RUTGERS
New Jersey Agricultural
Experiment Station

Impervious Cover Reduction Action Plan
for
Netcong Borough, Morris County, New Jersey

Prepared for Netcong Borough by the
Rutgers Cooperative Extension Water Resources Program

August 10, 2016

WILLIAM PENN
FOUNDATION

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Introduction

Located in Morris County in northern New Jersey, Netcong Borough covers approximately 0.96 square miles. Figures 1 and 2 illustrate that Netcong Borough is dominated by urban land uses. A total of 69.7% of the municipality's land use is classified as urban. Of the urban land in Netcong Borough, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2012 land use/land cover geographical information system (GIS) data layer categorizes Netcong Borough into many unique land use areas, assigning a percent impervious cover for each delineated area. These impervious cover values were used to estimate the impervious coverage for Netcong Borough. Based upon the 2012 NJDEP land use/land cover data, approximately 31.0% of Netcong Borough has impervious cover. This level of impervious cover suggests that the streams in Netcong Borough are likely non-supporting streams.[1]

Methodology

Netcong Borough contains portions of one subwatersheds (Figure 4). For this impervious cover reduction action plan, projects have been identified in each of these watersheds. Initially, aerial imagery was used to identify potential project sites that contain extensive impervious cover. Field visits were then conducted at each of these potential project sites to determine if a viable option exists to reduce impervious cover or to disconnect impervious surfaces from draining directly to the local waterway or storm sewer system. During the site visit, appropriate green infrastructure practices for the site were determined. Sites that already had stormwater management practices in place were not considered.

[1] Caraco, D., R. Claytor, P. Hinkle, H. Kwon, T. Schueler, C. Swann, S. Vysotsky, and J. Zielinski. 1998. Rapid Watershed Planning Handbook. A Comprehensive Guide for Managing Urbanizing Watersheds. Prepared by Center For Watershed Protection, Ellicott City, MD. Prepared for U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds and Region V. October 1998

