
CHECKED BY

March 25, 2019
DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-09D
Project:	Explore #0112	Sample Number:	35003
Location:	Not Provided	Depth (m):	31.2-31.4
Client:	Telkwa	Lab ID No:	B19-058

Testing Results	Sample Measurements
Max Load (kN) 101.30	Diameter (mm) 84.84
Stress σ_u (MPa) 17.9	Height (mm) 177.91
Pace Rate (kN/s) 1.25	Area (cm ²) 56.53
Lithology Siltstone	Volume (cm ³) 1005.77
	Mass (g) 2574.50
	Moisture Content (%) 2.27
	Wet Density (kg/m ³) 2560
	Dry Density (kg/m ³) 2503



BEFORE TEST

Failure Mode	Notes
Type: 6	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other



AFTER TEST

Comments

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

TESTED BY

DATE

CHECKED BY

DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-09D
Project:	Explore #0112	Sample Number:	35005
Location:	Not Provided	Depth (m):	48.7-48.9
Client:	Telkwa	Lab ID No:	B19-058

Testing Results	Sample Measurements
Max Load (kN) 275.90	Diameter (mm) 84.85
Stress σ_u (MPa) 48.8	Height (mm) 178.15
Pace Rate (kN/s) 1.25	Area (cm ²) 56.55
Lithology Sandstone	Volume (cm ³) 1007.43
	Mass (g) 2675.90
	Moisture Content (%) 1.83
	Wet Density (kg/m ³) 2656
	Dry Density (kg/m ³) 2608



BEFORE TEST

Failure Mode	Notes
Type: 3/6	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other



AFTER TEST

Comments

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

TESTED BY

DATE

CHECKED BY

DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-16D
Project:	Explore #0112	Sample Number:	35009
Location:	Not Provided	Depth (m):	57.6-57.9
Client:	Telkwa	Lab ID No:	B19-058

Testing Results		Sample Measurements	
Max Load (kN)	152.60	Diameter (mm)	84.80
Stress σ_u (MPa)	27.0	Height (mm)	164.14
Pace Rate (kN/s)	1.25	Area (cm ²)	56.47
Lithology	Siltstone	Volume (cm ³)	926.98
		Mass (g)	2398.40
		Moisture Content (%)	1.76
		Wet Density (kg/m ³)	2587
		Dry Density (kg/m ³)	2543



BEFORE TEST

Failure Mode	Notes
Type: 3	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other



AFTER TEST

Comments
Sample does not conform to ASTM requirements and results may differ from those obtained from test specimens that meet requirements. <i>ASTM D7012; Section 8.1.1 Desirable specimen length to diameter ratios are between 2.0:1 and 2.5:1. Specimen length to diameter ratios of less than 2.0:1 are unacceptable.</i>

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

TESTED BY

DATE

CHECKED BY

DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-16D
Project:	Explore #0112	Sample Number:	35010
Location:	Not Provided	Depth (m):	61.9-62.1
Client:	Telkwa	Lab ID No:	B19-058

Testing Results		Sample Measurements	
Max Load (kN)	229.60	Diameter (mm)	84.84
Stress σ_u (MPa)	40.6	Height (mm)	148.13
Pace Rate (kN/s)	1.25	Area (cm ²)	56.53
Lithology	Mudstone	Volume (cm ³)	837.32
		Mass (g)	2109.30
		Moisture Content (%)	2.08
		Wet Density (kg/m ³)	2519
		Dry Density (kg/m ³)	2468



BEFORE TEST

Failure Mode	Notes
Type: 6	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other



AFTER TEST

Comments
Sample does not conform to ASTM requirements and results may differ from those obtained from test specimens that meet requirements. <i>ASTM D7012; Section 8.1.1 Desirable specimen length to diameter ratios are between 2.0:1 and 2.5:1. Specimen length to diameter ratios of less than 2.0:1 are unacceptable.</i>

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

TESTED BY

DATE

CHECKED BY

DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-16D
Project:	Explore #0112	Sample Number:	35012
Location:	Not Provided	Depth (m):	72.2-73.2
Client:	Telkwa	Lab ID No:	B19-058

Testing Results		Sample Measurements	
Max Load (kN)	60.10	Diameter (mm)	84.88
Stress σ_u (MPa)	10.6	Height (mm)	177.88
Pace Rate (kN/s)	1.25	Area (cm ²)	56.58
Lithology	Siltstone	Volume (cm ³)	1006.47
		Mass (g)	2599.70
		Moisture Content (%)	2.72
		Wet Density (kg/m ³)	2583
		Dry Density (kg/m ³)	2515



BEFORE TEST

Failure Mode	Notes
Type: 7	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other



AFTER TEST

Comments
Failure Mode: The top half of the sample fractured into multiple pieces, while the bottom half remained intact.

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

TESTED BY

DATE

CHECKED BY

DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-17D
Project:	Explore #0112	Sample Number:	35014
Location:	Not Provided	Depth (m):	45.1-45.4
Client:	Telkwa	Lab ID No:	B19-058

Testing Results		Sample Measurements	
Max Load (kN)	195.80	Diameter (mm)	84.80
Stress σ_u (MPa)	34.7	Height (mm)	180.21
Pace Rate (kN/s)	1.25	Area (cm ²)	56.48
Lithology	Sandstone	Volume (cm ³)	1017.88
		Mass (g)	2655.90
		Moisture Content (%)	1.45
		Wet Density (kg/m ³)	2609
		Dry Density (kg/m ³)	2572



BEFORE TEST

Failure Mode	Notes
Type: 6	- Water content as received - Wet density based on as received moisture
α angle: N/A	Mode: (1) Simple Extension (2) Multiple Extension (3) Multiple Fracturing (4) Multiple Shear (5) Single Shear (6) Spalling (7) Other
* Degrees measured with respect to core axis.	
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	



AFTER TEST

Comments

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

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DATE

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DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-17D
Project:	Explore #0112	Sample Number:	35016
Location:	Not Provided	Depth (m):	51.3-51.5
Client:	Telkwa	Lab ID No:	B19-058

Testing Results		Sample Measurements	
Max Load (kN)	87.20	Diameter (mm)	84.69
Stress σ_u (MPa)	15.5	Height (mm)	174.50
Pace Rate (kN/s)	1.25	Area (cm ²)	56.33
Lithology	Siltstone	Volume (cm ³)	982.89
		Mass (g)	2730.80
		Moisture Content (%)	1.10
		Wet Density (kg/m ³)	2778
		Dry Density (kg/m ³)	2748



BEFORE TEST

Failure Mode	Notes
Type: 6	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other

Comments



AFTER TEST

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

TESTED BY

DATE

CHECKED BY

DATE

Uniaxial Compressive Strength of Intact Rock Core Specimens (Method C)

ASTM D7012

Project No.:	18109666/2000	Borehole:	19-18D
Project:	Explore #0112	Sample Number:	35017
Location:	Not Provided	Depth (m):	24.3-24.5
Client:	Telkwa	Lab ID No:	B19-058

Testing Results	Sample Measurements
Max Load (kN) 155.60	Diameter (mm) 84.88
Stress σ_u (MPa) 27.5	Height (mm) 180.41
Pace Rate (kN/s) 1.25	Area (cm ²) 56.58
Lithology Siltstone	Volume (cm ³) 1020.85
	Mass (g) 2646.90
	Moisture Content (%) 1.23
	Wet Density (kg/m ³) 2593
	Dry Density (kg/m ³) 2561



BEFORE TEST

Failure Mode	Notes
Type: 6	- Water content as received
α angle: N/A	- Wet density based on as received moisture
* Degrees measured with respect to core axis.	Mode:
The impact of any pre-existing feature on the test results will be noted in the comments, if applicable.	(1) Simple Extension
	(2) Multiple Extension
	(3) Multiple Fracturing
	(4) Multiple Shear
	(5) Single Shear
	(6) Spalling
	(7) Other



AFTER TEST

Comments

The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

B. Matheson

March 19, 2019

G. Patton

March 25, 2019

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DATE

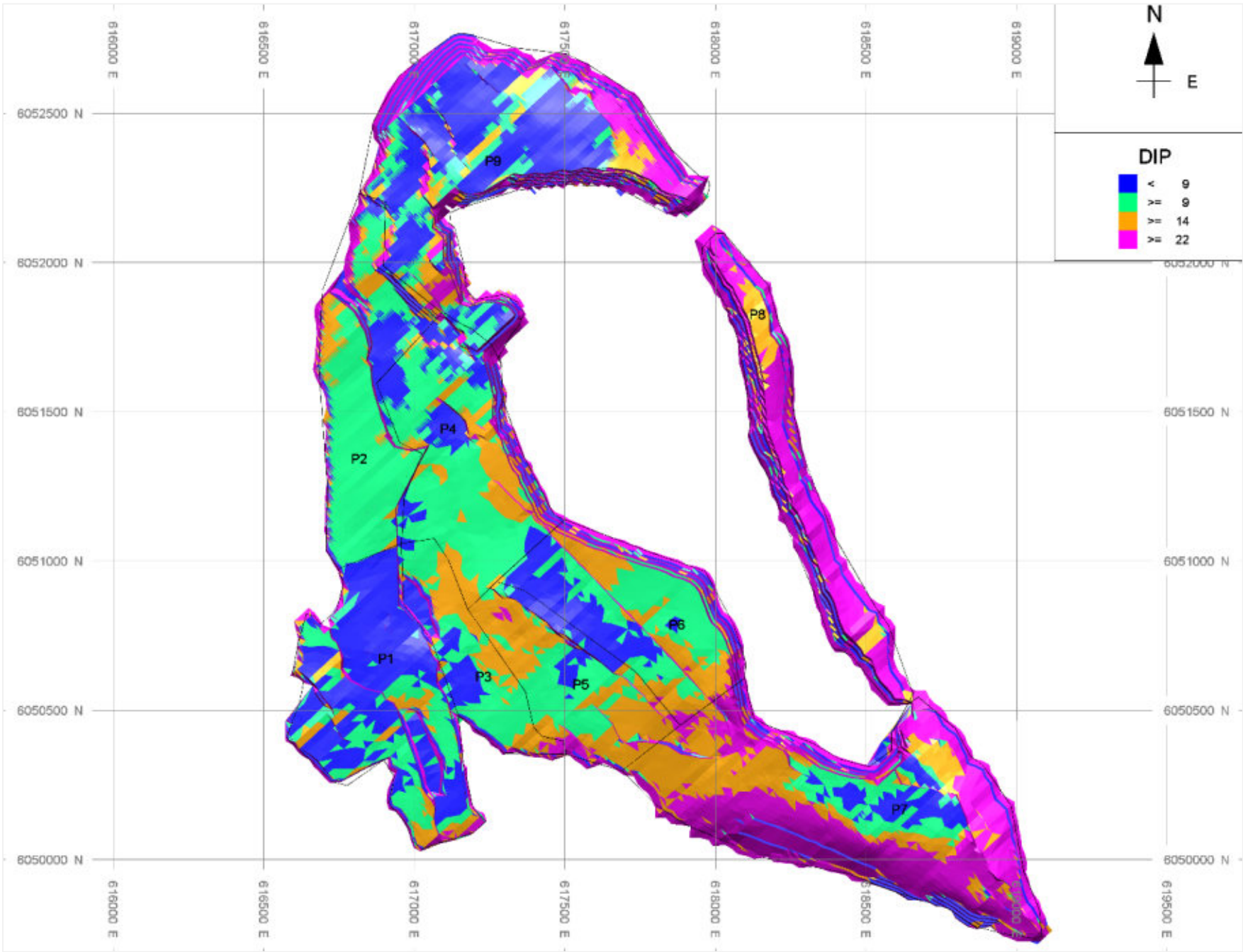
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Appendix F – Geological Cross Sections

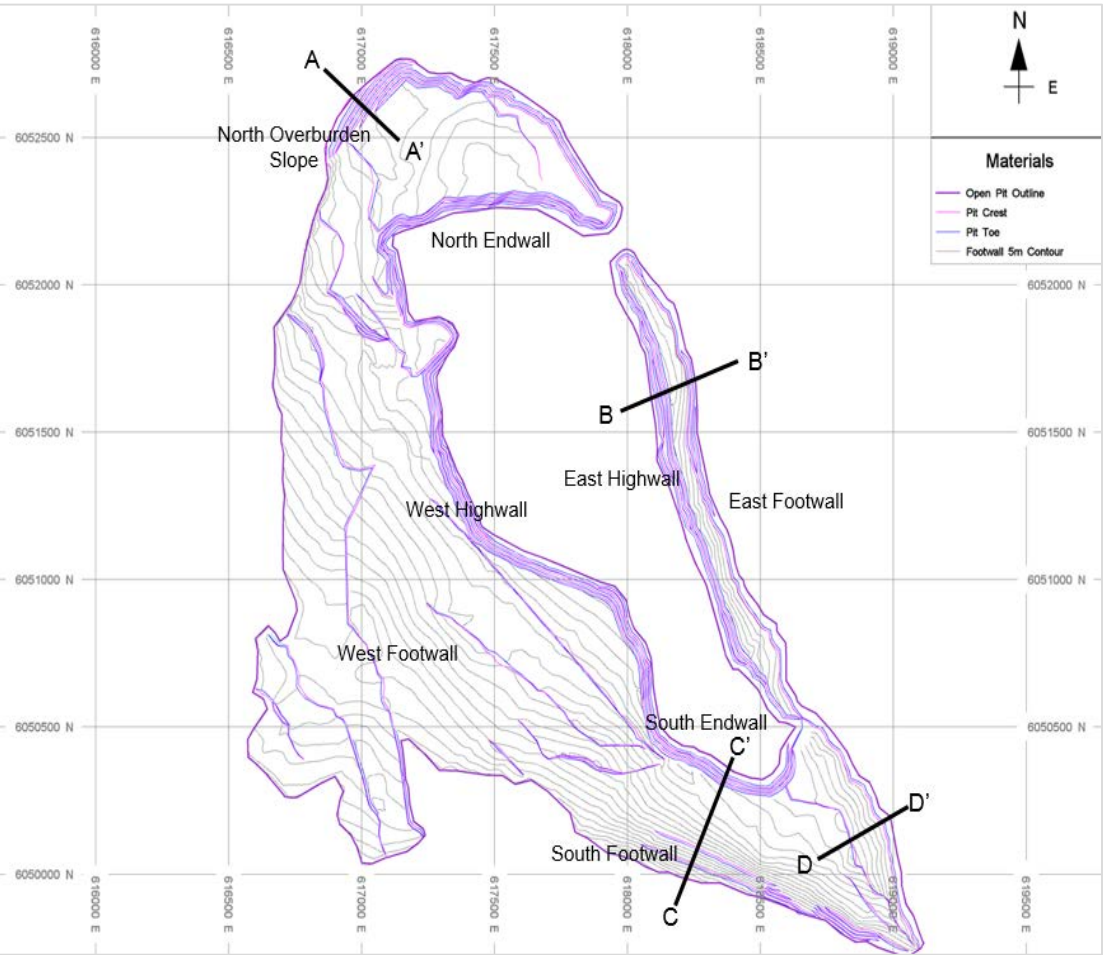
TENAS GEOLOGICAL MODEL

COAL SEAM GEOLOGY – BEDDING DIPS



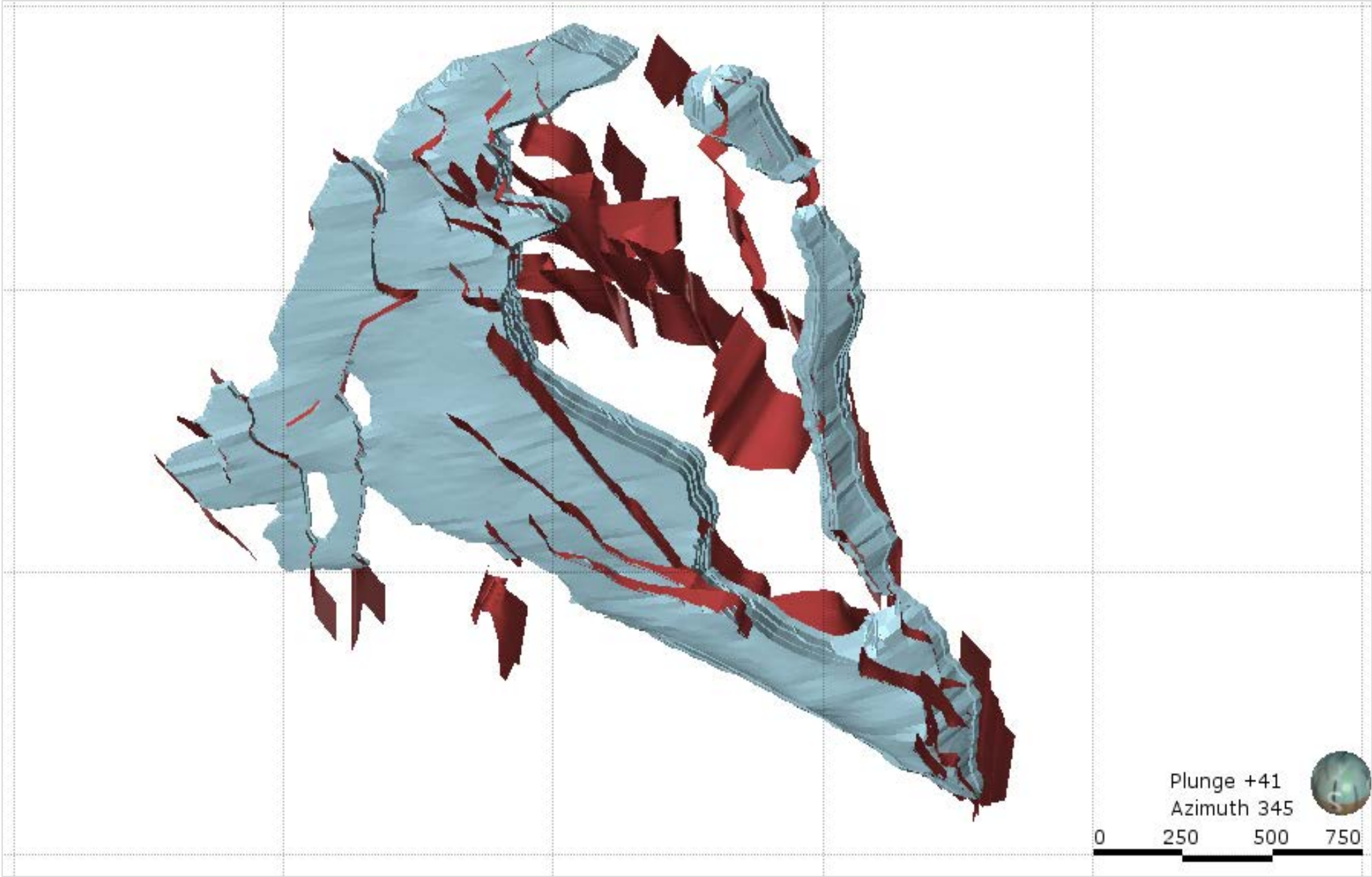
NOTE: Bedding dips shown for coal seam 1LA

FOOTWALL SLOPE CONTOURS



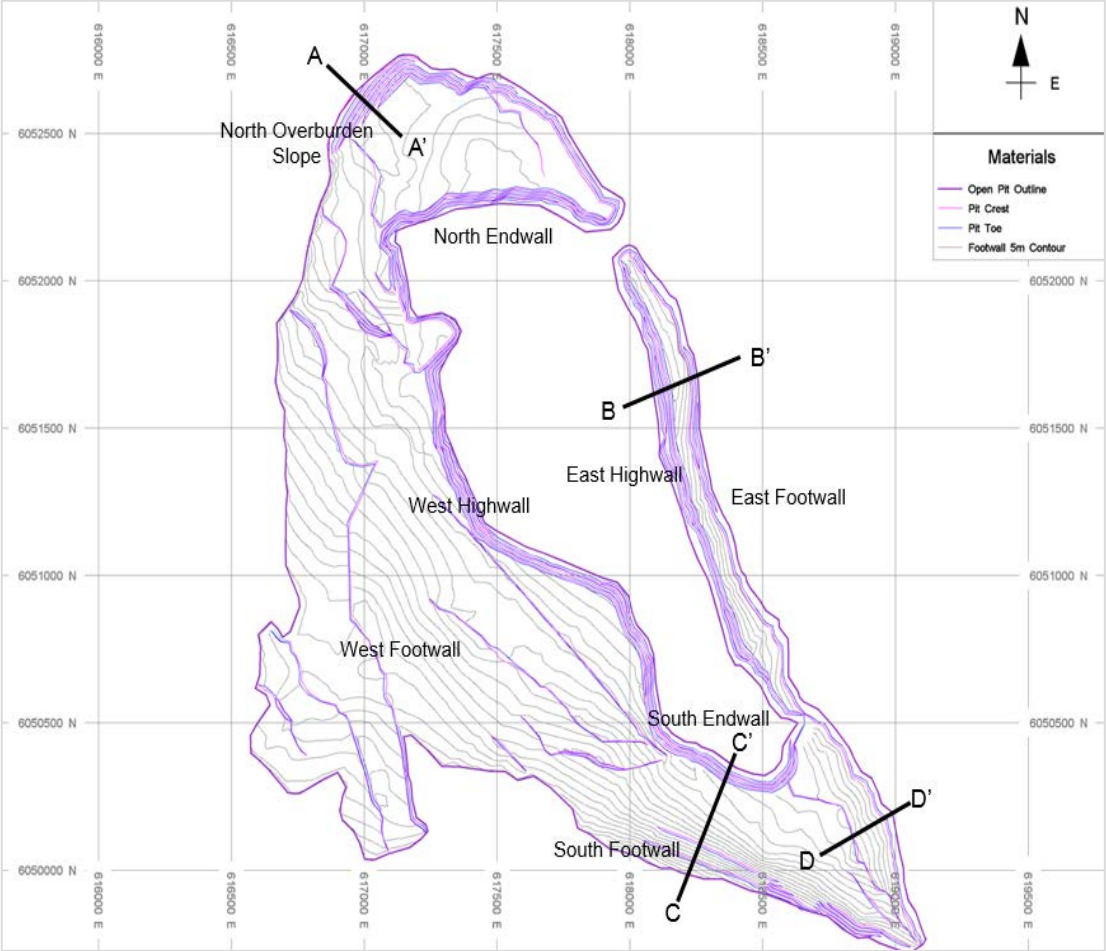
TENAS STRUCTURAL GEOLOGY

3D FAULT MODEL



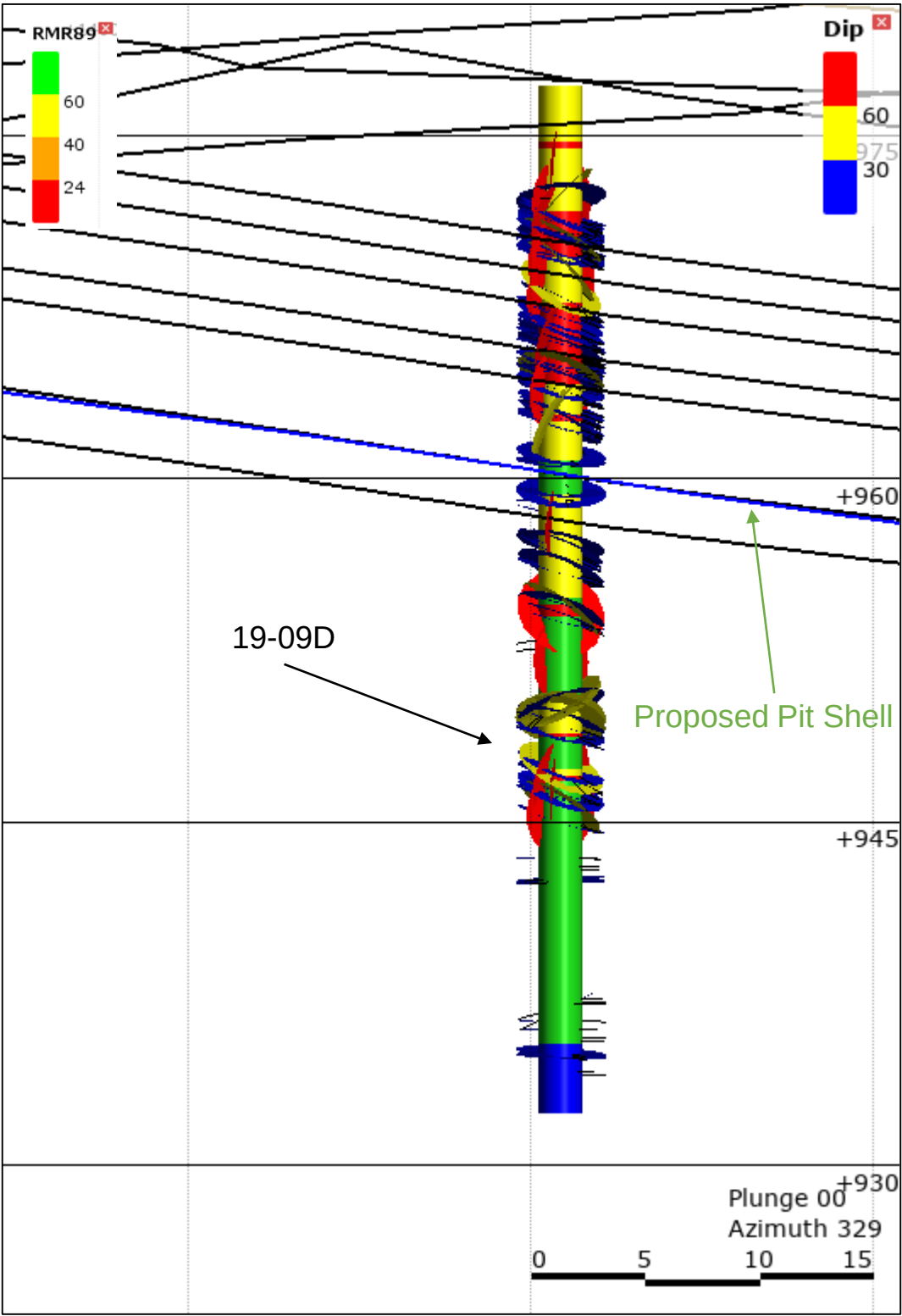
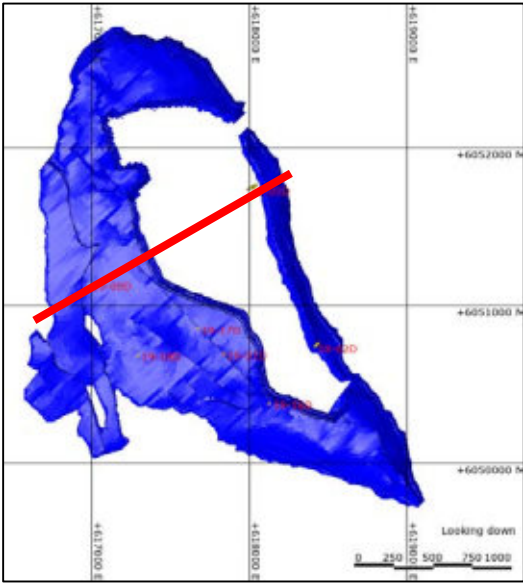
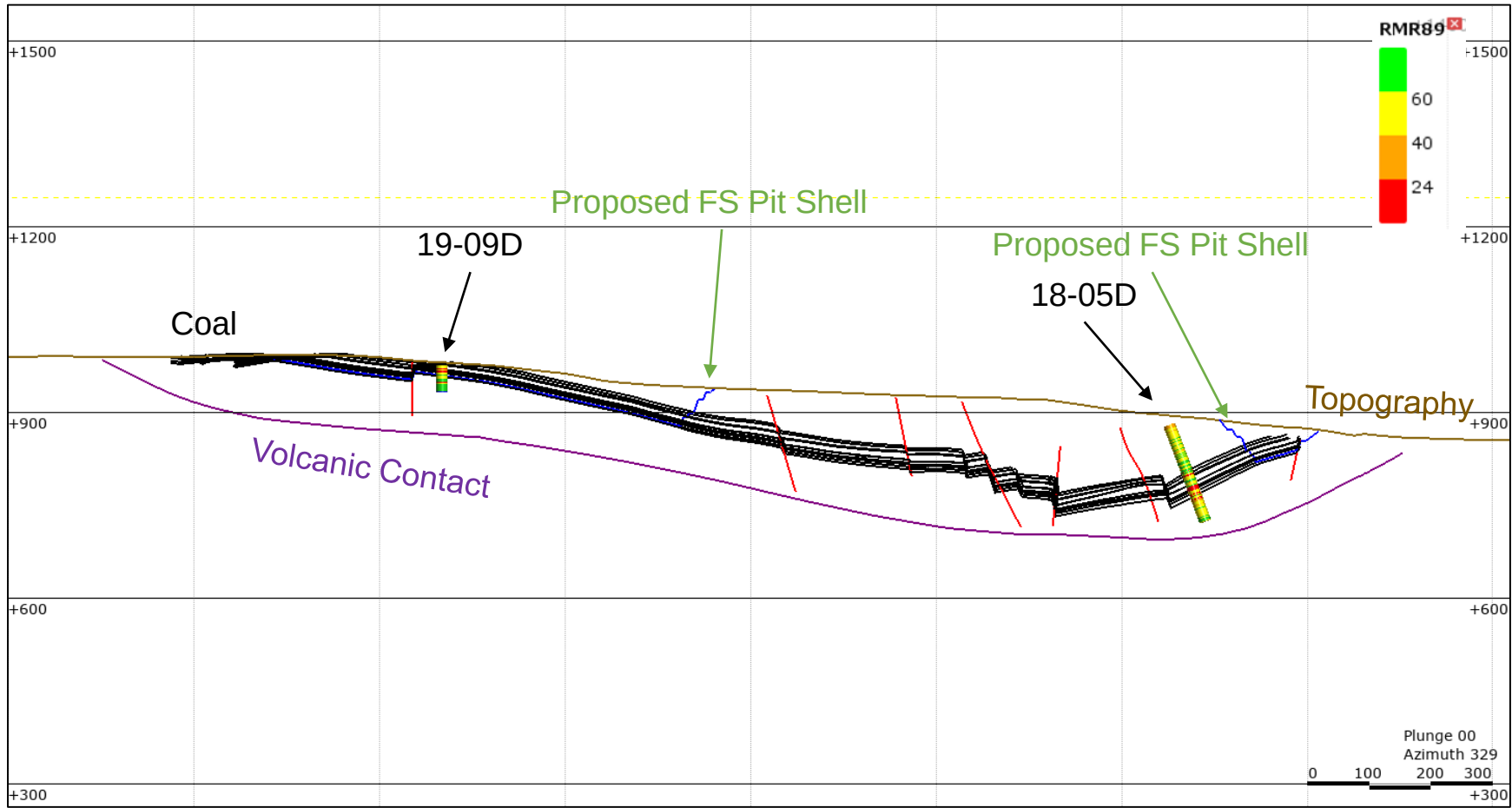
NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

FOOTWALL SLOPE CONTOURS



TENAS GEOLOGICAL SECTIONS

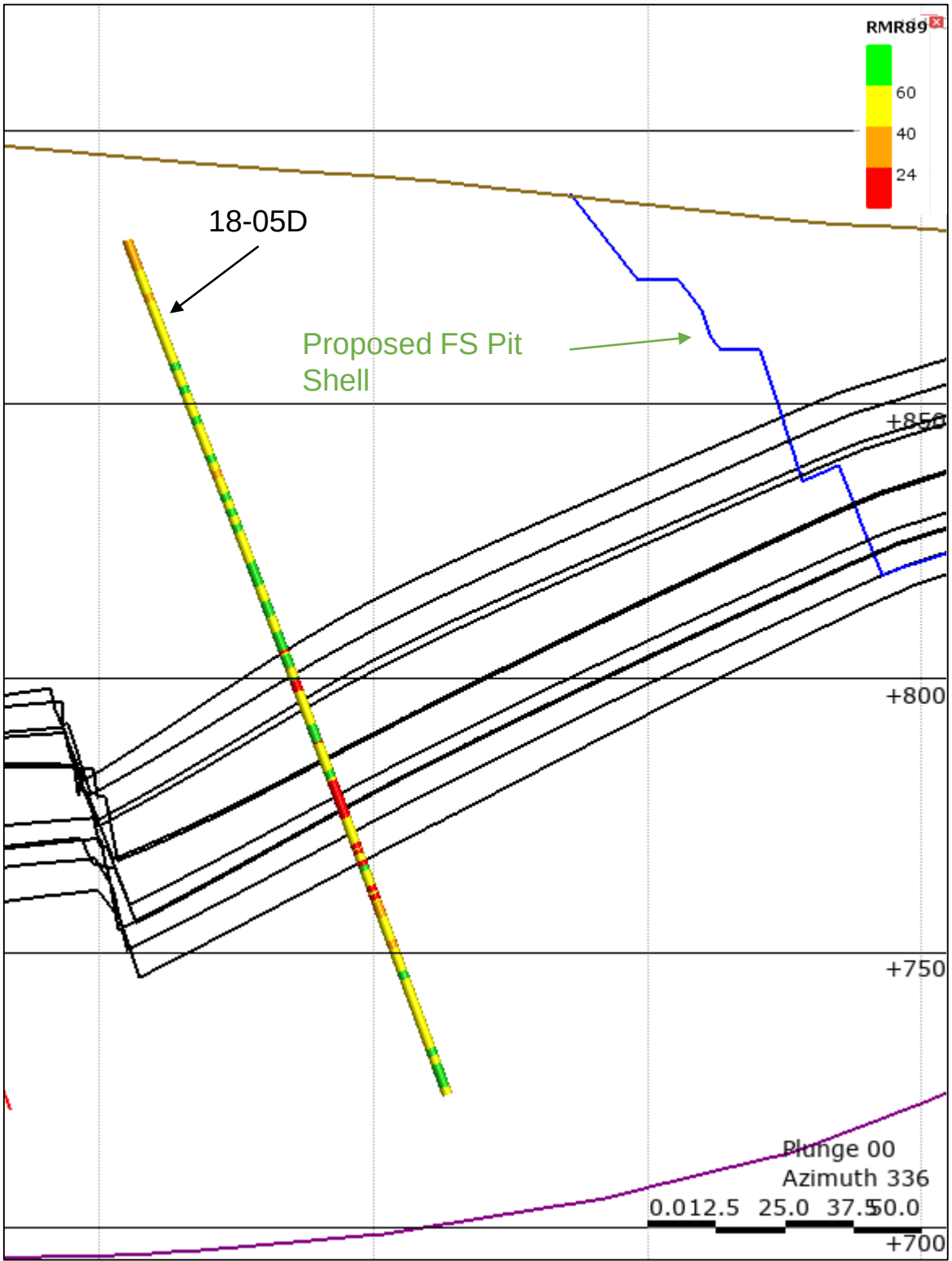
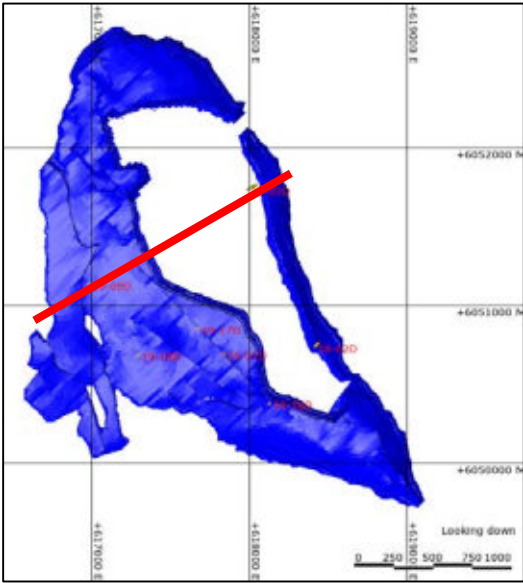
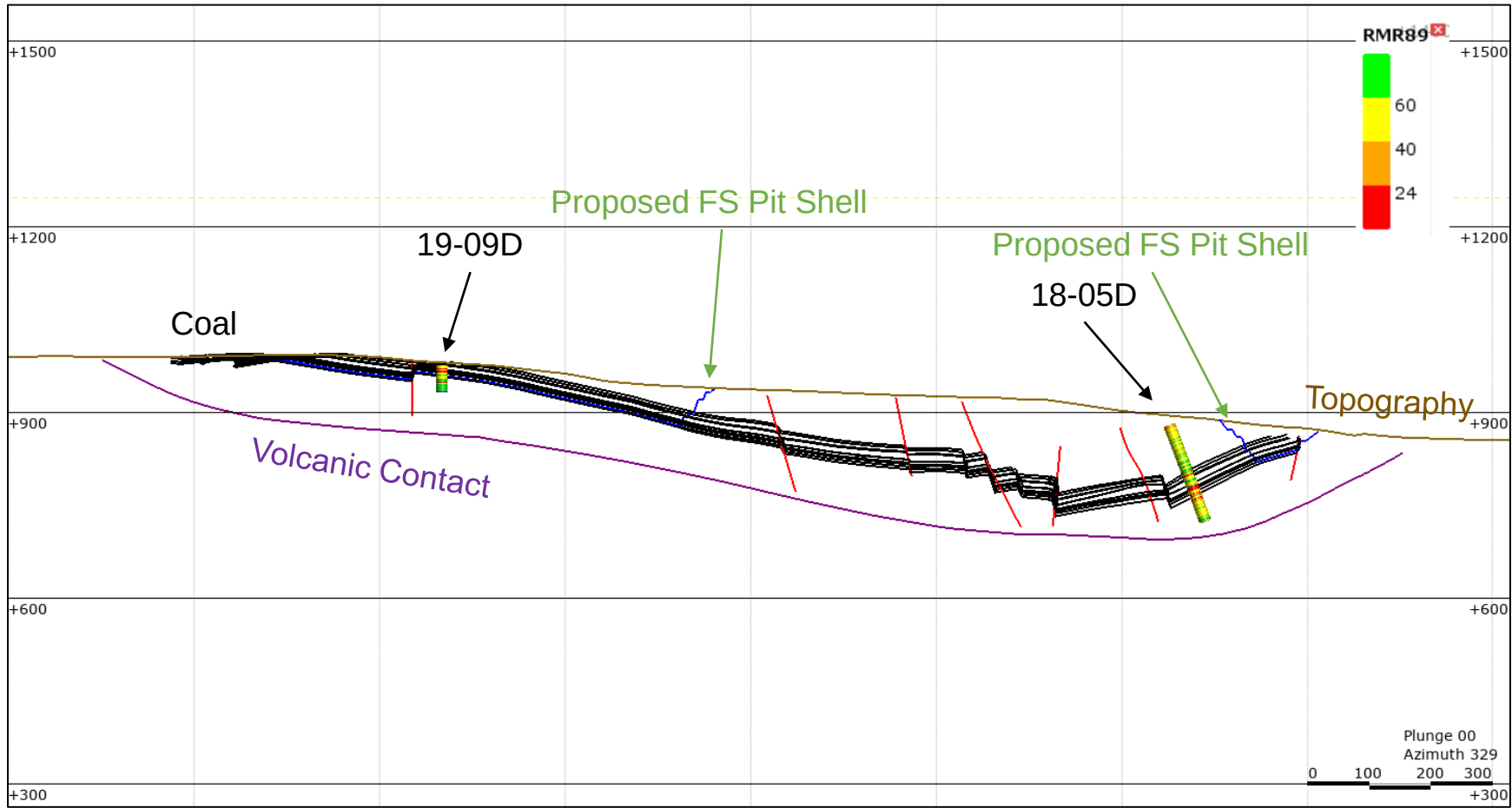
19-09D DRILLHOLE AND GEOLOGICAL SECYION



NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

TENAS GEOLOGICAL SECTIONS

18-05D DRILLHOLE AND GEOLOGICAL SECYION

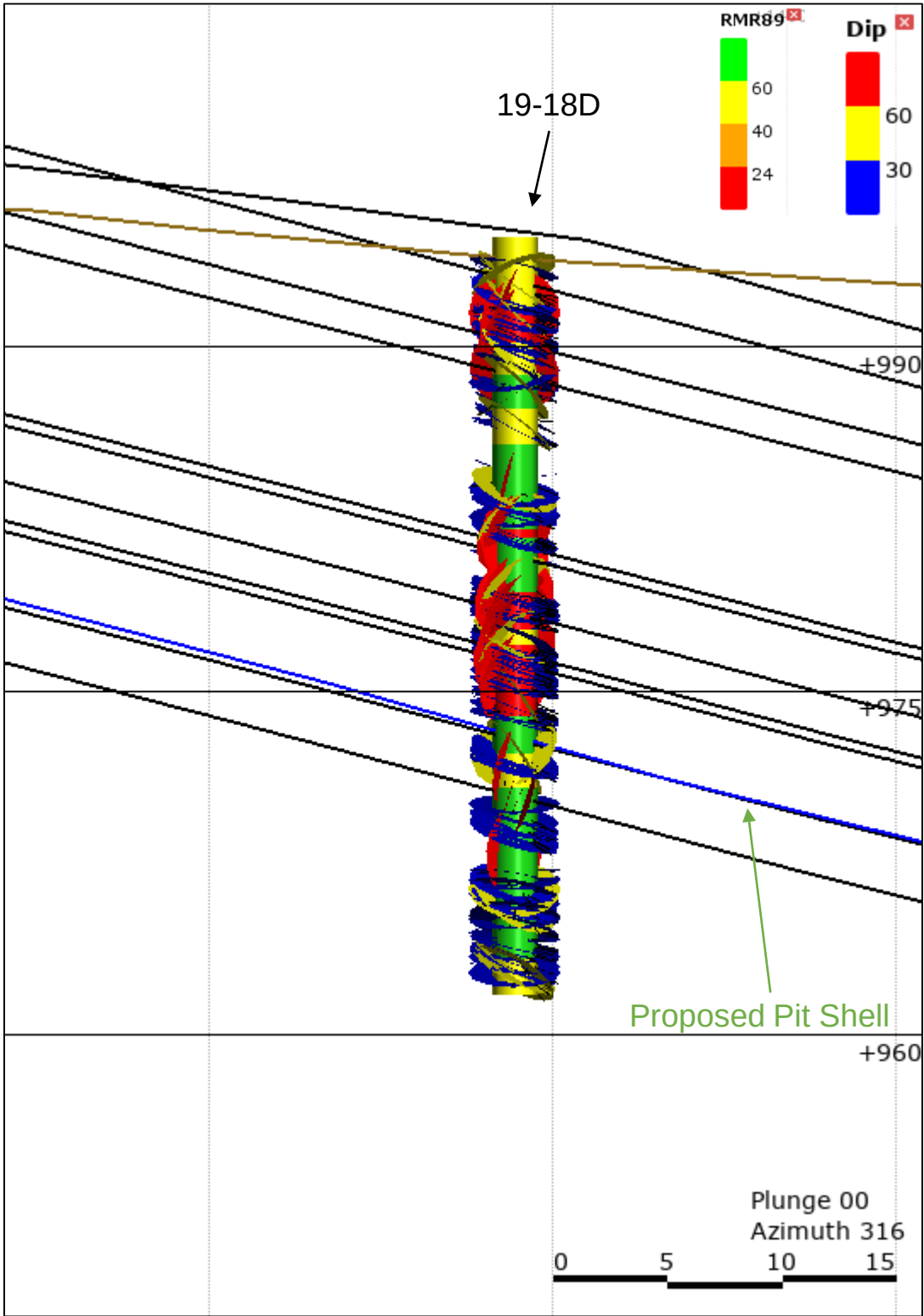
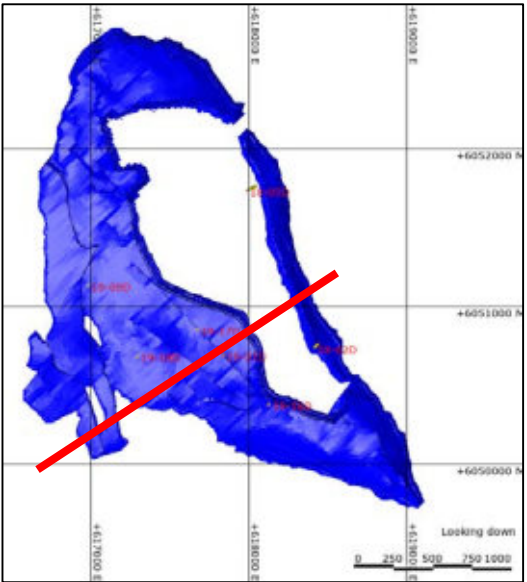
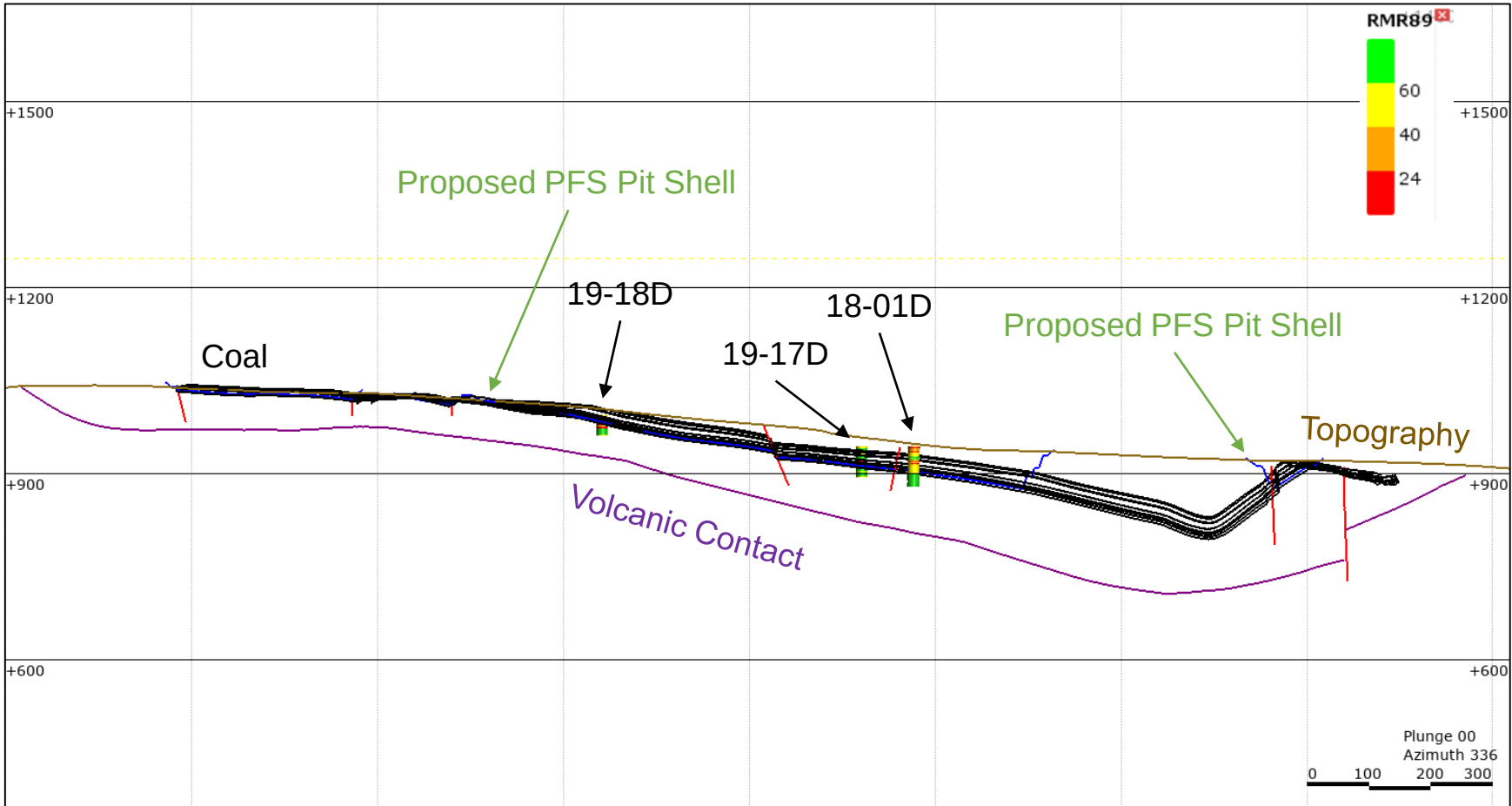


NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

		PIT SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		TENAS PIT GEOLOGY		
		Date: 2019/03/30	Approved:	Figure:

TENAS GEOLOGICAL SECTIONS

19-18D DRILLHOLE AND GEOLOGICAL SECYION

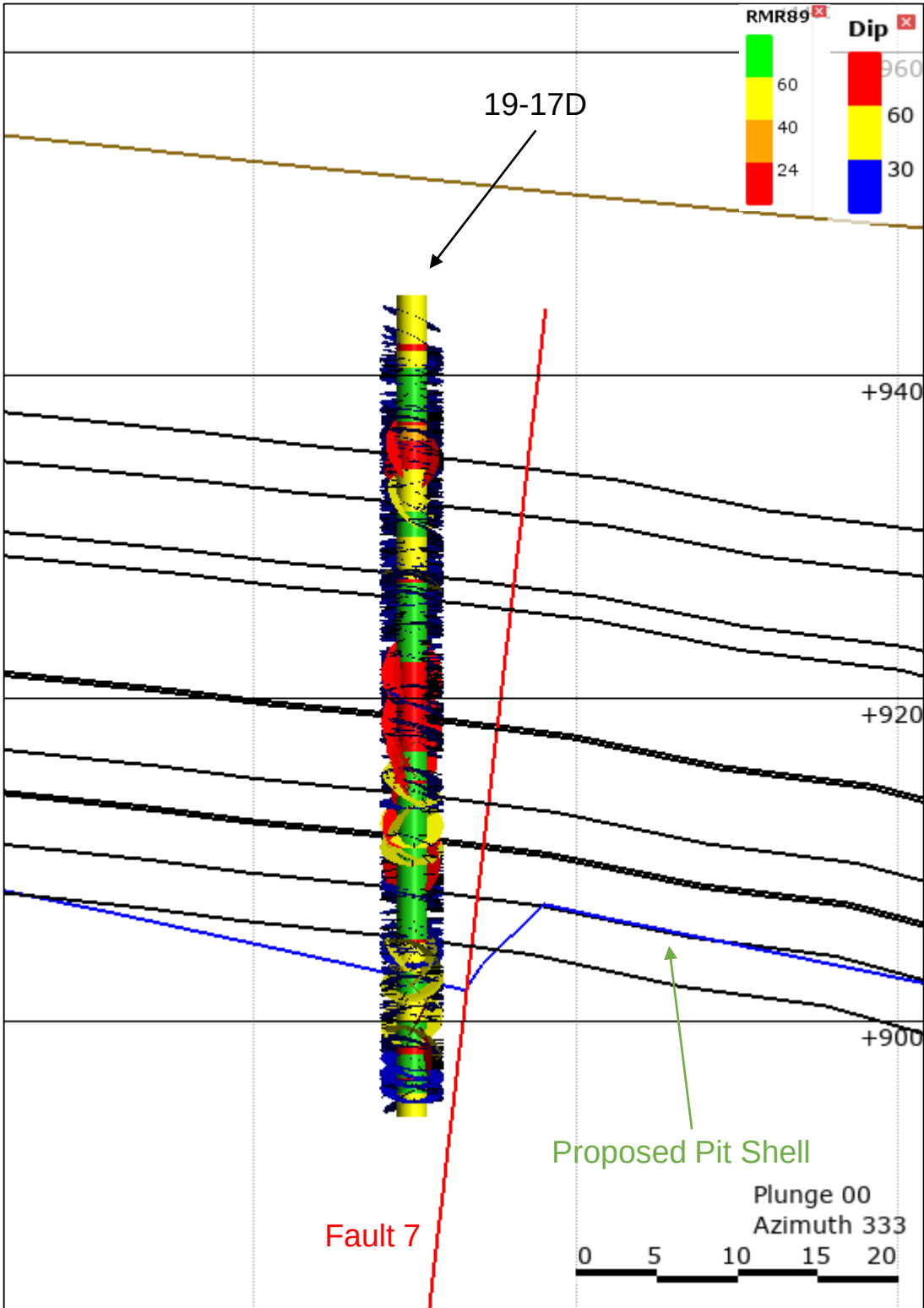
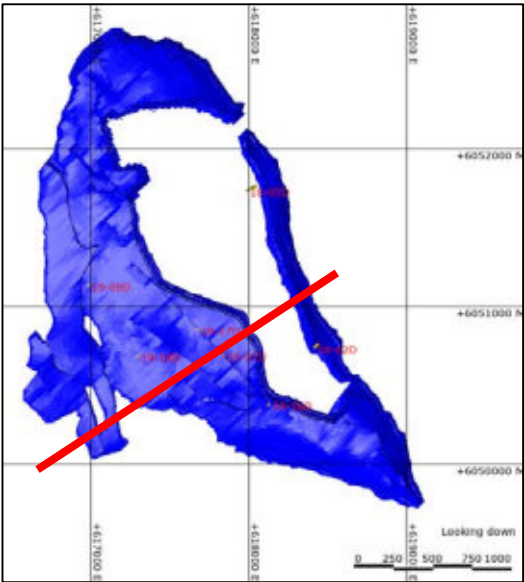
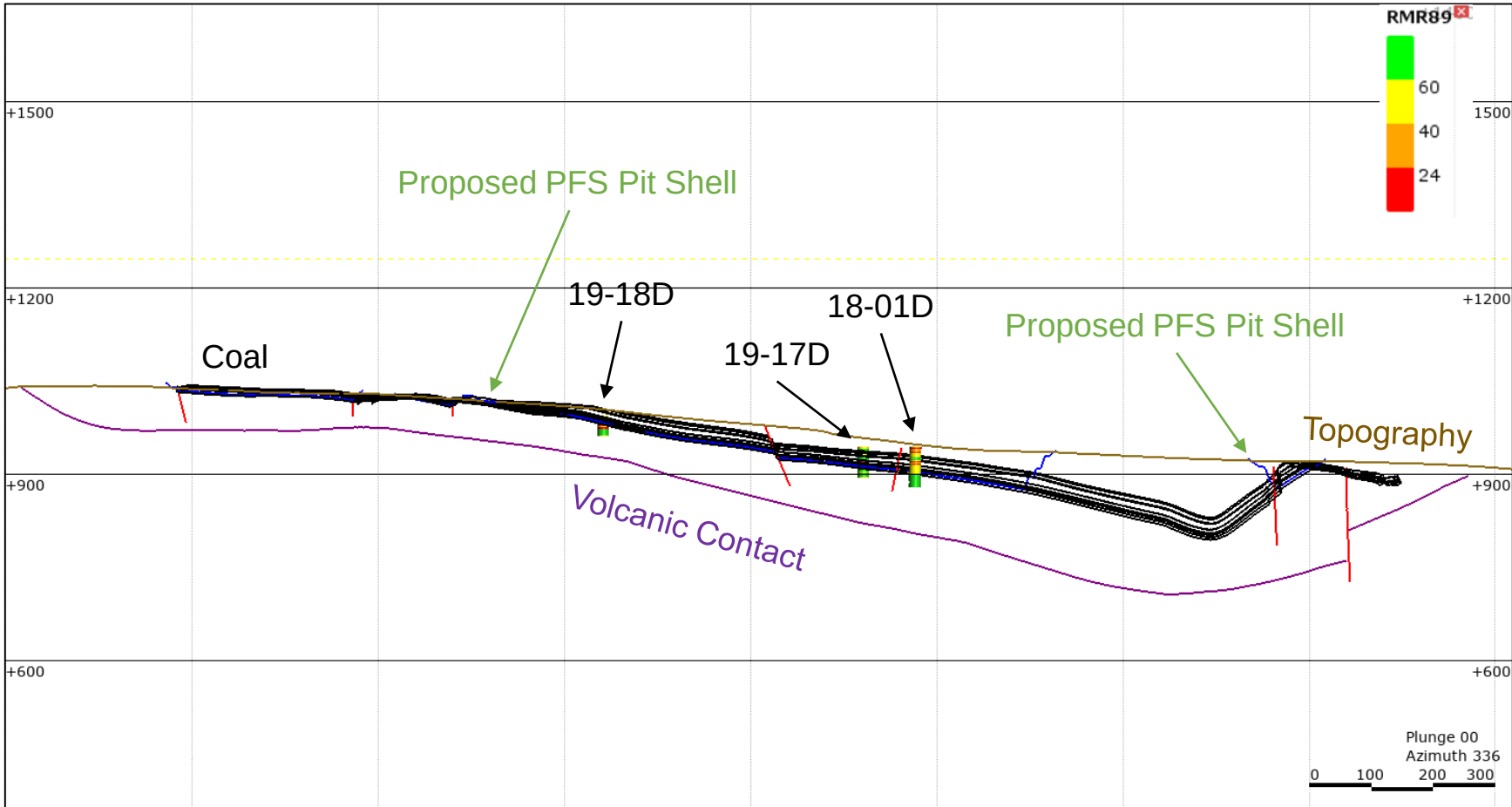


NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

 Job No: 2CI009.017	 TENAS PROJECT	PIT SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
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		Date: 2019/03/30	Approved:	Figure:

TENAS GEOLOGICAL SECTIONS

19-17D DRILLHOLE AND GEOLOGICAL SECYION

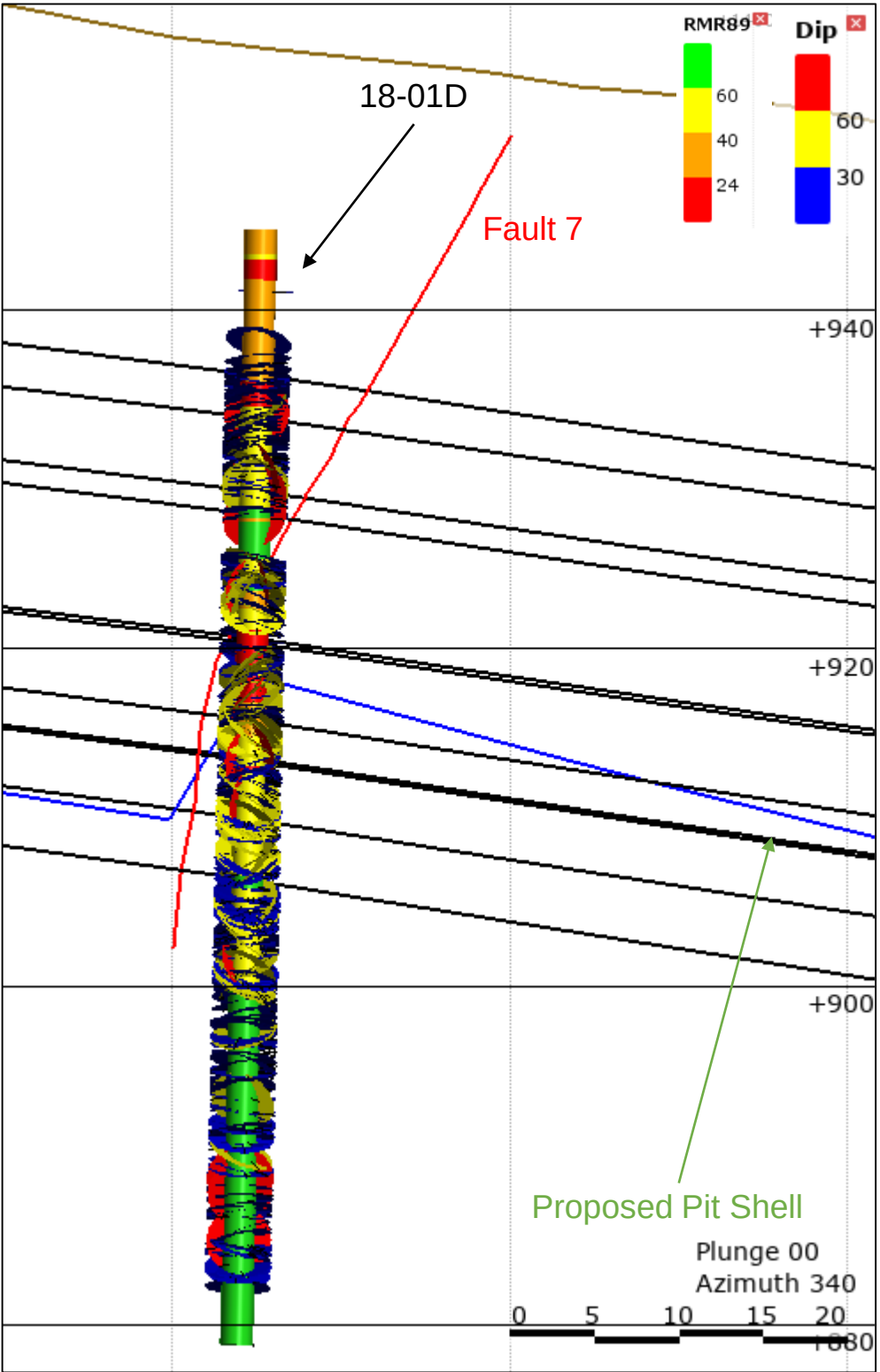
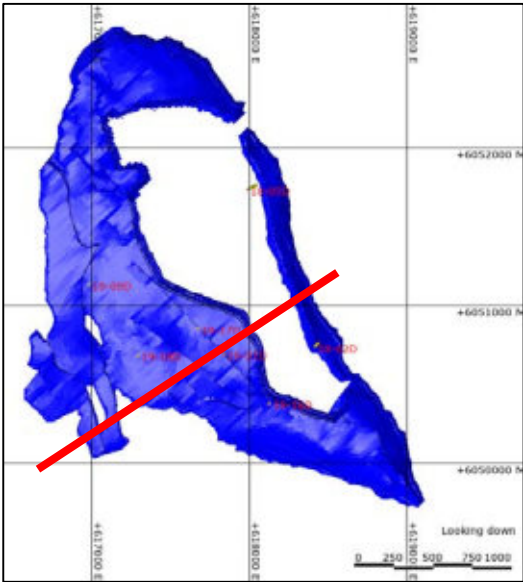
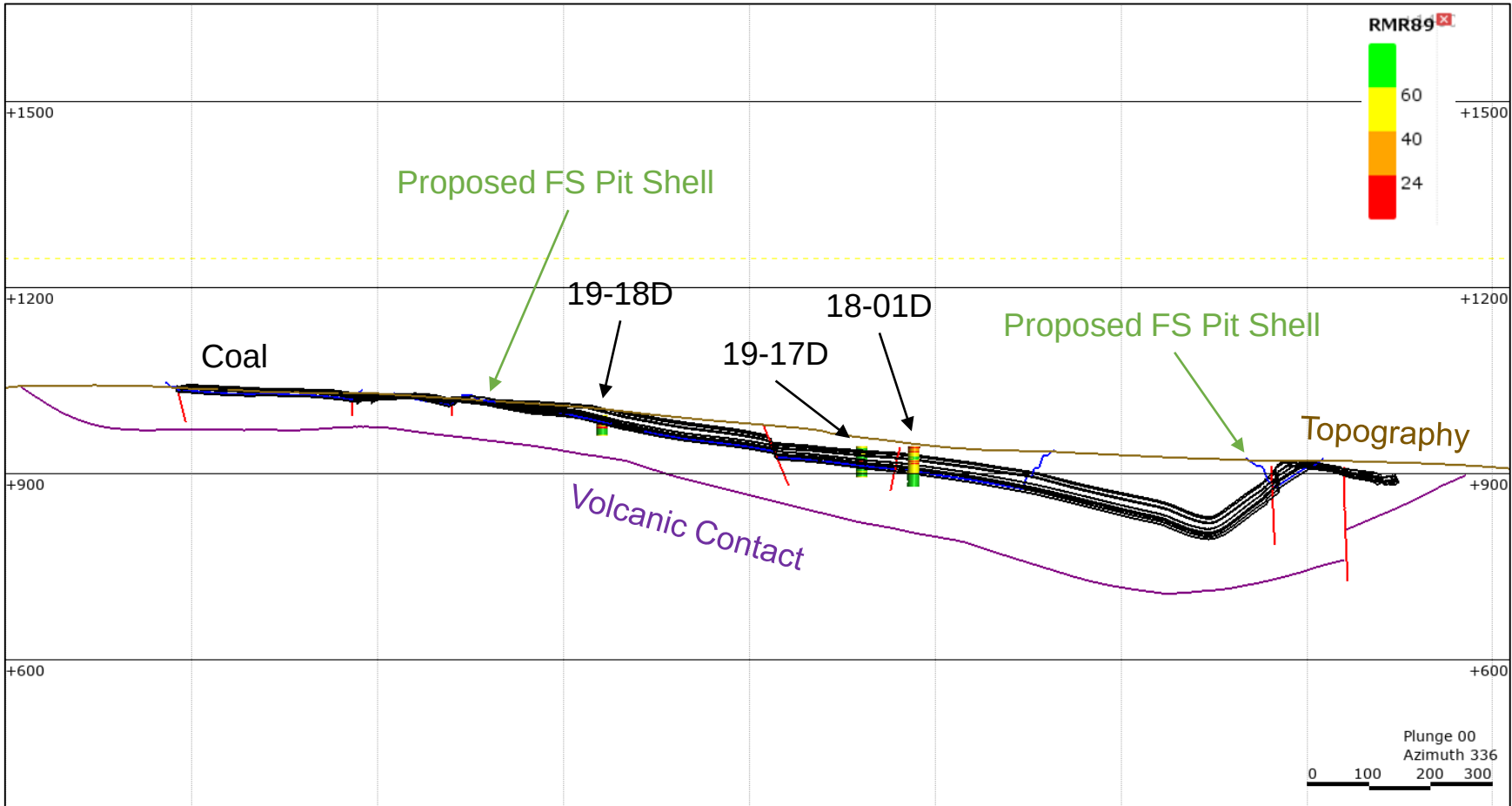


NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

 Job No: 2CI009.017	 TENAS PROJECT	PIT SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
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		Date: 2019/03/30	Approved:	Figure:

TENAS GEOLOGICAL SECTIONS

18-01D DRILLHOLE AND GEOLOGICAL SECYION

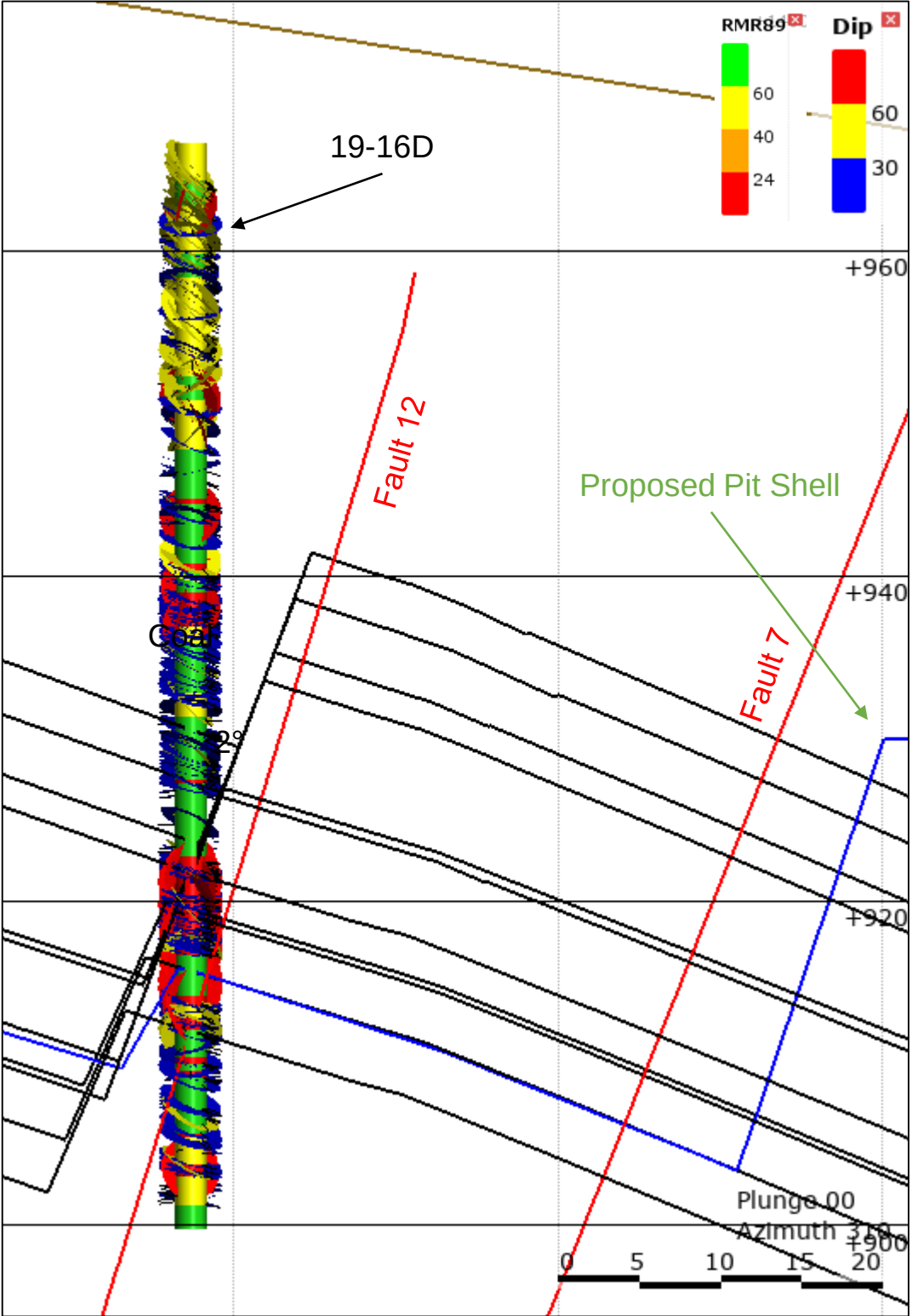
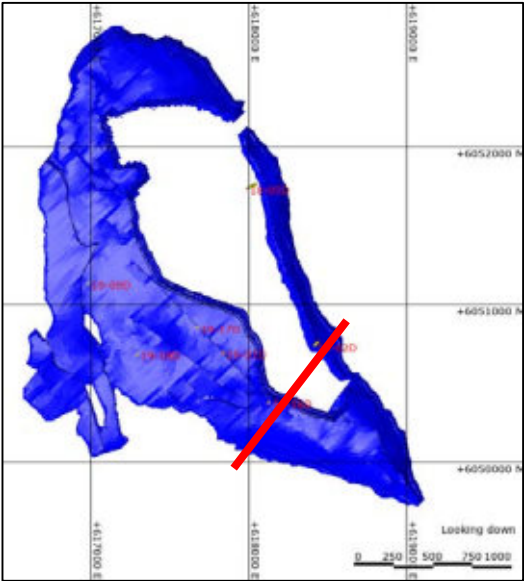
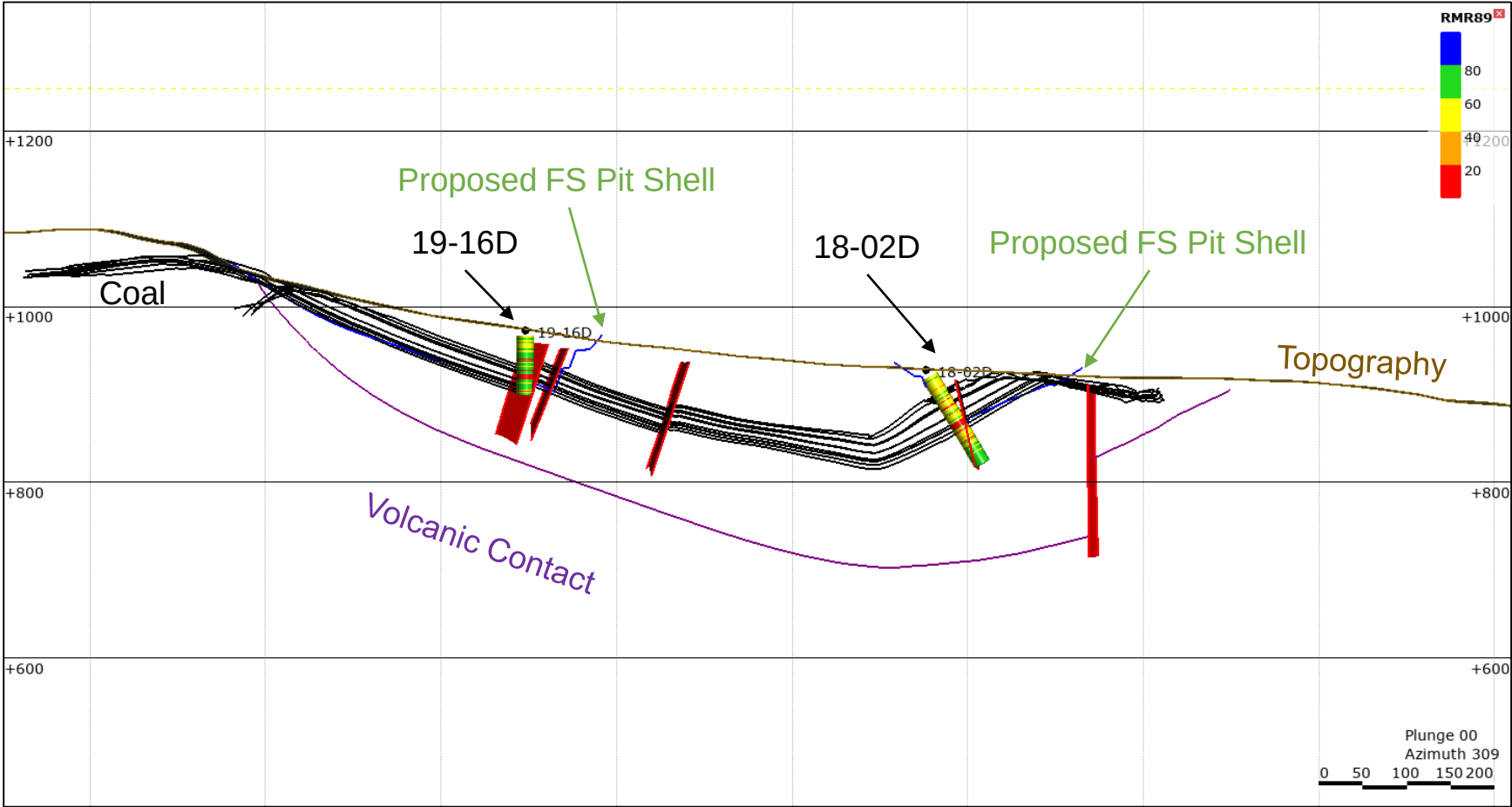


NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

 Job No: 2CI009.017	 TENAS PROJECT	PIT SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		TENAS PIT GEOLOGY		
		Date: 2019/03/30	Approved:	Figure:

TENAS GEOLOGICAL SECTIONS

19-16D DRILLHOLE AND GEOLOGICAL SECYION

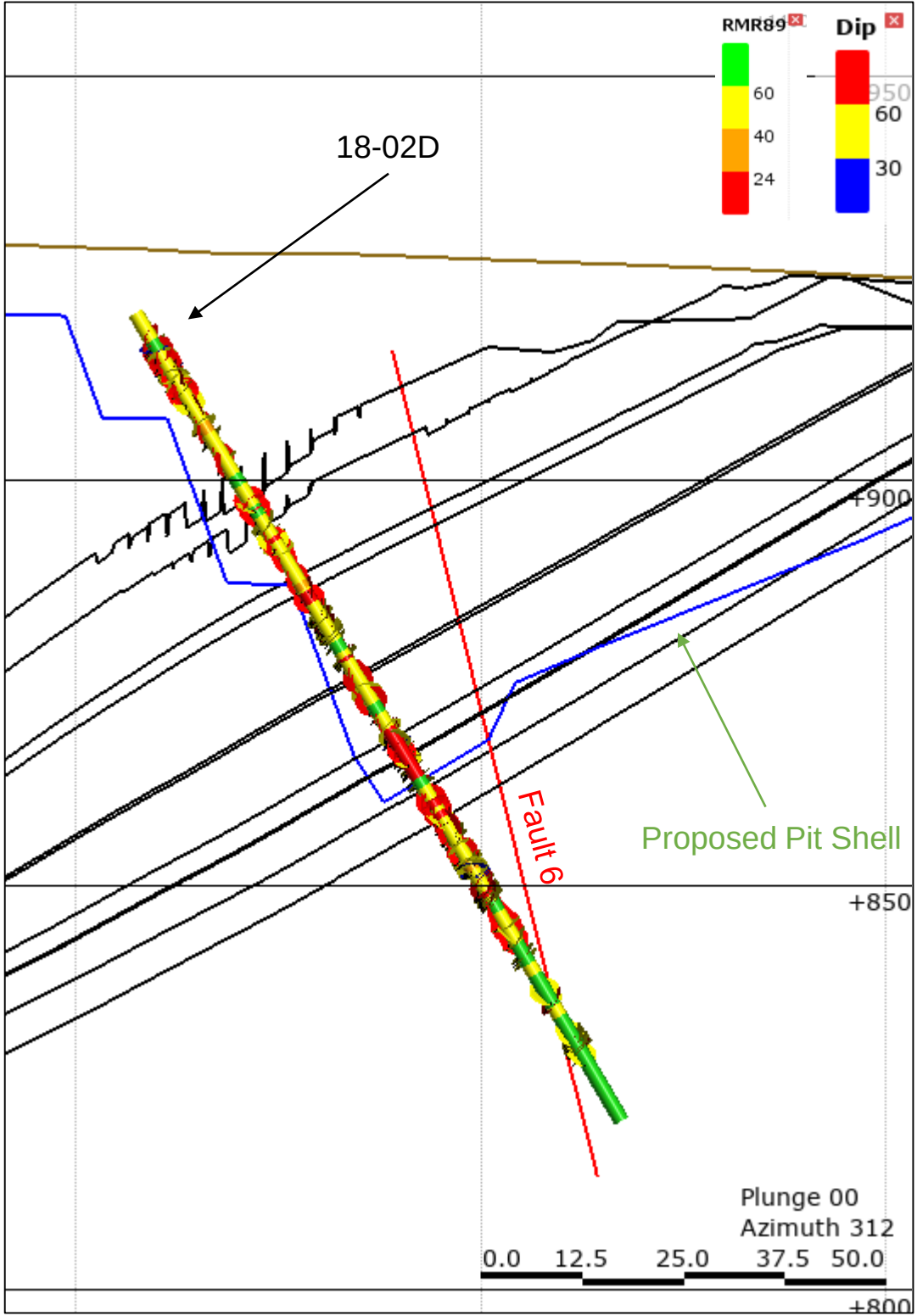
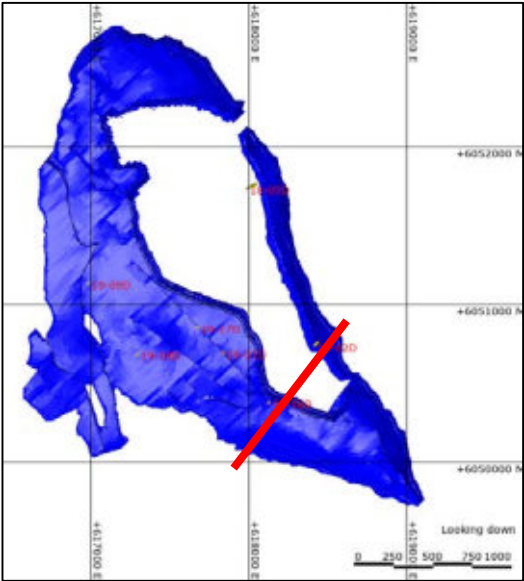
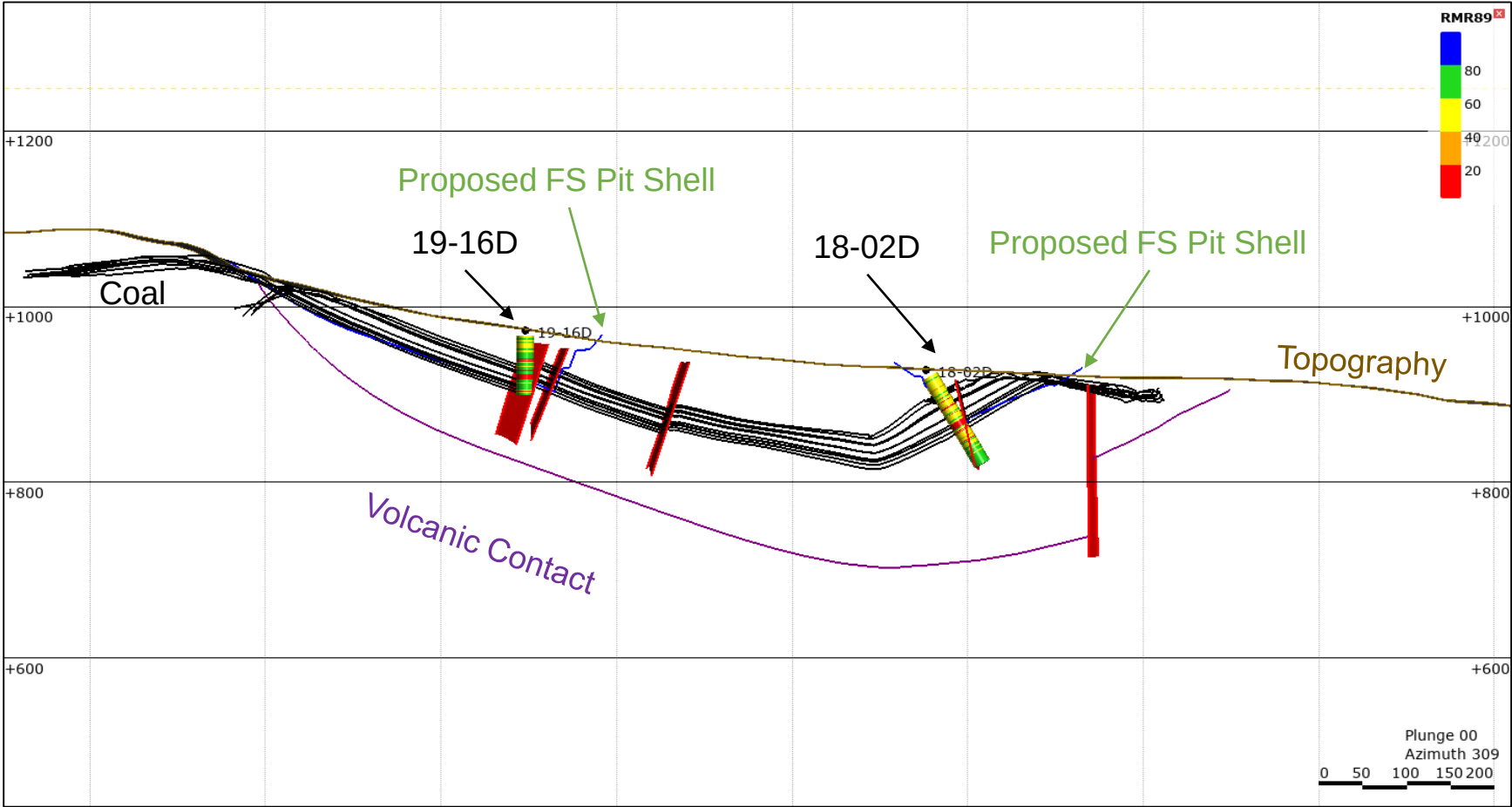


NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

 Job No: 2CI009.017	 TENAS PROJECT	PIT SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		TENAS PIT GEOLOGY		
		Date: 2019/03/30	Approved:	Figure:

TENAS GEOLOGICAL SECTIONS

19-16D DRILLHOLE AND GEOLOGICAL SECYION



NOTE: 3D Coal and Fault model developed by Telkwa Coal Ltd.

