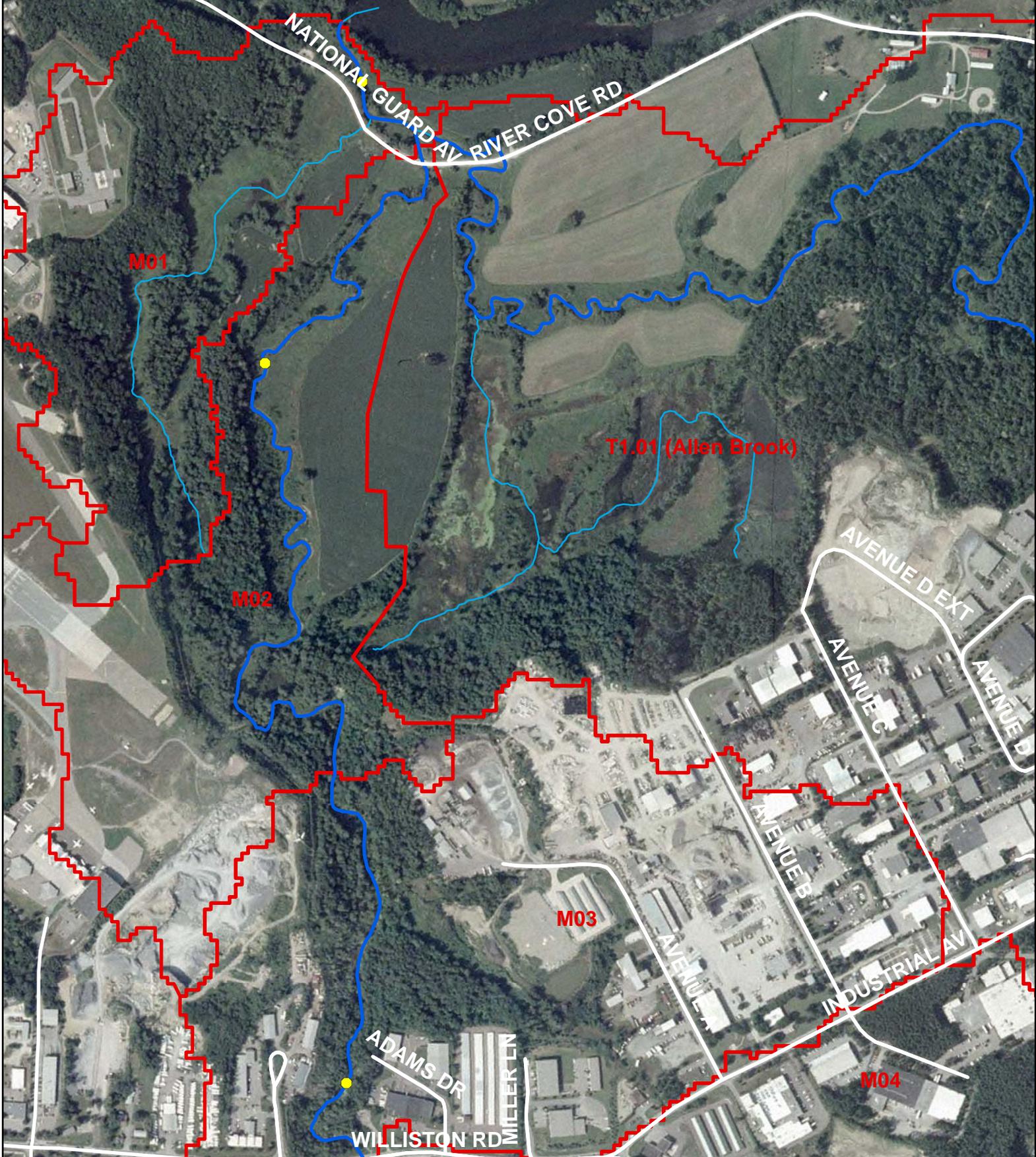


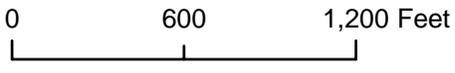
Appendix A

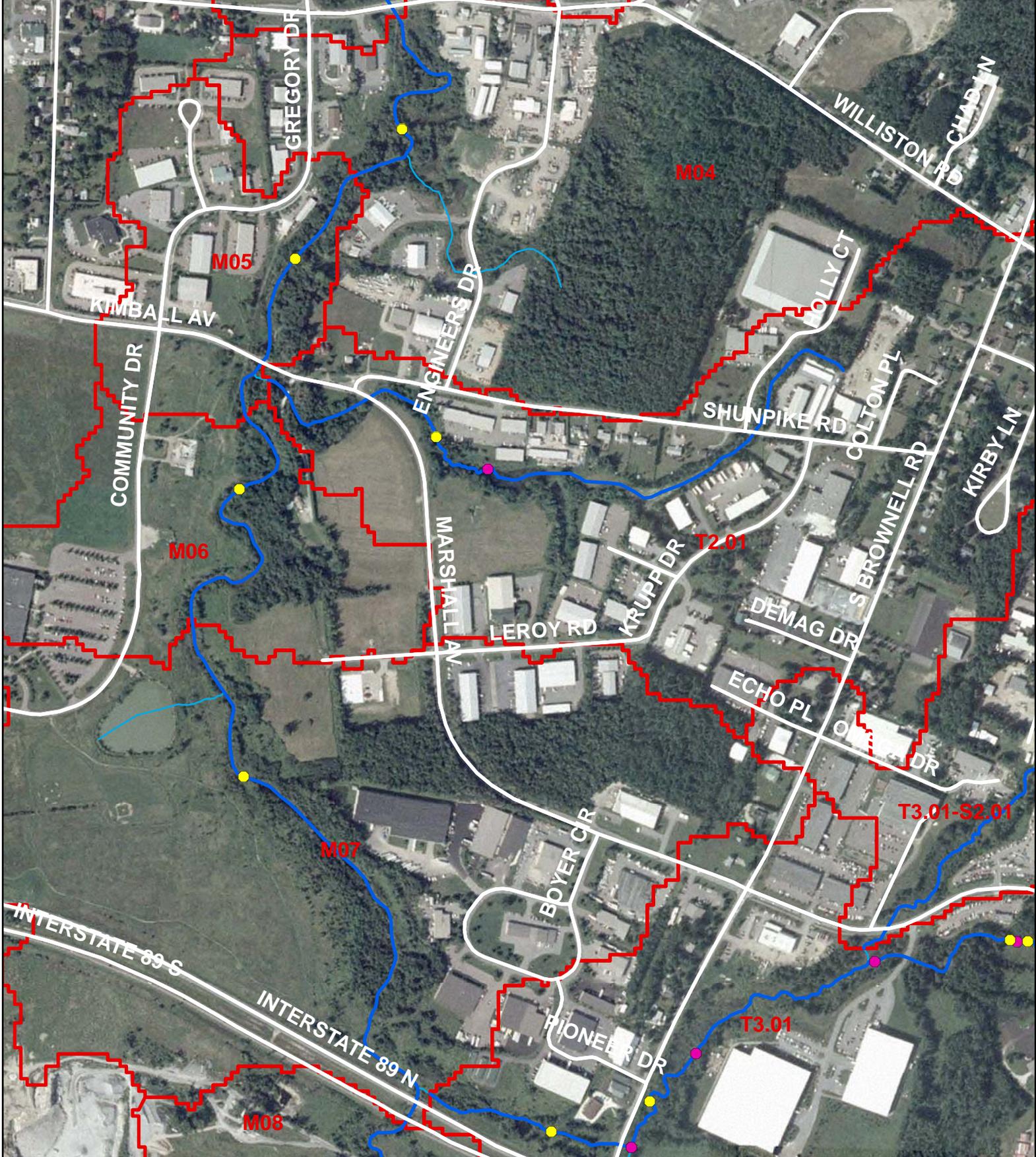
Reach Mapping



**Muddy Brook Phase 2 Mapping
Reaches M01, M02, M03 &
T1.01 (Allen Brook)**

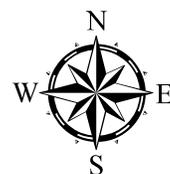
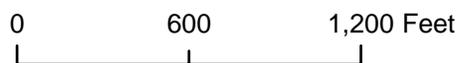
-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

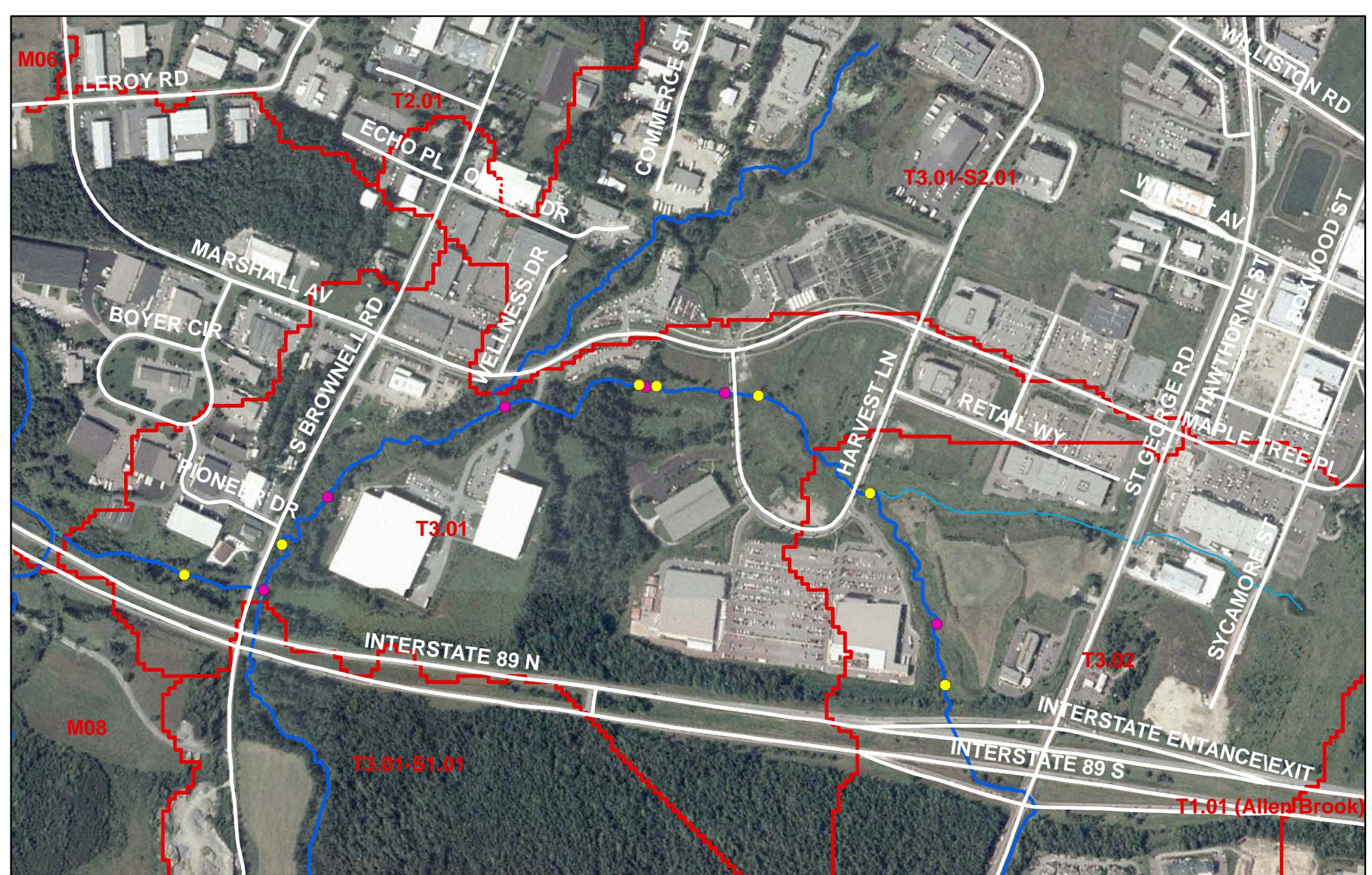




-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

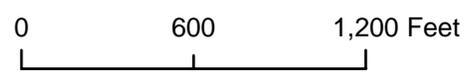
**Muddy Brook Phase 2 Mapping
Reaches M04, M05, M06,
M07 & T2.01**

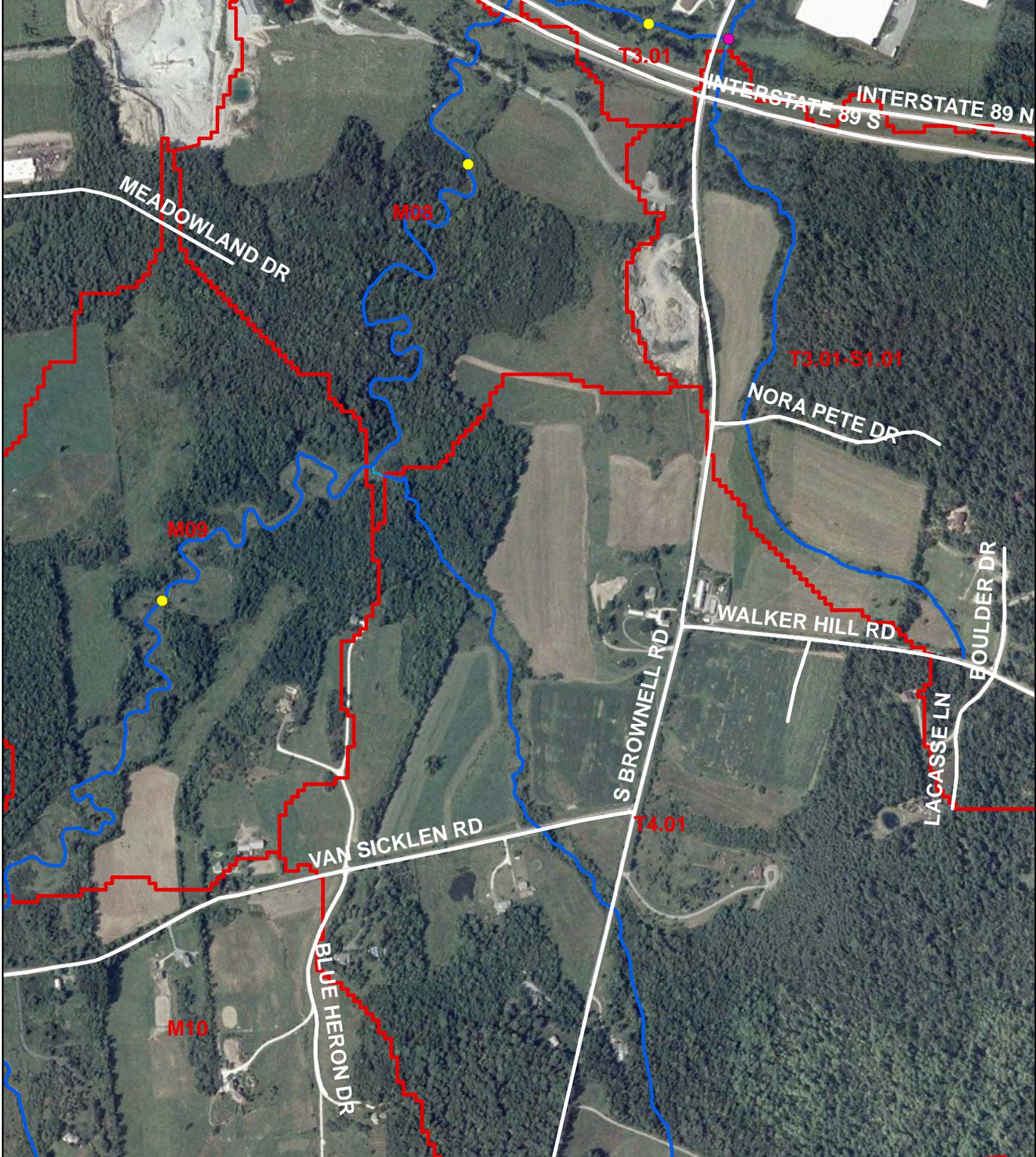




- Cross-Section Locations
- Segment Breaks
- ⬮ Subwatershed Boundaries
- ~ Muddy Bk Surface Waters
- ~ Minor Tributaries

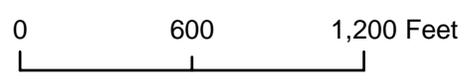
Muddy Brook Phase 2 Mapping
Reaches T3.01, T3.02,
T3.01-S1.01 & T3.01-S2.01



