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June 14, 2016

Town of Mansfield
Inland Wetlands Agency
14 Park Place
Mansfield, CT 06226-2217

Re: WETLANDS ASSESSMENT-SUPPLEMENTAL: WATER QUALITY INVESTIGATION
Lodges at Storrs, Hunting Lodge Road, Mansfield, CT

REMA Job No.: 15-1860-MNS18

Dear Agency Members:

REMA ECOLOGICAL SERVICES, LLC (REMA), is providing herein the results to date of a follow-up investigation of water quality conducted on May 12th, 2016, to supplement the data from March 24th, 2016, presented in a submitted REMA report dated April 4th, 2016.

Station #1, in the southern portion of the eastern semi-perennial watercourse (within Wetland C4) was sampled again. Additionally, water quality was tested in Cedar Swamp Brook (Station CSB-1) (see Figure A1, attached) to the west of the subject site, and downgradient of the far western section of the proposed project, where the proposed naturally vegetated buffer would be in excess of 500 feet in width. We note that roughly the western one third of the subject site is within the Cedar Swamp Brook watershed, the remainder (eastern) in the Eagleville Brook watershed.

In addition to laboratory testing of nutrient parameters in surface water samples, REMA conducted a family level RBI (Rapid Bio-assessment) of the benthic macroinvertebrate community, as another tool for assessing water quality in Cedar Swamp Brook. Note that



because this methodology requires a perennial stream, it could not be used in the eastern stream.

Because tolerance of excess nutrients and other pollutants varies widely among the relatively long-lived aquatic insects that live on the stream bottom, the make-up of the stream-bottom community provides valuable information on water quality, integrated over time. Using a widely accepted, long-established methodology, initially developed by Plafkin (1989), quantitative metrics to gauge stream health were calculated from the macro-invertebrate community data (which families were present and how many individuals of each).

The bio-assessment of Cedar Swamp Brook followed the sampling protocol recommended by CTDEEP (and USEPA) for a family-level study. Invertebrates were collected in a D-net securely lodged on the bottom, perpendicular to stream flow. Approximately one square foot of substrate was disturbed/scrubbed at ten locations, and flowing water washed insects and other loosened material into the net. Also a leaf pack was sampled. After sorting out extraneous material (leaves, stones), the sample was preserved in 90% ethyl alcohol. The sample was further sorted and insects were identified to family in the laboratory.

Sampling station locations are shown in Figure A1 (attached), and were also flagged in the field (also see attached annotated photos). REMA used the standard ancillary USEPA forms (attached) for recording in-stream and riparian habitat, stream substrate, etc. Habitat data is essential for using this technique to assess water quality, because a depauperate macroinvertebrate community may be due more to a degraded habitat rather than impaired water quality.

Water samples were collected in polypropylene bottles in mid-afternoon of May 12th, 2016, and delivered to Phoenix Environmental Laboratories, Inc., of Manchester, in late afternoon of the same day; sample preservation was as specified by the laboratory, e.g. H₂SO₄. The same nutrient parameters were tested as on March 24th, 2016, the first sampling. Three additional parameters were tested using a hand-held conductivity meter (YSI 30): conductivity, salinity, and temperature.

1.0 BACKGROUND

As of 2014 there were two impaired sections, per the CT DEEP, of the streams associated with the subject property. Segment CT3100-17_03 of Cedar Swamp Brook, upstream of



Hunting Lodge Road is impaired due to bacteria (*E. coli*), which impairs its recreational use, and does not meet the CT Water Quality Standards (see attachments). However, Segment CT3100-17_02, the segment that is associated with the subject site, meets the Water Quality Standards, and is not considered impaired. This is the segment that was sampled and assessed with the results presented herein.

For Eagleville Brook, approximately 0.43 miles downstream of the subject site, Stream Segment CT3100-19_02, is considered to be impaired, based on DEEP’s 2014 listing. Neither the criteria for aquatic life nor for recreation are met within this segment (see attachments). The cause is high levels of bacteria (*E. coli*), with potential sources including permitted and non-permitted stormwater discharges, and potentially insufficient septic systems. A TMDL (total maximum daily load) has been set for this segment of stream, and is quite unique, perhaps nationwide. The TMDL is impervious cover (IC). According to the Eagleville Brook Watershed Management Plan (2011)¹, impervious cover (IC) is further defined as *effective* impervious cover, the amount of IC that is directly connected to the stormwater system. Thus this plan encourages the use of stormwater management practices that infiltrate stormwater, thus essentially minimizing *effective* impervious cover. This is indeed what the stormwater management system designed for the subject site has strived to achieve, and in our opinion, successfully.

2.0 RESULTS

Eastern Unnamed Stream (*Eagleville Brook Watershed*)

The analytical results for May 12th, 2016, were slightly improved over those for March 24th, 2016, and continue to indicate moderately good water quality in the eastern stream. At 176.7 $\mu\text{S}/\text{cm}$, specific conductivity was 16% lower than the reading of 211 $\mu\text{S}/\text{cm}$, recorded on March 24th, 2016. It is expected that nutrient levels in the stream will drop as vegetation develops and takes up nutrients. Total phosphorus (TP) dropped 25%, from 40 $\mu\text{g}/\text{l}$ to 30 $\mu\text{g}/\text{l}$, about 6 $\mu\text{g}/\text{l}$ over the USEPA criterion. Nitrate dropped from 0.45 mg/l to 0.38 mg/l , now only 0.07 mg/l over the EPA criterion (0.31 mg/l). Nutrient parameters just slightly

¹ Dietz, M.E. and C. Arnold. 2011. Eagleville Brook Watershed Management Plan. Center for Land Use Education and Research. University of Connecticut Cooperative Extension.



exceeded the draft USEPA criteria for non-impaired watercourses. Additional two-lined salamanders were observed in the stream at the time of surface water sampling².

Cedar Swamp Brook

Water samples showed very low nutrient levels, lower than in the eastern stream, and well below the USEPA nutrient criteria: 10 µg/l total phosphorus (TP); 0.10 mg/l of nitrate, and 0.4 mg/l of Total Kjeldahl Nitrogen (TKN). Salinity was 0.1 ppt, the same as in the eastern stream. Specific conductivity at 183 µS/cm was very close to that in the eastern stream, but because the watershed of Cedar Swamp Brook is much larger, there is much more opportunity for dissolving of minerals from soils and rocks. In effect, the conductivity reading is very low for a stream of this size.

As shown at the end of the attached bioassessment spreadsheet, the formal results of the quantitative bioassessment are “very good to good,” consistent with the water testing results, taking in-stream habitat limitations into account. Pollution intolerant mayflies and stoneflies comprised 75.5% of the total invertebrate count, and the weighted average of pollution tolerance was very low at 2.2, compared to 3.15 at the reference station on the Natchaug River. However, invertebrate density was low (only 98 organisms were collected) and taxa richness was moderate, with 13 taxa compared to 21 taxa in the reference station. Habitat diversity was naturally low (not impaired), as the substrate consisted of about 75% boulders, with few large cobbles, and very little sand and gravel. This resulted in fewer ecological niches than in a typical brook of this size. Boulders have fewer surfaces and crannies for aquatic insects than a cobble-dominated streambed. The lack of sandy substrate results in an absence of dragonfly nymphs for example. Collector-filterer insects, like many of the caddisflies, were missing, likely due to minimal fine particulate organic matter (FPOM), consistent with very low TKN.

