EXECUTIVE SUMMARY

ENVIRONMENTAL RESOURCE INVENTORY AND PLAN
TOWN OF FARMINGTON

MMI #2412-01

FINAL

AUGUST 2005

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Executive Summary

Introduction

This document presents the results of Farmington's townwide *Environmental Resource Inventory and Plan*. This inventory and assessment was undertaken by the Town in an effort to identify important water, wetland, and upland resources in Farmington; and to evaluate the mechanisms by which these resources can be preserved, protected, and regulated at the local level.

This resource inventory includes an assessment of watershed hydrology, surface water quality, benthic habitat, wetland functions and values, and unfragmented wildlife habitat. The plan formulates strategies for resource management, stormwater management, low impact development, and sewer avoidance. The Plan is organized as follows:

→ Section 1.0 describes the scope and purpose of the Plan; summarizes the sources of information, data, reports, and resource mapping used in this assessment; and describes the overall organization of the Plan.

→ Section 2.0 presents an overview of watershed hydrology within the Town of Farmington and evaluates water quality, benthic habitat, water diversions, and impervious surfaces.

→ Section 3.0 presents an assessment of selected wetlands within the Town of Farmington.

→ Section 4.0 identifies critical and unique environmental resources based on the data, information, and analysis contained in the prior Plan sections, and recommends wetland management strategies.

→ Section 5.0 presents concepts in watershed management, stormwater management, and low impact development, and evaluates their application in Farmington.

→ Section 6.0 analyzes carrying capacity within Farmington's Sewer Avoidance Zone and recommends separation distances, lot sizes, and implementation procedures.

→ Section 7.0 presents a summary of findings and recommendations.

Overview of Hydrology

The Town of Farmington is home to several valuable watercourses and their tributaries. The subregional watersheds that are located within Farmington include the Farmington River, Pequabuck River, Trout Brook, and Bass Brook. Additionally, small portions of the watersheds of Roaring Brook, Copper Mine Brook, and the Quinnipiac River are located on the outskirts of town.

For analysis purposes, 57 subwatersheds that are located in whole or in part within the Town of Farmington have been inventoried. The Farmington River basin has been subdivided into 32 subwatersheds; the Pequabuck River basin into 11 subwatersheds; Bass Brook basin into seven subwatersheds; and Trout Brook basin into seven subwatersheds. Table ES-1 lists each subwatershed, along with a reference code, basin number, description or name, and watershed size. Table ES-2 summarizes pertinent data for the major identified tributaries.

TABLE ES-1
Subwatersheds within the Primary Subregional Basins of Farmington

Ref. Code	*Basin Number*	*Description or Name**	*Area (acres)*	*Area (mi^2)*
		Farmington River – 4300		
F-MS-1	4300-00-4+R14	Farmington River in Unionville	598.23	0.93
F-MS-2	4300-00-4+R14a	Most US Tributary of Farmington River in the Town	185.51	0.29
F-MS-3	4300-00-4+R14b	Tributary of Farmington River near Unionville Brook	87.71	0.14
F-MS-4	4300-00-4+R15	Farmington River - Unionville to Roaring Brook	189.05	0.30
F-MS-5	4300-00-4+R16	Farmington River - Roaring to Hyde Brook	573.05	0.90
F-MS-6	4300-00-4+R16a	Tributary of Farmington River near High School	123.20	0.19
F-MS-7	4300-00-4+R17	Farmington River - Hyde Brook to Pequabuck	1,150.37	1.80
F-MS-8	4300-00-5+R1	Farmington River - Pequabuck to Pope Brook	539.03	0.84
F-MS-9	4300-00-5+R2	Farmington River - US of Rice Brook	293.27	0.46
F-MS-10	4300-00-5+R3	Farmington River - Great to Poplar Swamp Brook	120.67	0.19
F-MS-11	4300-00-5+R4	Farmington River - DS of Poplar Swamp Brook	497.24	0.78
F-MS-12	4300-00-5+R4a	Southern Stream from Avon Mountain	94.64	0.15
F-MS-13	4300-29-1	Northern Stream from Avon Mountain	318.67	0.50
F-MS-14	4300-00-5+R5	Farmington River – Avon Town Line	154.78	0.24
F-UB-1	4300-20-3-R1	Unionville Brook	8.24	0.01
F-UB-2	4300-20-2-R1	Unionville Brook	26.32	0.04
F-UB-3	4300-21-1	Tributary to Unionville Brook from West District	391.12	0.61
F-UB-4	4300-20-1	Unionville Brook between Lake Garda & Tributaries	157.76	0.25
F-UB-5	4300-20-1-L2	Lake Garda	532.13	0.83
F-UB-6	4300-20-1-L1	US of Lake Garda	688.90	1.08
F-UB-7	4300-22-2-R1	Tributary to Unionville Brook	151.42	0.24
F-UB-8	4300-24-1	Tributary to Trib. of Unionville Brook	185.27	0.29
F-UB-9	4300-22-1	Tributary to Trib. of Unionville Brook	292.87	0.46
F-UB-10	4300-23-1	Tributary to Trib. of Unionville Brook	243.16	0.38
F-HB-1	4300-25-1	Hyde Brook	455.08	0.71
F-PB-1	4300-26-1a	Pope Brook Tributary	316.03	0.49
F-PB-2	4300-26-1b	Pope Brook	205.05	0.32

TABLE ES-1
Subwatersheds within the Primary Subregional Basins of Farmington

Ref. Code	*Basin Number*	*Description or Name**	*Area (acres)*	*Area (mi^2)*
		Farmington River – 4300		
F-RB-1	4300-00-5+R2a	Rice Brook	214.77	0.34
F-GB-1	4300-27-1	Great Brook	323.11	0.50
F-PSB-1	4300-28-1	Poplar Swamp Brook - DS	537.12	0.84
F-PSB-2	4300-28-1-L2	Poplar Swamp Brook - MS w/ Basins	738.93	1.15
F-PSB-3	4300-28-1-L1	Poplar Swamp Brook - US w/ Walton Pond	665.40	1.04
		Pequabuck River – 4315		
P-SHSB-1	4315-00-4-R6	Shade Swamp along Pequabuck River	181.84	0.28
P-SHSB-2	4315-00-4-R6a	Shade Swamp Brook	653.93	1.02
P-SCSB-1	4315-13-2-R1	Scott Swamp Brook - Impoundment to Pequabuck	17.22	0.03
P-SCSB-2	4315-13-2-L2	Scott Swamp Brook - FIP to Impoundment	559.78	0.87
P-SCSB-3	4315-13-1	Scott Swamp Brook - Tunxis Comm. College to FIP	310.79	0.49
P-SCSB-4	4315-13-1-L1	Scott Swamp Brook - US of Tunxis Comm. College	1,141.17	1.78
P-SCSB-5	4315-14-1	Tributary to Scott Swamp Brook – DS	71.23	0.11
P-SCSB-6	4315-14-1-L1	Tributary to Scott Swamp Brook – US	669.80	1.05
P-FR-1	4315-15-1	Farmington Reservoir Outflow Stream	337.78	0.53
P-FR-2	4315-15-1-L1	Farmington Reservoir	155.19	0.24
P-MS-1	4315-00-4-R5	Pequabuck River - Scott Swamp Brook to end	812.00	1.27
		Bass Brook - 4401		
B-DSB-1	4401-00-1-L1a	Deadwood Swamp Brook	1,451.47	2.27
B-BP-1	4401-00-1-L2a	Batterson Park Pond Outflow	186.74	0.29
B-BP-2	4401-00-1-L1	Batterson Park Pond Perimeter	291.17	0.45
B-BP-3	4401-00-1-L1c	Route 6 Stream	370.14	0.58
B-BP-4	4401-00-1-L1b	I-84 Stream	539.49	0.84
B-TR-1	4401-00-1-L2	Tributary to Bass Brook	557.10	0.87
B-TR-2	4401-00-1-L2b	Westfarms Mall Area	146.58	0.23
		Trout Brook - 4403		
T-MS-1	4403-00-1-L1	Trout Brook	520.32	0.81
T-MS-2	4403-00-1-L1a	Trout Brook upstream	127.39	0.20
T-TR-1	4403-01-1	Tributary to Woodridge Lake / Wood Pond	390.88	0.61
T-TR-2	4403-02-1	Northern Tributary to Reservoir #1	208.57	0.33
T-TR-3	4403-02-1a	Northern Tributary to Reservoir #1	200.74	0.31
T-TR-4	4403-04-1-L1a	Southern Tributary to Reservoir #1	844.02	1.32
T-TR-5	4403-02-1-L1	Tributary to Reservoir #3	352.67	0.55

TABLE ES-2
Summary of Data and Information for Major Tributaries

Watercourse	*Basin Designa-tion*	*Contributing Watershed Size*	*Water Quality Classification*	*Low Flow Impairment concerns?*	*Impaired Waterbody List?*	*Percent Impervious Cover*
Farmington River Basin						
Farmington River Main Stem	4300	163.87 sq. mi	B	N	Y	9.48%
Unionville Brook	4300	4.17 sq. mi.	A	N	N	NC
Hyde Brook	4300	0.71 sq. mi.	A	N	N	NC
Poplar Swamp Brook	4300	3.0 sq. mi.	A	Y	N	NC
Great Brook	4300	0.5 sq. mi.	A	N	N	NC
Rice Brook	4300	0.3 sq. mi.	A	N	N	NC
Pope Brook	4300	0.8 sq. mi.	A	Y	N	NC
Pequabuck River Basin						
Pequabuck River Main Stem	4315	29 sq. mi.	C/B	Y	Y	10.72%
Scott Swamp Brook	4315	4.32 sq. mi.	A	Y	N	NC
Shade Swamp Brook	4315	1.3 sq. mi	A	N	N	NC
Farm. Res. Unnamed Trib.	4315	0.77 sq. mi	A	N	N	NC
Bass Brook Basin						
Bass Brook Main Stem	4401	10.4 sq. mi.	A	N	Y	12.98%
Trout Brook Basin						
Trout Brook Main Stem	4403	1.3 sq. mi.	B/A	N	Y	14.29%

Note: NC = Not Calculated

Wetland Assessment

The more than 2,000 acres of wetlands in Farmington represent several ecological categories that include palustrine, lacustrine, and/or riverine systems. The relative proportions of each are presented in Table ES-3, below.

TABLE ES-3
Wetland Types within the Town of Farmington

Wetland Type	*Acreage within the Town of Farmington*	*Percentage within the Town of Farmington*
Palustrine Open Water	205 acres	10%
Palustrine Emergent Wetland	239 acres	12%
Palustrine Scrub-Shrub Wetland	176 acres	9%
Palustrine Forested Wetland	1,042 acres	52%
Lacustrine Wetland	135 acres	6%
Farmington River Wetland	235 acres	11%

In coordination with Town Planning staff, a preliminary hierarchy of sub-watershed sensitivity was established based upon known prior disturbance and development; known water quality; hydrology; extent, type, and function of wetlands; and the existence of undeveloped, natural lands that provide for wildlife habitat. Existing land uses were compared with zoning designations to determine areas of most likely development.

Site-specific wetland assessment was conducted in all four of the primary watersheds, with 23 wetland study areas in the Farmington basin; 17 in the Pequabuck basin; 12 in the Bass Brook Basin; and 8 in the Trout Brook basin. Selection of these wetland systems was based upon their size (≥5 acres), watershed, soil type, surrounding land use, development potential, national wetland inventory mapping, prior vernal pool survey mapping, and potential for high biodiversity or the presence of state and federal 'listed' species. Each of the selected wetland systems was then assigned an identification number (1 through 49). These are summarized in Tables ES-4 and ES-5. These are shown graphically in appended Figures ES-1 through ES-4, located at the end of the Executive Summary.

