August 4, 2021

Laurel McCreight MCIP, RPP
Planner II
Planning Services
Planning, Infrastructure & Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa ON K1P 1J1 sent by email: Kanatalakes@ottawa.ca

Re: Rezoning File #D02-02-19-0123; Subdivision Application #D07-16-19-0026
7000 Campeau Drive
Peer Review for Stormwater Management

Dear Ms. McCreight

I have been retained by the Kanata Greenspace Protection Coalition (KGPC) to conduct a peer review assessment of the Stormwater proposals included in the above applications.

I have been a Professional Engineer in Ontario for 20 years, and the last 16 years of my career has focused on stormwater management systems and riverine processes, with much of my career being at the Mississippi Valley Conservation Authority, providing technical reviews on precisely this kind of development. A copy of my resume is attached to this letter for your reference.

Several concerns are identified within the supporting materials provided by the consultants JFSA, Paterson Group, and DSEL to support the proposed SWM design for this proposal.

1) Design Criteria

There are a number of existing documents which provide the constraints relating to stormwater management for this site. While there are some design criteria identified in earlier versions of the existing reports, in my opinion a concern exists that some of the documents that provide relevant constraints to stormwater management for this site have not been considered. For example, a restrictive covenant on the deed of the property that specifically addresses stormwater management is not listed. The developer should provide the complete list of the constraints obtained during the mandatory pre-consultation for this project.

2) Sensitive Soils

Much of the development is identified as having sensitive fine-grained marine soils (e.g., Leda Clay). As such, changes in the groundwater conditions have a risk of producing unstable soil conditions. While tree restrictions, preloading, and limited grade raise can reduce the risks to future developments, those controls cannot be expected to decrease the risks to the existing properties immediately surrounding the site. Changes in groundwater conditions do not stop at property lines. The developer must demonstrate that the proposed site alterations will not negatively impact adjacent properties.

3) Groundwater Mounding

The geotechnical report indicates that there is a groundwater surface observed at and near the existing ground surface, to as deep as 3m below the ground surface. It also indicates that this is present only because of the presence of overland drainage coming from off-site, and that once that flow is directed into a subsurface sewer system, the surficial groundwater will drop down to 2-3m below ground surface. In my opinion, this strongly implies that groundwater mounding can be expected to reach up to 2m above the groundwater surface. When designing the Etobicoke Exfiltration System (EES), the invert of the clearstone trench is to be a minimum of 1.0m above the groundwater or bedrock elevation, and due to the presence of significant groundwater mounding, this could be considered an absolute minimum clearance, with 2m being a more appropriate average value.

Within the clay soils, the geotechnical report indicates there are grade change limitations that require that the finished ground surface is not increased beyond 2 or 2.5m above the existing grade, due to the inherent weakness of the sensitive marine soils. The minimum depth to invert on the storm sewer is 1.8m, the invert of the clear stone trench is a minimum of 1.05m below the invert of the storm sewer, and there is to be 2m to the groundwater surface. This puts the highest acceptable groundwater elevation to be 2.35m below the existing ground, which is 0.35m lower than the top of the range of expected groundwater. The lowest expected invert (not necessarily within the clays soils) is significantly deeper.

> Existing ground + 2.5m of grade raise – 1.8m of frost protection – 1.05m to bottom of EES = 0.35m of excavation below existing ground
>
> Existing ground – 2m down to future GW elevation + 2m of mounding = impeded infiltration if the bottom of excavation is below existing grades

As this is below the top of the expected range of groundwater, there will be places where infiltration can be impeded, making those areas inappropriate for the use of this approach. In my opinion, the consultant must identify where infiltration will be impeded (ideally graphically), and remove the EES from these areas.

4) LID design

The proposed EES is expected to infiltrate up to approximately 7000m^3 during a 'typical' rainfall event and to capture the runoff from a 22mm rainfall event. This is inconsistent with the MECP Draft LID manual, which would recommend 27mm of treatment in this location. The LID system as proposed in all roads, can be expected to convey water as interflow. By my calculation, the flow rate within the clear stone trench would cause approximately 2/3 of the captured water to reach the Beaver Pond while the Beaver Pond was still responding to the storm event. This suggests that the interflow has the potential of impacting the total volume in the pond and, as a result, the flow rate downstream through the balance of the Kizell Drain. Placing clay plugs within the clear stone trench to reduce longitudinal flow would be of limited value, due to the requirement of blasting and shattering within the bedrock to create the trench. In my opinion, there will be flow paths around the clay.

Likewise, there is approximately 72000m^3 of subsurface storage within the catchment of the Beaver Pond, however its location and description is not well defined. It is assumed to be within the pore spaces created by shattering stone subsequent to blasting in the previous phases of development of the golf course and the existing residential community. If the proposed development interferes with the existing storage by increasing subsurface conveyance to the Beaver Pond, then the potential exists to further increase the pond elevation, and thus the downstream flows into the receiving stream.

5) SWM design

4 ponds and 1 subsurface storage unit are proposed. 2 of the 4 ponds (Ponds 1 and 3) will require extensive rock excavation (up to 8m), which will, by necessity, interfere with existing groundwater flows. Ponds 1 and 3 are proposed as dry ponds with an impervious liner constructed within surrounding bedrock. This design runs the risk of experiencing an upward hydraulic gradient from the groundwater, unless there are specific efforts made to lower the groundwater table, by increasing the rate of subsurface conveyance. Interfering with groundwater has the potential of destabilizing sensitive soils and decreasing groundwater recharge.

6) Hydrologic modelling

The design as proposed by the consultant is based on a hydrologic model that was calibrated in 2019 with no infrequent events included and does demonstrate a high accuracy when limited to the site lands. When extended to the entire watershed, it produces, in my opinion, a poor representation of the existing system response. The Beaver Pond has a well-defined, mostly linear response for about 5 days after a major event, and the hydrologic model used does not reflect this well. In addition, there is no discussion of the previous work done by the consultant in 2015 that explored both the subsurface storage and the Beaver Pond response. Without defining both the storage capacity within the model and including infrequent events in the calibration, the model cannot be relied on to predict the existing conditions during severe events. In the absence of a predictive model for severe events, forward-looking conclusions will be of limited value.

SWM systems designed for infill development must demonstrate two functionalities. They can neither introduce new problems to an existing system nor can they exacerbate existing problems. In this case, I am of the opinion that the proposed works have the potential to increase water levels in the receiving water body (downstream Kizell Drain) and negatively impact unstable soils. No development proposal should be considered for the 7000 Campeau site unless the proponents can adequately address these concerns.

Sincerely,
HDR - Transportation

LICENSED PROFESSIONAL ENGINEER
D. J. NUTTALL
PROVINCE OF ONTARIO

Aug 4, 2021

Douglas Nuttall, P.Eng.
Senior Water Resources Engineer

100 York Boulevard, Suite 300, Richmond Hill, ON, CA L4B 1J8
(289) 695-4600