

Nutrient Enrichment Analysis Watershed Overview

Last Updated: 7 Nov. 2011

INTRODUCTION

A geo-spatial modeling analysis was conducted in the following watersheds below facilities discharging phosphorus to assess the level of nutrient enrichment in the river. The goal of the Connecticut interim nutrient management strategy is to achieve or maintain an enrichment factor (EF) of 8.4 or below throughout a watershed. An EF represents the ratio of the total seasonal phosphorus load (April through October) at the point of complete mixing downstream of a National Pollutant Discharge Elimination System (NPDES) discharge to that load calculated for the same location from a fully forested upstream watershed with no point discharges. The total current load includes the current load from the NPDES facility and any additional NPDES facilities upstream plus the load from current land use export.

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

The EF quantifies the cumulative influence of anthropogenic activity (point and non point) on current phosphorus loads. The goal of an 8.4 EF represents a threshold at which a significant change is seen in stream algal communities indicating highly enriched conditions and impacts to aquatic life uses. The analysis was conducted using stream algae collected in rivers and streams throughout CT under varying enrichment conditions. The approach targets the critical 'growing' season (April through October) when phosphorus is more likely to be taken up by sediment and biomass because of low flow and warmer conditions. During winter months aquatic plants are dormant and flows are higher providing constant flushing of phosphorus through aquatic systems with a less likely chance that it will settle out into the sediment. Limiting the phosphorus export from industrial and municipal facilities offers a targeted management strategy for achieving aquatic life designated uses within a waterbody.

Nutrient Enrichment Analysis Watershed Overview

Bantam River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
LITCHFIELD WPCF	CT0100803	LITCHFIELD	0.80	AS, Nitr, DNitr,UV

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
LITCHFIELD WPCF	0.50	3.29	13.07	2.39	9.97

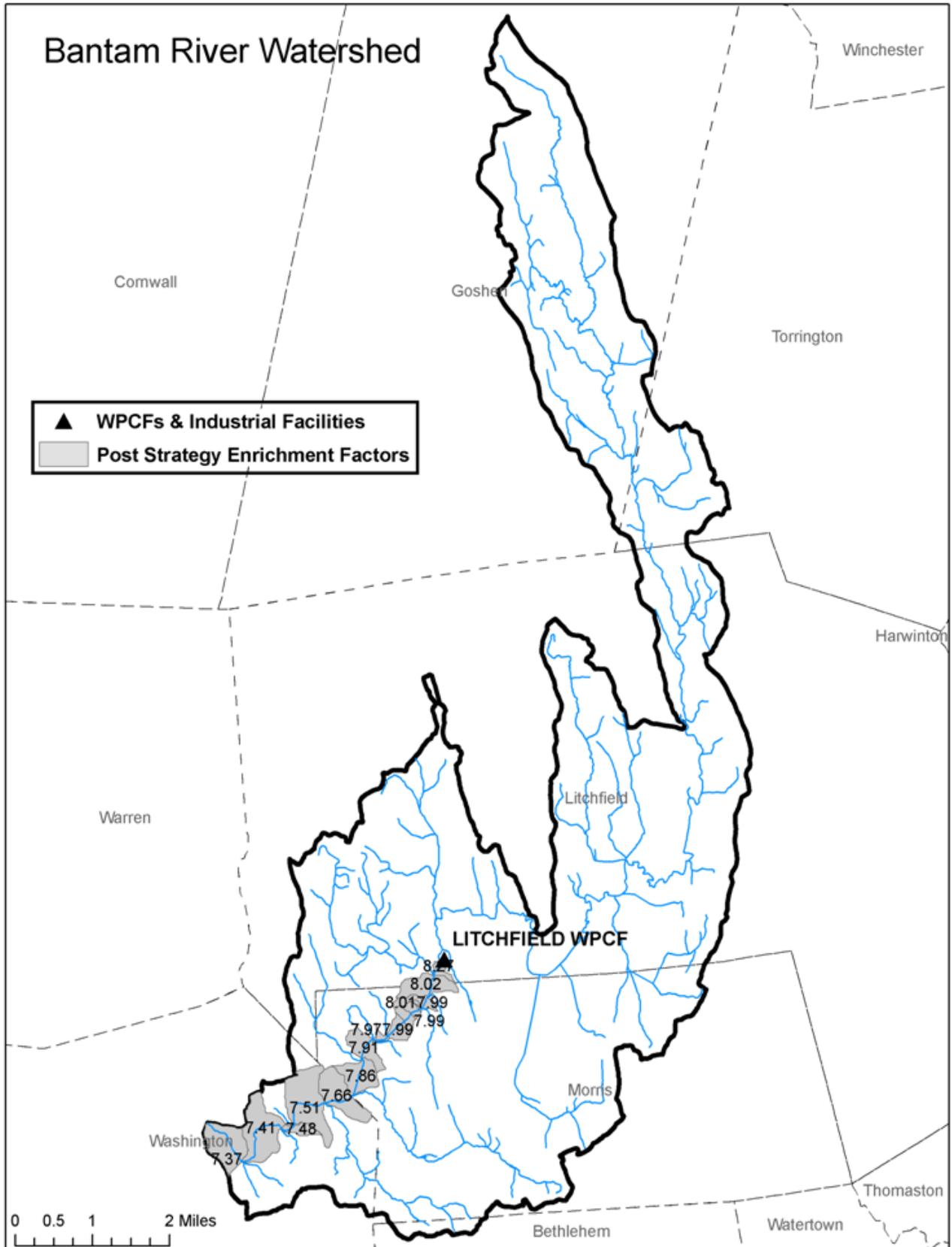
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
LITCHFIELD WPCF	13.07	14.04	2.86	9.50	9.97	8.40

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Post Strategy Implementation Enrichment Factors



Nutrient Enrichment Analysis Watershed Overview

Blackberry River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
NORFOLK SEWER DISTRICT	CT0101231	NORFOLK	0.35	AS, EA, DChlor, SFilt
NORTH CANAAN WPCF	CT0100064	CANAAN	0.40	AS, UV

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, SFilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
NORFOLK SEWER DISTRICT	0.31	1.70	3.45	Cap	3.45
NORTH CANAAN WPCF	0.32	1.88	4.29	Cap	4.29

