Impervious Cover Reduction Action Plan
for
Lower Township, Cape May County, New Jersey

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

October 13, 2016

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Introduction

Located in Cape May County in southern New Jersey, Lower Township covers approximately 31 square miles. Figures 1 and 2 illustrate that Lower Township is dominated by wetland land uses. A total of 32.1% of the municipality's land use is classified as urban. Of the urban land in Lower Township, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2012 land use/land cover geographical information system (GIS) data layer categorizes Lower 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 Lower Township. Based upon the 2012 NJDEP land use/land cover data, approximately 11.2% of Lower Township has impervious cover. This level of impervious cover suggests that the streams in Lower Township are likely impacted streams.[1]

Methodology

Lower Township contains portions of seven 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

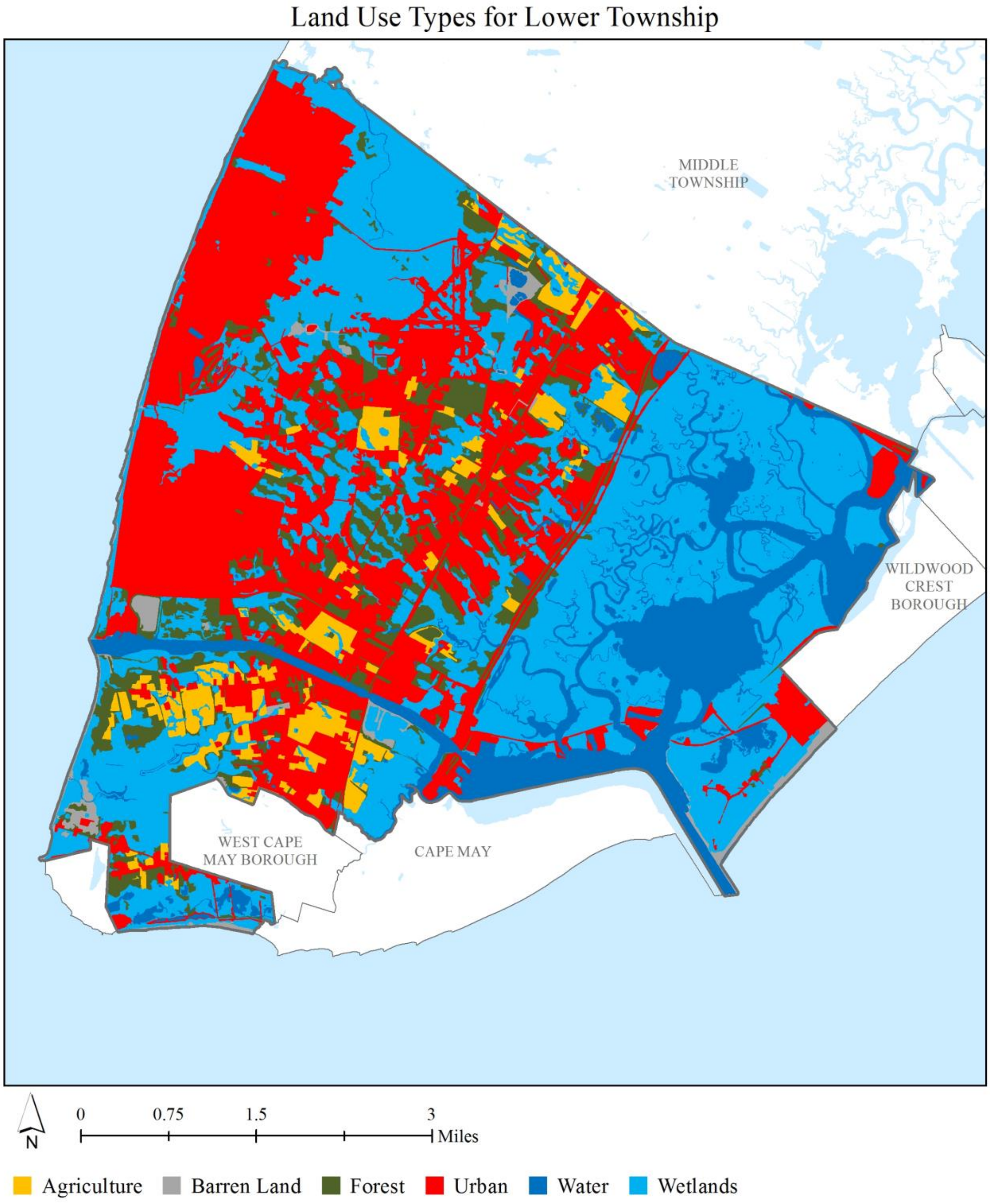


Figure 1: Map illustrating the land use in Lower Township

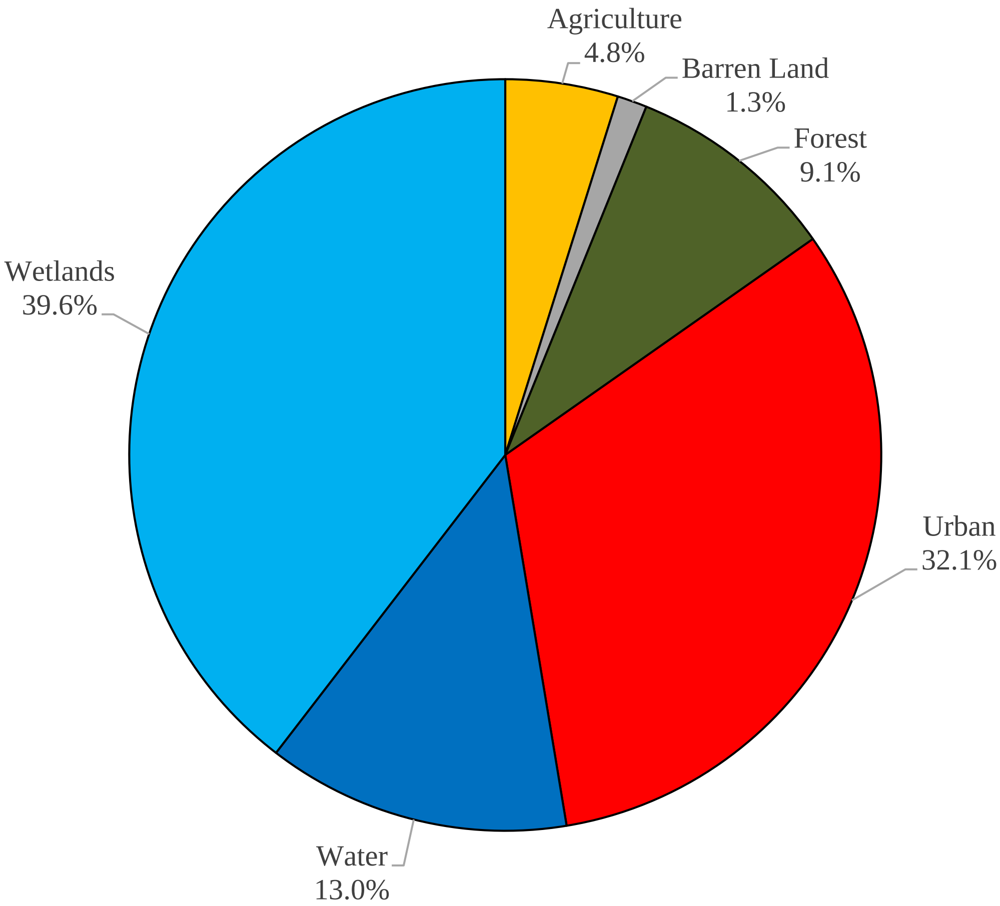


Figure 2: Pie chart illustrating the land use in Lower Township

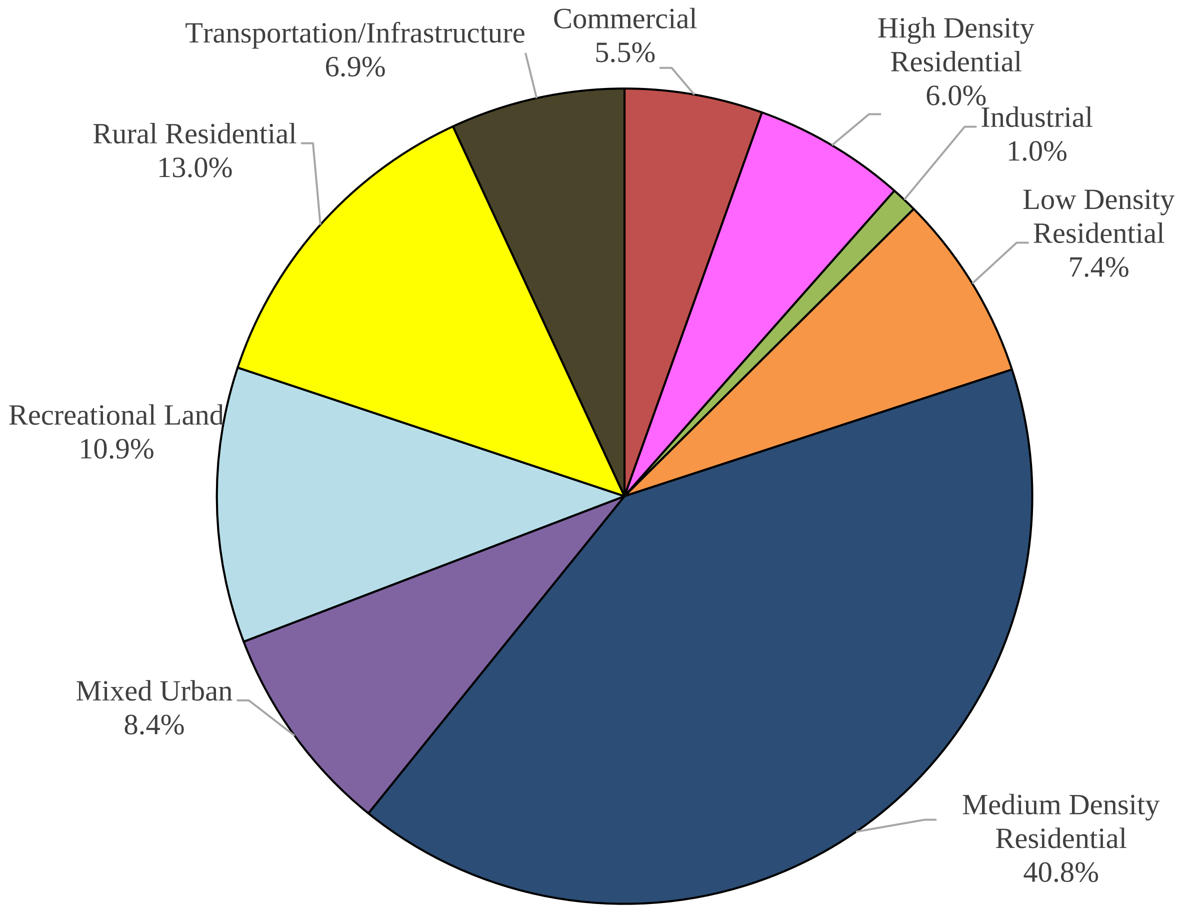


Figure 3: Pie chart illustrating the various types of urban land use in Lower Township

