



September 26, 2018

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Attention: Jennifer Ailey, P.Eng.

**Subject: Summerside West Phase 4 / Comparison of 100-Year Maximum Water Levels in the
Avalon West Stormwater Management Pond**

our file: 1102-13

As requested by your office, we have summarized below the maximum water levels in the Avalon West Stormwater Management (SWM) Pond during the 100-Year 24-Hour SCS Type II design storm, as reported over the history of the pond design. Table 1 inserted at the end of this memo summarizes the maximum 100-year water levels in the existing pond, and Table 2 summarizes the maximum 100-year water levels in the expanded pond proposed to accommodate the Summerside West Phase 4 development. Further discussion of the information presented in Tables 1 and 2 is below.

The maximum 100-year water level reported for the existing pond is 84.65 m, as per the November 2014 *Update to Avalon West Stormwater Management Facility Design Report: Proposed Mattamy Bisson Lands* memo by IBI Group. This 100-year water level was generally maintained in subsequent reports up to the December 2016 reports documented in Table 1, where the 100-year water level is 84.64 m. The approved Summerside West Phases 1-3 developments and the emergency overflow from the 10th Line sanitary pumping station were designed with respect to this 100-year pond level. It is our understanding that this was also the case for the Avalon West subdivision designed by IBI Group, based on their documentation in the November 2014 memo.

The recent May 2018 *Avalon West SWM Facility Model Update and Confirmation of Tailwater Boundary Condition* memo was prepared by IBI Group, and at the request of City staff, incorporated the detailed design of the Avalon West subdivision into the overall model of the existing Avalon West SWM facility and Summerside West Phases 1-3 (previous versions included only high-level modelling of the Avalon West subdivision). Based on this change and a couple other modifications documented in the May 2018 memo, the updated 100-year water level in the existing pond was reported as 84.54 m. An updated version of this detailed modelling was provided by IBI Group on September 6, 2018, and incorporated into the latest JFSA modelling of Summerside West Phases 1-3, for an updated 100-year water level of 84.50 m in the existing pond. Please note that up to this point, boundary conditions at the pond outlet had been modelled using stage-time relationship developed by IBI Group through iterative input of pond outflows into McKinnon's Creek SWMHYMO / HEC-RAS model. In the September 2018 model, JFSA instead modelled boundary conditions at the pond outlet by import of the HEC-RAS model of McKinnon's Creek submitted with the May 2018 memo into the XPSWMM model of the pond and subdivisions, in order to model the interaction between the pond and the downstream creek dynamically rather than iteratively.

An expansion of the existing Avalon West SWM Facility is proposed to accommodate future Summerside West Phase 4 development in the December 2017 *Mer Bleue Urban Expansion Area 10, Master Servicing Study* by IBI Group. The proposed expansion encroaches on the existing McKinnon's Creek corridor, and results in a 100-year pond level of 84.43 m. Note that the Master Servicing Study modelling made use of the iterative approach to boundary conditions described above, and included high-level modelling of the Avalon West subdivision rather than the detailed modelling put together in May 2018 and September 2018.

In July 2018, DSEL and JFSA proposed a pond expansion that did not encroach on McKinnon's Creek, and reported a 100-year water level of 84.63 m in the July 2018 *Summerside West Phase 4 / Avalon West Stormwater Management Pond Expansion* memo by JFSA. This 100-year water level was targeted based on the 100-year water levels reported for the existing pond between November 2014 and December 2016, as described above. Note that this modelling again used only high-level modelling of the Avalon West subdivision, but did model boundary conditions at the pond outlet dynamically based on import of McKinnon's Creek HEC-RAS modelling into the XPSWMM model of the pond and subdivisions. An updated version of the detailed modelling of the Avalon West subdivision was provided by IBI Group on September 6, 2018, and incorporated into the latest JFSA modelling of Summerside West Phases 1-4 (including detailed design of Summerside West Phase 4). The updated 100-year pond level in the expanded Avalon West SWM facility was simulated as 84.47 m based on this modelling, as documented in the September 2018 *Summerside West Phase 4 / Avalon West Stormwater Management Pond Expansion* memo by JFSA. Note that this pond level is lower than both the the 100-year water levels reported for the existing pond between November 2014 and December 2016, and the latest 100-year water level of 84.50 m estimated for the existing pond.

Two alternative pond expansion scenarios are also documented in Table 2. If the proposed pond expansion is permitted to encroach into McKinnon's Creek, the 100-year pond level would lower to 84.35 m. Alternatively, if Summerside West Phase 4 is instead serviced by an independent SWM facility, the latest 100-year water level of 84.50 m estimated for the existing pond would stand.

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

Table 1: Reported 100-Year Water Levels in the Existing Avalon West Stormwater Management Pond during the 100-Year 24-Hour SCS Type II design storm