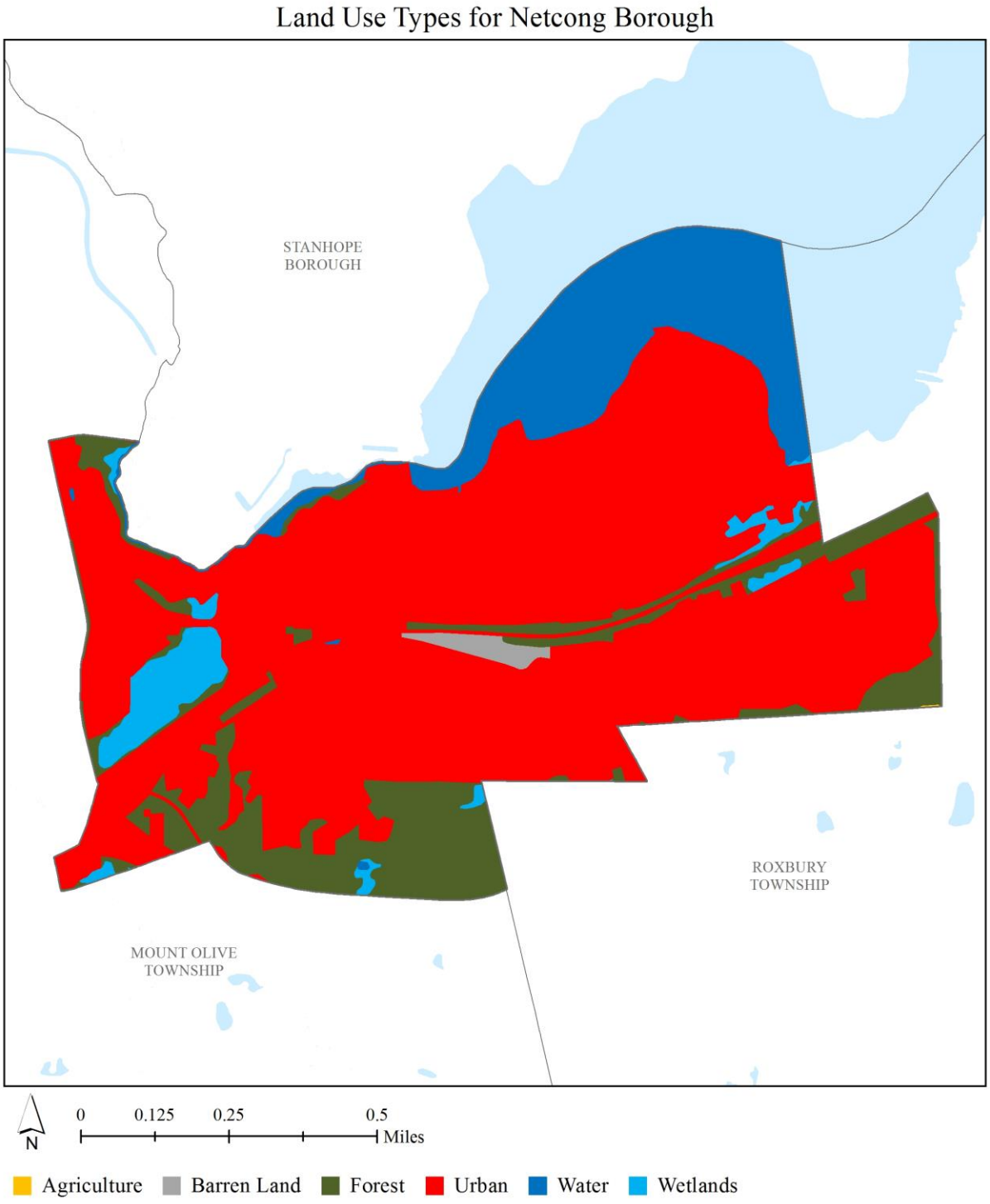


Figure 1: Map illustrating the land use in Netcong Borough

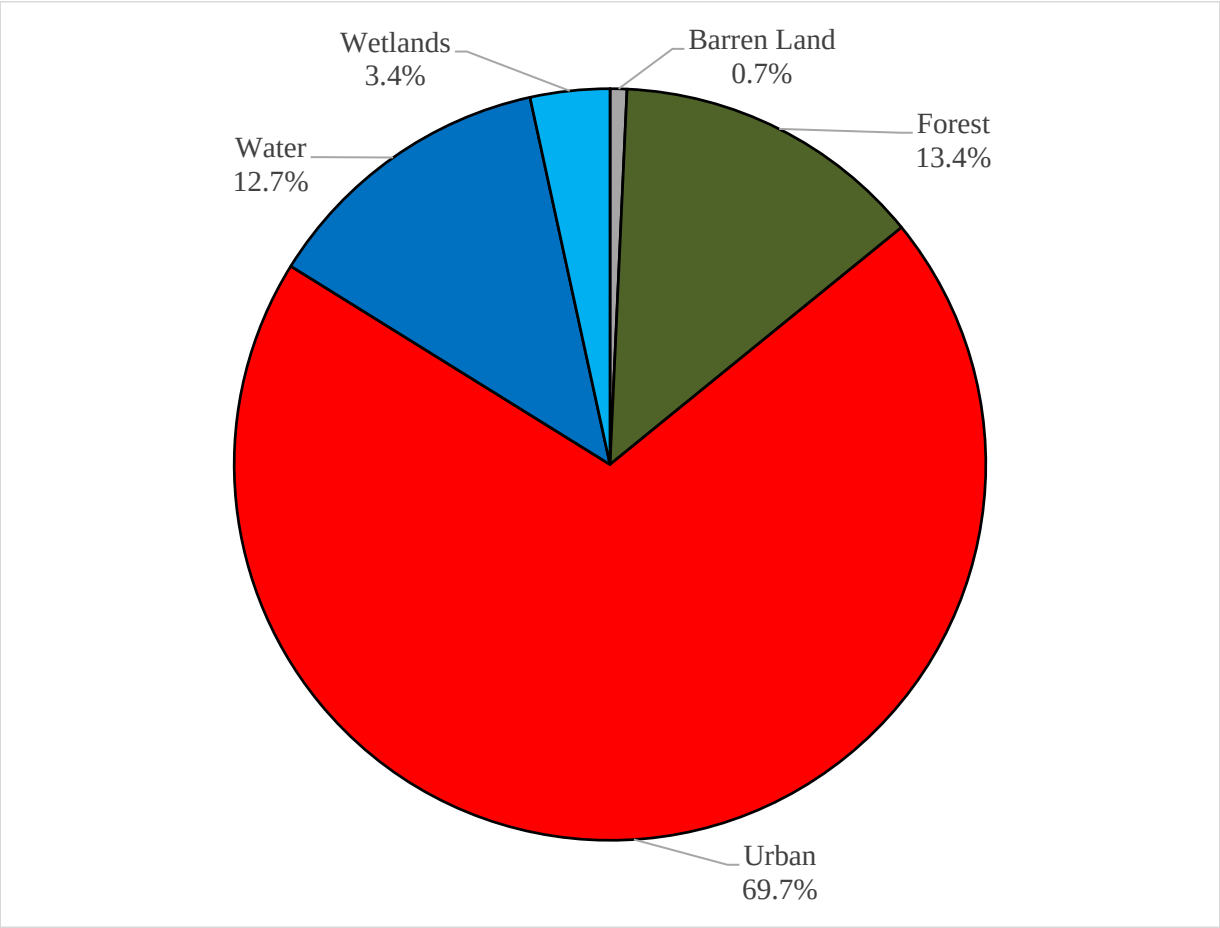


Figure 2: Pie chart illustrating the land use in Netcong Borough

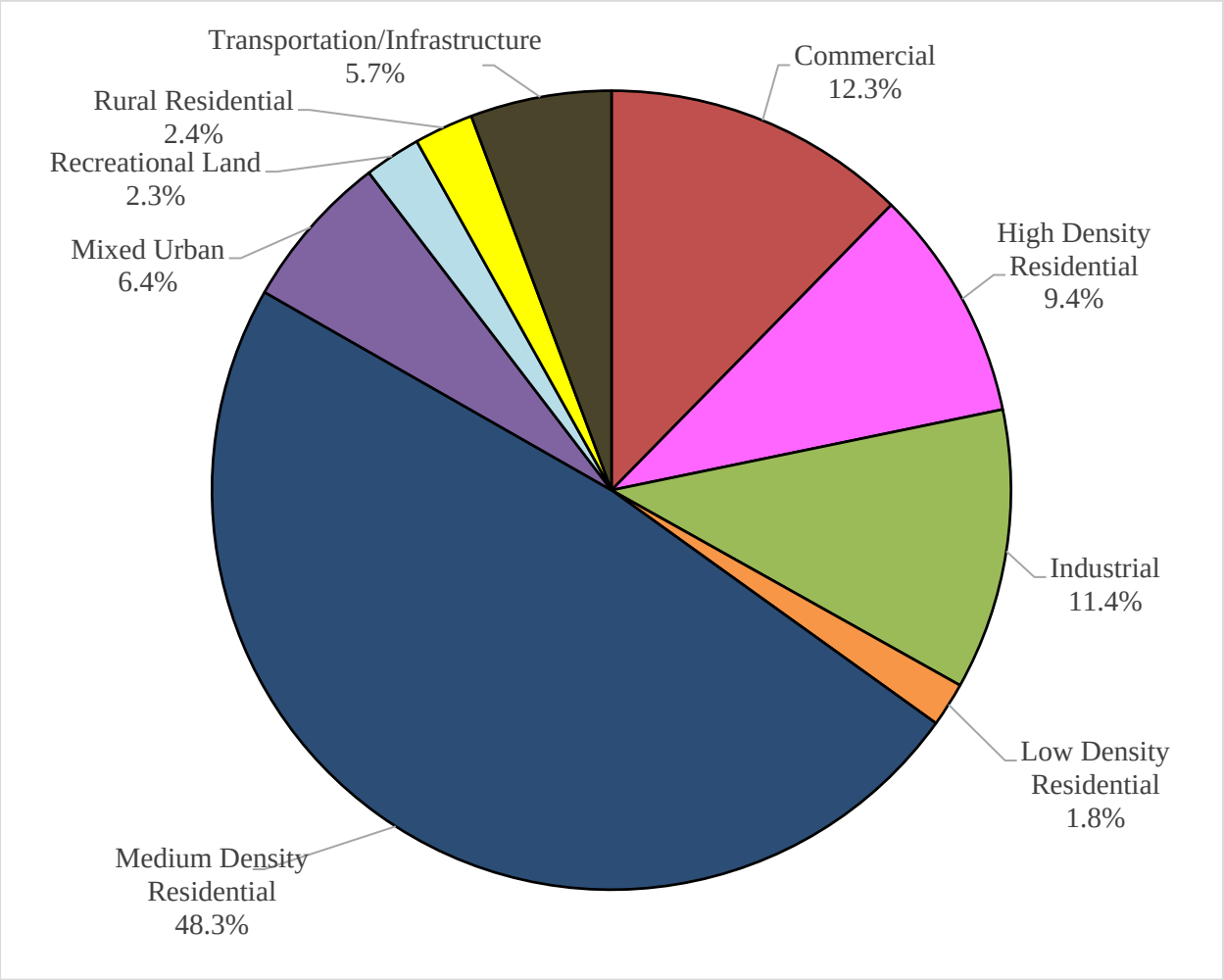


Figure 3: Pie chart illustrating the various types of urban land use in Netcong Borough

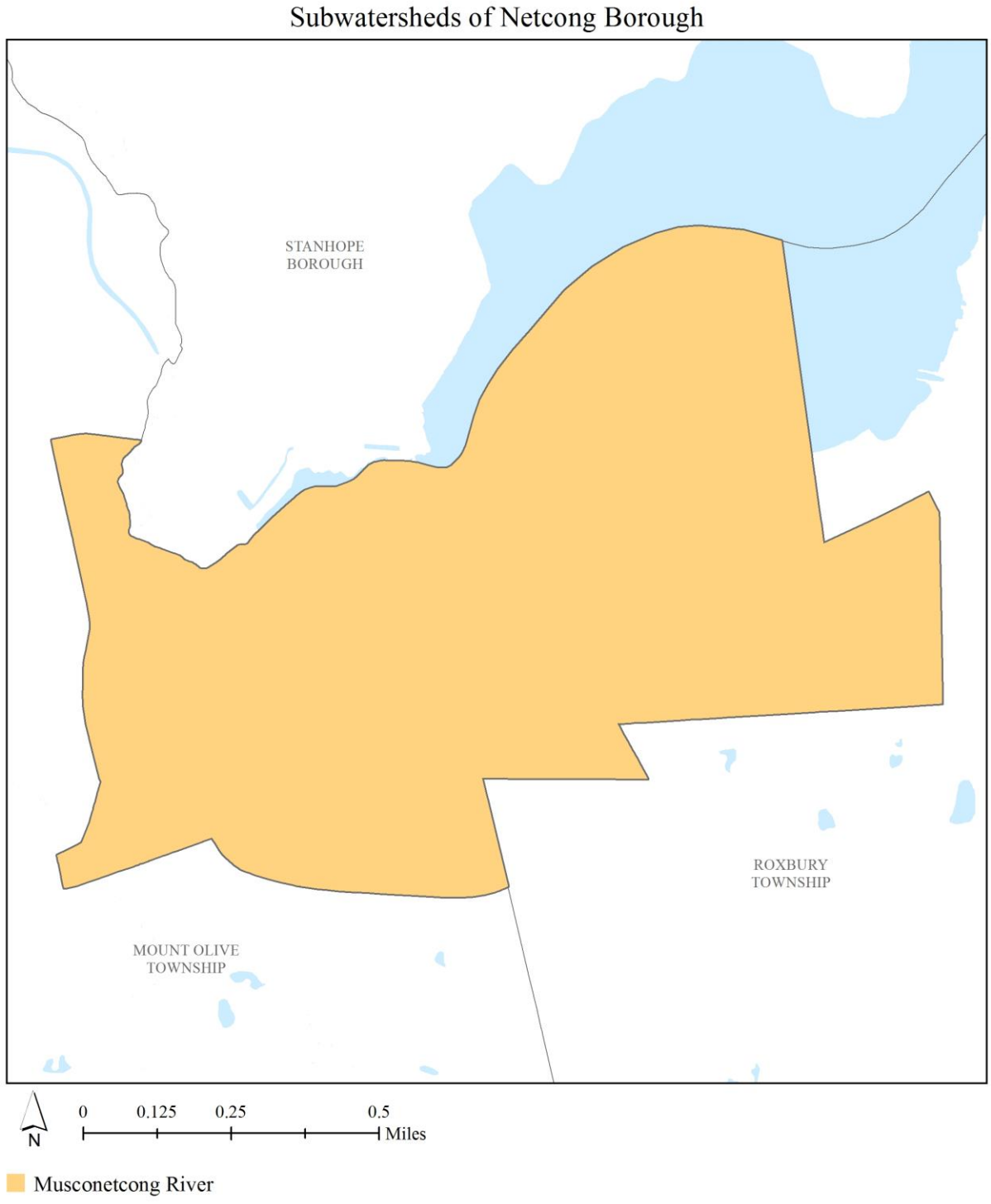


Figure 4: Map of the subwatersheds in Netcong Borough

For each potential project site, specific aerial loading coefficients for commercial land use were used to determine the annual runoff loads for total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS) from impervious surfaces (Table 1). These are the same aerial loading coefficients that NJDEP uses in developing total maximum daily loads (TMDLs) for impaired waterways of the state. The percentage of impervious cover for each site was extracted from the 2012 NJDEP land use/land cover database. For impervious areas, runoff volumes were determined for the water quality design storm (1.25 inches of rain over two-hours) and for the annual rainfall total of 44 inches.

Preliminary soil assessments were conducted for each potential project site identified in Netcong Borough using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, which utilizes regional and statewide soil data to predict soil types in an area. Several key soil parameters were examined (e.g., natural drainage class, saturated hydraulic conductivity of the most limiting soil layer (K_{sat}), depth to water table, and hydrologic soil group) to evaluate the suitability of each site's soil for green infrastructure practices. In cases where multiple soil types were encountered, the key soil parameters were examined for each soil type expected at a site.

