RUTGERS
New Jersey Agricultural
Experiment Station

Impervious Cover Reduction Action Plan
for
Peapack-Gladstone Borough, Somerset County, New Jersey

Prepared for Peapack-Gladstone Borough by the
Rutgers Cooperative Extension Water Resources Program

January 7, 2021

Highlands Council
New Jersey

ACKNOWLEDGEMENTS:

This document has been prepared by the Rutgers Cooperative Extension Water Resources Program, with funding and direction from the New Jersey Highlands Water Protection and Planning Council and the New Jersey Agricultural Experiment Station, to highlight green infrastructure opportunities within Peapack-Gladstone Borough. We would like to thank the New Jersey Highlands Water Protection and Planning Council, the New Jersey Agricultural Experiment Station, and Peapack-Gladstone Borough for their input and support in creating this document.

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Introduction

Located in Somerset County, New Jersey, Peapack-Gladstone Borough covers approximately 5.85 square miles. Figures 1 and 2 illustrate that Peapack-Gladstone is dominated by forest land use. A total of 38.5% of the municipality's land use is classified as urban. Of the urban land in Peapack-Gladstone Borough, rural 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 Peapack-Gladstone 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 Peapack-Gladstone Borough. Based upon the 2015 NJDEP land use/land cover data, approximately 7.1% of Peapack-Gladstone Borough has impervious cover. This level of impervious cover suggests that the streams in Peapack-Gladstone Borough likely range from sensitive to impacted streams. [1]

Methodology

Peapack-Gladstone contains portions of three subwatersheds (Figure 4). For this impervious cover reduction action plan, projects have been identified in two 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] 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.

