

# MEMO

July 26, 2022

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**GeoProcess**  
RESEARCH ASSOCIATES

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TOWN OF CALEDON  
PLANNING  
RECEIVED  
Aug 22, 2022

**Re: Erosion Threshold Assessment – 6939 King Street  
Comment Response**

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Dear Steven:

GeoProcess Research Associates Inc. (GRA) previously completed an erosion threshold study for a tributary to Lindsay Creek, which flows through a study area adjacent to 6939 King Street, in Caledon, Ontario (GeoProcess, 2020). The following memo summarizes comments from the Toronto and Region Conservation Authority (TRCA), dated April 21, 2021, and GRA's corresponding responses.

**TRCA Comment:**

*According to report, the West Humber Distributed Runoff Control (DRC) for the site is 15% of Q2yr target flow (25L/S) which is 3.75 L/S. The calculated critical erosion discharge resulted from the submitted Erosion Threshold Study is 200 L/S which is much greater than TRCA's Erosion Threshold of 3.75L/S and much greater than the 100-year peak flow target of 77 L/S. Typically, the critical erosion discharge is less than 1 year to 2-year peak flows in the channel, but the calculated erosion discharge is greater than TRCA's 100-year peak flow discharge. As the subject site is discharging to the ephemeral watercourse located southwest of the property that crosses private lots downstream of the site, it is important that this erosion threshold assessment be revised so that some reasonable critical erosion discharge is calculated, and some extended detention is provided. Otherwise, the on-site retention needs to be increased from 5mm to 15-25 mm on-site retention to address erosion issues and a three-year monitoring plan along with adaptive management plan is needed.*

**GeoProcess Response:**

GeoProcess acknowledges that the resulting critical discharge determined in the erosion threshold study exceeds the estimated return-period flows for the system. It is important to note that critical discharge is typically estimated independent of return-period flows through detailed field assessments combined with hydraulic and sediment transport modelling (consistent with the approach taken in our 2020 study). Erosion potential is a function of the available energy in the system (erosive forces from flowing water) and the resilience of the watercourse (the ability of the watercourse to absorb the erosive stress while maintaining form and function). As such, it is possible to have cases where frequent, and even infrequent discharges are not geomorphically significant (e.g. Hassan et al., 2014).

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Specific to the tributary at 6939 King Street, the watercourse was characterized as a previously modified agricultural channel. Due to historic modification, the channel is oversized relative to its undisturbed conditions (reflected in the estimated bankfull characteristics summarized in Table 1 of GeoProcess, 2020). Moreover, the field investigation revealed that dense riparian vegetation is contributing to erosion resistance. The surveyed channel geometry and conservative erosion thresholds reflecting the assessed conditions were used to estimate the critical discharge. The resulting critical discharge (taken as the most conservative estimate per Table 3 of GeoProcess 2020) is a reflection of the low-energy agricultural watercourse (since it is a headwater system) and the relative resilience of the watercourse due to the dense riparian vegetation. The fact that this discharge exceeds the proposed SWM discharges indicates that the proposed SWM plan is not expected to increase downstream erosion potential within this system.

We trust this memo clarifies the approach, rationale and results of the erosion threshold study. Should you have any additional questions, please do not hesitate to contact the undersigned.

Regards,

**GEOPROCESS RESEARCH ASSOCIATES INC**



Ben Plumb, PhD, P.Eng.  
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