 Job No: 2CI009.017	 TENAS PROJECT	PIT SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		TENAS PIT GEOLOGY		
		Date: 2019/03/30	Approved:	Figure:

**Appendix B: SRK 2019 Overburden and Rock Pile
Stability and Design Technical Report**



Tenas Project Feasibility Study - Pile Stability and Design Technical Report

Prepared for

Telkwa Coal Ltd.



Prepared by



SRK Consulting (Canada) Inc.
2CT025.005
March 2019

Tenas Project Feasibility Study - Pile Stability and Design Technical Report

March 2019

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Project No: 2CT025.005

File Name: Tenas_Telkwa_Pile Slope Design_Final Report_2CT025.005_20190521.docx

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Appendices

Appendix A: Results of Pile Slope Stability Analyses

1 Introduction

Telkwa Coal Ltd. (Telkwa) is preparing a National Instrument (NI) 43-101 compliant Feasibility study (FS) for the Tenas Project, located in central British Columbia. Telkwa retained SRK Consulting (Canada) Inc. (SRK) to conduct foundation field investigations and stability assessments of the external pile structures to support FS mine design work. Geotechnical assessment of the water and rock management pond structures are included in a separate report.

SRK had previously completed a pit slope assessment for the Telkwa/Tenas Project Pre-Feasibility Study (PFS) in 2017. Following the completion of the PFS, SRK supervised two field investigations which were conducted to collect data necessary for the stability assessment and design work detailed in this report, and to evaluate possible geotechnical risks as identified in the PFS.

2 Project Development

The Tenas Project is located approximately 15 km southwest of the town of Smithers, in the Telkwa River watershed (Figure 2-1). The project will consist of an open pit, waste rock pit filling, external piles and stockpiles, and water management ponds. The Tenas Project's total mine life is 21 years including one year of pre-stripping and construction followed by 20 years of production.

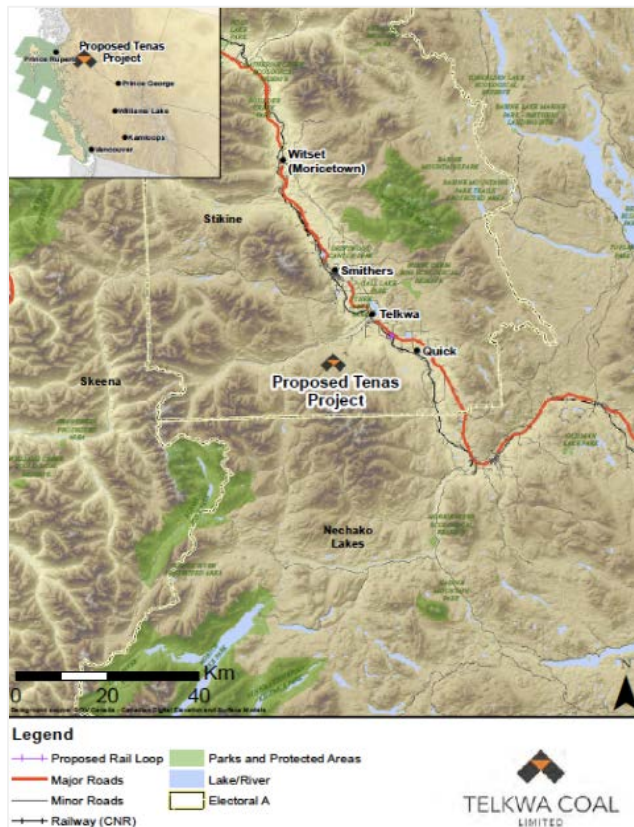


Figure 2-1: Tenas project location plan

There are multiple types of mine waste piles at the site, including topsoil, Non-Acid Generating (NAG) waste rock, Potentially-Acid Generating (PAG) waste rock, coarse coal rock rejects, overburden soils and topsoil. The end of mine layout is shown in. except for the PAG waste rock, which is to be placed into a dedicated cell excavation and saturated (i.e. Management Pond), the waste materials are to be placed in external piles (overburden, coal rock rejects and top soil) and in-pit backfills (NAG rock). Table 2-1 provides a summary of the Tenas soil and rock pile details.

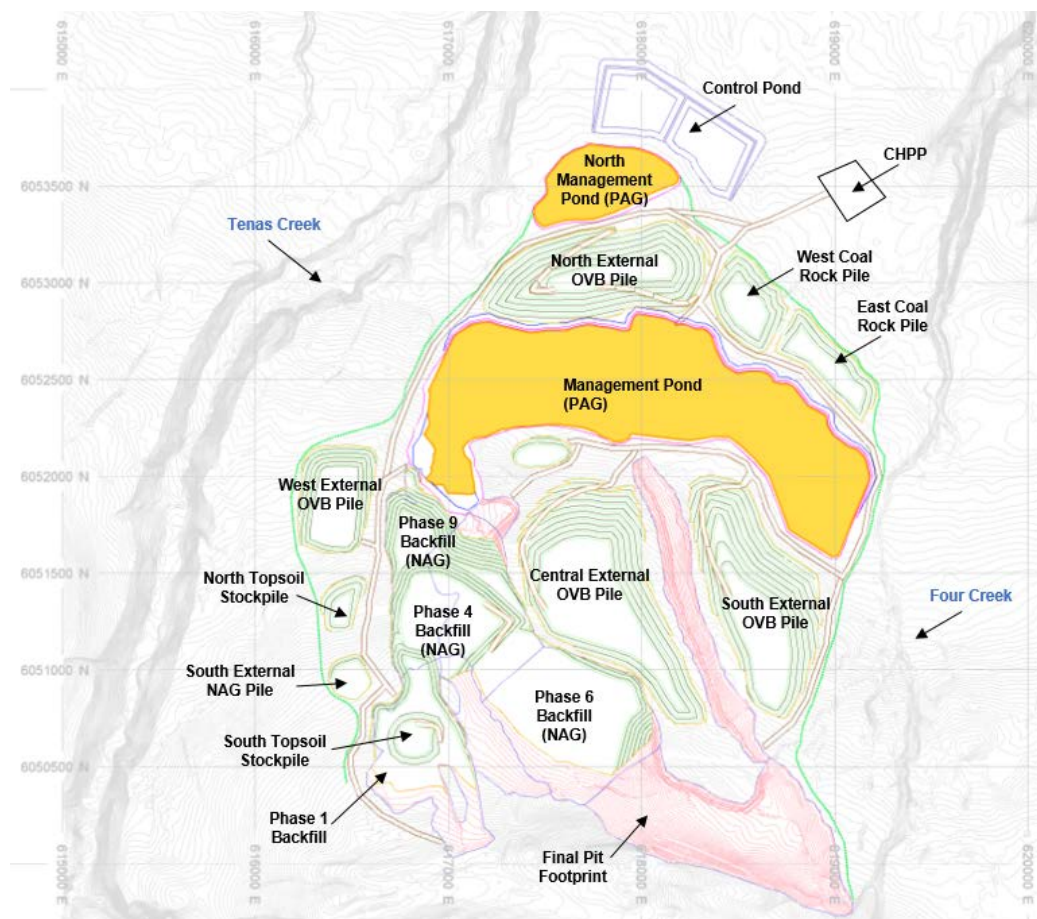


Figure 2-2: Location of mine infrastructure

Table 2-1: Summary of Tenas Soil and Rock Piles

Name	Material Type	Maximum Height (m)	Overall Slope Angle (°)	Construction Start (Year)	Construction End (Year)
North External OVB Pile	Overburden soils	55	18	0 (Pre-production)	10
Central External OVB Pile	Overburden soils	60	18	2	10
South External OVB Pile	Overburden soils	60	18	1	10
West External OVB Pile	Overburden soils	40	18	1	5
West Coal Rock Pile	Coal rock rejects	35	18	2	20 (End of mine)
East Coal Rock Pile	Coal rock rejects	25	18	2	5
Phase 4 Backfill	NAG waste rock	85 ¹	27	9	15
Phase 6 Backfill	NAG waste rock	75	28	15	20 (End of mine)
Phase 9 Backfill	NAG waste rock	85 ¹	28	4	9
Phase 10 Backfill	NAG waste rock	25	29	1	2
North Topsoil Stockpile	Organics and top soils	10	18	0 (Pre-production)	1
South Topsoil Stockpile	Organics and top soils	10	18	0 (Pre-production)	1

Note: ¹ - Height is related to the combined Phase 4/Phase 6 structure.

3 Physical Setting

3.1 Site Location

The Tenas Project is located in central British Columbia approximately 15 km south of Smithers and 2 km southwest of Telkwa, as shown in Figure 2-1. The project site is located south of the Telkwa River. Boundaries of the project encompasses the lower reaches of the Telkwa River, Goathorn Creek and Pine Creek. Goathorn Creek and Pine Creek are major tributaries of the Telkwa River. Near the village of Telkwa, the Telkwa River flows into the Bulkley River, which ultimately flows into the Skeena River.

3.2 Geomorphology and Surficial Soils

The Tenas site is located within the foothills of British Columbia, between the Bulkley Mountain Range to the north and west, and the low-lying gently sloping relief of the Nechako Plateau. Bedrock is typically covered by Quaternary soils, except for rocky outcrops along deeply eroded sections in adjacent river and stream valleys. Elevation across the site ranges generally from 600 to 900 m, with maximum elevations along the east side of the property (Levson et al, 1997).

The regional surficial soils have been studied by Levson et al. Two soil units are characterized regionally, and include:

- A widespread, massive unit, interpreted as a till, is located at or near the ground surface. The till is described as a diamicton, with particle sizes ranging from clay to boulders within a fine grained or sandy matrix. No thickness information was provided by Levson et al.
- In some areas, the till is underlain by both glaciofluvial stratified sands and gravels, and horizontally bedded sand, silt and clay sequences interpreted to be advanced-phase glacio-lacustrine sediments.

3.3 Bedrock Geology

The coal that is to be mined from the Tenas Pit is located within the sedimentary sequences of the early Cretaceous-aged Skeena Group. The Skeena Group consists of mudstones, siltstones, sandstones and conglomerates with inter-bedded, bituminous coal seams. The Skeena Group has been historically divided into four units (Palsgrove, 1991), of which two units are economically coal-bearing (Figure 3-1).

Of relevance to this study at Tenas is Unit 1 described by Palsgrove. A geological map of the Tenas Pit area with the Unit 1 outcrops is shown in Figure 3-2. Unit 1 comprises a 50 m to 120 m thick sedimentary sequence interbedded with Coal Seam 1 (Seams 1A to 1F). The individual coal seams vary from less than 1 m to 3 m in thickness, and can be laterally discontinuous (Palsgrove, 1991).

The Skeena Group unconformably overlies the Hazelton Volcanic Group rocks. Additionally, the project geology map indicates the intrusive unit is in contact with the Skeena Group in all directions outside of the proposed pit footprint (Figure 3-2). However, the Hazelton Volcanic Group was not intercepted in vertical diamond drillholes that extended below the lower-most coal plys at Tenas or the inclined diamond drillholes that were drilled through the east-limb of the Tenas syncline (i.e. proposed east wall) along the east side of the deposit.

The Skeena Group rocks have been folded into a syncline at Tenas. On the west side, the rocks are shallow, west dipping and gently folded along a west-limb. Toward the east, the bedding dips increase at the axis of the fold, and the rocks are moderately dipping to the east along the east-limb.

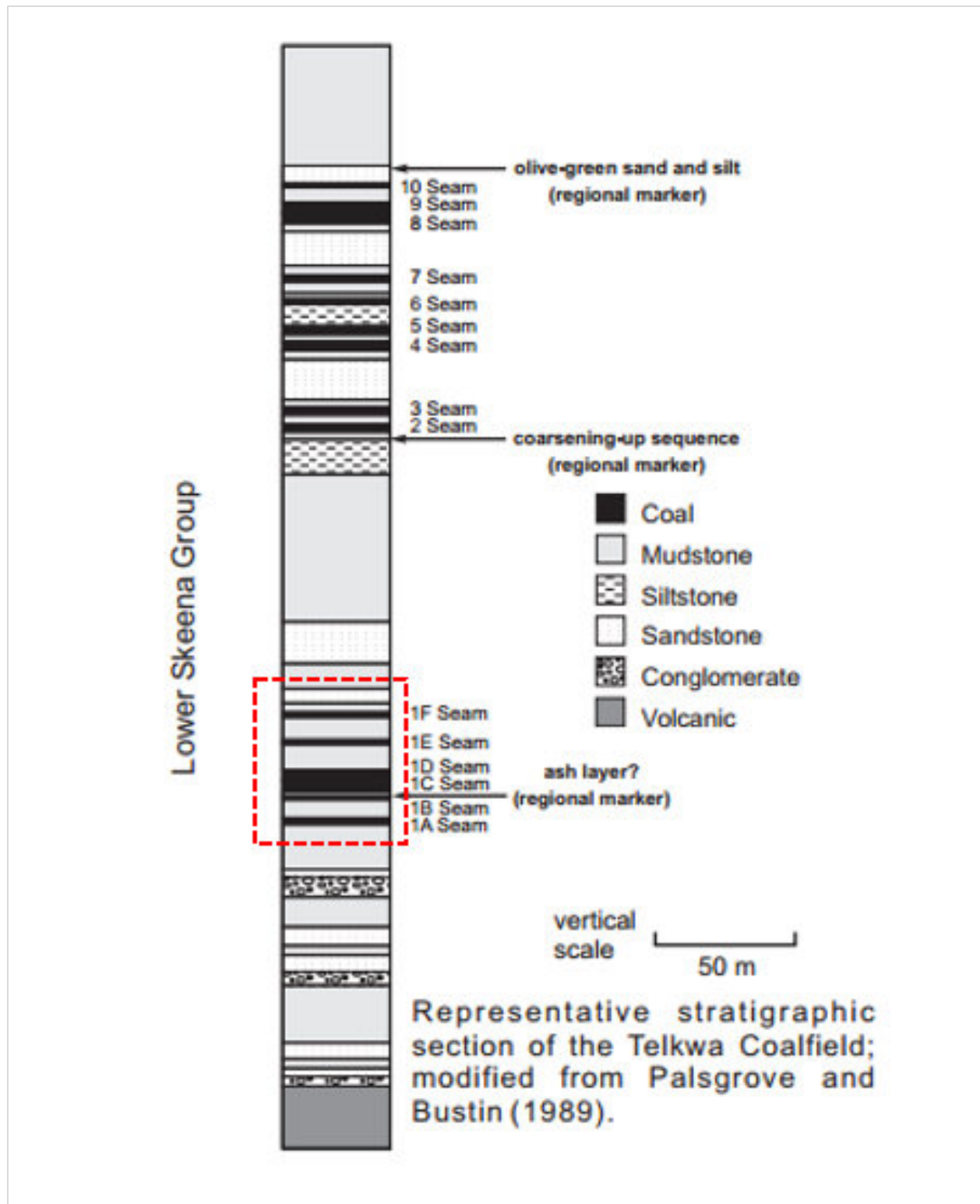


Figure 3-1: Representative stratigraphy of the Skeena Group (Palsgrove, 1991). Unit 1 shown in red dashed box

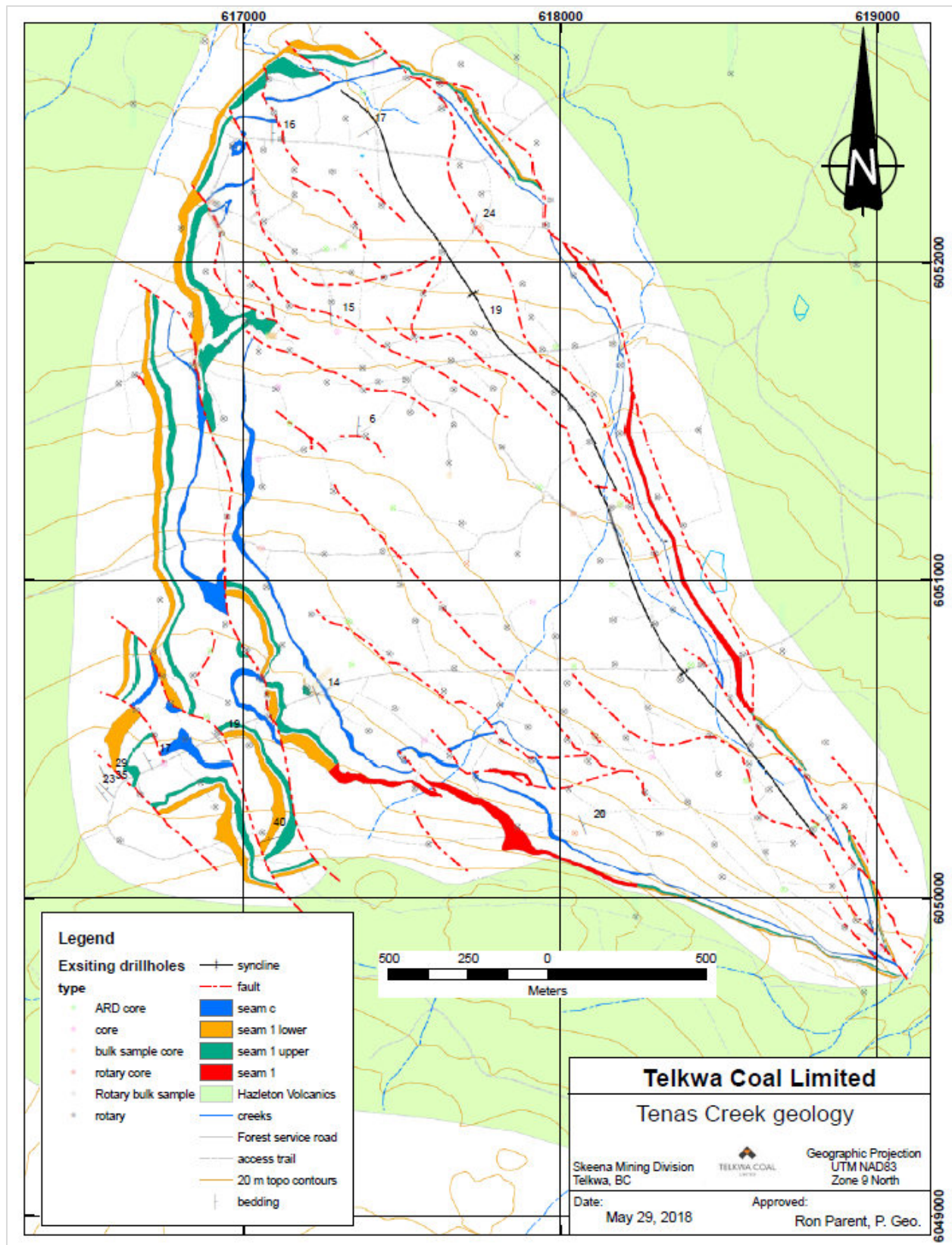


Figure 3-2: Tenas geology map (Telkwa, 2018)

3.4 Seismicity

The 2015 National Building Code Seismic Hazard Map (NRC, 2015) indicates that the Telkwa Coal project site is located in a relatively stable seismic area. The peak ground acceleration (PGA) for a two percent probability of exceedance in a 50-year period, i.e. once in 2,475 years, is 0.049 g (NRC, 2019). Given the relatively low seismic hazard, the 2,475 years is considered conservative for end of construction conditions.

4 Field and Laboratory Investigations

The following subsections summarise the field and laboratory investigations relevant to the geotechnical characterization of the pit slopes at Tenas.

4.1 Historical Field Investigations

Five previous geotechnical and hydrogeological investigation programs have been completed in the Telkwa area, as summarised in Table 4-1. These include investigations for the Tenas, Goathorn and Telkwa North deposits. The 1997 Piteau Engineering Ltd. (Piteau, 1997) report is most relevant to this current waste pile slope assessment, and relevant information from these historical investigations is presented. The 1997 Piteau field investigations included seven sonic drillholes relevant to the foundation characterization work.

Table 4-1: Summary of previous geotechnical and hydrogeological investigations in the Telkwa area

Consultant	Report Title	Year of Report	Pit Area
Klohn Leonoff	Stage II Geotechnical, Hydrological, and Hydrogeological Design report.	1985	Goathorn
Piteau Engineering Ltd.	Engineering Geology and Geotechnical Assessment for the Pit 7 and Pit 8 Areas.	1994	Telkwa North
Piteau Engineering Ltd.	Water Management of Tailings Pond and Pits 7 and 8.	1994	Telkwa North
Piteau Engineering Ltd.	Engineering Geology and Geotechnical Assessment for the Tenas Pit and Waste Dumps.	1997	Tenas
Piteau Engineering Ltd.	Geotechnical Assessment for the Coal Haul Roads, Tailings Pond and Plant Site.	1998	All pits

4.2 Geotechnical Field Investigations

As part of the 2018 and 2019 field investigations, a total of 25 sonic drillholes and 30 test pits were completed around the pit perimeter to characterize foundation materials for the mine infrastructure, including the overburden soil and rock piles. Both the investigations were conducted in January and February of each year. The locations of the sonic drillholes and test pits are shown in Figure 4-1.

A total of 13 standpipe piezometers were installed within the 2018/2019 sonic drillholes to monitor shallow groundwater conditions in combination with a network of deep groundwater wells. The groundwater monitoring data was used to evaluate the expected hydrogeology beneath the external piles. The results of the field investigations are summarised two separate data reports (SRK, 2018 and SRK, 2019) and are referenced throughout this report.

4.3 Laboratory Testing

Representative soil and rock samples from the 2018 and 2019 investigations were collected after the core was logged and photographed. Samples were sent to the Golder Associates (Golder) laboratory in Burnaby, British Columbia for testing. The relevant laboratory tests included:

- Overburden Soil Testing:
 - Particle Size Distribution Tests with Hydrometer;
 - Atterberg Limits (Plasticity);
 - Hydraulic Conductivity Tests;
 - Direct Shear Tests of Soil (Consolidated/Drained); and
 - Water Content Determinations.
- Rock Strength Testing:
 - Uniaxial Compressive Strength of Intact Rock;
 - Uniaxial Compressive Strength of Intact Rock with Elastic Moduli; and
 - Direct Shear Tests.

4.4 Hydrogeological Field Investigations

The hydrogeology of the Telkwa Project was studied extensively in the 1990s to support feasibility studies and environmental assessments (Piteau, 1998), and again in 2017 and 2018 (SRK 2017, 2018) to provide further information on the hydrogeological system. As of May 2019, hydrogeology baseline information included:

- 18 historical wells and 11 new wells constructed in 2019.
- 28 hydraulic conductivity tests in bedrock and 26 in overburden.
- Groundwater level observations measured between 1989 and 2018 (29 wells).
- Five wells with water level dataloggers to observe seasonal changes.

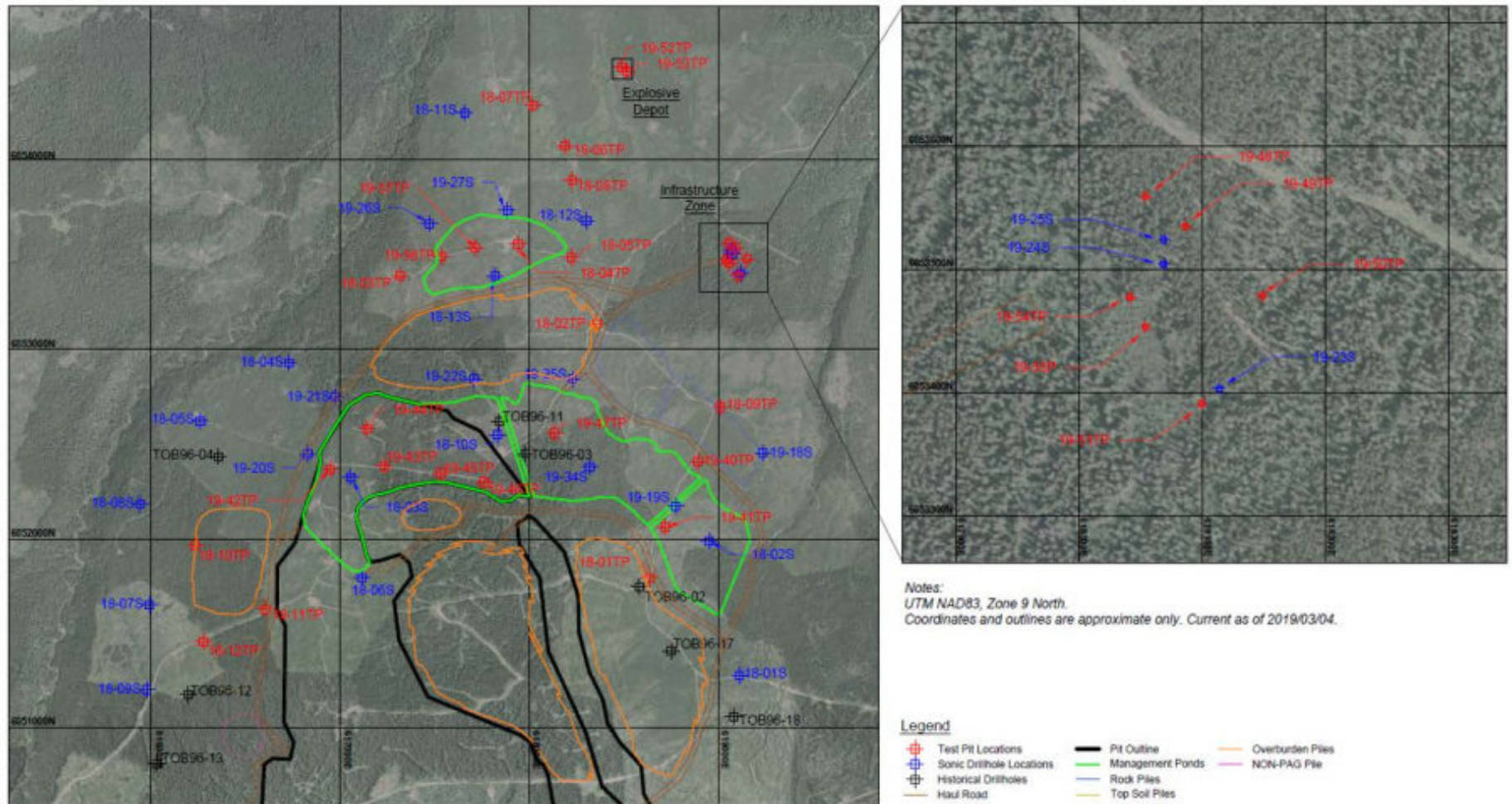


Figure 4-1: Location plan showing sonic drillholes and test pit investigations

Table 4-2: Summary of overburden sonic drilling investigations

Field Program	Drillhole ID	Termination Depth (m)	Easting (m) ²	Northing (m) ²	Elevation (m) ²	Depth to Bedrock	Depth to Groundwater	Standpipe Well Installation	Primary Investigation Purpose
SRK 2019	19-18S	47.2	619237	6052454	817	43.4	27.4	34.1-35.6	Management Ponds
	19-19S	47.2	618775	6052171	840	44.9	45.8	43.5-45.0	Management Ponds
	19-20S	44.2	616824	6052440	859	43.0	31.0	28.7-30.2	Management Ponds/Pit Slope
	19-21S	59.4	616976	6052746	834	56.1	24.9	56.7-58.2	Management Ponds/Pit Slope
	19-22S	29.7	617705	6052847	826	28.0	16.7	27.8-29.3	Management Ponds
	19-23S	11.3	619117	6053405	798	Not intercepted	Not encountered ¹	-	Plant Infrastructure Pad
	19-25S	10.7	619070	6053505	797	Not intercepted	Not encountered ¹	-	Plant Infrastructure Pad
	19-24S	20.4	619072	6053523	798	Not intercepted	Not encountered ¹	-	Plant Infrastructure Pad
	19-26S	67.1	617469	6053665	807	Not intercepted	33.1	50.8-52.3	Management Ponds
	19-27S	67.1	617883	6053726	808	Not intercepted	40.1	43.0-44.5	Management Ponds
	19-34S	38.1	618256	6052399	837	33.5	14.1	35.1-36.6	Management Ponds/Pit Slope
	19-35S	30.5	618228	6052834	829	Not intercepted	20.3	28.3-29.8	Management Ponds
SRK 2018	T18-01S	9.0	619132	6051278	863	Not intercepted	14.5	-	Overburden Piles
	T18-02S	19.5	618921	6051995	836	Not intercepted	Not encountered ¹	11.0-14.0	Overburden Piles
	T18-03S	15.0	617071	6052362	852	Not intercepted	Not encountered ¹	-	Management Ponds/Pit Slope
	T18-04S	20.0	616709	6052775	834	Not intercepted	Not encountered ¹	-	Overburden Piles
	T18-05S	14.0	616249	6052648	852	Not intercepted	Not encountered ¹	-	Overburden Piles
	T18-07S	27.9	616004	6051665	908	26.5	Not encountered ¹	-	Overburden Piles
	T18-08S	15.5	616018	6052169	885	Not intercepted	Not encountered ¹	-	Overburden Piles
	T18-09S	13.5	615957	6051117	939	13.9	Not encountered ¹	10.1-13.1	Overburden Piles
	T18-10S	14.0	617817	6052528	838	Not intercepted	Not encountered ¹	-	Overburden Piles
	T18-11S	19.5	617697	6054253	791	Not intercepted	Dry	7.5-10.5	Overburden Piles
	T18-12S	30.8	618296	6053689	801	Not intercepted	Not encountered ¹	-	Overburden Piles
	T18-13S	18.4	617809	6053408	815	Not intercepted	Dry	14.9-17.9	Overburden Piles
Piteau 1997	TOB-96-02	33.50	6051748	618580	853	Not intercepted	Not encountered ¹	17.0-20.0	Overburden Piles
	TOB-96-03	24.0	6052446	617976	836	22.9	Not encountered ¹	-	Overburden Piles/Pit Slope
	TOB-96-04	123.0	6052433	616356	853	117.0	77.0	-	Overburden Piles
	TOB-96-11	20.2	6052619	617839	827	Not intercepted	Not encountered ¹	18.2-20.2	Overburden Piles/Pit Slope
	TOB-96-12	4.60	6051178	616197	926	3.75	Not encountered ¹	1.7-4.0	Overburden Piles/Pit Slope
	TOB-96-13	20.0	6050812	616031	943	11.0	3.0	-	Overburden Piles
	TOB-96-17	14.0	6051407	618747	860	11.5	3.0	-	Overburden Piles
	TOB-96-18	17/0	6051061	619079	873	15.0	Not encountered ¹	-	Overburden Piles

Note: ¹ - Not encountered during drilling, ² - Datum: UTM NAD83, Zone 9 North. Coordinates and elevation surveyed after completion of program and provided by Telkwa. Values rounded to nearest metre

Table 4-3: Summary of overburden test pit investigations

Field Program	Test Pit ID	Final Depth (m)	Easting (m) ¹	Northing (m) ¹	Elevation (m) ¹	Primary Investigation Purpose
SRK 2019	19-40TP	3.3	618891	6052407	834	Management Ponds
	19-41TP	4.0	618716	6052062	842	Management Ponds
	19-42TP	3.7	616949	6052368	860	Management Ponds
	19-43TP	4.6	617233	6052385	841	Management Ponds
	19-44TP	3.7	617142	6052582	836	Management Ponds
	19-45TP	2.5	617531	6052346	838	Management Ponds
	19-46TP	4.0	617762	6052299	840	Management Ponds
	19-47TP	3.8	618131	6052559	835	Management Ponds
	19-48TP	4.3	619054	6053559	801	Plant Infrastructure Pad
	19-49TP	4.3	619087	6053535	801	Plant Infrastructure Pad
	19-50TP	4.2	619149	6053478	801	Plant Infrastructure Pad
	19-51TP	4.1	619100	6053391	803	Plant Infrastructure Pad
	19-52TP	3.3	618485	6054492	781	Explosives Depot Area
	19-53TP	3.1	618516	6054468	782	Explosives Depot Area
	19-54TP	4.2	619042	6053477	802	Plant Infrastructure Pad
	19-55TP	4.1	619054	6053453	827	Plant Infrastructure Pad
	19-56TP	3.9	617534	6053491	818	Management Ponds
	19-57TP	3.6	617712	6053538	813	Management Ponds
SRK 2018	T18-01TP	3.2	618635	6051793	848	Overburden Piles
	T18-02TP	4.0	618354	6053134	818	Overburden Piles
	T18-03TP	3.1	617316 ²	6053388 ²	808 ²	Management Ponds
	T18-04TP	3.6	617939	6053557	811	Management Ponds
	T18-05TP	3.0	618222	6053485	813	Overburden Piles
	T18-06TP	3.3	618188	6054074	788	Management Ponds
	T18-07TP	2.7	618019	6054291	785	Management Ponds
	T18-08TP	3.2	618226	6053894	797	Management Ponds
	T18-09TP	3.2	619008 ²	6052695 ²	821 ²	Overburden Piles
	T18-10TP	3.6	616234 ²	6051965 ²	897 ²	Overburden Piles
	T18-11TP	3.0	616607	6051628	923	Overburden Piles/Pit Slope
	T18-12TP	2.9	616277	6051458	930	Overburden Piles/Pit Slope

Note: ¹ – Datum: UTM NAD83, Zone 9 North. Coordinates and elevation surveyed after completion of program and provided by Telkwa. Values rounded to nearest metre

5 Geotechnical Characterization

The findings from the historical 2018 and 2019 field investigations have been used to conduct geotechnical characterization of the foundation and pile construction materials.

5.1 Bedrock

The evaluation of the bedrock surface at Tenas has been developed by Telkwa geologists. Telkwa utilizes the results of the historical exploration drilling to develop the surface. At the time of this pile stability assessment, the bedrock surface was developed using the results of the historical and 2018 sonic drilling. In general, the 2019 drilling showed comparable bedrock elevations, however, localized differences were observed, and the surface should be updated for detailed mine design work. The localized differences are not expected to affect the stability analyses work presented in this report.

The depth to bedrock ranges from approximately 4 m to over 100 m northeast of the proposed external overburden piles.

5.2 Shallow Foundation Conditions

The surficial geology summary for the Tenas project area is based on the results of SRK's 2018 and 2019 geotechnical investigations.

Most of the overburden materials above bedrock consists of a well graded till. In general, the till is a sandy lean clay (CL) with silt and fine sand and some gravel. Cobbles and boulders were encountered during the drilling, and these are estimated to comprise less than 5% of the materials intercepted. The till is commonly stiff to hard in consistency with low to medium plasticity. The colour ranges from medium-brown to very dark-brown or dark-grey. Sand, silt and gravel lenses were commonly encountered within the till at depth. These materials are generally comparable to the massive diamicton unit described by Levson et al (1997).

Intervals of clayey sand (SC) or silty sand (SM) greater than 1 m were observed during the sonic drilling at various depths. The SC and SM materials typically contain some fines (either clay or silt), some gravel and are dense, well graded. The plasticity of the fine's component is typically low to medium.

The till materials are generally consistent with the results of the Piteau (1997) and Klohn Leonoff (1985) investigations carried out previously. A summary of the till foundations conditions is provided below.

Particle Size Distribution

Particle Size Distribution testing was conducted, and the results show that the samples generally have a fines content greater than 50%, a typical sand content of 20% - 40%, and a gravel content of 0 % - 20%. The shape of the PSD curves indicates that most samples are well graded or gap-graded. The samples in 2018 were generally well graded as the sonic drilling focused on the

diamicton unit only. In 2019, both the diamicton unit and glaciofluvial stratified sands and gravels were intercepted. The glaciofluvial unit is expected to more gap-graded than the diamicton unit.

It should be noted that some samples may underestimate the percentage of gravel or boulders that were observed in the in-situ soil. This is because large cobbles and boulders that were too large to sample in the field and cannot be practically included in the tests.

Plasticity

Atterberg Limit tests were conducted to characterize the plasticity of the overburden soils. The results are plotted on the plasticity chart in Figure 5-2. In summary, the results indicate that the majority of the samples are a lean-clay (CL) with low to medium plasticity.

Density/Consistency

Soil density or consistency testing using a Standard Penetration Test (SPT) was conducted during drilling. The data indicates that the uncorrected N blows were generally above 20 (i.e. a compact granular soil or a very stiff cohesive soil) at 1.5 m below ground surface level and increased with depth (Figure 5-3). SPT N blows for the sandy lean clay till (CL) varied between 15 to >50 correlating to a very-stiff to hard fine-grained material. SPT N values for intervals of clayey sand (SC) or silty sand (SM) varied from 30 to 50 correlating to a dense coarse-grained material, with most values achieving 50 blows or hammer bounce refusal. Refusal is shown as a 50 count and was represented in the field with no sign of movement as the SPT hammer was dropped.

Shear Strength

Ten soil direct shear tests were performed on remolded and disturbed soil samples. The testing was conducted on finer-grained portions of the samples collected during the investigations. The shear vs normal stress plot for the testing is presented in Figure 5-4. There is an observed difference in the testing from the 2018 and 2019 programs. The difference is related to the poorer sample quality and preparation during 2018 with comparison to the 2019 program. The results from the 2019 program were used to determine the material strength parameters for this study, which is summarized below:

- Average peak friction angle of 30 degrees and apparent cohesion of 22 kPa; and
- Average residual friction angle of 27 degrees and apparent cohesion of 50 kPa.

The minimal friction angle difference between the peak and residual values is related to the more homogenous characteristics of the remoulded test specimen. The very stiff to hard consistency of the fine-grained soils suggests that the remoulded characteristics of the samples may underestimate the shear strength of the shallow foundation materials intercepted during the 2018 and 2019 drilling investigations, as indicated by the SPT blow counts (Figure 5-3). Furthermore, tests excluded the coarse fraction of the till materials due to limitations in sampling and testing.

Shallow Groundwater

Piezometric information and water table estimates were based on a review of monitoring well reading data and saturated soil observations during the sonic drilling. Where intercepted in monitoring wells completed as part of the 2018/2019 investigation, the shallowest groundwater levels were approximately 14 m, however, most of the recorded levels were between 20 m and 40 m (Table 4-2). During the test pit excavations, groundwater inflow was only encountered in two test pits and was encountered at the interface of sandy top soil and the finer grained till.

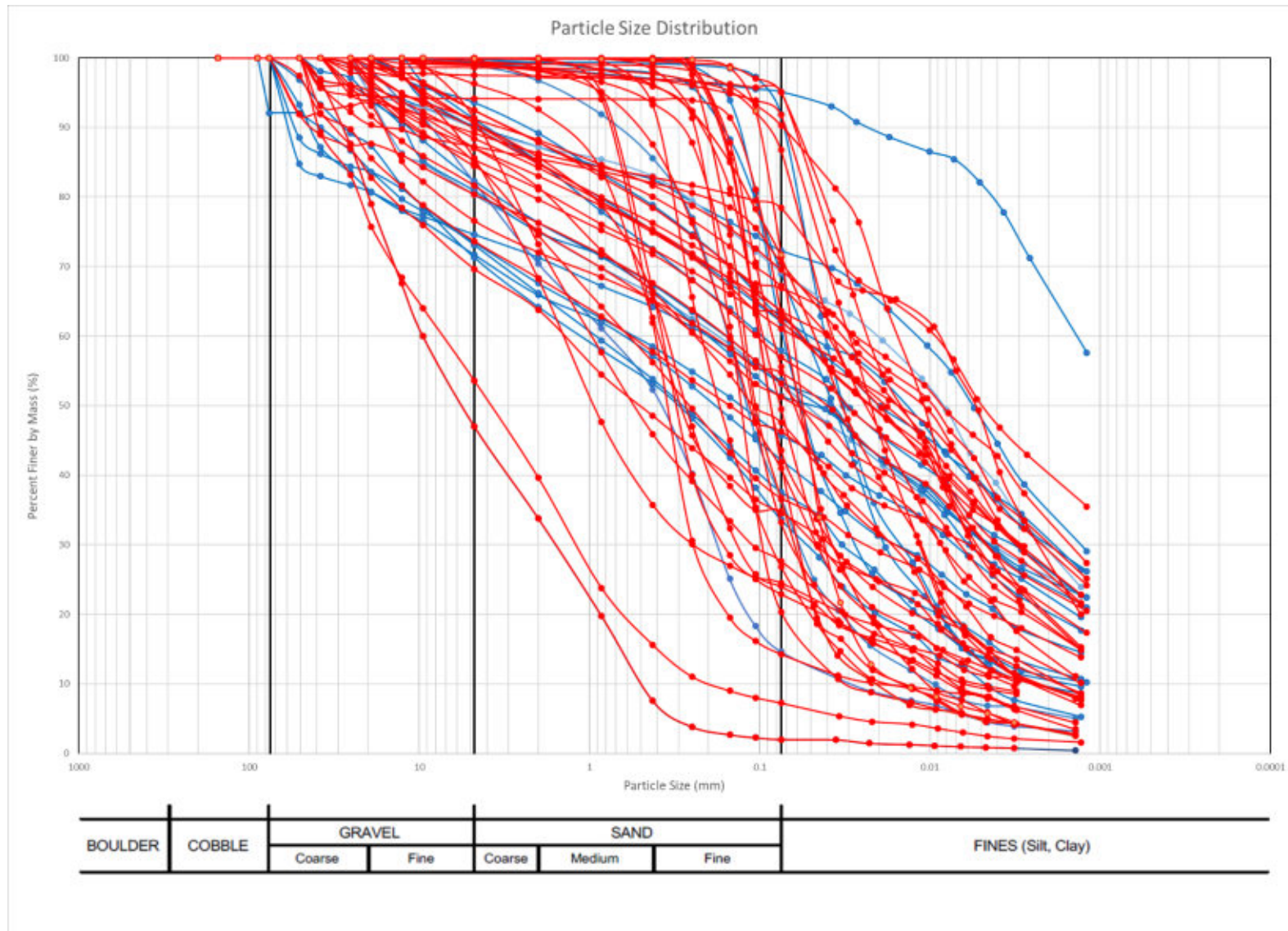


Figure 5-1: PSD curves for 2018 (blue) and 2019 (red) tested samples

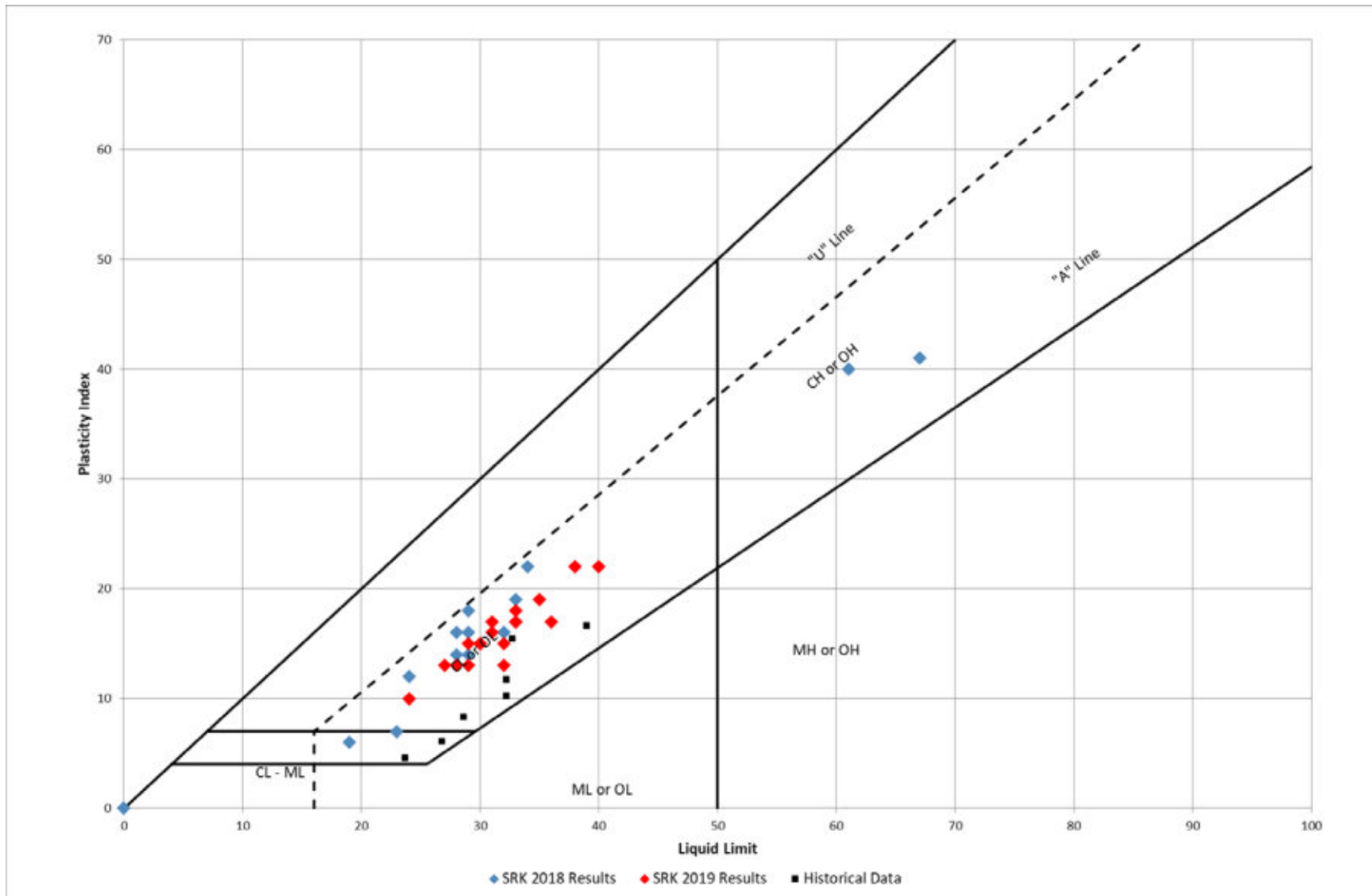


Figure 5-2: Atterberg limits for 2018, 2019 test results and historical data

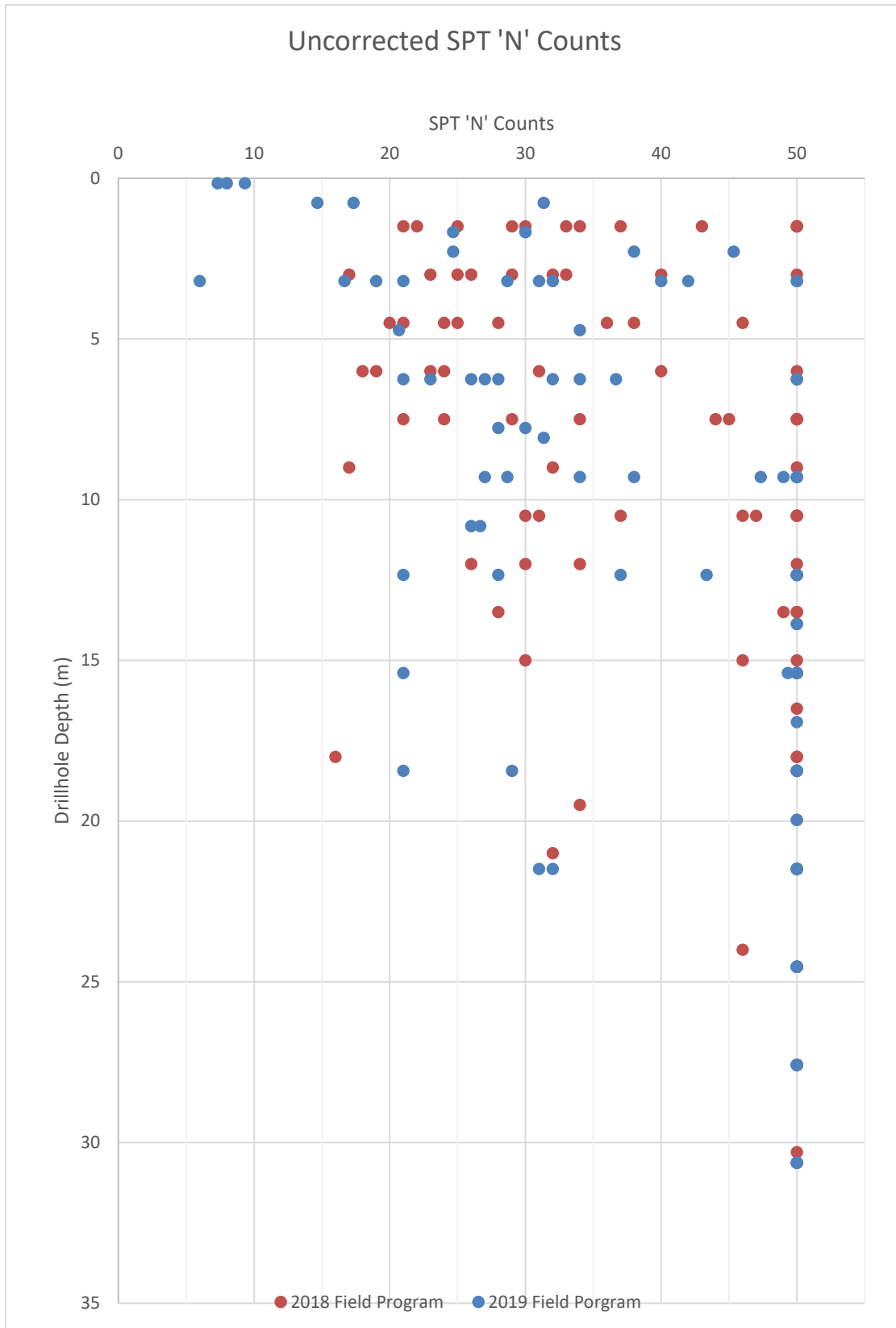


Figure 5-3: SPT N Blows vs. Depth for 2018 and 2019 sonic drilling

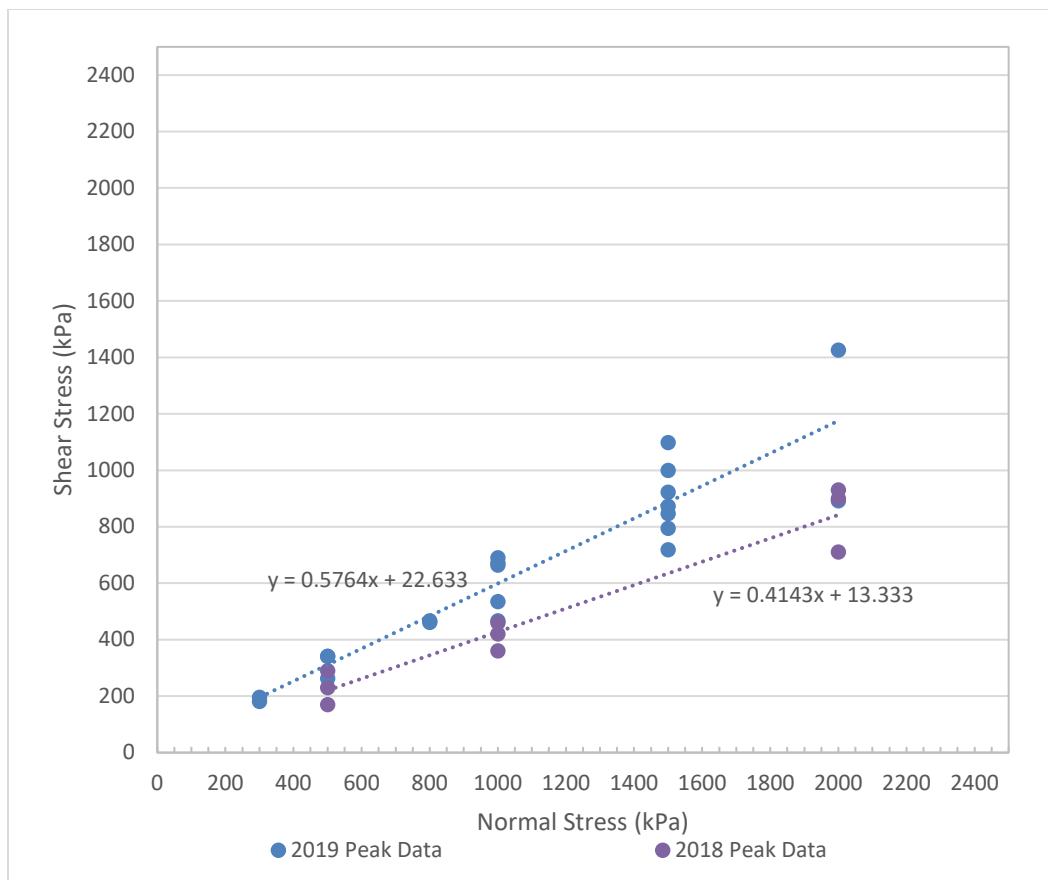


Figure 5-4: Soil Direct Shear Testing Shear vs Normal Stress Plot

5.3 Waste Material Schedule

Based on the mine plan, the waste material schedule indicates:

- Significant volume of overburden till to be produced from pre-production (i.e. Year 2020 in Figure 5-4) through to Year 9 (2029). The till is to be excavated from the Management Ponds and Phase 9 and stripping of overburden across the pit footprint. Following 2029, the overburden production generally decreases with the exception of 2032 and 2040.
- The Phase 9 excavations from 2024 to 2029 is approximately 70% overburden soil and 30% PAG/NAG waste rock by volume.
- Similar excavation volumes of PAG waste rock throughout the life of mine, with increasing volumes from about Year 9 (2029). PAG rock is to be placed into the Management Pond cell. The Management Pond stability assessment is presented in a separate report.
- Similar excavation volumes of NAG waste rock from 2023 to 2026. Volumes become variable from 2029 to end of mine.

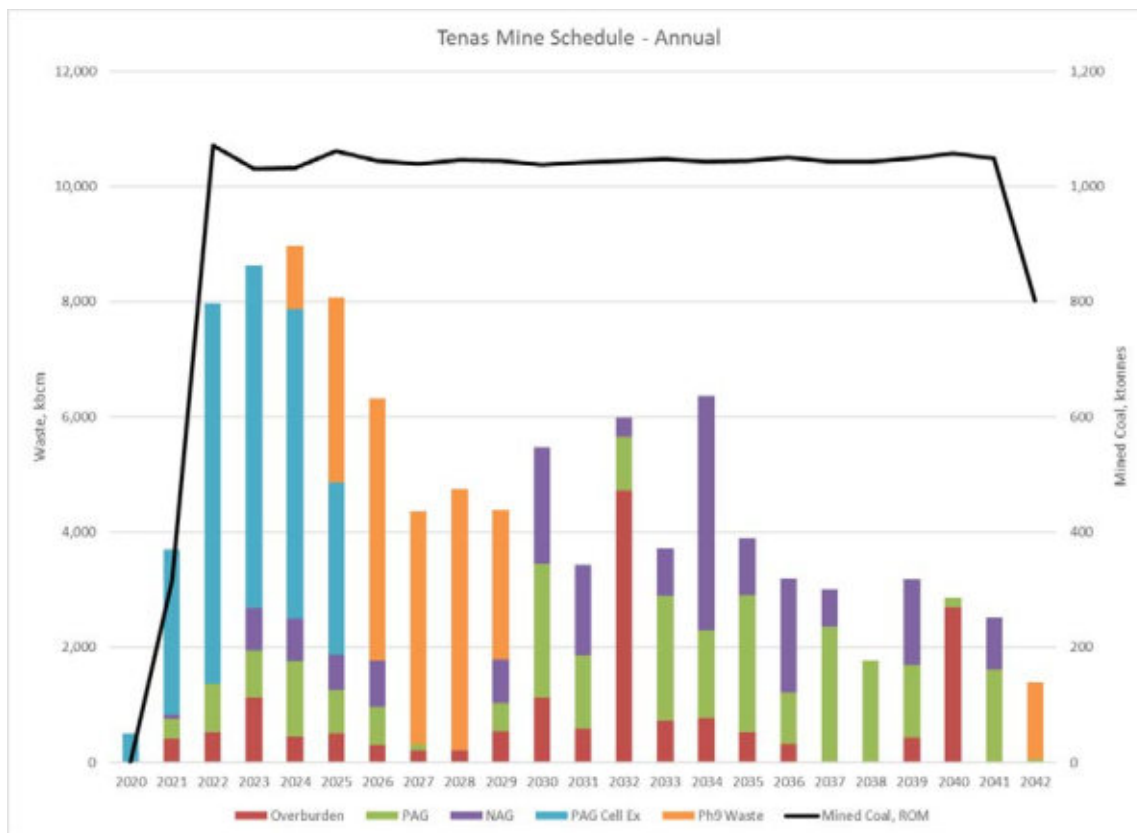


Figure 5-5: Mine waste material schedule

5.4 Construction Materials

Overburden Till

As described in Section 5.2, the till materials that cover the Tenas project site comprise a sandy lean clay (CL). The clay typically contains silt and fine sand with some gravel, is commonly stiff to hard in consistency with low to medium plasticity, and well graded. Cobbles and boulders were encountered during the test pitting and sonic drilling investigations.

The fine-grained portions of the till were typically very stiff to hard. However, during excavation the cementation of the materials is expected to be broken and the cohesion of these materials significantly reduced at placement. The reduced cohesion value have been reflected with a 0 kPa geotechnical parameter for use in the stability analyses work.

The external piles are to be initially constructed with bottom-up methods prior to end-dumping opportunities (i.e. hybrid method). The bottom-up construction will improved the compaction and density of the placed materials.

NAG Waste Rock

The NAG waste rock excavated from the Tenas Pit will consist of blasted sandstones, siltstones and mudstones with some coal fragments. The material particle size is expected to be predominately cobbles and boulders with some gravel and sand. The shear strength behaviour of the waste rock will largely depend upon the gradation, angularity and degree of compaction.

Coal Rejects

Coal rejects materials are to comprise the rock that directly overlies or underlies the economic coal seams. The rejects will be mechanically sorted and placed in stockpiles at the Coal Preparation Plant (CPP) before being placed in the West and East Coal Rock Piles (Figure 2-2). The crushed rock will be variable in size and generally range from sand sized particles to cobbles and boulders.

6 Hydrogeology and Hydrology

The hydrogeology and hydrology of the Tenas area are summarised in the following subsections.

6.1 Climate and Precipitation

The climate in central interior British Columbia is characterized by four distinct seasons. Based on historical regional observations, spring is the driest season and fall is the wettest. Mean annual precipitation for the site was determined to be 618 mm. This is approximately 20% greater than average precipitation recorded in the valley at the Smithers Airport station (Table 6-1), reflecting the fact that precipitation is typically greater at higher elevations.

Table 6-1: Project precipitation summary [mm]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall	4.3	2.8	2.9	14.5	34.1	42.5	49.7	40.2	46.2	44.0	9.2	4.3	294.8
Snowfall	67.7	47.6	35.3	12.5	2.4	0.0	0.0	0.0	1.9	26.8	62.0	67.2	323.4
Total	72.0	50.4	38.2	27.0	36.5	42.5	49.7	40.2	48.1	70.8	71.2	71.6	618.1

Figure 6-1 illustrates the average monthly precipitation as rain and snow. Precipitation typically falls as snow during from October to April. Annually, the average snowfall (323 mm) is approximately 52% of the mean annual precipitation.

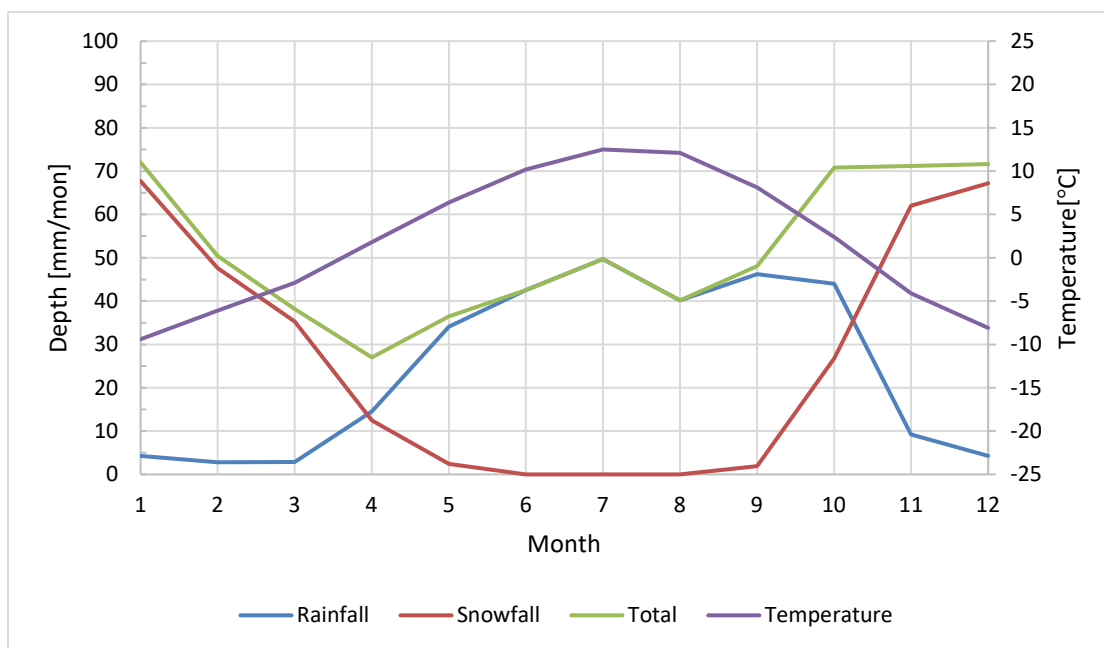


Figure 6-1: Monthly precipitation as snow and rain

6.2 Hydraulic Conductivity

The results of the field investigations indicate the hydraulic conductivity of the foundation soils can significantly vary (Table 6-2). The till will have a variable bulk hydraulic conductivity, which will be largely controlled by the proportion of less permeable clay and silts compared to the coarser sands and gravels. The inter-fingering of these units and resulting hydraulic properties is more evident through the northern portion of the project site where a buried glacial valley crosses from west to east.

Table 6-2: Summary of Tenas hydraulic conductivity testing

Hydrogeological Unit		No. Tests	Hydraulic Conductivity (m/s)		
			Minimum	Geometric Mean	Maximum
Foundation Soils	Clay/Silt	14	7E-11	6E-09	7E-07
	Sand/Gravel	5	6E-08	1E-06	1E-05
	Mixed grains	4	7E-09	1E-07	1E-06
	All soil units	23	7E-11	4E-08	1E-05
Bedrock	Coal seams	12	2E-08	5E-07	6E-06
	Sandstone	2	4E-08	3E-07	3E-06
	Mudstone, Siltstone	5	8E-09	3E-08	2E-07
	Conglomerate	2	7E-09	2E-08	6E-08
	Volcanic rock	7	3E-09	1E-07	9E-07
	All rock units	28	3E-09	2E-07	6E-06

Note: ¹ – Mixed grains is representative of coarse-grained material with fines content greater than 25%

6.3 Groundwater Flow System

The groundwater system can be divided into two:

1. A deep system controlled by the hydraulic properties of the Skeena sedimentary rock group, the volcanic group, fractures and faults. Data shows no influence to groundwater flow from faults; however, this cannot be ruled out due to the difficulties of characterizing impermeable barriers or permeable conduits.
2. A shallow overburden system influenced by the distribution of glacial clay- or silt-rich till, and sand and gravel outwash.

The deep bedrock groundwater system has a large lateral extent. The bulk of recharge to the bedrock system is expected to occur from the infiltration of precipitation and runoff in the upland area of the Tenas Creek and Goathorn Creek watersheds, where the extent of the silt/clay-rich till is limited. The groundwater level measurements show that groundwater flows from the higher elevated topography in the south toward the north and into the main drainage river (Telkwa River) and creeks (Tenas and Goathorn Creek).

The shallow overburden system is characterized by local unconfined groundwater flows. Groundwater flows in a north-easterly direction towards Four Creek and in a north-westerly direction towards Tenas Creek, from higher topography in the south. A downward vertical gradient is observed between the upper and lower water-bearing surficial deposits. Between the overburden units and bedrock units, the vertical gradient varies. In the south, measurements indicate the vertical gradient is upward, while vertical gradient is generally downwards across the rest of the project area. In places, the groundwater is disconnected (i.e. perched) above the bedrock groundwater system.

6.4 Groundwater Levels

The groundwater table is considered to follow topography (Piteau, 1996), with groundwater gradients downslope toward the Telkwa River Valley. Figure 6-2 shows the hydraulic head associated with respective to overburden and bedrock in the Tenas area. The groundwater in both systems is interpreted to flow under an average horizontal hydraulic gradient of approximately 0.1 towards the valleys, moving away from the Tenas Pit towards Tenas Creek, the Telkwa River, and Goathorn Creek.

Static water levels are generally less than 2 mbgs (meters below ground surface) in the south to more than 20 mbgs in the north part of the Tenas area. In the north, the overburden soils can be thicker with a sequence of sand and gravel outwash deposits. Most of the external piles are located toward the north.

Two nested wells (T18-04D#2 and T96R-16-28) constructed within bedrock show groundwater elevations above ground surface (i.e. flowing artesian conditions controlled by topography), at least on a seasonal basis. These two wells are located to the south of the proposed pit excavation and their artesian influence will likely be limited by the local depressurization of the aquifer adjacent to the pit. Downward gradients from overburden to bedrock or from bedrock upper layer to lower layers in the lowlands of the Tenas area can be observed in four historic wells.

