RUTGERS
New Jersey Agricultural
Experiment Station

Draft

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

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

December 17, 2018

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Introduction

Located in Burlington County, New Jersey, Pemberton Township covers approximately 62.8 square miles. Figures 1 and 2 illustrate that Pemberton Township is dominated by wetlands. A total of 15.1% of the municipality's land use is classified as urban. Of the urban land in Pemberton 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 Pemberton 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 Pemberton Township. Based upon the 2012 NJDEP land use/land cover data, approximately 4.5% of Pemberton Township has impervious cover. This level of impervious cover suggests that the streams in Pemberton Township are sensitive streams. [1]

Methodology

Pemberton Township contains portions of eleven 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.

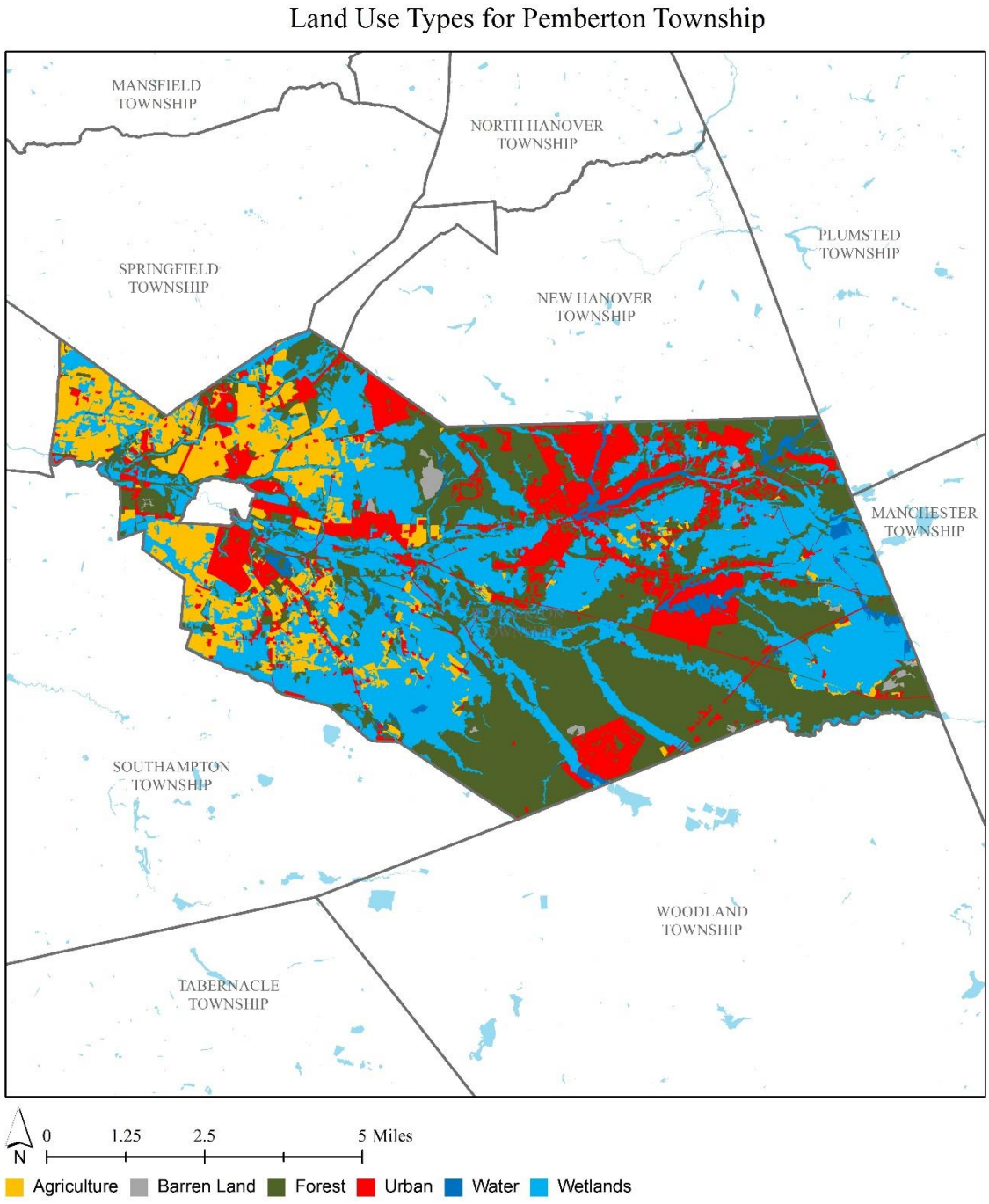


Figure 1: Map illustrating the land use in Pemberton Township

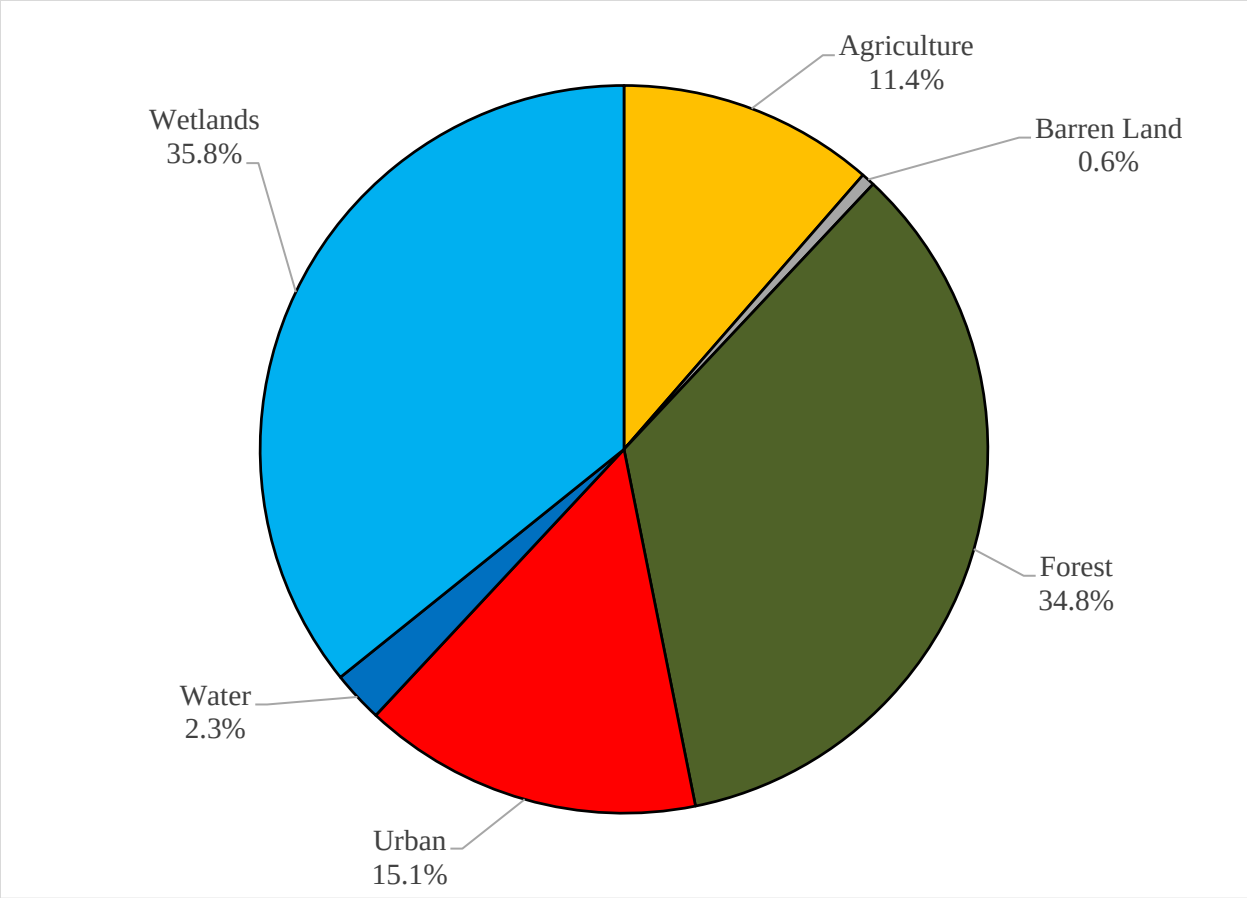


Figure 2: Pie chart illustrating the land use in Pemberton Township

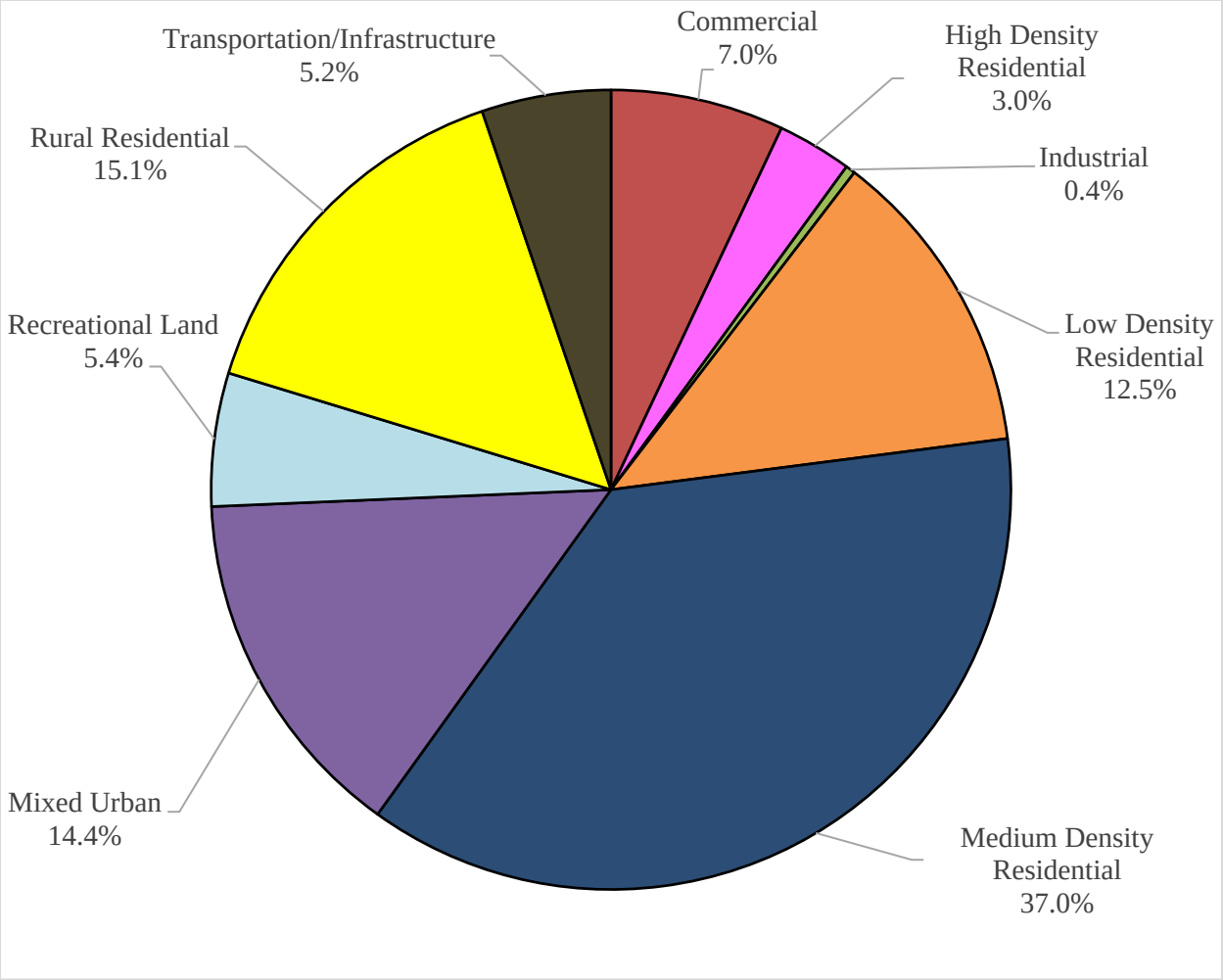


Figure 3: Pie chart illustrating the various types of urban land use in Pemberton Township

