



RUTGERS UNIVERSITY

Water Resources Program

New Jersey Agricultural Experiment Station



Watershed Restoration and Protection Plan for the North Branch Raritan River

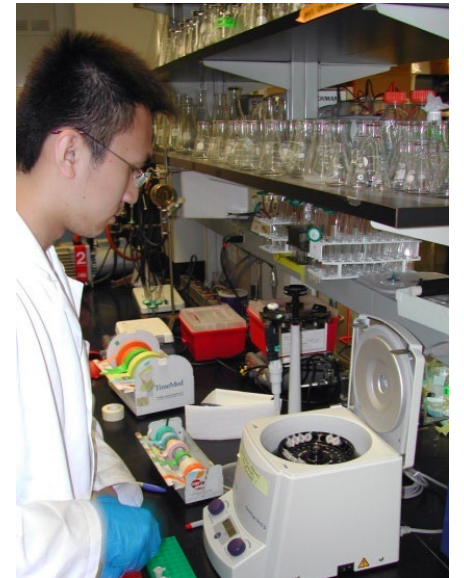
Christopher C. Obropta, Ph.D., P.E.

April 23, 2025



Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.





Water Resources Program



Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.

Project Partners



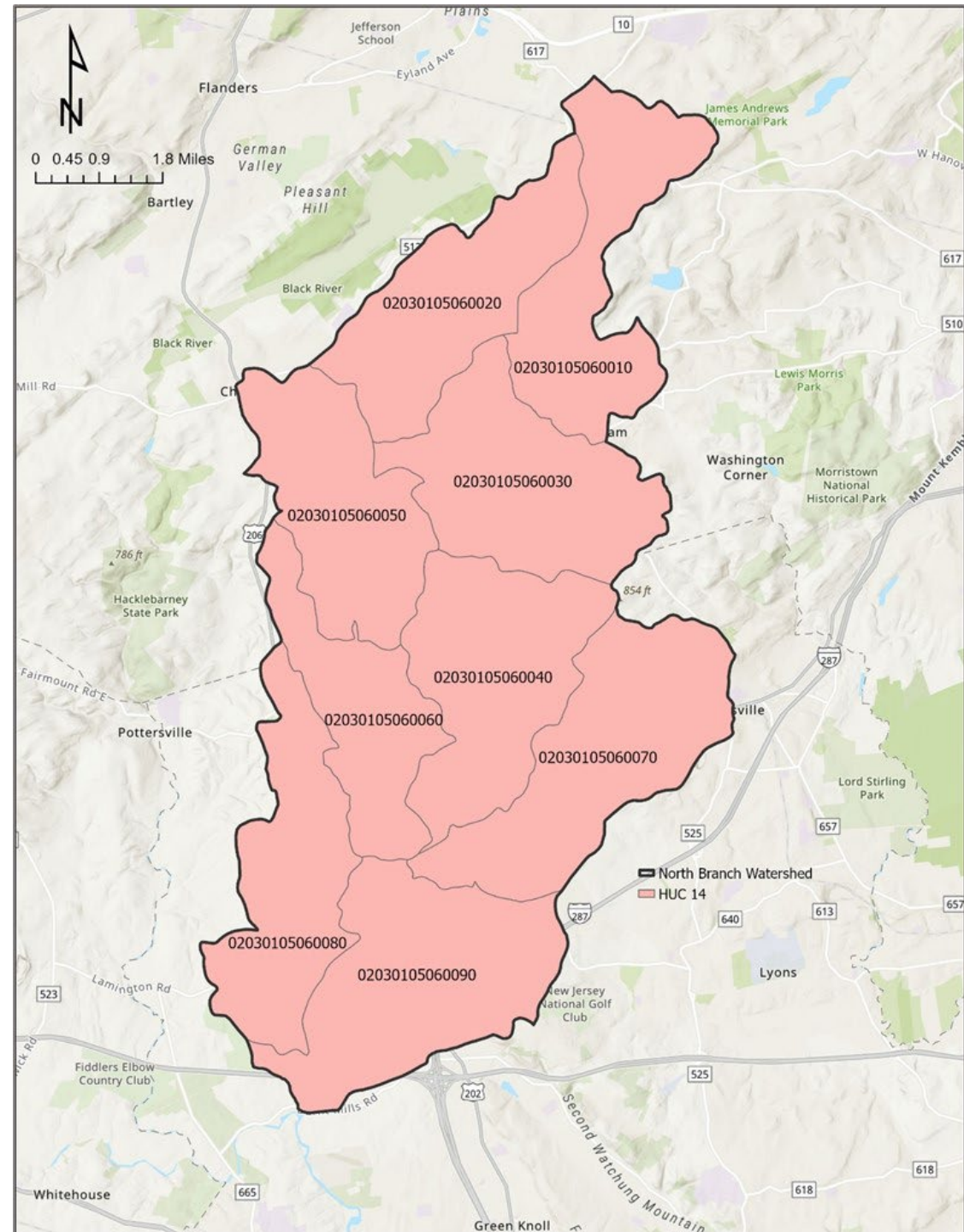
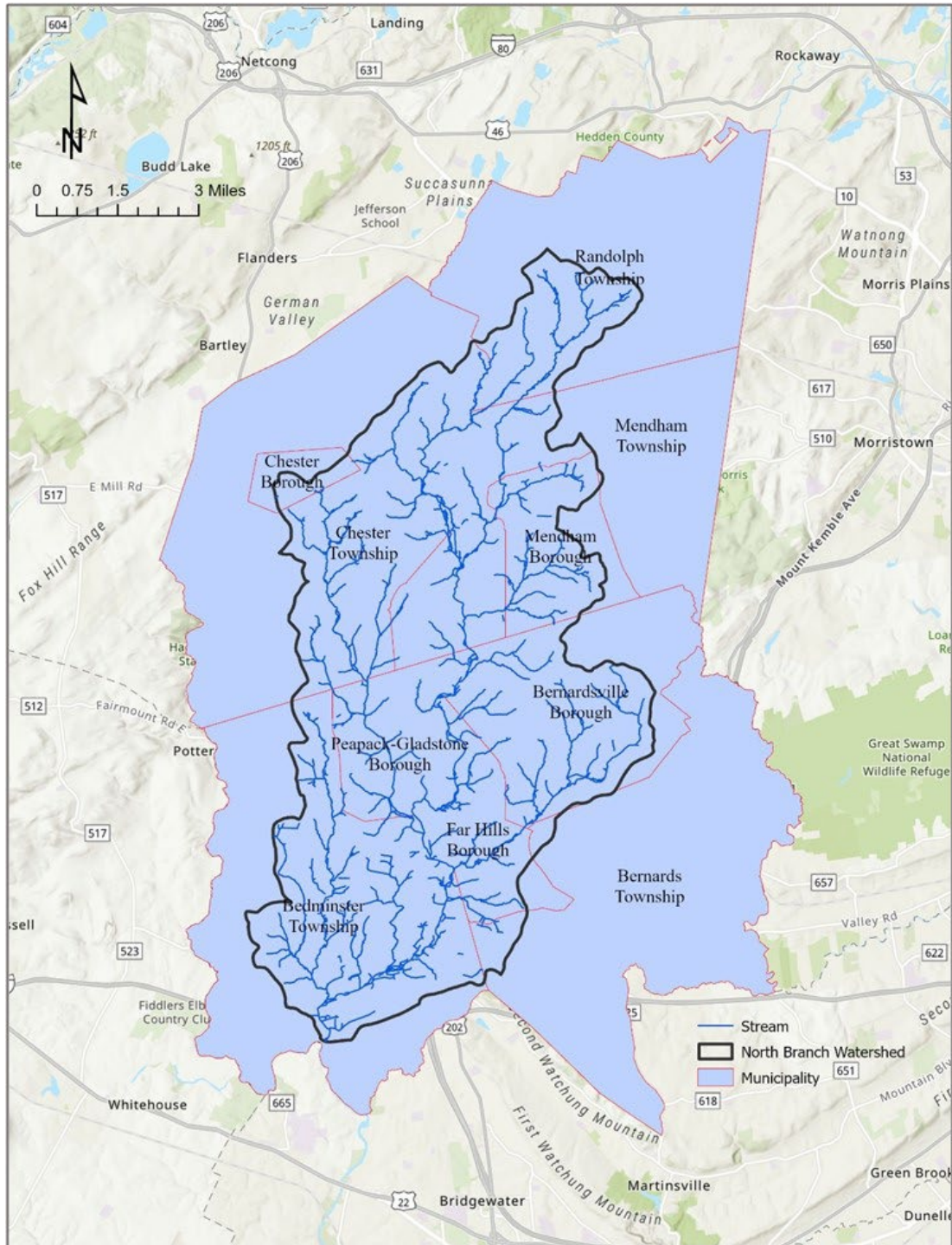
Reason for the Work

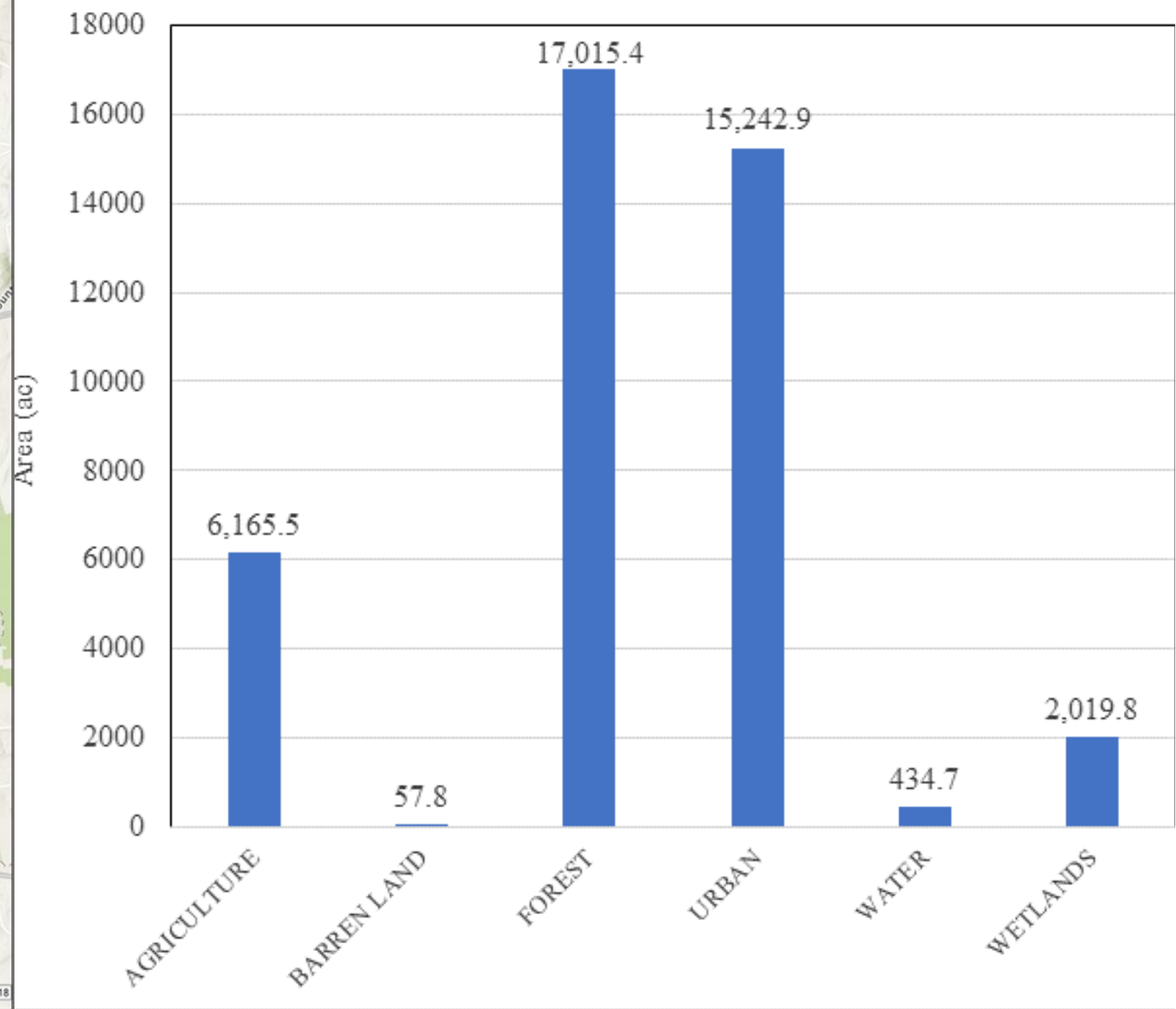
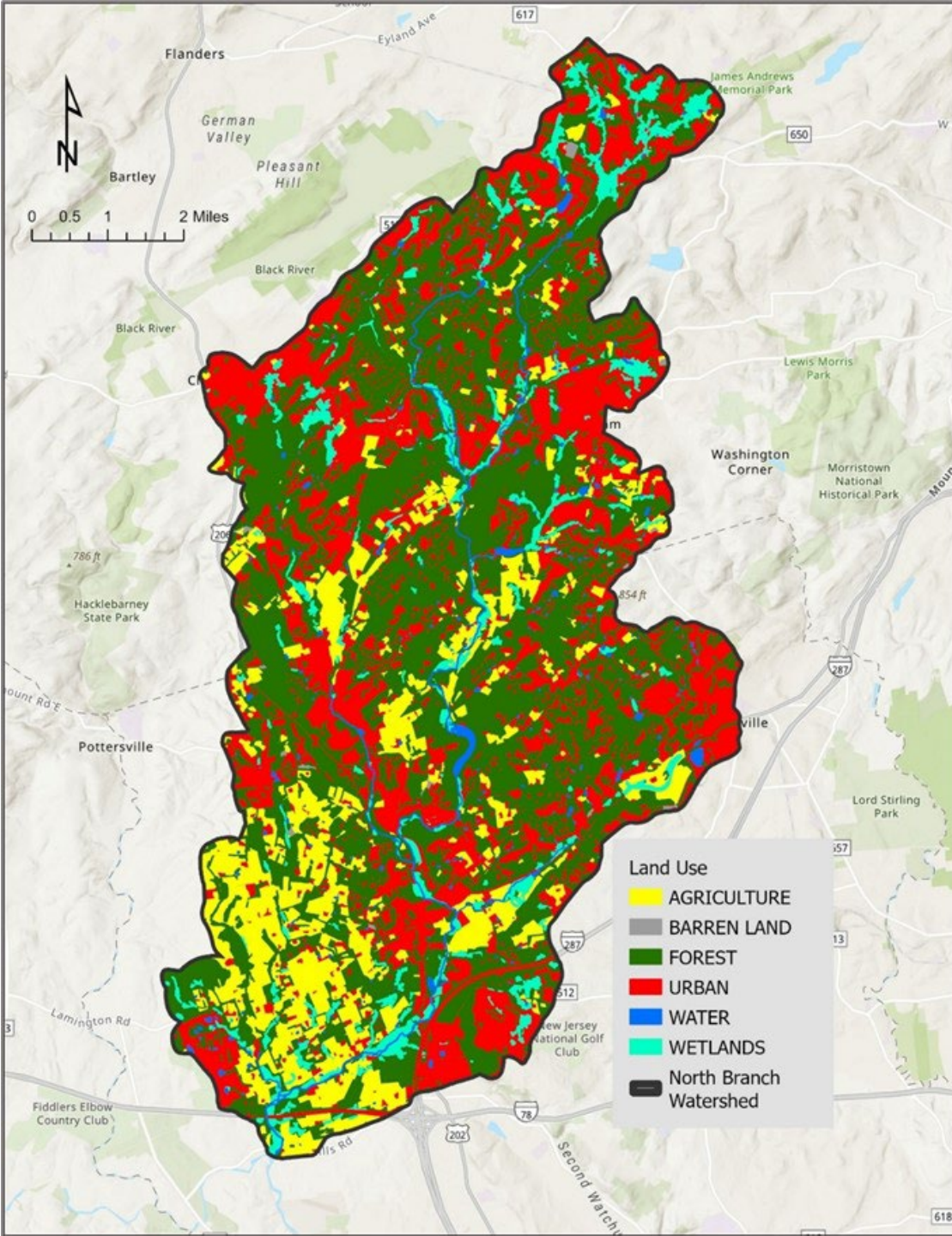
The NJDEP has prepared a TMDL for total suspended solids and total phosphorus that requires a 60% reduction in total suspended solids and a 68% to 84% reduction in total phosphorus. This project will create a plan that will be a blueprint for how to achieve these reductions.



