

# APPENDIX A

## PHASE 2 GEOMORPHIC ASSESSMENT DATA

Phase 2 Reach Summary Statistics for Gunstock Brook

Reach/ Segment ID	Segment Length (ft)	Watershed Area (sq mi)	Reference Condition	Phase 1 Valley Width (ft)	Phase 1 Confinement Ratio	Phase 1 Confinement Type	Reference Bankfull Width (ft)	Hyd. Geo.Cross- sectional Area (sq ft)	Phase 2 Valley Width (ft)	Phase 2 Confinement Ratio	Phase 2 Confinement type	Channel Dimensions			Channel & Floodplain Ratios			Existing Conditions			RGA <sup>†</sup> Condition	RHA <sup>†</sup> Condition	CEM <sup>‡</sup> Stage	CEM <sup>‡</sup> Stage	Stream Sensitivity	
			Stream Type, Substrate, Bedform									Width (ft)	Mean Depth (ft)	Area (ft <sup>2</sup> )	Width-to- Depth	Entrench- ment	Incision	Stream Type	Substrate	Bedform						
M01-A	596	9.06										NA-not assessed Impounded														
M01-B	1,203	9.06	C, Gravel, Riffle-pool	1,320	57.4	Very Broad	37.0	84.6	1,065	46.3	Very Broad	23.0	2.51	57.7	9.2	1.9	2.2	Bc	Gravel	Plane-Bed	Fair	Fair	F	II	Very High	
M01-C	2,195	9.06	C, Gravel, Riffle-pool	1,787	77.7	Very Broad	37.0	84.6	1,616	70.3	Very Broad	23.0	2.60	59.8	8.8	1.7	2.3	Bc	Gravel	Riffle-Pool	Fair	Fair	F	II	Very High	
M01-D	654	9.06	C, Gravel, Riffle-pool	1,750	51.5	Very Broad	37.0	84.6	1,277	37.6	Very Broad	34.0	2.00	68.0	17.0	34.0	1.3	C	Gravel	Riffle-Pool	Fair	Fair	F	III	Very High	
M01-E	1,110	9.06	C, Gravel, Riffle-pool	1,440	38.9	Very Broad	37.0	84.6	400	10.8	Very Broad	44.3	1.30	57.6	34.1	2.4	1.8	C	Gravel	Riffle-Pool	Fair	Fair	F	III	Very High	
M02-A	1,807	8.22	C, Cobble, Plane Bed	303	8.7	Broad	35.0	78.6	225	6.4	Broad	36.0	2.61	94.0	13.8	4.8	1.3	Cb	Cobble	Plane-Bed	Poor	Fair	F	III	High	
M02-B	653	8.22	B**, Cobble, Step Pool	266	10.1	Very Broad	35.0	78.6	80	3.0	Semi-confined	26.3	1.91	50.2	13.8	1.37	1.0	B	Cobble	Step-Pool	Good	Fair	F	I	Moderate	
M02-C	3,470	8.22	C, Cobble, Riffle-pool	428	12.2	Very Broad	35.0	78.6	227	6.5	Broad	38.5	2.0	77.0	19.3	2.49	1.0	C	Cobble	Riffle-Pool	Fair	Fair	F	III	High	
M03-A	2,388	5.86	C, Cobble, Riffle-pool	468	15.6	Very Broad	30.0	60.9	225	7.5	Broad	40	1.15	46.0	34.8	2.15	2.0	C	Cobble	Riffle-Pool	Poor	Fair	F	IV	High	
M03-B	1,098	5.86	Fb, Cobble, Step-pool	112	3.7	Semi-confined	30.0	60.9	86	2.9	Semi-confined	30	1.71	51.3	17.5	1.2	1.0	Fb	Cobble	Step-Pool	Good	Fair	F	I	High	
M04-A	5,200	5.61	C, Gravel, Riffle-pool	1,464	50.5	Very Broad	29.0	58.9	889	30.7	Very Broad	35	1.5	52.5	23.3	16.1	1.0	C	Gravel	Riffle-Pool	Good	Good	F	I	High	
M04-B	3,641	5.61	C, Gravel, Riffle-pool	918	39.4	Very Broad	29.0	58.9	576	24.7	Very Broad	23.3	2.24	52.2	10.4	5.2	1.3	C	Gravel	Riffle-Pool	Fair	Good	F	II	Very High	
M04-C	848	5.61	C, Gravel, Riffle-pool	1,273	45.5	Very Broad	29.0	58.9	1,235	44.1	Very Broad	28.0	1.68	47.0	16.7	17.1	1.5	C	Gravel	Riffle-Pool	Fair	Fair	F	II	Very High	
M05-A	936	3.91	C, Gravel, Riffle-pool	888	48.5	Very Broad	24.0	44.9	888	48.5	Very Broad	18.3	1.70	31.1	10.8	10.1	1.5	C	Gravel	Riffle-Pool	Fair	Fair	F	II	Very High	
M05-B	1,433	3.91	C, Gravel, Riffle-pool	1,344	56.0	Very Broad	24.0	44.9	1,238	51.6	Very Broad	26.4	1.41	37.2	18.7	19.4	1.0	C	Gravel	Riffle-Pool	Good	Good	D	IIc	High	
M05-C	2,056	3.91	C, Gravel, Riffle-pool	936	39.0	Very Broad	24.0	44.9	916	38.2	Very Broad	33.0	1.50	49.5	22.0	11.3	1.0	C	Gravel	Riffle-Pool	Fair	Good	D	IIc	Very High	
T2.01-A	1,482	1.49	Cb, Gravel, Riffle-pool	407	27.1	Very Broad	15.0	21.6	407	27.1	Very Broad	20.0	1.41	28.2	14.2	13.2	1.1	Cb	Gravel	Riffle-Pool	Good	Good	D	IIc	High	
T2.01-B	2,324	1.49	Cb, Gravel, Riffle-pool	190	12.7	Very Broad	15.0	21.6	179	11.9	Very Broad	17	1.37	23.3	12.4	6.8	1.0	Cb	Gravel	Riffle-Pool	Good	Good	F	I	High	

<sup>†</sup>RGA = Rapid Geomorphic Assessment, RHA = Rapid Habitat Assessment; <sup>‡</sup>CEM = Channel Evolution Model

NA = Not Applicable

\*\*= Modified reference stream type

last updated March 7, 2012

Summary of the Rapid Habitat Assessment (RHA) Values for Gunstock Brook

Segment/ Reach ID	Reference Stream Type	Woody Debris Cover	Bed Substrate Cover	Scour and Depositional Features	Channel Morphology	Hydrologic Characteristics	Connectivity	River Banks		Riparian Area		Total Score	Percentage	Habitat Condition
								Left	Right	Left	Right			
M01-A	Impounded - Not Assessed													
M01-B	Riffle-Pool	7	6	11	8	13	12	3	4	2	2	68	43%	Fair
M01-C	Riffle-Pool	6	9	12	5	13	14	5	5	3	3	75	47%	Fair
M01-D	Riffle-Pool	7	12	13	14	12	12	4	4	3	4	85	53%	Fair
M01-E	Riffle-Pool	3	7	8	7	7	12	6	4	2	2	58	36%	Fair
M02-A	Plane Bed	13	12	11	14	13	13	6	5	4	7	98	61%	Fair
M02-B	Step-Pool	7	11	12	14	13	12	2	6	1	9	87	54%	Fair
M02-C	Riffle-Pool	6	8	9	11	13	13	6	3	7	2	78	49%	Fair
M03-A	Riffle-Pool	13	13	8	8	12	13	7	3	5	7	89	56%	Fair
M03-B	Step-Pool	8	12	12	13	13	3	3	7	2	7	80	50%	Fair
M04-A	Riffle-Pool	14	16	13	14	14	17	7	7	6	6	114	71%	Good
M04-B	Riffle-Pool	16	14	14	16	11	15	9	9	3	10	117	73%	Good
M04-C	Riffle-Pool	8	16	10	8	9	14	3	8	3	8	87	54%	Fair
M05-A	Riffle-Pool	9	13	13	8	14	13	7	7	3	7	94	59%	Fair
M05-B	Riffle-Pool	12	13	13	14	13	14	9	9	10	10	117	73%	Good
M05-C	Riffle-Pool	16	11	11	16	12	17	9	9	9	9	119	74%	Good
T2.01-A	Riffle-Pool	15	18	13	15	9	13	9	9	9	9	119	74%	Good
T2.01-B	Riffle-Pool	11	14	17	18	13	18	8	9	8	8	124	78%	Good
<b>Total Possible Scores:</b>		<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>160</b>	<b>100%</b>	<b>Reference</b>

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M01	Segment:	A	Completion Date:	24-Aug-11		
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	I	Rain:	Yes		
Organization:	BCE		Segment Location:	From mouth to Lakeshore Road						
Segment Length (ft):	596									
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<u>3.3 Riparian Corridor</u>	<u>Left</u>	<u>Right</u>	
1.1 Segmentation:	OT		2.6 Width/Depth Ratio	NE		<u>Bank Texture</u>	<u>Left</u>	<u>Right</u>	<u>Corridor Land Use</u>	
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	NE		Upper			Dominant	Shrub/Sapling
<u>1.3 Corridor Encroachments:</u>			2.8 Incision Ratio	NE		Material Type	Sand	Sand	Sub-dominant	Commercial
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA		Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0
Berms	0	0	2.9 Sinuosity	Low (<1.2)	Lower				Height (ft)	0
height (ft)			2.10 Riffle Type	Not Evaluated		Material Type	Sand	Sand	Gullies (number)	0
Roads	0	0	2.11 Riffle Step Spacing (ft)	NA		Consistency	Non-cohesive	Non-cohesive	Height (ft)	0
height (ft)			<u>2.12 Substrate Composition</u>			<u>Bank Erosion</u>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>	
Railroads	0	0	Bedrock	NE	%	Erosion Length (ft)	0	48	4.1 Springs/ Seeps	None
height (ft)			Boulder	NE	%	Erosion Height (ft)		4	4.2 Adjacent Wetlands	Minimum
Improved Paths	0	0	Cobble	NE	%	Revetment Type	Multiple	Multiple	4.3 Flow Status	Base
height (ft)			Coarse Gravel	NE	%	Revetment Length (ft)	36	73	4.4 # of Debris Jams	0
Development	417	0	Fine Gravel	NE	%	<u>Near Bank Veg. Type</u>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>
<u>1.4 Adjacent Side</u>	<u>Left</u>	<u>Right</u>	Sand	NE	%	L Trees (%)	10	0	0	100
Hillside Slope	Flat	Flat				R Trees (%)	70	0	0	100
Continuous	Never	Never	Silt/Clay Present	No		<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	
W/in 1 bankfull	Never	Never	Embedded (chan)	NE	%	L Shrub/Sapling (%)	100	0	80	20
Texture	NE	NE	Embedded (marg)	NE	%	R Shrub/Sapling (%)	70	0	30	70
<u>1.5 Valley Features</u>			LWD #	NE		<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	
Valley Width (ft)	1100					L Herbs (%)	60	10	80	10
Width Determination	Estimated		<u>2.13 Average Largest Particle</u>			R Herbs (%)	80	10	90	10
Confinement Type	Very Broad		Bed	Ne	inches	<u>Bank Canopy</u>	<u>Left</u>	<u>Right</u>	<b>Step 5. Channel Bed &amp; Planform Changes</b>	
Rock Gorge?	No		Bar	NE	inches	Canopy %	26-50	51-75	<u>5.1 Bar Types</u>	<u>Mid</u>
Human Caused Change?	No		2.13a % Subs. Exp.	NE	%	Mid-channel canopy	Open			<u>Point</u>
<b>Step 2. Stream Channel</b>			<u>2.14 Stream Type</u>			<u>3.2 Riparian Buffer</u>			<u>5.2 Other Features</u>	<u>Flood</u>
2.1 Bankfull Width (ft)	NE		Stream Type:	E		Buffer Width	<u>Left</u>	<u>Right</u>		<u>NCO</u>
2.1a Wetted Width (ft)	NE		Bed Material:	Sand		Dominant	51-100	51-100		<u>Avulsion</u>
2.1b Ratio (wetted/bkfl)	NE		Subclass Slope:	None		Sub-dominant	26-50	26-50		
2.2 Max Depth (ft)	NE		Bed Form:	Dune-Ripple		Length <25 ft	NE	NE		
2.3 Mean Depth (ft)	NE		Field Measured Slope:			<u>Buffer Veg. Type</u>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>
2.4 Floodprone Width (ft)	NE		<u>2.15 Reference Stream Type</u>			L Trees (%)	10	0	0	100
2.5 RAF	NE		E, Sand, Dune-Ripple			R Trees (%)	40	0	0	100
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	
			<u>3.1 Stream Banks</u>			L Shrub/Sapling (%)	70	0	80	20
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	70	0	10	90
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	
						L Herbs (%)	50	0	80	20
						R Herbs (%)	40	0	70	30
						Bridge and Culvert Survey				No

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8

Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut

NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M01 Segment: A Completion Date: 24-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: I Rain: Yes  
 Segment Length (ft): 596 Segment Location: From mouth to Lakeshore Road

1.6 Grade Controls		None				Step 7. Rapid Geomorphic Assessment Summary <i>(fill out RGA sheet first, then enter narrative)</i>			
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type	Unconfined		
							Score	STD	Historic
						7.1 Channel Degradation	NE	NE	NE
						7.2 Channel Aggradation	NE	NE	NE
						7.3 Widening Channel	NE		NE
						7.4 Change in Planform	NE		NE
						Total Score: NE Geomorphic Rating: NE			
						Channel Evolution Model NE Channel Evolution Stage NE Geomorphic Condition NE Stream Sensitivity NE			
4.8 Channel Constrictions		None				<b>Channel Adjustment Processes Narrative</b>			
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.				
<b>Problems:</b>									
						<b>Notes:</b>			
						Did not walk entire segment.			