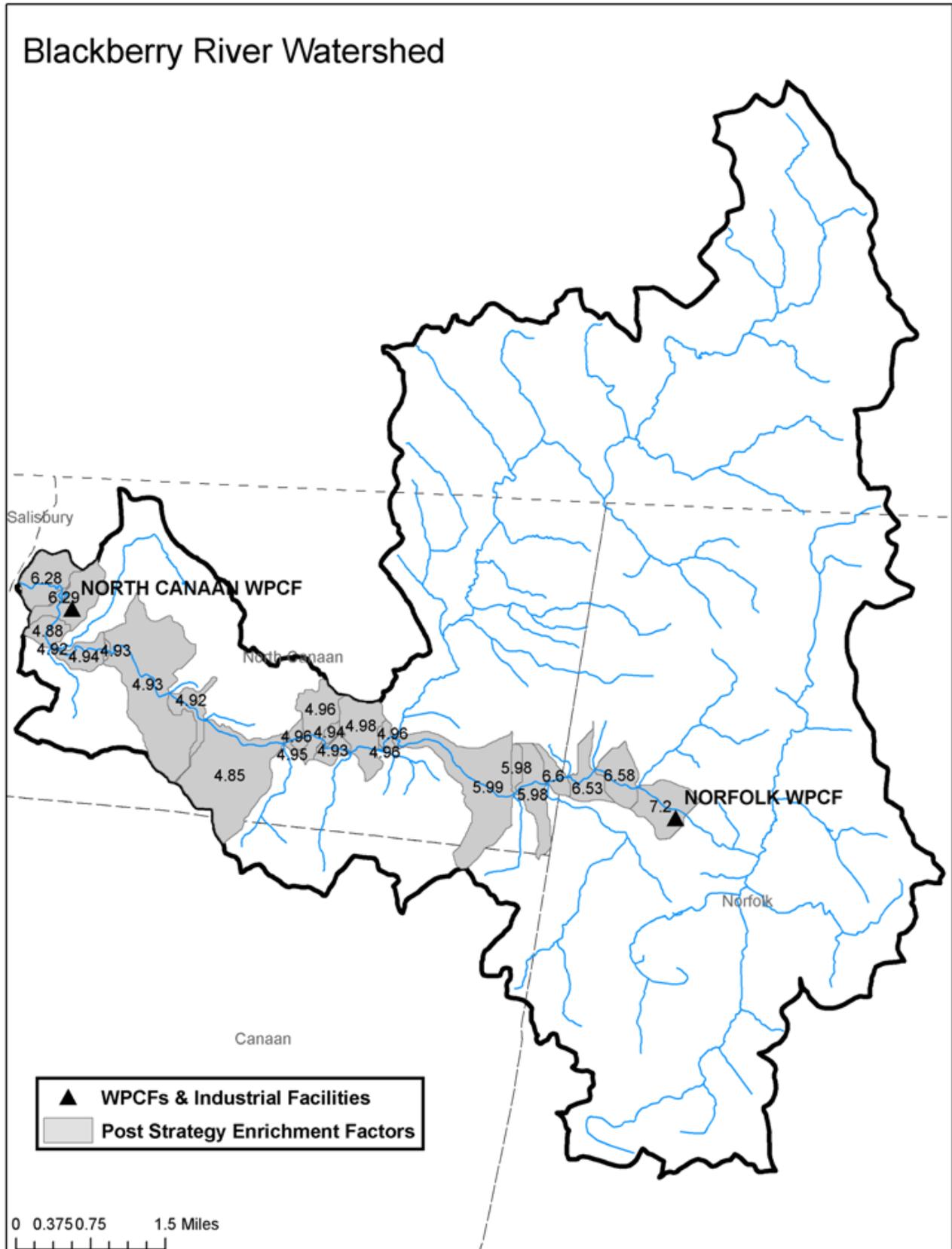
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
NORFOLK SEWER DISTRICT	3.45	2.33	0.80	7.20	3.45	7.20
NORTH CANAAN WPCF	7.74	11.40	3.04	6.30	7.74	6.30

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Post Strategy Implementation Enrichment Factors



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Factory Brook Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
SALISBURY WPCF	CT0100498	SALISBURY	0.67	AS, SFilt, UV

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, SFilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
SALISBURY WPCF	0.38	2.40	7.14	0.62	1.97

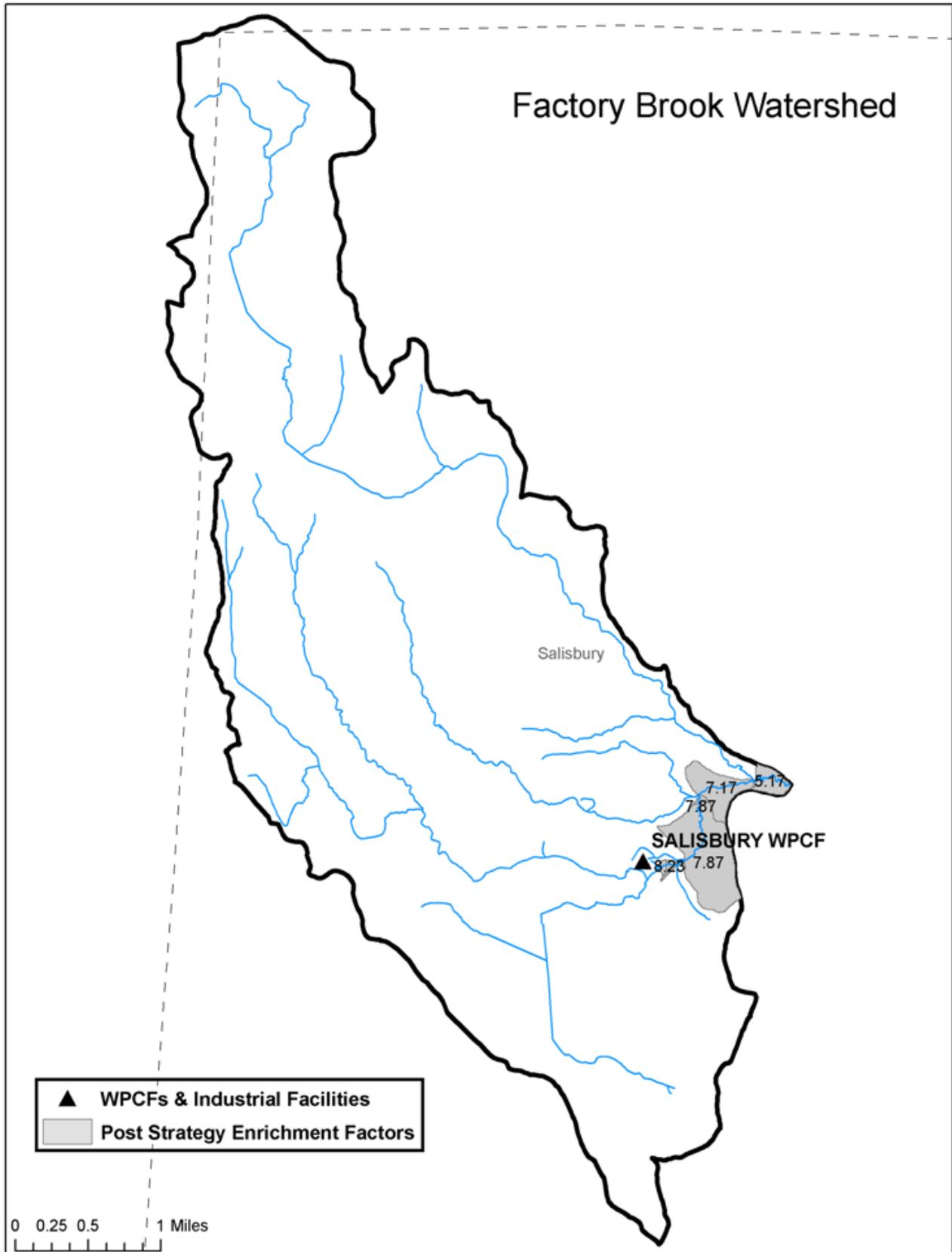
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
SALISBURY WPCF	7.14	1.83	0.45	19.80	1.97	8.40

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Farmington River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
PLYMOUTH WPCF	CT0100463	TERRYVILLE	1.75	AS, AdvTr, Nitr, DNitr, UV
WINSTED WPCF	CT0101222	WINSTED	3.50	AS, AdvTr, Nitr, DChlor
BRISTOL WPCF	CT0100374	BRISTOL	10.75	AS, AdvTr, Nitr, UV
PLAINVILLE WPCF	CT0100455	PLAINVILLE	3.80	RBC, SFilt, UV, AdvTr, Nitr
NEW HARTFORD WPCF*	CT0100331	NEW HARTFORD	0.40	AS, EA
CANTON WPCF	CT0100072	CANTON	0.80	RBC, SFilt, TFilt, UV
FARMINGTON WPCF	CT0100218	FARMINGTON	5.65	AS, TFilt, AdvTr, Nitr, DNitr, DChlor
SIMSBURY WPCF	CT0100919	SIMSBURY	2.85	AS, OD, Nitr, DNitr, UV

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, SFilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
PLYMOUTH WPCF	1.05	3.47	28.64	0.5	4.38
WINSTED WPCF	1.38	1.87	20.03	1.49	17.16
BRISTOL WPCF	8.96	2.62	189.33	0.1	7.48
PLAINVILLE WPCF	2.09	5.08	82.35	0.2	3.49
NEW HARTFORD WPCF*	0.40	3.27	10.92	Cap	10.92
CANTON WPCF	0.60	5.44	24.80	Cap	24.80
FARMINGTON WPCF	4.20	3.55	119.01	2	70.11
SIMSBURY WPCF	2.25	4.57	85.99	2.5	46.95