Subwatersheds of Lower Township

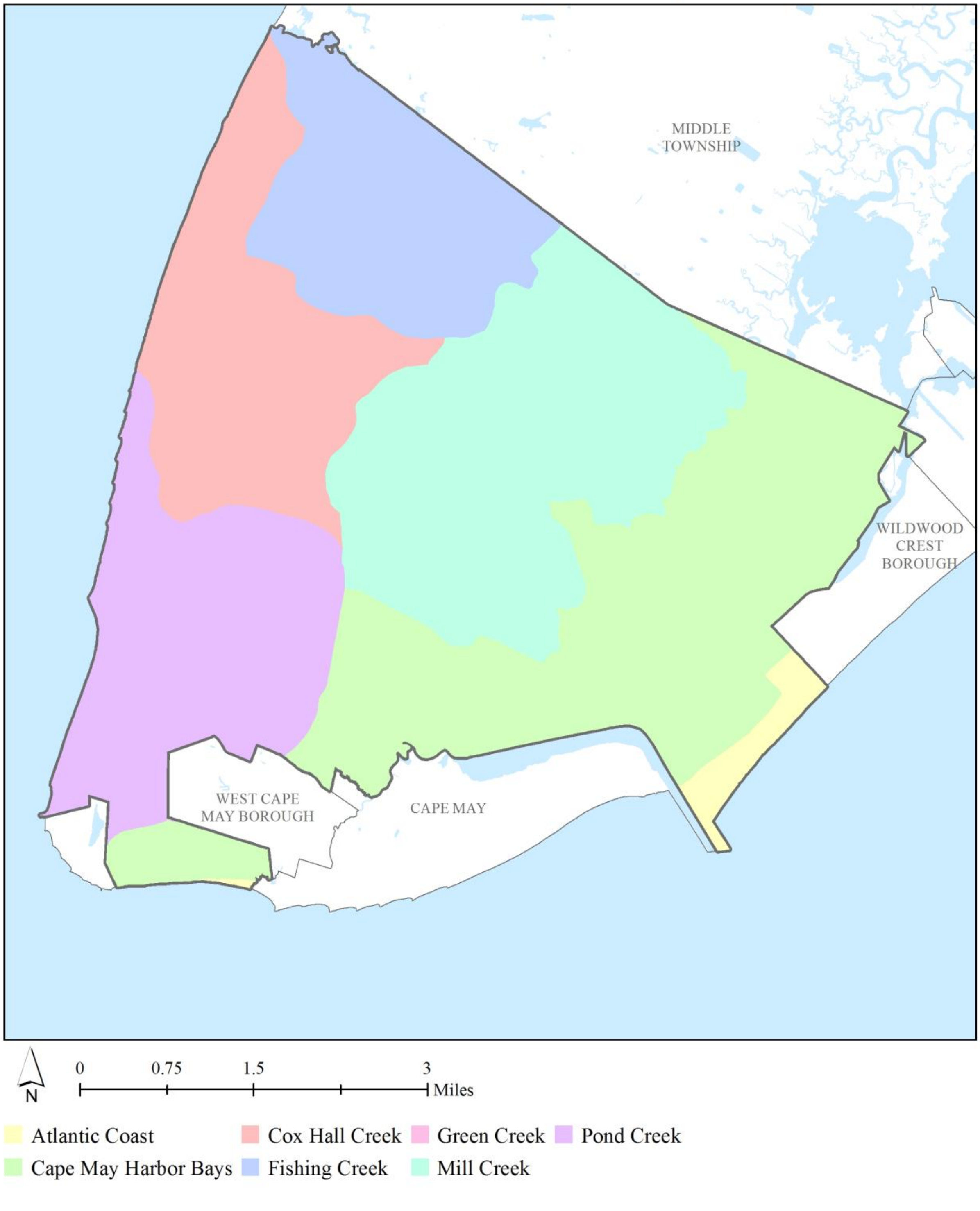


Figure 4: Map of the subwatersheds in Lower Township

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 in Lower 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 Lower 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

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

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

Conclusion

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

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

a. Green Infrastructure Sites

LOWER TOWNSHIP: GREEN INFRASTRUCTURE SITES

SITES WITHIN THE CAPE MAY HARBOR & BAYS SUBWATERSHED

1. Carl T. Mitnick School
2. First Assembly of God

SITES WITHIN THE COX HALL CREEK / MICKELS RUN SUBWATERSHED

3. Covenant Presbyterian Church
4. David C. Douglass Veterans Memorial School
5. Lower Township Municipal Utilities Authority
6. Saint Barnabas by-the-Bay Church
7. Villas Fire Department

SITES WITHIN THE MILL CREEK / JONES CREEK / TAYLOR CREEK SUBWATERSHED

8. Maud Abrams Elementary School
9. Seashore Community Church of the Nazarene
10. Tabernacle United Methodist Church

b. Proposed Green Infrastructure Concepts

CARL T. MITNICK SCHOOL

Subwatershed: Cape May Harbor & Bays

Site Area: 1,029,010 sq. ft.

Address: 905 Seashore Road
Cape May, NJ 08204

Block and Lot: Block 753.01, Lot 4.01

The sidewalk in front of the school can be replaced with porous concrete to capture and infiltrate rooftop 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"
31	323,244	15.6	163.3	1,484.1	0.252	8.87

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	0.362	61	28,043	1.05	3,700	$92,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

Carl T Mitnick School

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

0 30' 60'

FIRST ASSEMBLY OF GOD

Subwatershed: Cape May Harbor & Bays

Site Area: 707,011 sq. ft.

Address: 1068 Seashore Road
Cape May, NJ 08204

Block and Lot: Block 752.01, Lot 15.01

Parking spots south of the church can be replaced with porous asphalt to capture and infiltrate stormwater. Installing a rain garden in the turfgrass area southeast of the parking lot can capture, treat, and infiltrate parking lot 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"
12	84,657	4.1	42.8	388.7	0.066	2.32

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.135	23	10,494	0.39	1,400	$7,000
Pervious pavement	0.289	48	22,395	0.84	3,360	$84,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

First Assembly of God

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

0 20' 40'

COVENANT PRESBYTERIAN CHURCH

Subwatershed: Cox Hall Creek / Mickels Run

Site Area: 359,004 sq. ft.

Address: 123 Fishing Creek Road
Cape May, NJ 08204

Block and Lot: Block 410.01, Lot 43

Parking spots in front of the building can be replaced with porous asphalt to capture and infiltrate stormwater. Installing a rain garden in the turfgrass area northeast of the church can capture, treat, and 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"
17	61,338	3.0	31.0	281.6	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 system	0.191	32	14,788	0.55	1,860	$9,300
Pervious pavement	0.154	26	11,946	0.45	1,720	$43,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Covenant Presbyterian Church

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

DAVID C. DOUGLASS VETERANS MEMORIAL SCHOOL

Subwatershed: Cox Hall Creek / Mickels Run

Site Area: 167,924 sq. ft.