The high proportion of undeveloped land uses in the watershed of Cedar Swamp Brook would be expected to result in excellent water quality at this location, especially the very large cedar swamp in Willington. One densely developed area with narrow stream setbacks is the trailer park just south of Route 44. It is this segment of the stream that was listed as

² The two-lined salamanders (*Eurycea bislineata*) is Connecticut’s most common stream salamander. Although they can be found in a variety of habitats, and are somewhat tolerant of urbanization, in our experience they are not found in impaired surface waters. Although a targeted search for stream salamanders was not undertaken, they were encountered often, indicating that they are relatively abundant.



impaired (CT DEEP 2014) due to bacteria (*E. coli*). However, this type of residential community is typically a minor source of turf chemicals in runoff, as economic constraints limit application rates of turf chemicals. The crest of the ridge to the west of the sampling station is the limit of the watershed, such that any future development along Bone Hill Road will not drain easterly towards Cedar Swamp Brook. The proposed development at the subject site, at the top of the hill, is highly unlikely to become a pollution source because the setback to the brook average 500 feet, steep slopes are avoided, and stormwater renovation practices meet all the applicable standards and guidelines.

Based on all of water quality sampling of both streams associated with the subject site, and the bio-assessment of Cedar Swamp Brook, it is apparent that neither of the two watercourses are currently impaired and do meet the Connecticut Water Quality Standards for Class A surface waters.

Please call us if you have any questions.

Respectfully submitted,

REMA ECOLOGICAL SERVICES, LLC

A handwritten signature in black ink that reads "Sigrun N. Gadwa".

Sigrun N. Gadwa, MS, PWS
Professional Wetland Scientist
Registered Soil Scientist

A handwritten signature in black ink that reads "George T. Logan".

George T. Logan, MS, PWS, CSE
Professional Wetland Scientist
Registered Soil Scientist, Certified Senior Ecologist

VIA E-MAIL & HAND-DELIVERY

Attachments: Figure A1 and B; Photos 1 to 4; Table 1: Water Quality Summary Table; Laboratory Analytical Results; watershed related materials (excerpts)



*Wetland A & Vernal
Pool Habitat*

*Wetland C4 &
Intermittent Stream*

VP-1

S-1

CSB-1

*Cedar Swamp Brook
(off-site)*

FIGURE A1: Surface Water Quality Sampling Stations at the Proposed "**Lodges at Storrs**" residential community, Mansfield, CT (as seen on a April 2013 aerial photo; Google Earth)



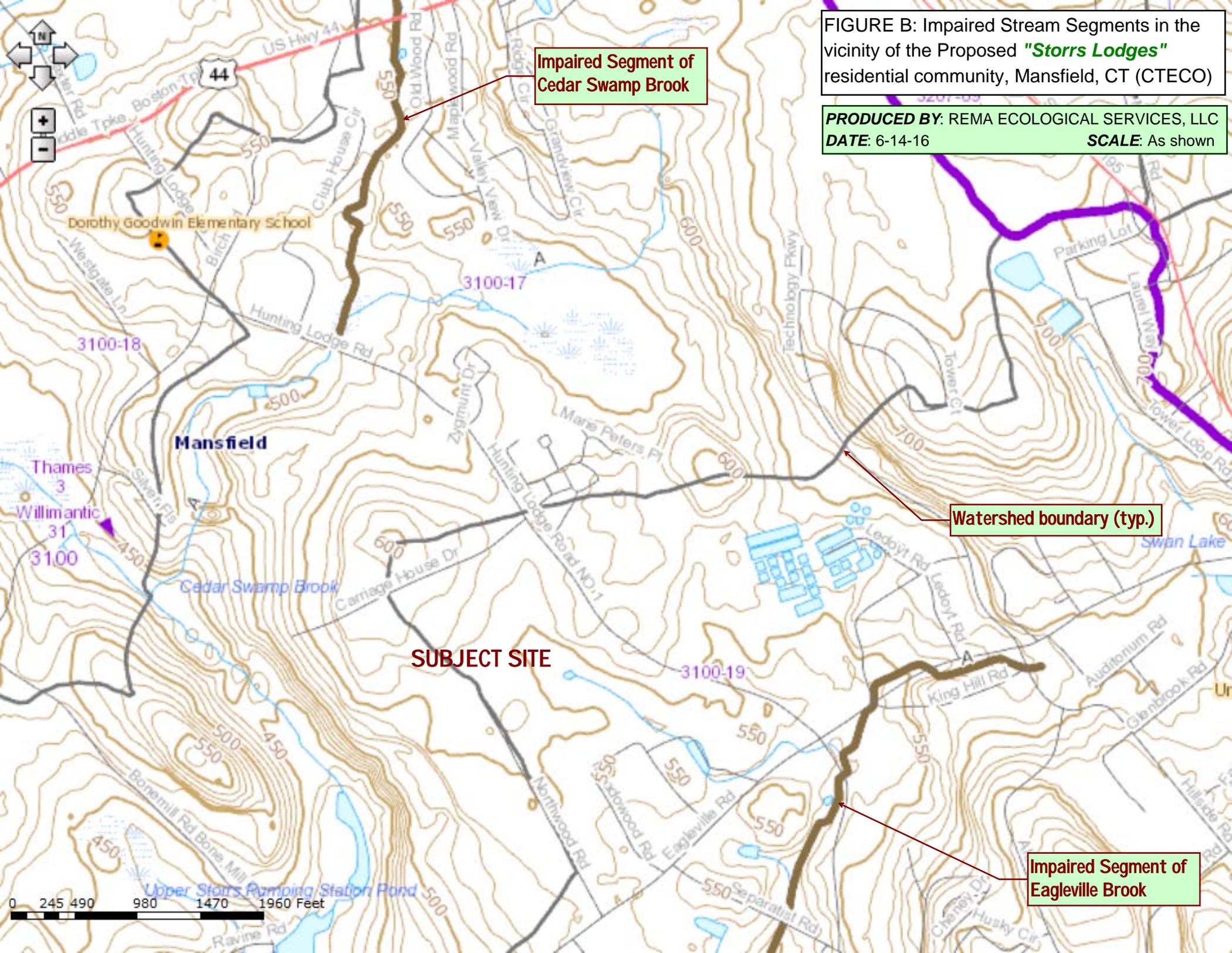


FIGURE B: Impaired Stream Segments in the vicinity of the Proposed "Storrs Lodges" residential community, Mansfield, CT (CTECO)

PRODUCED BY: REMA ECOLOGICAL SERVICES, LLC
DATE: 6-14-16
SCALE: As shown

Impaired Segment of Cedar Swamp Brook

Watershed boundary (typ.)

Impaired Segment of Eagleville Brook

SUBJECT SITE

0 245 490 980 1470 1960 Feet



Photo 1: Station 1 (Stream-1) surface water quality sampling station (at blue flag) at unnamed stream within Wetland C4; facing northeasterly



Photo 2: Station 1 (Stream-1) surface water quality sampling; conductivity (176.9 µS/cm) and temperature (19 Celsius) was measured with YSI meter.



Photo 3: Station CSB-1 (Cedar Swamp Brk.), sampling for surface water (near bank, 4' upstream of start of photo). Macroinvertebrates also collected from this riffle. Facing northerly. Note high percent cover of boulders, full canopy cover, & stable banks.



Photo 2: Downgradient of CSB-1 (Cedar Swamp Brook). This segment of stream is a run (habitat). Note lack of bank erosion & downward incision. Watershed has much forest cover.