Detailed Scope of Work (List of Objectives)

1. Identification of the causes and sources of nutrient loading
2. Estimation of the load reductions expected for the management measures
3. Recommendation of nonpoint source (NPS) management measures to address the causes and sources
4. Estimation of the amounts of technical and financial assistance needed
5. Development and delivery of informational and education component
6. Development of a schedule for implementing NPS controls
7. Development of interim, measurable milestones
8. Development of criteria to ensure load reductions are being achieved
9. Development of a monitoring component to evaluate effectiveness





Land Use and Nonpoint Source Loading Analysis

Land Cover	Total Phosphorus (TP) load (lbs/acre/yr)	Total Nitrogen (TN) load (lbs/acre/yr)	Total Suspended Solids (TSS) load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barren Land/ Transitional Area	0.5	5	60

Land Use Code	Land Use Label	Land Use Type	TP	TN	TSS
1110	Residential, High Density or Multiple Dwelling	Urban	1.4	15	140
1120	Residential, Single Unit, Medium Density	Urban	1.4	15	140
1130	Residential, Single Unit, Low Density	Urban	0.6	5	100
1140	Residential, Rural, Single Unit	Urban	0.6	5	100
1150	Mixed Residential	Urban	1.4	15	140
1200	Commercial/Services	Urban	2.1	22	200
1211	Military Installations	Urban	2.1	22	200
1214	No Long Military	Urban	2.1	22	200
1300	Industrial	Urban	1.5	16	200
1400	Transportation/Communication/Utilities	Urban	1.5	16	200
1410	Major Roadway	Urban	1.5	16	200
1411	Mixed Transportation Corridor Overlap Area	Urban	1.5	16	200
1419	Bridge Over Water	Water	0.1	3	40
1420	Railroads	Urban	1.5	16	200
1440	Airport Facilities	Urban	1.5	16	200
1461	Wetland Rights-Of-Way	Wetlands	0.1	3	40
1462	Upland Rights-Of-Way Developed	Urban	1	10	120

Land Use	Area (acres)		
	HUC14		
	02030105060010	02030105060020	02030105060030
AGRICULTURE	142.7	119.6	434.3
BARREN LAND	9.9	9.3	4.1
FOREST	1,596.5	1,936.2	2,293.9
URBAN	2,036.1	1,934.5	1,826.1
WATER	33.8	43.3	67.3
WETLANDS	463.3	210.9	271.6
Total:	4,282.3	4,253.7	4,897.2

Land Use	Area (acres)		
	HUC14		
	02030105060010	02030105060020	02030105060030
AGRICULTURE	3.3%	2.8%	8.9%
BARREN LAND	0.2%	0.2%	0.1%
FOREST	37.3%	45.5%	46.8%
URBAN	47.5%	45.5%	37.3%
WATER	0.8%	1.0%	1.4%
WETLANDS	10.8%	5.0%	5.5%
Total:	100.0%	100.0%	100.0%

Land Use	Area (acres)		
	HUC14		
	02030105060040	02030105060050	02030105060060
AGRICULTURE	607.2	426.7	562.0
BARREN LAND	6.4	1.6	12.6
FOREST	2,617.2	1,827.0	1,376.4
URBAN	1,316.9	1,775.9	1,249.6
WATER	91.5	13.4	21.0
WETLANDS	165.5	183.8	26.3
Total:	4,804.7	4,228.4	3,248.0

Land Use	Area (acres)		
	HUC14		
	02030105060040	02030105060050	02030105060060
AGRICULTURE	12.6%	10.1%	17.3%
BARREN LAND	0.1%	0.0%	0.4%
FOREST	54.5%	43.2%	42.4%
URBAN	27.4%	42.0%	38.5%
WATER	1.9%	0.3%	0.6%
WETLANDS	3.4%	4.3%	0.8%
Total:	100.0%	100.0%	100.0%

Land Use	Area (acres)		
	HUC14		
	02030105060070	02030105060080	02030105060090
AGRICULTURE	496.7	1,847.5	1,528.5
BARREN LAND	6.2	5.7	1.9
FOREST	2,186.8	1,337.3	1,844.1
URBAN	2,458.7	961.3	1,684.5
WATER	62.5	32.2	69.7
WETLANDS	169.2	95.4	434.1
Total:	5,380.2	4,279.4	5,562.8

Land Use	Area (acres)		
	HUC14		
	02030105060070	02030105060080	02030105060090
AGRICULTURE	9.2%	43.2%	27.5%
BARREN LAND	0.1%	0.1%	0.0%
FOREST	40.6%	31.2%	33.1%
URBAN	45.7%	22.5%	30.3%
WATER	1.2%	0.8%	1.3%
WETLANDS	3.1%	2.2%	7.8%
Total:	100.0%	100.0%	100.0%

Table 6. Pollutant loads for HUC 02030105060010

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	142.7	185.4	1,426.5	42,796.1
Barren Land	9.9	5.0	49.7	595.9
Forest	1,596.5	159.7	4,789.5	63,860.4
Urban	2,036.1	1,603.0	14,824.1	222,373.8
Water	33.8	3.4	101.4	1,352.1
Wetlands	463.3	45.2	1,355.1	18,067.5
Totals =	4,282.3	2,001.6	22,546.3	349,045.6

Table 7. Pollutant loads for HUC 02030105060020

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	119.6	155.4	1,195.6	35,869.1
Barren Land	9.3	4.6	46.4	556.7
Forest	1,936.2	193.6	5,808.4	77,445.6
Urban	1,934.5	1,329.5	11,733.6	202,584.1
Water	43.3	4.3	130.0	1,733.7
Wetlands	210.9	21.1	632.6	8,434.1
Totals =	4,253.7	1,708.6	19,546.6	326,623.4

Table 8. Pollutant loads for HUC 02030105060030

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	434.3	564.5	4,342.6	130,277.3
Barren Land	4.1	2.0	20.5	245.5
Forest	2,293.9	229.4	6,881.8	91,757.0
Urban	1,826.1	1,275.0	11,300.1	193,163.9
Water	67.3	6.7	201.7	2,690.0
Wetlands	271.6	27.0	809.3	10,790.8
Totals =	4,897.2	2,104.7	23,555.9	428,924.4

Table 9. Pollutant loads for HUC 02030105060040

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	607.2	789.4	6,072.3	182,170.5
Barren Land	6.4	3.2	32.1	385.0
Forest	2,617.2	261.7	7,851.6	104,687.7
Urban	1,316.9	958.7	8,645.8	140,148.4
Water	91.5	9.2	274.6	3,660.7
Wetlands	165.5	15.9	476.5	6,353.7
Totals =	4,804.7	2,038.1	23,352.9	437,405.9

Table 10. Pollutant loads for HUC 02030105060050

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	426.7	554.7	4,266.9	128,008.0
Barren Land	1.6	0.8	8.1	97.1
Forest	1,827.0	182.7	5,481.0	73,079.4
Urban	1,775.9	1,393.1	12,715.2	197,724.0
Water	13.4	1.3	40.1	534.3
Wetlands	183.8	18.3	549.5	7,327.2
Totals =	4,228.4	2,151.0	23,060.8	406,770.0

Table 11. Pollutant loads for HUC 02030105060060

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	562.0	730.6	5,620.1	168,603.7
Barren Land	12.6	6.3	63.1	757.7
Forest	1,376.4	137.6	4,129.2	55,055.8
Urban	1,249.6	1,081.9	10,305.9	143,005.0
Water	21.0	2.1	63.0	840.6
Wetlands	26.3	9.6	147.7	1,318.1
Totals =	3,248.0	1,968.2	20,329.1	369,580.9

Table 12. Pollutant loads for HUC 02030105060070

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	496.7	645.8	4,967.4	149,023.1
Barren Land	6.2	3.1	31.0	371.5
Forest	2,186.8	218.7	6,560.5	87,473.2
Urban	2,458.7	2,013.6	18,835.2	268,914.5
Water	62.5	6.3	187.6	2,501.6
Wetlands	169.2	19.3	527.3	6,785.4
Totals =	5,380.2	2,906.7	31,109.0	515,069.3

Table 13. Pollutant loads for HUC 02030105060080

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	1,847.5	2,401.7	18,475.0	554,249.0
Barren Land	5.7	2.8	28.5	341.5
Forest	1,337.3	133.7	4,011.9	53,491.4
Urban	961.3	827.4	7,907.2	109,113.6
Water	32.2	3.2	96.6	1,288.5
Wetlands	95.4	9.5	285.1	3,800.9
Totals =	4,279.4	3,378.5	30,804.2	722,284.8

Table 14. Pollutant loads for HUC 02030105060090

General Land Use Category	Area (acres)	Total Phosphorus (lbs/yr)	Total Nitrogen (lbs/yr)	Total Suspended Solids (lbs/yr)
Agriculture	1,528.5	1,987.0	15,284.9	458,548.1
Barren Land	1.9	1.0	9.6	115.7
Forest	1,844.1	184.4	5,532.2	73,762.6
Urban	1,684.5	1,835.8	18,428.7	220,844.9
Water	69.7	7.0	209.2	2,789.1
Wetlands	434.1	42.6	1,278.1	17,041.0
Totals =	5,562.8	4,057.8	40,742.7	773,101.4

General Land Use Category	Area	Total Phosphorus	Total Nitrogen	Total Suspended Solids
	(acres)	(lbs/yr)	(lbs/yr)	(lbs/yr)
Agriculture	6,165	8,015	61,651	1,849,545
Barren Land	58	29	289	3,467
Forest	17,015	1,702	51,046	680,613
Urban	15,244	12,318	114,696	1,697,872
Water	435	44	1,304	17,391
Wetlands	2,020	209	6,061	79,919
Totals =	40,937	22,315	235,048	4,328,806

Impervious Cover Analysis



Impervious Cover Model

Stream Quality

Good

Fair

Poor

Sensitive

Impacted

Non-Supporting

Urban Drainage

10%

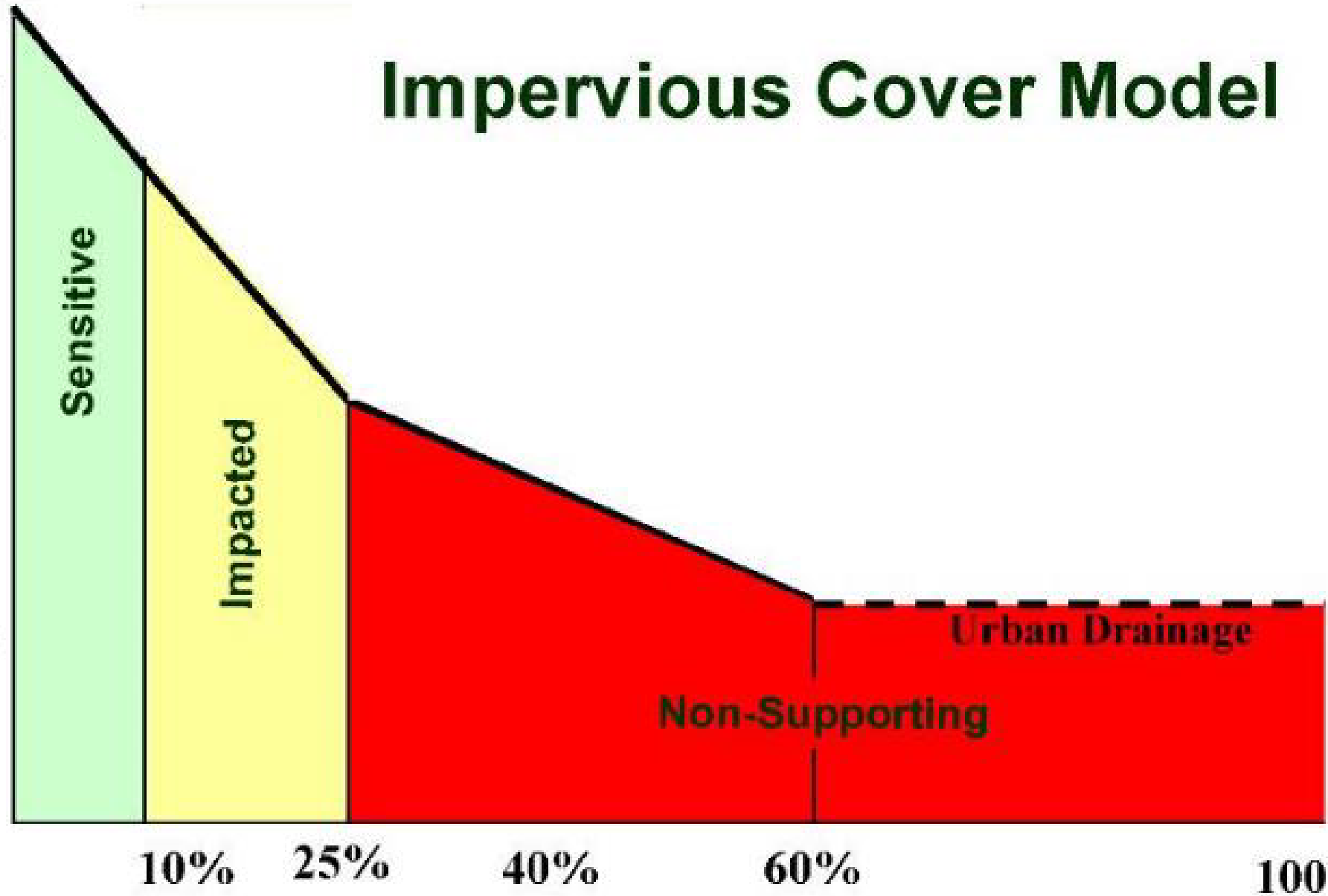
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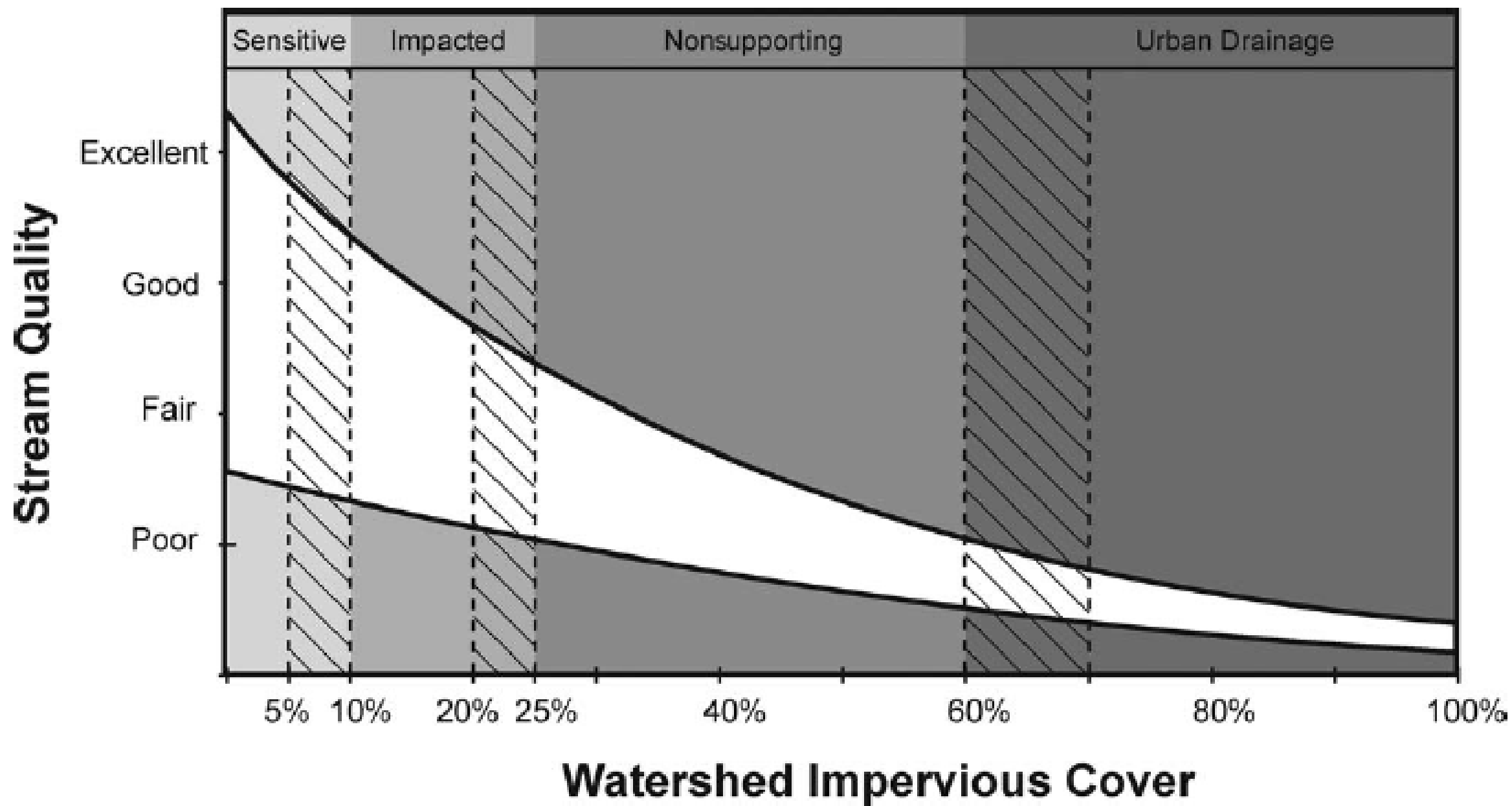
40%

