APPENDIX J

Draft Fluvial Geomorphology and Meander Beltwidth Assessment

FIRST CAPITAL | METROLINX

August 14, 2021
WE 20030

Ms. Melissa Alexander, B.Sc., MCIP, RPP
Environmental Planner/ Environmental Services Group
Hatch
2800 Speakman Drive
Mississauga, Ontario
L5K 2R7

Dear Ms. Alexander:

**RE: Park Lawn GO Station Fluvial Geomorphic and Erosion Rate Assessment
Toronto, Ontario**

Water's Edge was authorized by Hatch to provide a Fluvial Geomorphic and Erosion Rate Assessment for the reach of Mimico Creek adjacent to the site of a proposed GO Station. The purpose of this assessment is to identify the fluvial conditions and erosion rate for Mimico Creek along an outside creek bend protected by a retaining wall.

We have completed our assessment of the creeks in accordance with the approved project Terms of Reference. Data sources for the analysis include:

- Physiography of Southern Ontario by Chapman & Putnam (1984) (digital data from the Ontario Geological Survey);
- Ontario Flow Assessment Tool III (OFAT) (from Ministry of Natural Resources and Forestry);
- Ontario Base Mapping (OBM);
- Mimico Creek Conceptual Design GO Transit Oakville Mile 5.94 City of Toronto. 2017 report prepared by Beacon Environmental Limited;
- Communications with Hatch and the Toronto Region Conservation Authority (TRCA); and,
- Site inspection and survey by Water's Edge staff

A site inspection and survey were completed by Water's Edge staff on October 16, 2020. The site inspection was undertaken following a review of available resources to confirm site and general system characteristics.

1 WATERSHED CONDITIONS

1.1 General Watershed Characteristics

The site is located on Mimico Creek downstream of the Gardiner Expressway to the railway bridge (**Figure 1**). The site is within the jurisdiction of the Toronto Region Conservation Authority (TRCA), and is at the downstream end of the watercourse, upstream from the outlet into Lake Ontario. The watershed is highly urbanized with 89.2 percent of the watershed landuse dedicated to infrastructure, resulting in a susceptibility to flashy discharges in the watercourse. The remainder of the landuse is agriculture (8.1 percent) and other (2.7 percent).

Based on the Ontario Flow Assessment Tool III (OFAT), the study area has a total drainage area 78.51 km^2, with an average watershed slope of 2.4 percent. The reach exhibits a mean annual flow of 0.76 m^3/s. The two, five and one hundred-year flows are 29.86 m^3/s, 45.04 m^3/s and 85.96 m^3/s.

1.2 Geology & Physiography

Reviewing the sites surficial materials is important to evaluate active channel processes. Stream channel form and sediment supply are controlled by the region's physiography and underlying surficial geology. The site is found in the Iroquois Plain and is predominated by modern alluvial deposits (**Figure 2**), with sediments predominated by gravels and cobbles. While this can result in a stable bed, it can result in banks that are highly susceptible to erosion, especially when banks are steep.

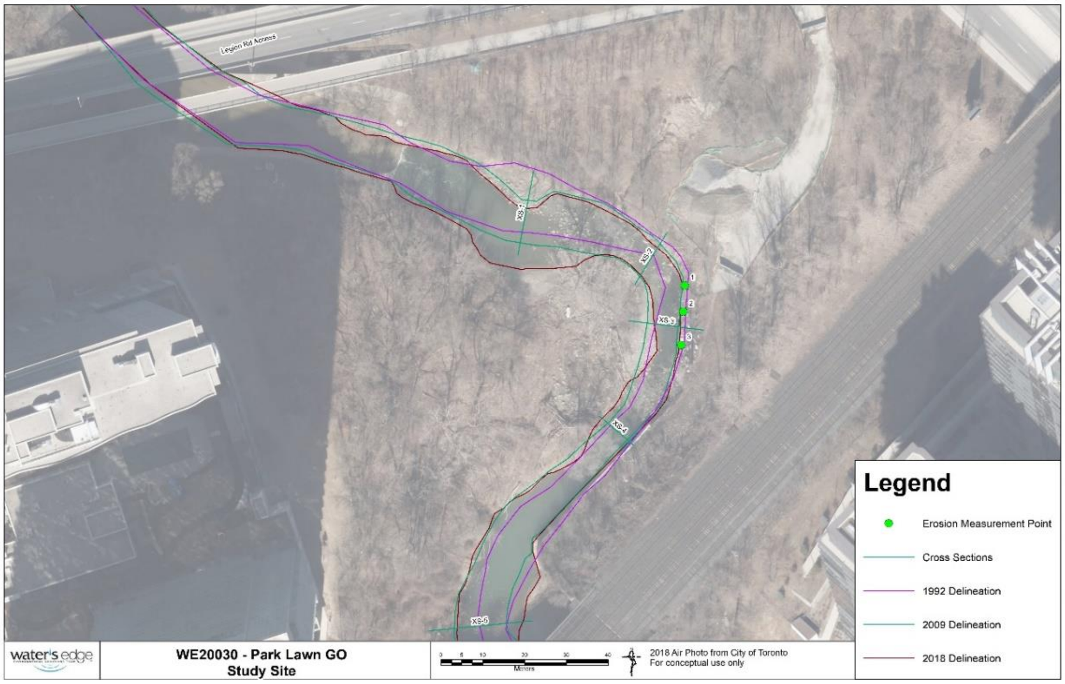


Figure 1: Study site showing Mimico Creek extending from the Gardiner Expressway to the railway line.

