Draft

Impervious Cover Reduction Action Plan for Southampton Township, Burlington County, New Jersey

Prepared for Southampton Township by the Rutgers Cooperative Extension Water Resources Program

December 19, 2018

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Introduction

Located in Burlington County, New Jersey, Southampton Township covers approximately 55.2 square miles. Figures 1 and 2 illustrate that Southampton Township is dominated by wetlands. A total of 15.4% of the municipality's land use is classified as urban. Of the urban land in Southampton Township, rural 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 Southampton Township 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 Southampton Township. Based upon the 2012 NJDEP land use/land cover data, approximately 2.9% of Southampton Township has impervious cover. This level of impervious cover suggests that the streams in Southampton Township are sensitive streams. [1]

Methodology

Southampton Township contains portions of eight 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.

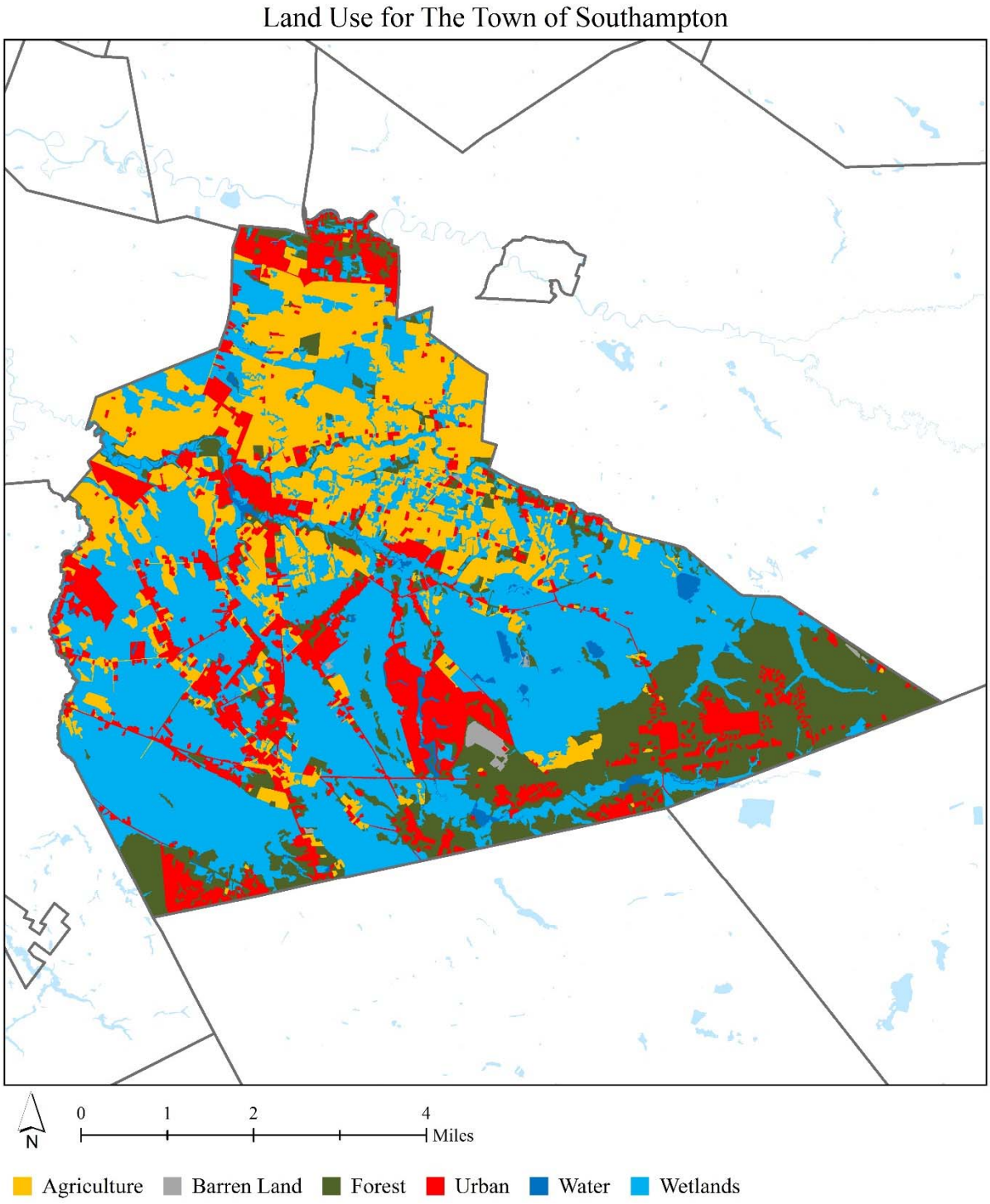


Figure 1: Map illustrating the land use in Southampton Township

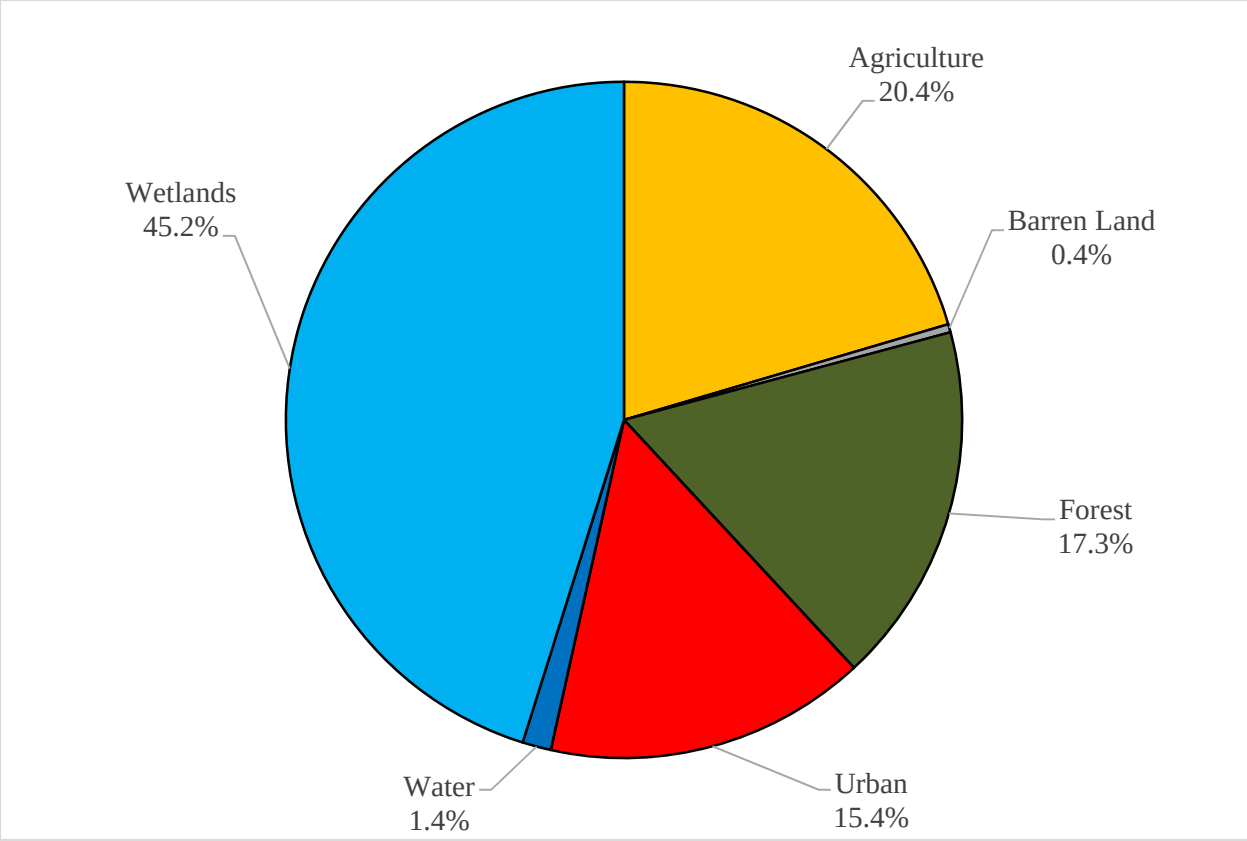


Figure 2: Pie chart illustrating the land use in Southampton Township

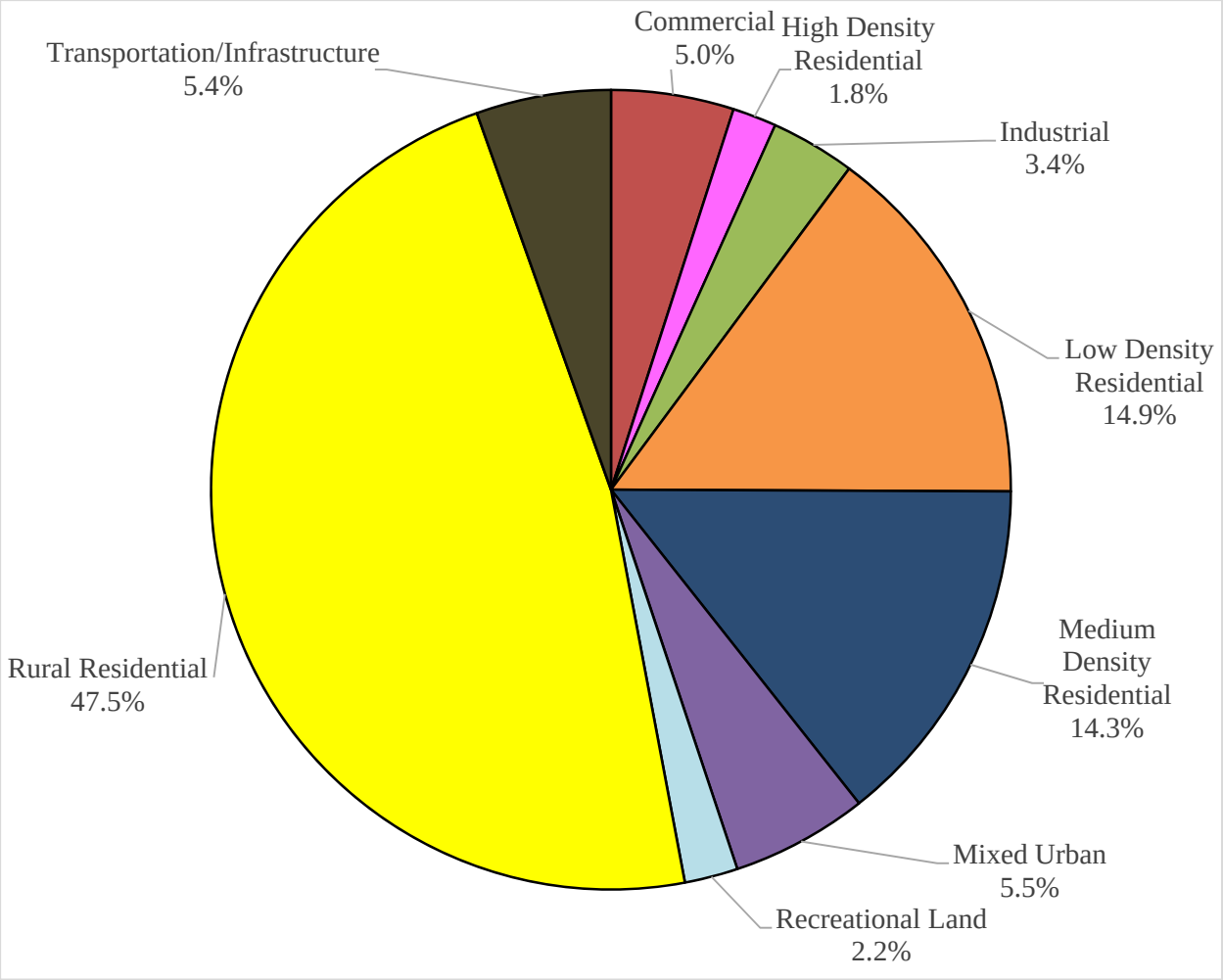


Figure 3: Pie chart illustrating the various types of urban land use in Southampton Township

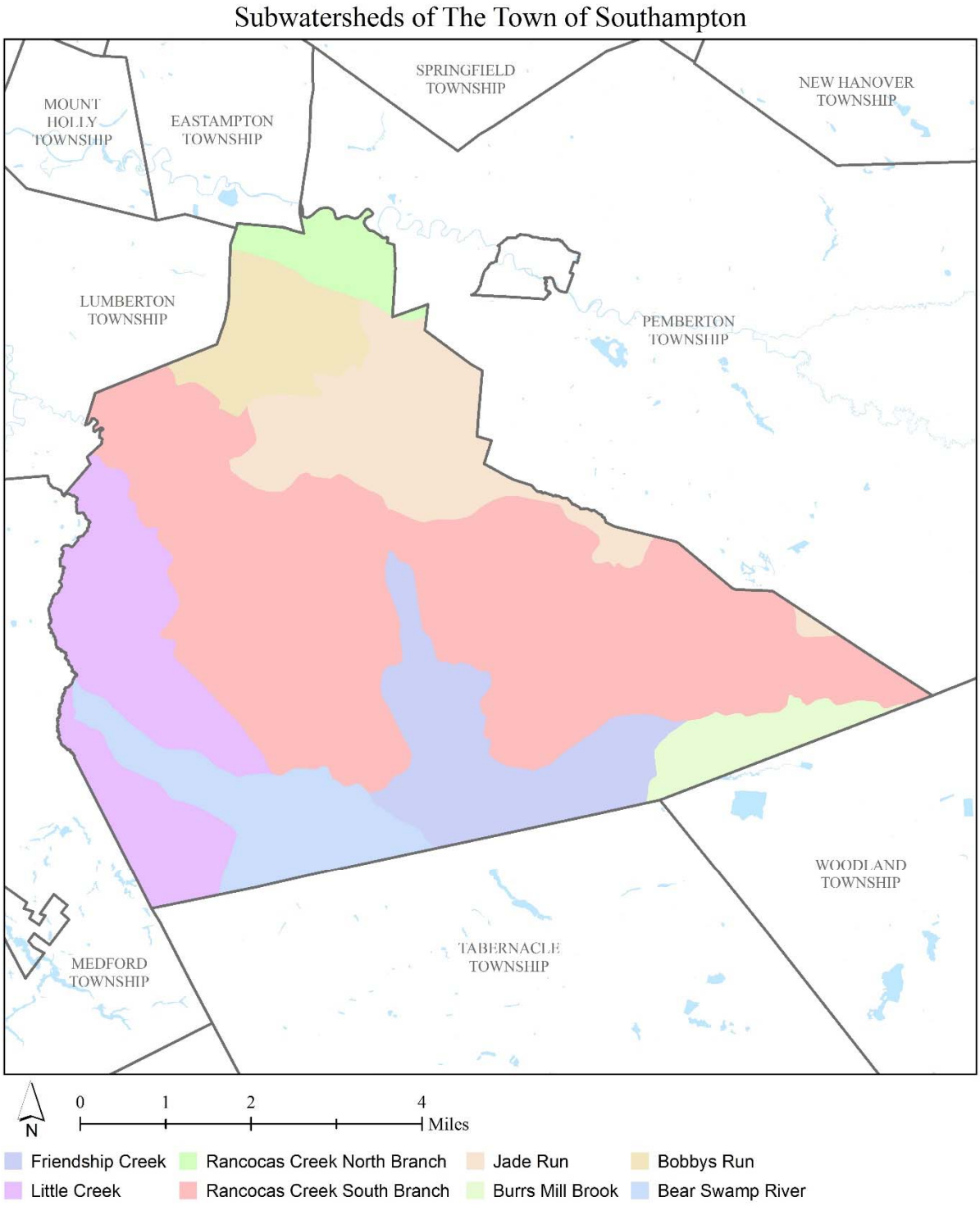


Figure 4: Map of the subwatersheds in Southampton Township

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 Southampton Township 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 Southampton Township. 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*.