60%

100%

Watershed Impervious Cover

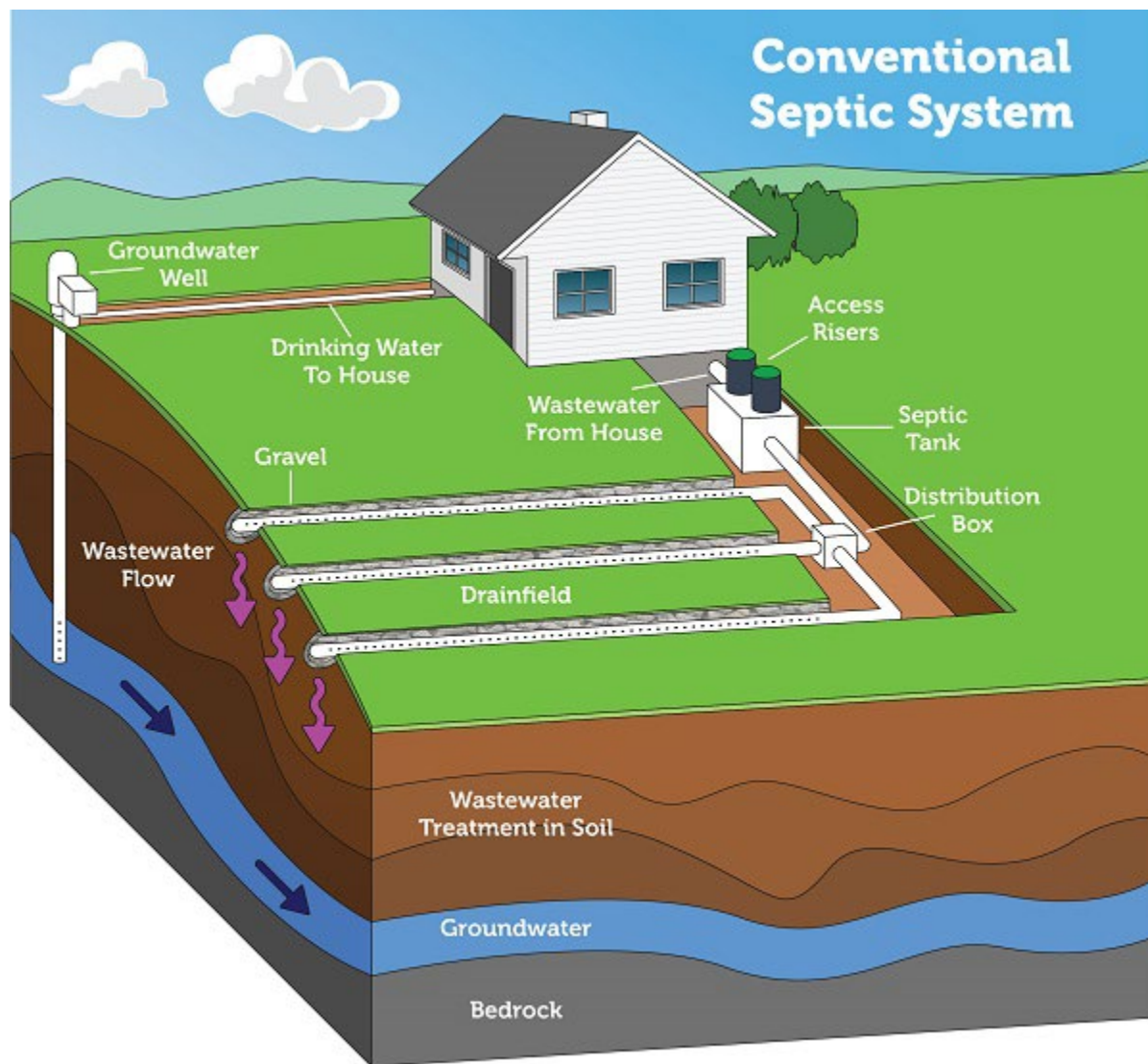




HUC14	Impervious Cover (acres)			
	Buildings	Other	Road	Total
02030105060010	133.4	290.1	171.7	595.2
02030105060020	100.5	238.3	145.3	861.9
02030105060030	77.1	187.9	139.9	405.0
02030105060040	50.0	170.8	69.2	290.1
02030105060050	101.8	246.0	135.0	482.9
02030105060060	73.5	189.5	124.8	387.9
02030105060070	141.9	383.4	184.4	709.7
02030105060080	29.9	149.1	57.0	236.0
02030105060090	164.1	283.5	297.0	744.7
TOTALS =	872.2	2,138.6	1,324.3	4,713.4

HUC14	Total Impervious Cover (ac)	Total HUC14 Area (ac)	Impervious Cover (%)
02030105060010	595.2	4,282.3	13.9%
02030105060020	861.9	4,253.7	11.4%
02030105060030	405.0	4,897.2	8.3%
02030105060040	290.1	4,804.7	6.0%
02030105060050	482.9	4,228.4	11.4%
02030105060060	387.9	3,248.0	11.9%
02030105060070	709.7	5,380.2	13.2%
02030105060080	236.0	4,279.4	5.5%
02030105060090	744.7	5,562.8	13.4%
Totals =	4,713.4	40,936.7	11.5%

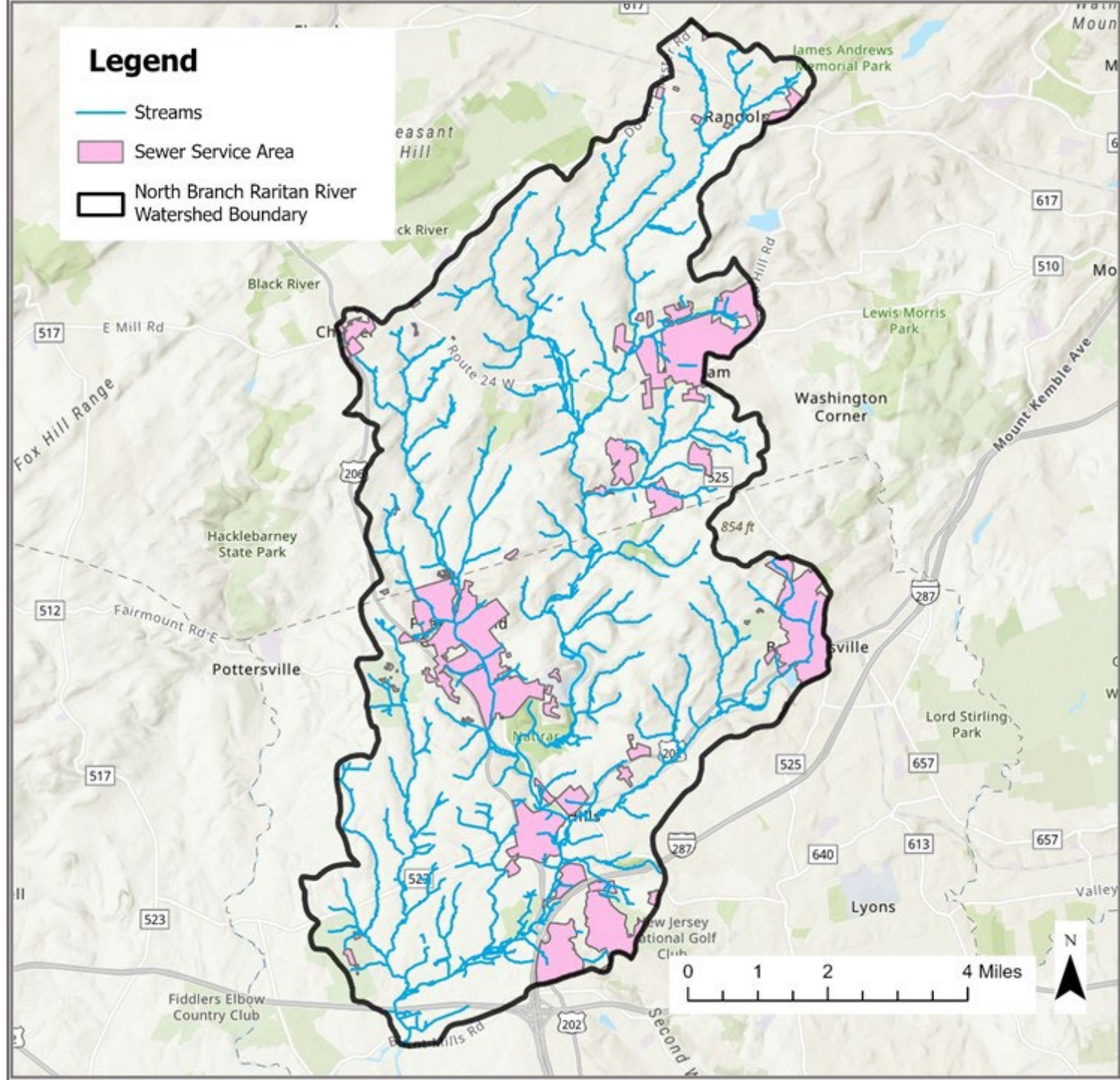
Septic System Analysis



Please note: Septic systems vary. Diagram is not to scale.

Legend

- Streams
- Sewer Service Area
- North Branch Raritan River Watershed Boundary



HUC14	Number of Parcels that are outside Sewer Service Area and Inside the 200- meter Stream Buffer (septic systems)	Homes with Septic Systems Built Prior to 2000	TP Load from Septic Systems (lbs/yr)
02030105060010	412	347	2,178.3
02030105060020	773	708	4,444.5
02030105060030	384	355	2,228.5
02030105060040	181	151	947.9
02030105060050	444	401	2,517.3
02030105060060	140	116	728.2
02030105060070	378	334	2,096.7
02030105060080	28	26	163.2
02030105060090	89	79	495.9
Totals =	2,643	2,378	15,800.7

Fertilizer Ordinance

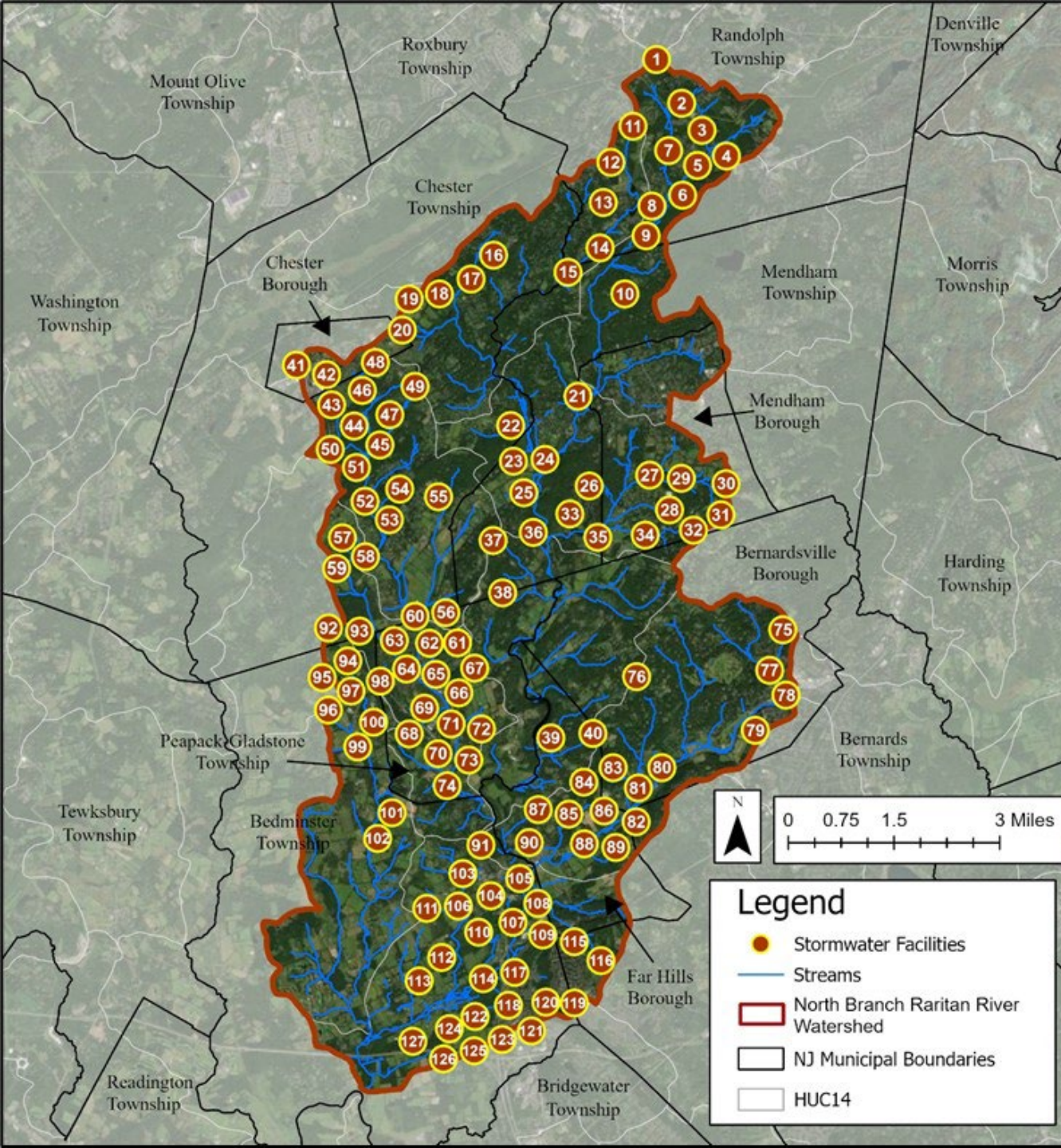


North Branch Raritan River Watershed				
Residential Area (ac)	Impervious Cover Total (ac)	Lawn (ac)	TP Fertilizer Applied (lbs/yr)	TP Fertilizer Runoff (lbs/yr)
HUC 02030105060010				
1,690.7	453.7	1,237.0	4,445.4	111.1
HUC 02030105060020				
1,646.9	381.0	1,265.9	4,549.3	113.7
HUC 02030105060030				
1,507.9	298.5	1,209.4	4,346.2	108.7
HUC 02030105060040				
970.2	173.9	796.3	2,861.7	71.5
HUC 02030105060050				
1,422.8	308.4	1,114.4	4,004.8	100.1
HUC 02030105060060				
855.2	204.9	650.3	2,337.0	58.4
HUC 02030105060070				
1,949.8	436.0	1,513.8	5,440.1	136.0
HUC 02030105060080				
387.4	67.6	319.8	1,149.3	28.7
HUC 02030105060090				
995.8	327.6	668.2	2,401.3	60.0
TOTALS				
11,426.7	2,651.6	8,775.1	31,535.1	788.4

Street Sweeping and Leaf Collection



Watershed-wide Practice		TP Reduction (lbs/yr)
1	Street Sweeping (twice per week throughout entire study area)	1,324
2	Street Sweeping (once a month throughout entire study area)	105.9
3	Fall Street Sweeping and Leaf Collection (only residential areas)	651.7
4	Combination of 2 and 3	757.6



ID	Owner	Address	Type	Town
HUC 02030105060010				
1	Capalbo, Gino/Raffaella	2 Tamari Ct	N	Randolph
2	Township Of Randolph	122 Morris Tpke	D	Randolph
3	Township Of Randolph	1318 Sussex Tpke	N	Randolph
4	Township Of Randolph	1264 Sussex Tpke	N	Randolph
5	Township Of Randolph	83 Heritage Ct	N	Randolph
6	Township Of Randolph Municipal Building	5 Dolly Bridge Rd	D	Randolph
7	Vasta, Thomas J/Pamela A	3 Edgewood Ter	N	Randolph
8	Meadow Lane Associates, LLC	57 Combs Hollow Rd	N	Mendham

