RUTGERS
New Jersey Agricultural
Experiment Station

Impervious Cover Reduction Action Plan
for
Stanhope Borough, Sussex County, New Jersey

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

August 24, 2021

ACKNOWLEDGEMENTS:

This document has been prepared by the Rutgers Cooperative Extension Water Resources Program, with funding and direction from the National Fish and Wildlife Foundation [NFWF GRANT ID: 0403.19.065576] and the New Jersey Agricultural Experiment Station, to highlight green infrastructure opportunities within Stanhope Borough. We would like to thank the National Fish and Wildlife Foundation, the New Jersey Agricultural Experiment Station, and Stanhope Borough for their input and support in creating this document.

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Introduction

Located in Sussex County, New Jersey, Stanhope Borough covers approximately 2.09 square miles. Figures 1 and 2 illustrate that Stanhope Borough is dominated by urban land uses. A total of 44.4% of the municipality's land use is classified as urban. Of the urban land in Stanhope Borough, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2015 land use/land cover geographical information system (GIS) data layer categorizes Stanhope 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 Stanhope Borough. Based upon the 2015 NJDEP land use/land cover data, approximately 25.4% of Stanhope Borough has impervious cover. This level of impervious cover suggests that the streams in Stanhope Borough are likely non-supporting streams. [1]

Methodology

Stanhope Borough contains portions of two subwatersheds (Figure 4). For this impervious cover reduction action plan (RAP), projects have been identified in one subwatershed. Aerial imagery initially was studied to identify potential project sites that contain extensive impervious cover. Field inspections were conducted to determine if viable options exist at the sites to reduce impervious cover or to disconnect impervious surfaces from draining directly to the local waterway or storm sewer system. During the field inspections, appropriate green infrastructure practices for the sites were recommended. Sites that already had green infrastructure stormwater management practices in place were not considered.

[1] Schuler, T.R., L. Fraley-McNeal, and K. Cappiella. 2009. Is Impervious Cover Still Important? Review of Recent Research. *Journal of Hydrologic Engineering* 14 (4): 309-315.

