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June 13, 2017

**David Schaeffer Engineering Limited**

120 Iber Road, Unit 103  
Ottawa, Ontario K2S 1E9

**Attention: Steve Pichette, P.Eng.**

**Subject: Kanata West Ponds 4 and 7 /  
Impact of Proposed Changes on Carp River Model**

*our file: 631-07*

As requested by your office, we have evaluated, based on the information described below, the impact of updating the contributing drainage areas and designs of Kanata West Ponds 4 and 7 in the City of Ottawa ultimate conditions Carp River PCSWMM Model.

The ultimate conditions PCSWMM model of the Carp River was prepared by the City of Ottawa as per the February 2017 *Carp River PCSWMM Model Documentation*. The 12-hour SCS Type II MTO design storm distribution, as provided with the model, was used to generate 2- to 100-year peak flows and water levels along the Carp River and its tributaries.

### **KANATA WEST POND 4**

In the City of Ottawa ultimate conditions Carp River PCSWMM model, Pond 4 has a drainage area of 279.234 ha at 62% imperviousness and discharges to the Carp River. Note that this is slightly off from the 278.288 ha ultimate drainage area at 62% imperviousness documented in the December 2014 *Design Brief for Pond 4, Kanata West, Mattamy Homes*. Per information provided by DSEL and the proposed drainage area plan shown in Attachment A, we understand that approximately 35.640 ha of drainage area at 51% imperviousness in the northwest corner of the Pond 4 catchment area will be redirected to the Kanata West Pond 7, for a revised ultimate conditions drainage area of 243.594 ha at 64% imperviousness to Pond 4. The redirected area is comprised of subcatchments C-6, C-7 and C-14, as identified in the June 2006 *Kanata West Master Servicing Study* by Stantec. Note that the imperviousness of these subcatchments has also been revised to 70% imperviousness (refer to the Kanata West Pond 7 section below). Changes made to the PCSWMM model to reflect this proposed drainage area redirection are presented in Table A-1 of Attachment A.

In the City of Ottawa ultimate conditions Carp River PCSWMM model, the Pond 4 stage-storage-area-discharge relationship was modelled as per the ultimate conditions design presented in the December 2014 *Design Brief for Pond 4*. As directed by DSEL, it is proposed that the interim pond stage-storage-area relationship presented in the December 2014 *Design Brief for Pond 4* remain in place under ultimate conditions, with changes to the outlet control structure to accommodate ultimate conditions runoff. The revised ultimate Pond 4 was designed using the DDSWMM / XPSWMM modelling files submitted with the December 2014 *Design Brief for Pond 4*. The revised ultimate pond design is presented in Attachment B, and satisfies requirements established in the December 2014 *Design Brief for Pond 4* for forebay sizing, baseflow augmentation, quality control, 10-year quantity control, and emergency overflow conveyance. This revised design was prepared for the purpose of testing its impact on water levels and flows in the Carp River PCSWMM model; pond requirements and proposed modifications may be discussed in greater detail in a later submission specific to the proposed pond design.

Note that the revised ultimate Pond 4 design does not meet the 100-year quantity control target specified in the December 2014 *Design Brief for Pond 4*, but instead relies upon the earlier June 2006 *Kanata West Master Servicing Study*, where quantity control is required only up to the 10-year level. In order to respect hydraulic gradeline analyses completed for existing and future upstream developments, the 100-year ultimate pond level was maintained below the 94.74 m elevation simulated in the June 2006 *Kanata West Master Servicing Study* and the December 2014 *Design Brief for Pond 4*. A comparison of Pond 4 10- and 100-year outflow hydrographs from various sources, similar to that provided in the December 2014 *Design Brief for Pond 4*, is presented in Figures B-1 and B-2 of Appendix B.

## KANATA WEST POND 7

In the City of Ottawa ultimate conditions Carp River PCSWMM model, Pond 7 has a drainage area of 34.54 ha at 85% imperviousness, and discharges to Feedmill Creek. As per information provided by DSEL and the proposed drainage area plan shown in Attachment A, it is proposed that the ultimate conditions drainage area to Pond 7 be revised to 57.30 ha at 70% imperviousness. Note that part of this drainage area to Pond 7 has been redirected from the originally proposed drainage area to Pond 4, as discussed in the Kanata West Pond 4 section above. Additionally, a 10.50 ha development area at 70% imperviousness will discharge uncontrolled to Feedmill Creek. Note that the ultimate conditions PCSWMM model provided by the City has a 4.9 mm initial abstraction value for impervious areas in the 34.54 ha drainage area to Pond 7. I assume this is representative of required LID measures on-site, and have carried it forward for the revised drainage area to Pond 7, but not the 10.50 ha uncontrolled area.

An interim scenario was also considered, wherein 16.50 ha of the ultimate drainage area to Pond 7 (MTO lands) will remain as currently developed at 30% imperviousness and discharge uncontrolled to Feedmill Creek. Because the Carp River model already has “interim” and “ultimate” scenarios, these two conditions are henceforth referred to as Ultimate Scenario A (40.80 ha to Pond 7, 16.50 ha to Feedmill Creek) and Ultimate Scenario B (57.30 ha to Pond 7). Changes made to the PCSWMM model to reflect the proposed drainage area revisions are presented in Table A-1 of Attachment A. Under both scenarios, the PCSWMM model has also been modified to reflect the drainage area and pond design changes discussed above in the Kanata West Pond 4 section.

In the City of Ottawa ultimate conditions Carp River PCSWMM model, the Pond 7 preliminary stage-storage-area-discharge relationship was modelled to meet unit release rates of 0.51 L/s/ha for the 15 mm 3-hour Chicago design storm and 8 L/s/ha for the 100-year 12-hour SCS Type II design storm, based on the 34.54 ha drainage area and the April 2017 *Feedmill Creek Stormwater Management Criteria Study*. These target release rates of 17.7 L/s and 276.3 L/s were not revised based on the proposed drainage area revisions; instead the volume available in Pond 7 was adjusted in the PCSWMM model for each scenario to meet the established target release rates.

## IMPACT ON CARP RIVER AND FEEDMILL CREEK

The ultimate conditions 2- to 100-year 12-hour SCS Type II design storm flows and water levels at key points on the Carp River and Feedmill Creek are summarized in Attachment C for the original February 2017 scenario provided by the City of Ottawa, and Scenarios A and B as described above. As may be seen from the attached, water levels increase from the original February 2017 results by up to 1 cm on the Carp River and 14 cm on Feedmill Creek under Scenario A. Under Scenario B, water levels increase from the original February 2017 results by up to 2 cm on the Carp River and 10 cm on Feedmill Creek.

Yours truly,

**J.F. Sabourin and Associates Inc.**



Laura Pipkins, P.Eng.

cc: J.F. Sabourin, M.Eng, P.Eng.

Director of Water Resources Projects

Attachment A: Proposed Drainage Areas to Ponds 4 and 7 (Figure STM-PRF, DSEL, July 2016)  
Revised Catchment Boundaries in the Carp River Model

Attachment B: Pond 4 Controls - Quality, Extended Detention and Quality, Sediment Forebay Calculations, Comparison of  
Pond 4 Outflow Hydrographs

Attachment C: Comparison of 2- to 100-Year Water Levels and Flows at Key Points on the Carp River and Feedmill Creek

# ATTACHMENT

## A

Proposed Drainage Areas to Ponds 4 and 7  
(Figure STM-PRF, DSEL, July 2016)