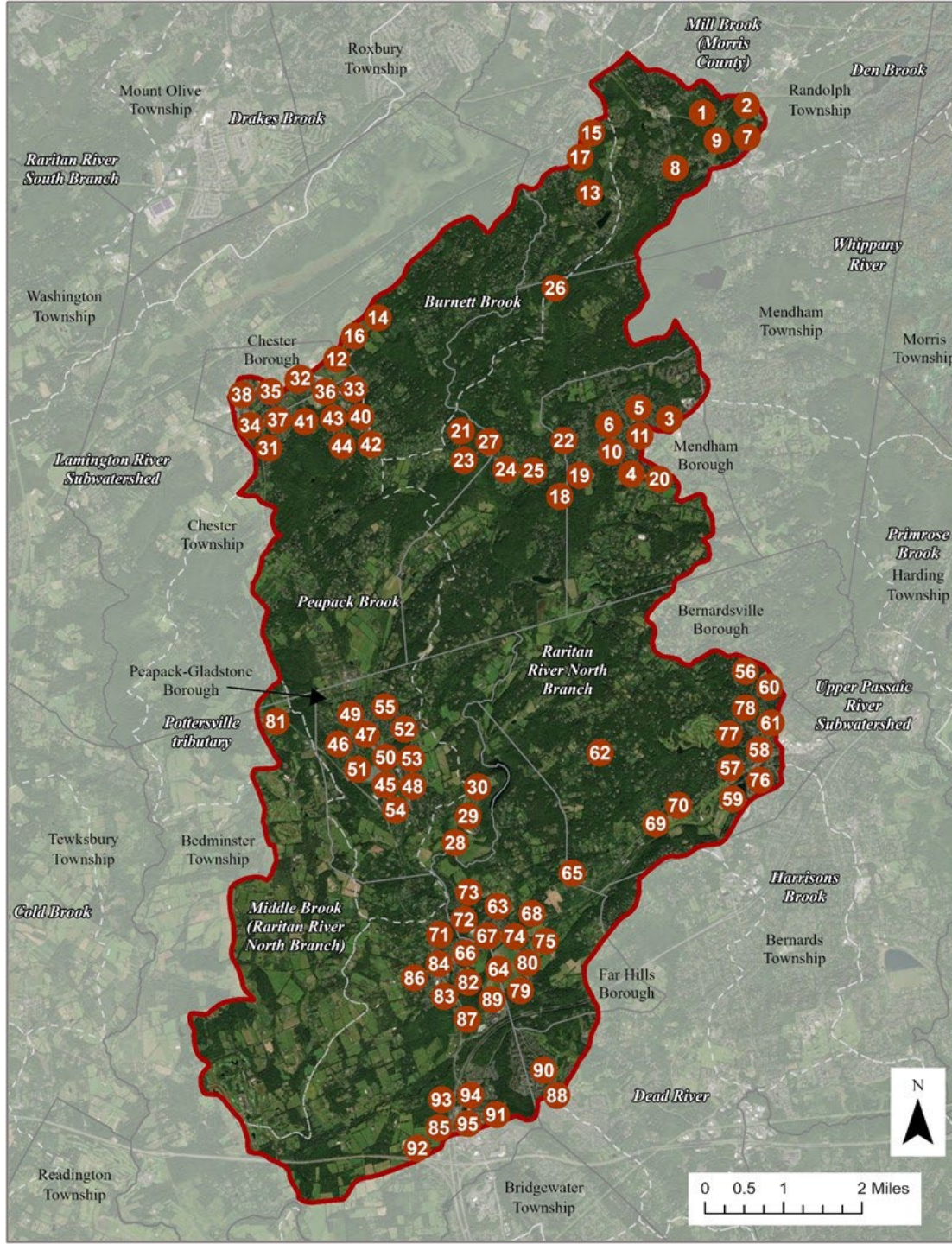
ID	Land Use	Drainage Area	Type	TP Load (lbs/yr)	Existing TP Load Reduction	Future TP Load Reduction
HUC 2030105060010						
1	Residential, Single Unit, Low Density	20.02	N	12.01	7.2	7.2
2	Residential, Single Unit, Low Density	25.31	D	15.19	3.0	9.1
3	Residential, Single Unit, Low Density	7.67	N	4.60	2.8	2.8
4	Residential, Rural, Single Unit	11.03	N	6.62	4.0	4.0
5	Residential, Single Unit, Low Density	17.38	N	10.43	6.3	6.3
6	Residential, Single Unit, Low Density	29.22	D	17.53	3.5	10.5
7	Residential, Rural, Single Unit	160.00	N	96.00	57.6	57.6
8	Residential, Rural, Single Unit	59.24	N	35.54	21.3	21.3

Existing Pollutant Load for the Study Area

	North Branch Raritan River Watershed
Nonpoint source aerial loading based upon land use	22,315
Septic system load	15,800.7
Detention Basin Load Reduction	-993.2
Total Existing Load	37,122.5

Parcels for Retrofitting with Green Infrastructure

- 95 sites
- 1,382,965 sq.ft. = drainage area (31.7 ac)
- 83 Rain Gardens
- 67 Porous Pavement Projects
- 18 Cisterns
- 29 Planter Boxes



Site ID	Site Name and Address	Lot Area (sq.ft.)	Impervious Cover for Lot (sq.ft.)	Total Drainage Area (sq.ft.)	Size of Rain Garden Practice (sq.ft.)	Size of Porous Asphalt Practice (sq.ft.)	Size of Other Practice
HUC 02030105060010							
1	Brundage Park, 43 North Bungalow Lane, Randolph NJ 07869	818,135	217,150	91,370	810	61,430	300 ₁
2	Freedom Park, 630 Millbrook Avenue, Randolph NJ 07869	4,389,539	348,578	35,115	6,230	3,530	0
3	Grace Lutheran Church, 65 East Main Street, Mendham Borough NJ 07945	88,239	47,168	35,620	5,830	2,485	350 ₁

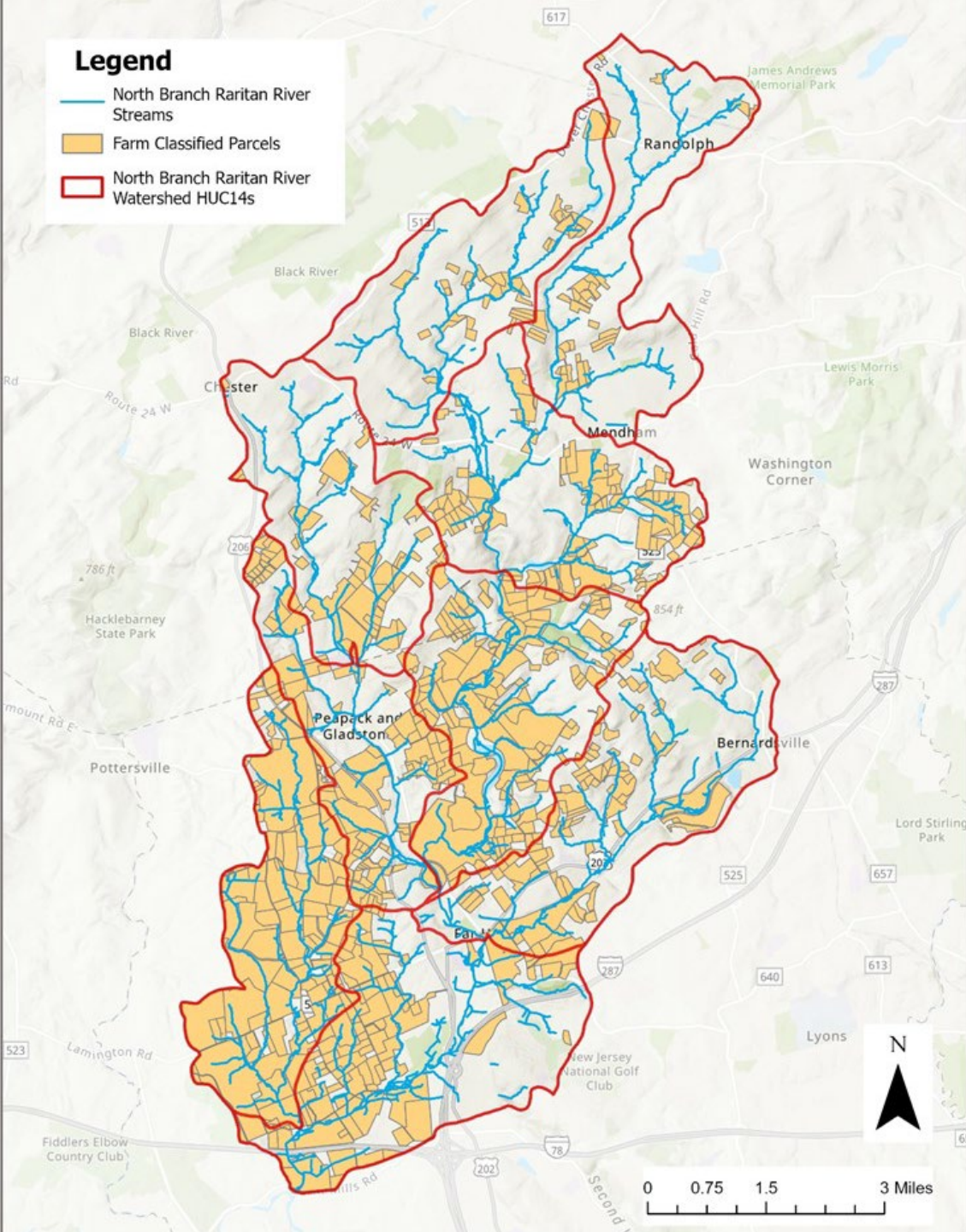
Site ID	Site Name and Address	TP Loading reduction with underdrain (lbs/yr)	TP Loading reduction w/o underdrain (lbs/yr)
HUC 02030105060010			
1	Brundage Park, 43 North Bungalow Lane, Randolph NJ 07869	6.30	9.45
2	Freedom Park, 630 Millbrook Avenue, Randolph NJ 07869	10.08	15.12
3	Grace Lutheran Church, 65 East Main Street, Mendham Borough NJ 07945	1.38	2.07
4	Mendham Borough Library, 10 Hilltop Road, Mendham NJ 07945	0.42	0.63
5	Mendham Borough Park, 8 Orchard Street, Mendham Borough NJ 07945	5.46	8.19

Rain Gardens to Manage Rooftop Runoff



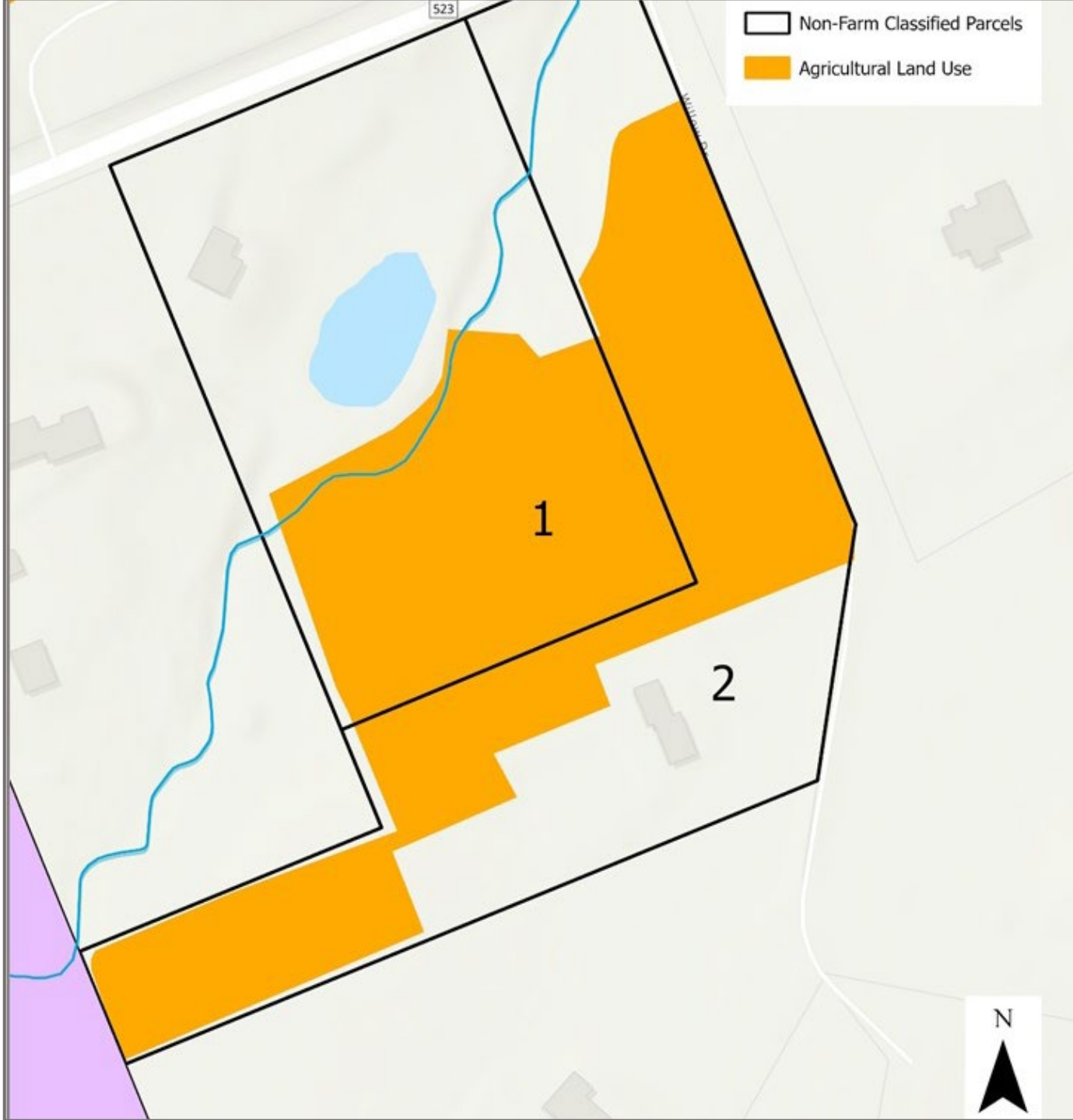
- 12,739 buildings in the study area
- 872.2 acres of rooftop
- 25% of the rooftops of 25% buildings
- TP Reduction = 108.8 lbs/yr
- TN Reduction = 1,139.3 lbs/yr
- TSS Reduction = 10,357.4 lbs/yr



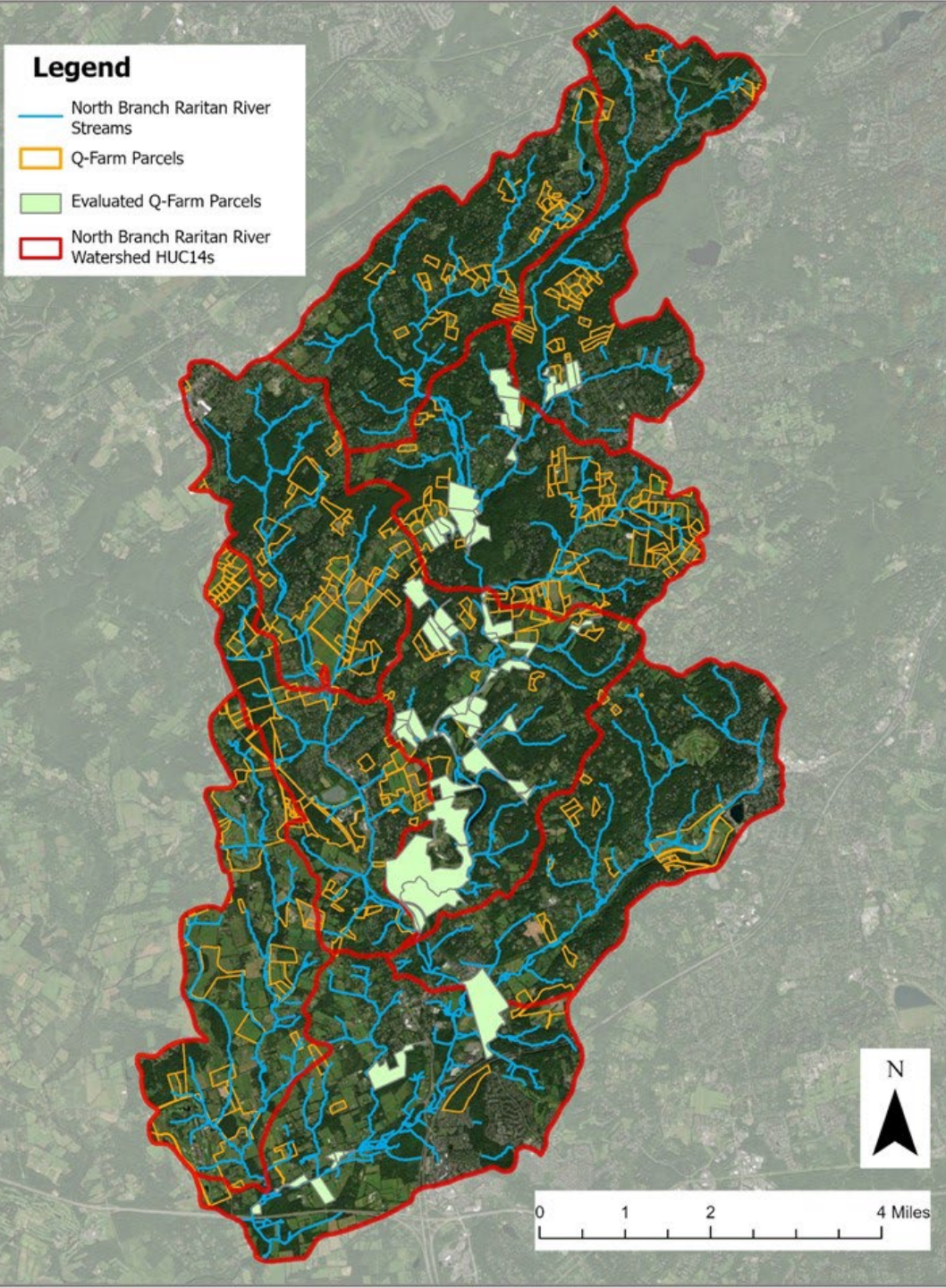


Analysis of Farm Parcels

- Urban Lands = 12,318 lb TP / year
- Ag Lands = 8,015 lb TP / year
- 756 Farm Parcels = 15,641 acres
- Ag land use in these parcels = 5,380 acres = 6,993 lb TP / year