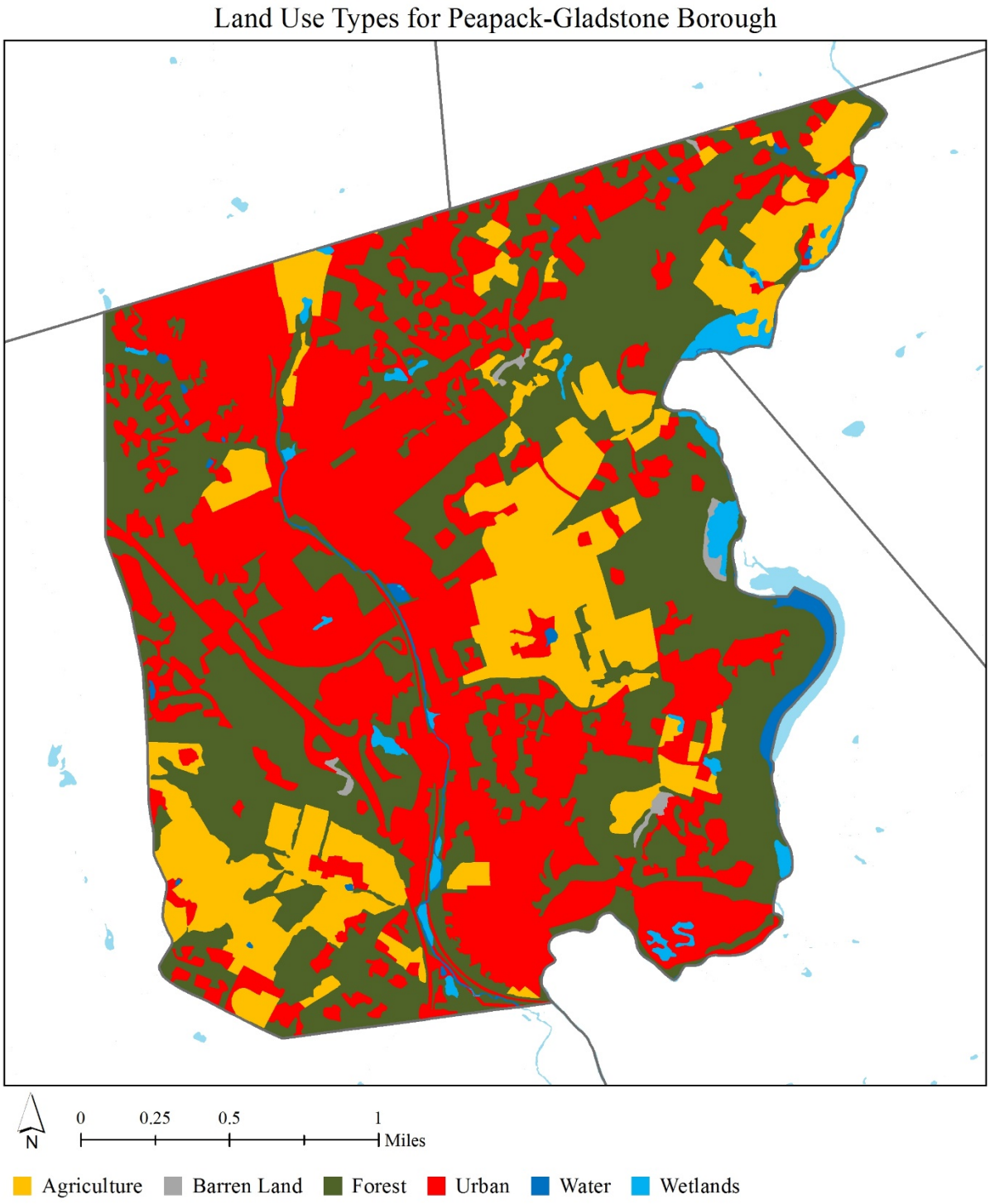


Figure 1: Map illustrating the land use in Peapack-Gladstone Borough

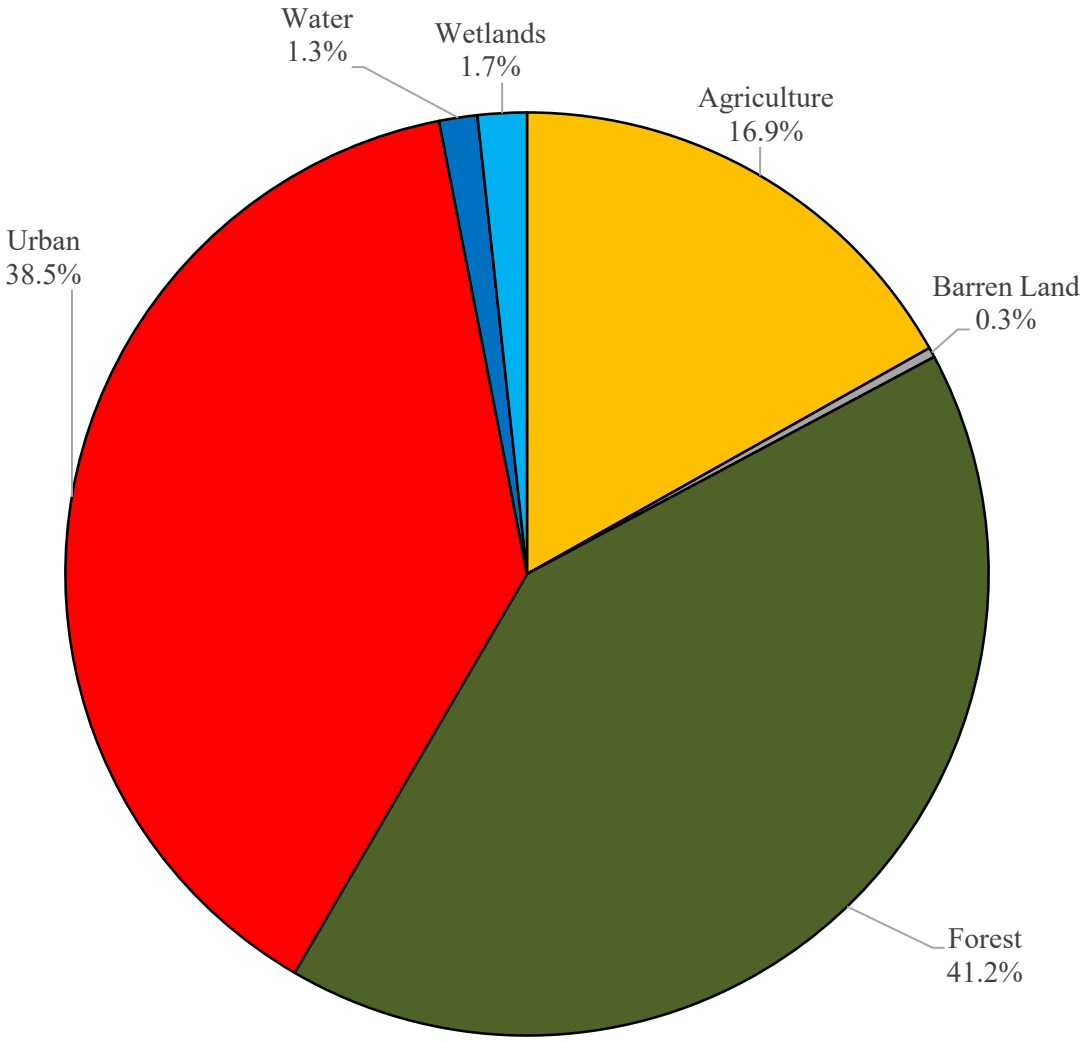


Figure 2: Pie chart illustrating the land use in Peapack-Gladstone Borough

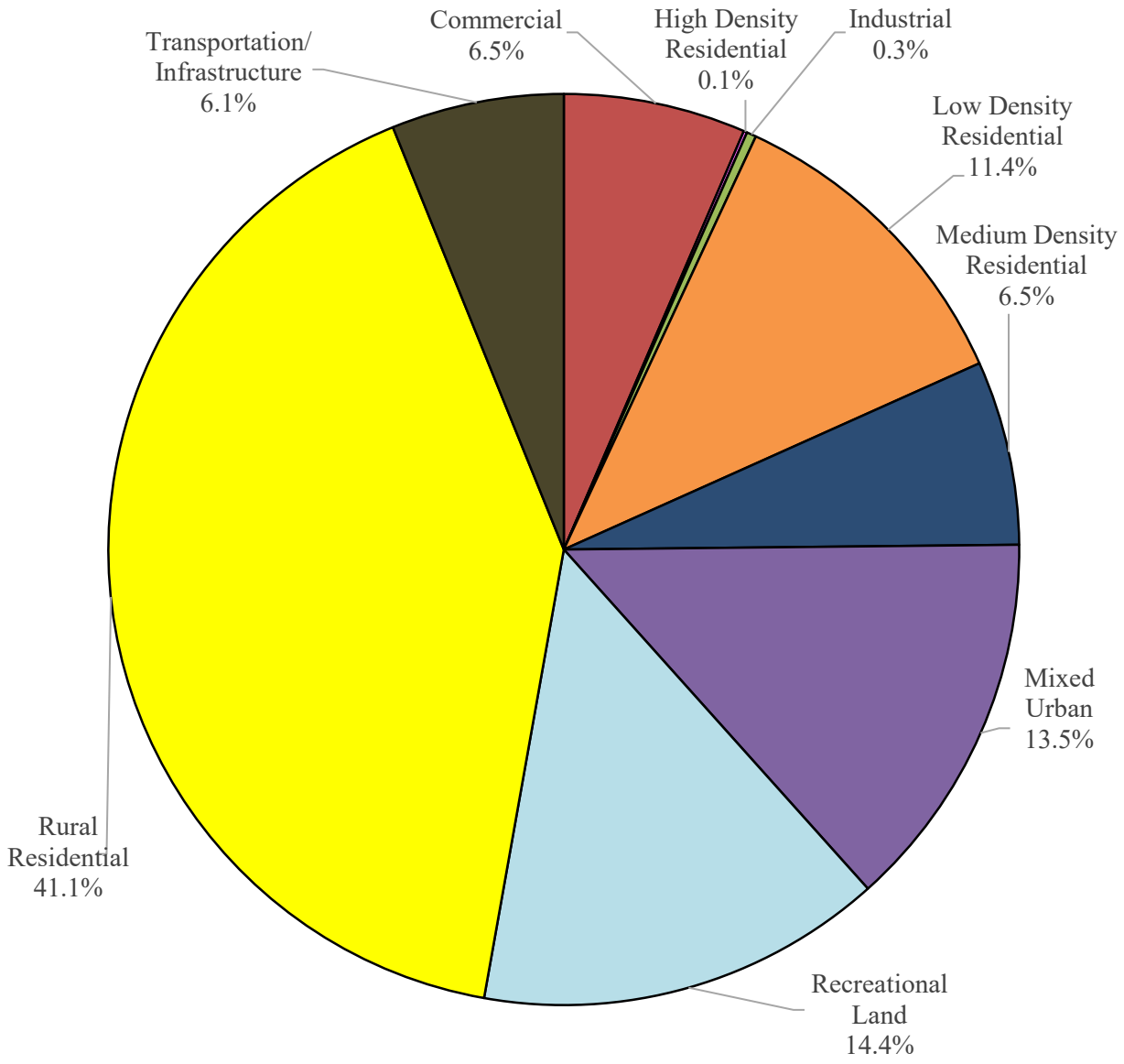


Figure 3: Pie chart illustrating the various types of urban land use in Peapack-Gladstone Borough

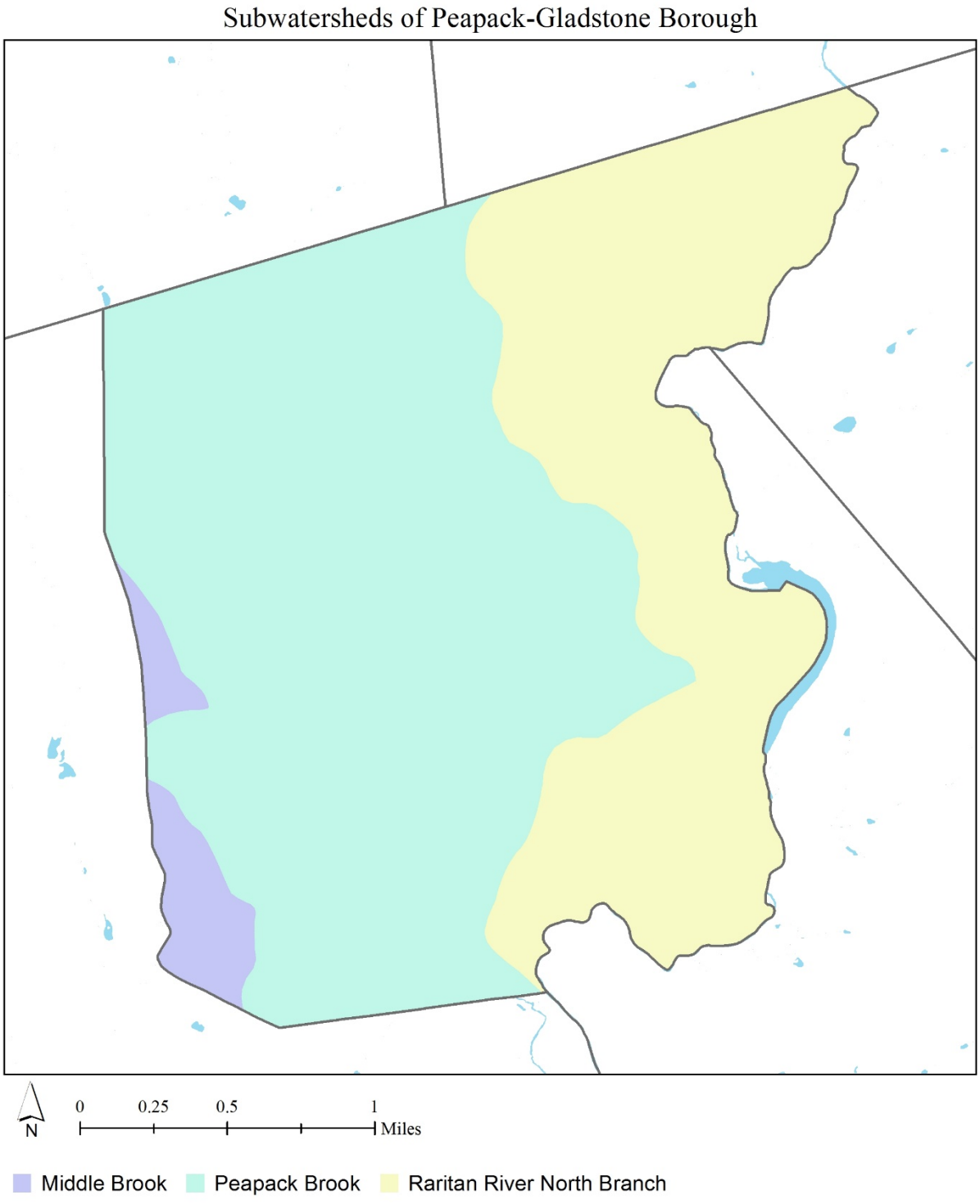


Figure 4: Map of the subwatersheds in Peapack-Gladstone Borough

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 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 Peapack-Gladstone 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 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 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 Peapack-Gladstone 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.

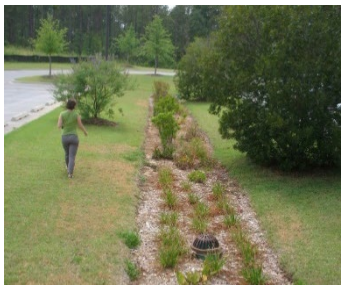
Downspout planter boxes

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

Appendix A contains information on potential project sites where green infrastructure practices could be installed as well as information 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, the recharge potential, TSS removal potential, maximum volume reduction potential per storm, the peak reduction potential, and estimated costs 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

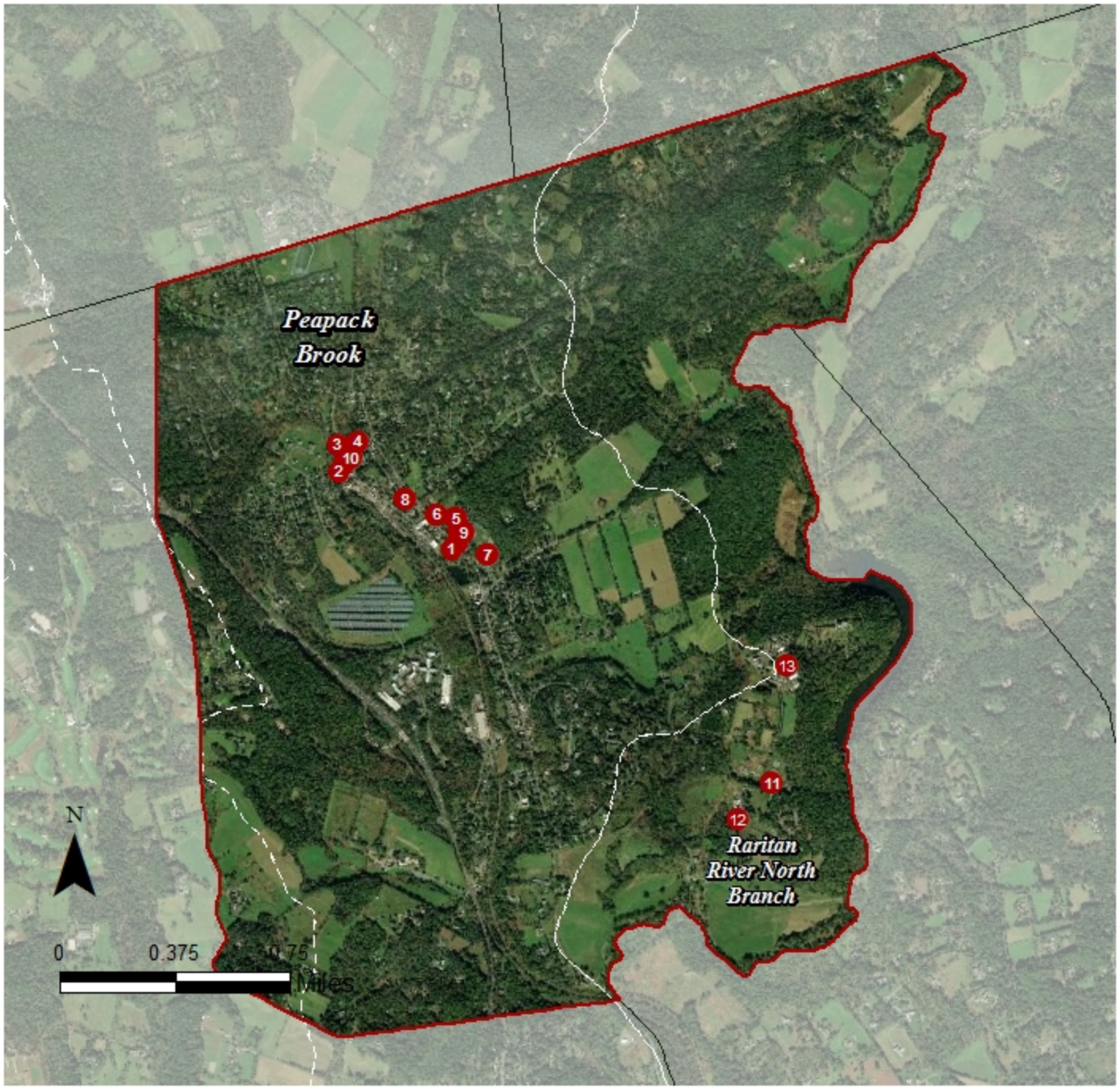
This impervious cover reduction action plan is meant to provide the municipality with a blueprint for implementing green infrastructure practices that will reduce the impact of stormwater runoff from impervious surfaces. These projects can be implemented by a wide variety of people such as boy scouts,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

Appendix A: Climate Resilient Green Infrastructure

a. Green Infrastructure Sites

PEAPACK-GLADSTONE: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE PEAPACK BROOK SUBWATERSHED

1. Bailey Funeral Home
2. Gladstone Tavern
3. Murphy Capital Management
4. Peapack & Gladstone Fire Department
5. Peapack-Gladstone First Aid & Rescue Squad
6. Peapack-Gladstone Bank
7. Peapack & Gladstone Library
8. Peapack Reformed Church
9. Saint Luke's Episcopal Church
10. USPS

SITES WITHIN THE RARITAN RIVER NORTH BRANCH SUBWATERSHED

11. Cooking School at Natirar
12. Natirar Park
13. The Matheny School

b. Proposed Green Infrastructure Concepts

BAILEY FUNERAL HOME

Subwatershed: Peapack Brook

Site Area: 24,480 sq. ft.