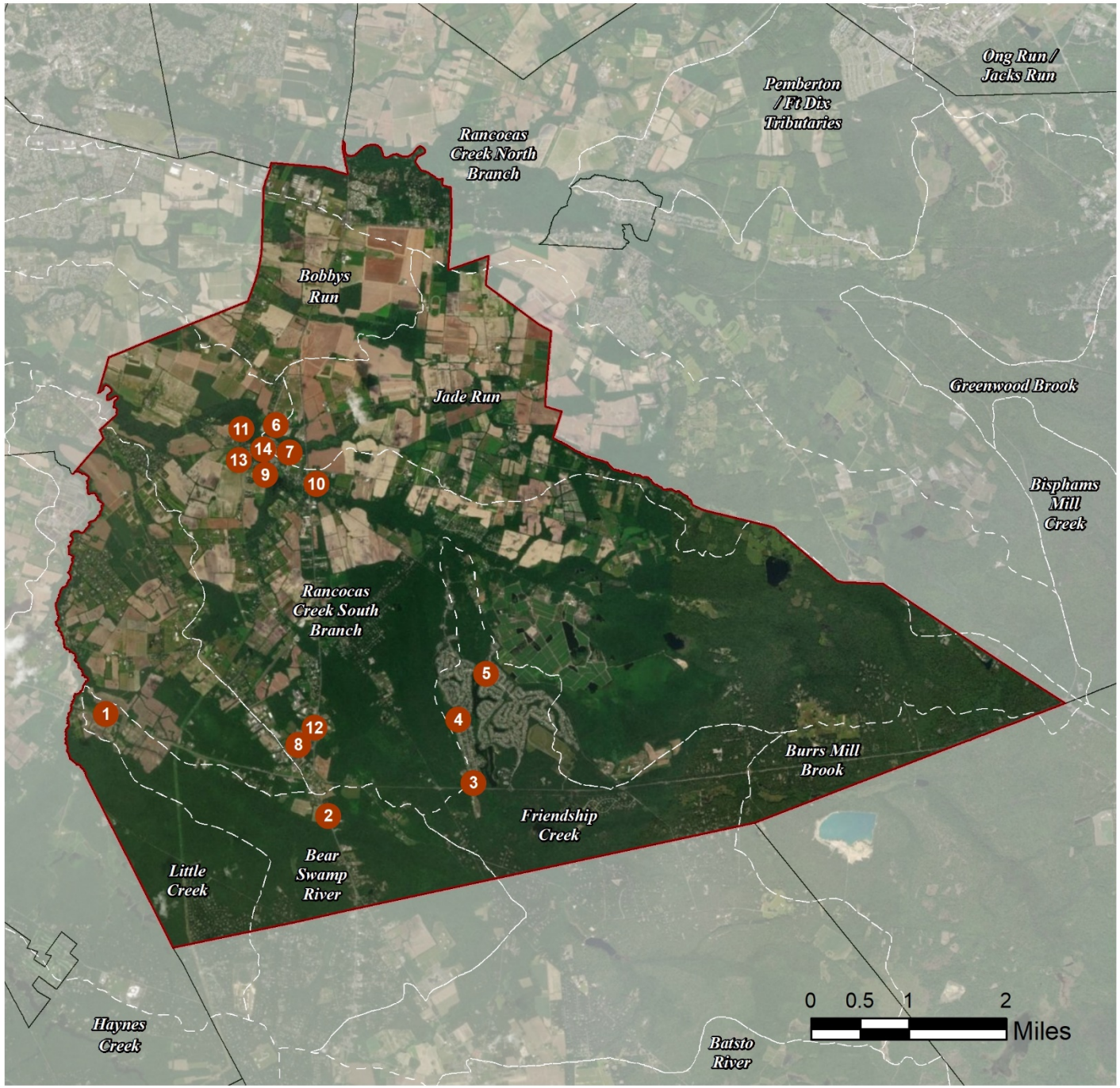
Conclusion

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.

a. Green Infrastructure Sites

SOUTHAMPTON: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BEAR SWAMP RIVER SUBWATERSHED

1. The Early Learning Center
2. New Jersey State Police Red Lion Station

SITES WITHIN THE FRIENDSHIP CREEK SUBWATERSHED

3. Hampton Lakes Emergency Squad
4. Hampton Lakes Volunteer Fire Company
5. LeisureTowne Recreation Building

SITES WITHIN THE JADE RUN SUBWATERSHED

6. First Baptist Church of Vincentown
7. Southampton Township Schools

SITES WITHIN THE RANCOCAS CREEK SOUTH BRANCH SUBWATERSHED

8. Red Lion Faith Chapel
9. Sally Stretch Keen Memorial Library
10. Southampton Municipal Complex
11. Trinity Episcopal Church
12. Vincentown Post Office
13. Vincent Fire Company
14. Vincentown United Methodist Church

b. Proposed Green Infrastructure Concepts

The Early Learning Center

Subwatershed: **Bear Swamp River**

Site Area: **120,215 sq. ft.**

Address: **1633 NJ-70**
Southampton, NJ 08088

Block and Lot: **Block 2002, Lot 16.02**

A rain garden can be installed in the turfgrass area in front of the building across the driveway. The garden will be placed here to catch stormwater runoff from the driveway area and provide aesthetic and educational value to the learning center. 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"
8	9,915	0.5	5.0	45.5	0.008	0.27

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	0.050	8	3,700	0.14	475	$2,375

GREEN INFRASTRUCTURE RECOMMENDATIONS

The Early Learning Center

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

0 25' 50'

New Jersey State Police Red Lion Station

Subwatershed: Bear Swamp River

Site Area: 49,243 sq. ft.

Address: 1722 US-206
Southampton, NJ 08088

Block and Lot: Block 3101, Lot 9.02

A rain garden can be installed in the turfgrass area near the roadway. The rain garden will collect runoff from the parking lot via curb cuts and regrading the lot. Two additional rain gardens can be installed on each side of the entrance by directing downspouts to capture runoff from the rooftop. 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"
65	32,008	1.5	16.2	147.0	0.025	0.88

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	0.158	26	11,840	0.44	1,520	$7,600

GREEN INFRASTRUCTURE RECOMMENDATIONS

New Jersey State Police Red Lion Station

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

0 25' 50'

Hampton Lakes Emergency Squad

Subwatershed: Friendship Creek

Site Area: 53,709 sq. ft.

Address: 4 Holly Boulevard
Southampton, NJ 08088

Block and Lot: Block 2606, Lot 1, 2, 5

A cistern can be installed in the southeast corner of the building. The cistern can capture runoff from the impervious roof and can be used to wash EMS vehicles and for other non-potable uses. 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"
45	24,100	1.2	12.2	110.7	0.019	0.66

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	0.041	7	1,300	0.05	1,300 (gal)	$2,600

GREEN INFRASTRUCTURE RECOMMENDATIONS

Hampton Lakes Emergency Squad

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

0 20' 40'

Hampton Lakes Volunteer Fire Company

Subwatershed: Friendship Creek

Site Area: 68,651 sq. ft.

Address: 72 Holly Blvd
Southampton, NJ 08088

Block and Lot: Block 2401; 2702
Lot 8; 84

A cistern can be installed in the northwest corner of the building. The cistern can collect stormwater runoff from the roof, which could be put to non-potable uses such as washing vehicles or fire trucks instead of directly entering nearby storm drains. A rain garden can also be installed at the southeast corner of the building by directing the nearby downspout into it to capture, treat, and infiltrate runoff from the rooftop. 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"
20	13,468	0.6	6.8	61.8	0.010	0.37

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	0.023	4	1,760	0.07	225	$1,125
Rainwater harvesting	0.047	8	1,400	0.05	1,400 (gal)	$2,800

GREEN INFRASTRUCTURE RECOMMENDATIONS

Hampton Lake Fire Company

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

0 20' 40'

LeisureTowne Recreation Building

Subwatershed: Friendship Creek

Site Area: 164,113 sq. ft.