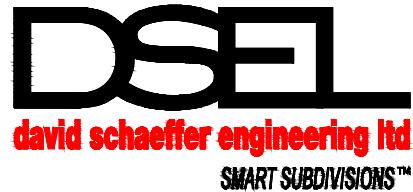
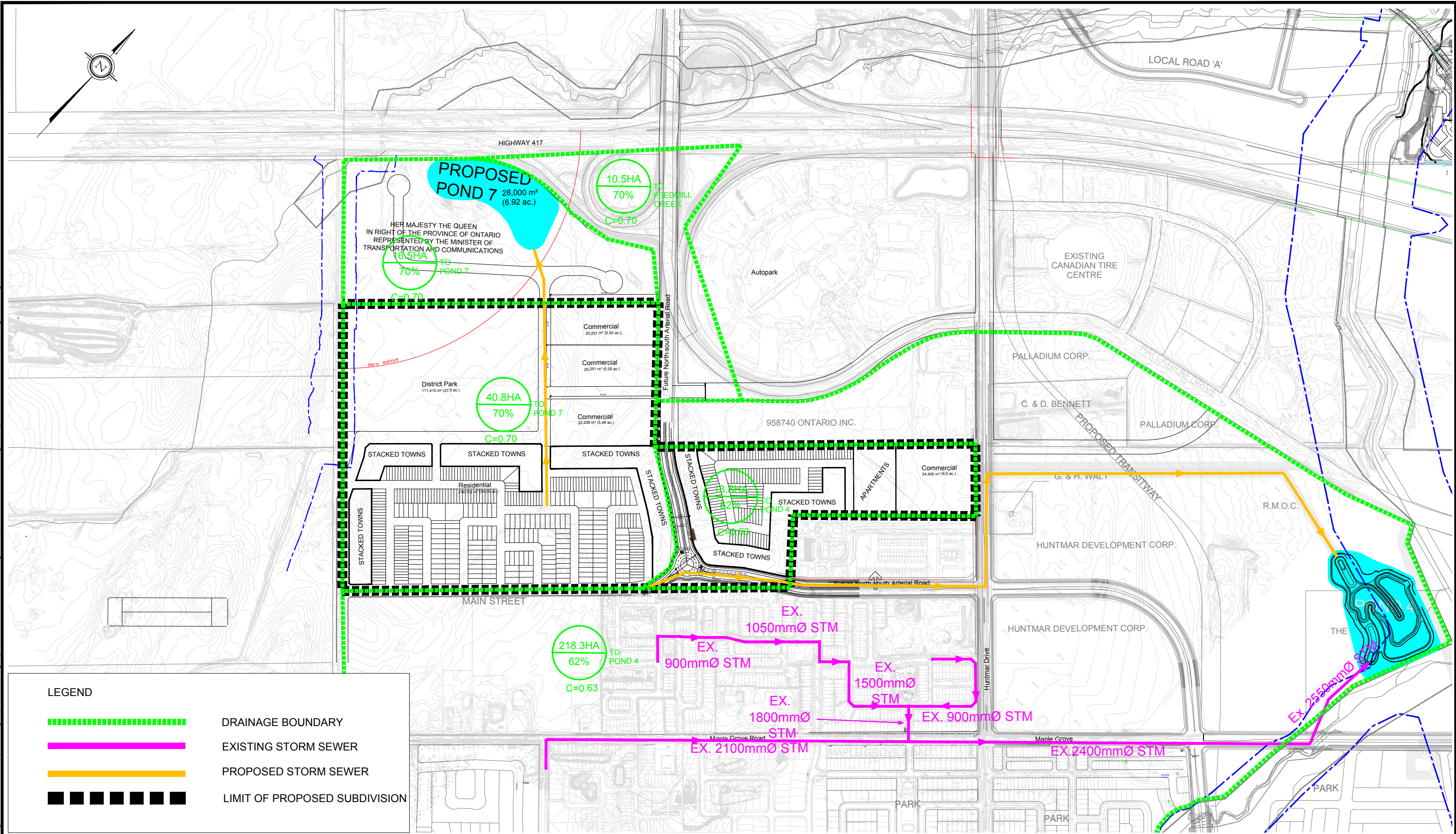
Revised Catchment Boundaries in the Carp River Model

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# 195 HUNTMAR DRIVE STORM SERVICING - PREFERRED CITY OF OTTAWA

DATE:  
JULY 11, 2016  
SCALE:  
1:7500  
PROJECT No.:  
12-624  
FIGURE  
STM-PRF

**Table A-1: Revised Catchment Boundaries in the Carp River Ultimate Conditions Model**

PCSWMM Catchment ID	Original March 2016 <sup>(1)</sup>			KWMSS Pond 4/7 Update <sup>(2)</sup>			Difference			Notes
	Area (ha)	Imperviousness (%)	Width (m)	Area (ha)	Imperviousness (%)	Width (m)	Area (ha)	Imperviousness (%)	Width (m)	
Scenario A										
PS202	106.24	71.045	708.27	70.60	81.207	470.67	-35.64	10.162	-237.60	North Development to Pond 4
FS107	34.54	85.00	430.00	40.80	70.00	507.95	6.26	-15.00	77.95	Development to Pond 7
FS107_2				10.50	70.00	130.72	10.50	70.00	130.72	Development to Feedmill Creek
FS107_3				16.50	30.00	205.42	16.50	30.00	205.42	MTO Lands Undeveloped to Feedmill Creek
Scenario B										
PS202	106.24	71.045	708.27	70.60	81.207	470.67	-35.64	10.162	-237.60	North Development to Pond 4
FS107	34.54	85.00	430.00	57.30	70.00	713.37	22.76	-15.00	283.37	Development to Pond 7
FS107_2				10.50	70.00	130.72	10.50	70.00	130.72	Development to Feedmill Creek

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa in May 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage areas.

# ATTACHMENT

## B

Pond 4 Controls – Quality, Extended Detention and Quantity

Sediment Forebay Calculations

Comparison of Pond 4 Outflow Hydrographs

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**Table B-1: Criteria for Required Storage Volumes (Ultimate Conditions)**

Pond	Area <sup>(1)</sup> (ha)	Imperviousness (%)	Storage Volume for Impervious Level <sup>(2)</sup> (m <sup>3</sup> /ha)
N/A	N/A	55	110
<b>SWM Pond 4</b>	<b>242.648</b>	<b>64</b>	122.00
N/A	N/A	70	130

<sup>(1)</sup> Refer to Appendix C for drainage areas to the SWM facility.

<sup>(2)</sup> Protection Level for Wet Pond: Normal 70% long-term S.S. removal.  
SWM Planning & Design Manual, Table 3.2, p.3-10 (March 2003).

**Table B-2: Required Storage Volumes for SWM Facility (Ultimate Conditions)**

Pond Component	Required Volume (m <sup>3</sup> )	Provided Volume <sup>(4)</sup> (m <sup>3</sup> )	Volume Ratio	Provided Area <sup>(5)</sup> (m <sup>2</sup> )	Provided Elevation (m)
Permanent Pool (PP) <sup>(1)</sup>	19897	29736	1.49	19714	93.200
Quality Control <sup>(2)</sup>	9706	9706	1.00	N/A	93.665
Extended Detention <sup>(3)</sup>	N/A	22288	N/A	N/A	94.200
Forebay (20% PP)	3979	N/A	N/A	3558	93.200
PP - Forebay	15918	N/A	N/A	16156	93.200
Area Ratio (%) <sup>(6)</sup> =				18	

<sup>(1)</sup> Required PP volume based on Table B-1 (122.00 - 40 = 82.00 m<sup>3</sup>/ha).

<sup>(2)</sup> Required quality control volume based on 40 m<sup>3</sup>/ha.

<sup>(3)</sup> Provided extended detention volume based on an elevation of 94.2 m as per **KWMSS**.

<sup>(4)</sup> Provided volume based on stage-storage curve and extended detention (refer to Tables B-3 and B-4).

<sup>(5)</sup> Based on grading plan provided by DSEL (refer to Figure 2).

<sup>(6)</sup> As per MOE, Maximum Forebay Area: 33% of Total Permanent Pool.

**Table B-3: Extended Detention Parameters for SWM Facility (Ultimate Conditions)**

Permanent Pool Parameters		Flow Augmentation Orifice Parameters	Quality Control Orifice Parameters
Area (C3)	19714.21 m <sup>2</sup>	Diameter 0.200 m	Diameter 0.350 m
Volume	29735.86 m <sup>3</sup>		
PP Elev	93.200 m	Area 0.031 m <sup>2</sup>	Area 0.096 m <sup>2</sup>
QC Elev	93.665 m	Invert 93.200 m	Invert 93.400 m
h (m)	0.465 m	C <sub>o</sub> 0.62	C <sub>o</sub> 0.62

- Notes:
- C3 is the intercept from the area-depth linear regression.
  - PP Elev indicates the elevation of the permanent pool.
  - QC Elev indicates the elevation of the storage volume required by MOE for quality control.
  - h is the maximum water elevation above the orifice (m).

**Table B-4: Extended Detention Drawdown Time for SWM Facility (Ultimate Conditions)**

Elev. (m)	Active Storage			C2 (m <sup>2</sup> /m)	Drawdown Time (h)	Drawdown Time (days)	Flow (m <sup>3</sup> /s)	Demarkation Point
	V (m <sup>3</sup> )	A (m <sup>2</sup> )	depth (m)					
<b>93.20</b>	<b>0.00</b>	<b>19714.21</b>	<b>0.00</b>				<b>0.000</b>	<b>PP Elev</b>
93.25	994.74	19720.10	0.05	118	28.35	1.18	0.007	
93.30	1998.14	20071.60	0.10	3574	40.33	1.68	0.013	
93.35	3010.55	20353.56	0.15	4262	49.62	2.07	0.018	
<b>93.40</b>	<b>4044.15</b>	<b>20639.89</b>	<b>0.20</b>	<b>4628</b>	<b>57.57</b>	<b>2.40</b>	<b>0.023</b>	<b>FA Elev</b>
93.45	5065.97	20991.49	0.25	5109	59.34	2.47	0.044	
93.50	6108.03	20996.71	0.30	4275	60.86	2.54	0.064	
93.55	7187.32	21435.33	0.35	4917	62.39	2.60	0.084	
93.60	8280.58	21869.67	0.40	5389	63.85	2.66	0.103	
93.65	9377.83	22064.99	0.45	5224	65.16	2.71	0.122	
<b>93.665</b>	<b>9706.00</b>	<b>22158.08</b>	<b>0.46</b>	<b>5260</b>	<b>65.54</b>	<b>2.73</b>	<b>0.128</b>	<b>QC Elev</b>
93.70	10497.31	22382.57	0.50	5337	66.45	2.77	0.141	
93.75	11622.97	22625.58	0.55	5293	67.67	2.82	0.160	
93.80	12760.97	22868.31	0.60	5257	68.85	2.87	0.177	
93.85	13911.14	23111.60	0.65	5227	69.99	2.92	0.193	
93.90	15073.37	23355.94	0.70	5202	71.10	2.96	0.208	
93.95	16247.57	23600.47	0.75	5182	72.18	3.01	0.221	
94.00	17434.88	23846.33	0.80	5165	73.24	3.05	0.234	
94.05	18720.80	24171.23	0.85	5244	74.32	3.10	0.246	
94.10	19963.97	24378.05	0.90	5182	75.32	3.14	0.257	
94.15	21058.08	24841.93	0.95	5398	76.43	3.18	0.268	
<b>94.20</b>	<b>22288.05</b>	<b>24842.98</b>	<b>1.00</b>	<b>5129</b>	<b>77.29</b>	<b>3.22</b>	<b>0.279</b>	<b>Ext. Det.</b>

- Notes:
- C2 is the slope coefficient from the area-depth linear regression.
  - PP Elev indicates the elevation of the permanent pool.
  - QC Elev indicates the elevation of the storage volume required by MOE for quality control.
  - FA Elev indicates the elevation of flow augmentation provided in accordance with the **KWMSS** (10% of active volume).
  - Ext. Det. indicates the elevation of extended detention provided as per the **KWMSS**.