TABLE ES-4
Summary of Wetland Reconnaissance Survey Locations – By Wetland #

Wetland #	*Subregional Basin*	*Local Basin*	*Size*	*Watershed Reference*
1A	Pequabuck	Scott Swamp Brook	118 acres	P-SCSB-4
1B	Pequabuck	Scott Swamp Brook	34 acres	P-SCSB-4
1C	Pequabuck	Scott Swamp Brook	16 acres	P-SCSB-6
2A	Pequabuck	Main Stem	70 acres	P-MS-1
2B	Pequabuck	Shade Swamp	30 acres	P-SHSB-1
2C	Farmington	Main Stem	212 acres	F-MS-7
2D	Farmington	Main Stem	144 acres	F-MS-8
2E	Farmington	Main Stem	187 acres	F-MS-9
2F	Farmington	Main Stem	332 acres	F-MS-14
3	Bass Brook	Deadwood Swamp Brook	440 acres	B-DSB-1
4	Farmington	Hyde Brook	14 acres	F-HB-1
5	Farmington	Pope Brook Tributary	46 acres	F-PB-1
6A	Farmington	Main Stem	30 acres	F-MS-7
6B	Pequabuck	Scott Swamp Brook	8 acres	P-SCSB-6
7A	Pequabuck	Scott Swamp Brook	58 acres	P-SCSB-4
7B	Pequabuck	Scott Swamp Brook	8 acres	P-SCSB-4
8A	Pequabuck	Scott Swamp Brook	44 acres	P-SCSB-6
8B	Pequabuck	Shade Swamp Brook	3 acres	P-SHSB-1
9	Farmington	Unionville – Lake Garda	5 acres	F-UB-5
10	Farmington	Unionville Tributary	11 acres	F-UB-3
11	Farmington	Unionville Brook	30 acres	F-UB-3
12	Farmington	Unionville Tributary	14 acres	F-UB-3
13	Farmington	Unionville Tributary	21 acres	F-UB-3
14	Farmington	Unionville Tributary	21 acres	F-UB-3
15	Farmington	Unionville Brook	30 acres	F-UB-4
16	Farmington	Main Stem	29 acres	F-MS-6
18	Farmington	Poplar Swamp Brook	68 acres	F-PSB-3
19	Farmington	Main Stem	6 acres	F-MS-12
20	Trout Brook	Tributary	7 acres	T-TR-5

TABLE ES-4 (Cont.)
Summary of Wetland Reconnaissance Survey Locations – By Wetland

Wetland #	*Subregional Basin*	*Local Basin*	*Size*	*Watershed Reference*
21	Farmington	Great Brook	7 acres	F-GB-1
22	Farmington	Great Brook	16 acres	F-GB-1
23	Farmington	Rice Brook	9 acres	F-RB-1
24	Trout Brook	Tributary	22 acres	T-TR-3
25	Trout Brook	Tributary	6 acres	T-TR-4
26	Trout Brook	Tributary	67 acres	T-TR-4
27	Trout Brook	Main Stem	5 acres	T-MS-2
28	Trout Brook	Tributary	22 acres	T-TR-1
29	Bass Brook	Batterson Park Pond	31 acres	B-BP-3
30A	Bass Brook	Batterson Park Pond	27 acres	B-BP-3
30B	Trout Brook	Tributary	31 acres	T-TR-4
31	Trout Brook	Tributary	9 acres	T-TR-4
32	Farmington	Pope Brook	22 acres	F-PB-2
33A	Pequabuck	Farmington Reservoir	12 acres	P-FR-1
33B	Pequabuck	Farmington Reservoir	16 acres	P-FR-1
34	Pequabuck	Farmington Reservoir	38 acres	P-FR-1
35	Bass Brook	Batterson Park Pond	50 acres	B-BP-4
36	Bass Brook	Deadwood Swamp Brook	22 acres	B-DSB-1
37	Bass Brook	Batterson Park Pond	10 acres	B-BP-4
38	Bass Brook	Batterson Park Pond	28 acres	B-BP-3
39	Bass Brook	Batterson Park Pond	6 acres	B-BP-4
40	Bass Brook	Deadwood Swamp Brook	11 acres	B-DSB-1
41	Bass Brook	Batterson Park Pond	15 acres	B-BP-1
42	Pequabuck	Scott Swamp Brook	94 acres	P-SCSB-2
43	Trout Brook	Tributary to Trout Brook	15 acres	T-TR-1
44	Bass Brook	Tributary to Bass Brook	23 acres	B-TR-2
45	Bass Brook	Deadwood Swamp Brook	63 acres	B-DSB-1
46	Farmington	Main Stem	46 acres	F-MS-7
47	Quinnipiac	Tributary	23 acres	QR-TR-1
48	Farmington	Tributary to Unionville	7 acres	F-UB-7
49	Bass Brook	Batterson Park Pond	12 acres	B-BP-4

TABLE ES-5
Summary of Wetland Reconnaissance Survey Locations – By Watershed

Watershed Ref	*Local Basin*	*Size*	*Wetland #s*
Farmington River Basin			
F-MS-6	Farmington Main Stem	0.19 sq. mi.	16
F-MS-7	Farmington Main Stem	1.80 sq. mi.	6A, 46, 2C
F-MS-8	Farmington Main Stem	0.84 sq. mi.	2D
F-MS-8	Farmington Main Stem		2E
F-MS-12	Farmington Main Stem	0.15 sq. mi.	19
F-MS-14	Farmington Main Stem	0.24 sq. mi.	2F
F-UB-3	Unionville Brook	0.61 sq. mi.	10, 11, 12, 13, 14
F-UB-4	Unionville Brook	0.25 sq. mi.	15
F-UB-5	Unionville Brook	0.83 sq. mi.	9
F-UB-7	Unionville Brook	0.24 sq. mi.	48

TABLE ES-5 (Cont.)
Summary of Wetland Reconnaissance Survey Locations – By Watershed

Watershed Ref	*Local Basin*	*Size*	*Wetland #s*
Farmington River Basin			
F-HB-1	Hyde Brook	0.71 sq. mi.	4
F-PB-1	Pope Brook	0.49 sq. mi.	5
F-PB-2	Pope Brook	0.32 sq. mi.	32
F-RB-1	Rice Brook	0.34 sq. mi.	23
F-GB-1	Great Brook	0.50 sq. mi.	21, 22
F-PSB-3	Poplar Swamp Brook	1.04 sq. mi.	18
Pequabuck River Basin			
P-SHSB-1	Shade Swamp Brook	0.28 sq. mi.	2B, 8B
P-SCSB-2	Scott Swamp Brook	0.87 sq. mi.	42
P-SCSB-4	Scott Swamp Brook	1.78 sq. mi.	1A, 1B, 7A, 7B
P-SCSB-6	Scott Swamp Brook	1.05 sq. mi.	1C, 6B, 8A
P-FR-1	Farmington Reservoir	0.53 sq. mi.	33A, 33B, 34
P-MS-1	Pequabuck Main Stem	1.27 sq. mi.	2A
Bass Brook Basin			
B-DSB-1	Deadwood Swamp Brook	2.27 sq. mi.	3, 36, 40, 45
B-BP-1	Batterson Park Pond	0.29 sq.mi.	41
B-BP-3	Batterson Park Pond	0.58 sq. mi.	29, 30A, 38
B-BP-4	Batterson Park Pond	0.84 sq. mi.	35, 37, 39, 49
B-TR-2	Tributary to Bass Brook	0.23 sq. mi.	44
Trout Brook Basin			
T-MS-2	Trout Brook Main Stem	0.20 sq. mi.	27
T-TR-1	Trout Brook Tributary	0.61 sq. mi.	28, 43
T-TR-3	Trout Brook Tributary	0.31 sq. mi.	24
T-TR-4	Trout Brook Tributary	1.32 sq. mi.	25, 26, 30B, 31
T-TR-5	Trout Brook Tributary	0.55 sq. mi.	20
Quinnipiac River Basin			
Q-TR-1	Quinnipiac River	1.08 sq. mi.	47

Results of this analysis are described in the following discussions of individual watershed basins.

Benthic and Water Quality Assessment

In the fall of 2003 Milone and MacBroom, Inc. project team members conducted an initial reconnaissance survey of the primary watersheds to evaluate potential inventory and sampling locations. Based on the results of the reconnaissance surveys, along with a review of contributing watersheds, existing land uses, Connecticut Department of Environmental Protection (CTDEP) Division of Inland Fishery Resources data, CTDEP aerial photography, the draft Farmington Valley Biodiversity Report, and review by Farmington representatives, twelve inventory and sampling locations were identified for water quality sampling.

The inventory and sampling locations represent a variety of geographical areas within the Town of Farmington. They provide a range of land use types, biological diversity as identified in the Farmington River Watershed Association's September 2003 *Draft Farmington Valley Biodiversity Project* report, and reflect impacted as well as non-impacted wetland systems.

Specific stream segments were identified for "kick sampling" to evaluate benthic habitat. Kick sampling sites were determined during field reconnaissance by an aquatic entomologist. Water quality was evaluated coincident with kick sampling inventory locations. Benthic and water quality analysis, where conducted, is presented in the following discussions of individual watershed basins.

Farmington River Basin

The Farmington River is one of the largest tributaries of the Connecticut River and is the dominant water resource within the Town of Farmington. Figure ES-1 (located at the end of this Executive Summary) depicts this watershed. Eight formally named tributaries join the Farmington River in the Town of Farmington. One of these, Roaring Brook, was not evaluated in detail because most of its watershed lies within the Town of Avon. A second tributary, the Pequabuck River, is addressed separately due to its significant size (29 square miles). The remaining six named tributaries include Unionville Brook, Hyde Brook, Pope Brook, Rice Brook, Great Brook, and Poplar Swamp Brook.

The Farmington River headwaters are located in Beckett Massachusetts. The River is approximately 81 miles long and has a total watershed size of approximately 600 square miles. The Farmington River watershed within the Town of Farmington covers approximately 20.8 square miles. The river falls approximately 73 feet in elevation over a distance of nine miles through Farmington. Water quality of the Farmington River is designated Class Bc according to the "*Water Quality Classification Map of Connecticut*" published by the Department of Environmental Protection. The Class Bc designation indicates that the river is of moderate to high quality and is designated for recreational use, coldwater fisheries, wildlife habitat, agricultural uses, and industrial water supply.

The Farmington River was listed on the 1996 and 1998 inventories for inadequate fish passage, although none of the causes (dams) were located in the Town of Farmington. The river is listed on the 2002 inventory as "partially supporting" primary contact recreation, the presence of bacteria being cited as the limitation. The source of bacteria is listed as "unknown," however; data clearly indicates that the source originates in the Pequabuck River. The listed reach of the river is from the confluence of the Farmington with the Pequabuck River, downstream to Rainbow Reservoir. Numerous water quality studies indicate that bacteria levels have decreased in the Farmington River over the last 20 years. However, according to the 2002 inventory, these levels may still be considered too high for the given water quality classification.

An overall improvement in water quality in the Farmington River over the past several decades reflects improved performance of sewage treatment plants and the reduction of point source pollution. Increases in chloride and persistent turbidity, among other findings, indicate that urbanization continues to affect water quality. Recent and future improvements in the area of stormwater management are expected to help improve water quality in the river. Site specific water quality data was not collected in the Farmington River main stem as part of this inventory, since this system has already been the subject of a significant number of studies and water quality analyses.

The Farmington River main stem does *not* suffer from over allocation or excessively low flows, even though a significant number of water diversions are either registered or permitted from the river. Two of the six named tributaries of the Farmington River (Poplar Swamp Brook and Pope Brook) have the potential for water allocation problems, even as the Farmington River does not. Impervious surfaces in the Farmington River watershed comprise 9.48% of its area. This is below the threshold that is typically referenced for impaired water quality due to imperviousness.

Eight wetland systems were analyzed in the Farmington River main stem. A general characterization of their quality is summarized in Table ES-6. Two wetland study areas (Wetland 2C and 2D) had notable functions and values. Other wetland study areas provide local functions, but are not believed to be regionally significant.

TABLE ES-6
Significant Wetland Functions & Values
Wetland Study Areas in the Farmington River Main Stem

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-MS-6	16	X				
F-MS-7	2C	X	X	X	X	X
F-MS-7	6A	X				X
F-MS-7	46	X				
F-MS-8	2D	X	X	X	X	X
F-MS-9	2E	X	X			X
F-MS-12	19	X				
F-MS-14	2F	X	X			X

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Each of the major tributaries to the Farmington River is described below.

<u>*Unionville Brook*</u>

Unionville Brook is located in the northwest part of Farmington. It has a drainage area of approximately 4.17 square miles, with portions of its watershed located in the towns of Farmington and Burlington. The upper portion of the watershed is dominated by residential areas, whereas the lower portions of the watershed remain forested. The brook falls approximately 45 feet in elevation between its headwaters at Lake Garda and its outlet at the Farmington River. The water quality classification in Unionville Brook is A. There are no known diversions within this watershed and it is not believed to be low flow impaired.