Address: 2600 Bayshore Road
Villas, NJ 08251

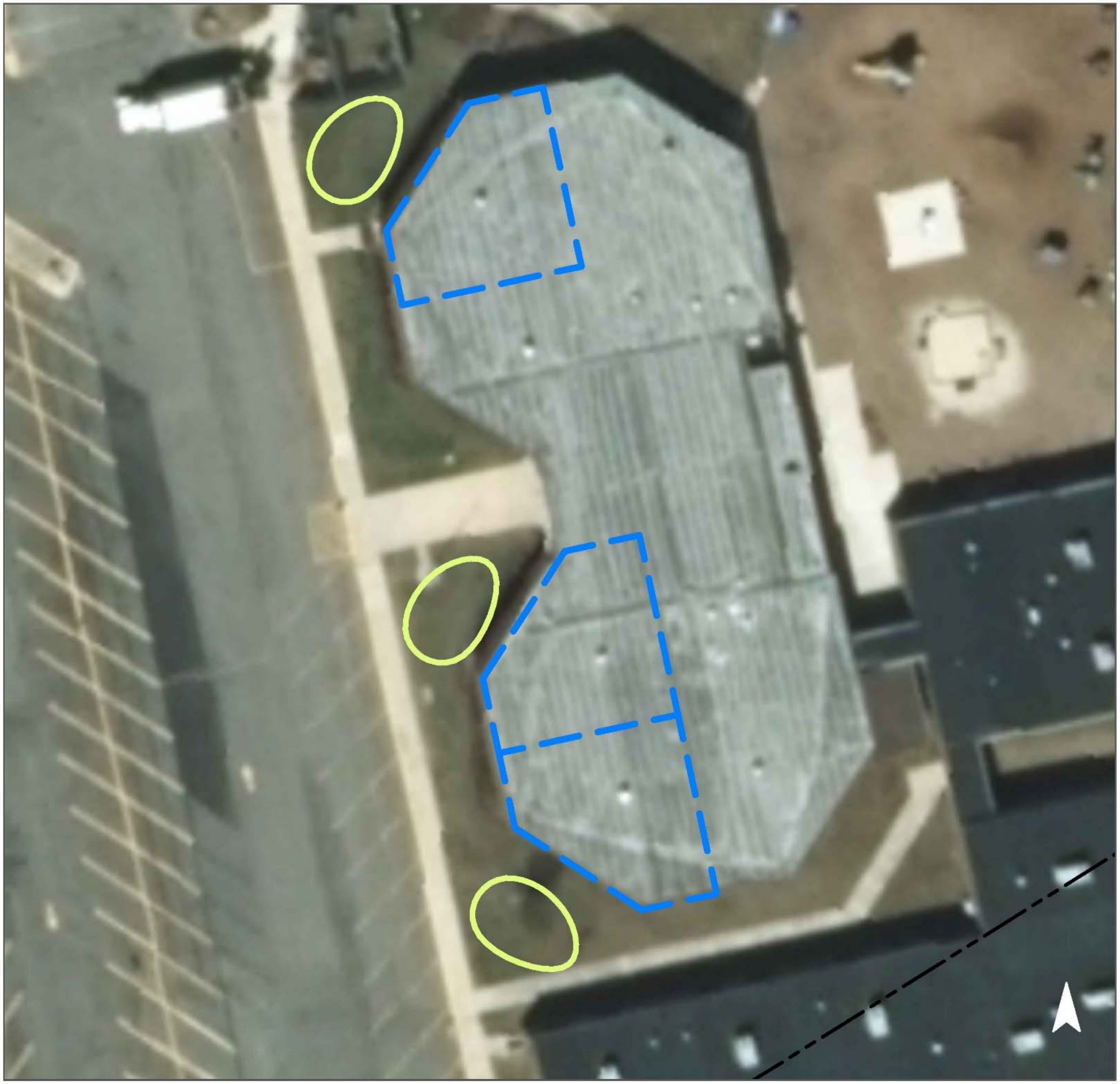
Block and Lot: Block 410.01 , Lot 63.01

Installing rain gardens adjacent to the building can capture, treat, and infiltrate roof top 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"
54	91,228	4.4	46.1	418.9	0.071	2.50

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	0.150	25	11,579	0.43	1,410	$7,050

GREEN INFRASTRUCTURE RECOMMENDATIONS



David C. Douglass Veterans Memorial School

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

0 20' 40'

LOWER TOWNSHIP MUNICIPAL UTILITIES AUTHORITY

Subwatershed: Cox Hall Creek / Mickels Run

Site Area: 2,748,419 sq. ft.

Address: 2900 Bayshore Road
Villas, NJ 08251

Block and Lot: Block 410.01, Lot 46.01, 49, 51.01, 50.02

Parking spots in front of the building can be replaced with porous asphalt to capture and infiltrate stormwater. The sidewalk between two buildings can be replaced with porous concrete to capture roof runoff. Installing a rain garden adjacent to the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
12	330,023	15.9	166.7	1,515.3	0.257	9.05

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.052	9	4,017	0.15	500	$2,500
Pervious pavement	0.188	31	14,564	0.55	2,110	$52,750

GREEN INFRASTRUCTURE RECOMMENDATIONS

Lower Township Municipal Utilities

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

0 25' 50'

SAINT BARNABAS BY-THE-BAY CHURCH

Subwatershed: Cox Hall Creek / Mickels Run

Site Area: 23,409 sq. ft.