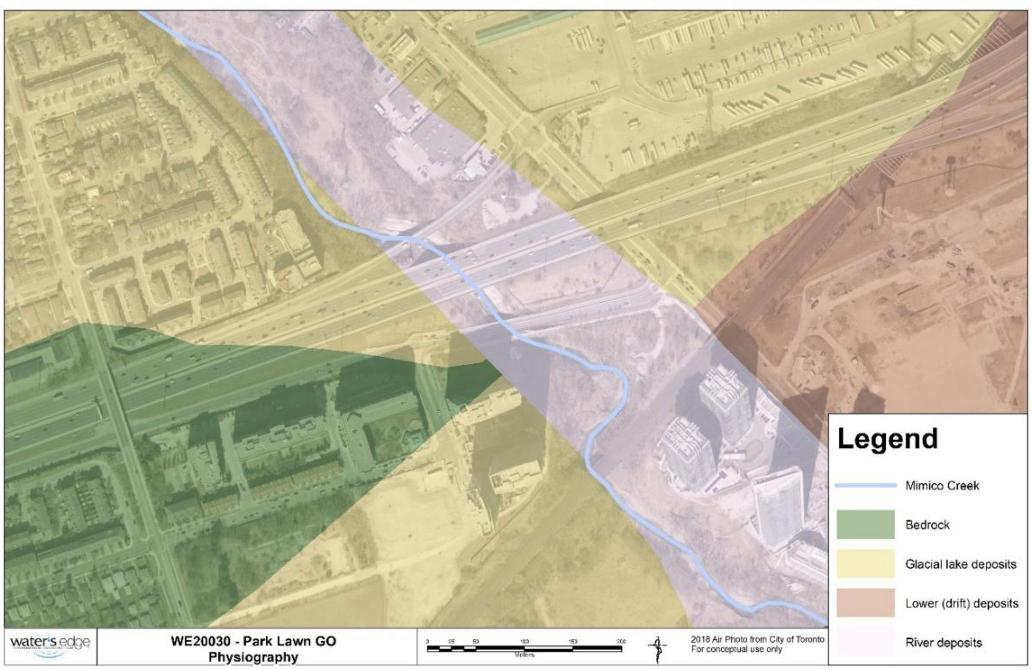


Figure 2: Local physiography of the study site, found within the Iroquois Plain (Chapman & Putnam, 1984).

2 GEOMORPHIC ASSESSMENT

2.1 Site Conditions

The reach of Mimico Creek is situated downstream of the Gardiner Expressway and generally flows from north to south, with an average bankfull width and depth of 12.44 m and 0.45 m respectively. The upstream end of the study reach has been fully hardened using concrete. While this reduces the erosion risk directly beneath the Gardiner Expressway off ramp bridge, it makes for a more hydraulically efficient system. Therefore, when the watercourse reconnects with the downstream alluvial watercourse, the increased water velocity has formed a large scour hole immediately downstream from the outlet from the concrete channel.

Downstream from this scour pool the channel exhibits regular riffle-pool sequences. These cascade down to where the east bank has been armoured at the meander bend. The bend has been protected using large pieces of armourstone that have since slumped and begun falling into the creek (**Figure 3**). Downstream from the armourstone bank protection, further bank and slope protection consist of a short section of gabion basket wall and longer section of concrete retaining wall. While these walls appear to be in good condition with little to no outflanking from fluvial processes, a deep scour pool has formed directly adjacent to the concrete wall. While this does not appear to have undercut the wall, it is imperative that it is monitored as the existing slope stability is dependent on that wall. Downstream from the wall, the watercourse widens and shallows, transitioning into the conditions found downstream from the railway bridge.

The west bank is generally very shallow and leads to a forested area. For much of the reach, a rocky beach can be found on the bank of the river, resulting in small changes in water levels having significant changes to the bankfull width. On the east bank, aside from where it has been armoured, there is evidence of erosion with exposed roots, leaning vegetation and freshly exposed soil. The riparian zone is well forested, with several paths through the trees and recent plantings.

Bankfull channel characteristics for the channel have been summarized in **Table 1**. Photographs of the site can be seen in **Appendix A** and the surveyed cross-section plots can be seen in **Appendix B.**

Table 1: Summary of geomorphic parameters for Mimico Creek

Parameter	Average	Minimum	Maximum
Floodprone Width (m)	12.44	7.4	18.69
Bankfull Width (m)	8.24	1.68	17.67
Entrenchment Ratio	1.31	1.06	1.52
Mean Depth (m)	0.45	0.27	0.74
Maximum Depth (m)	0.77	0.6	1.16
Width-Depth Ratio	25.9	6.6	42.1
Bankfull Area (m^2)	4.19	2.52	7.47
Wetted Perimeter (m)	10.39	6.02	17.81
Hydraulic Radius	0.42	0.26	0.60

Figure 3: Looking downstream at the armoured bank. Slumping armourstone protects the bend, and the gabion basket and concrete retaining walls can be seen protecting the slope. Note that there are scour pools directly adjacent to the concrete wall.

2.2 Rapid Geomorphic Assessment (RGA)

Channel stability was assessed using a Rapid Geomorphic Assessment (RGA) (MOE, 2003). The RGA assessment focuses entirely on the geomorphic component of a river system. The RGA method consists of four factors that summarize various components of channel adjustment, specifically: aggradation, degradation, channel widening and planform adjustment. Each factor is assessed separately, and the total score indicates the overall stability of the system as seen in **Table 2**. This methodology has been applied to numerous streams and rivers and **Table 3** details the ranking criteria. Generally, the lower the score, the more stable the channel is. The full assessment can be seen in **Appendix C**.

Mimico Creek was assessed as “Transitional” due to the erosion found on the east bank and in the scour pool, alongside the slumping armourstone.

Table 2: RGA Scores and Ranking

Aggradation	Degradation	Widening	Planimetric Form Adjustment	Stability Index (Final)	Verbal Ranking
0.29	0.40	0.50	0.14	0.33	Transitional

Table 3: Interpretation of RGA Score

Stability Index (SI) Value	Classification	Interpretation
SI ≤ 0.20	In Regime	The channel morphology is within a range of variance for rivers of similar hydrographic characteristics and evidence of instability is isolated or associated with normal river meander processes.
0.21 ≤ SI ≤0.40	**Transitional/Stressed**	**Channel morphology is within a range of variance for rivers of similar hydrographic characteristics, but the evidence of instability is frequent.**
SI ≥ 0.40	In Adjustment	Channel morphology is not within the range of variance and evidence of instability is wide-spread.

2.3 Rapid Stream Assessment Technique (RSAT)

The Rapid Stream Assessment Technique (RSAT) was developed by John Galli and other staff of the Metropolitan Washington (DC) Council of Governments (Galli et al, 1996). The RSAT systematically focuses on conditions reflecting aquatic-system response to watershed urbanization. It groups responses into six categories, presumed to adequately evaluate the conditions of the river system at the time of measurement on a reach-by-reach basis. Specifically, the RSAT categorizes the channel based on channel stability; channel scouring and sediment deposition; physical in-stream habitat; water quality; riparian habitat conditions; and biological conditions.