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment, NE= Not evaluatec

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M01	Segment:	B	Completion Date:	24-Aug-11						
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes						
Organization:	BCE		Segment Length (ft):	1203	Segment Location:	From Lakeshore Road upstream to Old Lakeshore Road								
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>		<b>3.3 Riparian Corridor</b>		<u>Left</u>	<u>Right</u>				
1.1 Segmentation:	CD	2.6 Width/Depth Ratio	9.2	Bank Texture	<u>Left</u>	<u>Right</u>	Corridor Land Use							
1.2 Alluvial Fan:	None	2.7 Entrenchment Ratio	1.9	Upper			Dominant		Residential	Residential				
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	2.2	Material Type	Sand	Sand	Sub-dominant		None	None			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)		0	0			
Berms	0	0	2.9 Sinuosity	Mod (1.2-1.5)	Lower			Height (ft)						
height (ft)			2.10 Riffle Type	Not Applicable	Material Type	Sand	Sand	Gullies (number)		0	0			
Roads	0	0	2.11 Riffle Step Spacing (ft)	95	Consistency	Non-cohesive	Non-cohesive	Height (ft)						
height (ft)			<b>2.12 Substrate Composition</b>		<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>						
Railroads	0	0	Bedrock	0 %	Erosion Length (ft)	290	153	4.1 Springs/ Seeps		None				
height (ft)			Boulder	1 %	Erosion Height (ft)	4	3	4.2 Adjacent Wetlands		None				
Improved Paths	0	0	Cobble	6 %	Revetment Type	Multiple	Multiple	4.3 Flow Status		Base				
height (ft)			Coarse Gravel	5 %	Revetment Length (ft)	392	366	4.4 # of Debris Jams		0				
Development	595	267	Fine Gravel	66 %	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type				
<u>Left</u>	<u>Right</u>		Sand	22 %	L Trees (%)	30	0	0	100	4.6 Up/Downstream Flow Reg				
Hillside Slope	Flat	Flat	Silt/Clay Present	No	R Trees (%)	30	0	0	100	4.7 Stormwater Inputs				
Continuous	Never	Never	Embedded (chan)	56 %	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch		0	Road Ditch	2	
W/in 1 bankfull	Never	Never	Embedded (marg)	40 %	L Shrub/Sapling (%)	30	0	0	100	Urban Storm Pipe		1	Tile Drain	0
Texture	NE	NE	LWD #	6	R Shrub/Sapling (%)	70	0	50	50	Overland Flow		0	Other	0
<b>1.5 Valley Features</b>					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams			0		
Valley Width (ft)	1065				L Herbs (%)	70	0	70	30	Affected Length (ft)				
Width Determination	Estimated	<b>2.13 Average Largest Particle</b>			R Herbs (%)	70	0	70	30	<b>Step 5. Channel Bed &amp; Planform Changes</b>				
Confinement Type	Very Broad	Bed	3.2	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>				<u>Mid</u>	<u>Point</u>	<u>Side</u>
Rock Gorge?	No	Bar	1.2	inches	Canopy %	1-25	1-25			1	2	2		
Human Caused Change?	Yes	2.13a % Subs. Exp.	10	%	Mid-channel canopy	Open				<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>		
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>		<b>3.2 Riparian Buffer</b>					1	0	0		
2.1 Bankfull Width (ft)	23	Stream Type:	B		Buffer Width	<u>Left</u>	<u>Right</u>	<b>5.2 Other Features</b>		<u>Flood</u>	<u>NCO</u>	<u>Avulsion</u>		
2.1a Wetted Width (ft)	13.4	Bed Material:	Gravel		Dominant	26-50	26-50			1	0	0		
2.1b Ratio (wetted/bkfl)	0.58	Subclass Slope:	c		Sub-dominant	0-25	51-100			<u>Braiding</u>				
2.2 Max Depth (ft)	3.95	Bed Form:	Plane Bed		Length <25 ft	248	518			0				
2.3 Mean Depth (ft)	2.51	Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>				
2.4 Floodprone Width (ft)	44	<b>2.15 Reference Stream Type</b>			L Trees (%)	10	0	0	100	# SRs	# HCs	Trib Rejuv.		
2.5 RAF	8.7	C, Gravel, Riffle-Pool			R Trees (%)	30	0	10	90	1	0	No		
*Human Elevated FP	NA	<b>Step 3. Riparian Features</b>				<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:				
		<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	20	0	0	100	5.5 Straightening		Straightening		
		Typical Bank Slope	Steep		R Shrub/Sapling (%)	10	0	0	100	Length (ft)		822		
					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging		None			
					L Herbs (%)	90	0	90	10	Bridge and Culvert Survey				
					R Herbs (%)	90	0	90	10	Yes				

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M01 Segment: B Completion Date: 24-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 1203 Segment Location: From Lakeshore Road upstream to Old Lakeshore Road

1.6 Grade Controls						None				Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )			
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type Unconfined							
						Score	STD	Historic					
4.8 Channel Constrictions						Present				<b>Channel Adjustment Processes Narrative</b>			
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	Segment has experienced extreme incision. Aggradation is minor but bed has considerable fine deposition. Widening is being prevented by extensive rip rap. Planform has been altered by straightening, but it is not a major process.							
Bridge	36	Yes	Yes	Yes	No	<b>Notes:</b> Sandy substrate. Not much exposed substrate. Generally fair pool cover.							
<b>Problems:</b> None													
Culvert	20	Yes	Yes	Yes	Yes								
<b>Problems:</b> SB													
Bridge	29	Yes	Yes	Yes	Yes								
<b>Problems:</b> DA, DB													

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M01	Segment:	C	Completion Date:	24-Aug-11							
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes							
Organization:	BCE		Segment Location:	Begins at Old Lakeshore Road and continues upstream for about 1/2 mile to where banks and buffers contain more trees											
Segment Length (ft):	2195														
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>		<b>3.3 Riparian Corridor</b>		<u>Left</u>	<u>Right</u>					
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	8.8	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<i>Corridor Land Use</i>							
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	1.7	Upper			Dominant							
<u>1.3 Corridor Encroachments:</u>			2.8 Incision Ratio	2.3	Material Type	Sand	Sand	Sub-dominant		Hay	Crop				
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)		Shrub/Sapling	Shrub/Sapling				
Berms	0	0	2.9 Sinuosity	Low (<1.2)	Lower			Height (ft)		0	0				
height (ft)			2.10 Riffle Type	Complete	Material Type	Sand	Sand	Gullies (number)		0	0				
Roads	0	0	2.11 Riffle Step Spacing (ft)	74	Consistency	Non-cohesive	Non-cohesive	Height (ft)							
height (ft)			<u>2.12 Substrate Composition</u>		<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>							
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	475	517	4.1 Springs/ Seeps			Minimum			
height (ft)			Boulder	0	%	Erosion Height (ft)	3	3	4.2 Adjacent Wetlands			Extensive			
Improved Paths	0	0	Cobble	2	%	Revetment Type	Multiple	Multiple	4.3 Flow Status			Base			
height (ft)			Coarse Gravel	30	%	Revetment Length (ft)	306	609	4.4 # of Debris Jams			0			
Development	103	0	Fine Gravel	44	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type		Irrigation		
<u>1.4 Adjacent Side</u>	<u>Left</u>	<u>Right</u>	Sand	24	%	L Trees (%)	10	0	0	100	4.6 Up/Downstream Flow Reg		None		
Hillside Slope	Flat	Flat	Silt/Clay Present	No		R Trees (%)	10	0	0	100	<u>4.7 Stormwater Inputs</u>				
Continuous	Never	Never	Embedded (chan)	32	%	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch		0	Road Ditch	0	
W/in 1 bankfull	Never	Never	Embedded (marg)	32	%	L Shrub/Sapling (%)	90	0	90	10	Urban Storm Pipe		0	Tile Drain	0
Texture	NE	NE	LWD #	9		R Shrub/Sapling (%)	90	0	90	10	Overland Flow		0	Other	0
<u>1.5 Valley Features</u>						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams			0		
Valley Width (ft)	1616					L Herbs (%)	90	0	10	90	Affected Length (ft)				
Width Determination	Estimated		<u>2.13 Average Largest Particle</u>			R Herbs (%)	90	0	10	90	<b>Step 5. Channel Bed &amp; Planform Changes</b>				
Confinement Type	Very Broad		Bed	2.9	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>						
Rock Gorge?	No		Bar	2	inches	Canopy %	51-75	51-75	<u>5.2 Bar Types</u>		<u>Mid</u>	<u>Point</u>	<u>Side</u>		
Human Caused Change?	Yes		2.13a % Subs. Exp.	20	%	Mid-channel canopy	Open				2	8	7		
<b>Step 2. Stream Channel</b>			<u>2.14 Stream Type</u>			<u>3.2 Riparian Buffer</u>			<b>5.3 Steep Riffles &amp; Headcuts</b>						
2.1 Bankfull Width (ft)	23		Stream Type:	B		Buffer Width	<u>Left</u>	<u>Right</u>	<b>5.2 Other Features</b>		<u>Flood</u>	<u>NCO</u>	<u>Avulsion</u>		
2.1a Wetted Width (ft)	12.8		Bed Material:	Gravel		Dominant	26-50	26-50			5	0	1		
2.1b Ratio (wetted/bkfl)	0.56		Subclass Slope:	c		Sub-dominant	51-100	51-100			<u>Braiding</u>				
2.2 Max Depth (ft)	3.3		Bed Form:	Riffle-Pool		Length <25 ft	178	274			0				
2.3 Mean Depth (ft)	2.6		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>				
2.4 Floodprone Width (ft)	38		<u>2.15 Reference Stream Type</u>			L Trees (%)	10	0	0	100	# SRs		# HCs	Trib Rejuv.	
2.5 RAF	7.6		C, Gravel, Riffle-Pool			R Trees (%)	10	0	0	100	6		0	No	
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:					
			<u>3.1 Stream Banks</u>			L Shrub/Sapling (%)	30	0	50	50	5.5 Straightening			Straightening	
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	30	0	50	50	Length (ft)			1444	
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging			None		
						L Herbs (%)	100	0	90	10	Bridge and Culvert Survey				
						R Herbs (%)	100	0	70	30	No				

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M01 Segment: C Completion Date: 24-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 2195 Segment Location: Begins at Old Lakeshore Road and continues upstream for about 1/2 mile to where banks and buffers contain more trees

1.6 Grade Controls		None			
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS

Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative)			
Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	3	C to B	Yes
7.2 Channel Aggradation	13	None	No
7.3 Widening Channel	15		No
7.4 Change in Planform	11		No
Total Score:		42	
Geomorphic Rating:		0.53	
Channel Evolution Model F			
Channel Evolution Stage II			
Geomorphic Condition Fair (0.35-0.64)			
Stream Sensitivity Very High			

4.8 Channel Constrictions		Present			
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.
Old abutment	17.2	Yes	Yes	Yes	Yes

**Channel Adjustment Processes Narrative**  
 Extreme historic incision. Widening is minor due to extensive rip rap in segment. However, erosion on outside bends. Planform was altered by channel straightening. Diagonal bars are small and just starting to form. Elevation stage is late stage II or early stage III.

**Notes:**  
 High banks with outflanked riprap. Poor cover in pools. Very long featureless pools. Bank erosion occurred during Mother's Day flood in 2006.

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M01	Segment:	D	Completion Date:	24-Aug-11						
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes						
Organization:	BCE		Segment Location:	Begins where banks and buffers contain more trees and continues 682 feet until developed section										
Segment Length (ft):	654													
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>		<u>Left</u>	<u>Right</u>				
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	17.0		<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<i>Corridor Land Use</i>					
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	34.0		<i>Upper</i>			Shrub/Sapling	Shrub/Sapling				
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.3		<i>Material Type</i>	Sand	Sand	Sub-dominant	Hay	Crop			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA		<i>Consistency</i>	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0			
Berms	0	0	2.9 Sinuosity	Mod (1.2-1.5)		<i>Lower</i>			Height (ft)					
height (ft)			2.10 Riffle Type	Complete		<i>Material Type</i>	Gravel	Gravel	Gullies (number)	0	0			
Roads	0	0	2.11 Riffle Step Spacing (ft)	93		<i>Consistency</i>	Non-cohesive	Non-cohesive	Height (ft)					
height (ft)			<b>2.12 Substrate Composition</b>			<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>					
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	133	111	4.1 Springs/ Seeps	Minimum				
height (ft)			Boulder	0	%	Erosion Height (ft)	5	5	4.2 Adjacent Wetlands	Extensive				
Improved Paths	0	0	Cobble	28	%	Revetment Type	None	None	4.3 Flow Status	Base				
height (ft)			Coarse Gravel	65	%	Revetment Length (ft)	0	0	4.4 # of Debris Jams	0				
Development	39	0	Fine Gravel	2	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type	None		
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	5	%	<b>L Trees (%)</b>	10	0	0	100	4.6 Up/Downstream Flow Reg	None		
Hillside Slope	Flat	Flat	Silt/Clay Present	No		<b>R Trees (%)</b>	10	0	0	100	<b>4.7 Stormwater Inputs</b>			
Continuous	Never	Never	Embedded (chan)	22	%	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch	0	Road Ditch	0	
W/in 1 bankfull	Never	Never	Embedded (marg)	26	%	<b>L Shrub/Sapling (%)</b>	100	0	90	10	Urban Storm Pipe	0	Tile Drain	0
Texture	NE	NE	LWD #	4		<b>R Shrub/Sapling (%)</b>	100	0	90	10	Overland Flow	0	Other	0
<b>1.5 Valley Features</b>						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams	0			
Valley Width (ft)	1277					<b>L Herbs (%)</b>	100	10	60	30	Affected Length (ft)			
Width Determination	Estimated		<b>2.13 Average Largest Particle</b>			<b>R Herbs (%)</b>	100	10	60	30	<b>Step 5. Channel Bed &amp; Planform Changes</b>			
Confinement Type	Very Broad		Bed	4.4	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>			<u>Mid</u>	<u>Point</u>	<u>Side</u>
Rock Gorge?	No		Bar	2.8	inches	Canopy %	1-25	1-25				0	4	2
Human Caused Change?	Yes		2.13a % Subs. Exp.	30 %		Mid-channel canopy	Open			<b>Diagonal</b>			<b>Delta</b>	<b>Island</b>
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>			<b>5.2 Other Features</b>			<b>Flood</b>	<b>NCO</b>	<b>Avulsion</b>
2.1 Bankfull Width (ft)	34		Stream Type:	C		Buffer Width	<u>Left</u>	<u>Right</u>				2	0	0
2.1a Wetted Width (ft)	13		Bed Material:	Gravel		Dominant	51-100	51-100				5	0	0
2.1b Ratio (wetted/bkfl)	0.38		Subclass Slope:	None		Sub-dominant	26-50	101-150				<b>Braiding</b>		
2.2 Max Depth (ft)	2.9		Bed Form:	Riffle-Pool		Length <25 ft	124	0				0		
2.3 Mean Depth (ft)	2		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>			
2.4 Floodprone Width (ft)	1155		<b>2.15 Reference Stream Type</b>			L Trees (%)	5	0	0	100	# SRs	# HCs	Trib Rejuv.	
2.5 RAF	3.7		C, Gravel, Riffle-Pool			R Trees (%)	5	0	0	100	2	0	No	
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:			None	
			<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	100	0	70	30	5.5 Straightening			None
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	100	0	70	30	Length (ft)	0		
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging			None	
						L Herbs (%)	100	5	25	70	Bridge and Culvert Survey			No
						R Herbs (%)	100	5	25	70				

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M01 Segment: D Completion Date: 24-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 654 Segment Location: Begins where banks and buffers contain more trees and continues 682 feet until developed section

1.6 Grade Controls		None				Step 7. Rapid Geomorphic Assessment Summary ( <i>fill out RGA sheet first, then enter narrative</i> )				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type	Unconfined			
							Score	STD	Historic	
						7.1 Channel Degradation	13	None	Yes	
						7.2 Channel Aggradation	8	None	No	
						7.3 Widening Channel	9		No	
						7.4 Change in Planform	14		No	
							Total Score:	44		
							Geomorphic Rating:	0.55		
							Channel Evolution Model F			
							Channel Evolution Stage III			
							Geomorphic Condition Fair (0.35-0.64)			
							Stream Sensitivity Very High			
4.8 Channel Constrictions		Present				<b>Channel Adjustment Processes Narrative</b>				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	Minor historic degradation, abundant aggradation - large point bars, some steep riffles and diagonal bars. Banks are eroding but low width to depth ratio. Channel is widening based on extensive erosion. Minor planform adjustment as indicated by flood chutes.				
<b>Problems:</b>						<b>Notes:</b>				
						High sinuosity with sandy banks. Good vegetation on undercuts.				

