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Edwards Pit

Presentation to Douro-Dummer Council

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2020 Investigation

- *Purpose of the study was to address Cambium's peer review recommendations, which are as follows:*
 - Consideration could have been given to advancing more test pits based on the variability of the esker deposits
 - It would be preferable for the locations and elevations of the test pits and boreholes to have been surveyed using an RTK or other system that is more accurate and able to provide geodetic elevations
 - Gradation testing on a large number of samples from the esker deposit would have been an inexpensive way to provide more detailed information about the volume of useful aggregates in the esker
 - Investigation and comments should also have been provided on the Bobcaygeon Formation.
 - It is somewhat misleading and unnecessary to compare the gradations of the 1" minus crushed limestone product, which was purposely created from the bedrock cores to allow for other testing, to the gradation envelopes for Granular A, Granular B, etc.

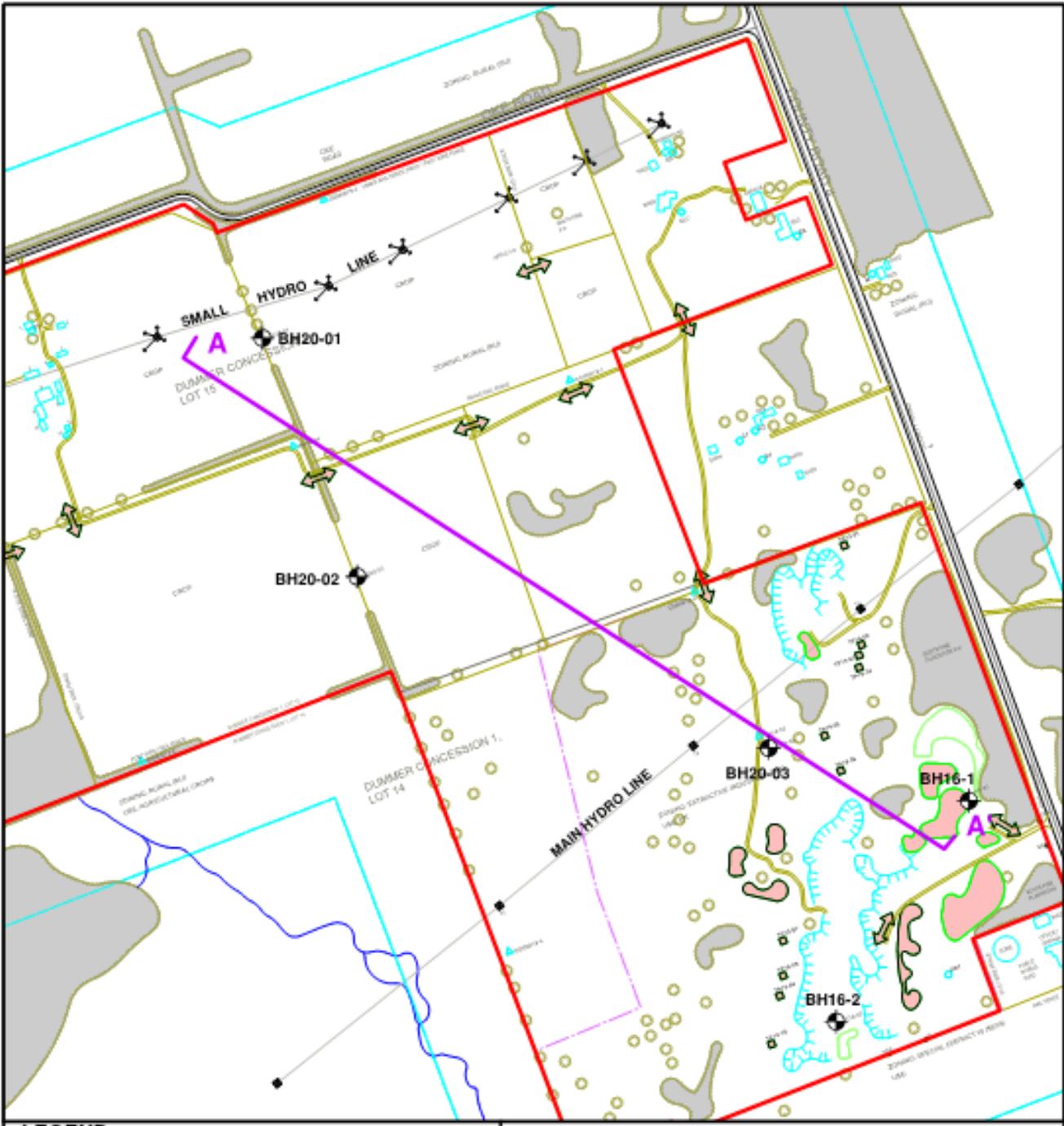
2020 Investigation

- Unconsolidated Materials – Esker Test Pitting
 - *Ten test pits*
- Consolidated Materials – Bedrock Investigation
 - *Three boreholes*
- Previous investigations included:
 - *Three boreholes in 2016*
 - *Materials testing – Reported January 2017*
 - *Two boreholes in 2018*
 - *Monitoring of groundwater elevations in four wells (BH16-3, MW18-1, MW18-2 and Craymer Well)*

