RUTGERS
New Jersey Agricultural
Experiment Station

Draft

Impervious Cover Reduction Action Plan
for
Englishtown Borough, Monmouth County, New Jersey

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

November 16, 2015

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Introduction

Located in Monmouth County in central New Jersey, Englishtown Borough covers approximately 0.59 square miles. Figures 1 and 2 illustrate that Englishtown Borough is dominated by urban land uses. A total of 70.6% of the municipality's land use is classified as urban. Of the urban land in Englishtown Borough, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2007 land use/land cover geographical information system (GIS) data layer categorizes Englishtown 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 Englishtown Borough. Based upon the 2007 NJDEP land use/land cover data, approximately 28.3% of Englishtown Borough has impervious cover. This level of impervious cover suggests that the streams in Englishtown Borough are likely non-supporting streams.[1]

Methodology

Englishtown Borough contains portions of four 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

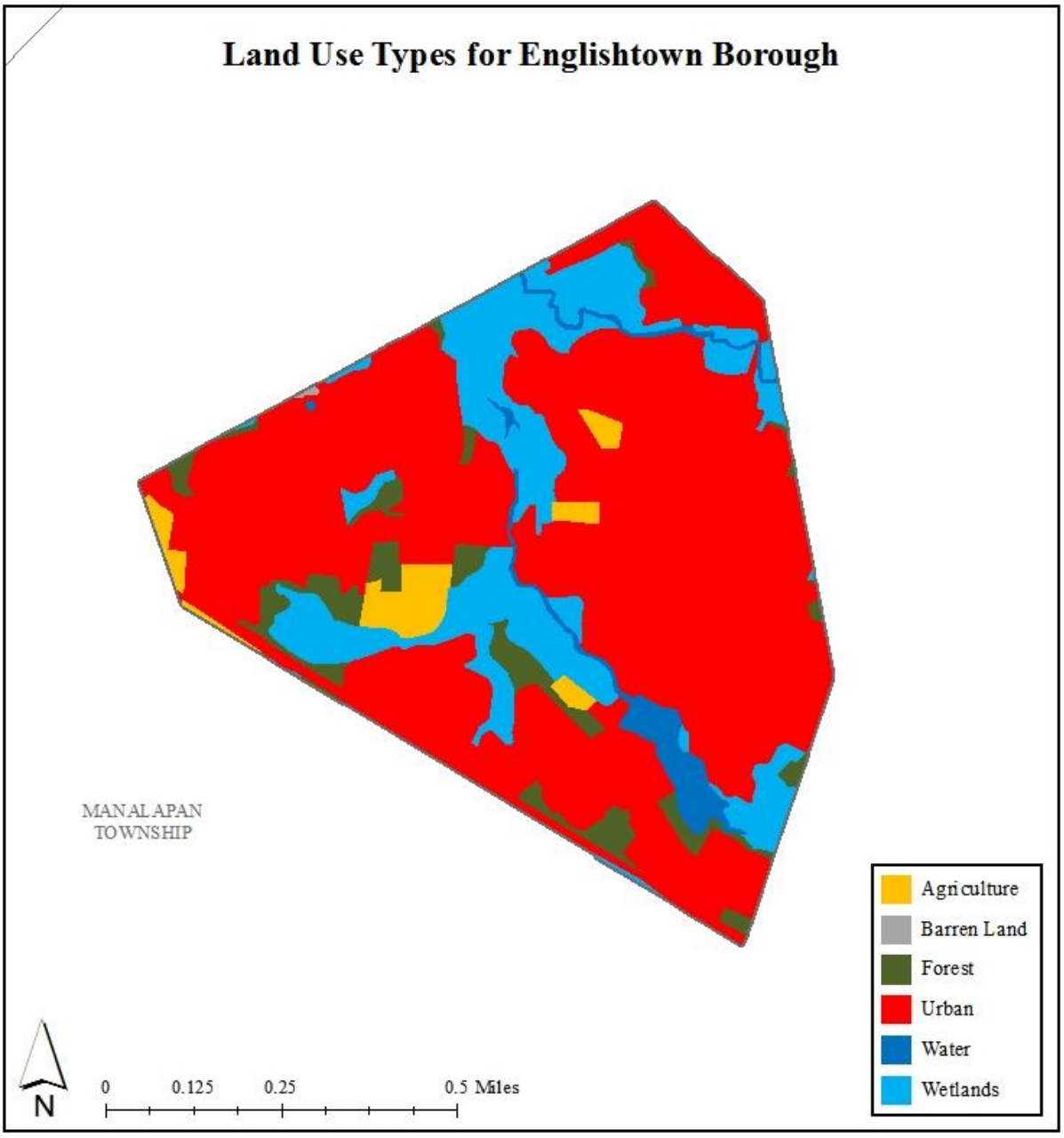


Figure 1: Map illustrating the land use in Englishtown Borough

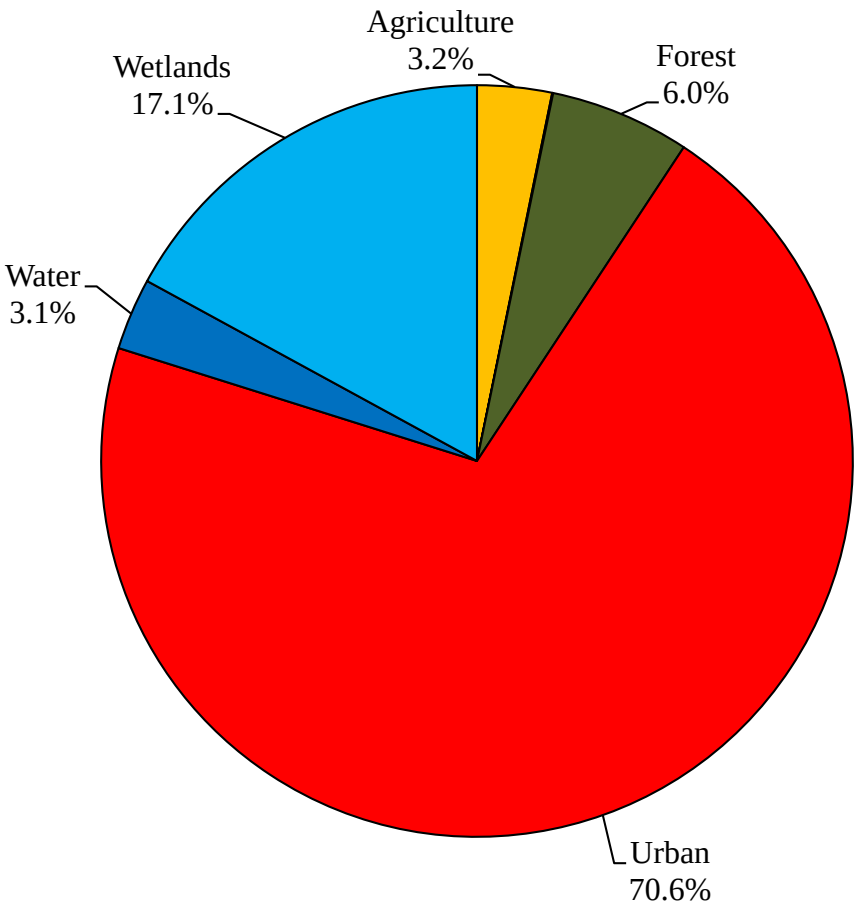


Figure 2: Pie chart illustrating the land use in Englishtown Borough

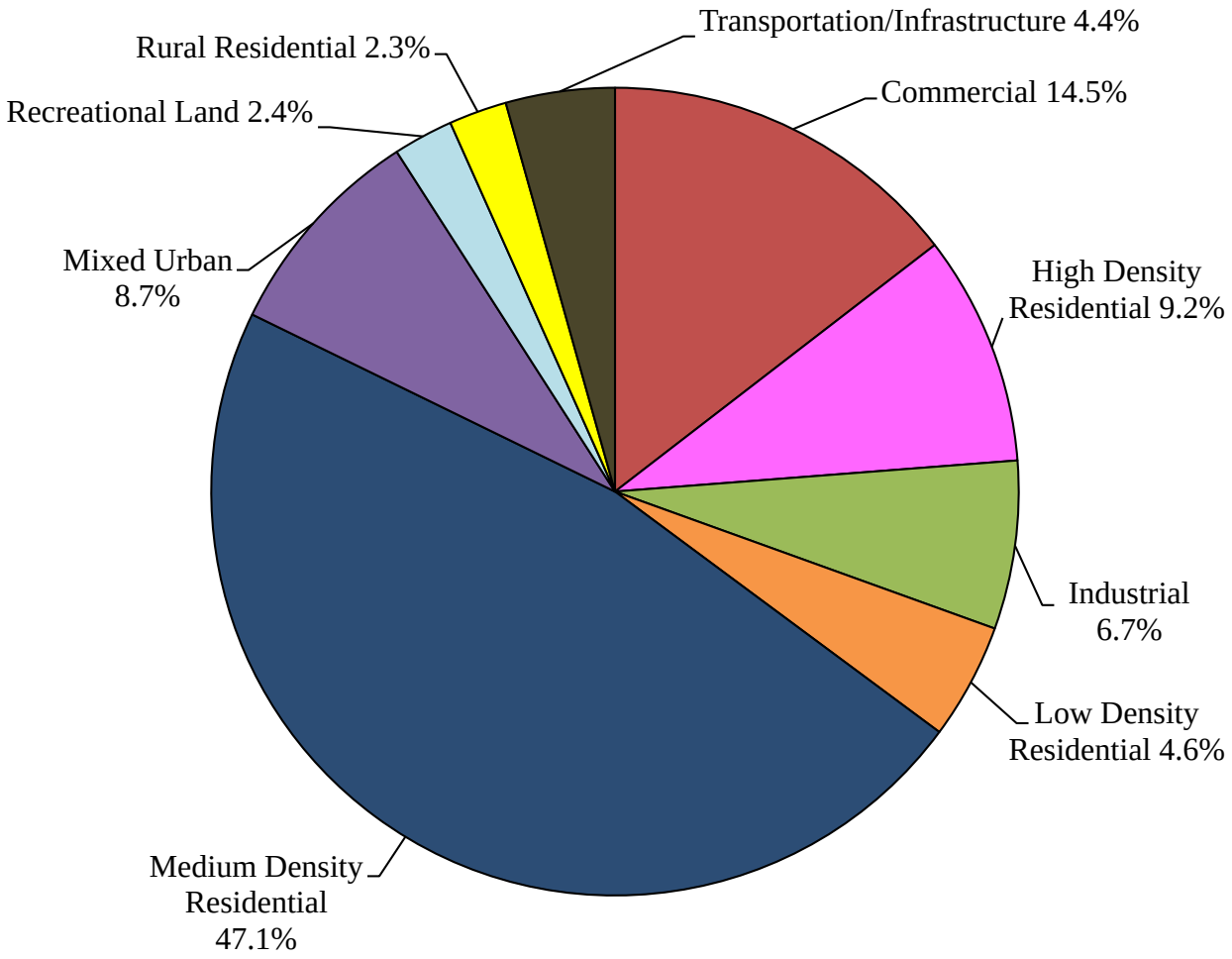


Figure 3: Pie chart illustrating the various types of urban land use in Englishtown Borough