Address: 236 Huntington Drive
Southampton, NJ 08088

Block and Lot: Block 2702.72, Lot 9.01

Parking spaces throughout the parking lot can be converted to porous pavement to capture and infiltrate stormwater runoff from the impervious parking lot. Several rain gardens can be installed around the building to capture 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"
56	92,566	4.5	46.8	425.0	0.072	2.54

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	0.206	34	15,400	0.58	1,980	$9,900
Pervious pavement	0.717	120	53,650	2.02	8,000	$200,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

LeisureTown Recreation Building

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

0 50' 100'

First Baptist Church of Vincentown

Subwatershed: Jade Run

Site Area: 26,656 sq. ft.

Address: 39 Main Street
Southampton, NJ 08088

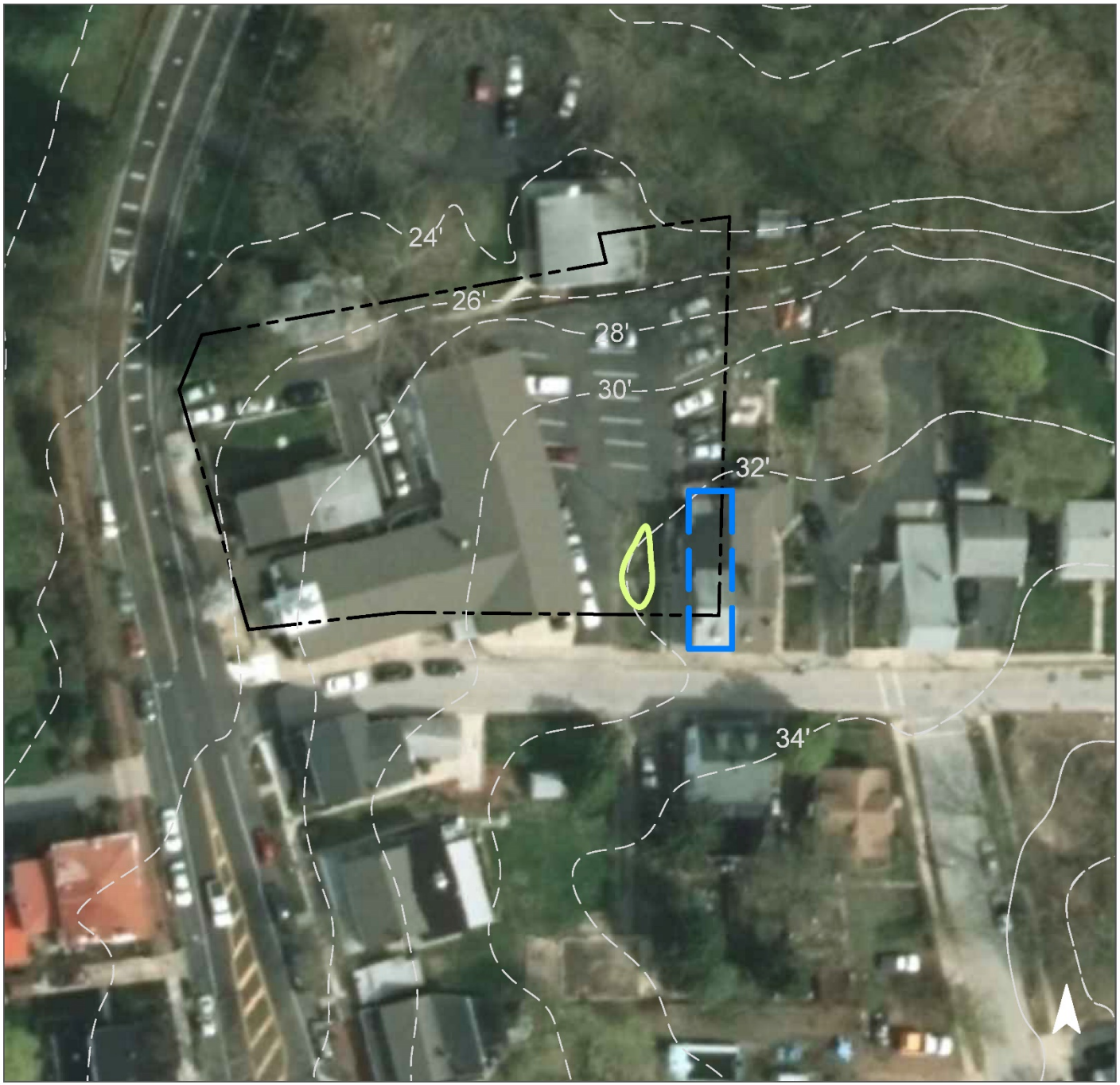
Block and Lot: Block 1005, Lot 1, 2

A rain garden can be installed by directing downspouts from the adjacent building into a turfgrass area. The garden will capture, treat, and infiltrate stormwater from the building's 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"
77	20,433	1.0	10.3	93.8	0.016	0.56

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	0.027	5	2,050	0.08	265	$1,325

GREEN INFRASTRUCTURE RECOMMENDATIONS



First Baptist Church of Vincentown

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

0 30' 60'

Southampton Township Schools

Subwatershed: Jade Run

Site Area: 1,577,199 sq. ft.

Address: 26 Pleasant Street
Southampton, NJ 08088

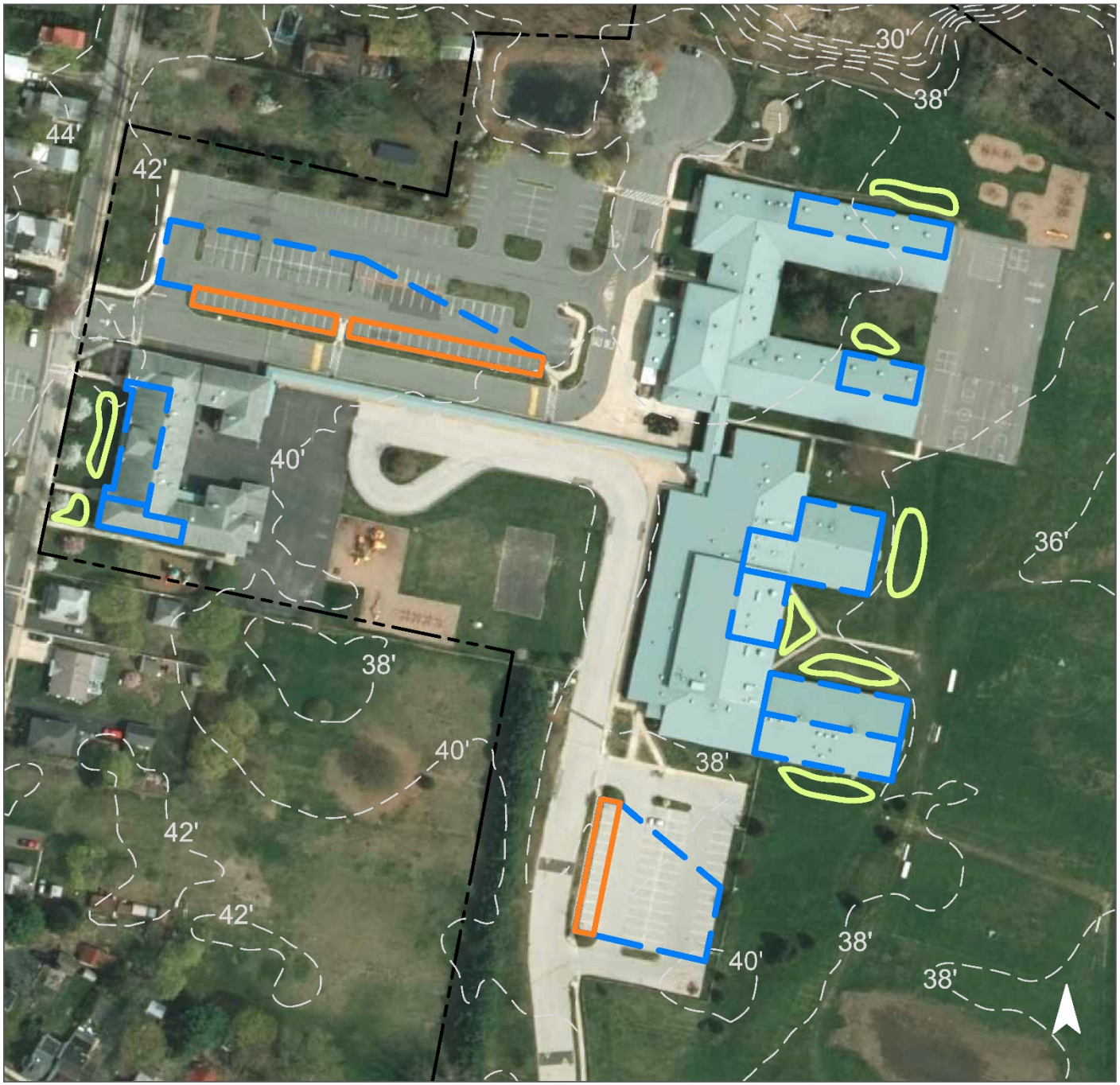
Block and Lot: Block 1005; 1202
Lot 15; 7, 8