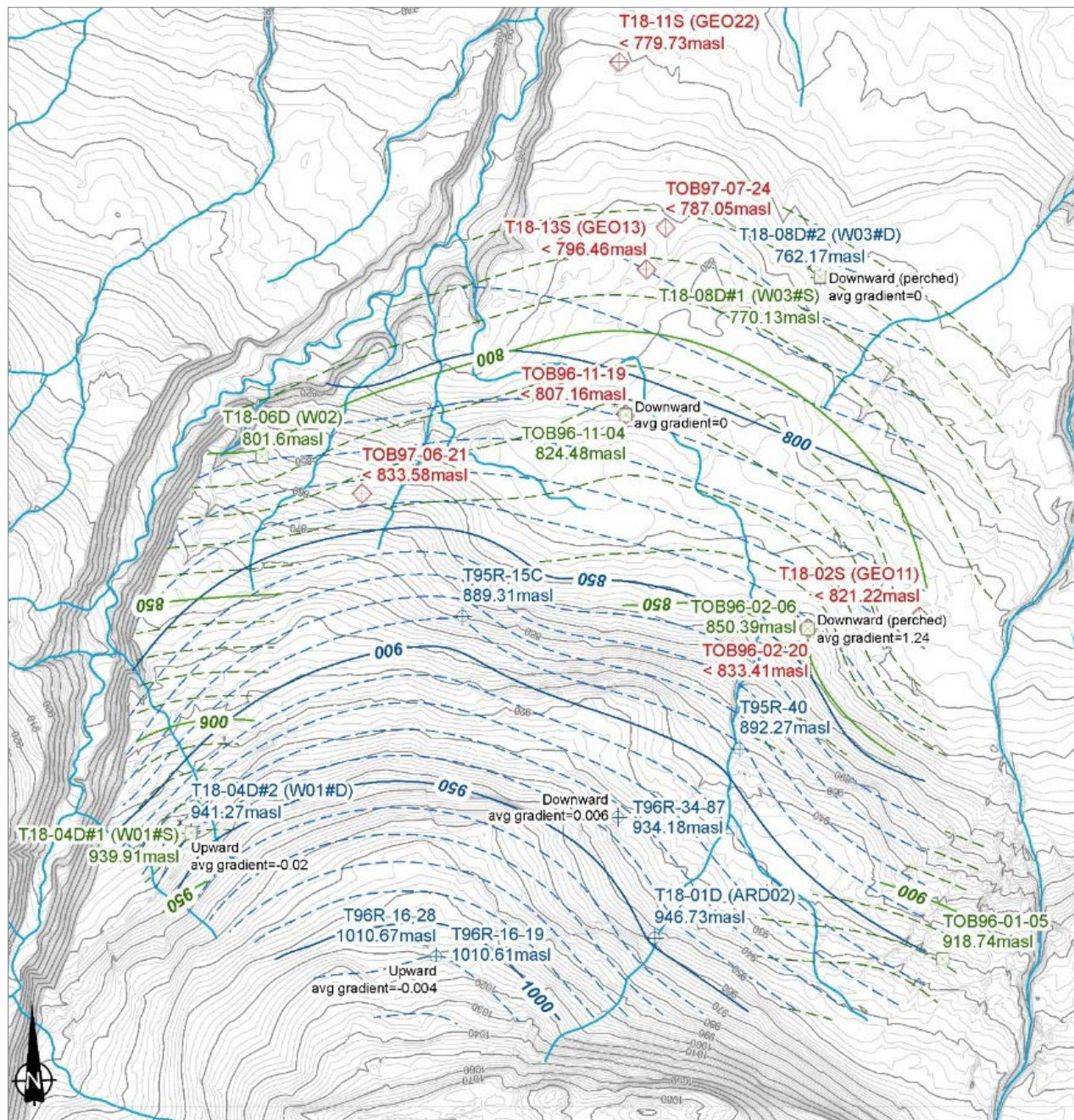


Figure 6-2: Hydraulic head contours

7 Waste Dump Hazard Classification

A semi-qualitative Waste Dump and Stockpile Stability Rating and Hazard Classification (WSRHC) using guidance provided by Hawley and Cuning (2017) was completed for each pile. The intention of the WSRHC was to form a basis of design for each pile, and to understand the changes in the hazard rating as the designs were optimized. The hazard ratings for each final pile design are summarised in Table 7-1. The results of the WSRCH indicate the following:

- Most dump designs have a low or *moderate hazard* rating.
- The *moderate* ratings can be attributed to the lower engineering geology index values that can be related to the material quality of the overburden soils that will be excavated and then placed into the external piles.

Table 7-1: Summary of waste dump and stockpile stability rating and hazard classification

Pile Name	Construction Material	Waste Dump Stability Rating and Hazard Classification			
		Engineering Geology Index	Design and Performance Index	Waste Dump and Stock Pile Stability Rating	Hazard Rating (Class)
North Ex-OVB Pile	Overburden Soils	14.5	33.5	48	Moderate Hazard
West Coal Rock Pile	Coal Rock Rejects	27	36	51.5	Low
East Coal Rock Pile	Coal Rock Rejects	27	36	51.5	Low
West Ex-OVB Pile	Overburden Soils	24	37	61	Low
Central Ex-OVB Pile	Overburden Soils	14.5	33	47.5	Moderate Hazard
South Ex-OVB Pile	Overburden Soils	14.5	34	48.5	Moderate Hazard
P9 and P4 Backfill	NAG Waste Rock	36	29	65	Low
P6 Backfill	NAG Waste Rock	37	31	68	Low
P1 Backfill	NAG Waste Rock	37	33.5	70.5	Low

8 Stability Assessment

Slope stability analyses were carried out to evaluate the overburden and rock piles during and at the end of construction. The analyzed foundation conditions and groundwater conditions is based on the results of the field investigations and laboratory testing. Two-dimensional deterministic limit equilibrium (LE) analyses were carried using the Rocscience program Slide (v7.0) (Rocscience, 2018), for both static and pseudo-static conditions. The following subsections detail the stability assessment approach and findings.

8.1 Slope Instability Mechanisms

With consideration to the foundation conditions and expected slope performance, the following instability mechanisms (Figure 8-1) were considered throughout the analyses and design work.

1. A deep-seated, overall slope instability that can be a combination of:
 - (a) An instability through a significant volume of the pile materials; or
 - (b) An instability through a significant volume of the pile materials and sliding along the underlying dump foundation-topography contact; or
 - (c) An instability through a significant volume of the pile materials and the shallow till foundation.
2. A shallow slope face instability through the dump materials caused either by over-steepening of the dump materials and/or erosion of the slope face leading to undercutting and a resulting slump event.

Shallow slope face instabilities should be expected throughout construction as material settles and slumps and should be managed in accordance with the implemented standard operating procedures. These shallow instabilities were not analyzed in the LE stability analyses as the modelling was conducted to assess a deep-seated instability of high consequence that could constrain the mine design work.

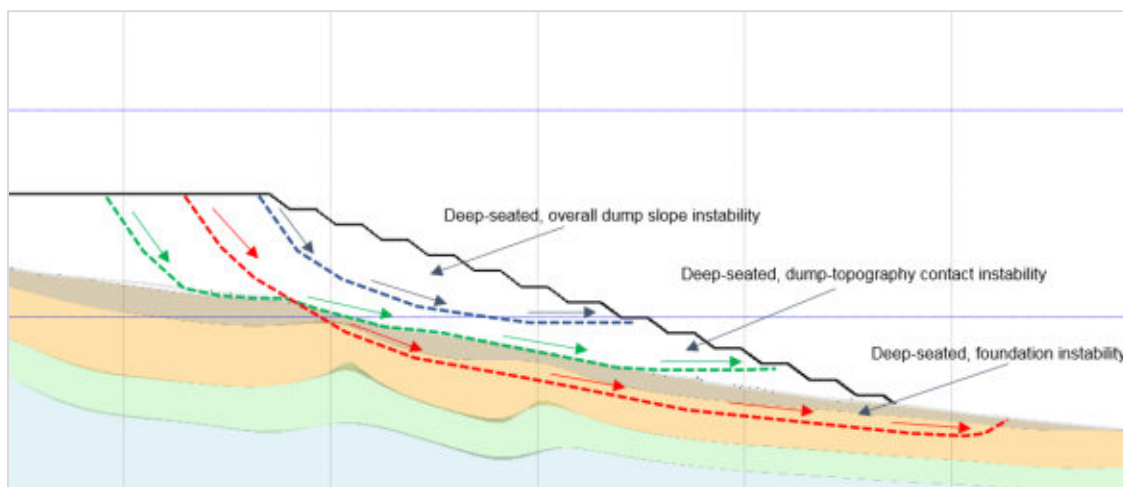


Figure 8-1: Deep-seated, overall instability mechanism examples

8.2 Acceptance Criteria

The recommended criteria are based on levels of confidence in the understanding of site conditions and material parameters and the consequences of instability in accordance with Hawley and Cuning (2017) and presented in Table 8-1. The acceptance criteria were compared against the results of the analyses for a deep-seated failure mechanism. For the piles at Tenas, a *moderate* possible failure consequence and a *moderate* data confidence were identified. A minimum static FOS of 1.3 and a pseudo-static FOS of 1.05 were evaluated for end of construction design purposes.

In addition, selected short-term, during construction designs were analyzed, and these results were compared against a minimum design Factor of Safety (FOS) values ranging from 1.1 to 1.3 in accordance with British Columbia Mine Waste and Rock Pile (BCMWRP) Interim Guidelines (1991).

Table 8-1: Suggested stability design criteria (Hawley and Cuning, 2017).

Possible Consequence	Data Confidence ¹	Static Analyses		Pseudo-Static Analyses
		Minimum FOS	Maximum POF	Minimum FOS
Low	Low	1.3-1.4	10-15%	1.05-1.1
	Moderate	1.2-1.3	15-25%	1.0-1.05
	High	1.1-1.2	25-40%	1.0
Moderate	Low	1.4-1.5	2.5-5%	1.1-1.15
	Moderate	1.3-1.4	5-10%	1.05-1.1
	High	1.2-1.3	10-15%	1.0-1.15
High	Low	>1.5	<1%	1.15
	Moderate	1.4-1.5	1-2.5%	1.1-1.15
	High	1.3-1.4	2.5-5%	1.05-1.1

Note: ¹ - Data confidence in dump material and foundation shear strength parameters, 3D overburden model

8.3 Geotechnical Parameters

Geotechnical material parameters were selected to represent the foundation and waste rock materials. Material parameters used in the stability analyses were based on the field investigation results, laboratory testing, and experience with materials showing similar characteristics. The material parameters used in the stability analyses are presented in Table 8-2.

Table 8-2: Summary of geotechnical material parameters

Material	Type	Failure Criterion	Unit Weight (kN/m ³)	Mohr-Coulomb Strength Parameters		Hoek-Brown Strength Parameters			Ru Coefficient
				Friction Angle (°)	Cohesion (kPa)	UCS (MPa)	GSI	mi	
Foundation	Till	Mohr-Coulomb	18	30	5	-	-	-	-
	Weak Bedding Plane	Mohr-Coulomb	26	23	0	-	-	-	-
	Bedrock	Generalized Hoek-Brown	26	-	-	35	46	7	-
Pile Construction	Overburden Waste	Mohr-Coulomb	18	27	0	-	-	-	0.0 / 0.2
	Coarse Rock	Mohr-Coulomb	19	37	0	-	-	-	-
	Coal Rejects	Mohr-Coulomb	19	35	0				

8.4 Groundwater

The groundwater influence on the foundation and dump material characteristics is critical to understanding the expected slope stability. The coarse-grained materials in the pit backfills are expected to be free-draining, and it has been assumed that elevated groundwater pressures will not develop. At the end of in-pit backfilling and pit excavation, groundwater levels are expected to rise and at that stage the waste rock will be buttressed against the benched pit slopes.

The overburden piles will be constructed with finer grained materials and during operations, run-off into the piles is not expected to be high as water diversion structures and the nearby pit excavation are expected to limit the surrounding catchment. Ponding and infiltration should be limited with suitable grading and diversion of the platform slopes. However, in the long-term, post-construction infiltration into the piles may increase and structures can become partially saturated.

The following approaches were modelled:

- Modelling of a steady-state phreatic surface to evaluate saturation of the foundation materials, as determined by the standpipe piezometer monitoring data; and
- Applying an Ru coefficient to the overburden pile platforms to simulate infiltration and partial saturation. The Ru coefficient is defined as pore pressure as a fraction of the vertical earth pressure (Rocscience, 2018), and was modelled with a mean value of 0.2.

As discussed in Section 6.3, downward hydraulic gradients are expected beneath the proposed soil and rock piles. The downward hydraulic gradients will support the long-term dissipation of pore

pressures beneath the proposed soil piles, including pressures that may become elevated during pile development.

8.5 Seismicity

Pseudo-static analyses have been performed to assess the long-term stability condition with consideration to an earthquake event. For these analyses, it is common practice to use the 50 percent of the peak ground acceleration (PGA) where there is no threat of liquefaction or severe loss of strength under seismic shaking. The waste rock and foundation tills are not expected to be susceptible to liquefaction or a severe loss of shear strength. A PGA of 0.025 (one half of 0.049g) was used in the pseudo-static analyses.

Given the relatively low seismic hazard and 20-year mine operating life, the 2,475 years is considered conservative for end of construction conditions. The return period for the design earthquake is recommended by the BCMWPRC (1991) is an earthquake event with a 10% probability of exceedance in 50 years (with a corresponding return period of 475 years)

8.6 Stability Sections

A total of 17 sections were selected to represent the steepest topography and highest pile slope at Tenas, as shown in Figure 8-2. The sections included:

- Ten sections through the external overburden piles;
- Five sections through the in-pit backfill piles; and
- Two sections through the coal rock rejects piles.

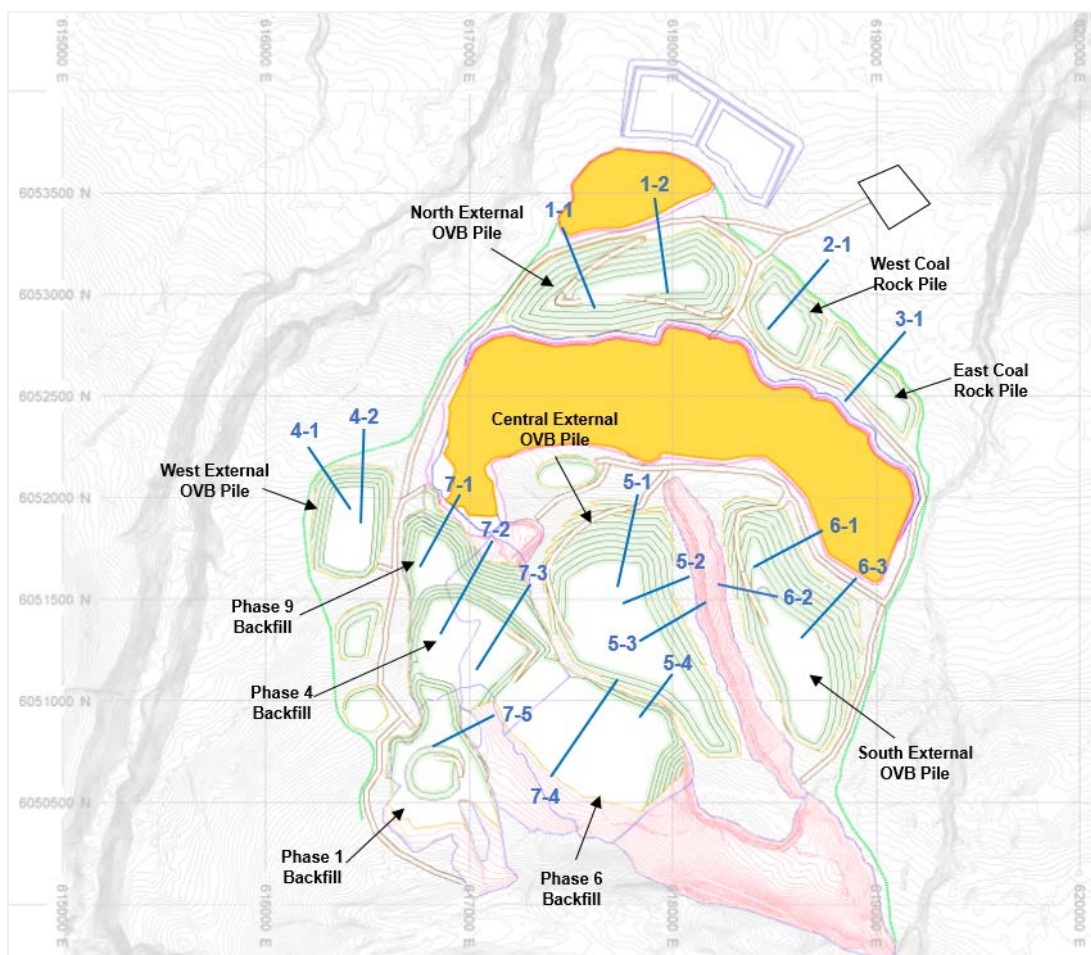


Figure 8-2: Location of overburden and rock stability sections

8.7 Results and Discussion

The results of the stability analyses indicate the proposed soil and rock piles are expected to satisfy the recommended minimum design static and pseudo-static FOS criteria, as outlined in Table 8-1. The results for a modelled deep-seated instability mechanism through the external overburden piles, pit backfills and coal reject rock piles are summarised in Table 8-3, Table 8-4 and Table 8-5. Although shallow slope instabilities are expected as the piles are constructed, design is constrained by the deep-seated overall foundation stability.

In general, the external piles have been designed with a shallow profile (i.e. 3:1 slope gradient) and are to be constructed on flat to gentle sloping topography which supports the long-term stability conditions. Furthermore, the piles are expected to be constructed to heights in the 35 m to 60 m range which is not considered significantly high. The bottom-up construction method will improve the compaction of the lower pile platforms and density of the materials that are to be placed into the external piles.

The external overburden piles which are to be constructed of fine-grained materials will require careful placement of materials and/or use of rock during the early stages of construction to achieve acceptable stability conditions as indicated by the analyses results. Construction and operational procedures are included in Section 9.

Following completion of mining, infiltration into the overburden piles is expected to increase as the surrounding diversion structures become less effective over time. To simulate the partial saturation of the piles, an Ru coefficient was applied. For most cases, acceptable design stability conditions were still indicated, however, two sections suggested a higher sensitivity to partially saturated conditions as demonstrated by an Ru of 0.2. These two sections included Section 5-1 and 6-3 which were located through the north side of the Central and South External Overburden Piles. To obtain an acceptable design FOS, the initial two platforms that are located on moderate topographic slopes (i.e. about 10-12°) should be constructed with coarse waste rock to buttress the overlying platforms and support long-term drainage along the face of the piles (Figure 8-3). Alternatively, a coarse rock wrap or buttress could be placed at the end of pile construction (along with a soil cover to promote vegetation). The placement of coarser waste rock should be incorporated into the mine operational procedures, detailed design mine work and final closure plan. Recommendations and operational procedures are described in Section 9.

Based on the results of the stability analyses, an Ru coefficient greater than about 0.2 could be result in problematic stability conditions. Ongoing stability analyses should be conducted at the piles are constructed to validate the design stability conditions using inputs from the installation of vibrating wire piezometers within the overburden piles.

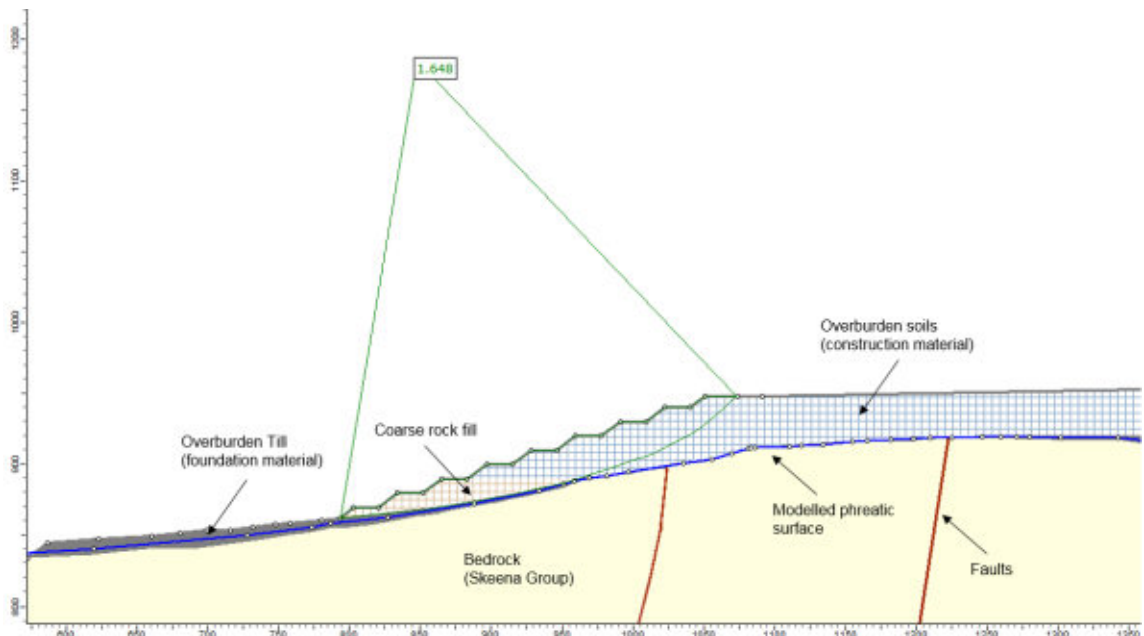


Figure 8-3: Stability Section 5-1 showing results for pile with coarse rock fill constructed at the toe

The in-pit dumping of NAG waste rock will be advanced down the footwall slope toward the north and east. In general, these piles will be buttressed by the previously excavated highwalls and the acceptable design stability conditions are reflected in the analyses results. Analyses were performed to assess the during construction or operational conditions through Section 7-1, 7-2 and 7-3. These analyses indicate acceptable design conditions and the risks associated with short-term stability conditions should be managed with appropriate with operational procedures, including inspections and monitoring (Section 9).

A critical operational procedure needs to include the local buttressing of any previously undercut footwall sections within the pit excavation. Loading of any locally undercut benches could contribute to a foundation planar sliding mechanism buttress downslope of the main backfill pile. To model a possible foundation sliding mechanism underlying the pit backfill piles, a weak coal bedding plane was included in the analyses. A conceptual example of the backfill rock loading on a locally undercut footwall slope is shown in Figure 8-4.

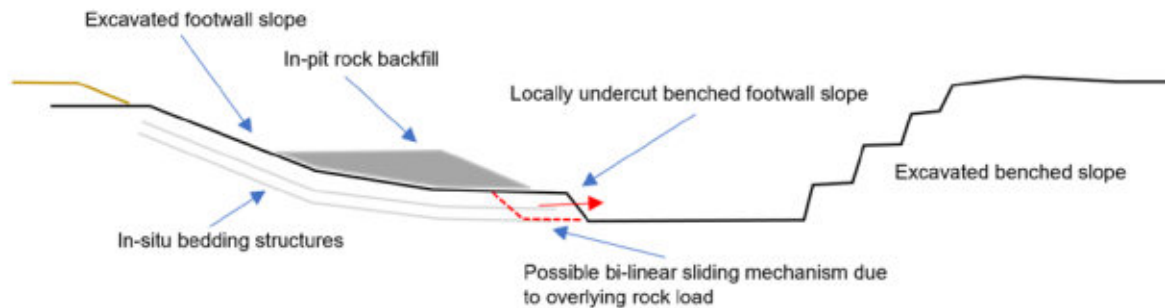


Figure 8-4: Conceptual example of the backfill rock loading on a locally undercut footwall slope

With consideration to the nearby pit excavation, the Central and South External OVB Piles will be completed early in the mine life and the stability performance will be able to be regularly assessed prior to any significant nearby pit excavation (i.e. East Highwall and Footwall slopes between the two piles). In general, early construction is beneficial as material settling occurs a short-term after construction.

Table 8-3: Summary of stability analyses for overburden piles

Overburden Pile	Stability Section	Modelled slope Height (m)	Modelled Groundwater Conditions	Static Conditions		Pseudo-static Conditions	
				Minimum Design FOS	Critical Modelled FOS	Minimum Design FOS	Critical Modelled FOS
North External OVB Pile	1-1	55	Phreatic Surface 10 m below ground surface	1.3-1.4	1.6	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.1
	1-2	55	Phreatic Surface 10 m below ground surface	1.3-1.4	1.5	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
West External OVB Pile	4-1	40	Phreatic Surface 10 m below ground surface	1.3-1.4	1.7	1.05-1.1	1.6
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
Central External OVB Pile	5-1	45	Phreatic Surface 5 m below ground surface	1.3-1.4	1.6	1.05-1.1	1.4
			Ru 0.2 within Pile (with buttress)	1.3-1.4	1.6	1.05-1.1	1.5
	5-2	46	Phreatic Surface 5 m below ground surface	1.3-1.4	1.6	1.05-1.1	1.5
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
	5-3	48	Phreatic Surface 5 m below ground surface	1.3-1.4	1.4	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.6	1.05-1.1	1.2
	5-4	35	Phreatic Surface 5 m below ground surface	1.3-1.4	1.8	1.05-1.1	1.7
			Ru 0.2 within Pile	1.3-1.4	1.5	1.05-1.1	1.5
South External OVB Pile	6-1	55	Phreatic Surface 5 m below ground surface	1.3-1.4	1.7	1.05-1.1	1.4
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
	6-2	55	Phreatic Surface 5 m below ground surface	1.3-1.4	1.4	1.05-1.1	1.3
			Ru 0.2 within Pile (with buttress)	1.3-1.4	1.3	1.05-1.1	1.2
	6-3	57	Phreatic Surface 5 m below ground surface	1.3-1.4	1.7	1.05-1.1	1.4
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.1

Table 8-4: Summary of stability analyses for pit backfills

Backfill Pile	Stability Section	Modelled slope Height (m)	Construction Stage	Modelled Groundwater Conditions	Static Conditions		Pseudo-static Conditions	
					Minimum Design FOS	Critical Modelled FOS	Minimum Design FOS	Critical Modelled FOS
Phase 9 Backfill	7-1	43 ¹	During Construction	Footwall elevation	1.1	1.4	n/a	-
	7-1	50	End of Construction	Footwall elevation	1.3-1.4	1.5	1.05-1.1	1.4
Phase 9 (lower platform)	7-2	55	During Construction	Footwall elevation	1.1	1.3	n/a	-
Phase 9/Phase 4	7-2	85	End of Construction	Footwall elevation	1.3-1.4	1.3	1.05-1.1	1.2
Phase 4 (upper platform)	7-3	50	End of Construction	Footwall elevation	1.3-1.4	1.7	1.05-1.1	1.6
Phase 6	7-4	30	During Construction	Footwall elevation	1.1	1.2	n/a	-
	7-4	40 ¹	End of Construction	Footwall elevation	1.3-1.4	1.8	1.05-1.1	1.7
Phase 1	7-5	20 ¹	End of Construction	Footwall elevation	1.3-1.4	2.2	1.05-1.1	2.0

Note: ¹ – Exposed slope height above the crest of backfilled pit.

Table 8-5: Summary of stability analyses for coal rejects rock piles

Coal Rock Pile	Stability Section	Modelled Slope Height (m)	Modelled Groundwater Conditions	Static Conditions		Pseudo-static Conditions	
				Minimum Design FOS	Critical Modelled FOS	Minimum Design FOS	Critical Modelled FOS
West Coal Rock Pile	2-1	35	10 m below ground surface	1.3-1.4	2.1	1.05-1.1	1.9
East Coal Rock Pile	3-1	25	10 m below ground surface	1.3-1.4	2.2	1.05-1.1	2.1

9 Design and Operational Considerations

The following subsections detail design and operational considerations.

9.1 Slope Design Criteria

The slope design criteria should be supported with the implementation of operational and monitoring procedures. Slope design recommendations are summarised in Table 9-1.

Table 9-1: Soil and rock slope design recommendations

Pile	Maximum Height Lift (m)	Dump Face Slope Angle (°)	Maximum Overall Slope Angle (°)
External Overburden Piles	10	37	18 (3:1)
Coal Rock Piles	10	37	18 (3:1)
Pit Backfills	40	37	27 (2:1)
Top Soil Piles	3	27	18 (3:1)
Short-term coal stockpiles	10	37	single slope

In addition to the slope design criteria presented in Table 9-1, the following geotechnical design requirements have been incorporated in the mine design work:

- The toe of the overburden piles will be set back approximately 50m from the edge of any significant watercourse or pond.
- The toe of the material piles will be set back approximately 50 m from the crest of any significant pit highwalls or endwalls.
- The toe of the material piles will be located on flat to gently sloping topography between 5° and 10°. Where pile toes are located on topography steeper than 10°, requirements for buttressing or rock wraps will need ongoing evaluation during construction.

9.2 Foundation Preparation

The foundations below the proposed piles should be grubbed and cleared prior to material placement. This includes the forested areas and the initial 0.3 m of top soil. The foundations should be cleared immediately before construction to limit infiltration and ponding of water which could lead to the softening of the till foundations directly below the proposed dumps. The cleared foundations should be inspected before construction to identify and provide direction for the removal of any significant thicknesses of soft material, particular near the down-slope toe of the proposed external overburden soil piles.

9.3 Construction

The following subsection details operational considerations related to the construction and monitoring of the waste rock dump. These considerations provide details for some aspects of the construction and monitoring that should be included in a formal standard operating procedure.

Standard Operating Procedures

Standard operating procedures for the dump construction should be implemented to improve the safety for operating staff who are tasked with building the dumps. The standard operating procedures should be implemented prior to construction and approved by a qualified geotechnical engineer.

Methodology

The dumps can be initially constructed over sloping topography up to 10° to 12°. There may be some shallow slumping as the waste materials are initially placed and loaded; this can be considered a hazard to mine operations during the construction. To reduce the risk of instability, the bottom-up construction methods supplemented with coarse rock won from the open pit excavations should be implemented by the operations teams. Furthermore, the initial materials placed into the piles should first be dumped behind the intended or established platform crest, and then pushed utilizing a tracked dozer.

Material Quality

The quality of materials should be managed during the dump construction and especially during the initial placement over the existing topography. Geotechnically-trained personnel should regularly characterize the waste materials that are being excavated from the pit and hauled to the waste dumps. Within the overburden piles, wet or soft materials should be placed away from the toe of the piles or the slope face.

Seasonality

During the winter seasons, the shallow foundation conditions can become frozen. At some mine sites within British Columbia, instabilities have occurred where foundations have been quickly loaded during winter and the shallow frost zone has limited time to dissipate any elevated pore

Advance Rates

A case study stability chart for dump height versus advance rate is provided in Figure 9-1 for short-term mine planning guidance. The actual stability relationship between advance rate and dump height is site-specific and can be determined from the geotechnical inspections and monitoring data.

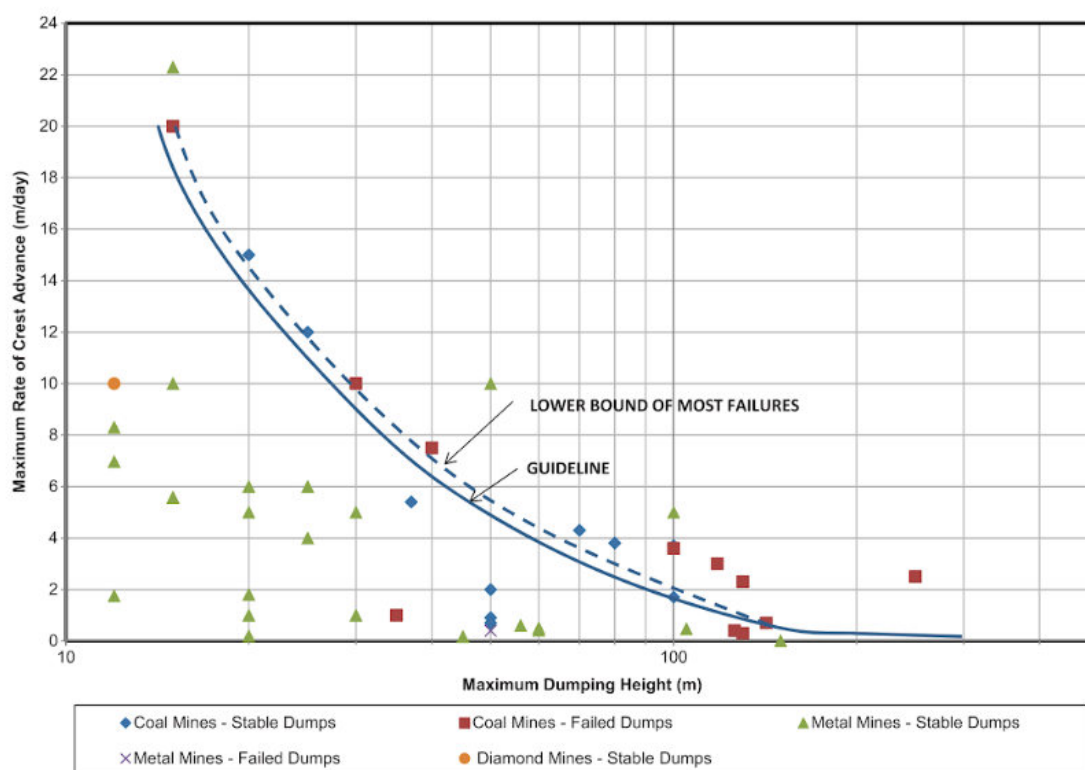


Figure 9-1: Plot of dump crest advance rate versus dump height (Hawley and Cunning, 2017)

9.4 Surface Water Management

As discussed, limiting the influence of surface water infiltration into the finer-grained dump materials is critical for the long-term stability conditions. Surface water management structures have been incorporated into the mine design, and the following mine operations aspects considered:

- Engineered drainage systems that can transmit base and peaks flows without compromising the stability of the dump.
- Minimise infiltration into the dump that could contribute to elevated pore pressures and reduced stability conditions.
- Avoid ponding of water on the dump surface that infiltrate and/or cause erosion of the weak, fine grained materials.
- Avoid surface run-off toward the dump slope faces that could contribute to erosion and gullyng.

9.5 Monitoring

Implementation of a robust monitoring program will be needed to validate the design stability conditions detailed in this report and provide data to reliably predict stability risks. In addition to regular slope inspections by mine personnel, quarterly audits should be carried out by a qualified geotechnical engineer.

Groundwater Monitoring

A groundwater monitoring network has been established at Tenas. The standpipe piezometers should be regularly monitored to validate the groundwater assumptions used in the stability analyses. Seasonality trends observed within the monitoring data should be tested with ongoing stability analyses as mining progresses.

Following completion of the overburden piles, vibrating wire piezometers should be installed within the piles to monitor pore pressures within the structure and foundations. The existing groundwater monitoring network should be utilized to review any local changes in conditions as the piles are constructed. The pore pressure data should be regularly reviewed to identify risks associated with elevated pressures, seasonal affects and to provide input into stability analyses that will be needed to validate the long-term stability.

Slope Extensometers

The pile platforms should be inspected for signs of deformation, including for example tension cracks (i.e. settlement), over-steepening, and bulging. Wireline extensometers should be installed across the front of the higher overburden pile platform crests to monitor the development of cracks and displacement rates (Figure 9-2). If settlement rates show an increasing trend, consideration would be given to the following:

- Reducing the dumping rates.
- Prioritising the addition of higher quality waste rock material to the dump.
- Spreading the waste rock over a wider strike length of crest.
- Temporary closure of the dump.

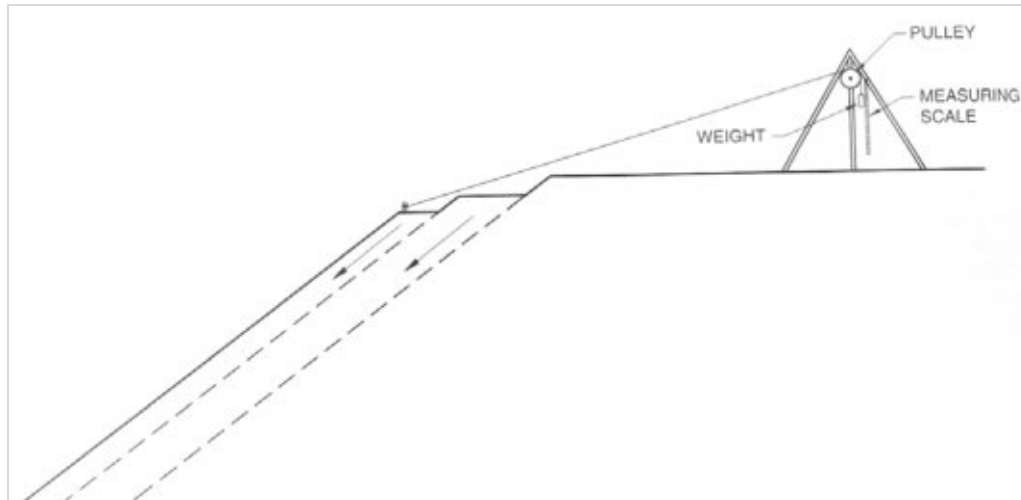


Figure 9-2: Schematic of a manual wireline extensometer (Hawley and Cunning, 2017)

Inclinometers and Time Domain Reflectometry

The internal stability of the overburden dump platforms may need to be monitored with inclinometers or time domain reflectometry (TDR) instrumentation if significant displacements are observed. The inclinometers and TDR instrumentation can detect any lateral displacement within the dumps that can not be visually observed or recorded with surface monitoring equipment (i.e. wire line extensometer).

Stream and Rock Drain Flow Gauges

Flow measurements in the natural drainages should be monitored to validate the design assumptions used evaluate infiltration into the external piles. The infiltration should be regularly reviewed to identify any slope or foundation stability risks and evaluate the slope performance aspects.

At the locations of the flow gauges, regular water quality monitoring should be carried out in order to assess the geochemistry and total dissolved sediments of the water that has passed through the run of mine or external piles (i.e. coal rock rejects piles).

10 Conclusions and Recommendations

Pit slope stability assessment has been carried out to guidance provided by the BCMWRP (1991) and the more recent *Guidelines to Waste Rock and Stockpile Design* publication (Hawley and Cunning, 2017). The results of 2018 and 2019 field investigations have been used to characterize the foundation conditions underlying the external overburden pits, and the footwall slope conditions for the pit backfills. Representative stability sections were analyzed, and the results indicated acceptable design conditions for the two groundwater scenarios modelled. Based on the results of the analyses, it is acknowledged that infiltration and potential for saturation of the finer-grained overburden pile materials will need review through construction, and is considered a stability risk at end of construction.

General recommendations have been provided throughout the report. The design criteria, operational procedures and monitoring, detailed in Section 9, will need to be adhered to through the construction of the piles at Tenas. The following specific recommendations are provided for detailed design work or to reduce possible slope risks in the long-term:

- To obtain acceptable long-term stability conditions for the north slopes of the Central and South External OVB Piles, coarse waste rock from pit excavation should be used to construct the initial two 10-m platforms to buttress the overlying platforms and support long-term drainage along the face of the piles. The volume of these platforms isn't significant as the platforms will be built into the upsloping topography. Alternatively, a coarse rock wrap or buttress could be placed at the end of pile construction. The general area where downslope support is needed is shown in Figure 10-1.
- The southern toe of the North External OVB Pile should be relocated a minimum distance of 50 m from the crest of the Management Pond. This is to provide contingency for a low probability run-out event that could impact the Management Pond during operations. Additionally, this will provide enough operating width to construct diversion water structures between the proposed Management Pond dike and the toe of the dump.

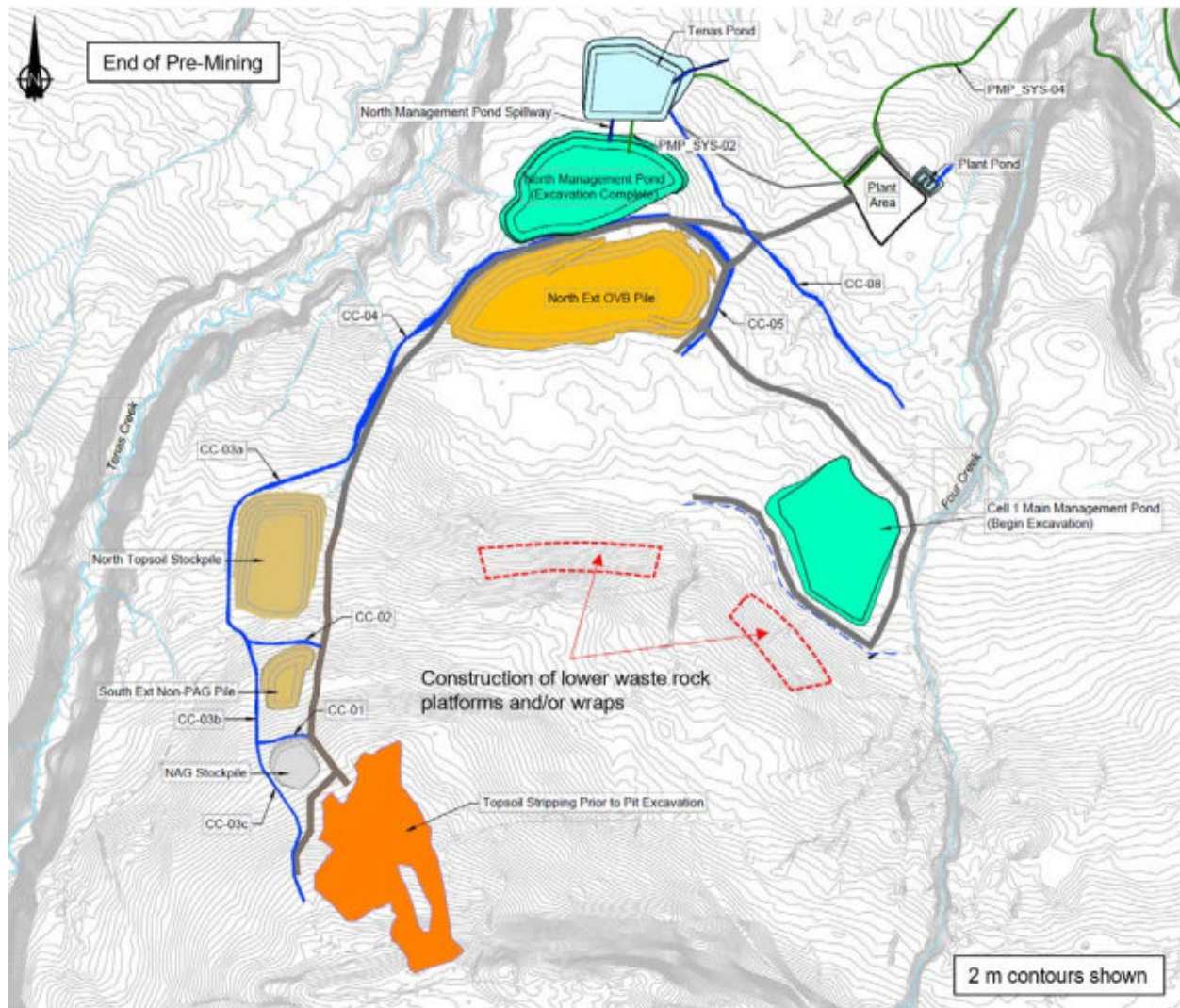


Figure 10-1: Recommended downslope areas for waste rock platforms or wraps

11 Risks and Opportunities

11.1 Risks

- The long-term stability through the north side of the Central and South External Overburden Piles require consideration throughout construction. Infiltration into the overburden piles is expected to result in partial saturation of the finer-grained materials in the longer term and elevated pore pressures that could drive an instability event following the completion of construction. Based on the results of the stability analyses, an R_u coefficient of 0.2 could be problematic for the design stability conditions assessed in this study. Ongoing stability analyses should be conducted to validate the design stability conditions using inputs from the installation of vibrating wire piezometers within the overburden dumps.
- Although the location of the Management Ponds is located away from the main body of most of the overburden piles, there are risks associated with any infrastructure located downslope of a constructed slope.
- The construction of the in-pit backfills are to be advanced over previously mined footwall slopes. Where there is local undercutting of the footwall, the loading from the rock could contribute to planar sliding mechanisms. The advancement across any undercut footwall is critical to supporting the overall foundation stability of the backfill complexes.
- Water management above and around the dumps is required to reduce erosion and infiltration leading to increase pore pressures within the pile platforms and foundations. Inadequate implementation and maintenance of the water management structures and operations could result in adverse stability conditions.

11.2 Opportunities

- The overall slope angles for the soil piles may be improved on a case-by-case basis should available coarse NAG waste rock be available to construct the lower platforms and/or to form wraps around the downslope slope face, in combination with adequate stability performance demonstrated by the as-constructed slopes.
- Opportunities exist to increase the height of the currently designed soil and rocks to reduce their footprint. This would be contingent on construction of coarse NAG waste rock in the lower platforms and/or to form wraps around the downslope slope face, in combination with adequate stability performance demonstrated by the as-constructed slopes.

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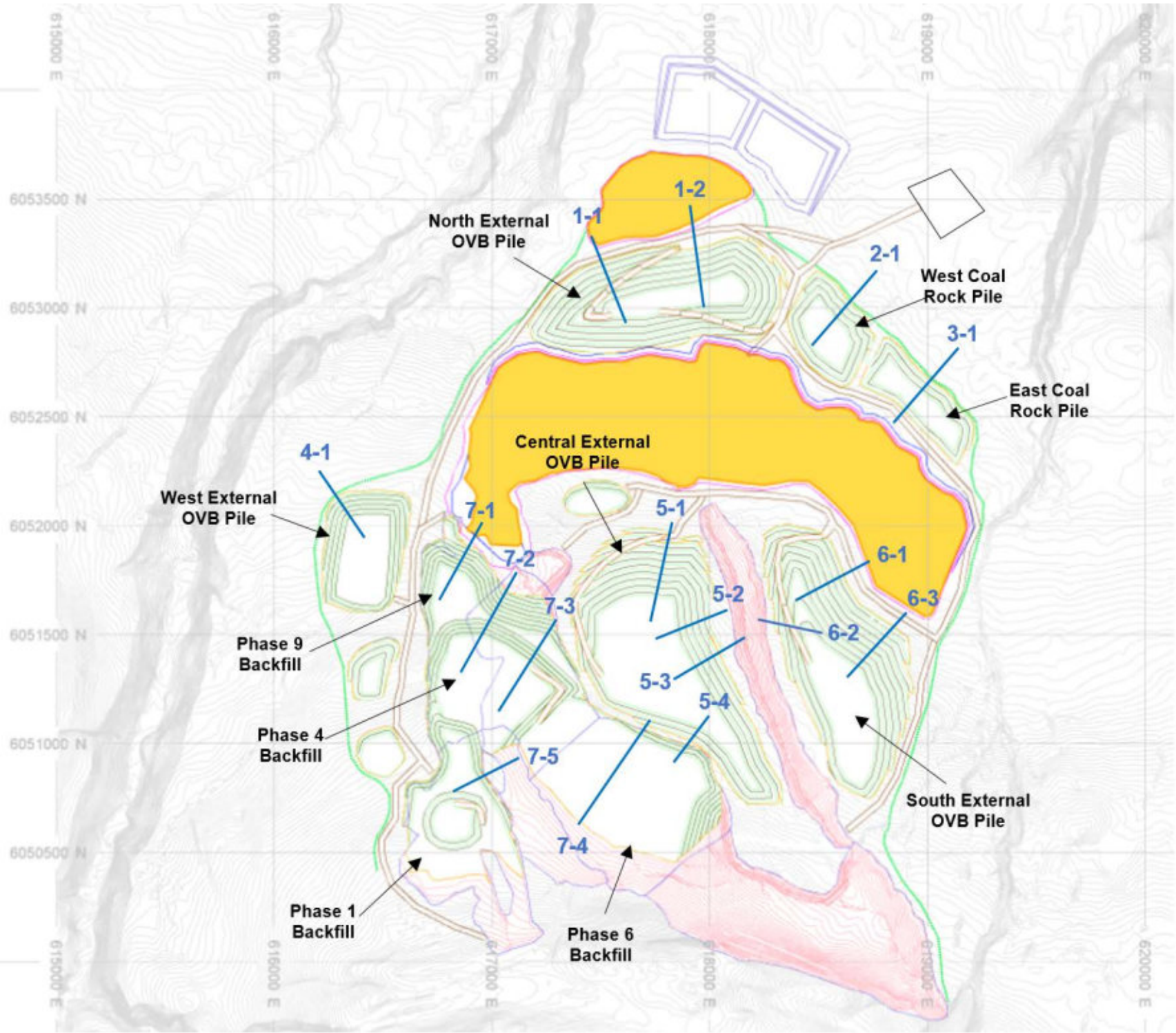
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Appendix A: Results of Stability Analyses

STABILITY ANALYSES RESULTS

STABILITY SECTION LOCATION PLAN



 Job No: 2CI009.017	 TENAS PROJECT	PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		TENAS PILE SLOPE STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:

STABILITY ANALYSES RESULTS

GEOTECHNICAL STRENGTH PARAMETERS

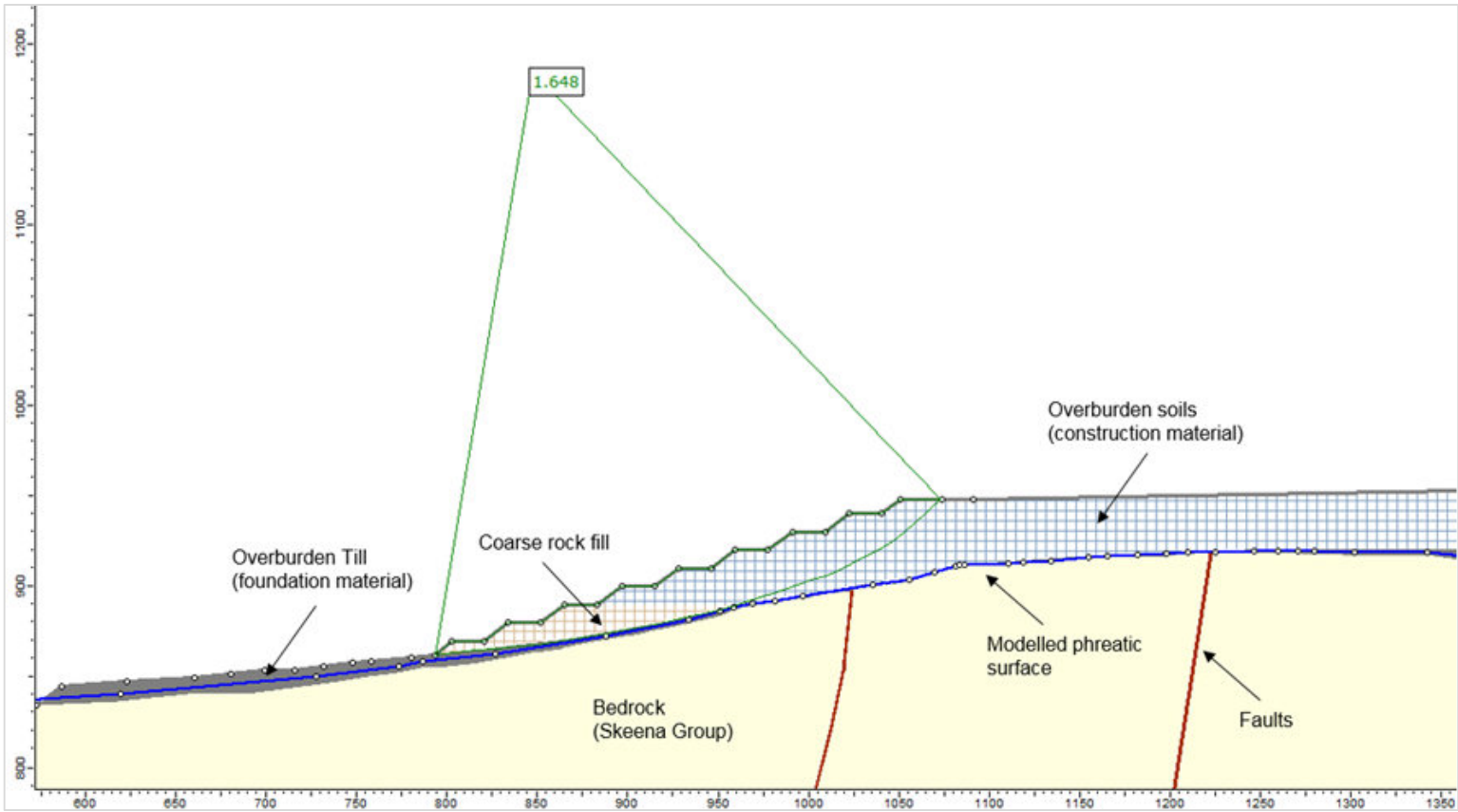
Material	Type	Failure Criterion	Unit Weight (kN/m³)	Mohr-Coulomb Strength Parameters		Hoek-Brown Strength Parameters			Ru Coefficient
				Friction Angle (°)	Cohesion (kPa)	UCS (MPa)	GSI	mi	
Foundation	Till	Mohr-Coulomb	18	30	5	-	-	-	-
	Weak Bedding Plane	Mohr-Coulomb	26	23	0	-	-	-	-
	Bedrock	Generalized Hoek-Brown	26	-	-	35	46	7	-
Pile Construction	Overburden Waste	Mohr-Coulomb	18	27	0	-	-	-	0.0 / 0.2
	Coase Rock	Mohr-Coulomb	19	37	0	-	-	-	-
	Coal Rejects	Mohr-Coulomb	19	35	0				

DESIGN ACCEPTANCE CRITERIA

Possible Consequence	Data Confidence¹	Static Analyses		Pseudo-Static Analyses
		Minimum FOS	Maximum POF	Minimum FOS
Low	Low	1.3-1.4	10-15%	1.05-1.1
	Moderate	1.2-1.3	15-25%	1.0-1.05
	High	1.1-1.2	25-40%	1.0
Moderate	Low	1.4-1.5	2.5-5%	1.1-1.15
	Moderate	1.3-1.4	5-10%	1.05-1.1
	High	1.2-1.3	10-15%	1.0-1.15
High	Low	>1.5	<1%	1.15
	Moderate	1.4-1.5	1-2.5%	1.1-1.15
	High	1.3-1.4	2.5-5%	1.05-1.1

The acceptance criteria were compared against the results of the analyses for a deep-seated failure mechanism. For the piles at Tenas, a *moderate* possible failure consequence and a *moderate* data confidence was determined. A minimum static FOS of 1.3 and a pseudo-static FOS of 1.05 were evaluated for design purposes. In addition, selected short-term, during construction designs were analyzed, and these results were compared against a minimum design Factor of Safety (FOS) values ranging from 1.1 to 1.3 in accordance with BCMWRP (1991).

TYPICAL STABILITY SECTION

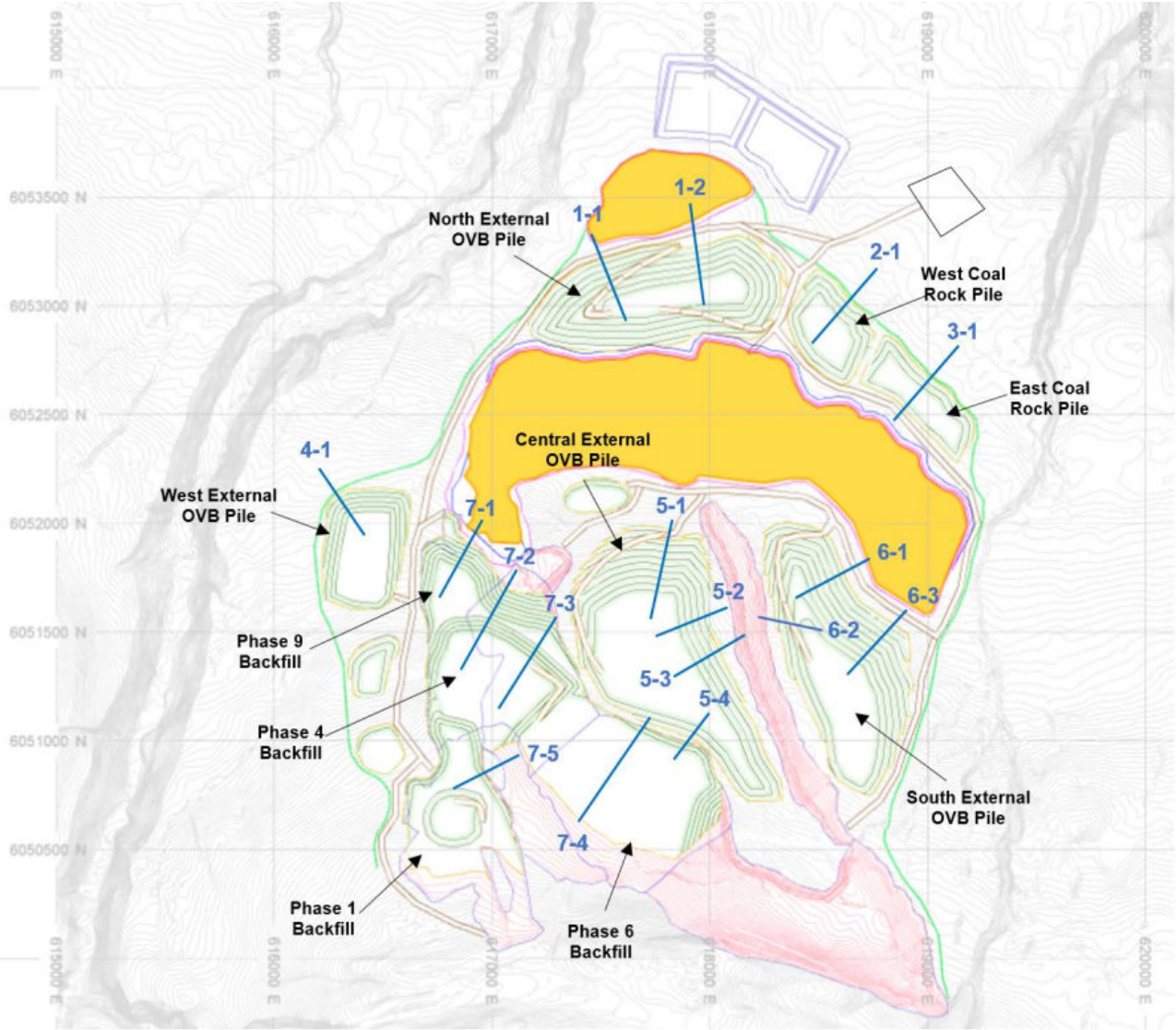


		PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		TENAS PILE SLOPE STABILITY ANALYSES		
Job No: 2CI009.017	TENAS PROJECT	Date: 2019/03/30	Approved:	Figure:

STABILITY ANALYSES RESULTS

SUMMARY OF RESULTS – EXTERNAL OVERBURDEN SOIL PILES

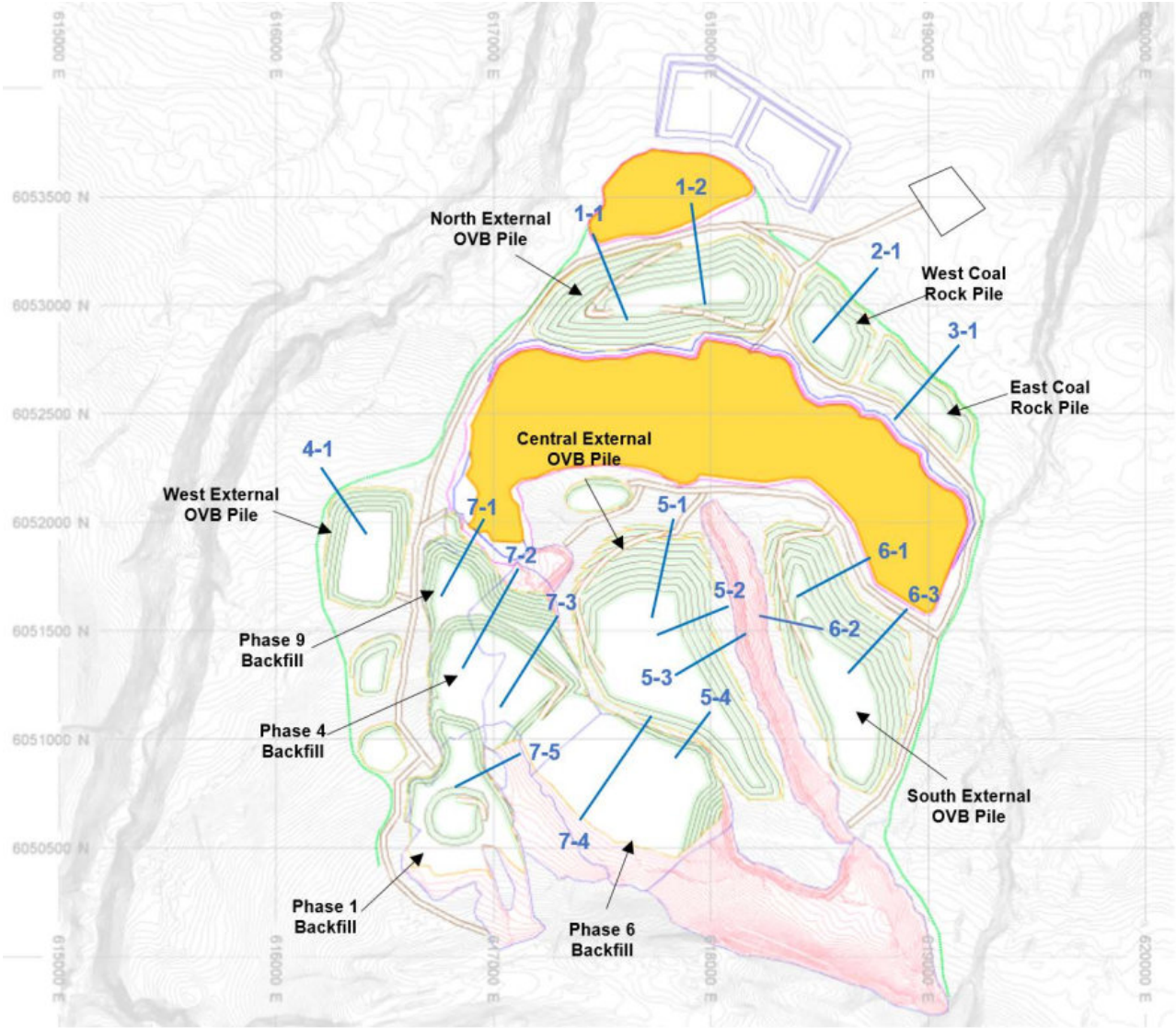
Overburden Pile	Stability Section	Modelled slope Height (m)	Modelled Groundwater Conditions	Static Conditions		Pseudo-static Conditions	
				Minimum Design FOS	Critical Modelled FOS	Minimum Design FOS	Critical Modelled FOS
North External OVB Pile	1-1	55	Phreatic Surface 10 m below ground surface	1.3-1.4	1.4	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.1
	-2	55	Phreatic Surface 10 m below ground surface	1.3-1.4	1.5	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
West External OVB Pile	4-1	40	Phreatic Surface 10 m below ground surface	1.3-1.4	1.7	1.05-1.1	1.6
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
Central External OVB Pile	5-1	45	Phreatic Surface 5 m below ground surface	1.3-1.4	1.5	1.05-1.1	1.4
			Ru 0.2 within Pile (with buttress)	1.3-1.4	1.6	1.05-1.1	1.5
	5-2	46	Phreatic Surface 5 m below ground surface	1.3-1.4	1.6	1.05-1.1	1.5
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
	5-3	48	Phreatic Surface 5 m below ground surface	1.3-1.4	1.4	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.6	1.05-1.1	1.2
	5-4	35	Phreatic Surface 5 m below ground surface	1.3-1.4	1.8	1.05-1.1	1.7
			Ru 0.2 within Pile	1.3-1.4	1.5	1.05-1.1	1.5
South External OVB Pile	6-1	55	Phreatic Surface 5 m below ground surface	1.3-1.4	1.5	1.05-1.1	1.4
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
	6-2	55	Phreatic Surface 5 m below ground surface	1.3-1.4	1.4	1.05-1.1	1.3
			Ru 0.2 within Pile	1.3-1.4	1.3	1.05-1.1	1.2
	6-3	57	Phreatic Surface 5 m below ground surface	1.3-1.4	1.7	1.05-1.1	1.4
			Ru 0.2 within Pile (with buttress)	1.3-1.4	1.3	1.05-1.1	1.1



STABILITY ANALYSES RESULTS

SUMMARY OF RESULTS – PIT BACKFILLS

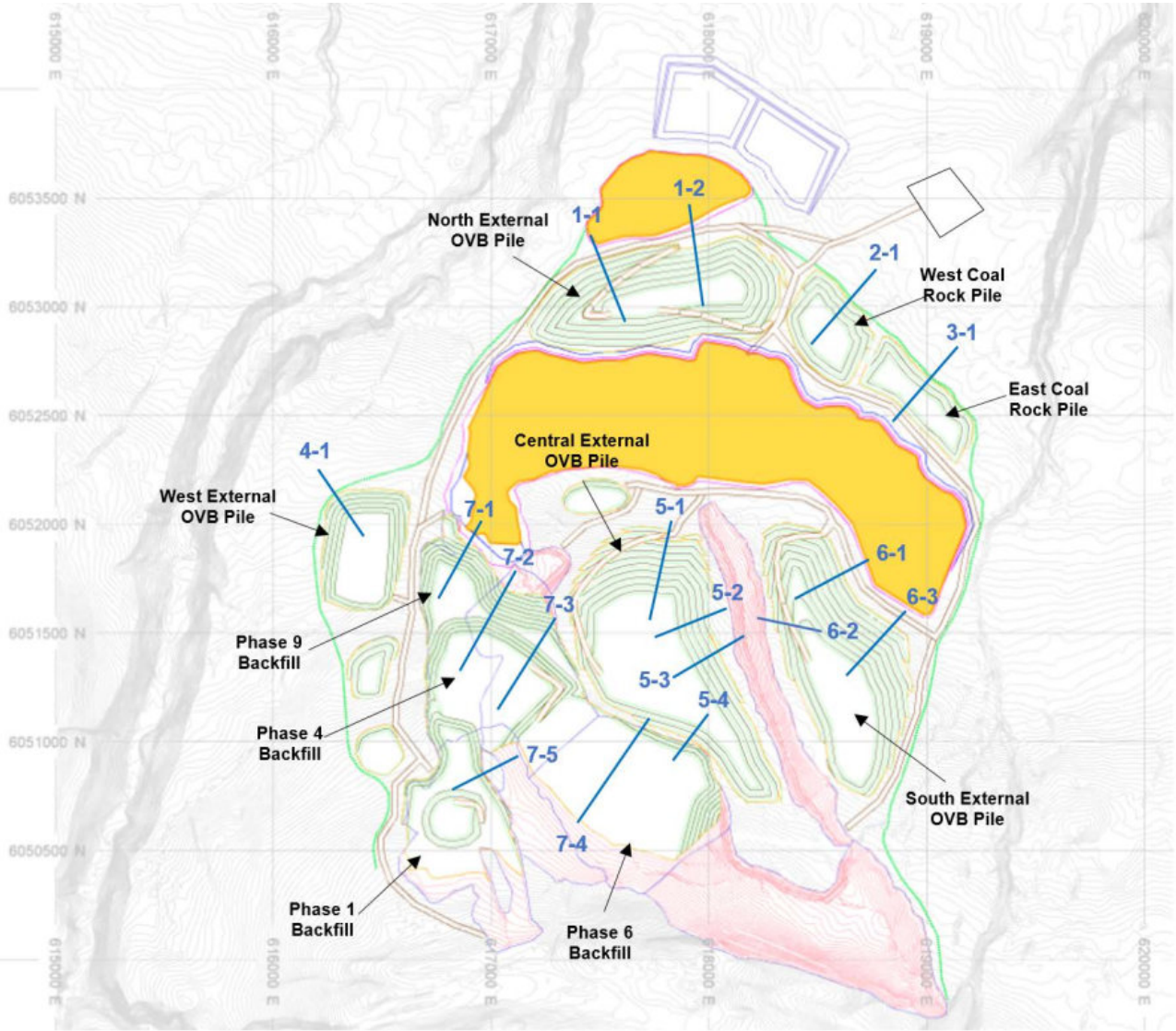
Backfill Pile	Stability Section	Modelled slope Height (m)	Construction Stage	Modelled Groundwater Conditions	Static Conditions		Pseudo-static Conditions	
					Minimum Design FOS	Critical Modelled FOS	Minimum Design FOS	Critical Modelled FOS
Phase 9 Backfill	7-1	43 ¹	During Construction	Footwall elevation	1.1	1.4	n/a	-
	7-1	50	End of Construction	Footwall elevation	1.3-1.4	1.5	1.05-1.1	1.3
Phase 9 (lower platform)	7-2	55	During Construction	Footwall elevation	1.1	1.3	n/a	-
Phase 9/Phase 4	7-2	85	End of Construction	Footwall elevation	1.3-1.4	1.3	1.05-1.1	1.2
Phase 4 (upper platform)	7-3	50	End of Construction	Footwall elevation	1.3-1.4	1.7	1.05-1.1	1.6
Phase 6	7-4	30	During Construction	Footwall elevation	1.1	1.2	n/a	-
	7-4	40 ¹	End of Construction	Footwall elevation	1.3-1.4	1.8	1.05-1.1	1.7
Phase 1	7-5	20 ¹	End of Construction	Footwall elevation	1.3-1.4	2.2	1.05-1.1	2.0



STABILITY ANALYSES RESULTS

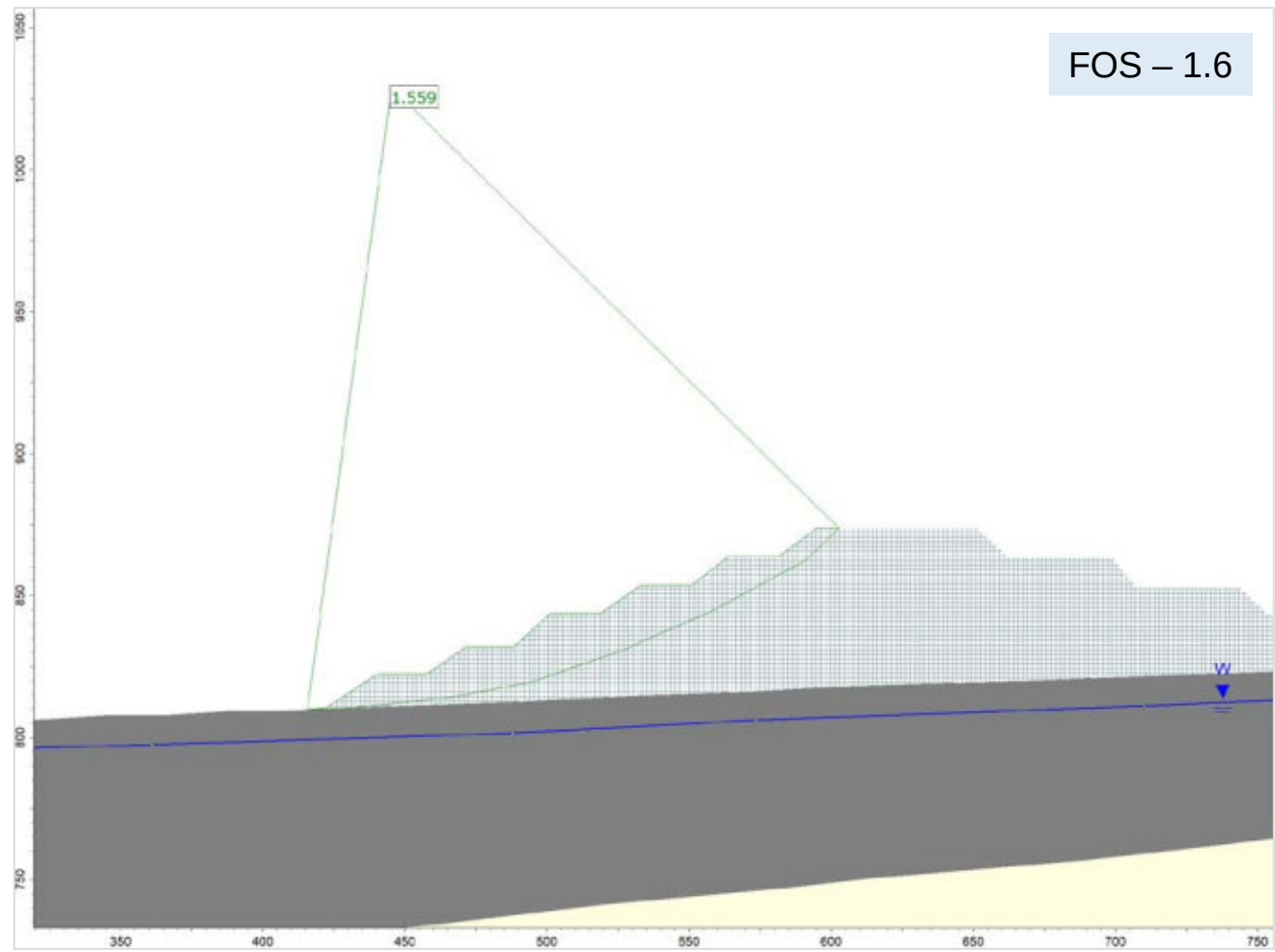
SUMMARY OF RESULTS – COAL ROCK REJECTS

Coal Rock Pile	Stability Section	Modelled Slope Height (m)	Modelled Groundwater Conditions	Static Conditions		Pseudo-static Conditions	
				Minimum Design FOS	Critical Modelled FOS	Minimum Design FOS	Critical Modelled FOS
West Coal Rock Pile	2-1	35	10 m below ground surface	1.3-1.4	2.1	1.05-1.1	1.9
East Coal Rock Pile	3-1	25	10 m below ground surface	1.3-1.4	2.2	1.05-1.1	2.1