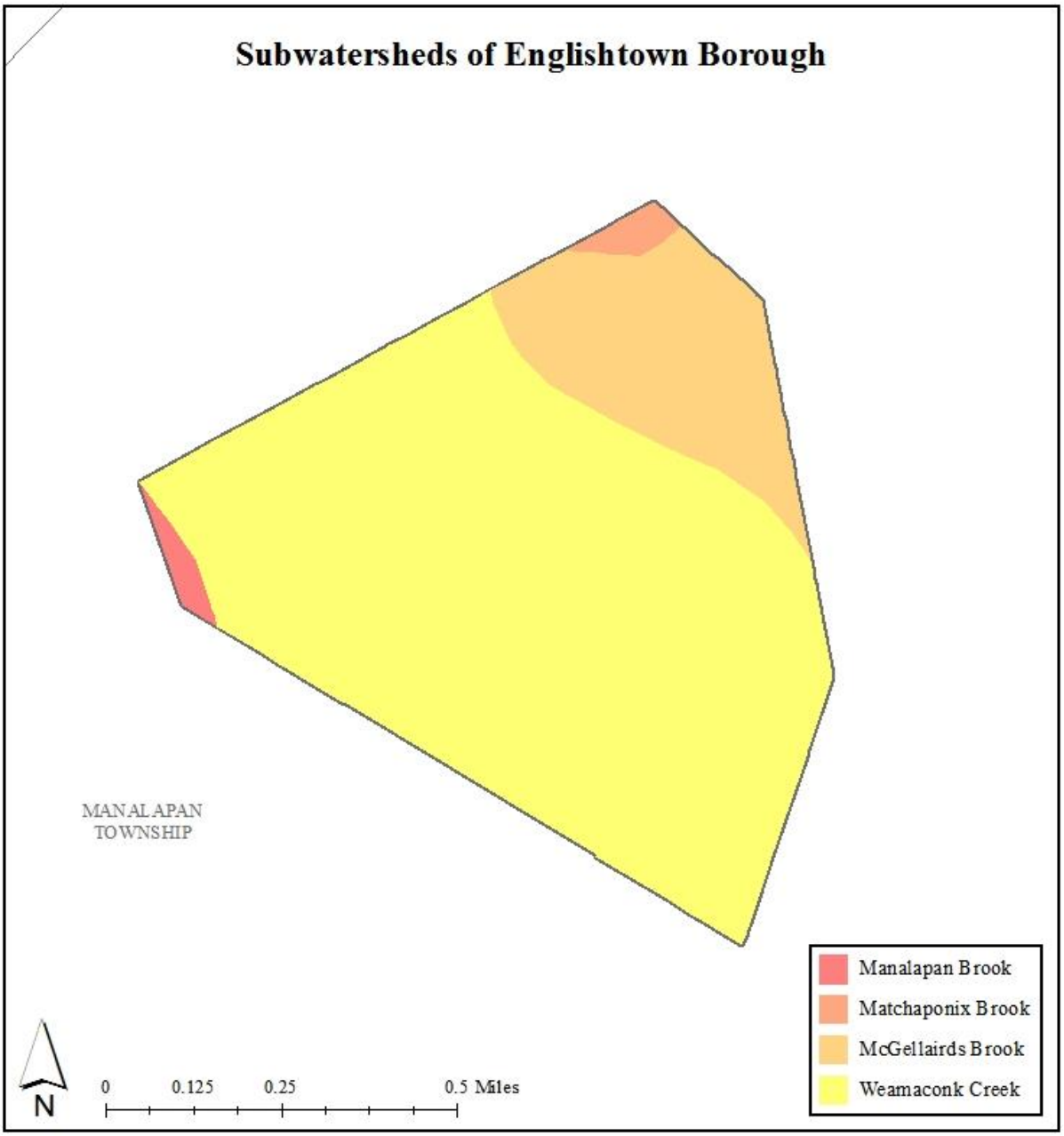


Figure 4: Map of the subwatersheds in Englishtown Borough

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 2007 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 Englishtown Borough using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, which utilizes regional and statewide soil data to predict soil types in an area. Several key soil parameters were examined (e.g., natural drainage class, saturated hydraulic conductivity of the most limiting soil layer (K_{sat}), depth to water table, and hydrologic soil group) to evaluate the suitability of each site's soil for green infrastructure practices. In cases where multiple soil types were encountered, the key soil parameters were examined for each soil type expected at a site.

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

Table 1: Aerial Loading Coefficients[2]

Land Cover	TP load (lbs/acre/yr)	TN load (lbs/acre/yr)	TSS load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

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

Green Infrastructure Practices

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

Disconnected downspouts

This is often referred to as simple disconnection. A downspout is simply disconnected, and 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

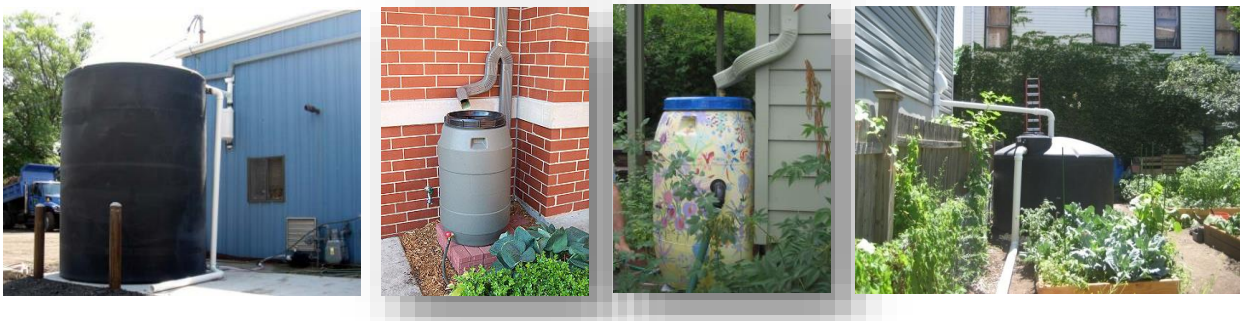
These are landscaped features that are designed to capture, treat, and infiltrate stormwater runoff. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating a wildlife habitat while managing stormwater runoff. Bioretention systems also can be used in soils 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*.

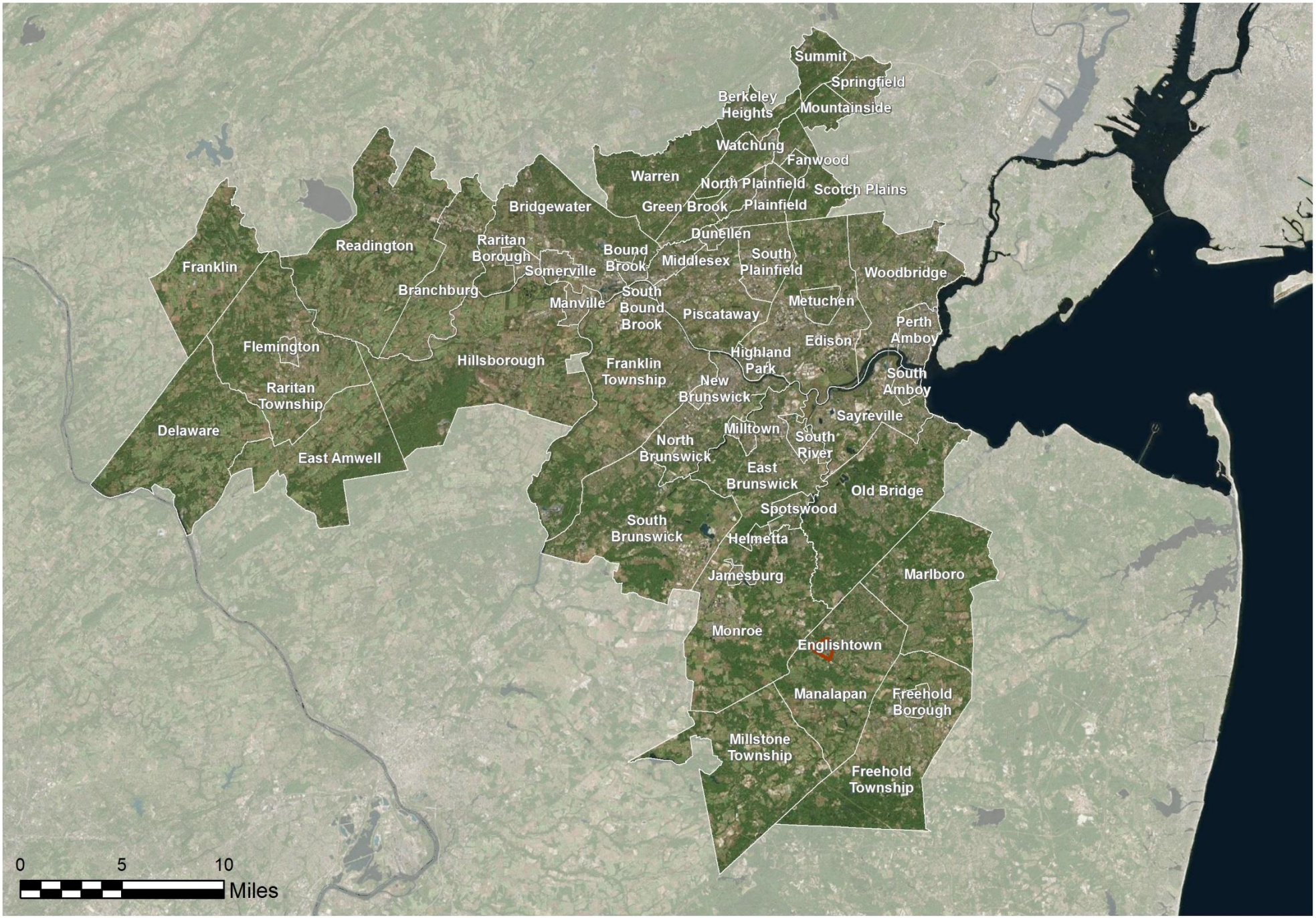
Conclusion

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. Overview Map of the Project

ENGLISHTOWN: CLIMATE RESILIENT GREEN INFRASTRUCTURE FOR THE RARITAN BASIN



b. Green Infrastructure Sites

ENGLISHTOWN: GREEN INFRASTRUCTURE SITES

SITES WITHIN THE MATCHAPONIX BRROK SUBWATERSHED:

1. Oxford Crossing Town Homes

SITES WITHIN THE MCGELLAIRDS BROOK SUBWATERSHED:

2. Village Center Mall
3. Walgreens
4. Reverend Charles R. Valentine Parish Center

SITES WITHIN THE WEAMACONK CREEK SUBWATERSHED:

5. Agway Garden Center
6. Crossroads Assembly of God
7. Englishtown Fire Department
8. Englishtown Police Department & Municipal Building
9. First Presbyterian Church of Englishtown
10. Franklin Autobody
11. Freehold Regional High School District Administration
12. Knights of Columbus
13. Manalapan-Englishtown Regional School Admin
14. Our Lady of Mercy Church
15. Santander Bank
16. Astaana-e-Zehra Ahle Baith Foundation, Inc.

c. Proposed Green Infrastructure Concepts

OXFORD CROSSING TOWN HOMES

Subwatershed: Matchaponix Brook and McGellairds Brook

Site Area: 509,896 sq. ft.

Address: 54 Oxford Court
Englishtown, NJ 07762

Block and Lot: Block 6, Lot 14-14.80

A rain garden can be installed to 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"
21	105,042	5.1	53.1	482.3	0.082	2.88

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	0.104	17	7,899	0.30	1,000	$5,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Oxford Crossing Town Homes

- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

VILLAGE CENTER MALL

Subwatershed: McGellairds Brook

Site Area: 77,425 sq. ft.