Table 1. Surface water analytical results on 5-12-16 in un-named Intermittent Stream (Wetland C4) at Proposed Lodges at Storrs, Hunting Lodge Road, Mansfield, CT, and in Cedar Swamp Brook, offsite to the west.

Sampling Station	<i>Unnamed Stream</i>	<i>Cedar Swamp Brook</i>	<i>CT Standards</i>
Sampling Date:	5/12/2016,	5/12/2016	
Sampling Time:	2:25 PM	4:42 PM	
Conductivity (μ S/cm)	176.7	183.0	NE
Salinity (PPT)	0.10	0.10	NE
Temperature (degrees C)	19	20	as naturally occurs ¹
Total Phosphorus as P (μg/l)	30	10	only of natural origin ¹ , 23.75 ²
Ortho Phosphorus as P (μg/l)	<0.01	<0.01	NE
Nitrate-N (mg/l)	0.38	0.10	0.31 ² (includes Nitrite-N)
Nitrite-N (mg/l)	<0.01	<0.01	NE
Ammonia (mg/l)	<0.05	<0.05	1.9 ³ (chronic)
Total Keldahl Nitrogen (mg/l)	0.34	0.40	5 ¹ ; 1.26 ²

NOTES:

N/A = Not applicable

NE = No standard established

mg/L = milligrams per Liter; μ g/L = micrograms per Liter

¹ The State of Connecticut Water Quality Standards for Class A Waters.

² USEPA Nutrient Criteria (draft) for EcoRegion 1V, Level 11 Ecoregion 59 (coastal New England).

³ USEPA Freshwater Ambient Criteria (chronic toxicity)

Note that the intermittent Brook (Wetland C4) was sampled downgradient of the old causeway crossing. Cedar Swamp Brook was sampled approx. 1,200 feet west of the extension of Northwood Rd, at the macro invertebrate sampling station.

MACROINVERTEBRATE SURVEY DATA

Sample #: **CSB-1 - Storrs** Date: **5/12/2016**
 Stream: **Cedar Swamp Brook**
 Location: **Lower 50 feet of major riffle west of Carriage Dr.**
 Sampled by: **SNG**

of organisms identified: **98**

MAYFLIES (*Ephemeroptera*)

Number found	Families	Feeding group	Tolerance value	HBI value
	Baetidae	C.gatherer	4	0
	Caeniidae	C.gatherer	7	0
37	Ephemerellidae	C.gatherer	1	37
	Ephemeridae	C.gatherer	4	0
	Heptageniidae	Scraper	4	0
	Leptophlebiidae	C.gatherer	2	0
	Oligoneuridae	C.filterer	2	0
	Potomanthidae	C.gatherer	4	0
	Siphonuridae	C.gatherer	7	0
	Tricorythidae	C.gatherer	4	0
				0
				0
37	TOTALS			37

STONEFLIES (*Plecoptera*)

Number found	Families	Feeding group	Tolerance value	HBI value
	Capniidae	Shredder	1	0
	Chloroperlidae	Predator	1	0
3	Leuctridae	Shredder	0	0
3	Nemouridae	Shredder	2	6
	Peltoperlidae	Shredder	0	0
2	Perlidae	Predator	1	2
29	Perlodidae	Predator	2	58
	Pteronarcyidae	Shredder	0	0
	Taeniopterygidae	Shredder	2	0
				0
				0
37	TOTALS			66

CADDISFLIES (*Trichoptera*)

Number found	Families	Feeding group	Tolerance value	HBI value
	Brachycentridae	Shredder	1	0
	Glossosomatidae	Scraper	0	0
	Helicopsychidae	Scraper	3	0
	Hydropsychidae	C.filterer	4	0
	Hydroptilidae	Scraper	4	0
	Lepidostomatidae	Shredder	1	0
	Leptoceridae	Shredder	4	0
1	Limnephilidae	Shredder	4	4
	Molannidae	Scraper	6	0
	Odontoceridae	Scraper	0	0
	Philopotamidae	C.filterer	3	0
	Polycentropodidae	C.filterer	6	0
2	Rhyacophilidae	Predator	0	0
				0
3	TOTALS			4

TRUE FLIES (*Diptera*)

Number found	Families	Feeding group	Tolerance value	HBI value
1	Athericidae	Predator	2	2
	Blephariceridae	Scraper	0	0
	Ceratopogonidae	Predator	6	0
4	Chironomidae	C.gatherer	6	24
	Empididae	Predator	6	0
5	Simuliidae	C.filterer	6	30
	Tabanidae	Predator	6	0
	Tipulidae	Shredder	3	0
				0
10	TOTALS			56

BEETLES (*Coleoptera*)

Number found	Families	Feeding group	Tolerance value	HBI value
	Dryopidae	Scraper	5	0
9	Elmidae	Scraper	4	36
	Psephenidae	Scraper	4	0
	Ptilodactylidae	Shredder	2	0
			5	0
9	TOTALS			36

DRAGONFLIES/DAMSELFLIES (*Odonata*)

Number found	Families	Feeding group	Tolerance value	HBI value
	Aeshnidae	Predator	3	0
	Calopterygidae	Predator	5	0
	Coenagrionidae	Predator	9	0
	Cordulergastridae	Predator	3	0
	Gomphidae	Predator	1	0
	Lestidae	Predator	9	0
	Libellulidae	Predator	9	0
			0	0
0	TOTALS			0

DOBSONFLIES/FISHFLIES (*Megaloptera*)

Number found	Families	Feeding group	Tolerance value	HBI value
1	Corydalidae	Predator	5	5
	Sialidae	Predator	4	0
				0
				0
1	TOTALS			5

NON-INSECT MACROINVERTEBRATES

Number found	Families	Feeding group	Tolerance value	HBI value
	Crustaceans			0
	Amphipoda	C.gatherer	6	0
	Decapoda	C.gatherer	6	0
	Isopoda	C.gatherer	8	0
	Leeches	Predator	10	0
1	Earth worms	C.gatherer	8	8
	Bivalves	C.filterer	7	0
	Gastropods	Scraper	7	0
	Aracnids	Predator	4	0
				0
1	TOTALS			8

MACROINVERTEBRATE SURVEY METRICS CALCULATIONS

Stream name: _____
 Location: Lower 50 feet of major riffle west of Carriage Dr.
 Sample #: CSB-1 - Storrs

Sampled by: SNG
 Calculations by: SNG
 Calculation date: 6/9/2016

of organisms identified: 98

ORDER	# of organisms	HBI value	% of total	# in dom. family	Dominant family in each order
MAYFLIES (Ephemeroptera)	37	37	37.8	37	Ephemerellidae
STONEFLIES (Plecoptera)	37	66	37.8	29	Perlodidae
CADDISFLIES (Trichoptera)	3	4	3.1	2	Rhyacophilidae
TRUE FLIES (Diptera)	10	56	10.2	5	Simuliidae
BEETLES (Coleoptera)	9	36	9.2	9	Elmidae
DRAGONFLIES/DAMSELFLIES (Odonata)	0	0	0.0	0	No families present
DOBSONFLIES/FISHFLIES (Megaloptera)	1	5	1.0	1	Corydalidae
NON-INSECT MACROINVERTEBRATES	1	8	1.0	1	Earth worms
TOTAL	98	212	100.0	84	