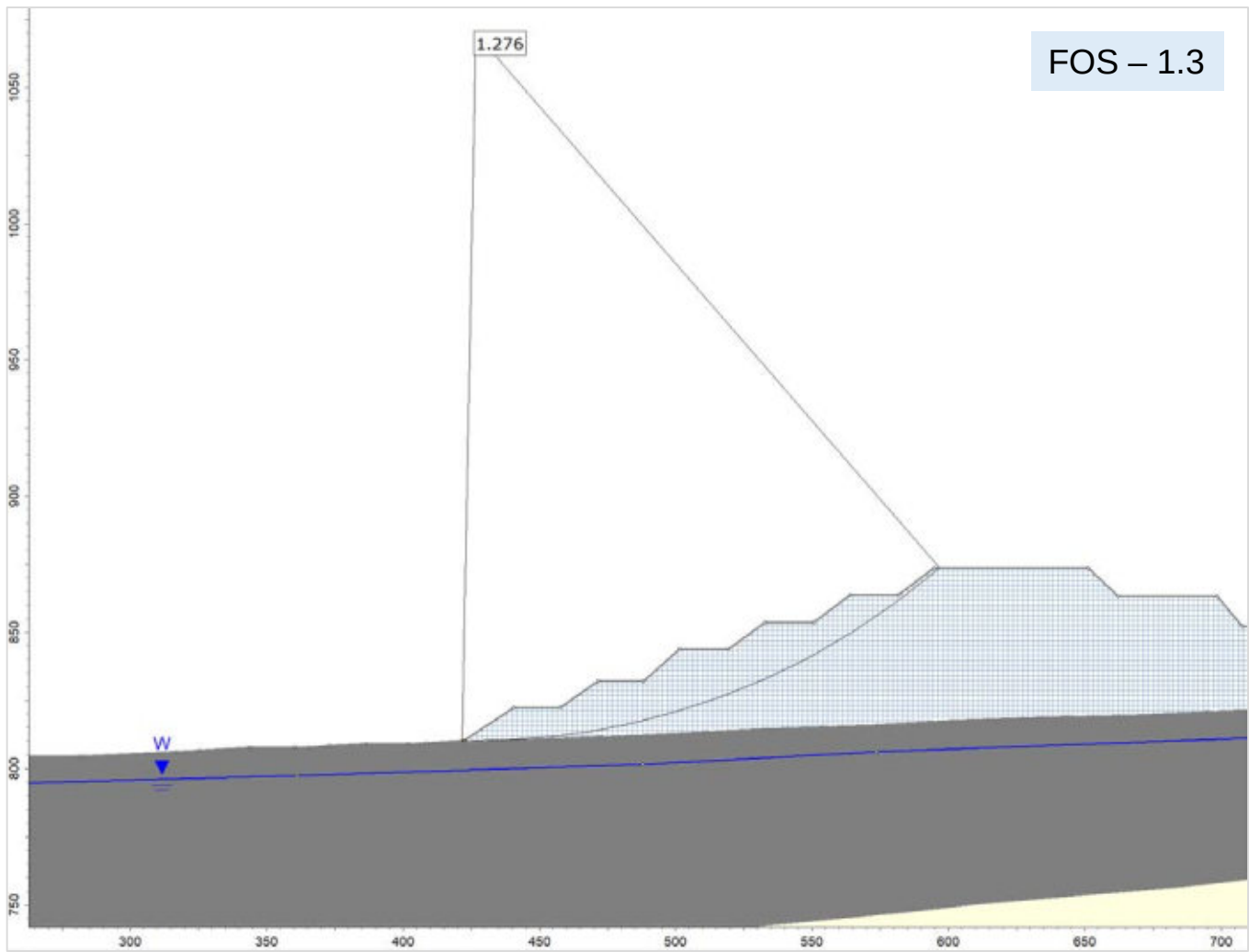


SECTION 1-1 – OVERBURDEN SOIL PILE STABILITY ANALYSES

SECTION 1-1 - PHREATIC SURFACE, STATIC CONDITIONS



SECTION 1-1 – Ru METHOD, STATIC CONDITIONS



PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT

SECTION 1-1 – STABILITY ANALYSES

Job No: 2CI009.017

TENAS PROJECT

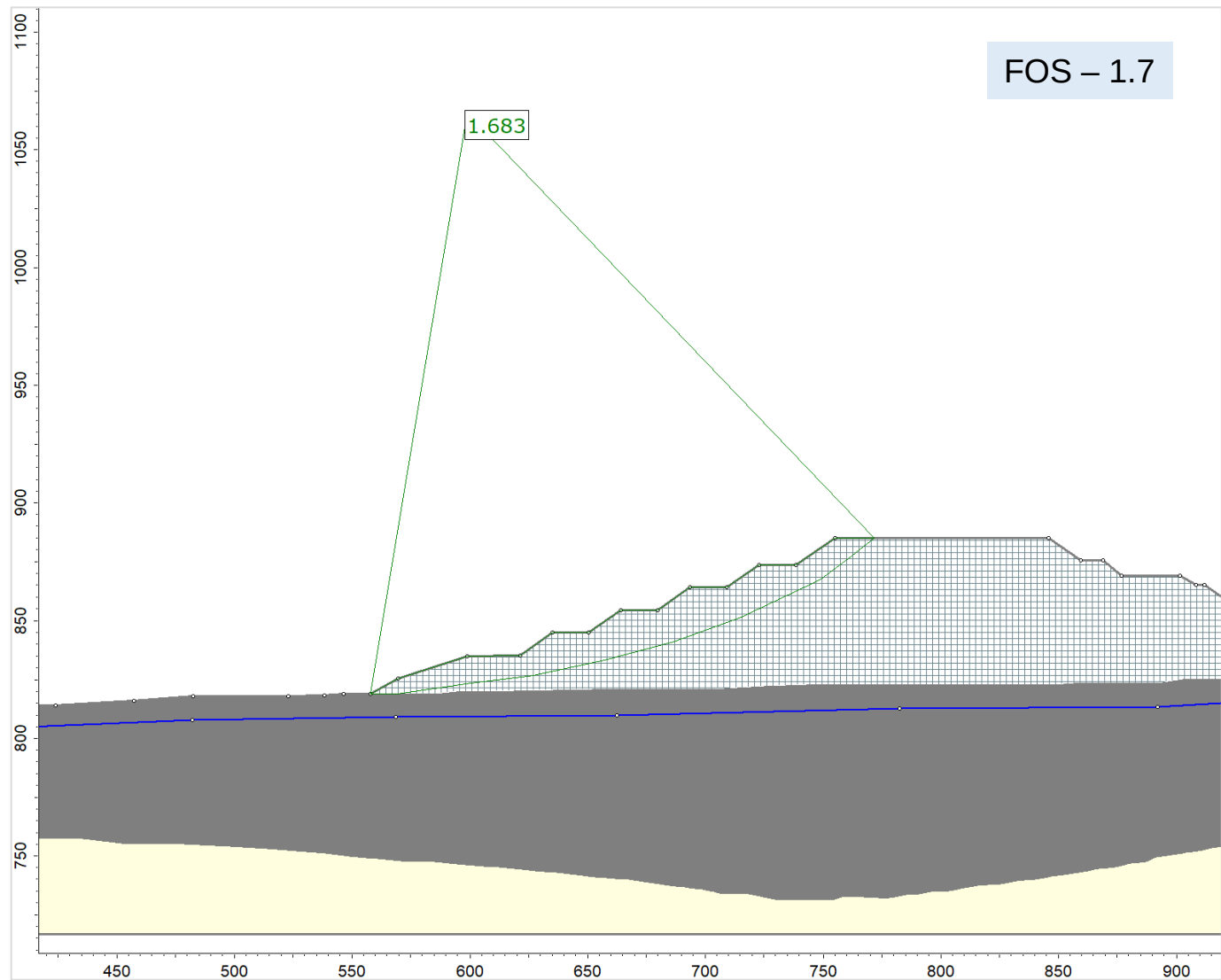
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Approved:

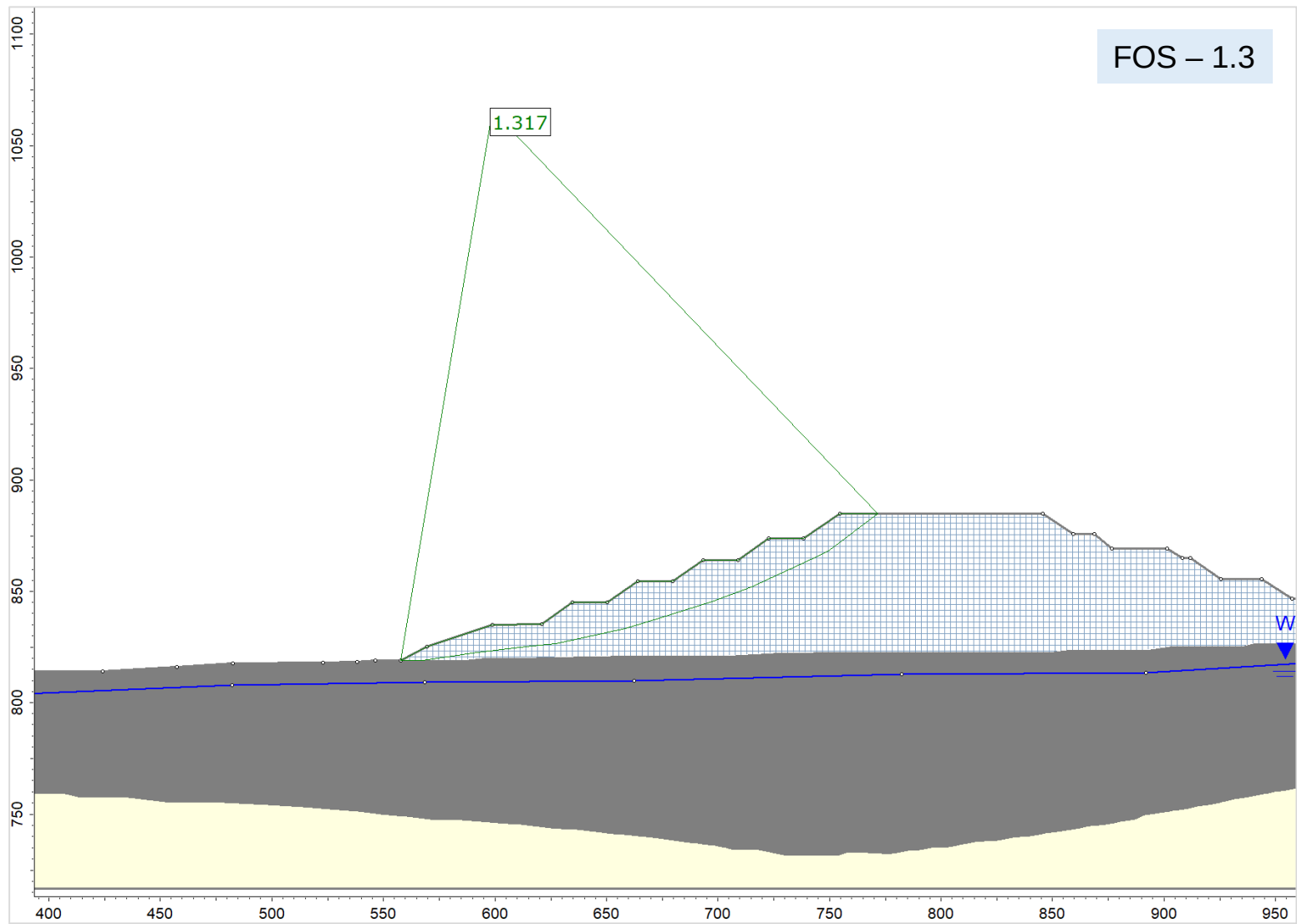
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SECTION 1-2 – OVERBURDEN SOIL PILE STABILITY ANALYSES

SECTION 1-2 - PHREATIC SURFACE, STATIC CONDITIONS



SECTION 1-2 – Ru METHOD, STATIC CONDITIONS



PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT

SECTION 1-2- STABILITY ANALYSES

Job No: 2CI009.017

TENAS PROJECT

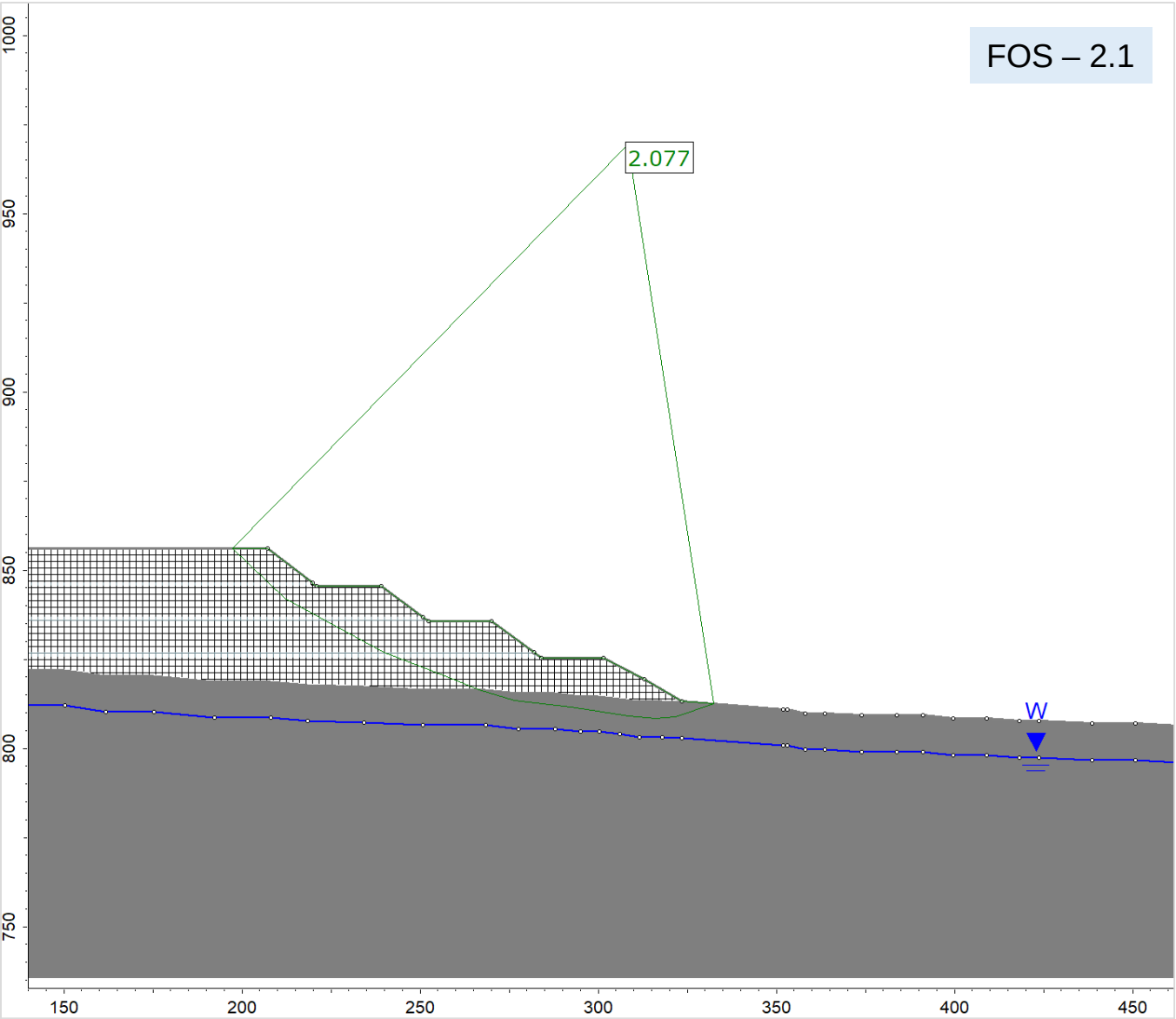
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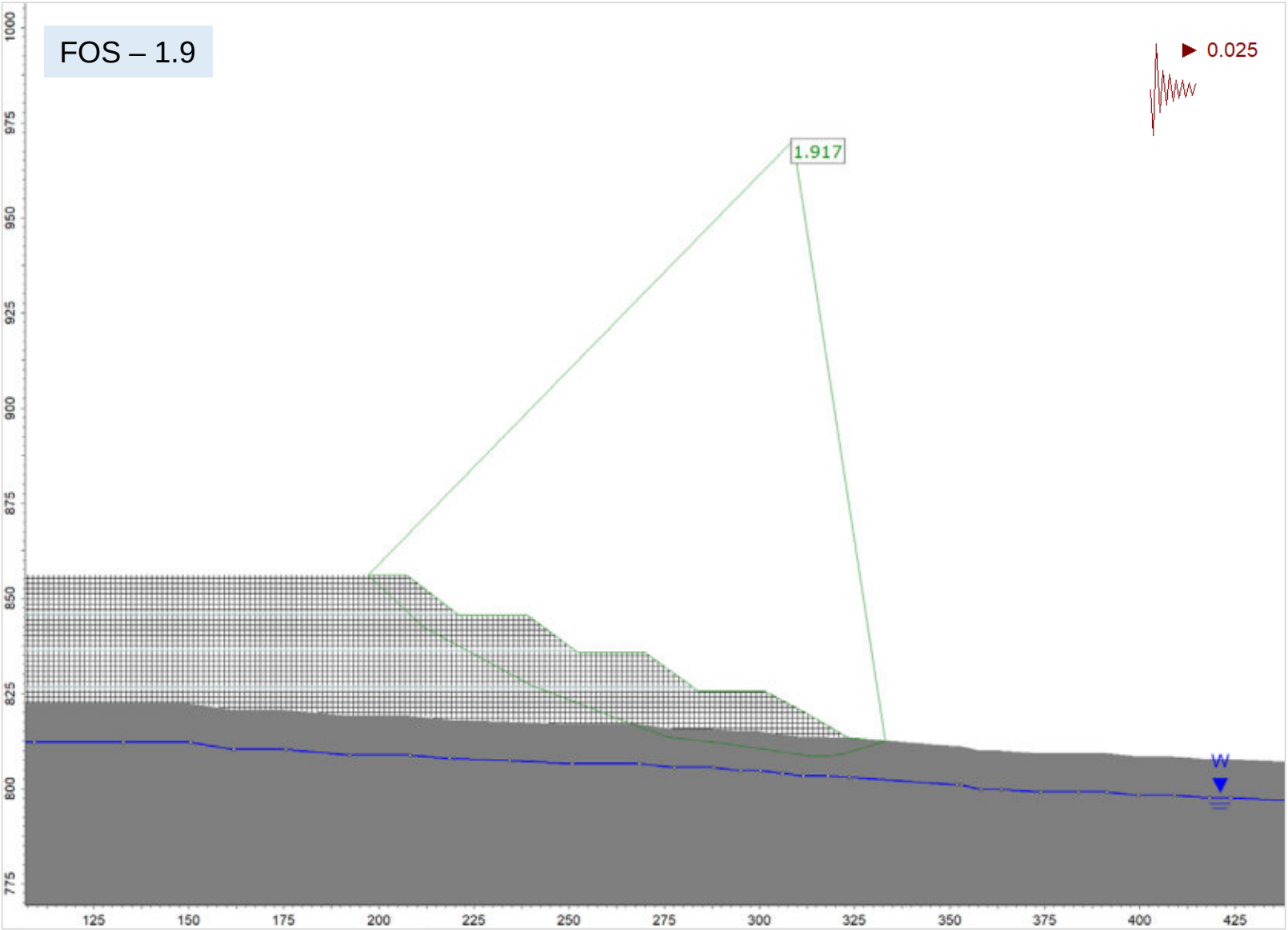
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SECTION 2-1 – COAL ROCK REJECTS STABILITY ANALYSES

SECTION 2-1 - PHREATIC SURFACE, STATIC CONDITIONS



SECTION 4-1 – PHREATIC SURFACE, PSEUDO-STATIC CONDITIONS



PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT

SECTION 2-1- STABILITY ANALYSES

Job No: 2CI009.017

TENAS PROJECT

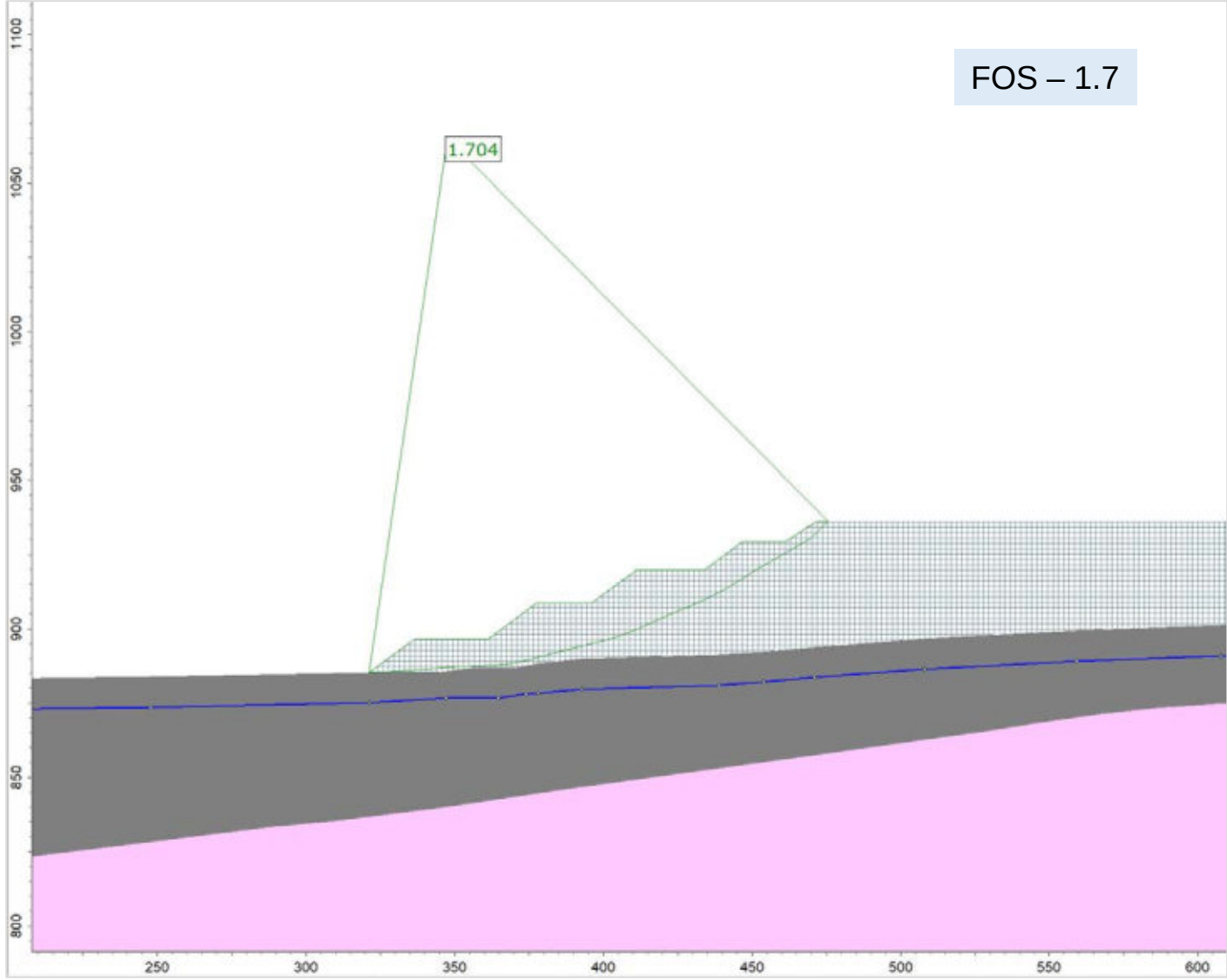
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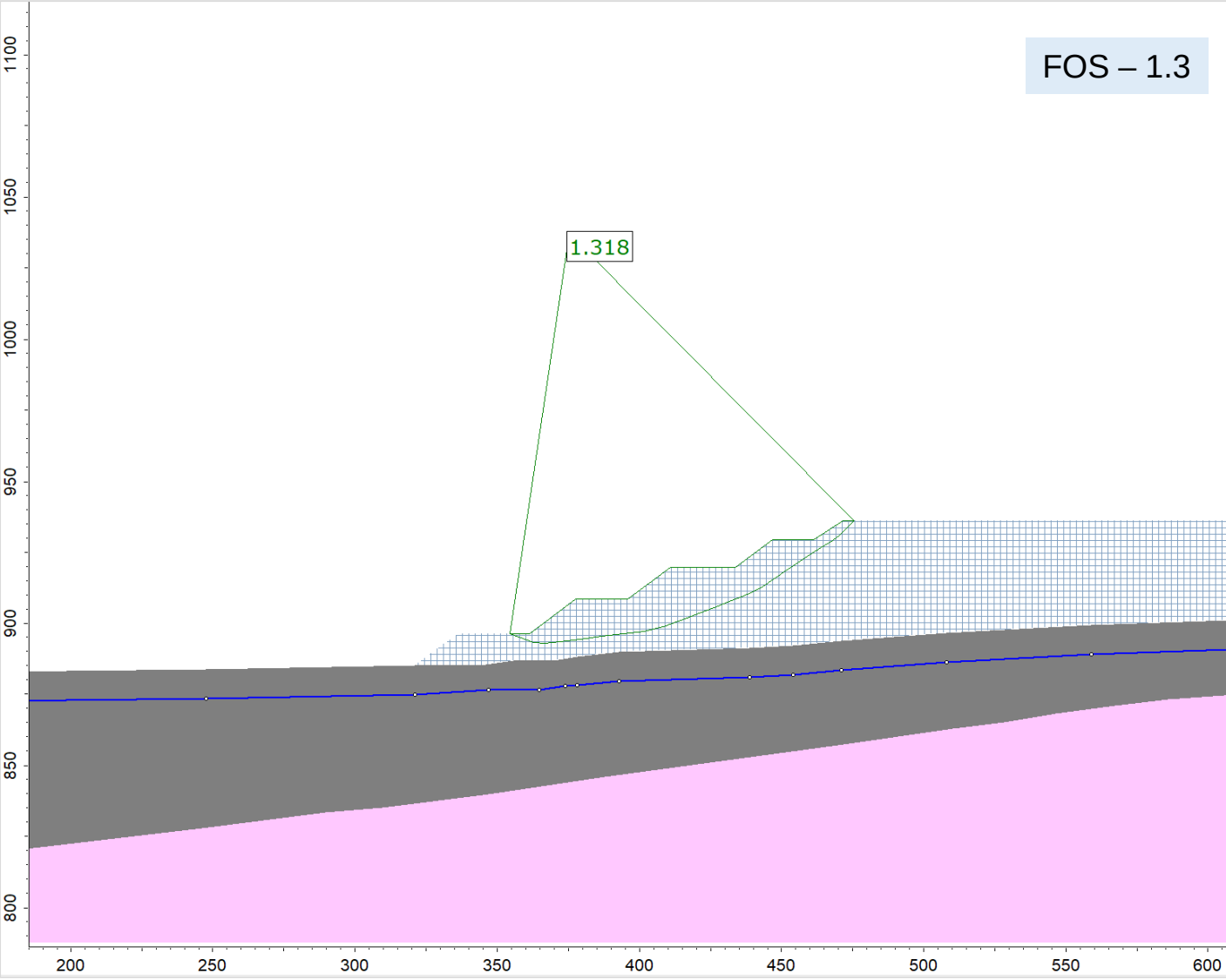
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SECTION 4-1 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 4-1 - PHREATIC SURFACE, STATIC CONDITIONS



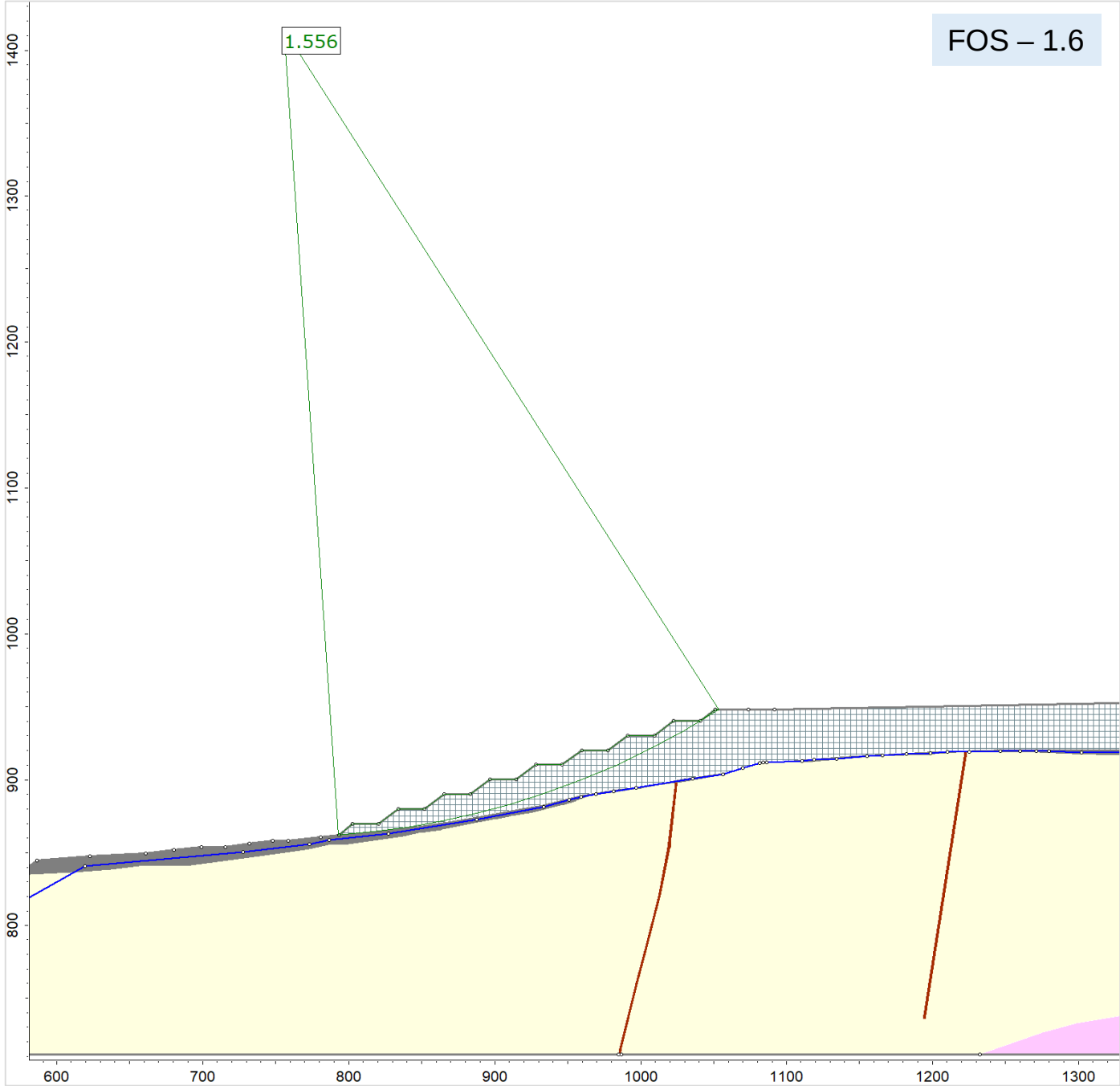
SECTION 4-1 – Ru METHOD, STATIC CONDITIONS



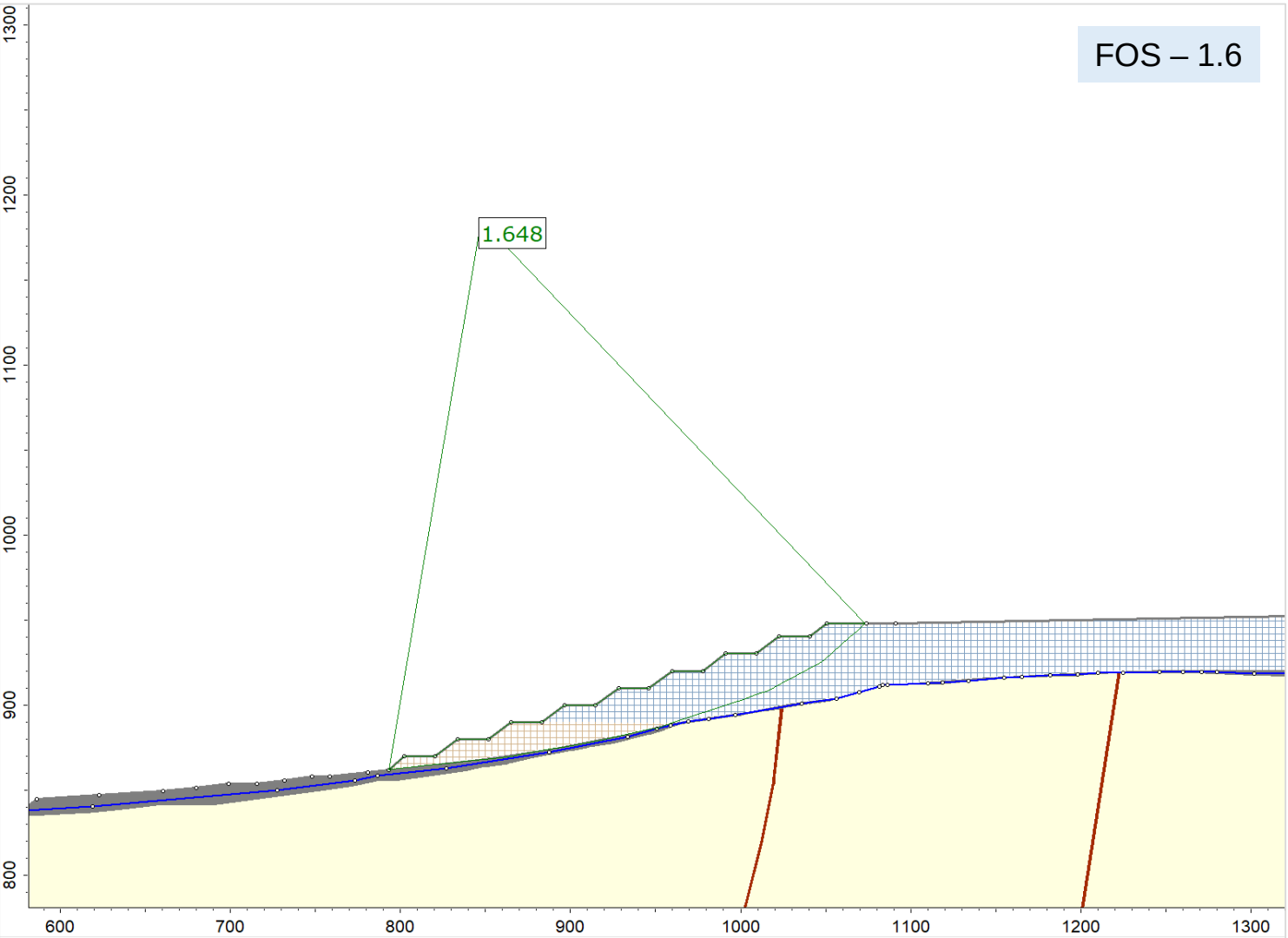
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		SECTION 4-1- STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 5-1 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 5-1 - PHREATIC SURFACE, STATIC CONDITIONS



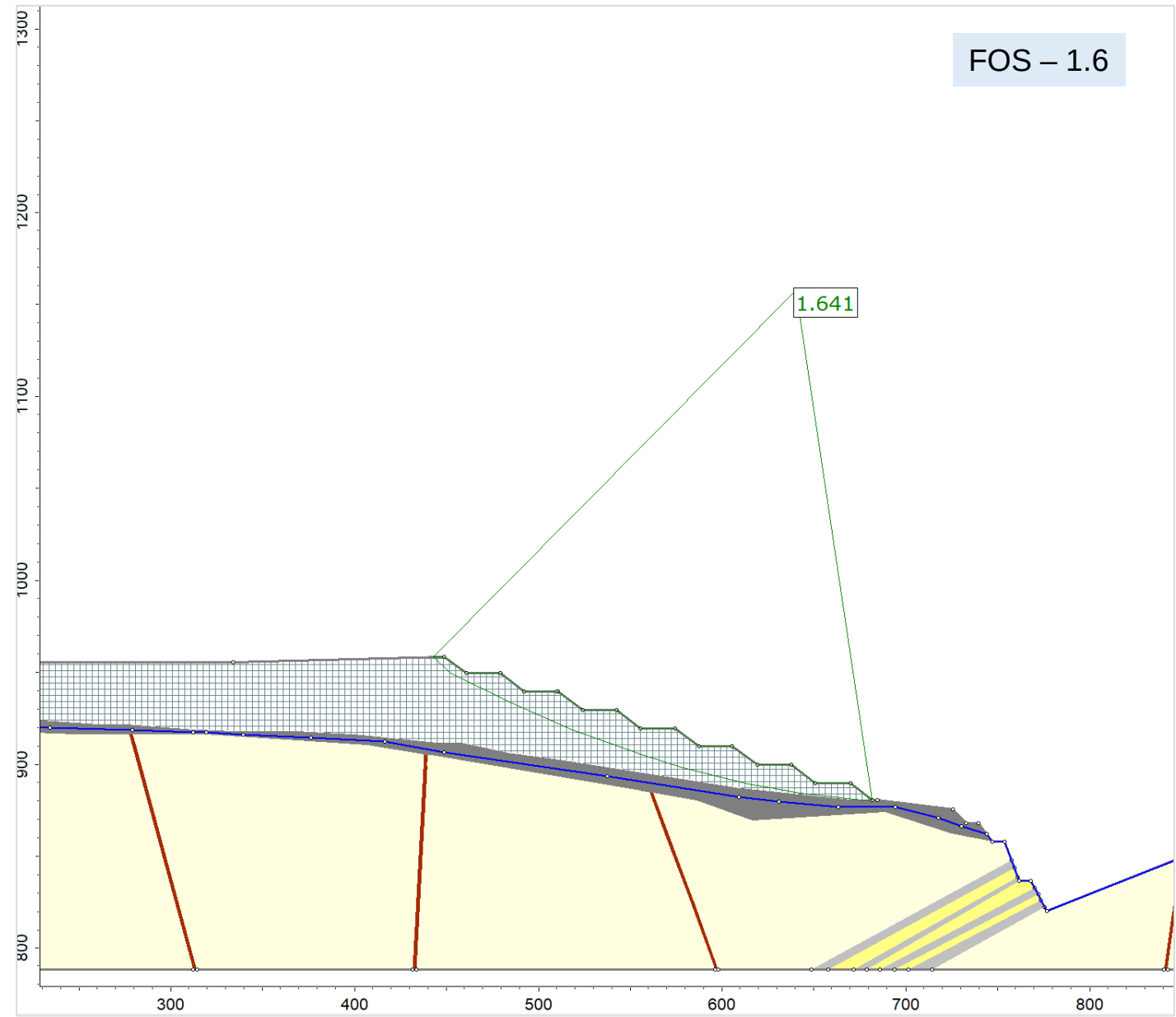
SECTION 5-1 (with buttress) – Ru METHOD, STATIC CONDITIONS



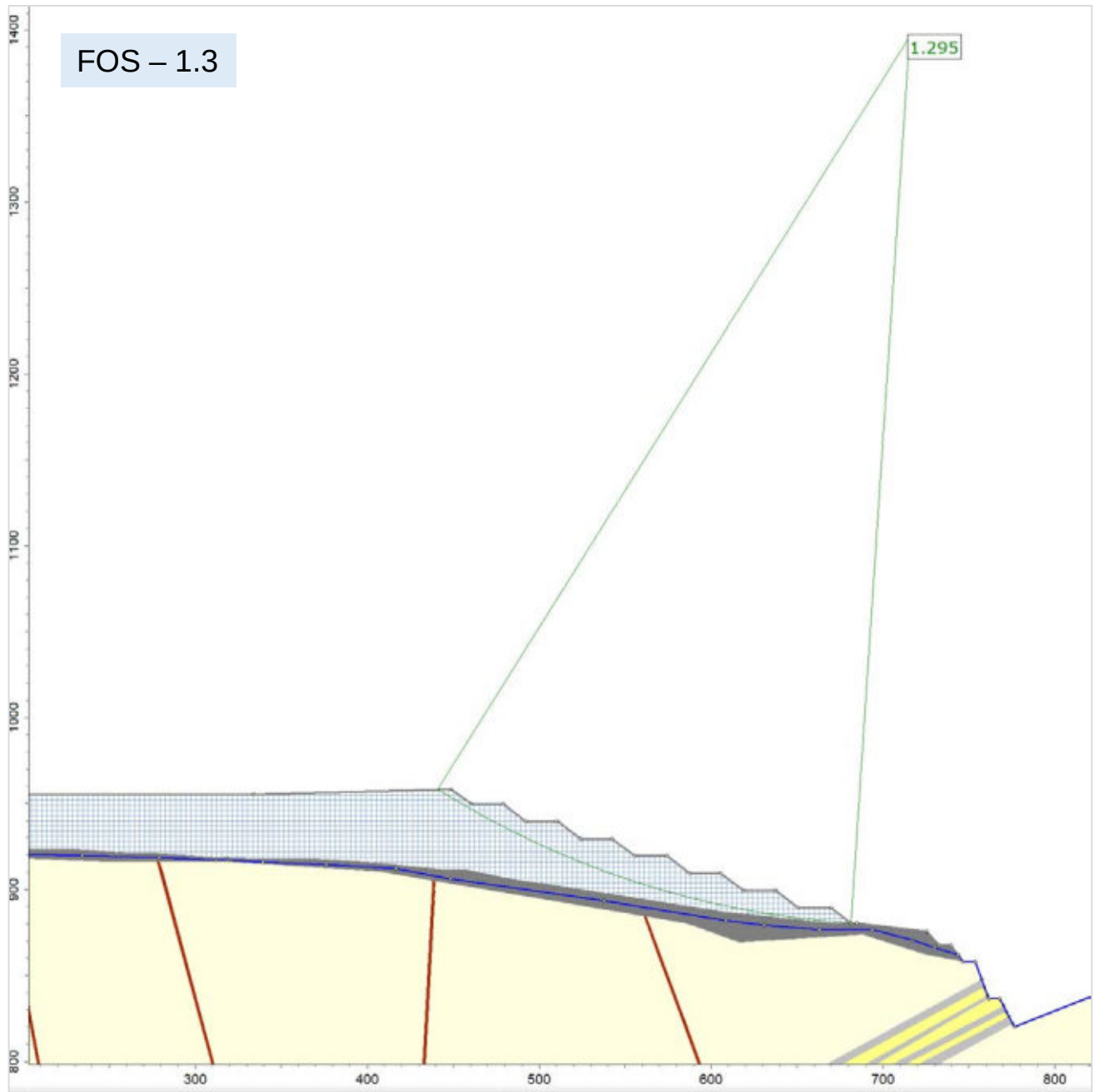
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		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 5-2 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 5-2 - PHREATIC SURFACE, STATIC CONDITIONS



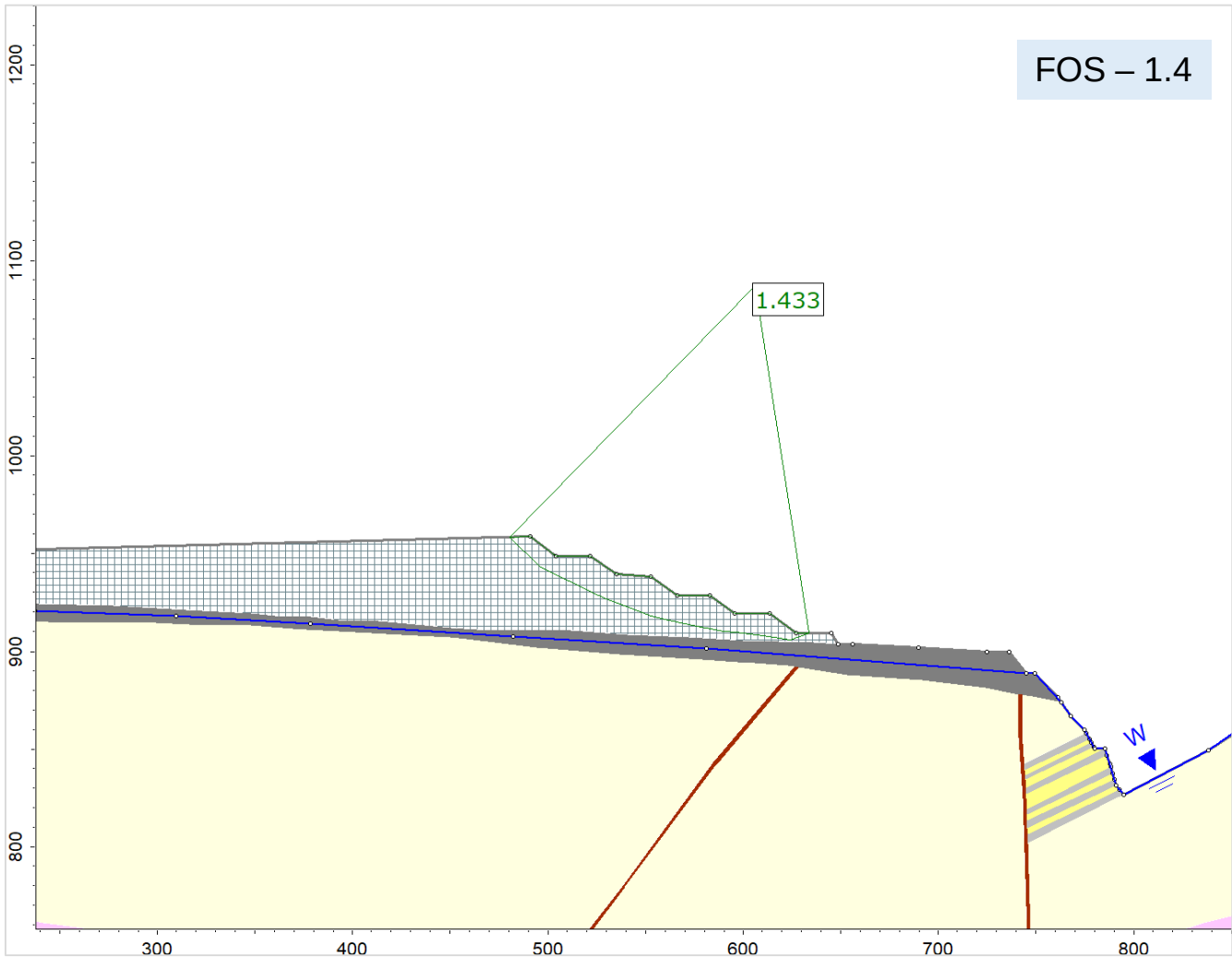
SECTION 5-2– Ru METHOD, STATIC CONDITIONS



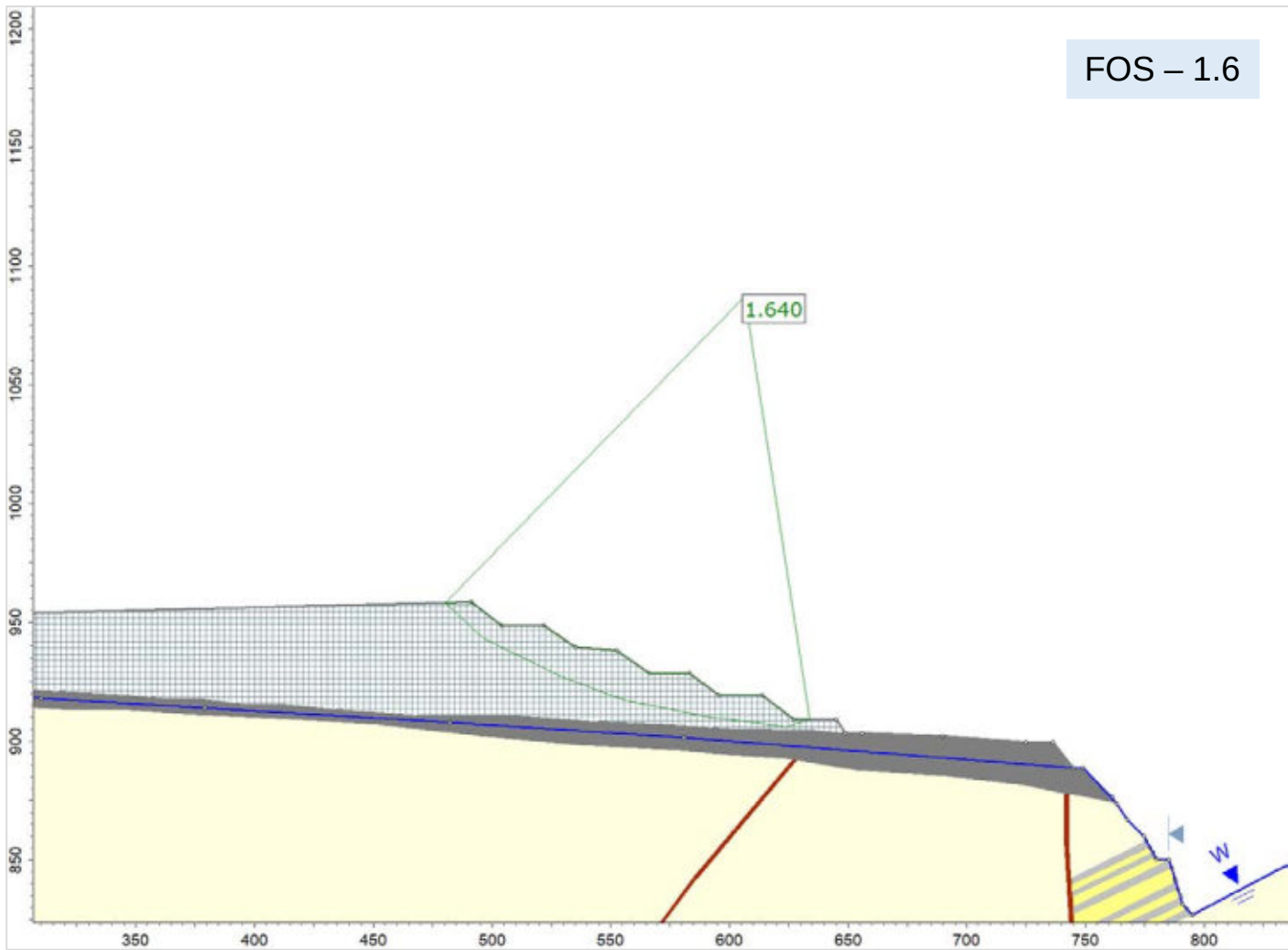
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		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 5-3 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 5-3 - PHREATIC SURFACE, STATIC CONDITIONS



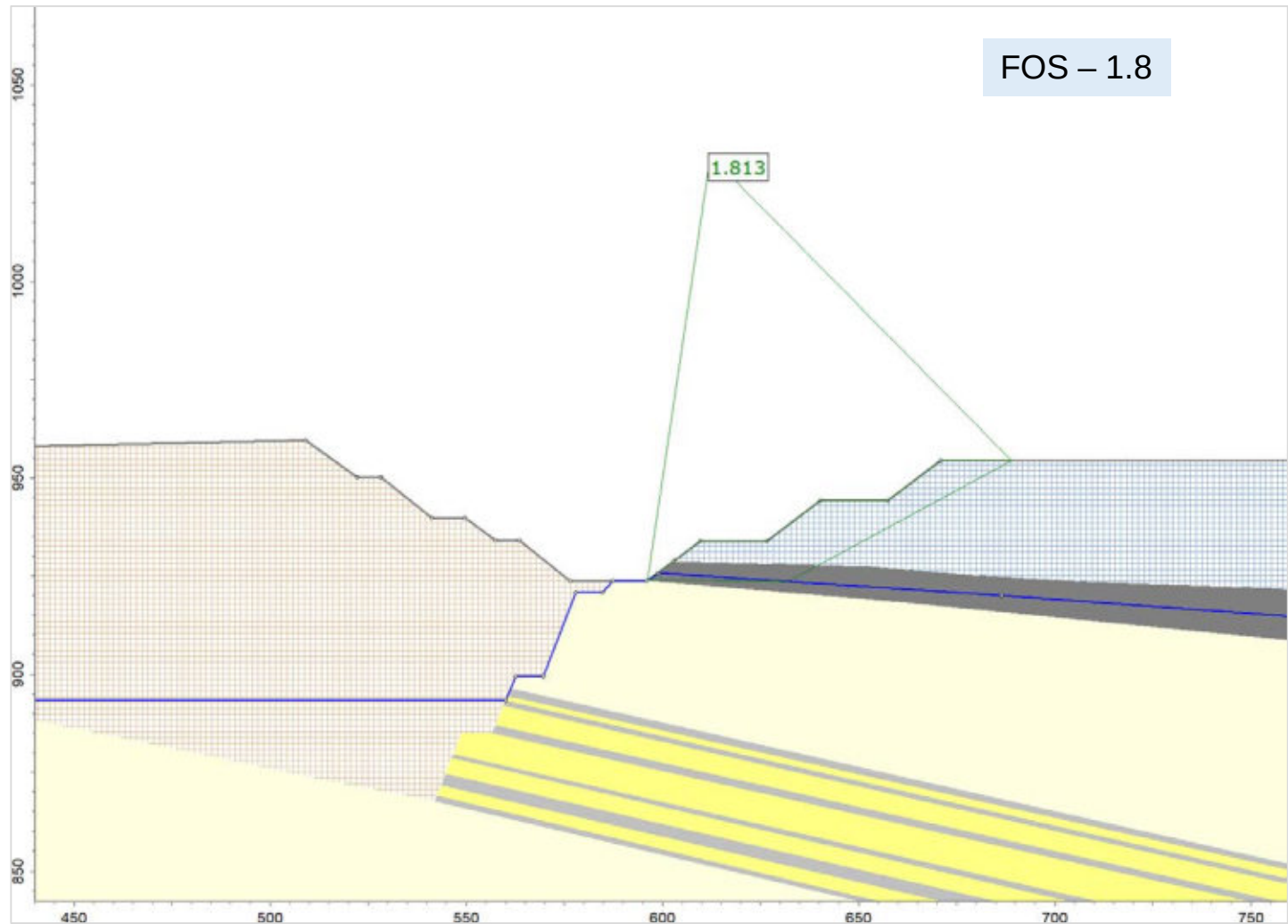
SECTION 5-3– Ru METHOD, STATIC CONDITIONS



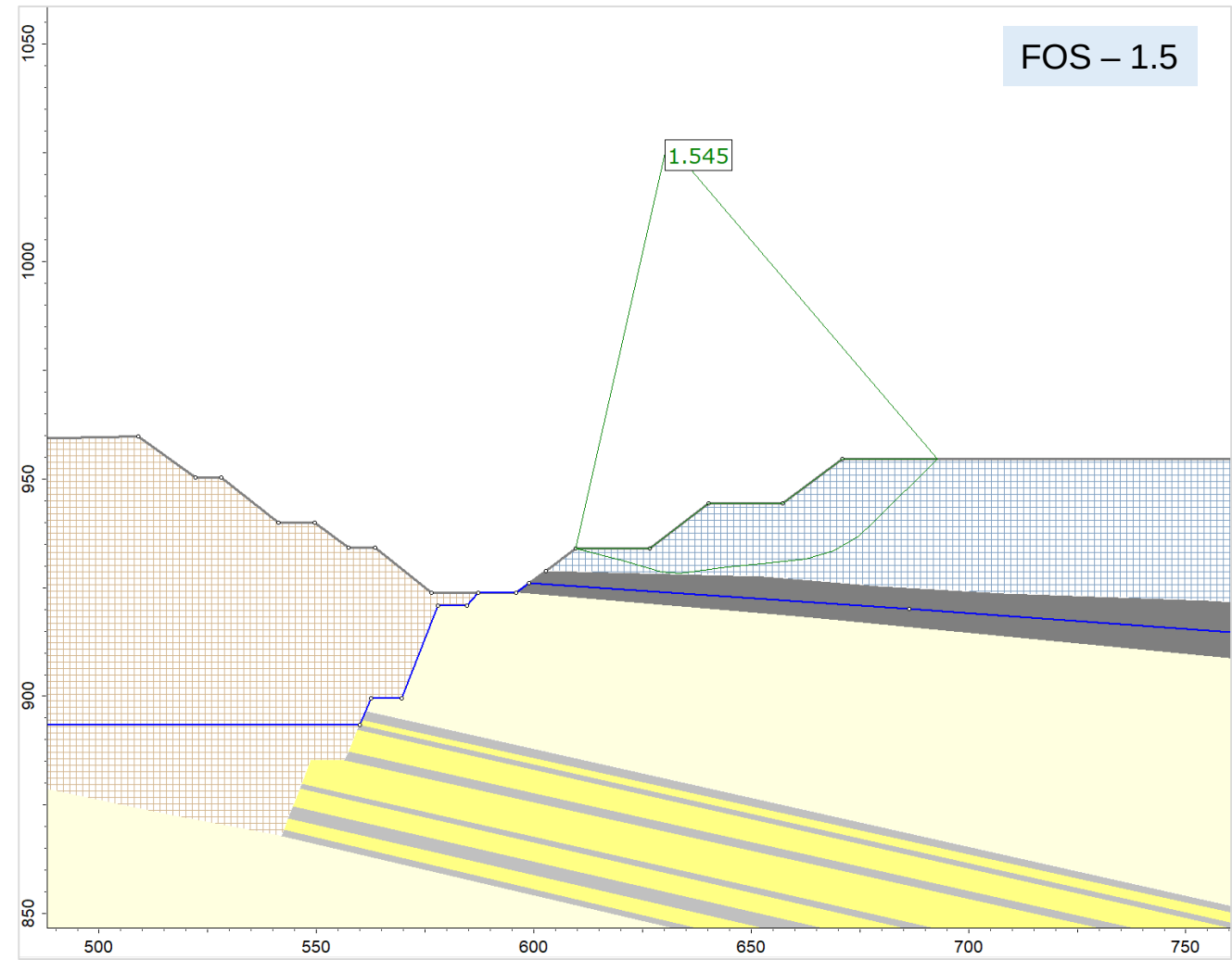
 Job No: 2CI009.017	 TENAS PROJECT	PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		SECTION 5-3– STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:

SECTION 5-4 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 5-4- PHREATIC SURFACE, STATIC CONDITIONS



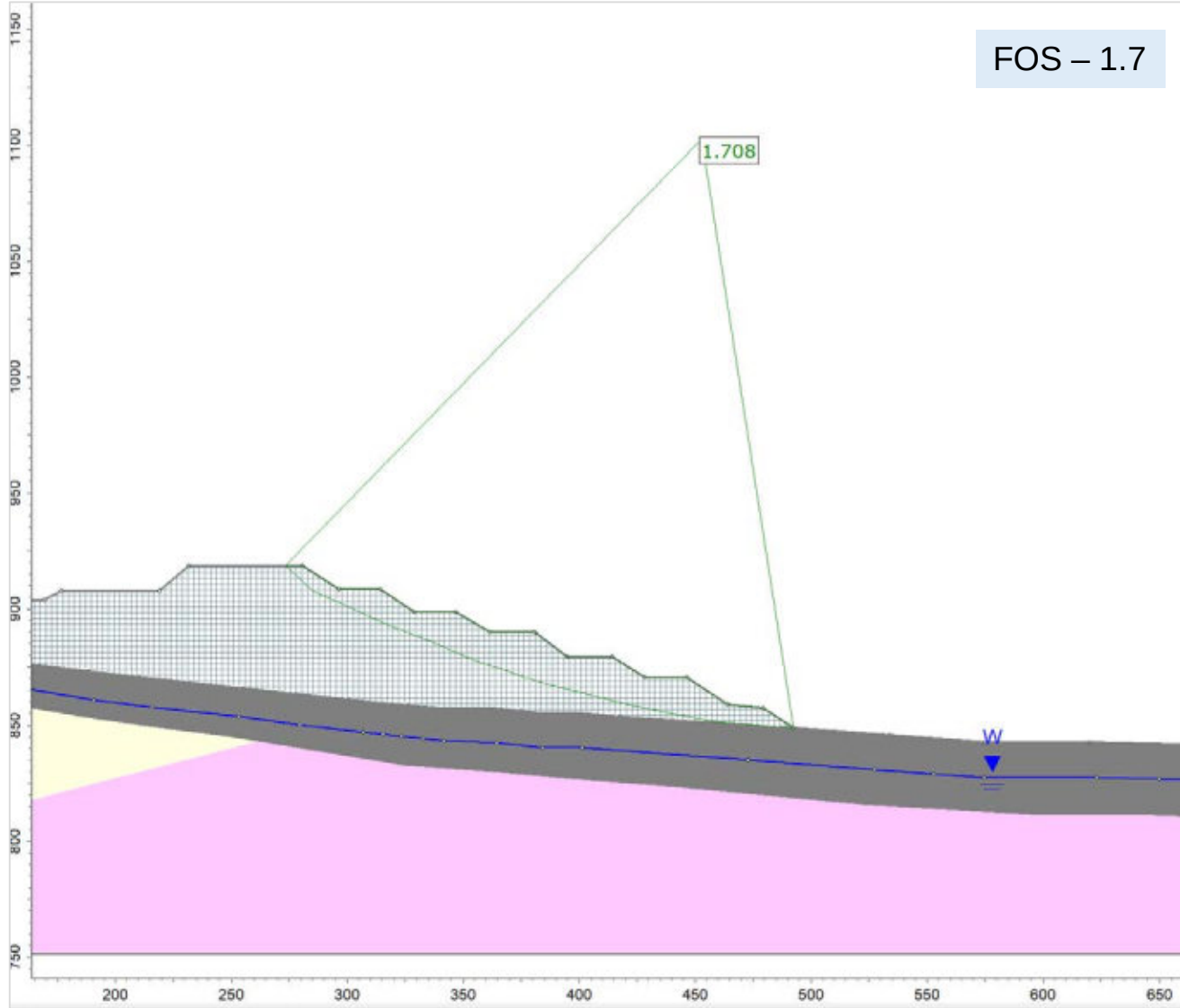
SECTION 5-4– Ru METHOD, STATIC CONDITIONS



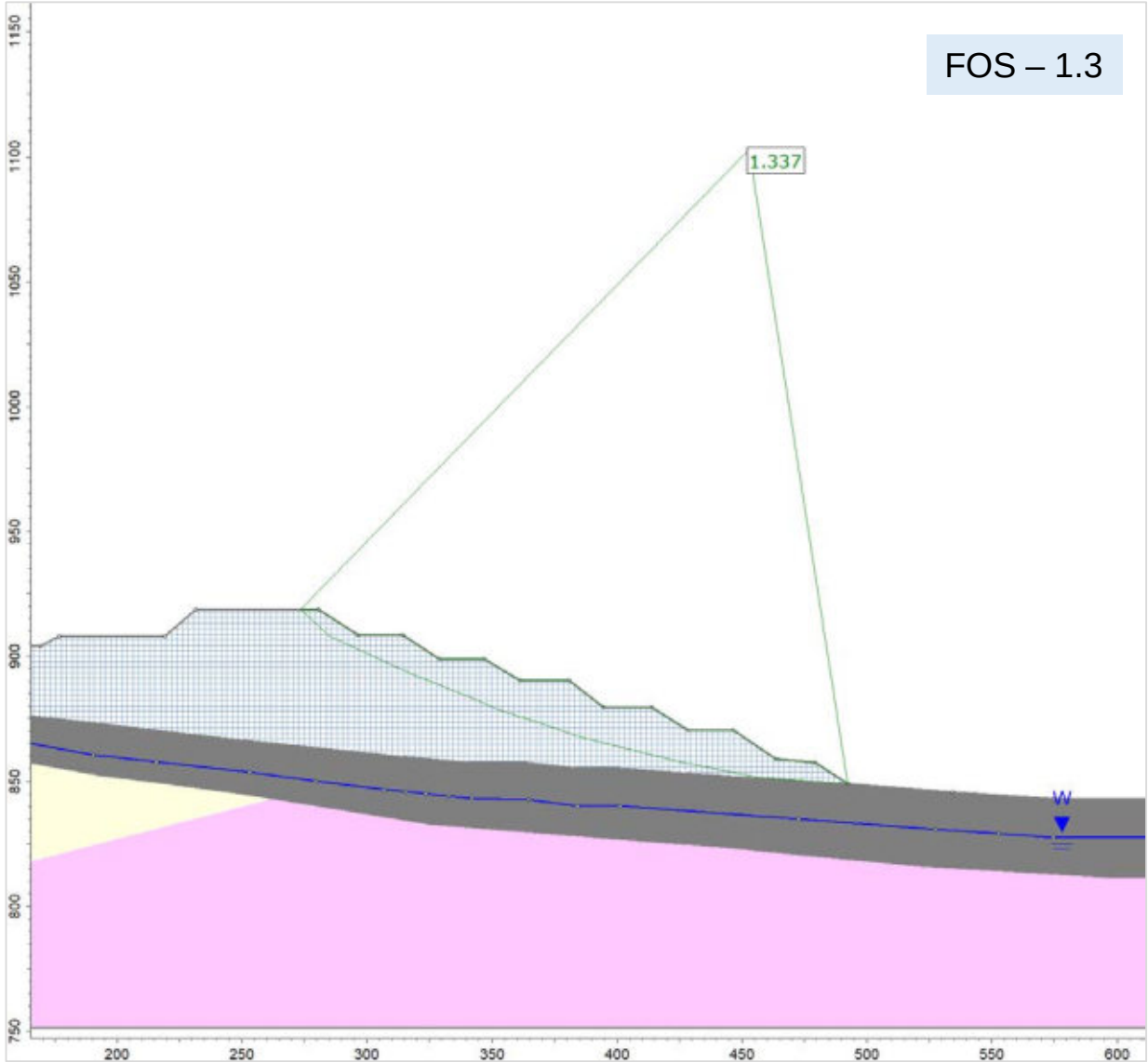
 Job No: 2CI009.017	 TENAS PROJECT	PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		SECTION 5-4 – STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:

SECTION 6-1 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 6-1 PHREATIC SURFACE, STATIC CONDITIONS

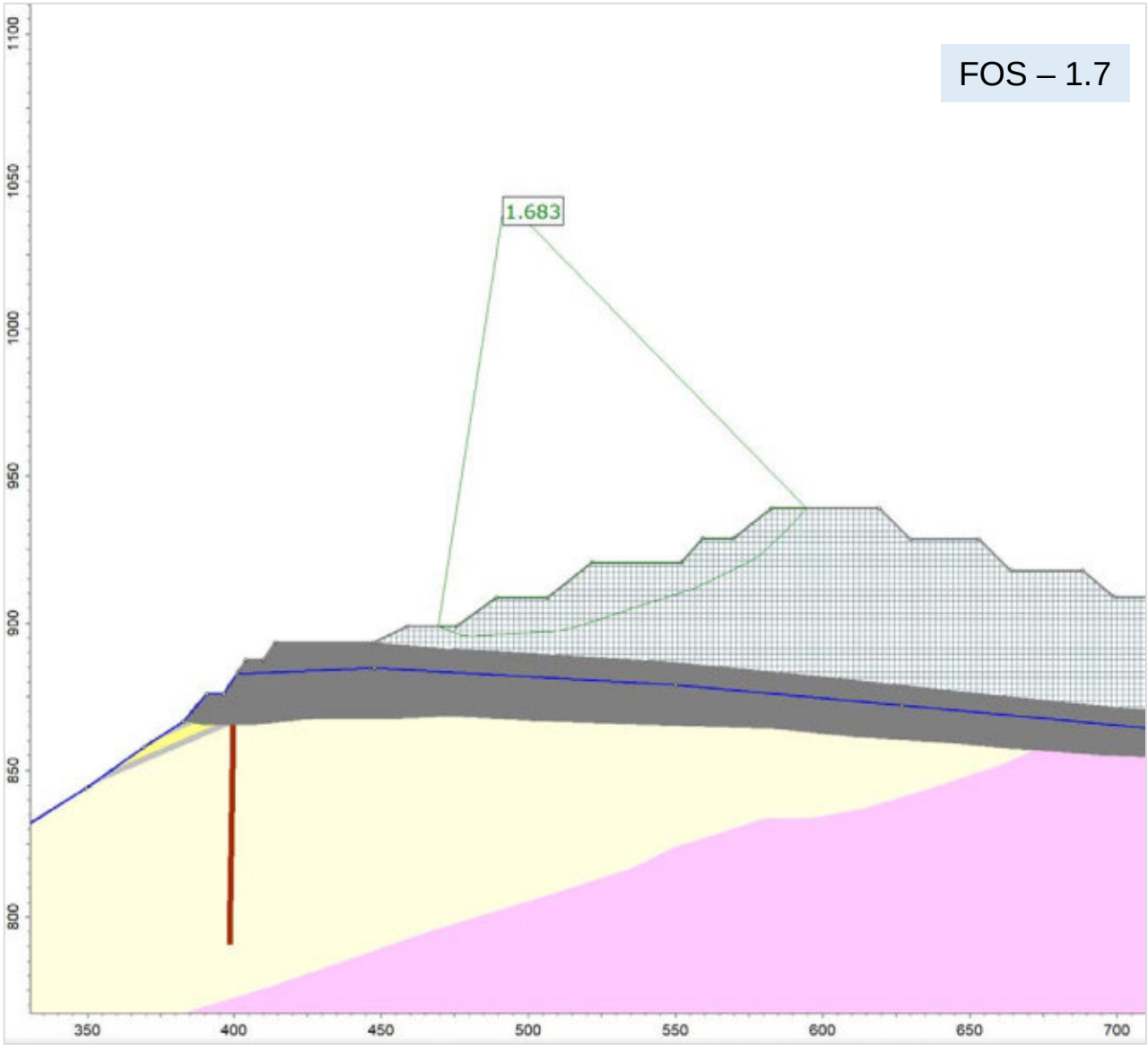


SECTION 6-1– Ru METHOD, STATIC CONDITIONS

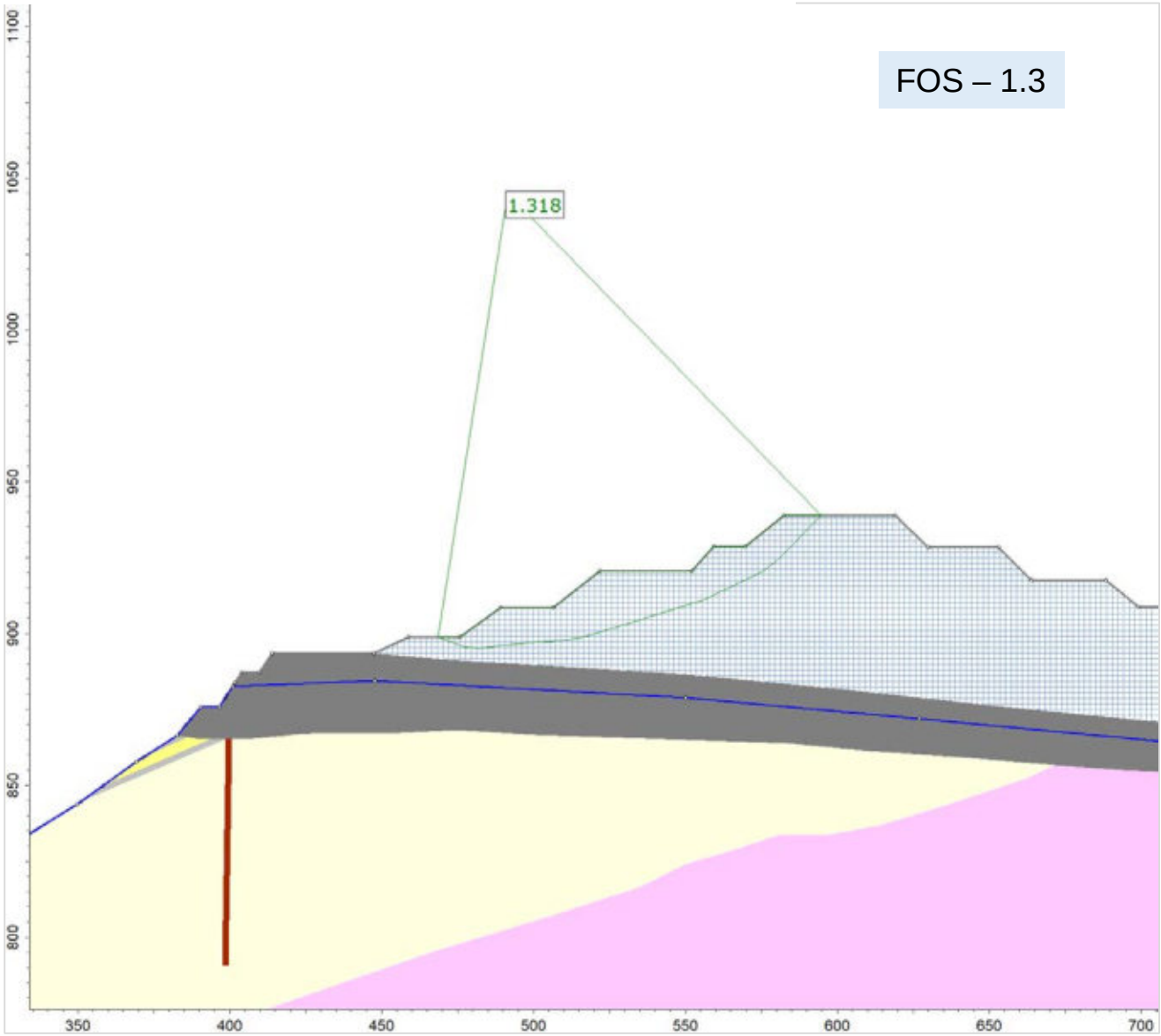


SECTION 6-2– OVERBURDEN PILE STABILITY ANALYSES

SECTION 6-2 PHREATIC SURFACE, STATIC CONDITIONS



SECTION 6-2– Ru METHOD, STATIC CONDITIONS



PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT

SECTION 6-2 – STABILITY ANALYSES

Job No: 2CI009.017

TENAS PROJECT

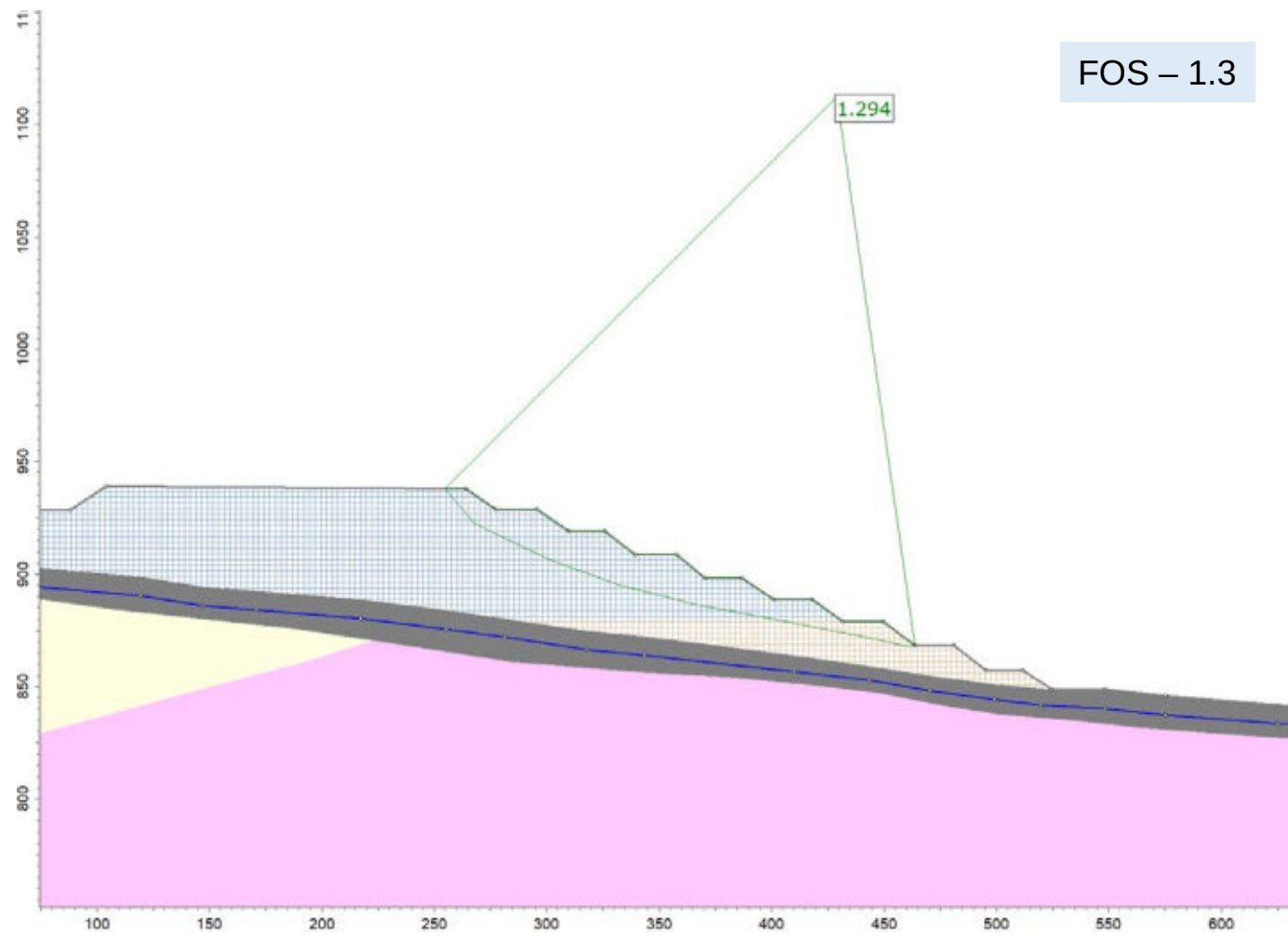
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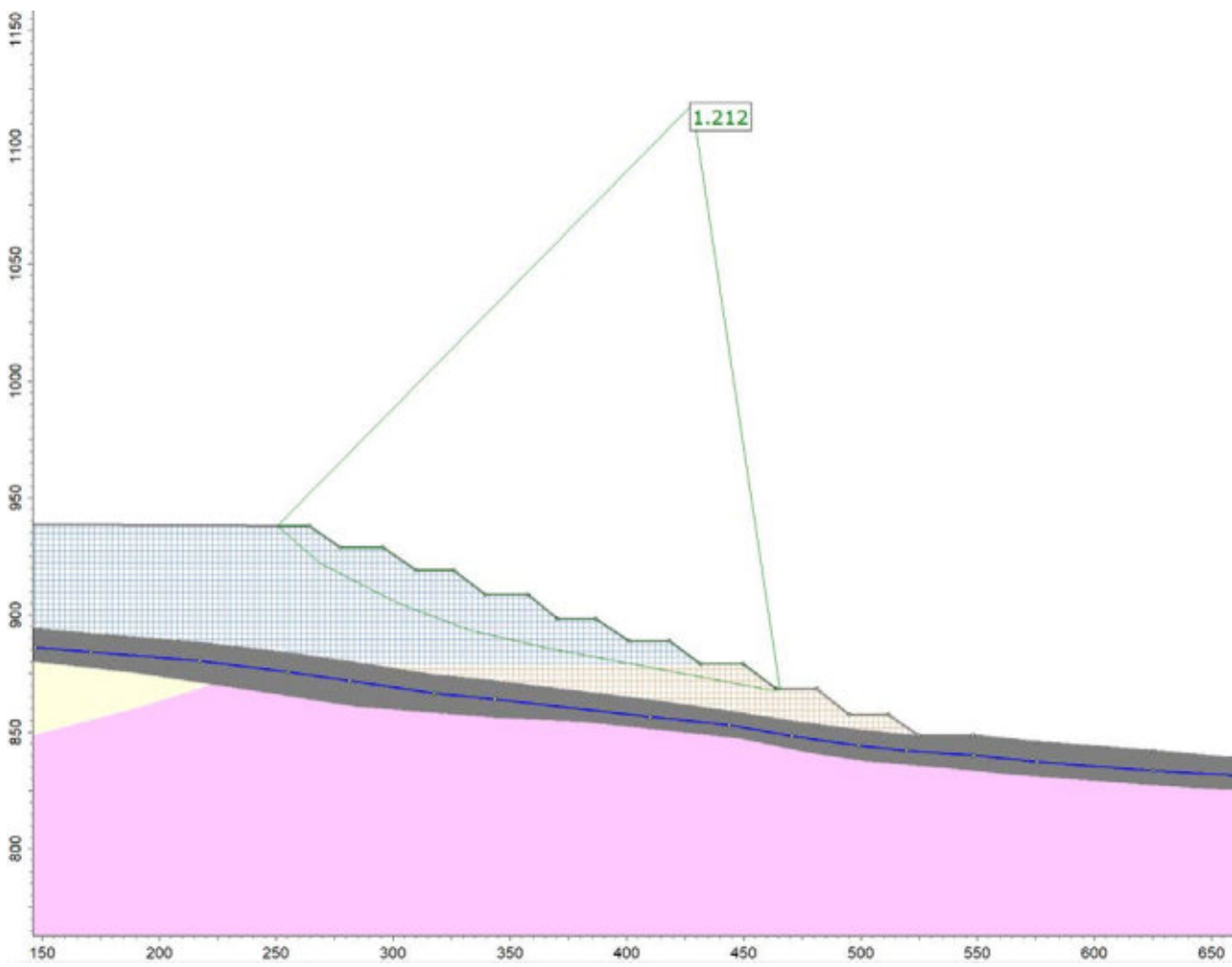
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SECTION 6-2 – OVERBURDEN PILE STABILITY ANALYSES