Address: 10 Wilson Avenue
Englishtown, NJ 07762

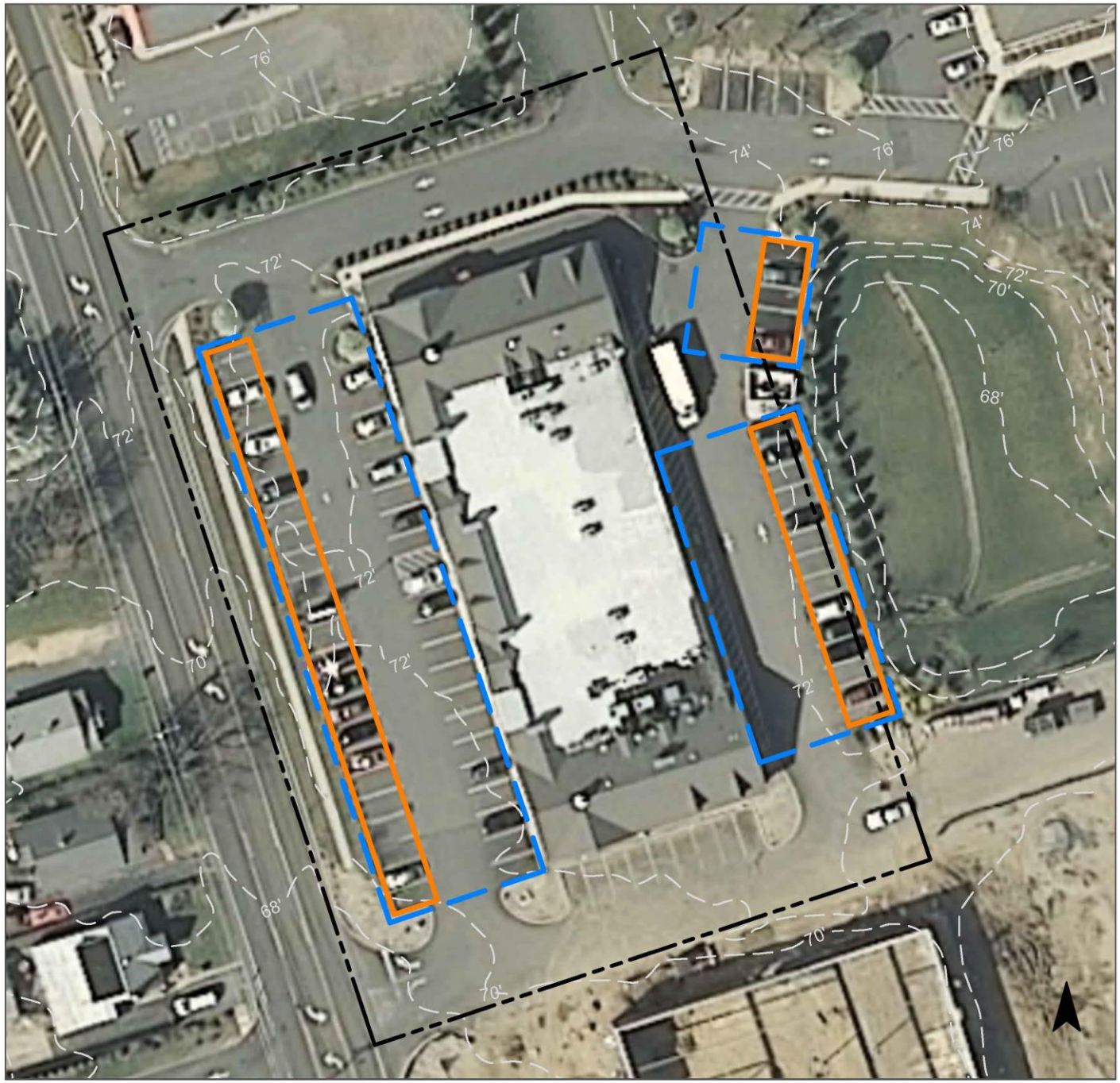
Block and Lot: Block 7,7.01 , Lot 13,1

Parking spaces can be replaced with porous asphalt to capture and infiltrate 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"
89	68,933	3.3	34.8	316.5	0.054	1.89

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 pavements	0.651	109	49,346	1.85	7,200	$180,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Village Center Mall

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

WALGREENS

Subwatershed: McGellairds Brook

Site Area: 46,965 sq. ft.

Address: 2 Gordons Corner Road
Englishtown, NJ 07762

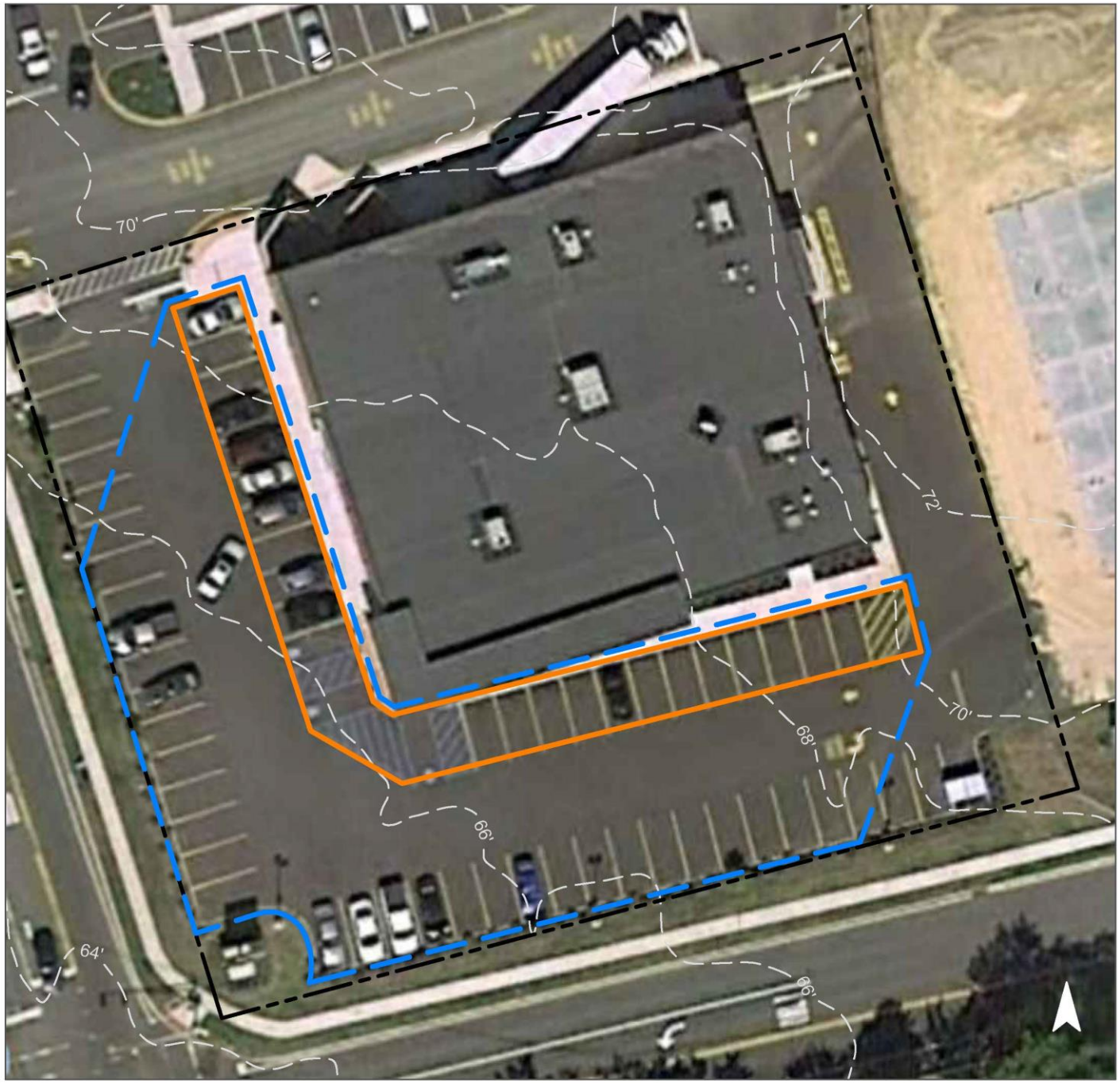
Block and Lot: Block 7, Lot 1

Parking spaces can be replaced with porous asphalt to capture 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"
98	45,800	2.2	23.1	210.3	0.036	1.26

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 pavements	0.477	80	36,121	1.36	4,800	$120,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Walgreens

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

REVEREND CHARLES R. VALENTINE PARISH CENTER

Subwatershed: McGellairds Brook and Weamaconk Creek

Site Area: 939,998 sq. ft.

Address: 3 Pine Street
Englishtown, NJ 07762

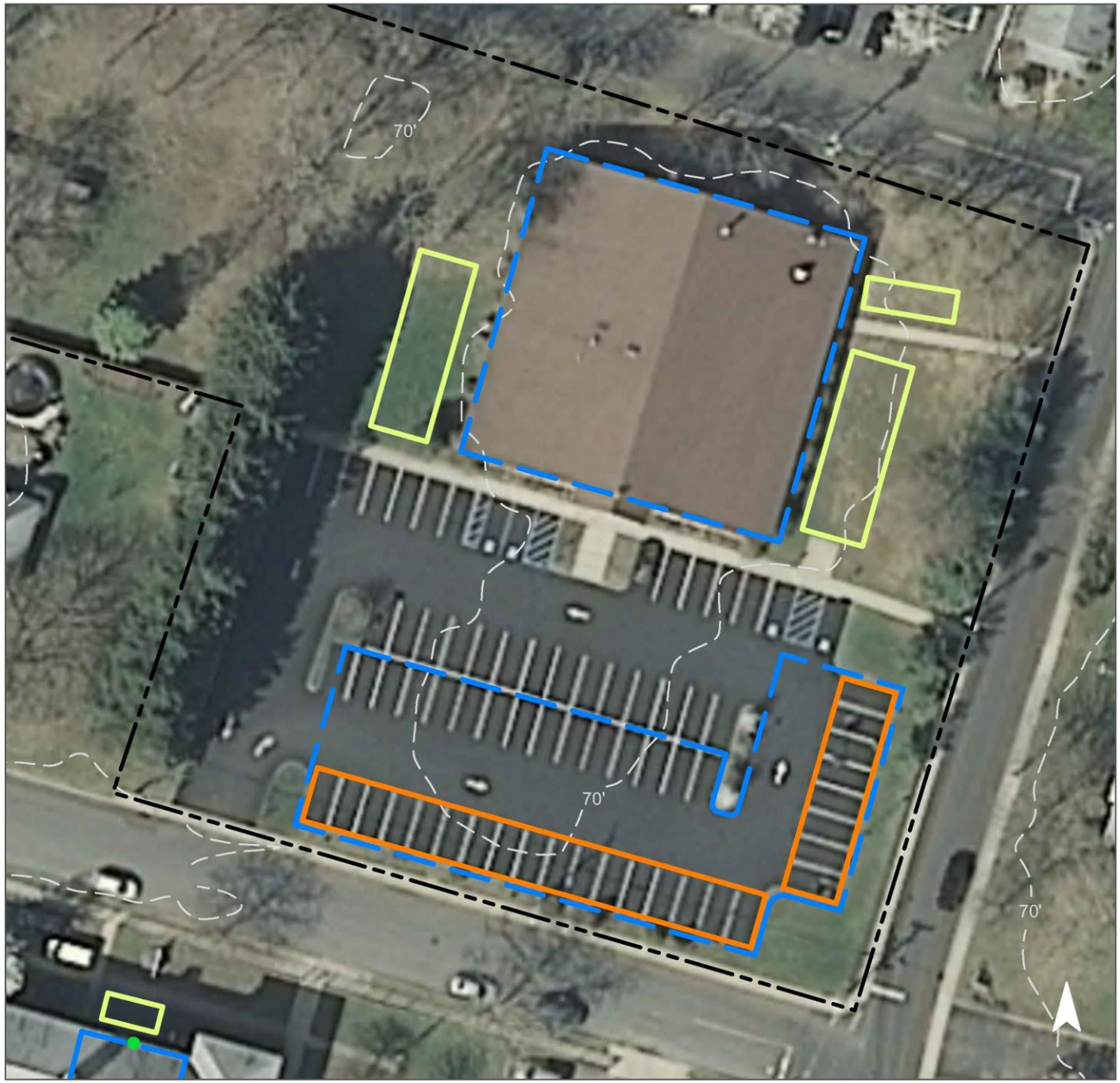
Block and Lot: Block 11, Lot 5.02

Parking spots can be replaced with porous asphalt to capture and infiltrate stormwater. Rain gardens 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"
5	50,191	2.4	25.3	230.4	0.039	1.38

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 systems	0.292	49	22,011	0.83	2,600	$13,000
Pervious pavements	0.307	51	23,293	0.87	4,000	$100,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Reverend Charles R. Valentine Parish Center

- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 25' 50'

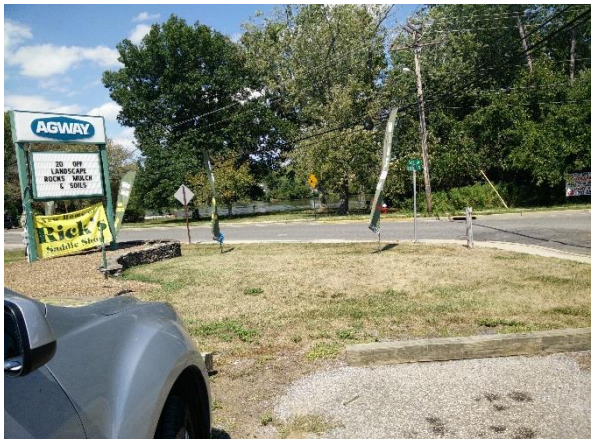
AGWAY GARDEN CENTER

Subwatershed: Weamaconk Creek

Site Area: 115,729 sq. ft.