	Ag LU	TP Load	No. of
Description	(acres)	(lbs/yr)	Parcels
Total for Farm Property (3A, 3B, and/or Q-Farm)	5,380	6,993	756
Total for entire study area (all nine HUC14s)	6,165	8,015	13,370*
Remaining	785	1,022	12,614



- 756 Farm Parcels
- 174 Farm Parcels intersect with river or tributaries
- 67 Farm Parcels were visited
- Farms Classified as:
 - Row Crops
 - Livestock/Horses
 - Hay/Grass
 - Wooded

Block	Lot	Q-Farm Code	Municipality	Cover Crop	Enhanced Stream Buffer	Impervious Cover Mgt.	Rainwater Harvesting	Livestock Exclusion	Manure Mgt.
51	2.1	QFARM	Bedminster Twp						X
52	1.01	QFARM	Bedminster Twp	X					
2	11	Q0001	Bernardsville Boro						X
10	2	Q0014	Bernardsville Boro	X					
1	4	Q0032	Bernardsville Boro						X
18	1	QFARM	Far Hills Boro			X	X		X
101	13	QFARM	Mendham Boro				X		X
101	14	QFARM	Mendham Boro						X

Existing load from 5 Q-Farms recommended for cover crop

Area (ac)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Load (lbs/yr)
157.5	95	933	22,854

Load reduction for cover crop on recommended 5 Q-Farms

Area (ac)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Load (lbs/yr)
157.5	57	280	18,283

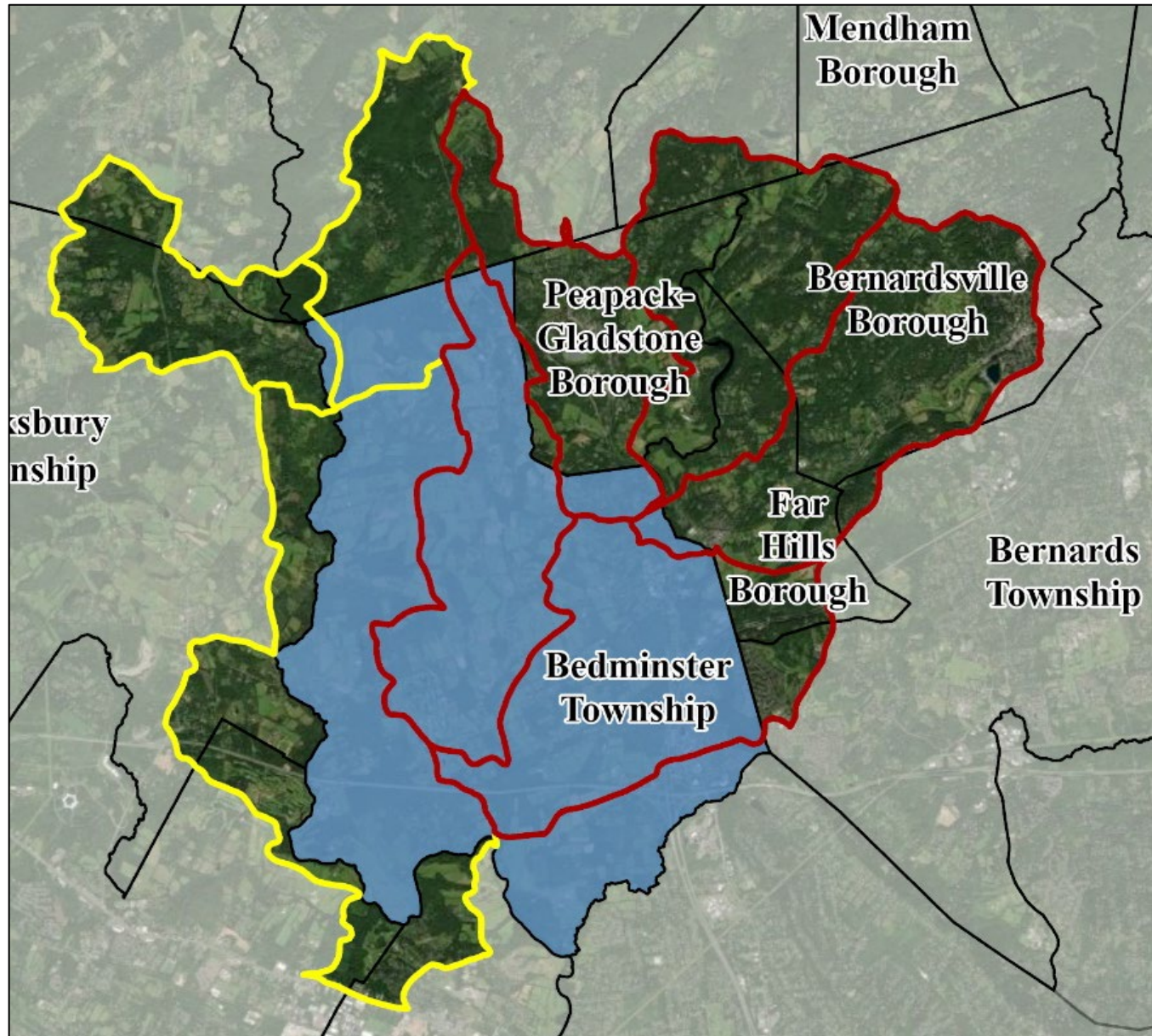
Load reductions for proposed management strategies

Management Strategy	TP Reduction (lb/yr)
Leaf collection and additional street sweeping (Option #4 – Table 27)	757.6
Green infrastructure for proposed retrofit sites	431.4
Rain gardens for ¼ rooftops for ¼ of buildings	108.8
Converting existing detention basins to bioretention basins	516.7
Agricultural management practices on specific farms	57.0
Septic system replacement	6,952.3
TOTAL =	8,823.8





Existing loads and proposed load reduction

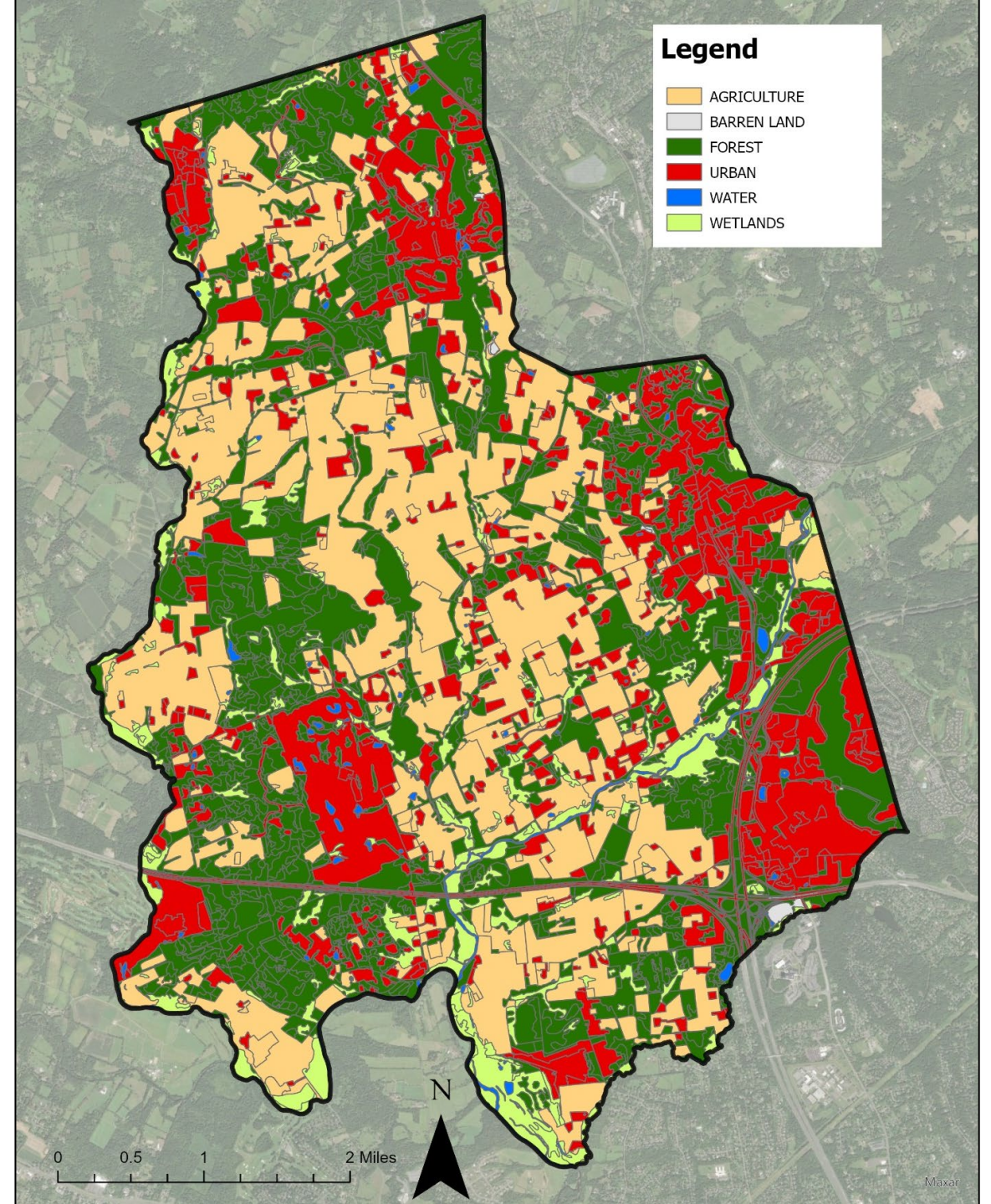
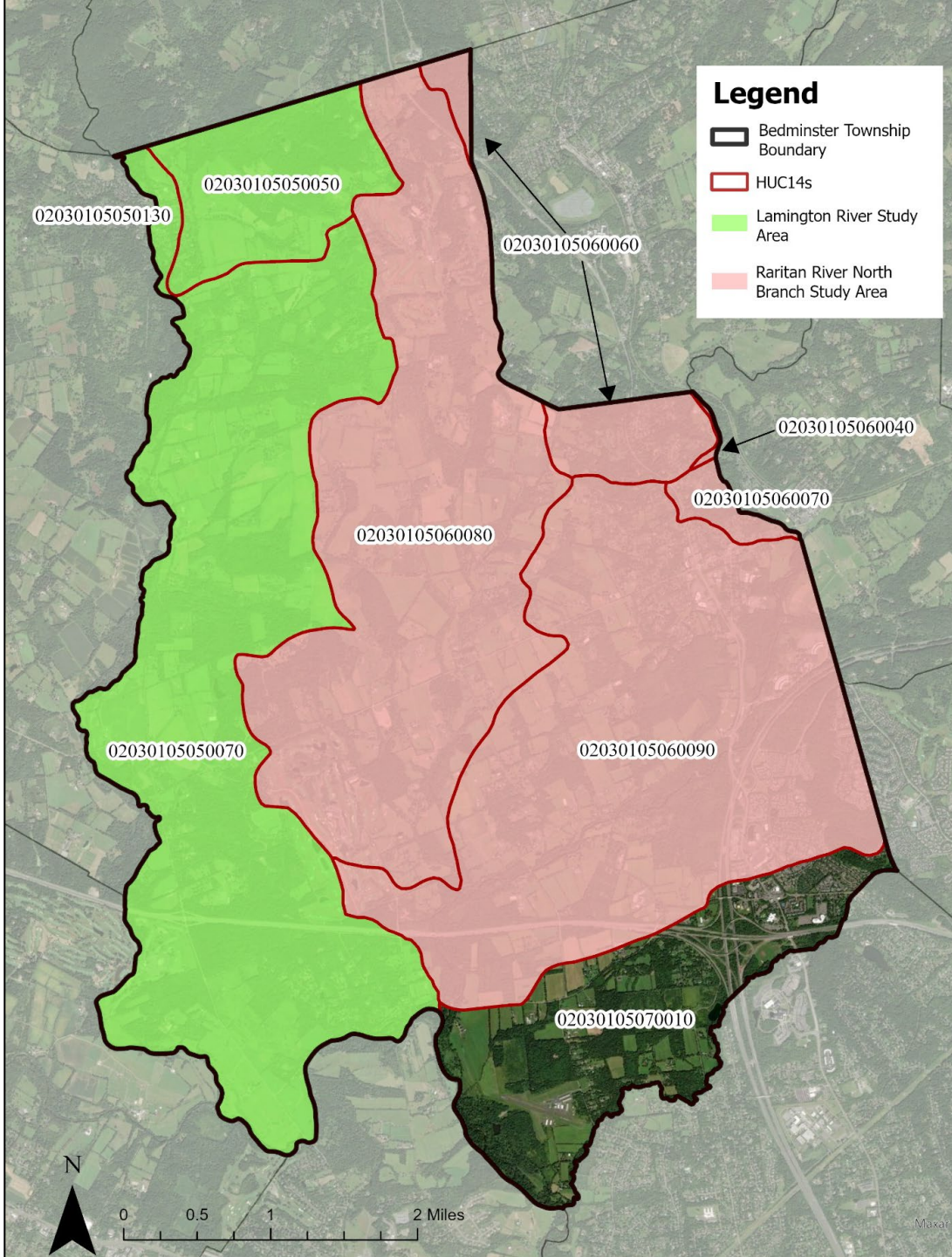
	TP (lbs/yr)
Existing Load	37,123
Load Reduction	8,824
% Load Reduction	23.8%

Analysis by Municipality



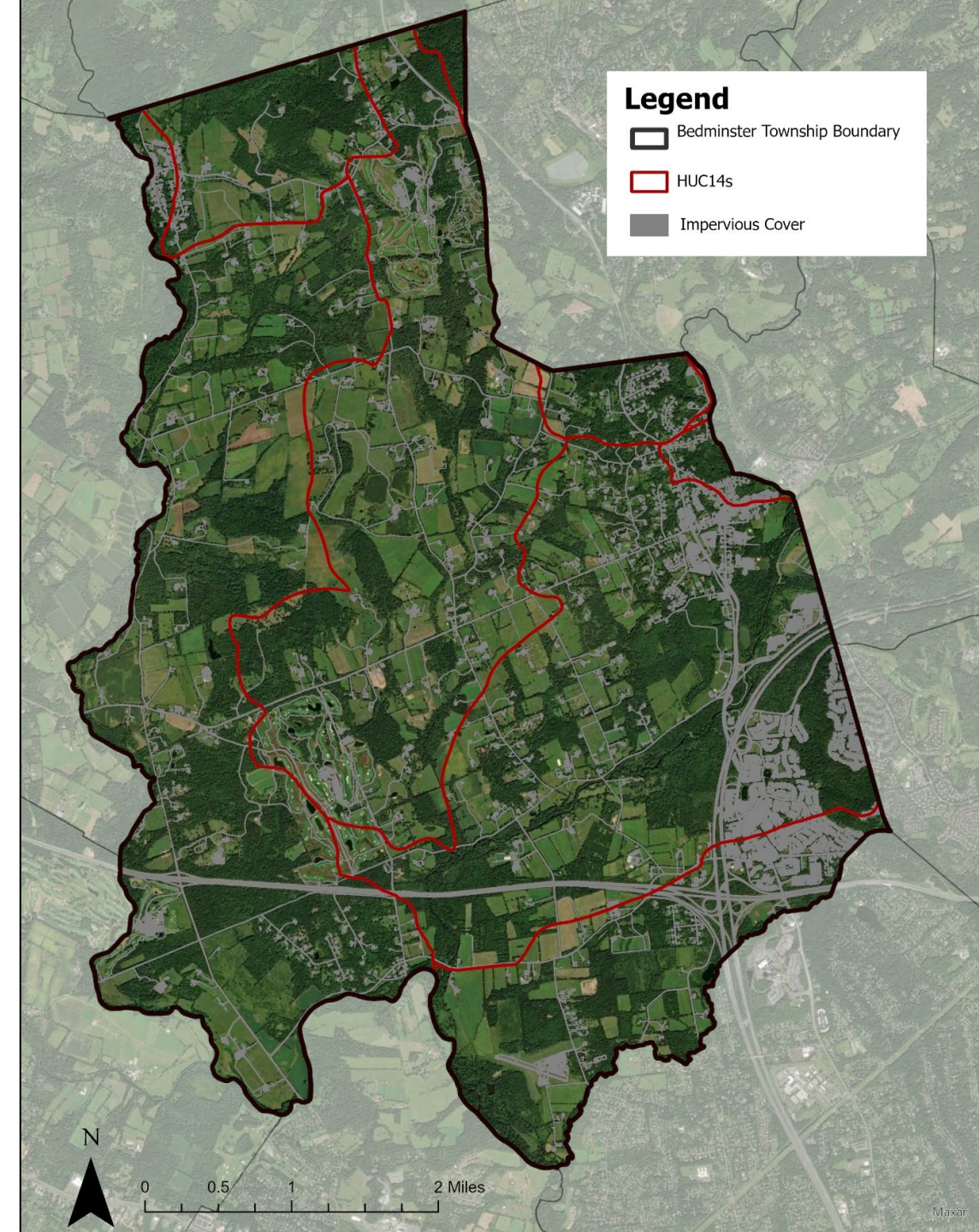
Legend

-  Bedminster Township
-  HUC14s in Raritan River North Branch Study Area
-  HUC14s in Lamington River Study Area
-  Municipalities in Study Area