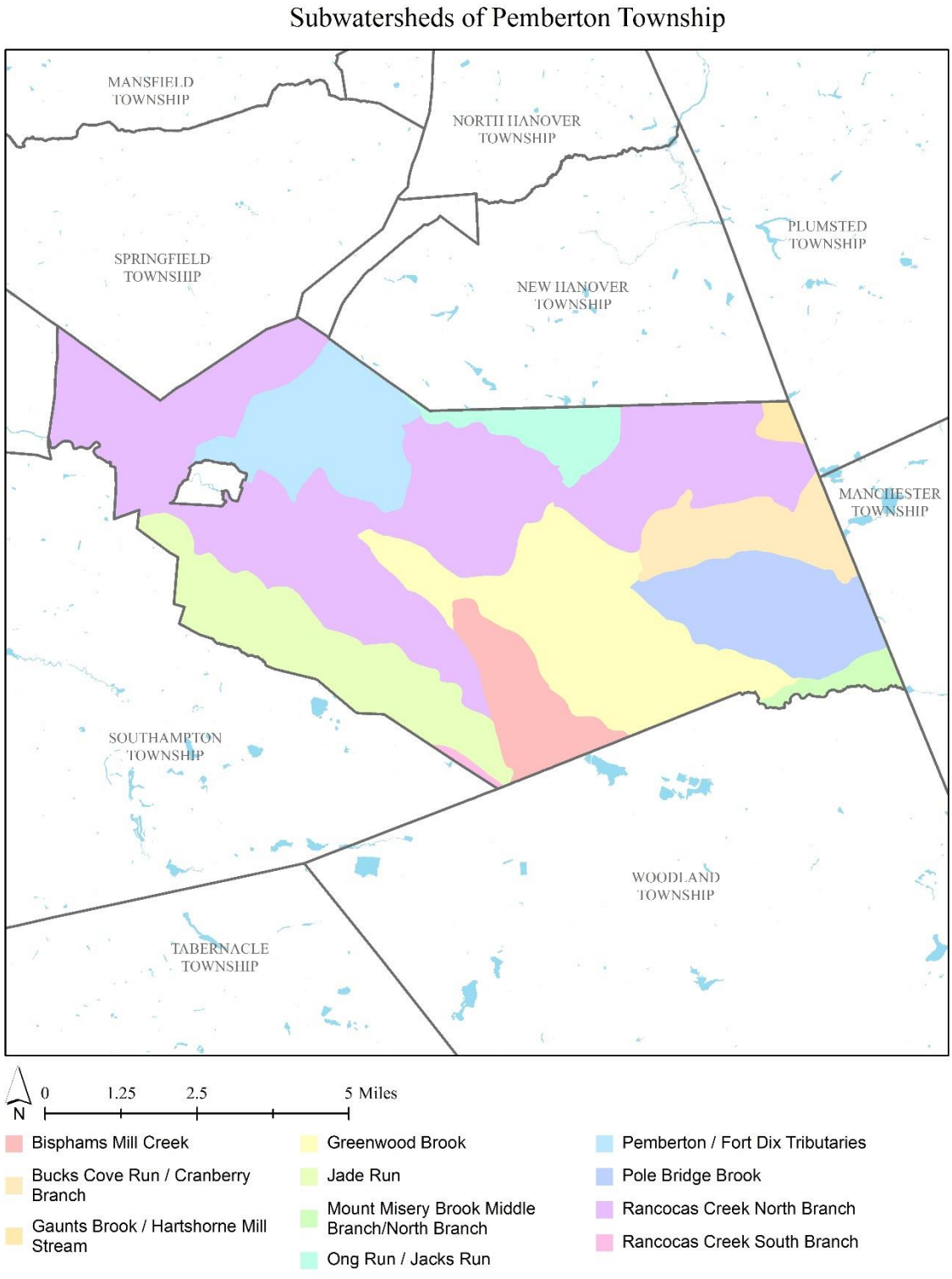


Figure 4: Map of the subwatersheds in Pemberton Township

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 Pemberton 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 Pemberton 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*.