Dominant family present in sample: Ephemerellidae 37 organisms

METRIC	Study reach	Ref. reach	% similarity	Ref. score	Study reach score
Hilsenhoff biotic index (HBI) =sum of HBI's/total # sampled	2.2	3.15	146	6	6
Taxa richness =families represented in sample	13	21	62	6	4
EPT index =families in E, P, & T orders	7	13	54	6	0
EPT:Chironomidae ratio =# EPTs/# Chironomids	19.3	33.00	58	6	4
Scraper:C.filterer ratio =#scrapers/#C.filterers	1.8	2.13	85	6	6
% contribution by dominant family =# dominant family/total #	37.8	0.16	n/a	6	2

Total stream points 36 22

Final study reach comparison versus reference reach = 61.1

Conclusion: Condition: **Slightly impaired** Water quality: **Very good to good**
 (from Plafkin, Attributes: **Community structure less than expected. Loss of some of the intolerant families.**
et. al, 1989) **Percent of tolerant forms increasing.**

Sample #: CSB-1 - Storrs

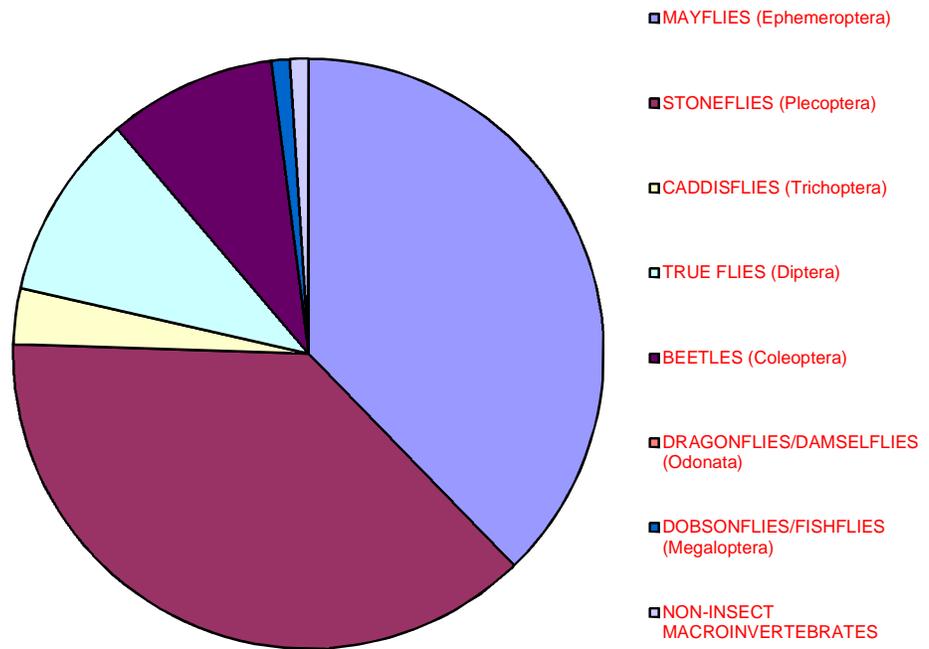
Stream: Cedar Swamp Brook

Location: Lower 50 feet of major riffle west of Carriage Dr.

Collection Date: 5/12/2016

of organisms identified:

Sample Community Balance by Order



Watercourse Physical Characterization/Water Quality Field Data Sheet
(Adapted from Figure 5.1-1 in U.S. EPA 1989)

Station Descriptor:	CSB-1		
Date:	5/12/2016		
Investigator(s):	Sigrun Gadwa	Weather:	clear, sixties
Watercourse Name:	Cedar Swamp Brook	Watershed No.:	3100-17
Watershed Size:	Perennial? <input type="checkbox"/> Yes <input type="checkbox"/> No	Stream Type: (Cold / Warm Water)	
Recent Precipitation:	Above <input type="checkbox"/> Below <input type="checkbox"/> Average <input type="checkbox"/> Station Type: (Riffle / Pool / Run)		
Station Description/Location:	Cedar Swamp Brook, Storrs, ~ 1,200 feet east of Bone Mill Rd and ~ 600 feet SW of the terminus of Carriage House Drive, first riffle.		

PHYSICAL CHARACTERIZATION

RIPARIAN ZONE/INSTREAM FEATURES

1. <i>Predominant Surrounding Land Uses:</i>	<input checked="" type="checkbox"/> Forest	<input type="checkbox"/> Agricultural	<input type="checkbox"/> Commercial	<input type="checkbox"/> Industrial
	<input type="checkbox"/> Field/Pasture	<input type="checkbox"/> Residential	<input type="checkbox"/> Other:	
2. <i>Local Watershed Erosion:</i>	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate	<input type="checkbox"/> Heavy
3. <i>Local Watershed Non-Point Source Pollution:</i>	<input checked="" type="checkbox"/> No Evidence	<input type="checkbox"/> Some Potential Sources	<input type="checkbox"/> Obvious Sources	
4. <i>Estimated Stream Width:</i>	_20_ ft			
<i>Estimated Stream Depth:</i>	Riffle	_0.75_ ft.	Run	_1.2_ ft. Pool
				1.4 ft.
5. <i>High Water Mark:</i>	_~1_ ft.			
6. <i>Velocity</i>	<input type="checkbox"/> Light	<input type="checkbox"/> Moderate	<input checked="" type="checkbox"/> Heavy	Measured: _____ m/sec
7. <i>Dam Present</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Location:	not known
8. <i>Channelized</i>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Extent/Location:	
9. <i>Canopy Cover:</i>	<input type="checkbox"/> Open	<input type="checkbox"/> Partly Shaded		
	<input type="checkbox"/> Partly Open	<input checked="" type="checkbox"/> Shaded		
10. <i>Cover Objects:</i>	<input checked="" type="checkbox"/> Abundant	<input type="checkbox"/> Absent		
	<input type="checkbox"/> Moderate	<input type="checkbox"/> Type: <u>boulder, cobble, gravel, sand</u>		

SEDIMENT/SUBSTRATE

1. <i>Sediment Odors:</i>	<input type="checkbox"/> Normal	<input type="checkbox"/> Petroleum	<input type="checkbox"/> Anaerobic
	<input type="checkbox"/> Sewage	<input type="checkbox"/> Chemical	<input checked="" type="checkbox"/> None
	<input type="checkbox"/> Other:		
2. <i>Sediment Oils:</i>	<input checked="" type="checkbox"/> Absent	<input type="checkbox"/> Moderate	
	<input type="checkbox"/> Slight	<input type="checkbox"/> Profuse	
3. <i>Sediment Deposits:</i>	<input type="checkbox"/> Sludge	<input type="checkbox"/> Paper Fiber	<input type="checkbox"/> Relict Shells
	<input type="checkbox"/> Sawdust	<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Other:
4. <i>Are the undersides of stones which are not deeply embedded black?</i>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

SEDIMENT/SUBSTRATE: Continued

INORGANIC SUBSTRATE COMPONENTS

Substrate Type	Diameter	% in Sampling Area
Bedrock		
Boulder	≥ 10"	75%
Cobble	2.5 - 10"	5%
Gravel	0.1 - 2.5	10%
Sand	gritty	10%
Silt		
Clay	slick	

ORGANIC SUBSTRATE COMPONENTS

Substrate Type	Description	% in Sampling Area
Detritus	Sticks, wood, coarse plant materials	7%
Muck-Mud	Black, very fine organic	1%
Marl	Gray, shell fragments	0%