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M01	Segment:	E	Completion Date:	24-Aug-11			
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes			
Organization:	BCE		Segment Location:	Begins in developed section where Phase 2 valley wall is narrower and continues until Henderson Road							
Segment Length (ft):	1110										
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>	<u>Left</u>	<u>Right</u>		
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	34.1	Bank Texture	<u>Left</u>	<u>Right</u>	Corridor Land Use			
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	2.4	Upper	Dominant			Residential	Residential	
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.8	Material Type	Sand	Sand	Sub-dominant			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)			
Berms	0	0	2.9 Sinuosity	Low (<1.2)	Lower	Height (ft)			0	0	
height (ft)			2.10 Riffle Type	Complete	Material Type	Gravel	Gravel	Gullies (number)			
Roads	77	0	2.11 Riffle Step Spacing (ft)	99	Consistency	Non-cohesive	Non-cohesive	Height (ft)			
height (ft)			<b>2.12 Substrate Composition</b>			<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>			
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	304	352	4.1 Springs/ Seeps		
height (ft)			Boulder	0	%	Erosion Height (ft)	4	4	4.2 Adjacent Wetlands		
Improved Paths	0	0	Cobble	37	%	Revetment Type	Multiple	Multiple	4.3 Flow Status		
height (ft)			Coarse Gravel	32	%	Revetment Length (ft)	102	362	4.4 # of Debris Jams		
Development	612	419	Fine Gravel	25	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	6	%	L Trees (%)	80	0	5	95	
Hillside Slope	Hilly	Very Steep	Silt/Clay Present	No		R Trees (%)	80	0	5	95	
Continuous	Never	Never	Embedded (chan)	42	%	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch	
W/in 1 bankfull	Never	Never	Embedded (marg)	48	%	L Shrub/Sapling (%)	70	0	10	90	
Texture	NE	NE	LWD #	2		R Shrub/Sapling (%)	70	0	10	90	
<b>1.5 Valley Features</b>						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams	
Valley Width (ft)	400					L Herbs (%)	70	10	50	40	
Width Determination	Measured		<b>2.13 Average Largest Particle</b>			R Herbs (%)	60	10	50	40	
Confinement Type	Very Broad		Bed	8.7	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>Step 5. Channel Bed &amp; Planform Changes</b>		
Rock Gorge?	No		Bar	3.9	inches	Canopy %	51-75	51-75	<b>5.1 Bar Types</b>		
Human Caused Change?	Yes		2.13a % Subs. Exp.	40	%	Mid-channel canopy	Open		<u>Diagonal</u>	<u>Delta</u>	
			<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>			2	0	
<b>Step 2. Stream Channel</b>			Stream Type:	C		Buffer Width	<u>Left</u>	<u>Right</u>	<b>5.2 Other Features</b>		
2.1 Bankfull Width (ft)	44.3		Bed Material:	Gravel		Dominant	51-100	51-100	<u>Flood</u>	<u>NCO</u>	
2.1a Wetted Width (ft)	13		Subclass Slope:	None		Sub-dominant	>200	0-25	5	0	
2.1b Ratio (wetted/bkfl)	0.29		Bed Form:	Riffle-Pool		Length <25 ft	19	191	<u>Braiding</u>		
2.2 Max Depth (ft)	2.45		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	
2.3 Mean Depth (ft)	1.3		<b>2.15 Reference Stream Type</b>			L Trees (%)	20	0	20	80	
2.4 Floodprone Width (ft)	108.3		C, Gravel, Riffle-Pool			R Trees (%)	20	0	20	80	
2.5 RAF	4.35		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:	
*Human Elevated FP	NA		<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	20	0	0	100	
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	20	0	0	100	
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Straightening	
						L Herbs (%)	100	0	90	10	
						R Herbs (%)	100	0	90	10	
						Bridge and Culvert Survey			Yes		

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M01 Segment: E Completion Date: 24-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 1110 Segment Location: Begins in developed section where Phase 2 valley wall is narrower and continues until Henderson Roac

1.6 Grade Controls		None				Step 7. Rapid Geomorphic Assessment Summary ( <i>fill out RGA sheet first, then enter narrative</i> )				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type	Unconfined			
							Score	STD	Historic	
						7.1 Channel Degradation	7	None	Yes	
						7.2 Channel Aggradation	9	None	No	
						7.3 Widening Channel	9		No	
						7.4 Change in Planform	12		No	
							Total Score:	37		
							Geomorphic Rating:	0.46		
							Channel Evolution Model F Channel Evolution Stage III Geomorphic Condition Fair (0.35-0.64) Stream Sensitivity Very High			
4.8 Channel Constrictions		Present				<b>Channel Adjustment Processes Narrative</b>				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	Channel has experienced major incision which has led to major widening. Planform is minor and aggradation is major as seen through steep riffles and diagonal bars.				
Culvert	18.5	Yes	Yes	Yes	Yes					
<b>Problems:</b>		DA, DB, SB				<b>Notes:</b>				
							Bank heights higher below Henderson Road. High bank erosion. Poor pool coverage and embedded cobbles. Knotweed on both sides. Many small pools are run-like.			

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M02	Segment:	A		Completion Date:	23-Aug-11						
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA		Rain:	Yes						
Organization:	BCE		Segment Location:	Begins just upstream of Henderson Road and continues for 1,770 feet until Intervale Road is very close to stream channel.											
Segment Length (ft):	1807														
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>			<b>3.3 Riparian Corridor</b>		<u>Left</u>	<u>Right</u>			
1.1 Segmentation:	PS		2.6 Width/Depth Ratio	13.8		<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	Corridor Land Use						
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	4.8		Upper			Dominant		Residential	Forest			
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.3		Material Type	Sand	Sand	Sub-dominant		Forest	Residential			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA		Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)		0	94			
Berms	32	0	2.9 Sinuosity	Low (<1.2)		Lower			Height (ft)			30			
height			2.10 Riffle Type	Not Applicable		Material Type	Gravel	Gravel	Gullies (number)		0	0			
Roads	718	0	2.11 Riffle Step Spacing	59		Consistency	Non-cohesive	Non-cohesive	Height (ft)						
height			<b>2.12 Substrate Composition</b>			<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>						
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	456	437	4.1 Springs/ Seeps		Extensive				
height			Boulder	7	%	Erosion Height (ft)	4	3	4.2 Adjacent Wetlands		None				
Improved Paths	0	0	Cobble	45	%	Revetment Type	Multiple	Multiple	4.3 Flow Status		Base				
height			Coarse Gravel	24	%	Revetment Length (ft)	77	79	4.4 # of Debris Jams		0				
Development	379	0	Fine Gravel	13	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type				
<u>1.4 Adjacent Side</u>	<u>Left</u>	<u>Right</u>	Sand	11	%	L Trees (%)	80	0	50	50	4.6 Up/Downstream Flow Reg				
Hillside Slope	Extremely Steep	Hilly	Silt/Clay Present	No		R Trees (%)	80	0	50	50	<b>4.7 Stormwater Inputs</b>				
Continuous	Sometimes	Sometimes	Embedded (chan)	38	%	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch		0	Road Ditch	1	
W/in 1 bnkfl	Sometimes	Sometimes	Embedded (marg)	50	%	L Shrub/Sapling (%)	30	0	0	100	Urban Storm Pipe		0	Tile Drain	0
Texture	NE	NE	# LWD	5		R Shrub/Sapling (%)	30	0	0	100	Overland Flow		0	Other	0
<b>1.5 Valley Features</b>						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams		0			
Valley Width (ft)	225					L Herbs (%)	70	0	10	90	Affected Length (ft)				
Width Determination	Measured		<b>2.13 Average Largest Particle</b>			R Herbs (%)	70	0	10	90	<b>Step 5. Channel Bed &amp; Planform Changes</b>				
Confinement Type	Broad		Bed	17.8	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>		<u>Mid</u>	<u>Point</u>	<u>Side</u>		
Rock Gorge?	No		Bar	7.6	inches	Canopy %	76-100		2		1	10			
Human Caused Change?	Yes		2.13a % Subs. Exp.	35	%	Mid-channel canopy	Closed		<u>Diagonal</u>		<u>Delta</u>	<u>Island</u>			
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>			<b>5.2 Other Features</b>						
2.1 Bankfull Width (ft)	36		Stream Type:	C		Buffer Width	<u>Left</u>	<u>Right</u>	2		0	1			
2.1a Wetted Width (ft)	24.2		Bed Material:	Cobble		Dominant	51-100		>200		1	0	0		
2.1b Ratio (wetted/bkfl)	0.67		Subclass Slope:	b		Sub-dominant	>200		None		<u>Braiding</u>				
2.2 Max Depth (ft)	3.4		Bed Form:	Plane Bed		Length <25 ft	116		0		1				
2.3 Mean Depth (ft)	2.61		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>				
2.4 Floodprone Width (ft)	173		<b>2.15 Reference Stream Type</b>			L Trees (%)	80	0	60	40	# SRs	# HCs	Trib Rejuv.		
2.5 RAF	4.5		C, Cobble, Plane Bed			R Trees (%)	80	0	60	40	3	0	No		
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:		None			
<b>3.1 Stream Banks</b>			<u>Left</u>	<u>Right</u>		L Shrub/Sapling (%)	50	0	0	100	5.5 Straightening		None		
Typical Bank Slope	Steep	Steep				R Shrub/Sapling (%)	50	0	0	100	Length (ft)		0		
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging		None			
						L Herbs (%)	20	0	0	100	Bridge and Culvert Survey		Yes		
						R Herbs (%)	20	0	0	100					

**Note:** Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M02 Segment: A Completion Date: 23-Aug-2011  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 1807 Segment Location: Begins just upstream of Henderson Road and continues for 1,770 feet until Intervale Road is very close to stream channel

1.6 Grade Controls Present						<p align="center"><b>Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative)</b></p> <table border="1"> <thead> <tr> <th>Confinement Type</th> <th>Plane bed</th> <th>Score</th> <th>STD</th> <th>Historic</th> </tr> </thead> <tbody> <tr> <td>7.1 Channel Degradation</td> <td></td> <td>13</td> <td>None</td> <td>Yes</td> </tr> <tr> <td>7.2 Channel Aggradation</td> <td></td> <td>3</td> <td>None</td> <td>No</td> </tr> <tr> <td>7.3 Widening Channel</td> <td></td> <td>7</td> <td></td> <td>No</td> </tr> <tr> <td>7.4 Change in Planform</td> <td></td> <td>3</td> <td></td> <td>No</td> </tr> <tr> <td colspan="2">Total Score:</td> <td>26</td> <td></td> <td></td> </tr> <tr> <td colspan="2">Geomorphic Rating:</td> <td>0.325</td> <td></td> <td></td> </tr> <tr> <td colspan="5">Channel Evolution Model F</td> </tr> <tr> <td colspan="5">Channel Evolution Stage III</td> </tr> <tr> <td colspan="5">Geomorphic Condition Poor (0.0-0.34)</td> </tr> <tr> <td colspan="5">Stream Sensitivity High</td> </tr> </tbody> </table>				Confinement Type	Plane bed	Score	STD	Historic	7.1 Channel Degradation		13	None	Yes	7.2 Channel Aggradation		3	None	No	7.3 Widening Channel		7		No	7.4 Change in Planform		3		No	Total Score:		26			Geomorphic Rating:		0.325			Channel Evolution Model F					Channel Evolution Stage III					Geomorphic Condition Poor (0.0-0.34)					Stream Sensitivity High				
Confinement Type	Plane bed	Score	STD	Historic																																																												
7.1 Channel Degradation		13	None	Yes																																																												
7.2 Channel Aggradation		3	None	No																																																												
7.3 Widening Channel		7		No																																																												
7.4 Change in Planform		3		No																																																												
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Geomorphic Condition Poor (0.0-0.34)																																																																
Stream Sensitivity High																																																																
4.8 Channel Constrictions Present						<p><b>Channel Adjustment Processes Narrative</b></p> <p>Channel has incised and is widening as shown by eroding banks. Large mass failure upstream from bridge crossing. Undersized structure has caused major deposition upstream and directed flow toward failing bank. Areas of braiding with islands and large depositional features causing major planform change.</p> <p><b>Notes:</b></p> <p>Bankfull cross-sectional area was high relative to other cross sections, but cross section photos support bankfull elevation measured in the field. If bankfull elevation were lowered (ie, higher incision ratio), this would not change the geomorphic condition, which was poor.</p>																																																										
Type	Width	Photo	GPS	Channel Constr.	Floodprone Constr.																																																											
Bridge	22	Yes	Yes	Yes	Yes																																																											
<b>Problems:</b> DA, DB, SB, A																																																																

**Phase 2 Segment Summary (page 1)**

Project: Gunstock Brook  
 Stream: Gunstock Brook  
 Organization: BCE  
 Segment Length (ft): 653  
 Reach #: M02  
 Observers: MN, PD  
 Segment Location: Segment begins where bedform changes to step-pool and continues for 668 feet.  
 Segment: B  
 Why Not Assessed: NA  
 Completion Date: 23-Aug-11  
 Rain: Yes