Address: 29 Park Avenue
Englishtown, NJ 07762

Block and Lot: Block 23, Lot 7

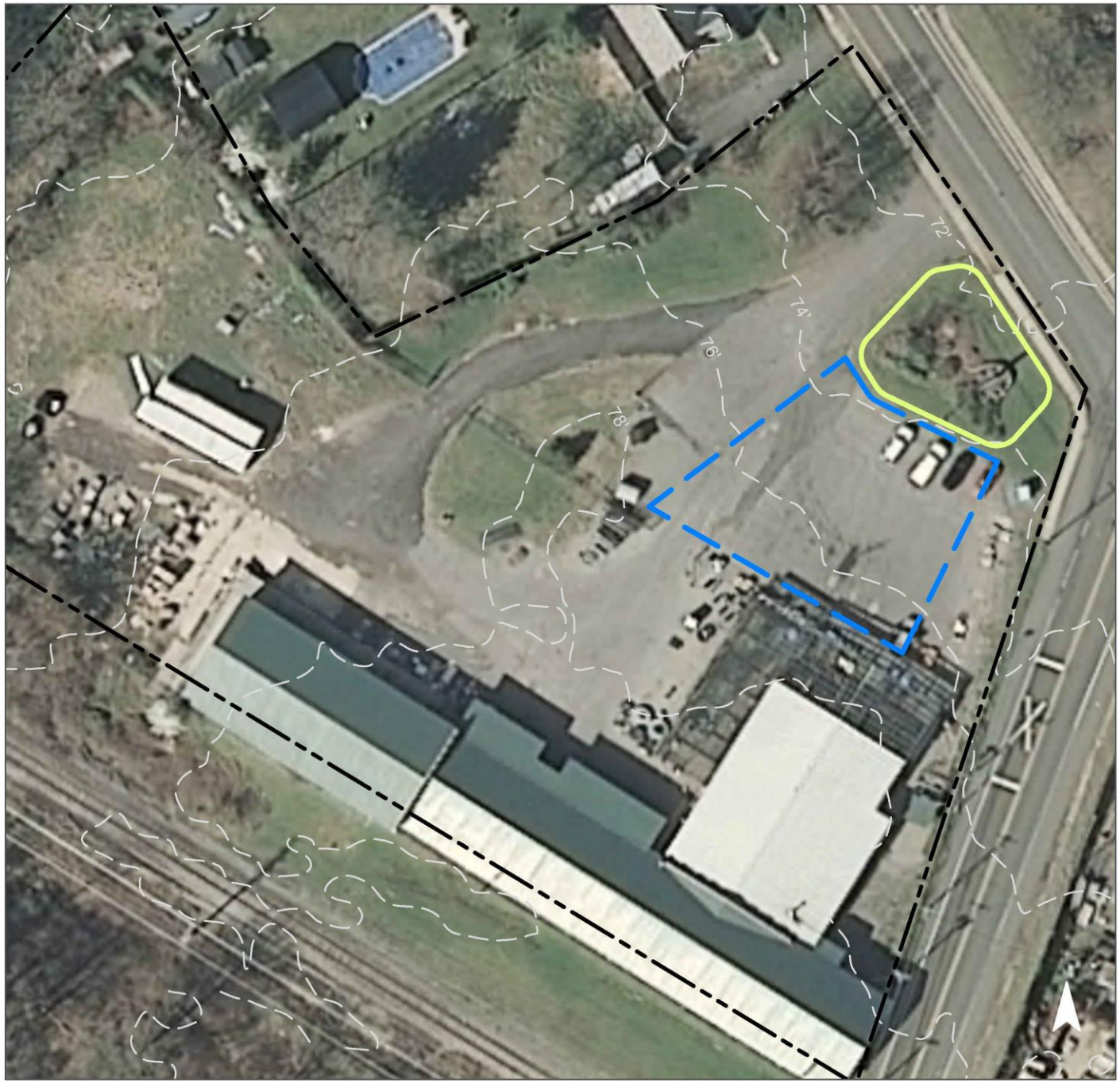


In the turf grass area located north of the building, a bioretention system can be installed to capture, treat, and infiltrate runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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"
32	37,424	1.8	18.9	171.8	0.029	1.03

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	0.203	34	15,394	0.58	3,000	$15,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Agway Garden Center

- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

CROSSROADS ASSEMBLY OF GOD

Subwatershed: Weamaconk Creek

Site Area: 84,249 sq. ft.

Address: 19 Main Street
Englishtown, NJ 07762

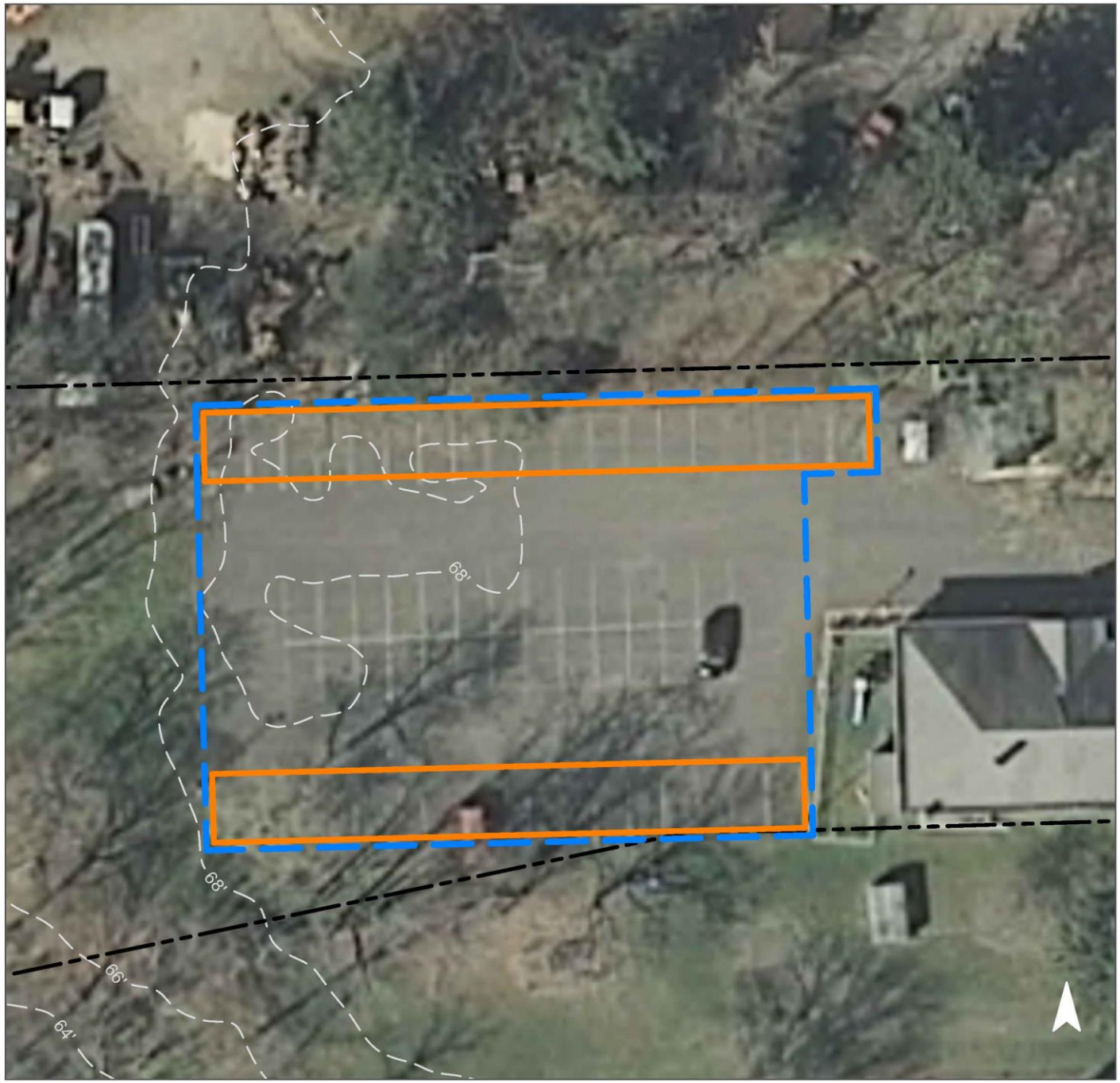
Block and Lot: Block 25, Lot 18-19

Parking spots west of the building can be replaced with porous asphalt to capture 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"
36	30,749	1.5	15.5	141.2	0.024	0.84

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 pavements	0.495	83	37,505	1.41	5,900	$147,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Crossroads Assembly of God

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

ENGLISHTOWN FIRE DEPARTMENT

Subwatershed: **Weamaconk Creek**

Site Area: **335,648 sq. ft.**

Address: **3 South Main Street**
Englishtown, NJ 07762

Block and Lot: **Block 23, Lot 1.03**

A cistern can be installed to harvest rainwater that can be used to wash emergency vehicles. 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"
58	193,238	9.3	97.6	887.2	0.151	5.30

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
Rainwater harvesting systems	0.055	9	2,000	0.16	2,000 (gal)	$4,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Englishtown Fire Department

- disconnected downspouts
- rainwater harvesting
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

ENGLISHTOWN POLICE DEPARTMENT AND MUNICIPAL BUILDING

Subwatershed: Weamaconk Creek

Site Area: 53,152 sq. ft.