SECTION 6-2 PHREATIC SURFACE, STATIC CONDITIONS



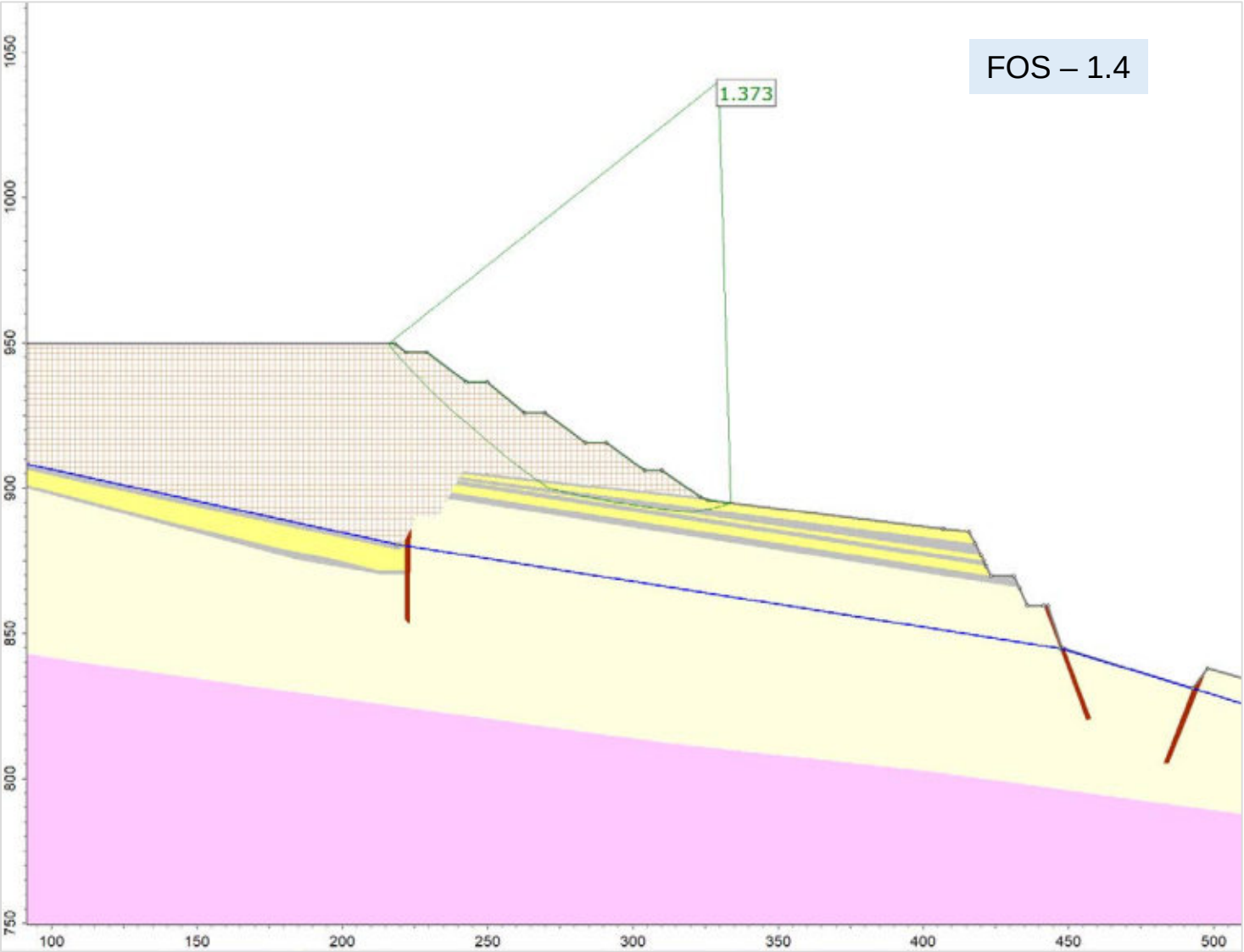
SECTION 6-2– Ru METHOD, STATIC CONDITIONS



 Job No: 2CI009.017	 TENAS PROJECT	PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		SECTION 6-2 – STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:

SECTION 7-1- PIT BACKFILL STABILITY ANALYSES

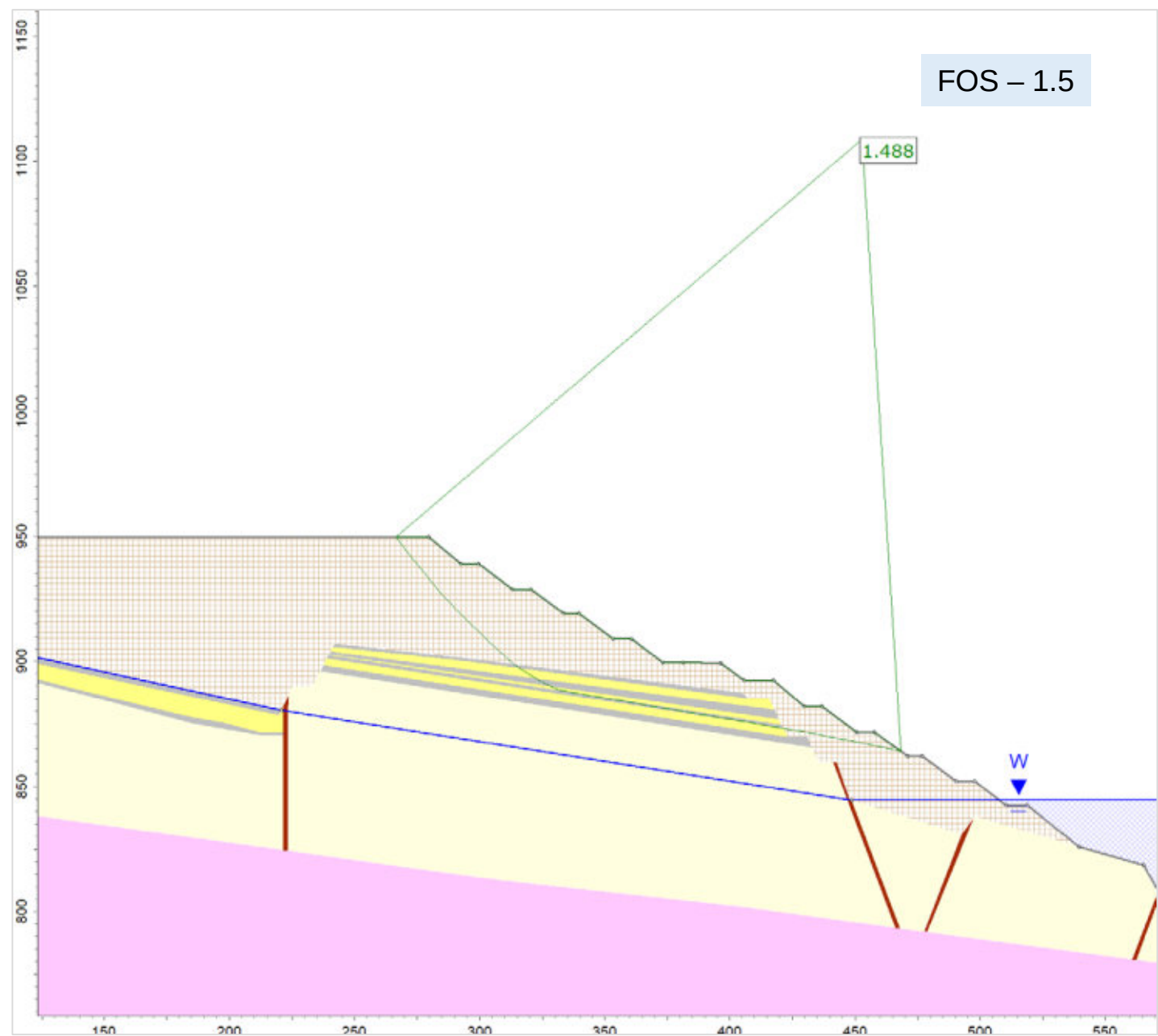
SECTION 7-1 PHREATIC SURFACE, DURING CONSTRUCTION



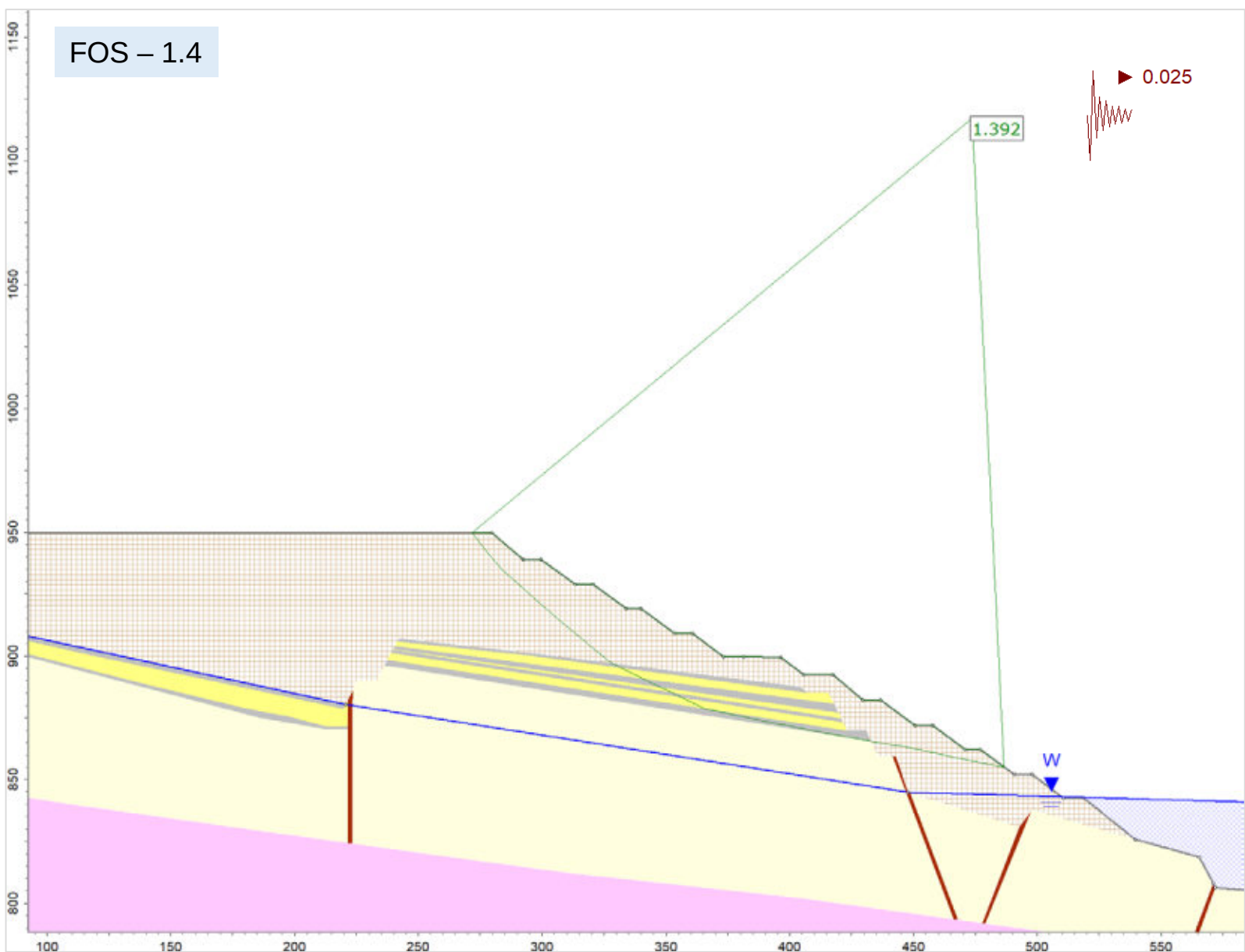
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		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 7-1- PIT BACKFILL STABILITY ANALYSES

SECTION 7-1 PHREATIC SURFACE, END OF CONSTRUCTION



SECTION 7-1 PHREATIC SURFACE, END OF CONSTRUCTION, PSEUDO-STATIC



PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT

SECTION 7-1 - STABILITY ANALYSES

Job No: 2CI009.017

TENAS PROJECT

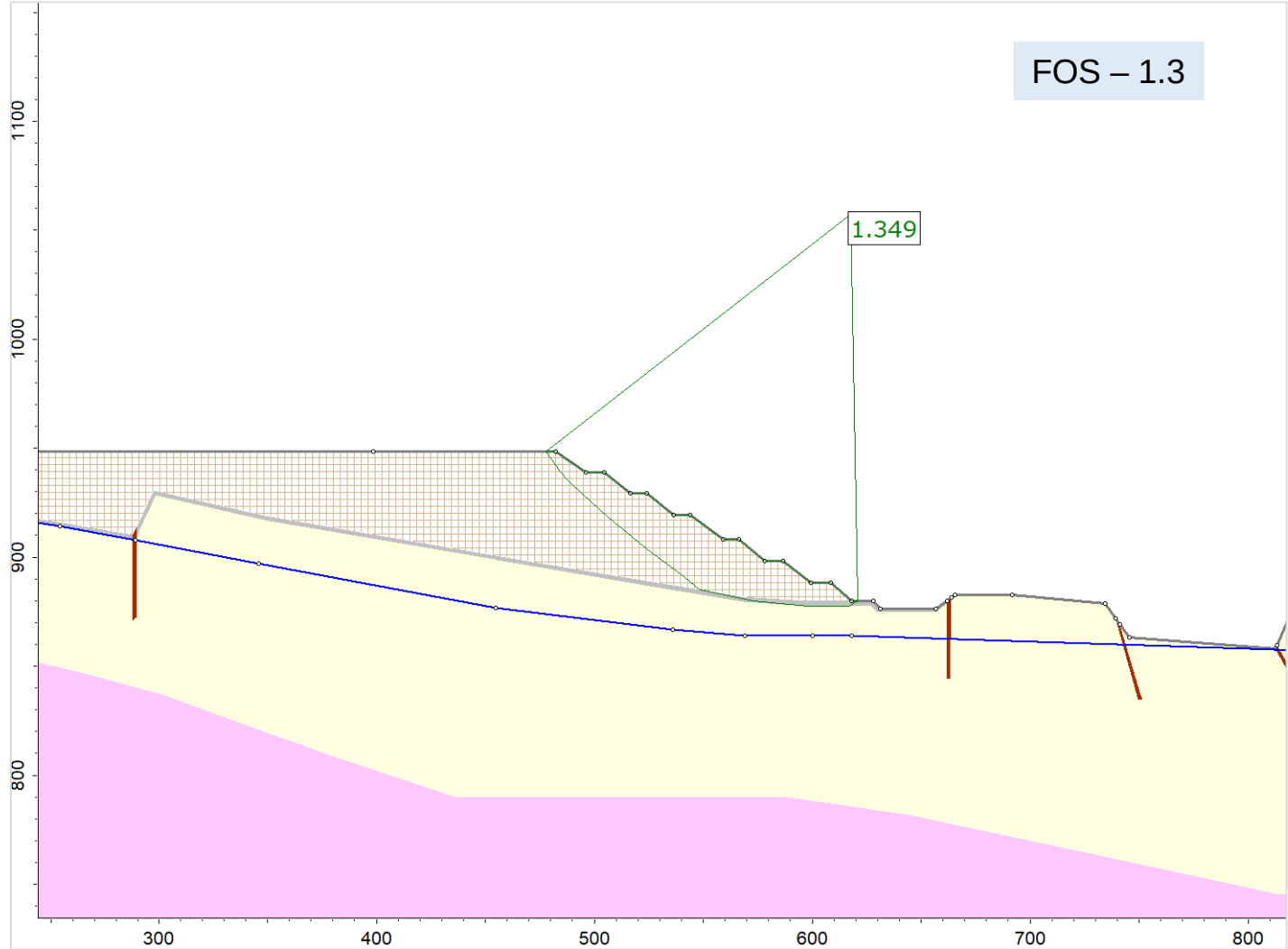
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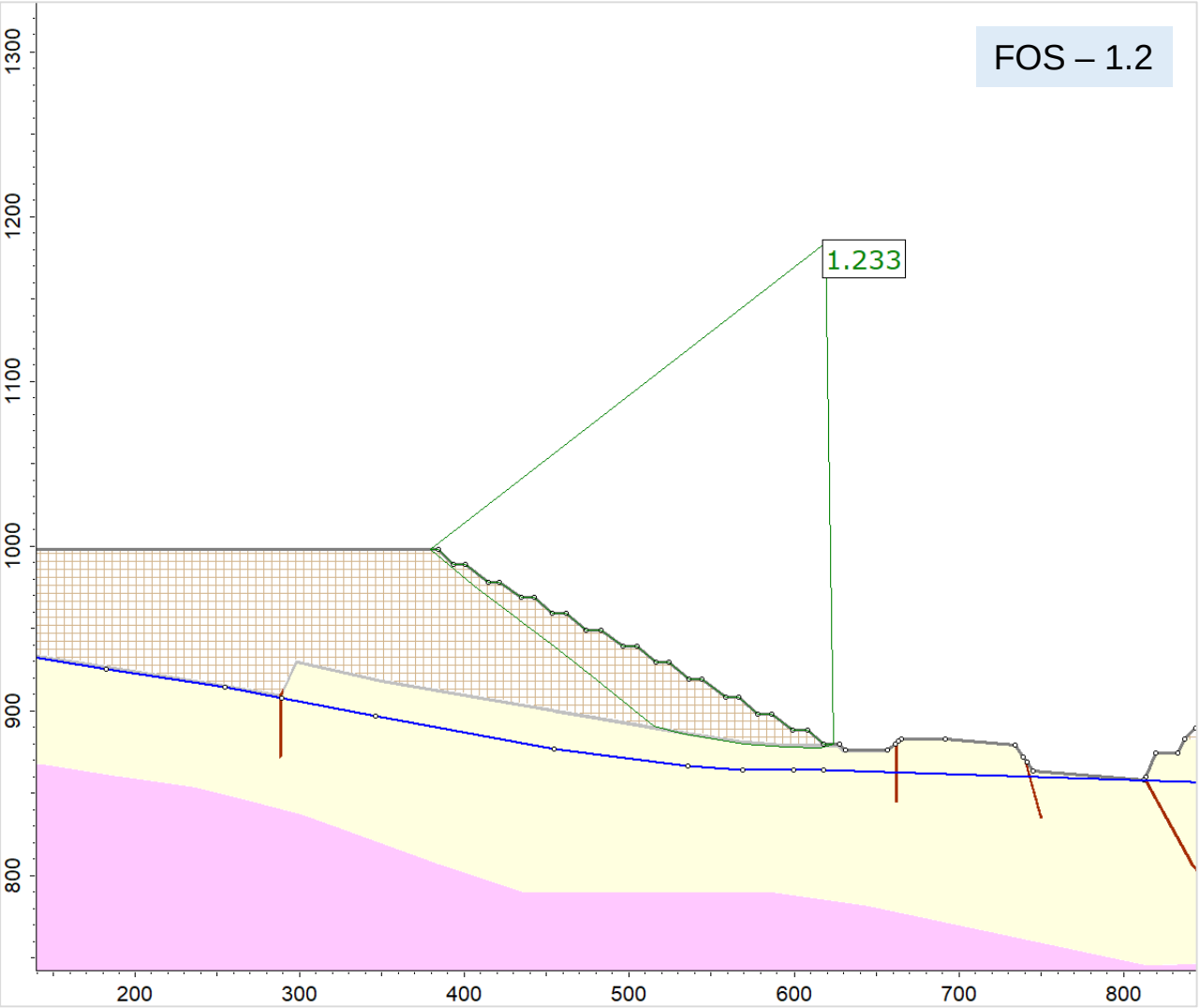
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SECTION 7-2 – PHASE 9 PIT BACKFILL STABILITY ANALYSES

SECTION 7-2 PHREATIC SURFACE, DURING CONSTRUCTION



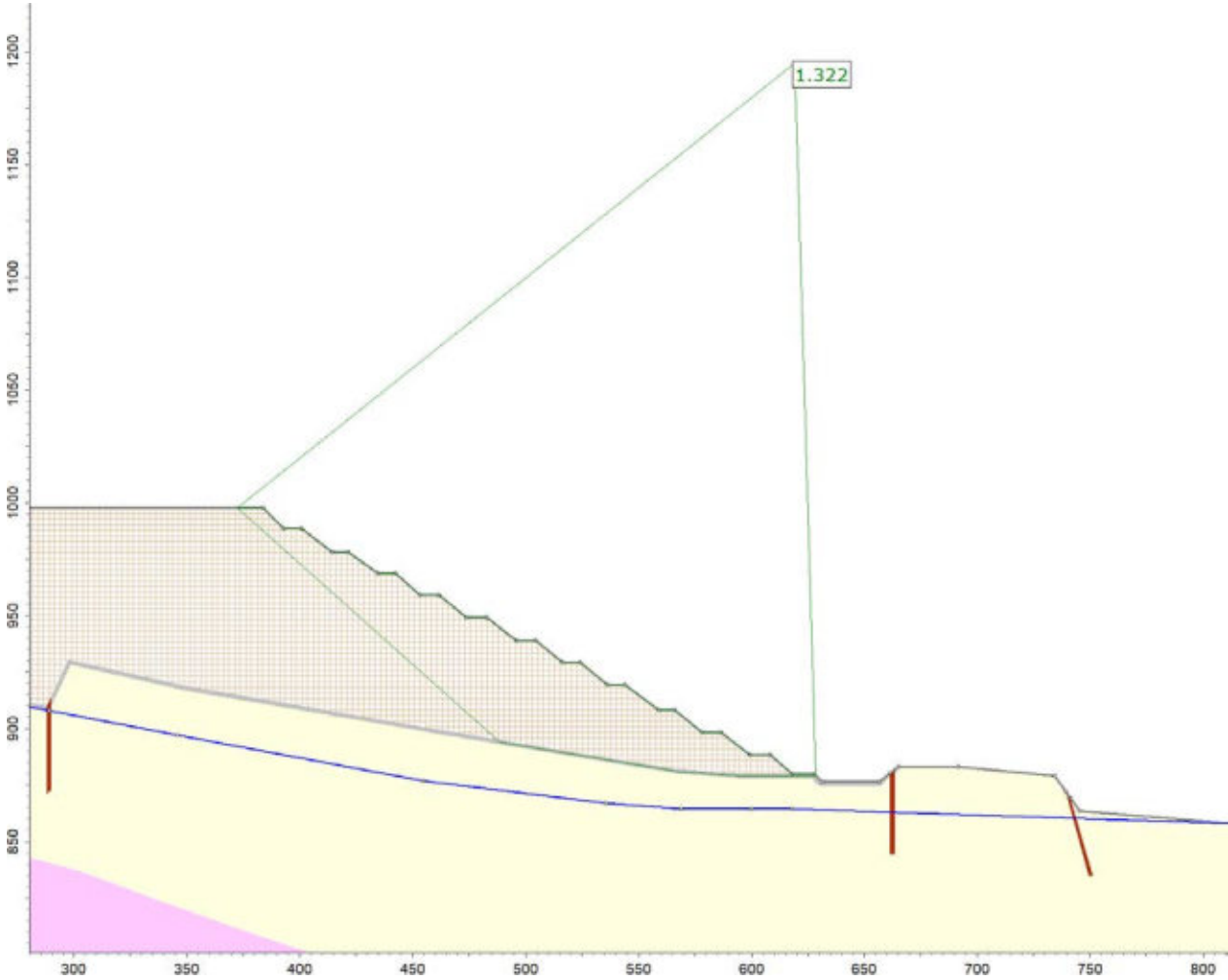
SECTION 7-2 PHREATIC SURFACE, END OF CONSTRUCTION, PSEUDO-STATIC



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		SECTION 7-2 – STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 7-2 – PHASE 9 PIT BACKFILL STABILITY ANALYSES

SECTION 7-2 PHREATIC SURFACE, DURING CONSTRUCTION

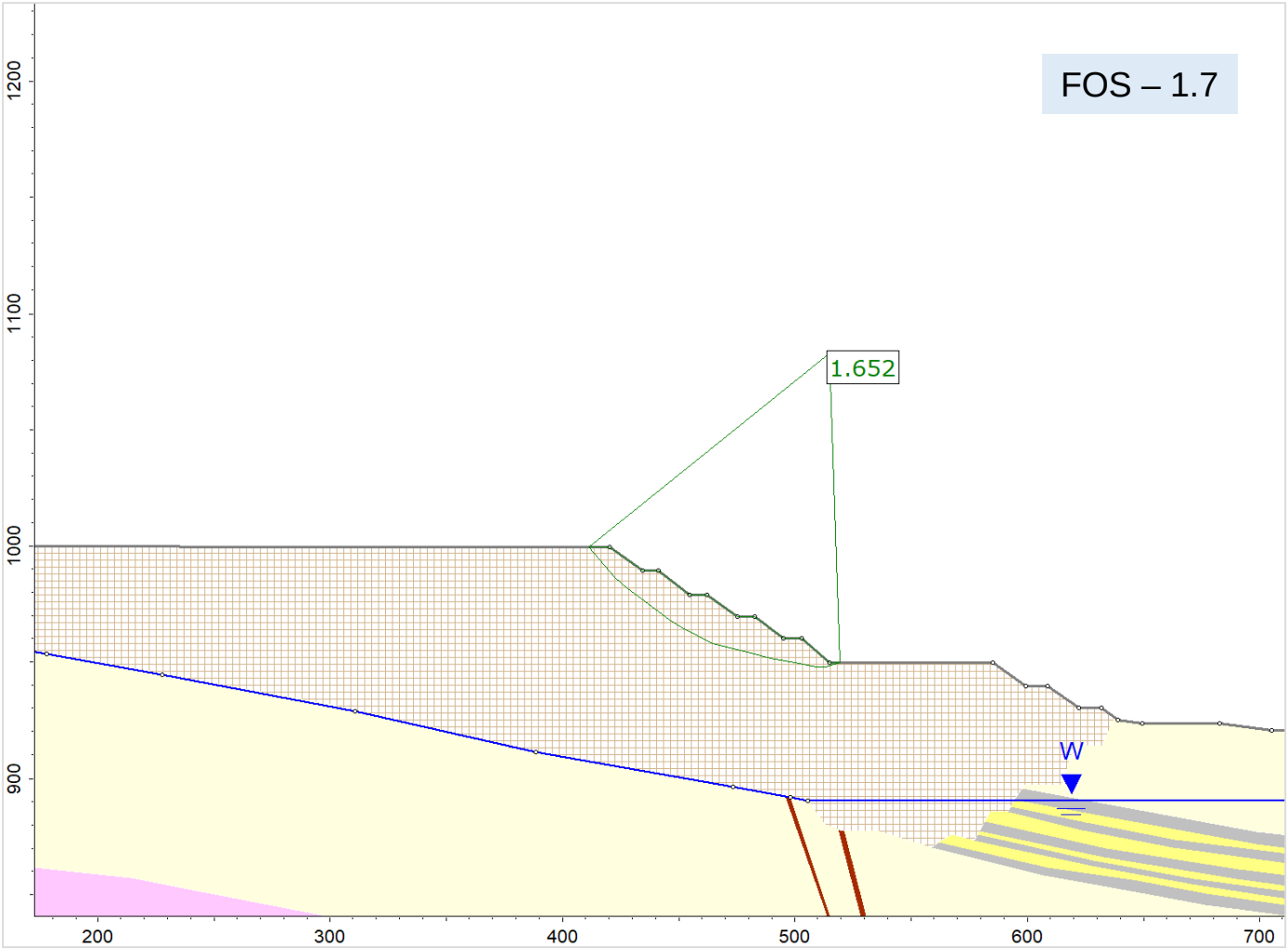


1.3

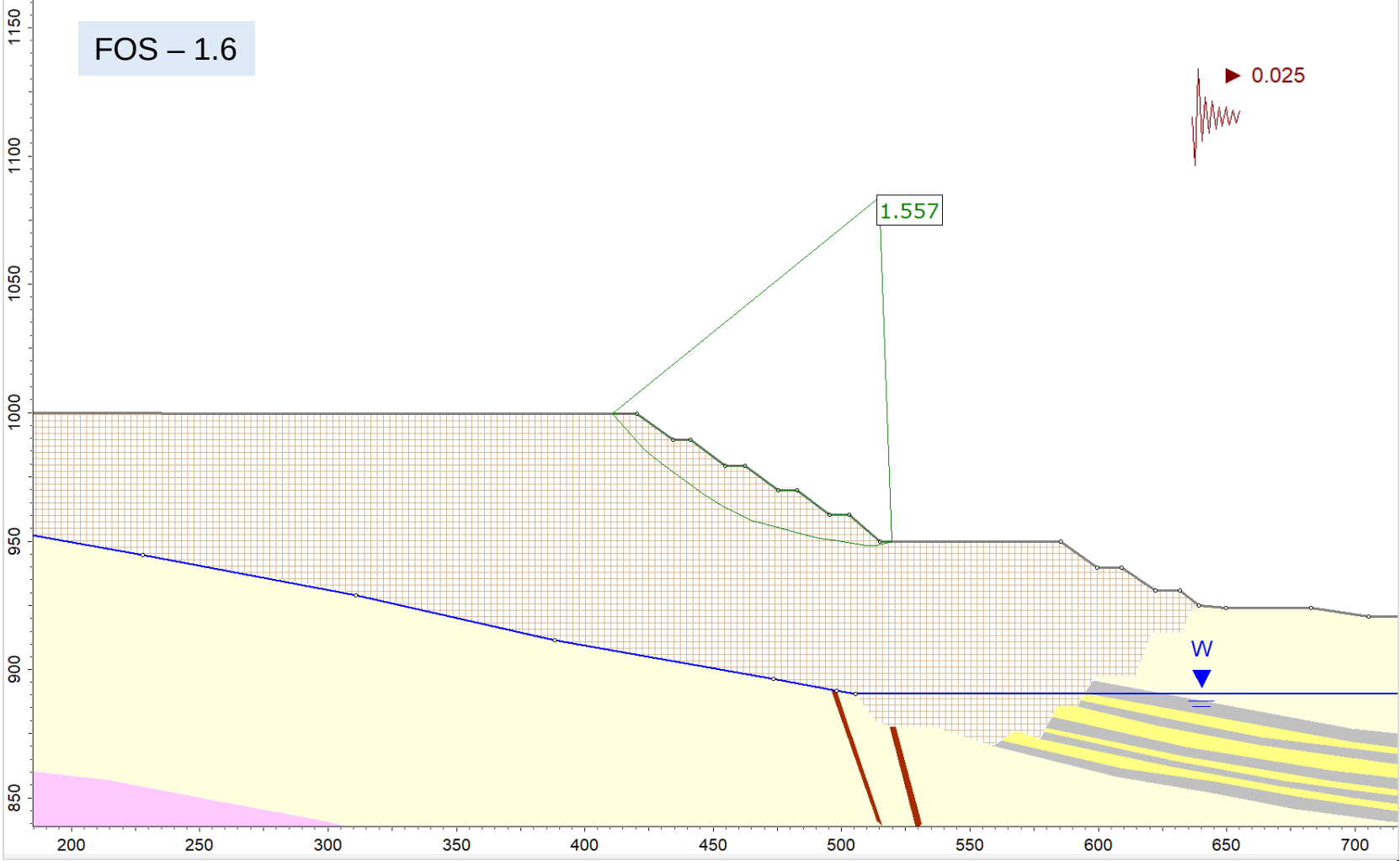
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		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 7-3 – PIT BACKFILL STABILITY ANALYSES

SECTION 7-3 PHREATIC SURFACE, END OF CONSTRUCTION

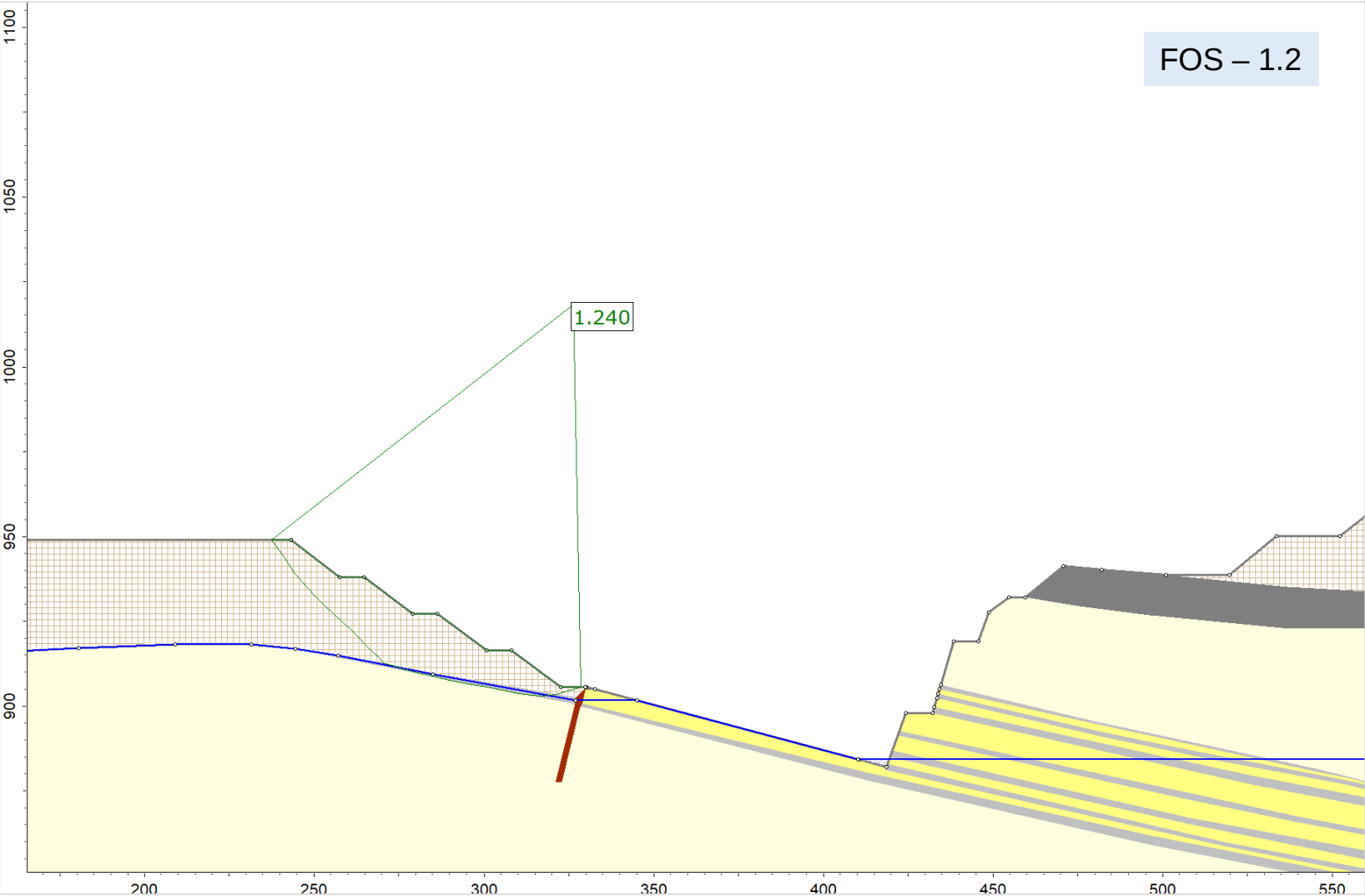


SECTION 7-3 PHREATIC SURFACE, END OF CONSTRUCTION, PSEUDO-STATIC



SECTION 7-4 – PHASE 6 PIT BACKFILL STABILITY ANALYSES

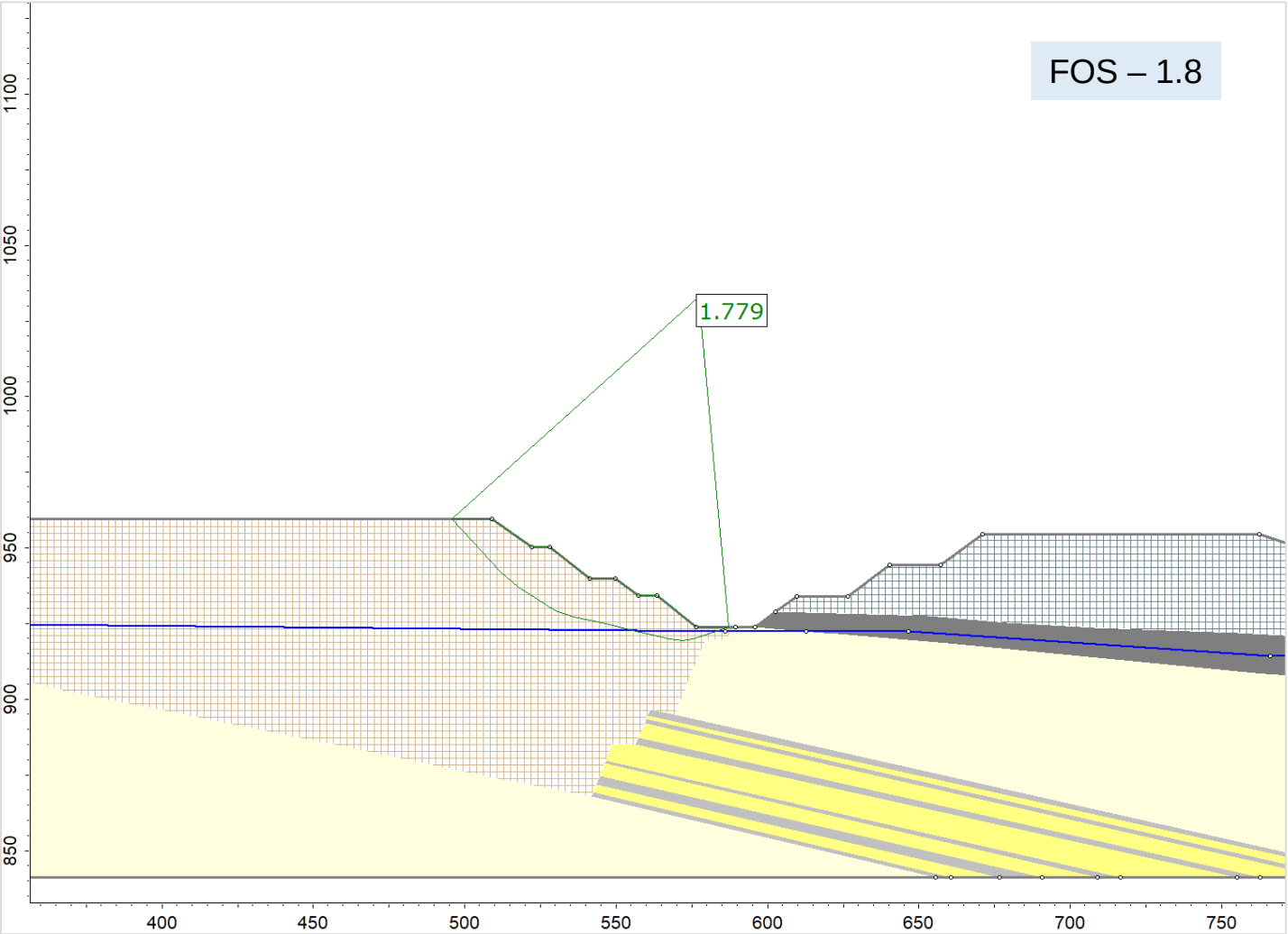
SECTION 7-4 PHREATIC SURFACE, DURING CONSTRUCTION



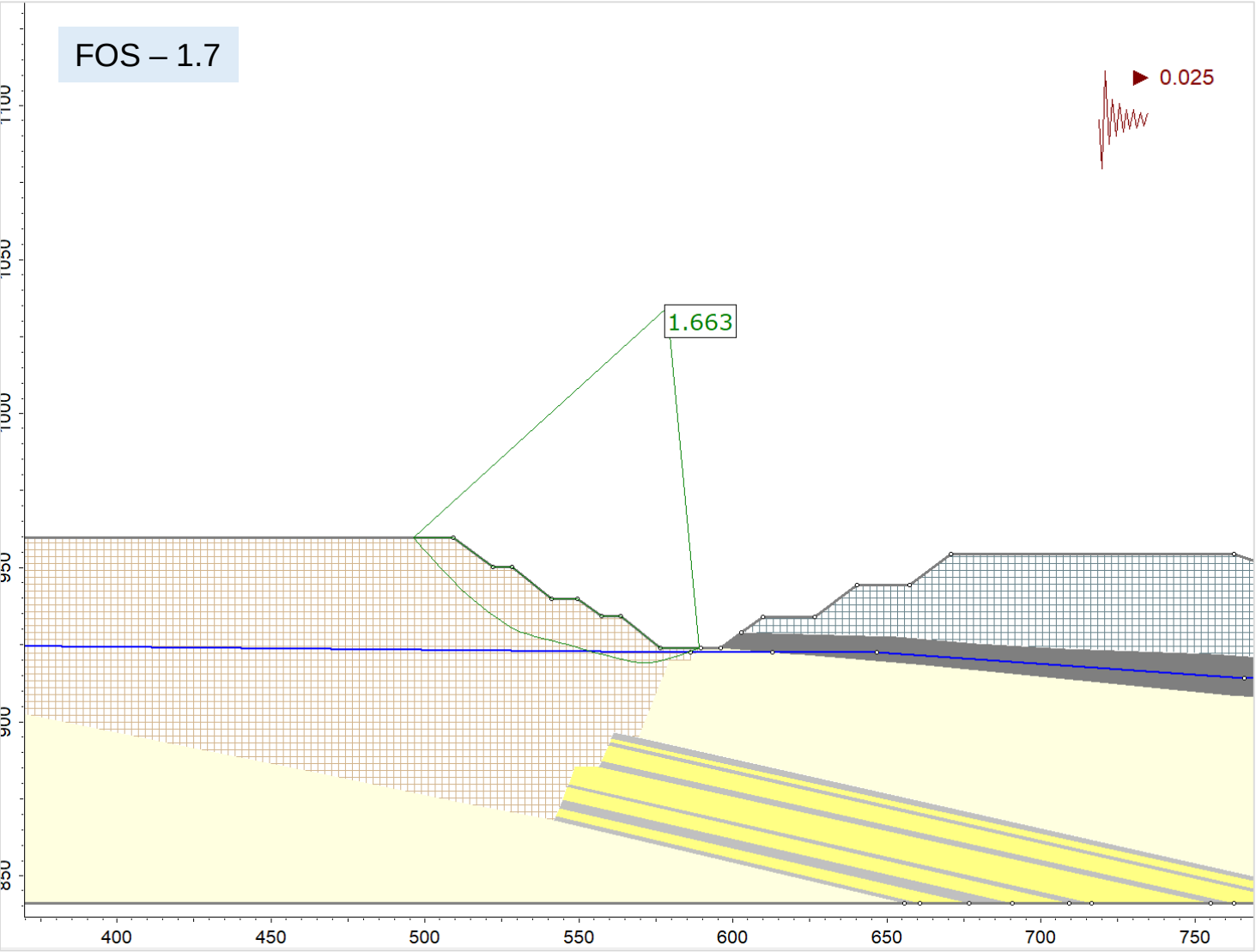
 Job No: 2CI009.017	 TENAS PROJECT	PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT		
		SECTION 7-4 – STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:

SECTION 7-4 – PHASE 6 PIT BACKFILL STABILITY ANALYSES

SECTION 7-4 PHREATIC SURFACE, END OF CONSTRUCTION



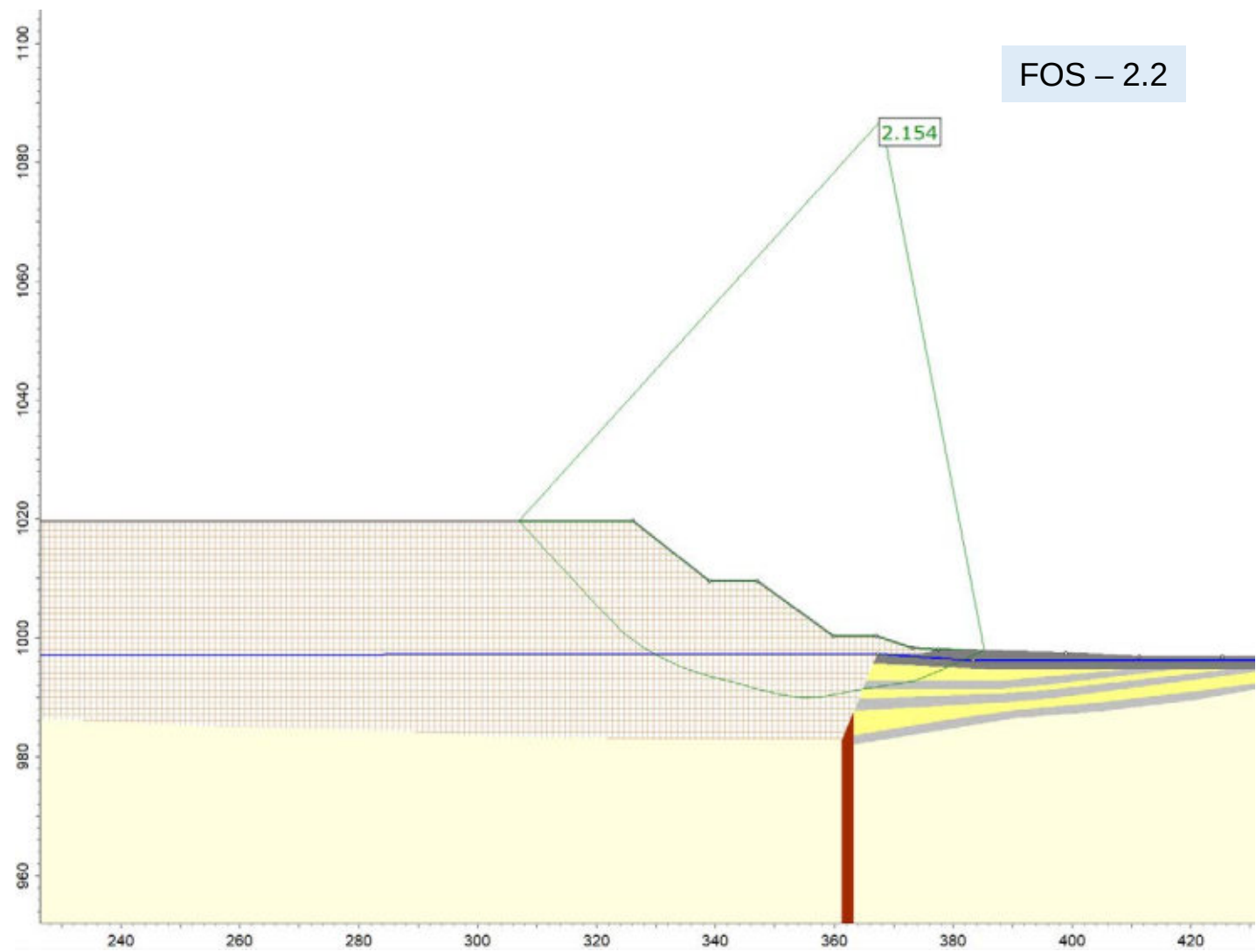
SECTION 7-4 PHREATIC SURFACE, END OF CONSTRUCTION – PSEUDO-STATIC



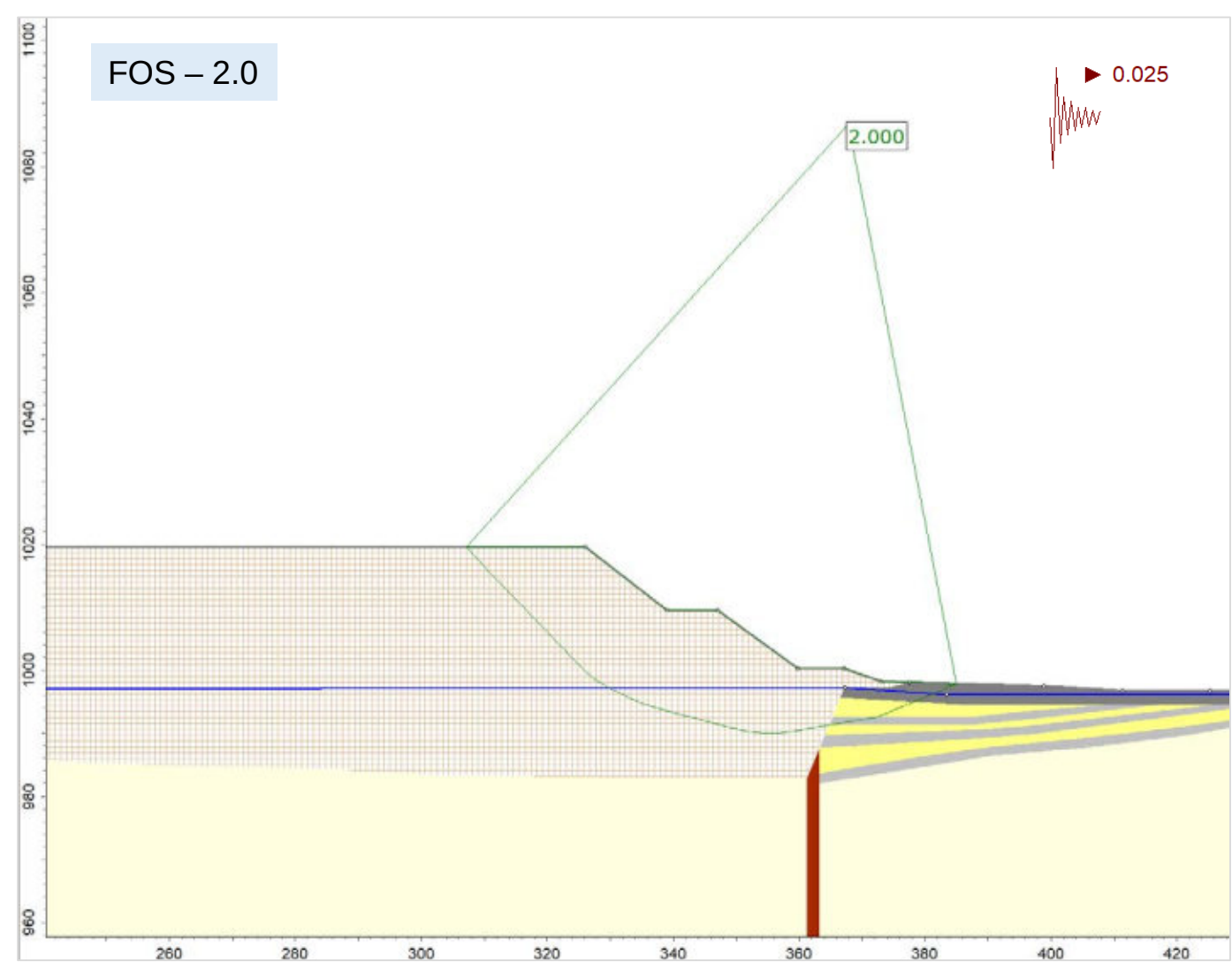
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		SECTION 7-4 – STABILITY ANALYSES		
		Date: 2019/03/30	Approved:	Figure:
Job No: 2CI009.017	TENAS PROJECT			

SECTION 7-5 – PHASE 1 PIT BACKFILL STABILITY ANALYSES

SECTION 7-5 PHREATIC SURFACE, END OF CONSTRUCTION



SECTION 7-5 PHREATIC SURFACE, END OF CONSTRUCTION – PSEUDO-STATIC



PILE SLOPE GEOTECHNICAL STABILITY ASSESSMENT

SECTION 7-5 – STABILITY ANALYSES

Job No: 2CI009.017

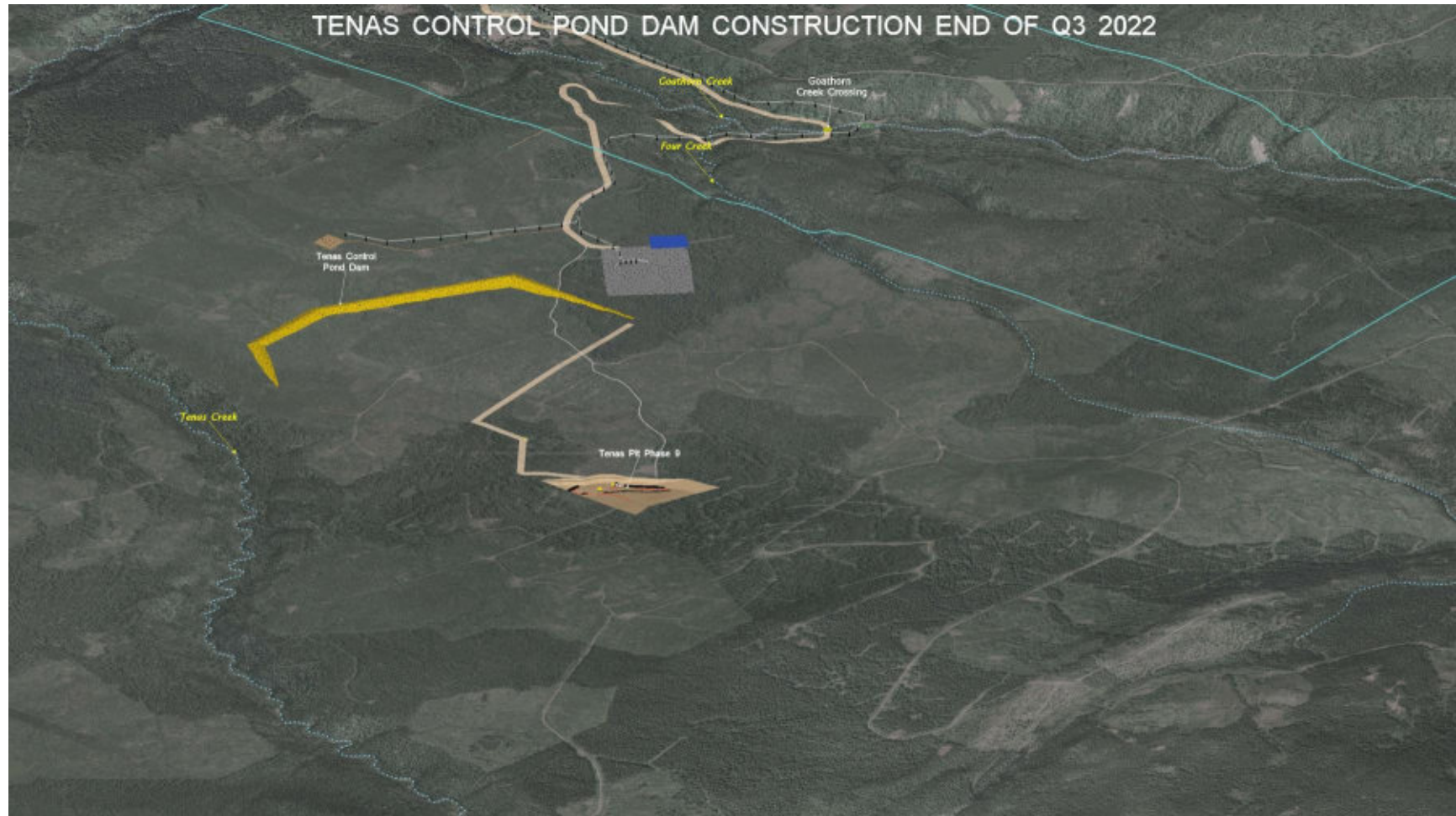
TENAS PROJECT

Date: 2019/03/30

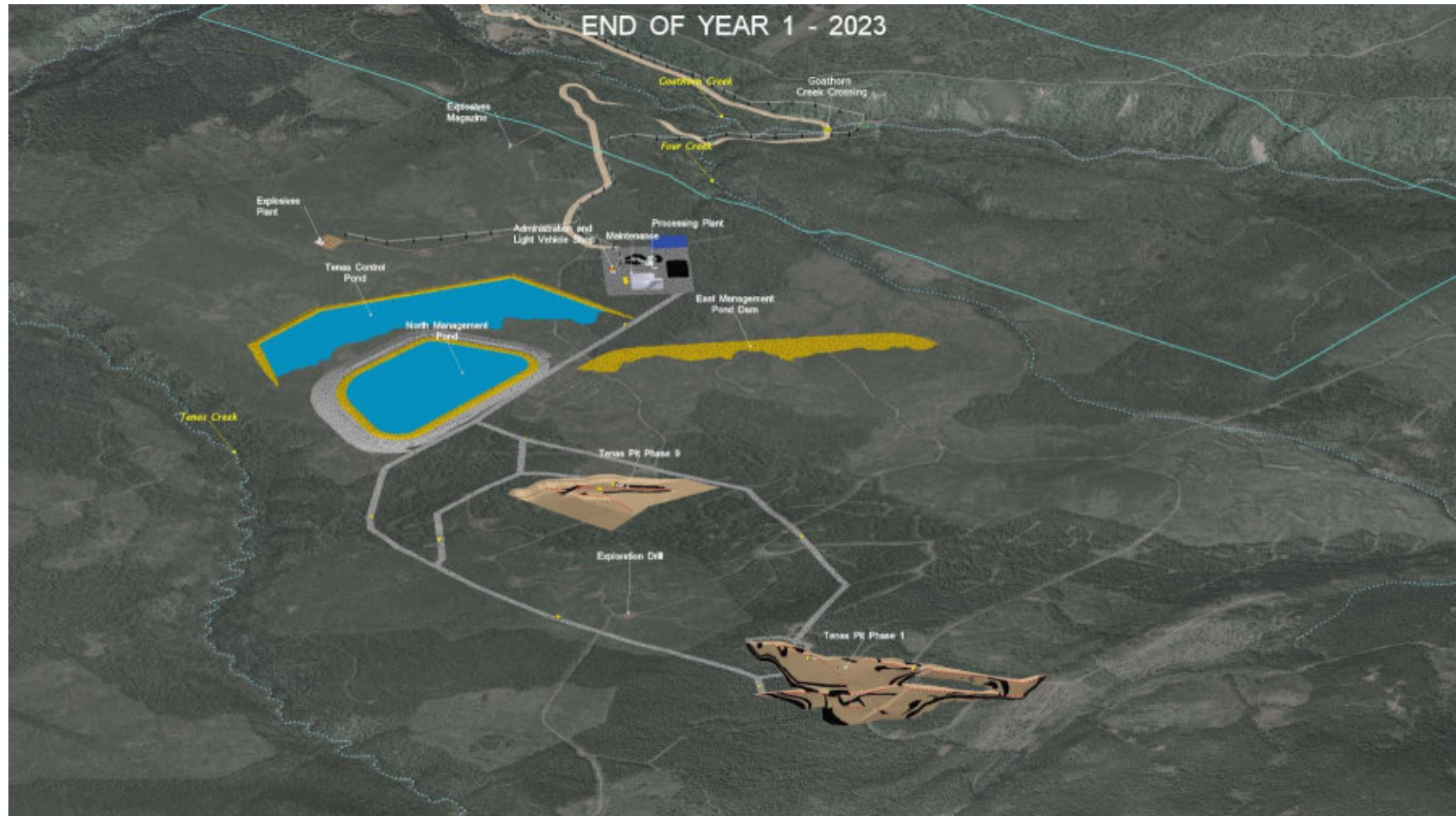
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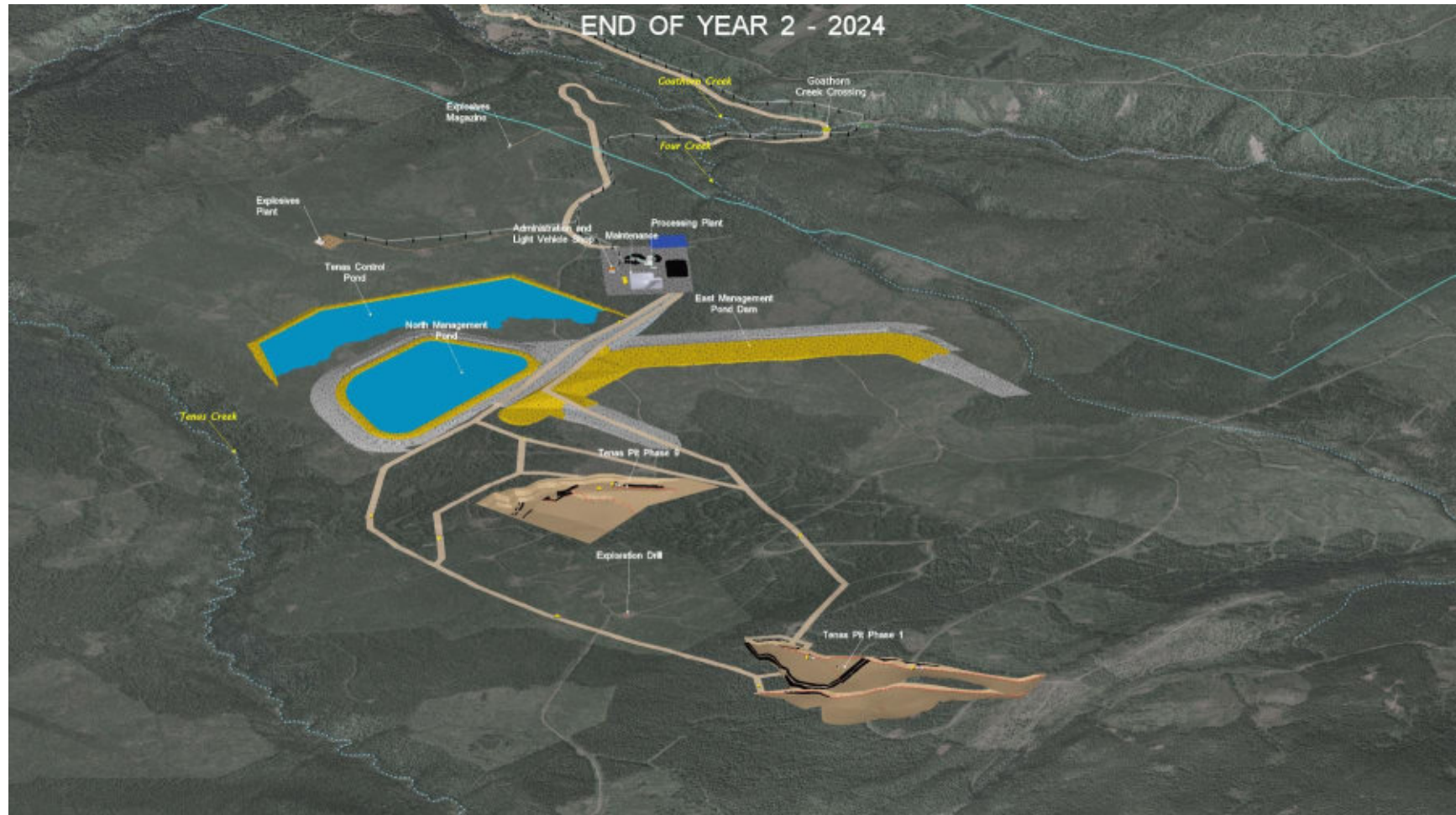
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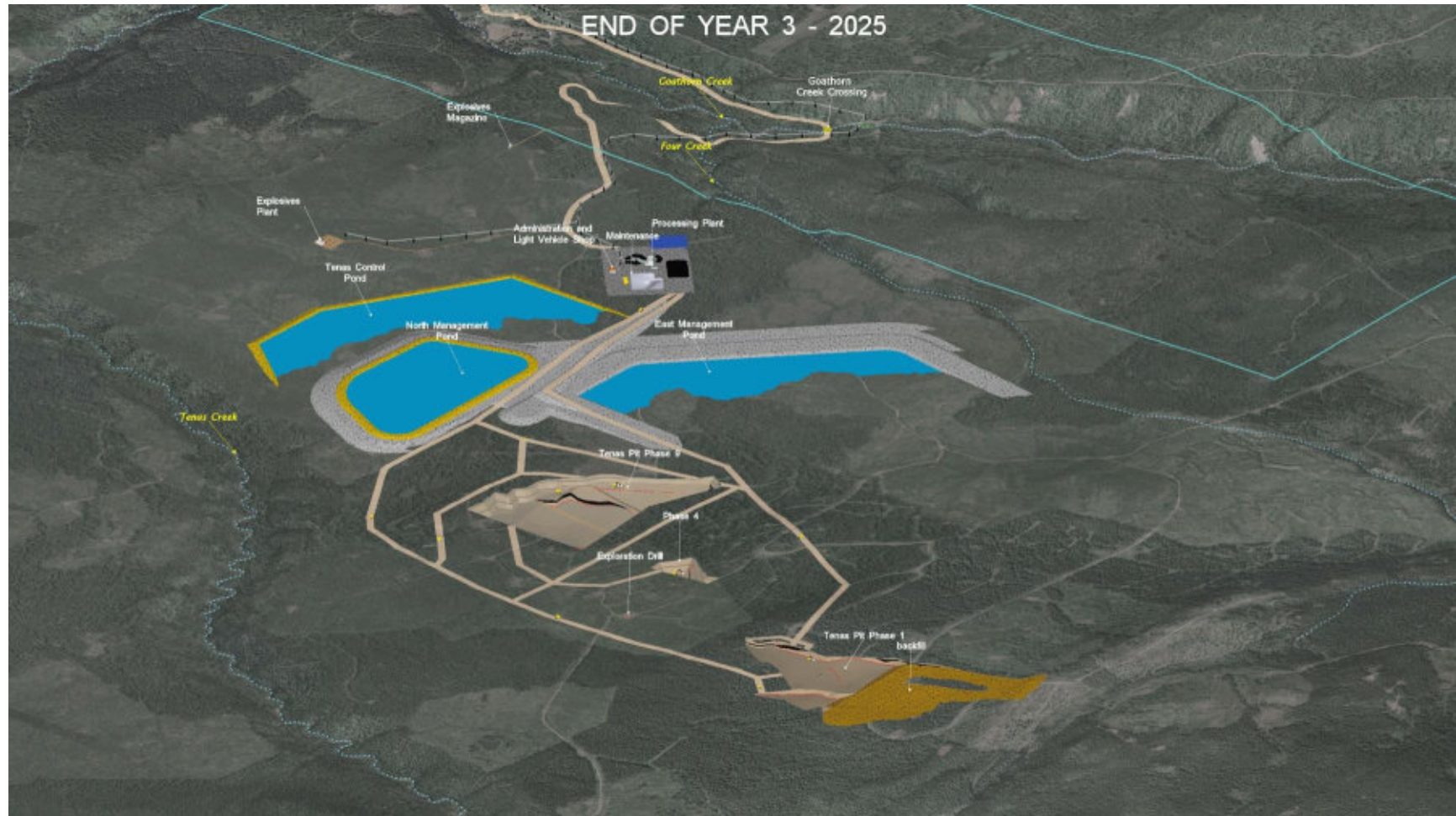
Appendix C: Proposed Mine Plan Presentation