River channel stability and cross-section characterization is a critical component of RSAT. The entire channel was inspected for signs of instability (such as bank sloughing, recently exposed non-woody tree roots, general absence of vegetation within the bottom third of the bank, recent tree falls, etc.) and channel degradation or downcutting (such as high banks in small headwater streams and erosion around man-made structures).

A rapid assessment of soil conditions along the riverbanks is also conducted to identify soil texture and potential erodibility of the watercourse bank. Qualitative water quality measurements were also made (temperature, turbidity, colour and odour) along with an indication of substrate fouling (i.e., the unwanted accumulation of sediment).

The RSAT also typically involves a quantitative sampling and evaluation of benthic organisms. As no benthic sampling was undertaken, the score was based on site conditions and general observations of water quality.

Each category was assigned a value which was then summed to provide an overall score and ranking. **Table 4** summarizes the range of scores and rankings with a higher score suggesting a healthier system, with scores described in **Table 5.** The full breakdown available in **Appendix C**.

Mimico Creek was assessed as “Good” due to the lack of significant sediment deposits, the good riparian buffer and the channel diversity. However, recent erosion was noted which is a primary cause of the score not being higher.

Table 4: RSAT Scores and Ranking

Category	Score
Channel Stability (/11)	5.4
Channel Scour and Deposition (/8)	6.2
Physical In-Stream Habitat (/8)	6.1
Water Quality (/8)	6.0
Riparian Habitat Conditions (/7)	3.5
Biological Indicators (/8)	4.00
Final Score (/50)	**31.2**
Verbal Ranking	**Good**

Table 5: Interpretation of RSAT Score

RSAT Score	Ranking
41-50	Excellent
31-40	**Good**
21-30	Fair
11-20	Poor
0-10	Degraded

2.4 Aerial Photography Assessment

Air photos from 1992, 2009 and 2018 were analyzed for changes in stream planform using GIS mapping where the photos were used to delineate the bankfull limits of the channel which the meander axis and beltwidths are based on. The historic air photos were used to provide a reasonable representation for how the river has adjusted in the past 28 years. The bankfull delineations can be seen in **Figure 1.**

Mimico Creek has remained relatively uniform across the study period. However, active erosion was observed and is evidenced by the bank-hardening infrastructure that is in place. In addition to erosion, other factors will contribute to the perceived migration in the air photo delineations. These factors include the development of canopy vegetation, and differences in water levels when the air photo was taken.

2.5 Erosion Rate Calculation

For this assessment, the 1992, 2009 and 2018 air photo delineations were used to calculate the 100-year erosion rate. Calculating erosion rates is dependent on high quality and high resolution aerial photography, precise orthorectification and minimal canopy coverage. While it can be difficult to delineate the watercourse in places due to canopy coverage, the watercourse could generally be delineated.

Measurement points were selected based on where active erosion was observed on the meander bend that is of greatest concern to the development of the GO Station. In addition, this bank is where active erosion was noted, and it is where infrastructure has been constructed to protect the bank (**Figure 1**). The results from these measurements can be seen in **Table 6**. This 100 year erosion rate is for a natural creek with no retaining wall or gabion basket.

However, and as can be seen on the air photos, there is a concrete/gabion retaining wall located immediately downstream of the bend. This wall has been in place for many years. Assuming the retaining wall is placed on solid foundation and maintained indefinitely, the creek should move 0 m/year. It is further assumed that there would be no erosion at that location given that the wall would be subject to maintenance (given the presence of the railroad tracks and related infrastructure on the top of the slope).

2.6 Creek Realignment

Due to the existing erosion rate, a creek realignment could alleviate the current erosion risk at the location of the existing retaining wall. The creek would be moved westwards slightly and the area adjacent to the armoured and retaining wall slope would be backfilled, resulting in fewer erosive forces against the base of this infrastructure, with small modifications upstream from the slope to reduce the radius of curvature and prevent the backfilled area from being continually washed out. Full details can be seen in the Beacon, 2017 Report.

Table 6: Erosion rate calculation for Mimico Creek. Final 100-year erosion rate is **5.8 m/100-yr.** Measurement points can be seen in **Map 1**, attached.

Measurement Point	Migration Distance (1992 – 2018) (m)	Erosion Rate (m/yr)	100-Year Erosion Rate (m/100-yr)
1	1.3	0.05	5.1
2	1.4	0.05	5.4
3	1.8	0.07	6.9

2.7 Hydrologic Alterations

Stream flow changes due to the following hydrologic alterations, specifically 1) alterations to upstream hydrology due to increased development or impervious cover; and 2) climate change. Either possibility may result in increased frequency of high flows, increased frequency of runoff events, and increased runoff volumes. It is assumed that there would be minimal impact on site conditions, and we note the following:

1. The 100-year floodline is below the top of the concrete wall. Should further hydrological alterations result in increased flows, it would be necessary to provide rip rap treatment or a bioengineering solution above this elevation. This can be readily achieved, if necessary.
2. The floodplain in the vicinity of the subject site is relatively broad. Any increase in flows would only result in a marginal increase in flood depths. As such, only marginal increases in tractive shear forces can be expected.
3. As flows increase, the flows will tend to flow over the point bar located on the right bank, and not directly at the left banks.
4. Rivers are natural systems that change their dimension (cross section), pattern (sinuosity) and profile (slope), as well as the riparian corridor over time and will react naturally to slow changes over time. Given that the outside bend slopes are protected, changes will be minimal in this location. Any natural adjustments would be very gradually realized on the opposite bank.
5. Should there be evidence of hydrologic alterations, due to either increased upstream imperviousness and/or climate change, it is recommended that the frequency of monitoring be increased.

3 RECOMMENDATIONS

It is important to note that the erosion rate of 5.8 m/100-yr is based on the bank in question not being armoured, and with no additional slope stabilization methods being enacted. If the retaining wall were to be removed, one could expect an erosion rate of 5 to 7 metres over 100 years. However, if the retaining wall is built on a strong foundation; is inspected regularly; and maintained as needed, there should be no erosion along those sections.

Scour of the slope behind the existing concrete retaining wall could also occur during high flows. However, based on the 2017 Beacon Report, a 100 year flood event would flow just below the top of the retaining wall. Thus, even during high flow events, the retaining wall should protect against major erosion of the stable slope.