100-Year Pond Level (m)	Date	Source	Brief Description	Additional Notes
84.56	October 2013	"Avalon West (Neighbourhood 5) Stormwater Management Facility Design" report by IBI Group	Designed to service Avalon West subdivision - approximately 194.28 ha at 57% imperviousness	Avalon West modelled at semi-lumped catchments to trunk sewers; Boundary conditions at pond outlet modelled as stage-time relationship developed by iterative input of pond outflows into McKinnon's Creek SWMHYMO / HEC-RAS model
84.65	November 2014	"Update to Avalon West Stormwater Management Facility Design Report: Proposed Mattamy Bisson Lands" memo by IBI Group	Designed to service Avalon West and Summerside West Phases 1-3 subdivisions - approximately 329.54 ha at 40% imperviousness (includes temporary 103.4 ha from rural Area 1)	Avalon West and Summerside West Phases 1-3 modelled at semi-lumped catchments to trunk sewers; Boundary conditions at pond outlet modelled as stage-time relationship developed by iterative input of pond outflows into McKinnon's Creek SWMHYMO / HEC-RAS model
84.64	December 2016	"Stormwater Management Report for Summerside West Phases 2 and 3" by JFSA	Designed to service Avalon West and Summerside West Phases 1-3 subdivisions - approximately 238.30 ha at 53% imperviousness (includes temporary 11.59 ha from rural Area 1)	Avalon West modelled as semi-lumped catchments to trunk sewers; Summerside West Phases 1-3 modelled per detailed design; Boundary conditions at pond outlet modelled as stage-time relationship developed by iterative input of pond outflows into McKinnon's Creek SWMHYMO / HEC-RAS model
84.64	December 2016	"Addendum to the Sanitary Overflow Analysis (DSEL/JFSA, August 31, 2015) Summerside West - Phase 2" memo by DSEL	As above	As above. This report is relevant in that pond levels define boundary conditions for emergency sanitary overflow for 10th Line Pumping Station
84.54	May 2018	"Avalon West SWM Facility Model Update and Confirmation of Tailwater Boundary Condition" memo by IBI Group	As above	Avalon West and Summerside West Phases 1-3 modelled per detailed design; Boundary conditions at pond outlet modelled as stage-time relationship developed by iterative input of pond outflows into McKinnon's Creek SWMHYMO / HEC-RAS model
84.50	September 2018	Digital modelling files attached ("Current Conditions")	As above	Avalon West modelled per detailed design as provided by IBI Group on September 6, 2018; Summerside West Phases 1-3 modelled per detailed design; Boundary conditions at pond outlet modelled by import of the HEC-RAS model of McKinnon's Creek (with culvert) submitted with the May 18, 2018 "Avalon West SWM Facility Model Update and Confirmation of Tailwater Boundary Condition" memo by IBI Group into the XPSWMM model, in order to model the interaction between the pond and the downstream creek dynamically rather than iteratively

Table 2: Reported 100-Year Water Levels in the Proposed Expanded Avalon West Stormwater Management Pond during the 100-Year 24-Hour SCS Type II design storm

100-Year Pond Level (m)	Date	Source	Brief Description	Additional Notes
84.43	December 2017	"Mer Bleue Urban Expansion Area 10, Master Servicing Study" by IBI Group	Pond expansion encroaches on McKinnon's Creek; Pond expanded to service Avalon West and Summerside West Phases 1-4 subdivisions - approximately 255.77 ha at 55% imperviousness (includes temporary 11.59 ha from rural Area 1)	Avalon West and Summerside West Phase 4 modelled as semi-lumped catchments to trunk sewers; Summerside West Phases 1-3 modelled per detailed design; Boundary conditions at pond outlet modelled as stage-time relationship developed by iterative input of pond outflows into McKinnon's Creek SWMHYMO / HEC-RAS model
84.63	July 2018	"Summerside West Phase 4 / Avalon West Stormwater Management Pond Expansion" memo by JFSA	Pond expansion does not encroach on McKinnon's Creek; Pond expanded to service Avalon West and Summerside West Phases 1-4 subdivisions - approximately 258.70 ha at 54% imperviousness (includes temporary 11.59 ha from rural Area 1)	Avalon West and Summerside West Phase 4 modelled as semi-lumped catchments to trunk sewers; Summerside West Phases 1-3 modelled per detailed design; Boundary conditions at pond outlet modelled by import of the pre-development McKinnon's Creek HEC-RAS model from the December 2017 Master Servicing Study (above) into the XPSWMM model, in order to model the interaction between the pond and the downstream creek dynamically rather than iteratively
84.47	September 2018	"Summerside West Phase 4 / Avalon West Stormwater Management Pond Expansion" memo by JFSA	Pond expansion does not encroach on McKinnon's Creek; Pond expanded to service Avalon West and Summerside West Phases 1-4 subdivisions - approximately 256.19 ha at 54% imperviousness (includes temporary 11.59 ha from rural Area 1)	Avalon West modelled per detailed design as provided by IBI Group on September 6, 2018; Summerside West Phases 1-4 modelled per detailed design; Boundary conditions at pond outlet modelled by import of the HEC-RAS model of McKinnon's Creek (with culvert) submitted with the May 18, 2018 "Avalon West SWM Facility Model Update and Confirmation of Tailwater Boundary Condition" memo by IBI Group into the XPSWMM model, in order to model the interaction between the pond and the downstream creek dynamically rather than iteratively
84.35	September 2018	Digital modelling files attached ("Pond Expansion Alternative")	Alternative wherein the pond expansion encroaches on McKinnon's Creek (similar to December 2017 Master Servicing Study); Pond expanded to service Avalon West and Summerside West Phases 1-4 subdivisions - approximately 256.19 ha at 54% imperviousness (includes temporary 11.59 ha from rural Area 1)	Avalon West modelled per detailed design as provided by IBI Group on September 6, 2018; Summerside West Phases 1-4 modelled per detailed design; Boundary conditions at pond outlet modelled by import of the HEC-RAS model of McKinnon's Creek (with culvert) submitted with the May 18, 2018 "Avalon West SWM Facility Model Update and Confirmation of Tailwater Boundary Condition" memo by IBI Group into the XPSWMM model, in order to model the interaction between the pond and the downstream creek dynamically rather than iteratively
84.50	September 2018	As per September 2018 Existing SWM Facility modelling	Alternative wherein existing SWM Facility remains as is, and Summerside West Phase 4 is serviced by an independent SWM facility	As per September 2018 Existing SWM Facility modelling