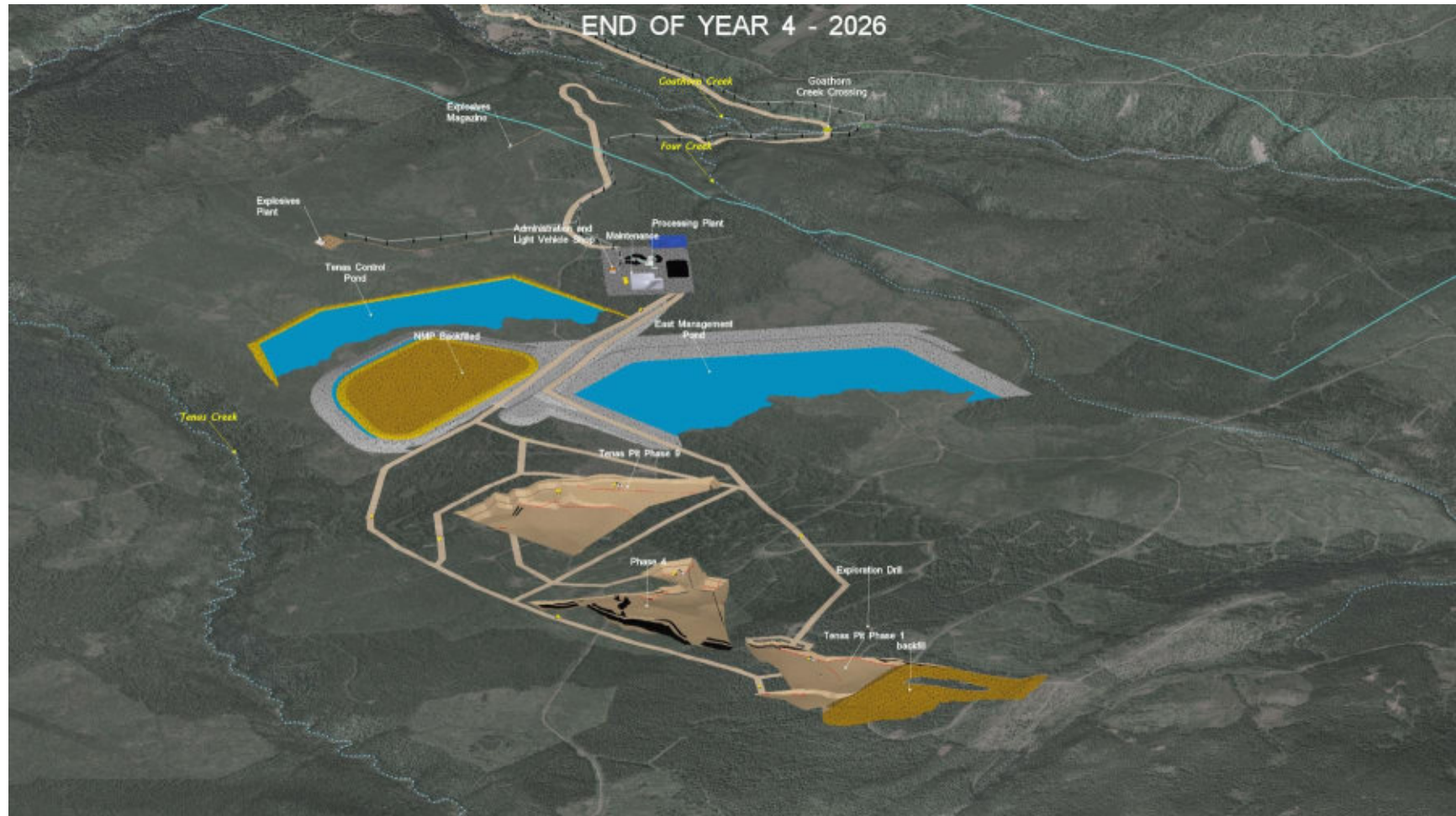


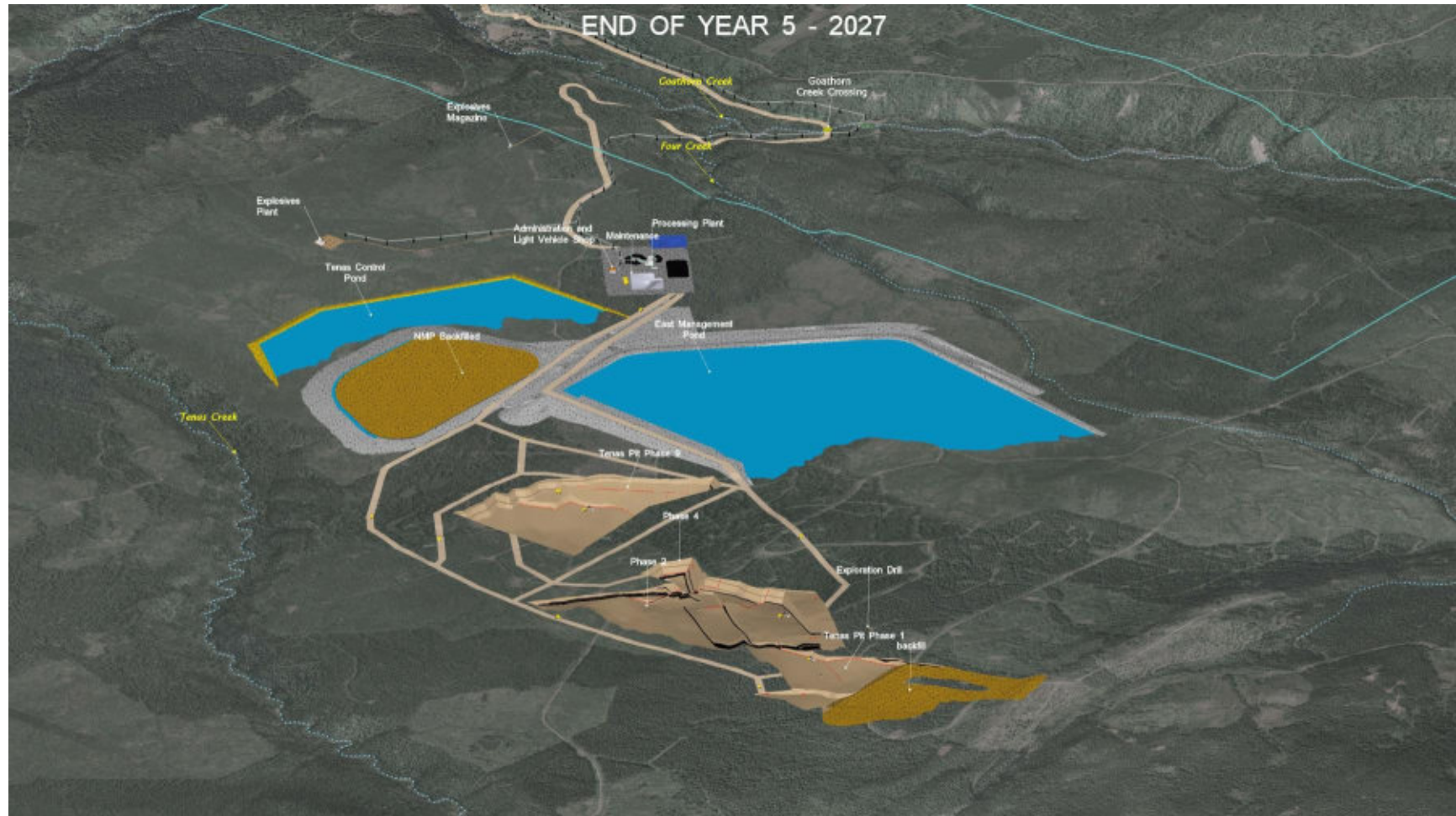


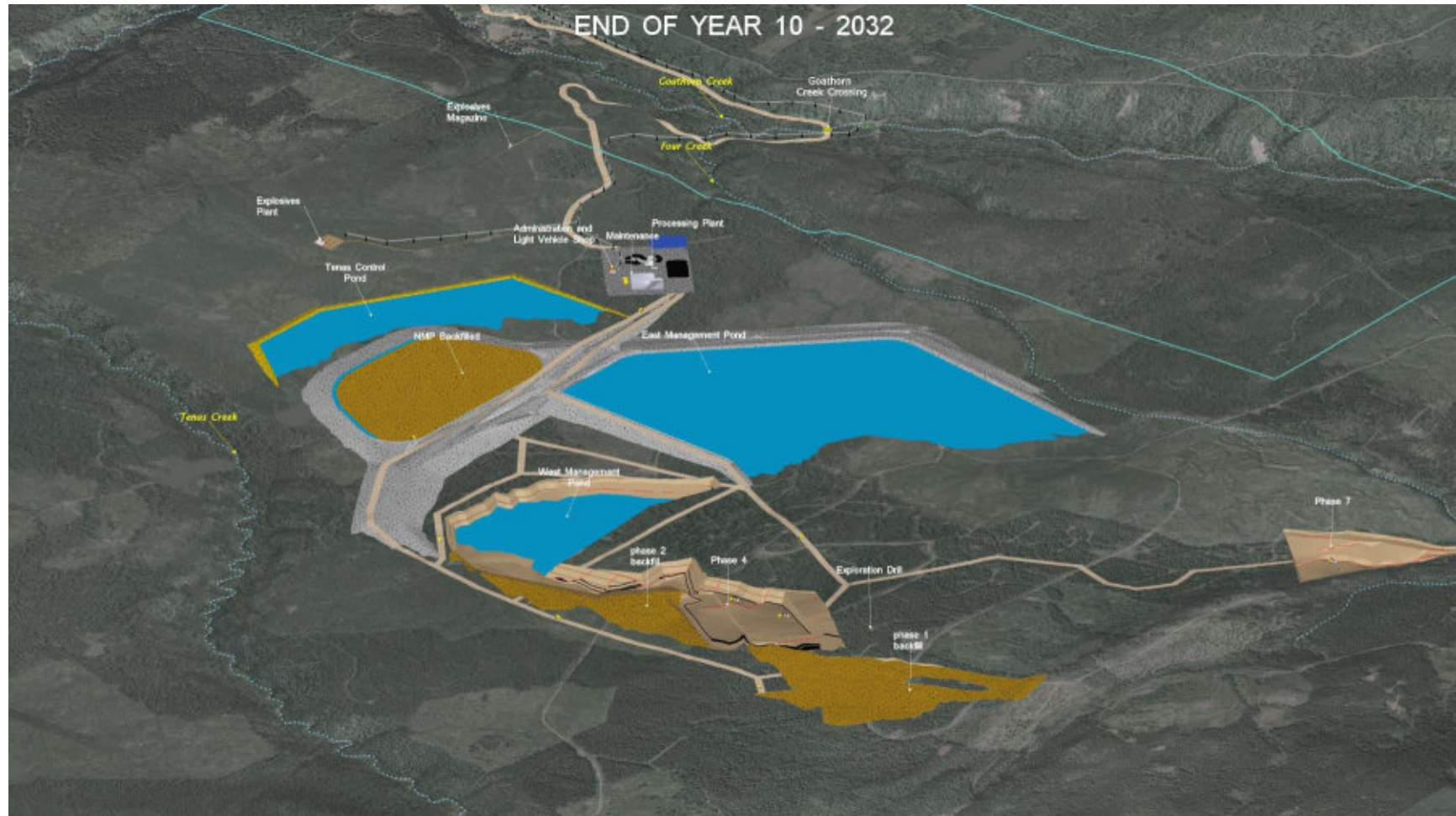




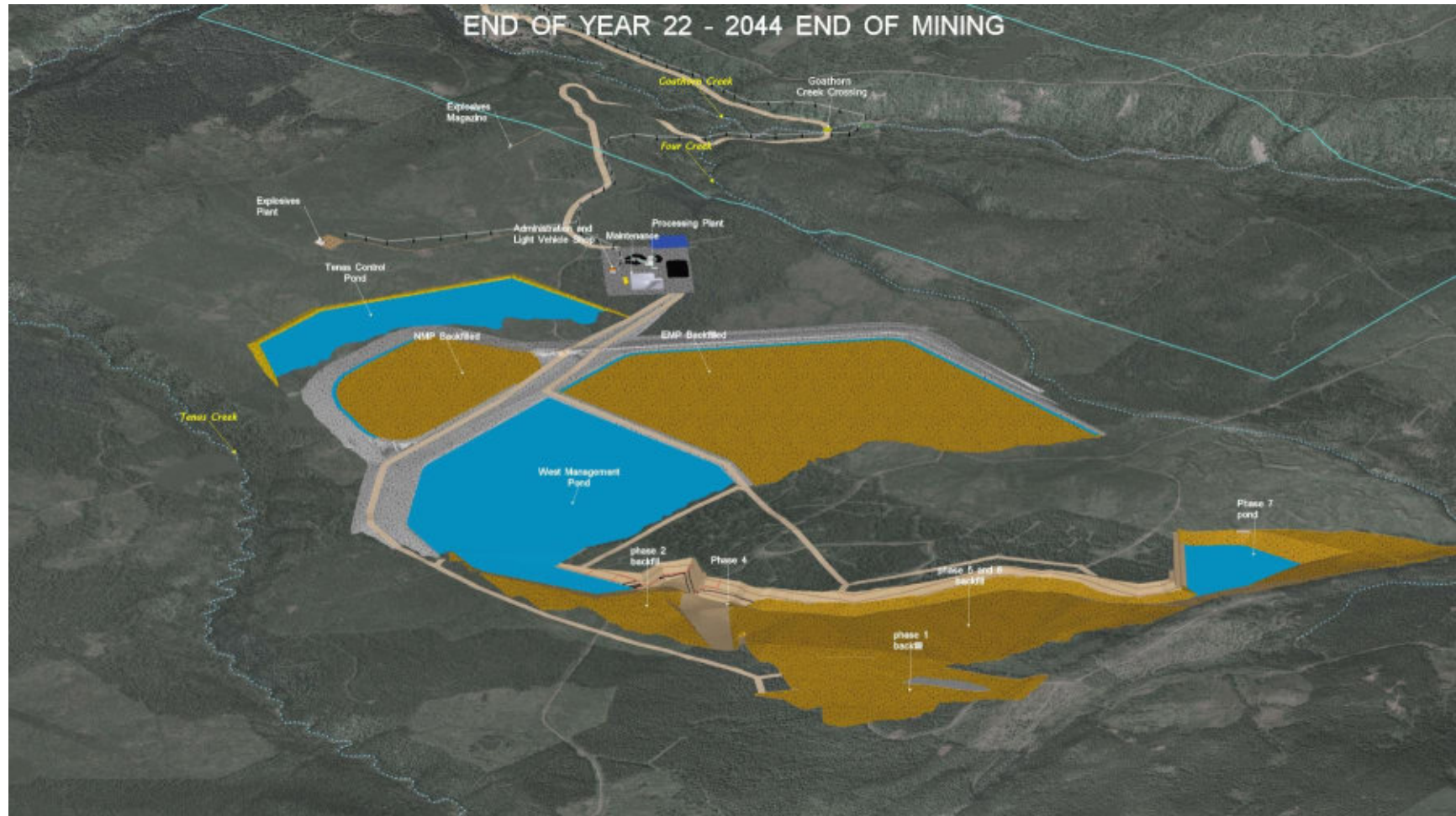






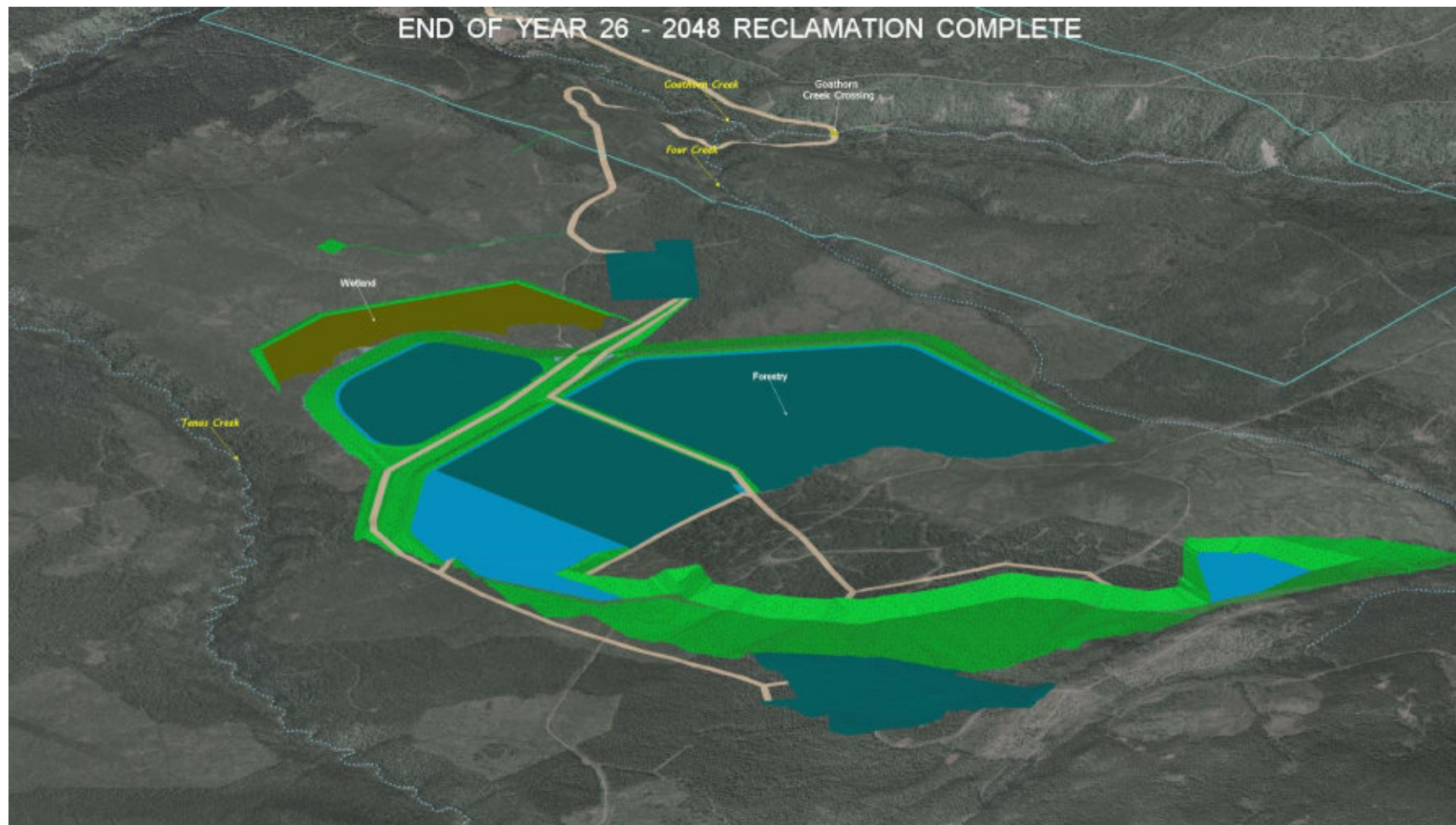








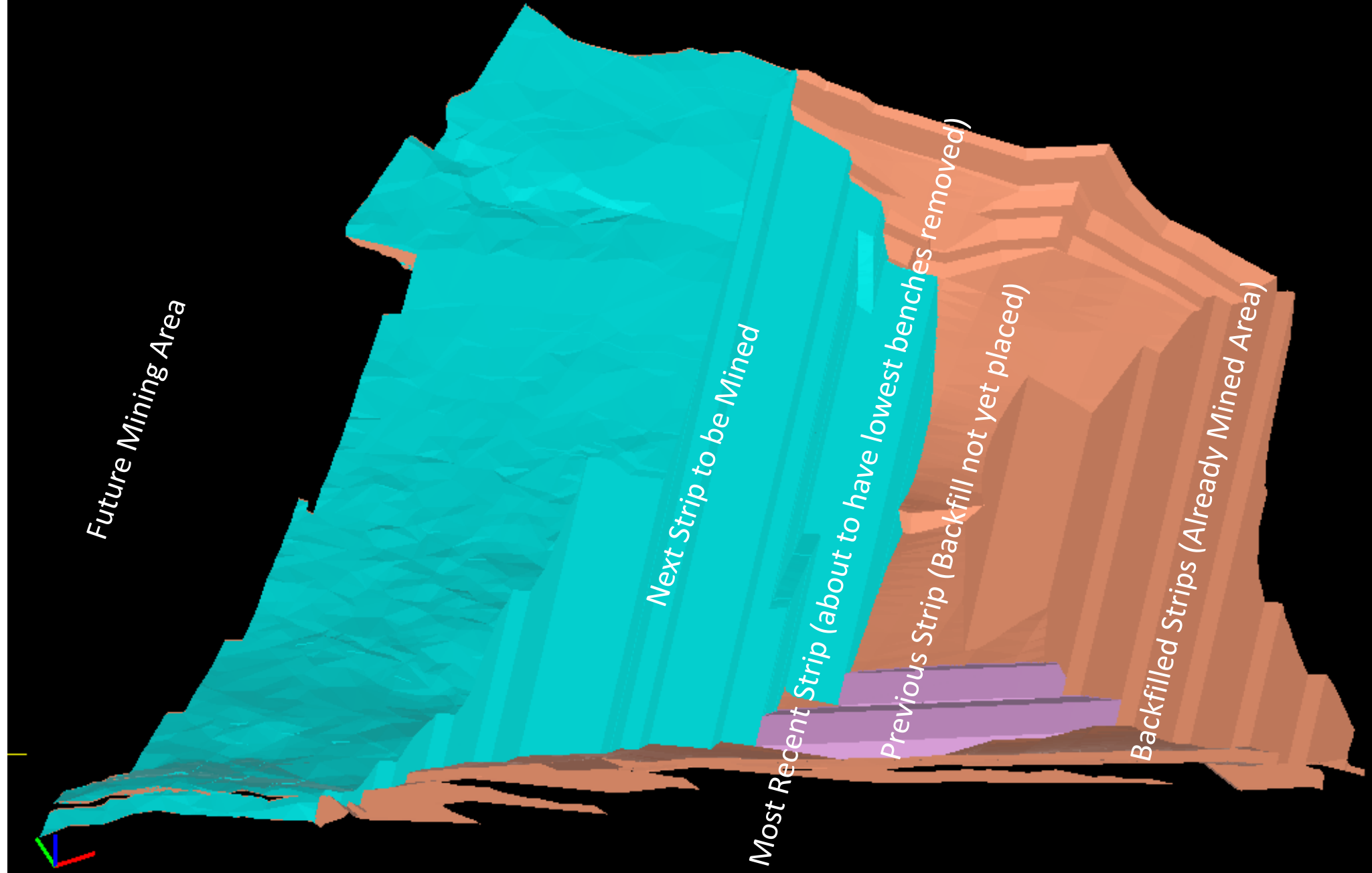
Period Map – End of 2022



Pit Sequence Example for Geotech Analysis - with Ramps v1

Tenas Project Pit – V7

2020/12



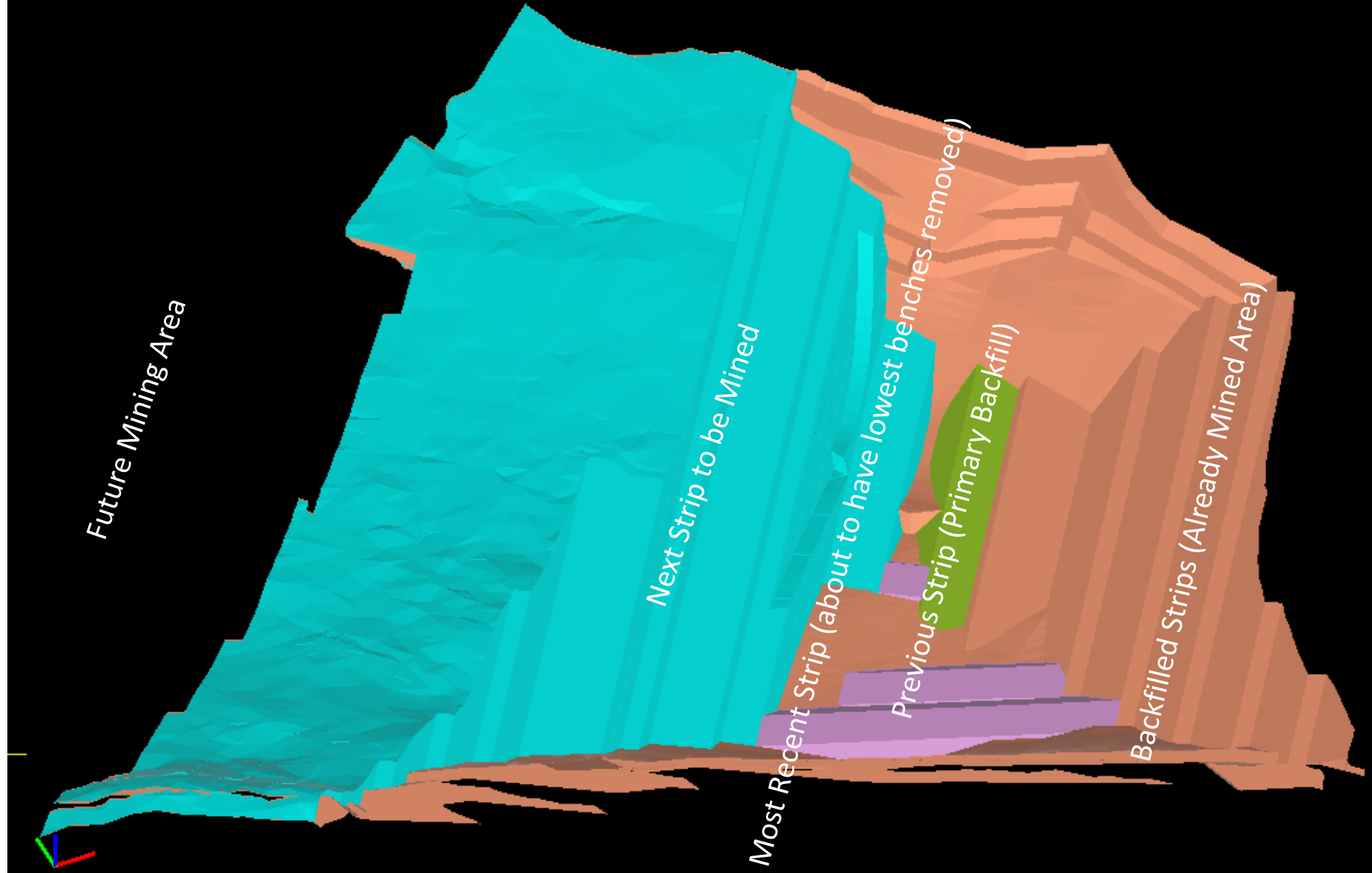
Future Mining Area

Next Strip to be Mined

Most Recent Strip (about to have lowest benches removed)

Previous Strip (Backfill not yet placed)

Backfilled Strips (Already Mined Area)



Future Mining Area

Next Strip to be Mined

Most Recent Strip (about to have lowest benches removed)

Previous Strip (Primary Backfill)

Backfilled Strips (Already Mined Area)



Future Mining Area

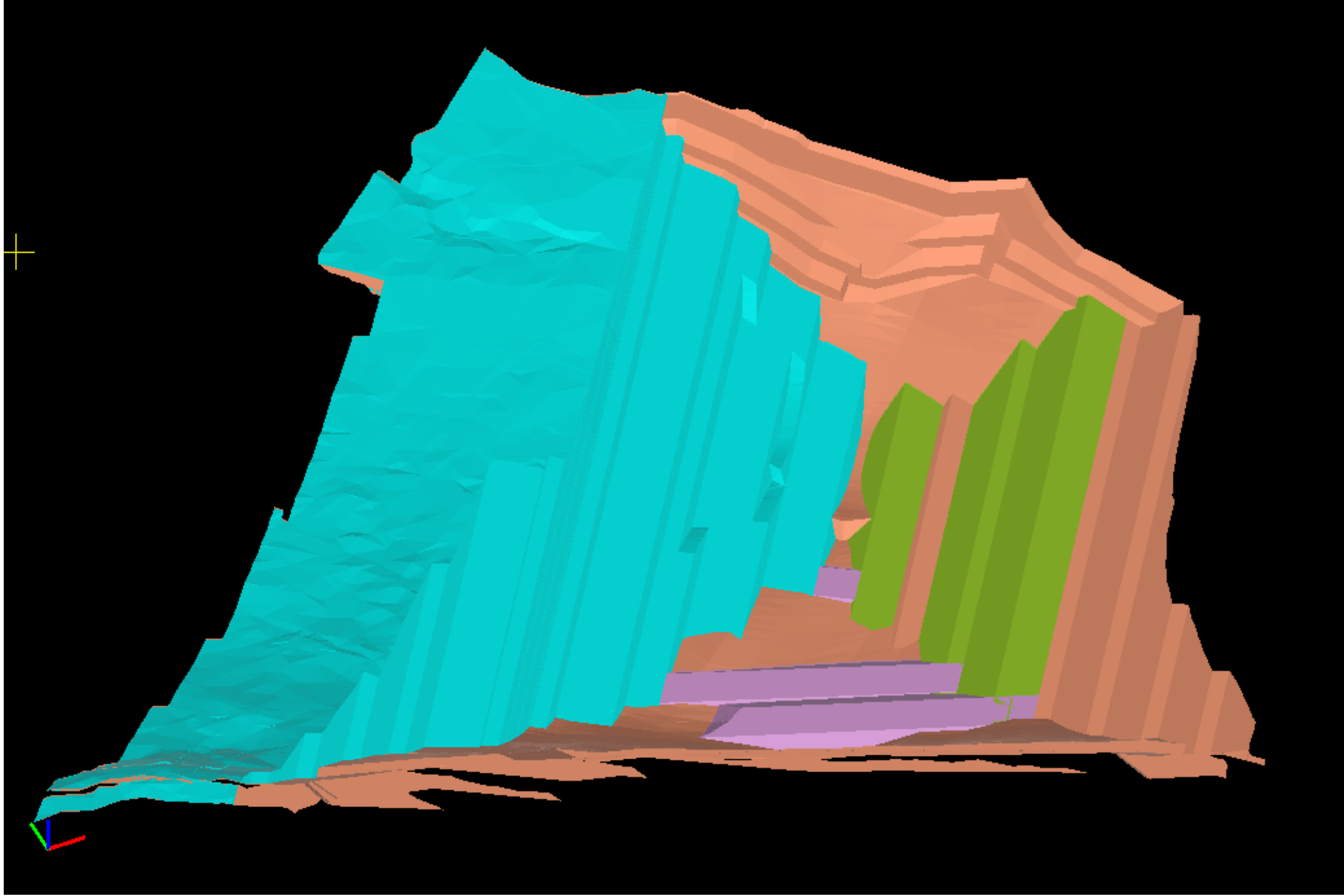
Next Strips to be Mined

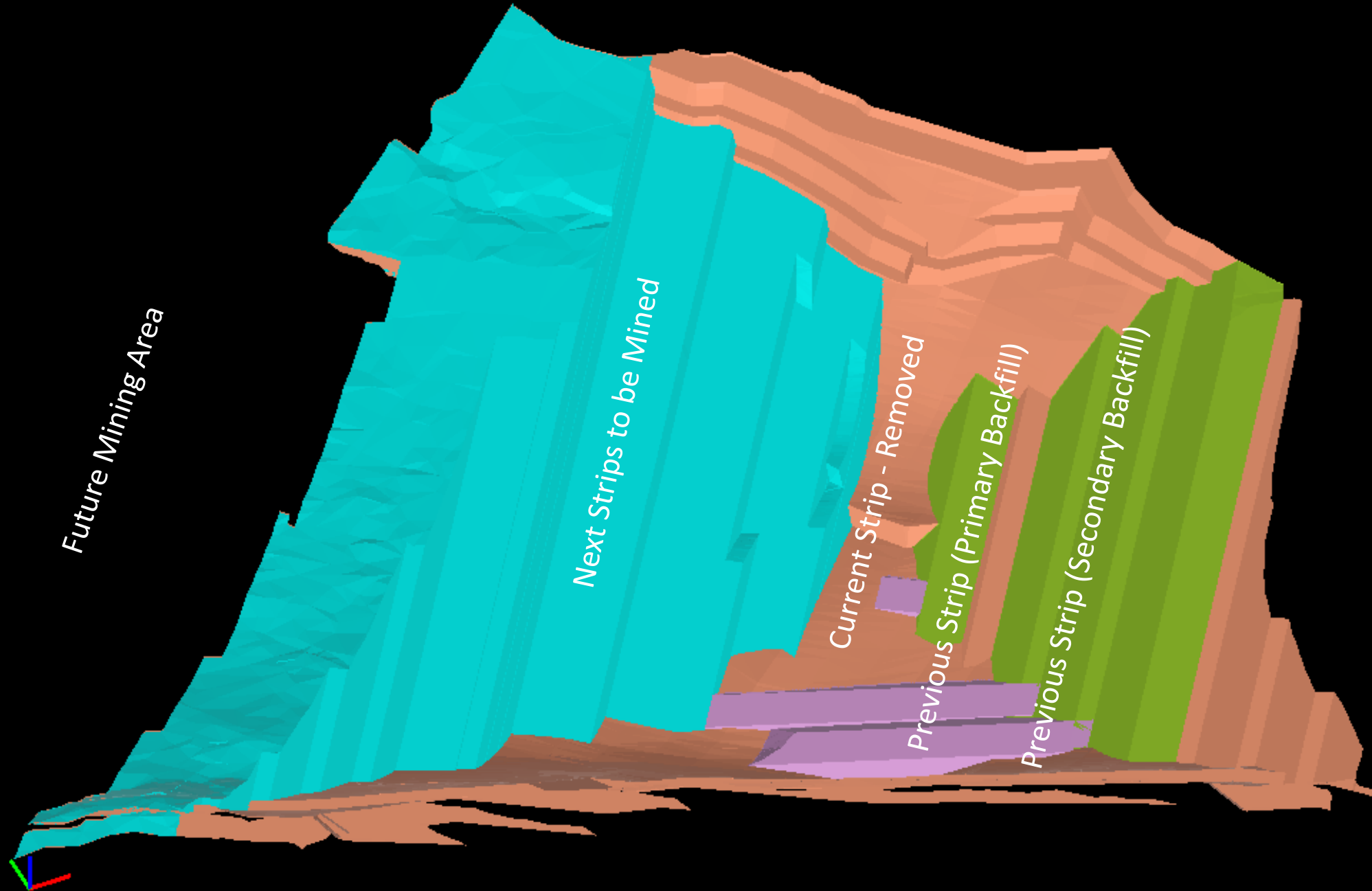
Current Strip

Previous Strip (Primary Backfill)

Previous Strip (Secondary Backfill)

Backfilled Strips (Already Mined Area)





Future Mining Area

Next Strips to be Mined

Current Strip - Removed

Previous Strip (Primary Backfill)

Previous Strip (Secondary Backfill)

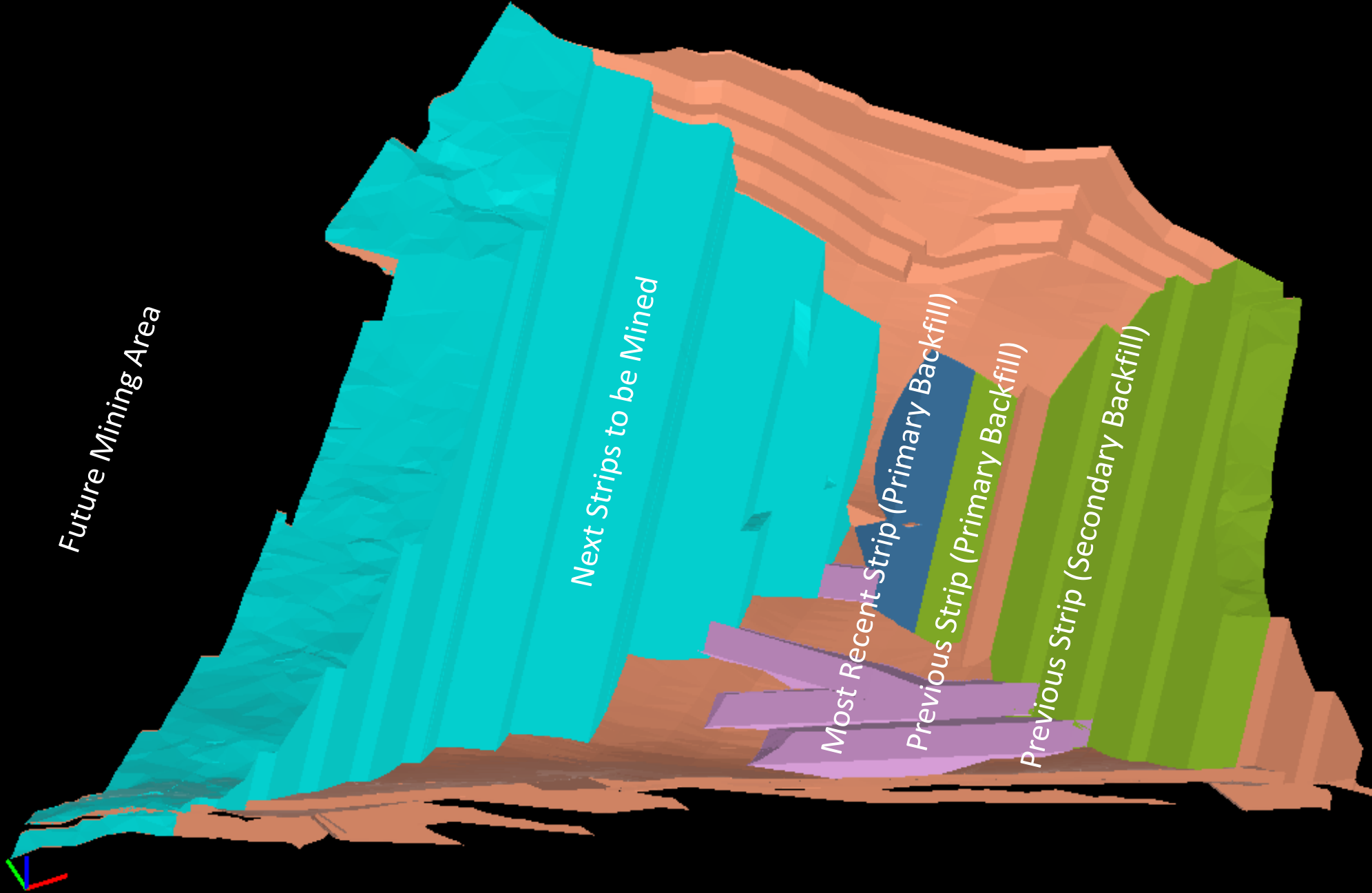
Future Mining Area

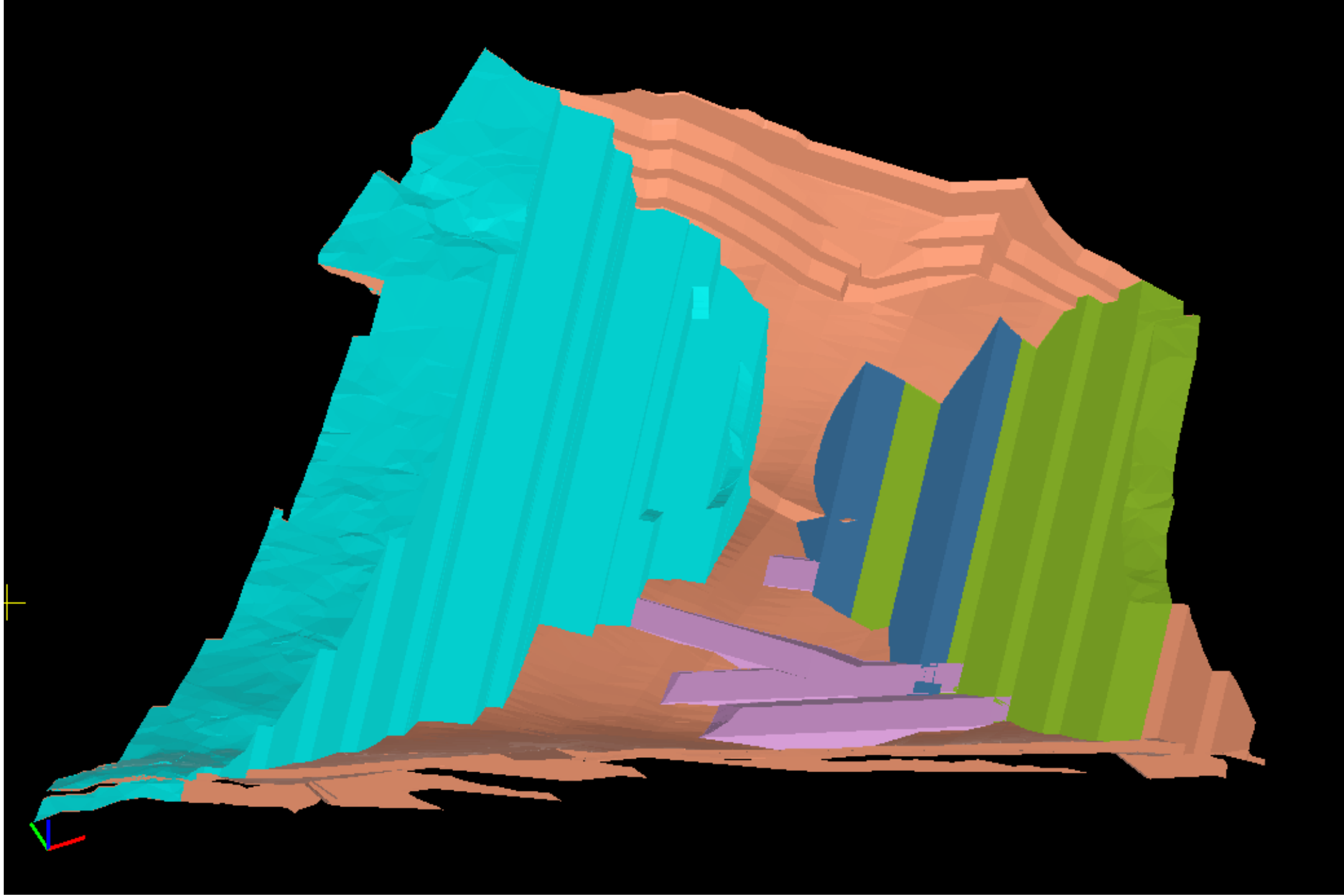
Next Strips to be Mined

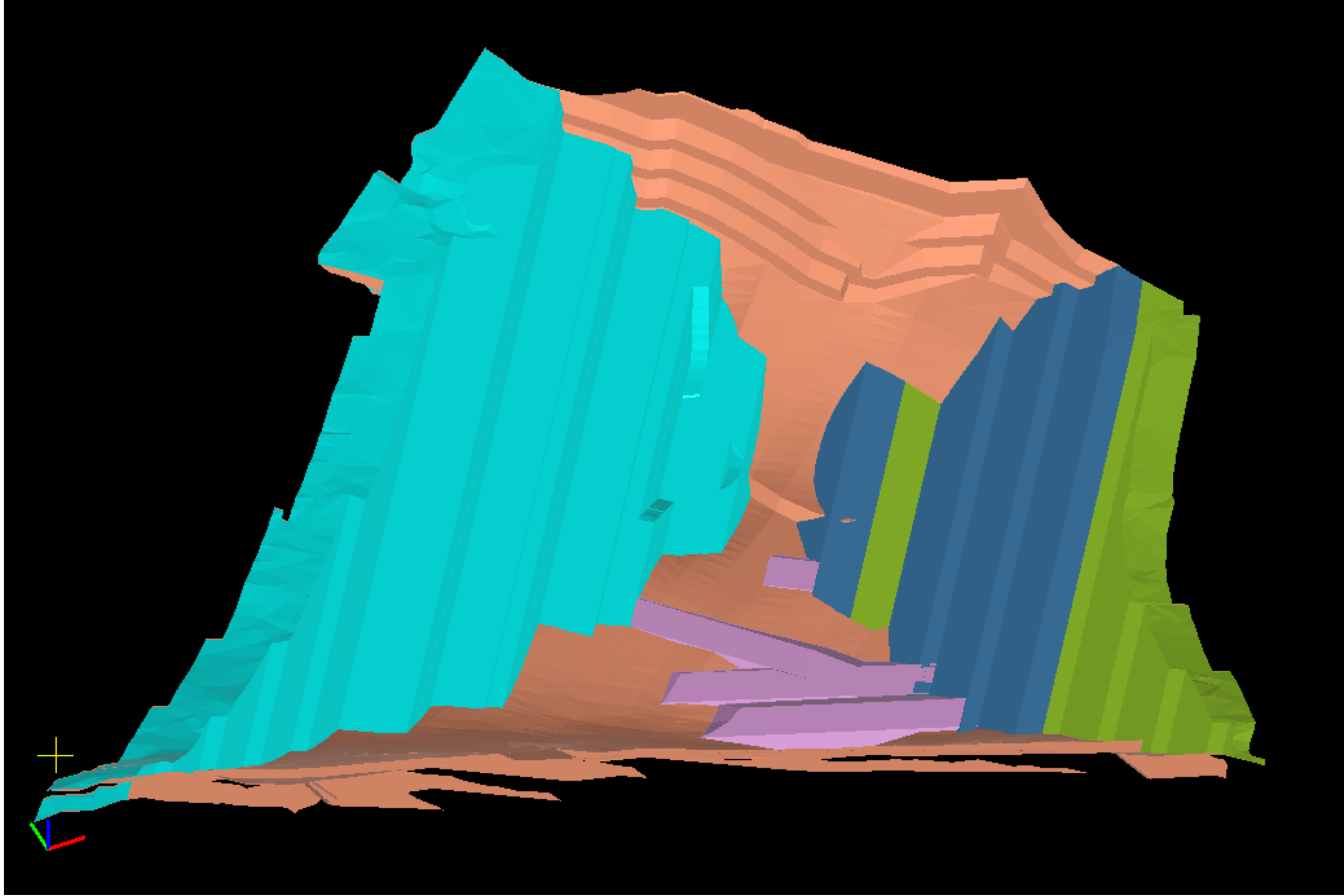
Most Recent Strip (Primary Backfill)

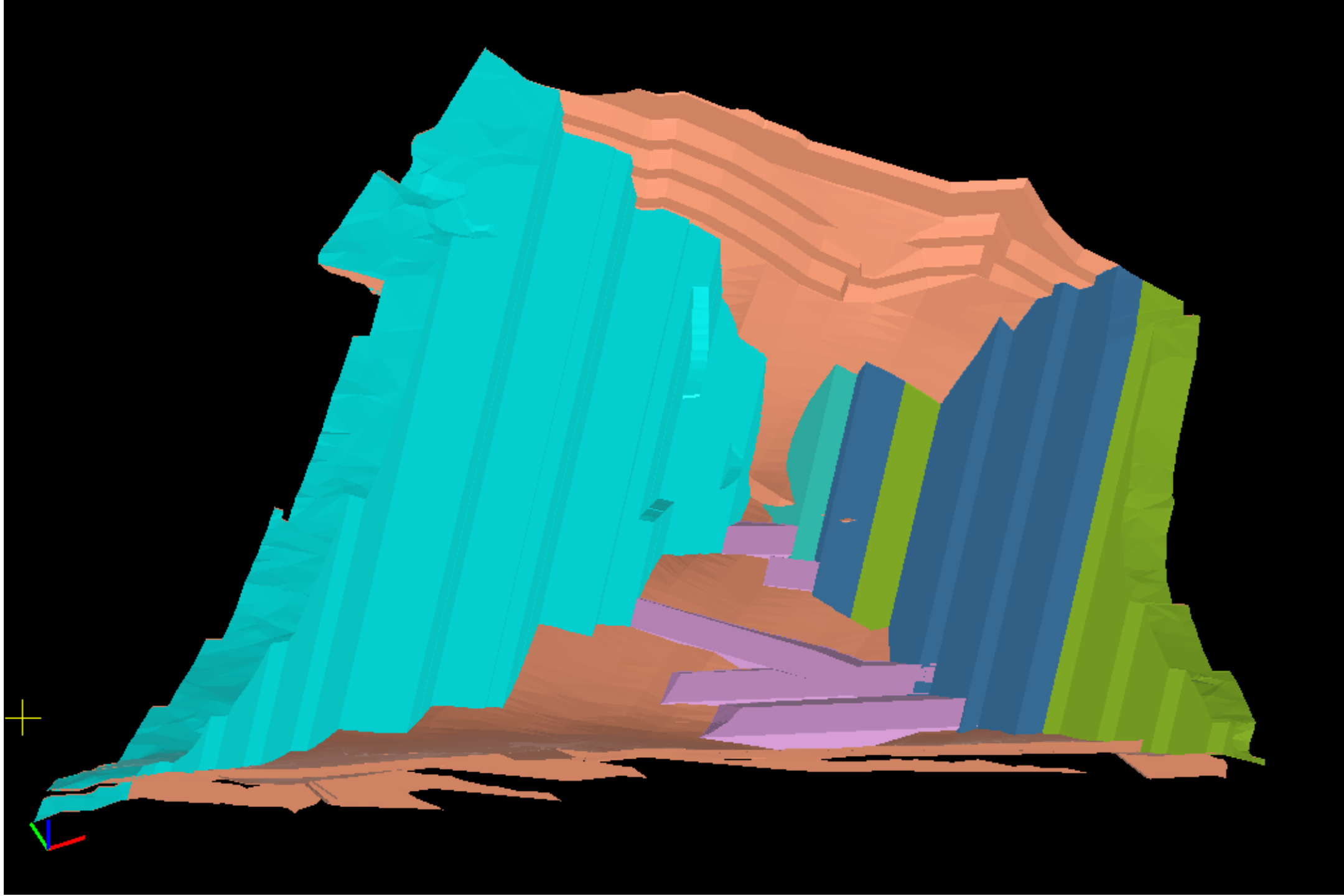
Previous Strip (Primary Backfill)

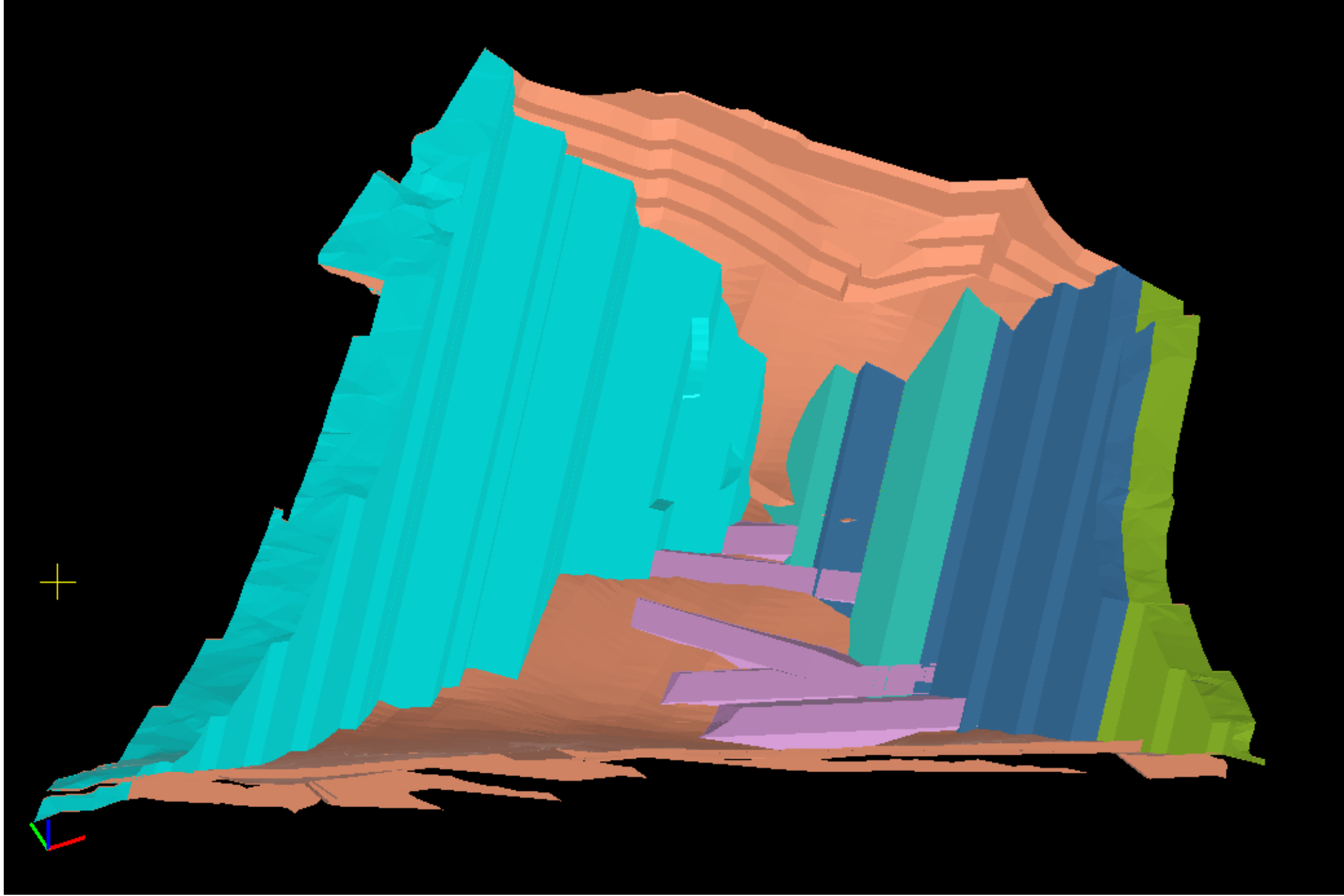
Previous Strip (Secondary Backfill)

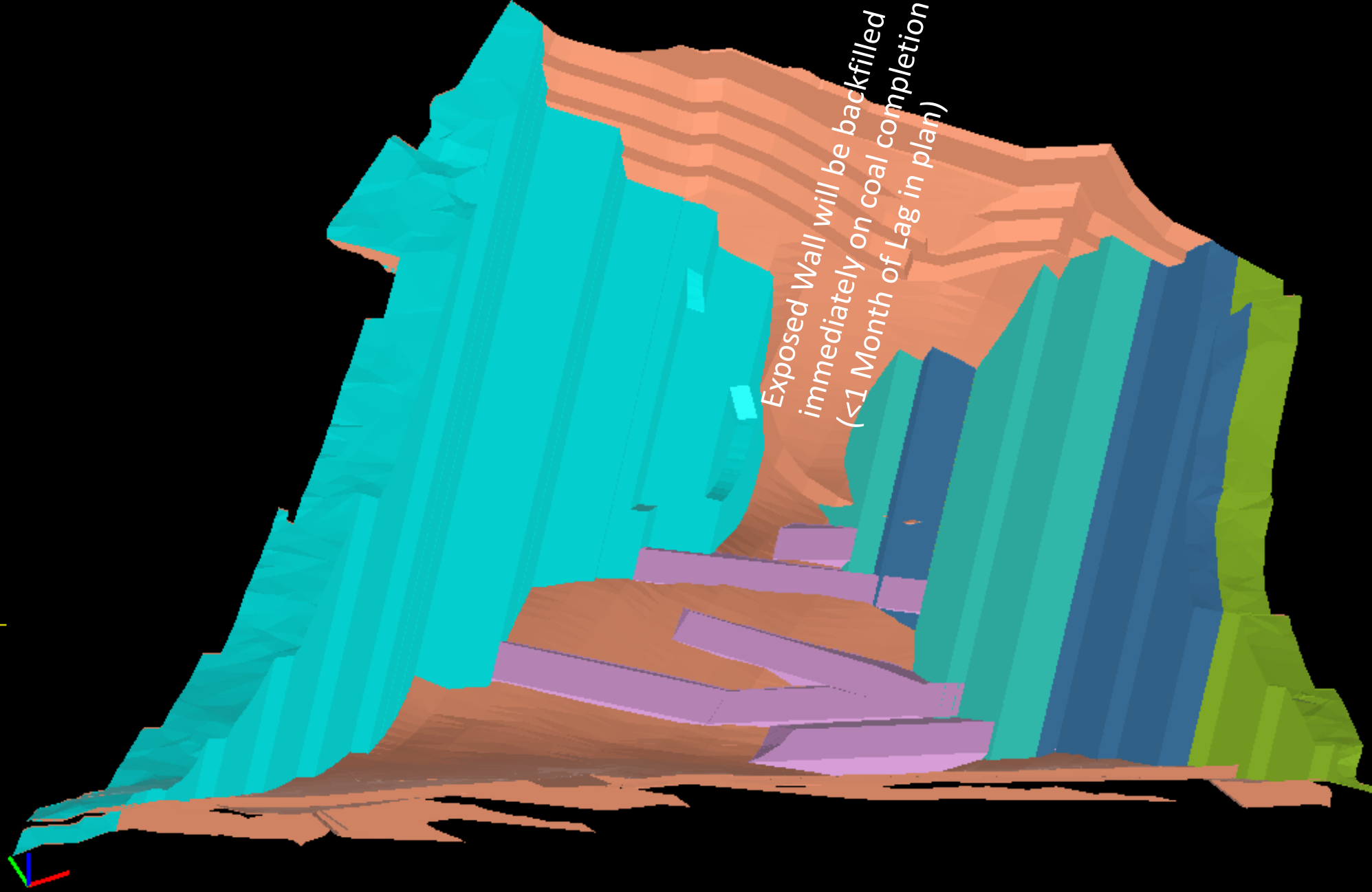
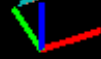




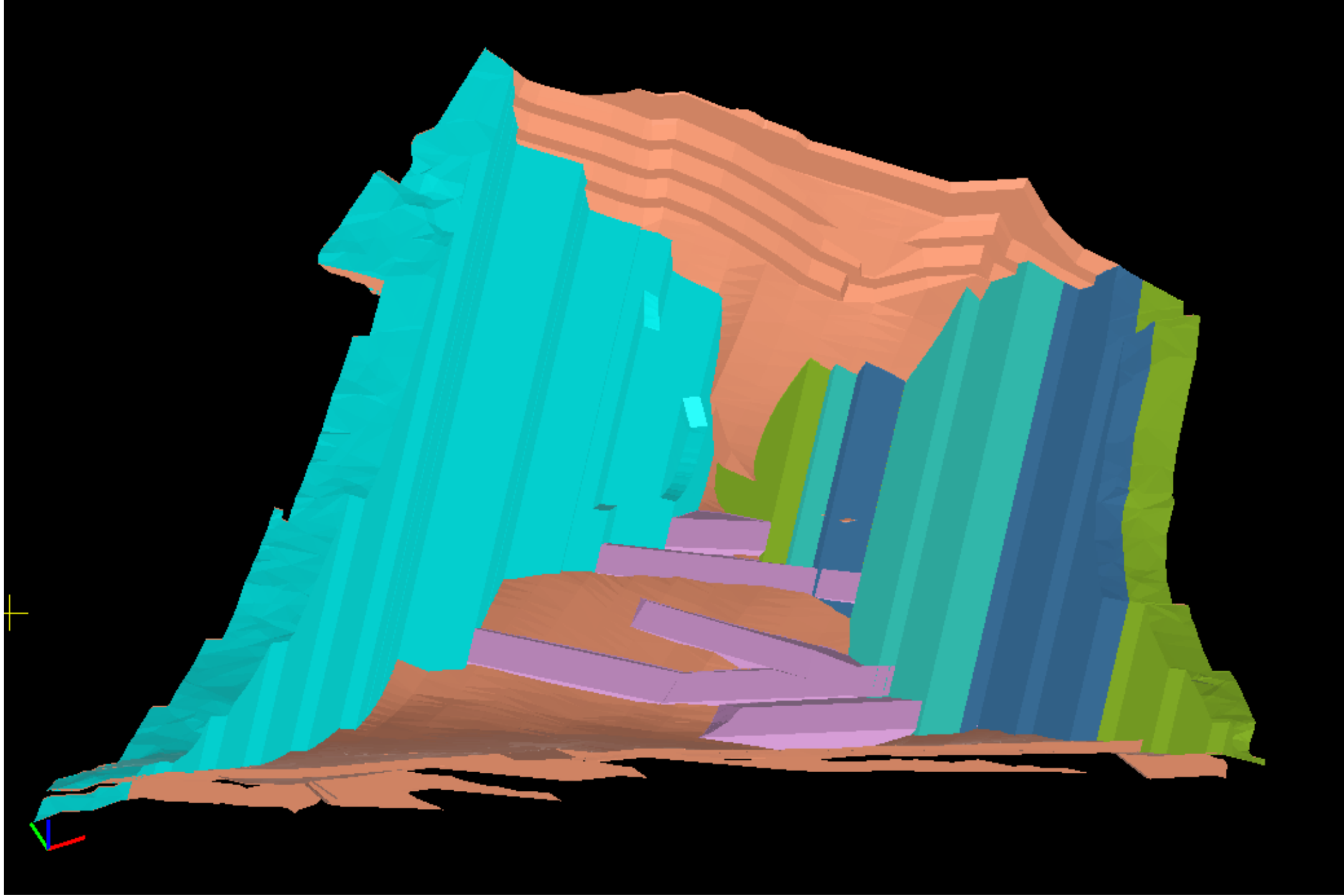


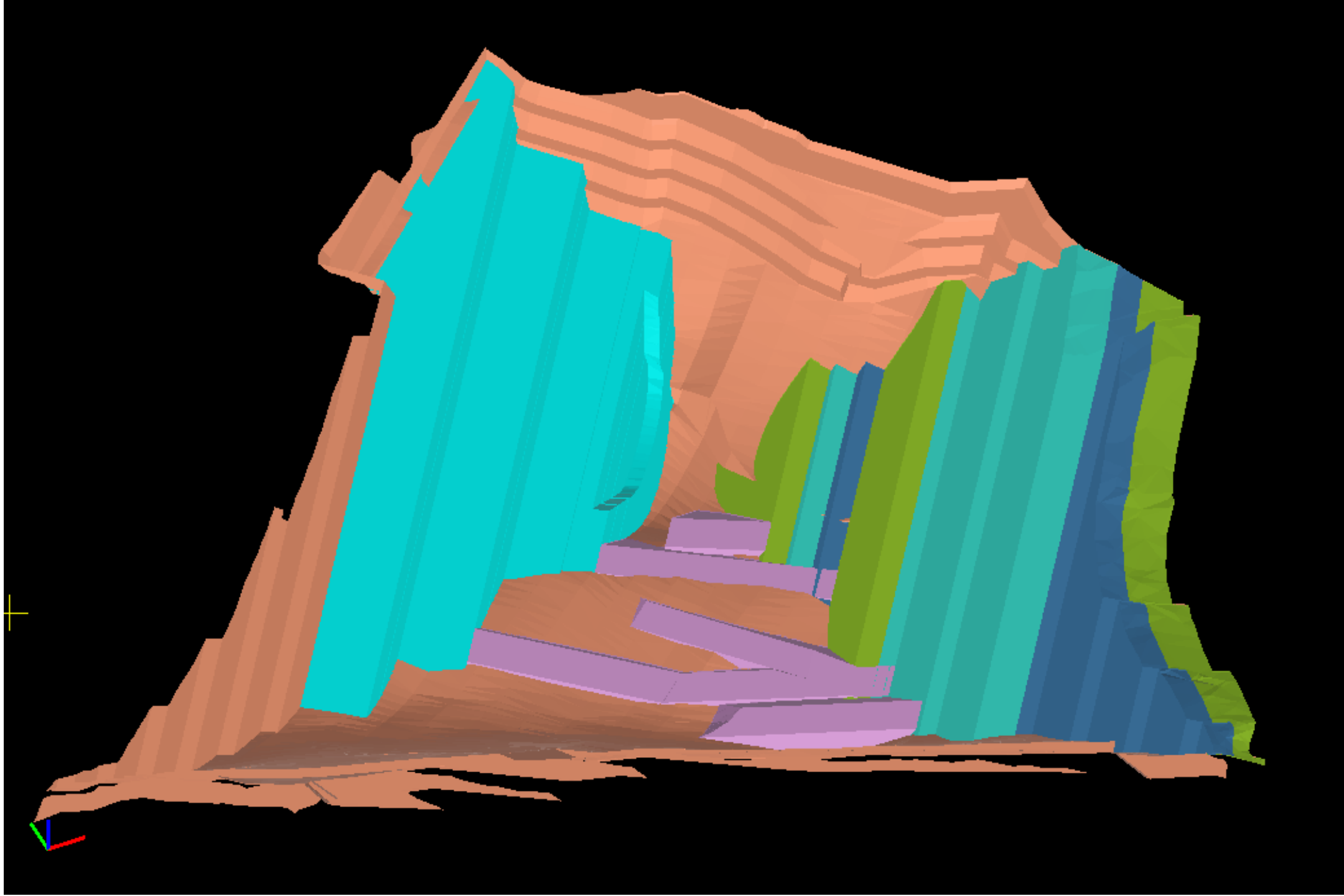


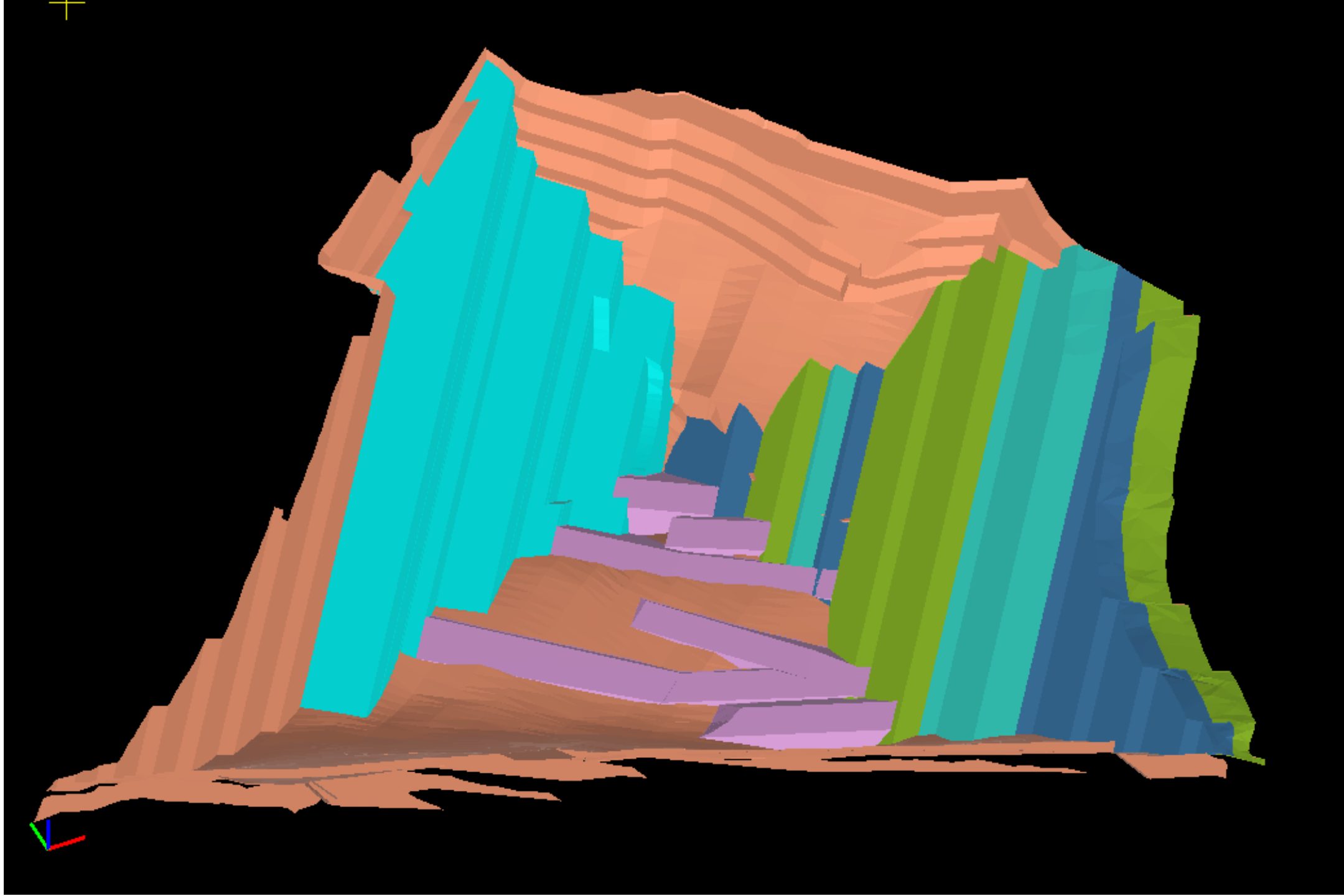


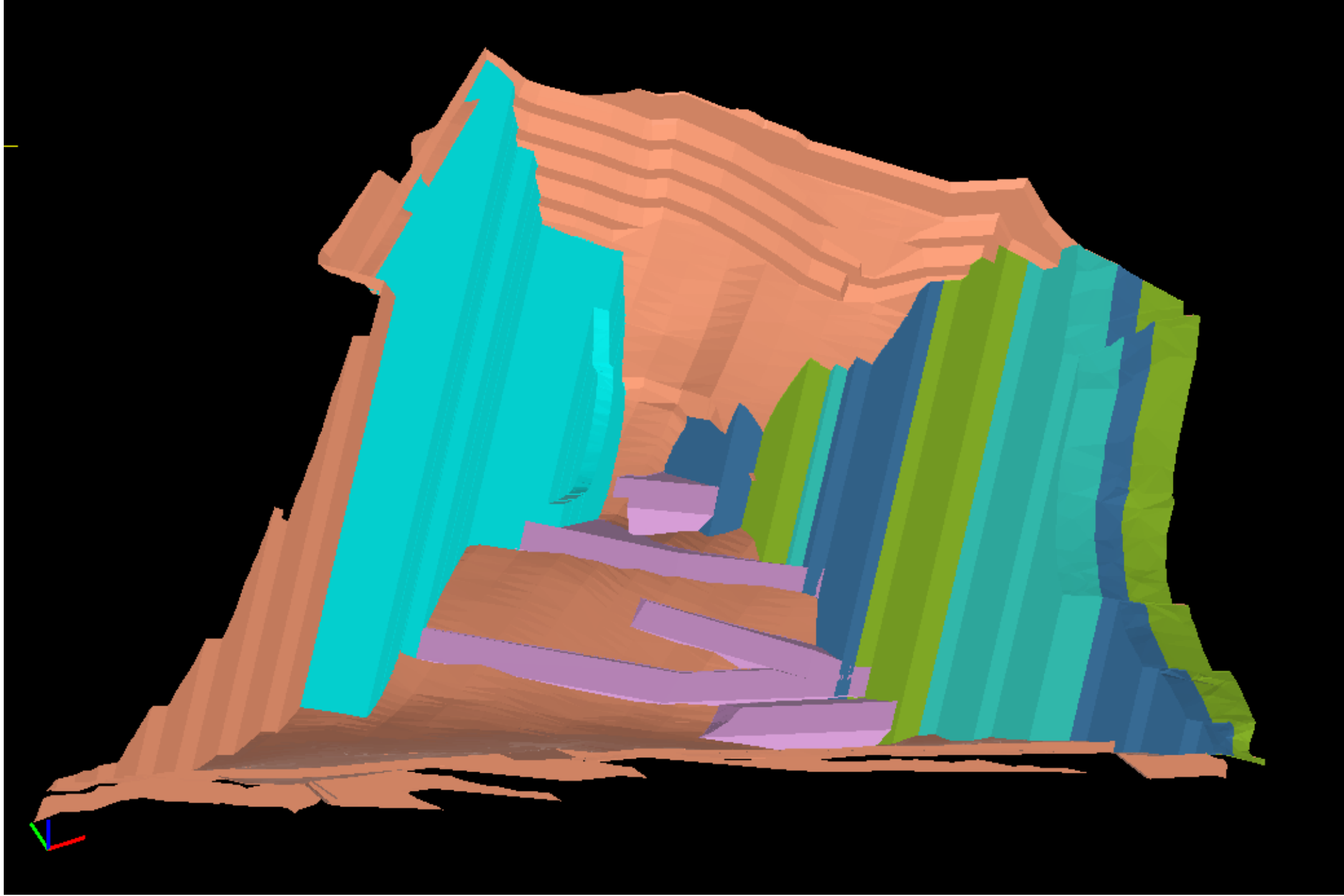


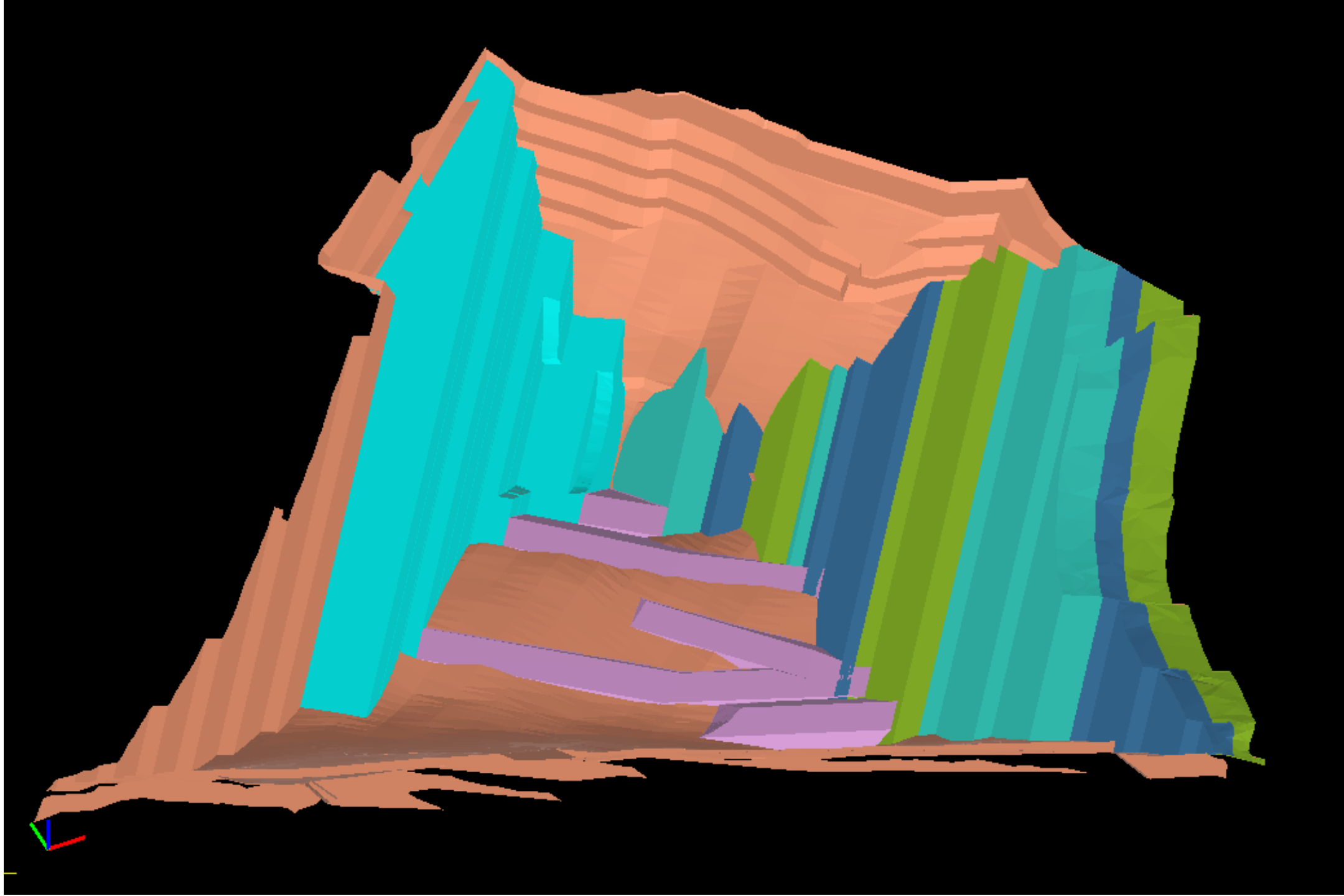
Exposed Wall will be backfilled
immediately on coal completion
(<1 Month of Lag in plan)