**Table B-5: Stage-Storage-Outflow Curve for SWM Facility (Ultimate, Free Outfall Conditions)**

			Flow Augmentation 1		Quality Control 1		Quantity Control 1		Quantity Control 2			
			Vertical Orifice		Vertical Orifice		Rectangular Weir		Rectangular Weir			
			Dia (m)	0.200	Dia (m)	0.350	L (m)	37	L (m)	30		
			Area (m <sup>2</sup> )	0.031	Area (m <sup>2</sup> )	0.096	top of DIS					
			Invert (m)	93.20	Invert (m)	93.40	C <sub>w</sub>	1.800	C <sub>w</sub>	1.670		
			C <sub>o</sub>	0.62	C <sub>o</sub>	0.62	Invert (m)	94.20	Invert (m)	94.60		
			Q @ D	0.027	Q @ D	0.111	n contr.	0	n contr.	0		
Elevation	Active Sto.	Demarkation	Head	Outflow	Head	Outflow	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m <sup>3</sup> )	Points	(m)	(m <sup>3</sup> /s)	(m)	(m <sup>3</sup> /s)	(m)	(m <sup>3</sup> /s)	(m)	(m <sup>3</sup> /s)	(m <sup>3</sup> /s)	(ha·m)
<b>93.20</b>	<b>0</b>	<b>PP Elev</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>
93.25	995		0.050	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.099
93.30	1998		0.100	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.200
93.35	3011		0.150	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.301
<b>93.40</b>	<b>4044</b>	<b>FA Elev</b>	<b>0.200</b>	<b>0.023</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.023</b>	<b>0.404</b>
93.45	5066		0.250	0.028	0.050	0.016	0.000	0.000	0.000	0.000	0.044	0.507
93.50	6108		0.300	0.033	0.100	0.032	0.000	0.000	0.000	0.000	0.064	0.611
93.55	7187		0.350	0.037	0.150	0.047	0.000	0.000	0.000	0.000	0.084	0.719
93.60	8281		0.400	0.040	0.200	0.063	0.000	0.000	0.000	0.000	0.103	0.828
93.65	9378		0.450	0.043	0.250	0.079	0.000	0.000	0.000	0.000	0.122	0.938
<b>93.665</b>	<b>9706</b>	<b>QC Elev</b>	<b>0.465</b>	<b>0.044</b>	<b>0.265</b>	<b>0.084</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.128</b>	<b>0.971</b>
93.70	10497		0.500	0.046	0.300	0.095	0.000	0.000	0.000	0.000	0.141	1.050
93.75	11623		0.550	0.049	0.350	0.111	0.000	0.000	0.000	0.000	0.160	1.162
93.80	12761		0.600	0.052	0.400	0.125	0.000	0.000	0.000	0.000	0.177	1.276
93.85	13911		0.650	0.054	0.450	0.139	0.000	0.000	0.000	0.000	0.193	1.391
93.90	15073		0.700	0.057	0.500	0.151	0.000	0.000	0.000	0.000	0.208	1.507
93.95	16248		0.750	0.059	0.550	0.162	0.000	0.000	0.000	0.000	0.221	1.625
94.00	17435		0.800	0.061	0.600	0.172	0.000	0.000	0.000	0.000	0.234	1.743
94.05	18721		0.850	0.064	0.650	0.182	0.000	0.000	0.000	0.000	0.246	1.872
94.10	19964		0.900	0.066	0.700	0.191	0.000	0.000	0.000	0.000	0.257	1.996
94.15	21058		0.950	0.068	0.750	0.200	0.000	0.000	0.000	0.000	0.268	2.106
<b>94.20</b>	<b>22288</b>	<b>Ext. Det.</b>	<b>1.000</b>	<b>0.070</b>	<b>0.800</b>	<b>0.209</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.279</b>	<b>2.229</b>
94.25	23567		1.050	0.072	0.850	0.217	0.050	0.745	0.000	0.000	1.033	2.357
94.30	24877		1.100	0.073	0.900	0.225	0.100	2.106	0.000	0.000	2.404	2.488
94.35	26201		1.150	0.075	0.950	0.233	0.150	3.869	0.000	0.000	4.177	2.620
94.40	27544		1.200	0.077	1.000	0.240	0.200	5.957	0.000	0.000	6.274	2.754
94.45	28903		1.250	0.079	1.050	0.247	0.250	8.325	0.000	0.000	8.651	2.890
94.50	30279		1.300	0.080	1.100	0.254	0.300	10.943	0.000	0.000	11.278	3.028
94.55	31665		1.350	0.082	1.150	0.261	0.350	13.790	0.000	0.000	14.133	3.166
94.60	33084		1.400	0.084	1.200	0.268	0.400	16.849	0.000	0.000	17.200	3.308
94.65	34456		1.450	0.085	1.250	0.274	0.450	20.104	0.050	0.560	21.024	3.446
94.70	35863		1.500	0.087	1.300	0.280	0.500	23.547	0.100	1.584	25.498	3.586
94.74	37288		1.540	0.088	1.340	0.285	0.540	26.428	0.140	2.624	29.426	3.729
94.80	38740		1.600	0.090	1.400	0.292	0.600	30.953	0.200	4.481	35.816	3.874
94.85	40229		1.650	0.091	1.450	0.298	0.650	34.902	0.250	6.263	41.554	4.023
94.90	41752		1.700	0.093	1.500	0.304	0.700	39.005	0.300	8.232	47.634	4.175
94.95	43321		1.750	0.094	1.550	0.310	0.750	43.258	0.350	10.374	54.036	4.332
95.00	44895		1.800	0.096	1.600	0.315	0.800	47.655	0.400	12.674	60.741	4.489
<b>95.05</b>	<b>46558</b>	<b>Top of Berm</b>	<b>1.850</b>	<b>0.097</b>	<b>1.650</b>	<b>0.321</b>	<b>0.850</b>	<b>52.192</b>	<b>0.450</b>	<b>15.124</b>	<b>67.734</b>	<b>4.656</b>

- Notes :
- PP Elev indicates the elevation of the permanent pool.
  - FA Elev indicates the elevation of flow augmentation provided in accordance with the **KWMSS** (10% of active volume).
  - QC Elev indicates the elevation of the storage volume required by MOE for quality control.
  - Ext. Det. indicates the elevation of extended detention provided as per the **KWMSS**.
  - Top of Berm indicates the elevation at the top of the berm.
  - Head losses for reverse grade pipe included in quality control outflow calculations.