Address: 176 Main Street
Peapack, NJ 07977

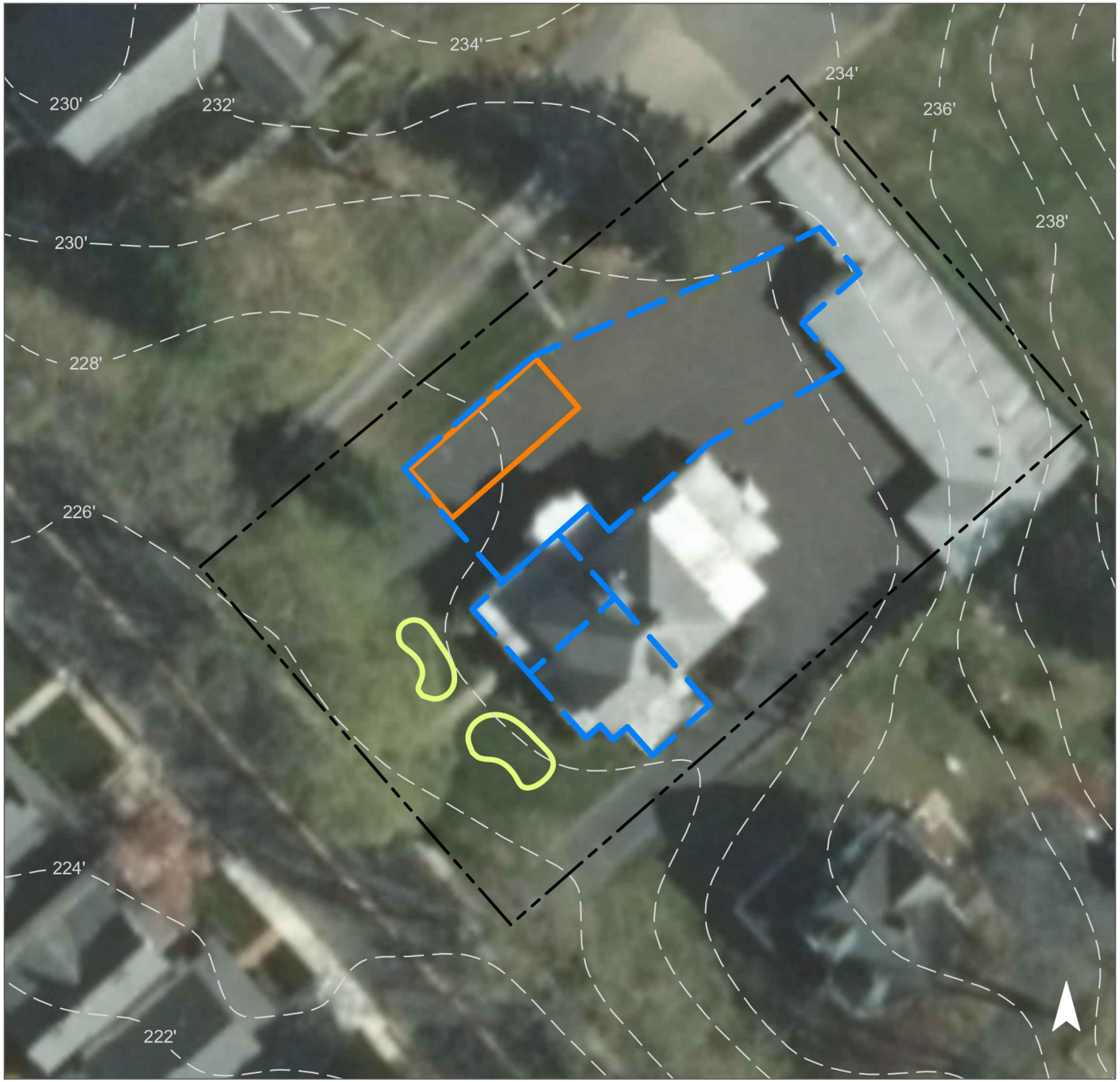
Block and Lot: Block 8, Lot 25

Rain gardens can be installed in front of the building, on either side of the walkway to help capture, treat, and infiltrate rooftop runoff. Pervious pavement can be installed on the northwest side of the home to infiltrate and filter parking lot 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"
70	17,110	0.8	8.6	78.6	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	0.044	7	3,200	0.12	500	$2,500
Pervious pavement	0.069	11	5,030	0.19	470	$11,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Bailey Funeral Home

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

0 20' 40'

GLADSTONE TAVERN

Subwatershed: Peapack Brook

Site Area: 50,370 sq. ft.

Address: 273 Main Street
Gladstone, NJ 07934

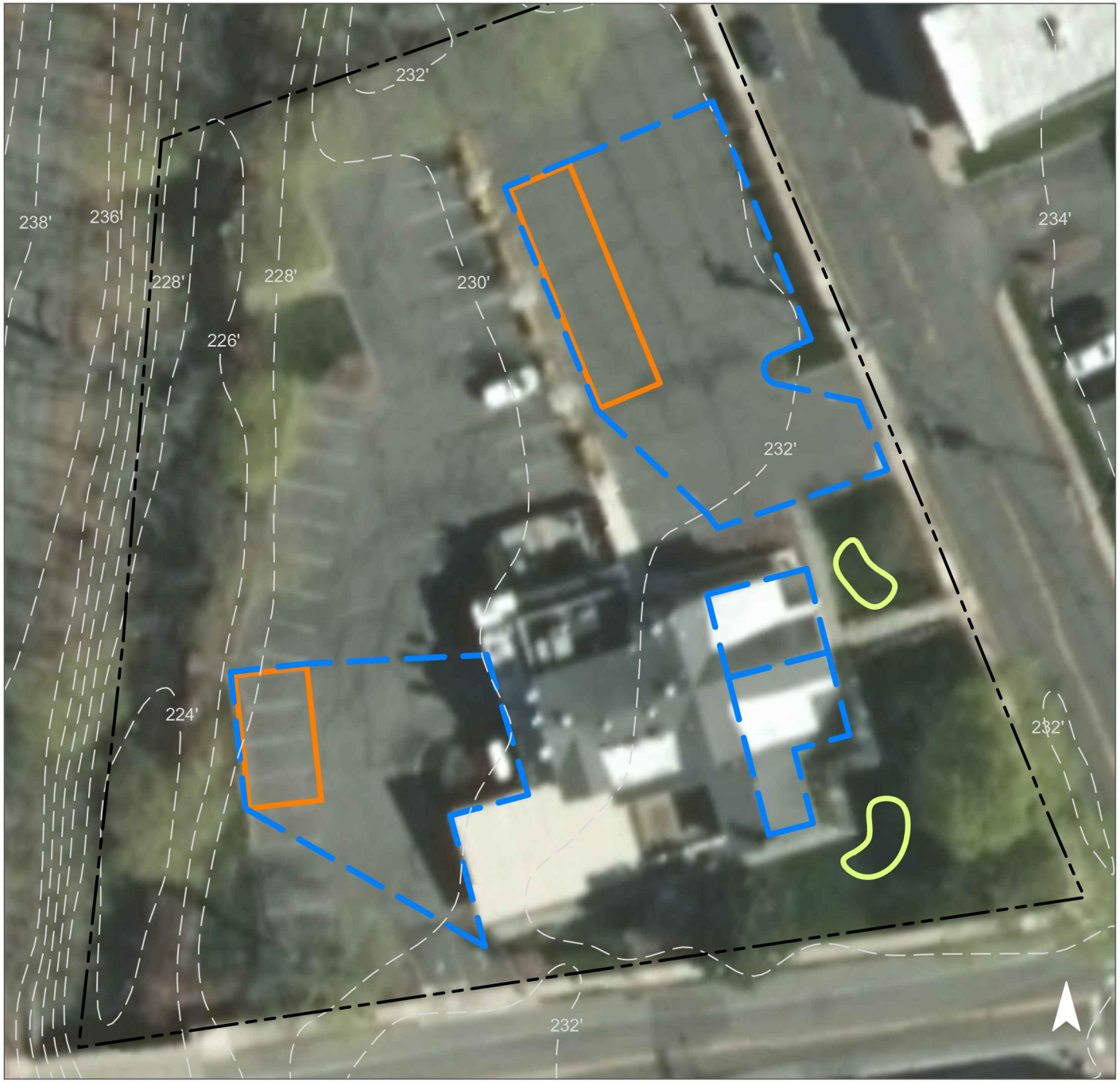
Block and Lot: Block 13, Lot 1

Rain gardens can be installed at the southeast corner of the building to help capture, treat, and infiltrate stormwater runoff from the roof of the building. Pervious pavement can be installed in the parking spaces to the west and to the north of the tavern to infiltrate parking lot 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"
81	40,975	2.0	20.7	188.1	0.032	1.12

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	0.038	6	2,780	0.10	500	$2,500
Pervious pavement	0.246	41	18,060	0.68	1,855	$46,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Gladstone Tavern

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

0 20' 40'

MURPHY CAPITAL MANAGEMENT

Subwatershed: Peapack Brook

Site Area: 9,895 sq. ft.