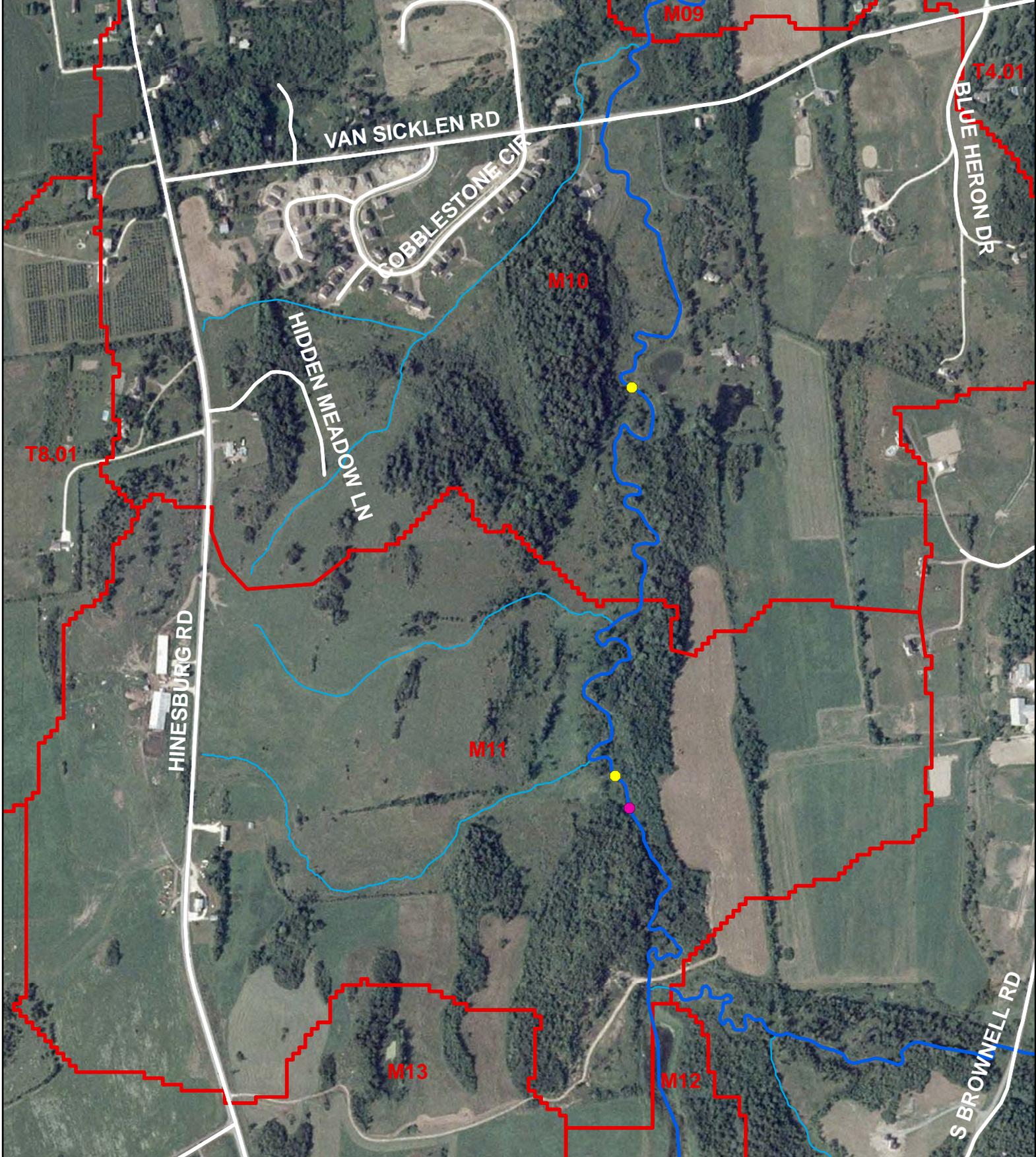


-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

**Muddy Brook Phase 2 Mapping
Reaches M08, M09,
T3.01-S1.01 & T4.01**

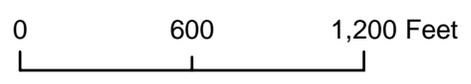


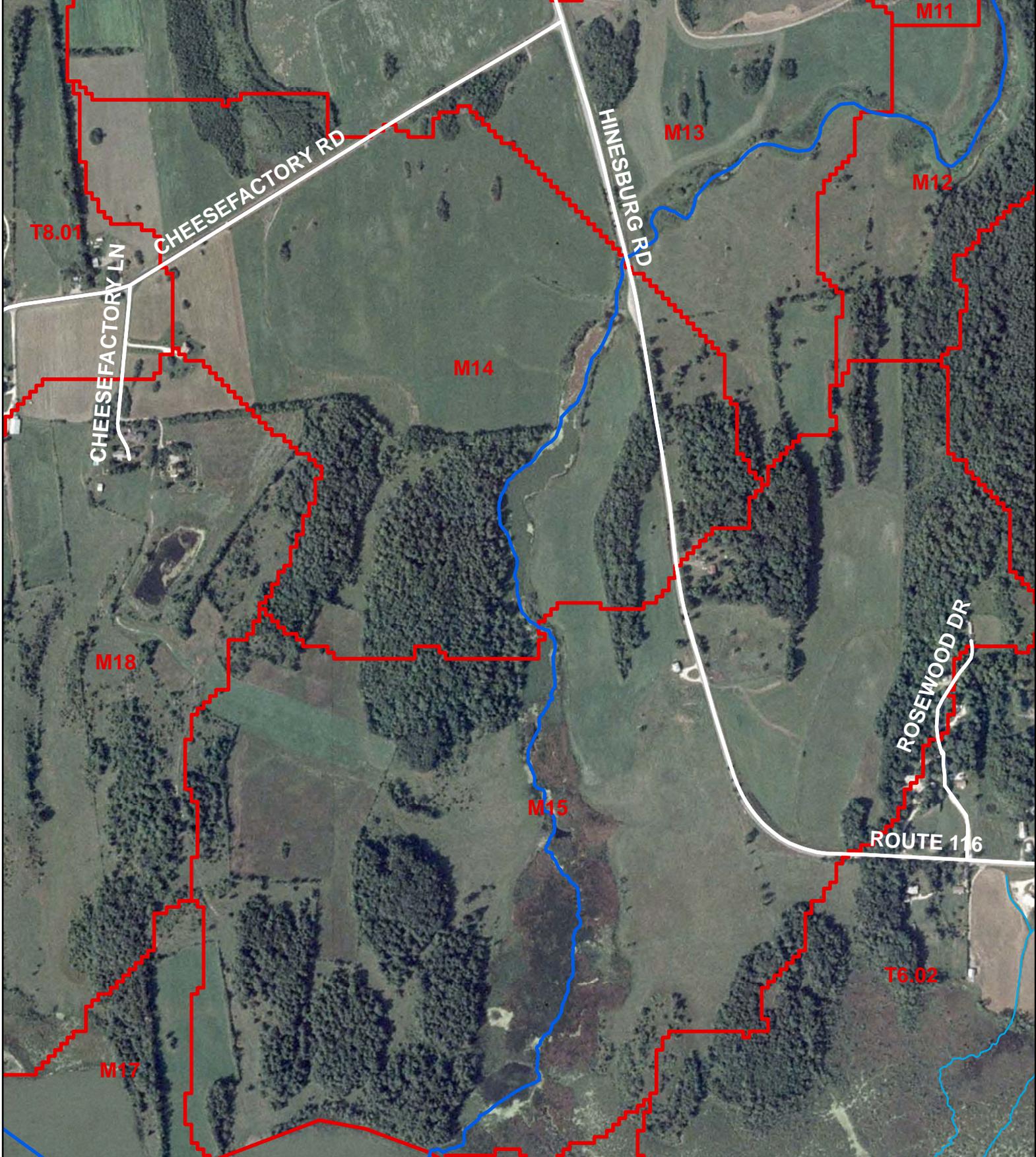
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www.fitzgeraldenvironmental.com



-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

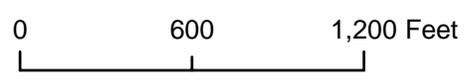
**Muddy Brook Phase 2 Mapping
Reaches M10 & M11**

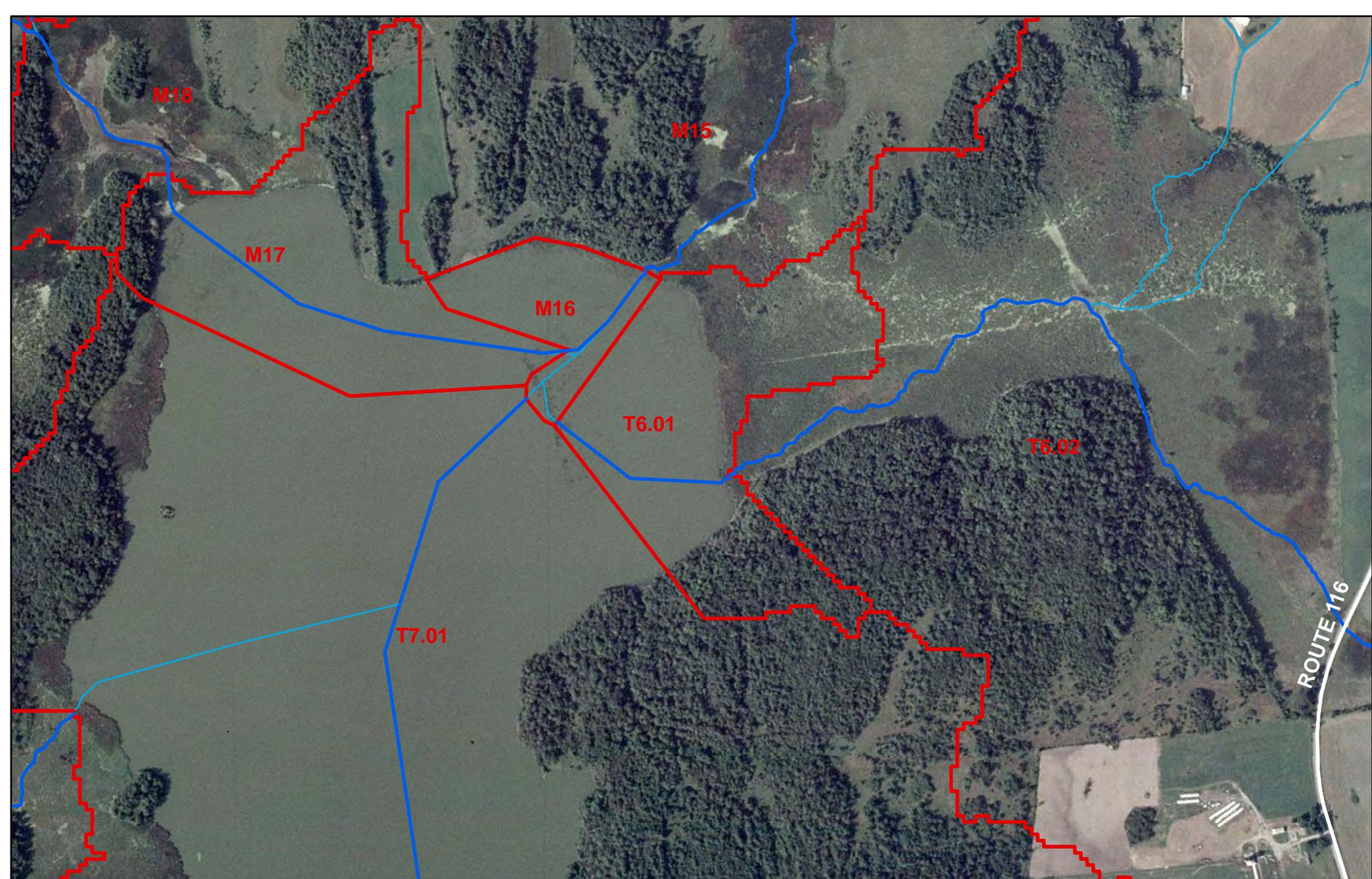




-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

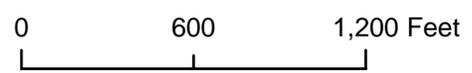
**Muddy Brook Phase 2 Mapping
Reaches M12, M13, M14 & M15**



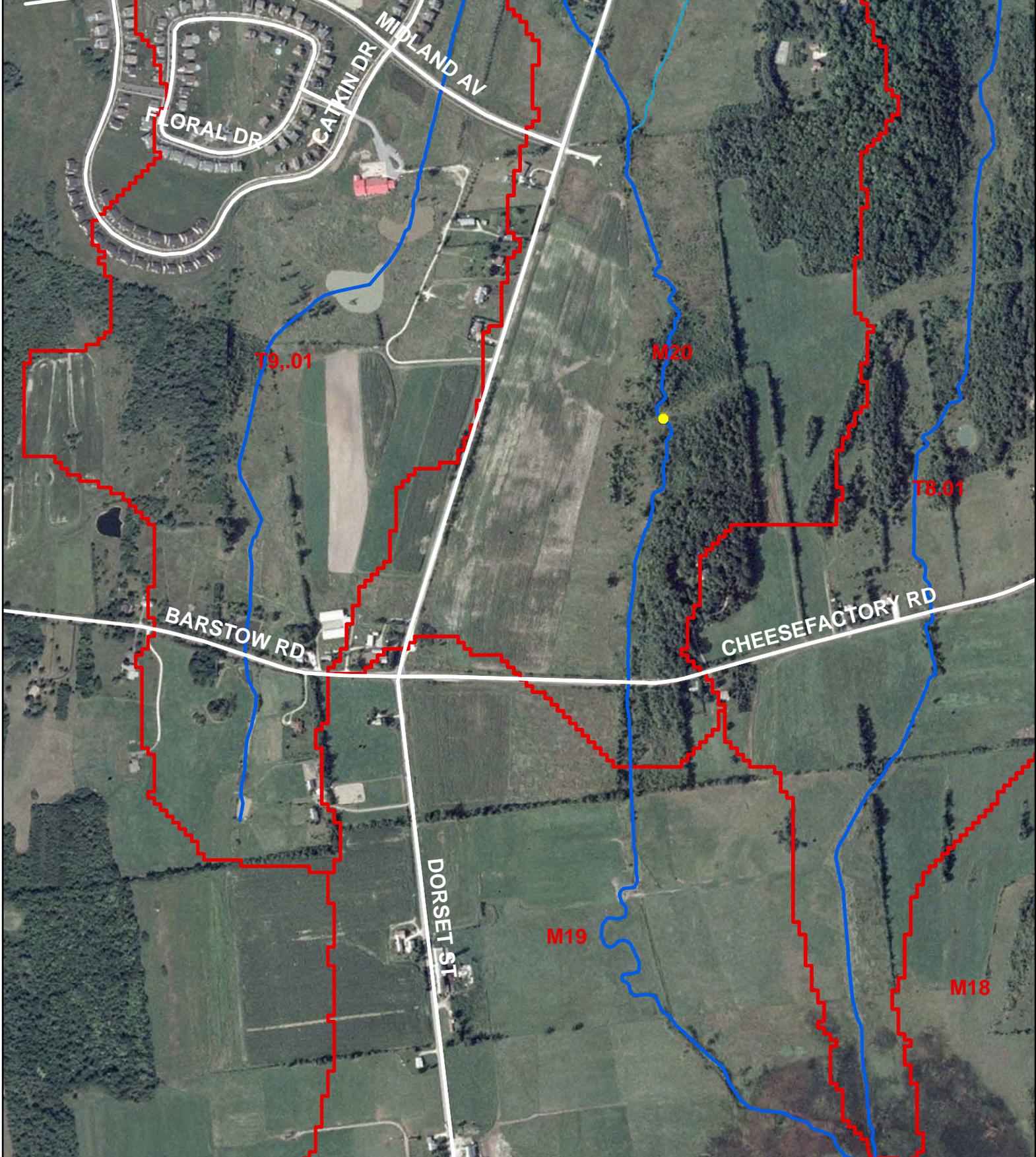


-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

Muddy Brook Phase 2 Mapping
Reaches M16, M17, M18,
T6.01, T6.02 & T7.01

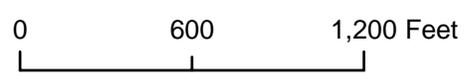


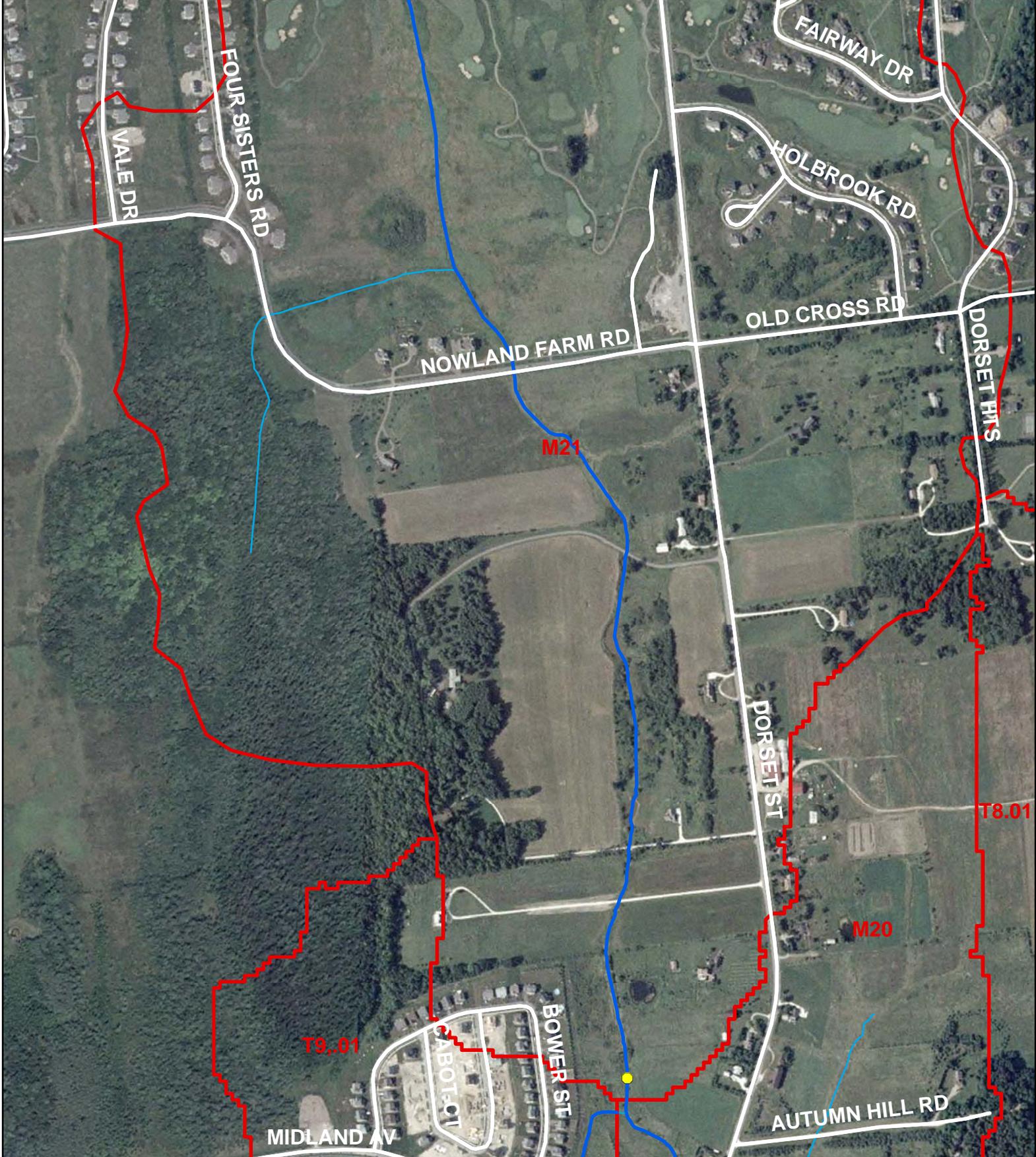
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-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