Based on the desktop and field assessment, two scenarios exist:

1. Continue to maintain the existing gabion basket and concrete retaining walls and armourstone revetment; or,
2. Realign Mimico Creek away from the existing stabilization infrastructure into the wooded area.

It is recommended that the first solution is better for both the health of the creek and to avoid disturbing a natural area in what is otherwise a highly urbanized environment. In addition, there is limited space to work with to the west of the watercourse as there are several condo towers that require consideration in any movement of Mimico Creek. However, it is critical that the retaining walls are inspected regularly and repaired as required based on inspection results. If the walls are left to weaken, it could result in significant erosion and damage to the rail line during a high discharge event.

4 CONCLUSIONS

Based on our observations and analysis we can conclude the following:

1. As a result of our Erosion Rate Assessment, we conclude that the bank would have a migration rate of 5.8 m/100-yr on the bank adjacent to the proposed Park Lawn GO station with no armouring. However, this bank has been armoured and there would be a corresponding reduction of the annual migration rate.
2. At the location of the existing gabion/concrete retaining wall the creek has an effective erosion rate of 0 m/year if the wall is maintained indefinitely: and,
3. We recommend that to prevent further erosion and meander movement the existing armourstone revetment, the gabion basket and concrete retaining walls be maintained to protect against high discharge events.

Should you have any comments or questions on this please do not hesitate to contact the undersigned.

Respectfully submitted,

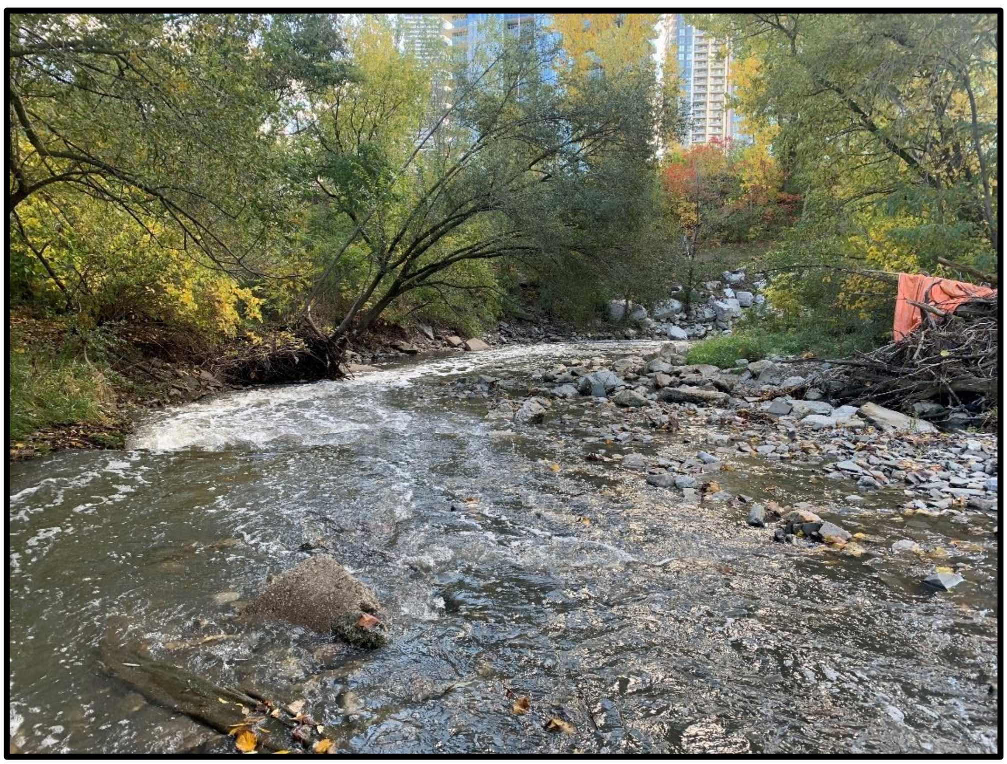
Ed Gazendam, Ph.D., P.Eng.,
President, Sr. Geomorphologist

Attachments
Appendix A: Site Photography
Appendix B: Cross Section and Longitudinal Plots
Appendix C: RGA and RSAT Assessment Sheets

APPENDIX A:

Site Photography

PHOTOGRAPH NO.: 1
FROM: XS-1
LOOKING: Upstream



PHOTOGRAPH NO.: 2
FROM: XS-1
LOOKING: Downstream

PHOTOGRAPH NO.: 3
FROM: XS-1
LOOKING: At left bank

PHOTOGRAPH NO.: 4
FROM: XS-1
LOOKING: At right bank

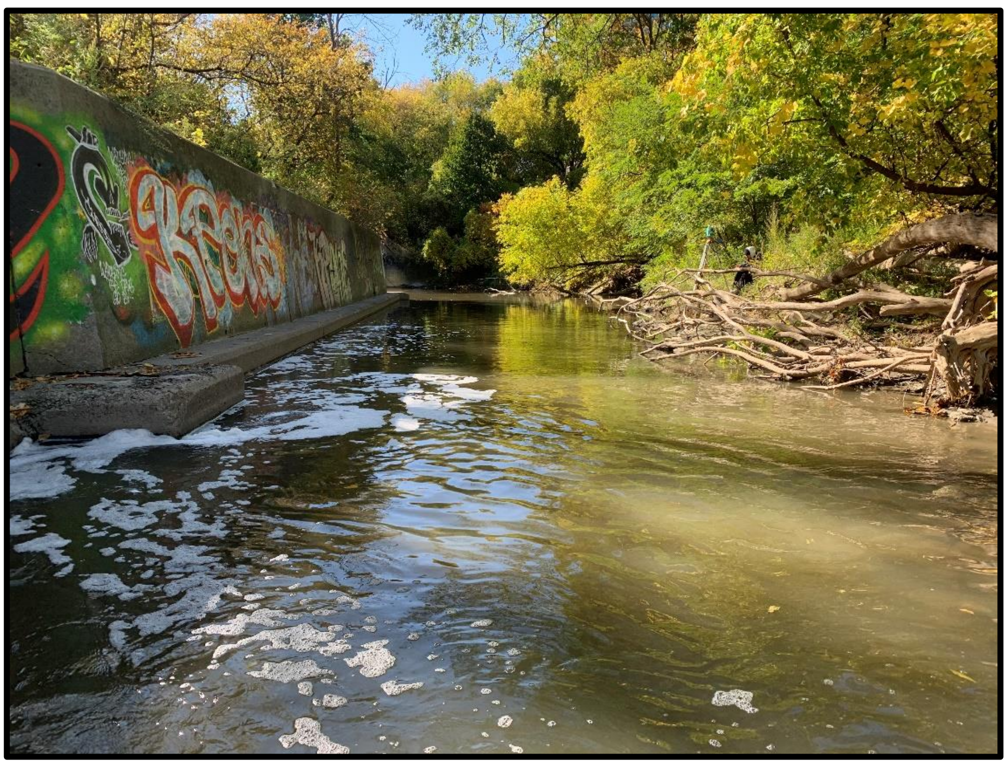
PHOTOGRAPH NO.: 5
FROM: XS-2
LOOKING: Upstream