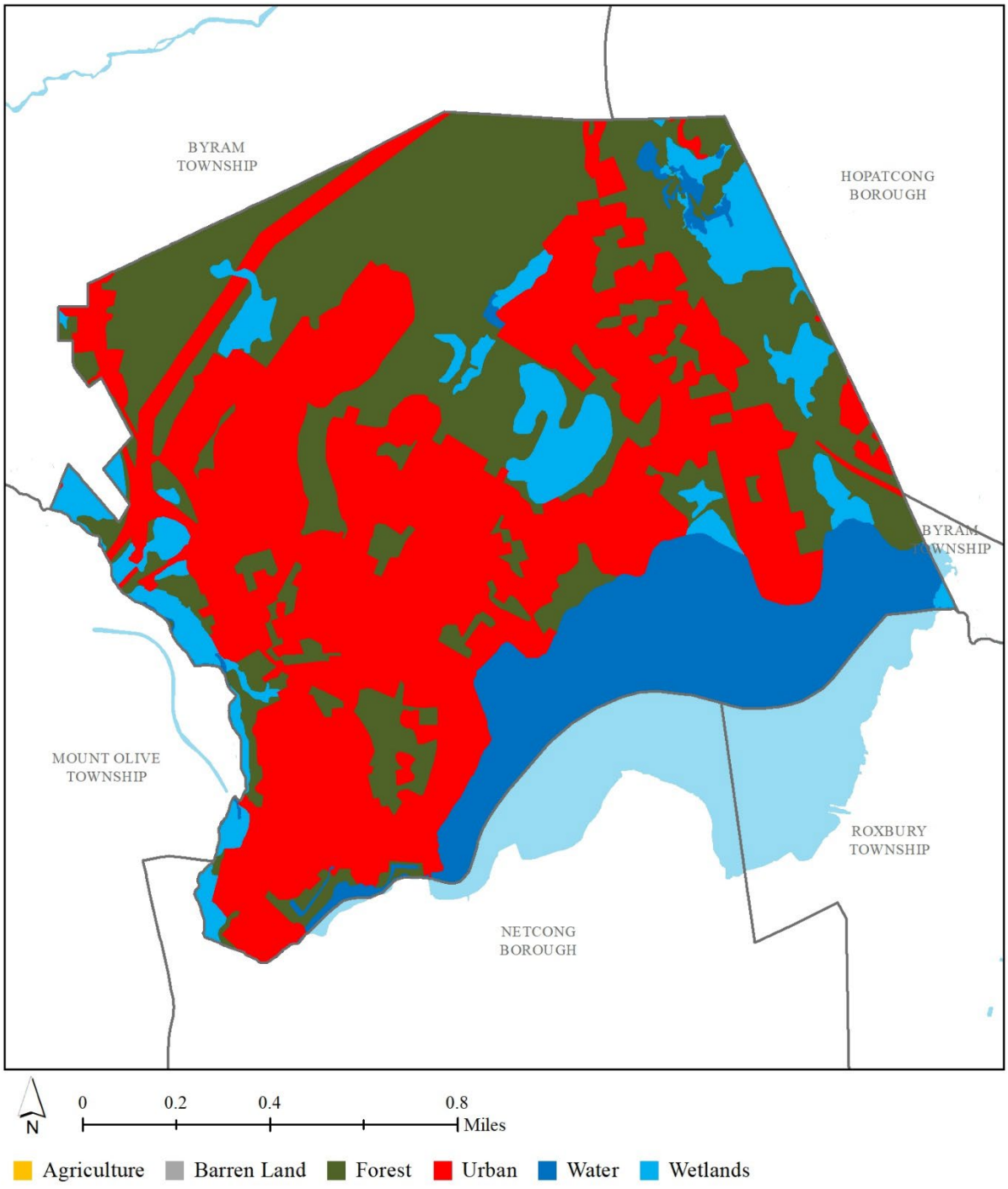


Figure 1: Map of land use in Stanhope Borough

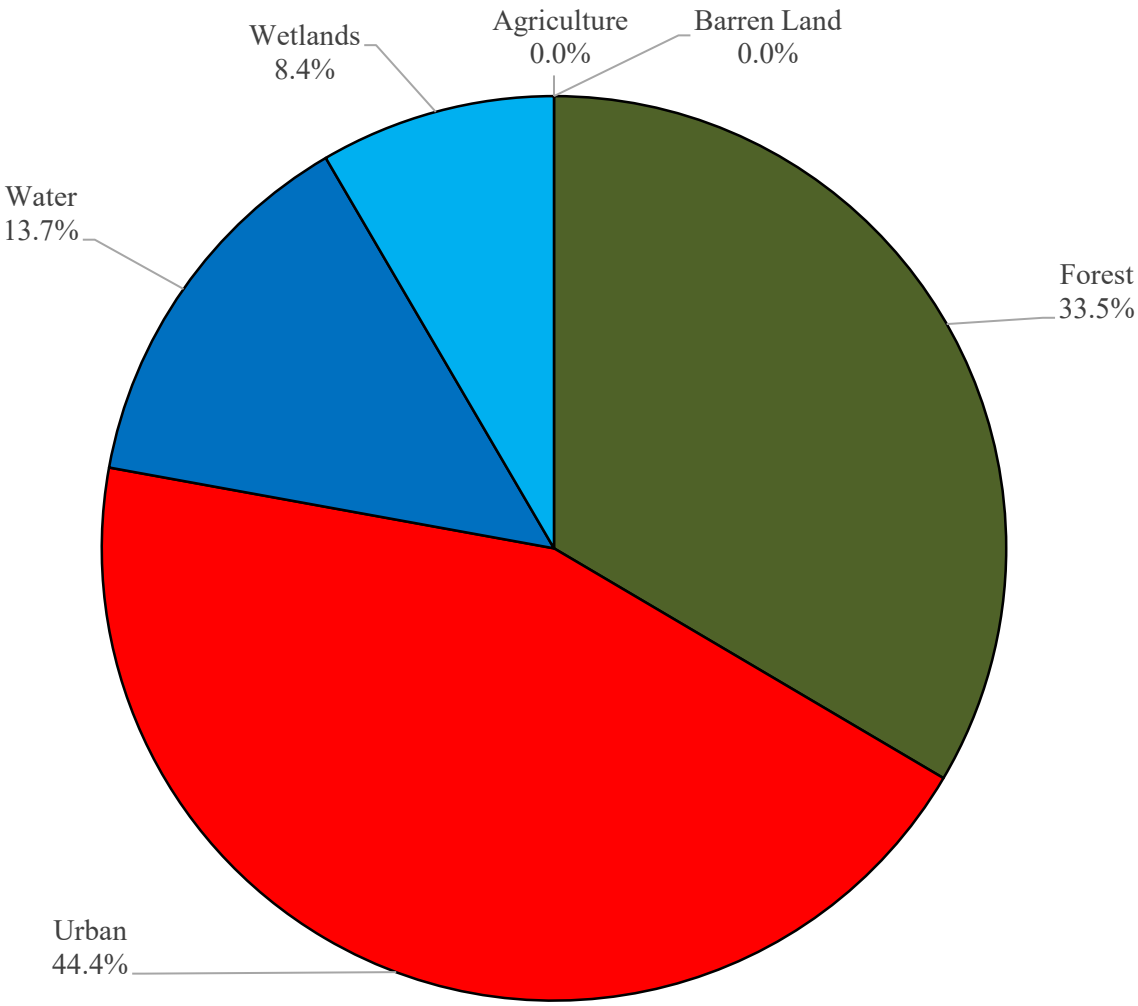


Figure 2: Pie chart illustrating the land use in Stanhope Borough

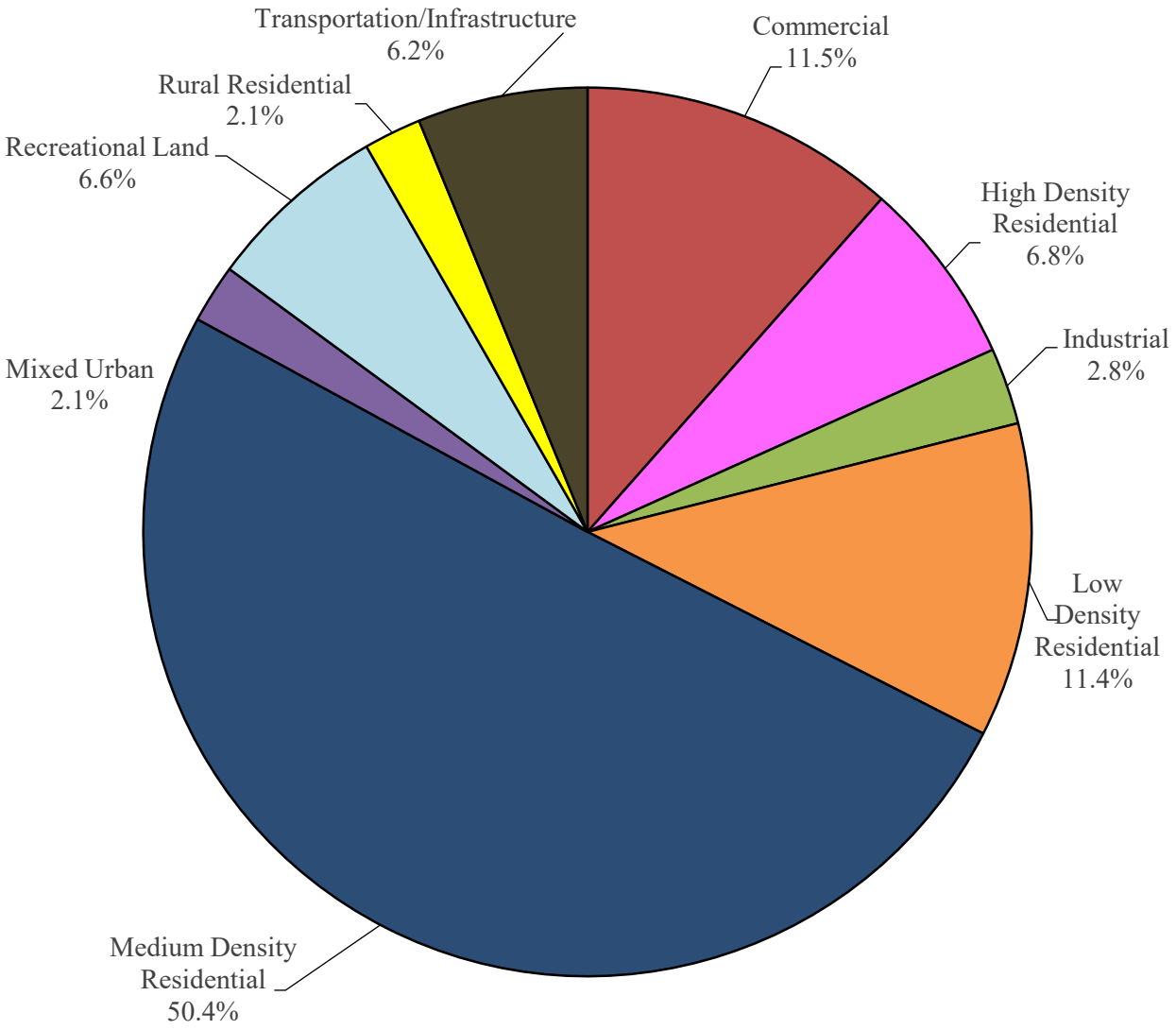


Figure 3: Pie chart illustrating the various types of urban land use in Stanhope Borough