**Table B-6: Stage-Storage-Outflow Curve for SWM Facility (Ultimate, Restrictive Downstream Conditions)**

			Flow Augmentation 1		Quality Control 1		Quantity Control 1		Quantity Control 2			
			Vertical Orifice		Vertical Orifice		Rectangular Weir		Rectangular Weir			
			Dia (m)	0.200	Dia (m)	0.350	L (m)	37	L (m)	30		
			Area (m <sup>2</sup> )	0.031	Area (m <sup>2</sup> )	0.096	top of DIS					
			Invert (m)	94.20	Invert (m)	94.20	C <sub>w</sub>	1.800	C <sub>w</sub>	1.670		
			C <sub>o</sub>	0.62	C <sub>o</sub>	0.62	Invert (m)	94.20	Invert (m)	94.60		
			Q @ D	0.027	Q @ D	0.111	n contr.	0	n contr.	0		
Elevation	Active Sto.	Demarkation	Head	Outflow	Head	Outflow	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m <sup>3</sup> )	Points	(m)	(m <sup>3</sup> /s)	(m)	(m <sup>3</sup> /s)	(m)	(m <sup>3</sup> /s)	(m)	(m <sup>3</sup> /s)	(m <sup>3</sup> /s)	(ha·m)
93.20	0	PP Elev	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
93.25	995	FA Elev	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.099
93.30	1998		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200
93.35	3011		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.301
93.40	4044		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.404
93.45	5066		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.507
93.50	6108		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.611
93.55	7187		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.719
93.60	8281		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.828
93.65	9378	QC Elev	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.938
93.665	9706		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.971
93.70	10497		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.050
93.75	11623		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.162
93.80	12761		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.276
93.85	13911		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.391
93.90	15073		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.507
93.95	16248		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.625
94.00	17435	Ext. Det.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.743
94.05	18721		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.872
94.10	19964		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.996
94.15	21058		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.106
94.20	22288		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.229
94.25	23567		0.050	0.007	0.050	0.016	0.050	0.745	0.000	0.000	0.767	2.357
94.30	24877		0.100	0.013	0.100	0.032	0.100	2.106	0.000	0.000	2.150	2.488
94.35	26201		0.150	0.018	0.150	0.047	0.150	3.869	0.000	0.000	3.935	2.620
94.40	27544	Top of Berm	0.200	0.023	0.200	0.063	0.200	5.957	0.000	0.000	6.043	2.754
94.45	28903		0.250	0.028	0.250	0.079	0.250	8.325	0.000	0.000	8.432	2.890
94.50	30279		0.300	0.033	0.300	0.095	0.300	10.943	0.000	0.000	11.071	3.028
94.55	31665		0.350	0.037	0.350	0.111	0.350	13.790	0.000	0.000	13.938	3.166
94.60	33084		0.400	0.040	0.400	0.125	0.400	16.849	0.000	0.000	17.014	3.308
94.65	34456		0.450	0.043	0.450	0.139	0.450	20.104	0.050	0.560	20.847	3.446
94.70	35863		0.500	0.046	0.500	0.151	0.500	23.547	0.100	1.584	25.328	3.586
94.75	37288		0.550	0.049	0.550	0.162	0.550	27.166	0.150	2.911	30.287	3.729
94.80	38740	0.600	0.052	0.600	0.172	0.600	30.953	0.200	4.481	35.658	3.874	
94.85	40229	0.650	0.054	0.650	0.182	0.650	34.902	0.250	6.263	41.401	4.023	
94.90	41752	0.700	0.057	0.700	0.191	0.700	39.005	0.300	8.232	47.486	4.175	
94.95	43321	0.750	0.059	0.750	0.200	0.750	43.258	0.350	10.374	53.891	4.332	
95.00	44895	0.800	0.061	0.800	0.209	0.800	47.655	0.400	12.674	60.600	4.489	
95.05	46558	0.850	0.064	0.850	0.217	0.850	52.192	0.450	15.124	67.596	4.656	

- Notes :
- PP Elev indicates the elevation of the permanent pool.
  - FA Elev indicates the elevation of flow augmentation provided in accordance with the **KWMSS** (10% of active volume).
  - QC Elev indicates the elevation of the storage volume required by MOE for quality control.
  - Ext. Det. indicates the elevation of extended detention provided as per the **KWMSS**.
  - Top of Berm indicates the elevation at the top of the berm.
  - Head losses for reverse grade pipe included in quality control outflow calculations.

## **CALCULATION SHEET B-1: ULTIMATE CONDITIONS CONTROLS**

Flow Augmentation 1			Quality Control 1			Quantity Control 1			Quantity Control 2		
Vertical Circular Orifice			Vertical Circular Orifice			Rectangular Weir			Rectangular Weir		
Diameter	(m)	0.200	Diameter	(m)	0.350	L	(m)	37	L	(m)	30
$A_o$	(m <sup>2</sup> )	0.031	$A_o$	(m <sup>2</sup> )	0.096	Top of drop inlet structure			$C_w$	(m)	1.67
invert	(m)	93.20	invert	(m)	93.40	$C_w$		1.80			
$C_o$		0.62	$C_o$		0.62	Crest Elev.	(m)	94.200	Crest Elev.	(m)	94.600
						n contr.		0	n contr.		0
100yr Water Level	(m)	94.708	100yr Water Level	(m)	94.708	100yr Water Level	(m)	94.708	100yr Water Level	(m)	94.708
Head of Water	(m)	1.508	Head of Water	(m)	1.308	h	(m)	0.508	h	(m)	0.108
$Q_o$	(m <sup>3</sup> /s)	0.102	$Q_o$	(m <sup>3</sup> /s)	0.281	$Q_w$	(m <sup>3</sup> /s)	24.128	$Q_w$	(m <sup>3</sup> /s)	1.783
Orifice Equation: $Q_o = C_o A_o (2gh)^{0.5}$ Not including outlet pipe losses $Q_o$ is the orifice flow $C_o$ is the orifice coefficient $A_o$ is the orifice flow area $g$ is the gravitational constant $h$ is the head of water			Orifice Equation: $Q_o = C_o A_o (2gh)^{0.5}$ $Q_o$ is the orifice flow $C_o$ is the orifice coefficient $A_o$ is the orifice flow area $g$ is the gravitational constant $h$ is the head of water			Weir Equation: $Q_w = C_w (L - 0.1nh) h^{1.5}$ $Q_w$ is the weir flow $C_w$ is the weir coefficient $L$ is the weir length $h$ is the weir height $n$ is the # of side contractions			Weir Equation: $Q_w = C_w (L - 0.1nh) h^{1.5}$ $Q_w$ is the weir flow $C_w$ is the weir coefficient $L$ is the weir length $h$ is the weir height $n$ is the # of side contractions		

## **CALCULATION SHEET B-2: FOREBAY SIZING FOR SWM FACILITY**

### **Kanata West, Mattamy Homes SWM Pond 4 - Ultimate Conditions City of Ottawa Calculation of South Forebay Size**

© DSEL

#### **Settling Criteria**

From the SWMP Manual, the required length for settling is as follows:

$$L_{\min} = \left( \frac{r Q_p}{V_s} \right)^{0.5}$$

where:

$r$  = length to width ratio, at the invert of the inlet pipe.

$Q_p$  = peak outflow during design quality storm

$V_s$  = settling velocity

Input:  $r$  = 4.09 (90 m / 22 m)  
 $Q_p$  = 0.279 m<sup>3</sup>/s (at elevation 94.2 m)  
 $V_s$  = 0.0003 m/s

$$L_{\min} = 61.63 \text{ m}$$

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

#### **Dispersion Criteria**

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{\min} = \frac{8Q}{d V_f}$$

where:

$Q$  = Inlet flowrate (10-Year, 12-Hour SCS Storm)

$d$  = depth of permanent pool (forebay)

$V_f$  = desired final velocity

Input:  $Q$  = 11.681 m<sup>3</sup>/s  
 $d$  = 2.0 m  
 $V_f$  = 0.5 m/s

$$L_{\min} = 93.45 \text{ m}$$

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	93.45 m	
Length of Forebay Provided	115.00 m	(at elevation 93.2 m)

#### **Average Forebay Velocity**

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{\text{avg}} = \frac{Q}{d W_{\text{avg}}}$$

where:

$Q$  = Inlet flowrate (10-Year, 12-Hour SCS Storm)

$d$  = depth of pond during peak 10-year inflow (6h:10min)

$W_{\text{avg}}$  = average width of forebay

Input:  $Q$  = 11.681 m<sup>3</sup>/s  
 $d$  = 2.9 m  
 $W_{\text{avg}}$  = 16 m (10 m bottom, 22 m permanent pool)

$$V = 0.25 \text{ m/s} < 0.15 \text{ m/s}$$

## **CALCULATION SHEET B-3: FOREBAY SIZING FOR SWM FACILITY**

### **Kanata West, Mattamy Homes SWM Pond 4 - Ultimate Conditions City of Ottawa Calculation of North Forebay Size**

© DSEL

#### **Settling Criteria**

From the SWMP Manual, the required length for settling is as follows:

$$L_{\min} = \left( \frac{r Q_p}{V_s} \right)^{0.5} \quad \text{where:} \quad \begin{array}{l} r = \text{length to width ratio, at the invert of the inlet pipe.} \\ Q_p = \text{peak outflow during design quality storm} \\ V_s = \text{settling velocity} \end{array}$$

$$\begin{array}{ll} \text{Input:} & r = 3.32 \quad (73 \text{ m} / 22 \text{ m}) \\ & Q_p = 0.279 \text{ m}^3/\text{s} \quad (\text{at elevation } 94.2 \text{ m}) \\ & V_s = 0.0003 \text{ m/s} \end{array}$$

$$L_{\min} = 55.51 \text{ m}$$

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

#### **Dispersion Criteria**

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{\min} = \frac{8Q}{d V_f} \quad \text{where:} \quad \begin{array}{l} Q = \text{Inlet flowrate (10-Year, 12-Hour SCS Storm)} \\ d = \text{depth of permanent pool (forebay)} \\ V_f = \text{desired final velocity} \end{array}$$

$$\begin{array}{ll} \text{Input:} & Q = 8.131 \text{ m}^3/\text{s} \\ & d = 2.0 \text{ m} \\ & V_f = 0.5 \text{ m/s} \end{array}$$

$$L_{\min} = 65.05 \text{ m}$$

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	65.05 m	
Length of Forebay Provided	94.00 m	(at elevation 93.2 m)

