

July 31, 2025

TACCGATE Developments Inc.
600 Applewood Crescent
Vaughan, Ontario

Attn: Vince Figliomeni
Associate Development Coordinator

Re: Field Observation Summary and Erosion Analysis Recommendations
TACCGATE Parcel 24 – City of Pickering
Ganastekiagon Creek – Reach GB2
GEO Morphix Project Number: PN24118

Introduction

GEO Morphix Ltd. was retained to review previous work completed on **reaches G6** and **GB2** for the TACCGATE Parcel 24 property in the City of Pickering. Parcel 24 is located in the north end of the City of Pickering, with Peter Matthews Drive to the west, Alexander Knox Road to the north, and tributaries of the Ganastekiagon Creek to the east and south. **Reach GB2** runs along the east side of the property and is proposed to receive stormwater flows from Pond 25 within the property.

Previously, an erosion assessment was completed for **Reach G6** as part of the Seaton Mid Block Tributaries of the Ganatsekiagon Creek Erosion Assessment (GEO Morphix Ltd., 2017) and a detailed assessment was completed for **Reach GB2**, which are the receiving watercourses associated with Stormwater Management Facility (SWMF) 25 within the Seaton Mid Block Lands. SWMF 25 will outlet to **Reach GB2**, which is located upstream of **Reach G6**, which was identified as the most sensitive reach downstream of the proposed stormwater management facility. Previously, erosion threshold targets were set in principle for **Reach G6** under the *Seaton Master Environmental Servicing Plan Addendum* (MESPA; The Sernas Group, 2014) and for **Reach GB2** within *Parcel 24 Erosion Threshold Analysis Report* prepared by GEO Morphix Ltd. (2025).

It is our understanding that during a pre-con meeting for the Parcel 24 development Toronto and Region Conservation Authority (TRCA) requested an erosion threshold analysis be completed. This letter provides a summary of the field observations that were completed in 2015, and compares them to recent observations. Updated field observations were completed to review the site conditions and ensure the observations completed in 2016 were still applicable for the erosion threshold analysis.

Field Observations

A rapid geomorphic assessment was completed along **Reach GB2** on July 3, 2025 to compare with the previous observations completed in 2016. The rapid geomorphological field assessments were completed to identify existing channel erosion/instability issues and document stream habitat conditions. This included the following observations for each reach:

- Characterization of stream form, process, and evolution using the Rapid Geomorphological Assessment (RGA) (MOE, 2003; VANR, 2007), which evaluates degradation, aggradation, widening, and planimetric form adjustment at the reach scale
- Assessment of the ecological function of the watercourse using the Rapid Stream Assessment Technique (RSAT) (Galli, 1996), which evaluates stream health based on a number of biological indicators
- Instream estimates of bankfull channel geometry
- Bed and bank material composition and structure
- Georeferenced photographs to document the location of all observed erosion and infrastructure

Channel instability was objectively quantified through the application of the Ontario Ministry of the Environment's (MOE, 2003) Rapid Geomorphic Assessment (RGA). Observations were quantified using

an index that identifies channel sensitivity based on evidence of aggradation, degradation, channel widening, and planimetric adjustment. The index produces values that indicate whether the channel is *stable/in regime* (score <0.20), *stressed/transitional* (score 0.21-0.40) or *adjusting* (score >0.41).

The Rapid Stream Assessment Technique (RSAT) was also employed to provide a broader view of the system and consider the ecological functioning of the watercourse (Galli, 1996). Observations were made of channel stability, channel scouring or sediment deposition, instream and riparian habitats, and water quality. The RSAT score ranks the channel as maintaining a *poor* (<13), *fair* (13-24), *good* (25-34) or *excellent* (35-42) degree of stream health.

A table summarizing the results of the general reach characteristics and measurements for the 2 reaches from the *Identification of Potential Outfall Locations and Support in Identification of Erosion Concerns Associated with SWM Facilities Report* (GEO Morphix Ltd., 2015) as well as the recent observations from 2025 are provided in

Table 1. Reach classification according to the RGA and RSAT are provided in **Table 2.**

Table 1. Reach Characteristics

Reach Name	Avg. Bankfull Width (m)	Avg. Bankfull Depth (m)	Riffle Substrate	Pool Substrate	Valley Type	Dominant Riparian Condition	Notes
2015							
GB2	4.9	0.48	Gravel, cobble	Sand, gravel	Partially confined	Continuous coverage of mature trees	Numerous tributaries drain into reach GB2, Reach opens up at upstream extent to a wetland area with multiple flow paths, terracing, sandy basal scour, meander amplitudes of 23.3 m and 25 m, pool wetted depth of 0.33 m, Undercut of 0.30 m. Water quality clear with no odour.
2025							
GB2	4.25	0.70	Gravel, cobble	Sand, gravel, cobble	Partially confined	Continuous coverage of mature trees	Beaver dam has been breached likely causing the channel adjustment observed at the downstream extent. Undercutting was present along both banks for a majority of the reach. Till exposures were also present along the channel bed.