PHOTOGRAPH NO.: 6
FROM: XS-2
LOOKING: Downstream

PHOTOGRAPH NO.: 7
FROM: XS-2
LOOKING: At left bank

PHOTOGRAPH NO.: 8
FROM: XS-2
LOOKING: At right bank

PHOTOGRAPH NO.: 9
FROM: XS-4
LOOKING: Upstream



PHOTOGRAPH NO.: 10
FROM: XS-4
LOOKING: Downstream

PHOTOGRAPH NO.: 11
FROM: XS-4
LOOKING: At left bank

PHOTOGRAPH NO.: 12
FROM: XS-4
LOOKING: At right bank

PHOTOGRAPH NO.: 13
FROM: Downstream of railway bridge
LOOKING: Upstream

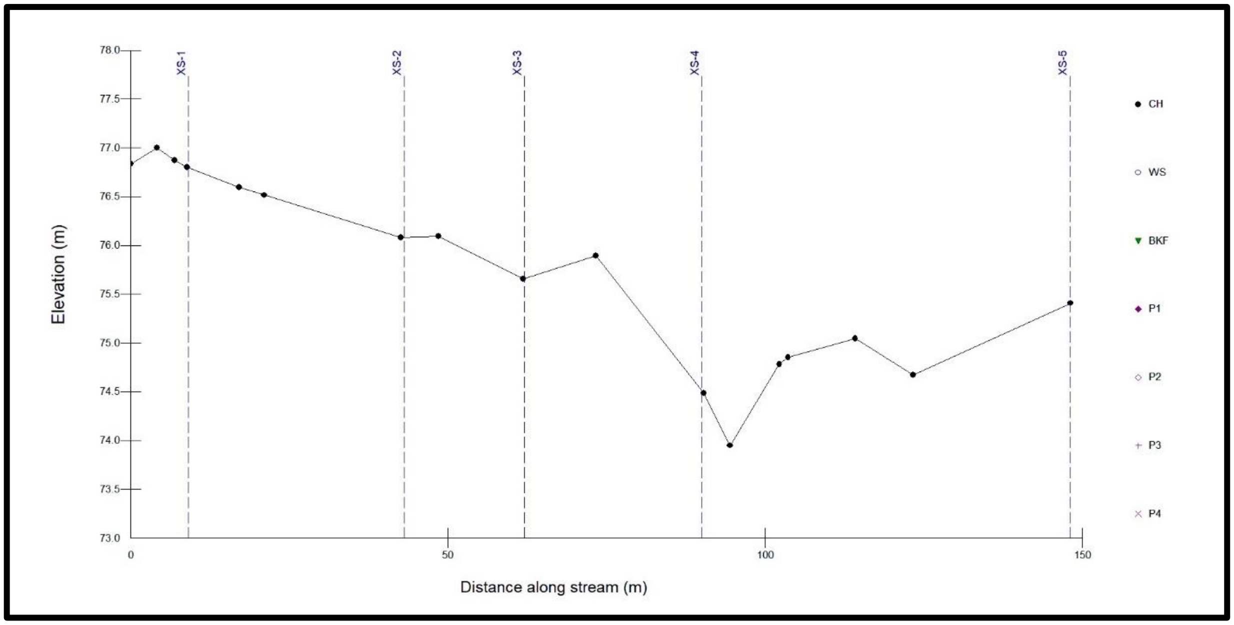
PHOTOGRAPH NO.: 14
FROM: Downstream of railway bridge
LOOKING: Downstream

PHOTOGRAPH NO.: 15
FROM: Downstream of railway bridge
LOOKING: At left bank

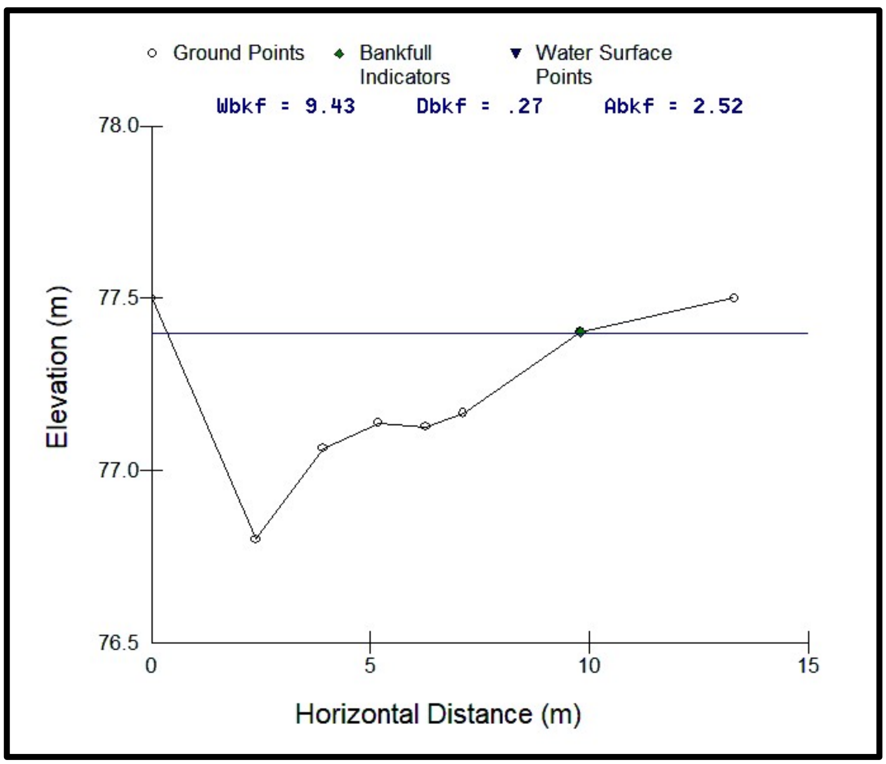
PHOTOGRAPH NO.: 16
FROM: Downstream of railway bridge
LOOKING: At right bank