For each potential project site, drainage areas were determined for each of the green infrastructure practices proposed at the site. These green infrastructure practices were designed to manage the 2-year design storm, enabling these practices to capture 95% of the annual rainfall. Runoff volumes were calculated for each proposed green infrastructure practice. The reduction in TSS loading was calculated for each drainage area for each proposed green infrastructure practice using the aerial loading coefficients in Table 1. The maximum volume reduction in stormwater runoff for each green infrastructure practice for a storm was determined by calculating the volume of runoff captured from the 2-year design storm. For each green infrastructure practice, peak discharge reduction potential was determined through hydrologic modeling in HydroCAD. For each green infrastructure practice, a cost estimate is provided. These costs are based upon the square footage of the green infrastructure practice and the real cost of green infrastructure practice implementation in New Jersey.

Table 1: Aerial Loading Coefficients[2]

Land Cover	TP load (lbs/acre/yr)	TN load (lbs/acre/yr)	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
Barrenland/Transitional Area	0.5	5	60

[2] New Jersey Department of Environmental Protection (NJDEP), Stormwater Best Management Practice Manual, 2004.

Green Infrastructure Practices

Green infrastructure is an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure projects capture, filter, absorb, and reuse stormwater to maintain or mimic natural systems and to treat runoff as a resource. As a general principal, green infrastructure practices use soil and vegetation to recycle stormwater runoff through infiltration and evapotranspiration. When used as components of a stormwater management system, green infrastructure practices such as bioretention, green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits. In addition to effectively retaining and infiltrating rainfall, these practices can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits[3]. A wide range of green infrastructure practices have been evaluated for the potential project sites in Netcong Borough. Each practice is discussed below.

Disconnected downspouts

This is often referred to as simple disconnection. A downspout is simply disconnected, prevented from draining directly to the roadway or storm sewer system, and directed to discharge water to a pervious area (i.e., lawn).

Pervious pavements

There are several types of permeable pavement systems including porous asphalt, pervious concrete, permeable pavers, and grass pavers. These surfaces are hard and support vehicle traffic but also allow water to infiltrate through the surface. They have an underlying stone layer to store stormwater runoff and allow it to slowly seep into the ground.




[3] United States Environmental Protection Agency (USEPA), 2013. Watershed Assessment, Tracking, and Environmental Results, New Jersey Water Quality Assessment Report. http://ofmpub.epa.gov/waters10/attains_state.control?p_state=NJ

Bioretention systems/rain gardens

These are landscaped features that are designed to capture, treat, and infiltrate stormwater runoff. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating wildlife habitat while managing stormwater runoff. Bioretention systems also can be used in soils that do not quickly infiltrate by incorporating an underdrain into the system.

Downspout planter boxes

These are wooden boxes with plants installed at the base of a downspout that provide an opportunity to beneficially reuse rooftop runoff.

Rainwater harvesting systems (cistern or rain barrel)

These systems capture rainwater, mainly from rooftops, in cisterns or rain barrels. The water can then be used for watering gardens, washing vehicles, or for other non-potable uses.

Bioswale

Bioswales are landscape features that convey stormwater from one location to another while removing pollutants and providing water an opportunity to infiltrate.

Stormwater planters

Stormwater planters are vegetated structures that are built into the sidewalk to intercept stormwater runoff from the roadway or sidewalk. Many of these planters are designed to allow the water to infiltrate into the ground while others are designed simply to filter the water and convey it back into the stormwater sewer system.

Tree filter boxes

These are pre-manufactured concrete boxes that contain a special soil mix and are planted with a tree or shrub. They filter stormwater runoff but provide little storage capacity. They are typically designed to quickly filter stormwater and then discharge it to the local sewer system.

Potential Project Sites

Attachment 1 contains information on potential project sites where green infrastructure practices could be installed. The recommended green infrastructure practice and the drainage area that the green infrastructure practice can treat are identified for each potential project site. For each practice, the recharge potential, TSS removal potential, maximum volume reduction potential per storm, and the peak reduction potential are provided. This information is also provided so that proposed development projects that cannot satisfy the New Jersey stormwater management requirements for major development can use one of the identified projects to offset a stormwater management deficit. [4]

[4] New Jersey Administrative Code, N.J.A.C. 7:8, Stormwater Management, Statutory Authority: N.J.S.A. 12:5-3, 13:1D-1 et seq., 13:9A-1 et seq., 13:19-1 et seq., 40:55D-93 to 99, 58:4-1 et seq., 58:10A-1 et seq., 58:11A-1 et seq. and 58:16A-50 et seq., *Date last amended: April 19, 2010*.

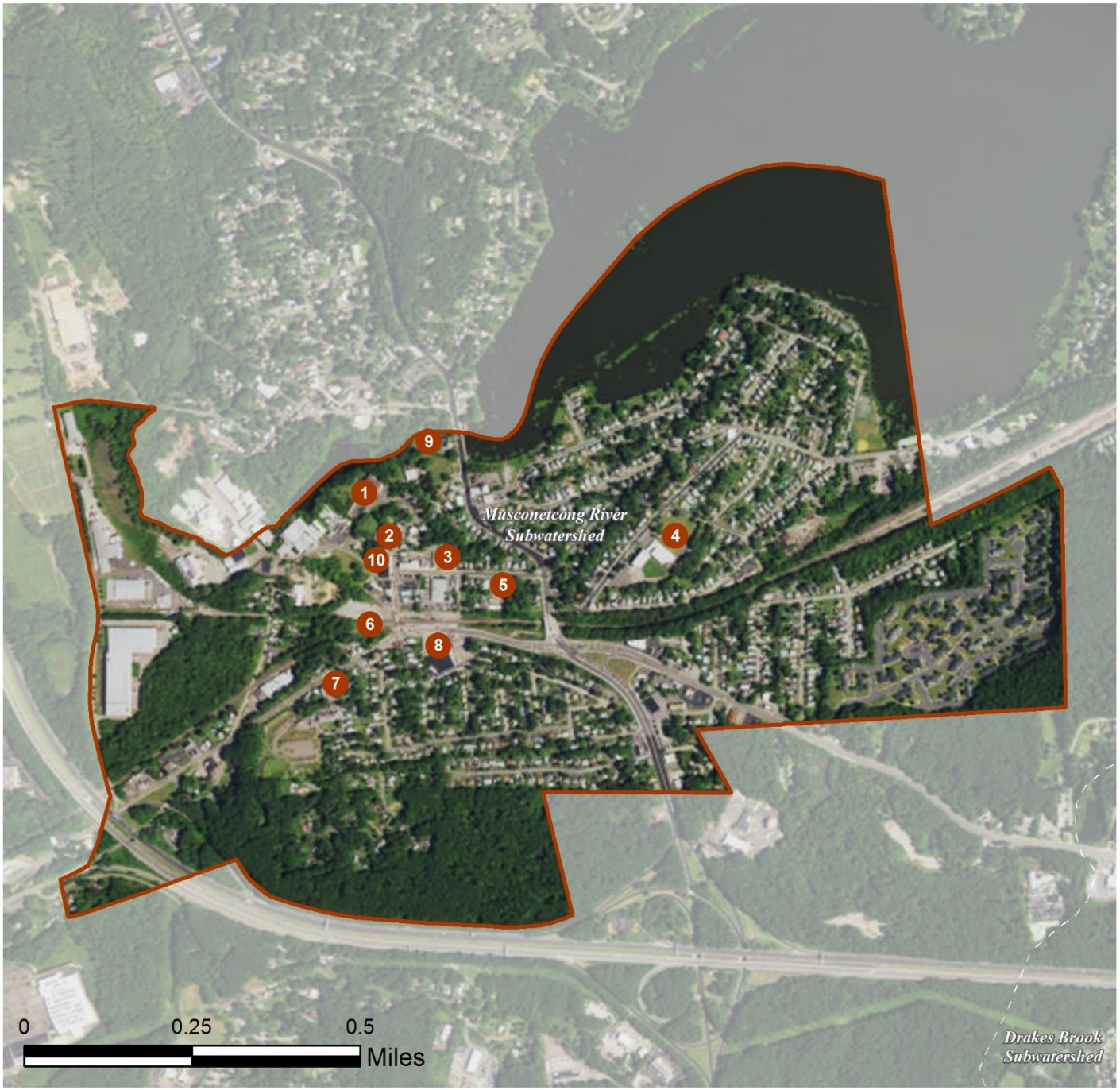
Conclusion

This impervious cover reduction action plan is meant to provide the municipality with a blueprint for implementing green infrastructure practices that will reduce the impact of stormwater runoff from impervious surfaces. These projects can be implemented by a wide variety of people such as boy scouts, girl scouts, school groups, faith-based groups, social groups, watershed groups, and other community groups.