#### **Average Forebay Velocity**

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{\text{avg}} = \frac{Q}{d W_{\text{avg}}} \quad \text{where:} \quad \begin{array}{l} Q = \text{Inlet flowrate (10-Year, 12-Hour SCS Storm)} \\ d = \text{depth of pond during peak 10-year inflow (6h:15min)} \\ W_{\text{avg}} = \text{average width of forebay} \end{array}$$

$$\begin{array}{ll} \text{Input:} & Q = 8.131 \text{ m}^3/\text{s} \\ & d = 3.0 \text{ m} \\ & W_{\text{avg}} = 16 \text{ m} \quad (10 \text{ m bottom, } 22 \text{ m permanent pool}) \end{array}$$

$$V = 0.17 \text{ m/s} < 0.15 \text{ m/s}$$

Figure B-1: 10-Year, 12-Hour SCS Design Storm Outflows from Pond 4

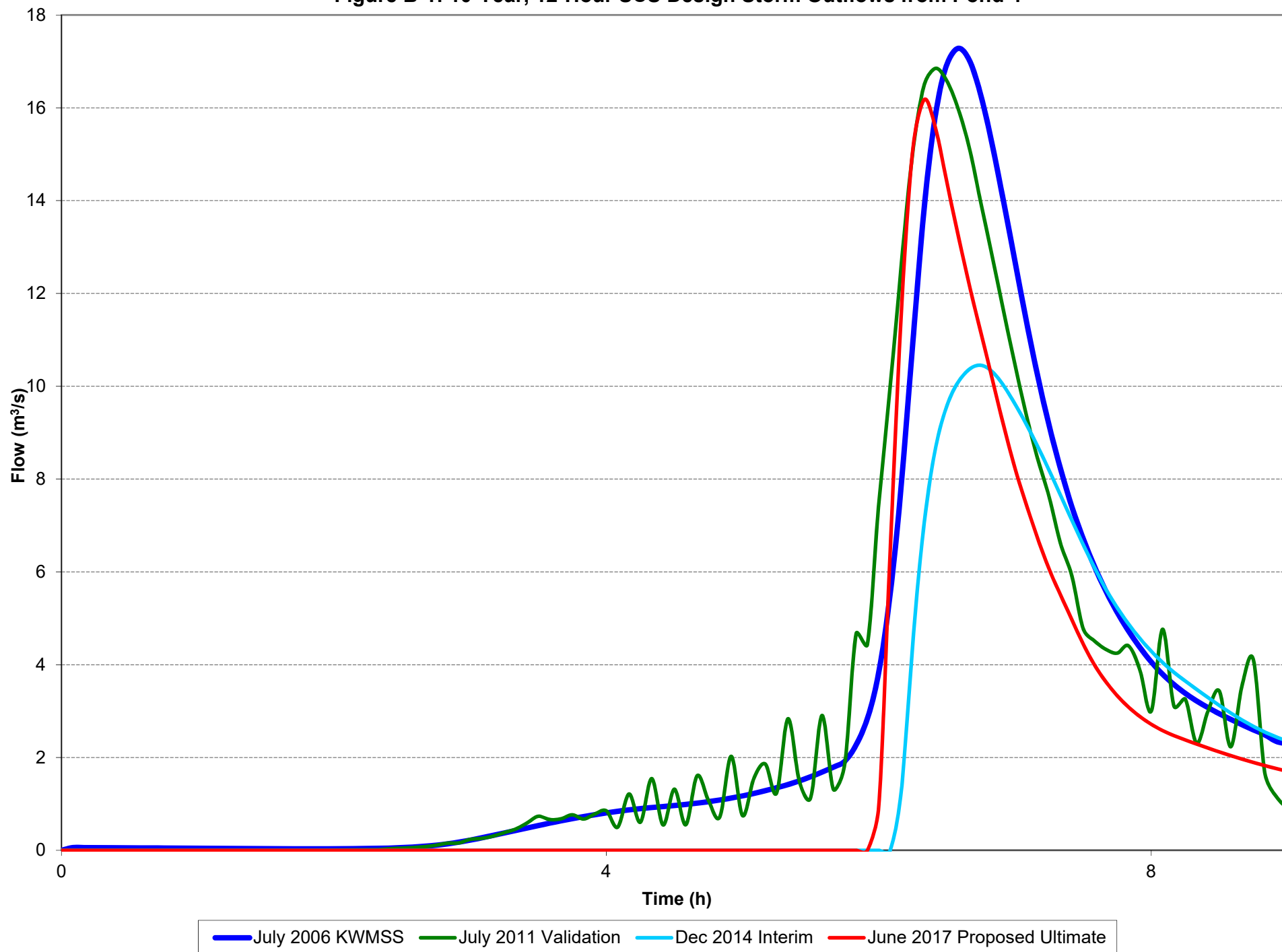
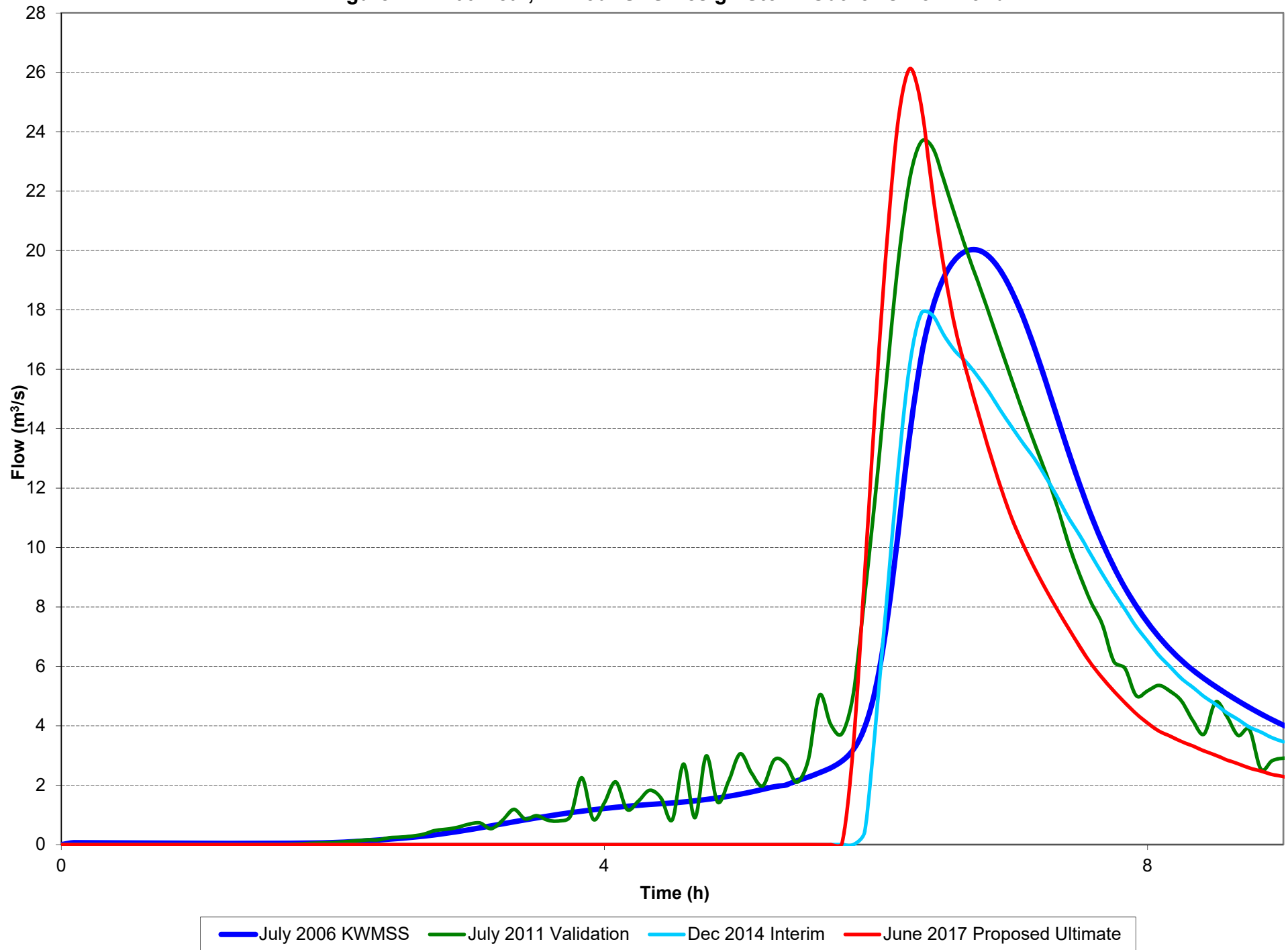


Figure B-2: 100-Year, 12-Hour SCS Design Storm Outflows from Pond 4



# ATTACHMENT

# C

## Comparison of 2- to 100-Year Water Levels and Flows at Key Points on the Carp River and Feedmill Creek

**JFSA**

Water Resources and  
Environmental Consultants



J.F. Sabourin and Associates Inc.  
Water Resources and  
Environmental Consultants

Kanata West Ponds 4 and 7  
Impact of Proposed Changes on Carp River Model

**Table C-1A: 2-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario A**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	3.83	93.68	3.82	93.69	0.00	0.01
Near Fernbank Pond 2 Outfall	CJ200	5.75	93.64	5.74	93.64	-0.01	0.00
Hazeldean Road	CJ199	5.64	93.61	5.64	93.62	-0.01	0.01
Maple Grove Road	CJ172	5.42	93.44	5.02	93.45	-0.40	0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	26.74	93.38	26.23	93.38	-0.50	0.00
Highway 417	CJ120	11.42	93.10	11.39	93.11	-0.03	0.01
Feedmill Creek	CJ106	14.56	92.88	14.66	92.89	0.10	0.01
Richardson Side Road	CJ050	13.03	92.58	13.27	92.59	0.25	0.01
Huntmar Drive	CJ032	14.79	91.73	15.07	91.74	0.27	0.01
Downstream of Eco Woods Pond	FJ105	0.51	117.52	0.51	117.52	0.00	0.00
Upstream of Overland Drive	FJ094	0.98	113.35	0.98	113.35	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.64	110.46	0.64	110.46	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	0.81	110.30	0.81	110.30	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	0.80	110.28	0.80	110.28	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.00	106.81	1.00	106.81	0.00	0.00
Existing major system spill point (Interim model)	FJ073	1.00	106.73	1.00	106.73	0.00	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	0.99	106.52	0.99	106.52	0.00	0.00
Upstream of Highway 417*	FJ063	2.09	105.37	2.09	105.37	0.00	0.00
Downstream of Highway 417	FJ062	1.96	105.33	1.96	105.33	0.00	0.00
Upstream of Palladium Dr.	FJ038	3.37	99.62	3.55	99.66	0.18	0.04
Upstream of 417 on-ramp	FJ034	3.35	98.77	3.51	98.81	0.17	0.04
Upstream of 417 off-ramp	FJ032	3.33	98.69	3.50	98.73	0.17	0.04
Upstream of Tanger access road	FJ027	3.34	97.46	3.46	97.48	0.12	0.02
Upstream of Huntmar Drive	FJ019	4.49	96.89	4.65	96.91	0.16	0.02
Between Huntmar Drive and the Carp River	FJ007	4.45	94.46	4.62	94.48	0.17	0.02

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design; 16.5 ha MTO lands developed at 30% imp. and draining directly to Feedmill Creek as under existing conditions.