Address: 13 West Bates Avenue
Villas, NJ 08251

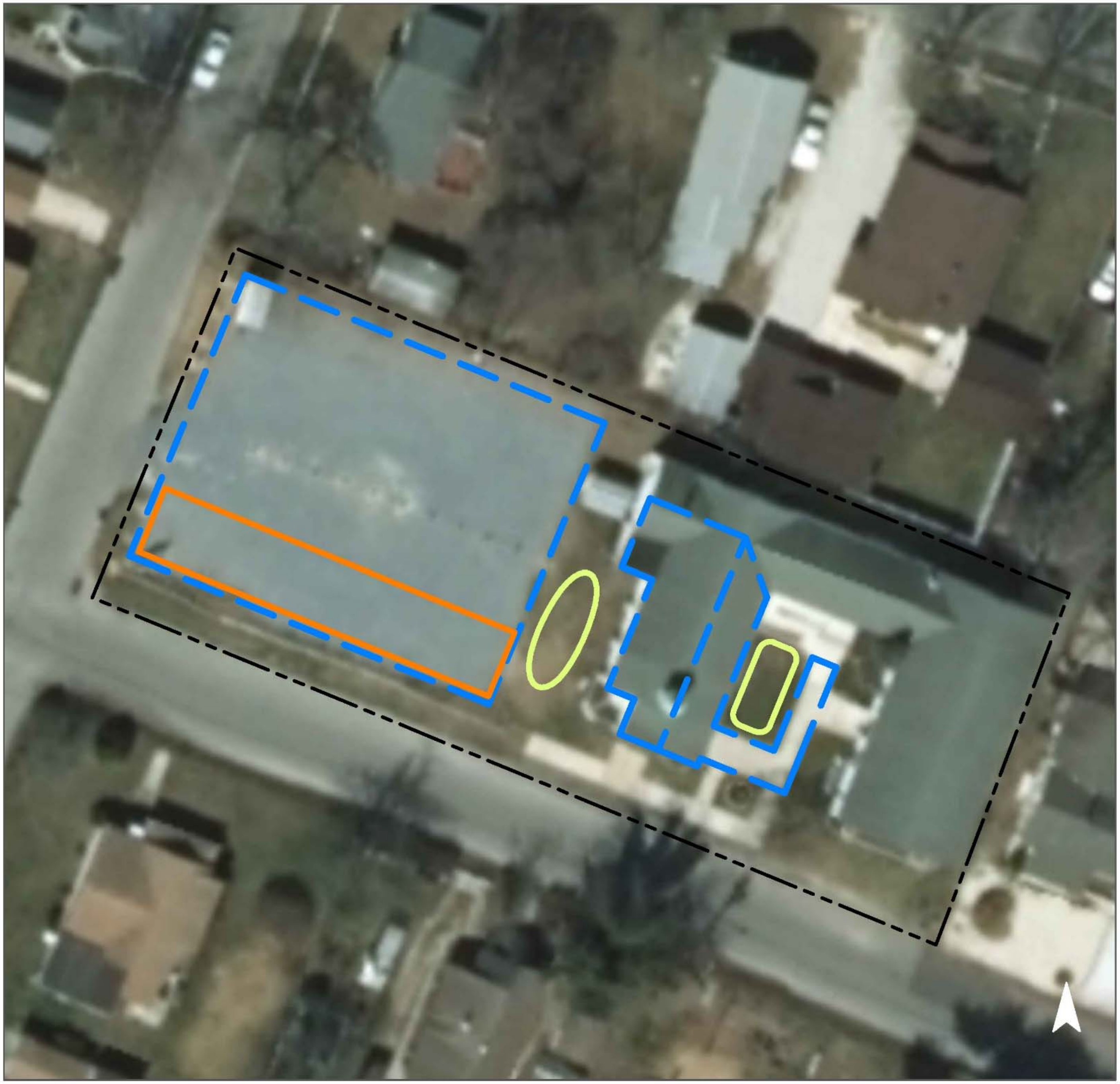
Block and Lot: Block 137, Lot 11-18

The gravel parking lot can be replaced, and porous asphalt can be used for the parking spots to capture and infiltrate stormwater. Installing rain gardens adjacent to the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
60	14,046	0.7	7.1	64.5	0.011	0.39

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	0.057	10	4,436	0.17	540	$2,700
Pervious pavement	0.211	35	16,344	0.61	3,780	$94,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Saint Barnabas by-the-Bay Church

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

0 20' 40'

VILLAS FIRE DEPARTMENT

Subwatershed: Cox Hall Creek / Mickels Run

Site Area: 70,870 sq. ft.