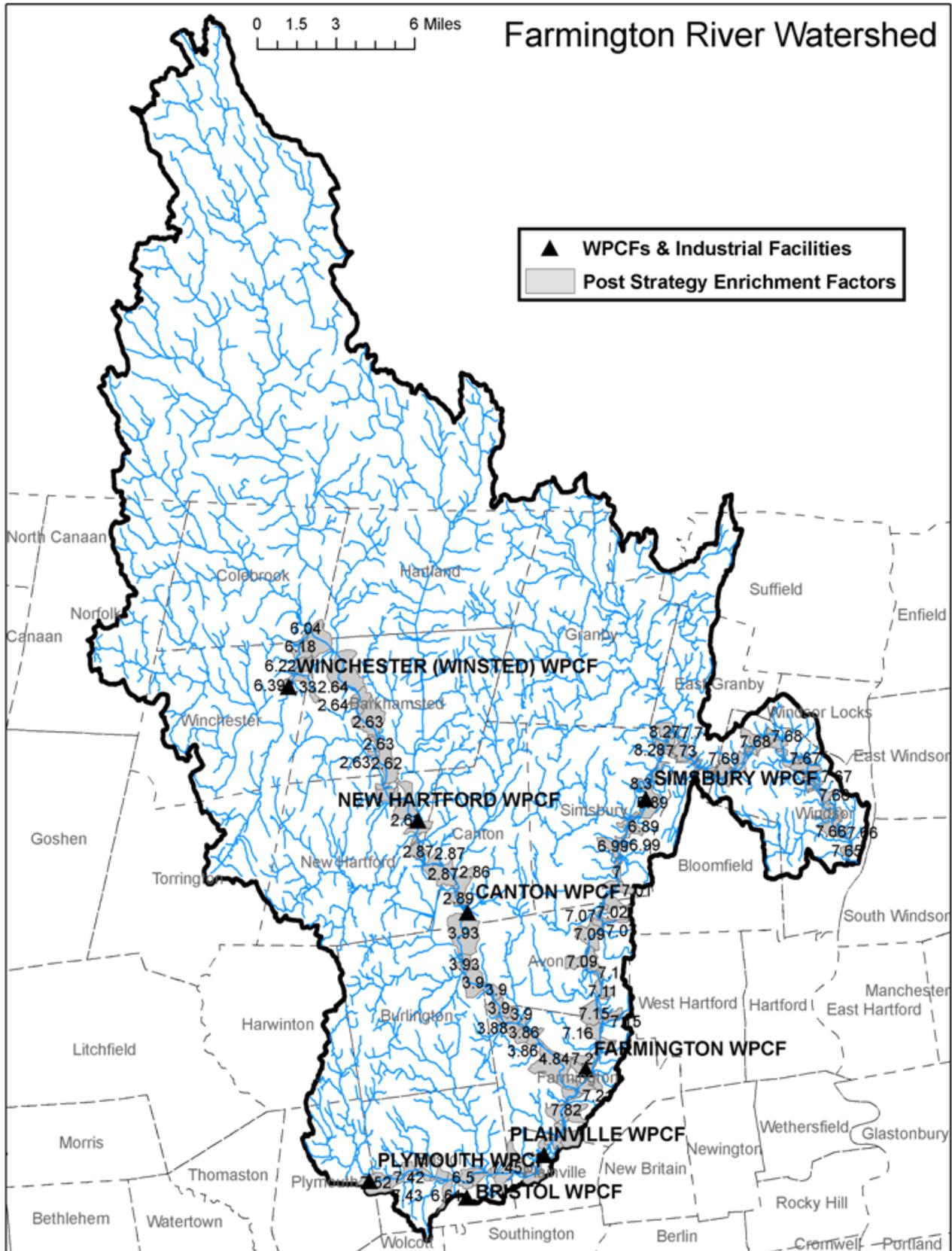
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
PLYMOUTH WPCF	28.64	3.42	1.04	30.90	4.38	7.50
WINSTED WPCF	20.03	6.70	2.85	9.40	17.16	8.40
BRISTOL WPCF	217.97	11.07	3.04	75.40	11.86	7.60
PLAINVILLE WPCF	300.32	12.13	3.27	95.50	15.35	8.40
NEW HARTFORD WPCF*	30.95	36.38	20.15	3.30	28.08	3.20
CANTON WPCF	55.75	47.77	23.94	4.30	52.88	4.20
FARMINGTON WPCF	475.08	68.46	29.75	18.30	138.34	7.00
SIMSBURY WPCF	561.07	80.96	32.97	19.50	185.29	8.10

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Post Strategy Implementation Enrichment Factors



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Fivemile River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
NEW CANAAN WPCF	CT0101273	NEW CANAAN	1.70	AS, OD, EA, AdvTr, Nitr, DNitr, UV

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
NEW CANAAN WPCF	0.93	1.42	10.45	0.19	1.47

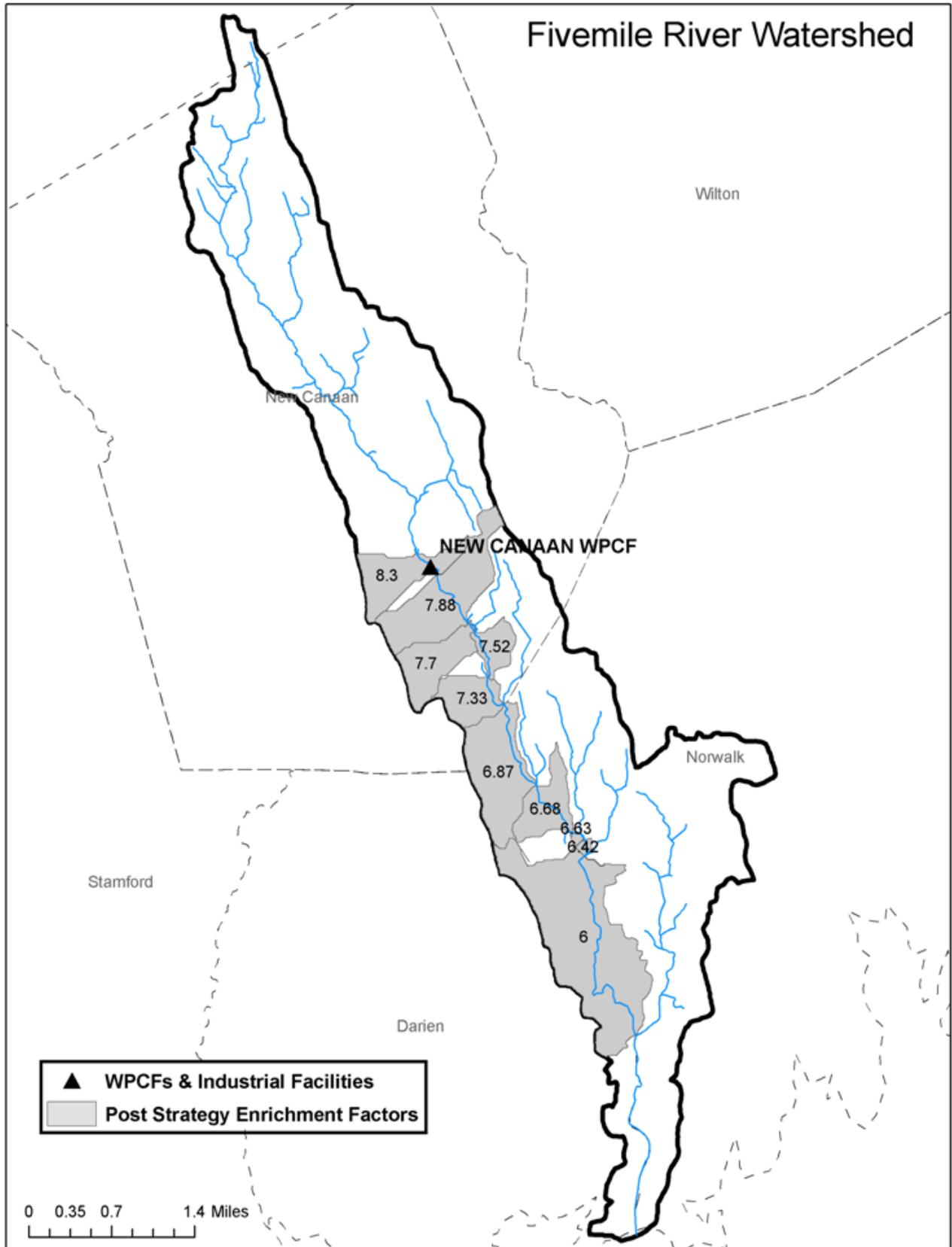
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
NEW CANAAN WPCF	10.45	1.26	0.33	35.50	1.47	8.30

