Appendix A Study Area Mapping



Legend





Pond

Bronte River Limited Partnership Development

Conceptual Channel Design and Erosion Assessment

Oakville, Ontario

Reach Break and Label, Alluvial Fan, Pond, Detailer

MORPHIX

GEO

Imagery: Google Earth Imagery, 2017. Reach Break and Label, Alluvial Fan, Pond, Detailed Assessment: GEO Morphix Ltd., 2022. Study Site: Argo, 2021. Watercourse: MNRF and GEO Morphix Ltd., 2021. Drainage Feature, Proposed Outlet: GEO Morphix Ltd., 2023. 1 m Contour: Conservation Halton, 2016. Printed: April 2023. PN20117. Drawn by: J.T., M.O.

























Appendix C Field Observations



GEO MORPHIX

al Site Characteristics C

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Project Code: 20117

Checked by: _____ Completed by

MORPHIX

Gener	al Site Cha	arac	teristics	Project Code: 2017-	
Date:		20	20-12-17	Stream/Reach:	
Weather	1	SU	NNY -4°C	, Location: Bronte Green	
Field Staff: CVM TR		MTR	Watershed/Subwatershed: Browte Creek		
Field State Features X X	aff: each break ross-section ow direction iffle bol edial bar roded bank ndercut bank ip rap/stabilization eaning tree ence ulvert/outfall wamp/wetland rasses ree sstream log/tree /oody debris tation location egetated island e tanding water carcely perceptible mooth surface flow pwelling ippled nbroken standing wat hute ree fall e ilt and ravel mall cobble arge cobble	e flow wave ave S6 S7 S8 S9	on Small boulder Large boulder Bimodal Bedrock/till	Watershed/Subwatershed: Browle Creek Site Sketchr: 51 X52 US Fallen tree Site Sketchr: 51 X52 US Fallen tree Site Sketchr: 51 X52 US Site Sketchr: 52 X52 US Site Sketchr: 53 X52 US Site S	
Other BM B BS B DS D WDJ W VWC V	enchmark acksight ownstream /oody debris jam alley wall contact	EP RB US TR FC	Erosion pin Rebar Upstream Terrace Flood chute	Additional Natas:	PRING
	ULLOTH OF SIODE	rP	FIOOD Plain	Auditional Notes:	

Completed by: _____ Checked by: __

MORPHIX

Detailed Assessment (Level)

Project Code: 20(17

Date: Weather Field Sta	: ff:	2020- Derads TR CI	$\frac{12 \cdot 17}{4 - 100}$	Reach: Locatio Waters	on: shed/Subw	vatershed:		gully rawine
Тор	Middle	Bottom	Angle	Water	XS	Notes	S	Survey Direction
	11							Upstream to Downstream
	15							□ Downstream to Upstream
	File	20117	FZOZU		<i>n</i>			
							C	ross-sections
						8		lo. of Cross-sections: <u>10</u>
		D D La						Ionitoring Cross-sections:
	Long	16 LOA	= 117					
	poin	100	- 14/					If yes, which ones: 4 & 10
	min	+ 107 -	wit					
	10.		C C Land	/			R	lain in last 24 hours
		and the second	Carlo Harris Carlo Ca					🖉 None
	XSI	points	1100-77 1	17				🗆 Yes: Amount mm
		1						
	×52 F	points	1200-7	1220				/alley Type:
	1.67		1 Chan					Confined Partially Unconfined
	x - 5 pi	21145	1500-7	1315				dannel zone:
M	V64 .	inte	14m -2	1171				and Use: 16 dentral havest
	2226	01***	** 108 J - 1	1921				quatic Vegetation: N/A
	255	aints	1502-7	1520			c	Coverage of Reach:%
		1					R	Riparian Vegetation: <u>Lees</u>
	X56 p	oints	1600-7	1620] E	xtent of Riparian Cover:
	l							Fragment None Continuous
	XS7 p	oints	1700-7	1717		-	R	Riparian Cover (channel widths):
51	,							1-4 4-10 (>10)
	×58 p	aints	1800~7	1820			A	ge Class of Riparian Vegetation:
					-	an a		Immature Established Mature
	×54 f	Dinty	1400-1	1921				(<5 yrs) (5-30 yrs) (>30 yrs)
	×410	hould	2000.	777 216				None Minimal Moderate
	1700	portra	6.000	- 001-1				Heavy Extreme
								Density of Woody Debris:
								Low Moderate High
								Ø Overall Photographs Taken
							E	Blockage(s) in Channel:
								Infrastructure Dam (LWD)
XS	1+2 siled	not a	part	of.		Completed b	y:	Checked By:
	-add +	ional	data					Page of

M O R P H I X

Cross-Section Characteristics

Project Code: PN 20117

Date:	2020-12-17-	Reach/Cross-section:	XSI
Weather:	overcast	Location:	Bronke
Field Staff:	TR CVM	Watershed/Subwatershed:	Branke Creek

	Notes	Cross-sectional Morphology
-total	Station	🗆 Riffle 🛛 Pool 🔅 Run 🗌 Other
		Substrate
		Sample:
		🗆 Bed 🔲 Bank 🗆 Subpavement 🗆 Water 🗆 None
		Pebble Count (cm):
		1. <u>4.5</u> 11. <u>1.0</u> 21. <u>0.2</u> 31. <u>0.9</u>
		2. 9.0 12.3.4 22.0.4 32.1.1
		3. 25 13. 28 23. 12 33. 13
		4. 0.3 14. 0.8 24. 6.5 34. 0.4
		5. 0.2 15.0.6 25.2.4 35.1.2
		6. 1.4 16. 0.3 26. 1.2 36. 0.5
		7. 4.2 17. 0.3 27. 1.0 37. 0.4
		8.3.4 18.0.3 28.0.6 38.0.5
		9.1.5 1905 29.04 39.0.6
 		10.4.8 20.04 30.05 40.05
		Particle Shape:
		Embededness: <u>00</u> %
 		Sorting: U Well U Moderate M Poor U Very poor
 		Sediment Transport
 		□ Observed □ Not Observed
 		If Observed:
 		□ Suspended □ Sliding □ Rolling □ Saltation
		Percentage of Bed Active: %
(Velocity and Discharge
		Velocity: Method:
		Estimated m/s Wiffle ball
		Measuredm/s Current Meter
		Discharge:
		Estimated m ³ /s Marsh McBirney
		□ Measuredm ³ /s □ Other

Completed by: _____ Checked by: _____

GEO	М	0	R	Ρ	Н	١	Х
	Geon Earth	orpholo Science	9Y				

in characteristics	Pro	Project Code: 20117-			
Date: 2020-12-1	Rea	ach/XS:	151		
ketch (Viewed Downstrean	n) Include: vegetation type and locat	tion, soil horizons, woody deb	ris, roots, etc.		
Left Bank		•	Right Bank		
	the second	* and	1 Samal		
www.du	coly e	gravee one			
eft Bank Materials	Cons	Right Bank Materia	als		
ift Bank Materials	Gravel	Right Bank Materia	als		
ift Bank Materials	Gravel Small Cobble	Right Bank Materia	als		
eft Bank Materials	Gravel Small Cobble Large Cobble	Right Bank Materia	als		
ift Bank Materials Bedrock Till Clay Silt Sand	Gravel Small Cobble Large Cobble Small Boulder	Right Bank Materia	als Gravel Small Cobble Large Cobble Small Boulder Large Boulder		
eft Bank Materials □ Bedrock □ Till □ Clay □ Silt ☑ Sand Bank Height: VWC	Gravel Small Cobble Large Cobble Small Boulder Large Boulder	Right Bank Materia	als V Gravel Small Cobble Large Cobble Small Boulder Large Boulder	m	
eft Bank Materials □ Bedrock □ Till □ Clay □ Silt □ Sand Bank Height: ↓ ₩ (Bank Angle: ↓ ₩ (Gravel Small Cobble Large Cobble Small Boulder Large Boulder Cm >	Right Bank Materia	als	m	
eft Bank Materials	Gravel Small Cobble Cobble Small Boulder Common Second Sec	Right Bank Materia	als P Gravel Small Cobble Large Cobble Small Boulder UWC 80 3.0	m °	
eft Bank Materials □ Bedrock □ Till □ Clay □ Silt □ Sand Bank Height: ↓ ₩ (Bank Angle: Root Depth: Boot Density: 5	Gravel Gravel Small Cobble Cobble Common Solution Small Boulder Common Solution Small Boulder Common Solution Small Boulder Smal	Right Bank Materia	als Gravel Small Cobble Large Cobble Small Boulder Large Boulder VWC 80 30 5	m ° m %	
eft Bank Materials	Gravel Small Cobble Compared Cobble Cobble Cobble Compared Cobble Compared Cobble Compared Cob	Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut:	als	m ° m % m	
eft Bank Materials	Gravel Small Cobble Common Signature Com	Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Depsity: Undercut: Erosion Pin:	als	m ° m % m m	
eft Bank Materials	Gravel Small Cobble Small Cobble Small Boulder Large Boulder Cm Cm Cm Cm Cm Cm Cm Cm Ckg/cm ² : □ Yes □ No	Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	als Ver Gravel Small Cobble Large Cobble Small Boulder VWC 80 30 55 0 N/A- Foot Used: □Yes	m ° m % m m kg/cm² □ No	
eft Bank Materials eft Bank Materials Bedrock Till Clay Silt Sand Bank Height: VWC Bank Angle: VWC Bank Angle: Coot Depth: Bank Angle: Coot Density:	Gravel Small Cobble Small Cobble Small Boulder Large Boulder Cm	Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	als	m ° m m m kg/cm² □ No	
.eft Bank Materials Bedrock Till Clay Silt Sand Bank Height: YWC Bank Angle: Root Depth: Root Density: Undercut: K Penetrometer: Foot Used: Additional Notes	Gravel Small Cobble Small Cobble Small Boulder Large Boulder Cm C	Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	als	m ° m % m m kg/cm² □ No	
eft Bank Materials Bedrock Till Clay Silt Silt Sand Bank Height: YWC Bank Angle: Root Depth: Root Density: Undercut: V Erosion Pin: Penetrometer: Foot Used:	Gravel Small Cobble Small Cobble Small Boulder Large Boulder Cm Cm Cm Cm Cm Cm Cm Cm Ckg/cm ² C	Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	als P Gravel Small Cobble Large Cobble Small Boulder VWC 80 3.0 5 0 N/A- Foot Used: Yes	m ° m m m kg/cm² □ No	
eft Bank Materials Bedrock Till Clay Silt Sand Bank Height: VWC Bank Angle: Koot Depth: Charles Penetrometer: Foot Used: dditional Notes	Gravel Small Cobble Small Cobble Small Boulder Cm C	Right Bank Materia	als 'P'Gravel Small Cobble Large Cobble Small Boulder UWC 80 30 5 0 N/A- Foot Used: Yes	m ° m m kg/cm² □ No	