Address: 1619 Bayshore Road
Villas, NJ 08251

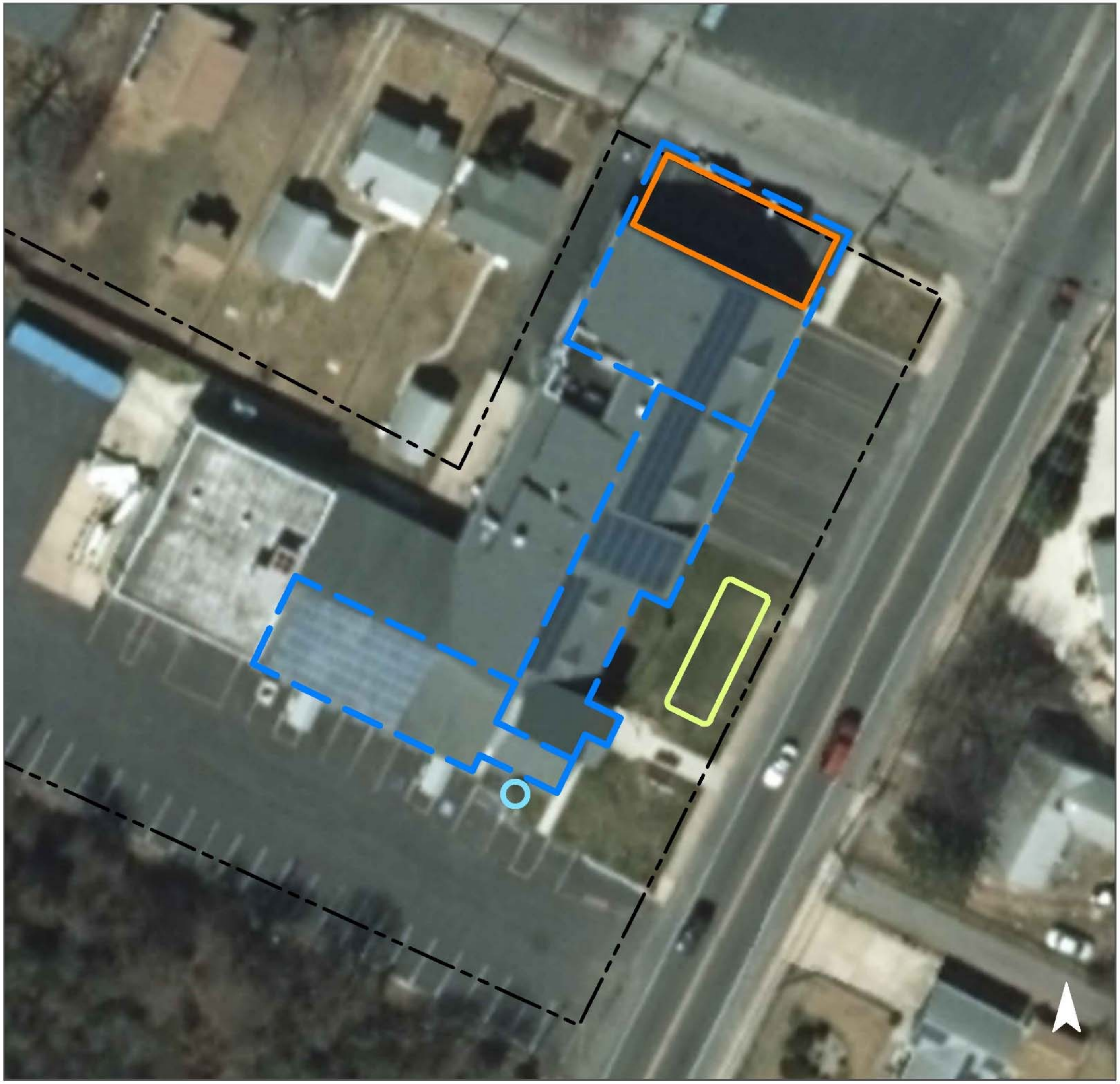
Block and Lot: Block 218 , Lot 1-5

Parking spots to the north of the building can be replaced with porous asphalt to capture and infiltrate stormwater. Installing a rain garden in front of the building can capture, treat, and infiltrate roof top runoff. Rainwater can be harvested by installing a cistern in the south corner of the building. The water can then be used for washing vehicles or for other non-potable uses. 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	54,765	2.6	27.7	251.4	0.043	1.50

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	0.097	16	7,487	0.28	930	$4,650
Pervious pavement	0.128	21	9,926	0.37	1,580	$39,500
Rainwater harvesting	0.041	7	3,186	0.12	3,000 (gal)	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Villas Fire Department

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

0 25' 50'

MAUD ABRAMS SCHOOL

Subwatershed: Mill Creek / Jones Creek / Taylor Creek

Site Area: 438,749 sq. ft.

Address: 714 Town Bank Road
Cape May, NJ 08204

Block and Lot: Block 742.04 , Lot 1.03

Installing a rain garden adjacent to the north corner of the school can capture, treat, and infiltrate roof runoff. Another rain garden can be installed in the turfgrass area southwest of the school and can treat runoff generated by the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
36	159,395	7.7	80.5	731.8	0.124	4.37

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 systems	0.377	63	29,202	1.10	3,640	$18,200

GREEN INFRASTRUCTURE RECOMMENDATIONS

SEASHORE COMMUNITY CHURCH OF THE NAZARENE

Subwatershed: Mill Creek / Jones Creek / Taylor Creek

Site Area: 375,169 sq. ft.

Address: 446 Seashore Road
Cape May, NJ 08204

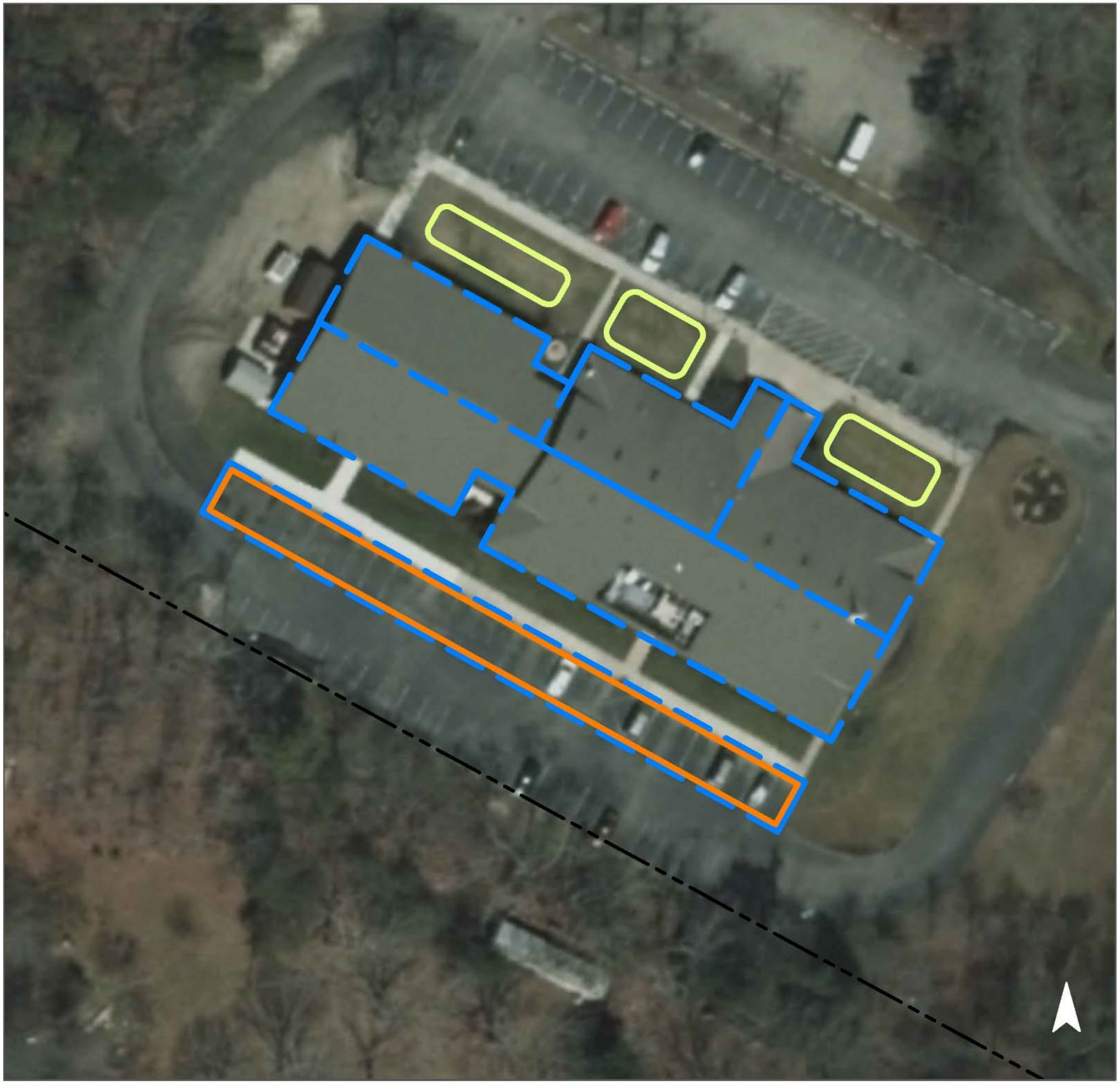
Block and Lot: Block 410.01 , Lot 14

Parking spots south of the church can be replaced with porous asphalt to capture and infiltrate stormwater. Installing rain gardens adjacent to the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
22	83,629	4.0	42.2	384.0	0.065	2.29

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
Bioretention systems	0.285	48	22,029	0.83	2,680	$13,400
Pervious pavement	0.432	72	33,473	1.26	4,610	$115,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Seashore Community Church of the Nazarene

bioretention system

pervious pavement

drainage area

property line

2015 Aerial: NJOIT, OGIS

0 30' 60'

TABERNACLE UNITED METHODIST CHURCH

Subwatershed: Mill Creek / Jones Creek / Taylor Creek

Site Area: 299,549 sq. ft.