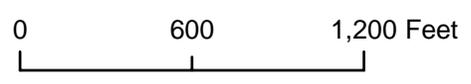
**Muddy Brook Phase 2 Mapping
Reaches M19, M20,
T8.01 & T9.01**





-  Cross-Section Locations
-  Segment Breaks
-  Subwatershed Boundaries
-  Muddy Bk Surface Waters
-  Minor Tributaries

**Muddy Brook Phase 2 Mapping
Reaches M20 & M21**



Appendix B
Reach Summary Data

Stream Geometry Data

Muddy Brook

Reach	Phase 2 Stream Type				Phase 1 Data			Phase 2 Channel Data										RGA				
	Seg- ment	Stream Type	Bed		Subcl. Slope	Sub Rch?	Channel Slope	Channel width	Bankfull width	Max. depth	Mean depth	Floodpr. width	Abandn FldPln	W/D Ratio	Entrench- ment	Incision Ratio	Stage- Evol.	evol. Model.	Cond Conc.	RHA Cond.	QC Stf	Aut
			Material	Bedform																		
M01	0	C	Sand	Dune-Ripple	None	No	0.23	60.08	57.0	4.75	3.66	210.0	9.1	15.57	3.68	1.92	II	F	Fair	Fair	P	P
M02	0	E	Sand	Dune-Ripple	None	No	0.20	25.00	24.9	4.6	3.31	325.0	7.3	7.52	13.05	1.59	II	F	Fair	Fair	P	P
M03	0	B	Cobble	Step-Pool	None	No	3.06	49.74	45.1	3.3	2.31	93.0	4.1	19.52	2.06	1.24	III	F	Fair	Good	P	P
M04	0	C	Cobble	Riffle-Pool	None	No	0.21	49.48	35.0	2.5	1.91	407.0	3.4	18.32	11.63	1.36	IV	F	Fair	Good	P	P
M05	0	B	Cobble	Plane Bed	c	No	0.47	49.02	40.0	2.9	1.91	84.0	2.9	20.94	2.10	1.00	IIc	D	Fair	Fair	P	P
M06	0	C	Cobble	Riffle-Pool	None	No	0.18	32.70	32.7	3.3	2.29	90.0	4.0	14.28	2.75	1.21	III	F	Good	Fair	P	P
M07	0	E	Cobble	Plane Bed	None	No	0.00	24.30	24.3	3.6	2.57	157.0	4.8	9.46	6.46	1.33	II	F	Fair	Fair	P	P
M08	0	E	Silt	Dune-Ripple	None	No	0.00	27.70	27.7	4.2	2.4	331.0	5.1	11.54	11.95	1.21	I	F	Good	Good	P	P
M09	0	E	Silt	Dune-Ripple	None	No	0.00	20.00	20.0	4.7	3.45	400.0	6.2	5.80	20.00	1.32	I	F	Good	Good	P	P
M10	0	E	Sand	Dune-Ripple	None	No	0.00	18.00	18.0	4.2	3.13	156.0	5.9	5.75	8.67	1.40	II	F	Fair	Fair	P	P
M11	A	E	Gravel	Dune-Ripple	None	No	0.00	15.00	15.0	3.45	2.48	370.0	4.95	6.05	24.67	1.43	II	F	Fair	Fair	P	P
M11	B	E	Sand	Dune-Ripple	None	No	0.00	15.00											Fair		P	F
M12	0	E	Sand	Dune-Ripple	None	No	0.00	33.35											Fair		P	F
M13	0	E	Sand	Dune-Ripple	None	No	0.00	33.23											Fair		P	F
M14	0	E	Sand	Dune-Ripple	None	No	0.00	32.78											Fair		P	F
M15	0	E	Sand	Dune-Ripple	None	No	0.00	32.34											Fair		P	F
M18	0	E	Sand	Dune-Ripple	None	No	0.00	21.12											Fair		P	F
M19	0	E	Sand	Dune-Ripple	None	No	0.00	17.92											Fair		P	F
M20	0	E	Sand	Dune-Ripple	None	No	0.28	6.00	6.0	1.6	0.94	130.0	1.6	6.38	21.67	1.00	I	F	Good	Fair	P	P
M21	0	E	Sand	Dune-Ripple	None	No	0.32	4.00	3.5	1.7	0.79	58.5	2.2	4.43	16.71	1.29	II	F	Fair	Fair	P	P
T2.01	A	E	Sand	Dune-Ripple	None	No	0.64	6.93	5.5	1.5	0.94	40.0	2.3	5.85	7.27	1.53	II	F	Fair	Fair	P	P
T2.01	B	E	Sand	Dune-Ripple	None	No	0.64	6.93											Fair		P	F
T3.01	A	E	Silt	Plane Bed	None	No	0.60	17.55	19.8	5.2	2.84	151.0	6.5	6.97	7.63	1.25	II	F	Fair	Fair	P	P
T3.01	B	E	Silt	Dune-Ripple	None	No	0.60	17.55	10.7	3.2	2.05	182.0	3.7	5.22	17.01	1.16	I	F	Good	Good	P	P
T3.01	C	E	Sand	Dune-Ripple	None	No	0.60	17.55											Fair		P	F
T3.01	D	E	Sand	Dune-Ripple	None	No	0.60	17.55	11.0	2.5	1.55	160.0	4.3	7.10	14.55	1.72	IV	F	Fair	Fair	P	P
T3.01	E	G	Silt	Plane Bed	None	No	0.60	17.55	5.3	2.5	1.65	8.5	6.3	3.21	1.60	2.52	II	F	Poor	Poor	P	P
T3.01	F	E	Silt	Dune-Ripple	None	No	0.60	17.55	4.0	1.2	0.56	144.0	1.2	7.14	36.00	1.00	I	F	Good	Fair	P	P
T3.02	A	C	Gravel	Riffle-Pool	b	No	2.10	10.01	11.8	2.3	1.49	152.0	2.3	7.92	12.88	1.00	I	F	Fair	Good	P	P
T3.02	B	G	Cobble	Step-Pool	None	Yes	2.10	10.01	7.0	1.8	1.15	10.9	4.0	6.09	1.56	2.22	II	F	Fair	Fair	P	P

Rapid Geomorphic Assessment

Muddy Brook

Reach	Seg- ment	Sub- Rch?	Degradation			Aggradation			Widening		Planform		Geo. Score	Geo. Condition	Evol. Stage	Confin- ement Type	Sens- itivity	QC	
			Score	STD	Historic	Score	STD	Historic	Score	Historic	Score	Historic						Stf	Aut
M01	0	No	10	None	Yes	11	None	No	10	No	11	No	0.53	Fair	II	BD	Very	P	P
M02	0	No	6	None	Yes	12	None	No	5	No	5	No	0.35	Fair	II	VB	Extreme	P	P
M03	0	No	13	None	No	14	None	No	11	No	13	No	0.64	Fair	III	SC	High	P	P
M04	0	No	11	None	Yes	12	None	No	9	No	10	No	0.53	Fair	IV	BD	High	P	P
M05	0	No	14	None	No	10	None	No	14	No	13	No	0.64	Fair	IIC	SC	High	P	P
M06	0	No	14	None	No	11	None	No	13	No	15	No	0.66	Good	III	NW	Moderat	P	P
M07	0	No	9	None	Yes	9	None	No	11	No	12	Yes	0.51	Fair	II	BD	High	P	P
M08	0	No	15	None	No	14	None	No	15	No	16	No	0.75	Good	I	VB	High	P	P
M09	0	No	15	None	No	15	None	No	13	No	12	No	0.69	Good	I	VB	High	P	P
M10	0	No	9	None	No	14	None	No	10	No	12	No	0.56	Fair	II	VB	Extreme	P	P
M11	A	No	10	None	No	14	None	No	11	No	13	No	0.60	Fair	II	VB	Extreme	P	P
M11	B	No											0.00	Fair				P	F
M12	0	No											0.00	Fair				P	F
M13	0	No											0.00	Fair				P	F
M14	0	No											0.00	Fair				P	F
M15	0	No											0.00	Fair				P	F
M18	0	No											0.00	Fair				P	F
M19	0	No											0.00	Fair				P	F
M20	0	No	13	None	No	16	None	No	17	No	14	No	0.75	Good	I	VB	High	P	P
M21	0	No	10	None	No	12	None	No	14	No	11	Yes	0.59	Fair	II	VB	Extreme	P	P
T2.01	A	No	7	None	No	8	None	No	10	No	11	No	0.45	Fair	II	VB	Extreme	P	P
T2.01	B	No											0.00	Fair				P	F
T3.01	A	No	9	None	No	12	None	No	12	No	13	Yes	0.58	Fair	II	BD	Extreme	P	P
T3.01	B	No	15	None	No	16	None	No	17	No	14	No	0.78	Good	I	VB	High	P	P
T3.01	C	No											0.00	Fair				P	F
T3.01	D	No	12	None	No	3	None	Yes	5	No	8	No	0.35	Fair	IV	VB	Extreme	P	P
T3.01	E	No	2	E to G	Yes	3	None	No	4	Yes	7	Yes	0.20	Poor	II	VB	Extreme	P	P
T3.01	F	No	14	None	No	13	None	No	15	No	14	No	0.70	Good	I	VB	Very	P	P
T3.02	A	No	11	None	No	11	None	No	14	No	12	No	0.60	Fair	I	VB	Very	P	P
T3.02	B	Yes	3	Other	Yes	11	None	No	12	No	11	No	0.46	Fair	II	SC	Extreme	P	P

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
Berms	0	0	0
height	0	0	0
Roads	71	0	0
height	0	0	0
Railroads	0	0	0
height	0	0	0
Improved Paths	0	0	0
height	0	0	0
Development	0	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>	
Hillside Slope	Steep	Steep	
Continuous w/	Sometimes	Sometimes	
W/in 1 Bankfill	Always	Never	
Texture	Sand	Sand	
1.5 Valley Features			
Valley Width (ft)	400		
Width Determination	Estimated		
Confinement Type	Broad		
Rock Gorge?	No		
Human-caused Change?	No		

Step 2. Stream Channel

2.1 Bankfull Width	57
2.2 Max Depth (ft)	4.75
2.3 Mean Depth (ft)	3.66
2.4 Floodprone Width (ft)	210

Notes:
 Aggradation of fine sediments due to backwater at confluence with the Winooski River. Limited habitat variability due to aggradation and lack of woody debris in channel--only one significant pool with cover.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	9.10	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	15.57	
2.7 Entrenchment Ratio	3.68	
2.8 Incision Ratio	1.92	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Moderate	
2.10 Riffles Type	Not Applicable	
2.11 Riffle/Step Spacing (ft)	200	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	2%	
Fine Gravel	10%	
Sand	53%	
Silt and smaller	35%	
Silt/Clay Present?	Yes	
Detritus	10 %	
# Large Woody	5	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	C	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Mix
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	95	290
Erosion Height (ft)	4.00	7.25
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Herbaceous
Sub-dominant	Herbaceous	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	26-50
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	26-50	26-50
Sub-dominant	0-25	0-25
W less than 25	283	258
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Herbaceous
Sub-dominant	Herbaceous	Mixed Trees
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Crop
Sub-dominant	Residential	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Moderate
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	1
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	3	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
------	----------	-------	--------------------------	-------------	----------

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
------	-------	--------------	------------	-----------------------	--------------------------

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	10	None	Yes
7.2 Channel Aggradation	11	None	No
7.3 Widening Channel	10		No
7.4 Change in Planform	11		No
Total Score	42		
Geomorphic Rating	0.525		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Very High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **Low**

	Score
6.1 Epifaunal Substrate - Available Cover	7
6.2 Pool Substrate	6
6.3 Pool Variability	5
6.4 Sediment Deposition	7
6.5 Channel Flow Status	13
6.6 Channel Alteration	9
6.7 Channel Sinuosity	7
6.8 Bank Stability	Left: 3 Right: 3
6.9 Bank Vegetation Protection	Left: 6 Right: 4
6.10 Riparian Vegetation Zone Width	Left: 5 Right: 3
Total Score	78
Habitat Rating	0.39

Habitat Stream Condition **Fair**

Narrative:

Historic and current agricultural activities and the presence of the road bed has limited the channel's ability to meander, causing degradation and incision . Additional deposition of fines and erosion is caused by the backwater of the Winooski.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Steep	Hilly
Continuous w/	Never	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Sand
1.5 Valley Features		
Valley Width (ft)	350	
Width Determination	Estimated	
Confinement Type	Very Broad	
Rock Gorge?	No	
Human-caused Change?	No	

Step 2. Stream Channel

2.1 Bankfull Width	25
2.2 Max Depth (ft)	4.60
2.3 Mean Depth (ft)	3.31
2.4 Floodprone Width (ft)	325

Notes:
 Extreme incision (Avg. ~ 1.6) throughout the lower-to-middle reach. This incision was brought about by a combination of historic straightening, loss of LWD inputs, and the fine non-cohesive substrate.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	7.30	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	7.52	
2.7 Entrenchment Ratio	13.05	
2.8 Incision Ratio	1.59	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Moderate	
2.10 Riffles Type	Eroded	
2.11 Riffle/Step Spacing (ft)	190	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	6%	
Fine Gravel	15%	
Sand	57%	
Silt and smaller	21%	
Silt/Clay Present?	Yes	
Detritus	10	%
# Large Woody	62	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	Multiple	24.25
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Mix
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	1,154	837
Erosion Height (ft)	4.53	5.37
Revetmt. Type	Hard Bank	Rip-Rap
Revetmt. Length (ft)	37	143
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	1-25
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	51-100
Sub-dominant	51-100	26-50
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Hay
Mass Failures	51	342
Height	20	28
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	3
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	1
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
<u>Mid</u>	<u>Point</u>	<u>Side</u>	
8	7	7	
<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>	
0	0	0	
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
2	1	0	
5.3 Steep Riffles and Head Cuts			
<u>Steep Riffles</u>	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	1	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			Straightening
Straightening Length:			1,022
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M02** Segment: **0** Completion Date: **May 27, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **5,570** Segment Location: **From National Guard Ave. at the confluence with Allen Brook up to change in**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	26.0	Yes	Yes	No	Yes

Problem Alignment

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	6	None	Yes
7.2 Channel Aggradation	12	None	No
7.3 Widening Channel	5		No
7.4 Change in Planform	5		No
Total Score	28		
Geomorphic Rating	0.35		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	8	
6.2 Pool Substrate	6	
6.3 Pool Variability	10	
6.4 Sediment Deposition	6	
6.5 Channel Flow Status	15	
6.6 Channel Alteration	8	
6.7 Channel Sinuosity	12	
6.8 Bank Stability	Left: 2	Right: 2
6.9 Bank Vegetation Protection	Left: 5	Right: 5
6.10 Riparian Vegetation Zone Width	Left: 7	Right: 4
Total Score	90	
Habitat Rating	0.45	
Habitat Stream Condition	Fair	

Narrative:

Incision and severe bank erosion throughout the lower-to-mid reach.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
	Berms	0	0
	height	0	0
	Roads	0	0
	height	0	0
	Railroads	0	0
	height	0	0
	Improved Paths	0	0
	height	0	0
	Development	0	0
1.4 Adjacent Side	<u>Left</u>		<u>Right</u>
Hillside Slope	Extremely		Extremely
Continuous w/	Sometimes		Sometimes
W/in 1 Bankfill	Always		Always
Texture	Sand		Sand
1.5 Valley Features			
Valley Width (ft)	166		
Width Determination	Estimated		
Confinement Type	Semi-confined		
Rock Gorge?	No		
Human-caused Change?	No		
Step 2. Stream Channel			
2.1 Bankfull Width	45		
2.2 Max Depth (ft)	3.30		
2.3 Mean Depth (ft)	2.31		
2.4 Floodprone Width (ft)	93		