Address: 268 Main Street
Gladstone, NJ 07934

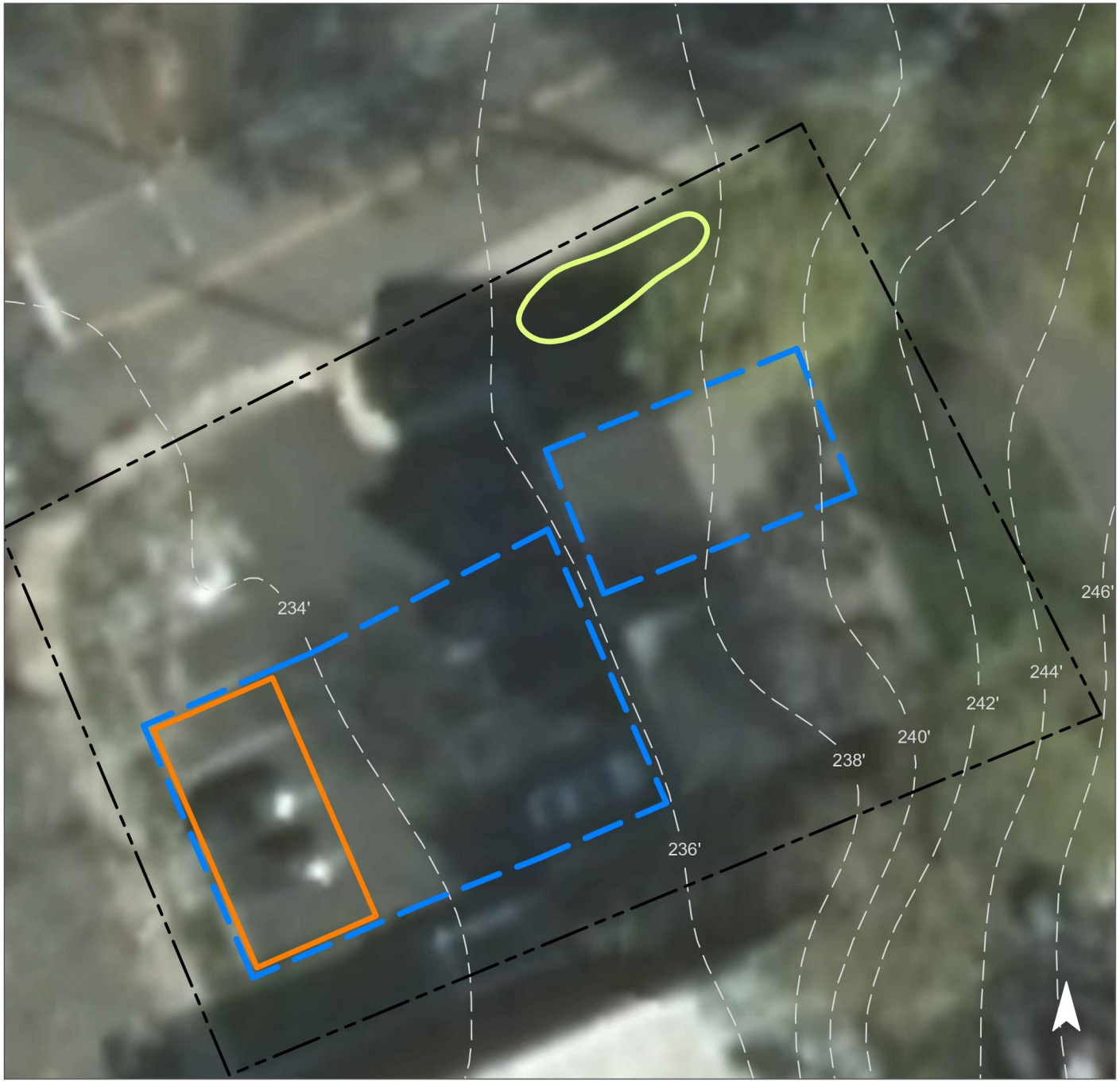
Block and Lot: Block 12, Lot 15

A rain garden can be installed adjacent to the sidewalk and north of the building to capture, treat, and infiltrate stormwater runoff from the roof of the building. Pervious pavement can be installed in the southeastern corner of the parking lot to infiltrate pavement 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"
90	8,905	0.4	4.5	40.9	0.007	0.24

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	0.019	3	1,380	0.05	180	$900
Pervious pavement	0.057	9	4,160	0.16	650	$16,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Murphy Capital Management

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

0 10' 20'

PEAPACK & GLADSTONE FIRE DEPARTMENT

Subwatershed: Peapack Brook

Site Area: 88,770 sq. ft.

Address: 6 Dewey Avenue
Gladstone, NJ 07934

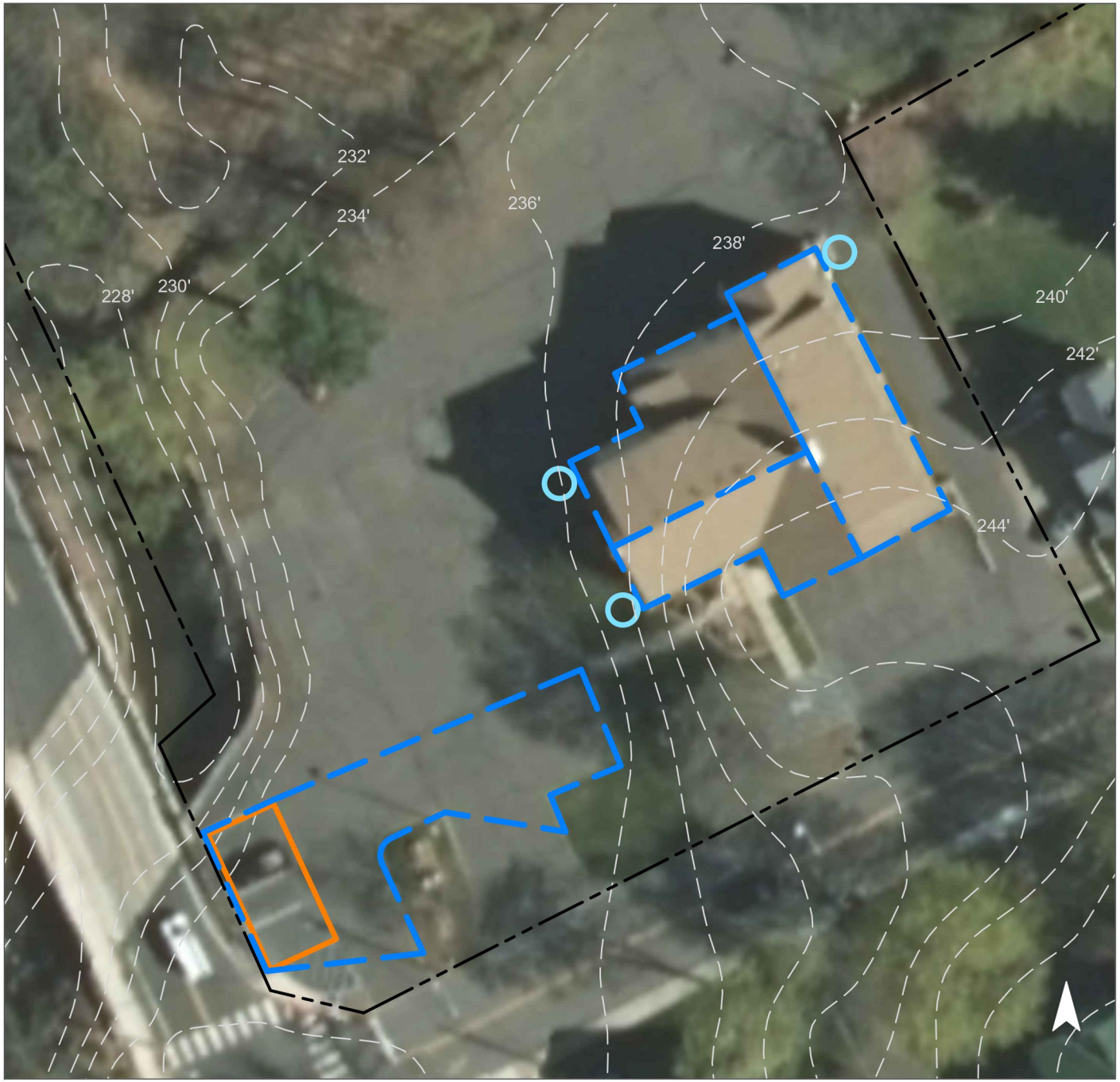
Block and Lot: Block 11, Lot 14

Cisterns can be installed at the southwest, west, and northeast corners of the building to capture and allow non-potable reuse of stormwater. Pervious pavement can be installed in the parking spaces southwest of the building to infiltrate parking lot 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"
58	51,480	2.5	26.0	236.4	0.040	1.41

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	0.094	16	6,880	0.26	800	$20,000
Rainwater harvesting	0.136	23	4,500	0.44	4,500 (gal)	$9,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Peapack & Gladstone Fire Department

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

0 20' 40'

PEAPACK-GLADSTONE FIRST AID & RESCUE SQUAD

Subwatershed: Peapack Brook

Site Area: 39,230 sq. ft.