Address: 702 Seashore Road
Cape May, NJ 08204

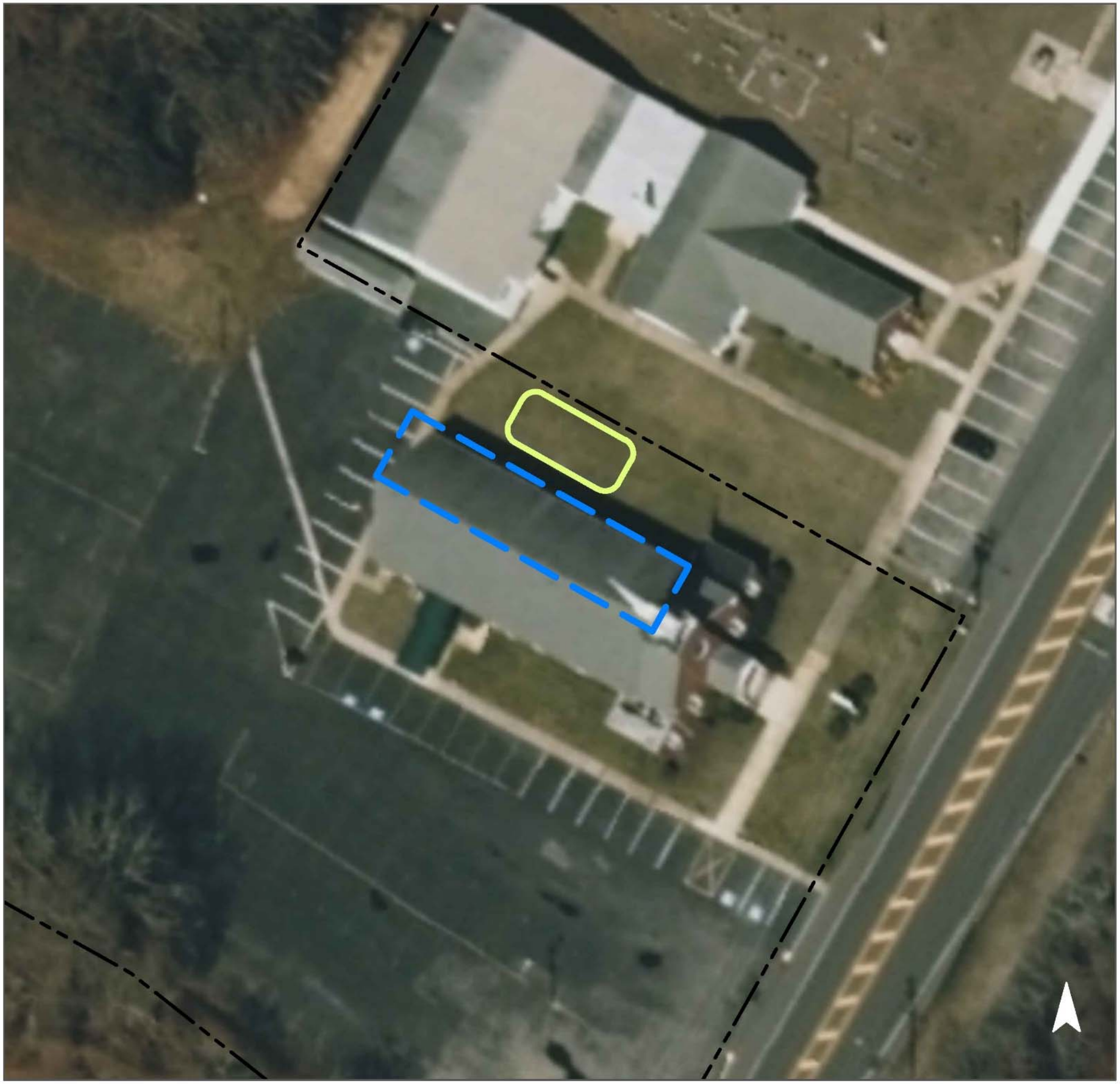
Block and Lot: Block 501 , Lot 8.03

Installing a rain garden adjacent to the north side of the church can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
25	73,685	3.6	37.2	338.3	0.057	2.02

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	0.066	11	5,086	0.19	730	$3,650