Notes:
 A fairly stable reach with some aggradation and migration in the lower reach caused by sediments supplied from upslope mass failures. Many stoneflies and caddis in lower reach. Springs from eastern corridor provides cool water inputs.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	4.10	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	19.52	
2.7 Entrenchment Ratio	2.06	
2.8 Incision Ratio	1.24	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Complete	
2.11 Riffle/Step Spacing (ft)	250	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	29%	
Cobble	45%	
Coarse Gravel	9%	
Fine Gravel	5%	
Sand	6%	
Silt and smaller	6%	
Silt/Clay Present?	Yes	
Detritus	5 %	
# Large Woody	34	
2.13 Average Largest Particle on		
Bed	13.0	inches
Bar	3.8	inches
2.14 Stream Type		
Stream Type:	B	
Bed Material:	Cobble	
Subclass Slope:	None	
Bed Form:	Step-Pool	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	Multiple	20.33
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Mix
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	69	0
Erosion Height (ft)	5.00	0.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	87	90
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Coniferous	Coniferous
Sub-dominant	Herbaceous	Herbaceous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	51-75	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	51-100	None
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Coniferous	Coniferous
Sub-dominant	Mixed Trees	Mixed Trees
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Forest	Forest
Sub-dominant	None	None
Mass Failures	0	294
Height	0	19
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Abundant
4.2 Adjacent Wetlands	Minimal
4.3 Flow Status	Low
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	4
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	5
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	2	1
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
2	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **2,400**

Phase 2 Reach Summary
 Reach # **M03**
 Observers: **EPF, SPP**
 Segment Location: **From reach break near the airport up to Williston Rd.**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **May 27, 2008**
 Rain: **Yes**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Waterfall	Mid-segment	12.00	8.00	Yes	
Ledge	Mid-segment	8.00	8.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	11.0	Yes	Yes	No	No
	Problem	None			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Score	STD	Historic
Confined			
7.1 Channel Degradation	13	None	No
7.2 Channel Aggradation	14	None	No
7.3 Widening Channel	11		No
7.4 Change in Planform	13		No
Total Score	51		
Geomorphic Rating	0.6375		
Channel Evolution Model	F		
Channel Evolution Stage	III		
Geomorphic Condition	Fair		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Score
High	
6.1 Epifaunal Substrate - Available Cover	15
6.2 Embeddedness	13
6.3 Velocity/Depth Patterns	15
6.4 Sediment Deposition	15
6.5 Channel Flow Status	12
6.6 Channel Alteration	16
6.7 Frequency of Riffles/Steps	15
6.8 Bank Stability	Left: 8 Right: 8
6.9 Bank Vegetation Protection	Left: 9 Right: 9
6.10 Riparian Vegetation Zone Width	Left: 6 Right: 8
Total Score	149
Habitat Rating	0.745
Habitat Stream Condition	Good

Narrative:

Some aggradation and migration in the lower reach.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	None
1.2 Alluvial Fan	None
1.3 Corridor Encroachments	
Length (ft)	One Both
Berms	0 0
height	0 0
Roads	0 0
height	0 0
Railroads	0 0
height	0 0
Improved Paths	0 0
height	0 0
Development	0 0
1.4 Adjacent Side	Left Right
Hillside Slope	Very Steep Very Steep
Continuous w/	Sometimes Never
W/in 1 Bankfill	Sometimes Sometimes
Texture	Sand Not Evalua
1.5 Valley Features	
Valley Width (ft)	303
Width Determination	Estimated
Confinement Type	Broad
Rock Gorge?	No
Human-caused Change?	No
Step 2. Stream Channel	
2.1 Bankfull Width	35
2.2 Max Depth (ft)	2.50
2.3 Mean Depth (ft)	1.91
2.4 Floodprone Width (ft)	407

Notes:
 Flood chutes in lower reach indicate changes in planform from ongoing aggradation and beaver activity. This reach has high sinuosity and an active floodplain, however moderate erosion/incision (perhaps due to urban land use in the watershed) could disconnect

Passed Step 2. (Contued)

2.5 Aband. Floodpln	3.40 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	18.32
2.7 Entrenchment Ratio	11.63
2.8 Incision Ratio	1.36
Human Elevated Inc Rat	0.00
2.9 Sinuosity	High
2.10 Riffles Type	Complete
2.11 Riffle/Step Spacing (ft)	200
2.12 Substrate Composition	
Bedrock	0%
Boulder	7%
Cobble	46%
Coarse Gravel	22%
Fine Gravel	15%
Sand	7%
Silt and smaller	2%
Silt/Clay Present?	Yes
Detritus	15 %
# Large Woody	9
2.13 Average Largest Particle on	
Bed	11.0 inches
Bar	4.0 inches
2.14 Stream Type	
Stream Type:	C
Bed Material:	Cobble
Subclass Slope:	None
Bed Form:	Riffle-Pool
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
3.3 old	Amount Mean Height
Failures	One 20.00
Gullies	None 0.00

Step 3. Riparian Features

3.1 Stream Banks	
Typical Bank Slope	Undercut
Bank Texture	Left Right
Upper	
Material Type	Sand Sand
Consistency	Non-cohesive Non-cohesive
Lower	
Material Type	Boulder/Cobbl Boulder/Cobbl
Consistency	Non-cohesive Non-cohesive
Bank Erosion	Left Right
Erosion Length (ft)	60 214
Erosion Height (ft)	3.00 3.00
Revetmt. Type	None None
Revetmt. Length (ft)	0 0
Near Bank Veg. Type	Left Right
Dominant	Deciduous Deciduous
Sub-dominant	Herbaceous Herbaceous
Bank Canopy	Left Right
Canopy %	51-75 26-50
Mid-Channel Canopy	Closed
3.2 Riparian Buffer	
Buffer Width	Left Right
Dominant	>100 >100
Sub-dominant	None 51-100
W less than 25	0 0
Buffer Veg. Type	Left Right
Dominant	Shrubs/Saplin Shrubs/Saplin
Sub-dominant	Mixed Trees Mixed Trees
3.3 Riparian Corridor	
Corridor Land	Left Right
Dominant	Forest Forest
Sub-dominant	Shrubs/Saplin Shrubs/Saplin
Mass Failures	72 0
Height	20 0
Gullies	0 0
Height	0 0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	1
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	1 Road Ditch 0
Other	1 Tile Drain 0
Overland Flow	0 Urb Strm Wtr Pipe 1
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types		
Mid	Point	Side
2	3	1
Diagonal	Delta	Island
0	0	0
5.2 Other Features	Braiding	
Flood	Neck Cutoff	Avulsion
2	0	0
5.3 Steep Riffles and Head Cuts		
Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No
5.4 Stream Ford or Animal	No	
5.5 Straightening	None	
Straightening Length:	0	
5.5 Dredging	None	
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.		

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **1,434**

Phase 2 Reach Summary
 Reach # **M04**
 Observers: **EPF, SPP**
 Segment Location: **From reach break upstream of Williston Rd. to change in confinement along side of**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **May 28, 2008**
 Rain: **Yes**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	11	None	Yes
7.2 Channel Aggradation	12	None	No
7.3 Widening Channel	9		No
7.4 Change in Planform	10		No
Total Score	42		
Geomorphic Rating	0.525		
Channel Evolution Model	F		
Channel Evolution Stage	IV		
Geomorphic Condition	Fair		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	11
6.2 Embeddedness	11
6.3 Velocity/Depth Patterns	13
6.4 Sediment Deposition	8
6.5 Channel Flow Status	11
6.6 Channel Alteration	16
6.7 Frequency of Riffles/Steps	18
6.8 Bank Stability	Left: 6 Right: 5
6.9 Bank Vegetation Protection	Left: 8 Right: 8
6.10 Riparian Vegetation Zone Width	Left: 9 Right: 7
Total Score	131
Habitat Rating	0.655

Habitat Stream Condition **Good**

Narrative:

Some evidence of floodplain redevelopment and stage IV of CEM due to moderate incision, changes in planform, and aggradation.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	138	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Mixed	Mixed
1.5 Valley Features		
Valley Width (ft)	126	
Width Determination	Estimated	
Confinement Type	Semi-confined	
Rock Gorge?	No	
Human-caused Change?	No	

Step 2. Stream Channel

2.1 Bankfull Width	40
2.2 Max Depth (ft)	2.90
2.3 Mean Depth (ft)	1.91
2.4 Floodprone Width (ft)	84

Notes:
 Unusual combination of low slope (0.5%) and confined valley setting. Under reference conditions there would likely be better development of a riffle-pool sequence, however some aggradation and planform changes have resulted in mostly plane bed

Passed Step 2. (Contued)

2.5 Aband. Floodpln	2.90	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	20.94	
2.7 Entrenchment Ratio	2.10	
2.8 Incision Ratio	1.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Sedimented	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	1%	
Boulder	9%	
Cobble	53%	
Coarse Gravel	16%	
Fine Gravel	8%	
Sand	6%	
Silt and smaller	7%	
Silt/Clay Present?	No	
Detritus	10	%
# Large Woody	14	
2.13 Average Largest Particle on		
Bed	9.0	inches
Bar	5.0	inches
2.14 Stream Type		
Stream Type:	B	
Bed Material:	Cobble	
Subclass Slope:	c	
Bed Form:	Plane Bed	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	One	25.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	140	41
Erosion Height (ft)	2.69	4.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	56	27
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Coniferous
Sub-dominant	Herbaceous	Deciduous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	76-100	76-100
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	>100
Sub-dominant	26-50	None
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Herbaceous
Sub-dominant	Coniferous	Mixed Trees
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Forest	Forest
Sub-dominant	Commercial	None
Mass Failures	0	54
Height	0	25
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal		
4.2 Adjacent Wetlands	Minimal		
4.3 Flow Status	Low		
4.4 # of Debris Jams	0		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	1
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	2
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	2	0	1
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	1
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
2	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M05** Segment: **0** Completion Date: **May 28, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **1,478** Segment Location: **From reach break near Gregory Dr. to upstream of Marshall Ave. ~400 feet.**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	16.0	Yes	Yes	Yes	Yes
	Problem	None			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Score	STD	Historic
Confined			
7.1 Channel Degradation	14	None	No
7.2 Channel Aggradation	10	None	No
7.3 Widening Channel	14		No
7.4 Change in Planform	13		No
Total Score	51		
Geomorphic Rating	0.6375		
Channel Evolution Model	D		
Channel Evolution Stage	IIc		
Geomorphic Condition	Fair		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Score
High	
6.1 Epifaunal Substrate - Available Cover	14
6.2 Embeddedness	10
6.3 Velocity/Depth Patterns	8
6.4 Sediment Deposition	11
6.5 Channel Flow Status	11
6.6 Channel Alteration	18
6.7 Frequency of Riffles/Steps	6
6.8 Bank Stability	Left: 8 Right: 6
6.9 Bank Vegetation Protection	Left: 7 Right: 9
6.10 Riparian Vegetation Zone Width	Left: 6 Right: 8
Total Score	122
Habitat Rating	0.61
Habitat Stream Condition	Fair

Narrative:

Aggradation and planform adjustments without incision suggests stage IIIc of the D-model of channel evolution.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	None	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Silt/Clay
1.5 Valley Features		
Valley Width (ft)	190	
Width Determination	Measured	
Confinement Type	Narrow	
Rock Gorge?	No	
Human-caused Change?	No	
Step 2. Stream Channel		
2.1 Bankfull Width	33	
2.2 Max Depth (ft)	3.30	
2.3 Mean Depth (ft)	2.29	
2.4 Floodprone Width (ft)	90	

Notes:
 Good riffle-pool formations. High richness of sensitive macroinvertebrate species (EPT orders) noted in riffle habitat. One area of ponding in upper reach where an old on-stream impoundment may have been located.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	4.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	14.28	
2.7 Entrenchment Ratio	2.75	
2.8 Incision Ratio	1.21	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Moderate	
2.10 Riffles Type	Complete	
2.11 Riffle/Step Spacing (ft)	230	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	13%	
Cobble	50%	
Coarse Gravel	9%	
Fine Gravel	12%	
Sand	8%	
Silt and smaller	8%	
Silt/Clay Present?	No	
Detritus	15 %	
# Large Woody	4	
2.13 Average Largest Particle on		
Bed	9.0	inches
Bar	N/A	inches
2.14 Stream Type		
Stream Type:	C	
Bed Material:	Cobble	
Subclass Slope:	None	
Bed Form:	Riffle-Pool	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	One	10.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	71	75
Erosion Height (ft)	3.00	3.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Deciduous
Sub-dominant	Herbaceous Shrubs/Saplin	
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	26-50	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	>100
Sub-dominant	26-50	26-50
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Deciduous
Sub-dominant	Herbaceous Shrubs/Saplin	
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Forest
Sub-dominant	Crop Shrubs/Saplin	
Mass Failures	0	24
Height	0	10
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	1
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	1	1
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	1	<u>Neck Cutoff</u>	<u>Avulsion</u>
		0	0
5.3 Steep Riffles and Head Cuts			
Steep Riffles	0	<u>Head Cuts</u>	<u>Trib Rejuv.</u>
		0	No
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M06** Segment: **0** Completion Date: **May 28, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **1,701** Segment Location: **From reach break to just upstream of ponded area by the commercial building.**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	14	None	No
7.2 Channel Aggradation	11	None	No
7.3 Widening Channel	13		No
7.4 Change in Planform	15		No
Total Score	53		
Geomorphic Rating	0.6625		
Channel Evolution Model	F		
Channel Evolution Stage	III		
Geomorphic Condition	Good		
Stream Sensitivity	Moderate		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	High	
	Score	
6.1 Epifaunal Substrate - Available Cover	11	
6.2 Embeddedness	11	
6.3 Velocity/Depth Patterns	10	
6.4 Sediment Deposition	10	
6.5 Channel Flow Status	13	
6.6 Channel Alteration	16	
6.7 Frequency of Riffles/Steps	15	
6.8 Bank Stability	Left: 6	Right: 8
6.9 Bank Vegetation Protection	Left: 5	Right: 8
6.10 Riparian Vegetation Zone Width	Left: 4	Right: 7
Total Score	124	
Habitat Rating	0.62	
Habitat Stream Condition	Fair	

Narrative:
 Some aggradation in pools and riffles with minor incision suggests stage III CEM. Note: the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
Berms	0	0	0
height	0	0	0
Roads	537	0	0
height	0	0	0
Railroads	0	0	0
height	0	0	0
Improved Paths	0	0	0
height	0	0	0
Development	0	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>	
Hillside Slope	Steep	Steep	
Continuous w/	Sometimes	Sometimes	
W/in 1 Bankfill	Sometimes	Sometimes	
Texture	Not Evalua	Not Evalua	

1.5 Valley Features

Valley Width (ft)	204
Width Determination	Estimated
Confinement Type	Broad
Rock Gorge?	No
Human-caused Change?	No

Step 2. Stream Channel

2.1 Bankfull Width	24
2.2 Max Depth (ft)	3.60
2.3 Mean Depth (ft)	2.57
2.4 Floodprone Width (ft)	157

Notes:

Much of this reach has been historically straightened, resulting in plane bed morphology and higher diameter substrate due to increased stream power. Reach is currently aggrading fine sediment within some riffles, however deposition is not severe

Passed Step 2. (Contued)

2.5 Aband. Floodpln	4.80	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	9.46	
2.7 Entrenchment Ratio	6.46	
2.8 Incision Ratio	1.33	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Eroded	
2.11 Riffle/Step Spacing (ft)	410	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	3%	
Cobble	52%	
Coarse Gravel	24%	
Fine Gravel	2%	
Sand	14%	
Silt and smaller	5%	

Silt/Clay Present?	No
Detritus	60 %
# Large Woody	11

2.13 Average Largest Particle on

Bed	9.5	inches
Bar	N/A	inches

2.14 Stream Type

Stream Type:	E
Bed Material:	Cobble
Subclass Slope:	None
Bed Form:	Plane Bed

Field Measured Slope:

2.15 Reference Stream Type
(if different from Phase 1)

<u>3.3 old</u>	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	389	307
Erosion Height (ft)	3.89	4.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	181	173
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Herbaceous	Deciduous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	26-50	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	0-25	26-50
W less than 25	99	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Herbaceous	Deciduous
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Commercial	Commercial
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal		
4.2 Adjacent Wetlands	Minimal		
4.3 Flow Status	Low		
4.4 # of Debris Jams	0		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	1
Other	3	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	2
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

<u>Mid</u>	<u>Point</u>	<u>Side</u>
1	0	0
<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
0	0	0

5.2 Other Features

			<u>Braiding</u>
<u>Flood</u>	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	

5.3 Steep Riffles and Head Cuts

<u>Steep Riffles</u>	<u>Head Cuts</u>	<u>Trib Rejuv.</u>
1	0	No

5.4 Stream Ford or Animal

5.5 Straightening	Straightening
Straightening Length:	2,167

5.5 Dredging

	None
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Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	61.0	Yes	Yes	No	No
	Problem	None			
Bridge	61.0	Yes	Yes	No	No
	Problem	None			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	9	None	Yes
7.2 Channel Aggradation	9	None	No
7.3 Widening Channel	11		No
7.4 Change in Planform	12		Yes
Total Score	41		
Geomorphic Rating	0.5125		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	6	
6.2 Pool Substrate	3	
6.3 Pool Variability	3	
6.4 Sediment Deposition	5	
6.5 Channel Flow Status	13	
6.6 Channel Alteration	5	
6.7 Channel Sinuosity	2	
6.8 Bank Stability	Left: 5	Right: 5
6.9 Bank Vegetation Protection	Left: 6	Right: 8
6.10 Riparian Vegetation Zone Width	Left: 3	Right: 7
Total Score	71	
Habitat Rating	0.355	
Habitat Stream Condition	Fair	

Narrative:

Aggradation of fine sediments within riffles. Historical straightening has increased sed. transport and lowered WDR. Note: the reference condition for this reach is E-type and the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
	Berms	0	0
	height	0	0
	Roads	101	0
	height	0	0
	Railroads	0	0
	height	0	0
	Improved Paths	0	0
	height	0	0
	Development	0	0
1.4 Adjacent Side	<u>Left</u>		<u>Right</u>
	Hillside Slope	Steep	Hilly
	Continuous w/	Sometimes	Sometimes
	W/in 1 Bankfill	Sometimes	Sometimes
	Texture	Silt/Clay	Bedrock
1.5 Valley Features			
	Valley Width (ft)	402	
	Width Determination	Estimated	
	Confinement Type	Very Broad	
	Rock Gorge?	Yes	
Human-caused Change?	No		
Step 2. Stream Channel			
2.1 Bankfull Width	28		
2.2 Max Depth (ft)	4.20		
2.3 Mean Depth (ft)	2.40		
2.4 Floodprone Width (ft)	331		

Notes:
 Stable channel geometry with high sinuosity characteristic of reference conditions for E type channels. Some minor incision in upper reach immediately downstream of the reach break/ grade control. Culvert beneath Quarry Access Rd. is extremely undersized and

Passed Step 2. (Contued)

2.5 Aband. Floodpln	5.10	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	11.54	
2.7 Entrenchment Ratio	11.95	
2.8 Incision Ratio	1.21	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	High	
2.10 Riffles Type	Complete	
2.11 Riffle/Step Spacing (ft)	190	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	2%	
Fine Gravel	7%	
Sand	18%	
Silt and smaller	73%	
Silt/Clay Present?	Yes	
Detritus	25 %	
# Large Woody	36	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Silt	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Mix
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	322	168
Erosion Height (ft)	5.04	4.05
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	85	83
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Herbaceous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	76-100	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	0-25	None
W less than 25	194	95
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Forest	Forest
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Abundant
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	3
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	1
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	1
Affected Length (ft)	1,000

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	1	1	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M08** Segment: **0** Completion Date: **May 29, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **4,712** Segment Location: **From just upstream of I-89 to change in confinement in the wooded area upstream.**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Ledge	Mid-segment	2.00	1.00	Yes	

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	15	None	No
7.2 Channel Aggradation	14	None	No
7.3 Widening Channel	15		No
7.4 Change in Planform	16		No
Total Score	60		
Geomorphic Rating	0.75		
Channel Evolution Model	F		
Channel Evolution Stage	I		
Geomorphic Condition	Good		
Stream Sensitivity	High		

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	7.00	Yes	Yes	Yes	Yes

Problem Scour Above, Scour Below, Alignment

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	15	
6.2 Pool Substrate	18	
6.3 Pool Variability	12	
6.4 Sediment Deposition	15	
6.5 Channel Flow Status	18	
6.6 Channel Alteration	19	
6.7 Channel Sinuosity	15	
6.8 Bank Stability	Left: 7	Right: 9
6.9 Bank Vegetation Protection	Left: 8	Right: 6
6.10 Riparian Vegetation Zone Width	Left: 8	Right: 6
Total Score	156	
Habitat Rating	0.78	
Habitat Stream Condition	Good	

Narrative:

Mostly stable channel with some incision in upper reach. Note: the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
Berms	0	0	0
height	0	0	0
Roads	0	0	0
height	0	0	0
Railroads	0	0	0
height	0	0	0
Improved Paths	0	0	0
height	0	0	0
Development	0	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>	
Hillside Slope	Hilly	Steep	
Continuous w/	Never	Sometimes	
W/in 1 Bankfill	Sometimes	Sometimes	
Texture	Not Evalua	Bedrock	
1.5 Valley Features			
Valley Width (ft)	421		
Width Determination	Estimated		
Confinement Type	Very Broad		
Rock Gorge?	No		
Human-caused Change?	No		
Step 2. Stream Channel			
2.1 Bankfull Width	20		
2.2 Max Depth (ft)	4.70		
2.3 Mean Depth (ft)	3.45		
2.4 Floodprone Width (ft)	400		

Notes:
 Stable channel geometry with high sinuosity characteristic of reference conditions for E type channels. Many remnants of old beaver dams (now debris jams) throughout. Old abutments causing erosion and channel migration mid-reach.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	6.20	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	5.80	
2.7 Entrenchment Ratio	20.00	
2.8 Incision Ratio	1.32	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	High	
2.10 Riffles Type	Complete	
2.11 Riffle/Step Spacing (ft)	160	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	0%	
Fine Gravel	8%	
Sand	10%	
Silt and smaller	82%	
Silt/Clay Present?	Yes	
Detritus	25 %	
# Large Woody	58	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Silt	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Silt	Silt
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	374	188
Erosion Height (ft)	3.22	3.69
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	26-50	26-50
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	None	51-100
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	8
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	2	2
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	2
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
3	2	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **5,197**

Phase 2 Reach Summary
 Reach # **M09**
 Observers: **EPF, SPP**
 Segment Location: **From reach break to just downstream of Van Sicklen Rd.**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **May 29, 2008**
 Rain: **Yes**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Old	12.5	Yes	Yes	Yes	Yes

Problem Deposition Above, Scour Below

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Score	STD	Historic
Unconfined			
7.1 Channel Degradation	15	None	No
7.2 Channel Aggradation	15	None	No
7.3 Widening Channel	13		No
7.4 Change in Planform	12		No
Total Score	55		
Geomorphic Rating	0.6875		
Channel Evolution Model	F		
Channel Evolution Stage	I		
Geomorphic Condition	Good		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Score
Low	
6.1 Epifaunal Substrate - Available Cover	18
6.2 Pool Substrate	16
6.3 Pool Variability	18
6.4 Sediment Deposition	15
6.5 Channel Flow Status	18
6.6 Channel Alteration	19
6.7 Channel Sinuosity	14
6.8 Bank Stability	Left: 7 Right: 7
6.9 Bank Vegetation Protection	Left: 7 Right: 7
6.10 Riparian Vegetation Zone Width	Left: 9 Right: 9
Total Score	164
Habitat Rating	0.82
Habitat Stream Condition	Good

Narrative:

Mostly stable channel. See step 5 for further narrative. Note: the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
	Berms	0	0
	height	0	0
	Roads	0	0
	height	0	0
	Railroads	0	0
	height	0	0
	Improved Paths	0	0
	height	0	0
	Development	184	0
1.4 Adjacent Side	<u>Left</u>		<u>Right</u>
	Hillside Slope	Steep	Steep
	Continuous w/	Sometimes	Never
	W/in 1 Bankfill	Sometimes	Never
	Texture	Bedrock	Not Evalua

1.5 Valley Features

Valley Width (ft)	512
Width Determination	Measured
Confinement Type	Very Broad
Rock Gorge?	No
Human-caused Change?	No

Step 2. Stream Channel

2.1 Bankfull Width	18
2.2 Max Depth (ft)	4.20
2.3 Mean Depth (ft)	3.13
2.4 Floodprone Width (ft)	156

Notes:
 Many areas of reach are incised from past straightening and removal of riparian vegetation (i.e., lack of LWD inputs). Bank erosion extensive throughout and many area of failing rip-rap indicate that adjacent agriculture fields were protected in past from

Passed Step 2. (Contued)

2.5 Aband. Floodpln	5.90 ft.	
Human Elev Floodpln	0.00 ft.	
2.6 Width/Depth Ratio	5.75	
2.7 Entrenchment Ratio	8.67	
2.8 Incision Ratio	1.40	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Moderate	
2.10 Riffles Type	Not Applicable	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	1%	
Coarse Gravel	5%	
Fine Gravel	33%	
Sand	39%	
Silt and smaller	21%	
Silt/Clay Present?	Yes	
Detritus	20 %	
# Large Woody	36	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Clay	Clay
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	796	626
Erosion Height (ft)	4.73	4.79
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	289	21
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	1-25
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	0-25	None
W less than 25	474	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal		
4.2 Adjacent Wetlands	Abundant		
4.3 Flow Status	Low		
4.4 # of Debris Jams	2		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	0
Other	2	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	2	7	1
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			Straightening
	Straightening Length:		467
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M10** Segment: **0** Completion Date: **June 2, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, CFF** Rain: **Yes**
 Segment Length (ft): **4,338** Segment Location: **From approx. 400ft. downstream of Van Sichlen Rd. up to minor trib entering from**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	31.5	Yes	Yes	No	Yes
	Problem	None			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	9	None	No
7.2 Channel Aggradation	14	None	No
7.3 Widening Channel	10		No
7.4 Change in Planform	12		No
Total Score	45		
Geomorphic Rating	0.5625		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	11	
6.2 Pool Substrate	10	
6.3 Pool Variability	10	
6.4 Sediment Deposition	12	
6.5 Channel Flow Status	15	
6.6 Channel Alteration	8	
6.7 Channel Sinuosity	12	
6.8 Bank Stability	Left: 4	Right: 4
6.9 Bank Vegetation Protection	Left: 5	Right: 7
6.10 Riparian Vegetation Zone Width	Left: 4	Right: 6
Total Score	108	
Habitat Rating	0.54	
Habitat Stream Condition	Fair	

Narrative:
 Channel evolution is slow due to very low gradient channel with continued access to floodplain, and clay banks resistant to erosion. See step 5 for further narrative.
 Note: the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	Other Reason	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Very Steep	Very Steep
Continuous w/	Never	Sometimes
W/in 1 Bankfill	Never	Sometimes
Texture	Not Evalua	Not Evalua

1.5 Valley Features

Valley Width (ft)	335
Width Determination	Measured
Confinement Type	Very Broad
Rock Gorge?	No
Human-caused Change?	No

Step 2. Stream Channel

2.1 Bankfull Width	15
2.2 Max Depth (ft)	3.45
2.3 Mean Depth (ft)	2.48
2.4 Floodprone Width (ft)	370

Notes:
 No evidence of past straightening, but channel incision evident as in M10. Greater amounts of wood are present in channel b/c some larger trees and shrubs/saplings are found along the banks (more than in M10). High degree of bank erosion on outside

Passed Step 2. (Contued)

2.5 Aband. Floodpln	4.95 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	6.05
2.7 Entrenchment Ratio	24.67
2.8 Incision Ratio	1.43
Human Elevated Inc Rat	0.00
2.9 Sinuosity	Moderate
2.10 Riffles Type	Not Applicable
2.11 Riffle/Step Spacing (ft)	0
2.12 Substrate Composition	
Bedrock	0%
Boulder	0%
Cobble	4%
Coarse Gravel	8%
Fine Gravel	13%
Sand	75%
Silt and smaller	0%
Silt/Clay Present?	Yes
Detritus	20 %
# Large Woody	36
2.13 Average Largest Particle on	
Bed	N/A
Bar	N/A
2.14 Stream Type	
Stream Type:	E
Bed Material:	Gravel
Subclass Slope:	None
Bed Form:	Dune-Ripple
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
3.3 old	<u>Amount</u> <u>Mean Height</u>
Failures	One 11.00
Gullies	None 0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Clay	Clay
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	413	54
Erosion Height (ft)	5.04	5.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	26-50	26-50
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	None	None
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Herbaceous	Herbaceous
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	None	None
Mass Failures	0	21
Height	0	11
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Abundant		
4.2 Adjacent Wetlands	Abundant		
4.3 Flow Status	Low		
4.4 # of Debris Jams	4		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	1	0	1
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M11** Segment: **A** Completion Date: **June 2, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, CFF** Rain: **Yes**
 Segment Length (ft): **1,885** Segment Location: **From where trib enters at reach break with M10 up to beaver dam where valley width**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	10	None	No
7.2 Channel Aggradation	14	None	No
7.3 Widening Channel	11		No
7.4 Change in Planform	13		No
Total Score	48		
Geomorphic Rating	0.6		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **Low**

	Score
6.1 Epifaunal Substrate - Available Cover	11
6.2 Pool Substrate	10
6.3 Pool Variability	11
6.4 Sediment Deposition	13
6.5 Channel Flow Status	15
6.6 Channel Alteration	13
6.7 Channel Sinuosity	10
6.8 Bank Stability	Left: 4 Right: 4
6.9 Bank Vegetation Protection	Left: 6 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 7 Right: 7
Total Score	117
Habitat Rating	0.585

Habitat Stream Condition **Fair**

Narrative:

Incision and some widening. See step 5 for further narrative. Note: the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
	Berms	0 0
	height	0 0
	Roads	0 0
	height	0 0
	Railroads	0 0
	height	0 0
	Improved Paths	0 0
	height	0 0
	Development	0 0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
	Hillside Slope	
	Continuous w/ W/in 1 Bankfill	
	Texture	
1.5 Valley Features		
	Valley Width (ft)	0
	Width Determination	
	Confinement Type	
	Rock Gorge?	
Human-caused Change?		

Step 2. Stream Channel

2.1 Bankfull Width	0
2.2 Max Depth (ft)	0.00
2.3 Mean Depth (ft)	0.00
2.4 Floodprone Width (ft)	0

Notes:
 The reach has been impounded by beaver activity and extremely low slope of the valley. The reach was walked, despite the impoundments and valley and river corridor judgments were made.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	0.00
2.7 Entrenchment Ratio	0.00
2.8 Incision Ratio	0.00
Human Elevated Inc Rat	0.00
2.9 Sinuosity	
2.10 Riffles Type	
2.11 Riffle/Step Spacing (ft)	0
2.12 Substrate Composition	
Silt/Clay Present?	
Detritus	0 %
# Large Woody	0
2.13 Average Largest Particle on	
Bed	0.0
Bar	0.0
2.14 Stream Type	
Stream Type:	E
Bed Material:	Sand
Subclass Slope:	None
Bed Form:	Dune-Ripple
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
3.3 old	<u>Amount</u> <u>Mean Height</u>
Failures	None 0.00
Gullies	None 0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	1-25
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	None	None
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	3
Affected Length (ft)	4,600

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	1	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **1,542**

Phase 2 Reach Summary

Reach # **M11**
 Observers: **EPF, CFF**

page 2 of 2
 Segment: **B**

February 2, 2009
 Completion Date: **June 2, 2008**
 Rain: **Yes**

Segment Location: **From start of impoundment at beaver dam, to reach break upstream of driveway. The**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Narrative:

Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Step 2. Stream Channel

2.1 Bankfull Width	0
2.2 Max Depth (ft)	0.00
2.3 Mean Depth (ft)	0.00
2.4 Floodprone Width (ft)	0

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Deciduous
Sub-dominant	Pasture	Herbaceous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	0	51-75
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	>100
Sub-dominant	0-25	None
W less than 25	332	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Deciduous
Sub-dominant	Shrubs/Saplin	Herbaceous
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Hay	Forest
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **1,989**

Phase 2 Reach Summary
 Reach # **M12**
 Observers: **FEA, CFF**
 Segment Location: **Ponded reach from old farming road to ~600 yards downstream of Rt. 116 crossing.**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 2, 2008**
 Rain: **Yes**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Narrative:

Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	0	0
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	26-50	>100
Sub-dominant	51-100	None
W less than 25	214	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Hay	Hay
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	0	<u>Neck Cutoff</u>	<u>Avulsion</u>
	0	0	0
5.3 Steep Riffles and Head Cuts			
Steep Riffles	0	<u>Head Cuts</u>	<u>Trib Rejuv.</u>
	0	0	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **1,861**

Phase 2 Reach Summary

Reach # **M13**
 Observers: **FEA, CFF**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 2, 2008**
 Rain: **Yes**

Segment Location: **From the reach break up to the Rt. 116 crossing. Reach was not completely assessed**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Herbaceous
Sub-dominant	Herbaceous	None
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	51-75	0
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	0-25
Sub-dominant	0-25	26-50
W less than 25	272	1,620
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Mixed Trees	Herbaceous
Sub-dominant	Herbaceous	None
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Forest	Hay
Sub-dominant	Hay	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **2,262**

Phase 2 Reach Summary

Reach # **M14**
 Observers: **EPF, CFF**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 2, 2008**
 Rain: **No**

Segment Location: **From Rt. 116 crossing to reach break. Channel was not completely assessed due to**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	0
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	0-25	0-25
W less than 25	751	604
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Mixed Trees	None
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Hay	Hay
Sub-dominant	Forest	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	1
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	0	<u>Neck Cutoff</u>	<u>Avulsion</u>
	0	0	0
5.3 Steep Riffles and Head Cuts			
Steep Riffles	0	<u>Head Cuts</u>	<u>Trib Rejuv.</u>
	0	0	
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **3,539**

Phase 2 Reach Summary

Reach # **M15**
 Observers: **EPF, CFF**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 3, 2008**
 Rain: **Yes**

Segment Location: **From Reach break to Shelburne Pond. Reach was not completely assessed due to**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan		
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Step 2. Stream Channel

2.1 Bankfull Width	0
2.2 Max Depth (ft)	0.00
2.3 Mean Depth (ft)	0.00
2.4 Floodprone Width (ft)	0

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	0.00
2.7 Entrenchment Ratio	0.00
2.8 Incision Ratio	0.00
Human Elevated Inc Rat	0.00
2.9 Sinuosity	
2.10 Riffles Type	
2.11 Riffle/Step Spacing (ft)	0
2.12 Substrate Composition	
Silt/Clay Present?	
Detritus	0 %
# Large Woody	0
2.13 Average Largest Particle on	
Bed	0.0
Bar	0.0
2.14 Stream Type	
Stream Type:	E
Bed Material:	Sand
Subclass Slope:	None
Bed Form:	Dune-Ripple
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
3.3 old	<u>Amount</u> <u>Mean Height</u>
Failures	0.00
Gullies	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type		
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	None	None
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	0	0
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	>100
Sub-dominant	None	None
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	None	None
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg (old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal			
5.5 Straightening			
Straightening Length:			0
5.5 Dredging			