Biological and chemical water quality data was collected from Unionville Brook by MMI in the fall of 2003. Based on this data, it was concluded that the overall water quality within the lower Unionville Brook is good, but that watercourse conditions are moderately impaired. All of the chemical data collected and analyzed met the DEP water quality criteria, with dissolved oxygen levels and temperatures meeting cold water fishery standards. Table ES-7 summarizes water quality results and Table ES-8 summarizes benthic habitat results for Unionville Brook.

TABLE ES-7
Water Quality Results in Unionville Brook

Parameter	*Recommended Limit*	*Unionville Brook Upstream*	*Unionville Brook Downstream*
Dissolved Oxygen (mg/l)	5.0	9.74	10.36
Temperature, C[1]	3 to 16	14.0	13.5
Specific Conductivity (µS)		127.9	105.3
pH	6.7 to 8.3	6.72	6.73
Total Suspended Solids (mg/L)	10.0	2.0	2.0
Turbidity (NTU)	5.0	1.0	0.4
Total Dissolved Solids (mg/L)[2]	500.0	55.0	58.0
Total Phosphorus (mg/L)[3]	1.0	0.02	0.02
Total Nitrogen (mg/L)[4]	90	0.4	0.5
Total Petroleum Hydrocarbon	0.5	<0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-8
Summary of Metrics for Unionville Brook

Metric	*Evaluation Criteria*	*Typical Range*	*Value for Unionville Brook*
HBI	Lower is Better	0-10	3.6
Taxa Richness	Higher is Better	5-35	18
EPT Index	Higher is Better	0-15	10
EPT:Chironomidae Ratio*	Higher is Better	0-100	7.2
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	0.1
% Dominant Taxa	Lower is Better	0-100	37.4

*Highly variable in New England

Several primary wetland resources reside in the Unionville Brook watershed. The main stem of Unionville Brook can potentially support a cold water fishery. Many of its tributaries have manmade structures that can potentially inhibit fish passage. However, Unionville Brook has cold water temperatures, high dissolved oxygen levels, and good riparian zones, which make it a relatively high quality watercourse. Regionally, the Unionville Brook watershed contributes only about two percent of the total flow to the next higher order watercourse, the Farmington River.

The Unionville Brook watershed and its associated wetlands provide important functions and values on both a regional and local scale. The most significant are groundwater recharge, nutrient removal, recreational opportunities, flood flow alteration, cold water fishery habitat, and wildlife habitat. Additionally, many of the wetlands within the lower part of the watershed are underlain by stratified drift deposits, which are important links between groundwater recharge and discharge.

Eight wetland systems were analyzed in the Unionville Brook watershed. A general characterization of their quality is summarized in Table ES-9 below. Two wetland study areas (Wetland 10 and 15) had notable functions and values, particularly with respect to their biodiversity. Other wetland study areas provide local functions, but are not believed to be regionally significant.

TABLE ES-9
Significant Wetland Functions & Values
Wetland Study Areas in the Unionville Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-UB-3	10	X	X		X	X
F-UB-3	11	X	X			
F-UB-3	12	X				
F-UB-3	13	X	X			
F-UB-3	14	X				
F-UB-4	15	X	X		X	X
F-UB-5	9					
F-UB-7	48	X			X	

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Hyde Brook

Hyde Brook is located in the western part of Farmington and has a relatively small watershed area of 0.71 square miles. The upper portions of the watershed are primarily medium density residential areas, whereas the lower portion of the watershed is dominated by industrial and commercial properties. The brook falls from elevation 350 feet to elevation 170 feet where it meets the Farmington River. Water quality in Hyde Brook has been designated Class A. The Class A designation indicates that the brook has potential to support drinking water supply, certain fish and wildlife habitat, supports certain recreational activities, and may provide agricultural and industrial water supply.

Biological and chemical water quality data was collected from Hyde Brook by MMI in the fall of 2003. Based on this data, it was concluded that the overall water quality within Hyde Brook is good, but that the watercourse conditions are moderately impaired. All of the chemical data collected and analyzed meet the DEP water quality criteria, with dissolved oxygen levels and temperatures meeting cold water fishery standards. Table ES-10 summarizes water quality data and Table ES-11 summarizes benthic habitat results for Hyde Brook.

TABLE ES-10
Water Quality Results in Hyde Brook

Parameter	*Recommended Limit*	*Hyde Brook Upstream*	*Hyde Brook Downstream*
Dissolved Oxygen (mg/l)	5.0	9.61	9.98
Temperature, C[1]	3 to 16	14.5	13.6
Specific Conductivity (μS)		118.7	143.8
pH	6.7 to 8.3	6.74	6.75
Total Suspended Solids (mg/L)	10.0	2.0	3.0
Turbidity (NTU)	5.0	1.1	1.6
Total Dissolved Solids (mg/L)[2]	500.0	63.0	62.0
Total Phosphorus (mg/L)[3]	1.0	0.03	0.05
Total Nitrogen (mg/L)[4]	90	1.2	0.8
Total Petroleum Hydrocarbon	0.5	<0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-11
Summary of Metrics for Hyde Brook

Metric	*Evaluation Criteria*	*Typical Range*	*Value for Hyde Brook*
HBI	Lower is Better	0-10	4.1
Taxa Richness	Higher is Better	5-35	22
EPT Index	Higher is Better	0-15	8
EPT:Chironomidae Ratio*	Higher is Better	0-100	28.3
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	0.1
% Dominant Taxa	Lower is Better	0-100	61.7

*Highly variable in New England

Only one wetland system was analyzed in the Hyde Brook watershed, Wetland 4. A general characterization of its quality is summarized in Table ES-12 below. This wetland had significant biodiversity and provides local connectivity between primary core habitats. Because of its location within the *Town Forest*, Wetland 4 is well protected and provides the community an opportunity to experience a forested wetland system. It provides important wildlife habitat and supports high plant diversity. Wetland 4 is important to this watershed, because it is a relatively large tract of undeveloped forested land providing local connectivity between primary core habitats.

TABLE ES-12
Significant Wetland Functions & Values
Wetland Study Areas in the Hyde Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-HB-1	4				X	X

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Pope Brook

Pope Brook is located in the central portion of Farmington and has a relatively small watershed area of 0.8 square miles. The upper portion of the watershed is primarily forested and residential. The lower portion is dominated by a golf course. The brook falls from elevation 300 feet to elevation 150 feet where it meets the Farmington River, consistent with the large elevation difference between Talcott Mountain and the river. Water quality in Pope Brook has been designated Class A, however it is potentially low flow impaired due to a number of water diversions. Chemical water quality data was collected from Pope Brook by MMI in the fall of 2003. Table ES-13 summarizes the water quality results.

TABLE ES-13
Water Quality Results in Pope Brook

Parameter	*Recommended Limit*	*Pope Brook*
Dissolved Oxygen (mg/l)	5.0	9.47
Temperature, C[1]	3 to 16	14.3
Specific Conductivity (μS)		286.4
pH	6.7 to 8.3	6.83
Total Suspended Solids (mg/L)	10.0	1.0
Turbidity (NTU)	5.0	0.9
Total Dissolved Solids (mg/L)[2]	500.0	147.0
Total Phosphorus (mg/L)[3]	1.0	0.04
Total Nitrogen (mg/L)[4]	90	0.7
Total Petroleum Hydrocarbon	0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

Two wetland systems were analyzed in the Pope Brook watershed. A general characterization of their quality is summarized in Table ES-14 below. One wetland study area (Wetland 5) had notable functions and values, particularly with respect to its biodiversity. This wetland system is important to Farmington because it is protected, can be publicly accessed, provides recreational and educational opportunities, potentially contains endangered species, and promotes high biodiversity in plant and wildlife communities. Additional wetland functions and values include groundwater discharge, production export, and nutrient removal. Other wetland study areas in the Pope Brook watershed provide local functions, but are not believed to be regionally significant.

TABLE ES-14
Significant Wetland Functions & Values
Wetland Study Areas in the Pope Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-PB-1	5	X	X		X	X
F-PB-2	32	X			X	X

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Rice Brook

Rice Brook is located in the north central portion of Farmington and has a small watershed area of 0.3 square miles. The upper portion of the watershed is forested and residential, while the lower portion of the watershed is primarily a golf course. The brook falls from elevation 350 feet to elevation 150 feet where it meets the Farmington River, consistent with the large elevation difference between Talcott Mountain and the river. Water quality within Rice Brook has been designated Class A.

One wetland system was analyzed in the Rice Brook watershed, Wetland 23. A general characterization of its quality is summarized in Table ES-15 below. This wetland is locally important in that it is located at the headwaters of Rice Brook and acts as a buffer from surrounding development. However, this wetland is not believed to be regionally significant.

TABLE ES-15
Significant Wetland Functions & Values
Wetland Study Areas in the Rice Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-RB-1	23	X				

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Great Brook

Great Brook is located in the central portion of Farmington and has a small watershed area, 0.5 square miles in size. The watershed is primarily forested and residential. The brook falls from elevation 530 feet to elevation 150 feet where it meets the Farmington River. Water quality in Great Brook is designated Class A.

Biological and chemical water quality data was collected from Great Brook by MMI in the fall of 2003. Based on that data, it was concluded that overall, water quality is good. All of the chemical data collected and analyzed meet the DEP water quality criteria, with dissolved oxygen levels and temperatures meeting cold water fishery standards. Table ES-16 summarizes water quality data and Table ES-17 summarizes benthic habitat results for Unionville Brook.

TABLE ES-16
Water Quality Results in Great Brook

Parameter	*Recommended Limit*	*Great Brook*
Dissolved Oxygen (mg/l)	5.0	9.60
Temperature, C[1]	3 to 16	13.4
Specific Conductivity (μS)		233.3
pH	6.7 to 8.3	6.75
Total Suspended Solids (mg/L)	10.0	1.0
Turbidity (NTU)	5.0	0.3
Total Dissolved Solids (mg/L)[2]	500.0	120.0
Total Phosphorus (mg/L)[3]	1.0	0.04
Total Nitrogen (mg/L)[4]	90	0.9
Total Petroleum Hydrocarbon	0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-17
Summary of Metrics for Great Brook

Metric	*Evaluation Criteria*	*Typical Range*	*Value for Great Brook*
HBI	Lower is Better	0-10	3.9
Taxa Richness	Higher is Better	5-35	18
EPT Index	Higher is Better	0-15	10
EPT:Chironomidae Ratio*	Higher is Better	0-100	16.8
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	0.5
% Dominant Taxa	Lower is Better	0-100	21.0

*Highly variable in New England

Two wetland systems were analyzed in the Great Brook watershed, Wetlands 21 and 22. A general characterization of their quality is summarized in Table ES-18 below. Both provide local functions and values; however neither is believed to be regionally significant.

TABLE ES-18
Significant Wetland Functions & Values
Wetland Study Areas in the Great Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-GB-1	27					
F-GB-1	22	X	X			

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

<u>*Poplar Swamp Brook*</u>

Poplar Swamp Brook has a drainage area of approximately 3.0 square miles, with most of the watershed occurring within the Town of Farmington. Poplar Swamp Brook has been determined to be a "low-flow impaired" watercourse. In addition, other factors tend to lower the overall resource value of the brook, including constrained fish passage, fair to poor water quality, and the lack of riparian corridor in many areas, which tends to increase water temperature and decrease dissolved oxygen in the watercourse. Regionally, the Poplar Swamp Brook watershed contributes only about two percent of the total flow to the next higher order watercourse, the Farmington River.

Biological and chemical data was collected from Poplar Swamp Brook watershed in the fall of 2003. Table ES-19 summarizes water quality data for Poplar Swamp Brook. The biological data, summarized in Table ES-20, showed a loss of most intolerant macroinvertebrate families and reduction in the EPT index. The taxa that dominated the sample location was adaptable to rapid flow changes, low dissolved oxygen levels, higher water temperatures, and higher suspended solids. The overall water quality within the lower portions of Poplar Swamp Brook is low to poor and watercourse conditions are severely impaired. All the chemical data collected and analyzed met the DEP water quality criteria; however the brook exhibited warmer water temperatures and had one of the lowest dissolved oxygen levels in the study data set.