Additionally, development projects that are in need of providing off-site compensation for stormwater impacts can use the projects in this plan as a starting point. The municipality can quickly convert this impervious cover reduction action plan into a stormwater mitigation plan and incorporate it into the municipal stormwater control ordinance.

a. Green Infrastructure Sites

NETCONG BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE MUSCONETCONG RIVER SUBWATERSHED:

1. Kings View Apartments
2. Morgan Funeral Home
3. Netcong Borough Office
4. Netcong Elementary School
5. Netcong Fire Department and DPW
6. Netcong Train Station
7. Saint Michael's Church
8. Shoprite
9. Stanhope United Methodist Church
10. Veterans of Foreign Wars

b. Proposed Green Infrastructure Concepts

KINGS VIEW APARTMENTS

Subwatershed: **Musconetcong River**

Site Area: **119,574 sq. ft.**

Address: **1 Jenny Lind Street**
Netcong, NJ 07857

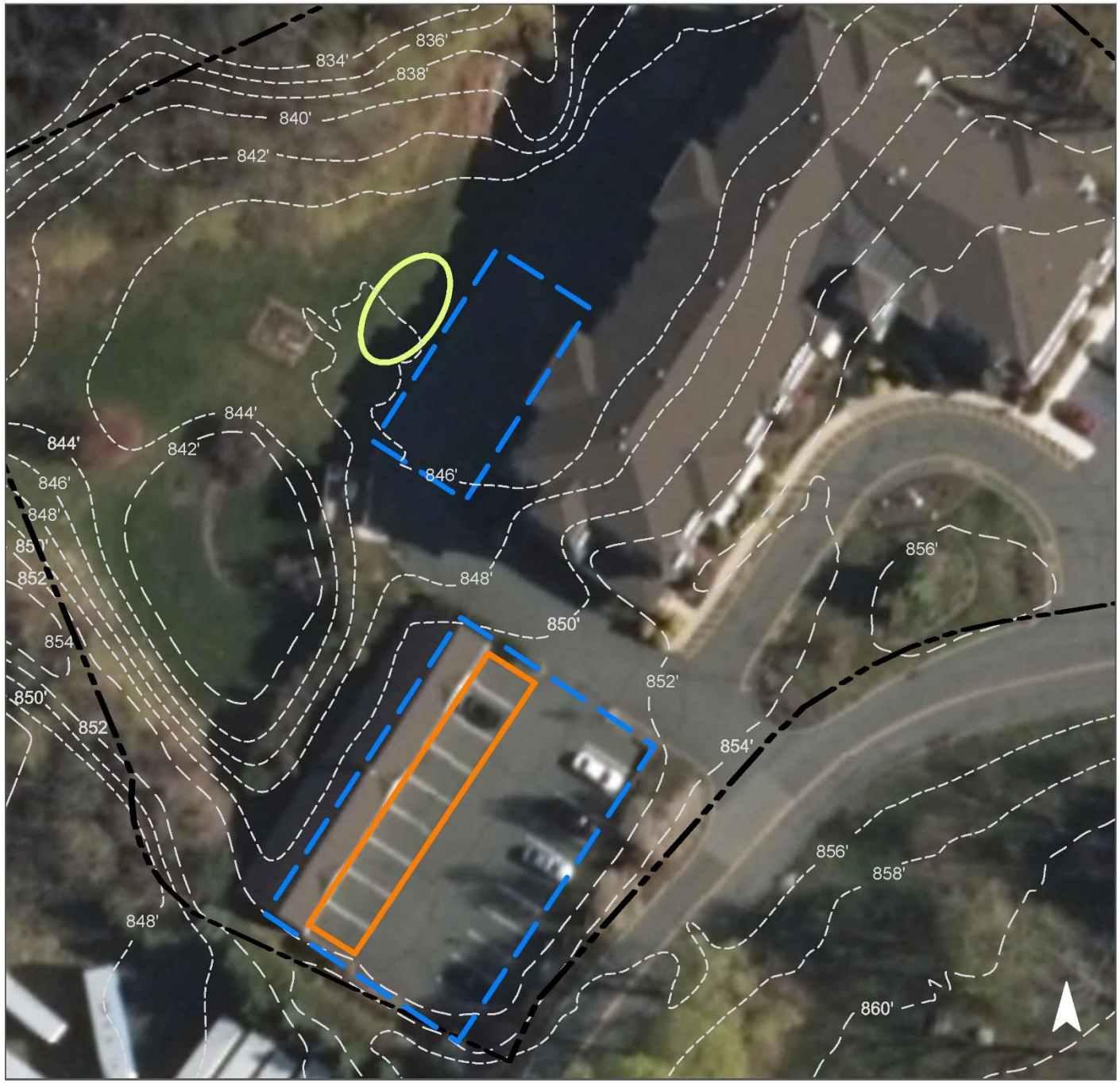
Block and Lot: **Block 16.01, Lot 23**

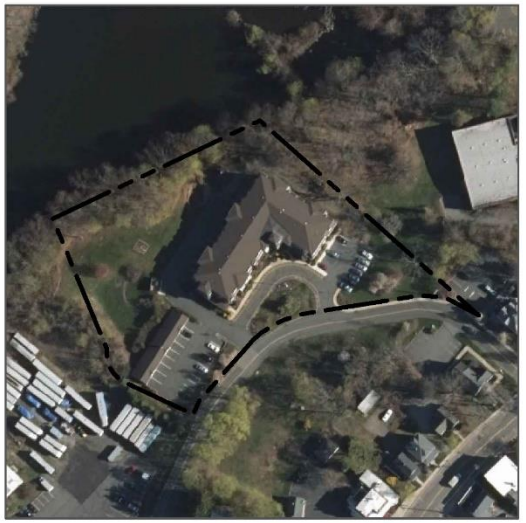
Stormwater is currently directed to an existing detention basin. Porous asphalt can be placed on the east side of the building to the southwest to capture and infiltrate stormwater. A rain garden at the bottom of the hill to the west of the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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 44"
44	52,175	2.5	26.4	239.6	0.041	1.43

Recommended Green Infrastructure Practices	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	0.074	12	5,760	0.20	700	$3,500
Pervious pavement	0.280	47	21,872	0.82	1,920	$48,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





Kings View Apartments

- bioretention system
- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 25' 50'

MORGAN FUNERAL HOME

Subwatershed: Musconetcong River

Site Area: 18,792 sq. ft.