APPENDIX B:

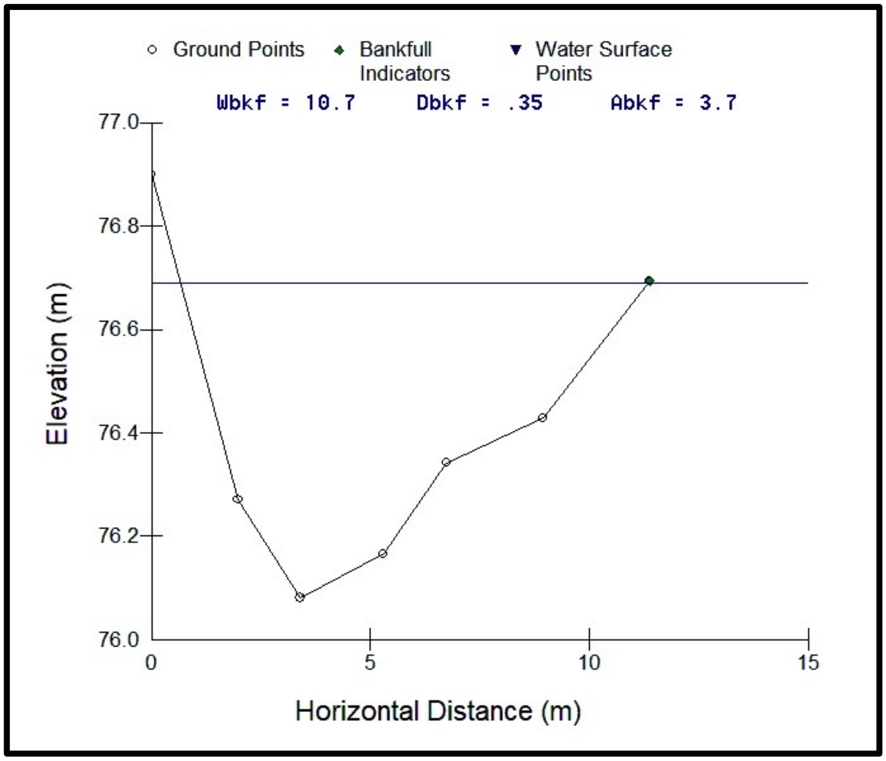
Cross-Section and Longitudinal Plots



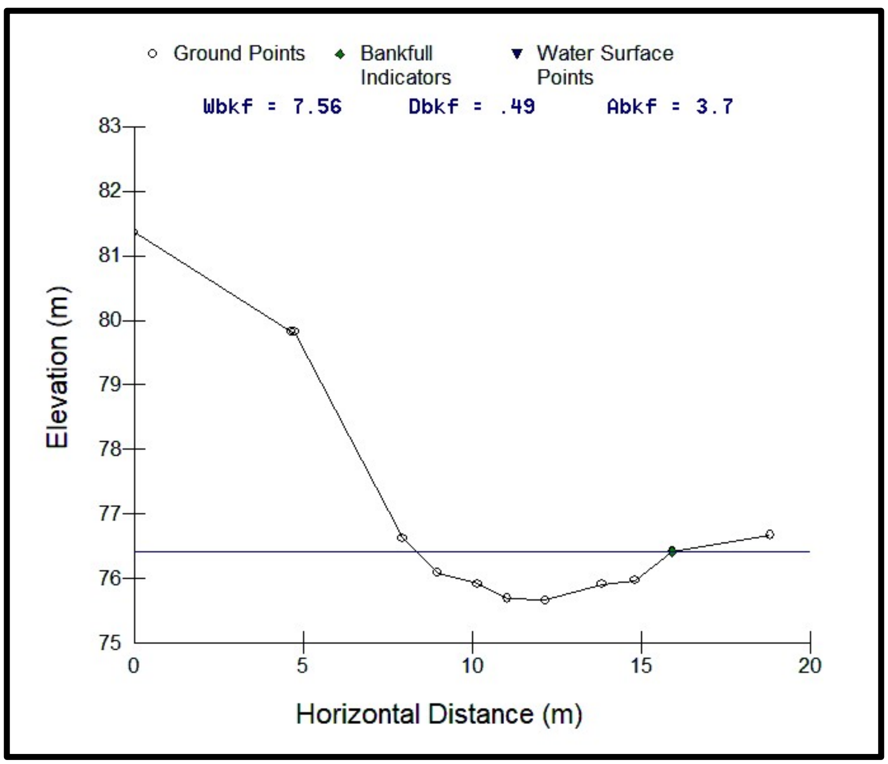
Plot 1: Longitudinal Profile



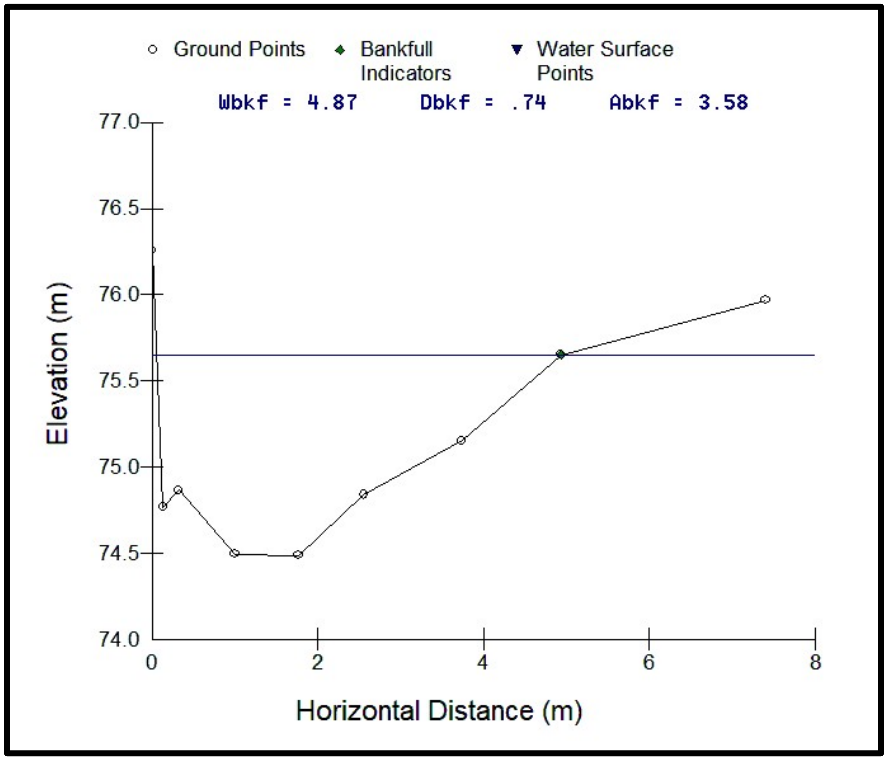
Plot 2: Cross-Section 1



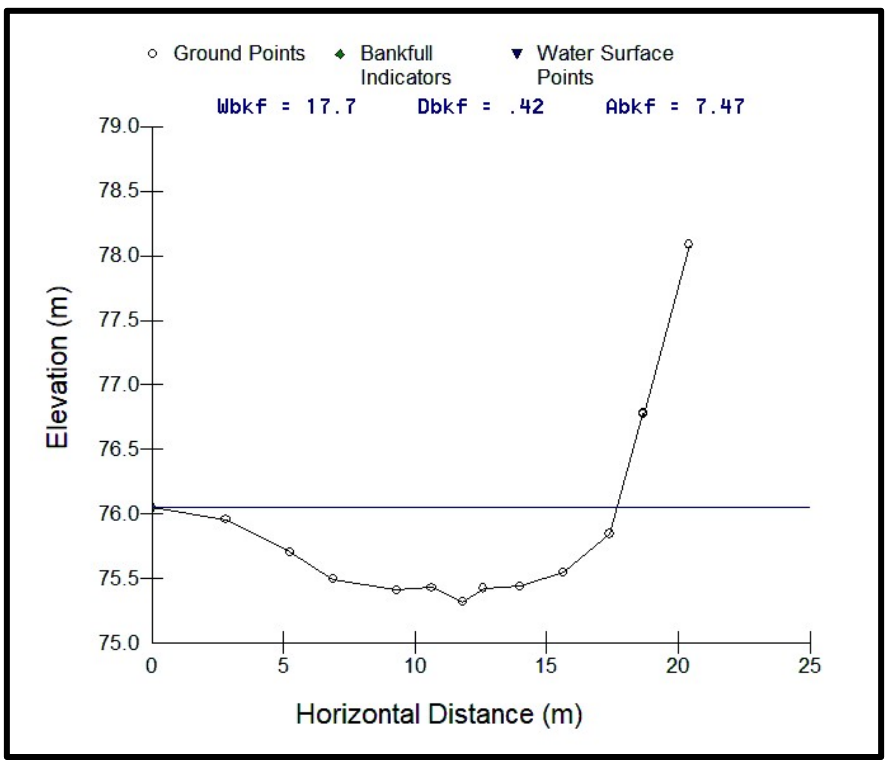
Plot 3: Cross-Section 2



Plot 4: Cross-Section 3



Plot 5: Cross-Section 4



Plot 6: Cross-Section 5

APPENDIX C:

RGA and RSAT Assessment Sheets

Rapid Geomorphic Assessment

Date: 28-Oct-20
Evaluator: AG
Stream: Mimico Creek
Conditions:
Project: 20030- Park Lawn GO

Form / Process (1)	Geomorphic Indicator No (2)	Description (3)	Present No (4)	Present Yes (5)	Factor Value (6)
Evidence of Aggradation	1	Lobate bar	1		
	2	Coarse material in riffles embedded	1		
	3	Siltation in pools		1	
	4	Medial bars	1		
	5	Accretion on point bars	1		
	6	Poor longitudinal sorting of bed materials	1		
	7	Deposition in the overbank zone		1	
		Sum of Indices	5	2	0.29
Evidence of Degradation (DI)	1	Exposed bridge footing(s)	1		
	2	Exposed sanitary/storm sewer/pipeline/etc.	1		
	3	Elevated storm sewer outfall(s)	1		
	4	Undermined gabion baskets/concrete aprons/etc.	1		
	5	Scour pools d/s of culverts/storm sewer outlets		1	
	6	Cut face on bar forms		1	