Biological and chemical data was *not* collected in the upper reaches of Poplar Swamp Brook. However during wetland investigations, the upper reach of Poplar Swamp Brook appeared to have moderate to good water quality and may support a more diverse macroinvertebrate assemblage as compared to its lower reaches.

TABLE ES-19
Water Quality Results in Poplar Swamp Brook

Parameter	*Recommended Limit*	*Poplar Swamp Brook*
Dissolved Oxygen (mg/l)	5.0	7.86
Temperature, C[1]	3 to 16	16.9
Specific Conductivity (µS)		132.3
pH	6.7 to 8.3	6.76
Total Suspended Solids (mg/L)	10.0	<1.0
Turbidity (NTU)	5.0	0.1
Total Dissolved Solids (mg/L)[2]	500.0	57.0
Total Phosphorus (mg/L)[3]	1.0	0.01
Total Nitrogen (mg/L)[4]	90	0.2
Total Petroleum Hydrocarbon	0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-20
Summary of Metrics for Poplar Swamp Brook

Metric	*Evaluation Criteria*	*Typical Range*	*Value for Poplar Swamp Brook*
HBI	Lower is Better	0-10	6.9
Taxa Richness	Higher is Better	5-35	9
EPT Index	Higher is Better	0-15	2
EPT:Chironomidae Ratio*	Higher is Better	0-100	0.2
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	23.7
% Dominant Taxa	Lower is Better	0-100	91.6

*Highly variable in New England

Only one wetland system was analyzed in the Poplar Swamp Brook watershed, Wetland 18. A general characterization of its quality is summarized in Table ES-21 below. This high quality wetland has been identified as a biodiverse system that provides aquifer recharge, flood water attenuation, and recreational opportunities. Additionally, this wetland occurs at the headwaters of Poplar Swamp Brook, provides vernal pool habitat, and contributes to the region's biodiversity.

TABLE ES-21
Significant Wetland Functions & Values
Wetland Study Areas in the Poplar Swamp Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
F-PB-3	18	X	X	X	X	X

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Pequabuck River Basin

Located in the southwestern portion of Farmington, the Pequabuck River is the largest tributary of the Farmington River. Figure ES-2 (located at the end of this Executive Summary) depicts this watershed. Within the Town of Farmington, its watershed is approximately 29 square miles in size, with a mix of land uses. Within the Town of Farmington, the Pequabuck River is classified as a low gradient river. Overall, it has an approximate length of 115 miles, with a gradient of six feet per mile. It flows within a broad floodplain characterized by wide stratified drift deposits. Water quality of the Pequabuck River is designated Class C/B.

Two formally named tributaries join the Pequabuck River in the Town of Farmington. These are Scott Swamp Brook and Shade Swamp Brook. A third unnamed tributary flows from the Farmington Reservoir.

The Pequabuck River was listed on the 1996 inventory based on a number of water quality concerns in several towns. In the Town of Farmington, the river was cited as having low dissolved oxygen as well as ammonia toxicity, both of which could potentially affect aquatic life. This condition was attributed to the Plymouth, Bristol, and Plainville sewage treatment plant discharges. The 1996 inventory stated that monitoring at U.S. Geological Survey station 01189030 showed the presence of cadmium, copper, and zinc at high levels. The 1996 and 1998 inventories indicated that the sewage treatment plants were upgraded and that follow-up monitoring would be completed. The 1998 inventory also cited an impairment of contact recreation due to bacteria caused by treated sewage discharges, urban runoff, mining, landfills, and/or industrial discharges.

The Pequabuck River is listed on the 2002 inventory for a number of water quality concerns in a number of towns, but only one line item is applicable to the Town of Farmington. Aquatic life support is listed as "partially supported" for a section of the river from the Plainville municipal border to the Farmington River. The cause is listed as "unknown." Based on a comparison of the 1998 and 2002 lists, it appears that recent progress has been made with respect to water quality in the Pequabuck River. Water quality results listed in the annual reports are consistent with this conclusion.

Available data and literature indicates an overall improvement in water quality in the Pequabuck River over the past several decades. Increases in chloride and persistent turbidity were found in the Pequabuck, indicative of urbanization and the effects of stormwater runoff. Both the Pequabuck River main stem and Scott Swamp Brook have the potential for low flow impairment. The Pequabuck River basin has 10.72% impervious surfaces. This is slightly above the threshold that is typically associated with impairment due to imperviousness. Site specific water quality data was not collected in the Pequabuck River main stem, since this system has been the subject of a significant number of independent studies and water quality analyses.

Only one wetland system was analyzed in the Pequabuck River main stem, Wetland 2A. A general characterization of its quality is summarized in Table ES-22 below. This wetland had significant biodiversity and provides flood flow attenuation. Locally, this wetland system is relatively large when compared to the surrounding watershed.

TABLE ES-22
Significant Wetland Functions & Values
Wetland Study Areas in the Pequabuck River Main Stem Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
P-MS-1	2A		X		X	X

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Each of the major tributaries to the Pequabuck is described below.

Shade Swamp Brook

Shade Swamp Brook has a watershed area of 1.3 square miles. The brook is a low gradient system, falling approximately five feet in elevation between its headwaters and its outlet. The brook has an approximate length of one mile and a gradient of five feet per mile. Shade Swamp Brook is embedded within several extensive emergent marsh, scrub shrub, and forested wetland systems. The upper portion of its watershed is dominated by residential, industrial and commercial land uses. Its mid to lower watershed is dominated by active agricultural land uses. The water quality of Shade Swamp Brook is designated Class A.

Two wetland systems were analyzed in the Shade Swamp Brook watershed, Wetland 2B and 8B. A general characterization of their quality is summarized in Table ES-23 below. Wetland 2B has been identified as a biodiverse system that provides aquifer recharge, flood water attenuation, and nutrient removal. Additionally, this wetland is located within the *Shade Swamp Wildlife Refuge*, and contributes to the region's biodiversity. Wetland 8B is not believed to be a regionally significant wetland.

TABLE ES-23
Significant Wetland Functions & Values
Wetland Study Areas in the Shade Swamp Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
P-SHSB-1	2B	X	X	X	X	X
P-SHSB-1	8B	X				

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Scott Swamp Brook

Scott Swamp Brook is located in the southwestern corner of Farmington. It has a watershed of area of approximately 4.32 square miles. The headwaters of this system are contained within the Town of Farmington. Scott Swamp has been identified as an important component of a regional biodiversity corridor. This wetland supports an important assemblage of sensitive, native flora and fauna. Many of the wetlands in this watershed are underlain by stratified drift deposits that are important links between groundwater recharge and discharge. Parts of this watershed will likely be within the designated Aquifer Protection Zone after mapping has been approved by DEP. In this watershed, the Unionville Water Company in Farmington and Valley Water System, Inc. in Plainville both withdraw water for public drinking water supply.

Biological and chemical water quality data was collected from the Scott Swamp Brook watersheds in the fall of 2003. The water quality data is summarized in Tables ES-24 and ES-25. The biological data, summarized in Table ES-26 and ES-27, showed a loss of most intolerant macroinvertebrate families and a reduction in the EPT index. The results also showed an increase in filter-feeding macroinvertebrates. This particular class of feeders is adaptable to rapid flow changes, higher water temperatures, and higher total suspended solids Therefore, it was concluded that the overall water quality was low to poor and that watercourse conditions were moderately impaired.

TABLE ES-24
Water Quality Results in Scott Swamp Brook Tributary

Parameter	*Recommended Limit*	*Scott Swamp Brook Trib.*
Dissolved Oxygen (mg/l)	5.0	8.48
Temperature, C[1]	3 to 16	14.1
Specific Conductivity (µS)		160.5
pH	6.7 to 8.3	6.78
Total Suspended Solids (mg/L)	10.0	2.0
Turbidity (NTU)	5.0	1.8
Total Dissolved Solids (mg/L)[2]	500.0	80.0
Total Phosphorus (mg/L)[3]	1.0	0.04
Total Nitrogen (mg/L)[4]	90	1.1
Total Petroleum Hydrocarbon	0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-25
Water Quality Results in Scott Swamp Brook

Parameter	*Recommended Limit*	*Scott Swamp Brook Upstream*	*Scott Swamp Brook Downstream*
Dissolved Oxygen (mg/l)	5.0	4.58	9.05
Temperature, C[1]	3 to 16	15.7	15.0
Specific Conductivity (µS)		222.1	208.4
pH	6.7 to 8.3	6.77	6.80
Total Suspended Solids (mg/L)	10.0	2.0	1.0
Turbidity (NTU)	5.0	4.1	1.6
Total Dissolved Solids (mg/L)[2]	500.0	122.0	107.0
Total Phosphorus (mg/L)[3]	1.0	0.04	0.03
Total Nitrogen (mg/L)[4]	90	1.2	1.3
Total Petroleum Hydrocarbon	0.5	<0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-26
Summary of Metrics for Scott Swamp Brook

Metric	*Evaluation Criteria*	*Typical Range*	*Value for Scott Swamp Brook*
HBI	Lower is Better	0-10	4.5
Taxa Richness	Higher is Better	5-35	13
EPT Index	Higher is Better	0-15	4
EPT:Chironomidae Ratio*	Higher is Better	0-100	33.5
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	0.2
% Dominant Taxa	Lower is Better	0-100	38.8

*Highly variable in New England

TABLE ES-27
Summary of Metrics for Scott Swamp Brook – Tributary #1

Metric	*Evaluation Criteria*	*Typical Range*	*Value for SSBT #1*	*Value for SSBT#2*	*Value for SSBT #3*
HBI	Lower is Better	0-10	5.2	4.6	3.9
Taxa Richness	Higher is Better	5-35	12	17	14
EPT Index	Higher is Better	0-15	5	9	7
EPT:Chironomidae Ratio*	Higher is Better	0-100	3.1	3.6	10.0
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	0.1	0.0	0.1
% Dominant Taxa	Lower is Better	0-100	30.5	36.5	44.6

*Highly variable in New England

In terms of chemical data, all of the parameters analyzed met the DEP water quality criteria, with the exception of the Scott Swamp Brook upstream dissolved oxygen sample.

The Scott Swamp Brook watershed and its associated wetlands provide important functions and values on both a regional and local scale. The most significant are groundwater recharge, flood flow alteration, and wildlife habitat. The primary wetland resource in this watershed is Scott Swamp Brook, which has been determined to be a "low-flow impaired" watercourse. Permitted and registered water withdrawals contribute to this condition. Other factors tend to lower the overall resource value of the brook, including constrained fish passage at manmade impoundments and beaver dams; fair to poor water quality, and the lack of a riparian corridor and overstory in many areas that tends to increase water temperature and decrease dissolved oxygen in the watercourse. Regionally, the Scott Swamp Brook watershed contributes only about 10 percent of the total flow to the next higher order watercourse, the Pequabuck River.

Eight wetland systems were analyzed in the Scott Swamp Brook watershed. A general characterization of their quality is summarized in Table ES-28. Three wetland study areas (Wetlands 1A, 1C, and 6B) are believed to be regionally significant. Wetlands 1A and 1C have notable functions and values with respect to their biodiversity, flood flow attenuation and aquifer recharge. Wetland 6B is a well protected, diverse habitat that is part of a larger wetland system.

Other wetland study areas provide local functions, but are not believed to be regionally significant.

TABLE ES-28
Significant Wetland Functions & Values
Wetland Study Areas in the Scott Swamp Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
P-SCSB-2	42	X	X			
P-SCSB-4	1A	X	X	X	X	
P-SCSB-4	1B	X	X			
P-SCSB-4	7A	X	X			X
P-SCSB-4	7B	X				
P-SCSB-6	1C	X	X	X	X	
P-SCSB-6	6B	X			X	X
P-SCSB-6	8A	X			X	

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Farmington Reservoir Watershed

The old Farmington Reservoir drains to the Pequabuck River through an unnamed stream and has a watershed area of 0.7 square miles. This stream is similar in gradient and length to the three watercourses that flow from Talcott Mountain into the Farmington Reservoir. The unnamed stream has an approximate gradient of four percent from its headwaters to its outlet. The unnamed stream is designated Class A.