*

Completed by: _____ Checked by: _____

MORPHIX Geomorphology

Cross-Section Characteristics

Project Code: PN 20117

Date:	2020-12-17	Reach/Cross-section:	X52	
Weather:	overcast	Location:	Bronte	
Field Staff:	TEOUM	Watershed/Subwatershed:		

				Notes	Cross-sectional Morphology
			total	Station	🗆 Riffle 🗌 Pool 🗌 Run 🗌 Other
					Substrate
	2.6			8	Sample:
	in the second				🗆 Bed 🗆 Bank 🗆 Subpavement 🗆 Water 🗆 None
					Pebble Count (cm):
					1.7.8 11.0.4 21.2.3 31. Sand
					2. 7.5 12. 0.5 22. 1.6 32. 1
					3. 0.9 13.2.2, 23. 5.4 33.
					4. 0.4 14. 1.1 24. 0.8 34.
					5. 0.5 15. 2.2 25. 1.6 35.
					6. 04 16. 02 26. 4.0 36.
					7. 0.5 17. 0.4 27. 7.7 37
-		······································			8. 0.3 18.3.3 28.6.6 38
	,				9. 0.2 19. 8. 4 29. 2. 0 39
					10. 1.1 20. 5-2 30. 0.9 40.
					Particle Shape:
				5	□ Platy
					Uvery Angular Angular Sub-Rounded
					Embededness: 80 %
					Subpavement:
5					Sorting: Well Moderate Poor Very poor
			1 - 10 ₁		Sediment Transport
					Observed Not Observed
			1		If Observed:
······					□ Suspended □ Sliding □ Rolling □ Saltation
					Percentage of Bed Active: %
					Velocity and Discharge
					Velocity: Method:
					□ Estimated m/s □ Wiffle ball
					□ Measured m/s □ Current Meter
					Discharge:
					□ Estimated m ³ /s □ Marsh McBirnev
					\square Measured m^3/s \square Other

Completed by: _____ Checked by: _____

	N-12-1-	Reach/XS: X52
Sketch (Viewed Dov	wnstream) Include: vegetation type and	d location, soil horizons, woody debris, roots, etc.
Left	Bank	Right Bank
the second se	and the first of the second	1
Ground		
water	J.	
		and the second sec
		2
	2V	avel, cobbles, sand
Left Davis Materials	Q	
Bedrock	\□/Gravel	Bedrock Gravel
TT TH	□ Small Cobble	Till Small Cobble
Clay	Large Cobble	Clay 🗆 Large Cobble
Clay	Large Cobble Small Boulder	□ Clay □ Large Cobble □ Silt □ Small Boulder
□ Clay □ Silt \10 Sand	□ Large Cobble □ Small Boulder □ Large Boulder	Clay Large Cobble Silt Sand Large Boulder Large Boulder
□ Clay □ Silt ☑ Sand Bank Height:	□ Large Cobble □ Small Boulder □ Large Boulder <u>↓ ₩ C</u> m	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height: <u>VWC</u> m
□ Clay □ Silt ☑ Sand Bank Height: Bank Angle:	□ Large Cobble □ Small Boulder □ Large Boulder <u>VWC</u> m <u>70</u> °	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height: m Bank Angle: °
□ Clay □ Silt ☑ Sand Bank Height: Bank Angle: Root Depth:	□ Large Cobble □ Small Boulder □ Large Boulder <u>VWC</u> m <u></u>	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height: <u>VWC</u> m Bank Angle: <u></u> ° Root Depth: <u></u> 30 m
□ Clay □ Silt ☑ Sand Bank Height: Bank Angle: Root Depth: Root Density:	□ Large Cobble □ Small Boulder □ Large Boulder <u>VWC</u> m <u></u>	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height: <u>VWC</u> m Bank Angle: <u></u>
Clay Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosian Din	□ Large Cobble □ Small Boulder □ Large Boulder <u>VWC</u> m <u></u>	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height:
□ Clay □ Silt ☑ Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin:	□ Large Cobble □ Small Boulder □ Large Boulder <u>VWC</u> m <u>70</u> ° <u>30</u> m <u>5</u> % <u>0</u> m <u>N/A</u> m	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder □ Bank Height: □ V W C m □ Bank Angle: □ V W C m □ Root Depth: □ 3.0 m □ Root Density: □ 0 % □ Undercut: ○ m □ V W C m m
□ Clay □ Silt ☑ Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	□ Large Cobble □ Small Boulder □ Large Boulder <u>VWC</u> m <u>70</u> ° <u>3.0</u> m <u>5</u> % <u>0</u> m <u>N/A</u> m	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height:
□ Clay □ Silt ☑ Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	□ Large Cobble □ Small Boulder □ Large Boulder <u>→ W C</u> m <u>→ 0</u> ° <u>→ 0</u> ° <u>→ 0</u> m <u>→ 5</u> % <u>→ 0</u> m <u>→ 1 A</u> m <u>× / A</u> m <u>kg/cm²</u> Foot Used: □ Yes □ No	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height:
□ Clay □ Silt □ Silt ○ Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer: F	□ Large Cobble □ Small Boulder □ Large Boulder <u>→ WC</u> m <u>→ 0</u> ° <u>→ 0</u> ° <u>→ 3.0</u> m <u>→ 5</u> % <u>→ 0</u> m <u>→ 70</u> m <u>→ 70</u> ° <u>→ 3.0</u> m <u>→ 5</u> % <u>→ 0</u> m <u>→ 1.4</u> m <u>→ 1.4</u> m	□ Clay □ Large Cobble □ Silt □ Small Boulder □ Sand □ Large Boulder Bank Height:

Sector Sector

M O R P H I X

Cross-Section Characteristics

Project Code: 20117

Date:	2020-12-17	Reach/Cross-section:	x53
Weather:	overast	Location:	Bronte Green
Field Staff:	TR CVM	Watershed/Subwatershed:	Bronte Creek

		Notes	Cross-sectional Morphology
t	otal s	station	🗆 Riffle 🛛 Pool 🗌 Run 🗌 Other
			Substrate
			Sample:
			🗆 Bed 🗔 Bank 🗆 Subpavement 🗆 Water 🗆 None
			Pebble Count (cm):
			1. 4.5 11. 1.2 21. 1.6 31. 3.8
			2. <u>19</u> 12. <u>20</u> 22. <u>1.3</u> 32. <u>28</u>
			3. 4.0 13. 1.5 23. 7.0 33. 7.5
			4. <u>35</u> 14. <u>1.6</u> 24. <u>14.0</u> 34. <u>2.4</u>
			5. 1.0 15. 3.8 25. 16.5 35. 1.4
			6. 2. 2 16. 2. 5 26. 20 36. 10.5
			7. 20 17. 10 27. 1.5 37. 8.3
			8. 3.2 18.1.5 28.4.2 38.2.4
			9. 3.4 19. 1.2 29. 7.8 39. 2.6
			10. 0.5 20. 1.2 30. 7.4 40. 1.7
		·	Particle Shape:
			🗆 Platy 🛛 Sub-angular 🗆 Well Rounded
		2	🗆 Very Angular 🖄 Angular 🗆 Sub-Rounded
			Rounded
			Embededness: 80 %
			Subpavement:
			Sorting: Well Moderate Poor Very poor
			Sediment Transport
			Observed Not Observed
			If Observed:
			Suspended Sliding Rolling Saltation
			Percentage of Bed Active: %
			Velocity and Discharge
			Velocity: Method:
			□ Estimated m/s □ Wiffle ball
			Measured m/s Current Meter
			\square Estimated m^3/c \square March McBirnov
			\Box Measured m^3/s \Box Other