**Table C-1B: 5-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario A**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	5.50	93.88	5.49	93.89	-0.01	0.01
Near Fernbank Pond 2 Outfall	CJ200	8.70	93.84	8.69	93.84	-0.01	0.00
Hazeldean Road	CJ199	8.51	93.82	8.49	93.82	-0.01	0.00
Maple Grove Road	CJ172	8.91	93.66	9.17	93.66	0.26	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	44.85	93.62	44.67	93.62	-0.18	0.00
Highway 417	CJ120	17.14	93.39	17.03	93.39	-0.11	0.00
Feedmill Creek	CJ106	22.41	93.15	22.45	93.16	0.04	0.01
Richardson Side Road	CJ050	20.24	92.85	20.38	92.86	0.14	0.01
Huntmar Drive	CJ032	24.34	92.05	24.49	92.06	0.15	0.01
Downstream of Eco Woods Pond	FJ105	0.66	117.59	0.66	117.59	0.00	0.00
Upstream of Overland Drive	FJ094	1.21	113.40	1.21	113.40	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.82	110.55	0.82	110.55	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.18	110.46	1.18	110.46	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.18	110.44	1.18	110.44	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.51	106.86	1.50	106.86	-0.01	0.00
Existing major system spill point (Interim model)	FJ073	1.50	106.84	1.49	106.83	-0.01	-0.01
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	1.52	106.61	1.51	106.61	-0.01	0.00
Upstream of Highway 417*	FJ063	2.75	105.56	2.75	105.56	0.00	0.00
Downstream of Highway 417	FJ062	2.68	105.49	2.68	105.49	0.00	0.00
Upstream of Palladium Dr.	FJ038	5.53	100.01	5.85	100.07	0.31	0.06
Upstream of 417 on-ramp	FJ034	5.40	99.26	5.84	99.32	0.44	0.06
Upstream of 417 off-ramp	FJ032	5.37	99.15	5.90	99.19	0.53	0.04
Upstream of Tanger access road	FJ027	5.86	97.76	6.51	97.81	0.65	0.05
Upstream of Huntmar Drive	FJ019	7.19	97.16	7.82	97.22	0.62	0.06
Between Huntmar Drive and the Carp River	FJ007	6.99	94.77	7.21	94.88	0.22	0.11

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design; 16.5 ha MTO lands developed at 30% imp. and draining directly to Feedmill Creek as under existing conditions.

**Table C-1C: 10-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario A**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	6.44	94.00	6.43	94.00	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	10.49	93.96	10.47	93.97	-0.02	0.01
Hazeldean Road	CJ199	10.21	93.95	10.20	93.95	-0.01	0.00
Maple Grove Road	CJ172	11.79	93.80	11.89	93.80	0.10	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	51.08	93.76	52.52	93.75	1.44	-0.01
Highway 417	CJ120	21.23	93.55	21.03	93.55	-0.21	0.00
Feedmill Creek	CJ106	27.92	93.29	27.93	93.29	0.01	0.00
Richardson Side Road	CJ050	24.99	93.03	25.22	93.04	0.23	0.01
Huntmar Drive	CJ032	31.03	92.23	31.29	92.24	0.26	0.01
Downstream of Eco Woods Pond	FJ105	0.78	117.64	0.78	117.64	0.00	0.00
Upstream of Overland Drive	FJ094	1.29	113.41	1.29	113.41	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.91	110.64	0.91	110.64	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.50	110.57	1.50	110.57	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.50	110.55	1.50	110.55	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.94	106.96	1.92	106.96	-0.02	0.00
Existing major system spill point (Interim model)	FJ073	1.93	106.94	1.92	106.94	-0.01	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	1.97	106.66	1.95	106.66	-0.02	0.00
Upstream of Highway 417*	FJ063	3.23	105.71	3.24	105.71	0.00	0.00
Downstream of Highway 417	FJ062	3.22	105.59	3.20	105.59	-0.02	0.00
Upstream of Palladium Dr.	FJ038	7.26	100.29	7.67	100.36	0.41	0.07
Upstream of 417 on-ramp	FJ034	7.27	99.49	7.60	99.53	0.33	0.04
Upstream of 417 off-ramp	FJ032	7.29	99.29	7.60	99.31	0.31	0.02
Upstream of Tanger access road	FJ027	7.59	97.91	7.82	97.94	0.23	0.03
Upstream of Huntmar Drive	FJ019	9.09	97.37	9.48	97.42	0.40	0.05
Between Huntmar Drive and the Carp River	FJ007	8.70	94.96	9.22	94.98	0.52	0.02

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design; 16.5 ha MTO lands developed at 30% imp. and draining directly to Feedmill Creek as under existing conditions.

**Table C-1D: 25-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario A**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	7.35	94.14	7.33	94.14	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	12.59	94.11	12.56	94.11	-0.03	0.00
Hazeldean Road	CJ199	12.08	94.10	12.08	94.10	0.00	0.00
Maple Grove Road	CJ172	13.94	93.96	13.88	93.96	-0.06	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	51.57	93.91	51.50	93.91	-0.06	0.00
Highway 417	CJ120	26.08	93.73	25.74	93.73	-0.34	0.00
Feedmill Creek	CJ106	34.65	93.46	34.63	93.46	-0.02	0.00
Richardson Side Road	CJ050	32.80	93.18	32.94	93.18	0.14	0.00
Huntmar Drive	CJ032	40.77	92.47	40.97	92.47	0.20	0.00
Downstream of Eco Woods Pond	FJ105	1.01	117.73	1.01	117.73	0.00	0.00
Upstream of Overland Drive	FJ094	1.28	113.42	1.28	113.42	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.18	110.77	1.18	110.77	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.96	110.72	1.96	110.72	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.96	110.70	1.96	110.70	0.00	0.00
Downstream of future Expansion Area 3	FJ074	2.53	107.02	2.51	107.02	-0.02	0.00
Existing major system spill point (Interim model)	FJ073	2.53	107.00	2.51	107.00	-0.02	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	2.59	106.74	2.56	106.73	-0.02	-0.01
Upstream of Highway 417*	FJ063	4.03	105.92	4.00	105.92	-0.03	0.00
Downstream of Highway 417	FJ062	4.04	105.75	4.01	105.76	-0.03	0.01
Upstream of Palladium Dr.	FJ038	9.65	100.64	10.18	100.71	0.53	0.07
Upstream of 417 on-ramp	FJ034	9.40	99.85	9.86	99.94	0.46	0.09
Upstream of 417 off-ramp	FJ032	9.39	99.53	9.85	99.58	0.46	0.05
Upstream of Tanger access road	FJ027	9.55	98.10	10.01	98.15	0.46	0.05
Upstream of Huntmar Drive	FJ019	11.51	97.63	11.90	97.69	0.39	0.06
Between Huntmar Drive and the Carp River	FJ007	11.34	95.10	11.88	95.14	0.54	0.04

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design; 16.5 ha MTO lands developed at 30% imp. and draining directly to Feedmill Creek as under existing conditions.