<b>Step 1. Valley and Floodplain</b>		<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>				<b>3.3 Riparian Corridor</b>					
		CD	2.6 Width/Depth Ratio	13.8	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	Corridor Land Use	<u>Left</u>	<u>Right</u>			
1.1 Segmentation:		None	2.7 Entrenchment Ratio	1.37	Upper			Dominant	Residential	Forest			
1.2 Alluvial Fan:			2.8 Incision Ratio	1.0	Material Type	Gravel	Sand	Sub-dominant	None	None			
<b>1.3 Corridor Encroachments:</b>			*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	25			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	2.9 Sinuosity	Low (<1.2)	Lower			Height (ft)		8			
Berms	0	0	2.10 Riffle Type	Complete	Material Type	Mix	Mix	Gullies (number)	0	0			
height (ft)			2.11 Riffle Step Spacing (ft)	75	Consistency	Non-cohesive	Non-cohesive	Height (ft)					
Roads	653	0	<b>2.12 Substrate Composition</b>		<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>					
height (ft)			Bedrock	0 %	Erosion Length (ft)	255	110	4.1 Springs/ Seeps	Present				
Railroads	0	0	Boulder	16 %	Erosion Height (ft)	6	7	4.2 Adjacent Wetlands	None				
height (ft)			Cobble	36 %	Revetment Type	Rip-rap	None	4.3 Flow Status	Base				
Improved Paths	0	0	Coarse Gravel	16 %	Revetment Length (ft)	283		4.4 # of Debris Jams	0				
height (ft)			Fine Gravel	12 %	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type	None		
Development	0	0	Sand	20 %	L Trees (%)	20	0	0	100	4.6 Up/Downstream Flow Reg	None		
<b>1.4 Adjacent Side</b>		<u>Left</u>	<u>Right</u>		R Trees (%)	80	0	90	10	<b>4.7 Stormwater Inputs</b>			
Hillside Slope	Extremely Steep	Extremely Steep			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>		Field Ditch	0		
Continuous	Always	Sometimes	Silt/Clay Present	No	L Shrub/Sapling (%)	30	0	0	100	Urban Storm Pipe	0		
W/in 1 bankfull	Always	Sometimes	Embedded (chan)	56 %	R Shrub/Sapling (%)	30	0	0	100	Overland Flow	0		
Texture	Sand	Sand	Embedded (marg)	46 %	<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>		4.9 # of Beaver Dams	0		
<b>1.5 Valley Features</b>			# LWD	1	L Herbs (%)	20	10	70	20	Affected Length (ft)			
Valley Width (ft)		80	2.13 Average Largest Particle		R Herbs (%)	80	10	10	80	<b>Step 5. Channel Bed &amp; Planform Changes</b>			
Width Determination		Measured	Bed	18.6 inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>			<b>5.1 Bar Types</b>	<u>Mid</u>	<u>Point</u>	<u>Side</u>
Confinement Type		Semi-Confined	Bar	5.6 inches	Canopy %	26-50	76-100			0	0	5	
Rock Gorge?		No	2.13a % Subs. Exp.	15 %	Mid-channel canopy	Open				<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>	
Human Caused Change?		Yes	<b>2.14 Stream Type</b>		<b>3.2 Riparian Buffer</b>					0	0	0	
<b>Step 2. Stream Channel</b>			Stream Type:	B	Buffer Width	<u>Left</u>	<u>Right</u>			<b>5.2 Other Features</b>			
2.1 Bankfull Width (ft)	26.3		Bed Material:	Cobble	Dominant	26-50	>200			<u>Flood</u>	<u>NCO</u>	<u>Avulsion</u>	
2.1a Wetted Width (ft)	17.2		Subclass Slope:	None	Sub-dominant	0-25	None			0	0	0	
2.1b Ratio (wetted/bkfl)	0.65		Bed Form:	Step Pool	Length <25 ft	284	0			<u>Braiding</u>			
2.2 Max Depth (ft)	3.1		Field Measured Slope:		<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>			
2.3 Mean Depth (ft)	1.9		2.15 Reference Stream Type		L Trees (%)	10	0	0	100	# SRs	# HCs	Trib Rejuv.	
2.4 Floodprone Width (ft)	36.1		Modified B, Cobble, Step-Pool		R Trees (%)	90	0	90	10	0	0	No	
2.5 RAF	3.1		<b>Step 3. Riparian Features</b>		<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>		<b>5.4 Stream Ford or Animal Crossing:</b>			
*Human Elevated FP	NA		<b>3.1 Stream Banks</b>		L Shrub/Sapling (%)	20	0	0	100	5.5 Straightening			
			Typical Bank Slope	Steep	R Shrub/Sapling (%)	30	0	0	100	None	Length (ft)		
					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>		5.5 Dredging			
					L Herbs (%)	90	10	80	10	None			
					R Herbs (%)	30	0	0	100	Bridge and Culvert Survey			

**Note:** Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
 NE= Not evaluated, NA=Not applicable

Revised March 13, 2012

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M02 Segment: B Completion Date: 23-Aug-11  
 Organization: BCE Observers: MN, PD Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 653 Segment Location: Segment begins where bedform changes to step-pool and continues for 668 feet.

1.6 Grade Controls						None				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )				
						Confinement Type	Confined			
						Score	STD	Historic		
						7.1 Channel Degradation	18	None	No	
						7.2 Channel Aggradation	17	None	No	
						7.3 Widening Channel	13		No	
						7.4 Change in Planform	14		No	
						Total Score:	62			
						Geomorphic Rating:	0.78			
						Channel Evolution Model F				
						Channel Evolution Stage I				
						Geomorphic Condition Good (0.65-0.84)				
						Stream Sensitivity Moderate				
4.8 Channel Constrictions						None				
Type	Width	Photo	GPS	Channel Constr.	Floodprone Constr.	<b>Channel Adjustment Processes Narrative</b>				
						The segment has a modified reference stream type of "B" due to change in valley width from Intervale Road. The floodplain encroachment from Intervale Road is acting as a "new valley wall" and will prohibit the evolution of the channel back to the natural reference stream type of "C". Segment is not incised and is in good condition.				
						<b>Notes:</b>				
						Considerable erosion on west bank where riprap along road has failed.				

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M02	Segment:	C	Completion Date:	23-Aug-11		
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes		
Organization:	BCE		Segment Length (ft):	3470	Segment Location:	Segment begins about 200 feet downstream of the Intervale Road Bridge and continues until tributary confluence				
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>	xsec. #1	xsec. #2	<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>		<u>Left</u>	<u>Right</u>
1.1 Segmentation:		CD	2.6 Width/Depth Ratio	19.3	9.7	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<i>Corridor Land Use</i>	
1.2 Alluvial Fan:		None	2.7 Entrenchment Ratio	2.5	1.5	Upper			Dominant	Forest Residential
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.0	1.0	Material Type	Sand	Sand	Sub-dominant	Residential Forest
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	3.1	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0 53
Berms	242	0	2.9 Sinuosity		Low (<1.2)	Lower			Height (ft)	10
height (ft)	4		2.10 Riffle Type		Complete	Material Type	Mix	Mix	Gullies (number)	0 0
Roads	3023	0	2.11 Riffle Step Spacing (ft)		68	Consistency	Non-cohesive	Non-cohesive	Height (ft)	
height (ft)			<b>2.12 Substrate Composition</b>			<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>	
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	547	814	4.1 Springs/ Seeps	Extensive
height (ft)			Boulder	5	%	Erosion Height (ft)	4	4	4.2 Adjacent Wetlands	Minimum
Improved Paths	0	0	Cobble	49	%	Revetment Type	Multiple	Multiple	4.3 Flow Status	Base
height (ft)			Coarse Gravel	20	%	Revetment Length (ft)	682	979	4.4 # of Debris Jams	1
Development	912	0	Fine Gravel	17	%	<i>Near Bank Veg. Type</i>	% Cover	Invasive	Conifer	Deciduous
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	9	%	L Trees (%)	80	0	10	90
Hillside Slope	Extremely Steep	Extremely Steep				R Trees (%)	50	0	10	90
Continuous	Sometimes	Never	Silt/Clay Present	Yes		% Cover	Invasive	WADs	Saplings	Field Ditch
W/in 1 bankfull	Sometimes	Sometimes	Embedded (chan)	40	%	L Shrub/Sapling (%)	60	0	0	100
Texture	NE	NE	Embedded (marg)	44	%	R Shrub/Sapling (%)	50	0	0	100
<b>1.5 Valley Features</b>			LWD #	11		% Cover	Invasive	Grasses	Forbs	4.9 # of Beaver Dams
Valley Width (ft)	227					L Herbs (%)	80	0	60	40
Width Determination	Measured		<b>2.13 Average Largest Particle</b>			R Herbs (%)	70	0	60	40
Confinement Type	Broad	Bed		14.6	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>Step 5. Channel Bed &amp; Planform Changes</b>	
Rock Gorge?	No	Bar		5.7	inches	Canopy %	76-100	26-50	<b>5.1 Bar Types</b>	<u>Mid</u>
Human Caused Change?	Yes	2.13a % Subs. Exp.		30	%	Mid-channel canopy	Open		<u>Delta</u>	<u>Point</u>
<b>Step 2. Stream Channel</b>	xsec. #1	xsec. #2	<b>2.14 Stream Type</b>						2	4
2.1 Bankfull Width (ft)	38.5	23.3	Stream Type:	C		<b>3.2 Riparian Buffer</b>			6	0
2.1a Wetted Width (ft)	24	16.3	Bed Material:	Cobble		Buffer Width	<u>Left</u>	<u>Right</u>	<b>5.2 Other Features</b>	<u>Flood</u>
2.1b Ratio (wetted/bkfl)	0.62	0.70	Subclass Slope:	None		Dominant	>200	26-50	11	0
2.2 Max Depth (ft)	2.8	3.2	Bed Form:	Riffle-Pool		Sub-dominant	26-50	51-100	<u>Braiding</u>	<u>NCO</u>
2.3 Mean Depth (ft)	2.00	2.39	Field Measured Slope:			Length <25 ft	253	946	0	<u>Avulsion</u>
2.4 Floodprone Width (ft)	96	34.8	<b>2.15 Reference Stream Type</b>			<i>Buffer Veg. Type</i>	% Cover	Invasive	Conifer	Deciduous
2.5 RAF	2.8	3.2	C, Cobble, Riffle-pool			L Trees (%)	90	0	10	90
*Human Elevated FP	NA	9.8	<b>Step 3. Riparian Features</b>			R Trees (%)	20	0	5	95
			<b>3.1 Stream Banks</b>			% Cover	Invasive	WADs	Saplings	5.4 Stream Ford or Animal Crossing:
			Typical Bank Slope	Steep		L Shrub/Sapling (%)	60	0	0	100
						R Shrub/Sapling (%)	20	0	0	100
						% Cover	Invasive	Grasses	Forbs	5.5 Straightening
						L Herbs (%)	60	0	10	90
						R Herbs (%)	80	10	70	20
										5.5 Dredging
										None
<b>Note:</b> General comments, Step 1.6 Grade Controls and Step 4.8										
Channel Constrictions on Sheet 2 of this workbook.										Yes
<b>Legend:</b> RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut										
NE= Not evaluated, NA=Not applicable										





**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M03 Segment: A Completion Date: 22-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 2388 Segment Location: Segment begins at tributary confluence and continues upstream until grade control, where confinement becomes much narrow

1.6 Grade Controls						None				Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )									
Type						Total Ht (ft)		Ht Above (ft)		Photo		GPS		Confinement Type		Unconfined			
												Score		STD		Historic			
7.1 Channel Degradation												5		None		Yes			
7.2 Channel Aggradation												3		None		No			
7.3 Widening Channel												8				No			
7.4 Change in Planform												5				No			
												Total Score:		21					
												Geomorphic Rating:		0.26					
												Channel Evolution Model F							
												Channel Evolution Stage IV							
												Geomorphic Condition Poor (0.0-0.34)							
												Stream Sensitivity High							
4.8 Channel Constrictions																		<b>Channel Adjustment Processes Narrative</b>	
Type						Width (ft)		Photo		GPS		Channel Constr.		Floodprone Constr.		Major degradation, extreme planform adjustment including braiding. Substrate not well sorted. Major channel widening and extreme planform adjustment. Channel has built a juvenile floodplain.			
Culvert						24		Yes		Yes		Yes		Yes					
<b>Problems:</b>						None													
																<b>Notes:</b>			
																Japanese knotweed at top of segment near Gilford town hall. Floodplain appears to have been filled in at one time along parking area. Planform adjustment below town hall where there is the first opportunity for floodplain access (depositional). Groundwater seeps below town hall. Multiple mass failures on east bank.			

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M03	Segment:	B	Completion Date:	22-Aug-11					
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes					
Organization:	BCE		Segment Length (ft):	1098	Segment Location:	Segment begins where confinement becomes much narrower and continues until just upstream of Belknap Mountain Road crossing							
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>		<b>3.3 Riparian Corridor</b>		<b>Left</b>	<b>Right</b>			
1.1 Segmentation:	GC		2.6 Width/Depth Ratio	17.5	Bank Texture	<b>Left</b>	<b>Right</b>	Corridor Land Use					
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	1.2	Upper			Dominant	Residential	Forest			
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.0	Material Type	Sand	Sand	Sub-dominant	Forest	Residential			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0			
Berms height (ft)	0	0	2.9 Sinuosity	Low (<1.2)	Lower			Height (ft)					
Roads height (ft)	277	0	2.10 Riffle Type	Complete	Material Type	Boulder/Cobble	Boulder/Cobble	Gullies (number)	0	0			
Railroads height (ft)	0	0	2.11 Riffle Step Spacing (ft)	NE	Consistency	Non-cohesive	Non-cohesive	Height (ft)					
Improved Paths height (ft)	0	0	<b>2.12 Substrate Composition</b>		<b>Bank Erosion</b>	<b>Left</b>	<b>Right</b>	<b>Step 4. Flow &amp; Flow Modifiers</b>					
Development	149	0	Bedrock	4 %	Erosion Length (ft)	27	58	4.1 Springs/ Seeps	Minimum				
<b>1.4 Adjacent Side</b>	<b>Left</b>	<b>Right</b>	Boulder	8 %	Erosion Height (ft)	8	4	4.2 Adjacent Wetlands	None				
Hillside Slope	Extremely Steep	Extremely Steep	Cobble	44 %	Revetment Type	Multiple	Multiple	4.3 Flow Status	Base				
Continuous	Sometimes	Sometimes	Coarse Gravel	11 %	Revetment Length (ft)	648	309	4.4 # of Debris Jams	0				
W/in 1 bankfull	Always	Always	Fine Gravel	15 %	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	4.5 Flow Reg Type	None				
Texture	NE	NE	Sand	18 %	L Trees (%)	30	0	4.6 Up/Downstream Flow Reg	None				
<b>1.5 Valley Features</b>					R Trees (%)	70	0	4.7 Stormwater Inputs					
Valley Width (ft)	86	# LWD		2	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch	0	Road Ditch	4	
Width Determination	Measured	<b>2.13 Average Largest Particle</b>			L Shrub/Sapling (%)	30	0	100	Urban Storm Pipe	0	Tile Drain	0	
Confinement Type	Semi-Confined	Bed	11.6	inches	R Shrub/Sapling (%)	60	0	0	100	Overland Flow	0	Other	0
Rock Gorge?	No	Bar	NA	inches	<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams	0	Affected Length (ft)		
Human Caused Change?	No	2.13a % Subs. Exp.	20	%	Mid-channel canopy	Closed			5.1 Bar Types	<u>Mid</u>	<u>Point</u>	<u>Side</u>	
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>		<b>3.2 Riparian Buffer</b>		<b>5.2 Other Features</b>		<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>		
2.1 Bankfull Width (ft)	30	Stream Type:	F		Buffer Width	<b>Left</b>	<b>Right</b>	<b>Flood</b>	<b>NCO</b>	<b>Avulsion</b>			
2.1a Wetted Width (ft)	19	Bed Material:	Cobble		Dominant	26-50	101-150	1	0	0			
2.1b Ratio (wetted/bkfl)	0.63	Subclass Slope:	b		Sub-dominant	51-100	51-100	<b>Braiding</b>					
2.2 Max Depth (ft)	2.45	Bed Form:	Step Pool		Length <25 ft	0	153	0					
2.3 Mean Depth (ft)	1.7	Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>			
2.4 Floodprone Width (ft)	36	<b>2.15 Reference Stream Type</b>			L Trees (%)	20	0	30	70	# SRs	# HCs	Trib Rejuv.	
2.5 RAF	2.45	F, Cobble, Step-pool			R Trees (%)	90	0	50	50	0	0	No	
*Human Elevated FP	NA	<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:				
<b>3.1 Stream Banks</b>			Typical Bank Slope		Steep	L Shrub/Sapling (%)	30	0	0	100	5.5 Straightening		
						R Shrub/Sapling (%)	50	0	0	100	Length (ft)	591	
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging			
						L Herbs (%)	80	0	80	20	None		
						R Herbs (%)	30	0	10	90	Bridge and Culvert Survey		
											Yes		