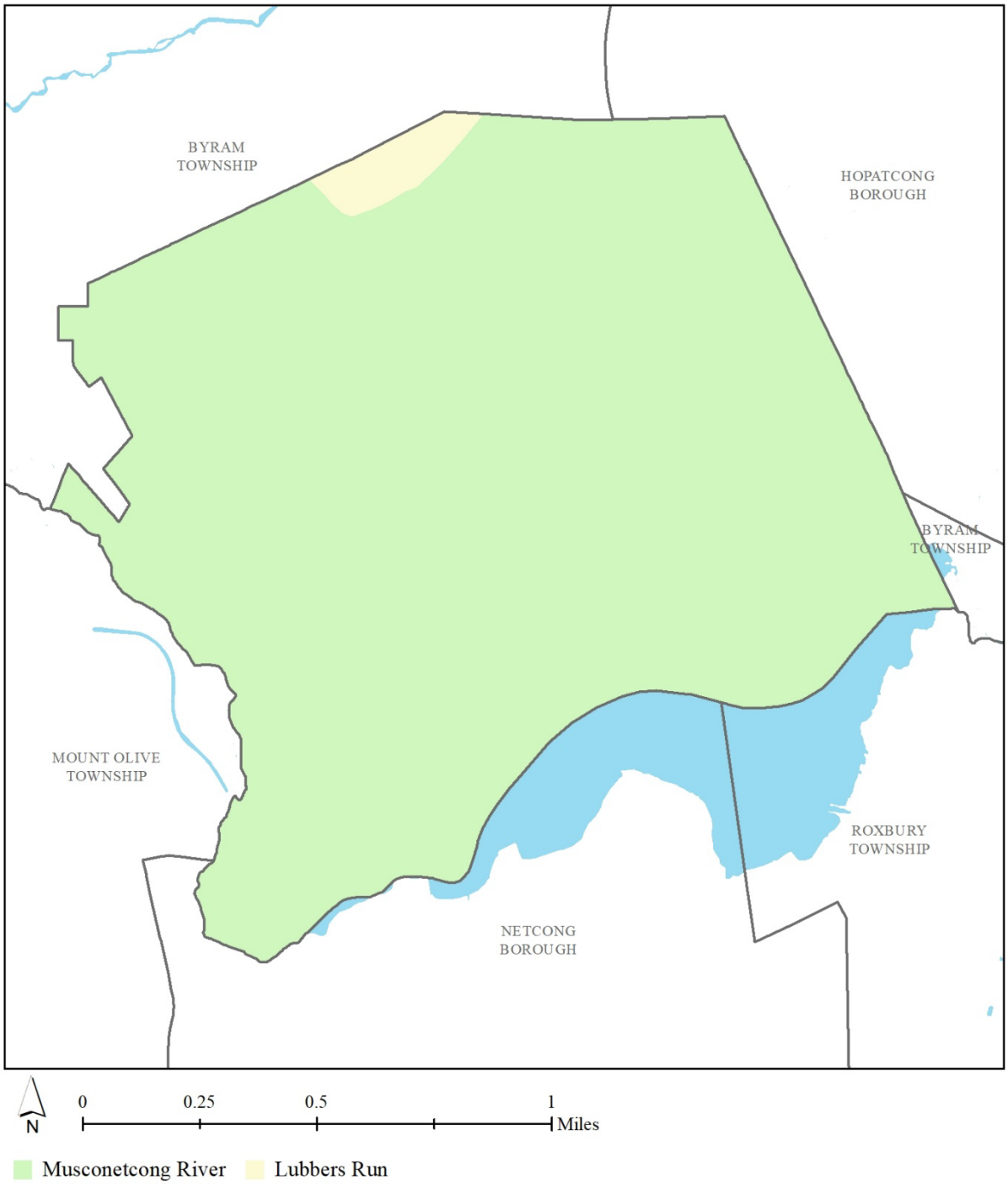


Figure 4: Map of the subwatersheds in Stanhope Borough

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 2015 NJDEP land use/land cover database. For impervious areas, runoff volumes were determined for the New Jersey water quality design storm (1.25 inches of rain over two hours) and for the average annual rainfall total of 44 inches.

Preliminary soil assessments were conducted for each potential project site identified in Stanhope 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, allowing for the capture of 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, February 2004, Page 3-11.

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 principle, 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 yield 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 Stanhope Borough. The practices are discussed below.

Disconnected downspouts

This is often referred to as simple disconnection. A downspout is simply disconnected 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 are designed with an underlying stone layer to retain stormwater runoff and allow it to slowly seep into the ground.




[3] United States Environmental Protection Agency (USEPA). 2015. Benefits of Green Infrastructure. http://www.epa.gov/greeninfrastructure/benefits-green-infrastructure

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.

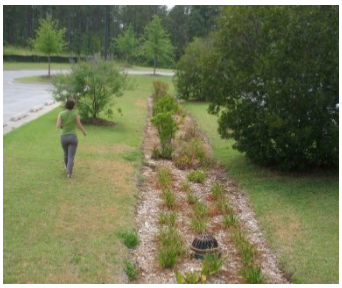
Downspout planter boxes

These are large wooden boxes that house a variety of water-retaining and/or filtering plants. When installed at the base of a downspout, water is captured by the plants which reduces stormwater runoff volume, provides a water source for the vegetation, and provides a small patch of habitat and food sources for birds and insects.

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. Bioswales are often designed for larger scale sites where water needs time to move and slowly infiltrate into the groundwater. Much like rain garden systems, bioswales can also be designed with an underdrain pipe that allows excess water to discharge to the nearest catch basin or existing stormwater system.

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. Tree filter boxes 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

Appendix A contains information on potential project sites where green infrastructure practices could be installed with a focus on existing site conditions. The recommended green infrastructure practices and the drainage area that the green infrastructure practices can treat are identified for each potential project site. For each practice, recharge potential, TSS removal potential, maximum volume reduction potential per storm, peak reduction potential, and estimated project costs are provided. This information will be especially useful in instances where proposed development projects cannot satisfy the New Jersey stormwater management requirements (N.J.A.C. 7:8).

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 through a wide variety of volunteer groups, such as Boy Scouts, Girl Scouts, Municipal Green Teams, corporate volunteerism, faith-based groups, school groups, watershed groups, and other active community organizations.

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 green infrastructure action plan into a stormwater mitigation plan and incorporate it into the municipal stormwater control ordinance.

Appendix A: Climate Resilient Green Infrastructure

a. Green Infrastructure Sites

STANHOPE BOROUGH: GREEN INFRASTRUCTURE SITES

SITES WITHIN THE MUSCONETCONG RIVER SUBWATERSHED

1. American Legion Ambulance Corps
2. First Presbyterian Church
3. Lakeland Bank
4. Sal's Pizzeria
5. Stanhope Family Dentistry
6. Stanhope Fire Department
7. Stanhope Borough Hall
8. The Lutheran Church of Our Savior
9. United States Postal Service
10. Valley Road School

b. Proposed Green Infrastructure Concepts

AMERICAN LEGION AMBULANCE CORPS

Subwatershed: Musconetcong River

Site Area: 48,470 sq. ft.