Address: 1 St. Luke's Avenue
Gladstone, NJ 07934

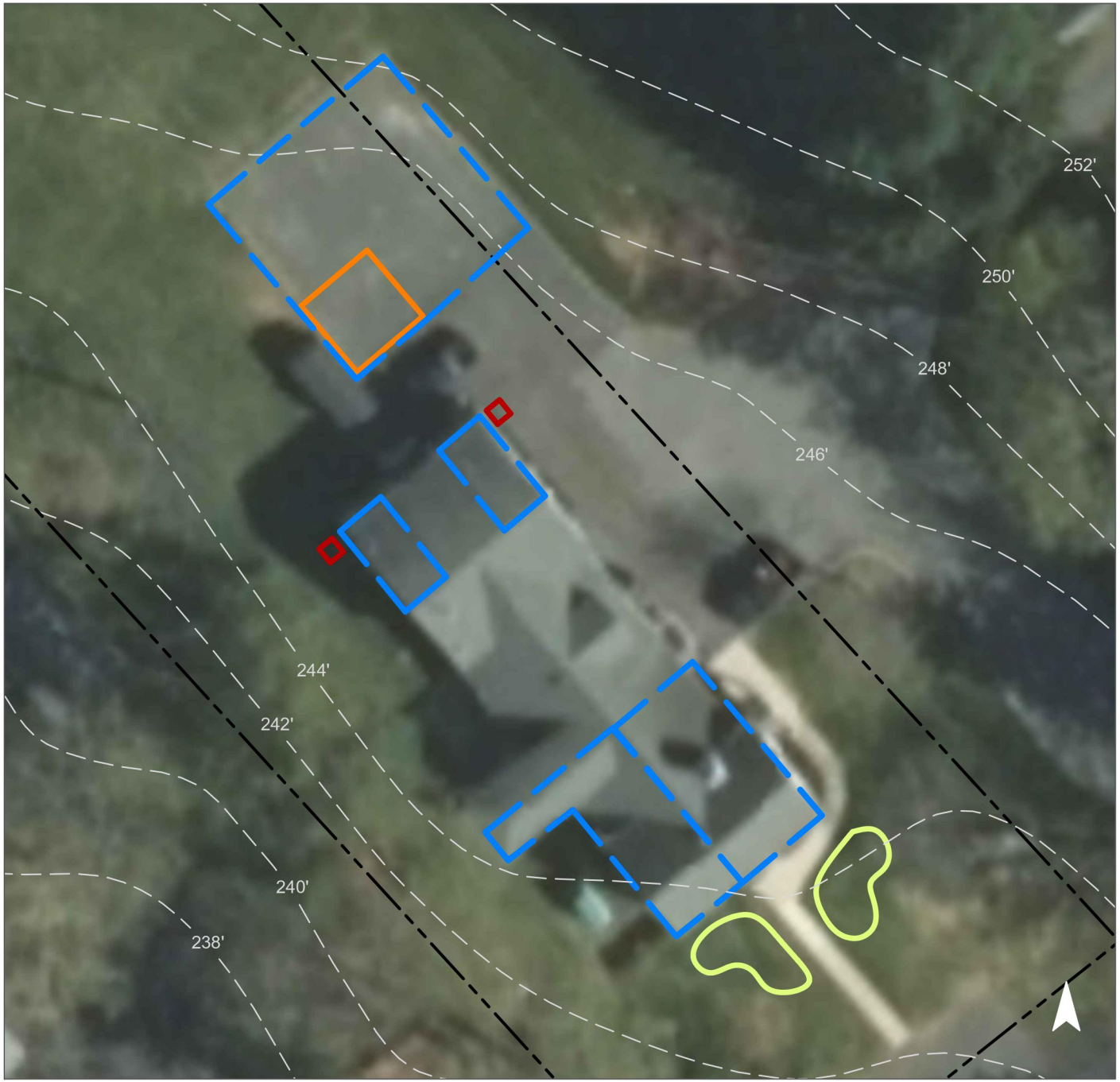
Block and Lot: Block 8, Lot 10

Rain gardens can be installed on both sides of the walkway to capture, treat, and infiltrate rooftop runoff from the building. Downspout planter boxes can be built in the rear of the building to capture and filter rooftop runoff. Pervious pavement can be installed in the parking spaces in the rear of the building to infiltrate parking lot 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"
42	16,540	0.8	8.4	75.9	0.013	0.45

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	0.041	7	3,030	0.11	405	$2,025
Pervious pavement	0.053	9	3,850	0.14	325	$8,125
Planter boxes	n/a	2	n/a	n/a	2 (boxes)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Peapack-Gladstone First Aid & Rescue Squad

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

0 15' 30'

PEAPACK-GLADSTONE BANK

Subwatershed: Peapack Brook

Site Area: 149,780 sq. ft.

Address: 190 Main Street
Gladstone, NJ 07934

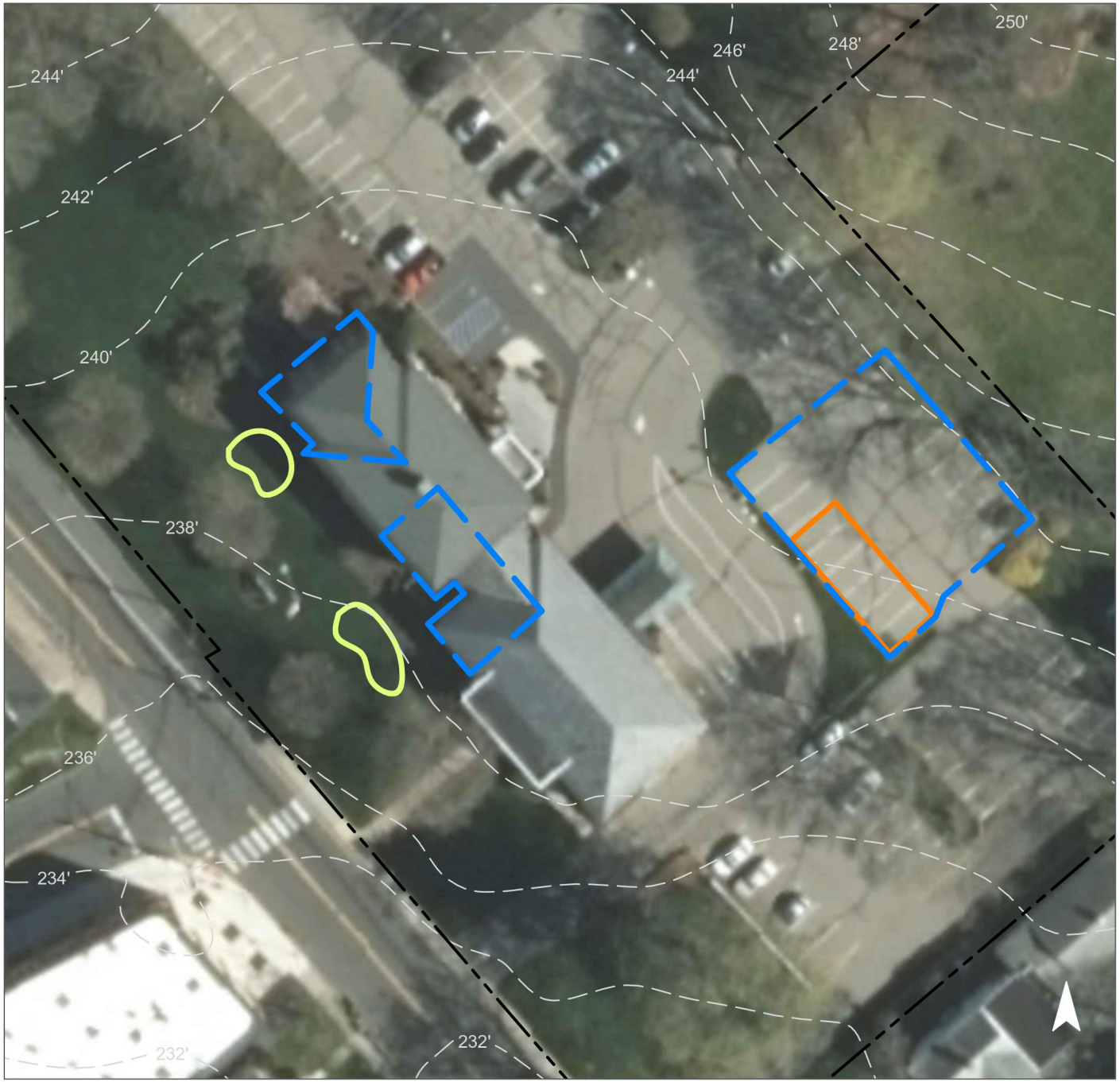
Block and Lot: Block 8, Lot 5

Rain gardens can be installed at the northwest corner and in front of the bank to capture, treat, and infiltrate rooftop runoff. Pervious pavement can be installed in the parking spaces behind the building to infiltrate and filter parking lot 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"
41	61,270	3.0	30.9	281.3	0.048	1.68

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	0.066	11	4,810	0.18	630	$3,150
Pervious pavement	0.155	26	11,390	0.43	1,000	$25,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Peapack-Gladstone Bank

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

0 25' 50'

PEAPACK & GLADSTONE LIBRARY

Subwatershed: Peapack Brook

Site Area: 181,490 sq. ft.