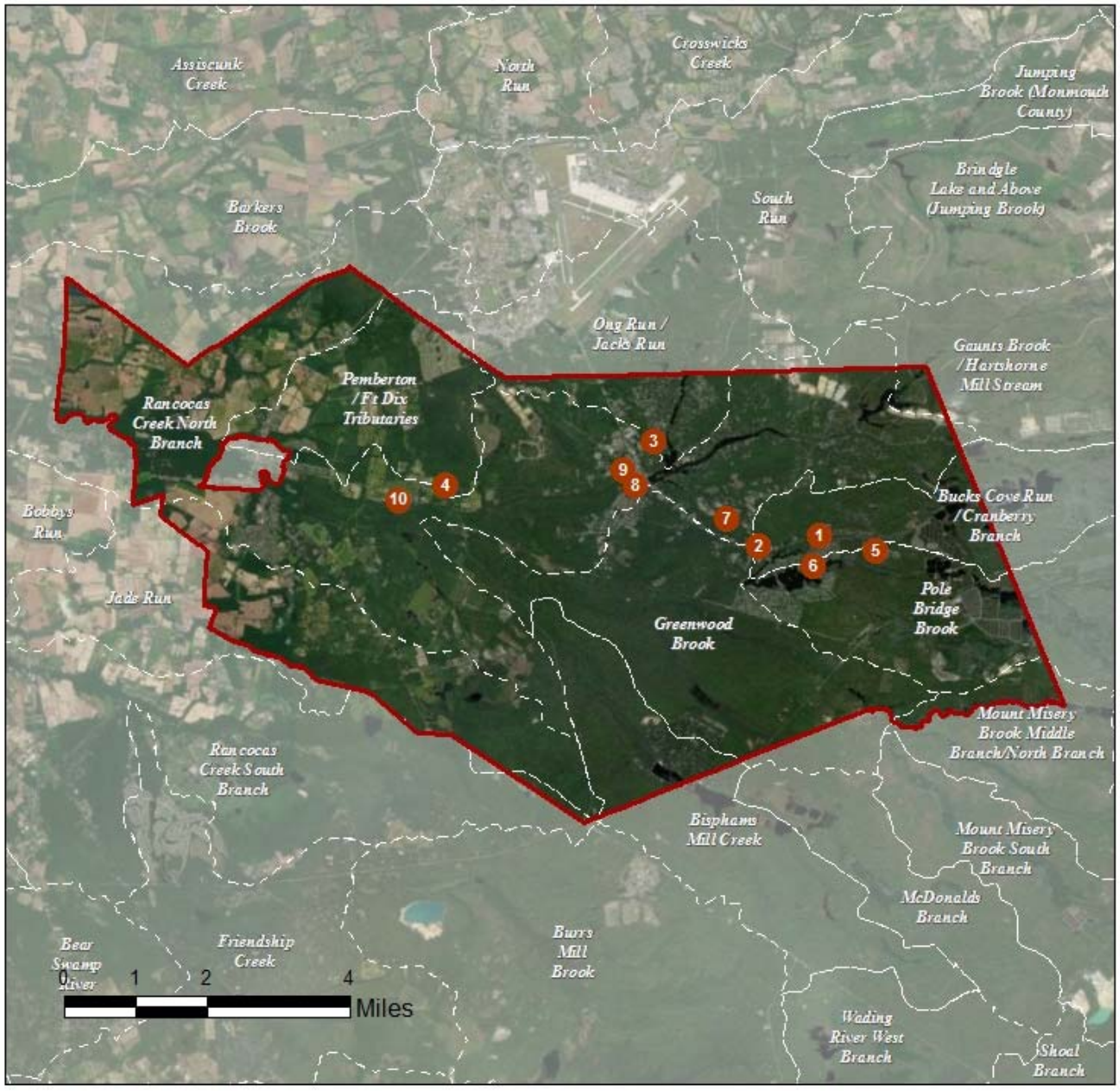
Conclusion

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

PEMBERTON TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BUCKS COVE RUN/CRANBERRY BRANCH SUBWATERSHED

1. Kingdom Hall of Jehovah's Witnesses

2. St. Mark Baptist Church

SITES WITHIN THE ONG RUN/JACKS RUN SUBWATERSHED

3. Pemberton Community Library

SITES WITHIN THE PEMBERTON/FORT DIX TRIBUTARIES SUBWATERSHED

4. Pemberton Township Municipal Building

SITES WITHIN THE POLE BRIDGE BROOK SUBWATERSHED

5. Friendship AME Church

6. Pemberton Township Recreation Department

SITES WITHIN THE RANCOCAS CREEK NORTH BRANCH SUBWATERSHED

7. Korean Baptist Church

8. Pemberton Post Office

9. Pemberton Township Senior Center

10. Rowan College at Burlington County – Pemberton Campus

b. Proposed Green Infrastructure Concepts

Kingdom Hall of Jehovah's Witnesses

Subwatershed: Bucks Cove Run

Site Area: 64,432 sq. ft.