Address: 15 Main Street
Englishtown, NJ 07762

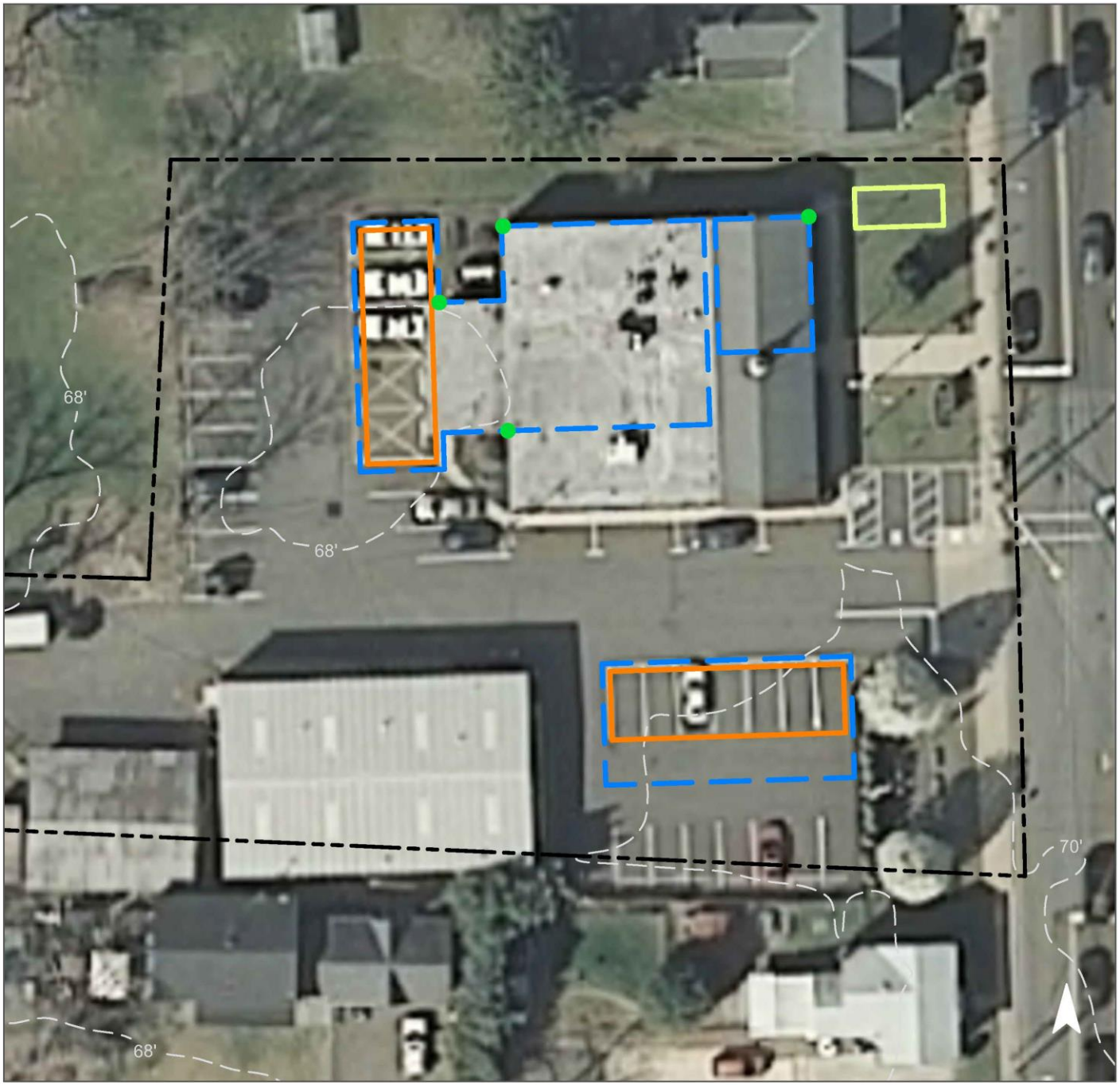
Block and Lot: Block 25, Lot 21,22

Parking spots can be replaced with porous asphalt to capture and infiltrate stormwater. A rain garden can be installed in the turf grass off of the northeast corner of the municipal building to 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"
62	33,103	1.6	16.7	152.0	0.026	0.91

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 systems	0.021	3	1,578	0.06	250	$1,250
Pervious pavements	0.180	30	13,621	0.51	2,200	$55,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Englishtown Police Department and Municipal Building

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

FIRST PRESBYTERIAN CHURCH OF ENGLISHTOWN

Subwatershed: Weamaconk Creek

Site Area: 40,496 sq. ft.

Address: 50 Main Street
Englishtown, NJ 07762

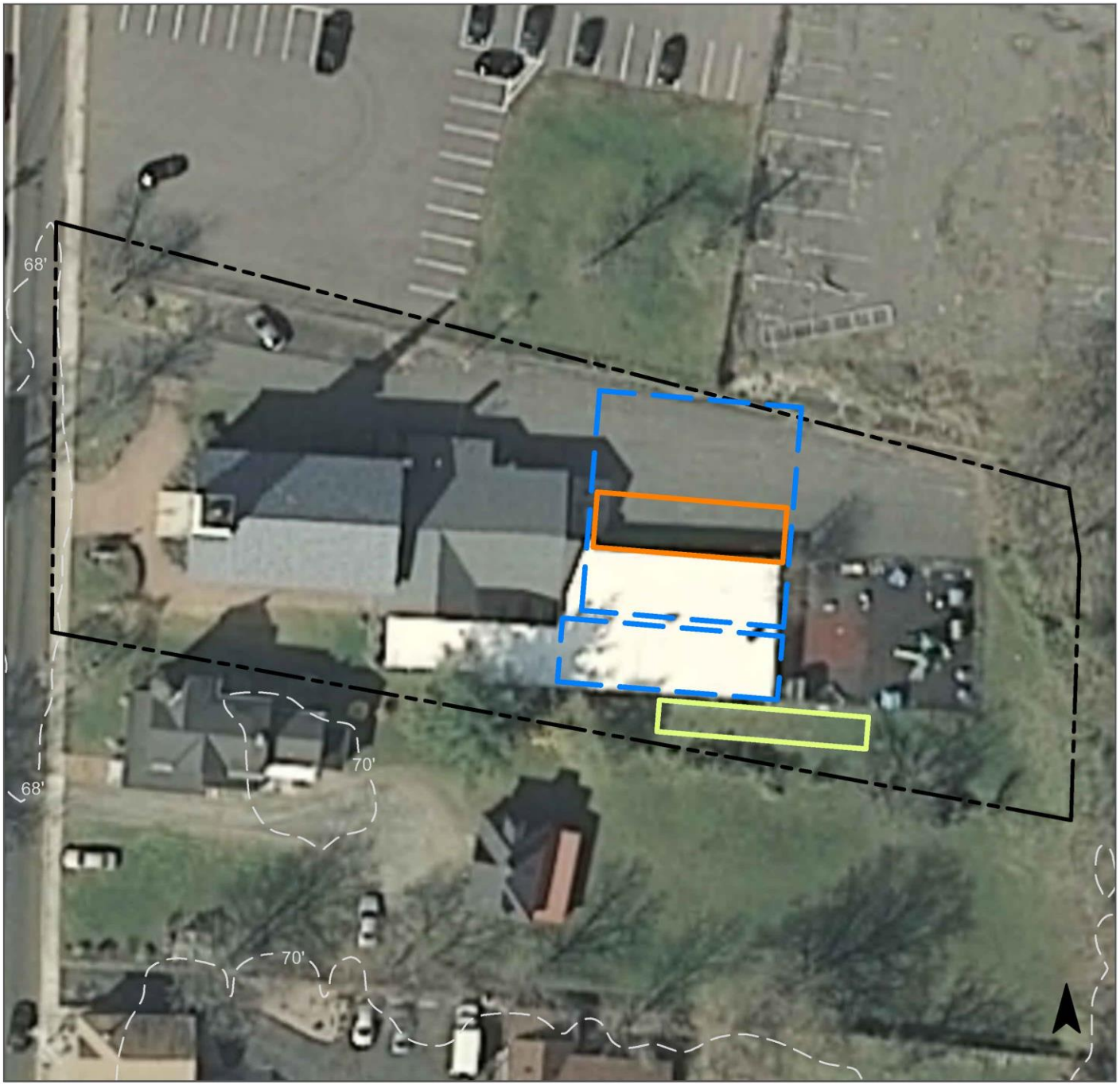
Block and Lot: Block 12, Lot 7

A bioretention system can be installed to capture, treat, and infiltrate rooftop runoff. Parking spaces can also be replaced with pervious pavement to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
56	22,492	1.1	11.4	103.3	0.018	0.62

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	0.039	7	2,962	0.11	700	$3,500
Pervious pavements	0.125	21	9,477	0.36	1,100	$27,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



First Presbyterian Church of Englishtown

- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 25' 50'

FRANKLIN AUTOBODY

Subwatershed: **Weamaconk Creek**

Site Area: **90,733 sq. ft.**

Address: **14 Wood Avenue**
Englishtown, NJ 07762

Block and Lot: **Block 3.01, Lot 7**

Bioretention systems can be installed to capture, treat, and infiltrate parking lot and 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"
50	45,513	2.2	23.0	209.0	0.035	1.25

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	0.185	31	14,018	0.53	1,900	$9,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

Franklin Autobody

- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

FREEHOLD REGIONAL HIGH SCHOOL DISTRICT ADMINISTRATION

Subwatershed: Weamaconk Creek

Site Area: 78,048 sq. ft.

Address: 11 Pine Street
Englishtown, NJ 07762

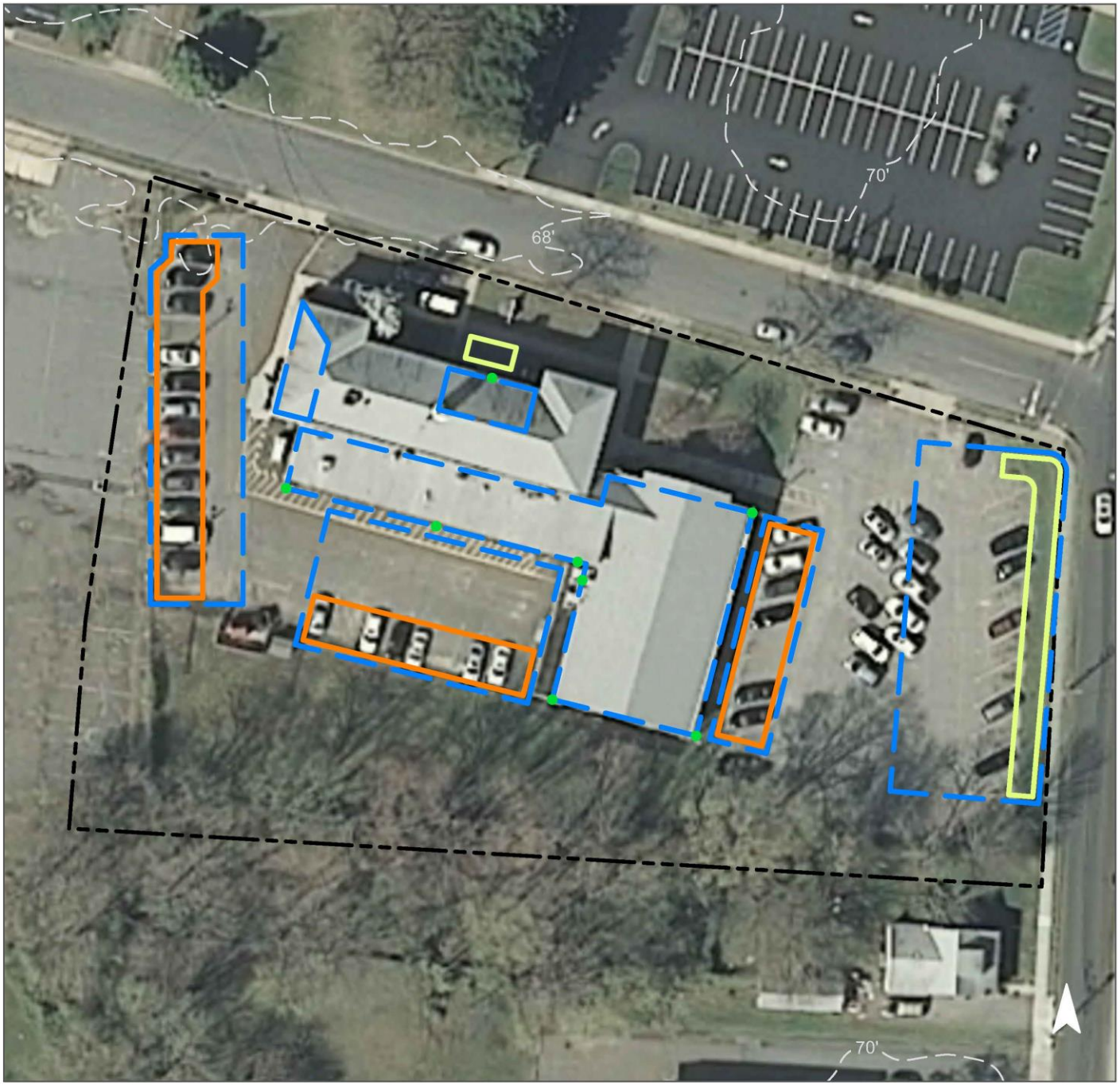
Block and Lot: Block 12, Lot 10.02

Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. Bioretention systems can also be installed to capture, treat, and infiltrate 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"
68	53,034	2.6	26.8	243.5	0.041	1.45

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	0.224	38	16,980	0.64	1,500	$7,500
Pervious pavements	0.534	89	40,467	1.52	5,700	$142,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Freehold Regional High School District Administration

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

KNIGHTS OF COLUMBUS

Subwatershed: Weamaconk Creek

Site Area: 53,218 sq. ft.