Three wetland systems were analyzed in the Farmington Reservoir watershed, Wetlands 33A, 33B, and 34. A general characterization of their quality is summarized in Table ES-29 below. Wetland 33A has been heavily impacted and does not provide significant functions. Wetland 33B provides nutrient removal and flood flow alteration. Neither system is believed to be regionally significant.

TABLE ES-29
Significant Wetland Functions & Values
Wetland Study Areas in the Farmington Reservoir Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
P-FR-1	33A	X				
P-FR-1	33B	X	X			
P-FR-1	34	X	X		X	X

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Bass Brook Basin

Bass Brook has a watershed area of approximately 10.4 square miles. Figure ES-3 (located at the end of this Executive Summary) depicts this watershed. A portion of its watershed is located in the southeastern section of Farmington. It falls approximately 300 feet in elevation from its headwaters located in Farmington to its outlet located in Newington. The water quality of the stream is Class A. The Bass Brook basin has 14.29% impervious surfaces, which is above the typical threshold attributed to impairment due to imperviousness.

The portion of the Bass Brook drainage basin that is located within the Town of Farmington is dominated by Batterson Park Pond. The largest tributary to Bass Brook, sometimes known as Deadwood Swamp Brook, has a watershed area of 2.3 square miles.

Batterson Park Pond is listed on the 1998 and 2002 inventories for problems related to eutrophication and nuisance aquatic plants. Aquatic life is "partially supported." Sources of pollution include erosion and sedimentation, highway runoff, urban runoff, storm sewers, and waterfowl waste.

Deadwood Swamp is located at the western portion of the watershed and has been identified as an important component of a regional biodiversity corridor. This wetland has the potential to support an important assemblage of sensitive, native flora and fauna. MMI did not collect chemical and/or physical water quality samples from within Deadwood Swamp Brook. However, based upon field observations, the brook appeared healthy and capable of supporting a warm water fishery.

Five wetland systems were analyzed in the Deadwood Swamp Brook watershed. A general characterization of their quality is summarized in Table ES-30 below. One of these areas, Wetland 3, is believed to have regional significance, particularly due to its biodiversity, large size, and presence of vernal pools. Other wetland study areas provide local functions, but are not believed to be regionally significant.

TABLE ES-30
Summary of Significant Wetland Functions & Values
Wetland Study Areas in the Deadwood Swamp Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
B-DSB-1	3	X	X		X	X
B-DSB-1	36	X			X	X
B-DSB-1	40	X			X	
B-DSB-1	45	X			X	
B-TR-2	44					

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Nine wetland systems were analyzed in the Batterson Park Pond watershed. A general characterization of their quality is summarized in Table ES-31 below. None of these study area are believed to be regionally significant.

TABLE ES-31
Summary of Significant Wetland Functions & Values
Wetland Study Areas in the Batterson Park Pond Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
B-BP-3	29	X	X		X	
B-BP-3	30A	X	X			
B-BP-3	30B	X				
B-BP-3	38	X	X			
B-BP-4	35	X				
B-BP-4	37	X				
B-BP-4	39	X	X			
B-BP-4	49	X	X		X	X
B-BP-4	41	X	X		X	

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity

One wetland system was analyzed in the Bass Brook Tributary watershed, Wetland 44. A general characterization of its quality is summarized in Table ES-32 below. This system provides local functions and values, but is not believed to be regionally significant.

TABLE ES-32
Significant Wetland Functions & Values
Wetland Study Areas in the Unnamed Tributary Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
B-TR-2	44	X			X	

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Trout Brook Basin

Only a very small portion of Trout Brook is located in the eastern section of Farmington. Figure ES-4 (located at the end of this Executive Summary) depicts this watershed. The headwaters of this system are contained within the Town of Farmington and the City of New Britain. Most of the Trout Brook drainage basin is characterized by a tributary of Hartford Reservoir No. 1. Trout Brook has a watershed area of 1.3 square miles in the northeast section of Farmington. It falls approximately 70 feet in elevation from its headwaters to its outlet. In addition, the brook has an approximate length of 2.1 miles and a gradient of 33 feet per mile. The watershed is primarily a mix of residential, commercial, and forested areas. The brook is bordered by forested wetland systems and has a small impoundment located within the University of Connecticut Farmington Health Center. Water quality in Trout Brook has been designated as Class B/A.

Trout Brook is not listed in the 1996 or 1998 inventories, but is listed in the 2002 inventory for "partially supporting" aquatic life criteria, and "not supporting" primary contact recreation criteria. Urban runoff, removal of riparian vegetation, and combined sewer overflows are cited as potential sources. The listed reach of the brook is from Boulevard (a street in West Hartford) to the headwaters. The Trout Brook basin has 12.98% impervious surfaces. This is slightly above the typical threshold identified with impairment due to imperviousness.

Biological and chemical water quality data was collected from the Trout Brook watershed in the fall of 2003 in the Wood's Pond Tributary and in Hartford Reservoir Tributary #1. Water quality data is summarized in Tables ES-33 and ES-34. The biological data, summarized in Table ES-35, indicates a very low EPT index and low taxa richness. No pollution intolerant taxa were recorded. Although the sample was taken in a wooded area with a well-protected riparian zone, the contributory watershed is one of the most developed in this study. The impaired benthic and water quality is likely the result of historical disturbances, poor stormwater management practices, and heavily fragmented riparian zones.

TABLE ES-33
Water Quality Results in Wood's Pond Tributary

Parameter	*Recommended Limit*	*Wood's Pond Tributary*
Dissolved Oxygen (mg/l)	5.0	10.68
Temperature, C[1]	3 to 16	14.6
Specific Conductivity (μS)		570.0
pH	6.7 to 8.3	7.40
Total Suspended Solids (mg/L)	10.0	<1.0
Turbidity (NTU)	5.0	3.6
Total Dissolved Solids (mg/L)[2]	500.0	303.0
Total Phosphorus (mg/L)[3]	1.0	0.03
Total Nitrogen (mg/L)[4]	90	1.0
Total Petroleum Hydrocarbon	0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-34
Water Quality Results in Hartford Reservoir Tributary #1

Parameter	*Recommended Limit*	*Hartford Res. Trib. #1*
Dissolved Oxygen (mg/l)	5.0	9.10
Temperature, C[1]	3 to 16	17.1
Specific Conductivity (μS)		629.0
pH	6.7 to 8.3	7.02
Total Suspended Solids (mg/L)	10.0	<1.0
Turbidity (NTU)	5.0	2.2
Total Dissolved Solids (mg/L)[2]	500.0	365.0
Total Phosphorus (mg/L)[3]	1.0	0.03
Total Nitrogen (mg/L)[4]	90	0.5
Total Petroleum Hydrocarbon	0.5	<0.5

[1]Recommended temperature C for cold water fisheries is 3 to 6 degrees C; and 15 to 23 for warm water fisheries.
[2]500 mg/L is recommended for drinking water supplies.
[3]Recommended limit is for phosphorus.
[4]90 mg/L is recommended for fisheries. 10 mg/L is recommended for drinking water supplies.

TABLE ES-35
Summary of Metrics for Hartford Reservoir Tributary #1

Metric	*Evaluation Criteria*	*Typical Range*	*Value for HRT #1*
HBI	Lower is Better	0-10	3.9
Taxa Richness	Higher is Better	5-35	10
EPT Index	Higher is Better	0-15	2
EPT:Chironomidae Ratio*	Higher is Better	0-100	103.0
Scraper:Collector-Filterer Ratio*	Higher is Better	0-100	0.2
% Dominant Taxa	Lower is Better	0-100	60.0

*Highly variable in New England

Nine wetland systems were analyzed in the Trout Brook watershed. A general characterization of their quality is summarized in Table ES-36 below. Three of these areas (Wetland 20, 24, and 26) occur near the Hartford Reservoir and are considered to be regionally significant. Other areas provide local functions and values, however are not believed to be regionally significant.

TABLE ES-36
Summary of Significant Wetland Functions & Values
Wetland Study Areas in the Trout Brook Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
T-MS-2	27					
T-TR-1	28	X	X		X	
T-TR-1	43					
T-TR-3	24	X	X		X	X
T-TR-4	25	X	X			
T-TR-4	26	X	X		X	
T-TR-4	30B	X	X			
T-TR-4	31	X	X		X	
T-TR-5	20	X	X		X	

NR = Nutrient Removal/Pollutant Renovation
FFA = Flood Flow Alteration
AR = Aquifer Recharge
BD = Biodiversity
RO = Recreational Opportunity

Quinnipiac River Basin

Wetland 47 is important because it is part of a larger wetland system that serves as the headwaters to the Quinnipiac River, and an extensive wildlife corridor along the Town's traprock ridge outcrops. A general characterization of its quality is summarized in Table ES-37 below.

TABLE ES-37
Significant Wetland Functions & Values
Wetland Study Areas in the Quinnipiac River Watershed

Watershed Ref	*Wetland #*	*NR*	*FFA*	*AR*	*BD*	*RO*
QR-TR-1	47	X	X			

Critical and Unique Resources

Through decades of well-documented research, it has become clear that wetlands and watercourses provide a host of important physical and chemical functions, as well as a suite of beneficial societal values. These functions and values operate at all scales, from the microscopic up to the local and regional landscape. While most wetlands perform some, or even many of these functions and values, some wetlands, because of their geology, location, vegetation, aesthetics, prior impacts, or their history, are inherently more valuable than others.

Within this report, these special wetlands and watercourses are referenced as "critical and unique systems." Two objectives were established for identifying critical and unique systems. These objectives included establishing a network of wetland systems that fully represented a diversity of wetland types and that performed key ecological and hydrological functions on a local and regional scale; and ensuring local and regional wetland biodiversity through designation and management of critical and unique wetland systems.

Several of these critical and unique wetlands provide important functions, including biodiversity, aquifer recharge, flood attenuation, and water quality protection. The 11 critical and unique wetland systems within Farmington are presented on Table ES-38. These are shown graphically on Figure ES-5 (located at the end of this Executive Summary).

Watershed Management and Low Impact Development

In broad classification, typical impacts to wetlands and water resources due to the alteration of hydrologic conditions associated with land development and other activities include degraded water quality; unnatural stream channel geomorphic changes; and increased frequency and severity of flooding. All of these potential impacts may also impact aquatic systems and can result in habitat loss and degradation and decreased biodiversity.

The practice of stormwater management is intended to mitigate hydrologic impacts resulting from changes to the land's surface. Stormwater management can occur at a watershed scale or at the site scale. At the watershed management scale land use controls, source controls and treatment controls are three common methods of stormwater management.

TABLE ES-38
Critical and Unique Wetland Systems

MMI Wetland Identification #	*Watershed*	*Designated Area*	*FVBP* Designated Core Habitats*	*Important Functions*
Farmington River Watershed				
2C, 2D	Farmington	North Meadows	Primary	Biodiversity, Aquifer Recharge, Flood Water Attenuation, Recreational Opportunity
15	Unionville Brook	Unionville Brook	ND	Biodiversity, Flood Water Attenuation, Biodiversity, Recreational Opportunity
5	Pope Brook	Hillstead	Primary	Biodiversity
4, 6B, 10	Hyde, Scott Swamp, Unionville	Town Forest	Primary	Biodiversity, Recreational Opportunity
18	Poplar Swamp Brook	Walton Pond	Primary	Biodiversity, Aquifer Recharge, Flood Water Attenuation
Pequabuck River Watershed				
1A, 1C	Pequabuck	Scott Swamp	Primary	Biodiversity, Flood Water Attenuation, Aquifer Recharge
2A	Pequabuck	Main Stem	ND	Biodiversity, Flood Water Attenuation
2B	Pequabuck	Shade Swamp	Primary	Biodiversity, Aquifer Recharge, Flood Water Attenuation
Bass Brook Watershed				
3	Bass, Scott Swamp	Deadwood Swamp	Primary	Biodiversity, Flood Water Attenuation, Recreational Opportunity
Trout Brook Watershed				
20, 24, 26	Trout Brook	Hartford Reservoir	Primary	Flood Water Attenuation, Biodiversity
Quinnipiac River Brook Watershed				
47	Quinnipiac River	Tributary	Primary	Flood Water Attenuation

Note: FVBD = Farmington Valley Biodiversity Project
D = No Designation by the FVBP

At a site scale, low impact development (LID) is currently the preferred method of managing stormwater. LID design practices make use of creative site planning and design tools that are intended to preserve or reduce the changes to a site's hydrology, rather than simply providing "end of pipe" treatment or highly engineered management systems. The use of these planning and design tools can often times reduce or even eliminate the requirement for more costly and sometimes obtrusive storage, infiltration, or end-of-pipe structural practices for the management of stormwater runoff. They can also result in development proposals that better fit the existing characteristics of a site, are aesthetically pleasing, and protect the environment.