Address: 31 Main Street
Netcong, NJ 07857

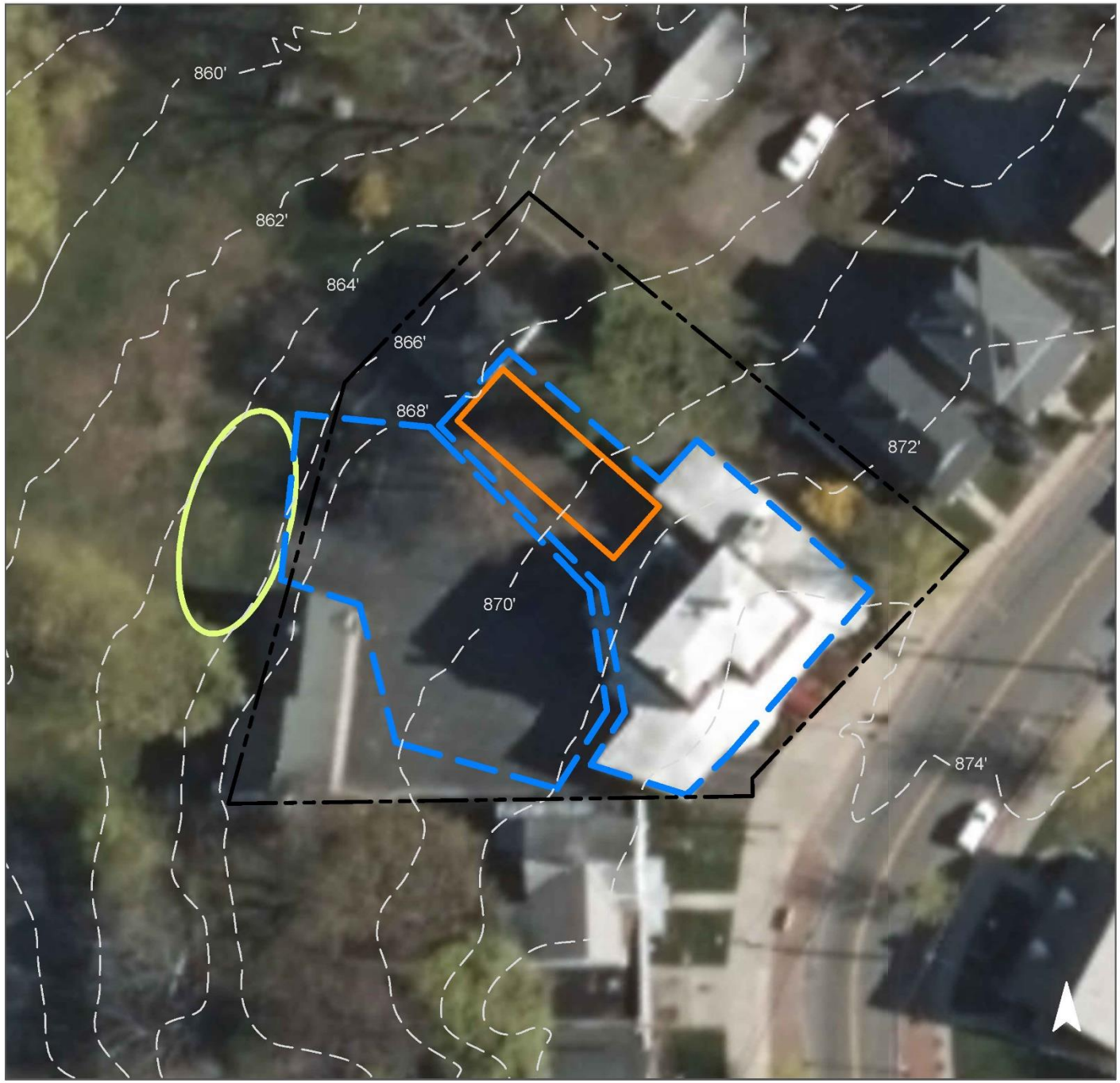
Block and Lot: Block 9, Lot 16

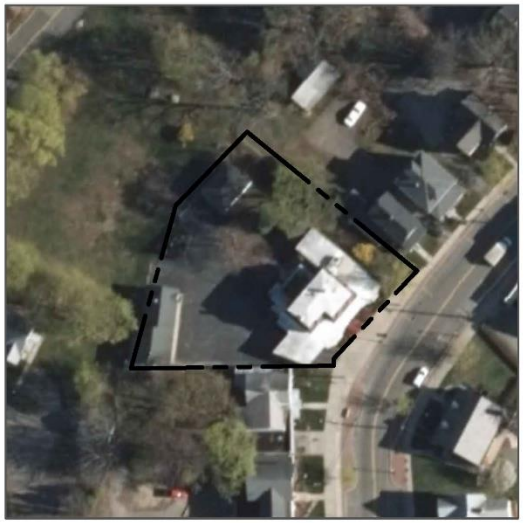
Stormwater is currently directed to the field behind the funeral home. Parking spots on the northeast corner of the parking lot can be replaced with porous asphalt to capture and infiltrate stormwater. A rain garden adjacent to the parking lot on the west edge can capture, treat, and infiltrate runoff from the roof and parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
69	13,000	0.6	6.6	59.7	0.010	0.36

Recommended Green Infrastructure Practices	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	0.135	23	9,881	0.37	1,290	$6,450
Pervious pavement	0.151	25	11,811	0.44	1,040	$26,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





Morgan Funeral Home

- bioretention system
- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

NETCONG BOROUGH OFFICE

Subwatershed: **Musconetcong River**

Site Area: **28,905 sq. ft.**

Address: **23 Maple Avenue**
Netcong, NJ 07857

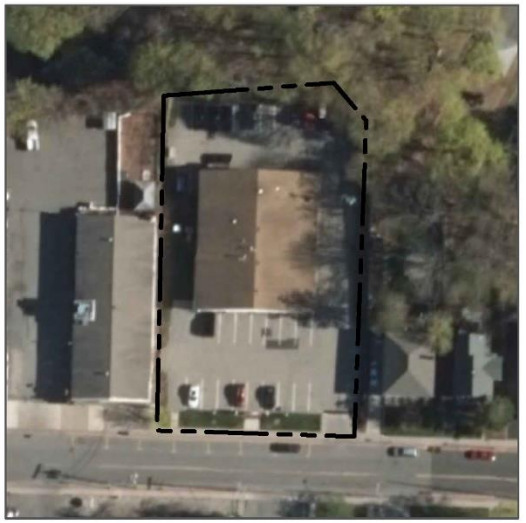
Block and Lot: **Block 15, Lot 25**

Stormwater is currently directed to an existing detention basin. Planter boxes can be attached to the downspouts on the eastern side of the building, two on each corner and two on the downspout at the center of the wall. Parking spots to the south of the building can be replaced with porous asphalt to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
93	26,919	1.3	13.6	123.6	0.021	0.74

Recommended Green Infrastructure Practices	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
Pervious pavement	0.171	29	13,337	0.59	1,565	$39,125
Planter boxes	0.034	6	n/a	n/a	72	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Netcong Borough Office

- pervious pavement
- planter box
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

NETCONG ELEMENTARY SCHOOL

Subwatershed: Musconetcong River

Site Area: 258,547 sq. ft.

Address: 26 College Road
Netcong, NJ 07857

Block and Lot: Block 9, Lot 22 &23

Stormwater is currently directed off the roof to the surrounding grass and pavement and pools in the back lot. Parking spots on the west side of the southwest lot can be replaced with porous asphalt to capture and infiltrate stormwater. A rain garden adjacent to the building on the northeast corner can capture, treat, and infiltrate roof runoff. Downspout planter boxes can be constructed on the northwest side to allow roof runoff to be reused. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
50	128,671	6.2	65.0	590.8	0.100	3.53

Recommended Green Infrastructure Practices	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	0.128	21	9,963	0.37	1,250	$6,250
Pervious pavement	0.287	48	22,328	0.84	2,000	$50,000
Planter boxes	0.034	6	n/a	n/a	72	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Netcong Elementary School

- bioretention system
- pervious pavement
- planter box
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 50' 100'

NETCONG FIRE DEPARTMENT & DPW

Subwatershed: Musconetcong River

Site Area: 40,880 sq. ft.

Address: 40 Maple Avenue
Netcong, NJ 07857

Block and Lot: Block 27, Lot 12

Stormwater is currently directed to an existing catch basin downhill from the site. Parking spots to the west of the firehouse can be replaced with porous asphalt to capture and infiltrate stormwater. A rain garden on the south side of the northwest grass area can capture, treat, and infiltrate roof runoff. A cistern can be placed on the northwest corner of the building and will be used to capture rainwater from the rooftop of the south building. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
60	24.467	1.2	12.4	112.3	0.019	0.67

Recommended Green Infrastructure Practices	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	0.108	18	8,467	0.32	1,040	$5,200
Pervious pavement	0.185	31	14,354	0.54	1,240	$31,000
Rainwater harvesting	0.044	7	1,600	0.13	1,600 (gal)	$3,200

GREEN INFRASTRUCTURE RECOMMENDATIONS

Netcong Fire Department & DPW

- bioretention system
- pervious pavement
- rainwater harvesting
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