Address: 22 Linden Avenue, Stanhope, NJ 07874

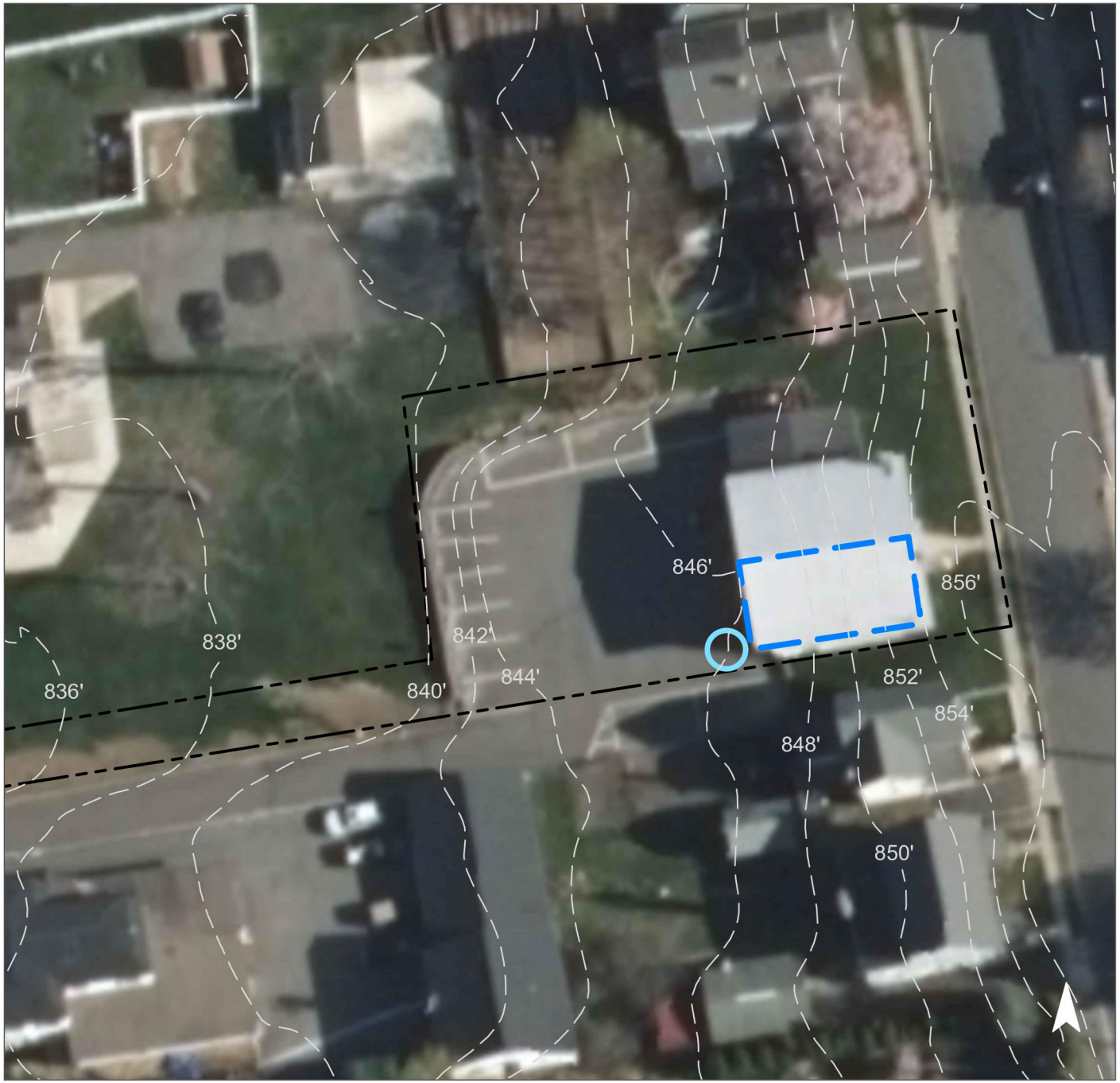
Block and Lot: Block 11304, Lot 18

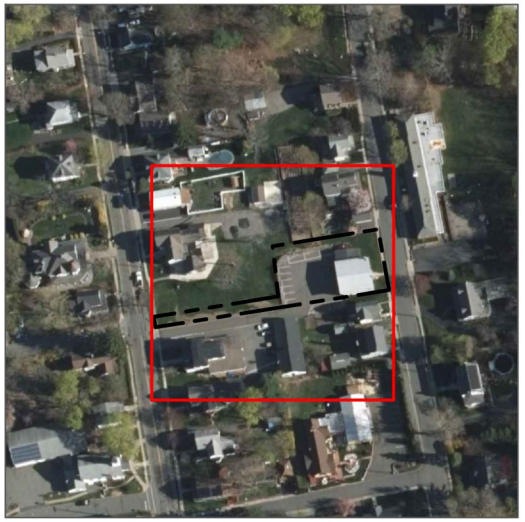
A cistern can be installed on the southwest corner of the building to capture and store runoff from the roof to allow for non-potable reuse. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
17	8,130	0.4	4.1	37.3	0.006	0.22

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
Rainwater harvesting	0.027	5	800	0.03	800 (gal)	$1,600

GREEN INFRASTRUCTURE RECOMMENDATIONS





American Legion Ambulance Corps

- rainwater harvesting
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

FIRST PRESBYTERIAN CHURCH

Subwatershed: Musconetcong River

Site Area: 34,300 sq. ft.

Address: 100 Main Street
Stanhope, NJ 07874

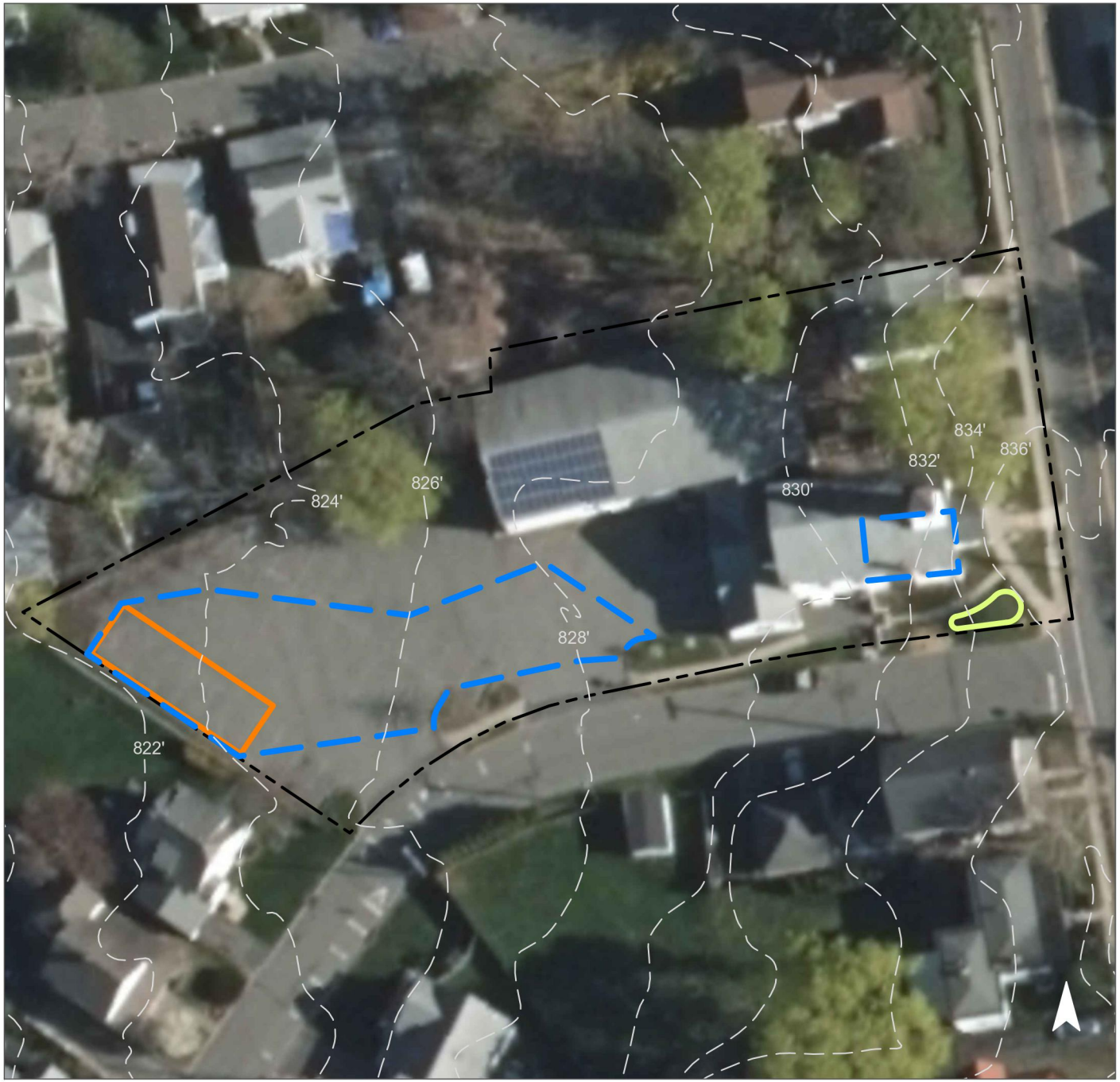
Block and Lot: Block 11303, Lot 2

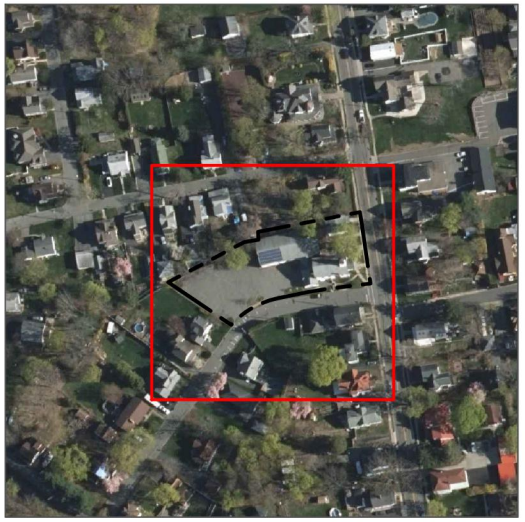
Parking spaces in the parking lot to the west of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A bioretention system can be installed southeast of the building to capture, treat, and infiltrate stormwater runoff from the roof. A preliminary 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"
85	28,990	1.4	14.6	133.1	0.023	0.80

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	0.016	3	1,110	0.04	150	$750
Pervious pavement	0.166	28	11,770	0.44	1,200	$30,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





First Presbyterian Church

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

0 25' 50'

LAKELAND BANK

Subwatershed: Musconetcong River

Site Area: 46,015 sq. ft.