The following site design elements incorporate LID:

1. Reduce paved areas to the extent possible. This may include reducing the width of paved roadways and cul-de-sac diameters, eliminating on-street parking, promoting use of common driveways, or using narrower driveway widths (perhaps nine or ten feet).

2. Use permeable pavement materials, such as grass pavers, whenever possible.

3. Avoid compaction of high permeability soils.

4. Minimize the area dedicated for construction easements and stockpile areas.

5. To the extent possible, plan site activities to limit the removal of trees and vegetation.

6. Disconnect impervious areas. Do not connect roof drains and footing drains into a piped drainage system (consider drywells or other infiltration devices). Provide curbless roads to allow sheet flow.

7. Maintain existing topography to the extent possible. The intent is to maintain runoff travel distances, slopes, roughness, and channel shapes whenever possible.

8. Maximize the use of open drainage systems, such as grass swales.

9. Alter front yard setbacks to move houses forward on a lot to reduce driveway lengths.

Table ES-39 presents a listing of preferred best management practices, specific to different zoning designations and land uses.

TABLE ES-39
Preferred Best Management Practices

Residential	*Retail/Industrial*	*Both*
Rain Gardens or Barrels	Pervious Parking	Grass Swales
Infiltration Basins or Trenches	Green Roof Storage	Deep sump catch basins in roads and parking areas
Dry Wells	Single Sidewalks	Hydrodynamic Separators
	Reduction in Building Footprint	Oil/water separators
	Parking Lot Storage	Created wetland systems
	Decentralized Parking	Bioretention facilities
	Bioretention at parking lot islands	Detention Basins

LID practices can be incorporated into proposed developments in any zone, provided soil types and other site conditions are favorable for the proposed LID application. The most important consideration is the ability to capture and collect pollutants in the event of a release. For this reason, the use of infiltration in business and industrial zones needs to be carefully considered based on the proposed use of the property.

In many communities across Connecticut, the application of LID principles in the design of development plans is hindered by language in the land use regulations that seemingly prohibits their use. A review of the land use regulations of the Town of Farmington was conducted and recommended revisions to promote the use of LID have been provided.

Carrying Capacity Analysis

In 1977, the State of Connecticut developed the Sewer Avoidance Program. Its purpose was to identify alternative sewage disposal methods in lieu of public sewers and to promote an organized program of techniques and strategies that would ensure the prevention of water pollution and maintenance of on-site sewage disposal systems. Within the Town of Farmington, the sewer avoidance designation applies to the section of Town with R-80 zoning that is approximately located north of Route 6 and east of the Farmington River. Two hundred feet of minimum frontage is required in this zone, with a minimum lot size of 80,000 square feet. Minimum front, side, and rear yard requirements in this zone are 50 feet, 40 feet, and 50 feet respectively. In the R-80 zone, the site must have suitable physical characteristics to adequately satisfy the requirements of the State Public Health Code for subsurface disposal.

Analyzing carrying capacity typically involves evaluation of the soil-slope relationship, along with subsequent elimination of certain soil types and a determination of minimum lot sizes. The conventional wisdom is that systems located in poorly suited soils (i.e. those with low carrying capacity) are more likely to fail and therefore need larger leaching fields and larger lot sizes. The larger lot sizes serve multiple purposes. First, the density of development is reduced, thereby lessening the burden on the underlying soils. Second, with appropriately sized lots, suitable separation distances can be achieved for the protection of individual water supply wells.

Finally, appropriately sized lots are better able to accommodate a replacement subsurface system, should the primary system fail or require expansion.

Composite mapping was developed in a GIS format for use in assessing the carrying capacity within Farmington's sewer avoidance zone. Based on the available mapping described above, eight areas of different surficial characteristics have been mapped.

The soils predominantly found in the sewer avoidance area are not the most suitable for development of on-site sewage disposal systems. Nevertheless, the records of the Health District indicate a low incidence of septic system failures in this area. The reason for the low incidence of septic system failures may be related to a particular combination of factors. For example, in alluvium and kame terrace deposits, soils will likely be suitable for septic systems, with little potential for failure. Talus and bedrock outcrops are unsuitable for development of septic systems, but because homes are usually not constructed on talus or outcrops, there is little risk of septic system failure in these geologic formations. The most commonly-found ground moraine deposits of average-thickness or thick till consist of soils that are generally unsuitable for large septic systems. However, individual residential systems can perform adequately without failure for long periods of time because the flow rates are low, the depth to bedrock is sufficient, and the depth to ground water may be sufficient. The low incidence of failure in the sewer avoidance area may be related to these characteristics, especially where thick till is present, shallow bedrock is not an issue.

An effluent flow capacity analysis was conducted for the sewer avoidance area to determine sewage effluent renovation in terms of bacteria travel time and nitrate dilution to derive recommendations on allowable or minimum lot sizes. Table ES-40 presents a summary of information and data presented in the report.

Nitrogen dilution calculations for stratified drift and glacial till areas revealed that less than an acre per lot is needed to dilute nitrogen to less than 10 mg/L – a conclusion that may be surprising but is in fact consistent with most of the literature that was developed for Connecticut. Of course, factors such as separating distances between septic systems and wells, watercourses, and other receptors listed in the Public Health Code will increase the lot size to larger than an acre in many cases. In other words, nitrogen dilution is not the limiting factor on one acre lot sizes, unless ground water flow patterns concentrate effluent.

A review of local regulations was conducted to evaluate consistency with the above findings and recommend amendments to the regulations, where appropriate.

TABLE ES-40
Summary of Recommended Separation Distances and Lot Sizes

Area No.	*Description of Soil Type*	*Is a Septic System Feasible?*	*Recommended Distance to Receptor (well or stream)*	*Recommended Distance to Wetland*
1	Floodplain Alluvium	Yes	150 feet	50 feet
2	Kame Terrace Deposits	Yes	200 feet	50 feet
3	Talus and Bedrock Outcrops	No[1, 2]	N/A	N/A
4	GMD, Mainly Glacial Till	Yes	50/75[4]	50 feet
5	GMD, Mainly Thick Till	Yes	50/75[4]	50 feet
6	GMD, Mainly Till, Locally Thin	Yes	50/75[4]	50 feet
7	GMD, Mainly Thin Till Over Sedimentary Bedrock	No[2]	N/A	N/A
8	GMD, Mainly Thin Till, Over Igneous Bedrock	No[2]	N/A	N/A

[1]Bedrock Exposed
[2]Shallow Depth to Rock
[3]Assumes 21 day travel time for pathogen control
[4]50 feet separation from a watercourse, 75 feet separation from a water supply well (based on Public Health Code)
Note: GMD = Ground Moraine Deposits

Summary of Findings

1. The Town of Farmington has placed a high priority on identifying, protecting, and managing its natural resources. Farmington is home to several valuable watercourses and their tributaries. The more than 2,000 acres of wetland in Farmington represent palustrine, lacustrine, and riverine systems.

2. The Farmington River is one of the largest tributaries of the Connecticut River and is the dominant water resource within the Town of Farmington. Eight formally named tributaries join the Farmington River in the Town of Farmington. These are the Pequabuck River, Unionville Brook, Hyde Brook, Pope Brook, Rice Brook, Great Brook, Poplar Swamp Brook, and Roaring Brook. Other watersheds that lie within Farmington include portions of Trout Brook, Bass Brook, Copper Mine Brook and the Quinnipiac River.

3. Water and benthic quality varies within and among the primary watercourses and their tributaries within the Town of Farmington. Historic trends show that water quality has improved in many of these streams and rivers, however further improvements are needed in the Pequabuck River, the Farmington River downstream of the Pequabuck River, the Trout Brook headwaters, and in Batterson Park Pond.

4. Water diversions in the Poplar Swamp Brook, Pope Brook, Scott Swamp Brook, and Pequabuck River drainage basins and subwatersheds may be contributing to low-flow impairment in these streams. Impervious surfaces in the Unionville Brook, Poplar Swamp Brook, Scott Swamp Brook, Bass Brook, and Trout Brook drainage basins and

subwatersheds exceed 10% and may contribute to low-flow impairment if sufficient water is not returned to the basins for base flow.

5. Unchecked or unregulated development can have profound negative impacts on the surrounding environment in the form of changes to stream flow, flooding, erosion and sedimentation, and deteriorated water quality in streams, ponds, and public water supplies. Many communities have attempted to address these issues through local zoning or subdivision regulations that prohibit increases in peak stormwater runoff rates. However, regulation is only one aspect of the zero-extra runoff concept. Of equal importance is consideration of the individual watershed(s) in which stormwater detention is proposed. Depending on the specific hydrology, detention could actually be detrimental to the watershed and even exacerbate downstream flooding impacts.

6. Through decades of well-documented research, it has become clear that wetlands and watercourses provide a host of important physical and chemical functions, as well as a suite of beneficial societal values. These functions and values operate at all scales, from the microscopic up to the local and regional landscape. While most wetlands perform some, or even many of these functions and values, some wetlands, because of their geology, location, vegetation, aesthetics, prior impacts, or their history, are inherently more valuable than others. Within this report, these special wetlands and watercourses are referenced as "critical and unique systems." Eleven such systems have been identified within the Town of Farmington: five are located in the Farmington River watershed; three in the Pequabuck River watershed; one in each of the Bass Brook, Trout Brook, and Quinnipiac River watersheds.

7. Mapping and analysis of critical environmental resources provides a baseline of information from which good planning can follow. This is true for individual sites and projects, as well as for broad-scale planning at the municipal, regional, or state-wide level. It is difficult for planning boards, regulatory commissions, and local officials to fully evaluate the merit and/or potential impact of an action when it is out of context of the broader environment in which it is to take place.

8. The existing inland wetland review process in Farmington has several features that promote a relatively fast, professional, and environmentally sensitive approach to reviewing inland wetland and watercourse related activities. Any project that may impact wetlands and/or watercourses within the Town requires a permit that is extensively reviewed by the Town Planning staff, the Conservation Commission, and the Planning and Zoning/Inland Wetlands and Watercourse Agency. In some cases, particularly large scale projects, the Town may enlist the aid of a private third party environmental review team before rendering a decision. Overall, Farmington's current regulatory review system is serving the community well.

9. As part of this study, MMI conducted a preliminary assessment of the Town's unfragmented natural areas. Unfragmented natural areas are a critical component to conserving biodiversity on a local and regional scale.

10. Many factors require that river management efforts extend beyond the banks that contain flowing water. Upstream land uses can lead to hydrologic impacts, such as increases in runoff volumes and peak discharge rates, as well as non-point sources of pollution. Floodplain encroachments can increase water surface elevations at upstream properties, and increase erosion downstream as water velocities increase in direct response to the loss in conveyance area. Loss of riparian buffers and/or wetlands can impact habitat quality and also increase water temperatures, as shade-providing vegetation is removed.

11. Effective watershed management involves a multi-faceted approach that encompasses land uses (past, present, and future); stream and wetland buffers; responsible development through adequate site selection, design, and maintenance; stormwater best management practices; control of non-stormwater discharges; control of destructive and unnatural erosion and sedimentation; and watershed stewardship programs that have the ability to span corporate boundaries and governmental divides.

12. The following watershed are believed to be most sensitive with regard to functions and values and potential for future development to impact existing unique, valuable, or critical resources:

Watershed Designation
F-MS-7
F-MS-8
F-UB-3
F-UB-4
F-PB-1
F-HB-1
F-PBS-3
P-SCSB-4
P-SCSB-6
P-MS-1
P-SHSB-1
B-DSB-1
T-TR3
T-TR4
T-TR5
Q-TR-1

13. In low impact development, land development design practices for stormwater management make use of creative site planning and design tools that are intended to preserve or reduce the changes to a site's hydrology, rather than simply providing "end of pipe" treatment or highly engineered management systems. Low impact development techniques and practices are intended to preserve natural systems and protect resources and their buffer areas through

design of drainage systems that mimic natural systems. The selection of specific BMPs varies from site to site. Some applications, such as infiltration systems, may not be appropriate for all land uses or all sites.