Water Quality

1. Temperature : <u>20</u> C Conductivity: <u>183</u> μS _____ pH Dissolved Oxygen (DO) : _____ mg/L		
Other:		
2. Water Odors:	<input type="checkbox"/> Normal	<input type="checkbox"/> Petroleum
	<input type="checkbox"/> Sewage	<input type="checkbox"/> Chemical
		<input checked="" type="checkbox"/> None
		<input type="checkbox"/> Other:
3. Water Surface Oils:	<input type="checkbox"/> Slick	<input type="checkbox"/> Globs
	<input type="checkbox"/> Sheen	<input type="checkbox"/> Flecks
		<input checked="" type="checkbox"/> None
4. Turbidity:	<input checked="" type="checkbox"/> Clear	<input type="checkbox"/> Turbid
	<input type="checkbox"/> Slightly Turbid	<input type="checkbox"/> Opaque
		<input type="checkbox"/> Water Color:

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

STREAM NAME Cedar Swamp Brook	LOCATION Western Storrs, btw Bone Mill Rd & end of Carriage Dr
SITE ID # CSB-1 REACH ID _____	STREAM CLASS _____
UTM N _____ UTM E _____	RIVER BASIN Willimantic River (#3100-17)
STORET # _____	AGENCY _____
INVESTIGATORS Sigrun Gadwa & George Logan	
FORM COMPLETED BY Sigrun Gadwa	DATE TIME 5-12-15 4 pm
REASON FOR SURVEY Proposed development in watershed, to east	

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 90	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 10 LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 10 RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Parameters to be evaluated broader than sampling reach

Total Score 90 + 96 = 186

Form # B12 -

This is comparable to the reference stream on the Natchaug River, and is in the highest of four categories.



Friday, May 20, 2016

Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Project ID: LODGES AT STORRS
Sample ID#s: BN31957 - BN31958

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

A handwritten signature in black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 20, 2016

FOR: Attn:
Rema Ecological Services
164 East Center Street
Suite 8
Manchester CT 06040

Sample Information

Matrix: SURFACE WATER
Location Code: REMA
Rush Request: Standard
P.O.#:

Custody Information

Collected by:
Received by: SW
Analyzed by: see "By" below

Date

05/12/16
05/13/16

Time

16:36
14:03

Laboratory Data

SDG ID: GBN31957
Phoenix ID: BN31957

Project ID: LODGES AT STORRS
Client ID: CEDAR SWAMP BK

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Hardness (CaCO ₃)	36.8	0.1	mg/L	1	05/17/16		E200.7
Dissolved Ortho-Phosphate-P	< 0.01	0.01	mg/L	1	05/13/16	KD	SM4500PF-99
Ammonia as Nitrogen	< 0.05	0.05	mg/L	1	05/19/16	WHM	E350.1
Nitrite-N	< 0.01	0.01	mg/L	1	05/13/16 20:01	KD/GD	E353.2
Nitrate-N	0.10	0.02	mg/L	1	05/13/16 20:01	KD/GD	E353.2
pH	7.21	0.10	pH Units	1	05/14/16 02:57	RWR/KDB	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.40	0.10	mg/L	1	05/19/16	WHM	E351.1
Phosphorus, as P	0.01	0.01	mg/L	1	05/18/16	JR	SM4500PE-99
Total Metals Digestion	Completed				05/16/16	AG	

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

May 20, 2016

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

May 20, 2016

FOR: Attn:
 Rema Ecological Services
 164 East Center Street
 Suite 8
 Manchester CT 06040

Sample Information

Matrix: SURFACE WATER
 Location Code: REMA
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date Time
 05/12/16 14:25
 05/13/16 14:03

Laboratory Data

SDG ID: GBN31957
 Phoenix ID: BN31958

Project ID: LODGES AT STORRS
 Client ID: STREAM-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Hardness (CaCO3)	46.2	0.1	mg/L	1	05/17/16		E200.7
Dissolved Ortho-Phosphate-P	< 0.01	0.01	mg/L	1	05/13/16	KD	SM4500PF-99
Ammonia as Nitrogen	< 0.05	0.05	mg/L	1	05/19/16	WHM	E350.1
Nitrite-N	< 0.01	0.01	mg/L	1	05/13/16 20:07	KD/GD	E353.2
Nitrate-N	0.38	0.02	mg/L	1	05/13/16 20:07	KD/GD	E353.2
pH	7.13	0.10	pH Units	1	05/14/16 02:59	RWR/KDB	SM4500-H B-00
Nitrogen Tot Kjeldahl	0.34	0.10	mg/L	1	05/19/16	WHM	E351.1
Phosphorus, as P	0.03	0.01	mg/L	1	05/18/16	JR	SM4500PE-99
Total Metals Digestion	Completed				05/16/16	AG	

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

May 20, 2016

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

May 20, 2016

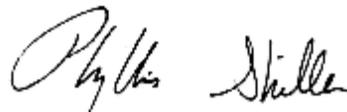
QA/QC Data

SDG I.D.: GBN31957

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 345576 (mg/L), QC Sample No: BN31576 (BN31957, BN31958)													
Ortho-Phosphate-P	BRL	0.01	0.33	0.32	3.10	95.8			99.8			85 - 115	20
QA/QC Batch 345608 (pH), QC Sample No: BN31943 (BN31957, BN31958)													
pH			7.60	7.61	0.10	98.9						85 - 115	20
QA/QC Batch 345587 (mg/L), QC Sample No: BN31957 (BN31957, BN31958)													
Nitrate-N	BRL	0.02	0.10	0.10	0	102			95.7			85 - 115	20
Nitrite-N	BRL	0.01	<0.01	<0.01	NC	94.0			107			85 - 115	20
QA/QC Batch 346040 (mg/L), QC Sample No: BN32109 (BN31957, BN31958)													
Ammonia as Nitrogen	BRL	0.05	<0.05	<0.05	NC	102			100			85 - 115	20
Nitrogen Tot Kjeldahl	BRL	0.10	0.47	0.47	NC	91.5			101			85 - 115	20
QA/QC Batch 345973 (mg/L), QC Sample No: BN34018 (BN31957, BN31958)													
Phosphorus, as P	BRL	0.01	0.17	0.16	6.10	111			98.2			85 - 115	20

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference


 Phyllis Shiller, Laboratory Director
 May 20, 2016

Sample Criteria Exceedences Report

GBN31957 - REMA

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----------------	-------------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.





Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

May 20, 2016

SDG I.D.: GBN31957

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Willimantic River Watershed Summary

Willimantic River, Eagleville Brook, and Cedar Swamp Brook

WATERSHED DESCRIPTION AND MAPS

The Willimantic River watershed covers an area of approximately 32,774 acres in northeastern Connecticut (Figure 1). There are multiple municipalities located at least partially in the watershed, including Ellington, Willington, Tolland, Coventry, Windham, Stafford, and Mansfield, CT.

The Willimantic River watershed includes three segments, Willimantic River (CT3100-00_06), Eagleville Brook (CT3100-19_02), and Cedar Swamp Brook (CT3100-08_01), impaired for recreation due to elevated bacteria levels. These segments were assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2010 303(d) list of impaired waterbodies. An excerpt of the Integrated Water Quality Report is included in Table 1 to show the status of some of the other waterbodies in the watershed (CT DEEP, 2010).