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **1,189**

Phase 2 Reach Summary

Reach # **M18**
 Observers: **EPF, CFF**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 3, 2008**
 Rain: **Yes**

Segment Location: **From Shelburne Pond to reach break in Ag field. Reach was not completely assessed**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Pasture	Pasture
Sub-dominant	Herbaceous	Herbaceous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	0	0
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	0-25	0-25
Sub-dominant	26-50	26-50
W less than 25	1,886	1,895
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Pasture	Pasture
Sub-dominant	Hay	Hay
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	1	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal			Yes
5.5 Straightening			With Windrowing
Straightening Length:			1,402
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **3,294**

Phase 2 Reach Summary

Reach # **M19**
 Observers: **EPF, SPP**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 11, 2008**
 Rain: **Yes**

Segment Location: **Reach was in the pasture field downstream of Cheeseactory Rd. Access to the reach**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Narrative:

Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	None
1.2 Alluvial Fan	None
1.3 Corridor Encroachments	
Length (ft)	One Both
Berms	85 0
height	0 0
Roads	0 0
height	0 0
Railroads	0 0
height	0 0
Improved Paths	0 0
height	0 0
Development	0 0
1.4 Adjacent Side	Left Right
Hillside Slope	Hilly Hilly
Continuous w/	Sometimes Sometimes
W/in 1 Bankfill	Sometimes Sometimes
Texture	Silt/Clay Silt/Clay
1.5 Valley Features	
Valley Width (ft)	440
Width Determination	Estimated
Confinement Type	Very Broad
Rock Gorge?	No
Human-caused Change?	No
Step 2. Stream Channel	
2.1 Bankfull Width	6
2.2 Max Depth (ft)	1.60
2.3 Mean Depth (ft)	0.94
2.4 Floodprone Width (ft)	130

Notes:
 Downstream of the Cheese Factory Rd. crossing the channel has been straightened with windrowing* which slightly limits its floodplain access - channel length was not long enough and floodplain disconnection not severe enough for this area to warrant

Passed Step 2. (Contued)

2.5 Aband. Floodpln	1.60 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	6.38
2.7 Entrenchment Ratio	21.67
2.8 Incision Ratio	1.00
Human Elevated Inc Rat	0.00
2.9 Sinuosity	Low
2.10 Riffles Type	Not Applicable
2.11 Riffle/Step Spacing (ft)	0
2.12 Substrate Composition	
Bedrock	0%
Boulder	0%
Cobble	0%
Coarse Gravel	0%
Fine Gravel	5%
Sand	85%
Silt and smaller	10%
Silt/Clay Present?	Yes
Detritus	5 %
# Large Woody	19
2.13 Average Largest Particle on	
Bed	N/A
Bar	N/A
2.14 Stream Type	
Stream Type:	E
Bed Material:	Sand
Subclass Slope:	None
Bed Form:	Dune-Ripple
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
3.3 old	Amount Mean Height
Failures	None 0.00
Gullies	None 0.00

Step 3. Riparian Features

3.1 Stream Banks	
Typical Bank Slope	Steep
Bank Texture	Left Right
Upper	
Material Type	Sand Sand
Consistency	Non-cohesive Non-cohesive
Lower	
Material Type	Clay Clay
Consistency	Cohesive Cohesive
Bank Erosion	Left Right
Erosion Length (ft)	0 0
Erosion Height (ft)	0.00 0.00
Revetmt. Type	None None
Revetmt. Length (ft)	0 0
Near Bank Veg. Type	Left Right
Dominant	Herbaceous Herbaceous
Sub-dominant	Shrubs/Saplin Shrubs/Saplin
Bank Canopy	Left Right
Canopy %	1-25 1-25
Mid-Channel Canopy	Open
3.2 Riparian Buffer	
Buffer Width	Left Right
Dominant	51-100 51-100
Sub-dominant	>100 26-50
W less than 25	524 623
Buffer Veg. Type	Left Right
Dominant	Herbaceous Herbaceous
Sub-dominant	Shrubs/Saplin Shrubs/Saplin
3.3 Riparian Corridor	
Corridor Land	Left Right
Dominant	Shrubs/Saplin Shrubs/Saplin
Sub-dominant	Forest Forest
Mass Failures	0 0
Height	0 0
Gullies	0 0
Height	0 0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	3
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types		
Mid	Point	Side
1	0	1
Diagonal	Delta	Island
0	0	0
5.2 Other Features	Braiding	
Flood	Neck Cutoff	Avulsion
0	0	0
5.3 Steep Riffles and Head Cuts		
Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No
5.4 Stream Ford or Animal	Yes	
5.5 Straightening	With Windrowing	
Straightening Length:	2,725	
5.5 Dredging	None	
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.		

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Muddy Brook** Reach # **M20** Segment: **0** Completion Date: **June 11, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **4,962** Segment Location: **From pasture clearing about 400 feet south of Cheeseactory Rd. to the confluence**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	4.00	Yes	No	Yes	Yes
	Problem	Scour	Above,	Scour	Below
Culvert	6.00	Yes	Yes	No	No
	Problem	None			
Culvert	5.50	Yes	Yes	No	No
	Problem	None			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	13	None	No
7.2 Channel Aggradation	16	None	No
7.3 Widening Channel	17		No
7.4 Change in Planform	14		No
Total Score	60		
Geomorphic Rating	0.75		
Channel Evolution Model	F		
Channel Evolution Stage	I		
Geomorphic Condition	Good		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	7	
6.2 Pool Substrate	12	
6.3 Pool Variability	6	
6.4 Sediment Deposition	16	
6.5 Channel Flow Status	16	
6.6 Channel Alteration	8	
6.7 Channel Sinuosity	7	
6.8 Bank Stability	Left: 9	Right: 9
6.9 Bank Vegetation Protection	Left: 7	Right: 7
6.10 Riparian Vegetation Zone Width	Left: 7	Right: 7
Total Score	118	
Habitat Rating	0.59	
Habitat Stream Condition	Fair	

Narrative:
 Channel seems very stable and well buffered by the near bank vegetation. See step 5 for further narrative. Note: the reference channel width used for phase I reflects field observations.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	None		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
Berms	0	0	0
height	0	0	0
Roads	0	0	0
height	0	0	0
Railroads	0	0	0
height	0	0	0
Improved Paths	0	0	0
height	0	0	0
Development	0	949	
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>	
Hillside Slope	Flat	Flat	
Continuous w/	Never	Never	
W/in 1 Bankfill	Never	Never	
Texture	Not Evalua	Not Evalua	

1.5 Valley Features		
Valley Width (ft)	394	
Width Determination	Estimated	
Confinement Type	Very Broad	
Rock Gorge?	No	

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width	4
2.2 Max Depth (ft)	1.70
2.3 Mean Depth (ft)	0.79
2.4 Floodprone Width (ft)	59

Notes:
 The channel largely exhibits E-type geometry, but the low slope in this headwater reach has led to ponding in several areas. Given the small drainage area of the reach and low slope there are little geomorphic processes at work, and the floodplain remains connected

Passed Step 2. (Contued)

2.5 Aband. Floodpln	2.20	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	4.43	
2.7 Entrenchment Ratio	16.71	
2.8 Incision Ratio	1.29	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Not Applicable	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	0%	
Fine Gravel	0%	
Sand	80%	
Silt and smaller	20%	
Silt/Clay Present?	Yes	
Detritus	5 %	
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Clay
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	1-25
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	51-100
Sub-dominant	0-25	0-25
W less than 25	1,833	1,690
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Other	Other
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Abundant
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	Large Run of
Flow Regulation Use	Other
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	1
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			Yes
5.5 Straightening			Straightening
Straightening Length:			7,496
5.5 Dredging			None
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook**
 Stream: **Muddy Brook**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **7,589**

Phase 2 Reach Summary
 Reach # **M21**
 Observers: **EPF, SPP**
 Segment Location: **From reach break at Tributary 9 to farm ditch near golf course.**

page 2 of 2
 Segment: **0**

February 2, 2009
 Completion Date: **June 12, 2008**
 Rain: **Yes**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	3.00	Yes	No	Yes	No
	Problem	Scour	Above,	Scour	Below
Culvert	3.50	Yes	No	Yes	No
	Problem	Scour	Above,	Scour	Below
Culvert	3.00	Yes	No	Yes	No
	Problem	Deposition	Above,	Scour	Below
Culvert	3.00	Yes	No	Yes	No
	Problem	None			
Culvert	3.50	Yes	No	Yes	No
	Problem	None			
Culvert	3.50	Yes	No	Yes	No
	Problem	None			

Narrative:

See step 5 for narrative. Note: the reference channel width used for phase I reflects field observations.

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	10	None	No
7.2 Channel Aggradation	12	None	No
7.3 Widening Channel	14		No
7.4 Change in Planform	11		Yes
Total Score	47		
Geomorphic Rating	0.5875		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	5	
6.2 Pool Substrate	6	
6.3 Pool Variability	8	
6.4 Sediment Deposition	10	
6.5 Channel Flow Status	14	
6.6 Channel Alteration	7	
6.7 Channel Sinuosity	5	
6.8 Bank Stability	Left: 8	Right: 8
6.9 Bank Vegetation Protection	Left: 5	Right: 5
6.10 Riparian Vegetation Zone Width	Left: 5	Right: 6
Total Score	92	
Habitat Rating	0.46	
Habitat Stream Condition	Fair	

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	Other Reason	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Very Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Sand
1.5 Valley Features		
Valley Width (ft)	99	
Width Determination	Measured	
Confinement Type	Very Broad	
Rock Gorge?	No	
Human-caused Change?	No	
Step 2. Stream Channel		
2.1 Bankfull Width	6	
2.2 Max Depth (ft)	1.50	
2.3 Mean Depth (ft)	0.94	
2.4 Floodprone Width (ft)	40	

Notes:
 Severe incision in lower reach where armoring is not present. Headcut noted immediately below Marshall Ave. crossing. Incision upstream of Marshall Ave. may be related to past beaver ponding and deposition of sediment behind the dams.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	2.30	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	5.85	
2.7 Entrenchment Ratio	7.27	
2.8 Incision Ratio	1.53	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Moderate	
2.10 Riffles Type	Not Applicable	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	0%	
Fine Gravel	0%	
Sand	90%	
Silt and smaller	10%	
Silt/Clay Present?	Yes	
Detritus	40 %	
# Large Woody	67	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	One	5.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	117	175
Erosion Height (ft)	2.22	1.55
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	112	115
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Herbaceous	Herbaceous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	51-75	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	51-100
Sub-dominant	26-50	26-50
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Mixed Trees	Mixed Trees
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Forest
Mass Failures	0	26
Height	0	5
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Abundant
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	3
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	1
Road Ditch	1
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
<u>Mid</u>	<u>Point</u>	<u>Side</u>	
0	3	1	
<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>	
0	0	0	
5.2 Other Features			<u>Braiding</u>
<u>Flood</u>	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
<u>Steep Riffles</u>	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	1	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			Straightening
Straightening Length:			193
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	2.50	Yes	Yes	Yes	Yes
	Problem	Deposition	Above,	Scour	Below
Culvert	3.50	Yes	Yes	Yes	Yes
	Problem	Scour	Below		

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	7	None	No
7.2 Channel Aggradation	8	None	No
7.3 Widening Channel	10		No
7.4 Change in Planform	11		No
Total Score	36		
Geomorphic Rating	0.45		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	13	
6.2 Pool Substrate	7	
6.3 Pool Variability	6	
6.4 Sediment Deposition	6	
6.5 Channel Flow Status	13	
6.6 Channel Alteration	10	
6.7 Channel Sinuosity	6	
6.8 Bank Stability	Left: 4	Right: 4
6.9 Bank Vegetation Protection	Left: 6	Right: 6
6.10 Riparian Vegetation Zone Width	Left: 5	Right: 5
Total Score	91	
Habitat Rating	0.455	
Habitat Stream Condition	Fair	

Narrative:

Incision and beginning stages of bank erosion and widening. See step 5 for further narrative.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope		
Continuous w/ W/in 1 Bankfill		
Texture		
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		

Step 2. Stream Channel

2.1 Bankfull Width	0
2.2 Max Depth (ft)	0.00
2.3 Mean Depth (ft)	0.00
2.4 Floodprone Width (ft)	0

Notes:
 Administrative judgment was used to enter stream type and condition in order to develop Fluvial Erosion Hazard (FEH) zones for reaches not completely assessed for Phase 2 data. The classification took into account the buffer and corridor conditions, past land use

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope		
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	2
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Deciduous	Deciduous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	1-25
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	51-100
Sub-dominant	26-50	26-50
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Mixed Trees	Mixed Trees
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Forest	Forest
Sub-dominant	Commercial Shrubs/Saplin	
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	
4.2 Adjacent Wetlands	
4.3 Flow Status	
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	1
4.9 # of Beaver Dams	1
Affected Length (ft)	1,500

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal			No
5.5 Straightening			None
Straightening Length:			0
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook**
 Stream: **Unnamed Tributary**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **2,222**

Phase 2 Reach Summary

Reach # **T2.01**
 Observers: **EPF, CFF**

page 2 of 2
 Segment: **B**

February 2, 2009
 Completion Date: **June 5, 2008**
 Rain: **Yes**

Segment Location: **From reach break to change in confinement and impoundments south of Shunpike Rd.**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation Channel Dimensions		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
Berms	0	0
height	0	0
Roads	222	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Very Steep	Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Mixed	Mixed
1.5 Valley Features		
Valley Width (ft)	188	
Width Determination	Measured	
Confinement Type	Broad	
Rock Gorge?	No	
Human-caused Change?	Yes	
Step 2. Stream Channel		
2.1 Bankfull Width	20	
2.2 Max Depth (ft)	5.20	
2.3 Mean Depth (ft)	2.84	
2.4 Floodprone Width (ft)	151	

Notes:
 Channel is incised from historic straightening associated with I-89 construction. Clay present in bed limiting further channel down-cutting. High degree of bank erosion and mass failures along right bank. Habitat highly impacted by change in channel morphology.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	6.50	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	6.97	
2.7 Entrenchment Ratio	7.63	
2.8 Incision Ratio	1.25	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Eroded	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	3%	
Fine Gravel	6%	
Sand	15%	
Silt and smaller	76%	
Silt/Clay Present?	Yes	
Detritus	25 %	
# Large Woody	40	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Silt	
Subclass Slope:	None	
Bed Form:	Plane Bed	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
<u>3.3 old</u>	<u>Amount</u>	<u>Mean Height</u>
Failures	Multiple	11.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Mix
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	156	113
Erosion Height (ft)	4.06	3.90
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	51-75	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	51-100
Sub-dominant	26-50	>100
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Mixed Trees
Sub-dominant	Herbaceous	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Commercial
Mass Failures	0	72
Height	0	11
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal	
4.2 Adjacent Wetlands	None	
4.3 Flow Status	Moderate	
4.4 # of Debris Jams	5	
4.5 Flow Regulation Type	None	
Flow Regulation Use		
Impoundments		
Impoundmt. Location		
4.6 Up/Down strm flow reg	None	
(old) Upstrm Flow Reg		
4.7 StormwaterInputs		
Field Ditch	1	Road Ditch 3
Other	0	Tile Drain 0
Overland Flow	0	Urb Strm Wtr Pipe 0
4.9 # of Beaver Dams	0	
Affected Length (ft)	0	

Step 5. Channel Bed and Planform Changes

5.1 Bar Types		
<u>Mid</u>	<u>Point</u>	<u>Side</u>
1	1	1
<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
0	0	0
5.2 Other Features		
Flood	Neck Cutoff	Avulsion
0	0	0
		<u>Braiding</u>
		0
5.3 Steep Riffles and Head Cuts		
<u>Steep Riffles</u>	<u>Head Cuts</u>	<u>Trib Rejuv.</u>
0	0	No
5.4 Stream Ford or Animal		
No		
5.5 Straightening		
Straightening Length: 996		
5.5 Dredging		
None		
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.		