**Table C-1E: 50-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario A**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	7.91	94.23	7.90	94.23	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	14.09	94.21	14.00	94.21	-0.09	0.00
Hazeldean Road	CJ199	13.34	94.20	13.31	94.20	-0.03	0.00
Maple Grove Road	CJ172	15.25	94.07	14.94	94.06	-0.31	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	51.23	94.03	51.02	94.02	-0.22	-0.01
Highway 417	CJ120	29.34	93.84	28.94	93.84	-0.40	0.00
Feedmill Creek	CJ106	39.21	93.55	39.18	93.55	-0.03	0.00
Richardson Side Road	CJ050	37.36	93.29	37.44	93.29	0.08	0.00
Huntmar Drive	CJ032	47.28	92.62	47.45	92.63	0.17	0.01
Downstream of Eco Woods Pond	FJ105	1.20	117.79	1.20	117.79	0.00	0.00
Upstream of Overland Drive	FJ094	1.16	113.44	1.16	113.44	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.53	110.86	1.53	110.86	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	2.26	110.82	2.26	110.82	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	2.26	110.79	2.26	110.79	0.00	0.00
Downstream of future Expansion Area 3	FJ074	2.93	107.05	2.90	107.05	-0.03	0.00
Existing major system spill point (Interim model)	FJ073	2.92	107.04	2.89	107.03	-0.03	-0.01
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	2.99	106.79	2.96	106.79	-0.03	0.00
Upstream of Highway 417*	FJ063	4.59	106.08	4.56	106.08	-0.03	0.00
Downstream of Highway 417	FJ062	4.61	105.86	4.58	105.86	-0.03	0.00
Upstream of Palladium Dr.	FJ038	11.07	100.84	11.61	100.98	0.54	0.14
Upstream of 417 on-ramp	FJ034	10.80	100.12	11.22	100.21	0.42	0.09
Upstream of 417 off-ramp	FJ032	10.80	99.70	11.22	99.76	0.42	0.06
Upstream of Tanger access road	FJ027	10.96	98.23	11.38	98.27	0.42	0.04
Upstream of Huntmar Drive	FJ019	12.78	97.79	13.31	97.85	0.53	0.06
Between Huntmar Drive and the Carp River	FJ007	12.92	95.16	13.44	95.17	0.52	0.01

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design; 16.5 ha MTO lands developed at 30% imp. and draining directly to Feedmill Creek as under existing conditions.

**Table C-1F: 100-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario A**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	8.52	94.33	8.48	94.32	-0.04	-0.01
Near Fernbank Pond 2 Outfall	CJ200	14.98	94.31	14.84	94.30	-0.14	-0.01
Hazeldean Road	CJ199	13.99	94.30	13.97	94.30	-0.02	0.00
Maple Grove Road	CJ172	16.63	94.19	16.29	94.17	-0.34	-0.02
Palladium Drive (Near Pond 4 Outfall)	CJ150	52.51	94.15	50.63	94.13	-1.88	-0.02
Highway 417	CJ120	32.49	93.97	31.91	93.97	-0.59	0.00
Feedmill Creek	CJ106	44.17	93.68	44.05	93.68	-0.12	0.00
Richardson Side Road	CJ050	43.35	93.46	43.34	93.46	-0.01	0.00
Huntmar Drive	CJ032	62.01	93.10	57.09	93.10	-4.93	0.00
Downstream of Eco Woods Pond	FJ105	1.46	117.87	1.46	117.87	0.00	0.00
Upstream of Overland Drive	FJ094	1.72	113.57	1.71	113.57	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.88	110.94	1.88	110.94	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	2.51	110.91	2.51	110.91	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	2.50	110.88	2.50	110.88	0.00	0.00
Downstream of future Expansion Area 3	FJ074	3.28	107.08	3.24	107.08	-0.04	0.00
Existing major system spill point (Interim model)	FJ073	3.27	107.06	3.24	107.06	-0.04	0.00
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	3.35	106.83	3.31	106.82	-0.04	-0.01
Upstream of Highway 417*	FJ063	5.18	106.15	5.14	106.14	-0.04	-0.01
Downstream of Highway 417	FJ062	5.19	105.94	5.16	105.94	-0.04	0.00
Upstream of Palladium Dr.	FJ038	12.02	101.17	12.47	101.31	0.45	0.14
Upstream of 417 on-ramp	FJ034	11.84	100.34	12.29	100.44	0.45	0.10
Upstream of 417 off-ramp	FJ032	11.84	99.84	12.29	99.90	0.45	0.06
Upstream of Tanger access road	FJ027	12.01	98.32	12.45	98.37	0.45	0.05
Upstream of Huntmar Drive	FJ019	13.85	97.91	14.48	97.98	0.63	0.07
Between Huntmar Drive and the Carp River	FJ007	14.04	95.19	14.61	95.20	0.57	0.01

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design; 16.5 ha MTO lands developed at 30% imp. and draining directly to Feedmill Creek as under existing conditions.

**Table C-2A: 2-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario B**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	3.83	93.68	3.82	93.69	0.00	0.01
Near Fernbank Pond 2 Outfall	CJ200	5.75	93.64	5.74	93.64	-0.01	0.00
Hazeldean Road	CJ199	5.64	93.61	5.64	93.62	-0.01	0.01
Maple Grove Road	CJ172	5.42	93.44	6.31	93.46	0.89	0.02
Palladium Drive (Near Pond 4 Outfall)	CJ150	26.74	93.38	25.91	93.38	-0.83	0.00
Highway 417	CJ120	11.42	93.10	11.36	93.11	-0.06	0.01
Feedmill Creek	CJ106	14.56	92.88	14.53	92.89	-0.03	0.01
Richardson Side Road	CJ050	13.03	92.58	13.18	92.58	0.15	0.00
Huntmar Drive	CJ032	14.79	91.73	14.99	91.73	0.20	0.00
Downstream of Eco Woods Pond	FJ105	0.51	117.52	0.51	117.52	0.00	0.00
Upstream of Overland Drive	FJ094	0.98	113.35	0.98	113.35	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.64	110.46	0.64	110.46	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	0.81	110.30	0.81	110.30	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	0.80	110.28	0.80	110.28	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.00	106.81	0.95	106.80	-0.04	-0.01
Existing major system spill point (Interim model)	FJ073	1.00	106.73	0.95	106.71	-0.04	-0.02
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	0.99	106.52	0.95	106.50	-0.04	-0.02
Upstream of Highway 417*	FJ063	2.09	105.37	2.09	105.37	0.00	0.00
Downstream of Highway 417	FJ062	1.96	105.33	1.96	105.33	0.00	0.00
Upstream of Palladium Dr.	FJ038	3.37	99.62	3.47	99.64	0.10	0.02
Upstream of 417 on-ramp	FJ034	3.35	98.77	3.45	98.79	0.10	0.02
Upstream of 417 off-ramp	FJ032	3.33	98.69	3.43	98.71	0.10	0.02
Upstream of Tanger access road	FJ027	3.34	97.46	3.44	97.47	0.10	0.01
Upstream of Huntmar Drive	FJ019	4.49	96.89	4.60	96.90	0.11	0.01
Between Huntmar Drive and the Carp River	FJ007	4.45	94.46	4.56	94.47	0.11	0.01

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design.

**Table C-2B: 5-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario B**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	5.50	93.88	5.49	93.88	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	8.70	93.84	8.69	93.84	-0.01	0.00
Hazeldean Road	CJ199	8.51	93.82	8.50	93.82	-0.01	0.00
Maple Grove Road	CJ172	8.91	93.66	9.33	93.66	0.43	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	44.85	93.62	44.50	93.61	-0.35	-0.01
Highway 417	CJ120	17.14	93.39	17.03	93.39	-0.11	0.00
Feedmill Creek	CJ106	22.41	93.15	22.30	93.15	-0.10	0.00
Richardson Side Road	CJ050	20.24	92.85	20.28	92.85	0.04	0.00
Huntmar Drive	CJ032	24.34	92.05	24.43	92.06	0.09	0.01
Downstream of Eco Woods Pond	FJ105	0.66	117.59	0.66	117.59	0.00	0.00
Upstream of Overland Drive	FJ094	1.21	113.40	1.21	113.40	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.82	110.55	0.82	110.55	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.18	110.46	1.18	110.46	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.18	110.44	1.18	110.44	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.51	106.86	1.43	106.85	-0.07	-0.01
Existing major system spill point (Interim model)	FJ073	1.50	106.84	1.43	106.82	-0.07	-0.02
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	1.52	106.61	1.45	106.60	-0.07	-0.01
Upstream of Highway 417*	FJ063	2.75	105.56	2.75	105.56	0.00	0.00
Downstream of Highway 417	FJ062	2.68	105.49	2.68	105.49	0.00	0.00
Upstream of Palladium Dr.	FJ038	5.53	100.01	5.69	100.04	0.16	0.03
Upstream of 417 on-ramp	FJ034	5.40	99.26	5.60	99.29	0.21	0.03
Upstream of 417 off-ramp	FJ032	5.37	99.15	5.67	99.17	0.30	0.02
Upstream of Tanger access road	FJ027	5.86	97.76	6.29	97.79	0.43	0.03
Upstream of Huntmar Drive	FJ019	7.19	97.16	7.60	97.20	0.41	0.04
Between Huntmar Drive and the Carp River	FJ007	6.99	94.77	7.09	94.87	0.10	0.10

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design.