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Hockanum River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
VERNON WPCF	CT0100609	VERNON	7.10	PAC, AdvTr, Nitr, SFilt, DChlor
MANCHESTER WATER & SEWER	CT0100293	MANCHESTER	8.25	AS, AdvTr, Nitr, UV

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, SFilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
VERNON WPCF	3.90	2.30	72.19	0.14	4.56
MANCHESTER WATER & SEWER	6.33	2.15	110.40	0.25	13.21

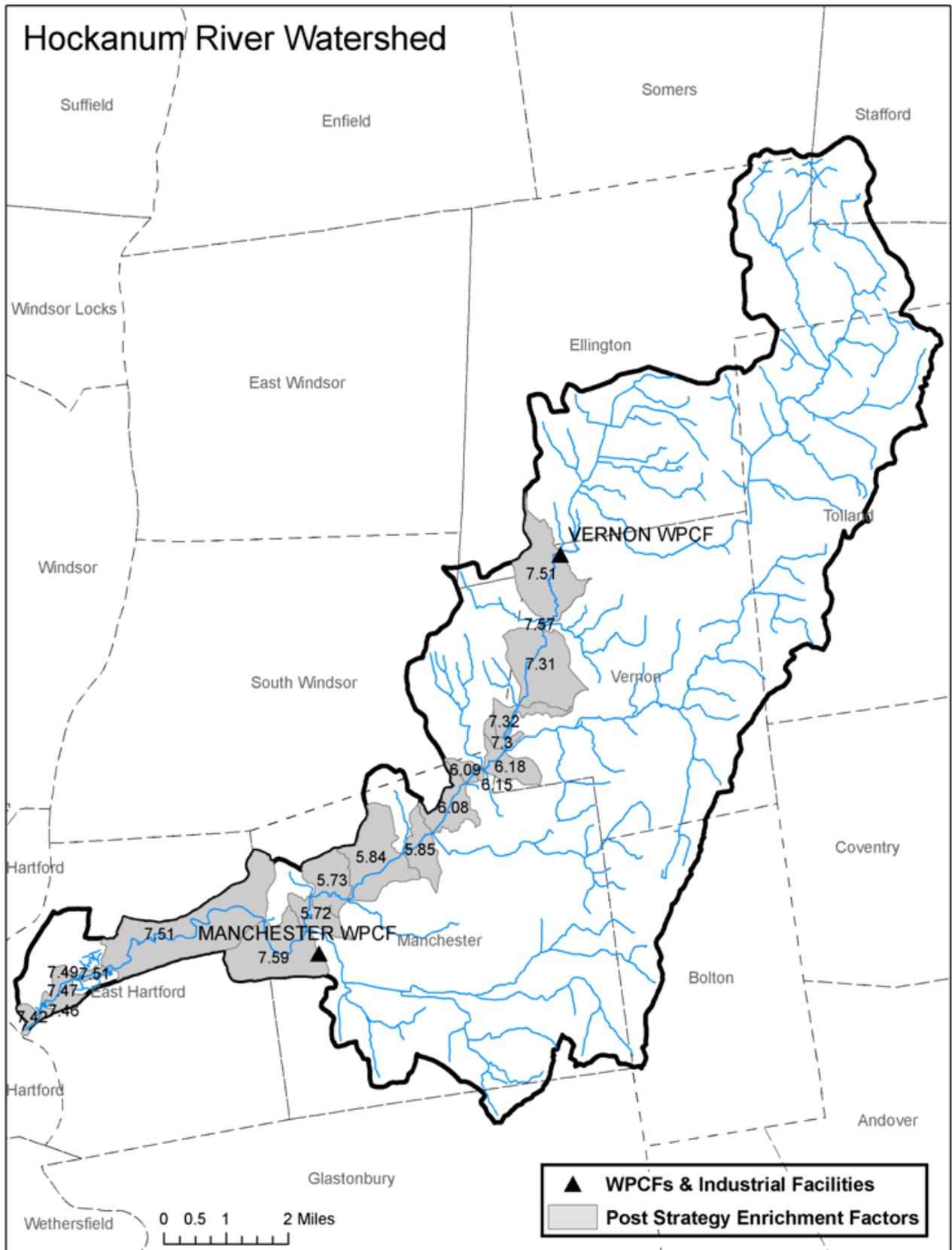
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
VERNON WPCF	72.19	10.00	1.77	46.50	4.56	8.20
MANCHESTER WATER & SEWER	182.59	22.96	4.85	42.40	17.77	8.40

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Housatonic River Main Stem Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
New Milford WPCF*	CT0100391	NEW MILFORD	1.02	AS, AdvTr, PRem

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
New Milford WPCF*	0.69	1.00	5.76	Cap	5.76

Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
New Milford WPCF*	79.49	301.85	71.87	5.30	79.49	5.30

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Limekiln Brook Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
DANBURY WPCF	CT0100145	DANBURY	15.50	AS, TFilt, AdvTr, Nitr, DNitr, PRem, DChlor

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
DANBURY WPCF	9.05	1.04	78.51	0.1	7.55