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Taft Corners Tributary** Reach # **T3.01** Segment: **A** Completion Date: **June 20, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **1,147** Segment Location: **From the confluence with the main stem just downstream of the I-89 Crossing to the**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	8.50	Yes	Yes	Yes	Yes
Problem Scour Below					

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	9	None	No
7.2 Channel Aggradation	12	None	No
7.3 Widening Channel	12		No
7.4 Change in Planform	13		Yes
Total Score	46		
Geomorphic Rating	0.575		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	6	
6.2 Pool Substrate	6	
6.3 Pool Variability	8	
6.4 Sediment Deposition	10	
6.5 Channel Flow Status	10	
6.6 Channel Alteration	7	
6.7 Channel Sinuosity	5	
6.8 Bank Stability	Left: 6	Right: 6
6.9 Bank Vegetation Protection	Left: 7	Right: 7
6.10 Riparian Vegetation Zone Width	Left: 5	Right: 7
Total Score	90	
Habitat Rating	0.45	
Habitat Stream Condition	Fair	

Narrative:
 The channel has been historically straightened during the construction of I-89 in the early 60's. It has since been down-cutting becoming slightly incised. Overall the segment is stabilized by the interstate and not developing new planform.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	662	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	Left	Right
Hillside Slope	Hilly	Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Mixed	Not Evalua

1.5 Valley Features

Valley Width (ft)	199
Width Determination	Measured
Confinement Type	Very Broad
Rock Gorge?	No

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width	11
2.2 Max Depth (ft)	3.20
2.3 Mean Depth (ft)	2.05
2.4 Floodprone Width (ft)	182

Notes:

Stable reach with high sinuosity and good floodplain connectivity. Healthy wetland vegetation and buffer provide high quality floodplain functions. High LWD density despite limited woody vegetation from recurrent beaver activity.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	3.70 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	5.22
2.7 Entrenchment Ratio	17.01
2.8 Incision Ratio	1.16
Human Elevated Inc Rat	0.00
2.9 Sinuosity	High
2.10 Riffles Type	Complete
2.11 Riffle/Step Spacing (ft)	88
2.12 Substrate Composition	
Bedrock	0%
Boulder	0%
Cobble	0%
Coarse Gravel	0%
Fine Gravel	5%
Sand	35%
Silt and smaller	60%

Silt/Clay Present?	Yes
Detritus	40 %
# Large Woody	18

2.13 Average Largest Particle on

Bed	N/A
Bar	N/A

2.14 Stream Type

Stream Type:	E
Bed Material:	Silt
Subclass Slope:	None
Bed Form:	Dune-Ripple

Field Measured Slope:

2.15 Reference Stream Type
(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	One	20.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Clay	Clay
Consistency	Cohesive	Cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	98	96
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	Left	Right
Canopy %	1-25	1-25
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	Left	Right
Dominant	>100	51-100
Sub-dominant	51-100	>100
W less than 25	0	0
Buffer Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Forest
Mass Failures	47	0
Height	20	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal		
4.2 Adjacent Wetlands	Abundant		
4.3 Flow Status	Low		
4.4 # of Debris Jams	2		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	0	0
Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No

5.4 Stream Ford or Animal

5.5 Straightening	Straightening
Straightening Length:	97

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Taft Corners Tributary** Reach # **T3.01** Segment: **B** Completion Date: **June 20, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **773** Segment Location: **From just upstream of S. Brownell Rd. to below the ponded area by the industrial park.**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	15	None	No
7.2 Channel Aggradation	16	None	No
7.3 Widening Channel	17		No
7.4 Change in Planform	14		No
Total Score	62		
Geomorphic Rating	0.775		
Channel Evolution Model	F		
Channel Evolution Stage	I		
Geomorphic Condition	Good		
Stream Sensitivity	High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **Low**

	Score
6.1 Epifaunal Substrate - Available Cover	15
6.2 Pool Substrate	15
6.3 Pool Variability	14
6.4 Sediment Deposition	13
6.5 Channel Flow Status	16
6.6 Channel Alteration	16
6.7 Channel Sinuosity	19
6.8 Bank Stability	Left: 8 Right: 8
6.9 Bank Vegetation Protection	Left: 6 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 8 Right: 7
Total Score	151
Habitat Rating	0.755
Habitat Stream Condition	Good

Narrative:

Stable reach, with lots of woody debris and good access to its floodplain.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	Flow Status	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Hilly	Hilly
Continuous w/	Sometimes	Never
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Not Evalua
1.5 Valley Features		
Valley Width (ft)	0	
Width Determination		
Confinement Type		
Rock Gorge?		
Human-caused Change?		
Step 2. Stream Channel		
2.1 Bankfull Width	0	
2.2 Max Depth (ft)	0.00	
2.3 Mean Depth (ft)	0.00	
2.4 Floodprone Width (ft)	0	

Notes:
 Given the ponding throughout the length of this segment it was not necessary to enter all of the data and only corridor characteristics were entered.

Administrative judgment was used to enter

Passed Step 2. (Contued)

2.5 Aband. Floodpln	0.00	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	0.00	
2.7 Entrenchment Ratio	0.00	
2.8 Incision Ratio	0.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity		
2.10 Riffles Type		
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Silt/Clay Present?		
Detritus	0	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	0.0	
Bar	0.0	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Silt	Silt
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	1-25	1-25
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	>100
Sub-dominant	>100	51-100
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal	
4.2 Adjacent Wetlands	Minimal	
4.3 Flow Status	Low	
4.4 # of Debris Jams	0	
4.5 Flow Regulation Type	None	
Flow Regulation Use		
Impoundments		
Impoundmt. Location		
4.6 Up/Down strm flow reg	None	
(old) Upstrm Flow Reg		
4.7 StormwaterInputs		
Field Ditch	0	Road Ditch 0
Other	0	Tile Drain 0
Overland Flow	0	Urb Strm Wtr Pipe 2
4.9 # of Beaver Dams	1	
Affected Length (ft)	1,223	

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
1	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0		
5.4 Stream Ford or Animal	Yes		
5.5 Straightening	None		
Straightening Length:	0		
5.5 Dredging	None		

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook**
 Stream: **Taft Corners Tributary**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **1,223**

Phase 2 Reach Summary
 Reach # **T3.01**
 Observers: **EPF, SPP, SEG**
 Segment Location: **Segment ponded and impounded throughout industrial area; assessed for corridor and**

page 2 of 2
 Segment: **C**

February 2, 2009
 Completion Date: **June 20, 2008**
 Rain: **Yes**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Narrative:

Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
 Channel Evolution Stage
 Geomorphic Condition **Fair**
 Stream Sensitivity

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	Flow Status		
1.2 Alluvial Fan	None		
1.3 Corridor Encroachments			
	<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
	Berms	0	0
	height	0	0
	Roads	0	0
	height	0	0
	Railroads	0	0
	height	0	0
	Improved Paths	0	0
	height	0	0
	Development	275	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>	
	Hillside Slope	Hilly	Hilly
	Continuous w/	Sometimes	Sometimes
	W/in 1 Bankfill	Sometimes	Sometimes
	Texture	Sand	Sand
1.5 Valley Features			
	Valley Width (ft)	195	
	Width Determination	Measured	
	Confinement Type	Very Broad	
	Rock Gorge?	No	
Human-caused Change?	No		

Step 2. Stream Channel

2.1 Bankfull Width	11
2.2 Max Depth (ft)	2.50
2.3 Mean Depth (ft)	1.55
2.4 Floodprone Width (ft)	160

Notes:
 Channel is receiving high degree of sediment exported from upstream segment with headcuts and gully. Lower section of channel near road crossing has some channel stability with limited floodplain - high overbank deposition of sands and silts in lower and

Passed Step 2. (Contued)

2.5 Aband. Floodpln	4.30	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	7.10	
2.7 Entrenchment Ratio	14.55	
2.8 Incision Ratio	1.72	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Moderate	
2.10 Riffles Type	Sedimented	
2.11 Riffle/Step Spacing (ft)	44	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	0%	
Fine Gravel	2%	
Sand	70%	
Silt and smaller	28%	
Silt/Clay Present?	Yes	
Detritus	20 %	
# Large Woody	9	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Sand	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Silt	Clay
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	69	44
Erosion Height (ft)	4.00	4.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	51-75	51-75
Mid-Channel Canopy	Closed	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	51-100
Sub-dominant	None	>100
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Mixed Trees	Mixed Trees
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Forest	Forest
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Abundant
4.3 Flow Status	Low
4.4 # of Debris Jams	4
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	1
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	1
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	5	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
1	1	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			Straightening
	Straightening Length:		218
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Taft Corners Tributary** Reach # **T3.01** Segment: **D** Completion Date: **June 20, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **902** Segment Location: **From just upstream of the confluence with sub tributary T3.01.S1.01 to segment break**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	6.00	Yes	Yes	Yes	Yes
	Problem	Deposition	Above,	Scour	Below

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	12	None	No
7.2 Channel Aggradation	3	None	Yes
7.3 Widening Channel	5		No
7.4 Change in Planform	8		No
Total Score	28		
Geomorphic Rating	0.35		
Channel Evolution Model	F		
Channel Evolution Stage	IV		
Geomorphic Condition	Fair		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	6	
6.2 Pool Substrate	6	
6.3 Pool Variability	6	
6.4 Sediment Deposition	1	
6.5 Channel Flow Status	14	
6.6 Channel Alteration	13	
6.7 Channel Sinuosity	10	
6.8 Bank Stability	Left: 2	Right: 2
6.9 Bank Vegetation Protection	Left: 6	Right: 6
6.10 Riparian Vegetation Zone Width	Left: 7	Right: 8
Total Score	87	
Habitat Rating	0.435	
Habitat Stream Condition	Fair	

Narrative:

A large head cut migration in upslope segment E has increased the sediment load. The channel has become more stable in the lower end of the segment and is actively depositing the increased sediment load from above. See step 5 for further narrative.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	Other Reason	
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
	<u>Length (ft)</u>	<u>One</u> <u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Flat	Flat
Continuous w/	Never	Sometimes
W/in 1 Bankfill	Never	Sometimes
Texture	Silt/Clay	Silt/Clay
1.5 Valley Features		
Valley Width (ft)	135	
Width Determination	Measured	
Confinement Type	Very Broad	
Rock Gorge?	No	
Human-caused Change?	No	

Step 2. Stream Channel

2.1 Bankfull Width	5
2.2 Max Depth (ft)	2.50
2.3 Mean Depth (ft)	1.65
2.4 Floodprone Width (ft)	9

Notes:
 Incised channel with multiple headcuts. Largest headcut (2.3') has migrated approx. 130' since 2004 aerial imagery, at a rate of approx. 33ft/yr. At this rate headcut will reach Harvest lane within 5 to 8 years and endanger culverts/road crossing.

Passed Step 2. (Contued)

2.5 Aband. Floodpln	6.30	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	3.21	
2.7 Entrenchment Ratio	1.60	
2.8 Incision Ratio	2.52	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Eroded	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	0%	
Fine Gravel	5%	
Sand	20%	
Silt and smaller	75%	
Silt/Clay Present?	Yes	
Detritus	5 %	
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	G	
Bed Material:	Silt	
Subclass Slope:	None	
Bed Form:	Plane Bed	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
3.3 old	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Cohesive	Non-cohesive
Lower		
Material Type	Clay	Clay
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	126	122
Erosion Height (ft)	6.00	6.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Bare	Bare
Sub-dominant	Herbaceous	Herbaceous
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	0	0
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	>100	51-100
Sub-dominant	None	>100
W less than 25	0	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Forest	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	Minimal
4.3 Flow Status	Low
4.4 # of Debris Jams	0
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0
Road Ditch	0
Other	0
Tile Drain	0
Overland Flow	0
Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	<u>Mid</u>	<u>Point</u>	<u>Side</u>
	0	0	0
	<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>
	0	0	0
5.2 Other Features			<u>Braiding</u>
Flood	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	3	No	
5.4 Stream Ford or Animal			No
5.5 Straightening			Straightening
Straightening Length:			440
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook**
 Stream: **Taft Corners Tributary**
 Organization: **Agency of Natural Resources**
 Segment Length (ft): **445**

Phase 2 Reach Summary
 Reach # **T3.01**
 Observers: **EPF, SPP**
 Segment Location: **From change in entrenchment to just downstream of Harvest Ln.**

page 2 of 2
 Segment: **E**

February 2, 2009
 Completion Date: **June 20, 2008**
 Rain: **Yes**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
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Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	2	E to G	Yes
7.2 Channel Aggradation	3	None	No
7.3 Widening Channel	4		Yes
7.4 Change in Planform	7		Yes
Total Score	16		
Geomorphic Rating	0.2		
Channel Evolution Model	F		
Channel Evolution Stage	II		
Geomorphic Condition	Poor		
Stream Sensitivity	Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **Low**

	Score
6.1 Epifaunal Substrate - Available Cover	1
6.2 Pool Substrate	1
6.3 Pool Variability	0
6.4 Sediment Deposition	1
6.5 Channel Flow Status	10
6.6 Channel Alteration	5
6.7 Channel Sinuosity	5
6.8 Bank Stability	Left: 0 Right: 0
6.9 Bank Vegetation Protection	Left: 0 Right: 0
6.10 Riparian Vegetation Zone Width	Left: 6 Right: 6
Total Score	35
Habitat Rating	0.175

Habitat Stream Condition **Poor**

Narrative:
 Channel is largely incised and entrenched from a series of three head cuts that have transported sediment to the downstream segment. This channel is actively changing quickly as the head cut moves upstream.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation Channel Dimensions		
1.2 Alluvial Fan	None	
1.3 Corridor Encroachments		
<u>Length (ft)</u>	<u>One</u>	<u>Both</u>
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	0
1.4 Adjacent Side	<u>Left</u>	<u>Right</u>
Hillside Slope	Flat	Flat
Continuous w/	Never	Never
W/in 1 Bankfill	Never	Sometimes
Texture	Not Evalua	Not Evalua
1.5 Valley Features		
Valley Width (ft)	195	
Width Determination	Estimated	
Confinement Type	Very Broad	
Rock Gorge?	No	
Human-caused Change?	No	
Step 2. Stream Channel		
2.1 Bankfull Width	4	
2.2 Max Depth (ft)	1.20	
2.3 Mean Depth (ft)	0.56	
2.4 Floodprone Width (ft)	144	

Notes:
 Stable channel upslope of headcut. Streamflow is diffuse through wetland - representative of what Segment E would have been prior to headcut migration and gully formation. Few features present in this segment to quantify. Segment characterized

Passed Step 2. (Contued)

2.5 Aband. Floodpln	1.20	ft.
Human Elev Floodpln	0.00	ft.
2.6 Width/Depth Ratio	7.14	
2.7 Entrenchment Ratio	36.00	
2.8 Incision Ratio	1.00	
Human Elevated Inc Rat	0.00	
2.9 Sinuosity	Low	
2.10 Riffles Type	Not Applicable	
2.11 Riffle/Step Spacing (ft)	0	
2.12 Substrate Composition		
Bedrock	0%	
Boulder	0%	
Cobble	0%	
Coarse Gravel	0%	
Fine Gravel	0%	
Sand	30%	
Silt and smaller	70%	
Silt/Clay Present?	Yes	
Detritus	60	%
# Large Woody	0	
2.13 Average Largest Particle on		
Bed	N/A	
Bar	N/A	
2.14 Stream Type		
Stream Type:	E	
Bed Material:	Silt	
Subclass Slope:	None	
Bed Form:	Dune-Ripple	
Field Measured Slope:		
2.15 Reference Stream Type		
(if different from Phase 1)		
<u>3.3 old</u>	<u>Amount</u>	<u>Mean Height</u>
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Steep	
Bank Texture	<u>Left</u>	<u>Right</u>
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Clay	Clay
Consistency	Cohesive	Cohesive
Bank Erosion	<u>Left</u>	<u>Right</u>
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0
Near Bank Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	None	None
Bank Canopy	<u>Left</u>	<u>Right</u>
Canopy %	0	0
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	<u>Left</u>	<u>Right</u>
Dominant	51-100	51-100
Sub-dominant	26-50	26-50
W less than 25	146	0
Buffer Veg. Type	<u>Left</u>	<u>Right</u>
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
3.3 Riparian Corridor		
Corridor Land	<u>Left</u>	<u>Right</u>
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal		
4.2 Adjacent Wetlands	Minimal		
4.3 Flow Status	Low		
4.4 # of Debris Jams	0		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
<u>Mid</u>	<u>Point</u>	<u>Side</u>	
0	0	0	
<u>Diagonal</u>	<u>Delta</u>	<u>Island</u>	
0	0	0	
5.2 Other Features			
			<u>Braiding</u>
<u>Flood</u>	<u>Neck Cutoff</u>	<u>Avulsion</u>	0
0	0	0	
5.3 Steep Riffles and Head Cuts			
<u>Steep Riffles</u>	<u>Head Cuts</u>	<u>Trib Rejuv.</u>	
0	0	No	
5.4 Stream Ford or Animal			
No			
5.5 Straightening			
Straightening Length:			614
5.5 Dredging			
None			
Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.			

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Taft Corners Tributary** Reach # **T3.01** Segment: **F** Completion Date: **June 20, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **642** Segment Location: **From segment break just downstream of Harvest Ln. to the reach break**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	4.00	Yes	Yes	Yes	Yes

Problem Deposition Above

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	14	None	No
7.2 Channel Aggradation	13	None	No
7.3 Widening Channel	15		No
7.4 Change in Planform	14		No
Total Score	56		
Geomorphic Rating	0.7		
Channel Evolution Model	F		
Channel Evolution Stage	I		
Geomorphic Condition	Good		
Stream Sensitivity	Very High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	Low	
	Score	
6.1 Epifaunal Substrate - Available Cover	3	
6.2 Pool Substrate	7	
6.3 Pool Variability	2	
6.4 Sediment Deposition	10	
6.5 Channel Flow Status	6	
6.6 Channel Alteration	10	
6.7 Channel Sinuosity	7	
6.8 Bank Stability	Left: 6	Right: 6
6.9 Bank Vegetation Protection	Left: 5	Right: 5
6.10 Riparian Vegetation Zone Width	Left: 6	Right: 6
Total Score	79	
Habitat Rating	0.395	
Habitat Stream Condition	Fair	

Narrative:
 Channel is stable. Any significant storm event just causes diffuse flow across the marshy area. However, upslope impervious surfaces are causing increased stream power and channel evolution is likely to occur yielding a channel much like segment E.