Completed by: _____ Checked by: _____

nk Characteristics		Project Code: 20117-					
ate:	2020-12	-17	8	Reach/XS:	X	53	X
(Yetch	Viewed Downstro	eam) Include: ve	getation type and	l location, soil horizon	s, woody debr	is, roots, etc.	
	Left Bank					Right Ba	nk
				6			
	\sim			a mantur tarana arang	L	X	
	1	F	allen tr	22		and the second	
				and the second se			
		$\langle \cdot \rangle$		1			
			and the second second	×.			
		\sim		Nel	1 mm 1	1.1.	
		X	0	VX2	woody	debris	
		X	2000	JX N	woody	debris	
		X	9000. L	, cobbles	woody I grav	debris vel	
		X	€0:0. L	, cobbles	n gran	debris vel	
eft Bani	k Materials		Cond.	, cobbles	WOOdy I grau	debris vel	
əft Banı	k Materials edrock	A Gravel	2000 L	Right Ban	WOOdy I Grau k Materia drock	debris rel Is X Grave	
eft Bani B T	k Materials edrock	Gravel	ble	Right Ban	WOOdy I grau k Materia drock	debris rel Is Grave	el I Cobble
eft Bani B T C	k Materials edrock ill lay	A Gravel Small Cobl	ble	Right Ban	WOOdy I grav k Materia drock I ay	debris rel Is Small Large	el I Cobble e Cobble
eft Banl B T C S	k Materials edrock ill lay ilt	Gravel Small Cobl Large Cobl	ble ble	Right Ban Ben Cla Sil	WOOdy I grau k Materia drock I ay t	debris rel Is Grave Small Large Small	el I Cobble e Cobble I Boulder
eft Banl B T C S	k Materials edrock ill lay ilt and	Gravel Small Cobl Large Cobl Small Boul Large Boul	ble ble lder lder	Right Ban Bea Cla Sil	WOOdy I Graw k Materia drock I ay t nd	Is Grave Small Large Large	el I Cobble e Cobble I Boulder e Boulder
eft Bani B T C S S Ba	k Materials edrock ill lay ilt and nk Height:	Gravel Small Cobl Large Cobl Small Boul Large Boul	ble ble lder lder m	Right Ban Ben Till Cla Sill XSa Bar	WOOdy I grav k Materia drock I drock I ay t nd hk Height:	Is Is Small Large V WC	el I Cobble e Cobble I Boulder e Boulder m
eft Banl B T C S Ba Ba B	k Materials edrock ill lay ilt and nk Height: ank Angle:	Gravel Small Cobl Large Cobl Small Boul Large Boul	ble ble lder lder - m - °	Right Ban Ber Cla Sil Xsa Bar Bar	WOOdy I Grau k Materia drock I drock I ay t nd nk Height: ank Angle:	debris KL Is Grave Grave Small Large V WC 	el I Cobble e Cobble I Boulder e Boulder e Boulder m s
eft Bani B T C S Ba Ba R	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth:	Gravel Gravel Small Cobl Large Cobl Small Boul Large Boul WC SO S.O C	ble ble lder lder 	Right Ban Ber Cobbles Cla Sil XSa Bar Bar Ro	WOOdy I Grock I drock I ay t nd nk Height: ank Angle: pot Depth:	Is IS Grave Small Large VWC -70 3.0	el I Cobble e Cobble I Boulder e Boulder e Boulder
eft Bani B T C S Ba Ba R Roc	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth: ot Density:	Gravel Gravel Small Cobi Large Cobi Small Boul Large Boul WC 80 3.0 5	ble ble lder lder - m - m - %	Right Ban Ban Ban Ban Ban Ban Ban Ban Ban Ban	WOOdy I grav k Materia drock drock t nd nk Height: ank Angle: pot Depth: it Density:	bris debris debris state Small Grave Small Large VWC -10 -5 0	el I Cobble e Cobble I Boulder e Boulder m ° m %
eft Bani B T C S Ba Ba B R Roo	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth: ot Density: Undercut:	Control Contr	ble ble lder lder - m - m - m - m - m	Right Ban Ben Cla Sil XSa Bar Ba Roo	WOOdy I Grock I drock I ank Height: ank Angle: bot Depth: t Density: Undercut:	bris KL Is Grave Small Large V WC -20 -5 0 NIL	el I Cobble e Cobble I Boulder e Boulder m % m % m m %
eft Banl B T C S Ba B R R C C S S S S E	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth: ot Density: Undercut: rosion Pin:	Gravel Gravel Small Cobi Large Cobi Small Boul Large Boul WC 80 3.0 5 0 J/ P-	ble ble lder der m m m m m m	Right Ban Ber Cobbles Cla Sil Sa Bar Ba Roo Er	WOOdy I Grock I drock I ank Height: ank Angle: bot Depth: t Density: Undercut: rosion Pin:	bris debris debris small Grave Small Large V HC - - - - - - - - - - - - -	el I Cobble 2 Cobble I Boulder 2 Boulder 2 Boulder 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m
eft Bani B T C S Ba Ba R R C C S E Pen	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth: oot Depth: to Density: Undercut: rosion Pin:	A Gravel Small Cobi Large Cobi Small Boul Large Boul WC 80 3.0 5 0) / A	ble ble lder lder - m - m - m - m - m	Right Ban Ber Cobbles Right Ban Cla Sil XSa Bar Ba Roo Roo Er	WOOdy K Materia drock	debris KL Is Grave Grave Small Large V WC -20 -3.0 -5 0 N/A	el I Cobble 2 Cobble I Boulder 2 Boulder 3 Boulder 4 m 6 m 6 m 7
eft Banl B T C S Ba Ba B R R C C S S S S S S S S S S S S S S S S	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth: oot Depth: t Density: Undercut: rosion Pin: etrometer: Foot Us	Gravel Gravel Small Cobl Large Cobl Small Boul Large Boul WC 80 3.0 5 0 J/P- Sed:Yes	ble ble lder der m m m m m m m	Right Ban Ber Cobbles Cla Sil Sa Bar Ba Roo Fr Pene	WOOdy I Grock I Materia drock I drock I ank Height: ank Angle: bot Depth: t Density: Undercut: rosion Pin: etrometer:	bbris dbris sd small Grave Small Grave Small Large V WC Foot Used:	el I Cobble 2 Cobble I Boulder 2 Boulder 2 Boulder 3 m 3 ° 3 ° 3 m 3 ° 3 ° 3 m 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 °
eft Bani B T C S M S Ba B R R C C S E Pen	k Materials edrock ill lay ilt and nk Height: ank Angle: oot Depth: oot Depth: t Density: Undercut: rosion Pin: etrometer: Foot Us	Image Gravel Image Small Cobin Image Large Cobin Image Large Bound Image Large Bound Image Cobin Image Cobin<	ble ble ble lder lder - m - m - m - m - m - m - m - m - m - m	Right Ban Ben Cobbles Ban Cla Sil XSa Ban Ban Ban Ban Ban Ban Ban Ban Ban Ba	WOOdy I Grow k Materia drock I and hk Height: ank Angle: bot Depth: t Density: Undercut: rosion Pin: etrometer:	bris Cl Small Grave Small Large VWC -20 3.0 5 0 N/A Foot Used:	el I Cobble 2 Cobble I Boulder 2 Boulder 2 Boulder 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 °
eft Bani B T C S Ba B R R C C S Ba B R R C C S S Ba B R R C C S S S Ba B C S S S S S S S S S S S S S S S S S S	k Materials edrock ill lay ilt and nk Height: oot Depth: oot Depth: oot Depth: Undercut: rosion Pin: etrometer: Foot Us	Gravel Gravel Small Cobl Large Cobl Small Boul Large Boul WC Sol Sol Sol Sol Sol Sol Sol Sol	ble ble lder lder - m - m - m - m - m - m - m	Right Ban Ber Till Cla Sill XSa Bar Ba Roo Er Pene	WOOdy I Grock k Materia drock drock t ank Height: ank Angle: bot Depth: t Density: Undercut: rosion Pin: etrometer:	bris debris d Grave Small Large Small Large VWC 	el I Cobble 2 Cobble I Boulder 2 Boulder 2 Boulder 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 m 3 ° 3 ° 3 m 3 ° 3 ° 3 m 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 ° 3 °
eft Bani B T C S Ba Ba R R R C C S S Ba Ba Ba Ba R C C S S S S S S S S S S S S S S S S S	k Materials edrock ill lay ilt and nk Height: oot Depth: oot Depth: oot Depsity: Undercut: rosion Pin: etrometer: Foot Us al Notes	A Gravel Small Cobl Large Cobl Small Boul Large Boul WC SO SO SO SO SO SO SO SO SO SO	ble ble lder lder - m - m - m - m - m - m - m - m - m	Right Ban Ber Cobbles Cla Sil XSa Bar Ba Roo Er Pene	WOOdy I Grow k Materia drock l and nk Height: ank Angle: pot Depth: t Density: Undercut: rosion Pin: etrometer:	bris debris debris scu small Grave Small Large VWC 	el I Cobble 2 Cobble I Boulder 2 Boulder 2 Boulder 3 m 3 % 3 m 3 m 3 % 3 m 3 m 3 % 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m
eft Banl B T C S Ba Ba B R R C C S S Ba B B R R C C S S Ba B B R C C S S Ba B B C C S S S Ba B C C S S S Ba B C C S S S S S S S S S S S S S S S S S	k Materials edrock ill lay ilt and nk Height: oot Depth: oot Depth: Dt Density: Undercut: rosion Pin: etrometer: Foot Us	C C C C C C C C C C C C C C	ble ble lder lder - m - m - m - m - m - m - m	Right Ban Ber Till Cla Sill XSa Bar Ba Roo Er Pene	WOOdy I Grow k Materia drock l drock l av t nd nk Height: ank Angle: bot Depth: t Density: Undercut: rosion Pin: etrometer:	bris	el I Cobble 2 Cobble I Boulder 2 Boulder 2 Boulder 3 m 3 % 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m 3 m

GEO M

MORPHIX Geomorphology Earth Science Observations

Cross-Section Characteristics

Project Code: PN 20117

Date:	2020-12-17	Reach/Cross-section:	X54-monitoring
Weather:	overwast	Location:	Bronte Green
Field Staff:	TROM	Watershed/Subwatershed:	Bronte Creek

			Notes	Cross-sectional Morphology
total	Statio	n		🗆 Riffle 🛛 Pool 🗌 Run 🗌 Other
				1
-				Substrate
				Sample:
				🗆 Bed 🔲 Bank 🗆 Subpavement 🗆 Water 🗆 None
				Pebble Count (cm):
				1. 14.0 11. 25.0 21. 1.7 31. 2.6
				2. 12 5 12. 11. 0 22. 2.8 32. 9.5
				3. 10.5 13.7.2 23.6.8 33.2.5
				4. 22.0 14. 11 24. 94 34. 5.8
				5. 17.5 15. 1.4 25. 5.2 35. 9.5
-				6, 135 16, 05 26, 55 36, 44
				7.68 17.23 27.32 37.37
 				8, 18.0 18, 6.2, 28, 1.3 38, 3.5
				9.29.5 19.3.3 29.4.8 39.7.0
				10 19.0 20 1.6 30 5.2 40 13.0
				Particle Shape:
				Very Angular Angular
				Embododnosou 60 M
				Subsystements
				Subpavement:
				Sediment Transport
				I Observed:
	· •			
				Percentage of Bed Active:%
 				Velocity and Discharge
				Velocity: Method:
 				Li Estimated m/s Di Wiffle ball
 				☐ Measuredm/s ☐ Current Meter
				Discharge: ADV
 				□ Estimated m³/s □ Marsh McBirney
				□ Measuredm³/s □ Other

