Memo

To:	Jacob Dosman, Weston Consulting
From:	Brian Bishop, Michael Penney, Wood Environment & Infrastructure Solutions
Date:	September 20, 2018
File:	TP113001
cc:	Rizwan Haq, Credit Valley Conservation Authority
Re:	**Hydraulic Assessment (HEC-RAS Model Updates): 86-90 Dundas Street East, City of Mississauga**

Further to the receipt of the valley slope restoration comments received from the City and Credit Valley Conservation (CVC) in August 2018, Skira & Associates Ltd. (Skira) have updated the detailed grading in September, 2018. Final revisions to the valley slope and site grading were provided by Skira on September 11th, 2018 and a final set of drawings provided September 19, 2018. In accordance with the comments, we have updated the proposed hydraulic modelling based on the Grading Plan (ref. Drawing 212-M107-2) provided by Skira. A recent version of this drawing (ref. Drawing 212-M107-2) was prepared by Skira on September 17th, 2018, primarily to reflect the change in the limits of the underground storage parking lot. There were no changes to the grading within the creek, creek valley slope or site grading within the 3.0 m buffer area, and hence this updated drawing did not impact the following hydraulic assessment.

The following changes in slope have been made to the hydraulic (HEC-RAS) cross-sections, to reflect the regrading of the upper valley slopes on the property:

CS 4.960 – side slope was 2.5 : 1, is now 3.0 : 1
CS 4.955 – side slope was 2.5 : 1, is now 3.0 : 1
CS 4.950 – side slope was 2.5 : 1, is now 3.0 : 1
CS 4.936 – side slope remains 3.0 : 1
CS 4.910 – side slope was 2.5 : 1, is now 3.0 : 1
CS 4.870 – side slope was 2.5 : 1, is now 3.0 : 1

The model was most recently updated in April 2018, based on CVC comments issued in March 2018. Further to consultation with CVC the model was updated and submitted April 16, 2018, and CVC confirmed their approval of the model on April 26, 2018. This was also confirmed in the August 2018 comments from CVC.

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Weston Consulting
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The current (September 2018) updates to the hydraulic model represent minor modifications to the upper valley side slopes from 2.5:1 to 3:1 and, as such, would provide additional flow area within the creek valley for conveyance. The simulation results are consistent with previous submissions including the local instability at the cross section immediately downstream of the Dundas Street culvert (ref. cross section 4.950).

We note that the hydraulic model has a local instability at cross section 4.950 due to the confluence of the "loop" and "BrUS" reaches. This instability is present in the CVC approved existing conditions model (April 2018). Although the changes in side slope are minimal, the changes have caused the instability to produce a difference at cross section 4.950 as the model tries to resolve the water surface elevation through the culvert and the flow over Dundas Street. The instability is demonstrated in Figure 1. Comparing the proposed condition 100-year water surface profile with the Regional Storm event profile shows that the proposed water surface elevation is more realistic than the existing 100-year storm profile. As such, although the model produces a different numerical result for the 100-year storm event between existing and proposed conditions, this is a result of the local instability and the existing condition water surface profile would, in reality, match the proposed conditions water surface profile. The results of the hydraulic assessment are presented in Tables 1 through 3. The local instability is shown as an increase of 1.92 m at cross section 4.950 which has caused corresponding increases within the "BrUS" reach. As demonstrated, the increase to Regional Storm water surface elevations are a maximum of 0.03 m and these are attributed to the local instability at section 4.950.