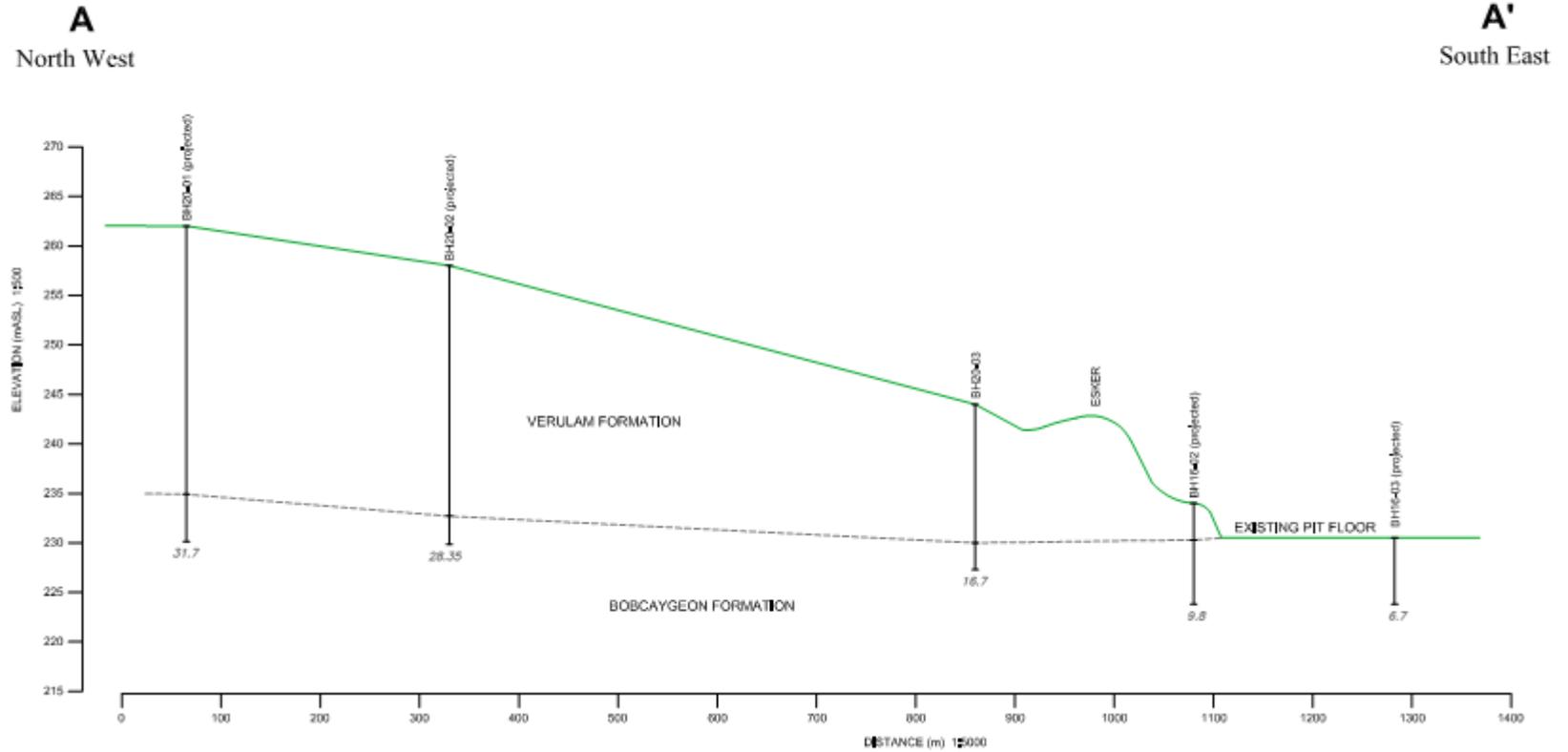
Site Plan



Site Plan



Cross Section



Summary of Laboratory Analyses



Table 3-2: Summary of Laboratory Analysis (Physical Quality Requirements)