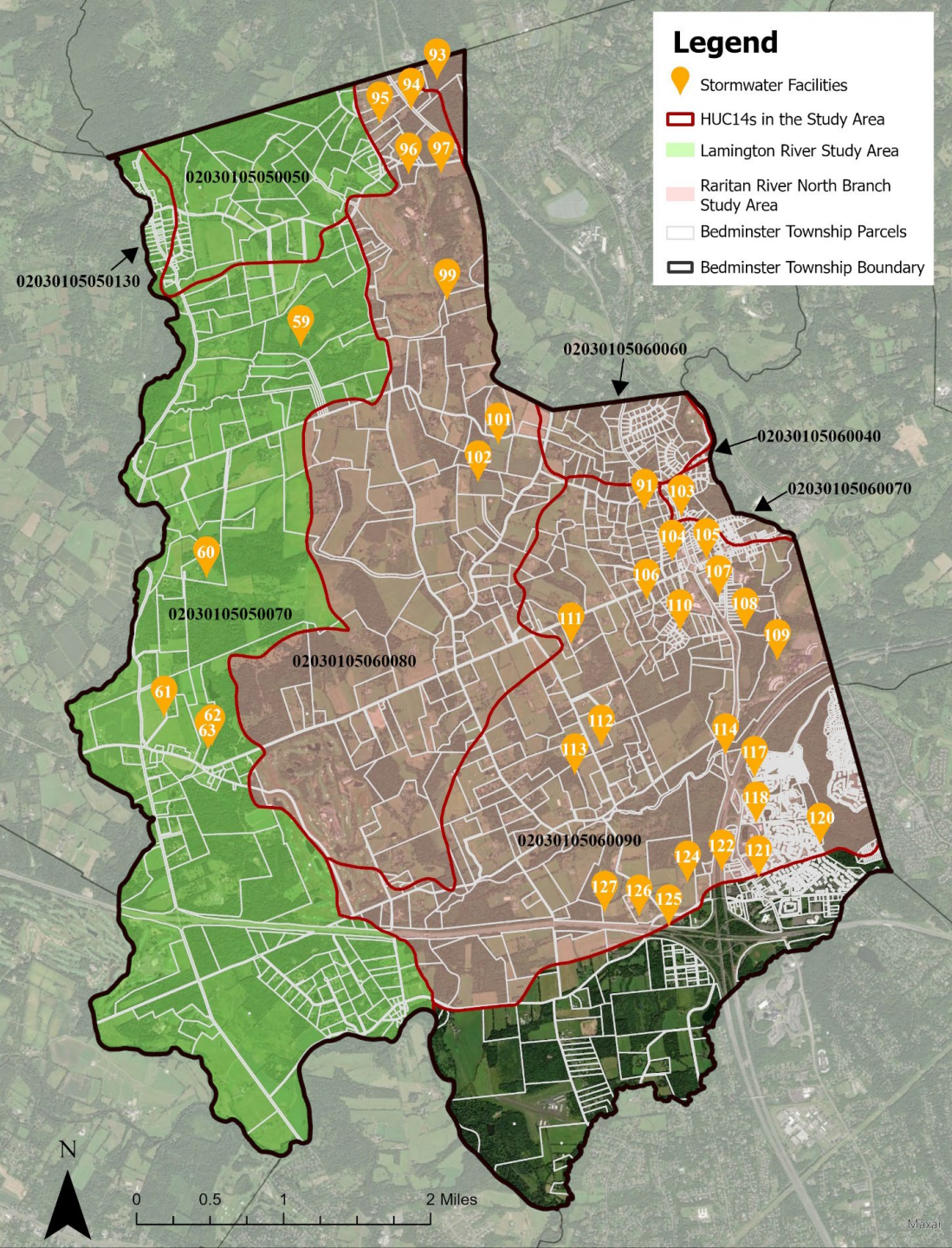
Land Use	Area (acres)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Load (lbs/yr)
02030105050050				
Agriculture	315.8	410.5	3,158.1	94,741.8
Barren Land	0.0	0.0	0.0	0.0
Forest	426.8	42.7	1,280.3	17,070.8
Urban	120.4	168.6	1,806.1	16,856.9
Water	4.8	0.5	14.5	192.7
Wetlands	32.2	3.2	96.7	1,289.4
TOTAL =	900.0	625.5	6,355.7	130,151.6
02030105050070				
Agriculture	1,667.1	2,167.2	16,671.1	500,133.4
Barren Land	0.0	0.0	0.0	0.0
Forest	2,101.8	210.2	6,305.5	84,072.8
Urban	665.7	932.0	9,986.2	93,204.4
Water	70.6	7.1	211.8	2,824.5
Wetlands	312.4	31.2	937.2	12,495.5
TOTAL =	4,817.6	3,347.7	34,111.8	692,730.6

Land Use	Area (acres)	TP Load (lbs/yr)	TN Load (lbs/yr)	TSS Load (lbs/yr)
All HUC14s				
Agriculture	5,668.6	7,369.2	56,686.5	1,700,596.1
Barren Land	23.8	11.8	118.8	1,423.8
Forest	6,236.6	623.7	18,710.0	249,468.5
Urban	3,670.0	5,138.2	55,051.8	513,816.4
Water	224.0	22.4	672.2	8,962.9
Wetlands	1,052.2	105.2	3,156.5	42,086.8
TOTAL =	16,875.2	13,270.5	134,395.8	2,516,354.5

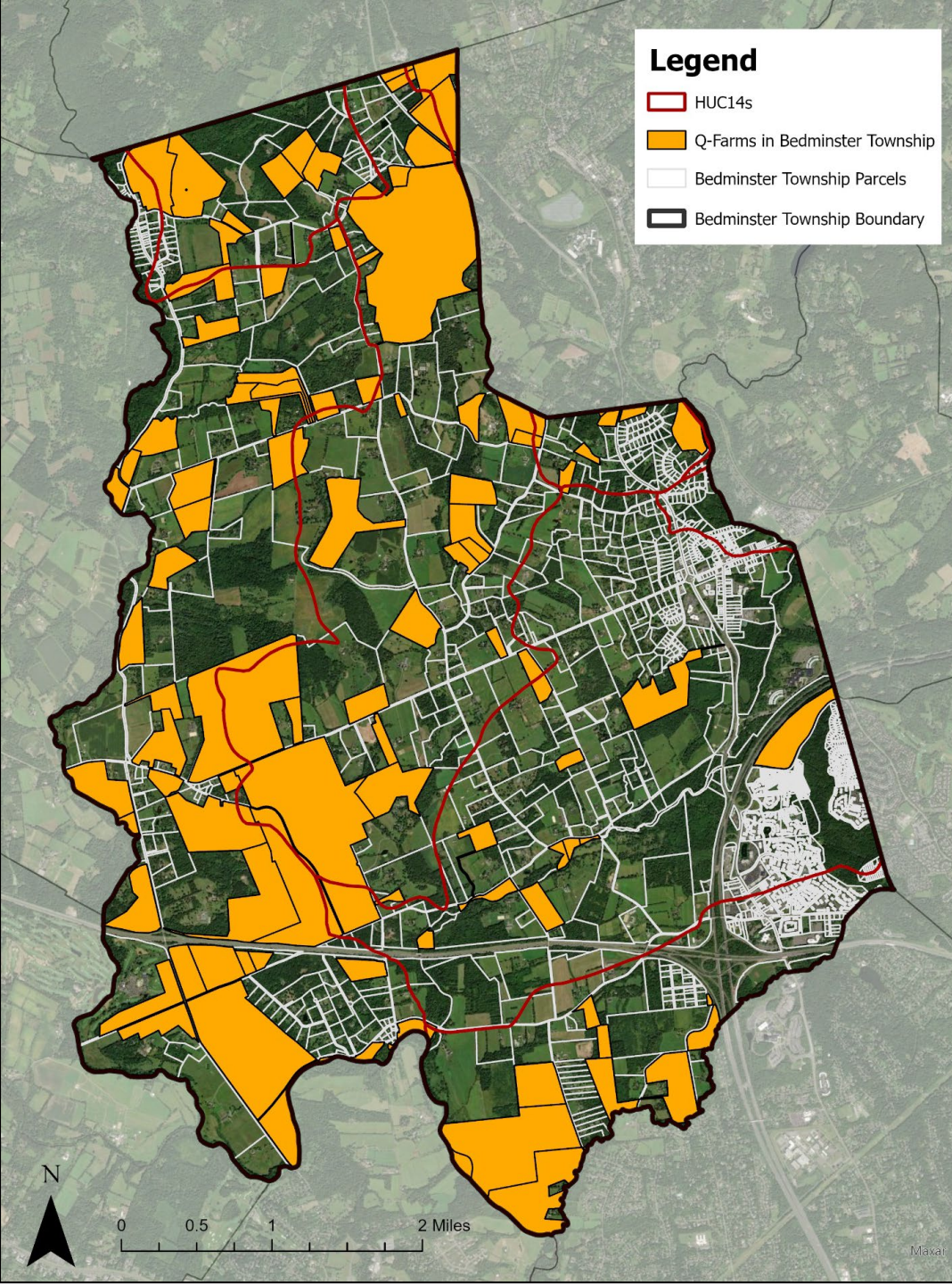


Class	Area (acres)	HUC Impervious Cover (%)
02030105050050		
Building	5.98	
Other	23.81	
Road	13.70	
TOTAL =	43.5	4.8%
02030105050070		
Building	21.88	
Other	109.25	
Road	88.75	
TOTAL =	219.9	4.6%
02030105050130		
Building	3.56	
Other	11.67	
Road	5.63	
TOTAL =	20.9	17.9%
02030105060040		
Building	0.35	
Other	0.54	
Road	1.14	
TOTAL =	2.0	15.7%

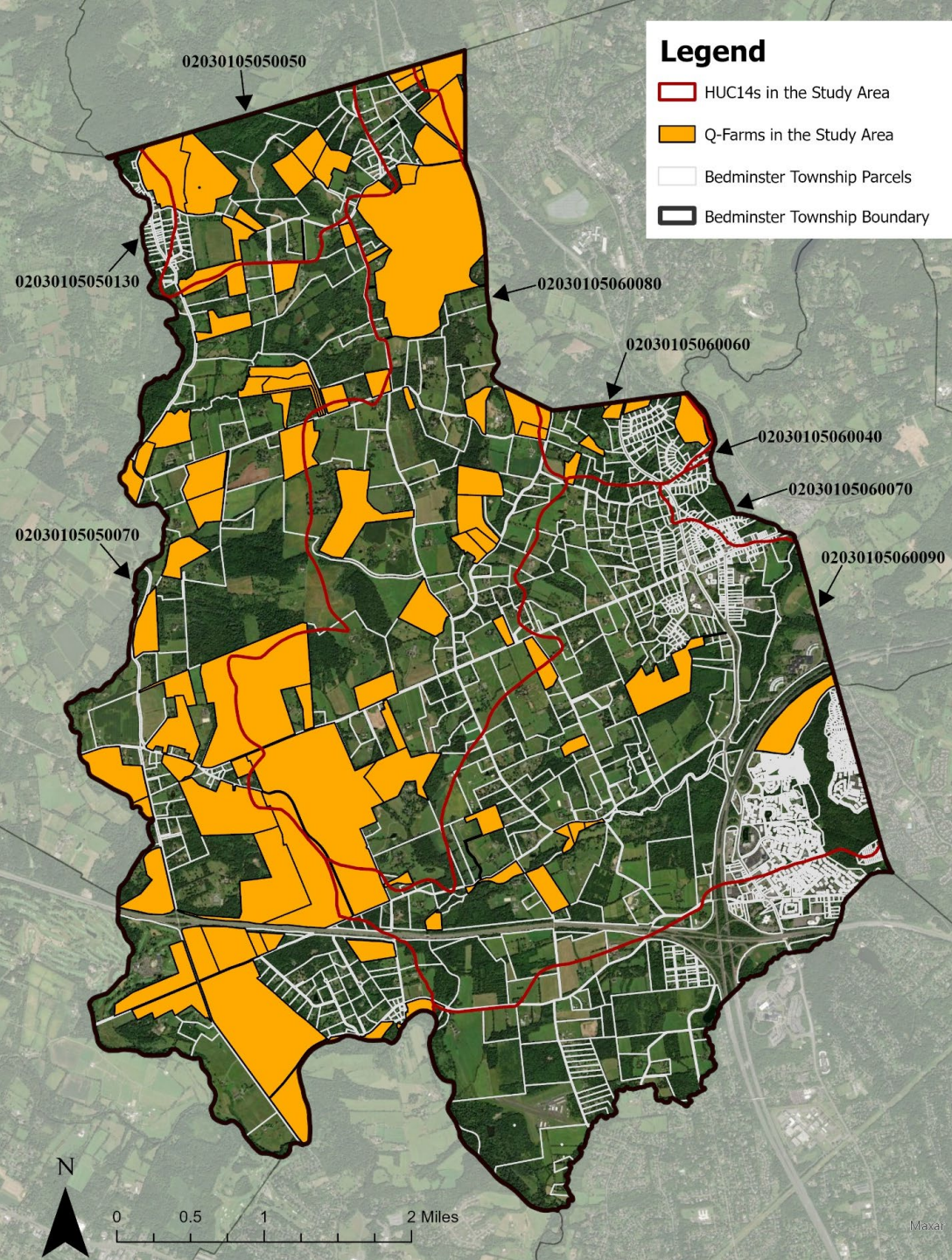
Class	Area (acres)	HUC Impervious Cover (%)
02030105060080		
Building	26.42	
Other	138.41	
Road	51.14	
TOTAL =	216.0	5.3%
02030105060090		
Building	122.30	
Other	223.44	
Road	227.68	
TOTAL =	573.4	12.6%
02030105070010		
Building	42.32	
Other	90.14	
Road	106.69	
TOTAL =	239.2	13.2%
All HUCs		
Building	234.93	
Other	626.09	
Road	515.06	
TOTAL =	1,376.1	8.2%