Completed by: _____ Checked by: _____

)ate:	2020-	12-17	Re	ach/XS:	(54 Monitor	ing
ketch (V	iewed Downs	stream) Include: yes	letation type and loca	tion, soil horizons, woody deb	ris roots etc	- 0
		ci camp madde. veg	jetation type and loca	don, son honzons, woddy del	nis, 1000s, etc.	
	Left Bar	nk			Right Bank	
	1					L
	1			y source that is a single set of the set of		
		M-	1			/
		10	and the second	A	and a second	
			μ			
		X				
		1		41		
		1	han	~//		
			LO OF	100		
				IN Cabbles	/	
				y cobble	5	
eft Bank	Materials			Right Bank Materia	als	
eft Bank	Materials drock	Gravel		Right Bank Materia	als	
eft Bank	Materials drock	Gravel	ble	Right Bank Materia	S Als ☐ Small Cobble	2
eft Bank Be Til Cla Sil	Materials drock I ay	Gravel	ole der	Right Bank Materia	als Gravel Small Cobble Large Cobble Small Boulde	e e e
eft Bank	Materials drock l ay t nd	Gravel	ole ole der der	Right Bank Materia	als Gravel Small Cobble Large Cobble Small Boulde Large Boulde	e e er er
eft Bank Be Til Cla Sil Sa Bar	Materials drock l ay t nd k Height:	Gravel	ole der der m	Right Bank Materia	Als Gravel Gravel Small Cobble Large Cobble Small Boulde Large Boulde O- 55	e e er er m
eft Bank Be Til Cla Sil Sar Bar Bar	Materials drock l ay t nd k Height: nk Angle:	Gravel Small Cobb Large Cobb Small Bould Large Bould WC FO	ole ole der der m o	Right Bank Materia	Als Q/Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0-55 20	e e er er m o
eft Bank Be Til Cla Sil Sa Bar Ba Ro	Materials drock l ay t nd k Height: nk Angle: ot Depth:	Gravel Small Cobb Large Cobb Small Bould Large Bould WC FO 30	ole ole der der m ° m	Right Bank Materia	als Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40	e e er er er m o m
eft Bank Be Til Cla Sil Sa Bar Bar Bar Roo	Materials drock ay t nd k Height: nk Angle: ot Depth: t Density:	Gravel Gravel Small Cobb Large Cobb Small Bould Large Bould WC FO 3.0 10	ole ole der der m ° m %	Right Bank Materia	als	e e er er m %
eft Bank Be Til Cla Sal Bar Ba Ro Roor	Materials drock l ay t nd k Height: nk Angle: ot Depth: t Density: Undercut:	Gravel Gravel Small Cobb Large Cobb Small Bould Large Bould WC PO 3.0 VO 0.08	ole ole der der m % m	Right Bank Materia	Als Q'Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40 10 0	e e er er m % m
eft Bank Be Til Cla Sil Sa Bar Ba Roo Roo Er	Materials drock I ay t nd k Height: ot Depth: t Density: Undercut: osion Pin:	Gravel Small Cobb Small Cobb Small Bould Small Bould Large Bould WC 7-0 3.0 10 0.0% ().20	ole ole der der m ° m % m m ivstalla	Right Bank Materia	als \[\scale{Gravel} Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0.55 \[\scale{O} 0.40 10 0 0.20	e er er m m % m m instal
eft Bank	Materials drock I ay t nd k Height: nk Angle: ot Depth: t Density: Undercut: osion Pin:	Gravel Gravel Small Cobb Large Cobb Small Bould Large Bould WC 7-0 3.0 10 0.08 ().20	ole ole der der m % m m iwsta Na	Right Bank Materia	Als Q'Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40 10 0.20	e er er m % m m i NStal
eft Bank Be Til Cla Sil Sa Bar Ba Roo Roo Pene	Materials drock I ay t nd k Height: ot Depth: t Density: Undercut: osion Pin: trometer:	Gravel Small Cobb Small Cobb Small Bould Large Bould WC 7-0 3.0 10 0.0% ().20	ole ole der der m % m m ivstallæ kg/cm²	Right Bank Materia	Als Gravel Small Cobble Cobble Small Boulde Large Boulde C-55 SO C-40 10 0 0.40 10 0 0.20 Ecot Used: Used	e er er m % m m instal kg/cm ² □ No
eft Bank	Materials drock l ay t nd k Height: ot Depth: t Density: Undercut: osion Pin: trometer: Foot	Gravel Gravel Small Cobb Large Cobb Small Bould Large Bould VWC PO 3.0 VO 0.0% ().20 Used:Yes	ole ole der der m % m m ivstalia kg/cm² □ No	Right Bank Materia Right Bank Materia Bedrock Till Clay Silt Sand Bank Height: Bank Angle: Root Depth: Root Density: Undercut: Erosion Pin: Penetrometer:	Als (Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40 10 0.20 Foot Used: Yes	e er er m % m m i n&fal kg/cm² □ No
eft Bank	Materials drock drock t ay t nd k Height: ot Depth: t Density: Undercut: osion Pin: trometer: Foot	Gravel Small Cobb Small Cobb Small Bould Large Bould WC 70 30 10 008 0.20	ole ole der der m % m m ivstalla kg/cm² □ No	Right Bank Materia	Als Gravel Small Cobble Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40 10 0 0.20 Foot Used: Yes	e er er m % m m i Nstal kg/cm² □ No
eft Bank Be Til Cla Sal Bar Ba Roo Roo Free Pene dditiona	Materials drock drock ay t nd k Height: nk Angle: ot Depth: t Density: Undercut: osion Pin: trometer: Foot I Notes	Gravel Small Cobb Large Cobb Small Bould Large Bould VWC PO 30 VO 008 ().20 Used: Yes	ole ole der der m % m m ivsta kg/cm² □ No	Right Bank Materia	Als Q'Gravel Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40 10 0 0.20 Foot Used: Yes	e er er m % m m instal kg/cm² □ No
eft Bank	Materials drock	Gravel Small Cobt Small Cobt Small Bould Large Bould WC 7-0 3 0 10 0 08 0.20	ole ole der der m % m m ivstalla kg/cm² □ No	Right Bank Materia	Als (Gravel Small Cobble Small Cobble Large Cobble Small Boulde Large Boulde 0.55 20 0.40 10 0 0.20 Foot Used: Yes	e er er m % m m i Wstal kg/cm² □ No

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MORPHIX

Cross-Section Characteristics

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Project Code: PN 20117

Date:	2020-12-17	Reach/Cross-section:	X55
Weather:	everyast	Location:	Bronte
Field Staff:	CVM.TR.	Watershed/Subwatershed:	Bronte Creek

		Notes	Cross-sectional Morphology
	total sta	ation	🗆 Riffle 🛛 Pool 🖾 Run 🗔 Other
			Substrate
			Sample:
			🗆 Bed 🗆 Bank 🗆 Subpavement 🗆 Water 🗆 None
			Pebble Count (cm):
			1. 25.0 11/05 21. 05 31. A.I
			2. 11.5 12. 14.0 22. 0.3 32. 1.6
			3. 8.5 13. 1.2 23. 0.4 33. 1.5
			4. 10.2 14. 1.4 24. 0.2 34. 0.5
			5. 6.4 15. 1. 1 25. 0.2 35. 07
			6. 4.8 16. 1.8 26. 0.5 36. 0.6
			7.70 17.1.2 27.0.4 37.06
			8.60 18.15 28.178 38.04
			9. 16.0 19. 0.5 29. 3.5 39. 0.5
			10.55 20.06 30.15 40.05
			Particle Shape:
			Platy Sub-angular U Well Rounded
			□ Very Angular □ Angular □ Sub-Rounded
•			
			Embededness: 40 %
			Subpavement:
	× 1		Sorting: Well Moderate Poor Very poor
			Sediment Transport
			Observed Not Observed
			If Observed:
			🗆 Suspended 🗆 Sliding 🗆 Rolling 🗆 Saltation
			Percentage of Bed Active: %
			Velocity and Discharge
			Velocity: Method:
			□ Estimated m/s □ Wiffle ball
			□ Measuredm/s □ Current Meter
			Discharge:
			□ Estimated m³/s □ Marsh McBirnev
			\square Measuredm ³ /s \square Other

Completed by: _____ Checked by: _____

ate:	2020-12-17	Reach	/XS:	x55	
ketch (\	/iewed Downstream) Include: vege	tation type and location, s	soil horizons, woody deb	oris, roots, etc.	
	Left Bank			Right Bank	
		Fall	enfree		
	A		Ŧ	Constant and the second s	
	Q	X,	woody du	laris	
		5000	bles + gra	vel	
eft Bank	Materials	Ric	ht Bank Materia	als	
□ Be	edrock 📈 Gravel		Bedrock	Gravel	
🗆 Til	II Small Cobble	e I	🗆 Till	Small Cobble	
	ay 🛛 Large Cobble		🗆 Clay	Large Cobble	
Si	It 🛛 Small Boulde	er	□ Silt	Small Boulde	r
🔀 Sa	and 🛛 Large Boulde	er	Sand	□ Large Boulde	r
Bar		m °	Bank Height:	80	m
Da	Ink Angle: <u>-10</u>		Bank Angle:	0.20	
Roo	t Density: 20	%	Root Depch:	10	111 04
100	Undercut: O	m	Undercute	0	70 m
Er	osion Pin: N/A	m	Erosion Pin:	NIA	m
Pene	trometer:	ka/cm ²	Penetrometer		ka/cm ²
	Foot Used: 🗆 Yes	□ No	, enerometer ,	Foot Used:	
ditiona	l Notes				

Cross-Section Characteristics

				a A a	•
		• •	GEO	MORPH Geomorphology Earth Science	ΙX
Cross-Section	Characteristics	Project Code:	20/17-	Observations	
Date:	2020-12-17-	Reach/Cross-section:	X56		
Weather:	overcast	Location:	Bronte		
Field Staff:	TR CVM	Watershed/Subwatershed:	Bronze	Creek	

and the second se		Notes	Cross-sectional Morphology
	total sta	hou	🗆 Riffle 🛛 Pool 🗌 Run 🗌 Other
			Substrate
			Sample:
			🗆 Bed 🗆 Bank 🗆 Subpavement 🗆 Water 🗆 None
			Pebble Count (cm):
			1,20.5 11, 1.2 21, 0.2 31, 0.7
			2.6.0 12.1.4 22 32 1.3
	~		3.7.8 13.1.2 23 33.1.2
			4 22.6 14 1.2 24 34 7.5
			5 14.5 157.5 25 25 25 25 25
			6 8.2 16 1.6 26 26 26 26
			7.15 17.08 27 28.
			1. <u>15</u> 11. <u>56</u> 21. <u>37. <u>5</u></u>
			$\frac{1}{12}$
			9. $\frac{nL}{19}$ 19. $\frac{LL}{19}$ 29. $\frac{39}{19}$ 39. $\frac{39}{19}$
			10. <u>7.7</u> 20. <u>6.3</u> 30. <u>40.</u> <u>7.2</u>
			Particle Shape:
· · · · · · · · · · · · · · · · · · ·			□ Platy V Sub-angular □ Well Rounded
			🗆 Very Angular 🗆 Angular 🛛 Sub-Rounded
•			□ Rounded
			Embededness:00/%
			Subpavement:
			Sorting: 🗆 Well 🗆 Moderate 🗹 Poor 🗆 Very poor
· · · · · · · · · · · · · · · · · · ·			Sediment Transport
			Observed Not Observed
			If Observed:
			Suspended Sliding Rolling Saltation
			Percentage of Bed Active: %
			Velocity and Discharge
			Velocity: Method:
			□ Estimated m/s □ Wiffle ball
			□ Measuredm/s □ Current Meter
			Discharge:
			□ Estimated m ³ /s □ Marsh McBirnev
			□ Measuredm ³ /s □ Other

Completed by: _____ Checked by: _____

		*	GEO M Geomer Earth Sci Oberaut	ORPH
ank Characteristics	Pro	ject Code: 20	117	
Date: 2020-12-17-	Rea	ch/XS:	156	······
Sketch (Viewed Downstream) Include: vegetat	ion type and locat	ion, soil horizons, woody debr	is, roots, etc.	
• Left Bank			Right Bank	
			<u><u></u></u>	Λ
	1	Source and	cobbles	
Woary aubitse		orater strate		
eft Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Bank Height: 0.72_{-} Bank Angle: 90 Root Depth: 0.40 Undercut: 0.21 Erosion Pin: N/A	m ° m m m	Right Bank Materia	Is Gravel Small Cobbl Large Cobbl Small Bould Large Bould 0.90 90 0.70 25 0.44 N/A	e er er m m m m m
Penetrometer: k Foot Used: □ Yes [<g cm²<br="">⊐ No</g>	Penetrometer:	Foot Used: 🗆 Yes	kg/cm² □ No
dditional Notes				
Photo Order:				

.