Address: 1 School Street
Peapack, NJ 07977

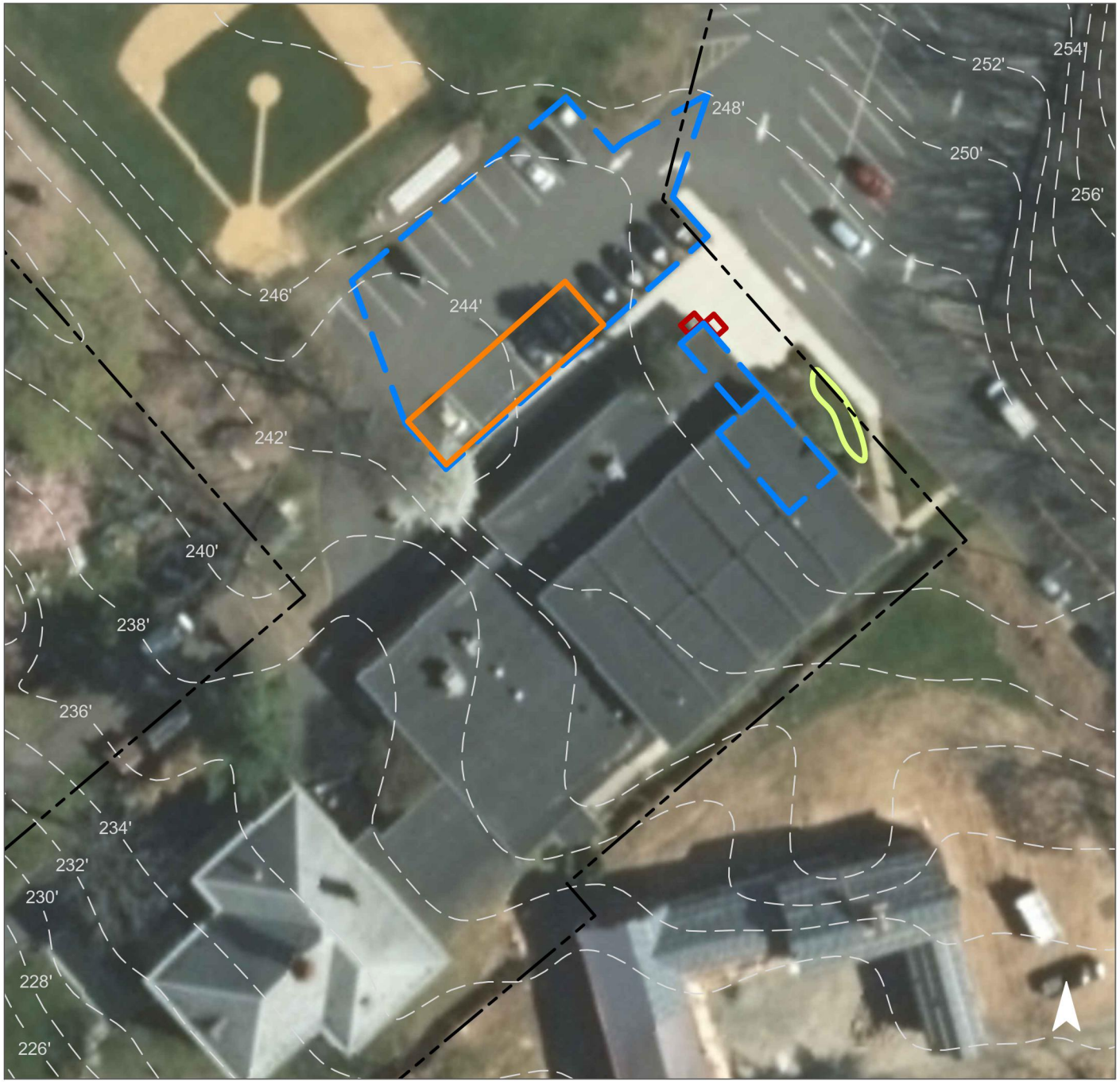
Block and Lot: Block 8, Lot 21

A rain garden can be installed between the sidewalk and the library on the northeastern side of the building to capture, treat, and infiltrate stormwater runoff from the roof of the building. Pervious pavement can be installed behind the library to infiltrate parking lot runoff. Downspout planter boxes can be installed in the northern corner of the building to allow stormwater reuse 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"
24	43,390	2.1	21.9	199.2	0.034	1.19

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	0.018	3	1,340	0.05	175	$875
Pervious pavement	0.193	32	14,170	0.53	1,400	$35,000
Planter boxes	n/a	1	n/a	n/a	2 (boxes)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Peapack & Gladstone Library

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

0 25' 50'

PEAPACK REFORMED CHURCH

Subwatershed: Peapack Brook

Site Area: 98,015 sq. ft.

Address: 224 Main Street
Gladstone, NJ 07934

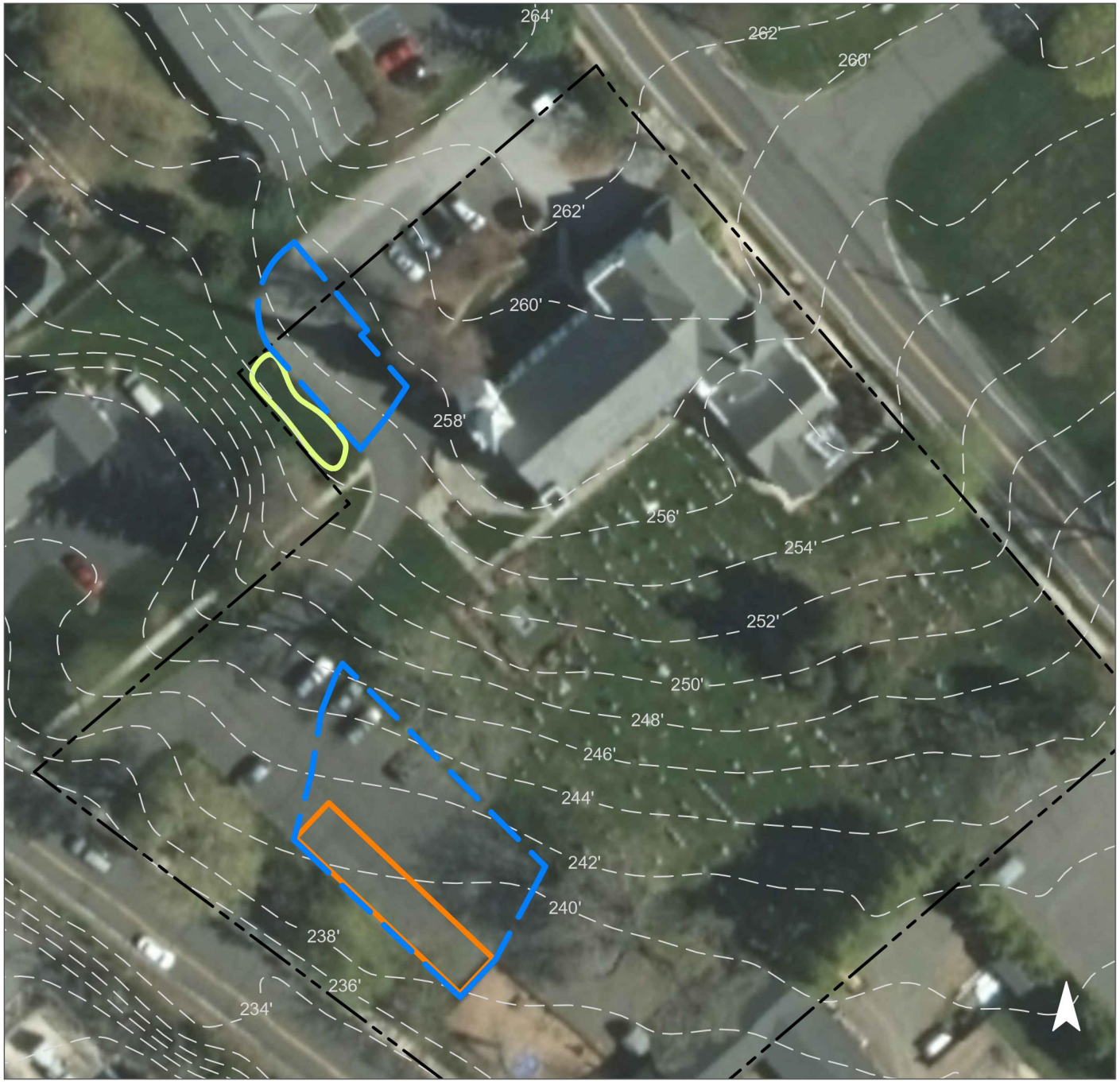
Block and Lot: Block 21, Lot 4

A rain garden can be installed at the edge of the parking lot to the southwest of the church to capture, treat, and infiltrate parking lot runoff. Pervious pavement can be installed in the parking spaces south of the church to infiltrate parking lot 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"
45	44,415	2.1	22.4	203.9	0.035	1.22

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
Bioretention system	0.068	11	4,970	0.19	650	$3,250
Pervious pavement	0.168	28	12,290	0.46	1,800	$45,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Peapack Reformed Church

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

0 30' 60'

SAINT LUKE'S EPISCOPAL CHURCH

Subwatershed: Peapack Brook

Site Area: 64,825 sq. ft.

Address: 182 Main Street
Gladstone, NJ 07934

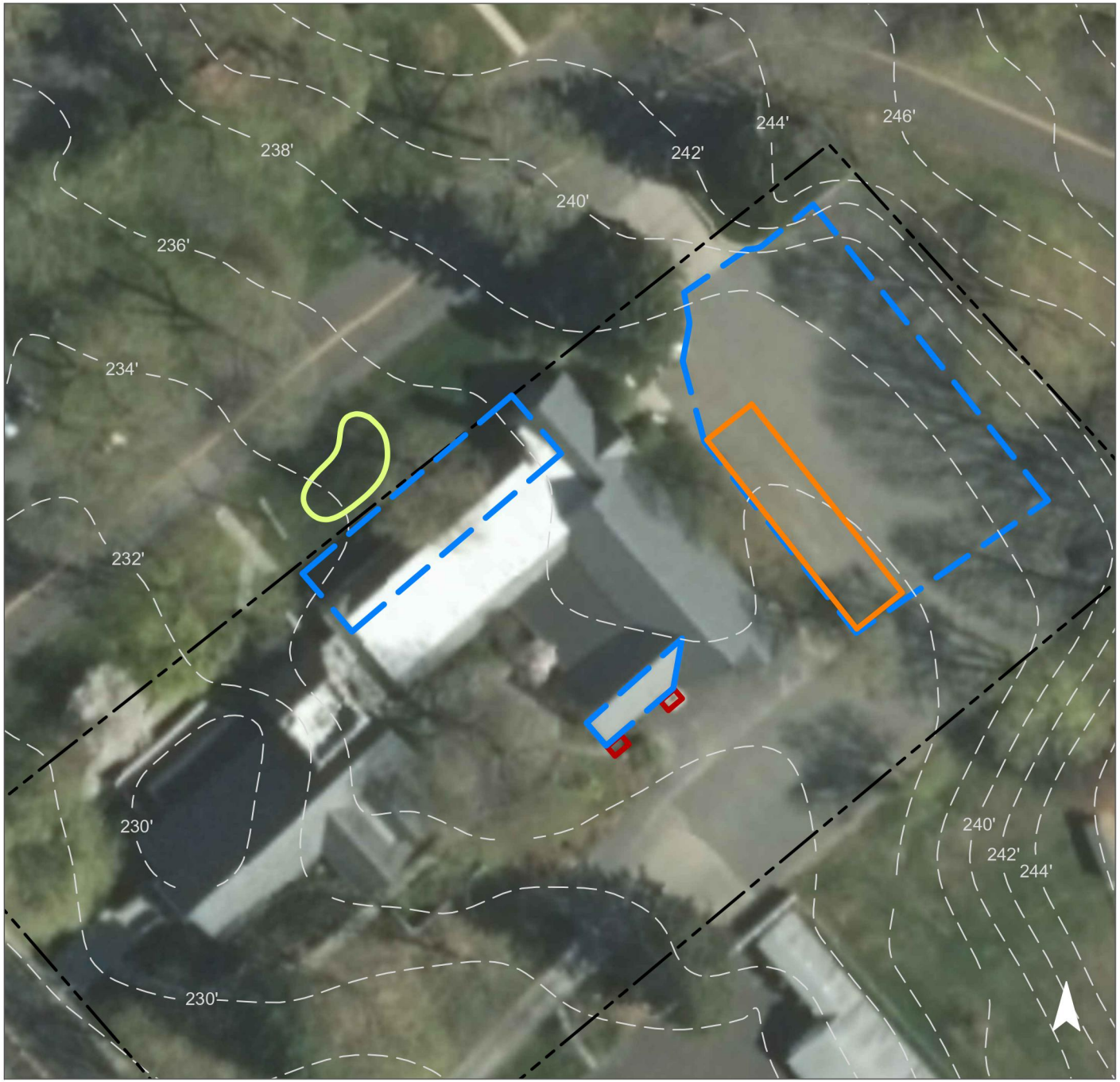
Block and Lot: Block 8, Lot 26

A rain garden can be installed north of the church to capture, treat, and infiltrate rooftop runoff. Downspout planter boxes can be installed by the main entrance to capture and filter stormwater. Pervious pavement can be installed in the parking spaces to the northeast of the church to filter 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"
69	44,985	2.2	22.7	206.5	0.035	1.23

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	0.059	10	4,300	0.16	565	$2,825
Pervious pavement	0.233	39	17,130	0.64	1,600	$40,000
Planter boxes	n/a	1	n/a	n/a	2 (boxes)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Saint Luke's Episcopal Church

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

0 25' 50'

USPS

Subwatershed: Peapack Brook

Site Area: 6,430 sq. ft.