14. Composite mapping was developed in a GIS format for use in assessing the carrying capacity within Farmington's sewer avoidance zone. The soils predominantly found in Farmington's sewer avoidance area are not the most suitable for development of on-site sewage disposal systems. Nevertheless, the records of the Health District indicate a low incidence of septic system failures in this area.

15. In Farmington, subsurface sewage disposal is regulated by the Farmington Valley Health District. The District's requirements mirror those codified in the Connecticut Public Health Code. The Health Code is health-based as opposed to being ecologically based. As such, it does not address transmission of nitrates and other parameters.

Summary of Recommendations

1. The Unionville Brook, Poplar Swamp Brook, and Scott Swamp Brook subwatersheds are susceptible to low flow impairment and should be managed to increase infiltration. Fortunately, each has a significant extent of stratified drift deposits along the watercourses, such that infiltration and recharge of the aquifers would be relatively easy. The Trout Brook and Bass Brook watersheds are also susceptible to low flow impairment. However, given the abundance of glacial till in these watersheds, recharge will be more difficult. The Town may wish to require an assessment by developers of the feasibility of incorporating infiltration and recharge into the design of new development.

2. Any future regulations that control the quantity and timing of stormwater runoff should be carefully crafted to account for the complex hydrologic and hydraulic processes occurring in the watershed in question. In watersheds with alluvial streams, a zero increase in peak flow does not preclude channel erosion. Sensitive streams are also stressed by increased stormwater volume and flow duration, even if peak flows are equalized. Accordingly, each of these components should be considered in the development and application of stormwater management regulations.

3. The inventory, mapping, and habitat analysis conducted under this *Environmental Resource Inventory* should be utilized by Town leaders and regulatory review boards to help guide and prioritize open space land acquisition; to serve as an active reference tool for the Farmington regulatory boards in reviewing applications; to provide the basis for comparison in the review of the applicability and adequacy of current zoning designations; and to distinguish a hierarchy of protection for natural resources based on their function and value in their respective ecological communities.

4. Numerous modifications to Farmington's Inland Wetland, Zoning, and Subdivision regulations have been suggested for possible implementation in light of the *Environmental Resource Inventory* presented herein. Of significance is the recommendation for upland review areas near wetlands and watercourses. MMI recommends a 100-foot upland review area along all wetlands and watercourses that have not been identified by this study as being *Critical and Unique*. For areas designated by this study as being *Critical and Unique,* MMI suggests a 200-foot upland review area from the edge of wetlands and/or watercourses.

5. The Town should consider a program to protect its unfragmented natural areas through land acquisition, where possible, and through its land use planning agencies. There are many benefits to maintaining the Town's unfragmented natural areas. Healthy, ecologically diverse systems that are unfragmented perform important natural, abiotic processes, such as decomposition of organic matter, soil and sediment creation, filtration of ground and surface water, air cleansing, pollutant renovation and nutrient retention. In addition, these unfragmented lands provide educational and recreational opportunities to the public such as bird watching, hiking, skiing, hunting, and fishing.

6. Land use regulations of the Town of Farmington were reviewed and revisions have been suggested for the promotion of low impact development (LID) in Farmington. The type and scope of LID techniques used may vary from watershed to watershed and site to site depending, not only on the proposed land use, but on the geology and topography of the site. Other factors, such as depth to water and depth to bedrock are also considerations when evaluating LID application.

7. An effluent flow capacity analysis was conducted for Farmington's sewer avoidance area to determine sewage effluent renovation in terms of bacteria travel time and nitrate dilution to derive recommendations on allowable or minimum lot sizes and separation distances. Additionally suggested modifications to Farmington's zoning, subdivision, and inland wetland regulations have been provided for the purpose of protecting public health and the environment within the sewer avoidance zone.

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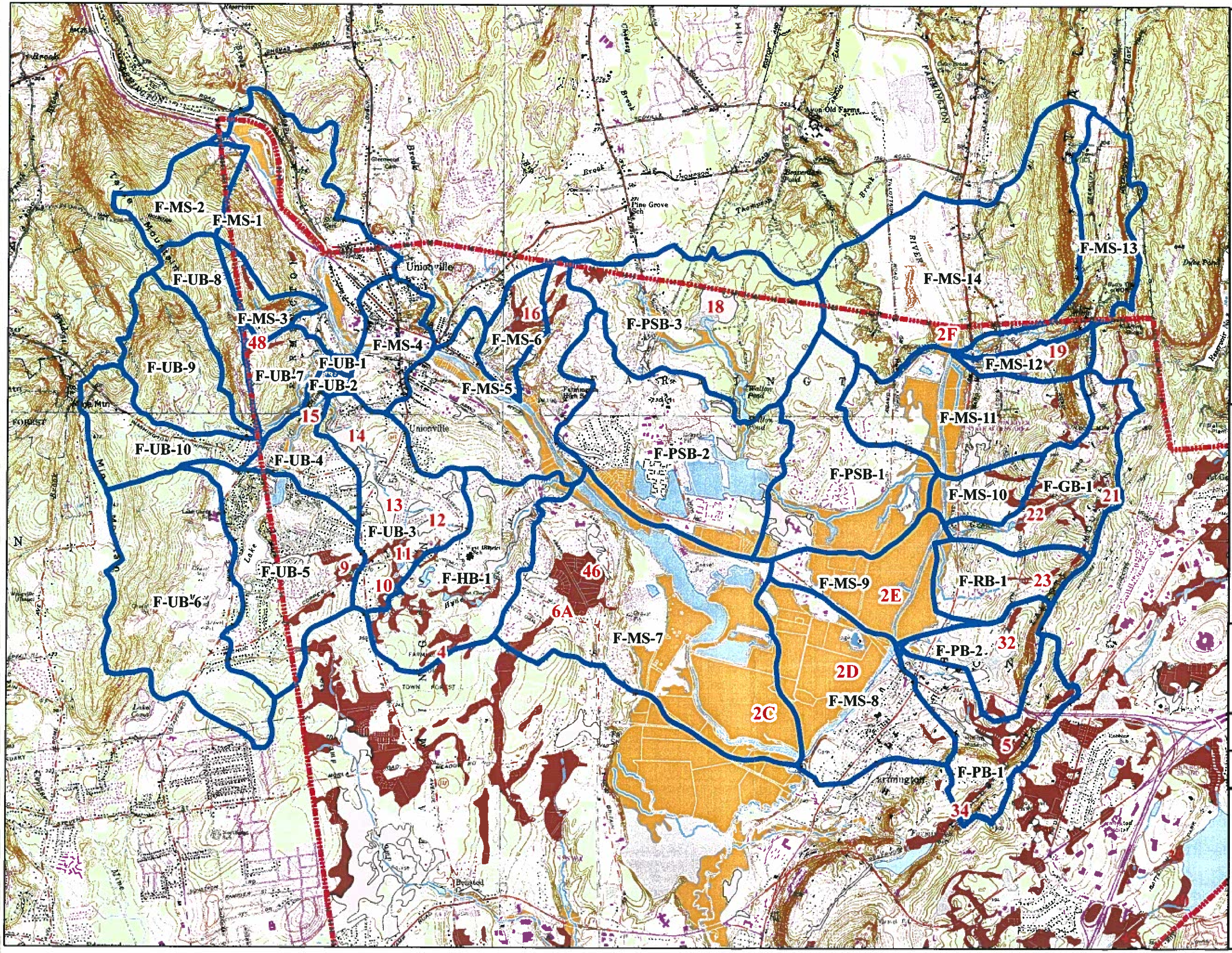

Legend

- Watershed Boundary
- Alluvial & Floodplain Soils
- Poorly & Very Poorly Drained
- Poorly Drained
- Very Poorly Drained

Key

10 = Wetland Number
F = Farmington River
MS = Main Stem
PB = Pope Brook
GB = Great Brook
RB = Rice Brook
PSB = Poplar Swamp Brook
HB = Hyde Brook
UB = Unionville Brook

N

Farmington River Watershed Map

Farmington Environmental Resource Inventory

Date: August 2005

Scale: 1:36,000

Sheet:

Figure ES-1

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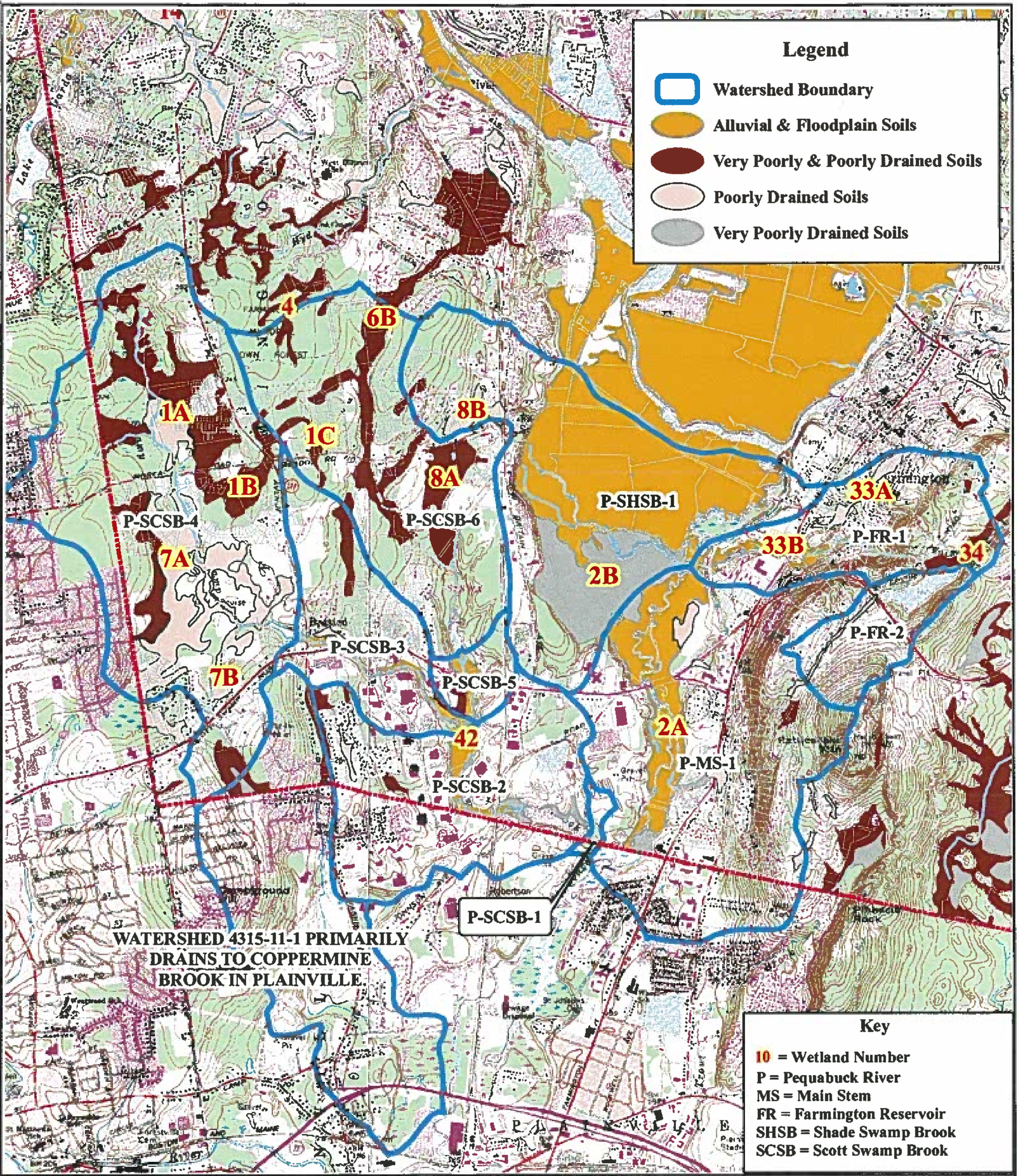

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Farmington Environmental Resource Inventory