GREEN INFRASTRUCTURE RECOMMENDATIONS



Tabernacle United Methodist Church

c. Summary of Existing Conditions

Summary of Existing Site Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Quality 2-hours) (Mgal)	Annual (Mgal)
CAPE MAY HARBOR & BAYS SUBWATERSHED	**39.85**	**1,736,021**			**19.7**	**206.0**	**1,872.8**		**9.36**	**407,901**	**0.318**	**11.19**
Carl T Mitnick School												
Total Site Info	23.62	1,029,010	753.01	4.01	15.6	163.3	1,484.1	31	7.42	323,244	0.252	8.87
First Assembly of God												
Total Site Info	16.23	707,011	752.01	15.01	4.1	42.8	388.7	12	1.94	84,657	0.066	2.32
COX HALL CREEK / MICKELS RUN SUBWATERSHED	**77.36**	**3,369,625**			**26.6**	**278.5**	**2,531.7**		**12.66**	**551,399**	**0.430**	**15.12**
Covenant Presbyterian Church												
Total Site Info	8.24	359,004	410.01	43	3.0	31.0	281.6	17	1.41	61,338	0.048	1.68
David C. Douglass Veterans Memorial School												
Total Site Info	3.85	167,924	410.01	63.01	4.4	46.1	418.9	54	2.09	91,228	0.071	2.50
Lower Township Municipal Utilities Authority												
Total Site Info	63.10	2,748,419	410.01	46.01, 49, 51.01, 50.02	15.9	166.7	1,515.3	12	7.58	330,023	0.257	9.05
Saint Barnabas by-the-Bay Church												
Total Site Info	0.54	23,409	137	11,12,13,14,15,16,17,18	0.7	7.1	64.5	60	0.32	14,046	0.011	0.39
Villas Fire Department												
Total Site Info	1.63	70,870	218	1,2,3,4,5	2.6	27.7	251.4	77	1.26	54,765	0.043	1.50
MILL CREEK / JONES CREEK / TAYLOR CREEK SUBWATERSHED	**25.56**	**1,113,467**			**15.3**	**160.0**	**1,454.1**		**7.27**	**316,710**	**0.247**	**8.69**
Maud Abrams Elementary School												
Total Site Info	10.07	438,749	742.04	1.03	7.7	80.5	731.8	36	3.66	159,395	0.124	4.37
Seashore Community Church of the Nazarene												
Total Site Info	8.61	375,169	410.01	14	4.0	42.2	384.0	22	1.92	83,629	0.065	2.29

Summary of Existing Site Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Quality 2-hours) (Mgal)	Annual (Mgal)
Tabernacle United Methodist Church												
Total Site Info	6.88	299,549	501	8.03	3.6	37.2	338.3	25	1.69	73,685	0.057	2.02

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
	CAPE MAY HARBOR & BAYS SUBWATERSHED	**30,200**	**0.69**	**0.787**	**132**	**60,932**	**2.28**	**8,460**			**$183,500**	**7.4%**
1	**Carl T Mitnick School**											
	Pervious pavement	13,900	0.32	0.362	61	28,043	1.05	3,700	25	SF	$92,500	4.3%
	Total Site Info	**13,900**	**0.32**	**0.362**	**61**	**28,043**	**1.05**	**3,700**			**$92,500**	**4.3%**
2	**First Assembly of God**											
	Bioretention system	5,200	0.12	0.135	23	10,494	0.39	1,400	5	SF	$7,000	6.1%
	Pervious pavement	11,100	0.25	0.289	48	22,395	0.84	3,360	25	SF	$84,000	13.1%
	Total Site Info	**16,300**	**0.37**	**0.425**	**71**	**32,890**	**1.23**	**4,760**			**$91,000**	**19.3%**
	COX HALL CREEK / MICKELS RUN SUBWATERSHED	**48,710**	**1.12**	**1.269**	**212**	**98,272**	**3.68**	**17,430**			**$261,950**	**8.8%**
3	**Covenant Presbyterian Church**											
	Bioretention system	7,330	0.17	0.191	32	14,788	0.55	1,860	5	SF	$9,300	12.0%
	Pervious pavement	5,920	0.14	0.154	26	11,946	0.45	1,720	25	SF	$43,000	12.0%
	Total Site Info	**13,250**	**0.30**	**0.345**	**58**	**26,734**	**1.00**	**3,580**			**$52,300**	**23.9%**
4	**David C. Douglass Veterans Memorial School**											
	Bioretention system	5,740	0.13	0.150	25	11,579	0.43	1,410	5	SF	$7,050	6.3%
	Total Site Info	**5,740**	**0.13**	**0.150**	**25**	**11,579**	**0.43**	**1,410**			**$7,050**	**6.3%**
5	**Lower Township Municipal Utilities Authority**											
	Bioretention system	1,990	0.05	0.052	9	4,017	0.15	500	5	SF	$2,500	0.6%
	Pervious pavement	7,220	0.17	0.188	31	14,564	0.55	2,110	25	SF	$52,750	2.2%
	Total Site Info	**9,210**	**0.21**	**0.240**	**40**	**18,580**	**0.70**	**2,610**			**$55,250**	**2.8%**
6	**Saint Barnabas by-the-Bay Church**											
	Bioretention systems	2,200	0.05	0.057	10	4,436	0.17	540	5	SF	$2,700	15.7%
	Pervious pavement	8,100	0.19	0.211	35	16,344	0.61	3,780	25	SF	$94,500	57.7%
	Total Site Info	**10,300**	**0.24**	**0.268**	**45**	**20,779**	**0.78**	**4,320**			**$97,200**	**73.3%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
7	**Villas Fire Department**											
	Bioretention system	3,710	0.09	0.097	16	7,487	0.28	930	5	SF	$4,650	6.8%
	Pervious pavement	4,920	0.11	0.128	21	9,926	0.37	1,580	25	SF	$39,500	9.0%
	Rainwater harvesting	1,580	0.04	0.041	7	3,186	0.12	3,000	2	gal	$6,000	2.9%
	Total Site Info	**10,210**	**0.23**	**0.266**	**45**	**20,600**	**0.77**	**5,510**			**$50,150**	**18.6%**
	MILL CREEK / JONES CREEK / TAYLOR CREEK SUBWATERSHED	**44,505**	**1.02**	**1.160**	**194**	**89,790**	**3.38**	**11,660**			**$150,500**	**14.1%**
8	**Maud Abrams Elementary School**											
	Bioretention systems	14,475	0.33	0.377	63	29,202	1.10	3,640	5	SF	$18,200	9.1%
	Total Site Info	**14,475**	**0.33**	**0.377**	**63**	**29,202**	**1.10**	**3,640**			**$18,200**	**9.1%**
9	**Seashore Community Church of the Nazarene**											
	Bioretention systems	10,920	0.25	0.285	48	22,029	0.83	2,680	5	SF	$13,400	13.1%
	Pervious pavement	16,590	0.38	0.432	72	33,473	1.26	4,610	25	SF	$115,250	19.8%
	Total Site Info	**27,510**	**0.63**	**0.717**	**120**	**55,502**	**2.09**	**7,290**			**$128,650**	**32.9%**
10	**Tabernacle United Methodist Church**											
	Bioretention system	2,520	0.06	0.066	11	5,086	0.19	730	5	SF	$3,650	3.4%
	Total Site Info	**2,520**	**0.06**	**0.066**	**11**	**5,086**	**0.19**	**730**			**$3,650**	**3.4%**