Several rain gardens can be installed in the turfgrass areas throughout the property to capture, treat, and infiltrate stormwater runoff from the impervious rooftops. The rain gardens would add aesthetic value to the environment as well as create a point of educational interest. Parking spaces in the parking lots can be replaced with pervious pavement to capture runoff from the parking lots. 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"
28	438,626	21.1	221.5	2,013.9	0.015	12.03

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	0.948	159	70,910	2.66	9,125	$45,625
Pervious pavement	0.982	164	73,480	2.76	8,500	$212,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Southampton Township Schools

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

0 75' 150'

Red Lion Faith Chapel

Subwatershed: Rancocas Creek South Branch

Site Area: 80,617 sq. ft.

Address: 118 Red Lion Road
Southampton, NJ 08088

Block and Lot: Block 2203, Lot 9

Two rain gardens can be installed in the turfgrass area near the entrance of the building to capture, treat, and infiltrate stormwater runoff from the roof. The garden will also add aesthetic value to the surrounding area. 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"
35	28,495	1.4	14.4	130.8	0.022	0.78

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	0.056	9	4,210	0.16	540	$2,700

GREEN INFRASTRUCTURE RECOMMENDATIONS

Red Lion Faith Chapel

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

0 30' 60'

Sally Stretch Keen Memorial Library

Subwatershed: Rancocas Creek South Branch

Site Area: 5,779 sq. ft.

Address: 94 Main Street
Southampton, NJ 08088

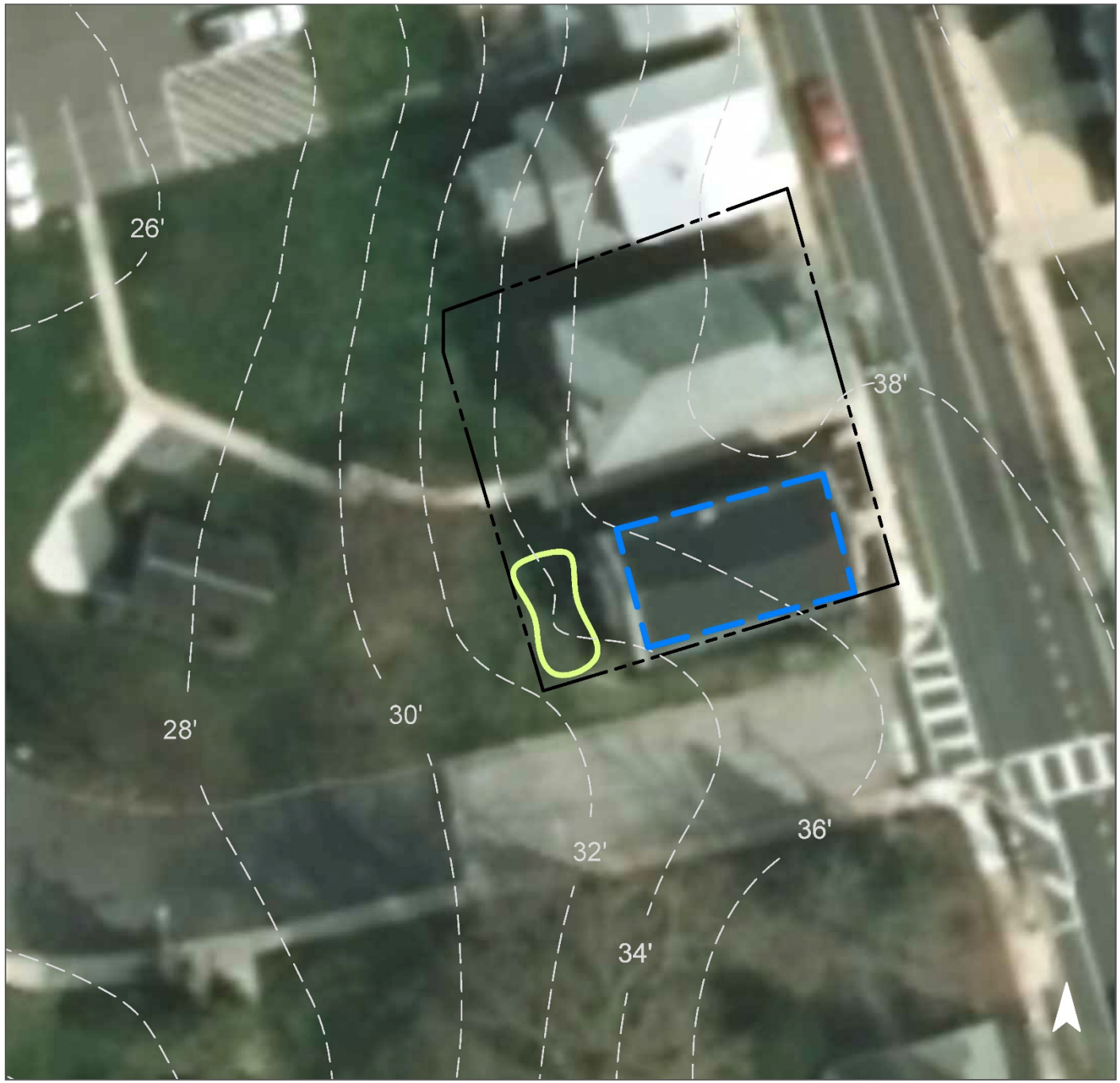
Block and Lot: Block 1003, Lot 19, 20

A rain garden can be installed in the turfgrass area behind the library building to capture, treat, and infiltrate stormwater runoff from the roof. The garden can provide not only aesthetic value to the library but educational value as well to teach the public about rain gardens. 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	4,000	0.2	2.0	18.4	0.003	0.11

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	0.026	4	1,950	0.07	250	$1,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Sally Stretch Keen Memorial Library

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

0 15' 30'

Southampton Municipal Complex

Subwatershed: Rancocas Creek South Branch

Site Area: 2,186,031 sq. ft.