**Note:** Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M03 Segment: B Completion Date: 22-Aug-2011  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 1098 Segment Location: gment begins where confinement becomes much narrower and continues until just upstream of Belknap Mountain Road crossi

1.6 Grade Controls		Present			
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS
Dam	at Belknap Rd	9	7	Yes	Yes
Ledge		6	4	Yes	No
Ledge		3	2.5	Yes	No
Ledge		3	2.5	Yes	No
Waterfall		5.5	5	Yes	No
Ledge		5	3.5	Yes	No
Ledge		8	6.5	Yes	No

Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )

Confinement Type	Confined		
	Score	STD	Historic
7.1 Channel Degradation	18	None	No
7.2 Channel Aggradation	15	None	No
7.3 Widening Channel	19		No
7.4 Change in Planform	10		No
Total Score:		62	
Geomorphic Rating:		0.78	
Channel Evolution Model F			
Channel Evolution Stage I			
Geomorphic Condition Good (0.65-0.84)			
Stream Sensitivity High			

4.8 Channel Constrictions		Present			
Type	Width	Photo	GPS	Channel Constr.	Floodprone Constr.
Bridge		19 Yes	Yes	Yes	Yes
<b>Problems:</b>	DA, SA				
Bedrock outcrop		4 Yes	No	Yes	No
<b>Problems:</b>	SB				
Bridge		19 Yes	No	Yes	No
<b>Problems:</b>	DA, SB				

**Channel Adjustment Processes Narrative**

Channel is a natural "F" despite being so close to Cherry Valley Road. Riprap is present adjacent to Cherry Valley Road and hard bank armoring is near covered bridge and Belknap Mt. Road Bridge. Armoring is keeping channel from widening and bedrock grade controls have prevented incision. Planform change is major due to straightening

**Notes:**  
 Some locations are "B" stream type. No appropriate bars for largest particle measurement. Japanese knotweed below covered bridge near Gilford town hall. Good pool cover below dam (large boulders and cobble).

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M04	Segment:	A	Completion Date:	20-Aug-11		
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes		
Organization:	BCE		Segment Length (ft):	5200	Segment Location:	Segment begins just upstream of Belknap Mountain Road crossing and continues until vegetation changes from wetland vegetation				
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>		<b>3.3 Riparian Corridor</b>		<b>Left</b>	<b>Right</b>
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	23.3	<i>Bank Texture</i>	<b>Left</b>	<b>Right</b>	<b>Corridor Land Use</b>		
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	16.1	Upper			Dominant	Shrub/Sapling	Shrub/Sapling
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.0	Material Type	Sand	Sand	Sub-dominant	Residential	Residential
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0
Berms	0	0	2.9 Sinuosity	High (>1.5)	Lower			Height (ft)		
height (ft)			2.10 Riffle Type	Sedimented	Material Type	Sand	Sand	Gullies (number)	0	0
Roads	807	0	2.11 Riffle Step Spacing (ft)	83	Consistency	Non-cohesive	Non-cohesive	Height (ft)		
height (ft)			<b>2.12 Substrate Composition</b>		<i>Bank Erosion</i>	<b>Left</b>	<b>Right</b>	<b>Step 4. Flow &amp; Flow Modifiers</b>		
Railroads	0	0	Bedrock	0 %	Erosion Length (ft)	194	218	4.1 Springs/ Seeps	Present	
height (ft)			Boulder	0 %	Erosion Height (ft)	4	4	4.2 Adjacent Wetlands	Extensive	
Improved Paths	0	0	Cobble	2 %	Revetment Type	Rip-rap	Rip-rap	4.3 Flow Status	Base	
height (ft)			Coarse Gravel	49 %	Revetment Length (ft)	213	173	4.4 # of Debris Jams	0	
Development	553	0	Fine Gravel	21 %	<i>Near Bank Veg. Type</i>	% Cover	Invasive	Conifer	Deciduous	4.5 Flow Reg Type
			Sand	19 %	L Trees (%)	5	0	0	100	4.6 Up/Downstream Flow Reg
<b>1.4 Adjacent Side</b>				9 %	R Trees (%)	80	0	100	0	4.7 Stormwater Inputs
Hillside Slope	Steep	Extremely Steep	Silt	9 %	% Cover	Invasive	WADs	Saplings	Field Ditch	0
Continuous	Sometimes	Sometimes	Silt/Clay Present	Yes	L Shrub/Sapling (%)	5	0	0	100	Urban Storm Pipe
W/in 1 bankfull	Sometimes	Sometimes	Embedded (chan)	20 %	R Shrub/Sapling (%)	80	0	100	0	Overland Flow
Texture	NE	Sand	Embedded (marg)	32 %	% Cover	Invasive	Grasses	Forbs	4.9 # of Beaver Dams	3
<b>1.5 Valley Features</b>			LWD #	35	L Herbs (%)	100	0	80	20	Affected Length (ft)
Valley Width (ft)		889			R Herbs (%)	100	0	80	20	1230
Width Determination	Estimated		<b>2.13 Average Largest Particle</b>		<i>Bank Canopy</i>	<b>Left</b>	<b>Right</b>	<b>Step 5. Channel Bed &amp; Planform Changes</b>		
Confinement Type	Very Broad		Bed	2.8 inches	Canopy %	26-50	26-50	<b>5.1 Bar Types</b>		
Rock Gorge?	No		Bar	1.0 inches	Mid-channel canopy	Open		<b>Diagonal</b>	<b>Delta</b>	<b>Island</b>
Human Caused Change?	Yes		2.13a % Subs. Exp.	20 %	<b>2.14 Stream Type</b>			3	20	9
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>		<b>3.2 Riparian Buffer</b>			4	0	1
2.1 Bankfull Width (ft)	35		Stream Type:	C	Buffer Width	<b>Left</b>	<b>Right</b>	<b>5.2 Other Features</b>		
2.1a Wetted Width (ft)	12		Bed Material:	Gravel	Dominant	>200	101-150	<b>Flood</b>	<b>NCO</b>	<b>Avulsion</b>
2.1b Ratio (wetted/bkfl)	0.34		Subclass Slope:	None	Sub-dominant	26-50	0-25	6	0	0
2.2 Max Depth (ft)	3.3		Bed Form:	Riffle-Pool	Length <25 ft	0	139	<b>Braiding</b>		
2.3 Mean Depth (ft)	1.5		Field Measured Slope:		<i>Buffer Veg. Type</i>	% Cover	Invasive	Conifer	Deciduous	<b>5.3 Steep Riffles &amp; Headcuts</b>
2.4 Floodprone Width (ft)	563		<b>2.15 Reference Stream Type</b>		L Trees (%)	10	0	20	80	# SRs
2.5 RAF	3.3		C, Gravel, Riffle-pool		R Trees (%)	40	0	20	80	# HCs
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>		<i>3.1 Stream Banks</i>	% Cover	Invasive	WADs	Saplings	4
			Typical Bank Slope	Shallow	L Shrub/Sapling (%)	80	0	80	20	5.4 Stream Ford or Animal Crossing:
					R Shrub/Sapling (%)	80	0	80	20	5.5 Straightening
					% Cover	Invasive	Grasses	Forbs	458	Length (ft)
					L Herbs (%)	80	0	80	20	5.5 Dredging
					R Herbs (%)	70	0	60	40	None
<b>Note:</b> General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.										
<b>Legend:</b> RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut										
NE= Not evaluated, NA=Not applicable										

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M04 Segment: A Completion Date: 20-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 5200 Segment Location: Segment begins just upstream of Belknap Mountain Road crossing and continues until vegetation changes from wetland veget

1.6 Grade Controls						Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative)			
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type	Score	STD	Historic
None						Unconfined			
						7.1 Channel Degradation	16	None	No
						7.2 Channel Aggradation	12	None	No
						7.3 Widening Channel	14		No
						7.4 Change in Planform	13		No
						Total Score:	55		
						Geomorphic Rating:	0.69		
						Channel Evolution Model F Channel Evolution Stage I Geomorphic Condition Good (0.65-0.84) Stream Sensitivity High			
4.8 Channel Constrictions						<b>Channel Adjustment Processes Narrative</b>			
Present						Has not incised in wetland. Some erosion in spots but is not widening. Some aggradation associated with diagonal bars and point bars. Limited planform adjustment noted in wetland with the exception of an island.			
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	<b>Notes:</b>			
Old abutment	9.2	Yes	Yes	Yes	Yes	A very short section (<200 feet) upstream of the intersection of Rt11 (Gilford Ave) and Belknap Mt. Road is channelized and entrenched due to floodplain encroachment from parking lot and Gilford Ave. Nice pools with vegetation. Abundant CPOM. Alders dominant vegetation.			
<b>Problems:</b>	DB, SA, SB, A								
Bridge	24	Yes	Yes	Yes	Yes				
<b>Problems:</b>	DB, A								
Old abutment	21	Yes	Yes	Yes	Yes				
<b>Problems:</b>	None								

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M04	Segment:	B	Completion Date:	20-Aug-11						
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes						
Organization:	BCE		Segment Location:	Segment begins where vegetation changes from wetland to forest and continues until Given Drive development										
Segment Length (ft):	3641													
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>		<u>Left</u>	<u>Right</u>				
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	10.4	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<i>Corridor Land Use</i>						
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	5.2	Upper			Dominant Residential Forest						
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.3	Material Type	Sand	Sand	Sub-dominant Forest None						
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft) 0 0						
Berms height (ft)	0	0	2.9 Sinuosity	Mod (1.2-1.5)	Lower			Height (ft)						
Roads height (ft)	0	0	2.10 Riffle Type	Sedimented	Material Type	Sand	Sand	Gullies (number) 0 0						
Railroads height (ft)	0	0	2.11 Riffle Step Spacing (ft)	83	Consistency	Non-cohesive	Non-cohesive	Height (ft)						
Improved Paths height (ft)	0	0	<b>2.12 Substrate Composition</b>			<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>						
Development	44	0	Bedrock	0	%	Erosion Length (ft)	405	358	4.1 Springs/ Seeps Minimum					
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Boulder	0	%	Erosion Height (ft)	3	2	4.2 Adjacent Wetlands Minimum					
Hillside Slope	Hilly	Hilly	Cobble	1	%	Revetment Type	Rip-rap	Rip-rap	4.3 Flow Status Base					
Continuous	Never	Never	Coarse Gravel	46	%	Revetment Length (ft)	43	379	4.4 # of Debris Jams 2					
W/in 1 bankfull	Never	Never	Fine Gravel	36	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type	None		
Texture	NE	NE	Sand	16	%	L Trees (%)	90	0	80	20	4.6 Up/Downstream Flow Reg	None		
<b>1.5 Valley Features</b>			Silt	1	%	R Trees (%)	90	0	80	20	<b>4.7 Stormwater Inputs</b>			
Valley Width (ft)	576		Silt/Clay Present	Yes		<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch	0	Road Ditch	0	
Width Determination	Measured		Embedded (chan)	5	%	L Shrub/Sapling (%)	30	0	0	100	Urban Storm Pipe	0	Tile Drain	0
Confinement Type	Very Broad		Embedded (marg)	14	%	R Shrub/Sapling (%)	50	0	0	100	Overland Flow	0	Other	0
Rock Gorge?	No		LWD #	15		<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams	0			
Human Caused Change?	Yes					L Herbs (%)	70	0	5	95	Affected Length (ft)			
<b>Step 2. Stream Channel</b>			<b>2.13 Average Largest Particle</b>			R Herbs (%)	80	0	5	95	<b>Step 5. Channel Bed &amp; Planform Changes</b>			
2.1 Bankfull Width (ft)	23.3		<b>2.14 Stream Type</b>			<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>					
2.1a Wetted Width (ft)	14.1		Stream Type:	C		Canopy %	76-100	76-100	<u>Mid</u>		<u>Point</u>	<u>Side</u>		
2.1b Ratio (wetted/bkfl)	0.61		Bed Material:	Gravel		Mid-channel canopy	Closed		4		10	20		
2.2 Max Depth (ft)	2.6		Bed Form:	Riffle-pool		<b>3.2 Riparian Buffer</b>			12		0	0		
2.3 Mean Depth (ft)	2.24		Field Measured Slope:			Buffer Width	<u>Left</u>	<u>Right</u>	<b>5.2 Other Features</b>					
2.4 Floodprone Width (ft)	120.5		<b>2.15 Reference Stream Type</b>			Dominant	51-100	>200	9		1	0		
2.5 RAF	3.5		C, Gravel, Riffle-pool			Sub-dominant	26-50	101-150	Braiding					
*Human Elevated FP	NA					Length <25 ft	0	211	0					
			<b>Step 3. Riparian Features</b>			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>			
			<b>3.1 Stream Banks</b>			L Trees (%)	20	0	80	20	# SRs	# HCs	Trib Rejuv.	
			Typical Bank Slope	Steep		R Trees (%)	90	0	80	20	12	0	No	
						<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	<b>5.4 Stream Ford or Animal Crossing:</b>				
						L Shrub/Sapling (%)	10	0	0	100	5.5 Straightening			
						R Shrub/Sapling (%)	70	0	0	100	Straightening Length (ft) 388			
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	<b>5.5 Dredging</b>				
						L Herbs (%)	90	0	80	20	None			
						R Herbs (%)	50	0	5	95	Bridge and Culvert Survey			
											Yes			

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M04 Segment: B Completion Date: 20-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 3641 Segment Location: Segment begins where vegetation changes from wetland to forest and continues until Given Drive development

1.6 Grade Controls						None				Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )							
Type						Total Ht (ft)		Ht Above (ft)		Photo		GPS		Confinement Type		Unconfined	
												Score		STD		Historic	
7.1 Channel Degradation												11		None		Yes	
7.2 Channel Aggradation												8		None		No	
7.3 Widening Channel												14				No	
7.4 Change in Planform												9				No	
												Total Score:		42			
												Geomorphic Rating:		0.53			
												Channel Evolution Model F					
												Channel Evolution Stage II					
												Geomorphic Condition Fair (0.35-0.64)					
												Stream Sensitivity Very High					
4.8 Channel Constrictions														Present			
Type						Width (ft)		Photo		GPS		Channel Constr.		Floodprone Constr.			
Bridge						23		Yes		Yes		No		No			
<b>Problems:</b>						DA, DB, SB											
Bridge						17.6		Yes		Yes		Yes		Yes			
<b>Problems:</b>						SA											
														<b>Channel Adjustment Processes Narrative</b>			
														Minor incision. Major planform change as sediment works its way through reach.			
														<b>Notes:</b>			
														Good diversity of pool sizes. Relatively stable banks and great undercut bank cover.			