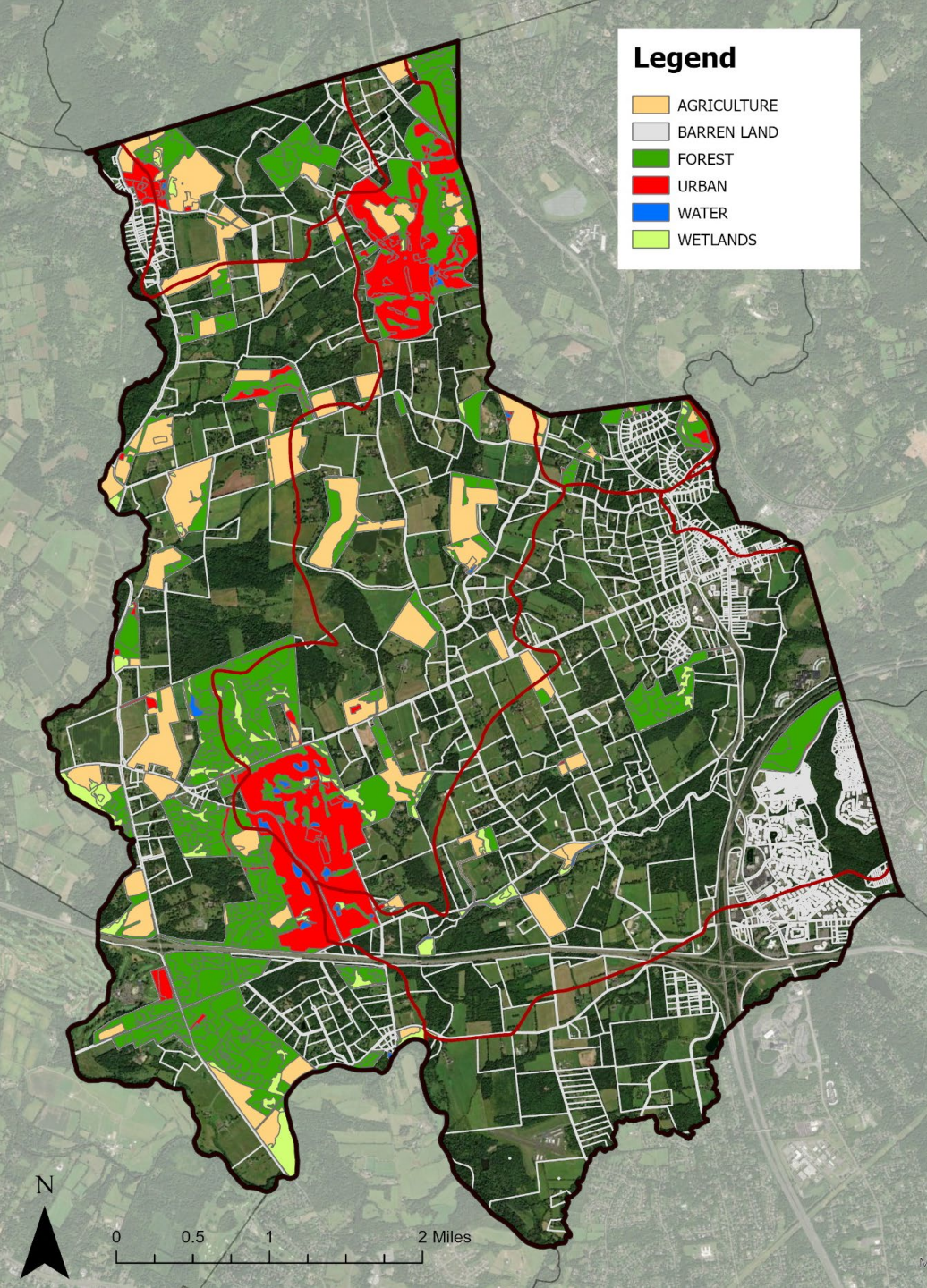
Lamington River Study Area			
ID	Owner	Address	Type
59	Upper Raritan Watershed Assoc.	2121 Larger Cross Road	N
60	Kimberly Ruggels Mell Family Trust	620 Black River Road	N
61	Richards, Andrew H & Cynthia D.	100 Black River Road	N
62	555 Lamington Rd. Holdings LLC	555 Lamington Road	N
63	556 Lamington Rd. Holdings LLC	555 Lamington Road	R
Raritan River North Branch Study Area			
ID	Owner	Address	Type
91	1691 Realty LLC	1691 US Highway 206	D
93	Old Farm Orchards LLC	14 Old Farm Lane	D
94	Old Farm Orchards LLC	3546 US Highway 206	D
95	Church Of the Hills	3545 Route 206	D



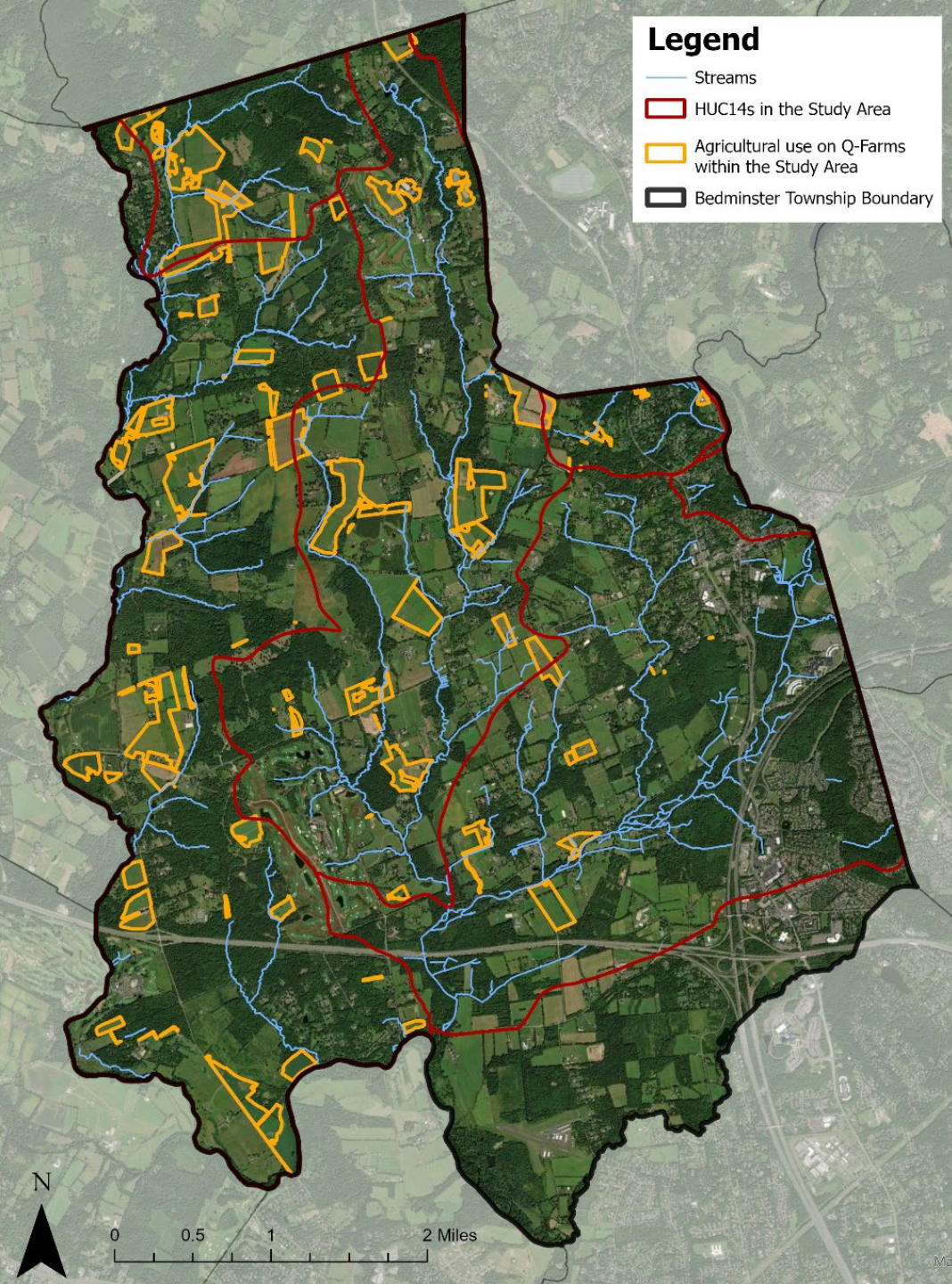
Blk	Lot	Location	Owner	Owner Address
2	1	N Side Pottersville Road	Purnell School	51 Pottersville Rd Box500
2	5	Pottersville Road	Piancone,Louis M.	23 Winterberry Circle
2	5.03	Pottersville Road	Herzog, Melvin E & Mae Emma	89 Brunswick Ave
2	8.03	Windsor Lane	Windsor Meadows Limited Partnership	Po Box 93
2	8.04	Windsor Lane	Uddo, Peter	881 Pottersville Road
2	8.05	Windsor Lane	Uddo, Peter	881 Pottersville Road
5	8	Pottersville Road	The Willow School,Inc.	1150 Pottersville Road
6	1.03	3584 E Side Rt 206	The Seeing Eye Inc	Po Box 375



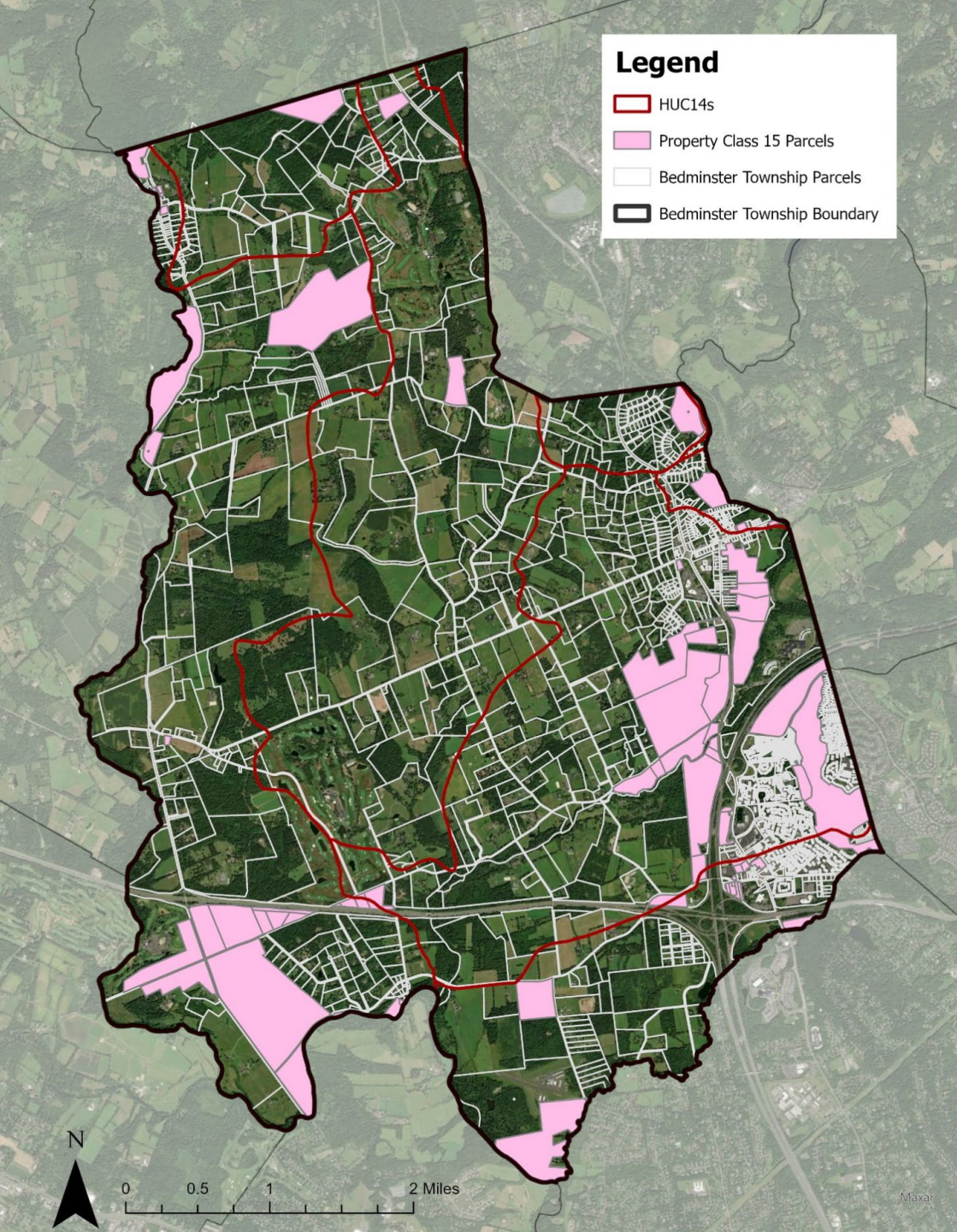
Blk	Lot	Location	Owner	Owner Address
2	1	N Side Pottersville Road	Purnell School	51 Pottersville Rd Box500
2	5	Pottersville Road	Piancone,Louis M.	23 Winterberry Circle
2	5.03	Pottersville Road	Herzog, Melvin E & Mae Emma	89 Brunswick Ave
2	8.03	Windsor Lane	Windsor Meadows Limited Partnership	Po Box 93
2	8.04	Windsor Lane	Uddo, Peter	881 Pottersville Road
2	8.05	Windsor Lane	Uddo, Peter	881 Pottersville Road
5	8	Pottersville Road	The Willow School,Inc.	1150 Pottersville Road
6	1.03	3584 E Side Rt 206	The Seeing Eye Inc	Po Box 375
6	1.04	3630 E Side Sh 206	The Seeing Eye Inc	Po Box 375
6	2	3476 E Side Sh 206	The Seeing Eye Inc	Po Box 375



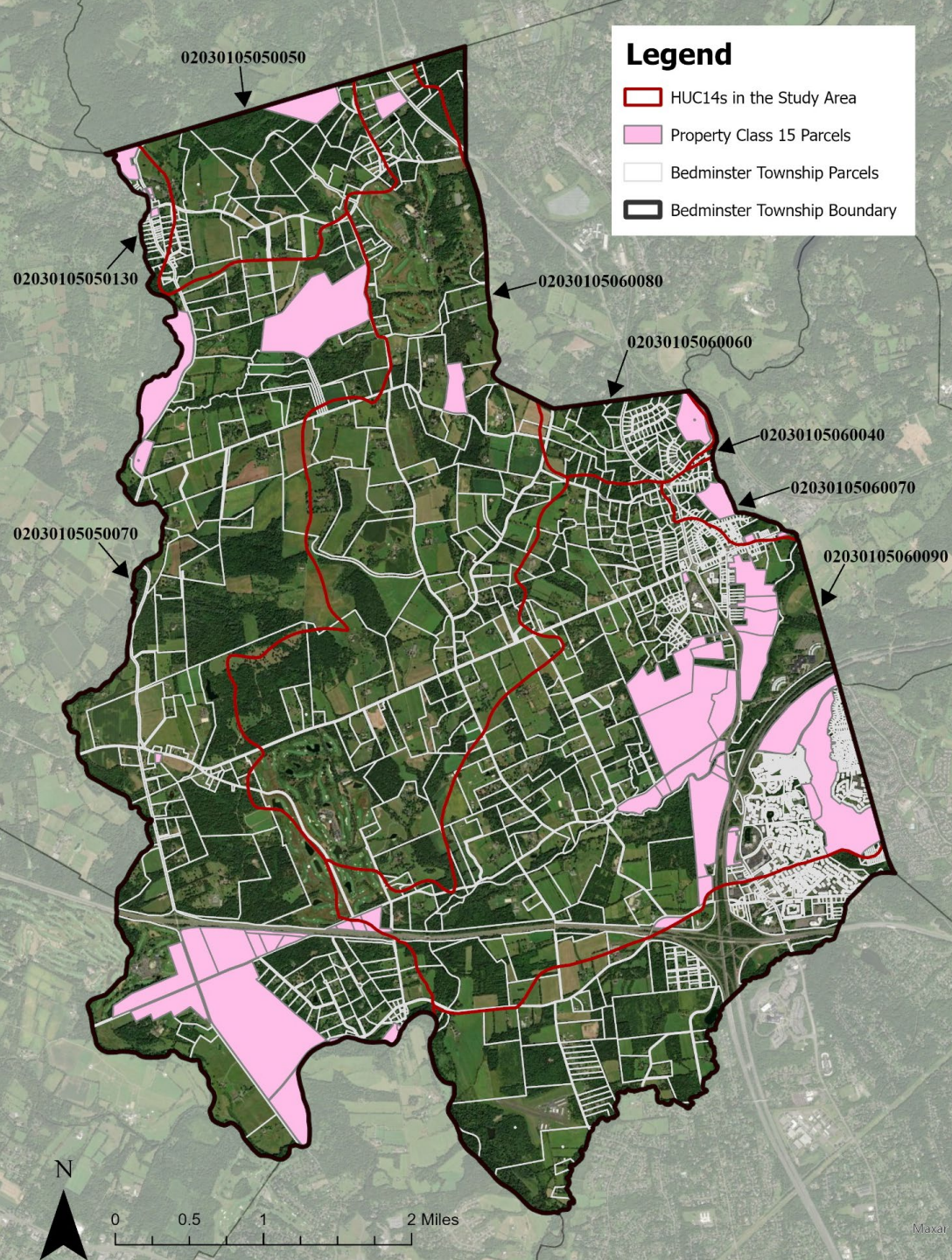
Land Use	Area (acres)
Agriculture	1,004.3
Barren Land	2.6
Forest	1,812.1
Urban	774.1
Water	53.5
Wetlands	193.7
Total:	3,840.3