Address: 266 Main Street
Gladstone, NJ 07934

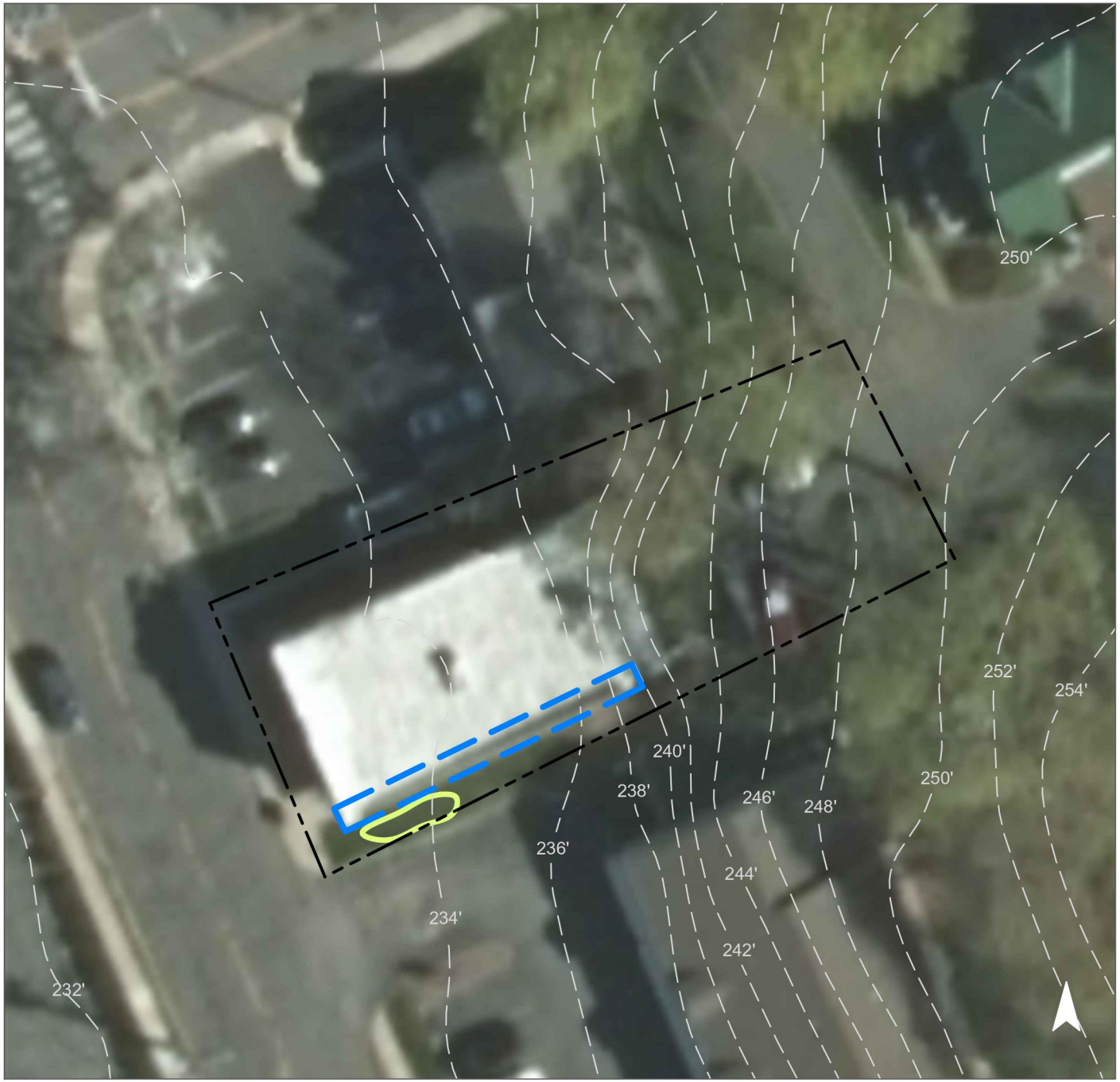
Block and Lot: Block 12, Lot 14

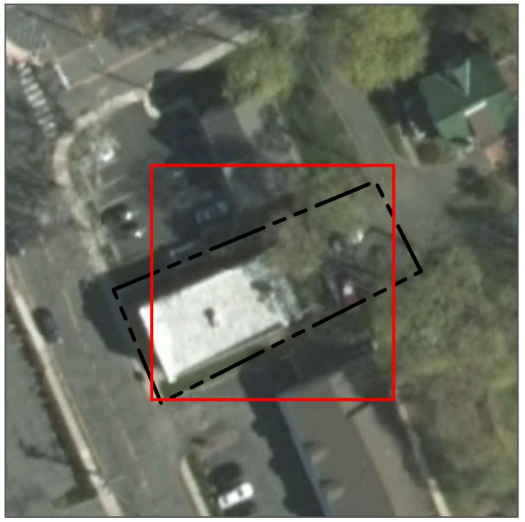
A rain garden can be installed between the post office and the parking lot to capture, treat, and infiltrate rooftop runoff since no gutters are installed. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
90	5,785	0.3	2.9	26.6	0.005	0.16

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	0.008	1	620	0.02	80	$400

GREEN INFRASTRUCTURE RECOMMENDATIONS





USPS

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

0 15' 30'

COOKING SCHOOL AT NATIRAR

Subwatershed: Raritan River North Branch

Site Area: 3,689,440 sq. ft.

Address: 2 Main Street
Peapack, NJ 07977

Block and Lot: Block 28, Lot 24.02

Rain gardens can be installed between the existing landscaped area and the sidewalk to capture, treat, and infiltrate stormwater runoff from the roof of the building. Downspout planter boxes can be installed on the eastern side of the building to capture and filter 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"
8	288,540	13.9	145.7	1,324.8	0.225	7.91

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	0.062	10	4,550	0.17	595	$2,975
Planter boxes	n/a	1	n/a	n/a	2 (boxes)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Cooking School of Natirar

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

0 20' 40'

NATIRAR PARK

Subwatershed: Raritan River North Branch

Site Area: 10,567,360 sq. ft.

Address: 2 Main Street
Gladstone, NJ 07934

Block and Lot: Block 28, Lot 24.01

Several rain gardens can be installed in multiple locations around the parking lots and driveways to capture stormwater runoff from those areas. 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"
0.18	19,340	0.9	9.8	88.8	0.015	0.53

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 systems	0.612	106	44,920	1.69	5,880	$29,400

GREEN INFRASTRUCTURE RECOMMENDATIONS

Natirar Park

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

0 50' 100'

THE MATHENY SCHOOL

Subwatershed: Raritan River North Branch

Site Area: 3,972,380 sq. ft.