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M04	Segment:	C		Completion Date:	20-Aug-11					
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA		Rain:	Yes					
Organization:	BCE		Segment Location:	Segment begins where there is a lack of buffer near the Given Drive development and continues for 736 feet at tributary confluence.										
Segment Length (ft):	848													
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>			<b>3.3 Riparian Corridor</b>	<u>Left</u>	<u>Right</u>			
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	16.7		<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	Corridor Land Use					
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	17.1		Upper			Dominant	Residential	Shrub/Sapling			
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.5		Material Type	Sand	Sand	Sub-dominant	Shrub/Sapling	Forest			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA		Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0			
Berms	0	0	2.9 Sinuosity	Low (<1.2)		Lower			Height (ft)					
height (ft)			2.10 Riffle Type	Eroded		Material Type	Mix	Mix	Gullies (number)	0	0			
Roads	0	0	2.11 Riffle Step Spacing (ft)	49		Consistency	Non-cohesive	Non-cohesive	Height (ft)					
height (ft)			<b>2.12 Substrate Composition</b>			<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>					
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	93	39	4.1 Springs/ Seeps	Present				
height (ft)			Boulder	0	%	Erosion Height (ft)	4	2	4.2 Adjacent Wetlands	Present				
Improved Paths	0	0	Cobble	24	%	Revetment Type	Rip-rap	None	4.3 Flow Status	Base				
height (ft)			Coarse Gravel	61	%	Revetment Length (ft)	141	0	4.4 # of Debris Jams	0				
Development	0	0	Fine Gravel	6	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type	None		
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	14	%	L Trees (%)	10	0	0	100	4.6 Up/Downstream Flow Reg	None		
Hillside Slope	Hilly	Hilly	Silt/Clay Present	No		R Trees (%)	10	0	0	100	<b>4.7 Stormwater Inputs</b>			
Continuous	Never	Never	Embedded (chan)	15	%	L Shrub/Sapling (%)	20	10	90	0	Field Ditch	0	Road Ditch	0
W/in 1 bankfull	Never	Never	Embedded (marg)	18	%	R Shrub/Sapling (%)	50	10	90	0	Urban Storm Pipe	0	Tile Drain	0
Texture	NE	NE	LWD #	3		<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams	0	Other	0	0
<b>1.5 Valley Features</b>						L Herbs (%)	100	0	100	0	Affected Length (ft)			
Valley Width (ft)	1235		<b>2.13 Average Largest Particle</b>			R Herbs (%)	40	0	70	30	<b>Step 5. Channel Bed &amp; Planform Changes</b>			
Width Determination	Measured		Bed	5.2	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>	<u>Mid</u>	<u>Point</u>	<u>Side</u>		
Confinement Type	Very Broad		Bar	2.5	inches	Canopy %	26-50	51-75		1	2	7		
Rock Gorge?	No		2.13a % Subs. Exp.	30	%	Mid-channel canopy	Open			<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>		
Human Caused Change?	Yes		<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>				0	0	0		
<b>Step 2. Stream Channel</b>			<i>Stream Type:</i>	C		<i>Buffer Width</i>	<u>Left</u>	<u>Right</u>	<b>5.2 Other Features</b>	<u>Flood</u>	<u>NCO</u>	<u>Avulsion</u>		
2.1 Bankfull Width (ft)	28		Bed Material:	Gravel		Dominant	0-25	>200		1	0	1		
2.1a Wetted Width (ft)	8.5		Subclass Slope:	None		Sub-dominant	51-100	51-100		<u>Braiding</u>				
2.1b Ratio (wetted/bkfl)	0.30		Bed Form:	Riffle-Pool		Length <25 ft	441	0		0				
2.2 Max Depth (ft)	3.2		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>	# SRs	# HCs	Trib Rejuv.
2.3 Mean Depth (ft)	1.68		<b>2.15 Reference Stream Type</b>			L Trees (%)	5	0	0	100		0	0	No
2.4 Floodprone Width (ft)	480		C, Gravel, Riffle-pool			R Trees (%)	10	0	0	100		0	0	No
2.5 RAF	4.7		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:				
*Human Elevated FP	NA		<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	10	10	90	0	5.5 Straightening	Straightening		
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	50	10	90	0	Length (ft)	509		
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging	None			
						L Herbs (%)	100	0	90	10	Bridge and Culvert Survey	No		
						R Herbs (%)	50	0	70	30				

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M04 Segment: C Completion Date: 20-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 848 Segment Location: Segment begins where there is a lack of buffer near the Given Drive development and continues for 736 feet at tributary confluence

1.6 Grade Controls						Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )				
None						Confinement Type Unconfined				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Score	STD	Historic		
						7.1 Channel Degradation	9	None	Yes	
						7.2 Channel Aggradation	12	None	No	
						7.3 Widening Channel	16		No	
						7.4 Change in Planform	8		No	
						Total Score:	45			
						Geomorphic Rating:	0.56			
						Channel Evolution Model F				
						Channel Evolution Stage II				
						Geomorphic Condition Fair (0.35-0.64)				
						Stream Sensitivity Very High				
4.8 Channel Constrictions						Channel Adjustment Processes Narrative				
None						Channel has incised. Was straightened within vicinity of development and riprapped. Channel seems to have avulsed here as well leading to major planform change. Some aggradation in upstream part of segment. Short riffles.				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	<b>Notes:</b>				
						Lacks buffers in backyards (left bank). Appears to be incised. Possible planting locale for alders. Very little pool cover. Becomes less incised at downstream end of segment (right bank height seems to be at bankfull elevation). Sediment transport reach.				

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M05	Segment:	A	Completion Date:	20-Aug-11					
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes					
Organization:	BCE		Segment Location:	Segment begins at tributary confluence and continues until Hoyt Road.									
Segment Length (ft):	936												
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>	<u>Left</u>	<u>Right</u>				
1.1 Segmentation:	CD		2.6 Width/Depth Ratio	10.8	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<i>Corridor Land Use</i>					
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	10.1	Upper			Dominant	Hay	Shrub/Sapling			
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.5	Material Type	Sand	Sand	Sub-dominant	Shrub/Sapling	Residential			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0			
Berms	0	0	2.9 Sinuosity	Low (<1.2)	Lower			Height (ft)					
height (ft)			2.10 Riffle Type	Complete	Material Type	Sand	Sand	Gullies (number)	0	0			
Roads	0	0	2.11 Riffle Step Spacing (ft)	78	Consistency	Non-cohesive	Non-cohesive	Height (ft)					
height (ft)			<b>2.12 Substrate Composition</b>			<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>					
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	44	30	4.1 Springs/ Seeps	Minimum			
height (ft)			Boulder	0	%	Erosion Height (ft)	3	4	4.2 Adjacent Wetlands	Extensive			
Improved Paths	0	0	Cobble	8	%	Revetment Type	Rip-rap	Rip-rap	4.3 Flow Status	Base			
height (ft)			Coarse Gravel	56	%	Revetment Length (ft)	94	50	4.4 # of Debris Jams	0			
Development	0	0	Fine Gravel	31	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>			
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	5	%	L Trees (%)	10	0	50	50			
Hillside Slope	Hilly					R Trees (%)	10	0	50	50			
Continuous	Never	Never	Silt/Clay Present	No		<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>				
W/in 1 bankfull	Never	Never	Embedded (chan)	14	%	L Shrub/Sapling (%)	100	10	90	0			
Texture	NE	NE	Embedded (marg)	32	%	R Shrub/Sapling (%)	100	10	90	0			
<b>1.5 Valley Features</b>			LWD #	2		<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>				
Valley Width (ft)	888					L Herbs (%)	80	0	90	10			
Width Determination	Measured		<b>2.13 Average Largest Particle</b>			R Herbs (%)	80	0	90	10			
Confinement Type	Very Broad		Bed	3.1	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>Step 5. Channel Bed &amp; Planform Changes</b>				
Rock Gorge?	No		Bar	2.8	inches	Canopy %	51-75	51-75	<b>5.1 Bar Types</b>	<u>Mid</u>	<u>Point</u>	<u>Side</u>	
Human Caused Change?	No		2.13a % Subs. Exp.	25	%	Mid-channel canopy	Open		1	3	6		
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>			<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>		
2.1 Bankfull Width (ft)	18.3		Stream Type:	C		Buffer Width	<u>Left</u>	<u>Right</u>	2	0	0		
2.1a Wetted Width (ft)	11.5		Bed Material:	Gravel		Dominant	26-50	>200	<b>5.2 Other Features</b>	<u>Flood</u>	<u>NCO</u>	<u>Avulsion</u>	
2.1b Ratio (wetted/bkfl)	0.63		Subclass Slope:	None		Sub-dominant	51-100	0-25	0	0	0		
2.2 Max Depth (ft)	2.35		Bed Form:	Riffle-Pool		Length <25 ft	40	137	0	<u>Braiding</u>			
2.3 Mean Depth (ft)	1.7		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>		
2.4 Floodprone Width (ft)	184		<b>2.15 Reference Stream Type</b>			L Trees (%)	10	0	50	50	# SRs	# HCs	Trib Rejuv.
2.5 RAF	3.55		C, Gravel, Riffle-pool			R Trees (%)	10	0	50	50	2	0	No
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:			
			<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	40	0	90	10	5.5 Straightening		
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	40	0	90	10	Length (ft)	359	
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging			
						L Herbs (%)	80	0	90	10	None		
						R Herbs (%)	80	0	50	50	Bridge and Culvert Survey		
											Yes		

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M05 Segment: A Completion Date: 20-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 936 Segment Location: Segment begins at tributary confluence and continues until Hoyt Road.

1.6 Grade Controls						Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type Unconfined				
						Score	STD	Historic		
						7.1 Channel Degradation	9	None	Yes	
						7.2 Channel Aggradation	12	None	No	
						7.3 Widening Channel	18		No	
						7.4 Change in Planform	10		No	
						Total Score:	49			
						Geomorphic Rating:	0.61			
						Channel Evolution Model F				
						Channel Evolution Stage II				
						Geomorphic Condition Fair (0.35-0.64)				
						Stream Sensitivity Very High				
4.8 Channel Constrictions						<b>Channel Adjustment Processes Narrative</b>				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	Major incision, not at widening stage yet. Planform change due to minor aggradation as seen through steep riffles and diagonal bars, but not as pronounced as upstream reaches. Some straightening.				
Bridge	20	Yes	Yes	No	No					
<b>Problems:</b>	None					<b>Notes:</b> Looks like it may have been historically straightened adjacent to ag fields. Very little riprap, yet appears straightened.				
Bridge	23	Yes	Yes	No	No					
<b>Problems:</b>	None									
Bridge	28	Yes	Yes	No	Yes					
<b>Problems:</b>	DB									

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M05	Segment:	B	Completion Date:	19-Aug-11							
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes							
Organization:	BCE		Segment Location:	Segment begins at Hoyt Road and continues for 1300 feet until corridor is forested again.											
Segment Length (ft):	1433														
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>	<u>Left</u>	<u>Right</u>						
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	18.7	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<b>Corridor Land Use</b>							
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	19.4	Upper			Dominant	Shrub/Sapling	Shrub/Sapling					
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.0	Material Type	Sand	Sand	Sub-dominant	None	None					
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0					
Berms	0	0	2.9 Sinuosity	Mod (1.2-1.5)	Lower			Height (ft)							
height (ft)			2.10 Riffle Type	Sedimented	Material Type	Sand	Sand	Gullies (number)	0	0					
Roads	0	0	2.11 Riffle Step Spacing (ft)	65	Consistency	Non-cohesive	Non-cohesive	Height (ft)							
height (ft)			<b>2.12 Substrate Composition</b>			<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>							
Railroads	0	0	Bedrock	0	%	Erosion Length (ft)	74	23	4.1 Springs/ Seeps	Present					
height (ft)			Boulder	0	%	Erosion Height (ft)	2	3	4.2 Adjacent Wetlands	Extensive					
Improved Paths	0	0	Cobble	13	%	Revetment Type	Rip-rap	Rip-rap	4.3 Flow Status	Base					
height (ft)			Coarse Gravel	58	%	Revetment Length (ft)	194	30	4.4 # of Debris Jams	1					
Development	0	0	Fine Gravel	13	%	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>					
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	16	%	L Trees (%)	0	0	0	0					
Hillside Slope	Hilly	Hilly	Silt/Clay Present	Yes		R Trees (%)	0	0	0	0					
Continuous	Never	Never	Embedded (chan)	11	%	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>						
W/in 1 bankfull	Never	Never	Embedded (marg)	36	%	L Shrub/Sapling (%)	100	0	100	0					
Texture	NE	NE	LWD #	5		R Shrub/Sapling (%)	100	0	100	0					
<b>1.5 Valley Features</b>						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>						
Valley Width (ft)	1238					L Herbs (%)	100	0	90	10					
Width Determination	Estimated		<b>2.13 Average Largest Particle</b>			R Herbs (%)	100	0	90	10					
Confinement Type	Very Broad		Bed	4.9	inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>Step 5. Channel Bed &amp; Planform Changes</b>						
Rock Gorge?	No		Bar	2.9	inches	Canopy %	51-75	51-75	<b>5.1 Bar Types</b>	<u>Mid</u>	<u>Point</u>	<u>Side</u>			
Human Caused Change?	Yes		2.13a % Subs. Exp.	30	%	Mid-channel canopy	Open		0	6	9				
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>			<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>				
2.1 Bankfull Width (ft)	26.4		Stream Type:	C		Buffer Width	<u>Left</u>	<u>Right</u>	2	0	0				
2.1a Wetted Width (ft)	8.3		Bed Material:	Gravel		Dominant	>200	>200	<b>5.2 Other Features</b>	<u>Flood</u>	<u>NCO</u>	<u>Avulsion</u>			
2.1b Ratio (wetted/bkfl)	0.31		Subclass Slope:	None		Sub-dominant	0-25	None	5	0	0				
2.2 Max Depth (ft)	2.4		Bed Form:	Riffle-Pool		Length <25 ft	54	0	<u>Braiding</u>						
2.3 Mean Depth (ft)	1.41		Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>				
2.4 Floodprone Width (ft)	512.5		<b>2.15 Reference Stream Type</b>			L Trees (%)	10	0	0	100	# SRs	# HCs	Trib Rejuv.		
2.5 RAF	2.4		C, Gravel, Riffle-pool			R Trees (%)	10	0	0	100	6	0	No		
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:					
			<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	100	10	90	0	5.5 Straightening				
			Typical Bank Slope	Steep		R Shrub/Sapling (%)	100	10	90	0	133	Length (ft)			
						<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging					
						L Herbs (%)	70	0	70	30	None				
						R Herbs (%)	70	0	70	30	Bridge and Culvert Survey				
											No				

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M05 Segment: B Completion Date: 19-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 1433 Segment Location: Segment begins at Hoyt Road and continues for 1300 feet until corridor is forested again.