Completed by: _____ Checked by: _____

MORPHIX GEO Project Code: PN 20117-**Cross-Section Characteristics** Reach/Cross-section: XS7 Date: 2020-12-17 Bronte Weather: SUNNY -4°C Location: TROVM Field Staff: Watershed/Subwatershed: Bronte Creek Notes **Cross-sectional Morphology** □ Riffle □ Pool □ Run Other Substrate Sample: □ Bed □ Bank □ Subpavement □ Water □ None Pebble Count (cm): 1. 21.5 11. 17 21. 0.2 31. 187 1. 21.5 11. 4.7 21. 21.5 31. 21.5 2. 5.2 12. 4.3 22. 32. 8.6 3. 46.0 13. 7.2 23. 33. 5.6 4. 4.8 14. 5.2 24. 34. 4.5 5. 2.4 15. 6.5 25. 35. 3.5 6. 2.0 16. 13.0 26. 36. 6.0 27. 28. 29. 30. 7. 1.6 17. 1.0 37. 9.5 8. 26 18. 0.6 38.7.0 9. <u>1.8</u> 19. <u>1.4</u> 10. <u>1.5</u> 20. <u>13.0</u> 39. 0.4 40.45 Particle Shape: 🗆 Platy Sub-angular 🗆 Well Rounded □ Very Angular SVAngular Sub-Rounded □ Rounded Embededness: <u>50</u>% Subpavement: _____ **Sorting:** □ Well □ Moderate □ Poor □ Very poor **Sediment Transport** □ Observed □ Not Observed If Observed: □ Suspended □ Sliding □ Rolling □ Saltation Percentage of Bed Active: % Velocity and Discharge Velocity: Method: □ Estimated _____ m/s □ Wiffle ball □ Measured _____m/s □ Current Meter Discharge: ADV □ Estimated _____ m³/s □ Marsh McBirney □ Measured _____m³/s □ Other

Completed by: _____ Checked by: _____

	. •		GEO	MORPH I Geomorphology Earth Science
ank Characteristics	Project Coc	le: 201	17-	1 Observations
Date: 2020-12-17-	Reach/XS:	X	57	
Sketch (Viewed Downstream) Include: vegetati	ion type and location, soil horizon	ns, woody debris	s, roots, etc.	
Left Bank			Right Ba	ank
				Y
			alude	shrik
	1000 g	, wo	ody de	ebris Loobble
.eft Bank Materials	Right Bar	y W9	ody de el and	eloris Loobble
eft Bank Materials	Right Bar	J WO grav hk Materials	el and	el
eft Bank Materials Bedrock Till Small Cobble Clay	Right Bar Be Tril	wo gyau hk Materials drock	el and s Grav	el Il Cobble
eft Bank Materials eft Bank Materials Gravel Till Clay Clay Silt Silt Small Cobble Silt Clay Clay	Right Bar Be Tril Cl	A Materials	el and s Grav Grav Grav	el Il Cobble e Cobble
eft Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder	Right Bar Bee Til Cl Si	k Materials drock ll ay lt	s Gay de el and Sma Large Sma Large	el Il Cobble e Cobble Il Boulder
.eft Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: Image Soulder	Right Bar Be Til Cl Si Sa Ba	A Materials A Materials A Materials A	Cody de <u>el and</u> s Grav. Sma Larg. Sma Larg. (-3	el Il Cobble e Cobble Il Boulder e Boulder
eft Bank Materials □ Bedrock Gravel □ Till □ Small Cobble □ Clay □ Large Cobble □ Silt □ Small Boulder Sand □ Large Boulder Bank Height: <u>1 + - r</u> Bank Angle: + r	Right Bar Be Cl Si Sa Ba Ba Ba	And Ank Materials And And And And And And And And	el and el and s Sma Large Large 1.3	el Il Cobble e Cobble Il Boulder e Boulder m °
.eft Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: 1+ Bank Angle: 10 Root Depth: 1	Right Bar Be Till Cl Si Sa Ba Ba Ba Ba Ba	Ak Materials Ak Materials Adrock Il ay It and nk Height: ank Angle: bot Depth:	s Carly de el and Sma Large Large 1.3	el Il Cobble e Cobble Il Boulder e Boulder e Boulder m °
eft Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: 17 Bank Angle: 10 Root Depth: 10 Root Density: 15	m m %	Ak Materials drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock drock droc	Cody de <u>el and</u> S Sma Large <u>1.3</u> <u>60</u> <u>1.0</u> <u>10</u>	el Il Cobble e Cobble Il Boulder e Boulder m %
.eft Bank Materials □ Bedrock Gravel □ Till □ Small Cobble □ Clay □ Large Cobble □ Silt □ Small Boulder ☑ Sand □ Large Boulder Bank Height: 1.1 □ Root Depth: 1.0 □ Root Density: 1.5 □ Undercut: 0	m m m m m m m m m m m m m m m m m m m	Ak Materials Ak Materials Adrock Il ay It and nk Height: ank Angle: bot Depth: bt Density: Undercut:	Cody de el and s Sma Large 1.3 60 1.0 1.0	el Il Cobble e Cobble Il Boulder e Boulder m m m
eft Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: 1.7 Root Depth: 1.0 Root Density: 1.5 Undercut: 0 Erosion Pin: N/A	m m m m m m m m m m m m m m m m m m m	A Materials adrock ay at and nk Height: ank Angle: bot Depth: bt Density: Undercut: rosion Pin:	cdy de el and $cdy de el and$ $cdy de el an$	el Il Cobble e Cobble Il Boulder e Boulder e Boulder m % m m % m m m
Left Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: 1.1 Root Depth: 1.0 Root Density: 1.5 Undercut: 0 Vindercut: 0 Penetrometer: Kout Used:	m m % m % m % m % m m % m m % m m m m m	k Materials drock ll ay lt and nk Height: and nk Height: ot Depth: ot Depth: ot Depth: ot Density: Undercut: rosion Pin: etrometer:	Cont Used:	el Il Cobble e Cobble Il Boulder e Boulder m m m % m m m % m m m % m m m m m m m m m m m m m
Left Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: 1.1 Root Depth: 1.0 Root Depsity: 1.5 Undercut: 0 Frosion Pin: N/A Penetrometer: k Foot Used: Yes	m m m m m m m m m m m m m m m m m m m	Ak Materials Ak Materials Adrock II ay It and nk Height: and nk Height: ot Depth: ot Depth: ot Density: Undercut: rosion Pin: etrometer: F	Cody de <u>el and</u> Sma Carge Sma Large <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u>1.0</u> <u></u>	el Il Cobble e Cobble Il Boulder e Boulder m % % % % % % % % % % % % %
Left Bank Materials Bedrock Gravel Till Small Cobble Clay Large Cobble Silt Small Boulder Sand Large Boulder Bank Height: 1.1 Root Depth: 1.5 Root Density: 15 Undercut: 0 Penetrometer: N/A Poot Used: Yes	m m m m m m m m m m m m m m m m m m m	A Materials A Mat	S Grave Sma Large 1.0 1.0 1.0 0 N/A Coot Used:	el Il Cobble e Cobble Il Boulder e Boulder m % m m % m m % m m % m m % m m m % m m m % m m m % m m m m m % m m m m m m % m m m m m m m m m m m m m

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Completed by: _____ Checked by: _____

			•	GEO MORPHIX Geomorphology Earth Science Observations	
Cross-Sectio	n Characteristics	Projec	t Code: 20	7117	
Date:	Date: 2020-12-17		tion:	XS8	
Weather:	Weather:		Location: Bronte		
Field Staff:	TROUM	Watershed/Subw	vatershed:	Bronte Creek	
		Notes	Cross-secti	ional Morphology	
	total	stetion		e 🗆 Pool 🗌 Run 🗆 Other	
			Substrate		
			Sample:		
				1176 2143 2117-0	
			2 12.0	12 17.5 22 4.8 22 0.2	
			3 12 0	$12.7 \times 22.7 \times 32.0 \times 12.0 \times $	
			4 19.0	14 9.5 24 3.5 34	
			5 10.5	15 12 5 25 3 2 35	
			6. 18.0	16, 10, 0 26, 4, 8 36, V	
			7. 7.0	17.14.5 27. 4.1 37. 6.5	
·····			8.11.5	18, 12-2 28, 15, 0 38, 6.5	
			9. 8-5	19.16.10 29.10.10 39. 6.8	
			10.7.2	20.6.0 30.11.5 40.6.9	
			Particle Sh	ape:	
			🗆 Platy	🗹 Sub-angular 🗆 Well Rounded	
		· · · · · · · · · · · · · · · · · · ·	🗆 Very Ang	ular 🗆 Angular 🛛 🗹 Sub-Rounded	
			Rounded		
			Embedednes	ss: <u>40</u> %	
			Subpaveme	nt:	
			Sorting:] Well 🗆 Moderate 🗆 Poor 🗆 Very poor	
		à.			
			Sediment 1	Fransport	
)bserved 🛛 Not Observed	
			If Observe	d:	
			🗆 Suspende	ed 🗆 Sliding 🗆 Rolling 🗆 Saltation	
			Percentage of	of Bed Active: %	
			Velocity an	ld Discharge	
			Velocity:	Method:	
			Estimated	I m/s 🛛 Wiffle ball	
			Measured	Im/s 🛛 Current Meter	
			Discharge:		
			🗆 Estimated	I m³/s 🛛 Marsh McBirney	
			Measured	m ³ /s 🗆 Other	