**Table C-2C: 10-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario B**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	6.44	94.00	6.43	94.00	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	10.49	93.96	10.47	93.97	-0.01	0.01
Hazeldean Road	CJ199	10.21	93.95	10.21	93.95	-0.01	0.00
Maple Grove Road	CJ172	11.79	93.80	11.61	93.80	-0.17	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	51.08	93.76	51.56	93.75	0.48	-0.01
Highway 417	CJ120	21.23	93.55	21.08	93.55	-0.16	0.00
Feedmill Creek	CJ106	27.92	93.29	27.72	93.29	-0.20	0.00
Richardson Side Road	CJ050	24.99	93.03	25.01	93.03	0.02	0.00
Huntmar Drive	CJ032	31.03	92.23	31.11	92.24	0.08	0.01
Downstream of Eco Woods Pond	FJ105	0.78	117.64	0.78	117.64	0.00	0.00
Upstream of Overland Drive	FJ094	1.29	113.41	1.29	113.41	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	0.91	110.64	0.91	110.64	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.50	110.57	1.50	110.57	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.50	110.55	1.50	110.55	0.00	0.00
Downstream of future Expansion Area 3	FJ074	1.94	106.96	1.84	106.95	-0.10	-0.01
Existing major system spill point (Interim model)	FJ073	1.93	106.94	1.82	106.93	-0.11	-0.01
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	1.97	106.66	1.84	106.65	-0.12	-0.01
Upstream of Highway 417*	FJ063	3.23	105.71	3.23	105.71	0.00	0.00
Downstream of Highway 417	FJ062	3.22	105.59	3.12	105.59	-0.10	0.00
Upstream of Palladium Dr.	FJ038	7.26	100.29	7.45	100.32	0.20	0.03
Upstream of 417 on-ramp	FJ034	7.27	99.49	7.43	99.50	0.16	0.01
Upstream of 417 off-ramp	FJ032	7.29	99.29	7.43	99.29	0.14	0.00
Upstream of Tanger access road	FJ027	7.59	97.91	7.72	97.93	0.12	0.02
Upstream of Huntmar Drive	FJ019	9.09	97.37	9.28	97.39	0.20	0.02
Between Huntmar Drive and the Carp River	FJ007	8.70	94.96	8.95	94.97	0.25	0.01

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design.

**Table C-2D: 25-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario B**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	7.35	94.14	7.33	94.14	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	12.59	94.11	12.56	94.11	-0.03	0.00
Hazeldean Road	CJ199	12.08	94.10	12.09	94.10	0.01	0.00
Maple Grove Road	CJ172	13.94	93.96	13.54	93.96	-0.40	0.00
Palladium Drive (Near Pond 4 Outfall)	CJ150	51.57	93.91	52.23	93.91	0.67	0.00
Highway 417	CJ120	26.08	93.73	25.73	93.73	-0.35	0.00
Feedmill Creek	CJ106	34.65	93.46	34.32	93.45	-0.32	-0.01
Richardson Side Road	CJ050	32.80	93.18	32.68	93.18	-0.12	0.00
Huntmar Drive	CJ032	40.77	92.47	40.76	92.47	-0.01	0.00
Downstream of Eco Woods Pond	FJ105	1.01	117.73	1.01	117.73	0.00	0.00
Upstream of Overland Drive	FJ094	1.28	113.42	1.28	113.42	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.18	110.77	1.18	110.77	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	1.96	110.72	1.96	110.72	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	1.96	110.70	1.96	110.70	0.00	0.00
Downstream of future Expansion Area 3	FJ074	2.53	107.02	2.41	107.01	-0.13	-0.01
Existing major system spill point (Interim model)	FJ073	2.53	107.00	2.40	106.99	-0.13	-0.01
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	2.59	106.74	2.46	106.72	-0.13	-0.02
Upstream of Highway 417*	FJ063	4.03	105.92	3.92	105.92	-0.11	0.00
Downstream of Highway 417	FJ062	4.04	105.75	3.90	105.75	-0.13	0.00
Upstream of Palladium Dr.	FJ038	9.65	100.64	9.89	100.67	0.24	0.03
Upstream of 417 on-ramp	FJ034	9.40	99.85	9.59	99.89	0.19	0.04
Upstream of 417 off-ramp	FJ032	9.39	99.53	9.59	99.55	0.19	0.02
Upstream of Tanger access road	FJ027	9.55	98.10	9.74	98.12	0.19	0.02
Upstream of Huntmar Drive	FJ019	11.51	97.63	11.64	97.66	0.13	0.03
Between Huntmar Drive and the Carp River	FJ007	11.34	95.10	11.62	95.12	0.28	0.02

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design.

**Table C-2E: 50-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario B**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	7.91	94.23	7.90	94.23	-0.01	0.00
Near Fernbank Pond 2 Outfall	CJ200	14.09	94.21	14.00	94.20	-0.09	-0.01
Hazeldean Road	CJ199	13.34	94.20	13.31	94.19	-0.03	-0.01
Maple Grove Road	CJ172	15.25	94.07	15.12	94.06	-0.13	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	51.23	94.03	52.00	94.02	0.77	-0.01
Highway 417	CJ120	29.34	93.84	28.95	93.84	-0.39	0.00
Feedmill Creek	CJ106	39.21	93.55	38.84	93.55	-0.37	0.00
Richardson Side Road	CJ050	37.36	93.29	37.23	93.28	-0.13	-0.01
Huntmar Drive	CJ032	47.28	92.62	47.25	92.62	-0.03	0.00
Downstream of Eco Woods Pond	FJ105	1.20	117.79	1.20	117.79	0.00	0.00
Upstream of Overland Drive	FJ094	1.16	113.44	1.16	113.44	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.53	110.86	1.53	110.86	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	2.26	110.82	2.26	110.82	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	2.26	110.79	2.26	110.79	0.00	0.00
Downstream of future Expansion Area 3	FJ074	2.93	107.05	2.78	107.04	-0.15	-0.01
Existing major system spill point (Interim model)	FJ073	2.92	107.04	2.78	107.02	-0.15	-0.02
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	2.99	106.79	2.84	106.77	-0.15	-0.02
Upstream of Highway 417*	FJ063	4.59	106.08	4.48	106.08	-0.11	0.00
Downstream of Highway 417	FJ062	4.61	105.86	4.46	105.86	-0.15	0.00
Upstream of Palladium Dr.	FJ038	11.07	100.84	11.30	100.90	0.24	0.06
Upstream of 417 on-ramp	FJ034	10.80	100.12	10.96	100.16	0.16	0.04
Upstream of 417 off-ramp	FJ032	10.80	99.70	10.96	99.72	0.16	0.02
Upstream of Tanger access road	FJ027	10.96	98.23	11.12	98.25	0.16	0.02
Upstream of Huntmar Drive	FJ019	12.78	97.79	13.03	97.82	0.25	0.03
Between Huntmar Drive and the Carp River	FJ007	12.92	95.16	13.17	95.16	0.25	0.00

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design.

**Table C-2F: 100-Year 12-Hour SCS Type II Storm Water Levels and Flows on the Carp River and Feedmill Creek Under Ultimate Scenario B**

Location on Carp River (CJ) or Feedmill Creek (FJ)	PCSWMM Node	Original March 2016 <sup>(1)</sup>		KWMSS Pond 4/7 Update <sup>(2)</sup>		Difference	
		Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)	Flow (m <sup>3</sup> /s)	Water Level (m)
Near Fernbank Pond 3 Outfall	CJ201	8.52	94.33	8.48	94.32	-0.04	-0.01
Near Fernbank Pond 2 Outfall	CJ200	14.98	94.31	14.84	94.31	-0.14	0.00
Hazeldean Road	CJ199	13.99	94.30	13.98	94.30	-0.01	0.00
Maple Grove Road	CJ172	16.63	94.19	16.57	94.18	-0.05	-0.01
Palladium Drive (Near Pond 4 Outfall)	CJ150	52.51	94.15	50.80	94.14	-1.71	-0.01
Highway 417	CJ120	32.49	93.97	32.08	93.96	-0.41	-0.01
Feedmill Creek	CJ106	44.17	93.68	43.72	93.68	-0.44	0.00
Richardson Side Road	CJ050	43.35	93.46	43.11	93.45	-0.24	-0.01
Huntmar Drive	CJ032	62.01	93.10	57.44	93.10	-4.58	0.00
Downstream of Eco Woods Pond	FJ105	1.46	117.87	1.46	117.87	0.00	0.00
Upstream of Overland Drive	FJ094	1.72	113.57	1.72	113.57	0.00	0.00
Upstream of Maple Grove open road allowance	FJ088	1.88	110.94	1.87	110.94	0.00	0.00
Downstream of Maple Grove open road allowance	FJ087	2.51	110.91	2.51	110.91	0.00	0.00
Adjacent to future Expansion Area 3	FJ085	2.50	110.88	2.50	110.88	0.00	0.00
Downstream of future Expansion Area 3	FJ074	3.28	107.08	3.11	107.07	-0.17	-0.01
Existing major system spill point (Interim model)	FJ073	3.27	107.06	3.11	107.05	-0.17	-0.01
Upstream of rural crossing, adjacent to Pond 7 area	FJ071	3.35	106.83	3.18	106.81	-0.17	-0.02
Upstream of Highway 417*	FJ063	5.18	106.15	5.08	106.14	-0.09	-0.01
Downstream of Highway 417	FJ062	5.19	105.94	5.00	105.94	-0.20	0.00
Upstream of Palladium Dr.	FJ038	12.02	101.17	12.18	101.22	0.17	0.05
Upstream of 417 on-ramp	FJ034	11.84	100.34	11.98	100.37	0.14	0.03
Upstream of 417 off-ramp	FJ032	11.84	99.84	11.98	99.86	0.14	0.02
Upstream of Tanger access road	FJ027	12.01	98.32	12.15	98.34	0.15	0.02
Upstream of Huntmar Drive	FJ019	13.85	97.91	14.14	97.95	0.28	0.04
Between Huntmar Drive and the Carp River	FJ007	14.04	95.19	14.31	95.20	0.27	0.01

<sup>(1)</sup> As per ultimate conditions Carp River PCSWMM model provided by the City of Ottawa, dated February 2017.

<sup>(2)</sup> Modified to reflect revised Kanata West Pond 4 and 7 drainage area and design.