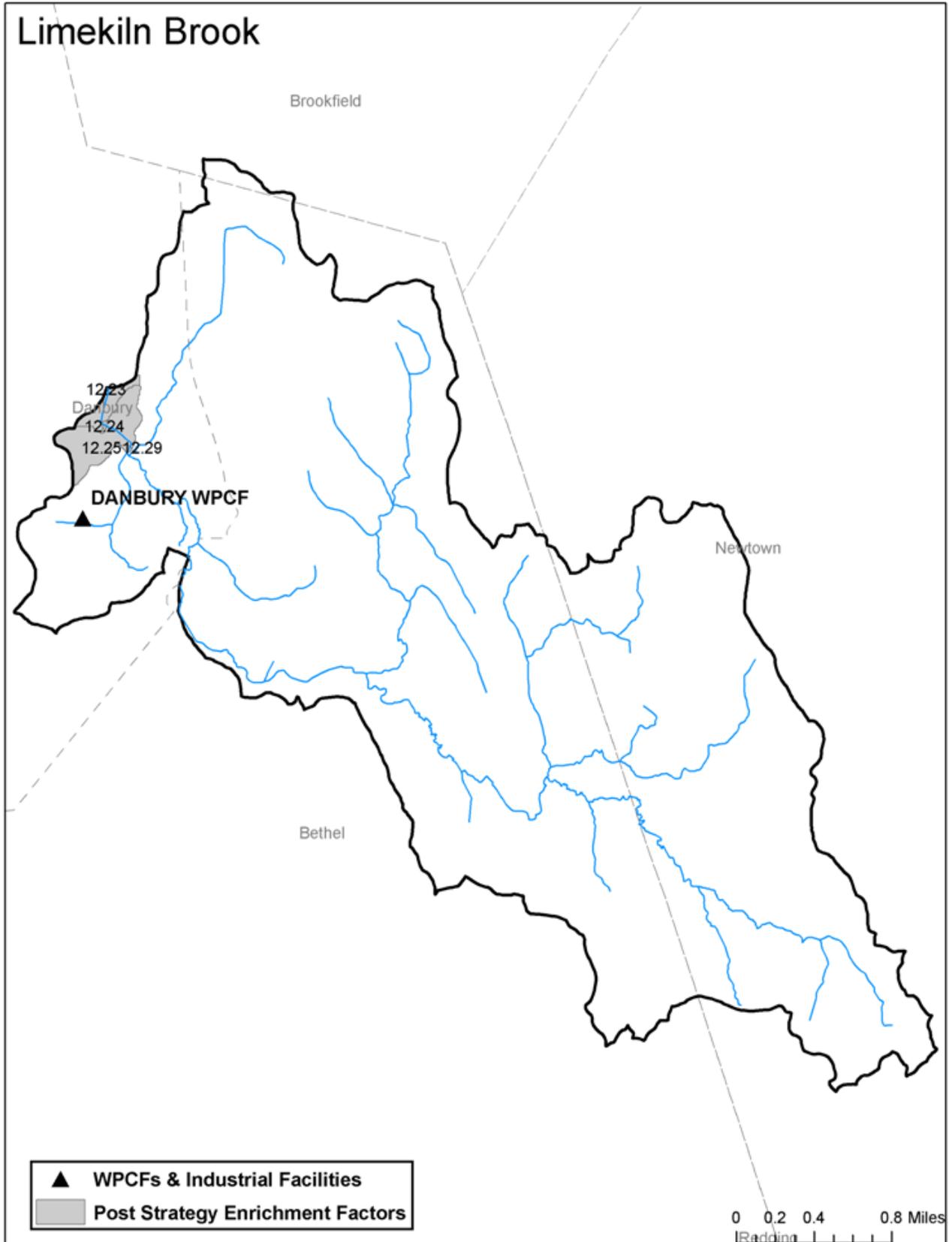
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
DANBURY WPCF	78.51	3.70	0.92	89.80	7.55	12.30

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Nutrient Enrichment Analysis Watershed Overview

Naugatuck River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
TORRINGTON WPCF	CT0100579	TORRINGTON	7.00	AS, AdvTr, Nitr, DNitr, DChlor
QUALITY ROLLING AND DEBURRING INC.	CT0025305	THOMASTON		
THOMASTON WPCF	CT0100781	THOMASTON	1.38	SBR, AdvTr, UV, Nitr, DNitr
WATERBURY WPCF	CT0100625	WATERBURY	27.00	AS, AdvTr, Nitr, DNitr, UV
NAUGATUCK WPCF	CT0100641	NAUGATUCK	10.30	AS, AdvTr, Nitr, DNitr, DChlor
BEACON FALLS WPCF	CT0101061	BEACON FALLS	0.71	AS, UV
SEYMOUR WPCF	CT0100501	SEYMOUR	2.93	AS, Nitr, DNitr, DChlor
ANSONIA WPCF	CT0100013	ANSONIA	3.50	AS, DChlor

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, Tfilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
TORRINGTON WPCF	5.18	1.68	64.73	0.4	17.29
QUALITY ROLLING AND DEBURRING INC.	0.09	0.70	0.54	0.7	0.53
THOMASTON WPCF	0.88	3.29	22.68	1	7.35
WATERBURY WPCF	20.52	3.19	539.92	0.2	34.26
NAUGATUCK WPCF	4.92	4.30	159.97	0.4	16.43
BEACON FALLS WPCF	0.32	3.19	7.91	1	2.67
SEYMOUR WPCF	1.29	3.98	41.09	0.7	7.54
ANSONIA WPCF	2.04	2.89	43.32	0.7	11.92

Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
TORRINGTON WPCF	64.73	11.52	3.63	21.00	17.29	7.90
QUALITY ROLLING AND DEBURRING INC.	65.27	22.60	6.72	13.10	17.82	6.00
THOMASTON WPCF	87.95	25.36	7.29	15.50	25.17	6.90
WATERBURY WPCF	627.87	51.35	13.87	49.00	59.42	8.00
NAUGATUCK WPCF	787.84	61.32	16.26	52.20	75.85	8.40
BEACON FALLS WPCF	795.75	64.55	17.66	48.70	78.52	8.10
SEYMOUR WPCF	836.84	72.85	20.05	45.40	86.06	7.90
ANSONIA WPCF	880.16	74.85	20.65	46.20	97.98	8.40

Nutrient Enrichment Analysis Watershed Overview

Norwalk River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
RIDGEFIELD MAIN WPCF C/O OMI	CT0100854	RIDGEFIELD	1.00	AS, AdvTr, Nitr, DNitr, PRem, Sfilt, UV
RIDGEFIELD RTE 7 C/O OMI*	CT0101451	RIDGEFIELD	0.12	RBC, UV, Nitr
REDDING WPCF	CT0101770	REDDING	0.25	SBR, UV, AdvTr, Nitr, DNitr

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
RIDGEFIELD MAIN WPCF C/O OMI	0.62	1.38	5.99	0.1	0.52
RIDGEFIELD RTE 7 C/O OMI*	0.12		0.00	1	1.00
REDDING WPCF	0.05	3.38	1.08	Cap	1.08

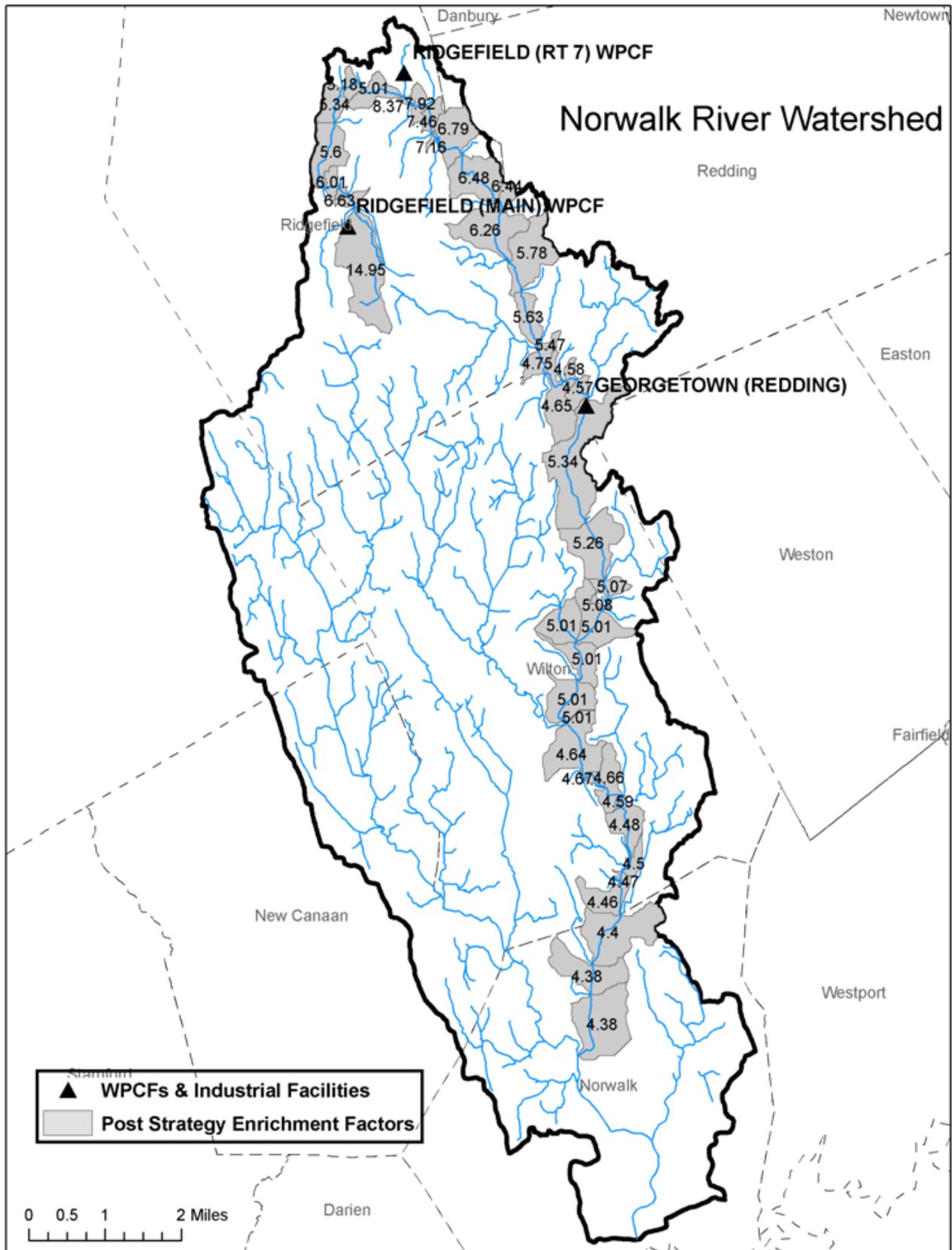
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
RIDGEFIELD MAIN WPCF C/O OMI	5.99	0.15	0.04	137.90	0.52	15.00
RIDGEFIELD RTE 7 C/O OMI*	5.99	0.84	0.28	24.20	1.52	8.40
REDDING WPCF	7.07	2.66	0.99	9.90	2.60	5.30