Address: 143 NJ Route 183
Stanhope, NJ 07874

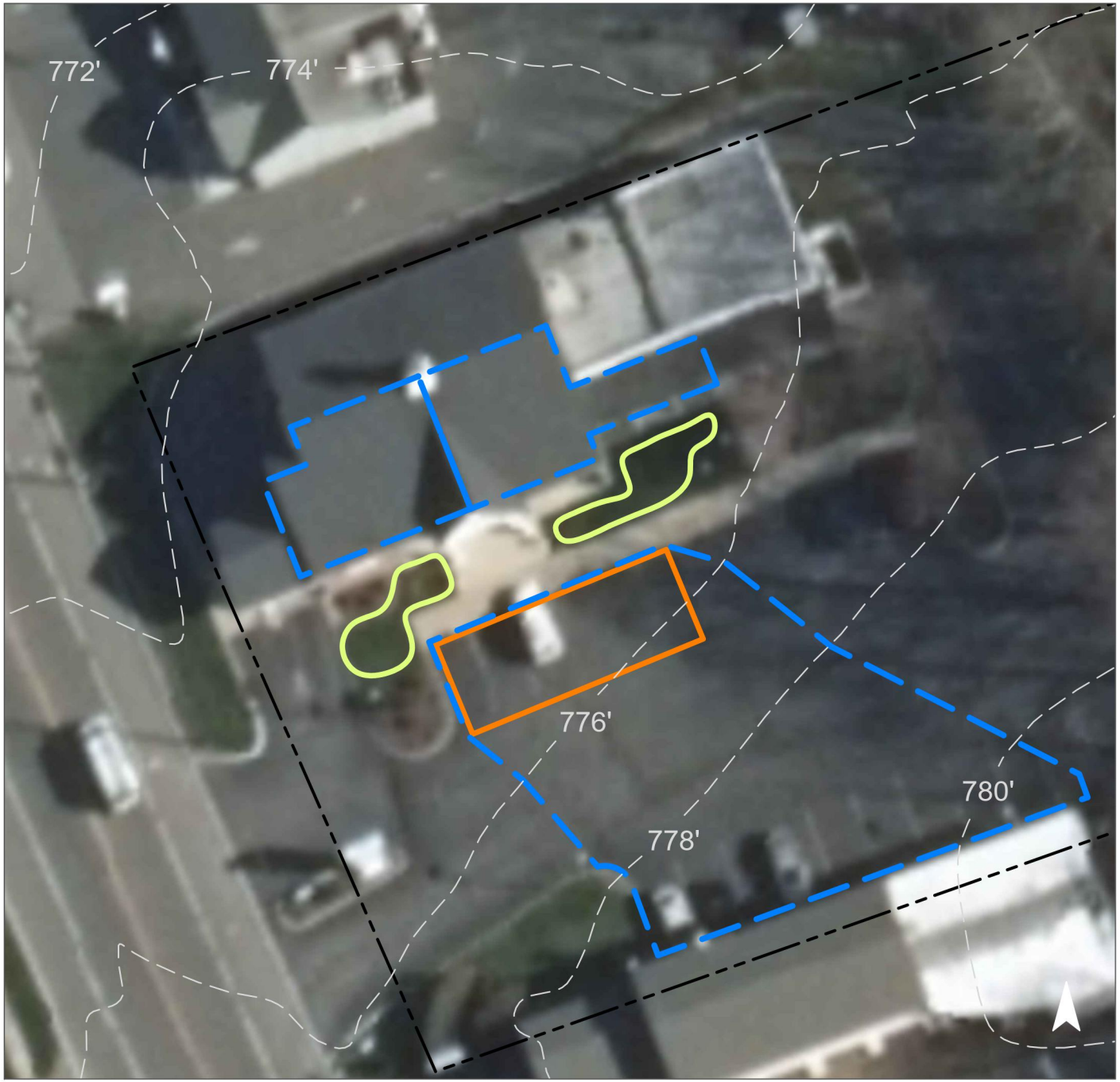
Block and Lot: Block 11402, Lot 32

Parking spaces in the parking lot south of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. Bioretention systems can be installed between the building and the south parking lot to capture, treat, and infiltrate stormwater runoff from the roof. 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"
46	21,230	1.0	10.7	97.5	0.017	0.58

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	0.051	9	3,630	0.14	490	$2,450
Pervious pavement	0.141	24	10,010	0.38	1,000	$25,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Lakeland Bank

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

0 15' 30'

SAL'S PIZZERIA

Subwatershed: Musconetcong River

Site Area: 30,370 sq. ft.

Address: 81 NJ Route 183
Stanhope, NJ 07874

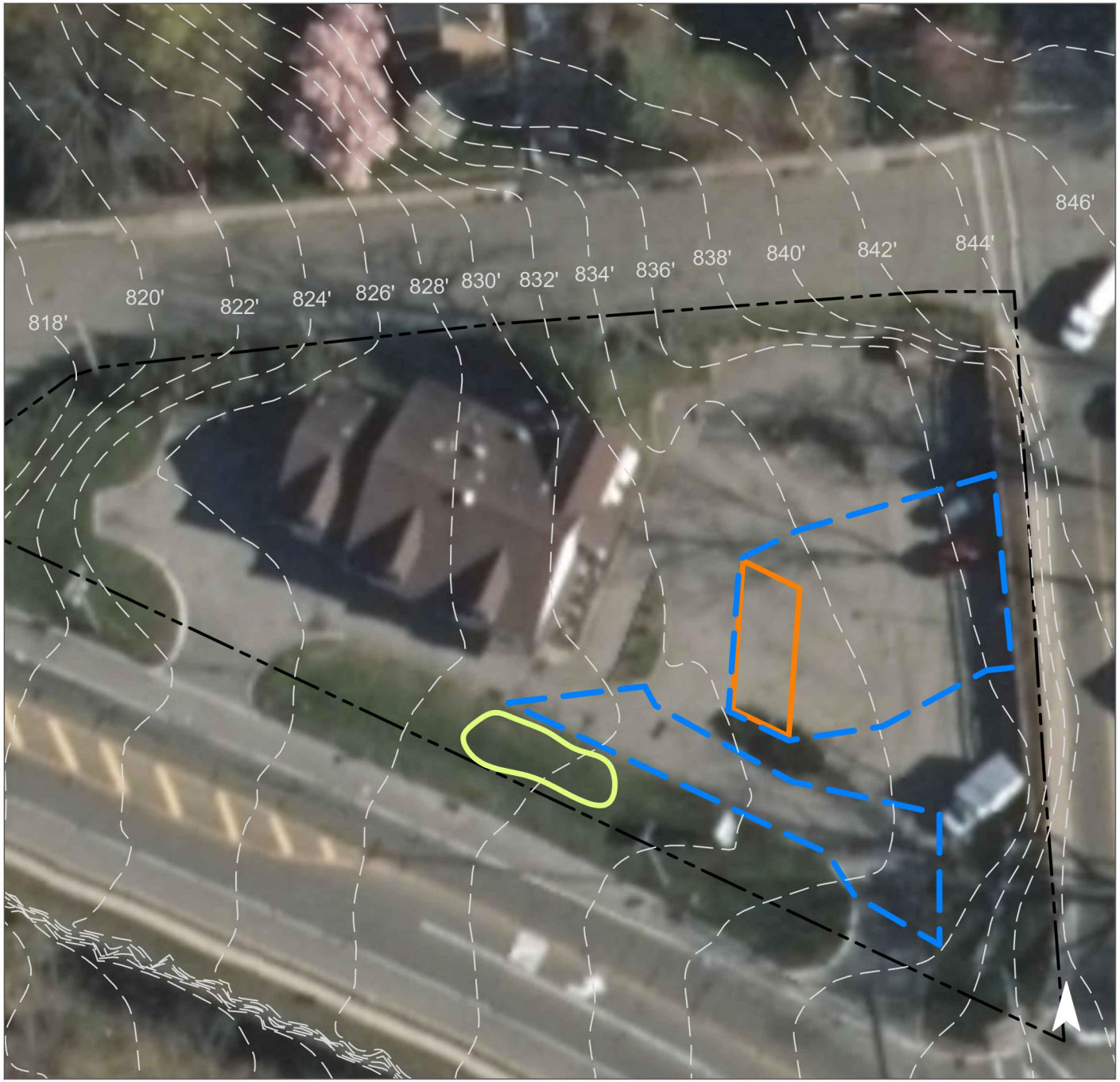
Block and Lot: Block 11305, Lot 1

Parking spaces in the parking lot to the east of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A bioretention system can be installed in the island south of the building to capture, treat, and infiltrate stormwater runoff from the parking lot. 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"
72	21,915	1.1	11.1	100.6	0.017	0.60

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	0.051	9	3,640	0.14	495	$2,475
Pervious pavement	0.095	16	6,730	0.25	650	$16,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Sal's Pizzeria

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

0 20' 40'

STANHOPE FAMILY DENTISTRY

Subwatershed: Musconetcong River

Site Area: 23,760 sq. ft.