Address: 65 Highland Avenue
Peapack, NJ 07977

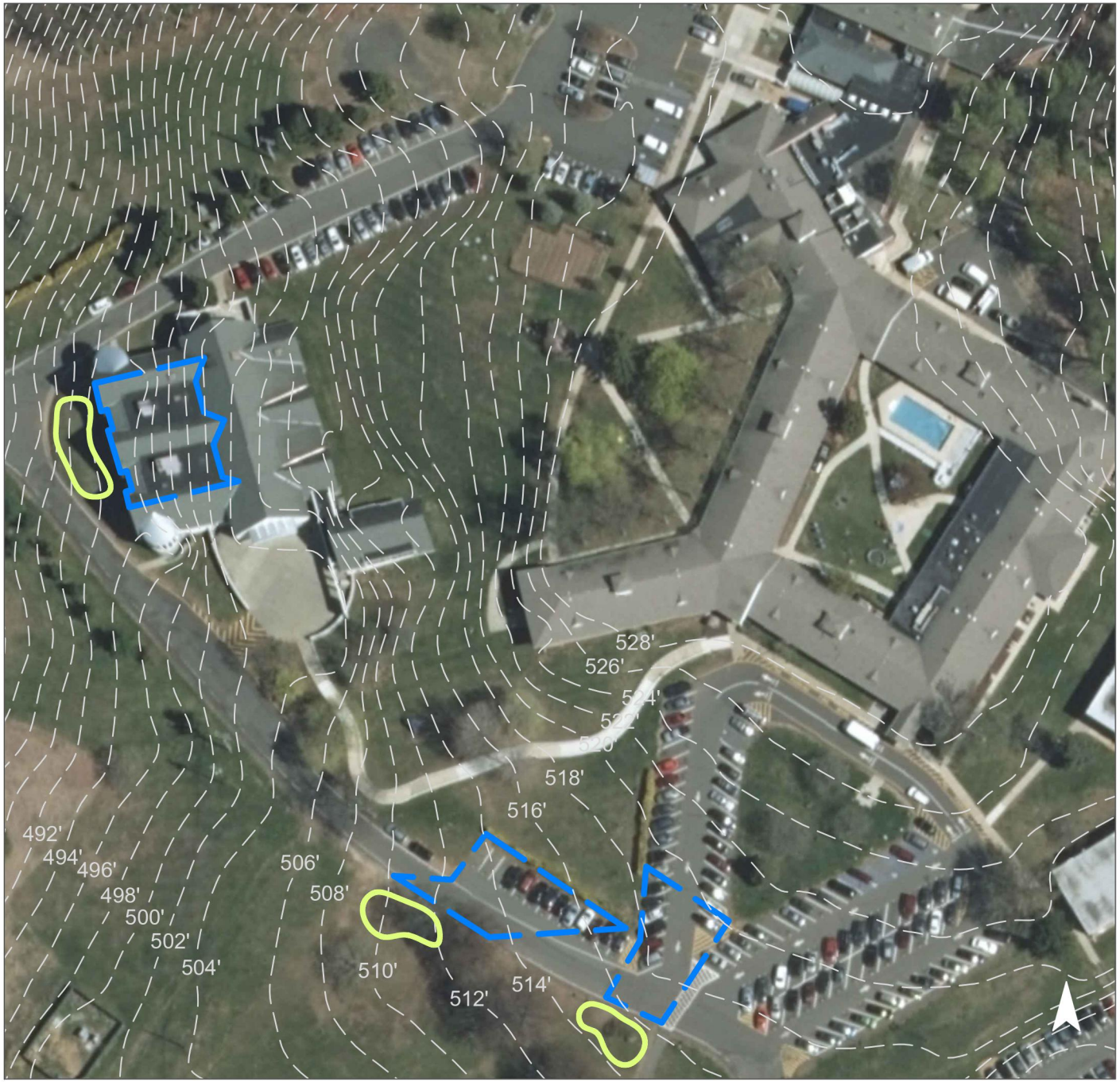
Block and Lot: Block 26, Lot 26

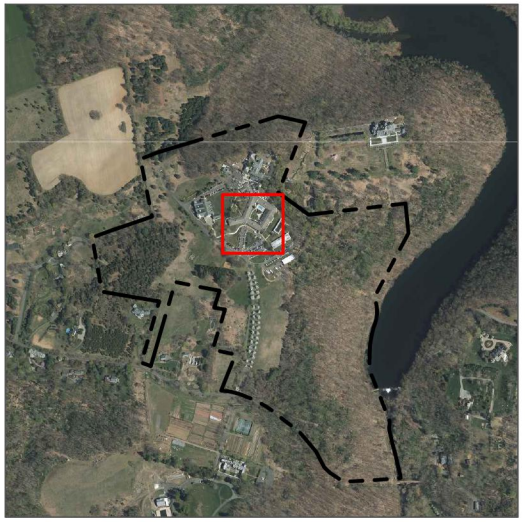
Rain gardens can be installed along the outer perimeter of the property, adjacent to the driveways and parking spaces, to capture, treat, and infiltrate stormwater runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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"
8.1	321,150	15.5	162.2	1,474.5	0.250	8.81

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	0.363	61	26,610	1.00	3,480	$17,400

GREEN INFRASTRUCTURE RECOMMENDATIONS





The Matheny School

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

0 100' 200'

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)
	PEAPACK BROOK SITES	**16.37**	**713,285**				**7.69**	**334,856**	**16.1**	**169.1**	**1,537.4**	**34,881**	**1,227,804**	**0.261**	**9.18**
1	**Bailey Funeral Home**														
	Total Site Info	0.56	24,480	8	25	70	0.39	17,110	0.8	8.6	78.6	1,782	62,737	0.013	0.47
2	**Gladstone Tavern**														
	Total Site Info	1.16	50,370	13	1	81	0.94	40,975	2.0	20.7	188.1	4,268	150,242	0.032	1.12
3	**Murphy Capital Management**														
	Total Site Info	0.23	9,895	12	15	90	0.20	8,905	0.4	4.5	40.9	928	32,652	0.007	0.24
4	**Peapack & Gladstone Fire Department**														
	Total Site Info	2.04	88,770	11	14	58	1.18	51,480	2.5	26.0	236.4	5,363	188,760	0.040	1.41
5	**Peapack-Gladstone First Aid & Rescue Squad**														
	Total Site Info	0.90	39,230	8	10	42	0.38	16,540	0.8	8.4	75.9	1,723	60,647	0.013	0.45
6	**Peapack-Gladstone Bank**														
	Total Site Info	3.44	149,780	8	5	41	1.41	61,270	3.0	30.9	281.3	6,382	224,657	0.048	1.68
7	**Peapack & Gladstone Library**														
	Total Site Info	4.17	181,490	8	21	24	1.00	43,390	2.1	21.9	199.2	4,520	159,097	0.034	1.19
8	**Peapack Reformed Church**														
	Total Site Info	2.25	98,015	21	4	45	1.02	44,415	2.1	22.4	203.9	4,627	162,857	0.035	1.22
9	**Saint Luke's Episcopal Church**														
	Total Site Info	1.49	64,825	8	26	69	1.03	44,985	2.2	22.7	206.5	4,686	164,945	0.035	1.23
10	**USPS**														
	Total Site Info	0.15	6,430	12	14	90	0.13	5,785	0.3	2.9	26.6	603	21,212	0.005	0.16
	RARITAN RIVER NORTH BRANCH SITES	**418.48**	**18,229,180**				**14.44**	**629,030**	**30.3**	**317.7**	**2,888.1**	**65,524**	**2,306,443**	**0.490**	**17.25**
11	**Cooking School of Natirar**														
	Total Site Info	84.70	3,689,440	28	24.02	8	6.62	288,540	13.9	145.7	1,324.8	30,056	1,057,980	0.225	7.91
12	**Natirar Park**														
	Total Site Info	242.59	10,567,360	28	24.01	0	0.44	19,340	0.9	9.8	88.8	2,015	70,913	0.015	0.53
13	**The Matheny School**														
	Total Site Info	91.19	3,972,380	26	26	8	7.37	321,150	15.5	162.2	1,474.5	33,453	1,177,550	0.250	8.81

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 %
	PEAPACK BROOK SITES	**68,770**	**1.58**	**1.763**	**299**	**123,890**	**4.91**				**$280,925**	**20.5%**
1	**Bailey Funeral Home**											
	Bioretention systems	1,675	0.04	0.044	7	3,200	0.12	500	5	SF	$2,500	9.8%
	Pervious pavement	2,630	0.06	0.069	11	5,030	0.19	470	25	SF	$11,750	15.4%
	Total Site Info	**4,305**	**0.10**	**0.112**	**19**	**8,230**	**0.31**				**$14,250**	**25.2%**
2	**Gladstone Tavern**											
	Bioretention systems	1,450	0.03	0.038	6	2,780	0.10	500	5	SF	$2,500	3.5%
	Pervious pavement	9,445	0.22	0.246	41	18,060	0.68	1855	25	SF	$46,375	23.1%
	Total Site Info	**10,895**	**0.25**	**0.284**	**48**	**20,840**	**0.78**				**$48,875**	**26.6%**
3	**Murphy Capital Management**											
	Bioretention system	720	0.02	0.019	3	1,380	0.05	180	5	SF	$900	8.1%
	Pervious pavement	2,175	0.05	0.057	9	4,160	0.16	650	25	SF	$16,250	24.4%
	Total Site Info	**2,895**	**0.07**	**0.075**	**13**	**5,540**	**0.21**				**$17,150**	**32.5%**
4	**Peapack & Gladstone Fire Department**											
	Pervious pavement	3,600	0.08	0.094	16	6,880	0.26	800	25	SF	$20,000	7.0%
	Rainwater harvesting	5,230	0.12	0.136	23	4,500	0.44	4500	2	gal	$9,000	10.2%
	Total Site Info	**8,830**	**0.20**	**0.230**	**39**	**11,380**	**0.70**				**$29,000**	**17.2%**
5	**Peapack-Gladstone First Aid & Rescue Squad**											
	Bioretention systems	1,585	0.04	0.041	7	3,030	0.11	405	5	SF	$2,025	9.6%
	Pervious pavement	2,015	0.05	0.053	9	3,850	0.14	325	25	SF	$8,125	12.2%
	Planter boxes	430	0.01	n/a	2	n/a	n/a	2	1000	box	$2,000	2.6%
	Total Site Info	**4,030**	**0.09**	**0.094**	**17**	**6,880**	**0.25**				**$12,150**	**24.4%**
6	**Peapack-Gladstone Bank**											
	Bioretention systems	2,515	0.06	0.066	11	4,810	0.18	630	5	SF	$3,150	4.1%
	Pervious pavement	5,960	0.14	0.155	26	11,390	0.43	1000	25	SF	$25,000	9.7%
	Total Site Info	**8,475**	**0.19**	**0.221**	**37**	**16,200**	**0.61**				**$28,150**	**13.8%**

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 %
7	**Peapack & Gladstone Library**											
	Bioretention system	700	0.02	0.018	3	1,340	0.05	175	5	SF	$875	1.6%
	Pervious pavement	7,415	0.17	0.193	32	14,170	0.53	1400	25	SF	$35,000	17.1%
	Planter boxes	300	0.01	n/a	1	n/a	n/a	2	1000	box	$2,000	0.7%
	Total Site Info	**8,415**	**0.19**	**0.211**	**36**	**15,510**	**0.58**				**$37,875**	**19.4%**
8	**Peapack Reformed Church**											
	Bioretention system	2,600	0.06	0.068	11	4,970	0.19	650	5	SF	$3,250	5.9%
	Pervious pavement	6,430	0.15	0.168	28	12,290	0.46	1800	25	SF	$45,000	14.5%
	Total Site Info	**9,030**	**0.21**	**0.235**	**39**	**17,260**	**0.65**				**$48,250**	**20.3%**
9	**Saint Luke's Episcopal Church**											
	Bioretention system	2,250	0.05	0.059	10	4,300	0.16	565	5	SF	$2,825	5.0%
	Pervious pavement	8,960	0.21	0.233	39	17,130	0.64	1600	25	SF	$40,000	19.9%
	Planter boxes	360	0.01	n/a	1	n/a	n/a	2	1000	box	$2,000	0.8%
	Total Site Info	**11,570**	**0.27**	**0.292**	**50**	**21,430**	**0.80**				**$44,825**	**25.7%**
10	**USPS**											
	Bioretention system	325	0.01	0.008	1	620	0.02	80	5	SF	$400	5.6%
	Total Site Info	**325**	**0.01**	**0.008**	**1**	**620**	**0.02**				**$400**	**5.6%**
	RARITAN RIVER NORTH BRANCH SITES	**40,140**	**0.92**	**1.037**	**175**	**76,080**	**2.86**				**$51,775**	**6.4%**
11	**Cooking School of Natirar**											
	Bioretention systems	2,380	0.05	0.062	10	4,550	0.17	595	5	SF	$2,975	0.8%
	Planter boxes	340	0.01	n/a	1	n/a	n/a	2	1000	box	$2,000	0.1%
	Total Site Info	**2,720**	**0.06**	**0.062**	**12**	**4,550**	**0.17**				**$4,975**	**0.9%**
12	**Natirar Park**											
	Bioretention systems	23,500	0.54	0.612	103	44,920	1.69	5880	5	SF	$29,400	121.5%
	Total Site Info	**23,500**	**0.54**	**0.612**	**103**	**44,920**	**1.69**				**$29,400**	**121.5%**
13	**The Matheny School**											
	Bioretention systems	13,920	0.32	0.363	61	26,610	1.00	3480	5	SF	$17,400	4.3%
	Total Site Info	**13,920**	**0.32**	**0.363**	**61**	**26,610**	**1.00**				**$17,400**	**4.3%**