The Willimantic River (CT3100-00_06) begins in Stafford adjacent to Route 32 at the confluence of the Middle River and Furnace Brook, flows south and parallel to Route 32, and ends just upstream of the Stafford Publicly Owned Treatment Works (POTW). The impaired segment of the Willimantic River is 0.4 miles long and is located entirely within the Town of Stafford (Figure 2). Eagleville Brook (CT3100-19_02) begins on the University of Connecticut's Campus in Mansfield, flows southeast, and ends at the confluence with King's Brook just east of North Eagleville Road. This impaired segment is 1.67 miles long and is located entirely within the Town of Mansfield (Figure 3). Cedar Swamp Brook (CT3100-17_03) begins at the outlet to Swamp Brook Pond just north of US Route 44 in Mansfield, flows southwest through residential neighborhoods, and ends just upstream of the Hunting Lodge Road crossing in Mansfield. This impaired segment is 0.61 miles long and is located entirely within the Town of Mansfield (Figure 3).

The impaired segment of the Willimantic River (CT3100-00_06) has a water quality classification of B. Its designated uses include habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. The impaired segments of Eagleville Brook (CT3100-19_02) and Cedar Swamp Brook (CT3100-17_03) have a water quality classification of A. Designated uses include potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. These segments are impaired due to elevated bacteria concentrations, affecting the designated use of recreation. As there are no designated beaches in these

Impaired Segment Facts

Impaired Segments, Lengths (miles), and Water Quality Classifications:

1. Willimantic River (CT3100-00_06); 0.4; B
2. Eagleville Brook (CT3100-19_02); 1.67; A
3. Cedar Swamp Brook (CT3100-17_03); 0.61; A

Towns: Stafford and Mansfield

Designated Use Impairments: Recreation

Sub-regional Basin Name and Code:

Willimantic River, 3100

Regional Basin: Willimantic River

Major Basin: Thames

Watershed Area (acres): 32,774

MS4 Applicable? No

Figure 1: Watershed location in Connecticut

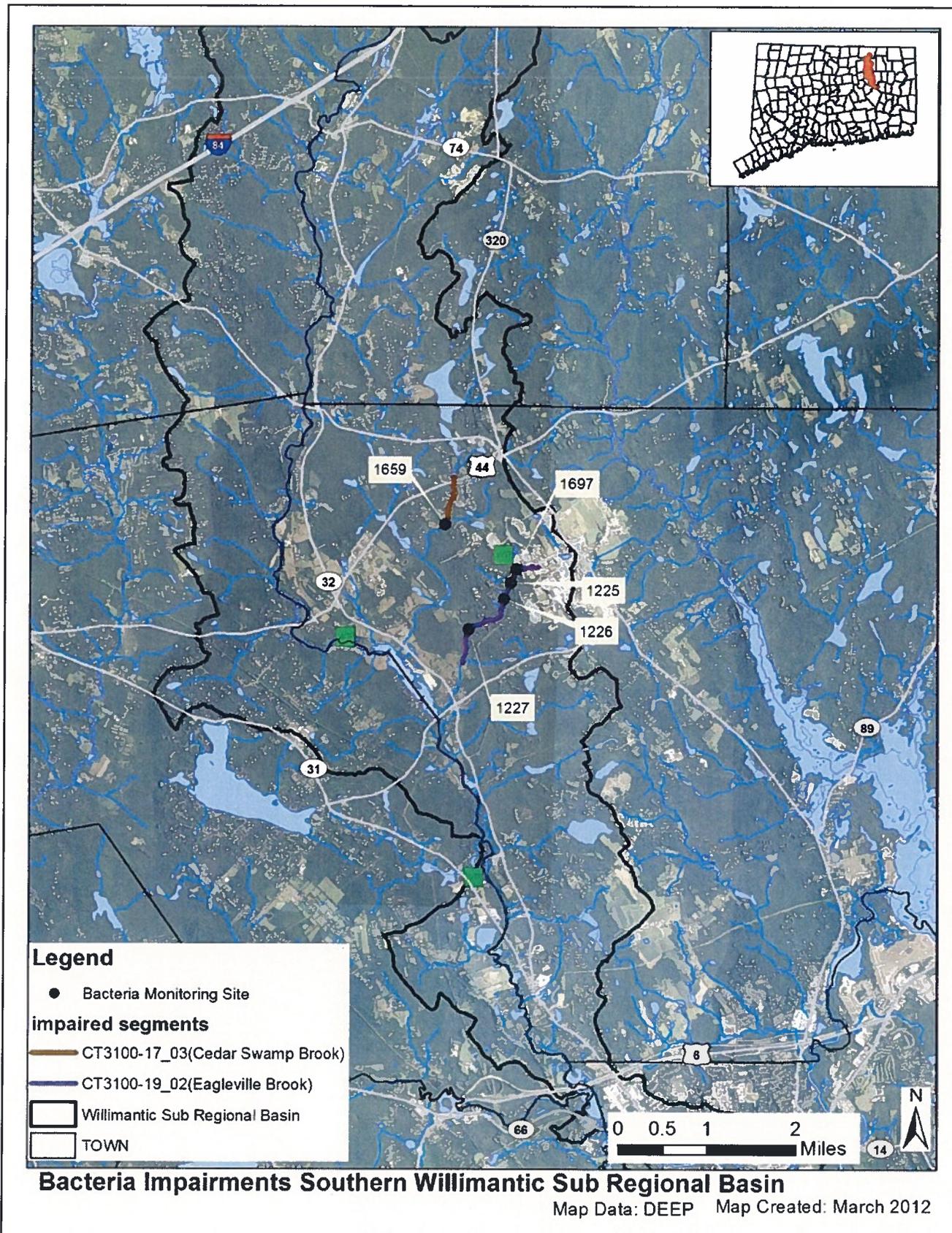


impaired segments of the Willimantic River, Eagleville Brook, or Cedar Swamp Brook, the specific recreation impairment is for non-designated swimming and other water contact related activities.

Table 1: Impaired segments and nearby waterbodies from the Connecticut 2010 Integrated Water Quality Report

Waterbody ID	Waterbody Name	Location	Miles	Aquatic Life	Recreation	Fish Consumption
CT3100-00_06	Willimantic River-06	From Stafford POTW (east of Route 32 (River Road)), US to headwaters at confluence of Middle River and Furnace Brook.	0.40	FULL	NOT	FULL
CT3100-19_02	Eagleville Brook-02	From confluence with Kings (Roberts) Brook (east side of North Eagleville Road), US to headwaters near UConn campus (just crossing Stadium Road), Mansfield.	1.67	NOT	NOT	FULL
CT3100-17_03	Cedar Swamp Brook (Mansfield)-03	From Hunting Lodge Road crossing, US to Swamp Brook Pond outlet dam (just US of Route 44 crossing), Mansfield.	0.61	U	NOT	FULL
<p>Shaded cells indicate impaired segment addressed in this TMDL FULL = Designated Use Fully Supported NOT = Designated Use Not Supported U = Unassessed</p>						

Figure 3: GIS map featuring general information of the Willimantic River watershed at the sub-regional level – Showing Eagleville Brook and Cedar Swamp Brook impaired segments



WHY IS A TMDL NEEDED?

E. coli is the indicator bacteria used for comparison with the CT State criteria in the CT Water Quality Standards (WQS) (CTDEEP, 2011). All data results are from CT DEEP, USGS, Bureau of Aquaculture, or volunteer monitoring efforts at stations located on the impaired segments.