Completed by: _____ Checked by: _____

ank Characteristics Date: 2020-12-17- Sketch (Viewed Downstream) Include: vegetation type Left Bank	GEO MORPH GEO MORPH Georgephology Entiscience Discretions Project Code: 20117 Reach/XS: X58 and location, soil horizons, woody debris, roots, etc. Right Bank Ground Water
Ank Characteristics Date: 2020-12-17- Sketch (Viewed Downstream) Include: vegetation type Left Bank	Project Code: 20117 Reach/XS: X58 b e and location, soil horizons, woody debris, roots, etc. Right Bank Ground Water
Sketch (Viewed Downstream) Include: vegetation type Left Bank	Reach/XS: XS8 e and location, soil horizons, woody debris, roots, etc. Right Bank Ground Water
Sketch (Viewed Downstream) Include: vegetation type Left Bank	e and location, soil horizons, woody debris, roots, etc. Right Bank Ground Water
Left Bank	Right Bank
	Ground Water
	Ground water
	F Ground Water
	H
- Com	- Brundy Ashrik
2000	S may como
_, (Q	00/62
eft Bank Materials	Right Bank Materials
Bedrock Gravel	Bedrock Gravel
Li Clay Large Cobble	Clay 🗆 Large Cobble
□ Silt □ Small Boulder	□ Silt □ Small Boulder
Sand 🗆 Large Boulder	□ Sand □ Large Boulder
Bank Height: <u>/ - 8</u> m	Bank Height: m
Bank Angle: 45 °	Bank Angle:
Root Depth: ΛO m	Root Depth:00 m
Root Density:%	Root Density:%
Undercut: m	Undercut: m
Erosion Pin:N/H m	Erosion Pin: m
Penetrometer: kg/cm ²	² Penetrometer: kg/cm ²
Foot Used: 🗆 Yes 🗆 No	Foot Used: 🗆 Yes 🗆 No
Additional Notes	
Photo Ordery	
noto viueri	
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· · ·	Completed by
· • •	Completed by: Checked by:

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ć		*	GEO MORPHIX Geomorphology Earth Science Observations		
Cross-Section	n Characteristics	Project Code: 2	DIIT The second second		
Date:	2020-12-17	Reach/Cross-section:	XS9 K		
Weather:	SUNNY -4°C	Location:	Bronte Green		
Field Staff:	WMTR	Watershed/Subwatershed: Bronte Creek			
		Notes Cross-sectional Morphology			
		🗆 Riffl	🗆 Riffle 🗆 Pool 🗆 Run 🗆 Other		
		Substrate	Substrate		
		Sample:	Sample:		
		🗆 Bed 🗆 B	🗆 Bed 🗆 Bank 🗆 Subpavement 🗆 Water 🗆 None		
		Pebble Cou	Pebble Count (cm):		
		1. 10.4	$11. \frac{0.0}{21.0} 21. \frac{0.2}{20.0} 31. \frac{0.2}{0.0}$		
5		2. 13.5	12.24.022.40 32.06		
		3. 4.3	$13. \underbrace{11.}_{-8} \underbrace{23. \underbrace{4.4}_{-6} 33. \underbrace{0.5}_{-6}}_{-6}$		
		4. 7.0	14. 50 24. 80 34. 000 34. 000 34. 000000 34. 0000 34. 0000 34. 0000 34. 00000 34. 00000 34. 00000 34. 00000 34. 00000 34. 00000 34. 00000 34. 00000 34. 00000 34. 000000 34. 0000000 34. 000000 34. 00000 34. 000000000 34. 000000		
		5. 10	151.2 25. 0.0 35. 0.5		
		6. <u>0°S</u>	160 260 361.0		
			17.0.2.2.5 $37.4.5$		
		8. 51	$18. \frac{1}{10.5} 28. \frac{1}{0.4} 38. \frac{1}{2.3}$		
		9.17	19.403 29.41 39.35		
			20 30 40		
		Particle Sh	nape:		
		Very Ang	lular 🗆 Angular 🗀 Sub-Rounded		
		Ellibededile	SS %		
		Subpaverne			
		Sediment	Transport		
			Observed INot Observed		
			ed □ Sliding □ Rolling □ Saltation		
		Dercentage	of Bed Active:		
			70 - Dea Active: 70		
		Velocity ar	nd Discharge		
		Velocity	Method		
		□ Fstimator	t m/s □ Wiffle hall		
			m/s □ Current Meter		
		Discharge			
		□ □ Fstimater	d m³/s □ Marsh McBirney		
			$m^3/s \square Other$		

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Completed by: _____ Checked by: _____

	GEO MORPH Geomorphology
nk Characteristics	Project Code: 20117
Date: XUXU-1X-17-	Reach/XS: XS9
Sketch (Viewed Downstream) Include: vegetation	n type and location, soil horizons, woody debris, roots, etc.
6949	
Left Bank	Right Bank
) d	
(S'	5 Ground
	1100
	Under
\sim	
	Woody
KQQ CO	A Jubris
4000	and and
	a small coppler + availed
Left Bank Materials	Right Bank Materials
□ Silt □ Small Boulder	
□ Sand □ Large Boulder	□ Sand □ Large Boulder
Bank Height: <u>1.95</u> m	Bank Height: m
Bank Angle: *	Bank Angle: 60 °
Root Depth: $-\frac{1}{2}$ m	Root Depth:6 m
Root Density:%	Root Density:%
Erosion Pin: N/A m	Undercut: m
Penetrometer: kg/	/cm ² Penetrometer: kg/cm ²
Foot Used: 🗆 Yes 🗆 🛙	No Foot Used: 🗆 Yes 🗆 No
dditional Notes	
Photo Order:	
· · · · · · · · · · · · · · · · · · ·	
	Completed by: Checked by:
	Page of

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____ OF _____

Cross-Section Characteristics

100 H 11	-	12	1	(General)
Project	Code:	AAO	Second	17812
		h we will	8 8	

X510 MONITORING 2020-12-17-Reach/Cross-section: Date: Weather: Loudy Location: Bronte CVM Field Staff: Watershed/Subwatershed: Bronke Creek Notes Cross-sectional Morphology □ Riffle □ Pool □ Run Other Substrate Sample: □ Bed □ Bank □ Subpavement □ Water □ None Pebble Count (cm):

 Pebble Count (cm):

 1. $\frac{43.0}{1.00}$ 11. $\frac{6.9}{1.00}$ 21. $\frac{18.0}{12.00}$ 31. $\frac{0.6}{3.20}$

 2. $\frac{35.0}{12.9.5}$ 12. $\frac{9.5}{22.12.00}$ 32. $\frac{0.3}{3.20.3}$

 3. $\frac{9.0}{1.00}$ 13. $\frac{9.4}{1.40}$ 23. $\frac{11.5}{14.5}$ 33. $\frac{0.6}{5.5}$

 4. $\frac{9.5}{1.50}$ 14. $\frac{4.6}{1.50}$ 24. $\frac{17.5}{1.50}$ 34. $\frac{0.6}{0.60}$

 5. $\frac{3.3}{5.3}$ 15. $\frac{6.1}{25.2900}$ 35. $\frac{6.2}{6.2}$

 6. $\frac{5.4}{5.4}$ 16. $\frac{4.2}{2.2}$ 26. $\frac{19.0}{2.00}$ 36. $\frac{2.4}{2.40}$

 7. $\frac{8.0}{2.00}$ 17. $\frac{6.2}{2.2}$ 27. $\frac{16.5}{2.5}$ 37. $\frac{3.4}{2.40}$

 8. $\frac{8.4}{2.80}$ 18. $\frac{5.5}{2.5}$ 28. $\frac{22.0}{2.5}$ 38. $\frac{2.4}{5.6}$
9. 28-0 19.7.7 39. 5-6 29.0.5 30. 0.4 40. 11-3 10.7.2 20.11.1 Particle Shape: Sub-angular 🗀 Well Rounded Platy Rounded Embededness: <u>30</u>% Subpavement: **Sorting:** □ Well □ Moderate □ Poor □ Very poor Sediment Transport Observed Not Observed If Observed: □ Suspended □ Sliding □ Rolling □ Saltation Percentage of Bed Active: % Velocity and Discharge Velocity: Method: □ Estimated _____ m/s □ Wiffle ball □ Measured _____m/s □ Current Meter Discharge: ADV □ Estimated m³/s □ Marsh McBirney □ Measured _____m³/s □ Other