Address: 93 NJ Route 183
Stanhope, NJ 07874

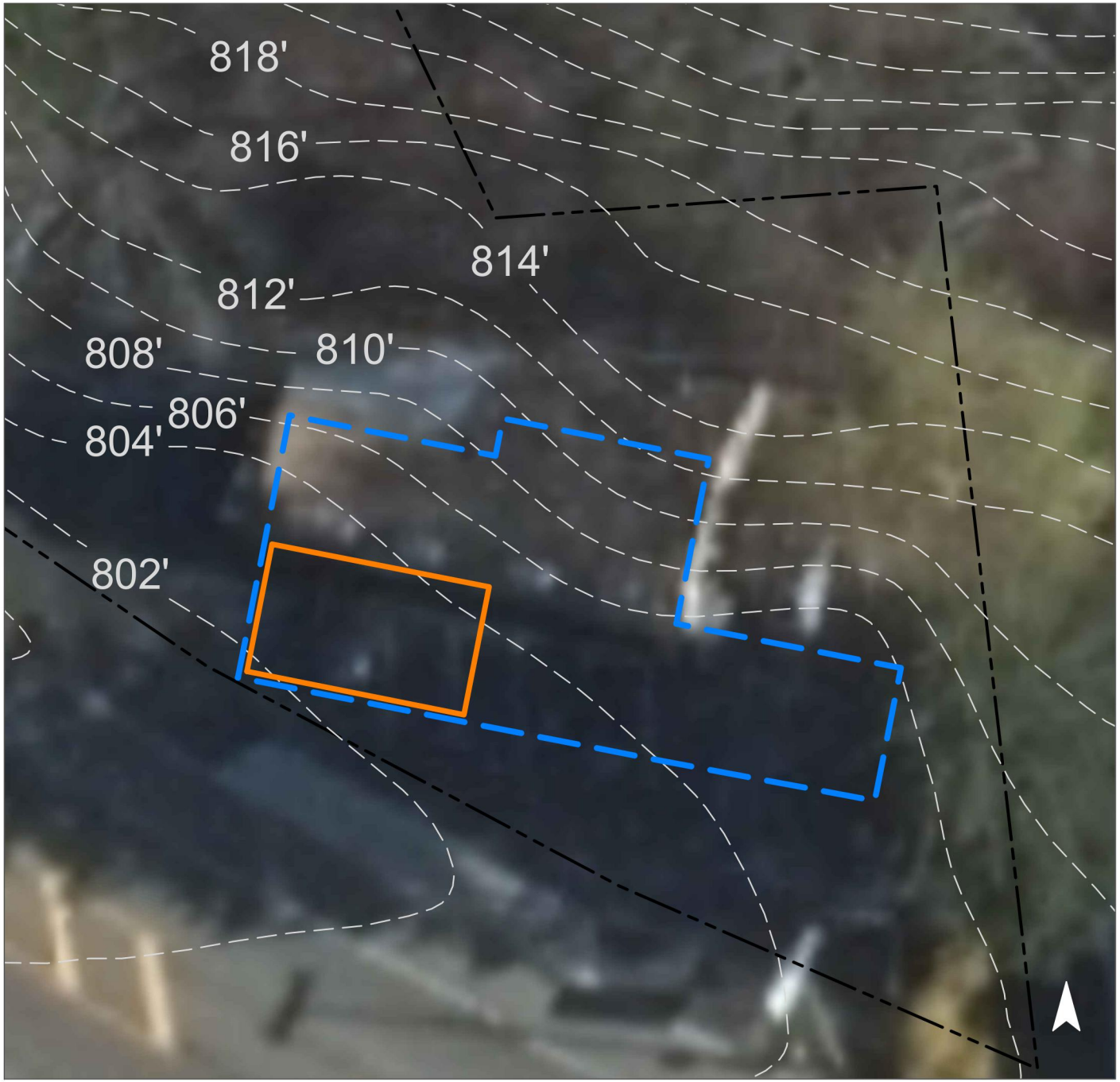
Block and Lot: Block 11402, Lot 42

Parking spaces in the parking lot to the south of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot and rooftop. 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"
45	10,630	0.5	5.4	48.8	0.008	0.29

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	0.068	11	2,438	0.11	540	$13,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Stanhope Family Dentistry

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

0 10' 20'

STANHOPE FIRE DEPARTMENT

Subwatershed: Musconetcong River

Site Area: 28,125 sq. ft.

Address: 26 Main Street,
Stanhope, NJ 07874

Block and Lot: Block 11203, Lot 10

A cistern can be installed north of the building to capture and store runoff from rooftop to allow for non-potable reuse. 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"
76	21,490	1.0	10.9	98.7	0.017	0.59

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
Rainwater harvesting	0.026	4	800	0.03	800 (gal)	$1,600

GREEN INFRASTRUCTURE RECOMMENDATIONS

Stanhope Fire Department

- rainwater harvesting
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

STANHOPE BOROUGH HALL

Subwatershed: Musconetcong River

Site Area: 26,980 sq. ft.

Address: 77 Main Street
Stanhope, NJ 07874

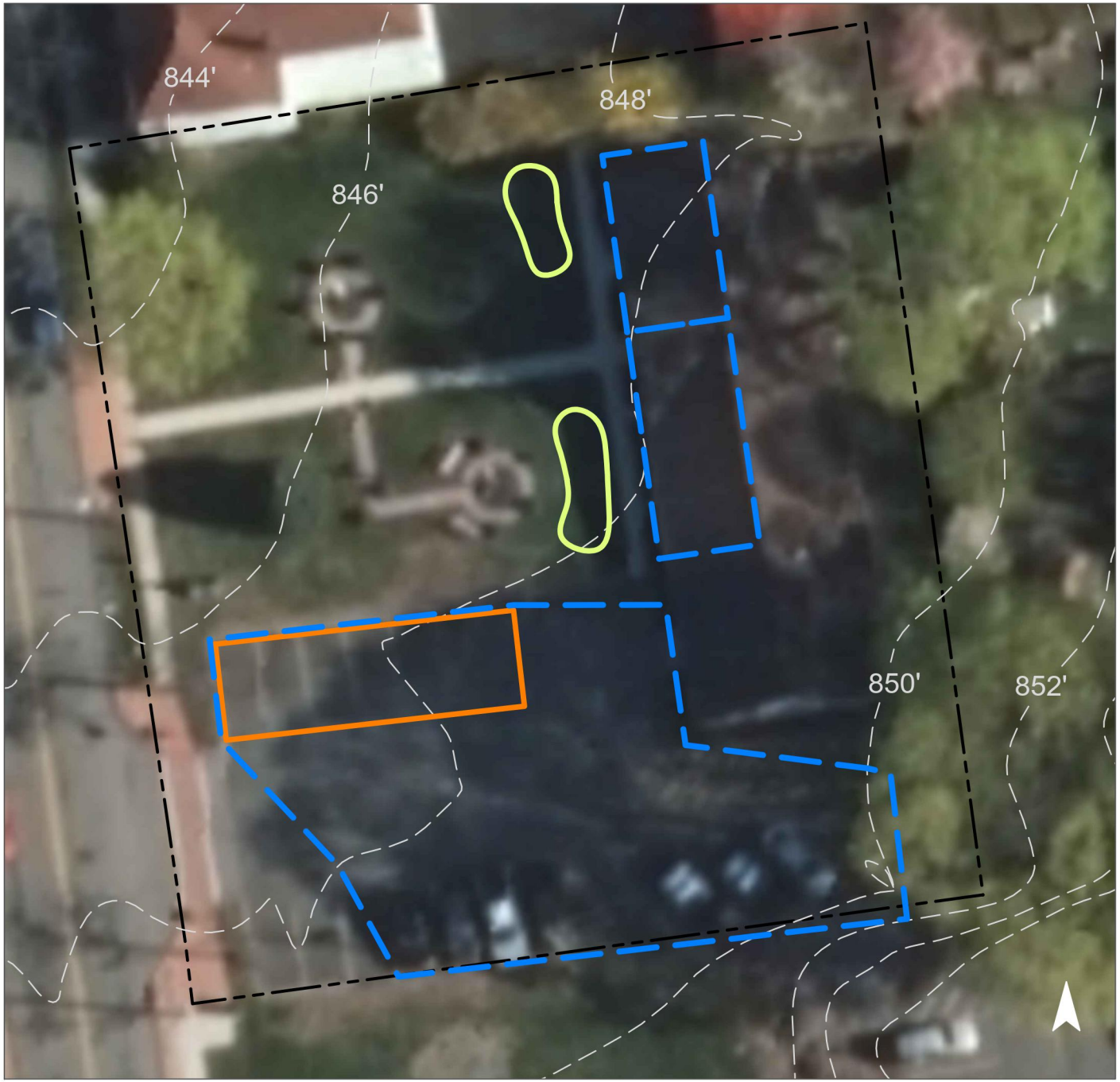
Block and Lot: Block 11207, Lot 12

Parking spaces in the parking lot to the southwest of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. Bioretention systems can be installed west of the building to capture, treat, and infiltrate stormwater runoff from the roof. 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"
75	20,125	1.0	10.2	92.4	0.016	0.55

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	0.042	7	2,960	0.11	400	$2,000
Pervious pavement	0.177	30	12,540	0.47	1,200	$30,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Stanhope Borough Hall

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

0 15' 30'

THE LUTHERAN CHURCH OF OUR SAVIOR

Subwatershed: Musconetcong River

Site Area: 378,360 sq. ft.