Table 2. Reach classifications

Reach Name	RGA (MOE, 2003)			RSAT (Galli, 1996)		
	Score	Condition	Dominant Systematic Adjustment	Score	Condition	Limiting Feature
2015						
GB2	0.27	In transition/stress	Widening	24	Fair	Channel Stability
2025						
GB2	0.33	In transition/stress	Widening	29	Good	Channel Stability

Detailed Geomorphological Assessment

Following the initial rapid assessments, **Reach GB2** was identified for a detailed assessment. This reach was previously selected because it was identified as the most sensitive reach downstream of the proposed stormwater management facility given bank erosion and channel widening were common throughout.

The detailed assessment was completed on December 13th, 2016, and included the following:

- Long-profile, level survey of the channel centre line
- Seven detailed cross-sectional surveys of the watercourse
- Detailed instream measurements at each cross-section location including bankfull channel geometry, riparian conditions, bank material, bank height/angle, and bank root density
- Bed material sampling at each cross-section following a modified Wolman's (1954) Pebble Count Technique or substrate sample
- Velocity and discharge measurements at select representative cross-sections

A summary of the detailed assessment results is provided in **Table 3**.

Table 3. Bankfull parameters

Channel parameter	Results
	GB2
Measured	
Average bankfull channel width (m)	3.01
Average bankfull channel depth (m)	0.32
Bankfull channel gradient (%)	0.49
D ₅₀ (mm)	0.34
D ₈₄ (mm)	4.75
Manning's n roughness coefficient	0.035
Computed	
Bankfull discharge (m ³ /s) ^a	0.92
Average bankfull velocity (m/s)	0.94
Unit stream power at bankfull discharge (W/m ²)	14.70
Tractive force at bankfull (N/m ²)	15.58
Critical shear stress (N/m ²) ^b	1.46
Flow competency for D ₅₀ (m/s) ^c	0.27
Flow competency for D ₈₄ (m/s) ^c	0.84

^a Based on Manning's equation

^b Based on Shields diagram from Miller et al. (1997)

^c Based on Komar (1987)

Summary of Erosion Threshold Analysis

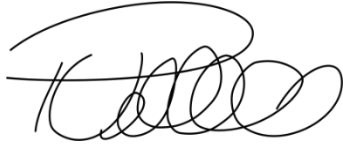
It was noted in the 2025 field observations there were adjustments within the downstream section of **Reach GB2**. A beaver dam was breached resulting in changes to the channel downstream where it was noted that widening was occurring within the channel, as well as degradation. Our office has reviewed the previous observations and noted the modifications to the system. The previous assessment is still an accurate representation of the reach. It should also be noted that there wasn't change within the whole system but rather changes occurring downstream of the beaver dam.

These findings likely have a minimal impact on the erosion threshold analysis that was previously completed as part of the *MESPA* (The Sernas Group, 2014). When developing erosion thresholds, it is anticipated that there are going to be changes to the system over time. The channel bed and bank substrates have remained generally consistent between 2015 and 2025. Additionally, Pond 25 and the associated drainage area account for a fraction of the overall drainage area to both **Reach GB2 (~2%)** and **Reach G6 (~0.8%)**. It is our opinion that the erosion control release rate criteria provided in the **MESPA** (extended detention volumetric storage of a minimum of 250 m³ per impervious ha to be released over a minimum duration of 120 hours at a maximum unitary release rate of 0.6 L/s/ha) shall govern the design of the stormwater management pond.

The proposed SWMP 25 will be designed using the recommendations proposed in the background documents, based on the previously completed analysis within the *MESPA* and the erosion threshold defined in *Parcel 24 Erosion Threshold Analysis Report* (GEO Morphix Ltd., 2025). Additionally, at detailed design an appropriate stormwater outfall will be designed as per the recommendations provided in the *MESPA* (The Sernas Group, 2014).

We trust this memo meets your current requirements. Should you have any questions, please contact us.

Regards,



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References

Galli, J. 1996. Rapid Stream Assessment Technique, Field Methods. Metropolitan Washington Council of Governments.

Geo Morphix Ltd. 2015. Identification of Potential Outfall Locations and Support in Identification of Erosion Concerns Associated with SWM Facilities, Seaton Mid Block, City of Pickering, Ontario (PN15048). Technical Memo.

Geo Morphix Ltd. 2017. Seaton Mid Block, Pickering, Ontario, Tributaries of Ganatsekiagon Creek, Erosion Assessment (PN15089). Technical Report.

Komar, P.D. 1987. Selective gravel entrainment and the empirical evaluation of flow competence. *Sedimentology*, 34: 1165-1176

Miller, M.C., McCave, I.N. and Komar, P.D. 1977. Threshold of sediment erosion under unidirectional currents. *Sedimentology*, 24: 507-527.

Ministry of Environment (MOE). 2003. Ontario Ministry of Environment. Stormwater Management Guidelines.

The Sernas Group. 2014. Master Environmental Servicing Plan Amendment, Seaton Community.