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation	Valley Width
1.2 Alluvial Fan	None
1.3 Corridor Encroachments	
	Length (ft) One Both
Berms	113 0
height	10 0
Roads	0 0
height	0 0
Railroads	0 0
height	0 0
Improved Paths	0 0
height	0 0
Development	622 0
1.4 Adjacent Side	Left Right
Hillside Slope	Hilly Steep
Continuous w/	Sometimes Sometimes
W/in 1 Bankfill	Sometimes Sometimes
Texture	Mixed Mixed
1.5 Valley Features	
Valley Width (ft)	152
Width Determination	Estimated
Confinement Type	Very Broad
Rock Gorge?	No
Human-caused Change?	No
Step 2. Stream Channel	
2.1 Bankfull Width	12
2.2 Max Depth (ft)	2.30
2.3 Mean Depth (ft)	1.49
2.4 Floodprone Width (ft)	152

Notes:
 This reach has received a recent influx in stream power over the last decade or so as many new buildings have been built in the surrounding watershed. Overall, the reach seems stable during large storm events because it has the ability to wash out over its

Passed Step 2. (Contued)

2.5 Aband. Floodpln	2.30 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	7.92
2.7 Entrenchment Ratio	12.88
2.8 Incision Ratio	1.00
Human Elevated Inc Rat	0.00
2.9 Sinuosity	Moderate
2.10 Riffles Type	Complete
2.11 Riffle/Step Spacing (ft)	50
2.12 Substrate Composition	
Bedrock	0%
Boulder	1%
Cobble	31%
Coarse Gravel	33%
Fine Gravel	15%
Sand	17%
Silt and smaller	3%
Silt/Clay Present?	No
Detritus	2 %
# Large Woody	2
2.13 Average Largest Particle on	
Bed	9.0 inches
Bar	3.5 inches
2.14 Stream Type	
Stream Type:	C
Bed Material:	Gravel
Subclass Slope:	b
Bed Form:	Riffle-Pool
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
3.3 old	Amount Mean Height
Failures	None 0.00
Gullies	None 0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	Left Right	
Upper		
Material Type	Sand Sand	
Consistency	Non-cohesive Non-cohesive	
Lower		
Material Type	Mix Mix	
Consistency	Cohesive Cohesive	
Bank Erosion	Left Right	
Erosion Length (ft)	176 179	
Erosion Height (ft)	2.49 3.46	
Revetmt. Type	Rip-Rap None	
Revetmt. Length (ft)	19 0	
Near Bank Veg. Type	Left Right	
Dominant	Herbaceous Herbaceous	
Sub-dominant	Deciduous Shrubs/Saplin	
Bank Canopy	Left Right	
Canopy %	0 0	
Mid-Channel Canopy	Open	
3.2 Riparian Buffer		
Buffer Width	Left Right	
Dominant	51-100 51-100	
Sub-dominant	0-25 0-25	
W less than 25	338 349	
Buffer Veg. Type	Left Right	
Dominant	Herbaceous Herbaceous	
Sub-dominant	Shrubs/Saplin Shrubs/Saplin	
3.3 Riparian Corridor		
Corridor Land	Left Right	
Dominant	Commercial Shrubs/Saplin	
Sub-dominant	Shrubs/Saplin None	
Mass Failures	0 0	
Height	0 0	
Gullies	0 0	
Height	0 0	

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	Minimal
4.2 Adjacent Wetlands	None
4.3 Flow Status	Low
4.4 # of Debris Jams	1
4.5 Flow Regulation Type	None
Flow Regulation Use	
Impoundments	
Impoundmt. Location	
4.6 Up/Down strm flow reg	None
(old) Upstrm Flow Reg	
4.7 StormwaterInputs	
Field Ditch	0 Road Ditch 0
Other	0 Tile Drain 0
Overland Flow	0 Urb Strm Wtr Pipe 2
4.9 # of Beaver Dams	0
Affected Length (ft)	0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	Mid	Point	Side
	0	3	1
	Diagonal	Delta	Island
	1	0	0
5.2 Other Features			Braiding
Flood	Neck Cutoff	Avulsion	0
2	1	0	
5.3 Steep Riffles and Head Cuts			
Steep Riffles	Head Cuts	Trib Rejuv.	
0	2	No	
5.4 Stream Ford or Animal		No	
5.5 Straightening		Straightening	
		Straightening Length:	604
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Taft Corners Tributary** Reach # **T3.02** Segment: **A** Completion Date: **July 2, 2008**
 Organization: **Agency of Natural Resources** Observers: **EPF, SPP** Rain: **Yes**
 Segment Length (ft): **1,372** Segment Location: **From change in substrate type downstream of Harvest Ln. to 100 ft East of the**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	5.00	Yes	Yes	Yes	Yes
Problem Deposition Above, Scour Below					

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Unconfined		
	Score	STD	Historic
7.1 Channel Degradation	11	None	No
7.2 Channel Aggradation	11	None	No
7.3 Widening Channel	14		No
7.4 Change in Planform	12		No
Total Score	48		
Geomorphic Rating	0.6		
Channel Evolution Model	F		
Channel Evolution Stage	I		
Geomorphic Condition	Fair		
Stream Sensitivity	Very High		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	High	
	Score	
6.1 Epifaunal Substrate - Available Cover	16	
6.2 Embeddedness	14	
6.3 Velocity/Depth Patterns	12	
6.4 Sediment Deposition	11	
6.5 Channel Flow Status	12	
6.6 Channel Alteration	13	
6.7 Frequency of Riffles/Steps	16	
6.8 Bank Stability	Left: 6	Right: 6
6.9 Bank Vegetation Protection	Left: 6	Right: 6
6.10 Riparian Vegetation Zone Width	Left: 6	Right: 7
Total Score	131	
Habitat Rating	0.655	
Habitat Stream Condition	Good	

Narrative:
 Some down-cutting but no incision evident in cross-section taken just upstream of Harvest Lane crossing. Large flow events still dissipate onto banks with minor changes in planform.

QC Status - Staff: Provisional Cons
Step 1. Valley and Floodplain

1.1 Segmentation	Valley Width
1.2 Alluvial Fan	None
1.3 Corridor Encroachments	
	Length (ft) One Both
Berms	435 0
height	10 0
Roads	580 914
height	0 0
Railroads	0 0
height	0 0
Improved Paths	0 0
height	0 0
Development	1,859 0
1.4 Adjacent Side	Left Right
Hillside Slope	Very Steep Very Steep
Continuous w/	Sometimes Sometimes
W/in 1 Bankfill	Always Always
Texture	Mixed Mixed
1.5 Valley Features	
Valley Width (ft)	22
Width Determination	Measured
Confinement Type	Semi-confined
Rock Gorge?	No
Human-caused Change?	Yes
Step 2. Stream Channel	
2.1 Bankfull Width	7
2.2 Max Depth (ft)	1.80
2.3 Mean Depth (ft)	1.15
2.4 Floodprone Width (ft)	11

Notes:
 Two cross section were taken for this reach. One (not representative) was taken above the major head cut, resulting in an entrenchment ratio of 2.45, indicating B-type channel.

But downstream of the headcut the channel

Passed Step 2. (Contued)

2.5 Aband. Floodpln	4.00 ft.
Human Elev Floodpln	0.00 ft.
2.6 Width/Depth Ratio	6.09
2.7 Entrenchment Ratio	1.56
2.8 Incision Ratio	2.22
Human Elevated Inc Rat	0.00
2.9 Sinuosity	Moderate
2.10 Riffles Type	Complete
2.11 Riffle/Step Spacing (ft)	60
2.12 Substrate Composition	
Bedrock	0%
Boulder	1%
Cobble	35%
Coarse Gravel	30%
Fine Gravel	15%
Sand	17%
Silt and smaller	3%
Silt/Clay Present?	No
Detritus	5 %
# Large Woody	0
2.13 Average Largest Particle on	
Bed	8.0 inches
Bar	4.0 inches
2.14 Stream Type	
Stream Type:	G
Bed Material:	Cobble
Subclass Slope:	None
Bed Form:	Step-Pool
Field Measured Slope:	
2.15 Reference Stream Type	
(if different from Phase 1)	
B 4 Non Riffle-Pool	
3.3 old	Amount Mean Height
Failures	Multiple 7.50
Gullies	None 0.00

Step 3. Riparian Features

3.1 Stream Banks		
Typical Bank Slope	Undercut	
Bank Texture	Left	Right
Upper		
Material Type	Mix	Mix
Consistency	Cohesive	Cohesive
Lower		
Material Type	Mix	Mix
Consistency	Cohesive	Cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	29	79
Erosion Height (ft)	3.00	3.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	39	38
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	Left	Right
Canopy %	1-25	1-25
Mid-Channel Canopy		Open
3.2 Riparian Buffer		
Buffer Width	Left	Right
Dominant	0-25	0-25
Sub-dominant	51-100	>100
W less than 25	1,537	822
Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Mixed Trees	Mixed Trees
3.3 Riparian Corridor		
Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Commercial	Forest
Mass Failures	43	37
Height	7	8
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps	None		
4.2 Adjacent Wetlands	None		
4.3 Flow Status	Low		
4.4 # of Debris Jams	0		
4.5 Flow Regulation Type	None		
Flow Regulation Use			
Impoundments			
Impoundmt. Location			
4.6 Up/Down strm flow reg	None		
(old) Upstrm Flow Reg			
4.7 StormwaterInputs			
Field Ditch	0	Road Ditch	2
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1
4.9 # of Beaver Dams	0		
Affected Length (ft)	0		

Step 5. Channel Bed and Planform Changes

5.1 Bar Types			
	Mid	Point	Side
	1	4	1
	Diagonal	Delta	Island
	0	0	0
5.2 Other Features			Braiding
Flood	1	Neck Cutoff	0
	0	Avulsion	0
5.3 Steep Riffles and Head Cuts			
Steep Riffles	0	Head Cuts	1
	0	Trib Rejuv.	No
5.4 Stream Ford or Animal			No
5.5 Straightening			Straightening
Straightening Length:			2,407
5.5 Dredging			None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Muddy Brook** Phase 2 Reach Summary page 2 of 2 February 2, 2009
 Stream: **Taft Corners Tributary** Reach # **T3.02** Segment: **B** Completion Date: **July 2, 2008**
 Organization: **Agency of Natural Resources** Observers: **SPP** Rain: **Yes**
 Segment Length (ft): **2,763** Segment Location: **From segment break 100' east of the northeast corner of the home depot building to**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
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4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	5.00	Yes	Yes	Yes	Yes
Problem Scour Below					

Step 7. Rapid Geomorphic Assessment Data

Confinement Type	Confined	Score	STD	Historic
7.1 Channel Degradation		3	Other	Yes
7.2 Channel Aggradation		11	None	No
7.3 Widening Channel		12		No
7.4 Change in Planform		11		No
Total Score		37		
Geomorphic Rating		0.4625		
Channel Evolution Model		F		
Channel Evolution Stage		II		
Geomorphic Condition		Fair		
Stream Sensitivity		Extreme		

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type	High	Score
6.1 Epifaunal Substrate - Available Cover		11
6.2 Embeddedness		13
6.3 Velocity/Depth Patterns		9
6.4 Sediment Deposition		10
6.5 Channel Flow Status		10
6.6 Channel Alteration		9
6.7 Frequency of Riffles/Steps		15
6.8 Bank Stability	Left: 4 Right: 4	
6.9 Bank Vegetation Protection	Left: 6 Right: 6	
6.10 Riparian Vegetation Zone Width	Left: 1 Right: 3	
Total Score		101
Habitat Rating		0.505
Habitat Stream Condition		Fair

Narrative:

Channel is down-cutting from point of headcut which will move upstream. Stream type departure from B to G.

Appendix C. VTDEC Biotic Sampling Data

Macroinvertebrate Samping Data

Date Sampled	VTDEC Site ID	Location	River Mile	SGA Reach	Mean Density	Mean Species Richness	Mean EPT* Richness	Community Assessment
9/8/1988	490500000012	Muddy Brook	2.2	M05	1532	32	13	Poor
7/31/1990	490500000012	Muddy Brook	2.2	M05	1908	35	17	Good
9/30/1993	490500000012	Muddy Brook	2.2	M05	2256	40	20	Very Good
10/5/2000	490500000012	Muddy Brook	2.2	M05	1810	38	13	Fair
10/14/2003	490500000012	Muddy Brook	2.2	M05	2164	41	18	Good
1997	NA	Tributary 4	0.2	T3.01	1316	35	6	NA
2005	NA	Tributary 4	0.2	T3.01	79	25	1	NA

* EPT: Pollution sensitive families of Ephemeroptera, Plecoptera, and Trichoptera

Fish Sampling Data

Date Sampled	VTDEC Site ID	Location	River Mile	SGA Reach	MWIBI [†]	Community Assessment
9/8/1988	490500000012	Muddy Brook	2.2	M05	23	Poor
7/31/1990	490500000012	Muddy Brook	2.2	M05	25	Poor
9/30/1993	490500000012	Muddy Brook	2.2	M05	33	Good
1993	NA	Tributary 4	0.2	M15	35	Good
1995	NA	Tributary 4	0.2	T3.01	33	Good
1997	NA	Tributary 4	0.2	T3.01	31	Good
1999	NA	Tributary 4	0.2	T3.01	31	Fair
2002	NA	Tributary 4	0.2	T3.01	33	Good

† Index of Biological Integrity: Mixed Water (MW) index

APPENDIX D – Shelburne Pond Summary

The following is an excerpt from:

VT Department of Environmental Conservation. 2008. Development of TMDL Capacity for Nutrient-impaired Lakes in Vermont, Final Project Summary and Reporting Statement for USEPA Cooperative Agreement X-97124401. Waterbury, VT, USA.

Shelburne Pond is a 452-acre lake located in the Champlain Valley. This shallow, high-alkalinity lake is fringed by large wetlands, and a considerable portion of the lakeshore is in conservation ownership. There is no direct development on the lakeshore, and a mix of agricultural, forest, and low-density residential characterizes the watershed. Over the past 20 years, much of the agricultural lands have gone out of production, and have been replaced by low density, rural single-family homes. Shelburne Pond supports a wide variety of warmwater species, and hosts tremendous waterfowl use. Recreationally, Shelburne Pond supports a large annual contingent of anglers, paddlers, and hunters. The pond is also heavily used in winter for ice activities. It is an ecologically and recreationally significant resource.

Shelburne Pond also has the highest total phosphorus concentration of any lake monitored by WQD over the long-term. The mean spring total phosphorus concentration is 92 ppb (± 7.2 , std. err.), based on 22 years of measurement. During summer, cyanobacterial blooms of literally “epic” proportions can develop. WQD scientists have observed meter-thick accumulations of cyanobacteria along shore, and pervasive bloom conditions across the entire lake surface. Such bloom conditions preclude recreational uses of the lake, and have prompted the VT Department of Health to post warnings against exposure to the blooms. In addition to persistent algal growth, the lake has experienced major fish kills in the past due in part to oxygen depletion from excessive productivity. Paradoxically, these prior kills may not have significantly impacted the quality of the present fishery. In summer 2007, a joint EPA-WQD fish sampling effort on the lake yielded numerous large and even trophy-sized northern pike and largemouth bass, despite a relatively low sampling effort, and poor sampling conditions. Finally, being quite close to the University of Vermont (UVM), Shelburne Pond has been extensively studied.

In order to address the nutrient impairment on this lake it is necessary to understand the background, or natural phosphorus concentrations that would have been expected absent any major watershed stressors. WQD’s basic hypothesis for this lake has been that it is to some degree naturally eutrophic. Were this the case, it would be inappropriate to manage the lake towards a mesotrophic state. To address this question, WQD commissioned a paleolimnological investigation of the lake, from a multidisciplinary team led by UVM. The purpose of this investigation was to determine the likely historic trophic state of the lake, to provide guidelines for management.

The UVM team collected so-called “long” and “short” cores on the lake. The long core provided historical perspective in the range of 5,000 years, while the short core was collected specifically to capture the more recent 150-year time period. The team used a multi-proxy approach relying on ^{210}Pb and ^{14}C dating, sediment phosphorus and silica, elemental and isotopic ratios of C and N, fossil pigments, and sediment diatoms, to reconstruct the trophic

history of the lake. The results of the analysis (Appendix C), as described in the following quotation, were unambiguous:

“All paleo-productivity proxies indicate that Shelburne Pond was oligo-mesotrophic before European settlement, and has become increasingly productive since the mid 19th century (~1850). Eutrophication rates intensified after ~1900, and reached peak levels during the past two decades (post-1990). Comparison of the sedimentary record with historical data suggests a causal relationship between deteriorating water quality in the pond and human activities in its watershed. Forest clearing since 1810, a switch to mechanized agriculture around ~1850, and intensive dairy farming during most of the 20th century, all resulted in progressive nutrient enrichment.

Despite these significant recent trends, data extending past the post-settlement record suggest that, although generally lower, Shelburne Pond’s productivity levels were at times quite significant during the past few thousand years. The causes of these, apparently natural, fluctuations remain to be investigated.”

This conclusion is emphatic that the historical background in the pond is a meso-oligotrophic state. What remains unanswered, however, is whether the lake can at this point be returned to that condition. There are two pathways available: 1) set a target concentration, and develop a TMDL with loading allocations; or, 2) conduct a Use Attainability Analysis to identify the current water-quality limitation of the lake, and manage the watershed towards the most realistically-attainable condition.

Given the current condition of the watershed, it is difficult to see how reductions of external loads can be achieved in a manner sufficient to meet a loading capacity in Shelburne Pond aimed at any reasonable in-lake phosphorus concentration. The internal sediment recycling in the lake is very likely a dominant phosphorus source; one that is increasing in magnitude with the continuing increases in growth of nitrogen-fixing cyanobacteria that senesce to the lake sediments annually. Given the shallow, windswept nature of the pond, it is unlikely that chemical controls on internal recycling would successfully control the sediment-phosphorus cycle. Likewise, mechanistic solutions to increase sediment-phosphorus retention by aeration would be cost and energy-prohibitive. Given these considerations, WQD is presently initiating discussions about drafting a Use Attainability Analysis for Shelburne Pond. Such an approach would articulate the need for achievable controls on watershed loads, while acknowledging the existing water quality limitations in Shelburne Pond that result from historical insults to the lake.