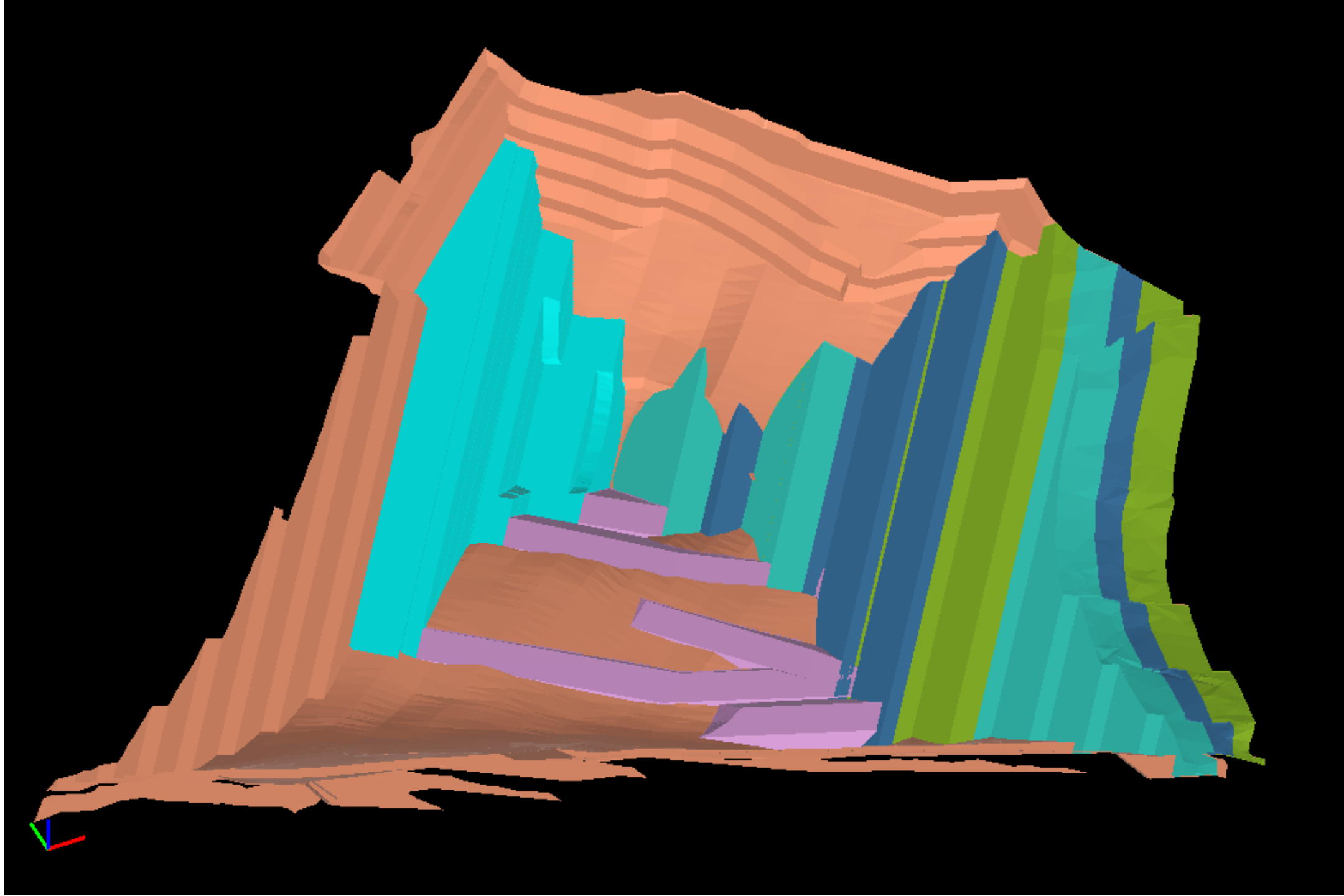


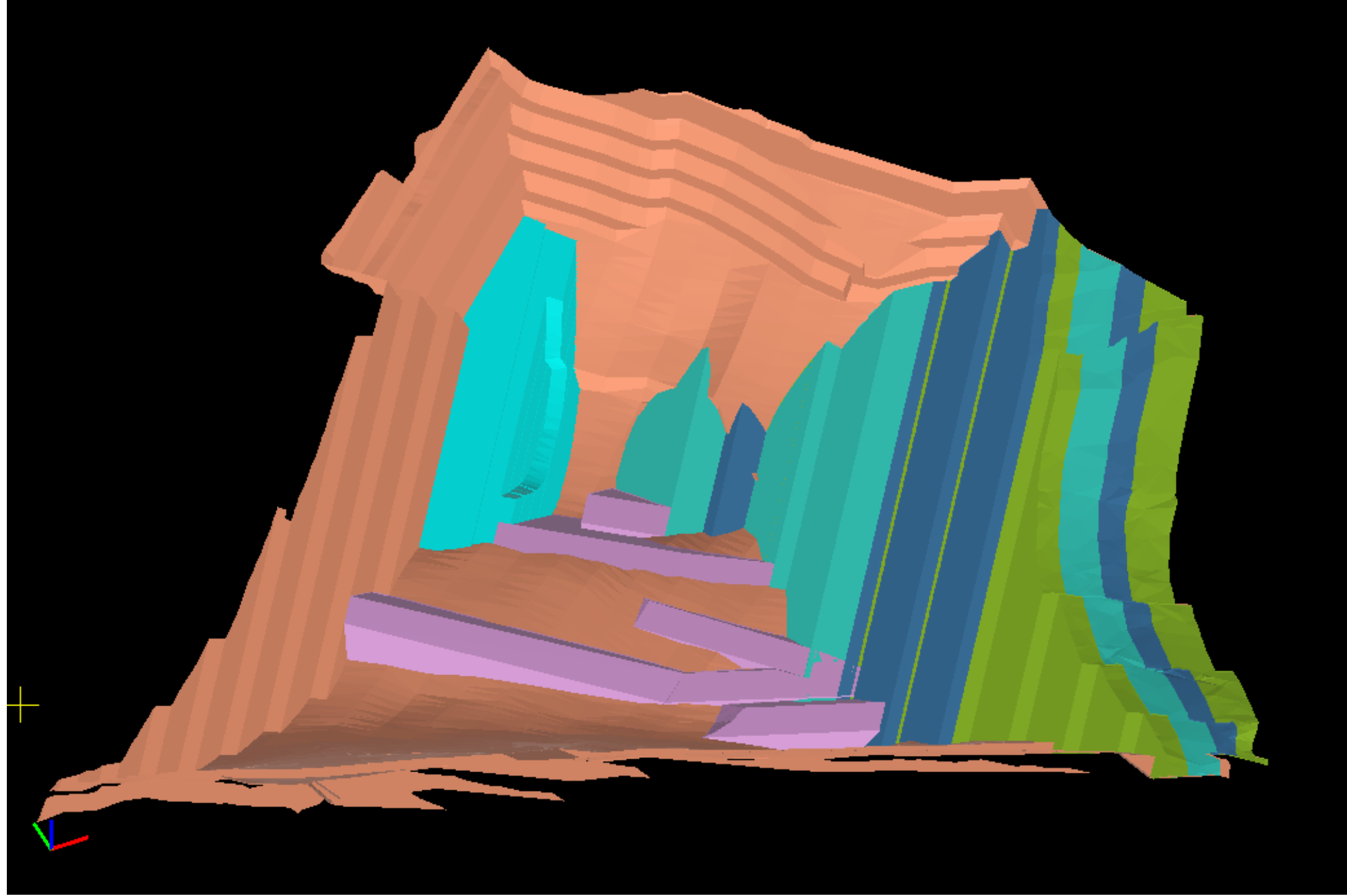


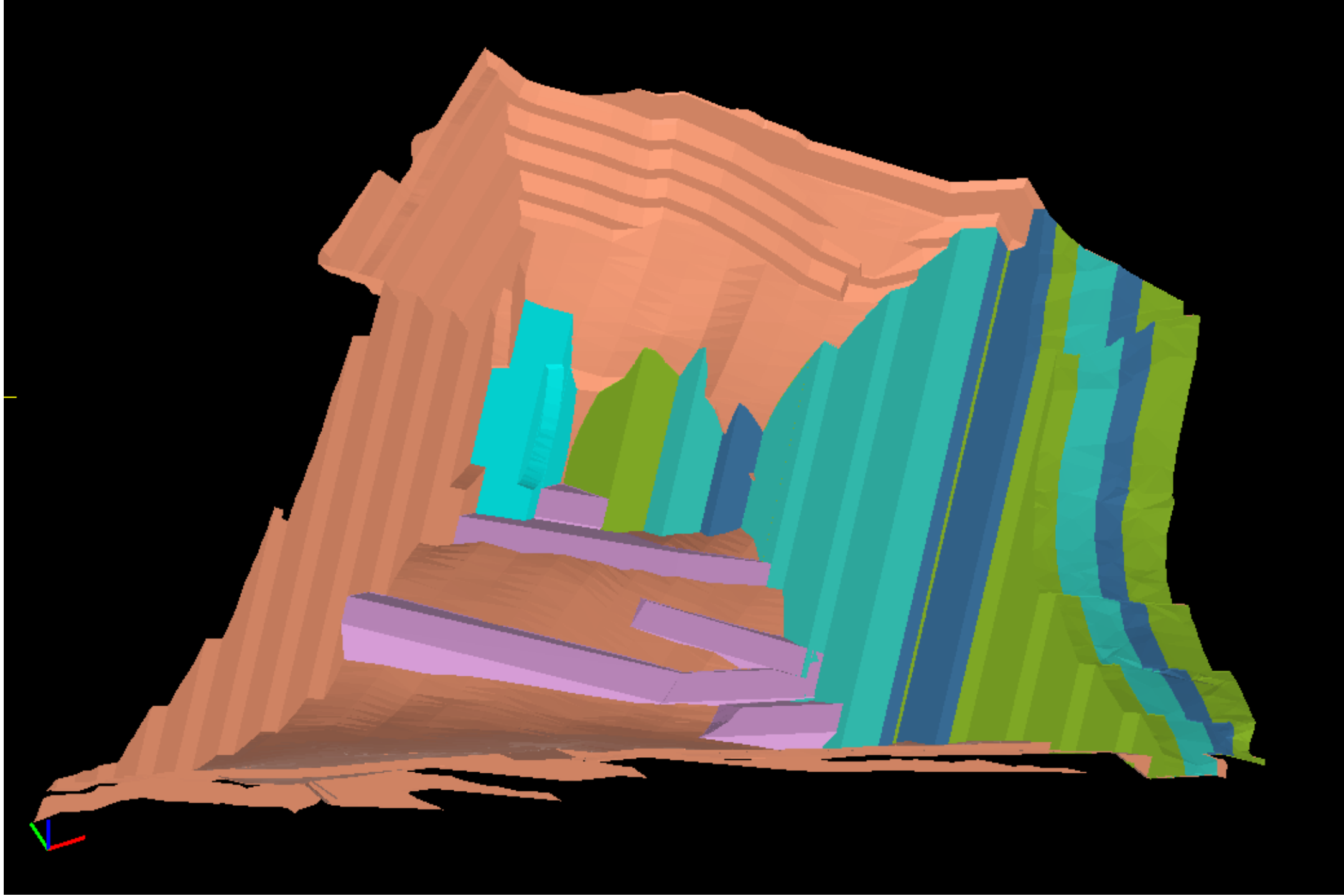


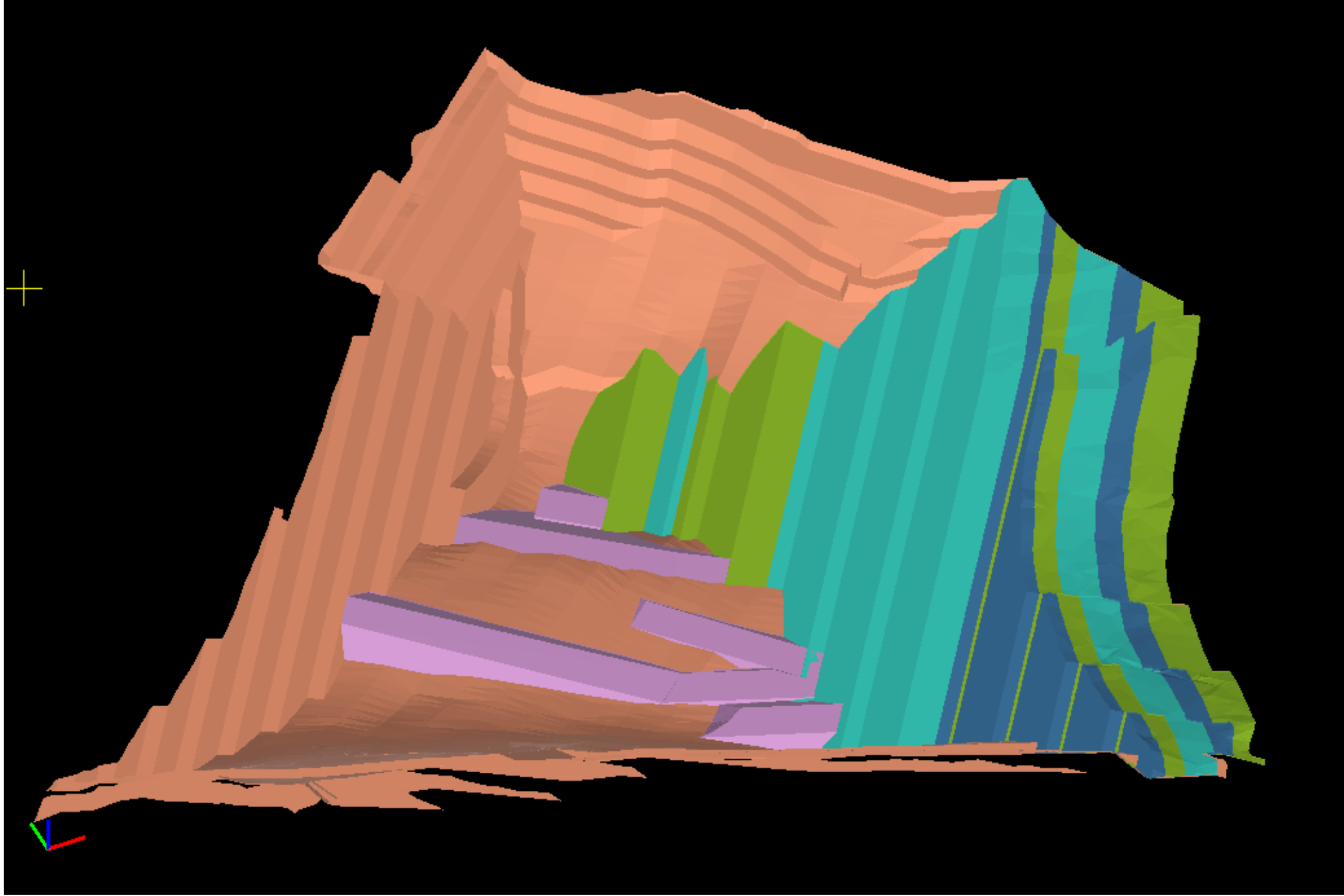


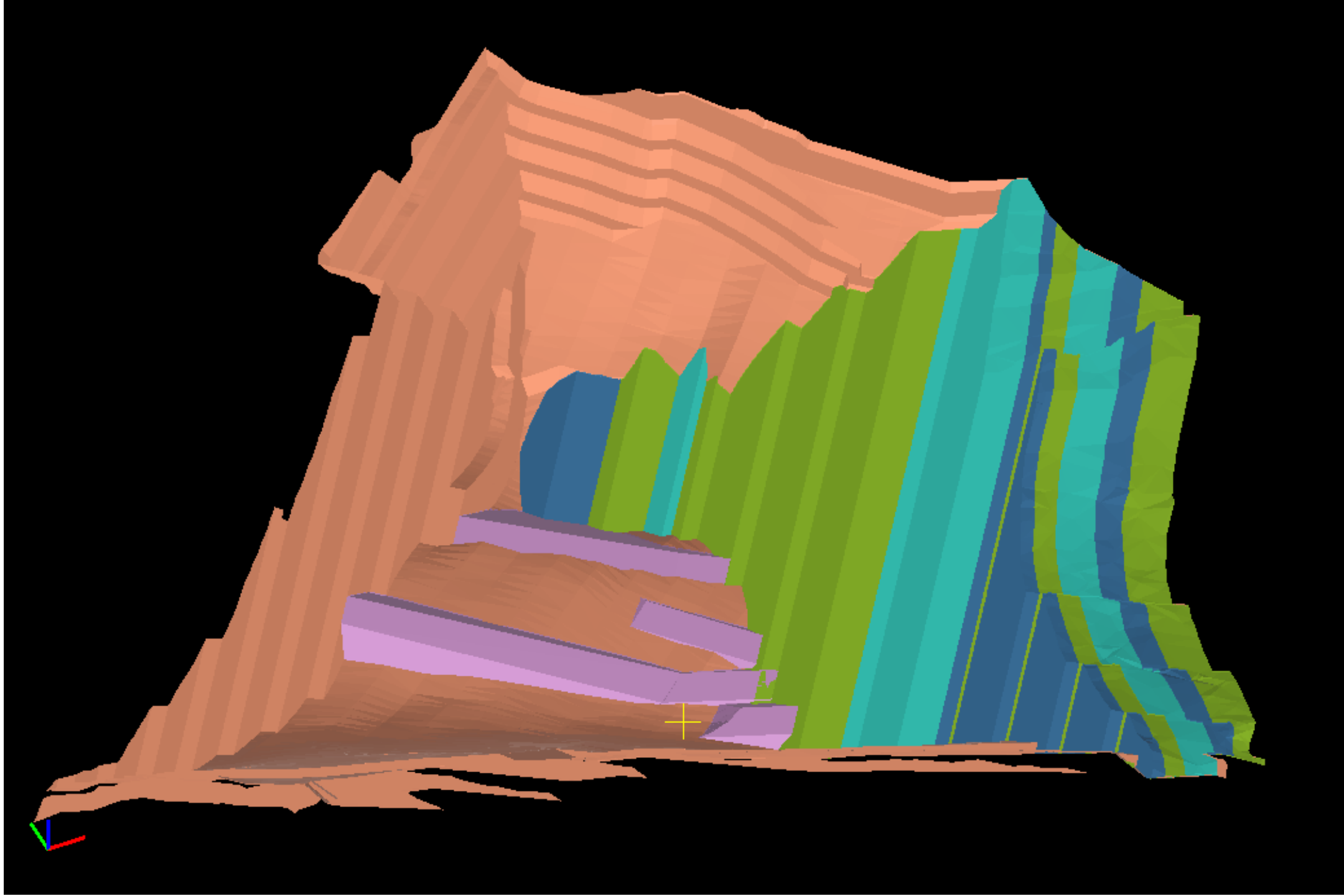


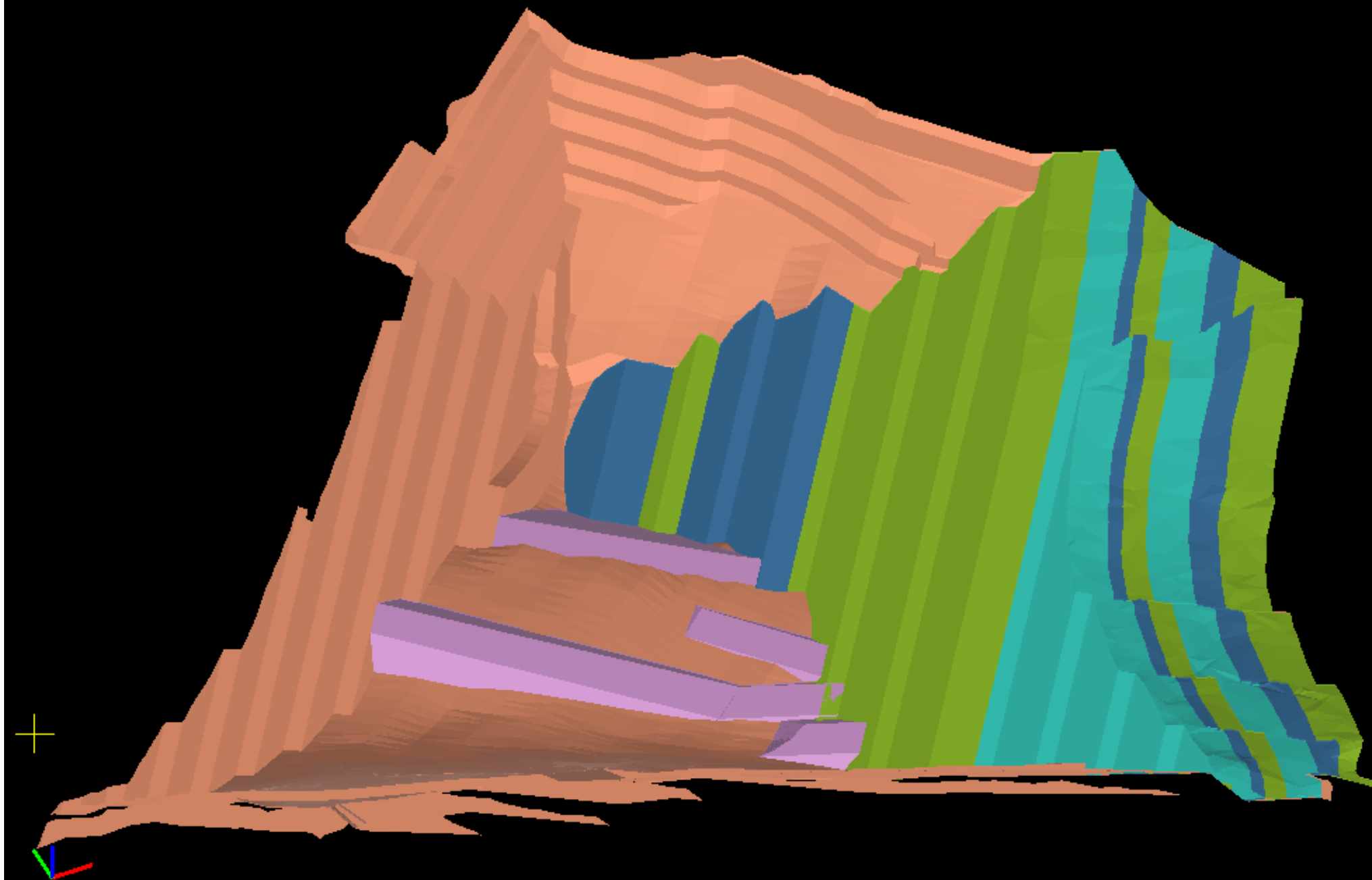








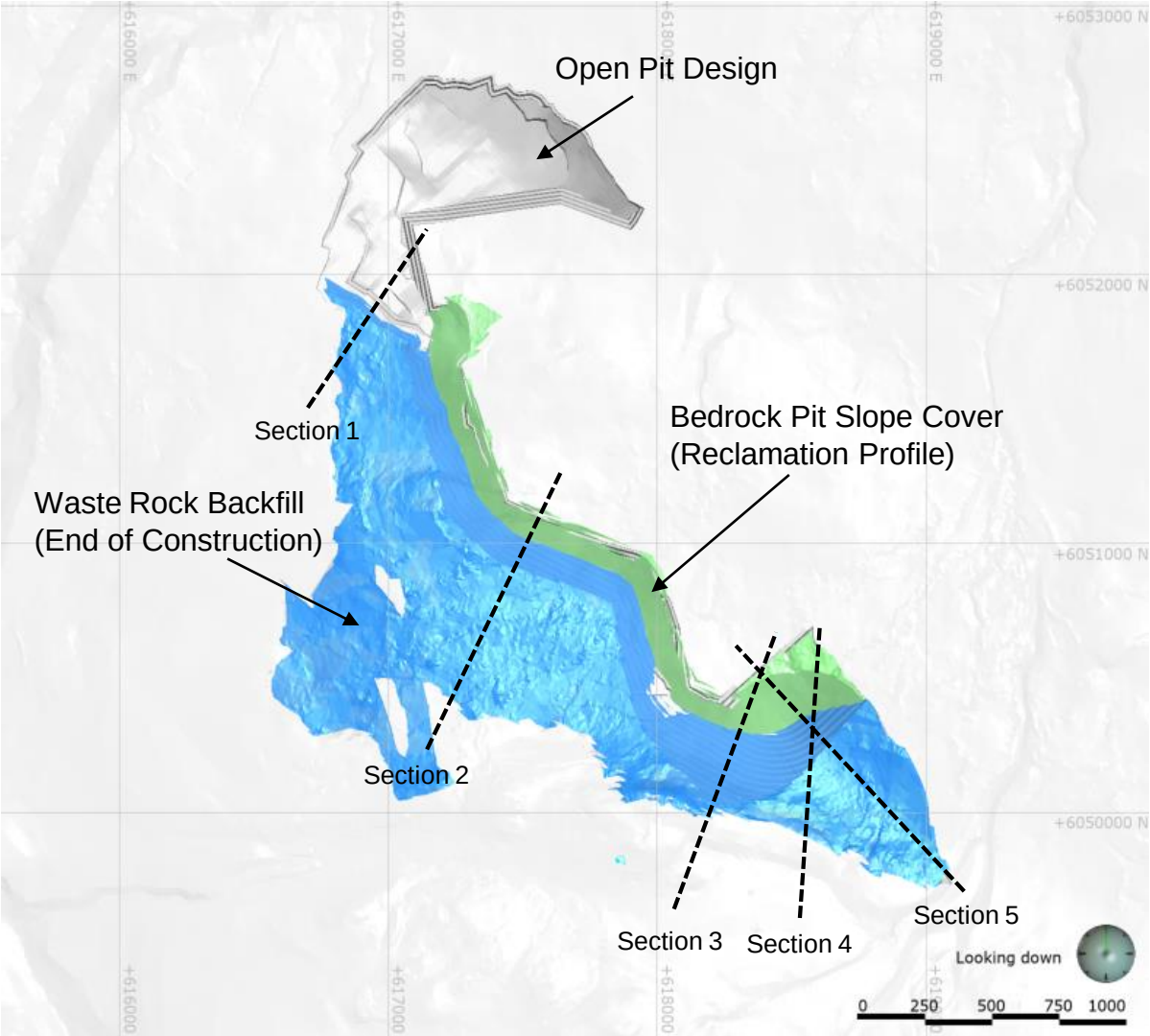




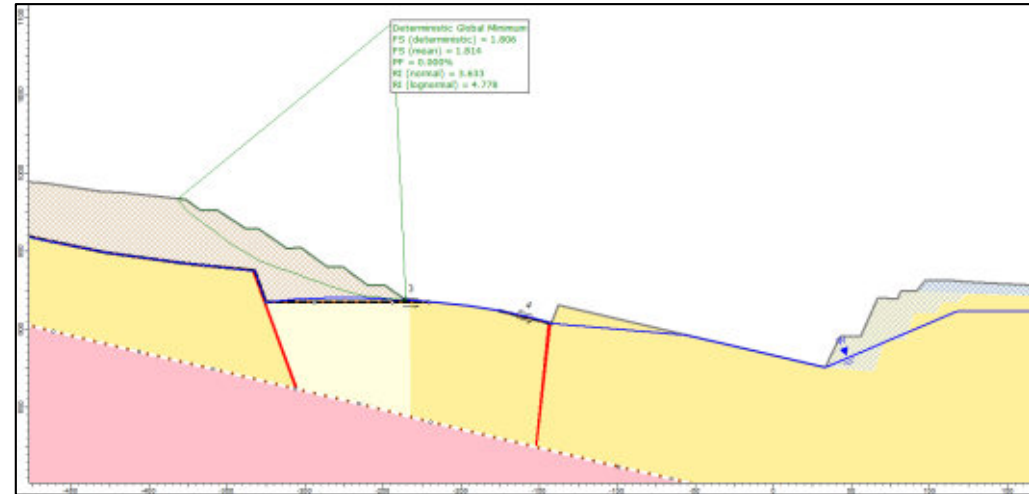
Appendix D: Results of Backfill Stability Analyses

BACKFILL WASTE ROCK 2D STABILITY ANALYSIS SUMMARY

Stability Section Locations



Typical Section



Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

Stability Analysis Results

Backfill	Stability Section	Modelled slope Height (m)	Maximum Footwall Slope Angle (°)	Construction Stage	Groundwater Conditions	Static Conditions				Pseudo-static Conditions	
						Minimum Design FOS	Minimum Modelled FOS	Maximum Design PoF	Maximum Modelled PoF	Minimum Design FOS	Minimum Modelled FOS
Phase 2	1	20	5	End of Construction	Footwall elevation	1.3	1.3	10%	3%	1.1	1.3
Phase 5/6	2	65	10	During Construction	Footwall elevation	1.3	1.8	10%	<1%	n/a	-
		80	13	End of Construction	Footwall elevation	1.3	1.6	10%	<1%	1.1	1.5
		80	13	Mine Reclamation	Pit Lake (901 m)	1.3	1.6	10%	<1%	1.1	1.5
Phase 7	3	95	41	End of Construction	Footwall elevation	1.3	1.4	10%	2%	1.1	1.3
		120	41	Mine Reclamation	Footwall elevation	1.3	1.4	10%	<1%	1.1	1.3
		120	41	Mine Reclamation	Pit Lake (910 m)	1.3	1.3	10%	5%	1.1	1.2
	4	115	39	End of Construction	Footwall elevation	1.3	1.4	10%	4%	1.1	1.3
		135	39	Mine Reclamation	Footwall elevation	1.3	1.4	10%	4%	1.1	1.3
		135	39	Mine Reclamation	Pit Lake (910 m)	1.3	1.4	10%	<1%	1.1	1.3
	5	75	5	During Construction – Stage 3	Footwall elevation	1.3	1.5	10%	<1%	n/a	-
		80	5	During Construction – Stage 6	Footwall elevation	1.3	1.5	10%	<1%	n/a	-
		90	12	During Construction – Stage 8	Footwall elevation	1.3	1.4	10%	<1%	n/a	-
		100	12	End of Construction – Stage 9	Pit Lake (910 m)	1.3	1.3	10%	<1%	1.1	1.2
		100	12	End of Construction – Stage 9	Mine reclamation	1.3	1.3	10%	6%	1.1	1.2



Backfill Waste Rock Stability Assessment

STABILITY ANALYSES RESULTS SUMMARY

Job No: 2CT025.008
Filename: Appendix A

TENAS PROJECT

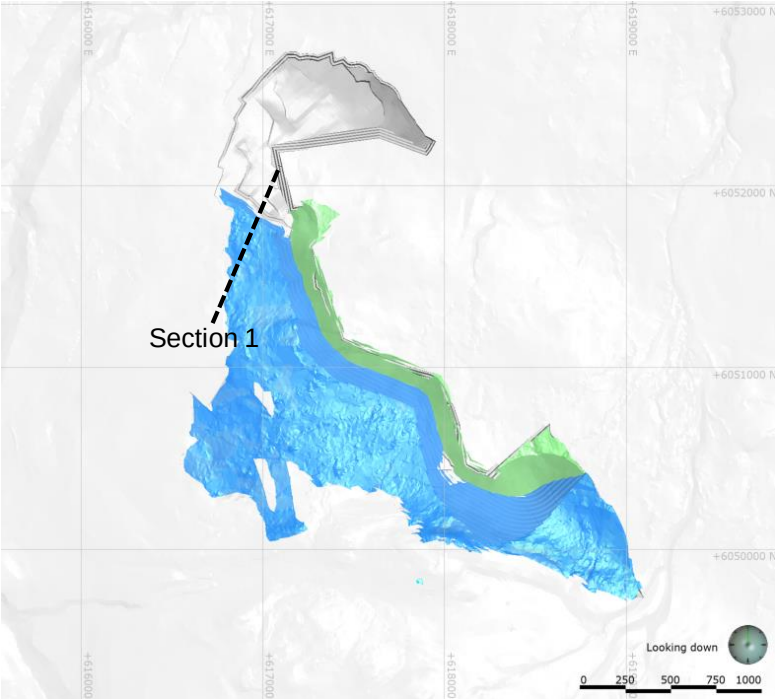
Date: Nov 2020

Approved: ES

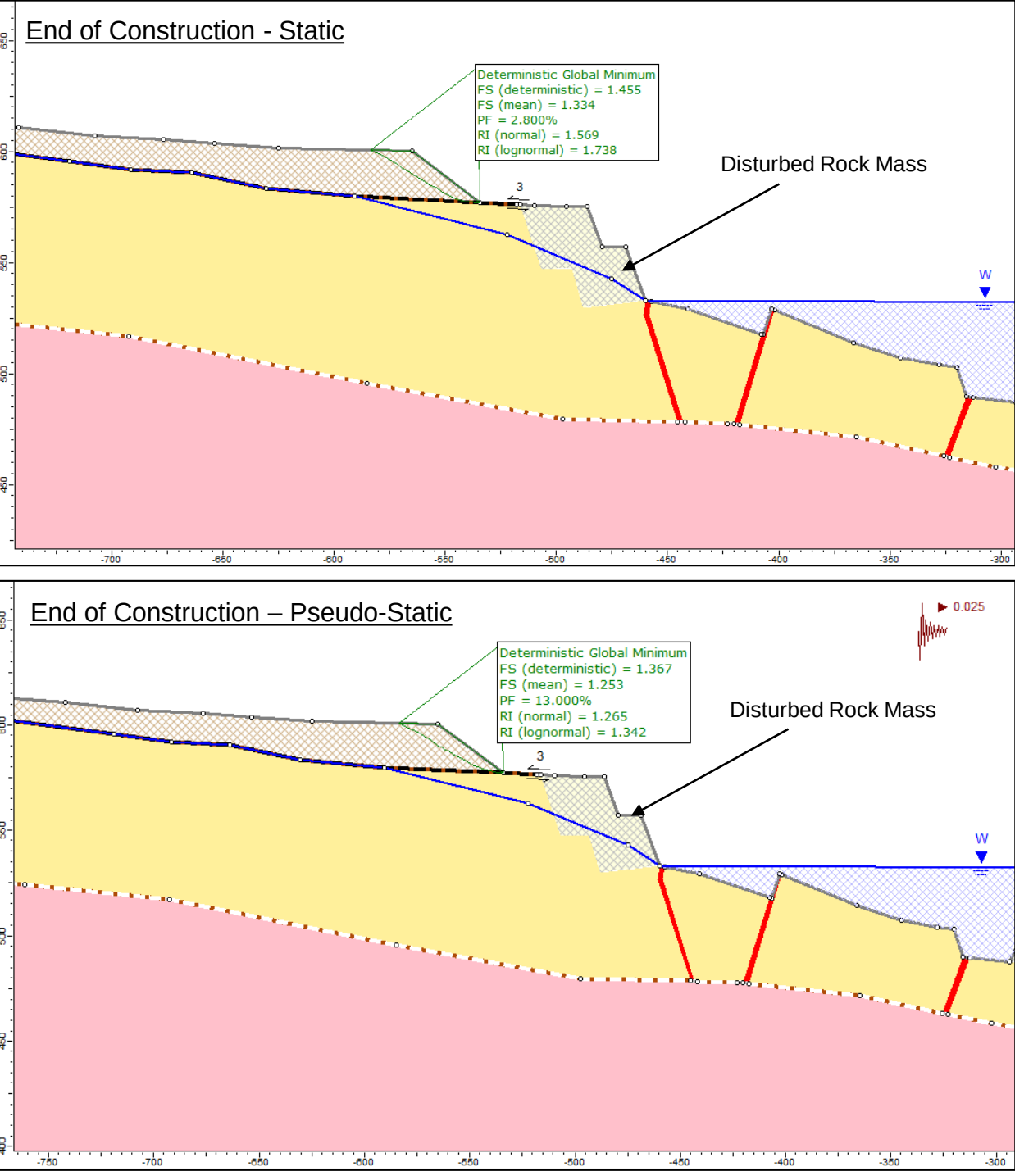
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SECTION 1 - STABILITY ANALYSES RESULTS

Stability Section Location



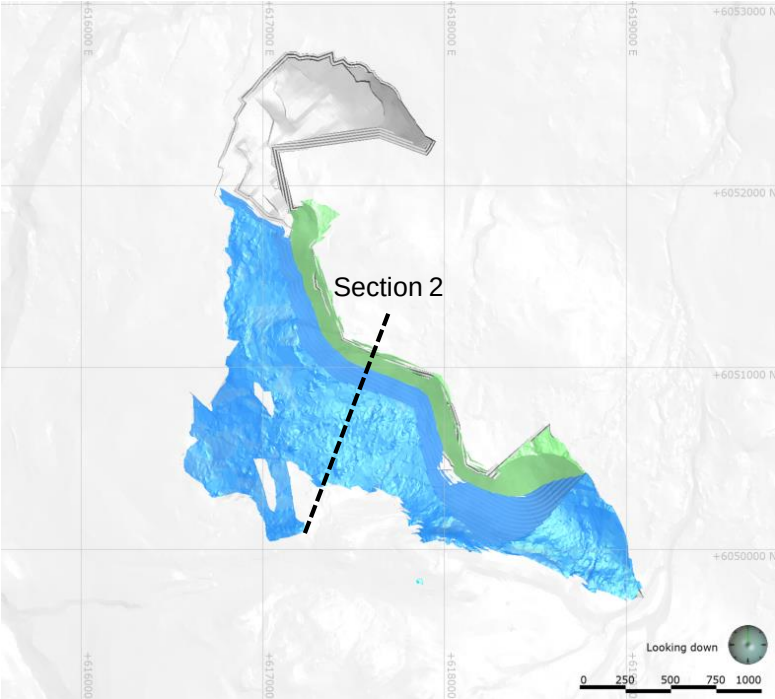
Stability Analysis Results



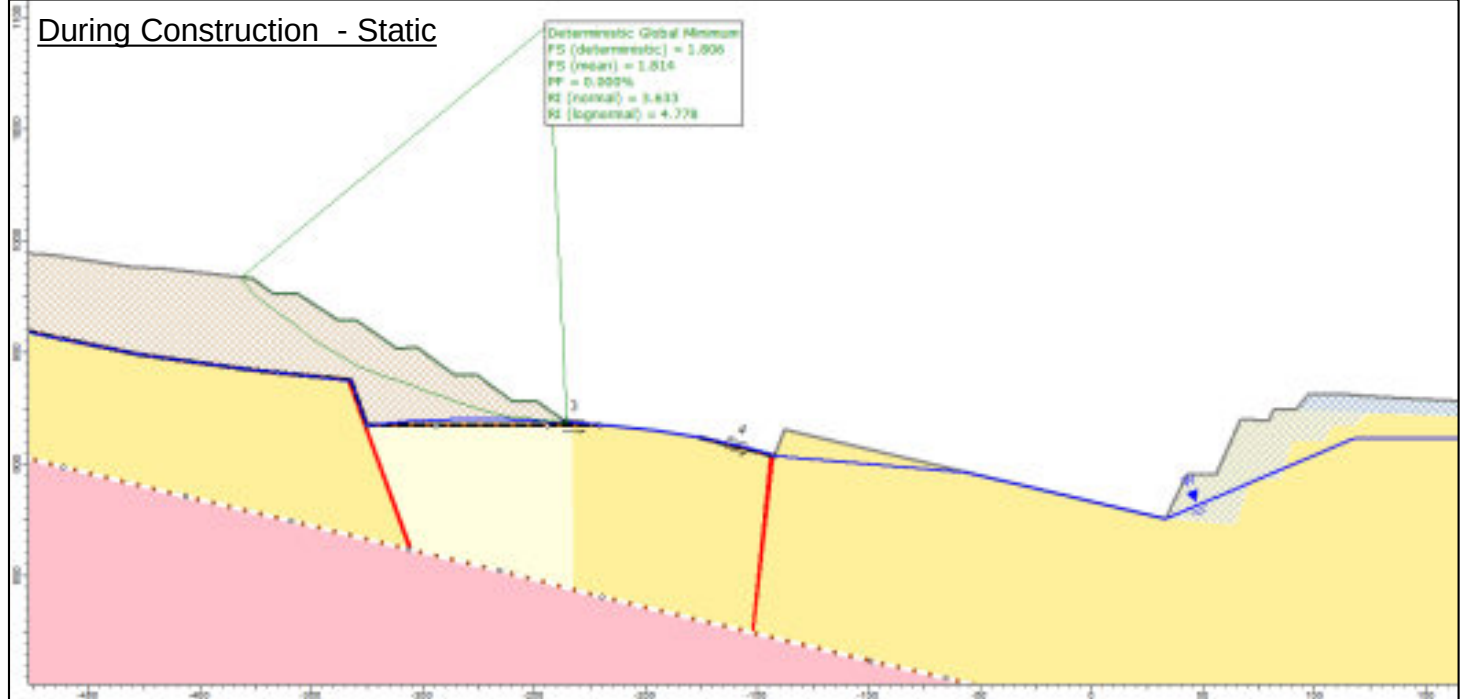
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 2 - STABILITY ANALYSES RESULTS

Stability Section Location



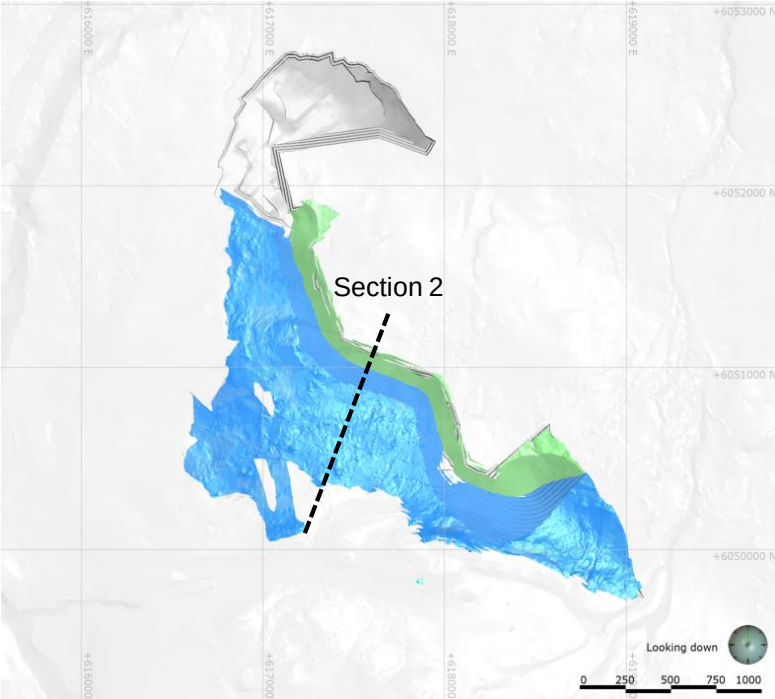
Stability Analysis Results



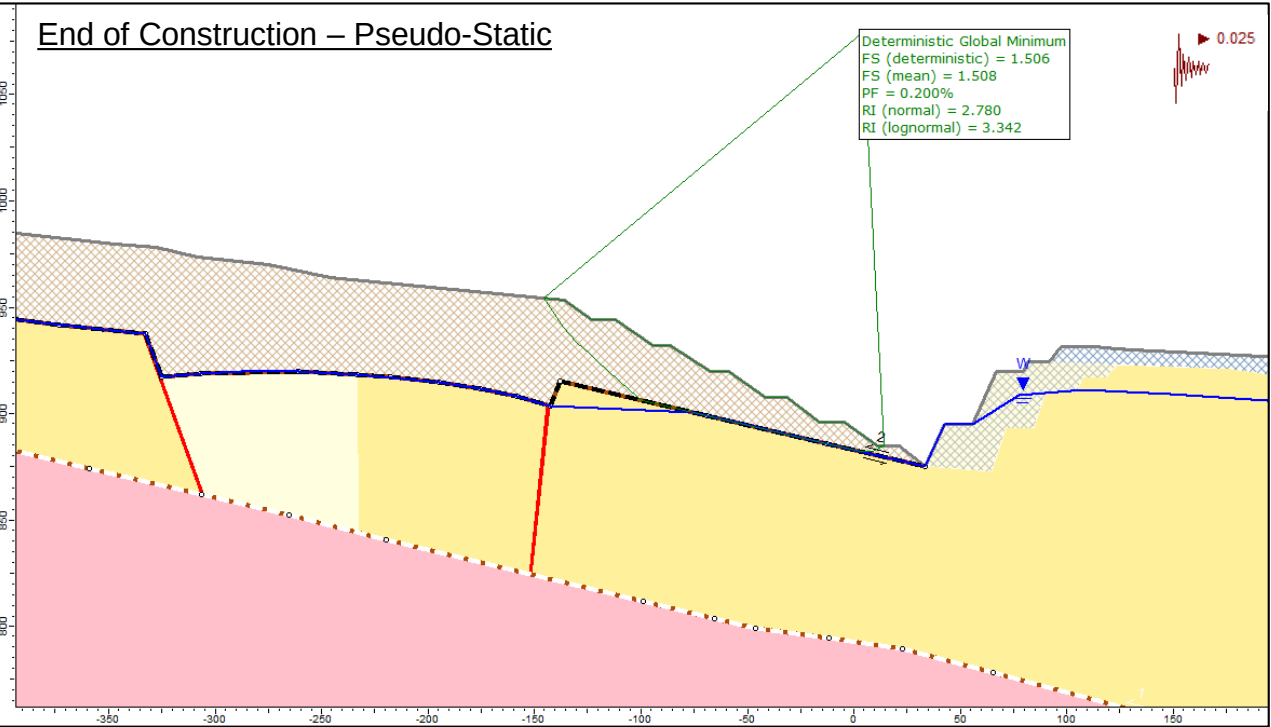
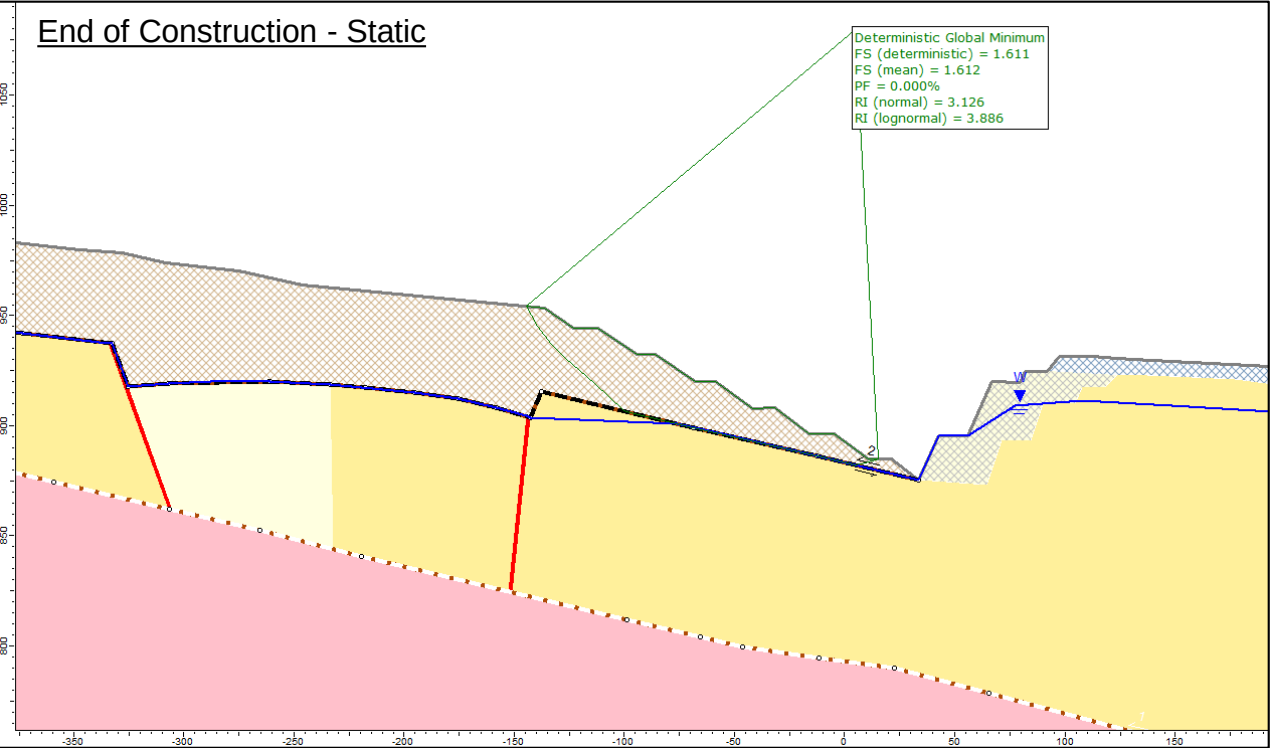
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 2 - STABILITY ANALYSES RESULTS

Stability Section Location



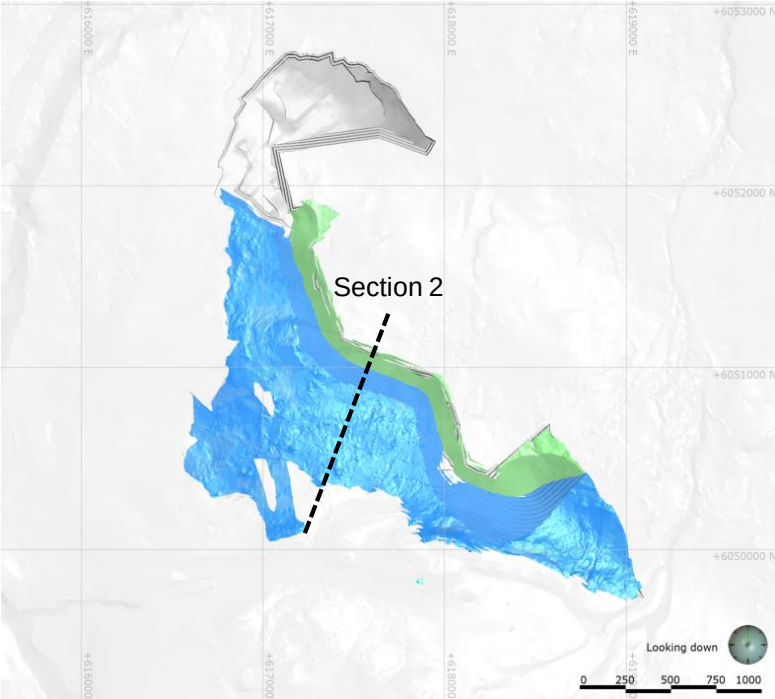
Stability Analysis Results



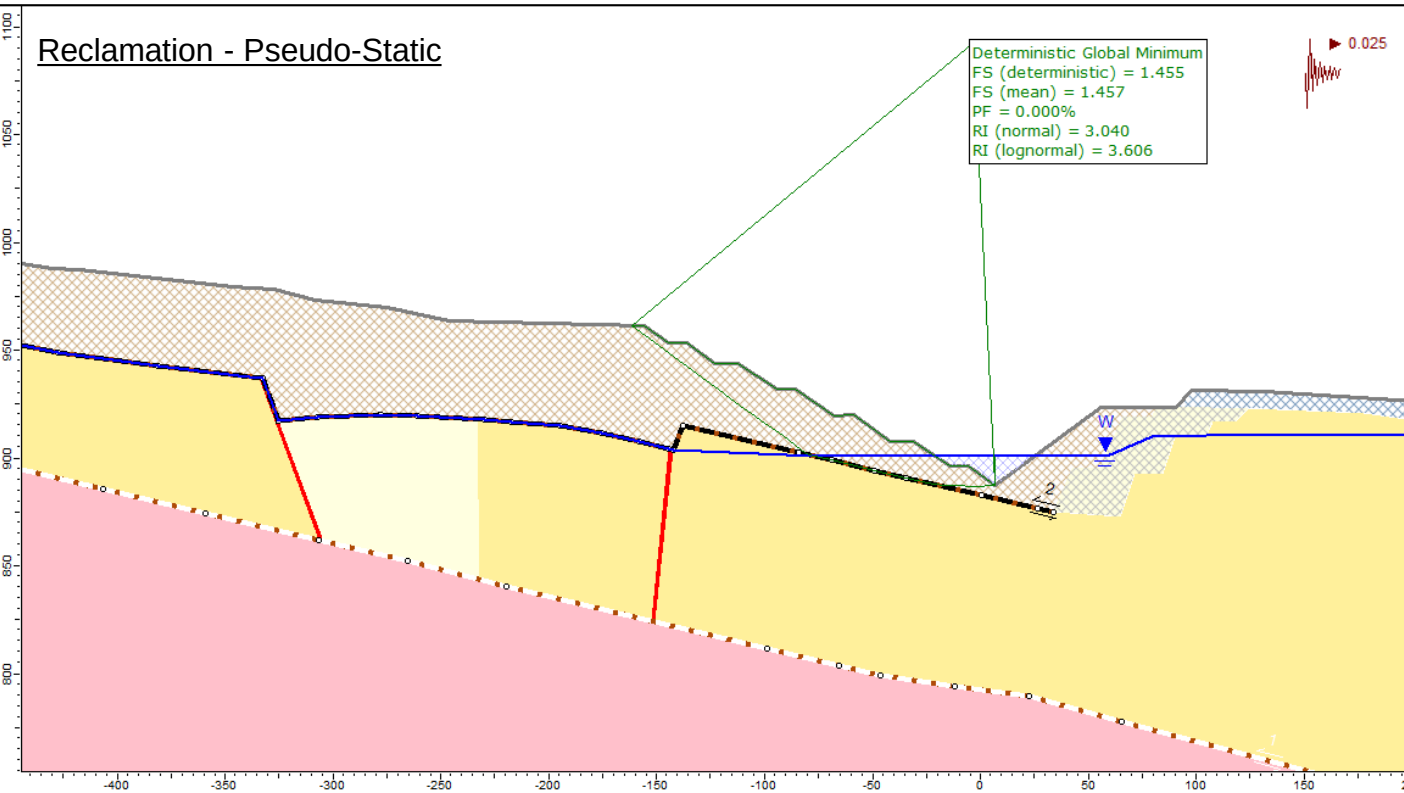
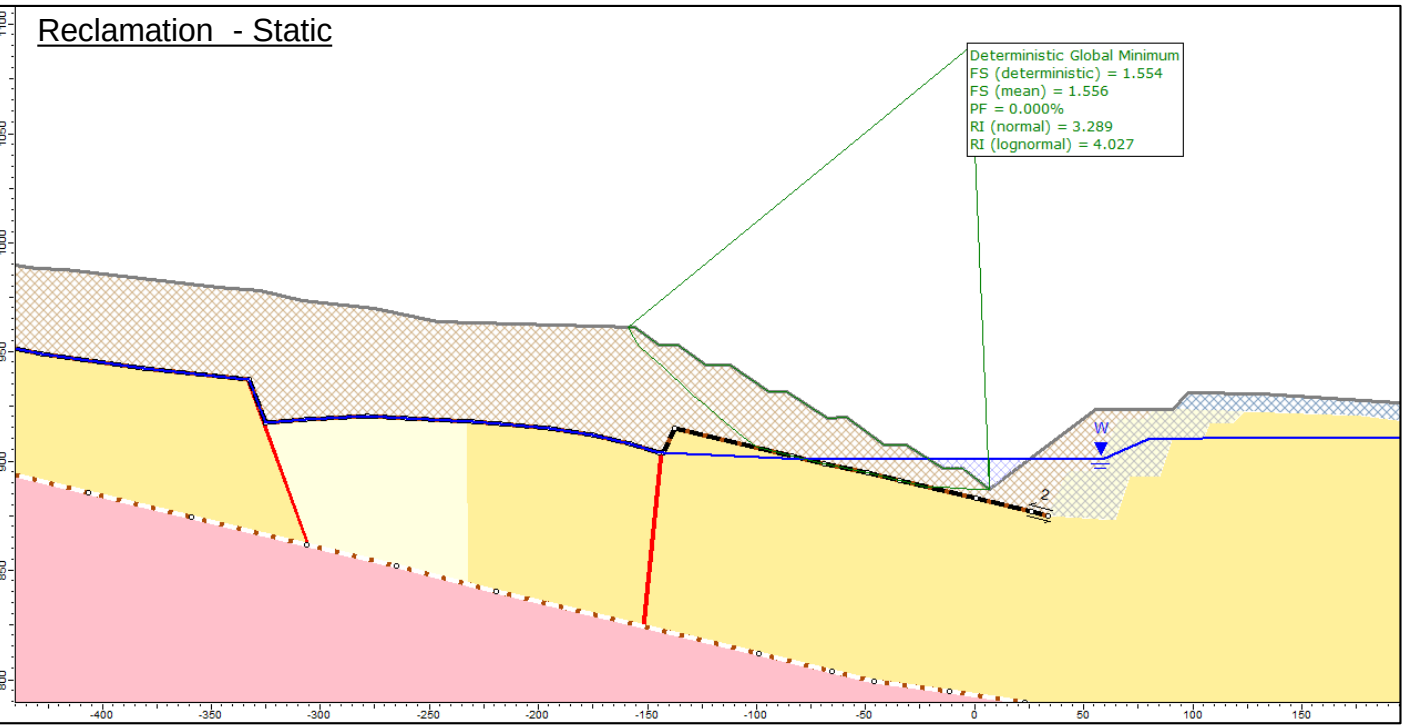
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 2 - STABILITY ANALYSES RESULTS

Stability Section Location



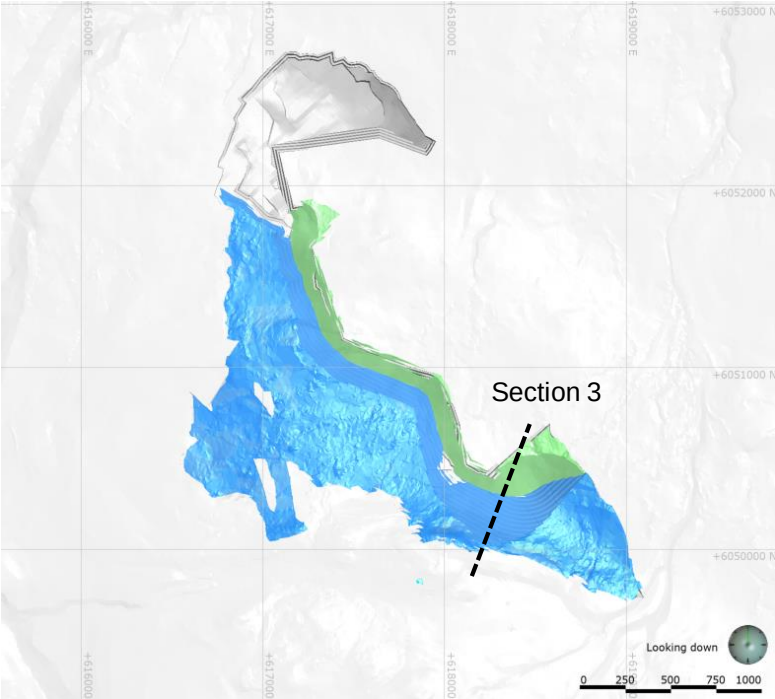
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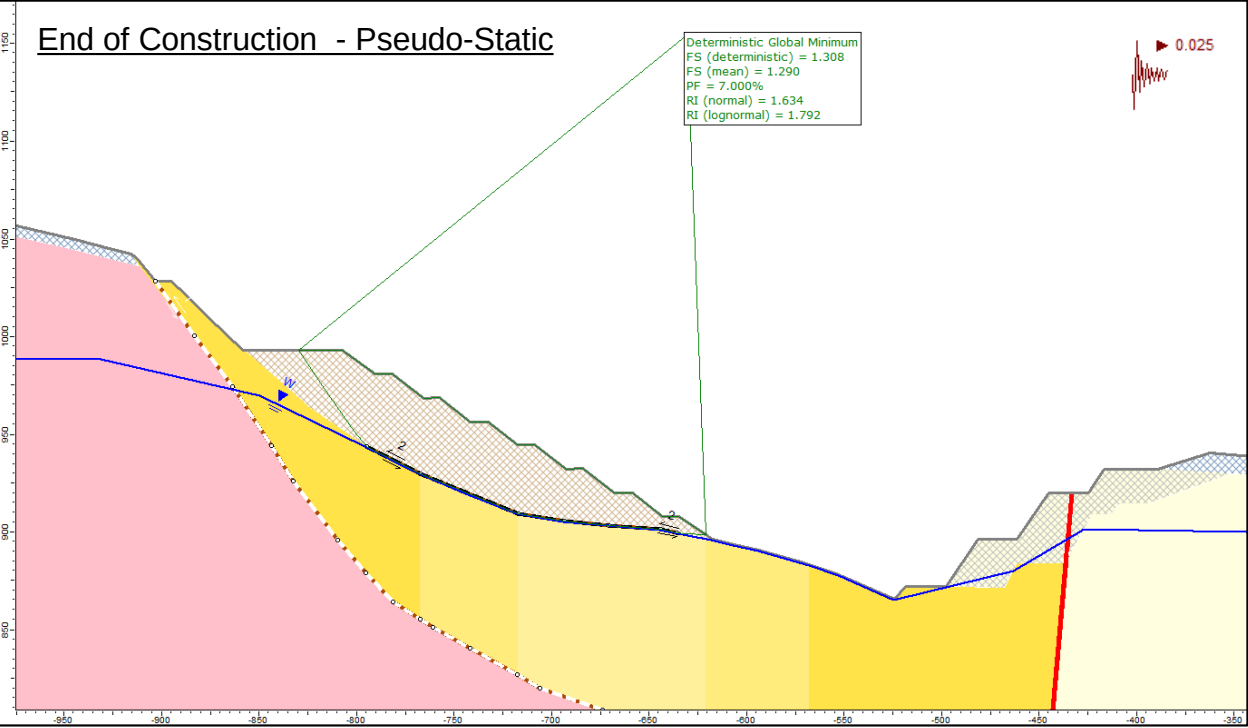
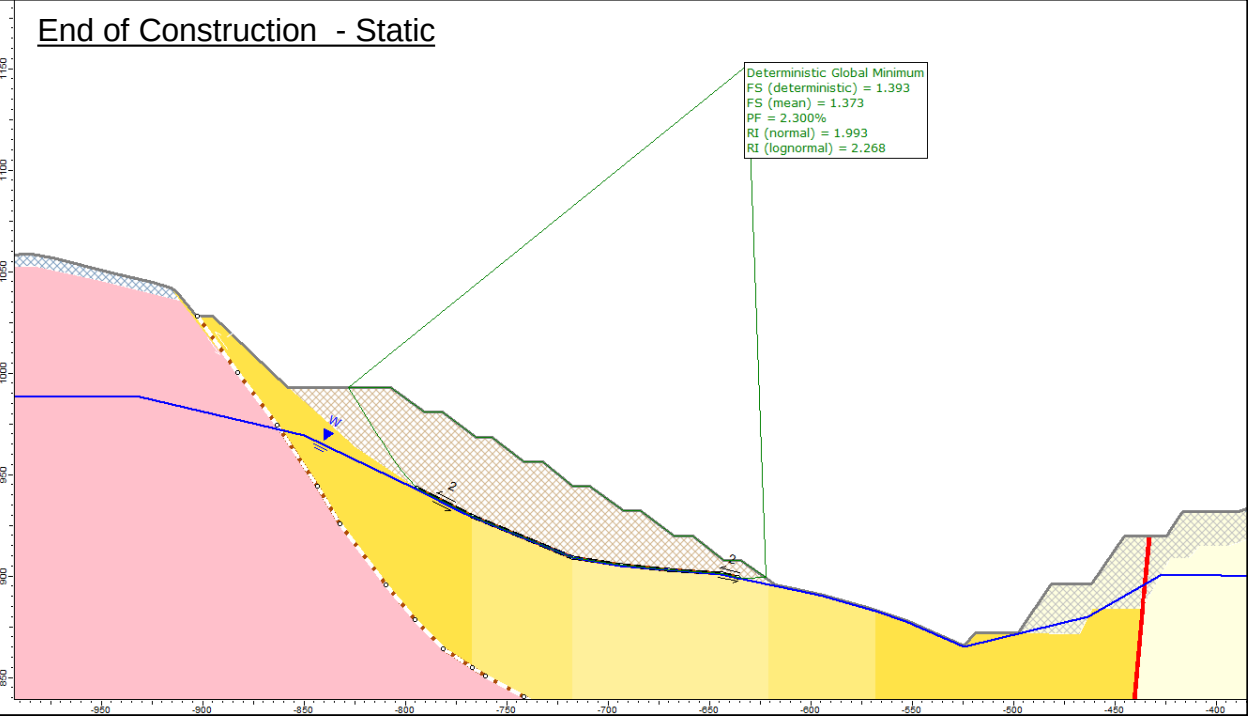
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 3 - STABILITY ANALYSES RESULTS

Stability Section Location



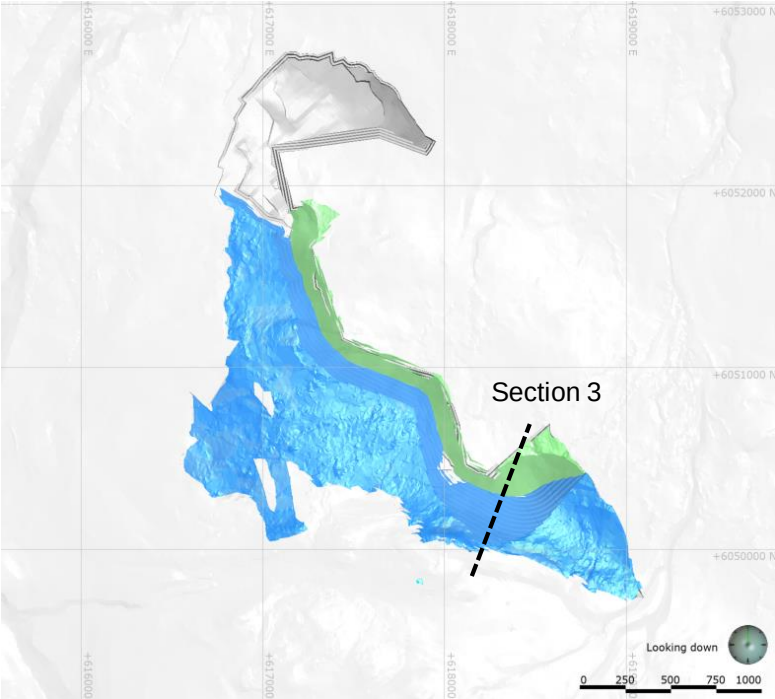
Stability Analysis Results



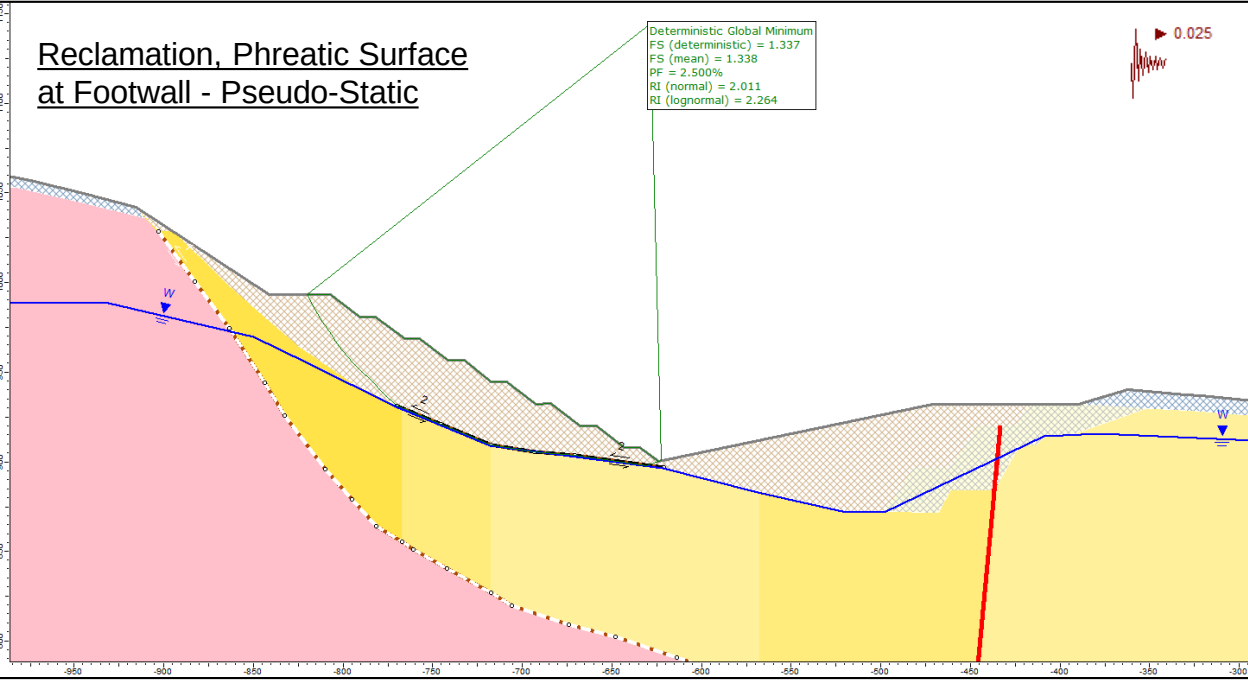
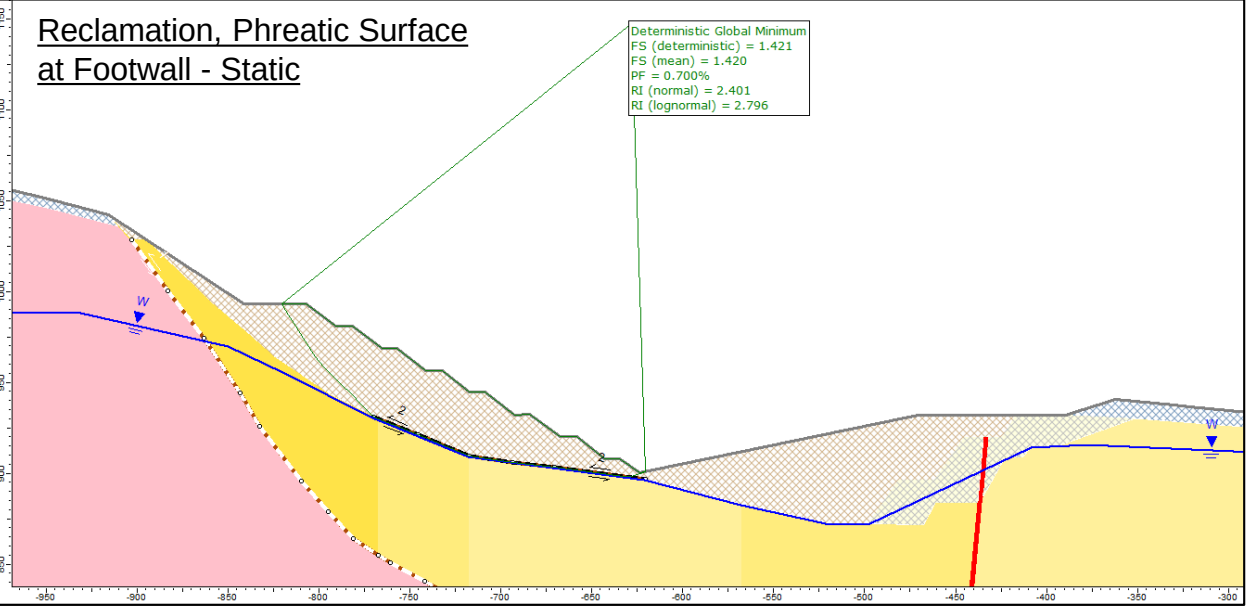
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 3 - STABILITY ANALYSES RESULTS