Address: 5 Retreat Road
Southampton, NJ 08088

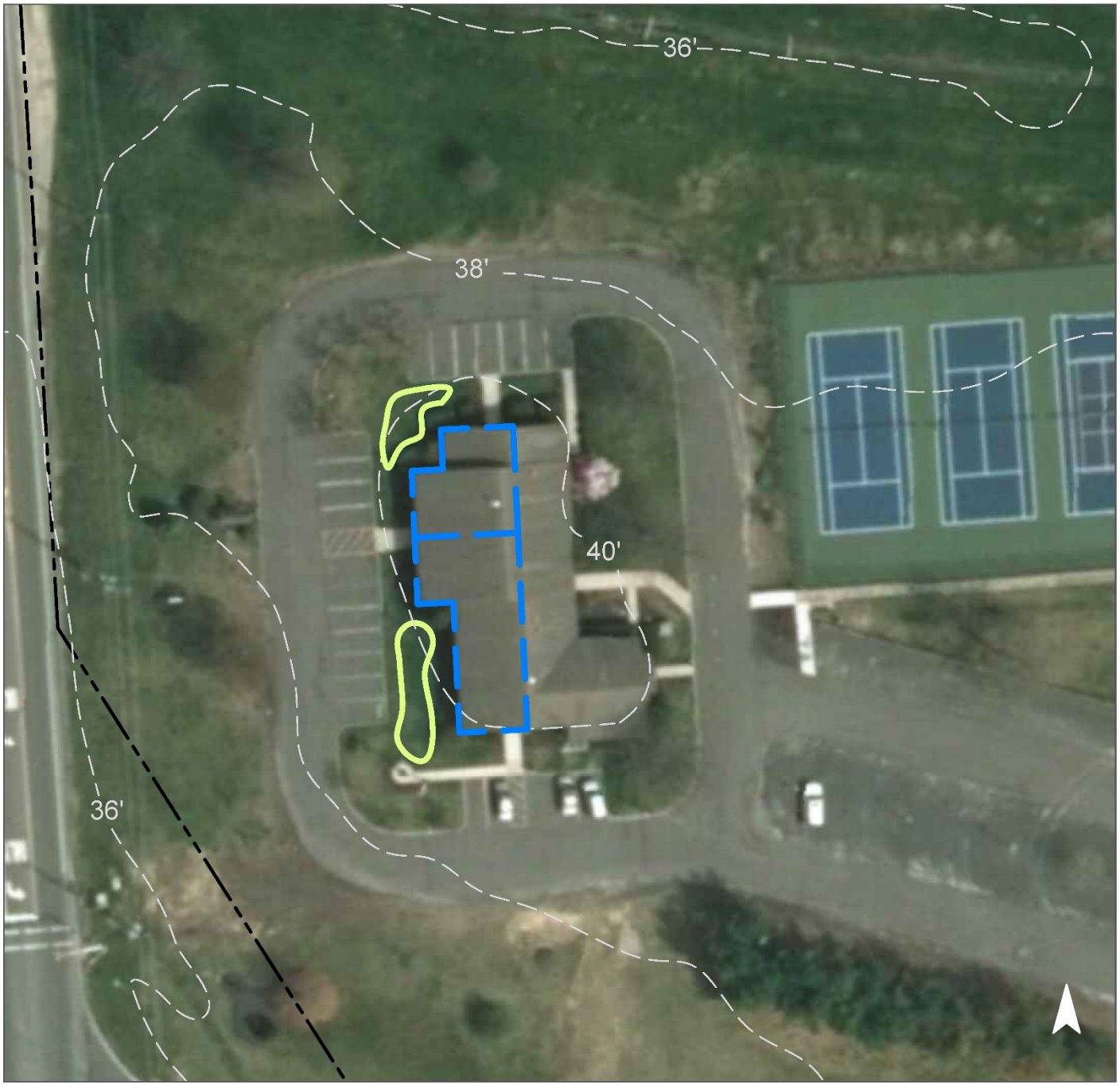
Block and Lot: Block 1502, Lot 1.01

Two rain gardens can be installed on the western side of the building to capture, treat, and infiltrate stormwater runoff from the impervious 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"
7	156,825	7.6	79.2	720.0	0.122	4.30

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	0.102	17	7,650	0.29	980	$4,900

GREEN INFRASTRUCTURE RECOMMENDATIONS



Southampton Municipal Complex

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

0 30' 60'

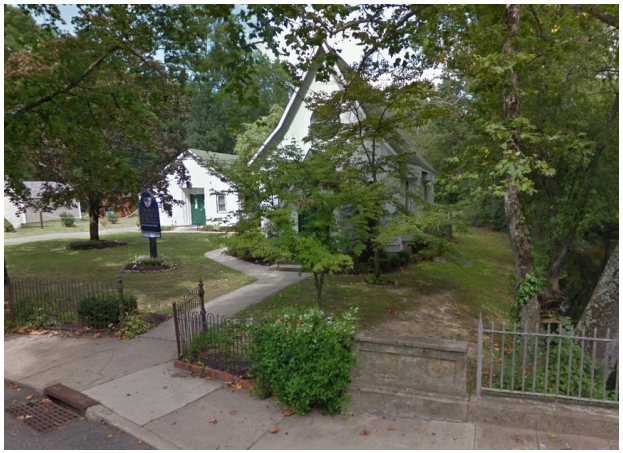
Trinity Episcopal Church

Subwatershed: Rancocas Creek South Branch

Site Area: 33,378 sq. ft.

Address: 18 Mill Street
Southampton, NJ 08088

Block and Lot: Block 1004, Lot 9



Parking spaces in the parking lot behind the church building to the northwest can be converted to pervious pavement to capture and infiltrate stormwater runoff from the parking lot and roof of the church. A rain garden can also be installed at the front of the church, and downspouts can be directed under the sidewalk into the large turfgrass area. 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	13,897	0.7	7.0	63.8	0.011	0.38

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	0.015	3	1,120	0.04	150	$750
Pervious pavement	0.125	21	9,360	0.35	1,265	$31,625

GREEN INFRASTRUCTURE RECOMMENDATIONS

Trinity Episcopal Church

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

0 25' 50'

Vincentown Post Office

Subwatershed: Rancocas Creek South Branch

Site Area: 95,733 sq. ft.

Address: 1813 US-206
Southampton, NJ 08088

Block and Lot: Block 2203, Lot 14.02

A rain garden can be installed in the turfgrass area in front of the parking lot to capture stormwater runoff from the surrounding pavement and provide aesthetic value to the public. An additional rain garden can be installed at the southeast corner of the building to capture stormwater 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"
70	67,436	3.3	34.1	309.6	0.053	1.85

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	0.296	50	22,130	0.83	2,850	$14,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

United States Post Office

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

0 30' 60'

Vincent Fire Company

Subwatershed: Rancocas Creek South Branch

Site Area: 90,117 sq. ft.