SAMPLE ID	REL. DENS. & ABSORB. COARSE	REL. DENS. & ABSORB. FINES	MICRO-DEVAL COARSE (LOSS %) RESULT	MICRO-DEVAL FINE (LOSS %) RESULT	PLASTIC FINES (Y/N)	FREEZE THAW
Unconsolidated Material (Esker)						
TP19-01*	2.658/0.71	2.623/1.26	21.4	10.1	N	--
TP19-02	2.609/1.35	2.554/2.36	24.1	15.5	N	--
TP19-03	2.620/1.13	2.573/1.70	24.5	14.9	N	--
TP19-04	2.622/1.04	2.545/2.26	20.2	11.0	N	--
TP19-05	2.601/1.50	2.554/2.16	23.7	18.6	N	--
TP19-06	2.605/1.63	2.570/2.25	25.1*	15.5	N	--
TP19-07	2.616/1.22	2.554/2.52	22.6	13.9	N	--
TP19-08	2.613/1.19	2.563/1.83	20.3	11.6	N	--
TP19-09	2.601/1.48	2.607/1.25	-	9.0	N	--
TP19-10	2.595/1.65	2.583/1.66	24.2	15.4	N	--
RANGE	0.71 to 1.65 (Absorption)	1.25 to 2.52 (Absorption)	20.2 to 25.1	9.0 to 18.6	N	--
Consolidated Material (Bedrock)						
BH20-01	2.651/0.77	2.532/2.54	16.0	22.5	--	2.7
BH20-02	2.658/0.69	2.519/2.61	15.4	22.3	--	1.8
BH20-03	2.674/0.50	2.521/2.64	13.8	20.6	--	2.5
BH16-1	2.689/0.37	2.634/1.06	13.0	16.2		1.7
Range	0.37 – 0.77 (Absorption)	1.06 – 2.64 (Absorption)	13.0 – 16.0	20.6 – 22.5	--	1.7 – 2.7
PHYSICAL QUALITY REQUIREMENTS (OPSS 1010 and 1004)						
Granular A	N/A	N/A	25	30	N	N/A
Granular B	N/A	N/A	30	35	N	N/A
Winter Sand	N/A	N/A	N/A	N/A	N/A	N/A

* Sample does not meet physical quality requirements specifications for Granular A

Comparison to OPSS Specifications

Table 3-3: Comparison of Gradation Results to OPSS Specifications

SIEVE SIZE (mm)	TP19-01	TP19-02	TP19-03	TP19-04	TP19-05	TP19-06	TP19-07	TP19-08	TP19-09	TP19-10	BH20-01	BH20-02	BH20-03	GRANULAR A*	GRANULAR B TYPE I*	WINTER SAND**
26.5	62.2	70.0	56.2	72.4	73.9	77.2	77.0	89.9	86.3	84.7	100	100	100	100	50 – 100	--
19.0	59.8	60.3	51.0	66.2	64.8	70.8	70.6	86.8	83.5	77.4	99.8	99.3	99.2	85 – 100	N/A	--
13.2	57.9	54.4	46.5	60.7	57.4	66.2	66.2	84.2	81.2	73.4	66.8	69.2	70.7	65 – 90	N/A	--
9.5	55.2	46.6	41.2	54.9	50.4	60.1	60.6	81.1	78.2	67.4	43.9	46.2	49.9	50 – 73	N/A	100
4.75	49.9	34.2	31.1	43.9	38.8	48.6	48.9	74.3	71.6	57.2	28.9	26.1	28.8	35 – 55	20 – 55	90 – 100
1.18	38.9	19.9	19.2	21.3	25.3	30.8	28.4	60.9	54.8	36.4	12.1	11.6	12.7	15 – 40	10 – 100	20 – 90
300 µm	12.9	12.3	9.4	5.9	12.6	17.3	10.0	14.3	11.4	12.9	6.4	6.6	6.6	5 – 22	2 – 65	0 – 35
75 µm	2.6	7.2	4.0	2.6	5.8	6.8	4.3	4.7	1.9	4.6	4.0	4.2	3.9	2.0 – 8.0	0 – 8.0	0 – 5.0
SPECIFICATION SUMMARY – DOES SAMPLE MEET OPSS SPECIFICATION (Y/N)																
Granular A	N	N	N	N	N	N	N	N	N	N				--	--	--
Granular B Type I	N	Y	N	Y	Y	Y	Y	Y	Y	Y				--	--	--
Winter Sand**	N	N	N	N	N	N	N	N	N	N				--	--	--

* OPSS 1010

** OPSS 1004

- Unconsolidated Material (Esker)
 - *Material is suitable for Granular B Type I*
- Consolidated Material (Bobcaygeon Formation)
 - *Results were mixed for use of crushed material in concrete and asphalt*
 - Freeze-thaw samples passed for pavement, structures, sidewalks and concrete base (OPSS 1002), Superpave (OPSS 1003), and all Classes of Surface Treatment Aggregate (OPSS 1006)
 - Micro-deval results met requirements for some of the coarse samples but none of the fine samples

- Quality of the Verulam
 - *Is further testing warranted?*
- Bobcaygeon vs Verulam
 - *Depth of extraction*
 - *Above or below water extraction*
- What are the future needs of the Township?
- What are the long term planning implications?

Thank you!

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