1.6 Grade Controls						Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )				
None						Confinement Type Unconfined				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Score	STD	Historic		
						7.1 Channel Degradation	19	None	No	
						7.2 Channel Aggradation	10	None	No	
						7.3 Widening Channel	16		No	
						7.4 Change in Planform	8		No	
						Total Score:	53			
						Geomorphic Rating:	0.66			
						Channel Evolution Model D				
						Channel Evolution Stage II c				
						Geomorphic Condition Good (0.65-0.84)				
						Stream Sensitivity High				
4.8 Channel Constrictions						Channel Adjustment Processes Narrative				
None						Major planform adjustment and aggradation. Not incised or widening.				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.					
						<b>Notes:</b>				
						More sinuous than NHD. Moderate sinuosity. Minor straightening upstream of Hoyt Road Bridge. Good floodplain access. Large trout observed.				

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	M05	Segment:	C	Completion Date:	19-Aug-11			
Stream:	Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes			
Organization:	BCE		Segment Location:	Segment begins where corridor is forested again and continues until tributary confluence							
Segment Length (ft):	2056										
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>		<b>3.3 Riparian Corridor</b>		<b>Left</b>	<b>Right</b>	
1.1 Segmentation:	BB		2.6 Width/Depth Ratio	22.0	<i>Bank Texture</i>	<b>Left</b>	<b>Right</b>	<b>Corridor Land Use</b>			
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	11.3	Upper			Dominant Forest Forest			
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.0	Material Type	Sand	Sand	Sub-dominant Shrub/Sapling Shrub/Sapling			
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft) 0 0			
Berms height (ft)	0	0	2.9 Sinuosity	Mod (1.2-1.5)	Lower			Height (ft)			
Roads height (ft)	0	0	2.10 Riffle Type	Sedimented	Material Type	Boulder/Cobble	Boulder/Cobble	Gullies (number) 0 0			
Railroads height (ft)	0	0	2.11 Riffle Step Spacing (ft)	54	Consistency	Non-cohesive	Non-cohesive	Height (ft)			
Improved Paths height (ft)	0	0	<b>2.12 Substrate Composition</b>		<i>Bank Erosion</i>	<b>Left</b>	<b>Right</b>	<b>Step 4. Flow &amp; Flow Modifiers</b>			
Development	0	0	Bedrock	0 %	Erosion Length (ft)	116	94	4.1 Springs/ Seeps Present Present			
			Boulder	0 %	Erosion Height (ft)	3	5	4.2 Adjacent Wetlands			
			Cobble	16 %	Revetment Type	None	None	4.3 Flow Status Base			
			Coarse Gravel	52 %	Revetment Length (ft)	0	0	4.4 # of Debris Jams 2			
			Fine Gravel	16 %	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type None	
<b>1.4 Adjacent Side</b>	<b>Left</b>	<b>Right</b>	Sand	16 %	L Trees (%)	70	0	50	50	4.6 Up/Downstream Flow Reg None	
Hillside Slope	Hilly	Steep	Silt/Clay Present	No	R Trees (%)	70	0	50	50	<b>4.7 Stormwater Inputs</b>	
Continuous	Never	Never	Embedded (chan)	28 %	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch 0 Road Ditch 0		
W/in 1 bankfull	Never	Never	Embedded (marg)	39 %	L Shrub/Sapling (%)	30	10	10	80	Urban Storm Pipe 0 Tile Drain 0	
Texture	NE	Sand	LWD #	30	R Shrub/Sapling (%)	30	10	10	80	Overland Flow 0 Other 0	
<b>1.5 Valley Features</b>					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams 0		
Valley Width (ft)	916				L Herbs (%)	60	0	10	90	Affected Length (ft)	
Width Determination	Estimated		<b>2.13 Average Largest Particle</b>		R Herbs (%)	60	0	10	90	<b>Step 5. Channel Bed &amp; Planform Changes</b>	
Confinement Type	Very Broad		Bed	4.5 inches	<i>Bank Canopy</i>	<b>Left</b>	<b>Right</b>	<b>5.1 Bar Types</b>			
Rock Gorge?	No		Bar	3.1 inches	Canopy %	51-75	51-75	Mid 2 Point 9 Side 18			
Human Caused Change?	No		2.13a % Subs. Exp.	50 %	Mid-channel canopy	Closed		Diagonal 7 Delta 1 Island 0			
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>		<b>3.2 Riparian Buffer</b>		<b>5.2 Other Features</b>		<b>Flood</b>	<b>NCO</b>	<b>Avulsion</b>
2.1 Bankfull Width (ft)	33		Stream Type:	C	Buffer Width	<b>Left</b>	<b>Right</b>	Braiding 11 0 1			
2.1a Wetted Width (ft)	16.4		Bed Material:	Gravel	Dominant	>200	>200	NCO 0 1			
2.1b Ratio (wetted/bkfl)	0.50		Subclass Slope:	None	Sub-dominant	None	>150	Braiding 0			
2.2 Max Depth (ft)	2.9		Bed Form:	Riffle-Pool	Length <25 ft	0	53	0			
2.3 Mean Depth (ft)	1.5		Field Measured Slope:		<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>	
2.4 Floodprone Width (ft)	373		<b>2.15 Reference Stream Type</b>		L Trees (%)	80	0	60	40	# SRs # HCs Trib Rejuv.	
2.5 RAF	2.9		C, Gravel, Riffle-pool		R Trees (%)	80	0	60	40	13 0 No	
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>		<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	4.4 Stream Ford or Animal Crossing: None		
			<b>3.1 Stream Banks</b>		L Shrub/Sapling (%)	20	5	0	95	5.5 Straightening None	
			Typical Bank Slope	Moderate	R Shrub/Sapling (%)	20	5	0	95	Length (ft) 0	
					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging None		
					L Herbs (%)	90	0	10	90	Bridge and Culvert Survey No	
					R Herbs (%)	90	0	10	90		

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut, NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Gunstock Brook Reach #: M05 Segment: C Completion Date: 19-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 2056 Segment Location: Segment begins where corridor is forested again and continues until tributary confluence

1.6 Grade Controls						Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )			
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type	Score	STD	Historic
None						Unconfined			
						7.1 Channel Degradation	18	None	No
						7.2 Channel Aggradation	7	None	No
						7.3 Widening Channel	15		No
						7.4 Change in Planform	7		No
						Total Score:	47		
						Geomorphic Rating:	0.59		
						Channel Evolution Model D Channel Evolution Stage II c Geomorphic Condition Fair (0.35-0.64) Stream Sensitivity Very High			
4.8 Channel Constrictions						<b>Channel Adjustment Processes Narrative</b>			
None						No incision, but major aggradation and planform adjustment. Deposition of sand on banks. Good floodplain access. Numerous flood chutes and steep riffles.			
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	<b>Notes:</b>			
						Nice undercut banks with stable roots. Steep riffles flow directly into pools on bends.			

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	T2.01	Segment:	A	Completion Date:	19-Aug-11						
Stream:	Trib to Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes						
Organization:	BCE		Segment Location:	Segment begins at confluence with the main stem and continues until valley width decreases										
Segment Length (ft):	1482													
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>			<i>Step 3. (Cont'd)</i>	<b>3.3 Riparian Corridor</b>	<u>Left</u>	<u>Right</u>					
1.1 Segmentation:	VW		2.6 Width/Depth Ratio	14.2	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	<i>Corridor Land Use</i>						
1.2 Alluvial Fan:	None		2.7 Entrenchment Ratio	13.2	Upper			Dominant	Forest	Forest				
<b>1.3 Corridor Encroachments:</b>			2.8 Incision Ratio	1.1	Material Type	Sand	Sand	Sub-dominant	None	None				
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	0	0				
Berms	0	0	2.9 Sinuosity	Mod (1.2-1.5)	Lower			Height (ft)						
height (ft)			2.10 Riffle Type	Sedimented	Material Type	Boulder/Cobble	Boulder/Cobble	Gullies (number)	0	0				
Roads	0	0	2.11 Riffle Step Spacing (ft)	44	Consistency	Non-cohesive	Non-cohesive	Height (ft)						
height (ft)			<b>2.12 Substrate Composition</b>			<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>						
Railroads	0	0	Bedrock	0 %	Erosion Length (ft)	122	76	4.1 Springs/ Seeps	Minimum					
height (ft)			Boulder	1 %	Erosion Height (ft)	3	3	4.2 Adjacent Wetlands	None					
Improved Paths	0	0	Cobble	37 %	Revetment Type	Rip-rap	Rip-rap	4.3 Flow Status	Base					
height (ft)			Coarse Gravel	43 %	Revetment Length (ft)	22	29	4.4 # of Debris Jams	0					
Development	0	0	Fine Gravel	14 %	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	4.5 Flow Reg Type	None			
<b>1.4 Adjacent Side</b>	<u>Left</u>	<u>Right</u>	Sand	5 %	L Trees (%)	70	0	20	80	4.6 Up/Downstream Flow Reg	None			
Hillside Slope	Flat	Steep	Silt/Clay Present	No	R Trees (%)	70	0	20	80	<b>4.7 Stormwater Inputs</b>				
Continuous	Never	Never	Embedded (chan)	17 %	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch					
W/in 1 bankfull	Never	Never	Embedded (marg)	19 %	L Shrub/Sapling (%)	40	0	0	100	Urban Storm Pipe	0	Tile Drain	0	
Texture	NE	NE	LWD #	30	R Shrub/Sapling (%)	40	0	0	100	Overland Flow	0	Other	1	
<b>1.5 Valley Features</b>					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	4.9 # of Beaver Dams					
Valley Width (ft)	407				L Herbs (%)	80	0	10	90	Affected Length (ft)				
Width Determination	Measured		<b>2.13 Average Largest Particle</b>			R Herbs (%)	80	0	10	90	<b>Step 5. Channel Bed &amp; Planform Changes</b>			
Confinement Type	Very Broad		Bed	9.3 inches	<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>	<b>5.1 Bar Types</b>						
Rock Gorge?	No		Bar	3.5 inches	Canopy %	76-100	76-100	<u>Mid</u>	<u>Point</u>	<u>Side</u>				
Human Caused Change?	No		2.13a % Subs. Exp.	30 %	Mid-channel canopy	Closed		4	4	19				
<b>Step 2. Stream Channel</b>			<b>2.14 Stream Type</b>			<b>3.2 Riparian Buffer</b>			<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>			
2.1 Bankfull Width (ft)	20		Stream Type:	C	Buffer Width	<u>Left</u>	<u>Right</u>	0	0	0				
2.1a Wetted Width (ft)	8.9		Bed Material:	Gravel	Dominant	>200	>200	8	2	0				
2.1b Ratio (wetted/bkfl)	0.45		Subclass Slope:	b	Sub-dominant	None	>150	<b>5.2 Other Features</b>						
2.2 Max Depth (ft)	2.05		Bed Form:	Riffle-Pool	Length <25 ft	0	0	0	<b>Braiding</b>					
2.3 Mean Depth (ft)	1.41		Field Measured Slope:		<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<b>5.3 Steep Riffles &amp; Headcuts</b>				
2.4 Floodprone Width (ft)	264		<b>2.15 Reference Stream Type</b>			L Trees (%)	80	0	30	70	# SRs	# HCs	Trib Rejuv.	
2.5 RAF	2.25		C, Gravel, Riffle-pool			R Trees (%)	80	0	30	70	6	0	No	
*Human Elevated FP	NA		<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	5.4 Stream Ford or Animal Crossing:				
			<b>3.1 Stream Banks</b>			L Shrub/Sapling (%)	50	0	0	100	5.5 Straightening			
			Typical Bank Slope	Steep	R Shrub/Sapling (%)	50	0	0	100	Length (ft)	0	1		
					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	5.5 Dredging					
					L Herbs (%)	50	0	0	100	None				
					R Herbs (%)	50	0	0	100	Bridge and Culvert Survey				
										Yes				

**Note:** General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.

**Legend:** RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cut  
NE= Not evaluated, NA=Not applicable

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Trib to Gunstock Brook Reach #: T2.01 Segment: A Completion Date: 19-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 1482 Segment Location: Segment begins at confluence with the main stem and continues until valley width decreases

1.6 Grade Controls		None				Step 7. Rapid Geomorphic Assessment Summary ( <i>fill out RGA sheet first, then enter narrative</i> )				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type	Unconfined			
							Score	STD	Historic	
						7.1 Channel Degradation	19	None	No	
						7.2 Channel Aggradation	9	None	No	
						7.3 Widening Channel	14		No	
						7.4 Change in Planform	10		No	
							Total Score:	52		
							Geomorphic Rating:	0.65		
							Channel Evolution Model D Channel Evolution Stage II c Geomorphic Condition Good (0.65-0.84) Stream Sensitivity High			
4.8 Channel Constrictions		Present				<b>Channel Adjustment Processes Narrative</b>				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	Aggradation is attributed to drop in channel slope in this segment. Possible contribution of sediment from gravel operation (per P. Tarpey).				
Culvert	4.7	Yes	Yes	Yes	Yes					
<b>Problems:</b>		DA, DB, SB				<b>Notes:</b>				