Address: 16 Race Street
Southampton, NJ 08088

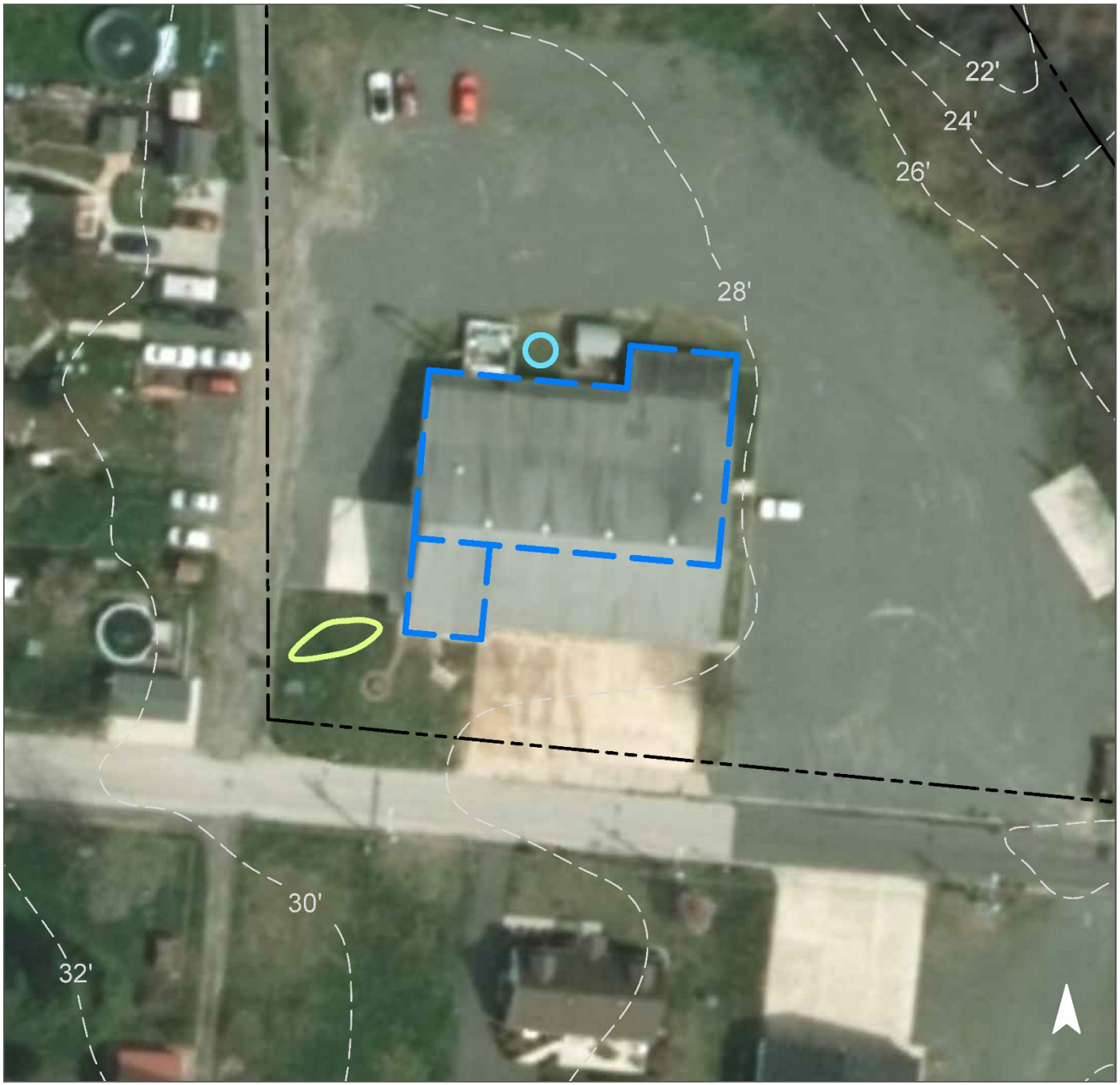
Block and Lot: Block 1003, Lot 25

A cistern can be installed on the building's north face. The cistern will be used to harvest rainwater from the impervious rooftop by rerouting the downspouts towards the cistern. The water captured can be used for washing vehicles and other non-potable uses. A rain garden can be installed in the turfgrass area to the southwest to capture stormwater from the rooftop. 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"
38	34,019	1.6	17.2	156.2	0.027	0.93

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	0.020	3	1,510	0.06	200	$1,000
Rainwater harvesting	0.156	26	5,000	0.19	5,000 (gal)	$10,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Vincent Fire Company

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

0 25' 50'

Vincentown United Methodist Church

Subwatershed: Rancocas Creek South Branch

Site Area: 32,898 sq. ft.

Address: 97 Main St
Southampton, NJ 08088

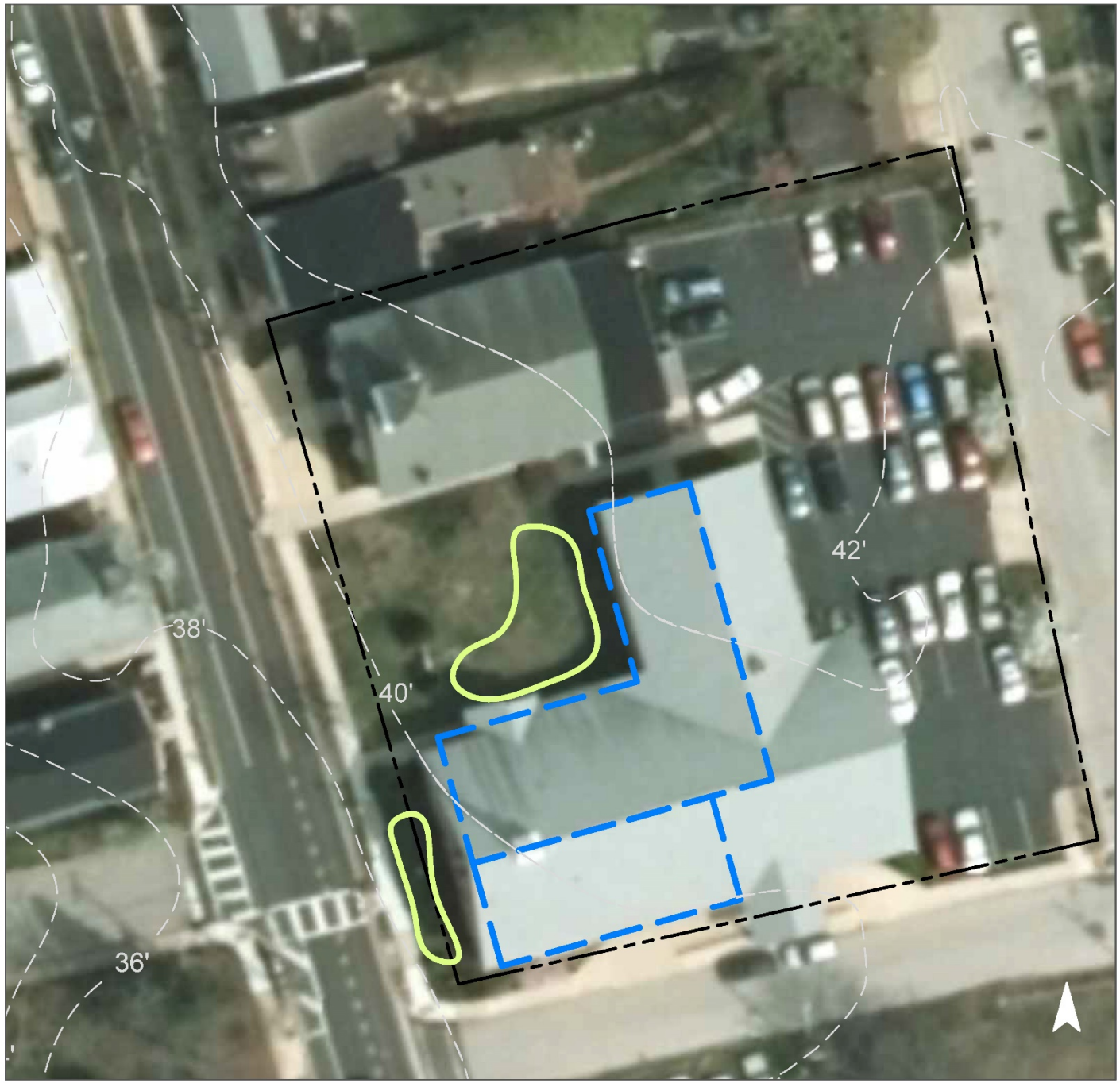
Block and Lot: Block 1009, Lot 12,13

A rain garden can be installed behind the front sign in the large turfgrass area. The rain garden will capture stormwater runoff from the roof of the building before entering the connected storm drains. An additional rain garden can be constructed in the turfgrass area at the southwest corner of the site. 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	14,804	0.7	7.5	68.0	0.012	0.41

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
Bioretention systems	0.151	25	11,300	0.42	1,450	$7,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Vincent United Methodist Church