Completed by: _____ Checked by: _____

Page _____ of _____

MORPHIX

GEO
						GEO MO Geomorpholo Earth Science Observations	кчн ^{ууу}
nk Characteristics			Project Code:	201	17		
te:	2020-12-	17		Reach/XS:	XS	510 - MONI	TORIN
etch (\	/iewed Downstrea	m) Include: ve	egetation type and	location, soil horizons, wo	ody debris,	roots, etc.	
	Left Bank					Right Bank	
			····				
×							and a second
						/	
						/	
	·····						
		for			and the second s		
		- Autom	2000 ·	A	3		
			and the second second	Cococi 1		-16100	
					> 0	poples	
		and the second	•		200	000100	
ft Bank	Materials	Gravel		Right Bank M	aterials	Bérnuel	
ft Bank	c Materials edrock E	Gravel	ble	Right Bank M	aterials		
ft Bank	c Materials edrock [] II [] av []	Gravel	ble	Right Bank M	aterials	Gravel	
ft Bank	ay C	Gravel Small Cob	ble	Right Bank M Bedroc Till Clay Silt	aterials	Gravel	
ft Bank	x Materials edrock [] II [] ay [] It []	Gravel Small Cob Large Cob	ble ble ilder	Right Bank M Bedroc Till Clay Silt	aterials k	Gravel	ſ
ft Bank Be Ti Cl Si Si Sa	c Materials edrock C II C ay C It C and C	Gravel Small Cob Large Cob Small Bou Large Bou	ble ble ilder ilder	Right Bank M Bedroc Till Clay Silt Sand	aterials k	Gravel Small Cobble Large Cobble Small Boulder Large Boulder	r r
ft Bank Be Ti Cl Si Si Ban	a Materials	Gravel Small Cob Large Cob Small Bou Large Bou 75	ible ible ilder ilder m	Right Bank M Bedroc Till Clay Silt Sand Bank H	aterials k eight:	Gravel	r r
ft Bank Bank Ti Cl Si Si Sa Ban Ban	Materials edrock [] ay [] ay [] lt [] and [] nk Height: 1 ank Angle: 5	Gravel Small Cob Large Cob Small Bou Large Bou 25	ible ible ilder ilder m	Right Bank M Bedroc Till Clay Silt Sand Bank H Bank /	aterials k eight:	Gravel Gravel Small Cobble Large Cobble Small Boulder Large Boulder 1-65 65 1-20	m °
ft Bank Be D Ti Cl Si Si Bai Ba Ro	a Materials edrock I ay I ay I lt I and I nk Height: 1 ank Angle: 5 pot Depth: 1	Gravel Gravel Small Cob Large Cob Small Bou Large Bou 25 0 5	ible ible ilder ilder m m	Right Bank M Bedroc Till Clay Silt Sand Bank H Bank A Root D	aterials k eight: . Angle: .	CyGravel Small Cobble Large Cobble Small Boulder Large Boulder 1-65 65 1-20 20	r m °
Ft Bank Be D Ti Cl Si Si Bai Ba Ro Ro	A Materials edrock I ay I ay I It I and I nk Height: Λ - ank Angle: 5 pot Depth: Λ - at Density: $2n$	Gravel Gravel Small Cob Large Cob Small Bou Large Bou 75 0 5	ible ible ilder ilder m m m %	Right Bank M Bedroc Till Clay Silt Sand Bank H Bank A Root D Root De	eight: Angle: An	Gravel Gravel Small Cobble Carge Cobble Small Boulder Carge Boulder Carg	m %
ft Bank Be D Ti Cl Si Si Sa Ban Ba Ro Ro	A Materials edrock [] ay [] ay [] lt [] and [] and [] ank Height: [] ank Angle: [] bot Depth: [] ut Density: [] Undercut: []	Gravel Small Cob Large Cob Small Bou Large Bou 25 0 5 0 1 0	ible ible ilder ilder 	Right Bank M Bedroc Till Clay Silt Sand Bank H Bank A Root D Root De Und	eight: Angle: An	Gravel Gravel Small Cobble Large Cobble Small Boulder Large Boulder 1-65 65 1-20 20 0	m % m
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Appendix D Detailed Assessment Summary

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Detailed Geomorphological Assessment Summary Reach BCT-1

Project Number:	PN20117	Date:	2020-12-17
Client:	Argo Bronte River Corporation	Length Surveyed (m):	46.2
Location:	Oakville	# of Cross-Sections:	8

Reach Characteristics						
Drainage Area:	n/a	Dominant Riparian Vegetation Type:	Trees			
Geology/Soils:	Glaciolacustrine deposits	Extent of Riparian Cover:	Continuous			
Surrounding Land Use:	Forested, residential	Width of Riparian Cover:	>10 Channel Widths			
Valley Type:	Confined	Age Class of Riparian Vegetation:	Mature			
Dominant Instream Vegetation Typ	be: n/a	Extent of Encroachment into Channel:	None			
Portion of Reach with Vegetation:	0%	Density of Woody Debris:	Low			

Hyarology			
Measured Discharge (m ³ /s):	Not measured	Calculated Bankfull Discharge (m ³ /s):	2.90
Modelled 2-year Discharge (m ³ /s):	Not modelled	Calculated Bankfull Velocity (m/s):	4.00
Modelled 2-year Velocity (m/s):	Not modelled		

Profile Characteristics		Planform Characteristics	
Bankfull Gradient (%):	20.84	Sinuosity:	1.10
Channel Bed Gradient (%):	20.78	Meander Belt Width (m):	Not measured
Riffle Gradient (%):	27.91	Radius of Curvature (m):	Not measured
Riffle Length (m):	7.59	Meander Amplitude (m):	Not measured
Riffle-Pool Spacing (m):	15.24	Meander wavelength (m):	Not measured

Longitudinal Profile

.. . .



Bank Characteristics								
	Minimum	Maximum	Average		Minimum	Maximum	Average	
Bank Height (m):	0.55	1.90	1.19					
Bank Angle (deg):	35	90	71	Torvane Value (kg/cm ²):		Not measured		
Root Depth (m):	0.20	80.00	6.79	Penetrometer Value (kg/cm ³):		Not measured		
Root Density (%):	5	25	11	Bank Material (range):				
Bank Undercut (m):	0.08	0.44	0.24					

Cross-Sectional Characteristics

	Minimum	Maximum	Average
Bankfull Width (m):	1.22	3.11	2.16
Average Bankfull Depth (m):	0.19	0.44	0.34
Bankfull Width/Depth (m/m):	3	17	7
Wetted Width (m):	0.00	0.73	0.42
Average Water Depth (m):	0.00	0.09	0.05
Wetted Width/Depth (m/m):	0	32	10
Entrenchment (m):		Not measured	
Entrenchment Ratio (m/m):		Not measured	
Maximum Water Depth (m):	0.00	0.11	0.07
Manning's <i>n</i> :		0.055	
I contraction of the second			



Photograph at cross section 4 (looking upstream)

Representative Cross-Section #4



Channel Thresholds						
Flow Competency (m/s):		Tractive Force at Bankfull (N/m ²):	684.99			
for D ₅₀ :	0.94	Tractive Force at 2-year flow (N/m ²):	Not modelled			
for D ₈₄ :	1.68	Critical Shear Stress (D ₅₀) (N/m ²):	21.67			
Unit Stream Power at Bankfull (W/m ²):	2741.58					

General Field Observations

Channel Description

Reach BCT-1 is a steep, confined channel that flows down along the valley associated with Bronte Creek. The channel is fed by a small pond at the top of the valley. Valley wall contact at the banks is nearly constant throughout the upstream portion of the reach. The downstream portion opens into the Bronte Creek floodplain, where the channel begins to exhibit a more meandering planform. Substrate is characterized by sand, gravel, and cobbles. Large woody debris is fairly common throughout and exposed mature tree roots are observable in many banks. Evidence of groundwater seepage in the banks was noted during the assessment. Average bankfull width and depth are 2.16 m and 0.34 m, respectively.



Appendix E Erosion Modelling Hydrograph



























Project #: 23026a

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Appendix F Conceptual Design Drawings







- IN EACH ZONE PRIOR TO MOVING ON TO NEXT ZONE. 14. REMOVE COFFERDAMS AND INTRODUCE FLOWS TO THE RESTORED CHANNEL ONCE THE SITE HAS BEEN DEEMED STABLE BY THE DESIGNER.
- 15. RESTORE SURFACES DISTURBED BY THE CONSTRUCTION WORK OR STAGING AREA(S) TO ORIGINAL CONDITION.





SCALE: AS NOTED

SHEET 2 OF 5















EROSION CONTROL BLANKET SPECIFICATIONS

- 1. A BIODEGRADABLE EROSION CONTROL BLANKET (ECB) SHALL BE INSTALLED ON ALL DISTURBED NATURAL SURFACES FOLLOWING THE PLACEMENT OF TOPSOIL AND APPLICATION OF THE NATIVE SEED MIX.
- 2. THE ECB MUST BE CONSTRUCTED OF 100% WOVEN COCONUT FIBRE (E.G., COIR) OR STRAW MAT WITHIN A GEOJUTE NETTING (TOP AND BOTTOM) WITH BIODEGRADABLE THREAD. NON-BIODEGRADABLE MATERIAL INCLUDING POLYPROPELENE OR PLASTICS WITH A BIODEGRADABLE RATING ARE NOT ACCEPTABLE. THE MINIMUM WEIGHT OF THE ECB MUST BE 400 g/m^2 (12 oz./yd²).
- 3. TO INSTALL, THE ECB MUST BE UNROLLED DOWNSLOPE OR IN DIRECTION OF WATER FLOW. ADJACENT ECBS SHOULD OVERLAP A MINIMUM OF 150 mm ALONG THE EDGES. AT THE END OF EACH ROLL, FOLD BACK 100 mm TO 200 mm OF THE ECB. OVERLAP THIS 100 mm TO 200 mm
- OVER THE START OF THE NEXT ROLL. SECURE THE TWO LAYERS TO THE GROUND SECURELY. 4. BIODEGRADABLE OR TAPERED WOODEN STAKES SHALL BE USED TO SECURE THE BLANKET. STAKES SHALL BE INSTALLED AT THE SPACING RECOMMENDED BY THE ECB MANUFACTURER TO PREVENT SURFACE RUNOFF FROM ERODING THE UNDERLYING SOIL.



SPECIES AND QUANTITIES

BARE
BARE
BARE

NOTES

- 1. QUANTITY TO BE DETERMINED BASED ON AREA OF DISTURBANCE TO BE I 2. LIVE STAKES SHOULD BE FROM AT MINIMUM 2-YEAR OLD STOCK.
- 3. LIVE STAKES ARE TO BE INSTALLED AT A DENSITY OF 3 STAKES PER SQUA
- 4. LIVE STAKES SHOULD BE PRE-SOAKED (SUBMERGED IN WATER) FOR AT LE AFTER HARVESTING AND IMMEDIATELY BEFORE INSTALLATION. 5. LIVE STAKES SHOULD NOT BE STORED FOR A PERIOD LONGER THAN 2 DAY
- BEING SOAKED. 6. THE CONTRACTOR SHALL PROTECT PLANT MATERIALS FROM DRYING FRO HARVEST UNTIL INSTALLED.
- 7. LIVE STAKES ARE TO BE A MINIMUM OF 25 mm IN DIAMETER AND CUT TO A
- 8. CUT ANGLE AT THE BOTTOM OF THE STAKE AND FLAT ON THE TOP. 9. TRIM ALL SIDE BRANCHES WHILE TAKING CARE NOT TO DAMAGE THE BARI
- 10. INSTALL STAKES WITH BUDS POINTING UPWARDS AND THICKER STEM IN T
- 11. LIVE STAKES SHOULD BE INSTALLED USING A LARGE RUBBER MALLET. 12. 80% OF THE STAKE IS TO BE BELOW SURFACE.
- 13. TAMP THE LIVE STAKE INTO THE GROUND AT RIGHT ANGLE TO THE SURFA
- 14. IN COMPACT SOIL A PILOT HOLE SHOULD BE USED TO LIMIT DAMAGE TO T 15. IF USING A PILOT HOLE REPACK SOIL AROUND THE LIVE STAKE.
- 16. LIVE STAKES SHOULD STAND FIRM FROM THE SOIL FOLLOWING INSTALLAT 17. ALL STAKES NOT PLANTED TO THE SPECIFICATIONS ABOVE WILL BE REPLA
- CONTRACTOR'S EXPENSE.