Address: 649 Lakehurst Road
Browns Mills, NJ 08015

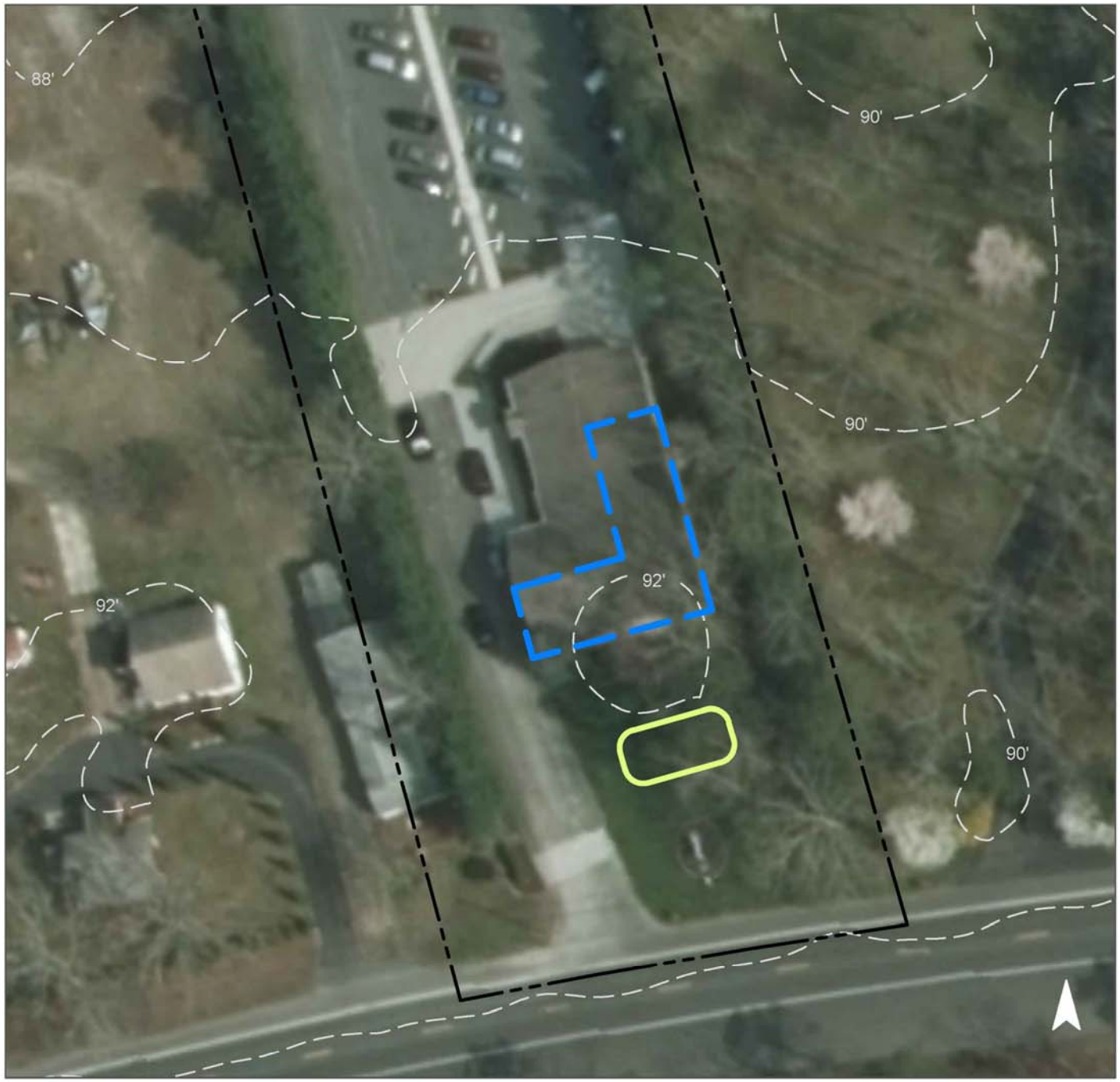
Block and Lot: Block 894, Lot 53, 54.01

A rain garden can be installed in the turfgrass in front of the church when entering from the main road to capture, treat, and infiltrate stormwater runoff from the roof. 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	38,755	1.9	19.6	177.9	0.030	1.06

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.066	11	4,810	0.18	630	$3,150

GREEN INFRASTRUCTURE RECOMMENDATIONS



Kingdom Hall of Jehovah's Witnesses

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

0 25' 50'

St. Mark Baptist Church

Subwatershed: Bucks Cove Run

Site Area: 211,545 sq. ft.

Address: 545 Lakehurst Road
Browns Mills, NJ 08015

Block and Lot: Block 894, Lot 1.01