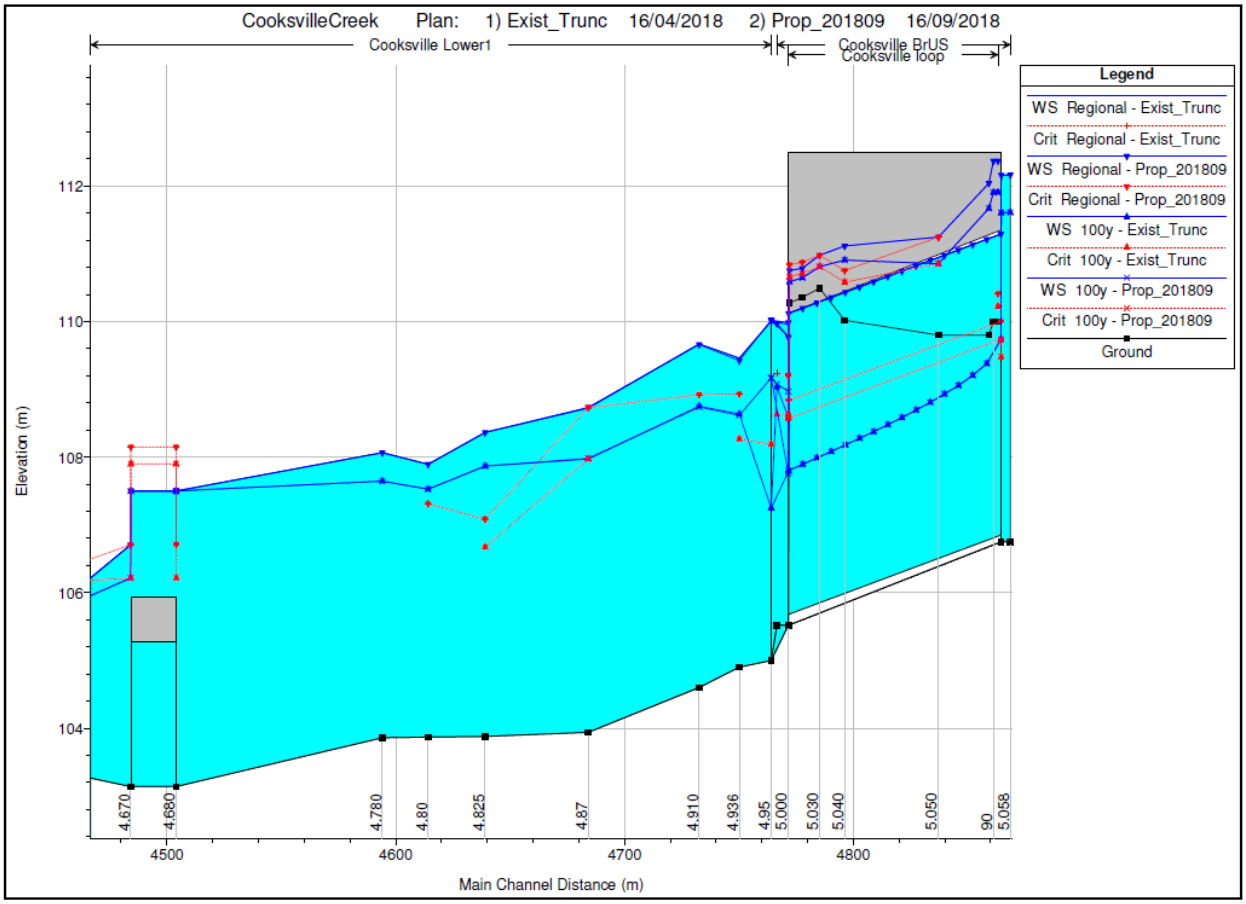

Figure 1: Hydraulic Profile of Regional Storm Event and 100-year Storm Event

Table 1: Existing Geometry - WSEL (m)

Reach	Section	Return Period (years)						Regional
		2	5	10	25	50	100	
loop	5.010	110.53	110.53	110.53	110.53	110.53	110.59	110.75
loop	5.000	106.54	106.75	106.91	107.26	107.56	107.79	109.96
BrUS	4.960	107.93	108.14	108.24	108.24	108.44	108.59	109.78
BrUS	4.955	107.5	107.73	107.9	108.35	108.73	109.03	109.95
Lower 1	4.950	106.13	106.3	106.44	106.75	107.03	107.25	110
Lower 1	4.936	106.35	106.53	106.69	107.07	107.48	108.64	109.46
Lower 1	4.910	106.45	106.64	106.82	107.21	108.4	108.75	109.67
Lower 1	4.870	105.81	106.09	106.33	107.05	107.72	107.97	108.73
Lower 1	4.825	106.92	107.17	107.32	107.56	107.74	107.87	108.36
Lower 1	4.800	106.79	107.01	107.15	107.33	107.46	107.53	107.89
Lower 1	4.780	106.83	107.07	107.21	107.41	107.56	107.64	108.06

Table 2: Proposed Geometry September 2018 3:1 Side Slopes - WSEL (m)								
Reach	Section	Return Period (years)						Regional
		2	5	10	25	50	100	
loop	5.010	110.53	110.53	110.53	110.53	110.53	110.59	110.75
loop	5.000	106.54	106.75	106.91	107.24	107.54	107.76	109.99
BrUS	4.960	107.88	108.04	107.95	108.2	108.39	108.97	109.77
BrUS	4.955	107.5	107.73	107.92	108.4	108.78	109.08	109.97
Lower 1	4.950	106.13	106.3	106.44	106.75	107.03	109.17	110.02
Lower 1	4.936	106.35	106.53	106.69	107.07	107.48	108.62	109.42
Lower 1	4.910	106.45	106.64	106.82	107.21	108.39	108.74	109.66
Lower 1	4.870	105.81	106.09	106.33	107.04	107.73	107.98	108.74
Lower 1	4.825	106.92	107.17	107.32	107.56	107.74	107.87	108.36
Lower 1	4.800	106.79	107.01	107.15	107.33	107.46	107.53	107.89
Lower 1	4.780	106.83	107.07	107.21	107.41	107.56	107.64	108.06

Table 3: Proposed Geometry September 2018 versus Existing Geometry - Difference (m)								
Reach	Section	Return Period (years)						Regional
		2	5	10	25	50	100	
loop	5.010	0	0	0	0	0	0	0
loop	5.000	0	0	0	-0.02	-0.02	-0.03	0.03
BrUS	4.960	-0.05	-0.1	-0.29	-0.04	-0.05	0.38	-0.01
BrUS	4.955	0	0	0.02	0.05	0.05	0.05	0.02
Lower 1	4.950	0	0	0	0	0	1.92	0.02
Lower 1	4.936	0	0	0	0	0	-0.02	-0.04
Lower 1	4.910	0	0	0	0	-0.01	-0.01	-0.01
Lower 1	4.870	0	0	0	-0.01	0.01	0.01	0.01
Lower 1	4.825	0	0	0	0	0	0	0
Lower 1	4.800	0	0	0	0	0	0	0
Lower 1	4.780	0	0	0	0	0	0	0

In summary, the proposed minor modifications of portions of the proposed reconstructed upper valley and site grading, will not negatively impact the flood levels or currently mapped Regional flood line in this reach of the Cooksville Creek. Localized minor increases in water surface elevation (maximum of +0.03 m) are predicted by the model for the reach, but would be contained to the channel valley and would not negatively impact adjacent properties.

We trust that this updated model with the revised 3:1 side slopes is satisfactory.

BB/MP/mp