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Pomperaug River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
SOUTHBURY HERITAGE VILLAGE WPCF*	CT0101133	SOUTHBURY	0.78	AS, Nitr, DNitr, PRem

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
SOUTHBURY HERITAGE VILLAGE WPCF*	0.66	0.96	10.92	Cap	10.92

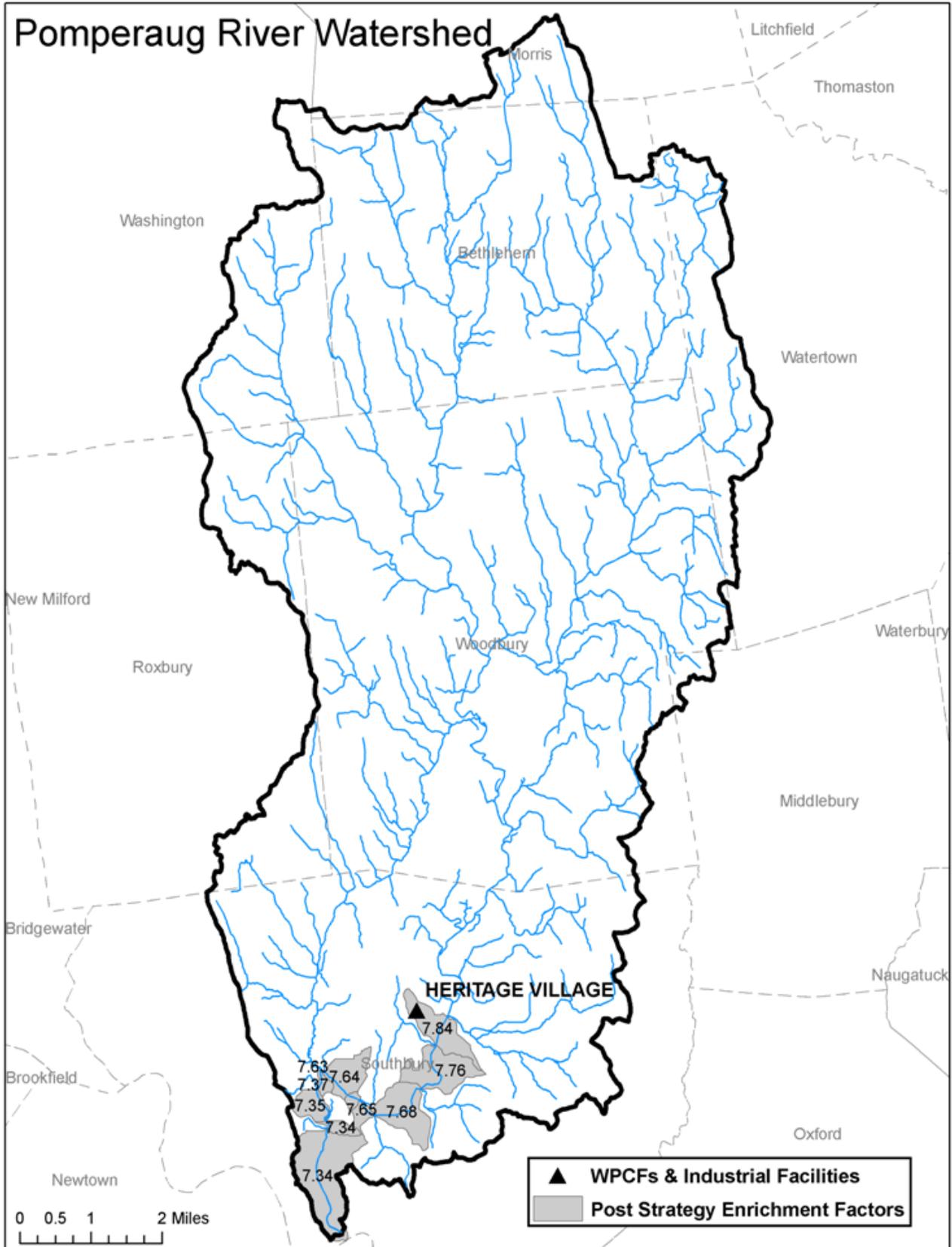
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
SOUTHBURY HERITAGE VILLAGE WPCF*	10.92	28.47	5.03	7.80	10.92	7.80

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Pootatuck River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
NEWTOWN WPCF	CT0101788	NEWTOWN	0.93	AS, OD, EA, UV, AdvTr, PRem, Nitr, DNitr

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
NEWTOWN WPCF	0.48	0.52	4.01	Cap	4.01

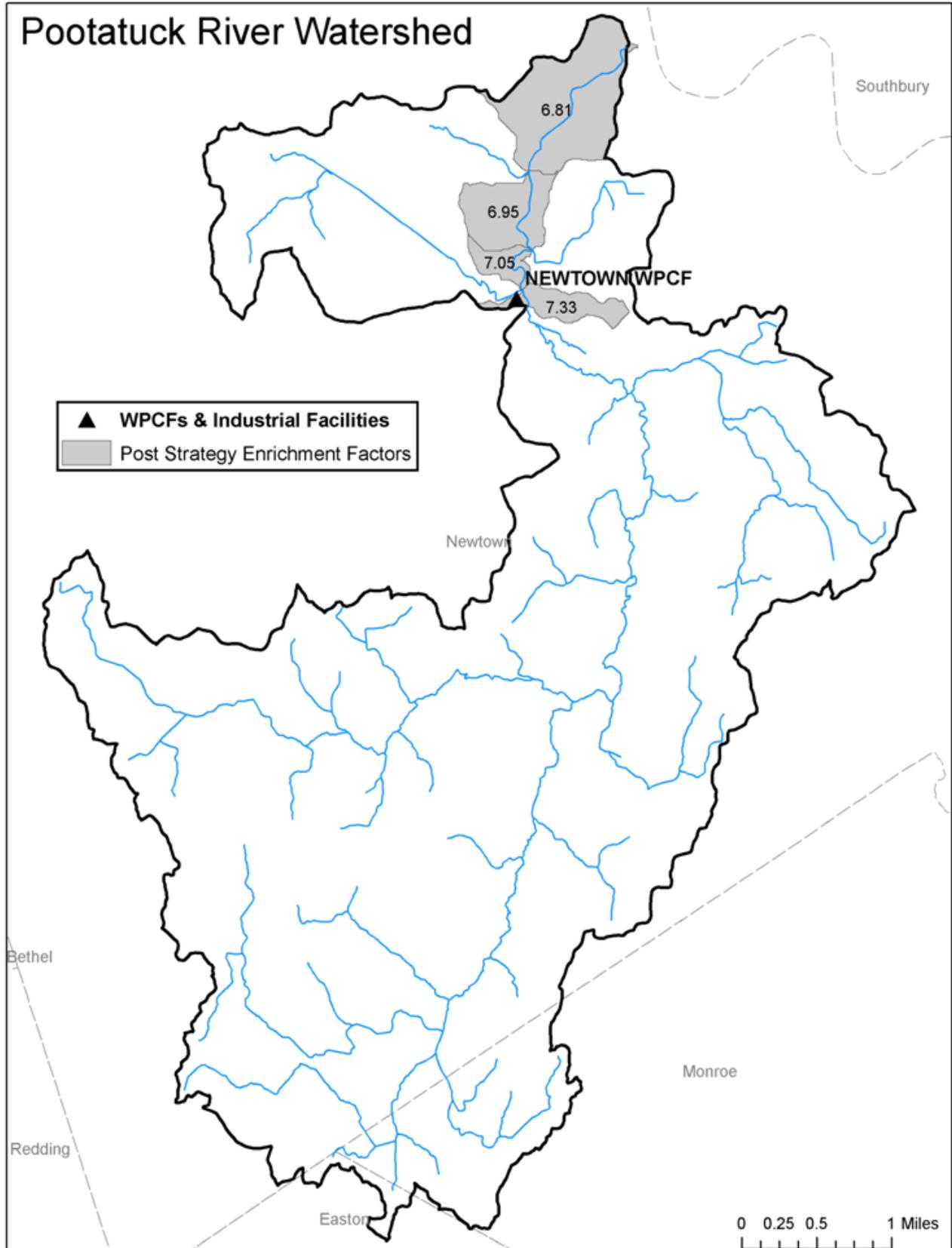
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
NEWTOWN WPCF	4.01	6.86	1.48	7.33	4.01	7.33