LOCATION: Farmington, CT

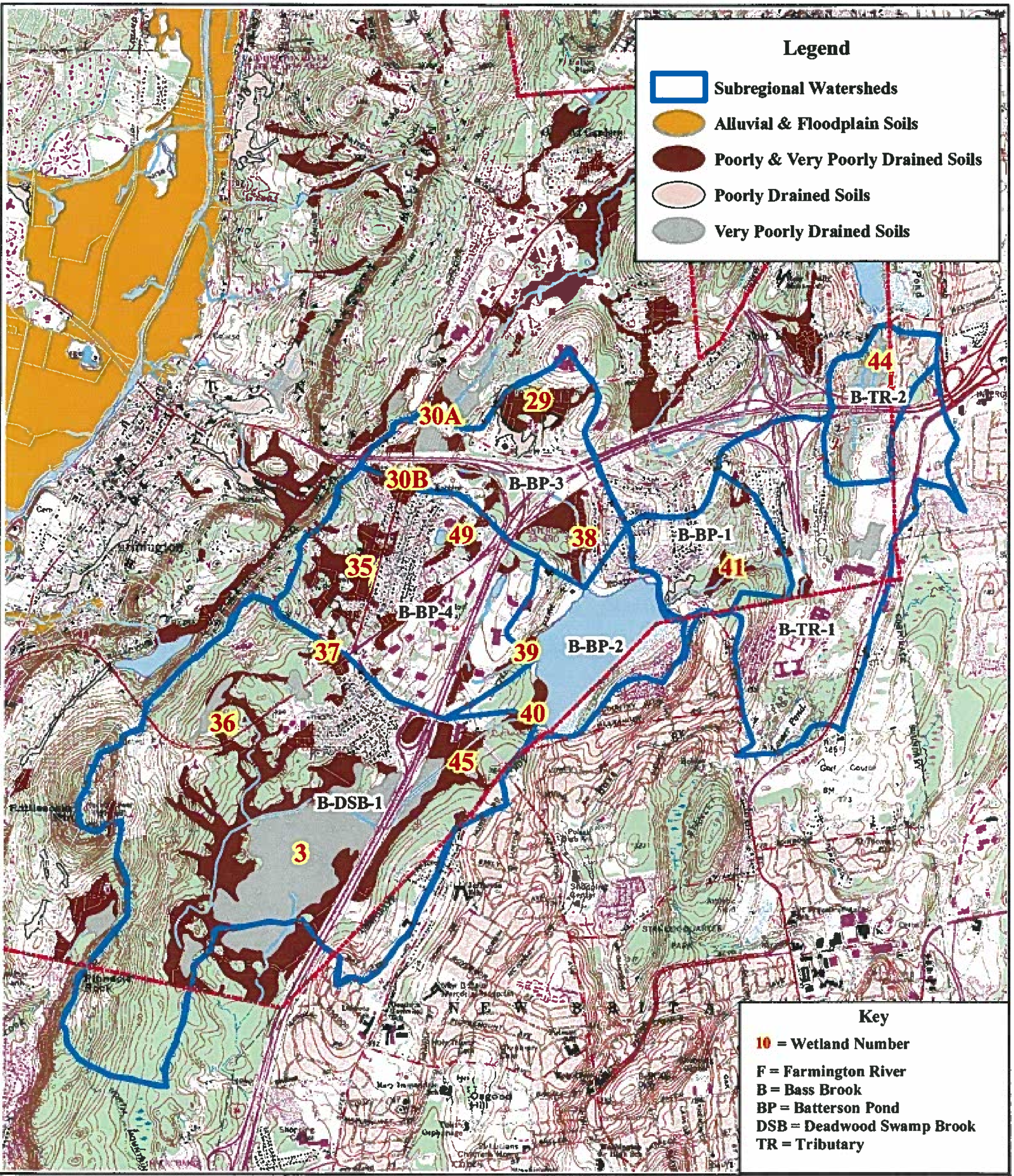
MMI#: 2412-01
MXD: H:Figure 3-8.mxd
SOURCE: DEP Bulletin 37

N

Pequabuck River Watershed Map

DATE: August 2005
SCALE: 1:36,000

SHEET: **Figure ES-2**



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Farmington Environmental Resource Inventory

LOCATION: Farmington, CT

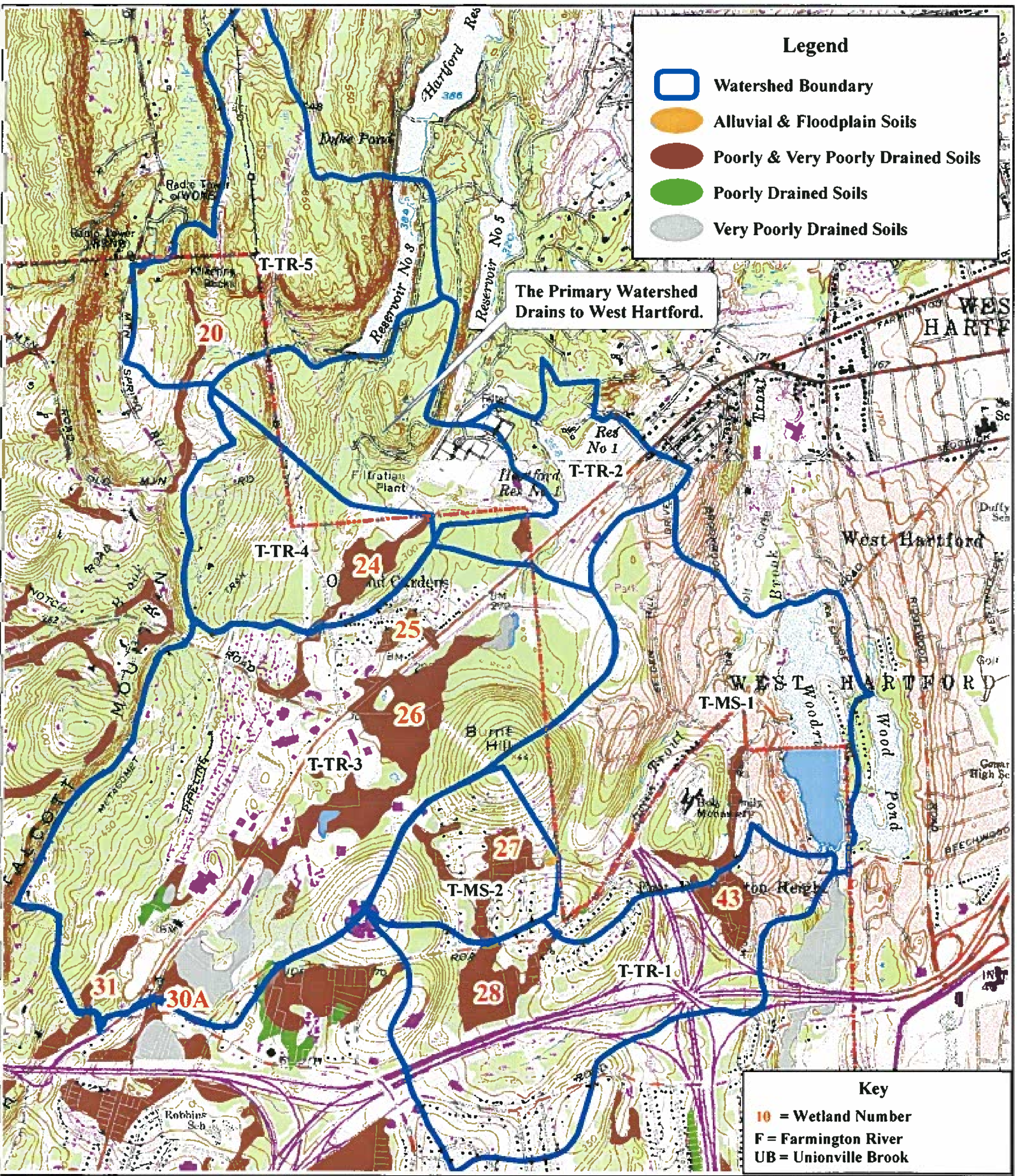
MMI#: 2412-01
MXD: H:Figure 3-19.mxd
SOURCE: DEP Bulletin 37

N

Bass Brook Watershed Map

DATE: August 2005
SCALE: 1:36,000

SHEET: Figure ES-3



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Farmington Environmental Resource Inventory

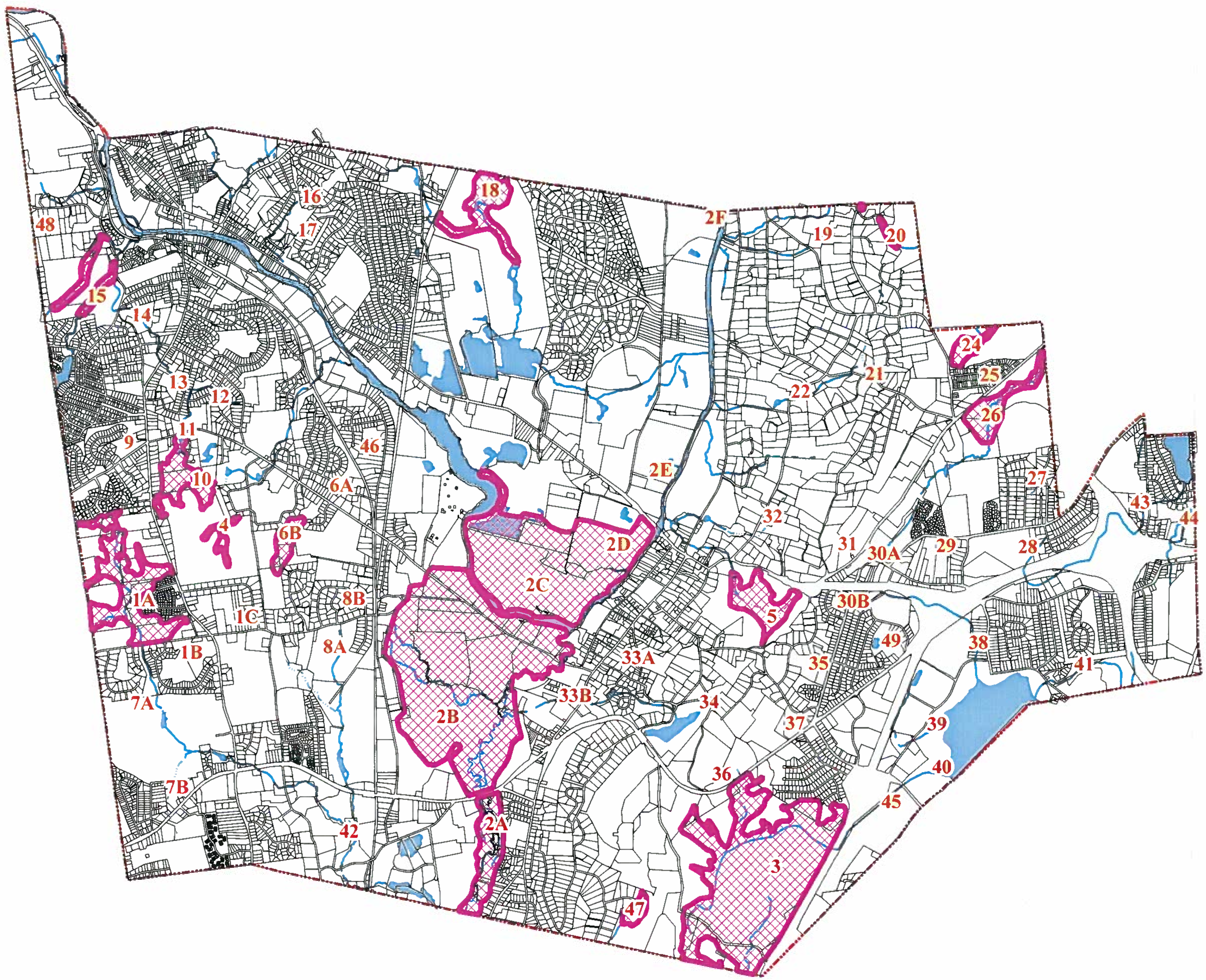
LOCATION: Farmington, CT

MMI#: 2412-01
MXD: H:Figure 3-27.mxd
SOURCE: DEP Bulletin 37

Trout Brook Watershed Map

DATE: August 2005
SCALE: 1:24,000

SHEET: Figure ES-4



Legend

Critical & Unique Wetlands

10 = Wetland Number

N

Critical and Unique Wetlands Location Map

Farmington Environmental Resource Inventory

Date: August 2005	Sheet:
Scale: 1:40,000	Figure ES-5

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