Address: 143 County Road 602
Stanhope, NJ 07874

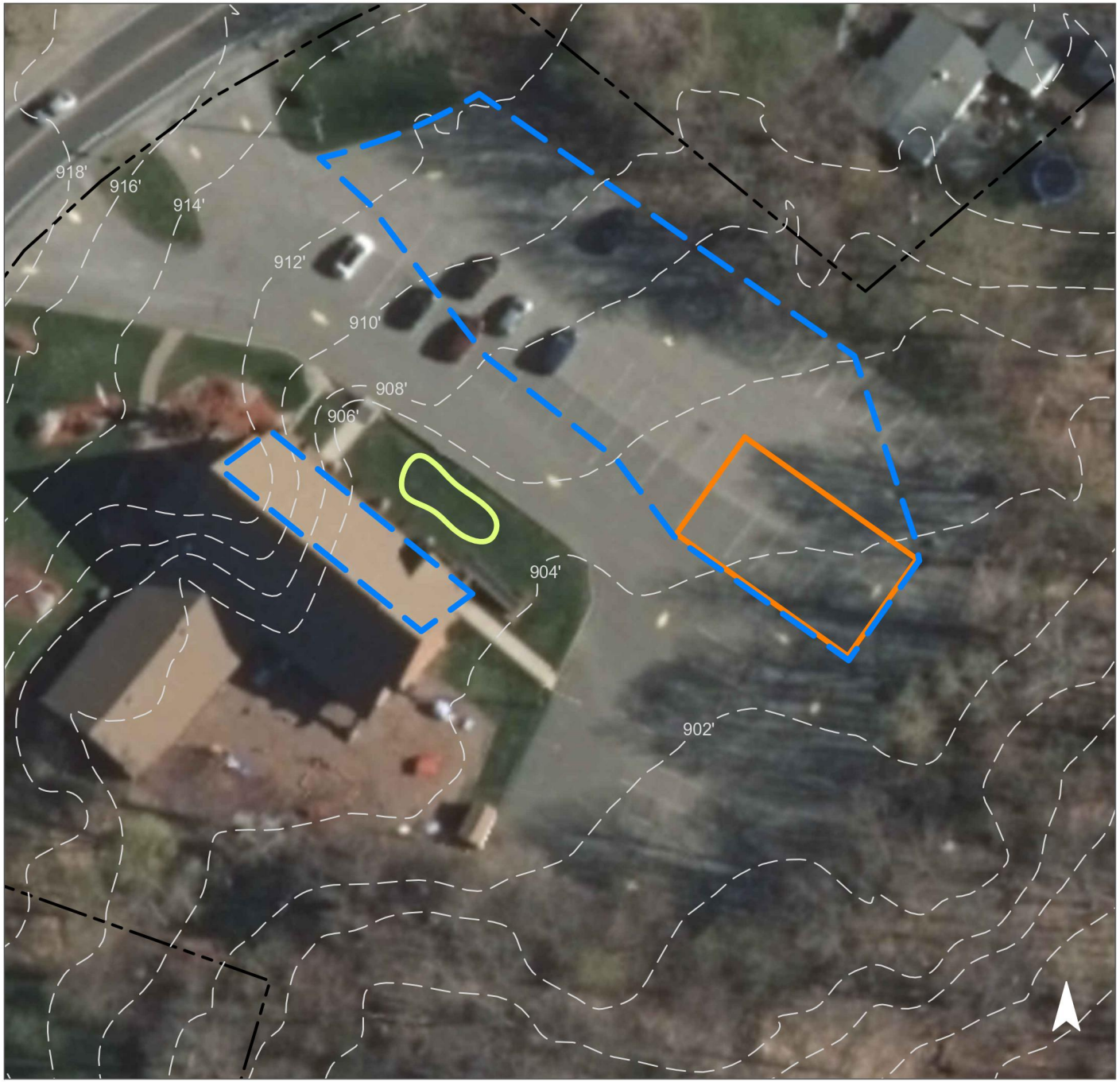
Block and Lot: Block 10615, Lot 3

Parking spaces in the parking lot to the east of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A bioretention system can be installed northeast of the building to capture, treat, and infiltrate stormwater runoff from the roof. 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"
20	75,270	3.6	38.0	345.6	0.059	2.06

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	0.044	7	3,140	0.12	425	$2,125
Pervious pavement	0.382	64	27,100	1.02	2,800	$70,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



The Lutheran Church of Our Savior

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

0 20' 40'

UNITED STATES POSTAL SERVICE

Subwatershed: Musconetcong River

Site Area: 16,065 sq. ft.