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

0 20' 40'

c. Summary of Existing Conditions

Summary of Existing Site 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)			Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
	BEAR SWAMP RIVER SUBWATERSHED	**3.89**	**169,458**				**0.96**	**41,923**	**2.0**	**21.17**	**192.5**	**0.033**	**1.15**
1	**The Early Learning Center**												
	Total Site Info	2.76	120,215	2002	16.02	8	0.23	9,915	0.5	5.0	45.5	0.008	0.27
2	**New Jersey State Police Red Lion Station**												
	Total Site Info	1.13	49,243	3101	9.02	65	0.73	32,008	1.5	16.2	147.0	0.025	0.88
	FRIENDSHIP CREEK SUBWATERSHED	**6.58**	**286,473**				**2.99**	**130,134**	**6.3**	**65.72**	**597.5**	**0.101**	**3.57**
3	**Hampton Lakes Emergency Squad**												
	Total Site Info	1.23	53,709	2606	1, 2, 5	45	0.55	24,100	1.2	12.2	110.7	0.019	0.66
4	**Hampton Lakes Volunteer Fire Company**												
	Total Site Info	1.58	68,651	2401; 2702.42	8; 84	20	0.31	13,468	0.6	6.8	61.8	0.010	0.37
5	**LeisureTowne Recreation Building**												
	Total Site Info	3.77	164,113	2702.72	9.01	56	2.13	92,566	4.5	46.8	425.0	0.072	2.54
	JADE RUN SUBWATERSHED	**0.61**	**1,603,855**				**10.54**	**459,059**	**22.1**	**231.85**	**2,107.7**	**0.031**	**12.59**
6	**First Baptist Church of Vincentown**												
	Total Site Info	0.61	26,656	1005	1, 2	77	0.47	20,433	1.0	10.3	93.8	0.016	0.56
7	**Southampton Township Schools**												
	Total Site Info	0.00	1,577,199	1005;1202	15; 7, 8	28	10.07	438,626	21.1	221.5	2,013.9	0.015	12.03
	RANCOCAS CREEK SOUTH BRANCH SUBWATERSHED	**57.96**	**2,524,554**				**7.33**	**319,476**	**15.4**	**161.35**	**1,466.8**	**0.249**	**8.76**
8	**Red Lion Faith Chapel**												
	Total Site Info	1.85	80,617	2203	9	35	0.65	28,495	1.4	14.4	130.8	0.022	0.78
9	**Sally Stretch Keen Memorial Library**												
	Total Site Info	0.13	5,779	1003	19, 20	69	0.09	4,000	0.2	2.0	18.4	0.003	0.11

Summary of Existing Site 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)			Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
10	**Southampton Municipal Complex**												
	Total Site Info	50.18	2,186,031	1502	1.01	7	3.60	156,825	7.6	79.2	720.0	0.122	4.30
11	**Trinity Episcopal Church**												
	Total Site Info	0.77	33,378	1004	9	42	0.32	13,897	0.7	7.0	63.8	0.011	0.38
12	**Vincentown Post Office**												
	Total Site Info	2.20	95,733	2203	14.02	70	1.55	67,436	3.3	34.1	309.6	0.053	1.85
13	**Vincent Fire Company**												
	Total Site Info	2.07	90,117	1003	25	38	0.78	34,019	1.6	17.2	156.2	0.027	0.93
14	**Vincentown United Methodist Church**												
	Total Site Info	0.76	32,898	1009	12,13	45	0.34	14,804	0.7	7.5	68.0	0.012	0.41

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 %
	BEAR SWAMP RIVER SUBWATERSHED	**7,975**	**0.18**	**0.208**	**35**	**15,540**	**0.58**				**$9,975**	**19.0%**
1	**The Early Learning Center**											
	Bioretention system	1,900	0.04	0.050	8	3,700	0.14	475	$5	SF	$2,375	19.2%
	Total Site Info	**1,900**	**0.04**	**0.050**	**8**	**3,700**	**0.14**				**$2,375**	**19.2%**
2	**New Jersey State Police Red Lion Station**											
	Bioretention systems	6,075	0.14	0.158	26	11,840	0.44	1,520	$5	SF	$7,600	19.0%
	Total Site Info	**6,075**	**0.14**	**0.158**	**26**	**11,840**	**0.44**				**$7,600**	**19.0%**
	FRIENDSHIP CREEK SUBWATERSHED	**39,690**	**0.91**	**1.034**	**173**	**73,510**	**2.77**				**$216,425**	**30.5%**
3	**Hampton Lakes Emergency Squad**											
	Rainwater harvesting	1,565	0.04	0.041	7	1,300	0.05	1,300	$2	gal	$2,600	6.5%
	Total Site Info	**1,565**	**0.04**	**0.041**	**7**	**1,300**	**0.05**				**$2,600**	**6.5%**
4	**Hampton Lakes Volunteer Fire Company**											
	Bioretention system	900	0.02	0.023	4	1,760	0.07	225	$5	SF	$1,125	6.7%
	Rainwater harvesting	1,800	0.04	0.047	8	1,400	0.05	1,400	$2	gal	$2,800	13.4%
	Total Site Info	**2,700**	**0.06**	**0.070**	**12**	**3,160**	**0.12**				**$3,925**	**20.0%**
5	**LeisureTowne Recreation Building**											
	Bioretention systems	7,900	0.18	0.206	34	15,400	0.58	1,980	$5	SF	$9,900	8.5%
	Pervious pavement	27,525	0.63	0.717	120	53,650	2.02	8,000	$25	SF	$200,000	29.7%
	Total Site Info	**35,425**	**0.81**	**0.923**	**155**	**69,050**	**2.60**				**$209,900**	**38.3%**
	JADE RUN SUBWATERSHED	**75,130**	**1.72**	**1.958**	**328**	**146,440**	**5.50**				**$259,450**	**16.4%**
6	**First Baptist Church of Vincentown**											
	Bioretention system	1,050	0.02	0.027	5	2,050	0.08	265	$5	SF	$1,325	5.1%
	Total Site Info	**1,050**	**0.02**	**0.027**	**5**	**2,050**	**0.08**				**$1,325**	**5.1%**

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	**Southampton Township Schools**											
	Bioretention systems	36,380	0.84	0.948	159	70,910	2.66	9,125	$5	SF	$45,625	8.3%
	Pervious pavement	37,700	0.87	0.982	164	73,480	2.76	8,500	$25	SF	$212,500	8.6%
	Total Site Info	**74,080**	**1.70**	**1.930**	**323**	**144,390**	**5.42**				**$258,125**	**16.9%**
	RANCOCAS CREEK SOUTH BRANCH SUBWATERSHED	**36,385**	**0.84**	**0.948**	**159**	**64,230**	**2.41**				**$73,725**	**11.4%**
8	**Red Lion Faith Chapel**											
	Bioretention systems	2,160	0.05	0.056	9	4,210	0.16	540	$5	SF	$2,700	7.6%
	Total Site Info	**2,160**	**0.05**	**0.056**	**9**	**4,210**	**0.16**				**$2,700**	**7.6%**
9	**Sally Stretch Keen Memorial Library**											
	Bioretention system	1,000	0.02	0.026	4	1,950	0.07	250	$5	SF	$1,250	25.0%
	Total Site Info	**1,000**	**0.02**	**0.026**	**4**	**1,950**	**0.07**				**$1,250**	**25.0%**
10	**Southampton Municipal Complex**											
	Bioretention systems	3,925	0.09	0.102	17	7,650	0.29	980	$5	SF	$4,900	2.5%
	Total Site Info	**3,925**	**0.09**	**0.102**	**17**	**7,650**	**0.29**				**$4,900**	**2.5%**
11	**Trinity Episcopal Church**											
	Bioretention system	575	0.01	0.015	3	1,120	0.04	150	$5	SF	$750	4.1%
	Pervious pavement	4,800	0.11	0.125	21	9,360	0.35	1,265	$25	SF	$31,625	34.5%
	Total Site Info	**5,375**	**0.12**	**0.140**	**23**	**10,480**	**0.39**				**$32,375**	**38.7%**
12	**Vincentown Post Office**											
	Bioretention systems	11,350	0.26	0.296	50	22,130	0.83	2,850	$5	SF	$14,250	16.8%
	Total Site Info	**11,350**	**0.26**	**0.296**	**50**	**22,130**	**0.83**				**$14,250**	**16.8%**
13	**Vincent Fire Company**											
	Bioretention system	775	0.02	0.020	3	1,510	0.06	200	$5	SF	$1,000	2.3%
	Rainwater harvesting	6,000	0.14	0.156	26	5,000	0.19	5,000	$2	gal	$10,000	17.6%
	Total Site Info	**6,775**	**0.16**	**0.177**	**30**	**6,510**	**0.25**				**$11,000**	**19.9%**
14	**Vincentown United Methodist Church**											
	Bioretention systems	5,800	0.13	0.151	25	11,300	0.42	1,450	$5	SF	$7,250	39.2%
	Total Site Info	**5,800**	**0.13**	**0.151**	**25**	**11,300**	**0.42**				**$7,250**	**39.2%**