Blk	Lot	Munic.	Cover Crop	Enhanced Stream Buffer	Impervious Cover Mgt.
1	11	Bedminster Twp	X		
1.08	25	Bedminster Twp	X		
1	13	Bedminster Twp	X		
15	1	Bedminster Twp	X		
14	23	Bedminster Twp	X		
15	9	Bedminster Twp	X		
19	2	Bedminster Twp		X	
19	3	Bedminster Twp		X	
19	14	Bedminster Twp		X	

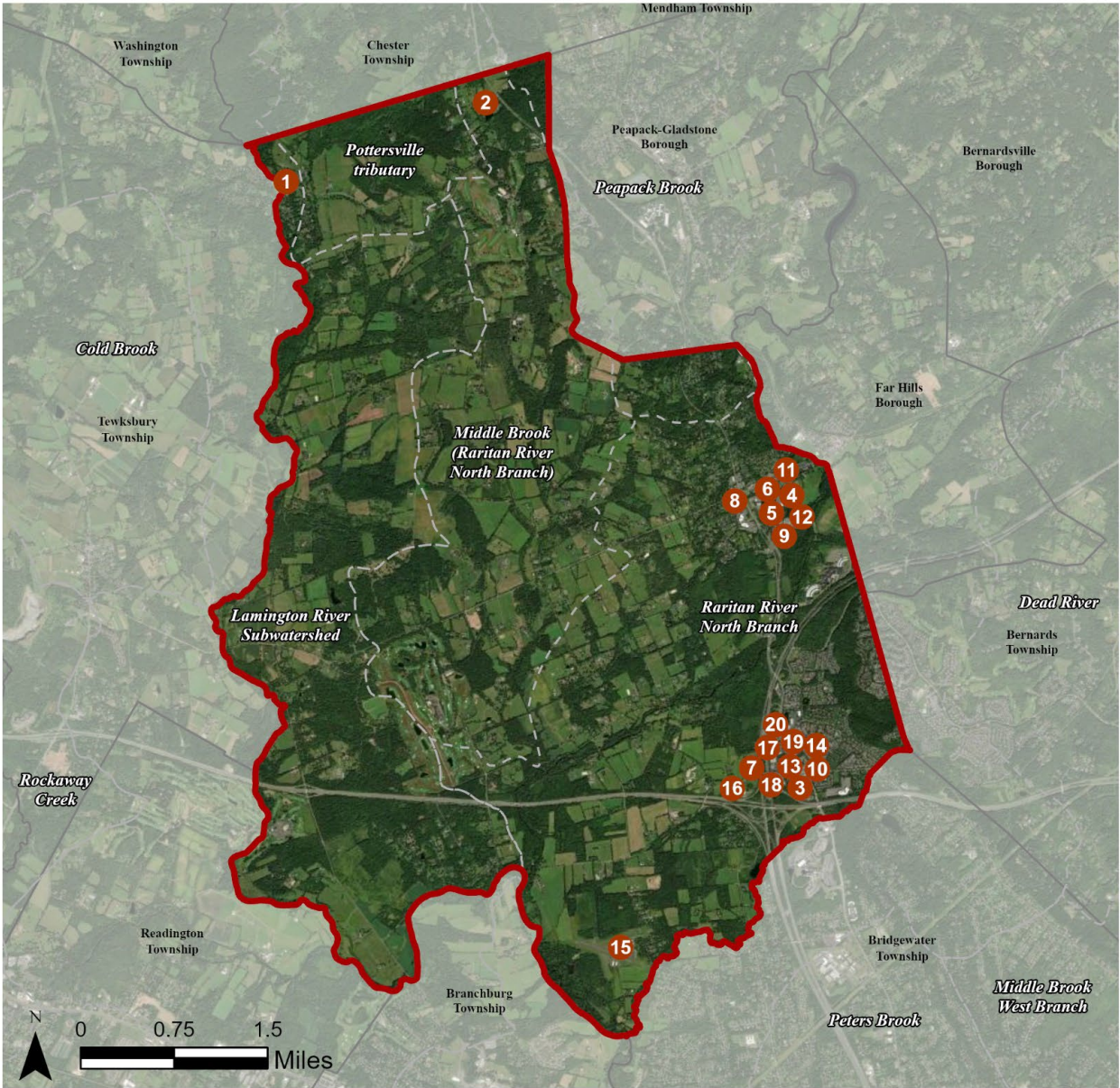


Blk	Lot	Prop Class	Location	Owner	Facility Type
36	1	15A	Somerville Road	Murk, Catherine C.	School
2	1	15B	Pottersville Road	Purnell School	Schools
8	20	15B	2121 Larger Cross Road	Upper Raritan Watershed Assoc.	Educ/Science /Office
38	3	15B	300 Lamington Road	Lamington Presbyterian Church	Schools
61	4	15B	1130 Burnt Mills Road	Forbes, Malcolm S.	School For Autism
62.01	1	15B	1810 Burnt Mills Road	Somerset Hills Learning Institute	School For Autism
5	8	15C	1150 Pottersville Road	The Willow School, Inc.	School
7	22	15C	Black River Road	JLJ Partnership C/O Johnson Off	Vacant Land



Blk	Lot	Prop Class	Location	Owner	Facility Type
*36	1	15A	Somerville Road	Bd Of Ed Of Bedminster Twp	School
2	1	15B	Pottersville Road	Purnell School	Schools
8	20	15B	2121 Larger Cross Road	Upper Raritan Watershed Assoc.	Educ/Science/Office
38	3	15B	300 Lamington Road	Lamington Presbyterian Church	Schools
61 ¹	4	15B	1130 Burnt Mills Road	Forbes, Malcolm S.	School For Autism
*62.01 ¹	1	15B	1810 Burnt Mills Road	Somerset Hills Learning Institute	School For Autism

BEDMINSTER TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE LAMINGTON RIVER SUBWATERSHED

- 1. Pottersville Volunteer Fire Company*

SITES WITHIN THE MIDDLE BROOK (RARITAN RIVER NORTH BRANCH) SUBWATERSHED

- 2. Resurgent Church*

SITES WITHIN THE RARITAN RIVER NORTH BRANCH SUBWATERSHED

- 3. Annie's Deli
- 4. Bedminster Public School
- 5. Bedminster Township Municipal Court
- 6. Bedminster USPS
- 7. Burnt Mills Park
- 8. Clarence Dillon Public Library
- 9. Far Hills-Bedminster Fire Department
- 10. Fresh Market
- 11. Grace Chapel*
- 12. Miller Lane Park
- 13. Oasis Day Spa
- 14. Pluckemin USPS
- 15. Somerset Airport
- 16. Somerset Hills Learning Institute
- 17. Sordoni Construction Co
- 18. The Center for Contemporary Art
- 19. The Hills Village Center
- 20. The Pluckemin Inn

*Sites evaluated in 2024 have updated annual rainfall numbers to reflect NJDEP 2023 average annual inches of rainfall per county. These sites also identify HUC14 IDs. The annual rainfall numbers of all other sites reflect NOAA 2000 average annual inches of rainfall per county.

POTTERSVILLE VOLUNTEER FIRE COMPANY



Subwatershed: Lamington River

HUC14 ID: 02030105050130

Site Area: 16,327 sq. ft.

Address: 8 Hacklebarney Road
Pottersville, NJ 07979

Block and Lot: Block 2, Lot 3

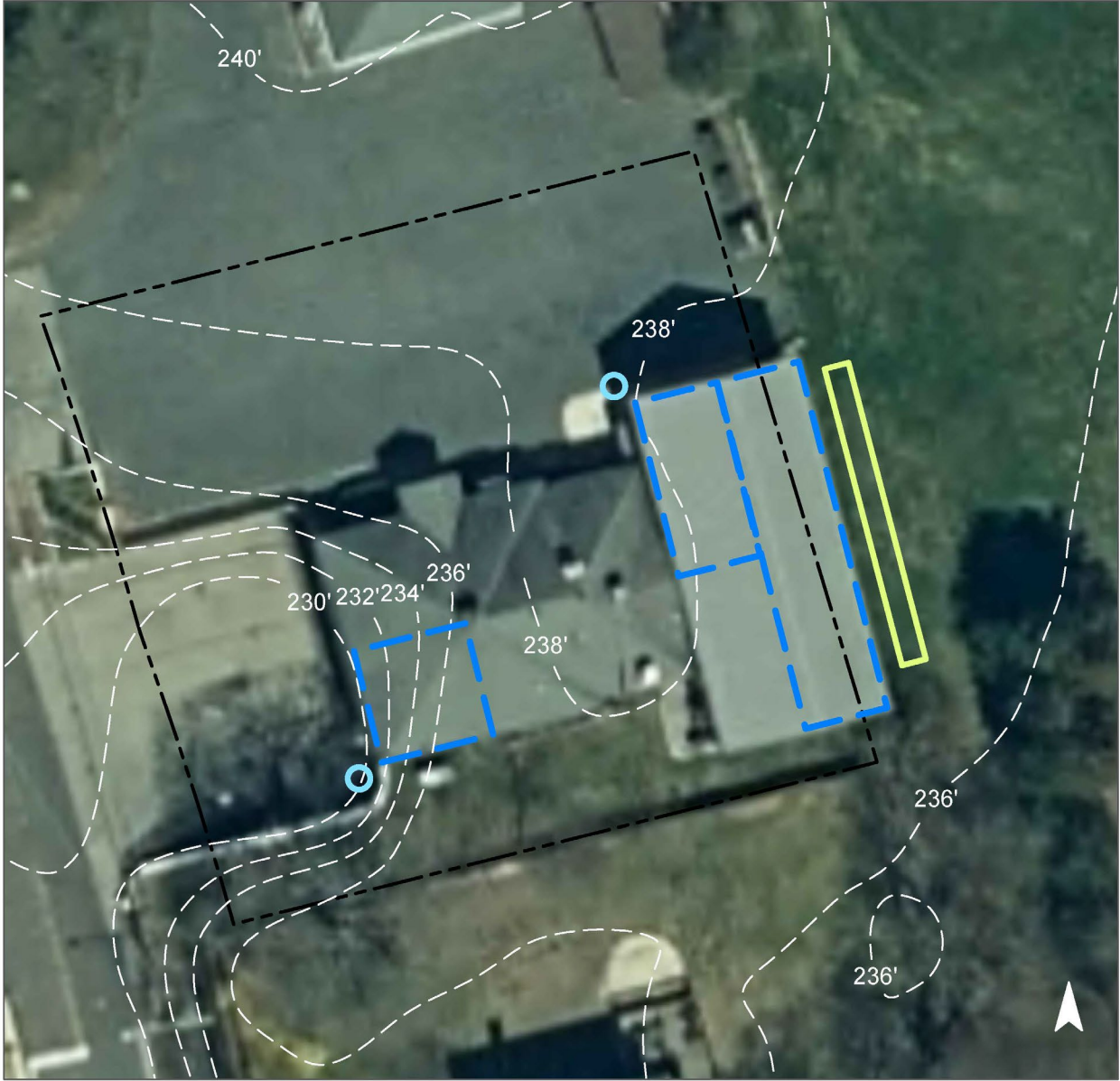


A rain garden can be installed in the grass area to the east of the building to capture, treat, and infiltrate the stormwater runoff from the rooftop. This would require downspout disconnections. Cisterns can be installed to the northeast and southwest of the building to divert and detain the stormwater runoff from the rooftop for later non-potable reuse such as washing vehicles. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure. An underdrain would be required.






Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 49"
94	15,311	0.7	7.7	70.3	0.012	0.47

Recommended Green Infrastructure Practices	Drainage Area (sq. ft.)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	1,155	0.034	6	2,240	0.08	290	\$2,900
Rainwater harvesting	1,085	0.031	4	850	N/A	850 (gal)	\$2,550

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pottersville Volunteer Fire Company

-  bioretention system
-  rainwater harvesting
-  captured drainage area
-  property line
-  2020 Aerial: NJOIT, OGIS



Next Steps

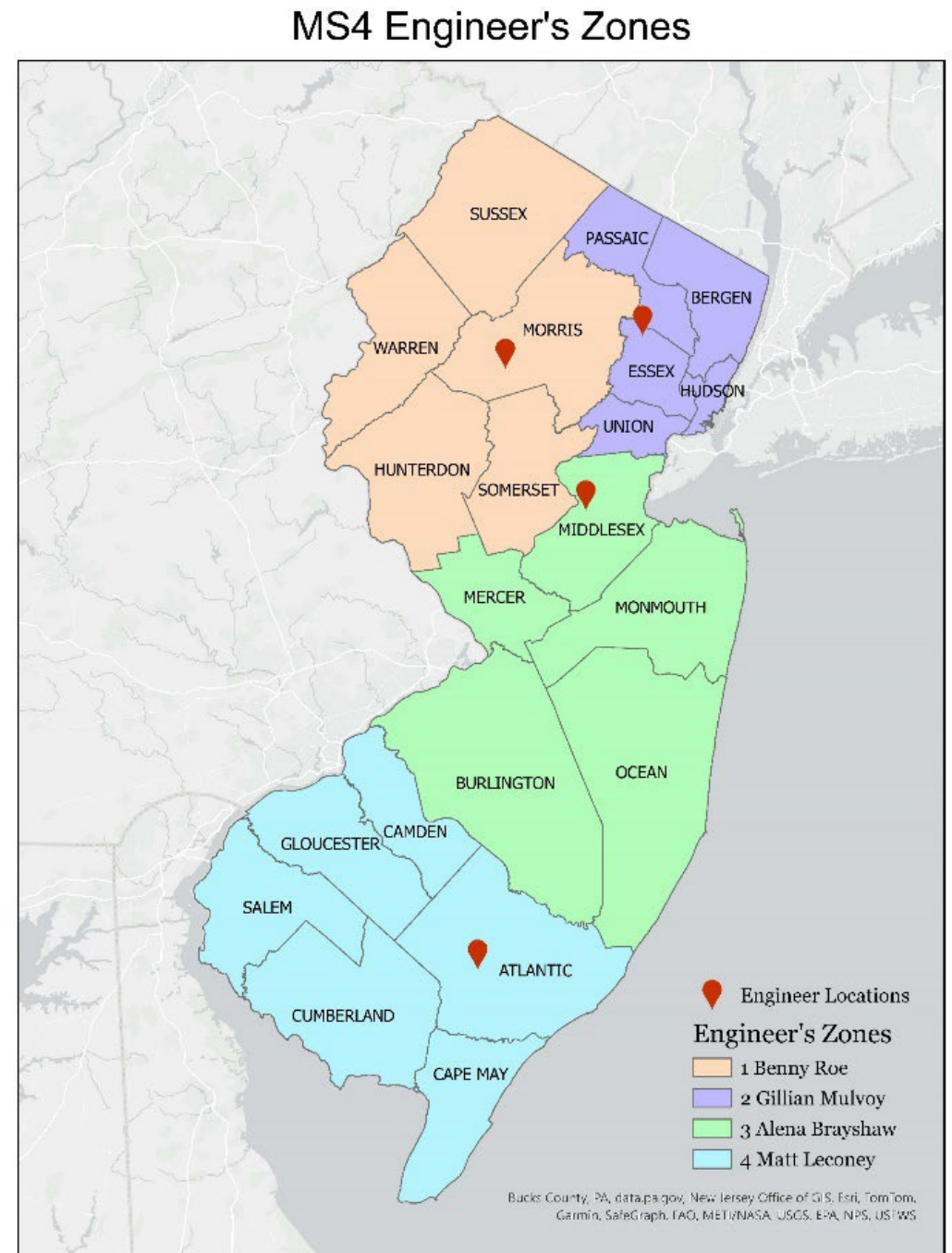
4. Estimation of the amounts of technical and financial assistance needed
5. Development and delivery of informational and education component
6. Development of a schedule for implementing NPS controls
7. Development of interim, measurable milestones
8. Development of criteria to ensure load reductions are being achieved
9. Development of a monitoring component to evaluate effectiveness

How can municipalities use these data?

- MS4 Permit Requirement to Develop a Watershed Improvement Plan
- Mapping is due December 31, 2025
 - Impervious areas will be mapped for the Watershed Restoration and Protection Plan
 - TMDL watershed will be identified and drainage areas to these waters
- Watershed Assessment Report is due December 31, 2026
 - Identification of potential water quality improvement projects
 - Estimate load reduction for each of these projects
- Watershed Improvement Plan Report is due December 31, 2027
 - Summary of potential projects
 - Implementation schedule
 - Project costs

Municipal Stormwater Management Technical Assistance Program

- Three-year agreement w/ NJDEP to support MS4 communities statewide
- Four Regional Engineers
- Provide technical support to all municipalities
 - Focus on former Tier B municipalities



QUESTIONS?