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

**Phase 2 Segment Summary (page 1)**

Project:	Gunstock Brook		Reach #:	T2.01	Segment:	B	Completion Date:	18-Aug-11		
Stream:	Trib to Gunstock Brook		Observers:	PD, MN	Why Not Assessed:	NA	Rain:	Yes		
Organization:	BCE		Segment Length (ft):	2324	Segment Location:	Segment begins where valley width decreases and continues to about 470 feet upstream of Belknap Mountain Road crossing				
<b>Step 1. Valley and Floodplain</b>			<i>Step 2. (Cont'd)</i>		<i>Step 3. (Cont'd)</i>		<u>3.3 Riparian Corridor</u>	<u>Left</u>	<u>Right</u>	
1.1 Segmentation:		VW	2.6 Width/Depth Ratio	12.4	<i>Bank Texture</i>	<u>Left</u>	<u>Right</u>	Corridor Land Use		
1.2 Alluvial Fan:		None	2.7 Entrenchment Ratio	6.8	Upper			Dominant	Forest	Forest
<u>1.3 Corridor Encroachments:</u>			2.8 Incision Ratio	1.0	Material Type	Mix	Mix	Sub-dominant	Residential	Residential
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>	*Human Elevated Incision	NA	Consistency	Non-cohesive	Non-cohesive	Mass Failures (ft)	74	0
Berms	0	0	2.9 Sinuosity	Low (<1.2)	Lower			Height (ft)	8	
height (ft)			2.10 Riffle Type	Complete	Material Type	Boulder/Cobble	Boulder/Cobble	Gullies (number)	0	0
Roads	0	0	2.11 Riffle Step Spacing (ft)	65	Consistency	Non-cohesive	Non-cohesive	Height (ft)		
height (ft)			<u>2.12 Substrate Composition</u>		<i>Bank Erosion</i>	<u>Left</u>	<u>Right</u>	<b>Step 4. Flow &amp; Flow Modifiers</b>		
Railroads	0	0	Bedrock	0 %	Erosion Length (ft)	321	125	4.1 Springs/ Seeps	Minimum	
height (ft)			Boulder	10 %	Erosion Height (ft)	4	4	4.2 Adjacent Wetlands	None	
Improved Paths	0	0	Cobble	24 %	Revetment Type	Rip-rap	Rip-rap	4.3 Flow Status	Base	
height (ft)			Coarse Gravel	31 %	Revetment Length (ft)	57	119	4.4 # of Debris Jams	1	
Development	0	0	Fine Gravel	21 %	<i>Near Bank Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	None
<u>1.4 Adjacent Side</u>	<u>Left</u>	<u>Right</u>	Sand	14 %	L Trees (%)	60	0	40	60	None
Hillside Slope	Extremely Steep	Extremely Steep	Silt/Clay Present	Yes	R Trees (%)	60	0	40	60	None
Continuous	Never	Never	Embedded (chan)	17 %	<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>	Field Ditch	0
W/in 1 bankfull	Never	Never	Embedded (marg)	42 %	L Shrub/Sapling (%)	30	0	0	100	Road Ditch
Texture	NE	NE	LWD #	10	R Shrub/Sapling (%)	30	0	0	100	Tile Drain
<u>1.5 Valley Features</u>					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>	Urban Storm Pipe	0
Valley Width (ft)		179			L Herbs (%)	70	0	20	80	Other
Width Determination	Measured		<u>2.13 Average Largest Particle</u>		R Herbs (%)	70	0	20	80	0
Confinement Type	Very Broad	Bed	12.6 inches		<i>Bank Canopy</i>	<u>Left</u>	<u>Right</u>		Overland Flow	0
Rock Gorge?	No	Bar	5.8 inches		Canopy %	76-100	76-100		4.9 # of Beaver Dams	0
Human Caused Change?	No	2.13a % Subs. Exp.	20 %		Mid-channel canopy	Closed			Affected Length (ft)	
<b>Step 2. Stream Channel</b>			<u>2.14 Stream Type</u>		<u>3.2 Riparian Buffer</u>			<b>Step 5. Channel Bed &amp; Planform Changes</b>		
2.1 Bankfull Width (ft)	17	Stream Type:	C		Buffer Width	<u>Left</u>	<u>Right</u>	<u>5.1 Bar Types</u>	<u>Mid</u>	<u>Point</u>
2.1a Wetted Width (ft)	10.5	Bed Material:	Gravel		Dominant	>200	101-150		0	2
2.1b Ratio (wetted/bkfl)	0.62	Subclass Slope:	b		Sub-dominant	51-100	51-100		0	0
2.2 Max Depth (ft)	2	Bed Form:	Riffle-Pool		Length <25 ft	0	0		0	0
2.3 Mean Depth (ft)	1.37	Field Measured Slope:			<i>Buffer Veg. Type</i>	<u>% Cover</u>	<u>Invasive</u>	<u>Conifer</u>	<u>Deciduous</u>	<u>5.2 Other Features</u>
2.4 Floodprone Width (ft)	116	<u>2.15 Reference Stream Type</u>			L Trees (%)	70	0	40	60	<u>Flood</u>
2.5 RAF	2	C, Gravel, Riffle-pool			R Trees (%)	70	0	40	60	<u>NCO</u>
*Human Elevated FP	NA	<b>Step 3. Riparian Features</b>			<u>% Cover</u>	<u>Invasive</u>	<u>WADs</u>	<u>Saplings</u>		<u>Avulsion</u>
		<u>3.1 Stream Banks</u>			L Shrub/Sapling (%)	50	0	0	100	
		Typical Bank Slope	Steep		R Shrub/Sapling (%)	50	0	0	100	
					<u>% Cover</u>	<u>Invasive</u>	<u>Grasses</u>	<u>Forbs</u>		
					L Herbs (%)	20	0	0	100	
					R Herbs (%)	20	0	0	100	
<b>Note:</b>	General comments, Step 1.6 Grade Controls and Step 4.8 Channel Constrictions on Sheet 2 of this workbook.									
<b>Legend:</b>	RAF=Recently Abandoned Floodplain, FP=Floodplain, LWD=Large Woody Debris, % Subs. Exp.=Exposed Substrate, Flood=Flood Chute, NCO=Neck Cutoff, SR=Steep Riffle, HC=Head Cui									
	NE= Not evaluated, NA=Not applicable									

**Phase 2 Segment Summary (page 2)**

Project: Gunstock Brook  
 Stream: Trib to Gunstock Brook Reach #: T2.01 Segment: B Completion Date: 18-Aug-11  
 Organization: BCE Observers: PD, MN Why Not Assessed: NA Rain: Yes  
 Segment Length (ft): 2324 Segment Location: Segment begins where valley width decreases and continues to about 470 feet upstream of Belknap Mountain Road crossing

1.6 Grade Controls		None				Step 7. Rapid Geomorphic Assessment Summary (fill out RGA sheet first, then enter narrative )				
Type	Location	Total Ht (ft)	Ht Above (ft)	Photo	GPS	Confinement Type Unconfined				
						Score	STD	Historic		
						7.1 Channel Degradation	17	None	No	
						7.2 Channel Aggradation	18	None	No	
						7.3 Widening Channel	17		No	
						7.4 Change in Planform	14		No	
						Total Score:	66			
						Geomorphic Rating:	0.83			
						Channel Evolution Model F				
						Channel Evolution Stage I				
						Geomorphic Condition Good (0.65-0.84)				
						Stream Sensitivity High				
4.8 Channel Constrictions		Present				<b>Channel Adjustment Processes Narrative</b>				
Type	Width (ft)	Photo	GPS	Channel Constr.	Floodprone Constr.	Some areas of channel have a higher bank, while other areas have a lower bank. Cross section was measured where banks are lower. No evidence of widening. Very little erosion. Banks may be naturally higher in places and therefore floodplain may be higher also. Channel does not appear incised.				
Bridge	15	Yes	Yes	Yes	Yes					
Problems:	None					<b>Notes:</b>				
						Step-pool above Belknap Mountain Road.				

**Legend:** Ht.=Height, Constr.=Constriction, Old abutm.=Old abutment, DA=Deposition above, DB=Deposition below, SA=Scour above, SB=Scour below, A=Alignment

New Hampshire Geological Survey  
New Hampshire Department of Environmental Services  
QA/QC Comments  
Gunstock Brook Phase 2 Data  
March 12, 2012

**Bear Creek Environmental, LLC**  
**QA/QC responses**  
**Gunstock Brook Phase 2 Data**  
**March 13, 2012**  
**Responses in red**

Reach 1, Segment A

- You indicate the reason for segmentation as “Other Reason.” What is the reason?  
**The other reason is that this lower segment is influenced by Lake Winnepesaukee and was impounded at the time of the assessment.**
- In Step 5.5., you indicate that there is a 49 foot length of straightening. Yet, I don’t see it in your FIT line shapefile that you sent.  
**The straightening was marked in the vicinity of the bridge. There is a record in the FIT length shapefile (Fit011nimpactseg.shp) for 49 feet.**
- The stream type is visually estimated as isn’t the bed material. As there is no cross-section data, FEH zones will not be able to be delineated for this segment.  
**That is correct; since this segment was not assessed there is no cross section data available. The steam type is based on administrative judgment in the field.**

Reach 1, Segment B

- Step 7.1, Row 5 – Your data indicates that the segment has experienced 822 feet of straightening, and you have several straightening lines digitized as part of your FIT data. In this row, then, do you have the “Good” checkbox selected. Is 822 feet of straightening not significant, such as defined in the “Fair” checkbox? What was your rationale for selecting “Good” instead of “Fair?”  
**“Fair” should have been checked due to the straightening in this segment.  
Checkbox was changed to “Fair” for step 7.1, row 5.**

Reach 1, Segment C

- Your data shows this typed out as a “B” stream type. The cross-section data shows that the entrenchment ratio places the stream in the “B” range, but the width/depth ratio does not squarely fit a “B” (w/d ratio = 8.85, while strictly speaking, the w/d ratio for a “B” type stream is greater than 12). Thus, this reach is a case where it doesn’t fit the stream typing method fully. Looking at the photos from this reach and the surrounding topography, its hard for this stream to fit the B4 description of a river channel. It seems that this really more fits a “C” type stream, and thus would type out as a C4, based upon your pebble count. The shape of the cross-section plot also verifies this interpretation. Any comments on this point?

We agree that the width to depth ratio does not fit a “B” stream type, but the channel has not widened yet and is still in stage F-II of the channel evolution model. Therefore, it would not have a higher width to depth ratio at this stage. We indicated that by reference the stream type is a “C”. Since the channel has incised considerably (incision ratio = 2.3), the stream has become more entrenched and is therefore now a “B”. Entrenchment is the first thing to look at in Rosgen’s stream classification and in this case, the channel is a “B” with a stream type departure from a reference “C” based on the entrenchment of 1.65. No changes were made.

Reach 2, Segment B

- The entrenchment ratio comes out to be 1.37. Typically, I don’t round. So, 1.37 is 1.37 . . . not 1.4, as you rounded to on your spreadsheet. That said, however, as it is close on the threshold of the 1.4 cutoff, after examining your photos from that segment and the shape of the plotted cross-section, I agree with your assessment that this types out as a “B” rather than an “F.”

The rounding was a function of the spreadsheet that we used to generate our reports. This has been corrected in the spreadsheet.

**New Hampshire Geological Survey, Shane Csiki**  
**QA Comments on Gunstock Brook**  
**Reaches 3 through 5**  
**3/21/2012**

**Response from Bear Creek Environmental, LLC**  
**March 28, 2012**

Reach 4A

In looking at the photos as well as what this reach looks like on the aerial photography, this strikes me as an area that was once inundated, possibly by additional impounding structures near the downstream reach break at some point in the past. This strikes me as if this was some sort of formerly inundated pond in the past (particularly downstream of Alvah Wilson Road).

It is very possible that this area was previously inundated and that there was a dam at the historic mill near the Belknap Mountain Road crossing. We asked Lisa Morin about this, and she has offered to call Pat Tarpey and the Gilford Historical Society to get some information.

Reach 4B

As you chose Cross-Section #1, rather than Cross-Section #2, the results from that cross-section type out as an “E” rather than a “C,” given the width/depth ratio value of 10.39 for the cross-section you selected. Based on your geomorphic condition rating of Fair based on the RGA, the difference in stream type between “E” and “C” marks the difference between a “Very High” and “Extreme” sensitivity rating. Now, if you chose Cross-Section #2, then the type would be “C” automatically. Can you provide your rationale here as to how you ultimately chose “C” for the stream type given the above?

You raise a good point here, and it’s important to justify this is a “C” stream type rather than an “E” stream type due to the differences in stream sensitivity and width of the FEH zones (6 channel widths versus 8 channel widths). There are a number of things that we look for to make an “E” stream type determination. Typically “E” channels occur in lacustrine soils (have cohesive clay soils) and high sinuosity. An “E” channel in reference condition would have a low width to depth ratio and should be able to efficiently transport sediment resulting in a lack of bars features.

Although the width to depth ratio in this cross section represents more of an “E” stream type, there are numerous bars in this segment including mid-channel and diagonal bars. These bars could certainly be a result of aggradation due to channel adjustment (as you point out, the geomorphic rating is fair”). The width to depth ratio is a guideline and allows for flexibility from the 12 value cutoff. Both of our cross sections indicate the channel was incised within segment M04-B. We thought segment M04-B was generally in stage F-II of the channel evolution model. Therefore, this low width to depth ratio would make sense. Cross section #2 provides some additional evidence that the channel is a “C” rather than an “E” due to the width to depth ratio of 13.6.

Based on the photos, you can see that the much of the segment is more “C” like. The sinuosity was moderate, where in an “E” stream, it would typically be high. We noted that the both the upper and lower banks in this segment are made up of sandy, non-cohesive material. Soils data from GRANIT shows much of the river corridor to be made up of very fine sandy loam or loamy fine sand rather than lacustrine soils. In conclusion, our best professional judgment is this segment is a “C” channel.

Reach 5A

Given the parameters inherent with the cross-section you collected here, what is your rationale for the “C” versus “E” stream typing?

Please see our response to segment M04b. The low sinuosity, presence of diagonal bars and mid-channel bars is more indicative of a “C” channel. Soils were sandy, and there was a lack of cohesive material. Once again, this segment was incised and was in stage F-II of the channel evolution model, resulting in a low width to depth ratio.