Table 2: Sampling station location description for impaired segments in the Willimantic River watershed

Waterbody ID	Waterbody Name	Station	Station Description	Municipality	Latitude	Longitude
CT3100-00_06	Willimantic River	457	Upstream Stafford POTW adjacent to park	Stafford	41.95049	-72.303653
CT3100-19_02	Eagleville Brook	1227	Upstream of Hillyndale Road	Mansfield	41.79908	-72.273817
		1226	Upstream of Separatist Road	Mansfield	41.80401	-72.266044
		1225	#43 Hunting Lodge Road (private driveway)	Mansfield	41.80668	-72.264592
		1697	N Eagleville Road adjacent to F-lot	Mansfield	41.80888	-72.263319
CT3100-17_03	Cedar Swamp Brook	1659	Upstream of Hunting Lodge Road	Mansfield	41.81637	-72.278984

The Willimantic River (CT3100-00_06) is a Class B freshwater river (Figure 7). Its applicable designated uses are habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. Eagleville Brook (CT3100-19_02) and Cedar Swamp Brook (CT3100-17_03) are Class A freshwater streams (Figure 7). Their applicable designated uses are potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. Water quality analyses were conducted using data from one sampling location on the Willimantic River (Station 457), four stations on Eagleville Brook (Stations 1227, 1226, 1225, and 1697), and one station on Cedar Swamp Brook (Station 1659).

Water quality criteria for *E. coli*, along with bacteria sampling results from 2010, for the Willimantic River (CT3100-00_06) are presented in Table 10. Single sample values at Station 457 exceeded the WQS for *E. coli* 18 out of the 23 (78%) samples taken in 2010. The annual geometric mean was calculated for Station 457 and exceeded the WQS for *E. coli* in 2010.

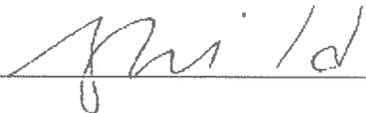
Water quality criteria for *E. coli*, along with bacteria sampling results from 2005 and 2010, for Eagleville Brook are presented in Table 11. Single sample values exceeded the WQS for *E. coli* multiple times at Stations 1227 and 1225 in 2005 and at Station 1697 in 2010. Single sample values exceeded the WQS for *E. coli* at Station 1226 at least once in 2005 and 2010. The annual geometric mean was calculated for all stations and exceeded the WQS for *E. coli* at Stations 1227, 1226, and 1225 in 2005.

Water quality criteria for *E. coli*, along with bacteria sampling results from 2010, for Cedar Swamp Brook are presented in Table 12. Single sample values at Station 1659 exceeded the WQS for *E. coli* multiple times in 2010. The annual geometric mean was calculated for Station 1659 and exceeded the WQS for *E. coli* in 2010.

2012 STATE OF CONNECTICUT INTEGRATED WATER QUALITY REPORT

Final – December 17, 2012

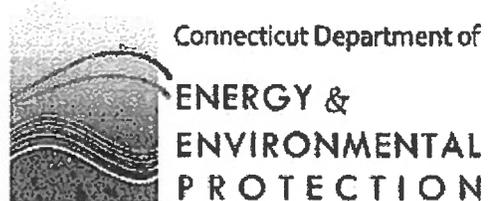
This document has been established pursuant
to the requirements of Sections 305(b) and 303(d)
of the Federal Clean Water Act



Betsy Wingfield, Chief
Bureau of Water Protection and Land Reuse



Date



Bureau of Water Protection and Land Reuse
79 Elm Street
Hartford, CT 06106-5127
(860) 424-3704

Daniel C. Esty, Commissioner

Waterbody Segment ID	Waterbody Name	Location	Miles	Aquatic Life	Recreation
CT3100-17_01	Cedar Swamp Brook (Mansfield)-01	From confluence with Willimantic River (segment03, in Eagleville Pond portion of river) just DS of Route 32 (Stafford Road) and railroad crossings, US to confluence with Nelson Brook, Mansfield.	1.54	Not Assessed	Fully Supporting
CT3100-17_03	Cedar Swamp Brook (Mansfield)-03	From Hunting Lodge Road crossing, US to Swamp Brook Pond outlet dam (just US of Route 44 crossing), Mansfield.	0.61	Not Assessed	Not Supporting
CT3100-19_01	Eagleville Brook-01	From mouth at entrance to Eagleville Pond (lower eastern corner), US to confluence with Kings (Roberts) Brook (east side of North Eagleville Road), Mansfield.	0.68	Fully Supporting	Fully Supporting
CT3100-19_02	Eagleville Brook-02	From confluence with Kings (Roberts) Brook (east side of North Eagleville Road), US to headwaters near UConn campus (just crossing Stadium Road), Mansfield.	1.67	Not Supporting	Not Supporting
CT3101-00_01	Edison Brook (Stafford)-01	Mouth at confluence with Middle River, East side of Swift Airport property (west of Route 190), US to confluence with Hopyard Brook (short outlet area from pond or wetland), US of Copper Lane crossing, parallel to dirt road, Stafford.	0.86	Not Assessed	Fully Supporting
CT3101-03_01	Crystal Lake Brook (Stafford)-01	From mouth at confluence with Ellis Brook, HW of Edson Brook (DS of West Stafford Road (Route 190) crossing), US to Crystal Lake outlet dam (just US of Conklin Road crossing), Stafford.	2.18	Fully Supporting	Fully Supporting
CT3102-00_01	Middle River (Stafford)-01	From mouth at confluence with Furnace Brook (above Willimantic River), US to 800Ft US of Route 32 crossing, Stafford Springs center.	0.23	Fully Supporting	Not Supporting
CT3102-00_02	Middle River (Stafford)-02	From 800Ft US of Route 32 crossing, Stafford Springs center, US to Orcutt's Pond dam outlet (just US of Orcuttville Road (Route319) crossing), Stafford.	3.92	Fully Supporting	Not Supporting
CT3102-00_03	Middle River (Stafford)-03	From Orcutt's Pond inlet, US to State Line Pond outlet (on southern end, just US of Route 32 crossing), Stafford.	2.78	Not Assessed	Fully Supporting
CT3103-00_01	Furnace Brook (Stafford)-01	From mouth at confluence with Middle River, US through concrete channel, stopping at US end of concrete channel (passes under railroad tracks and Route 14), Stafford.	0.18	Not Supporting	Not Supporting
CT3103-00_02	Furnace Brook(Stafford)-02	From US end of concrete channel (just US of Route 14 crossing), US to Staffordville Reservoir outlet dam (just US of Upper Road crossing), Stafford.	4.93	Fully Supporting	Not Supporting
CT3103-01_01	Delphi Brook (Stafford)-01	Mouth at inlet to Staffordville Reservoir, between Delphi Road and Route 19, US to Connecticut/ Massachusetts state line, parallel to Route 19,	1.46	Fully Supporting	Not Assessed

Table 3-4. Connecticut Impaired Waters List (EPA Category 5)