Nutrient Enrichment Analysis Watershed Overview

Post Strategy Implementation Enrichment Factors



Nutrient Enrichment Analysis Watershed Overview

Quinebaug River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
THOMPSON WPCF	CT0100706	THOMPSON	1.36	AS, DChlor
PUTNAM WPCF	CT0100960	PUTNAM	2.91	AS, DChlor
KILLINGLY WPCF	CT0101257	DANIELSON	8.00	AS, DChlor, TFilt
PLAINFIELD NORTH WPCF	CT0100447	PLAINFIELD	1.08	AS, DChlor
PLAINFIELD WPCF	CT0100439	PLAINFIELD	0.71	AS, EA, DChlor
GRISWOLD WPCA	CT0100269	JEWETT CITY	0.50	AS, OD, PRem, UV, (Nitr, DNitr capable)

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
THOMPSON WPCF	0.36	2.32	6.29	0.7	2.10
PUTNAM WPCF	1.44	1.80	19.69	0.7	8.41
KILLINGLY WPCF	3.12	1.58	40.64	0.7	18.23
PLAINFIELD NORTH WPCF	0.66	3.52	17.82	0.7	3.86
PLAINFIELD WPCF	0.43	3.13	10.51	0.7	2.51
GRISWOLD WPCA	0.50	2.11	5.52	0.7	2.92

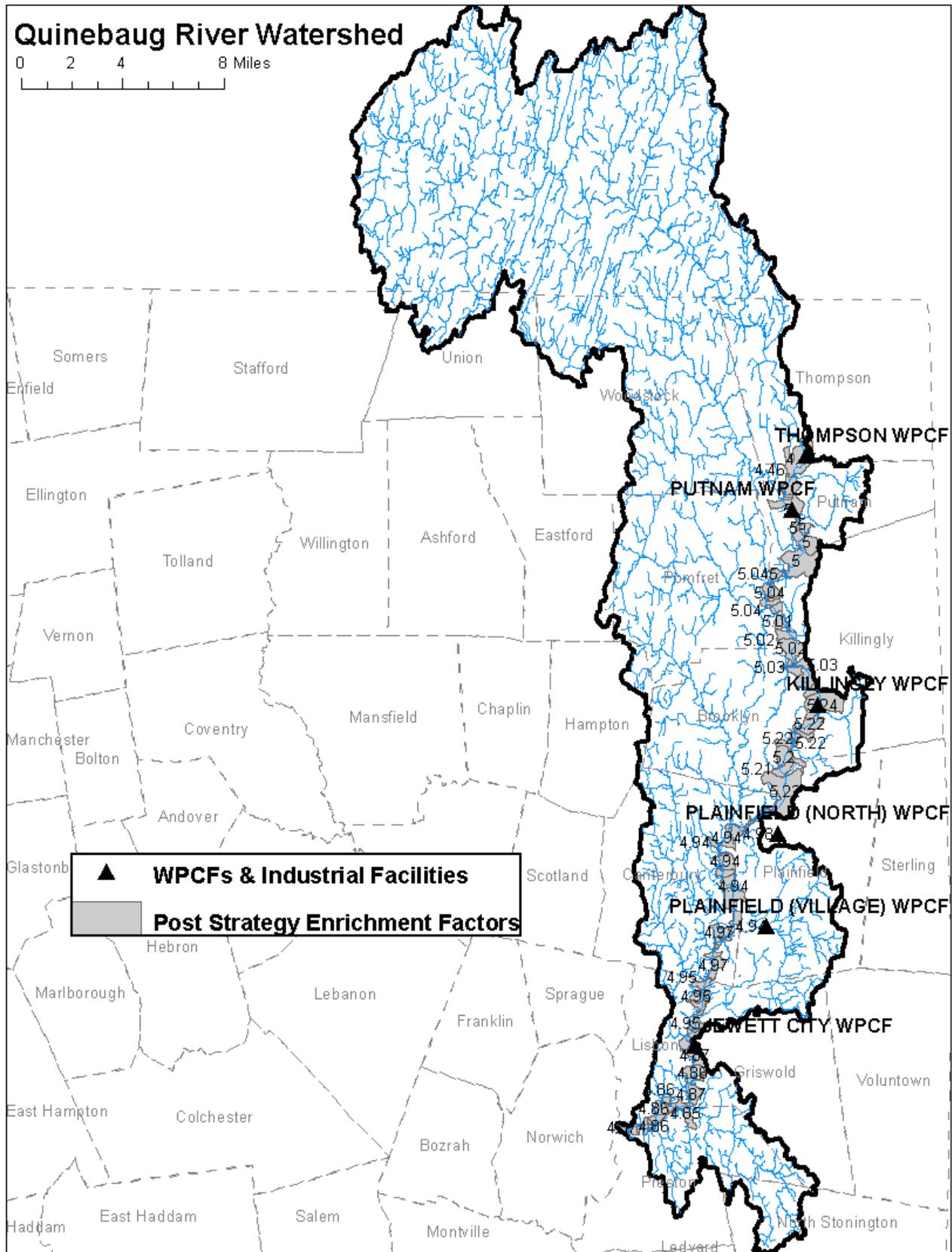
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
THOMPSON WPCF	6.29	25.65	7.45	5.80	2.10	5.30
PUTNAM WPCF	25.98	78.18	21.60	5.70	10.52	5.00
KILLINGLY WPCF	66.62	111.14	30.42	6.50	28.75	5.20
PLAINFIELD NORTH WPCF	84.44	133.45	37.22	6.40	32.60	5.00
PLAINFIELD WPCF	94.95	152.67	41.70	6.40	35.12	5.00
GRISWOLD WPCA	100.47	172.44	47.25	6.20	38.04	4.90