Stability Section Location



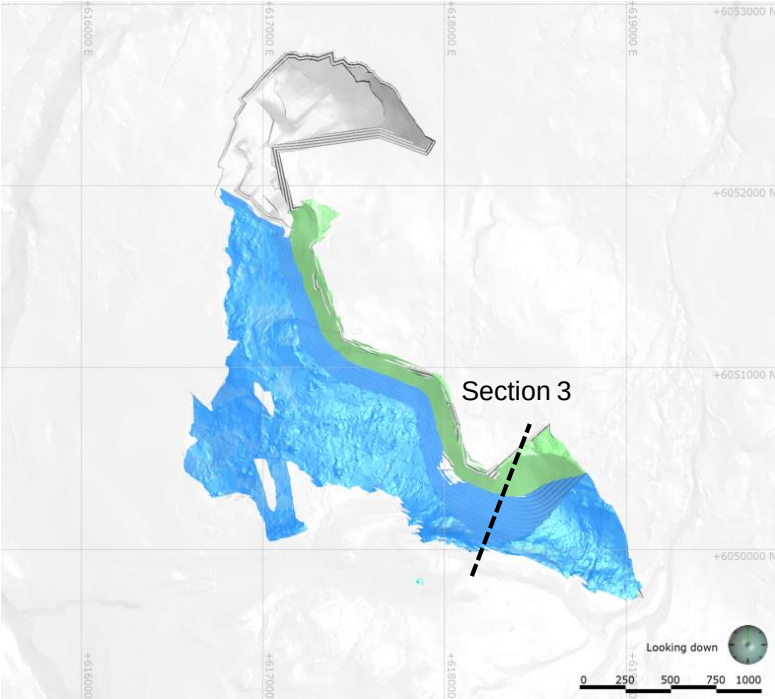
Stability Analysis Results



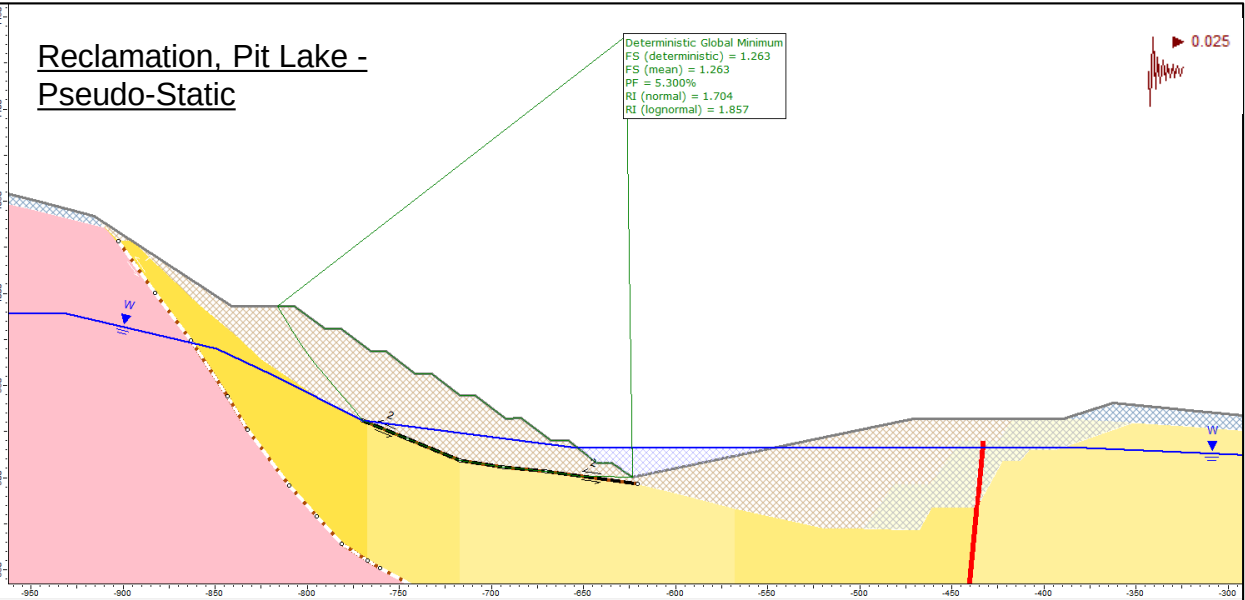
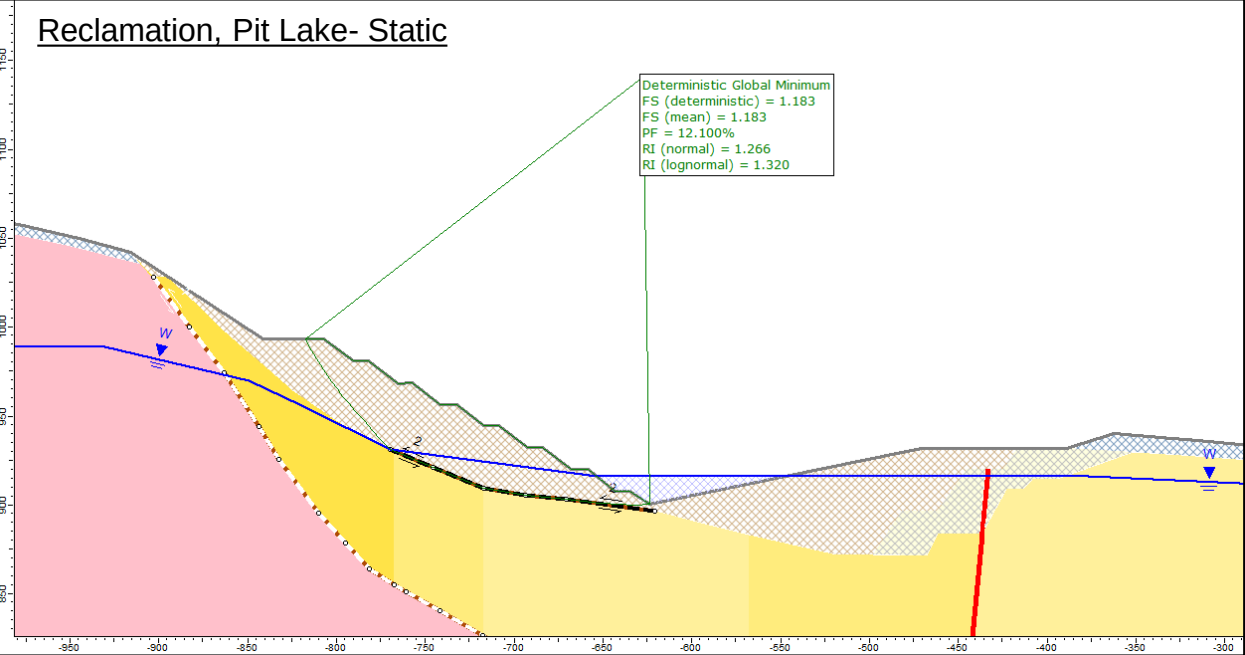
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 3 - STABILITY ANALYSES RESULTS

Stability Section Location



Stability Analysis Results



Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	



Backfill Waste Rock Stability Assessment

SECTION 3 RESULTS

Job No: 2CT025.008
Filename: Appendix A

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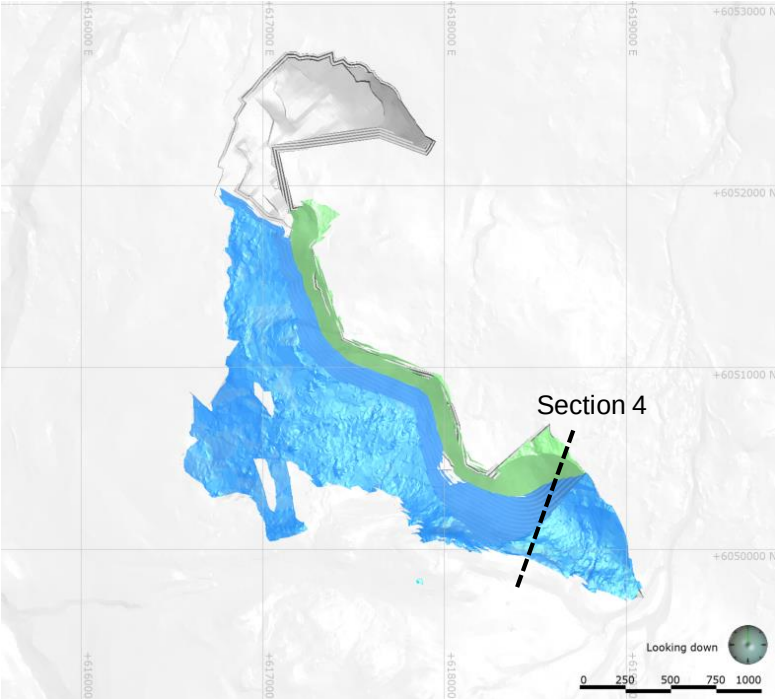
Date:
Nov 2020

Approved:
ES

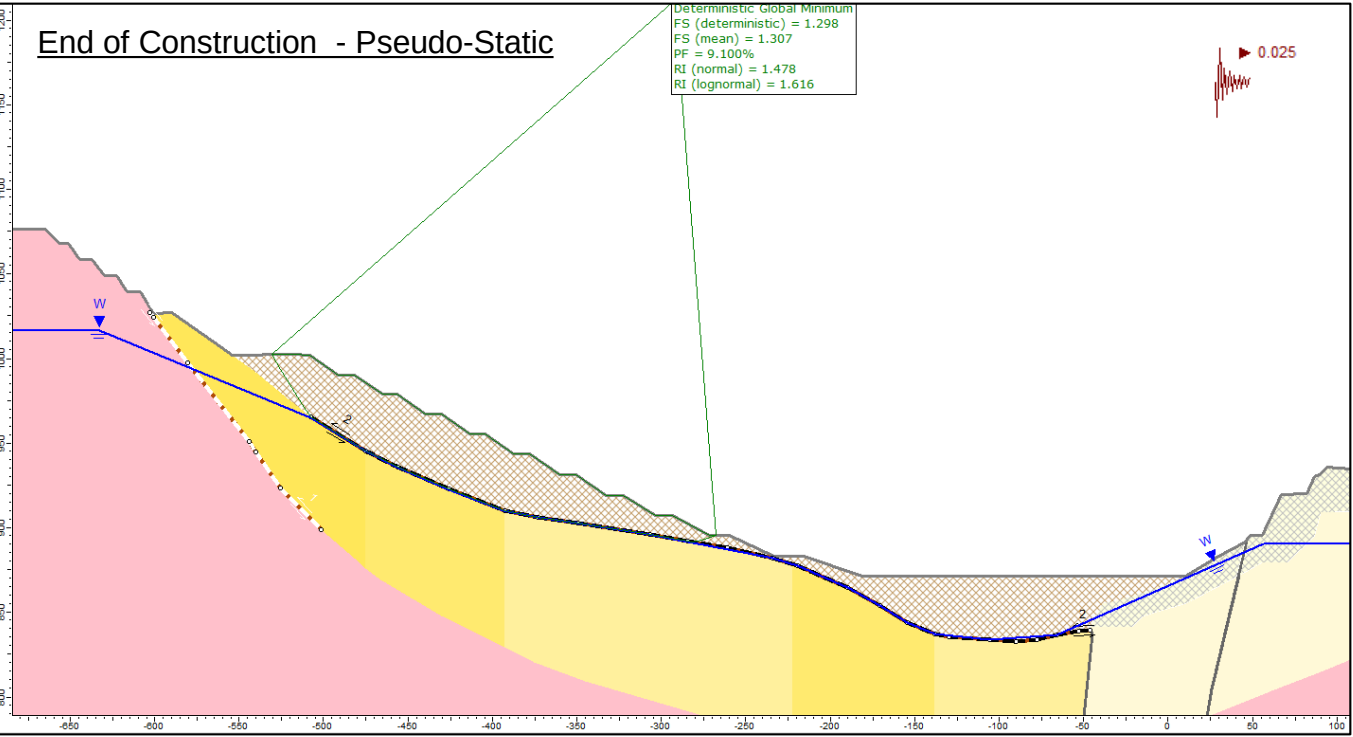
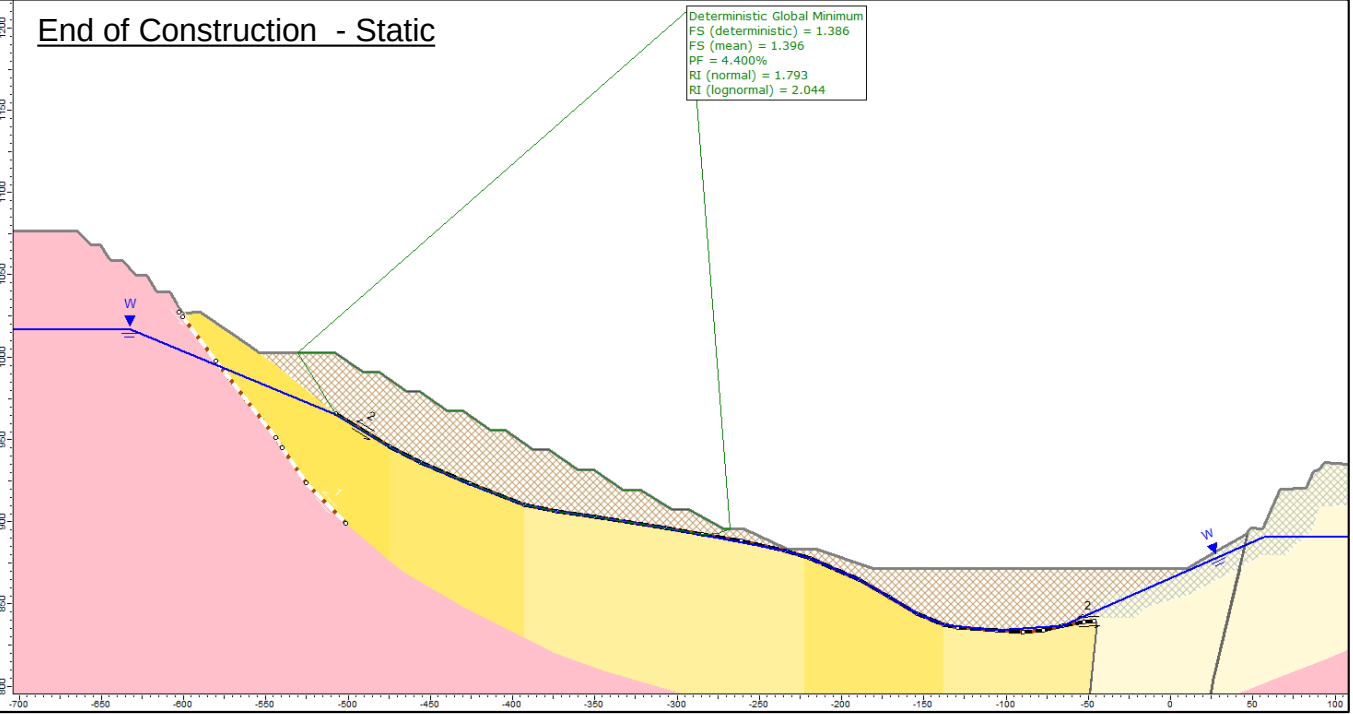
Figure:

SECTION 4 - STABILITY ANALYSES RESULTS

Stability Section Location



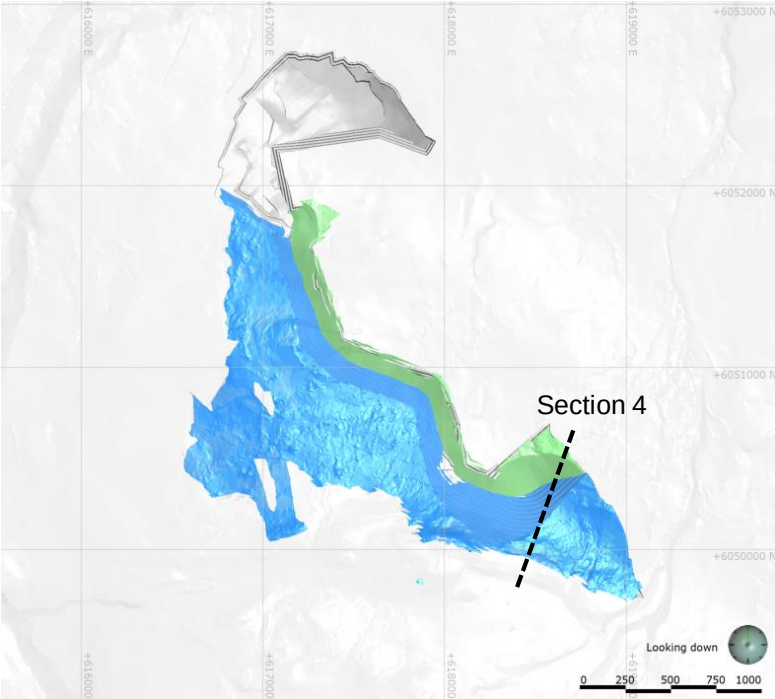
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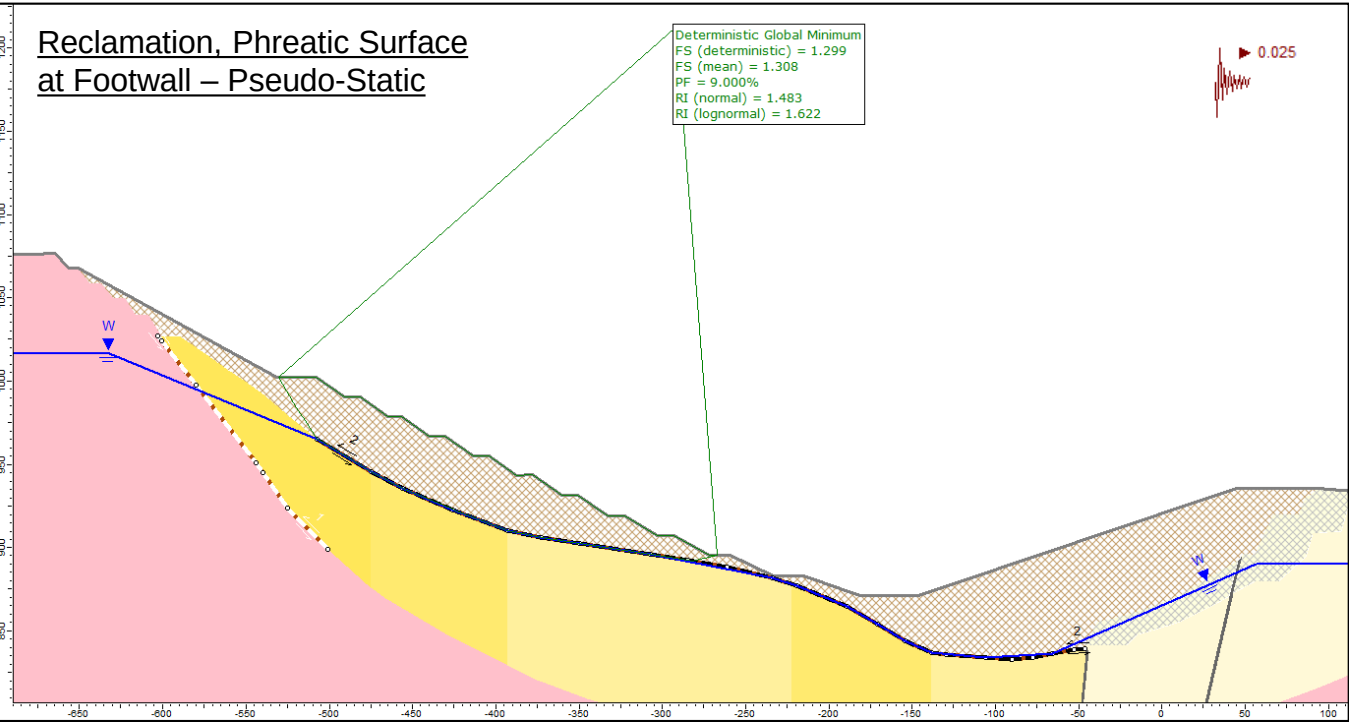
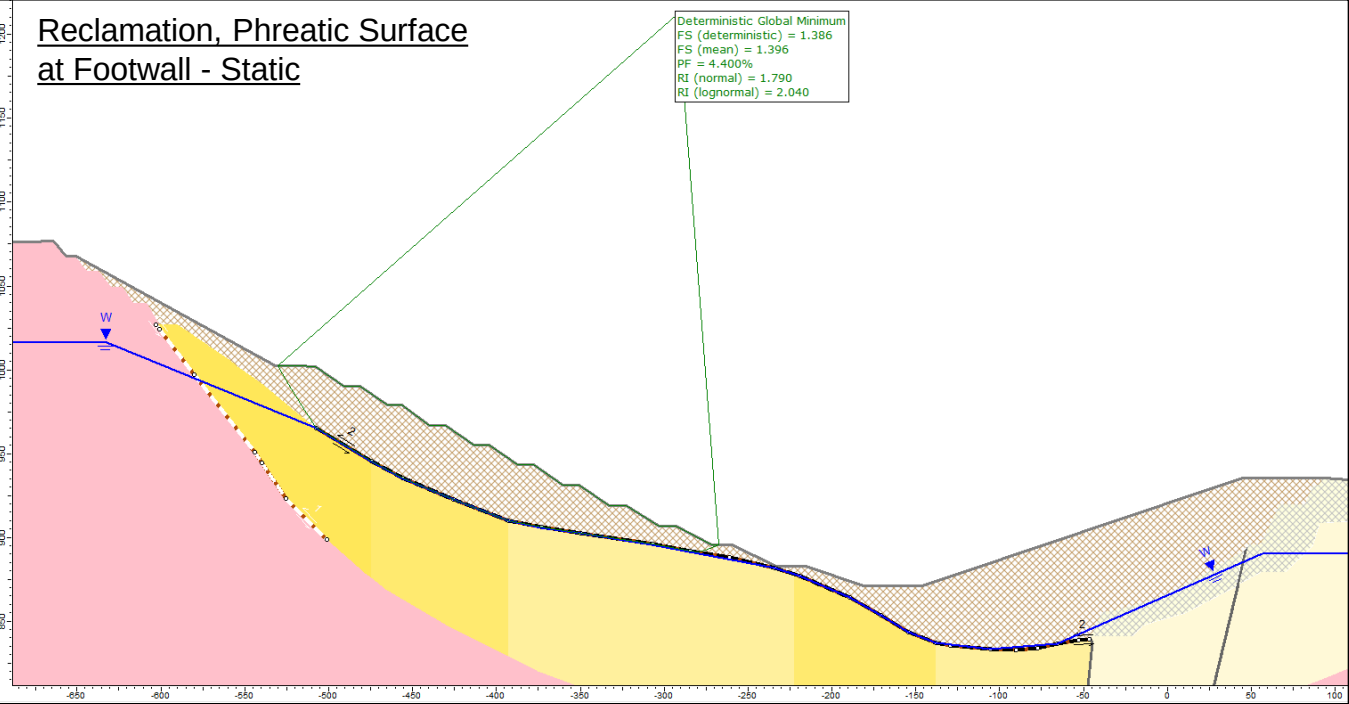
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 4 - STABILITY ANALYSES RESULTS

Stability Section Location



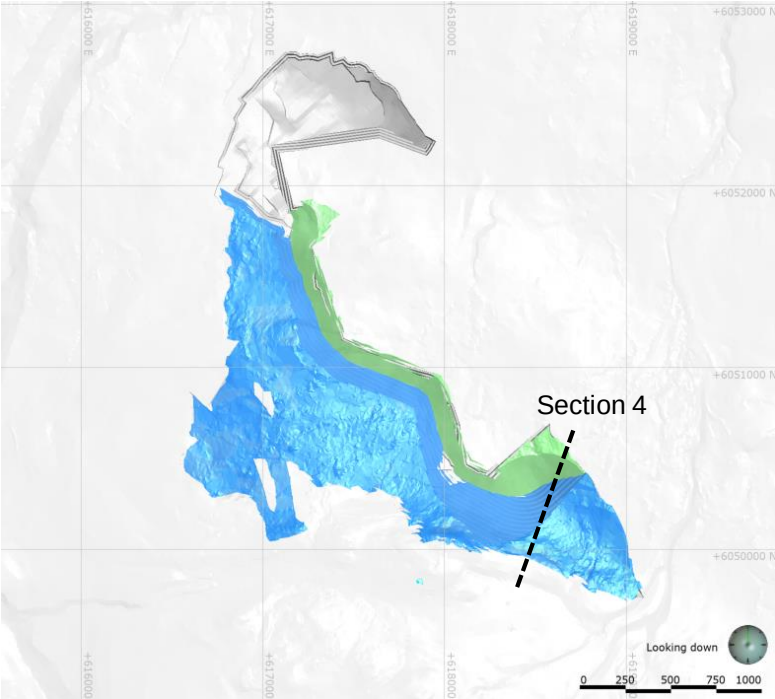
Stability Analysis Results



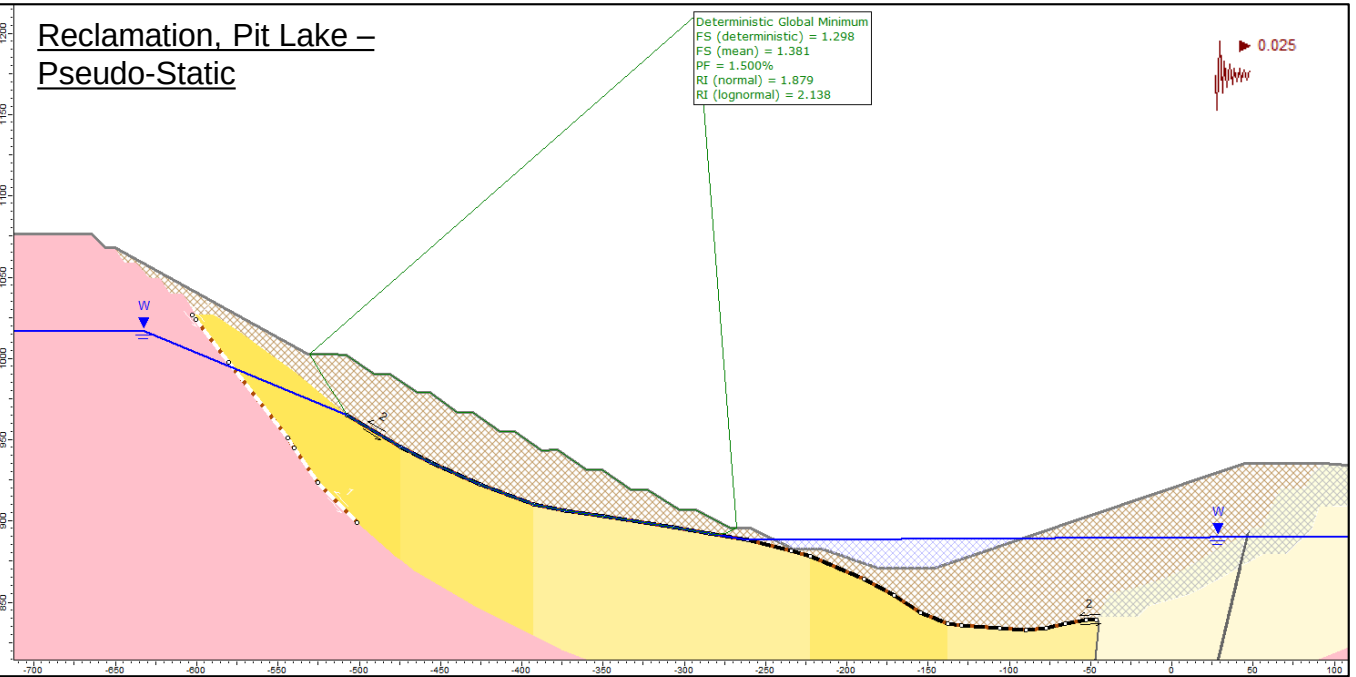
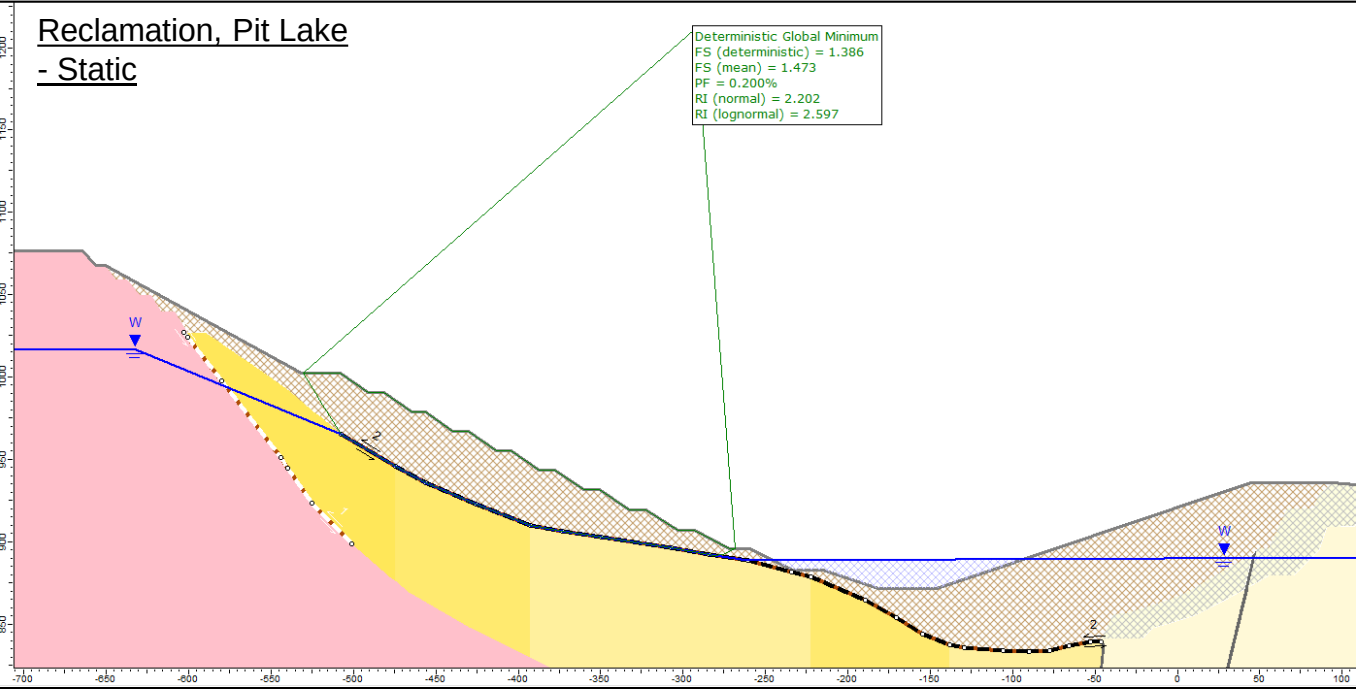
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 4 - STABILITY ANALYSES RESULTS

Stability Section Location



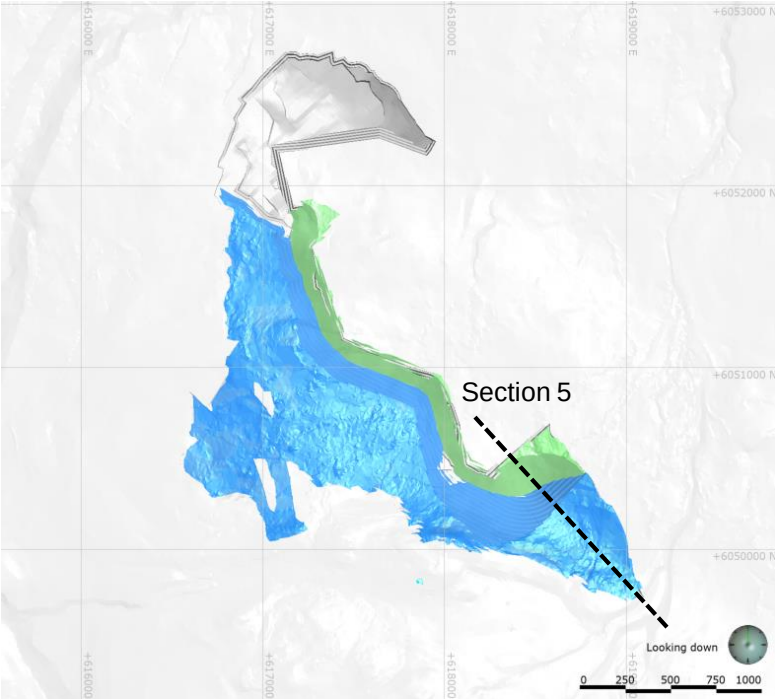
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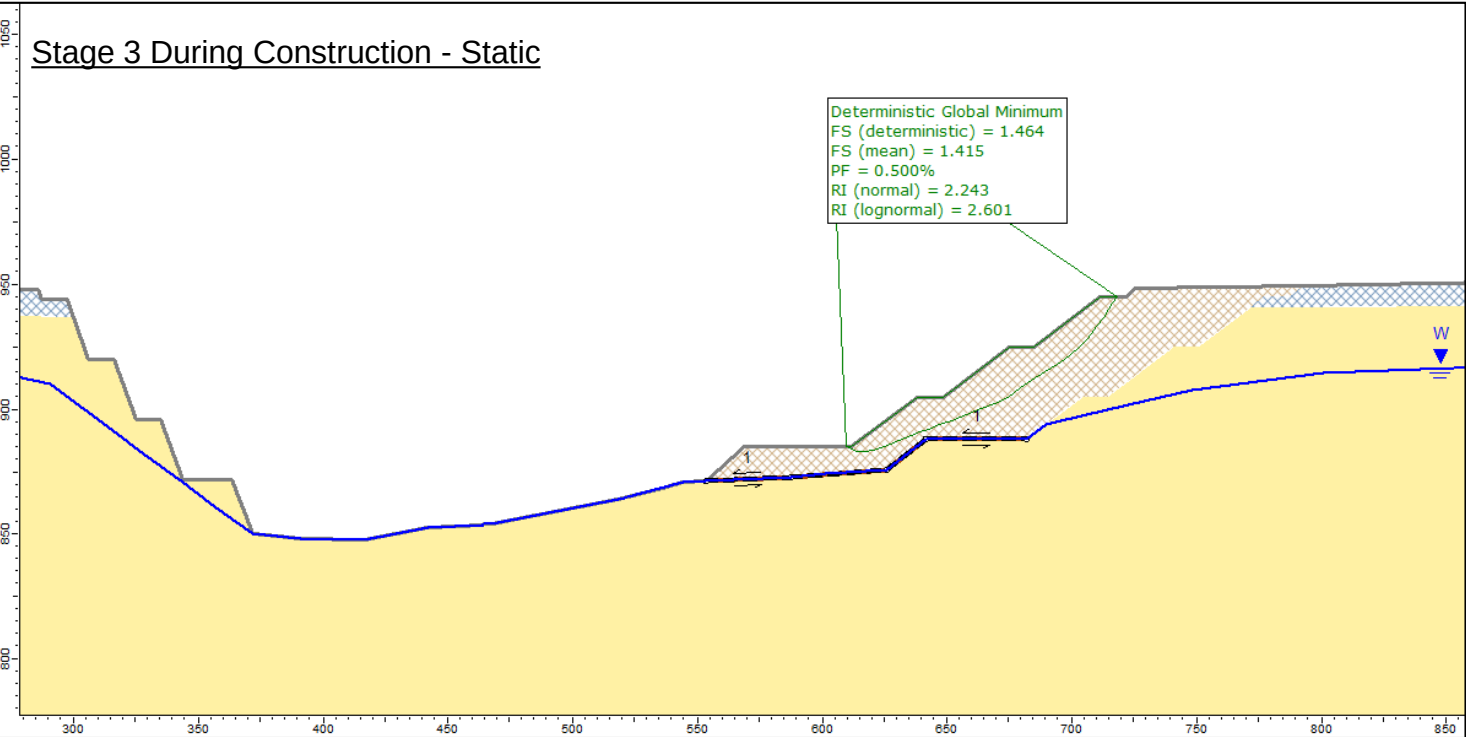
Material Name	Color
Overburden	
Fault	
Volcanics	
Bedding	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 5 - STABILITY ANALYSES RESULTS

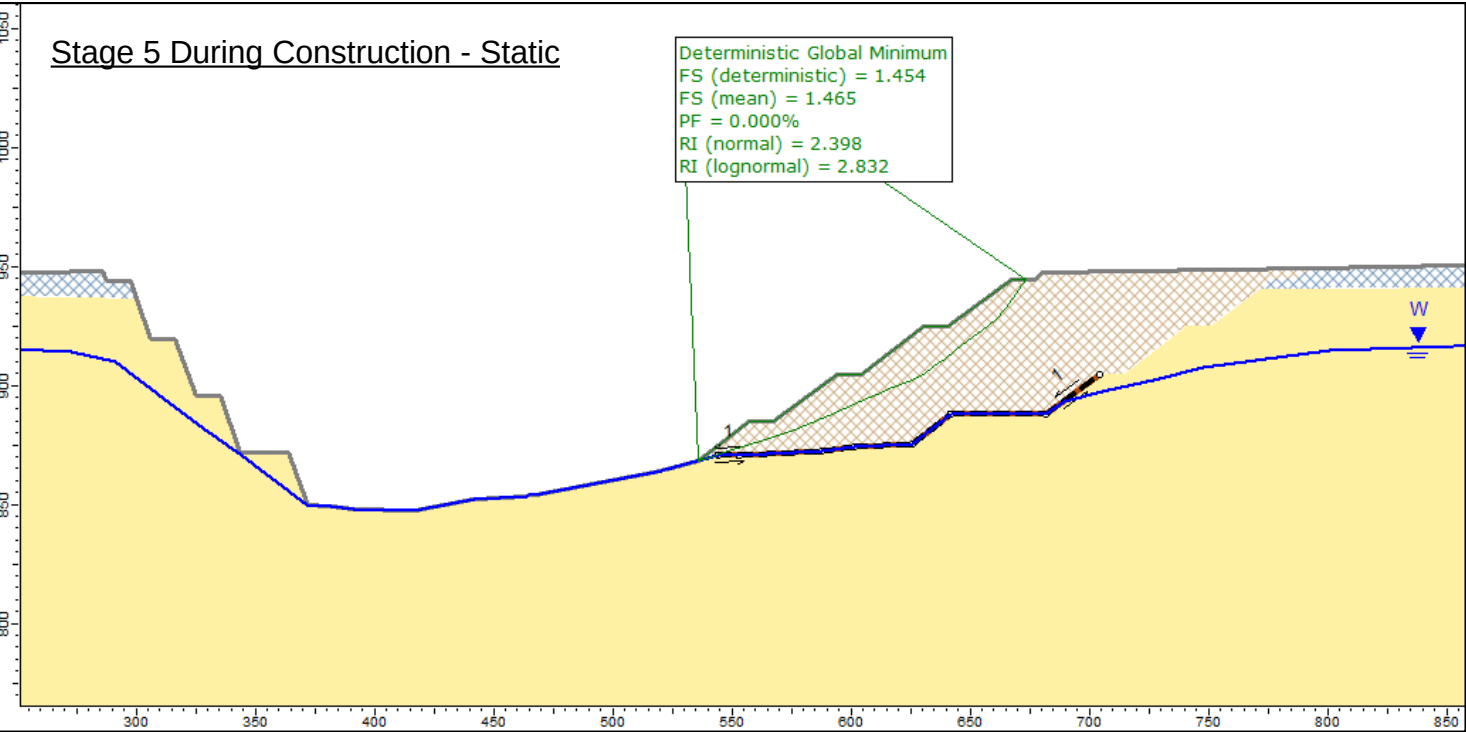
Stability Section Location



Stability Analysis Results



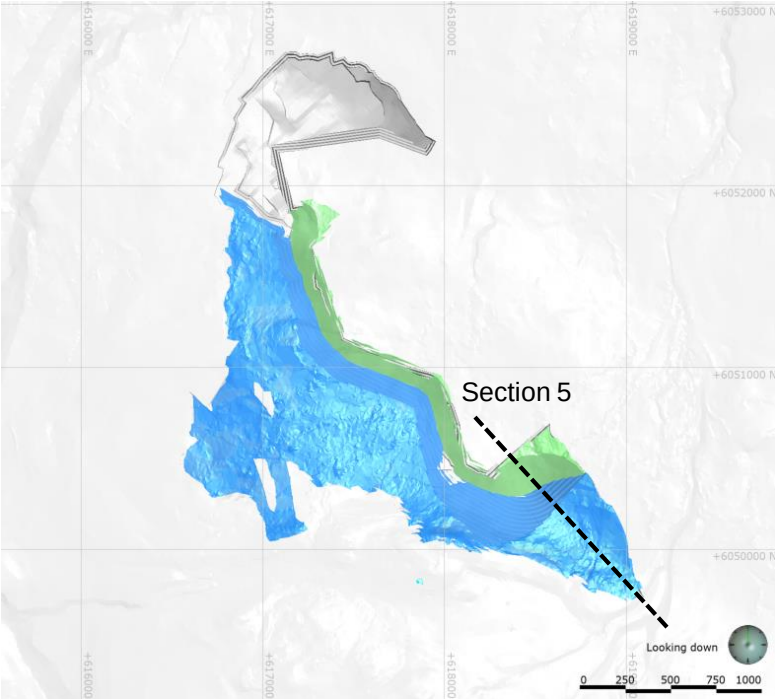
Modelled failure surface representative of a consequential event that could impact mine operations.



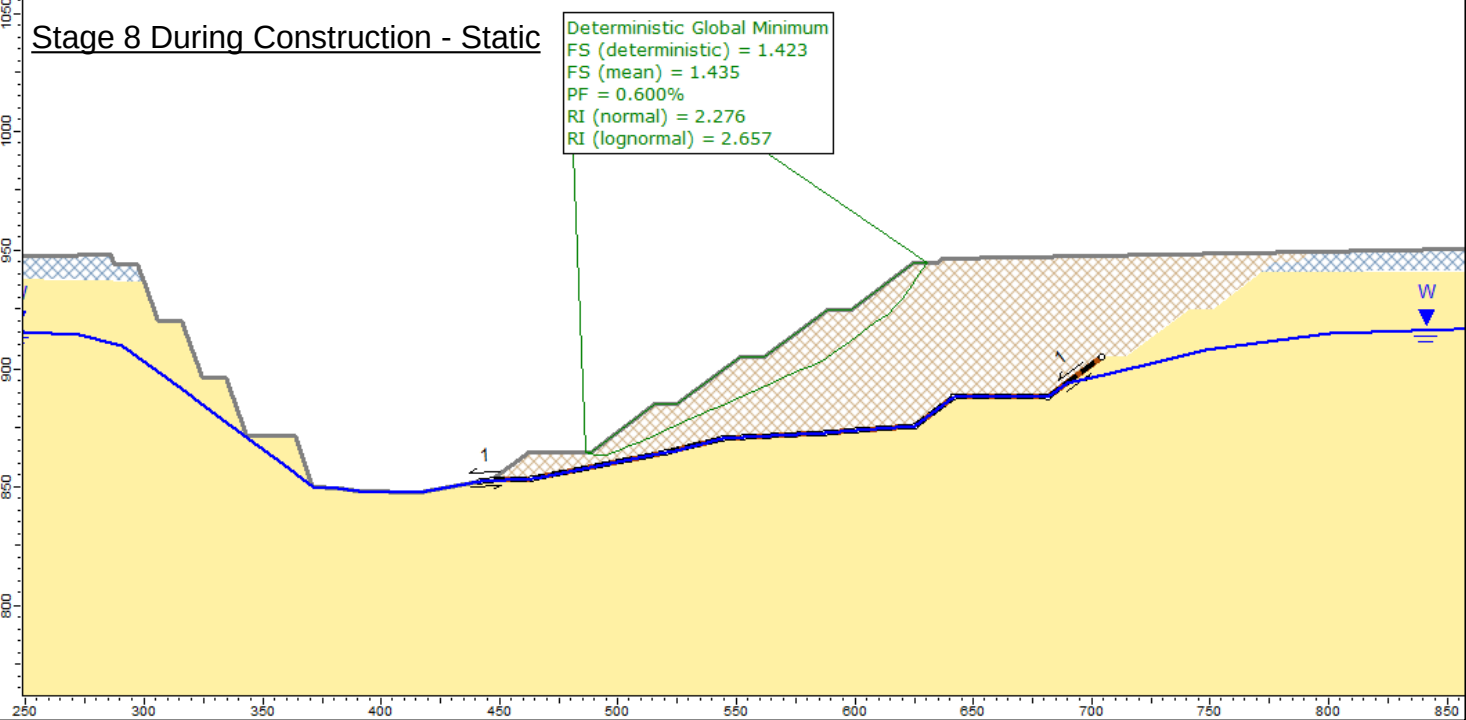
Material Name	Color
Overburden	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 5 - STABILITY ANALYSES RESULTS

Stability Section Location



Stability Analysis Results

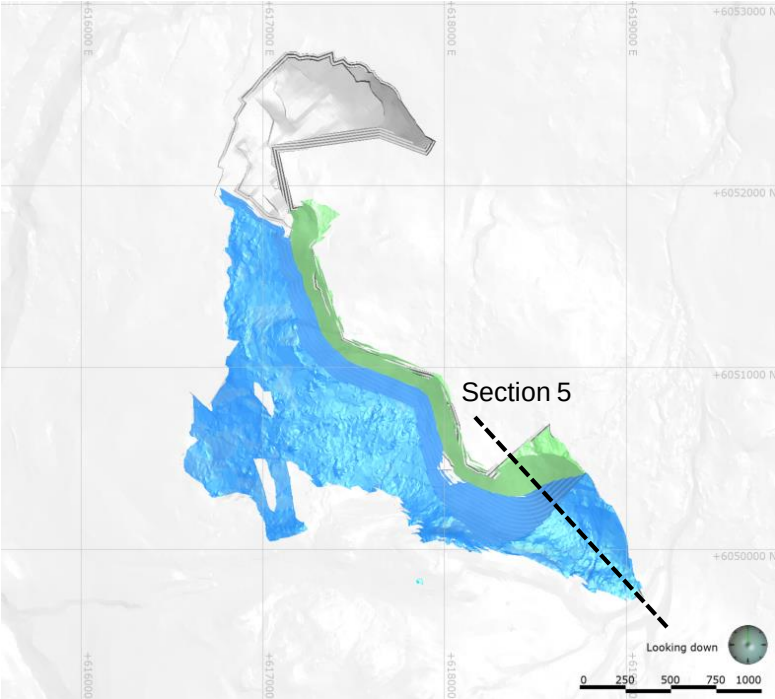


Modelled failure surface representative of a consequential event that could impact mine operations.

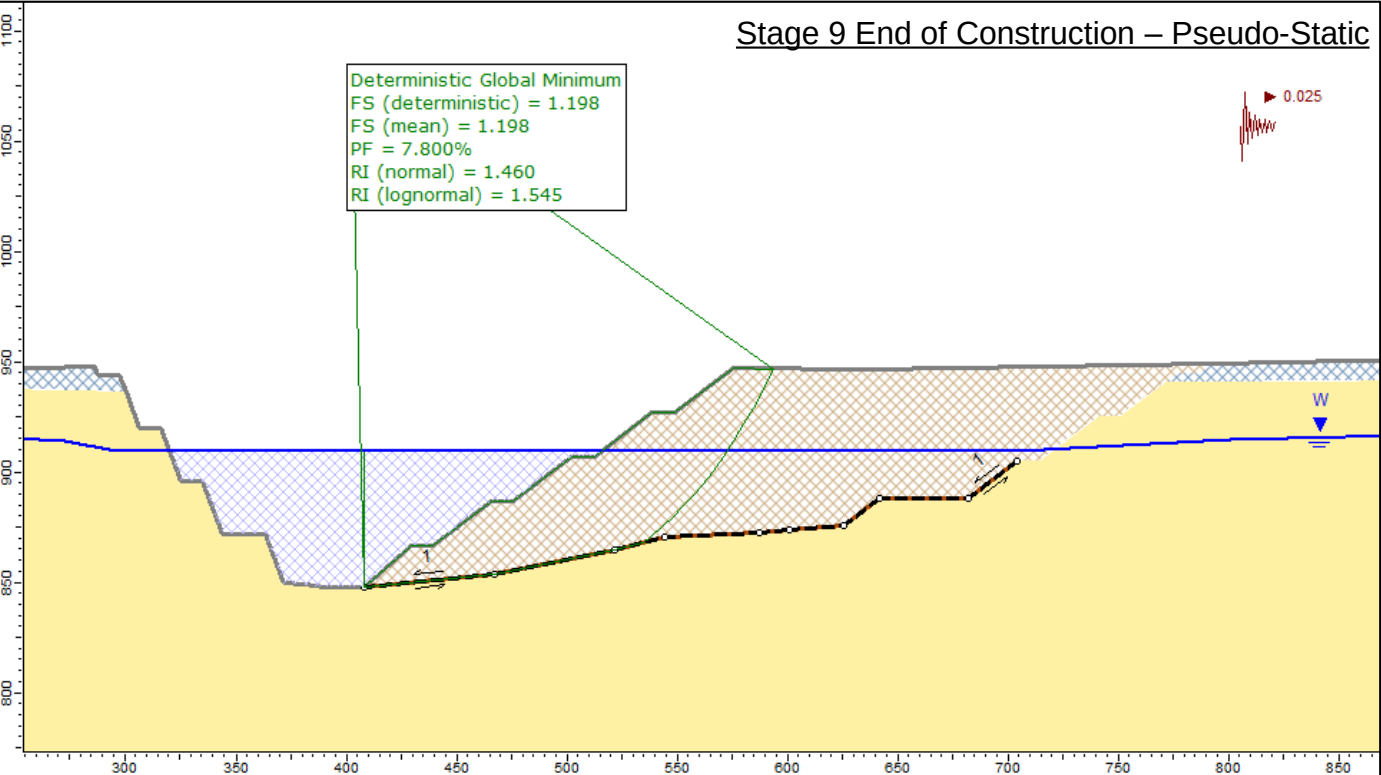
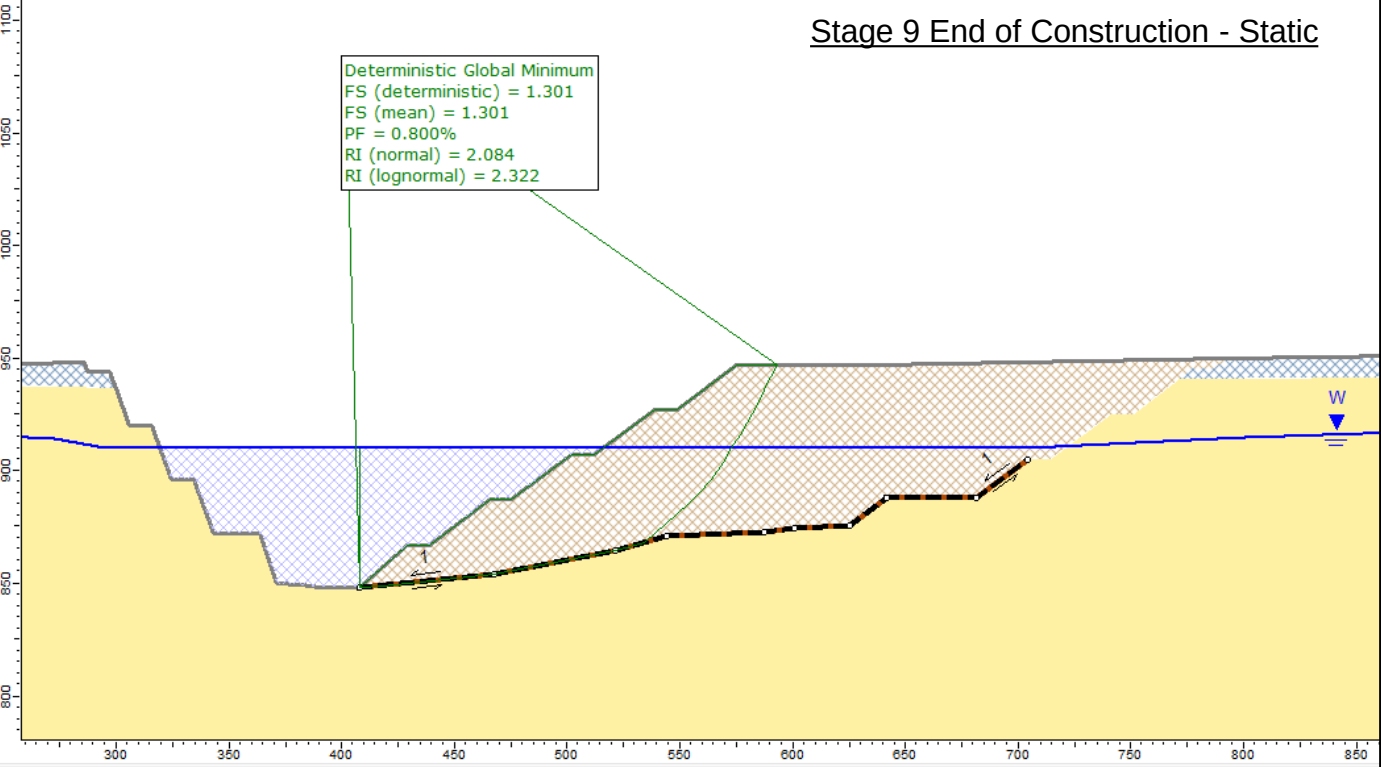
Material Name	Color
Overburden	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

SECTION 5 - STABILITY ANALYSES RESULTS

Stability Section Location



Stability Analysis Results



Material Name	Color
Overburden	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	



Backfill Waste Rock Stability Assessment

SECTION 5 RESULTS

Job No: 2CT025.008
Filename: Appendix A

TENAS PROJECT

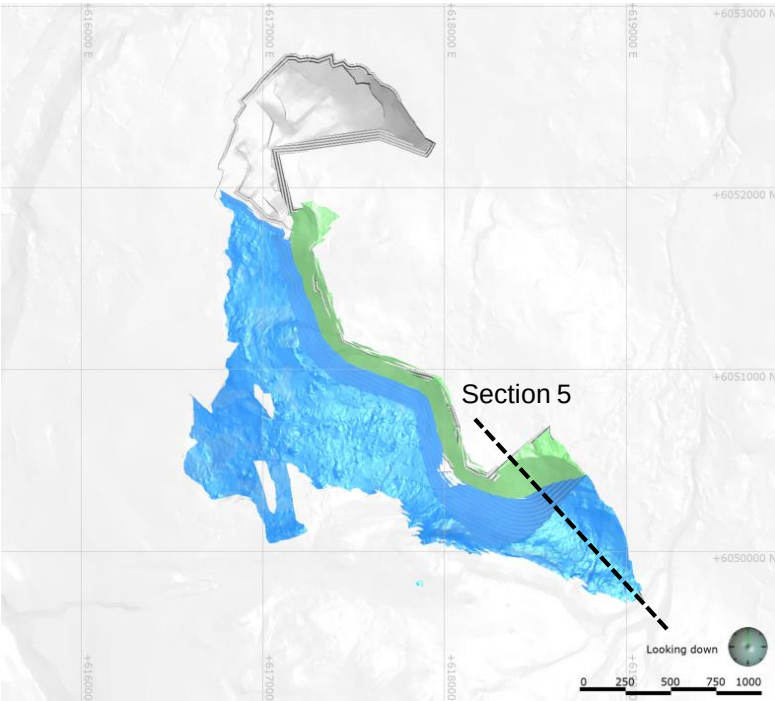
Date:
Nov 2020

Approved:
ES

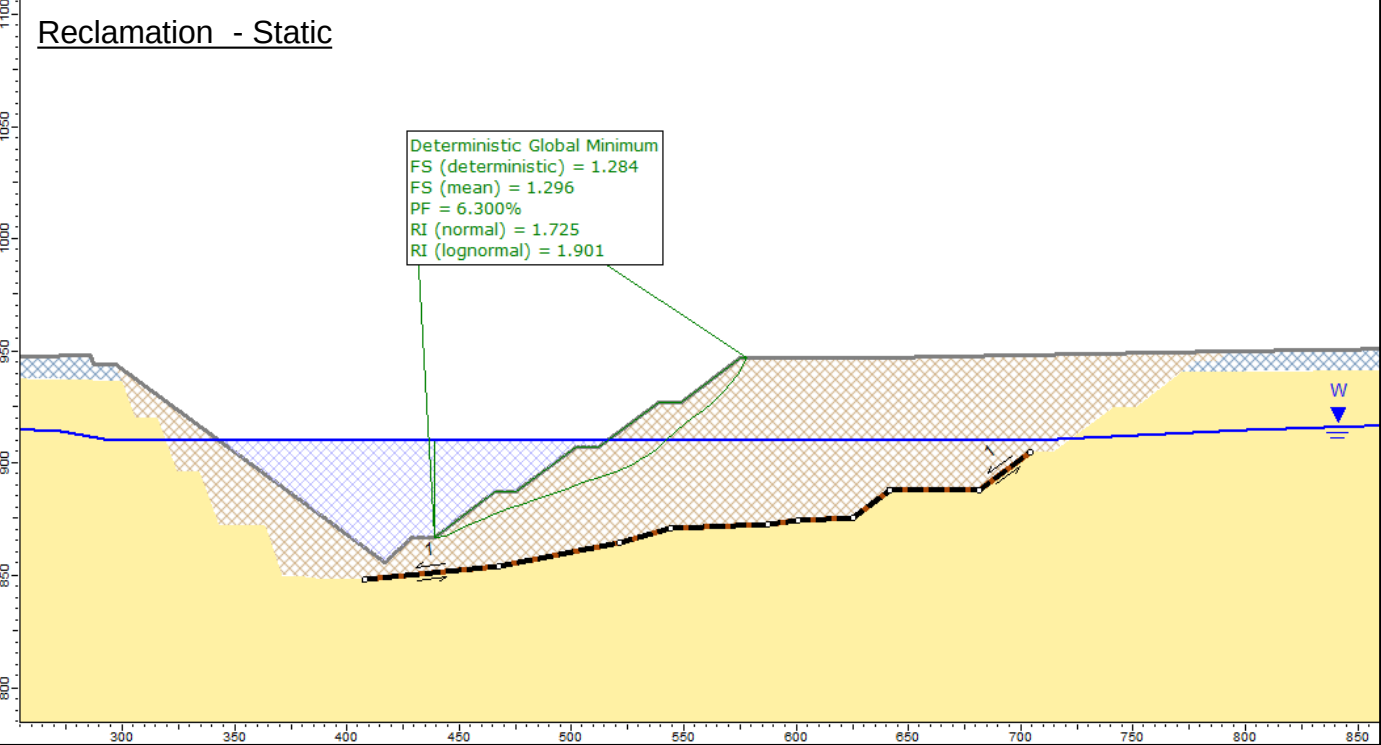
Figure:
14

SECTION 5 - STABILITY ANALYSES RESULTS

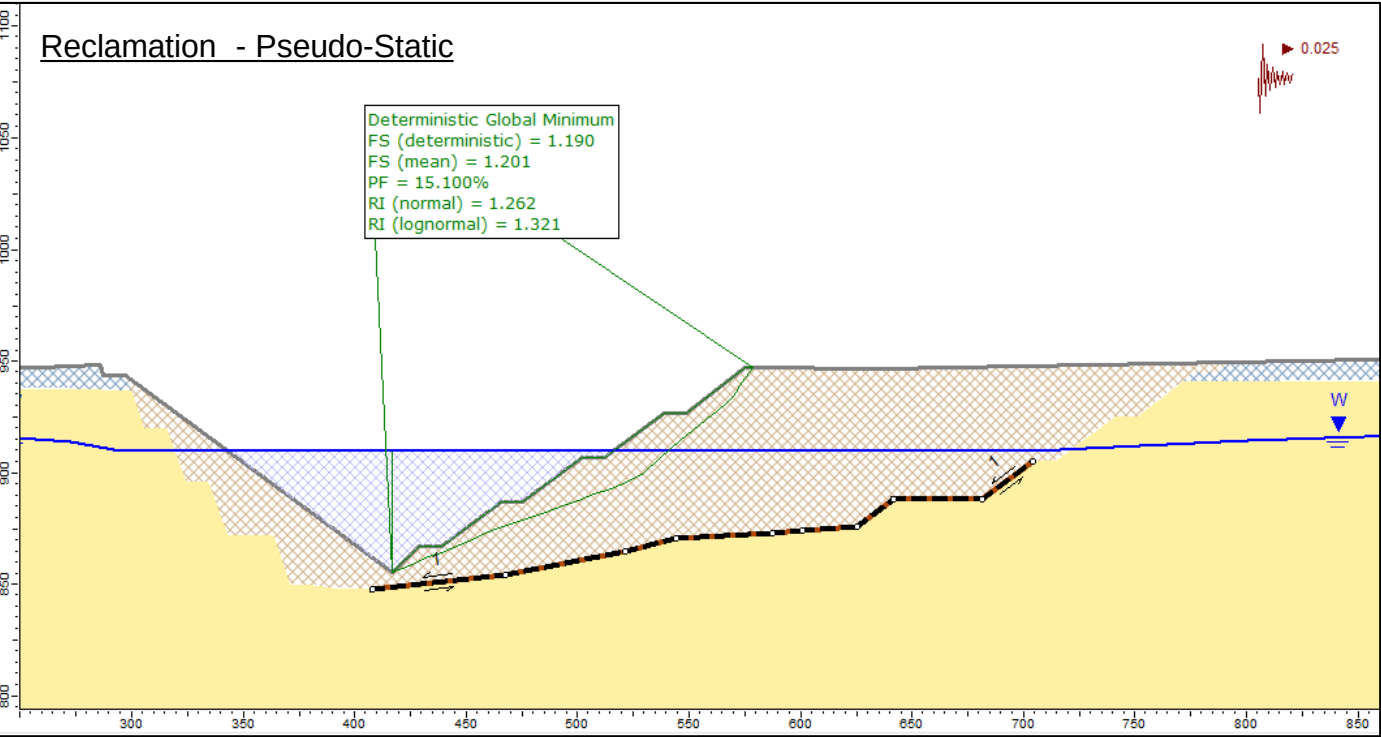
Stability Section Location



Stability Analysis Results



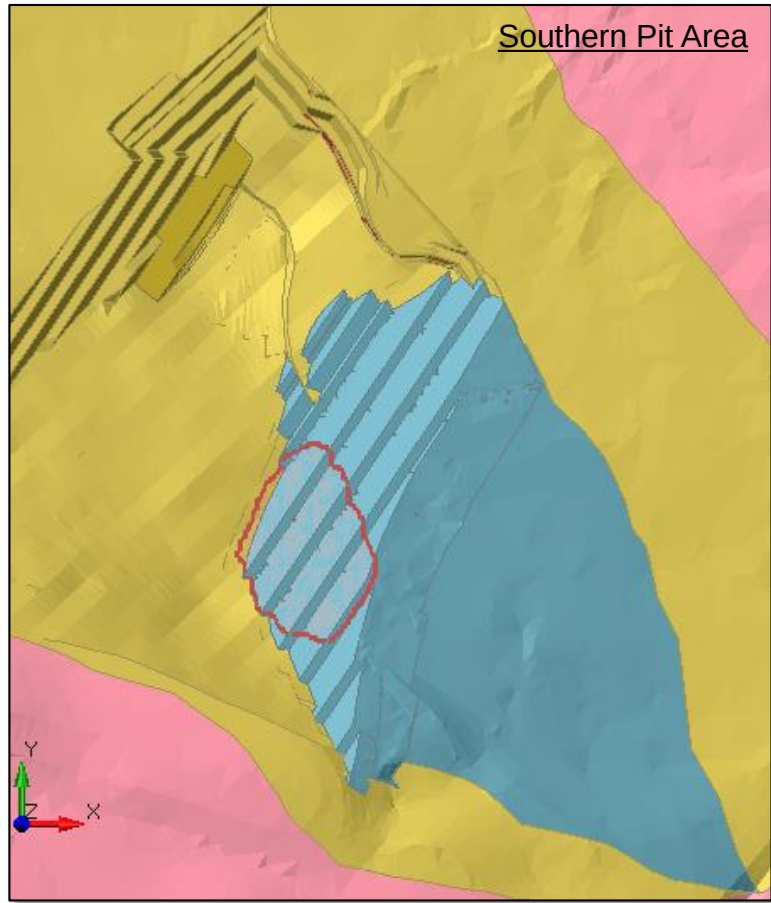
Modelled failure surface restricted to a shallower slope are due to buttressing against the opposing pit slope cover landform. Deep-seated failure exhibits a greater FOS.



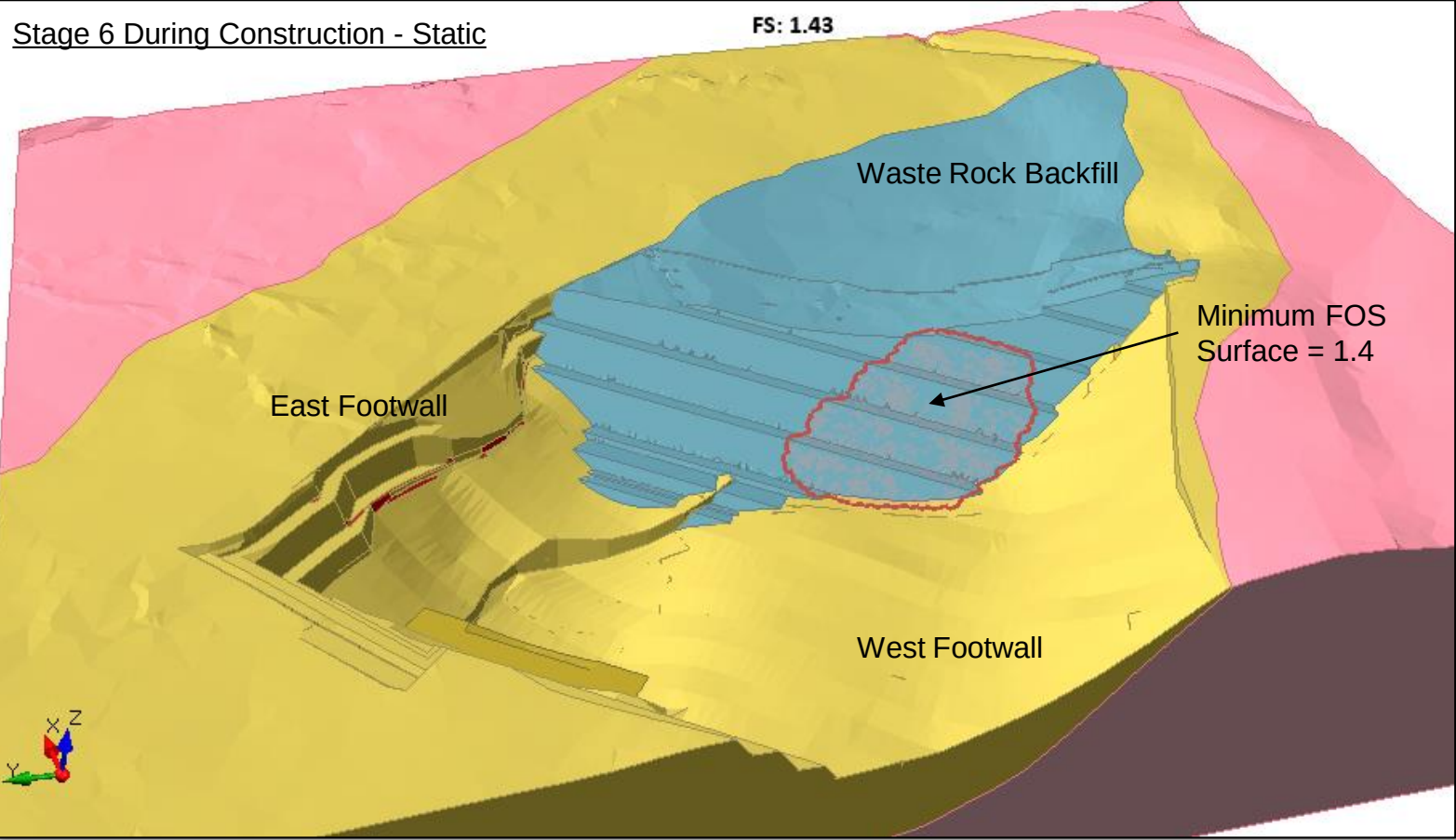
Material Name	Color
Overburden	
Skeena RM_Below FW	
Waste Rock	
Weak Bedding Surface	

PHASE 7 PIT – 3D STABILITY ANALYSES RESULTS FOR STAGE 5 DESIGN

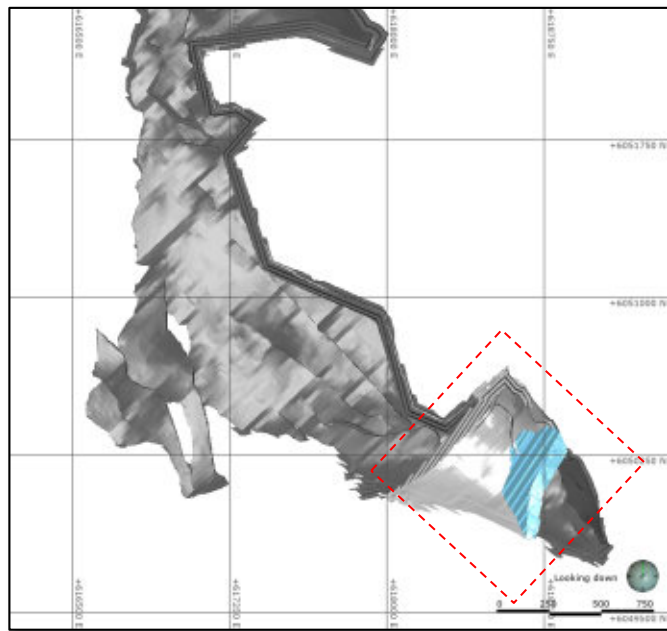
Stability Section Location



Stability Analysis Results



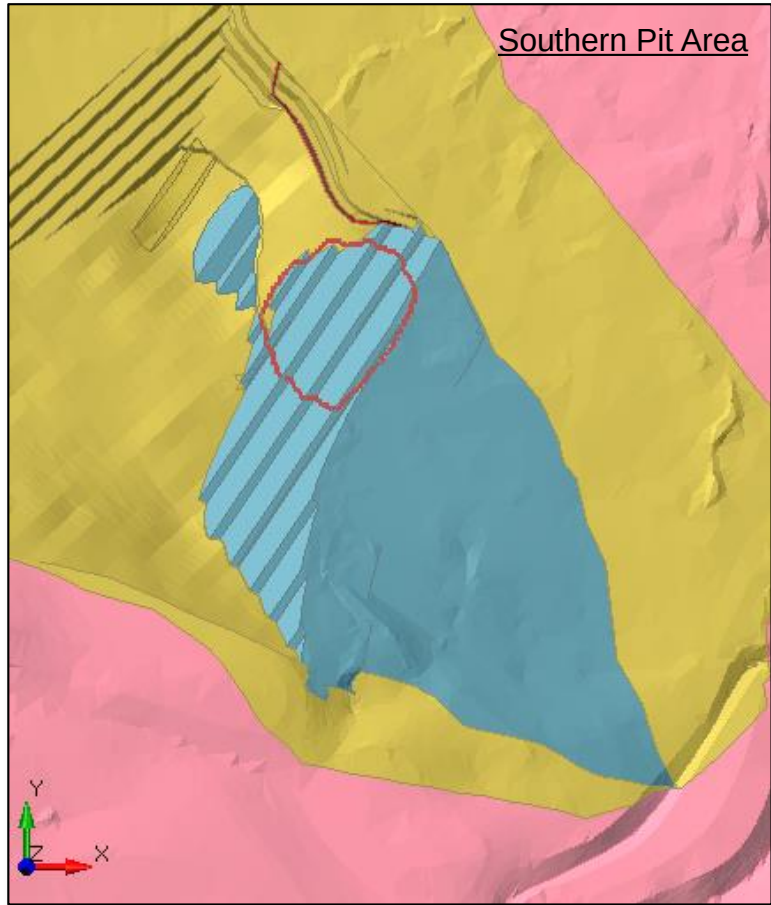
Stability Model Location



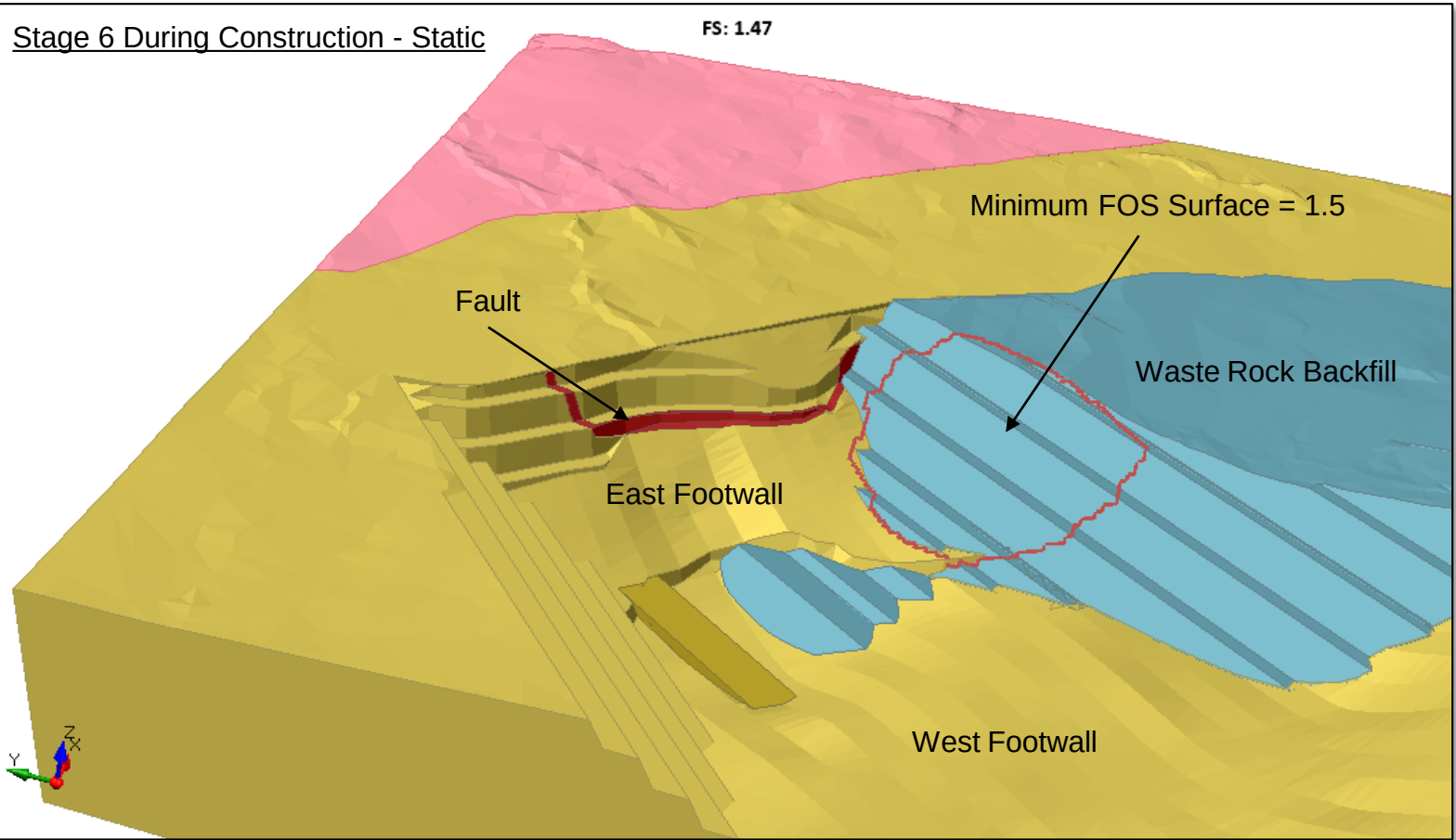
Modelled 3D surface represents failure through the waste rock and basal sliding along the east-dipping footwall slope (West Wall)

PHASE 7 PIT – 3D STABILITY ANALYSES RESULTS FOR STAGE 7 DESIGN

Stability Section Location



Stability Analysis Results



Modelled 3D surface represents failure through the waste rock and basal sliding along the west-dipping footwall slope (East Wall)

Stability Section Location