Address: 2 Lasatta Avenue
Englishtown, NJ 07762

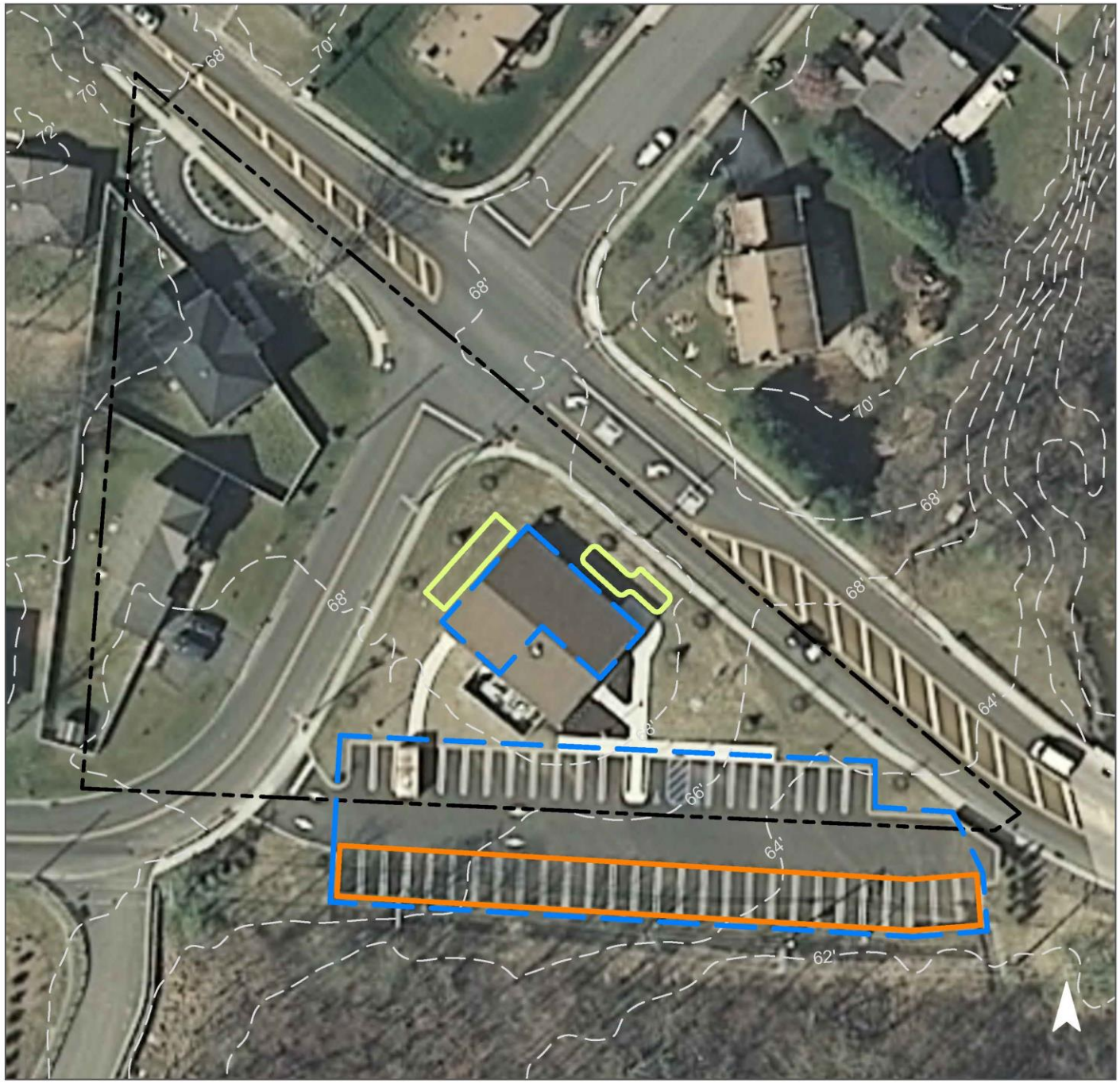
Block and Lot: Block 2, Lot 12

Parking spaces can be replaced with porous asphalt to capture and infiltrate stormwater. The installation of 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"
54	28,478	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	0.060	10	4,510	0.17	572	$2,860
Pervious pavements	0.381	64	28,835	1.08	5,047	$126,175

GREEN INFRASTRUCTURE RECOMMENDATIONS



Knights of Columbus

- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

MANALAPAN-ENGLISHTOWN REGIONAL SCHOOL ADMINISTRATION

Subwatershed: Weamaconk Creek

Site Area: 101,896 sq. ft.

Address: 54 Main Street
Englishtown, NJ 07762

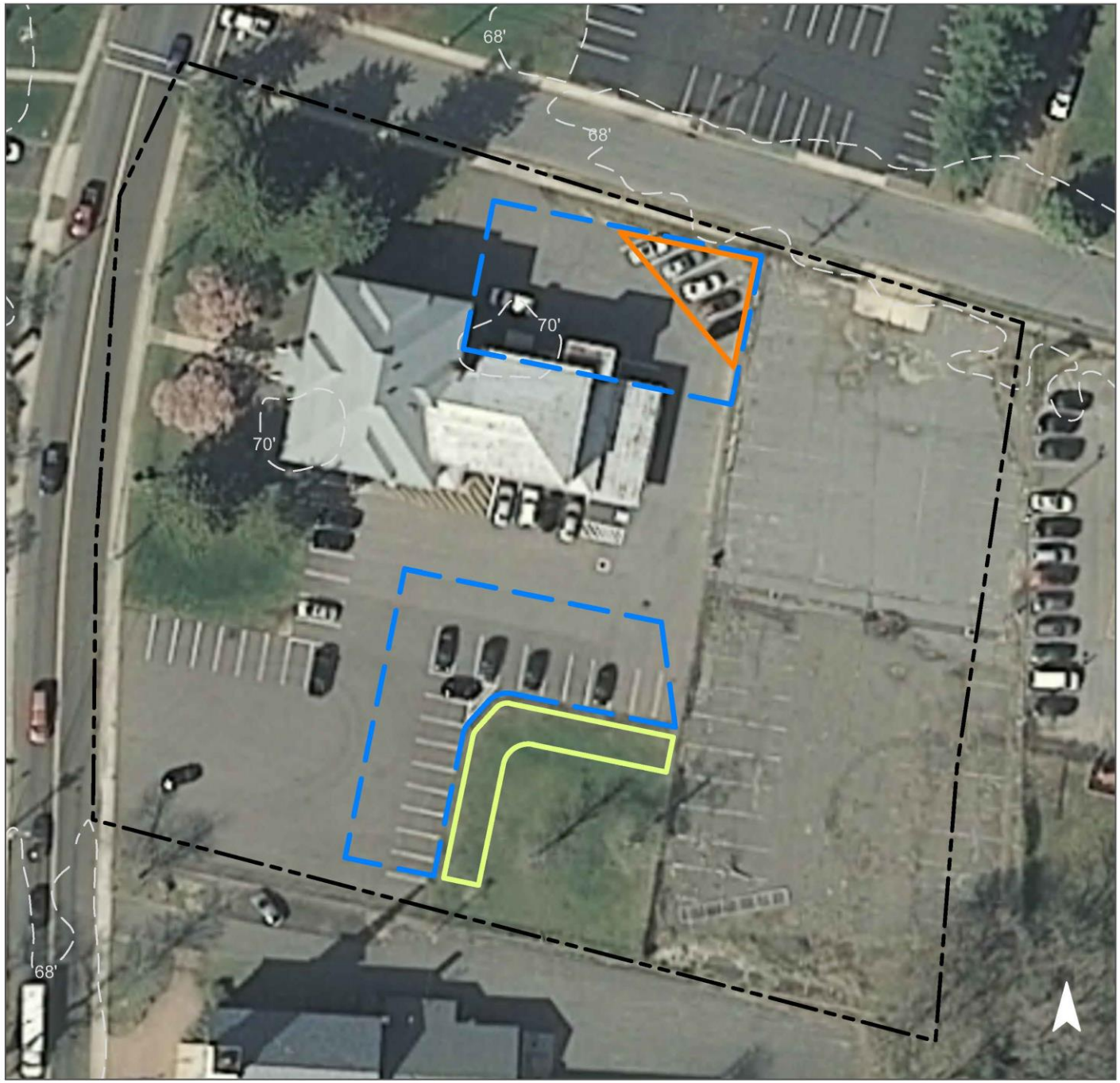
Block and Lot: Block 12, Lot 9,10.01

Parking spaces can be replaced with porous asphalt to capture and infiltrate stormwater. A bioretention system can be installed to 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"
85	86,360	4.2	43.6	396.5	0.067	2.37

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	0.182	31	13,816	0.52	1,800	$9,000
Pervious pavements	0.167	28	12,634	0.47	1,100	$27,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Manalapan-Englishtown Regional School Administration

- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

OUR LADY OF MERCY CHURCH

Subwatershed: Weamaconk Creek

Site Area: 43,802 sq. ft.