Nutrient Enrichment Analysis Watershed Overview

Post Strategy Implementation Enrichment Factors



Nutrient Enrichment Analysis Watershed Overview

Quinnipiac River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
SOUTHINGTON WPCF	CT0100536	SOUTHINGTON	7.40	AS, AdvTr, TFilt, UV, Nitr
CHESHIRE WPCF	CT0100081	CHESHIRE	3.50	AS, Nitr, DNitr, DChlor
MERIDEN WPCF	CT0100315	MERIDEN	11.60	AS, AdvTr, DChlor, Nitr, DNitr
WALLINGFORD WATER & SEWER	CT0100617	WALLINGFORD	8.00	RBC, UV, Nitr, DNitr, AdvTr
CYTEC INDUSTRIES INC.	CT0000086	WALLINGFORD		

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
SOUTHINGTON WPCF	4.51	2.74	100.00	0.2	7.53
CHESHIRE WPCF	2.43	4.61	88.20	0.2	4.06
MERIDEN WPCF	10.44	1.47	121.64	0.1	8.71
WALLINGFORD WATER & SEWER	5.36	3.46	145.16	0.2	8.95
CYTEC INDUSTRIES INC.	1.79	1.31	19.44	0.1	1.49

Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
SOUTHINGTON WPCF	100.00	14.61	3.72	30.80	7.53	6.00
CHESHIRE WPCF	188.20	18.77	4.61	44.90	11.59	6.60
MERIDEN WPCF	309.84	26.41	6.38	52.70	20.30	7.30
WALLINGFORD WATER & SEWER	455.00	31.45	7.34	66.20	29.25	8.30
CYTEC INDUSTRIES INC.	474.44	32.47	7.50	67.60	30.74	8.40

Nutrient Enrichment Analysis Watershed Overview

Shetucket River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
SPRAGUE WPCF	CT0100978	Baltic	0.40	AS, EA

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, TFilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
SPRAGUE WPCF	0.17	2.68	3.11	Cap	3.11

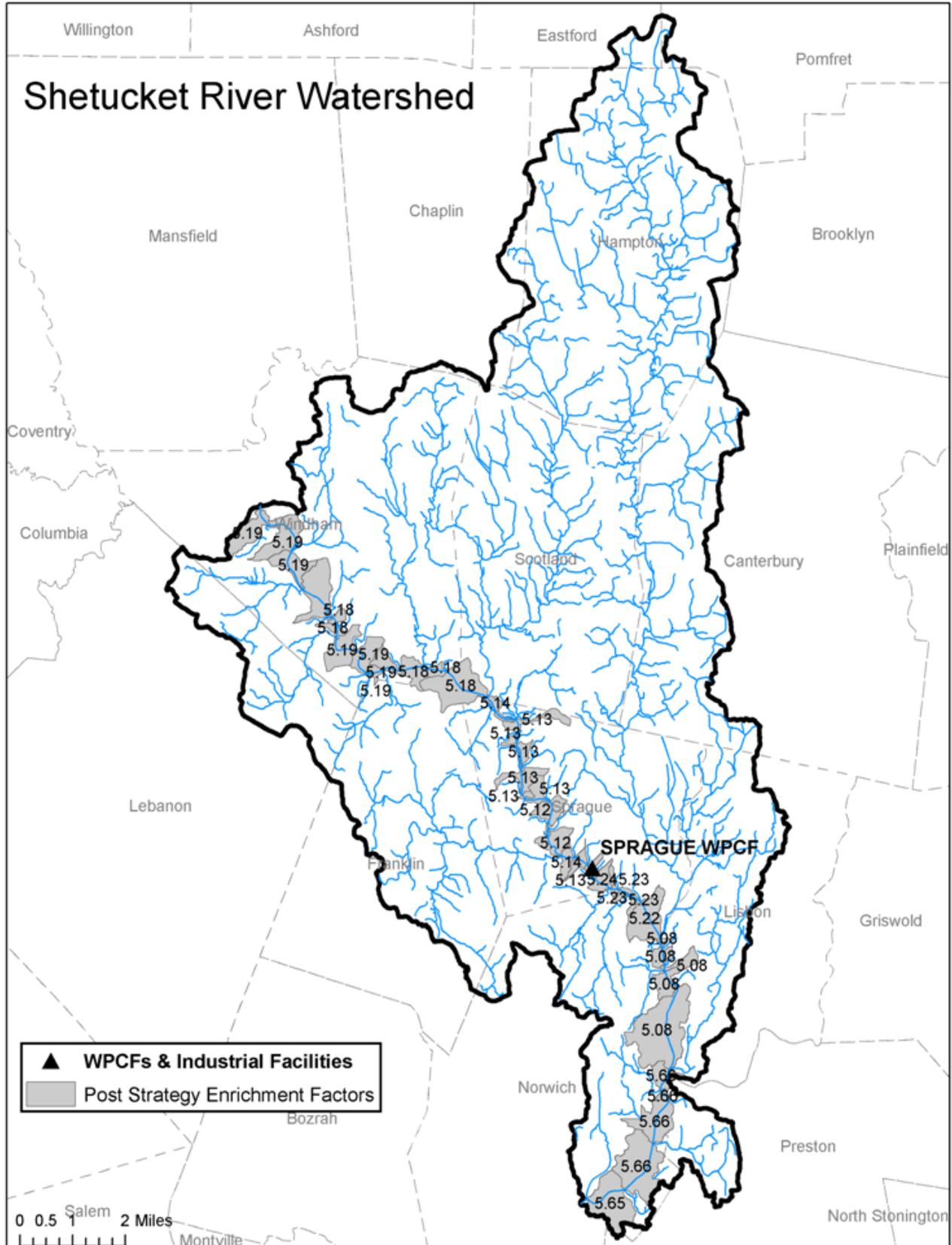
Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
SPRAGUE WPCF	54.11	107.31	30.83	5.20	54.11	5.20

Nutrient Enrichment Analysis Watershed Overview

Post Strategy Implementation Enrichment Factors



Nutrient Enrichment Analysis Watershed Overview

Willimantic River Watershed

Facility Overview

NPDES	NPDES#	Town	Design Flow	Type of Treatment*
STAFFORD WPCA	CT0101214	STAFFORD SPRINGS	2.00	AS, UV, Anthracite Filters
UCONN WPCF	CT0101320	STORRS	3.00	AS, ADvTr, OD, Nitr, DNitr, DChlor
WILLIMANTIC WPCF	CT0101001	WILLIMANTIC	5.50	AS, DChlor

* AS = activated sludge, RBC = rotating biological contractor system, SBR = sequencing batch reactor system, EA = extended aeration, OD = oxidation ditch, DChlor = dechlorination, UV = ultraviolet disinfection, AdvTr = advanced treatment, Nitr = nitrification, DNitr = denitrification, PRem = phosphorous removal, PAC = powdered activated carbon system, Sfilt = sand filter, Tfilt = trickling filter

Current and Proposed Seasonal Phosphorus Treatment

NPDES	Current Average Flow (MGD) 2001 - 2007	Current Average Concentration (mg/L) 2001 - 2007	Current Average Load (lbs/day) 2001 - 2007	Proposed Performance Limit (mg/L)	Proposed Permit Load (lbs/day)
STAFFORD WPCA	1.49	0.71	8.61	Cap	8.61
UCONN WPCF	1.27	2.45	23.76	Cap	23.76
WILLIMANTIC WPCF	2.42	0.95	18.63	Cap	18.63

Enrichment Factor at Point of Discharge

$$\text{Enrichment Factor (EF)} = \frac{\text{Total NPDES Load (lbs/day)} + \text{Land Cover Load (lbs/day)}}{\text{Forested Condition Load (lbs/day)}}$$

NPDES	Upstream NPDES Load (lbs/day)	Estimated Land Use Export Load (lbs/day)	Forested Condition Load (lbs/day)	Current EF	Proposed Upstream NPDES Load (lbs/day)	Proposed EF
STAFFORD WPCA	8.61	8.99	3.54	5.00	8.61	5.00
UCONN WPCF	32.37	21.06	7.36	7.30	32.37	7.30
WILLIMANTIC WPCF	51.00	50.78	14.89	6.80	51.00	6.80