LIVE STAKE N.T.S.

CONSERVATION HALTON EARLY SUCCESSION / RIP

COMMON NAME
BLACK EYED SUSAN
BLUE VERVAIN
CANADA ANEMONE
CANADA GOLDENROD
LITTLE BLUESTEM
COMMON MILKWEED
FOWL BLUEGRASS
MEADOW/OPEN FIELD SEDGE
NEW ENGLAND ASTER
PATH RUSH
PURPLE STEMMED ASTER
VIRGINS BOWER
WILD BERGAMOT

SPECIES % (Rudbeckia hirta Verbena hastata Anemone canadensis Solidago canadensis Schizachyrium scoparium Asclepias syriaca Poa palustris Carex granularis Symphyotrichum novae-angliae 1 Juncus tenuis Symphyotrichum puniceum Clematis virginiana Elymus virginicus

NOTES

1. APPLY SEED MIX AT A RATE OF 25 kg PER HECTARE.

2. SEEDING SHALL OVERLAP ADJACENT GROUND COVER BY 300 mn

3. APPLY NURSE CROP AT A RATE OF 25 kg PER HECTARE.

4. WATER SOIL AFTER SEED APPLICATION.

CONSERVATION HALTON MEADOW MARSH MIX

COMMON NAME	SPECIES
BEBBS SEDGE	Carex bebbi
BLUE LOBELIA	Lobelia siphilitica
BLUE VERVAIN	Verbana hastata
BONESET	Eupatorium perfoliatum
DARK GREEN BULRUSH	Scirpus atrovirens
FOX SEDGE	Carex vulpinoidea
GRASS LEAVED GOLDENROD	Euthamia graminifolia
MEADOW / OPEN FIELD SEDGE	Carex granularis
PURPLE STEMMED ASTER	Symphyotrichum puniceum
SOFT RUSH	Juncus effusus
SPOTTED JOE PYE WEED	Eupatorium maculatum
MONKEY FLOWER	Mimulus ringens
STALK GRAIN SEDGE	Carex stipata
TALL MANNA GRASS	Glyceria grandis
WOOLGRASS	Scirpus cyperinus
FOWL BLUEGRASS	Poa palustris
NOTES	

- 1. APPLY SEED MIX AT A RATE OF 25 kg PER HECTARE.
- 2. SEEDING SHALL OVERLAP ADJACENT GROUND COVER BY 300 mr 3. APPLY NURSE CROP AT A RATE OF 25 kg PER HECTARE.
- 4. WATER SOIL AFTER SEED APPLICATION.

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	N.T.S.	
	GENERAL NOTES	
	 ALL CONTRACT DRAWINGS, SPECIFICATIONS AND APPLICABLE PERMITS MUST BE KEPT ON SITE DURING CONSTRUCT FOR REFERENCE. THE CONTRACTOR MUST NOTIFY THE CONTRACT ADMINISTRATOR AND CONSERVATION AUTHORITY OF THE INTENT 	TION TO
	COMMENCE WORK AT LEAST 48 HOURS IN ADVANCE. 3. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY LOCATES. 4. LAYOUT MUST BE REVIEWED AND APPROVED BY THE CONTRACT ADMINISTRATOR.	
	TIMING OF WORKS	
	 TREE CLEARING SHOULD BE COMPLETED OUTSIDE THE BIRD NESTING SEASON TO COMPLY WITH THE FEDERAL MIGR BIRDS CONVENTION ACT. ANY TREES THAT REQUIRE REMOVAL OUTSIDE OF THIS TIMING WINDOW MUST FIRST BE INSPECTED BY A QUALIFIED BIOLOGIST TO DETERMINE THE PRESENCE OF NESTING BIRDS. THE WEATHER FORCE ACT OF WALL AND ADDITIONE TO CHOODING THAT WORKS AND ADDITIONE THAT WORKS AND ADDITIONE THAT WORKS AND ADDITIONE THAT WORKS AND ADDITIONE THAT WORKS AND ADDITIONED AND ADDITIONE THAT WORKS AND ADDITIONED AND ADDIT	RATORY
N ROOT	 THE WEATHER FORECAST SHOULD BE CONTINUALLY MONITORED TO ENSURE THAT WORKS ARE UNDERTAKEN ONLY I FAVOURABLE WEATHER CONDITIONS. COMPLETE THE WORKS WITH MINIMAL AVOIDABLE INTERRUPTIONS ONCE THEY COMMENCE. 	DURING
ROOT ROOT	SITE AND MATERIAL MANAGEMENT 1. ALL CONSTRUCTION EQUIPMENT AND MATERIALS (IMPORTED OR EXCAVATED) MUST BE STORED AT LEAST 30 m AW.	AY FROM
	ANY WATERBODY IN A STABLE AREA ABOVE THE ACTIVE FLOODPLAIN, OR IN A DESIGNATED STAGING/STORAGE ARE IN THE EVENT OF AN UNEXPECTED STORM, ALL UNFIXED ITEMS THAT HAVE THE POTENTIAL TO CAUSE A SPILL OR AN OBSTRUCTION TO FLOW MUST BE MOVED A STABLE AREA ABOVE ACTIVE FLOODPLAIN. STOCKPILES MUST BE LOCATED OUTSIDE THE ISOLATED WORK APEAS	EA. N
BE RESTORED	 STABILIZE STOCKPILED SOLLED GOLD OF SIDE THE PROCENCE WOLK AREAS. STABILIZE STOCKPILED SOLLED THAT ARE STORED FOR PROLONGED PERIODS WITH THE APPLICATION OF A NURSE CF RATE OF 60 kg/ha. STABILIZE, TEMPORARILY OR PERMANENTLY, ANY DISTURBED AREAS AS WORK PROGRESSES, OR SOON AS CONDITI 	ROP AT A
QUARE METRE.	ALLOW. ON SOILS THAT WILL BE EXPOSED FOR PROLONG PERIODS, TEMPORARILY INSTALL A BIODEGRADABLE ERO CONTROL BLANKET ON EXPOSED SOILS, OR APPLY A NURSE CROP AT A RATE OF 60 KG/HA. 6. MINIMIZE THE AREA OF DISTURBANCE TO THE EXTENT POSSIBLE. 7. ALL VEGETATION, ADJACENT TO THE WORK AREA. MUST BE PROTECTED AND DELINEATED WITH CONSTRUCTION EEP	NCING
AT LEAST 24 HOURS	OR TREE PROTECTION BARRIERS. 8. ALL GRADES IN THE AREA REGULATED BY THE CONSERVATION AUTHORITY MUST BE MAINTAINED OR MATCHED, UNL OTHERWISE AUTHORIZED IN THE APPLICABLE PERMIT.	ESS
2 DAYS, UNLESS THEY ARE	EROSION AND SEDIMENT CONTROL	
FROM THE TIME OF	 ALL LEMPUKARY ERUSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO START OF WORKS. SEDIMENT CONTROLS MUST BE INSPECTED DAILY TO ENSURE THAT THEY ARE IN GOOD REPAIR AND FUNCTIONING A INTENDED. EROSION AND SEDIMENT CONTROLS MUST BE MAINTAINED DURING CONSTRUCTION, AND ANY REOUIRED REPAIRS (AS OR
ΓΟ A LENGTH OF 1000 mm.	REPLACEMENTS MUST BE COMPLETED WITHIN 24 HOURS AFTER THEY HAVE BEEN IDENTIFIED DURING THE MONITOR 4. EROSION AND SEDIMENT CONTROLS MAY REQUIRE PERIODIC ADJUSTMENTS TO REFLECT CHANGING SITE CONDITIO CONTRACTOR WILL BE RESPONSIBLE FOR THESE ADJUSTMENTS TO ENSURE PROPER FUNCTION. 5. ANY CHANGES TO THE EROSION AND SEDIMENT CONTROL PLAN BEYOND MINOP ADJUSTMENTS MUST BE ADDOUGED	RING. DNS. THE BY THF
BARK. IN THE BED.	 CONTRACT ADMINISTRATOR. ADDITIONAL EROSION AND SEDIMENT CONTROL SUPPLIES MUST BE KEPT ON SITE IN ORDER TO FACILITATE IMMEDI REPAIRS AND/OR UPGRADES AS NEEDED. ALL TEMPORAPS SEDIMENT CONTROL S MUST BE DEMONSTOR AFTER THE CONTROL SUPPLIES AND SEDIMENTS OF A DISCUSSION AND SEDIMENT	
	TABLE STABLE.	TO BE
JRFACE. TO THE STAKES.	PREVENT THE RELEASE OF SEDIMENT, SEDIMENT-LADEN WATER, RAW CONCRETE, CONCRETE LEACHATE OR ANY OTH DELETERIOUS SUBSTANCES INTO ANY WATERBODY, RAVINE OR STORM SEWER SYSTEM.	HER
LLATION.	 ENSURE EQUIPMENT AND MACHINERY ARE IN GOOD OPERATING CONDITION (POWER WASHED), FREE OF LEAKS, EXCOL, AND GREASE. NO EQUIPMENT REFUELLING OR SERVICING SHOULD BE UNDERTAKEN WITHIN 30 m OF ANY WATERCOURSE OR SURI WATER DRAINAGE. 	CESS FACE
	 A SPILL CONTAINMENT KIT MUST BE READILY ACCESSIBLE ON SITE IN THE EVENT OF A RELEASE OF A DELETERIOUS SUBSTANCE TO THE ENVIRONMENT. ONSITE STAFF MUST BE TRAINED IN ITS USE. THE CONTRACT ADMINISTRATOR MUST BE NOTIFIED IMMEDIATELY IN THE EVENT OF A SPILL OF DELETERIOUS SUBST 	STANCE.
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Appendix G Restoration Design Reference Photos



Appendix A- BCT-1 Tributary Design Recommendations Photographic Record