	7	Head cutting due to knick point migration	1		
	8	Terrace cut through older bar material		1	
	9	Suspended armour layer visible in bank		1	
	10	Channel worn into undisturbed overburden/bedrock	1		
		Sum of Indices	6	4	0.40
Evidence of Widening (WI)	1	Fallen/leaning trees/fence posts/etc.		1	
	2	Occurrence of large organic debris		1	
	3	Exposed tree roots		1	
	4	Basal scour on inside meander bends	1		
	5	Basal scour on both sides of channel through riffle		1	
	6	Gabion baskets/concrete walls/etc. out flanked		1	
	7	Length of basal scour >50% through subject reach	1		
	8	Exposed length of previously buried pipe/cable/etc.	1		
	9	Fracture lines along top of bank	1		
	10	Exposed building foundation	1		
		Sum of Indices	5	5	0.50
Evidence of Planimetric Form Adjustment (PI)	1	Formation of cut (s)	1		
	2	Single thread channel to multiple channel	1		
	3	Evolution of pool-riffle form to low bed relief form	1		
	4	Cutoff channel(s)	1		
	5	Formation of island(s)	1		
	6	Thalweg alignment out of phase meander form		1	
	7	Bar forms poorly formed/reworked/removed	1		
		Sum of Indices	6	1	0.14
Stability Index (SI) = (AI + DI+ WI+ PI) /m					0.33
			Condition:	Transitional	

General Comments:

RAPID STREAM ASSESSMENT TECHNIQUE (RSAT) Evaluation

Creek Name: Mimico Creek **RSAT Section #:**

Project 20030- Park Lawn GO **Date:** 16-Oct-20

Assessor: AG **Coordinates:**

Evaluation Category	Relative Significance	Criteria	Rating Excellent	Good	Fair	Poor	Score
1 Channel Stability	Indicative of hydrologic/flow regime alteration and general condition of physical aquatic habitat. Provides insight into past, present and possible future changes in channel morphometry	Bank Stability	>80%	71-80 %	50-70 %	< 50 %	5
		Stream Bend Stability Outer bank height/bank overhang	<0.60 m / <0.60m	0.60 to 0.90 m / 0.60 to 0.75 m	0.90 to 1.20 m / 0.75 to 0.90 m	>1.20 m / >0.90 m	2
		Exposed roots and falls	old and large / 0-1	some young / 2-3	young common / 4-5	young abundant / >6	8
		Bottom 1/3 of Bank	resistant plant/soil	resistant plant/soil	highly erodable plant/soil	highly erodable plant/soil	6
		Cross-Section	V or U	V or U	Trapezoidal	Trapezoidal	6
		Typical Score:	**9 to 11**	**6 to 8**	**3 to 5**	**0 to 2**	**5.40**

NOTES:

Evaluation Category	Relative Significance	Criteria	Excellent	Good	Fair	Poor	Score
2 Channel Scour and Sediment Deposition	Relates to level of uncontrolled stormwater runoff, sediment load and transport and degradation of instream habitat.	Riffle Embeddedness	<25% sand & silt	25-50%	50-75%	>75%	7
		# of deep pools / substrate	high # / <30% fines	mod # / 30-60% fines	low-mod # / 60-80% fines	few # / >80 % fines	5
		Streak marks/sediment deposits absent	marks / dep absent	uncommon	common	common	6
		large sand deposits/fresh	rare / no fresh dep.	uncommon and small localized dep	common and small localized dep.	common and heavy dep along major portion	6
		Point bar/vege/sand	few / well vege / none	small/well vege/little	mod-large& unstable/high am't of sand common	mod-large& unstable/high am't of sand at most bends	7
		Typical Score:	**7 to 8**	**5 to 6**	**3 to 4**	**0 to 2**	**6.20**

NOTES:

Evaluation Category	Relative Significance	Criteria	Excellent	Good	Fair	Poor	Score
3 Physical In-stream Habitat	Relates to the ability of a stream to meet basic physical requirements necessary for the support of a well-balanced aquatic community (eg: depth of flow, water velocity, water temperature, substrate type and quality, etc).	Wetted Perimeter	> 85% of bottom width	61-85%	40 - 60 %	< 40 %	7
		Diversity of structure, velocity and depth of flow	All forms present, diverse vel. and depth of flow	Good mix of form, rel. diverse velocity and depth	Few pools, riffles and runs dominant, vel & depth gen shallow/slow	dominated by 1 type (usually runs) and 1 vel/depth (usually slow & shallow	5
		Riffle substrate	cobble, gravel, rubble, boulder mix with little sand & >50 % cobble	Good mix of gravel, cobble and rubble & 25-49% cobble	predominantly small cobble, gravel and sand & 5 - 24 % cobble	Predominantly gravel with high % sand & <5% cobble	7
		Riffle depth	>0.20 m	0.15 - 0.19 m	0.10 - 0.14 m	< 0.10 m	8
		Large Pool Depth	> 0.60 m	0.45 - 0.59 m	0.30 - 0.44 m	< 0.30 m	8
		Channel Process	No channel alteration of significant point bar formation or enlargement	Slight increase in point bar formation or slight amount of channel mod.	Mod. increase in point bars and / or channel mod.	extensive channel alteration or point bar formation / enlargement	7
		Riffle-Pool Ratio	0.9 - 1.1 to 1	0.7 - 0.89 to 1 or 1.11 - 1.3 to 1	0.5 - 0.69 to 1 or 1.31 - 1.5 to 1	< 0.49 to 1 or > 1.51 to 1	5
		Stream Temp. on a Summer Afternoon	< 20 ○ C	20 to 24 ○ C	24 to 26 ○ C	>27 ○ C	3
		Typical Score:	**7 to 8**	**5 to 6**	**3 to 4**	**0 to 2**	**6.14**

NOTES:

Evaluation Category	Relative Significance	Criteria	Excellent	Good	Fair	Poor	Score
4 Water Quality	Indicative of watershed perturbations / general level of human activity, point and non-point source loads, and aquatic habitat conditions.	Substrate Fouling (on rock underside)	None: 0 -10%	Light: 11-20%	Mod: 21 - 50 %	High >50%	7
		Total Dissolved Solids (TDS)	<50mg/L	50-100 mg/L	101-150 mg/L	>150 mg/L	6
		Clearness of Water	>0.90 m visibility	0.45 - 0.89 m	0.15 - 0.44 m	<0.15 m visible	4
		Odour	None	Slight organic odour	Slight - Moderate odour	Moderate to strong odour	7
		Typical Score:	**7 to 8**	**5 to 6**	**3 to 4**	**0 to 2**	**6.00**

NOTES:

Evaluation Category	Relative Significance	Criteria	Excellent	Good	Fair	Poor	Score
5 Riparian Habitat Conditions	Provides insight into change(s) in stream energetics, temperature regime, and both aquatic and terrestrial habitat conditions	Width of Riparian Buffer	Wide > 200' with mature forests on both sides	Forested buffer >100' along major portion	Predom. Wooded but major localized gaps	Mostly non-wooded vegetation, narrow width.	4
		Canopy coverage (Shading)	>80% shading	60-79% shading	50-60 % shading	<50 % shading	3
		Typical Score:	**6 to 7**	**4 to 5**	**2 to 3**	**0 to 1**	**3.50**

NOTES:

Evaluation Category	Relative Significance	Criteria	Excellent	Good	Fair	Poor	Score
6 Biological Indicators	Best overall indication of stream health and level of watershed perturbation	Diversity of macro-invert community	Diverse community present (mayflies, stoneflies, and cased caddisflies (few snails or leeches)	Mayflies and caddisflies (stoneflies absent)	Pollution-tolerant species; aquatic worms dominant	Poor diversity dominated by midgeflies, aquatic worms and snails.	4
		Number of Individuals	Mod to High #	Mod to High #	Low - Mod #	Low #	4
		Typical Score:	**7 to 8**	**5 to 6**	**3 to 4**	**0 to 2**	**4.00**

NOTES:

TOTAL SCORE:	**31.24**
CONDITION:	**Good**