Address: 4 Kelly Place,
Stanhope, NJ 07874

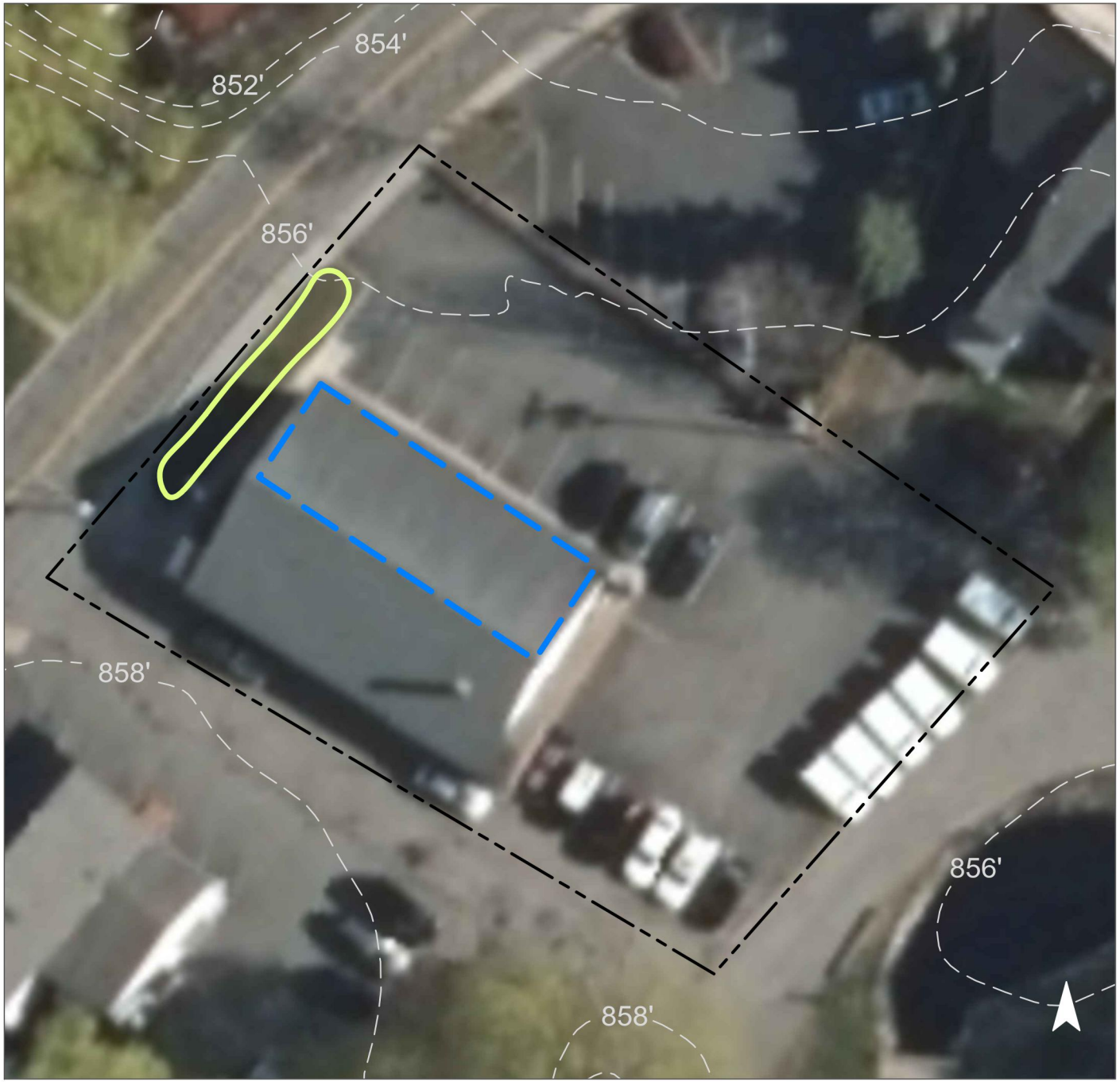
Block and Lot: Block 11203, Lot 26

A bioretention system can be installed west of the building to capture, treat, and infiltrate stormwater runoff from the roof. 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"
77	12,330	0.6	6.2	56.6	0.010	0.34

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	0.037	6	2,650	0.10	360	$1,800

GREEN INFRASTRUCTURE RECOMMENDATIONS



United States Postal Service

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

0 15' 30'

VALLEY ROAD SCHOOL

Subwatershed: Musconetcong River

Site Area: 595,180 sq. ft.

Address: 24 Valley Road
Stanhope, NJ 07874

Block and Lot: Block 10901, Lot 23

A bioretention system can be installed west of the building to capture, treat, and infiltrate stormwater runoff from the rooftop. 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"
27	158,350	7.6	80.0	727.0	0.123	4.34

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	0.039	7	2,780	0.10	375	$1,875

GREEN INFRASTRUCTURE RECOMMENDATIONS

Valley Road School

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

0 15' 30'

c. Summary of Existing Conditions

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial) TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Annual (cu.ft.)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
	MUSCONETCONG RIVER SUBWATERSHED SITES	**24.53**	**1,068,470**				**6.85**	**298,195**	**14.4**	**150.6**	**1369.1**	**31,062**	**1,093,382**	**0.232**	**8.18**
1	**American Legion Ambulance Corps**														
	Total Site Info	1.11	48,470	11304	18	16.77	0.19	8,130	0.4	4.1	37.3	847	29,810	0.006	0.22
2	**First Presbyterian Church**														
	Total Site Info	0.79	34,300	11303	2	84.52	0.67	28,990	1.4	14.6	133.1	3,020	106,297	0.023	0.80
3	**Lakeland Bank**														
	Total Site Info	1.06	46,015	11402	32	46.14	0.49	21,230	1.0	10.7	97.5	2,211	77,843	0.017	0.58
4	**Sal's Pizzeria**														
	Total Site Info	0.70	30,370	11305	1	72.16	0.50	21,915	1.1	11.1	100.6	2,283	80,355	0.017	0.60
5	**Stanhope Family Dentistry**														
	Total Site Info	0.55	23,760	11402	42	44.74	0.24	10,630	0.5	5.4	48.8	1,107	38,977	0.008	0.29
6	**Stanhope Fire Department**														
	Total Site Info	0.65	28,125	11203	10	76.41	0.49	21,490	1.0	10.9	98.7	2,239	78,797	0.017	0.59
7	**Stanhope Borough Hall**														
	Total Site Info	0.62	26,980	11207	12	74.59	0.46	20,125	1.0	10.2	92.4	2,096	73,792	0.016	0.55
8	**The Lutheran Church of Our Savior**														
	Total Site Info	8.69	378,360	10615	3	19.89	1.73	75,270	3.6	38.0	345.6	7,841	275,990	0.059	2.06
9	**United States Postal Service**														
	Total Site Info	0.37	16,065	11203	26	76.75	0.28	12,330	0.6	6.2	56.6	1,284	45,210	0.010	0.34
10	**Valley Road School**														
	Total Site Info	13.66	595,180	10901	23	26.61	3.64	158,350	7.6	80.0	727.0	16,495	580,617	0.123	4.34

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	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
	MUSCONETCONG RIVER SUBWATERSHED SITES	**52,235**	**1.20**	**1.361**	**228**	**92,098**	**3.48**				**$201,425**	**18%**
1	**American Legion Ambulance Corps**											
	Rainwater harvesing	1,035	0.02	0.027	5	800	0.03	800	2	gal	$1,600	13%
	Total Site Info	**1,035**	**0.02**	**0.027**	**5**	**800**	**0.03**				**$1,600**	**13%**
2	**First Presbyterian Church**											
	Bioretention system	600	0.01	0.016	3	1,110	0.04	150	5	SF	$750	2%
	Pervious pavement	6,360	0.15	0.166	28	11,770	0.44	1,200	25	SF	$30,000	22%
	Total Site Info	**6,960**	**0.16**	**0.181**	**30**	**12,880**	**0.48**				**$30,750**	**24%**
3	**Lakeland Bank**											
	Bioretention systems	1,960	0.04	0.051	9	3,630	0.14	490	5	SF	$2,450	9%
	Pervious pavement	5,410	0.12	0.141	24	10,010	0.38	1,000	25	SF	$25,000	25%
	Total Site Info	**7,370**	**0.17**	**0.192**	**32**	**13,640**	**0.52**				**$27,450**	**35%**
4	**Sal's Pizzeria**											
	Bioretention system	1,970	0.05	0.051	9	3,640	0.14	495	5	SF	$2,475	9%
	Pervious pavement	3,640	0.08	0.095	16	6,730	0.25	650	25	SF	$16,250	17%
	Total Site Info	**5,610**	**0.13**	**0.146**	**24**	**10,370**	**0.39**				**$18,725**	**26%**
5	**Stanhope Family Dentistry**											
	Pervious pavement	2,600	0.06	0.068	11	2,438	0.11	540	25	SF	$13,500	24%
	Total Site Info	**2,600**	**0.06**	**0.068**	**11**	**2,438**	**0.11**				**$13,500**	**24%**
6	**Stanhope Fire Department**											
	Rainwater harvesing	1,000	0.02	0.026	4	800	0.03	800	2	gal	$1,600	5%
	Total Site Info	**1,000**	**0.02**	**0.026**	**4**	**800**	**0.03**				**$1,600**	**5%**
7	**Stanhope Borough Hall**											
	Bioretention system	1,600	0.04	0.042	7	2,960	0.11	400	5	SF	$2,000	8%
	Pervious pavement	6,780	0.16	0.177	30	12,540	0.47	1,200	25	SF	$30,000	34%
	Total Site Info	**8,380**	**0.19**	**0.218**	**37**	**15,500**	**0.58**				**$32,000**	**42%**
8	**The Lutheran Church of Our Savior**											
	Bioretention system	1,700	0.04	0.044	7	3,140	0.12	425	5	SF	$2,125	2%
	Pervious pavement	14,650	0.34	0.382	64	27,100	1.02	2,800	25	SF	$70,000	19%
	Total Site Info	**16,350**	**0.38**	**0.426**	**71**	**30,240**	**1.14**				**$72,125**	**22%**

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)		($/unit)		($)	%
9	**United States Postal Service**											
	Bioretention system	1,430	0.03	0.037	6	2,650	0.10	360	5	SF	$1,800	12%
	Total Site Info	**1,430**	**0.03**	**0.037**	**6**	**2,650**	**0.10**				**$1,800**	**12%**
10	**Valley Road School**											
	Bioretention system	1,500	0.03	0.039	7	2,780	0.10	375	5	SF	$1,875	1%
	Total Site Info	**1,500**	**0.03**	**0.039**	**7**	**2,780**	**0.10**				**$1,875**	**1%**