NETCONG TRAIN STATION

Subwatershed: **Musconetcong River**

Site Area: **236,987 sq. ft.**

Address: **Main Street & Route 46**
Netcong, NJ 07857

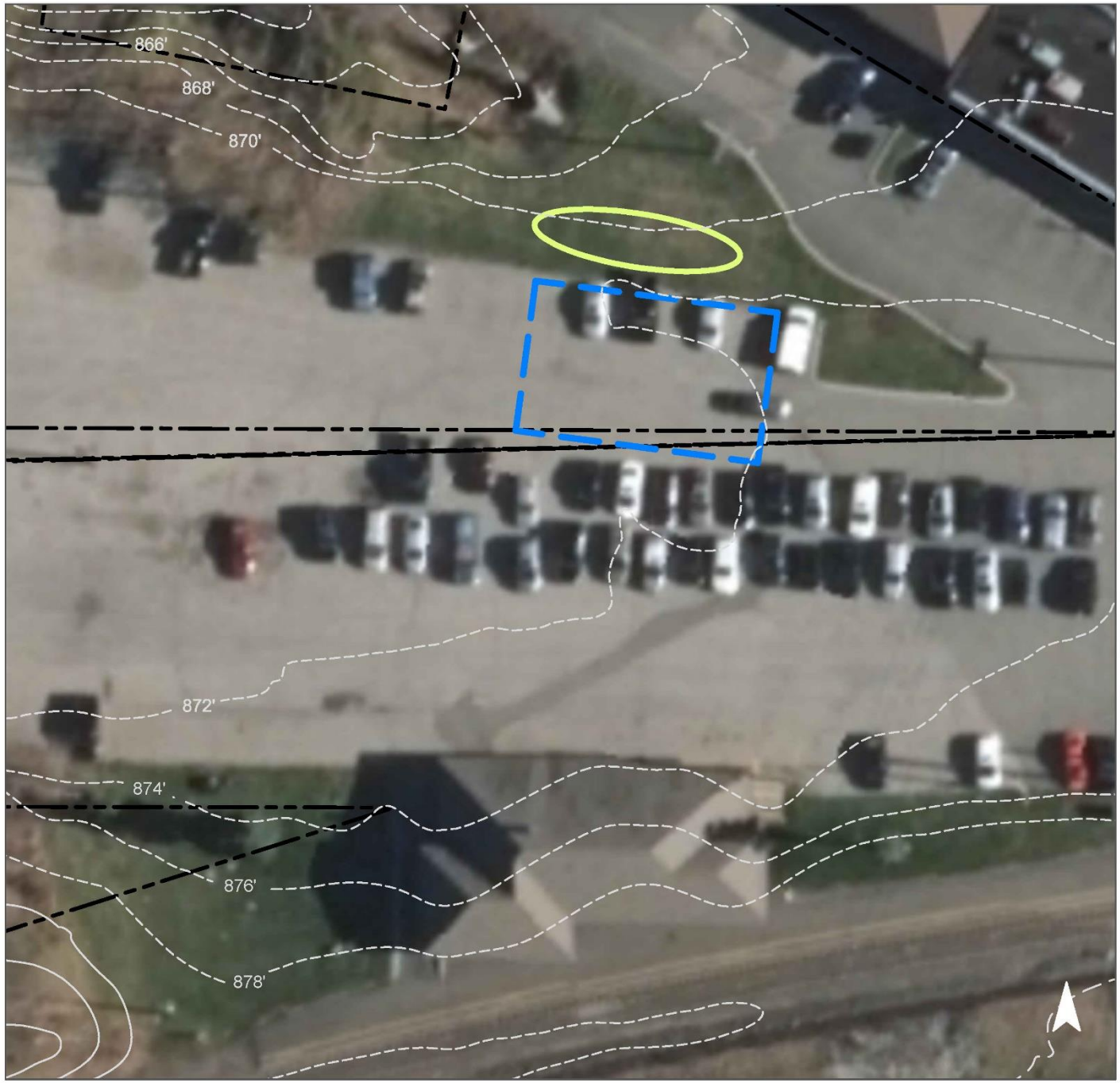
Block and Lot: **Block 19, Lot 36, 37**

Stormwater is currently directed to an existing catch basin in the grassy medium along the northern parking spaces. A rain garden installed in this grass area can capture, treat, and infiltrate runoff from the lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
50	118,069	5.7	59.6	542.1	0.092	3.24

Recommended Green Infrastructure Practices	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	0.052	9	4,069	0.15	600	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Netcong Train Station

- bioretention system
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

SAINT MICHAEL CHURCH

Subwatershed: Musconetcong River

Site Area: 20,406 sq. ft.

Address: 4 Church Street
Netcong, NJ 07857

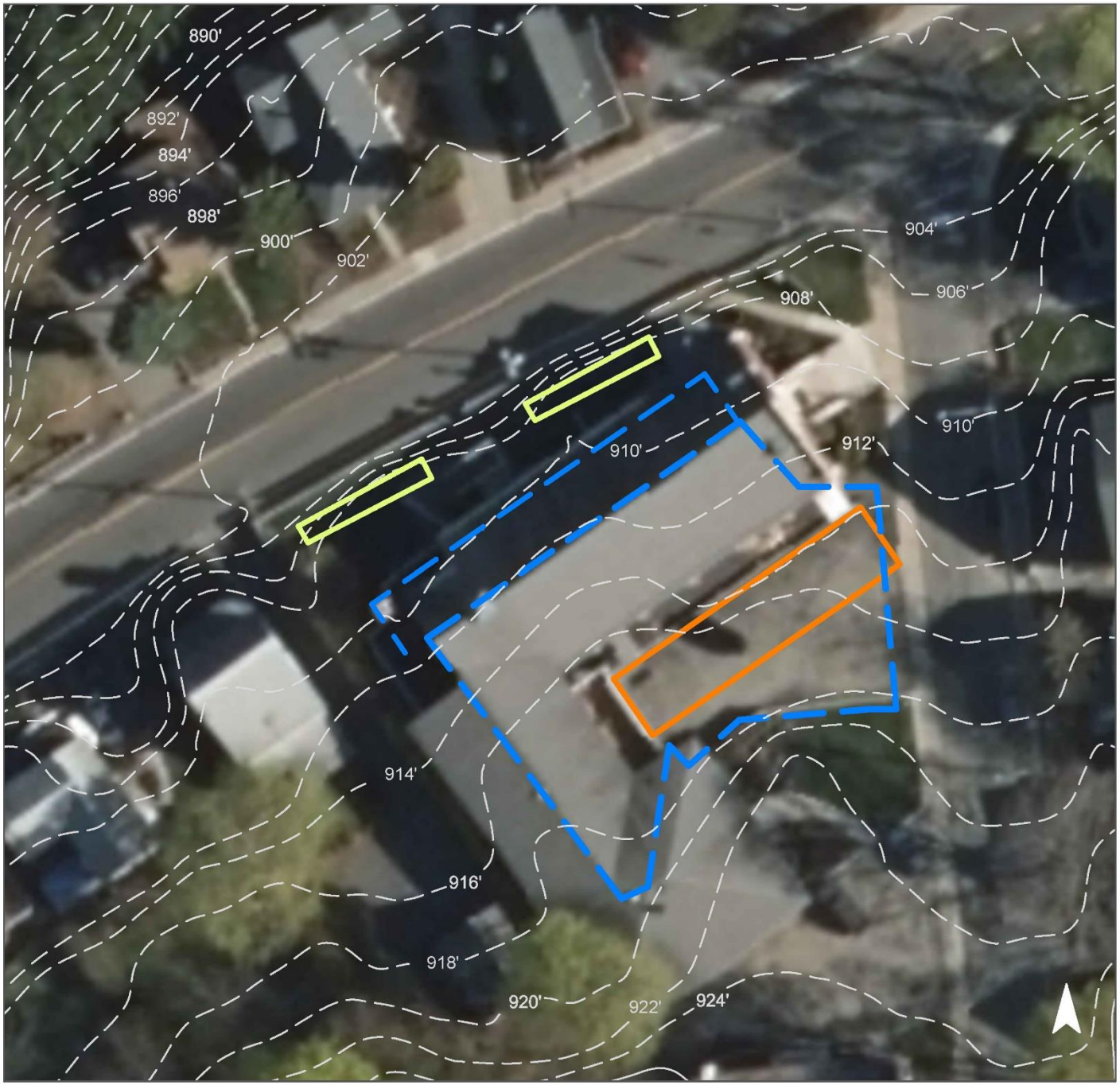
Block and Lot: Block 26, Lot 28

Stormwater is currently directed to an existing detention basin. Parking spots on the eastern side of the site can be replaced with porous asphalt to capture and infiltrate stormwater. Two rain gardens on the northern side of the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
84	17,098	0.8	8.6	78.5	0.013	0.47

Recommended Green Infrastructure Practices	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 systems	0.042	7	3,261	0.12	600	$3,000
Pervious pavement	0.120	20	9,365	0.35	1,420	$35,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Saint Michael Church

- bioretention system
- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 50' 100'

SHOPRITE

Subwatershed: Musconetcong River

Site Area: 106,875 sq. ft.