Address: 8 Pine Street
Englishtown, NJ 07762

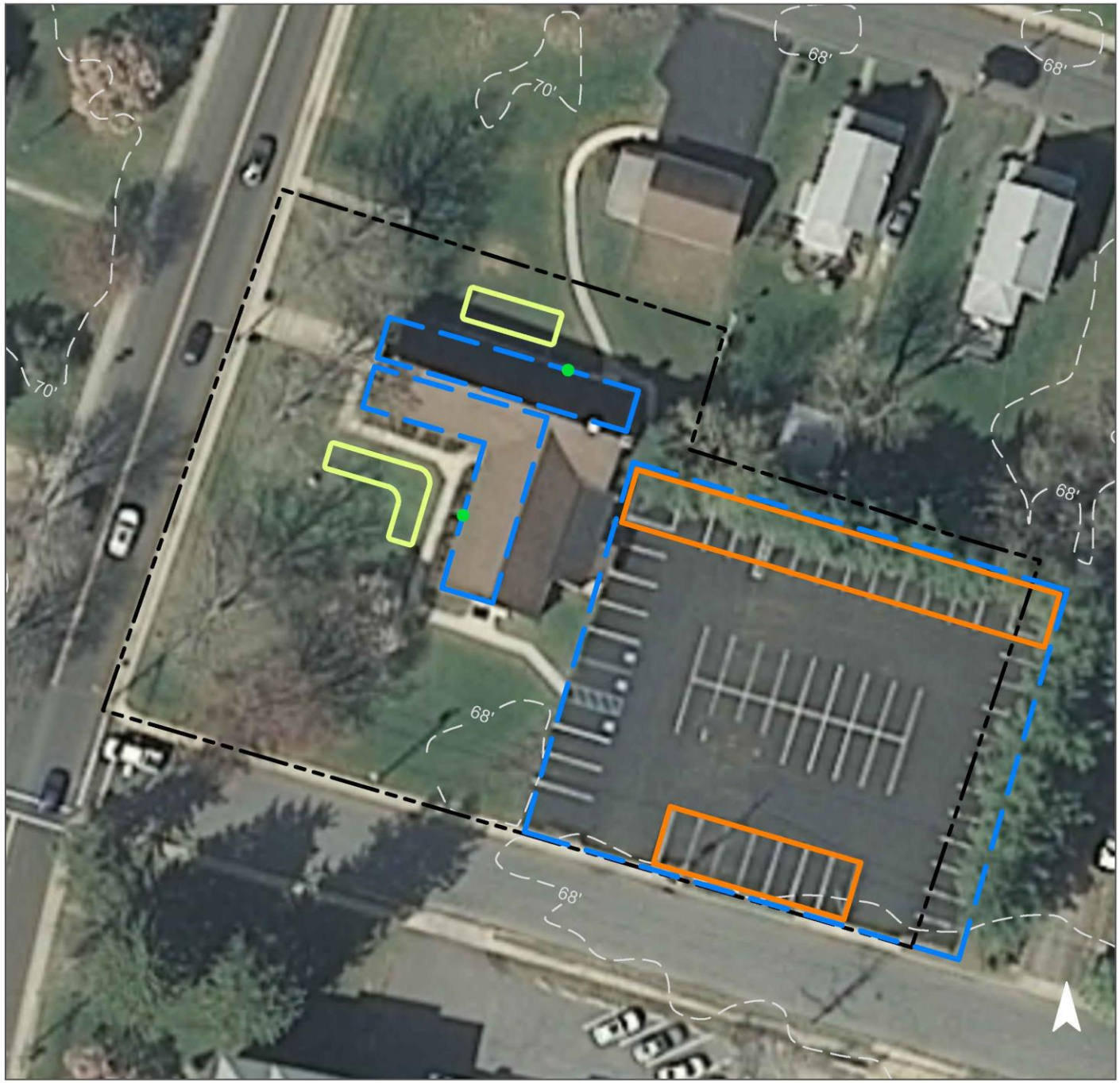
Block and Lot: Block 11, Lot 1

Parking spaces can be replaced with porous asphalt to capture and infiltrate stormwater. Installing rain gardens adjacent to the building can capture, treat, 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"
54	23,491	1.1	11.9	107.9	0.018	0.64

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	0.073	12	5,528	0.21	700	$3,500
Pervious pavements	0.487	82	36,914	1.39	3,800	$95,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Our Lady of Mercy Church

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 25' 50'

SANTANDER BANK

Subwatershed: Weamaconk Creek

Site Area: 29,531 sq. ft.

Address: 37 Main Street
Englishtown, NJ 07762

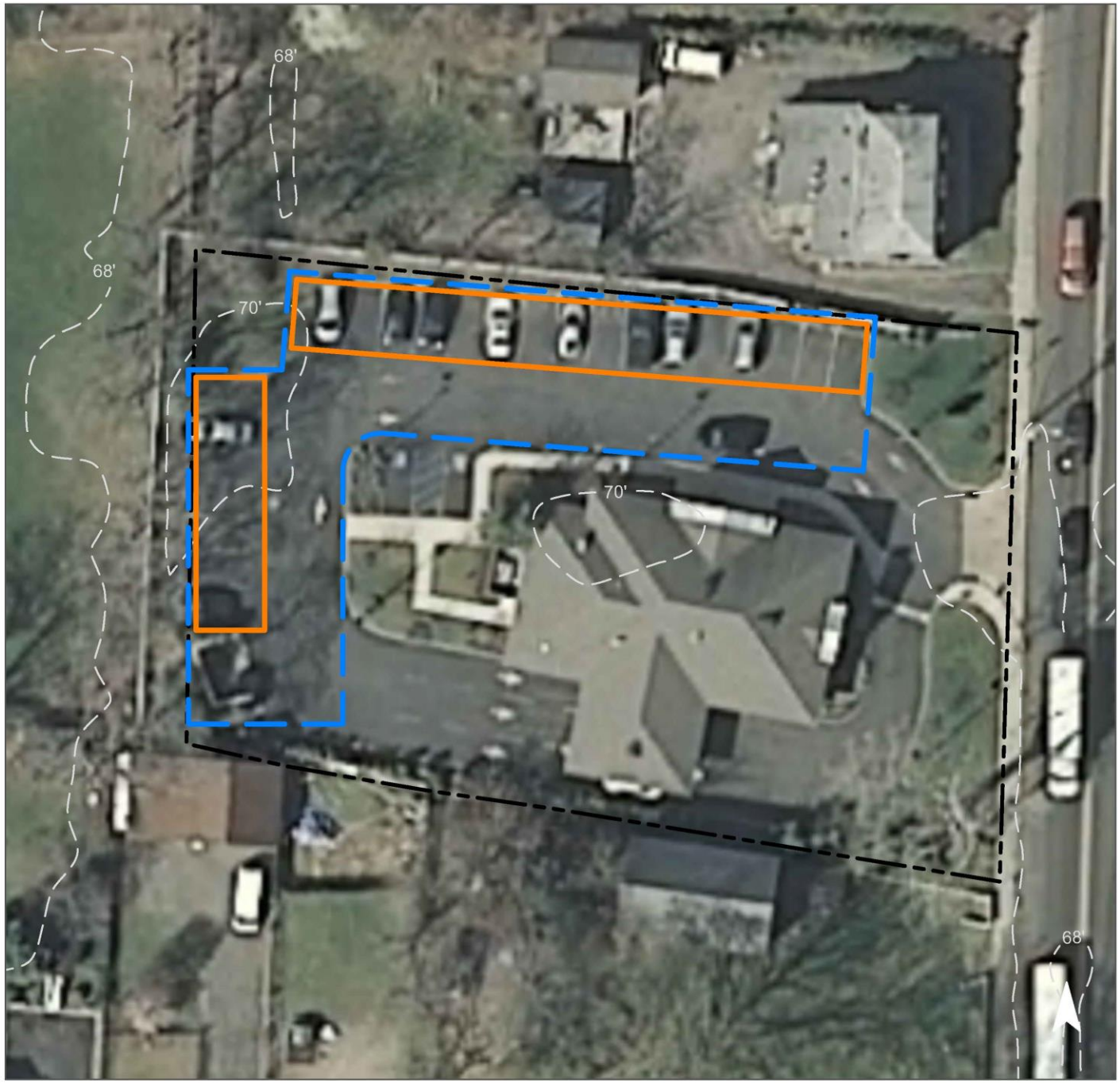
Block and Lot: Block 4, Lot 21

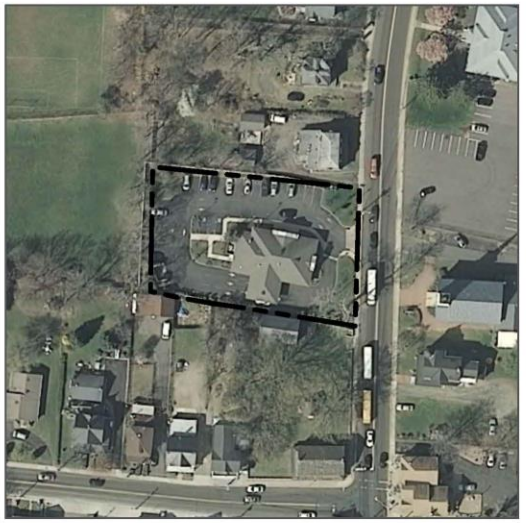
Parking spaces can be replaced with porous asphalt to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
84	24,662	1.2	12.5	113.2	0.019	0.68

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
Pervious pavements	0.253	42	19,149	0.72	3,900	$97,500

GREEN INFRASTRUCTURE RECOMMENDATIONS





Santander Bank

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

ASTAANA-E-ZEHRA AHLE BAITH FOUNDATION, INC.

Subwatershed: Weamaconk Creek and Manalapan Brook

Site Area: 59,235 sq. ft.

Address: 14 Mount Vernon Road Englishtown, NJ 07762

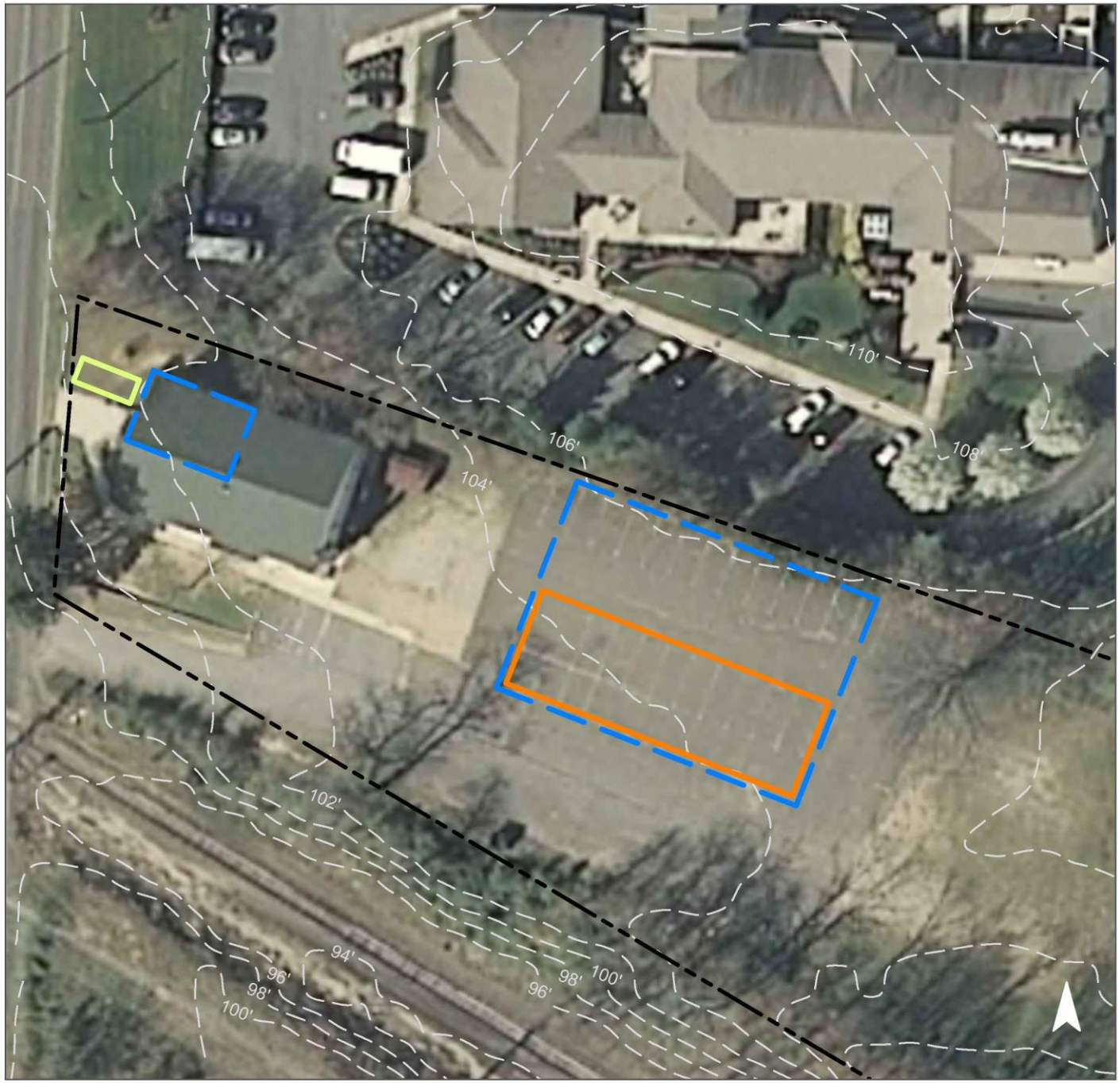
Block and Lot: Block 1, Lot 1.01A

A bioretention system can be installed to capture, treat, and infiltrate roof runoff. Parking spaces can be replaced with pervious pavement to capture 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"
50	29,523	1.4	14.9	135.5	0.023	0.81

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	0.021	3	1,578	0.06	200	$1,000
Pervious pavements	0.198	33	15,005	0.56	3,300	$82,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Astaana-e-Zehra Ahle Baith Foundation, Inc.

- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 25' 50'

d. 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)	Existing Annual Loads TN (lb/yr)	Existing Annual Loads TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
MATCHAPONIX BROOK AND MCGELLAIRDS BROOK SUBWATERSHED	**11.71**	**509,896**			**5.1**	**53.1**	**482.3**		**2.41**	**105,042**	**0.082**	**2.88**
Oxford Crossing Town Homes												
Total Site Info	11.71	509,896	6	14-14.80	5.1	53.1	482.3	21	2.41	105,042	0.082	2.88
MCGELLAIRDS BROOK SUBWATERSHED	**2.86**	**124,390**			**5.5**	**57.9**	**526.8**		**2.63**	**114,733**	**0.089**	**3.15**
Village Center Mall												
Total Site Info	1.78	77,425	7,7.01	13,1	3.3	34.8	316.5	89	1.58	68,933	0.054	1.89
Walgreens												
Total Site Info	1.08	46,965	7	1	2.2	23.1	210.3	98	1.05	45,800	0.036	1.26
MCGELLAIRDS BROOK AND WEAMACONK CREEK SUBWATERSHED	**21.58**	**939,998**			**2.4**	**25.3**	**230.4**		**1.15**	**50,191**	**0.039**	**1.38**
Reverend Charles R. Valentine Parish Center												
Total Site Info	21.58	939,998	11	5.02	2.4	25.3	230.4	5	1.15	50,191	0.039	1.38
WEAMACONK CREEK SUBWATERSHED	**23.57**	**1,026,501**			**27.9**	**292.2**	**2,656.3**		**13.28**	**2,760,134**	**0.451**	**15.87**
Agway Garden Center												
Total Site Info	2.66	115,729	23	7	1.8	18.9	171.8	32	0.86	37,424	0.029	1.03
Crossroads Assembly of God												
Total Site Info	1.93	84,249	25	18-19	1.5	15.5	141.2	36	0.71	30,749	0.024	0.84
Englishtown Fire Department												
Total Site Info	7.71	335,648	23	1.03	9.3	97.6	887.2	58	4.44	193,238	0.151	5.30
Englishtown Police Department and Municipal Building												
Total Site Info	1.22	53,152	25	21,22	1.6	16.7	152.0	62	0.76	33,103	0.026	0.91

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)	Existing Annual Loads TN (lb/yr)	Existing Annual Loads TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
First Presbyterian Church of Englishtown												
Total Site Info	0.93	40,496	12	7	1.1	11.4	103.3	56	0.52	22,492	0.018	0.62
Franklin Autobody												
Total Site Info	2.08	90,733	3.01	7	2.2	23.0	209.0	50	1.04	45,513	0.035	1.25
Freehold Regional High School District Administration												
Total Site Info	1.79	78,048	12	10.02	2.6	26.8	243.5	68	1.22	53,034	0.041	1.45
Knights of Columbus												
Total Site Info	1.22	53,218	2	12	1.4	14.4	130.8	54	0.65	28,478	0.022	0.78
Manalapan-Englishtown Regional School Administration												
Total Site Info	2.34	101,896	12	9,10.01	4.2	43.6	396.5	85	1.98	86,360	0.067	2.37
Our Lady of Mercy Church												
Total Site Info	1.01	43,802	11	1	1.1	11.9	107.9	54	0.54	23,491	0.018	0.64
Santander Bank												
Total Site Info	0.68	29,531	4	21	1.2	12.5	113.2	84	0.57	24,662	0.019	0.68
WEAMACONK CREEK AND MANALAPAN BROOK SUBWATERSHED	**1.36**	**59,235**			**1.4**	**14.9**	**135.5**		**0.68**	**29,523**	**0.023**	**0.81**
Astaana-e-Zehra Ahle Baith Foundation, Inc.												
Total Site Info	1.36	59,235	1	1.01A	1.4	14.9	135.5	50	0.68	29,523	0.023	0.81

e. 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 %
	MATCHAPONIX BROOK AND MCGELLAIRDS BROOK SUBWATERSHED	**4,000**	**0.09**	**0.104**	**17**	**7,899**	**0.30**	**1,000**			**$5,000**	**3.8%**
1	**Oxford Crossing Town Homes**											
	Bioretention systems/rain gardens	4,000	0.09	0.104	17	7,899	0.30	1,000	5	SF	$5,000	3.8%
	Total Site Info	**4,000**	**0.09**	**0.104**	**17**	**7,899**	**0.30**	**1,000**			**$5,000**	**3.8%**
	MCGELLAIRDS BROOK SUBWATERSHED	**43,300**	**0.99**	**1.128**	**189**	**85,466**	**3.21**	**12,000**			**$300,000**	**37.7%**
2	**Village Center Mall**											
	Pervious pavements	25,000	0.57	0.651	109	49,346	1.85	7,200	25	SF	$180,000	36.3%
	Total Site Info	**25,000**	**0.57**	**0.651**	**109**	**49,346**	**1.85**	**7,200**			**$180,000**	**36.3%**
3	**Walgreens**											
	Pervious pavements	18,300	0.42	0.477	80	36,121	1.36	4,800	25	SF	$120,000	40.0%
	Total Site Info	**18,300**	**0.42**	**0.477**	**80**	**36,121**	**1.36**	**4,800**			**$120,000**	**40.0%**
	MCGELLAIRDS BROOK AND WEAMACONK CREEK SUBWATERSHED	**23,000**	**0.53**	**0.599**	**100**	**45,404**	**1.70**	**6,600**			**$113,000**	**45.8%**
4	**Reverend Charles R. Valentine Parish Center**											
	Bioretention systems/rain gardens	11,200	0.26	0.292	49	22,111	0.83	2,600	5	SF	$13,000	22.3%
	Pervious pavements	11,800	0.27	0.307	51	23,293	0.87	4,000	25	SF	$100,000	23.5%
	Total Site Info	**23,000**	**0.53**	**0.599**	**100**	**45,404**	**1.70**	**6,600**			**$113,000**	**45.8%**
	WEAMACONK CREEK SUBWATERSHED	**142,000**	**3.26**	**3.700**	**619**	**278,162**	**10.55**	**41,250**			**$774,250**	**24.5%**
5	**Agway Garden Center**											
	Bioretention systems/rain gardens	7,800	0.18	0.203	34	15,394	0.58	3,000	5	SF	$15,000	20.8%
	Total Site Info	**7,800**	**0.18**	**0.203**	**34**	**15,394**	**0.58**	**3,000**			**$15,000**	**20.8%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential	TSS Removal Potential	Max Volume Reduction Potential	Peak Discharge Reduction Potential	Size of BMP	Unit Cost	Unit	Total Cost	I.C. Treated
		Area (SF)	Area (ac)	(Mgal/yr)	(lbs/yr)	(gal/storm)	(cfs)	(SF)	($)		($)	%
6	**Crossroads Assembly of God**											
	Pervious pavements	19,000	0.44	0.495	83	37,505	1.41	5,900	25	SF	$147,500	61.8%
	Total Site Info	**19,000**	**0.44**	**0.495**	**83**	**37,505**	**1.41**	**5,900**			**$147,500**	**61.8%**
7	**Englishtown Fire Department**											
	Rainwater harvesting systems	2,100	0.05	0.055	9	2,000	0.16	2,000	2	gal	$4,000	1.1%
	Total Site Info	**2,100**	**0.05**	**0.055**	**9**	**2,000**	**0.16**	**2,000**			**$4,000**	**1.1%**
8	**Englishtown Police Department and Municipal Building**											
	Bioretention systems/rain gardens	800	0.02	0.021	3	1,578	0.06	250	5	SF	$1,250	2.4%
	Pervious pavements	6,900	0.16	0.180	30	13,621	0.51	2,200	25	SF	$55,000	20.8%
	Total Site Info	**7,700**	**0.18**	**0.201**	**34**	**15,199**	**0.57**	**2,450**			**$56,250**	**23.3%**
9	**First Presbyterian Church of Englishtown**											
	Bioretention systems/rain gardens	1,500	0.03	0.039	7	2,962	0.11	700	5	SF	$3,500	6.7%
	Pervious pavements	4,800	0.11	0.125	21	9,477	0.36	1,100	25	SF	$27,500	21.3%
	Total Site Info	**6,300**	**0.14**	**0.164**	**27**	**12,439**	**0.47**	**1,800**			**$31,000**	**28.0%**
10	**Franklin Autobody**											
	Bioretention systems/rain gardens	7,100	0.16	0.185	31	14,018	0.53	1,900	5	SF	$9,500	15.6%
	Total Site Info	**7,100**	**0.16**	**0.185**	**31**	**14,018**	**0.53**	**1,900**			**$9,500**	**15.6%**
11	**Freehold Regional High School District Administration**											
	Bioretention systems/rain gardens	8,600	0.20	0.224	38	16,980	0.64	1,500	5	SF	$7,500	16.2%
	Pervious pavements	20,500	0.47	0.534	89	40,467	1.52	5,700	25	SF	$142,500	38.7%
	Total Site Info	**29,100**	**0.67**	**0.758**	**127**	**57,446**	**2.16**	**7,200**			**$150,000**	**54.9%**
12	**Knights of Columbus**											
	Bioretention systems/rain gardens	2,300	0.05	0.060	10	4,540	0.17	700	5	SF	$3,500	8.1%
	Pervious pavements	16,000	0.37	0.417	70	31,581	1.19	5,000	25	SF	$125,000	56.2%
	Total Site Info	**18,300**	**0.42**	**0.477**	**80**	**36,121**	**1.36**	**5,700**			**$128,500**	**64.3%**
13	**Manalapan-Englishtown Regional School Administration**											
	Bioretention systems/rain gardens	7,000	0.16	0.182	31	13,816	0.52	1,800	5	SF	$9,000	8.1%
	Pervious pavements	6,400	0.15	0.167	28	12,634	0.47	1,100	25	SF	$27,500	7.4%
	Total Site Info	**13,400**	**0.31**	**0.349**	**58**	**26,449**	**0.99**	**2,900**			**$36,500**	**15.5%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		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 %
		Area (SF)	Area (ac)									
14	**Our Lady of Mercy Church**											
	Bioretention systems/rain gardens	2,800	0.06	0.073	12	5,528	0.21	700	5	SF	$3,500	11.9%
	Pervious pavements	18,700	0.43	0.487	82	36,914	1.39	3,800	25	SF	$95,000	79.6%
	Total Site Info	**21,500**	**0.49**	**0.560**	**94**	**42,442**	**1.60**	**4,500**			**$98,500**	**91.5%**
15	**Santander Bank**											
	Pervious pavements	9,700	0.22	0.253	42	19,149	0.72	3,900	25	SF	$97,500	39.3%
	Total Site Info	**9,700**	**0.22**	**0.253**	**42**	**19,149**	**0.72**	**3,900**			**$97,500**	**39.3%**
	WEAMACONK CREEK AND MANALAPAN BROOK SUBWATERSHED	**8,400**	**0.19**	**0.219**	**37**	**16,583**	**0.62**	**3,500**			**$83,500**	**28.5%**
16	**Astaana-e-Zehra Ahle Baith Foundation, Inc.**											
	Bioretention systems/rain gardens	800	0.02	0.021	3	1,578	0.06	200	5	SF	$1,000	2.7%
	Pervious pavements	7,600	0.17	0.198	33	15,005	0.56	3,300	25	SF	$82,500	25.7%
	Total Site Info	**8,400**	**0.19**	**0.219**	**37**	**16,583**	**0.62**	**3,500**			**$83,500**	**28.5%**