Waterbody Segment ID	Waterbody Name	Waterbody Type	Waterbody Size	Units	Impaired Designated Use	Cause	Comment
CT3100-00_05	Willimantic River (Tolland/ Willington/ Ellington/ Stafford)-05	River	1.65	Miles	Habitat for Fish, Other Aquatic Life and Wildlife	Cause Unknown	Potential sources include municipal discharges, unspecified urban stormwater
CT3100-00_06	Willimantic River-06	River	0.4	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, illicit discharges, insufficient septic systems, nuisance wildlife/pets
CT3100-17_03	Cedar Swamp Brook (Mansfield)-03	River	0.61	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, insufficient septic systems, Nuisance wildlife/pets
CT3100-19_02	Eagleville Brook-02	River	1.67	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, insufficient septic systems, agricultural activity, nuisance wildlife/pets, landfills
CT3102-00_01	Middle River (Stafford)-01	River	0.23	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, illicit discharges, Nuisance wildlife/pets
CT3102-00_02	Middle River (Stafford)-02	River	3.92	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, illicit discharges, insufficient septic systems, nuisance wildlife/pets
CT3103-00_01	Furnace Brook (Stafford)-01	River	0.18	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, illicit discharges, nuisance wildlife/pets
CT3103-00_02	Furnace Brook (Stafford)-02	River	4.93	Miles	Recreation	Escherichia coli	Potential sources include permitted and non-permitted stormwater, illicit discharges, insufficient septic systems, agricultural activity, nuisance wildlife/pets

Table 3-5. Waterbodies with Adopted TMDLs (EPA Category 4a)

TMDL	Impaired Designated Use	Cause	Waterbody Segment ID	Waterbody Name	Date Established	EPA Approved
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6900-00_04	Naugatuck River	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6900-00_05	Naugatuck River	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6900-00_06	Naugatuck River	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6900-22_01	Great Brook	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6912-00_01	Steele Brook	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6912-00_02	Steele Brook	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6914-00_01	Mad River	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6914-00_02	Mad River	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6914-00_03a	Mad River	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6916-00_01	Hop Brook	5/6/2008	6/4/2008
Naugatuck River Regional Basin E.coli TMDL	Recreation	Escherichia coli	CT6917-00_01	Long Meadow Pond Brook	5/6/2008	6/4/2008
Northeast Regional Mercury TMDL	Fish Consumption	Mercury		All State fresh waterbodies	12/20/2007	12/20/2007
Southport Harbor TMDL	Shellfish Harvesting for Direct Consumption Where Authorized	Fecal Coliform	CT-W2_006	LIS WB Shore - Southport Harbor (East), Fairfield	9/19/2007	10/26/2007
Eagleville Brook Impervious Cover TMDL	Habitat for Fish, Other Aquatic Life and Wildlife	Impervious Cover	CT3100-19_01	Eagleville Brook-01	2/8/2007	3/28/2007
Eagleville Brook Impervious Cover TMDL	Habitat for Fish, Other Aquatic Life and Wildlife	Impervious Cover	CT3100-19_02	Eagleville Brook-02	2/8/2007	3/28/2007
Allen Brook, Allen Brook Pond, Gay City Pond and Schreeder Pond E.coli TMDL	Recreation	Escherichia coli	CT4707-00-2-L2_01	Gay City Pond (Hebron)	11/29/2006	1/4/2007

Table 3-8. Reconciliation List of Impaired Waters (Delistings and Listings)

Waterbody Segment ID	Waterbody Name	Impaired Designated Use	EPA Category	Change Type	Comment	Activity
CT3100-19_01	Eagleville Brook	Habitat for Fish, Other Aquatic Life and Wildlife	2	Category change from 5 to 2; Designated Use assessment change from Not Supporting to Fully Supporting.	DELIST 2012. Segment CT3100-19_01 first listed in 2004 for Aquatic Life Support because benthic samples from 2003 did not meet criteria. Fish assessment shows wild brook trout present 2010 back through 2004. Follow up sampling shows Benthic current assessment (2009-2010) passes with MMI=65.3, and fish assessment (2009-2010) shows pass at 2 sites, CW MMI=53.3 (station 1735) and CW MMI=75.0 (station 1230) both in this segment. Current water chemistry data (2009-2010) show no exceedances of chemical water quality criteria.	DELISTING
CT3708-10_01	North Running Brook	Habitat for Fish, Other Aquatic Life and Wildlife	2	Category change from 5 to 2; Designated Use assessment change from Not Supporting to Fully Supporting.	DELIST 2012. Segment CT3708-10_01 first listed in 2004 for Aquatic Life Support because probabilistic benthic samples (RPB I) from 2003 did not meet criteria. Recommend delisting due to farm implementing BMPs to prevent initial problem from 2004. Follow up sampling corroborate with current benthic assessment (2009-2010) MMI=67.5 no evidence of previous impairment. No fish community data here in this time frame. Macroinvertebrate MMI model=66.81. Current water chemistry data (2009-2010) show no exceedances of chemical water quality criteria.	DELISTING

Table 3-8. Reconciliation List of Impaired Waters (Delistings and Listings)

CT3100-17_03	Cedar Swamp Brook	Recreation	5	Category change from 3 to 5; Designated Use assessment change from Insufficient Information to Not Supporting.	New biological, chemical or physical data for 2012 Reporting cycle determined the assessment of one or more designated uses does not meet Water Quality Standards	Listing
CT3102-00_01	Middle River	Recreation	5	Category change from 2 to 5; Designated Use assessment change from Fully Supporting to Not Supporting.	New biological, chemical or physical data for 2012 Reporting cycle determined the assessment of one or more designated uses does not meet Water Quality Standards	Listing
CT3102-00_02	Middle River	Recreation	5	Category change from 3 to 5; Designated Use assessment change from Insufficient Information to Not Supporting.	New biological, chemical or physical data for 2012 Reporting cycle determined the assessment of one or more designated uses does not meet Water Quality Standards	Listing
CT3103-00_02	Furnace Brook	Recreation	5	Category change from 3 to 5; Designated Use assessment change from Insufficient Information to Not Supporting.	New biological, chemical or physical data for 2012 Reporting cycle determined the assessment of one or more designated uses does not meet Water Quality Standards	Listing
CT3110-00_01	Tennile River	Recreation	5	Category change from 3 to 5; Designated Use assessment change from Insufficient Information to Not Supporting.	New biological, chemical or physical data for 2012 Reporting cycle determined the assessment of one or more designated uses does not meet Water Quality Standards	Listing

Table 3-9. Priority List for TMDL Development of Impaired Waterbodies

Waterbody Segment ID	Waterbody	Water Type	Impaired Designated Use	Pollutant Cause	TMDL Priority Year
CT1004-00_01	Shunock River	River	Recreation	Bacteria	2012
CT2000-30_01	Fenger Brook-01	River	Habitat for Fish, Other Aquatic Life and Wildlife	Impervious Cover	2013
CT2000-30_01	Fenger Brook-01	River	Recreation	Bacteria	2012
CT2206-00_01	Bride Brook-01	River	Recreation	Bacteria	2012
CT2206-00_02	Bride Brook-02	River	Recreation	Bacteria	2012
CT2206-03_01	Unnamed tributary to Bride Brook (East Lyme)-01	River	Recreation	Bacteria	2012
CT3000-08_01	Flat Brook	River	Recreation	Bacteria	2012
CT3004-00_01	Oxoboxo Brook	River	Recreation	Bacteria	2012
CT3100-00_06	Willimantic River-06	River	Recreation	Bacteria	2012
CT3100-17_03	Cedar Swamp Brook (Mansfield)-03	River	Recreation	Bacteria	2012
CT3100-19_02	Eagleville Brook-02	River	Recreation	Bacteria	2012
CT3102-00_01	Middle River (Stafford)-01	River	Recreation	Bacteria	2012
CT3102-00_02	Middle River (Stafford)-02	River	Recreation	Bacteria	2012
CT3103-00_01	Furnace Brook (Stafford)-01	River	Recreation	Bacteria	2012
CT3103-00_02	Furnace Brook(Stafford)-02	River	Recreation	Bacteria	2012