Address: 75 US-46
Netcong, NJ 07857

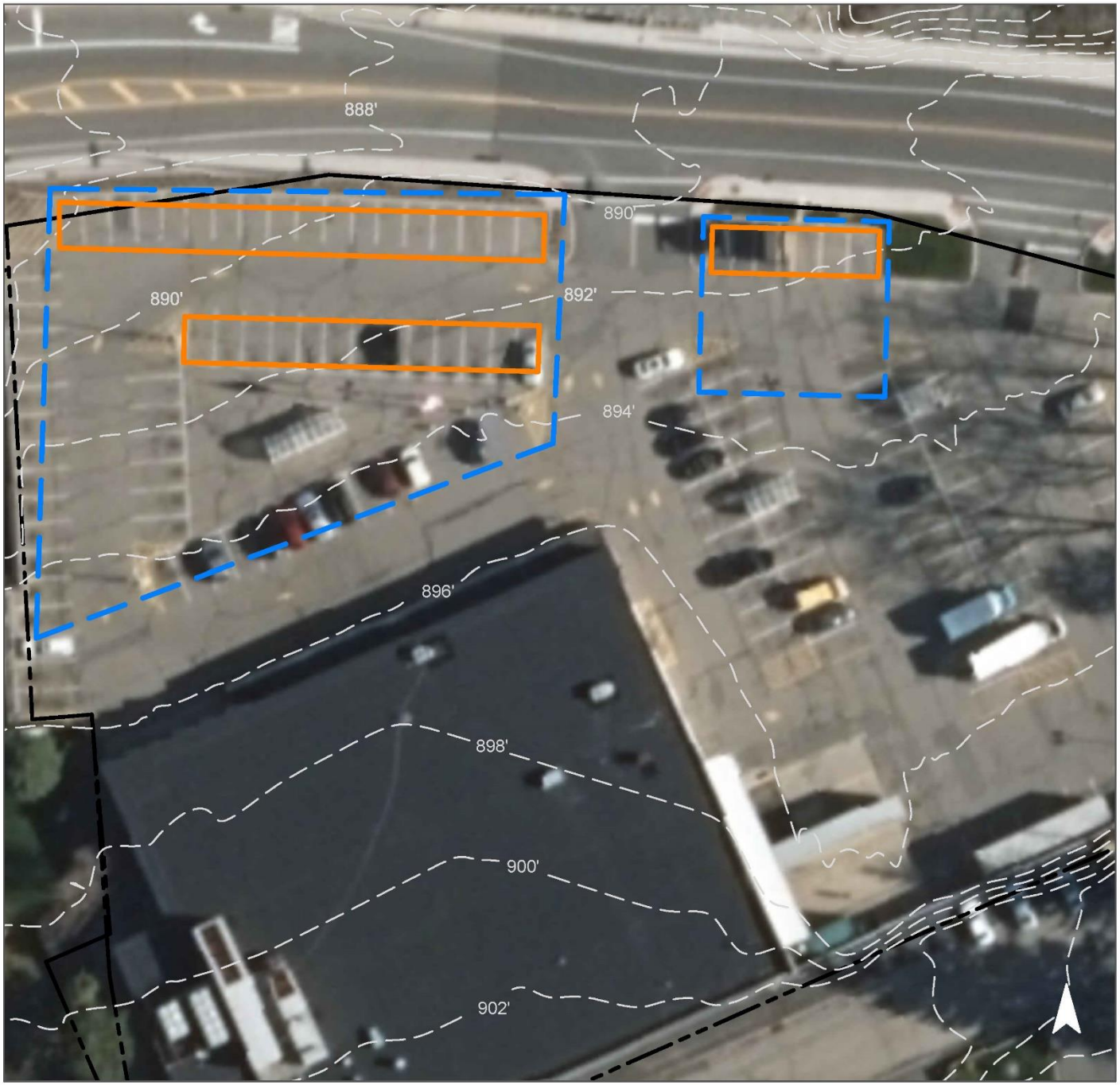
Block and Lot: Block 28, Lot 16

Stormwater is currently directed to an existing detention basin. Parking spots in the center of the parking lot to the north as well as the row of spots on the northeast corner can be replaced with porous asphalt to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
94	100,288	4.8	50.7	460.5	0.078	2.75

Recommended Green Infrastructure Practices	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
Pervious pavement	0.589	99	33,645	1.26	5,000	$125,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Shoprite

- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 25' 50'

STANHOPE UNITED METHODIST CHURCH

Subwatershed: Musconetcong River

Site Area: 62,783 sq. ft.

Address: 2 NJ-183
Netcong, NJ 07857

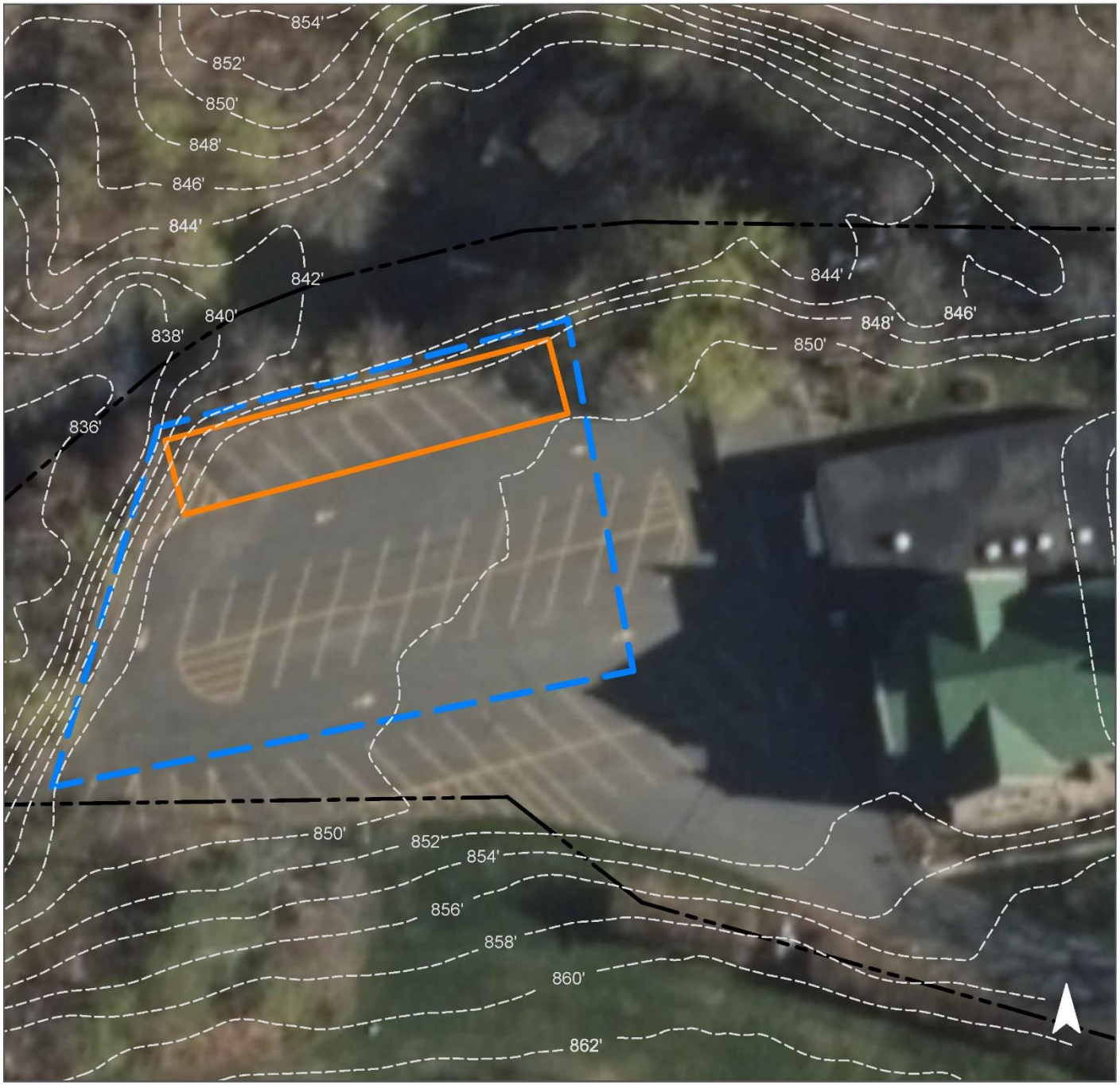
Block and Lot: Block 16.01, Lot 1

Stormwater is currently directed to the creek to the north that is downhill from the site. Parking spots on the north side of the parking lot can be replaced with porous asphalt to capture and infiltrate stormwater. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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 44"
67	41,786	2.0	21.1	191.9	0.033	1.15

Recommended Green Infrastructure Practices	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
Pervious pavement	0.310	52	23,719	0.89	2,080	$52,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Stanhope United Methodist Church

- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

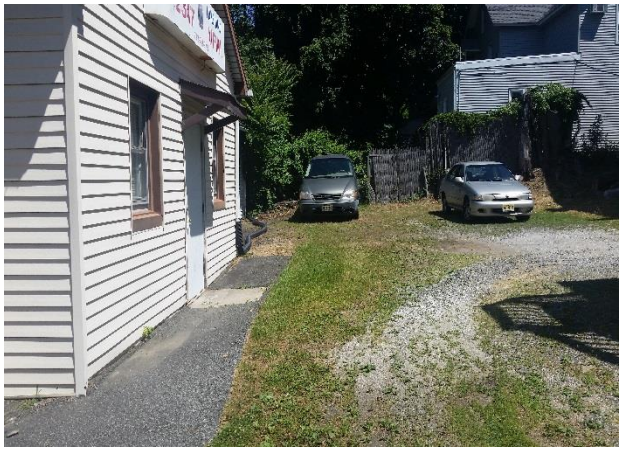
VETERANS OF FOREIGN WARS

Subwatershed: **Musconetcong River**

Site Area: **16,712 sq. ft.**

Address: **45 Main Street**
Netcong, NJ 07857

Block and Lot: **Block 16, Lot 12, 17**

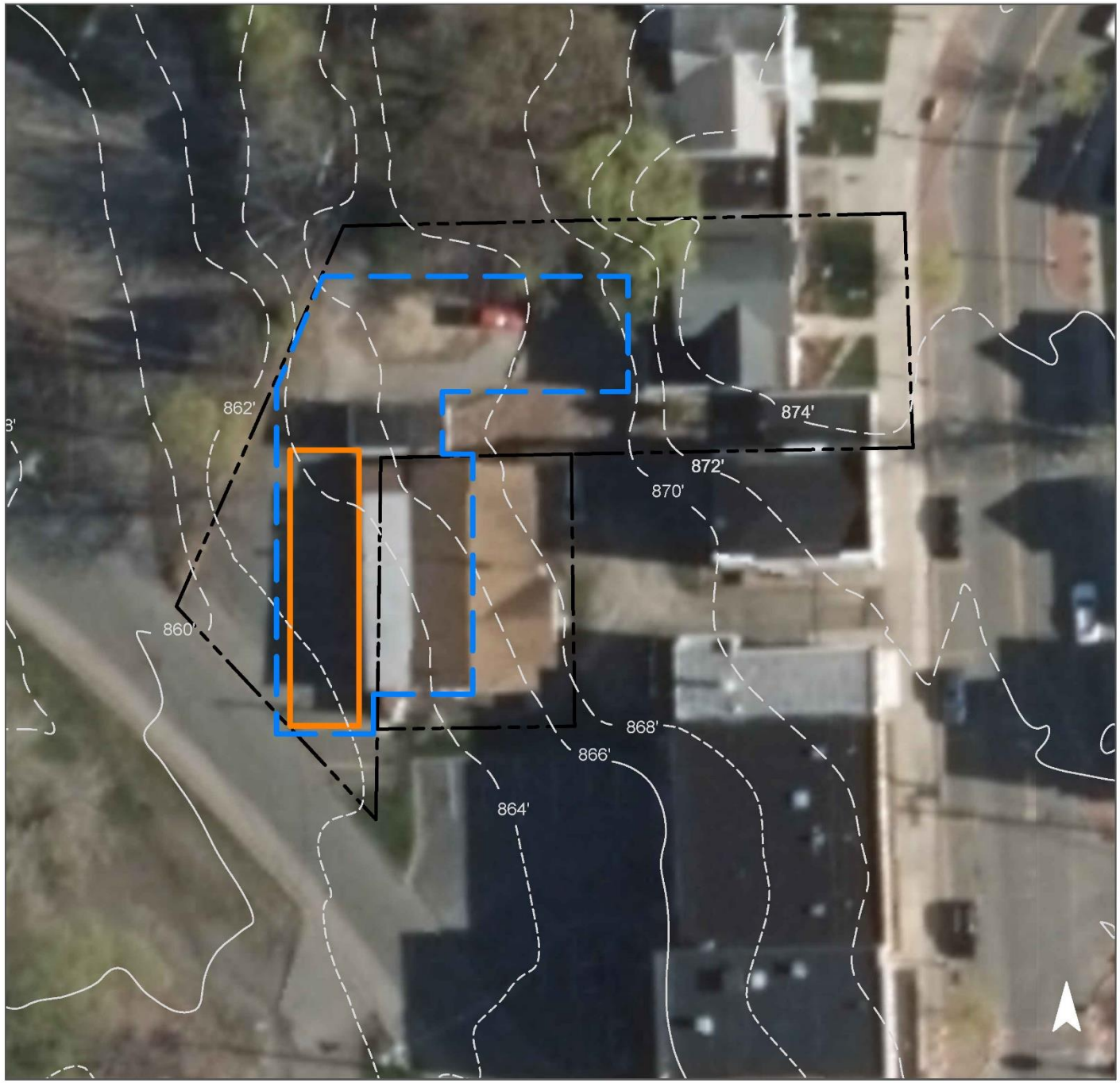


Stormwater is currently directed to an existing detention basin. Parking spots on the western side of the building can be replaced with porous asphalt to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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 44"
93	15,599	0.8	7.9	71.6	0.012	0.43

Recommended Green Infrastructure Practices	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
Pervious pavement	0.177	30	14,825	0.56	1,300	$32,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Veterans of Foreign Wars

- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

c. Summary of Existing Conditions

Summary of Existing Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	Existing Annual Loads TN (lb/yr)	Existing Annual Loads TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
MUSCONETCONG RIVER SUBWATERSHED	**20.90**	**910,460**			**25.9**	**271.8**	**2,470.5**		**12.35**	**538,072**	**0.419**	**14.76**
Kings View Apartments												
Total Site Info	2.75	119,574	16.01	23	2.5	26.4	239.6	44	1.20	52,175	0.041	1.43
Morgan Funeral Home												
Total Site Info	0.43	18,792	16	9	0.6	6.6	59.7	69	0.30	13,000	0.010	0.36
Netcong Borough Office												
Total Site Info	0.66	28,905	15	25	1.3	13.6	123.6	93	0.62	26,919	0.021	0.74
Netcong Elementary School												
Total Site Info	5.94	258,547	9	22, 23	6.2	65.0	590.8	50	2.95	128,671	0.100	3.53
Netcong Fire Department & DPW												
Total Site Info	0.94	40,880	27	12	1.2	12.4	112.3	60	0.56	24,467	0.019	0.67
Netcong Train Station												
Total Site Info	5.44	236,987	19	36, 37	5.7	59.6	542.1	50	2.71	118,069	0.092	3.24
Saint Michael's Church												
Total Site Info	0.47	20,406	26	28	0.8	8.6	78.5	84	0.39	17,098	0.013	0.47
Shoprite												
Total Site Info	2.45	106,875	28	16	4.8	50.7	460.5	94	2.30	100,288	0.078	2.75
Stanhope United Methodist Church												
Total Site Info	1.44	62,783	16.01	1	2.0	21.1	191.9	67	0.96	41,786	0.033	1.15
Veterans of Foreign Wars												
Total Site Info	0.38	16,712	16	12, 17	0.8	7.9	71.6	93	0.36	15,599	0.012	0.43

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
	MUSCONETCONG RIVER SUBWATERSHED	**112,014**	**2.57**	**2.919**	**489**	**208,257**	**7.95**	**24,789**			**$481,725**	**20.8%**
1	**Kings View Apartments**											
	Bioretention system	2,830	0.06	0.074	12	5,760	0.20	700	5	SF	$3,500	5.4%
	Pervious pavement	10,740	0.25	0.280	47	21,872	0.82	1,920	25	SF	$48,000	20.6%
	Total Site Info	**13,570**	**0.31**	**0.354**	**59**	**27,632**	**1.02**	**2,620**			**$51,500**	**26.0%**
2	**Morgan Funeral Home**											
	Bioretention system	5,170	0.12	0.135	23	9,881	0.37	1,290	5	SF	$6,450	39.8%
	Pervious pavement	5,800	0.13	0.151	25	11,811	0.44	1,040	25	SF	$26,000	44.6%
	Total Site Info	**10,970**	**0.25**	**0.286**	**48**	**21,692**	**0.81**	**2,330**			**$32,450**	**84.4%**
3	**Netcong Borough Office**											
	Pervious pavement	6,550	0.15	0.171	29	13,337	0.59	1,565	25	SF	$39,125	24.3%
	Planter boxes	1,290	0.03	0.034	6	n/a	n/a	72	1,000	SF	$6,000	4.8%
	Total Site Info	**7,840**	**0.18**	**0.204**	**34**	**13,337**	**0.59**	**1,637**			**$45,125**	**29.1%**
4	**Netcong Elementary School**											
	Bioretention system	4,900	0.11	0.128	21	9,963	0.37	1,250	5	SF	$6,250	3.8%
	Pervious pavement	11,000	0.25	0.287	48	22,328	0.84	2,000	25	SF	$50,000	8.5%
	Planter boxes	1,290	0.03	0.034	6	n/a	n/a	72	1,000	SF	$6,000	1.0%
	Total Site Info	**17,190**	**0.39**	**0.448**	**75**	**32,291**	**1.21**	**3,322**			**$62,250**	**13.4%**
5	**Netcong Fire Department & DPW**											
	Bioretention system	4,160	0.10	0.108	18	8,467	0.32	1,040	5	SF	$5,200	17.0%
	Pervious pavement	7,084	0.16	0.185	31	14,354	0.54	1,240	25	SF	$31,000	29.0%
	Rainwater harvesting	1,700	0.04	0.044	7	1,600	0.13	1,600	2	gal	$3,200	6.9%
	Total Site Info	**12,944**	**0.30**	**0.337**	**56**	**24,421**	**0.99**	**3,880**			**39,400**	**52.9%**
6	**Netcong Train Station**											
	Bioretention system	2,000	0.05	0.052	9	4,069	0.15	600	5	SF	$3,000	1.7%
	Total Site Info	**2,000**	**0.05**	**0.052**	**9**	**4,069**	**0.15**	**600**			**3,000**	**1.7%**
7	**Saint Michael's Church**											
	Bioretention systems	1,600	0.04	0.042	7	3,261	0.12	600	5	SF	$3,000	9.4%
	Pervious pavement	4,600	0.11	0.120	20	9,365	0.35	1,420	25	SF	$35,500	26.9%
	Total Site Info	**6,200**	**0.14**	**0.162**	**27**	**12,626**	**0.47**	**2,020**			**38,500**	**36.3%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential	TSS Removal Potential	Max Volume Reduction Potential	Peak Discharge Reduction Potential	Size of BMP	Unit Cost	Unit	Total Cost	I.C. Treated
		Area (SF)	Area (ac)	(Mgal/yr)	(lbs/yr)	(gal/storm)	(cfs)	(SF)	($)		($)	%
8	**Shoprite**											
	Pervious pavement	22,600	0.52	0.589	99	33,645	1.26	5,000	25	SF	$125,000	22.5%
	Total Site Info	**22,600**	**0.52**	**0.589**	**99**	**33,645**	**1.26**	**5,000**			**$125,000**	**22.5%**
9	**Stanhope United Methodist Church**											
	Pervious pavement	11,900	0.27	0.310	52	23,719	0.89	2,080	25	SF	$52,000	28.5%
	Total Site Info	**11,900**	**0.27**	**0.310**	**52**	**23,719**	**0.89**	**2,080**			**$52,000**	**28.5%**
10	**Veterans of Foreign Wars**											
	Pervious pavement	6,800	0.16	0.177	30	14,825	0.56	1,300	25	SF	$32,500	43.6%
	Total Site Info	**6,800**	**0.16**	**0.177**	**30**	**14,825**	**0.56**	**1,300**			**$32,500**	**43.6%**