A rain garden can be installed in the turfgrass in front of the main entrance to capture, treat, and infiltrate stormwater runoff from the roof and pavement. Another rain garden can be installed in the turfgrass in the back of the church near the parking lot to capture, treat, and infiltrate stormwater runoff from the roof. 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"
47	98,701	4.8	49.8	453.2	0.077	2.71

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	0.433	72	31,740	1.19	4,150	$20,750

GREEN INFRASTRUCTURE RECOMMENDATIONS

St. Mark Baptist Church

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

0 25' 50'

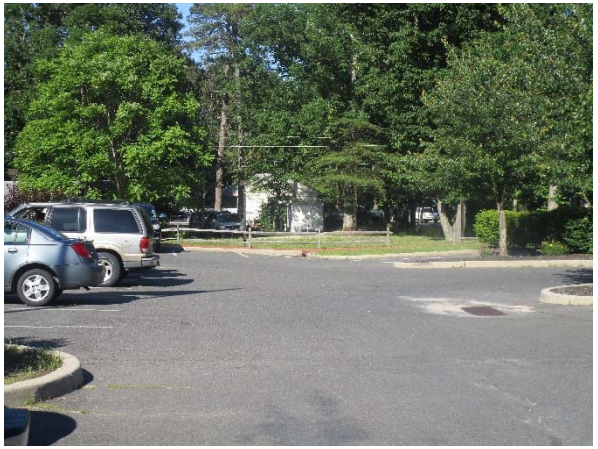
Pemberton Community Library

Subwatershed: Ong Run / Jacks Run

Site Area: 184,259 sq. ft.

Address: 16 Broadway Street
Browns Mills, NJ 08015

Block and Lot: Block 530, Lots 11.12, 11.13

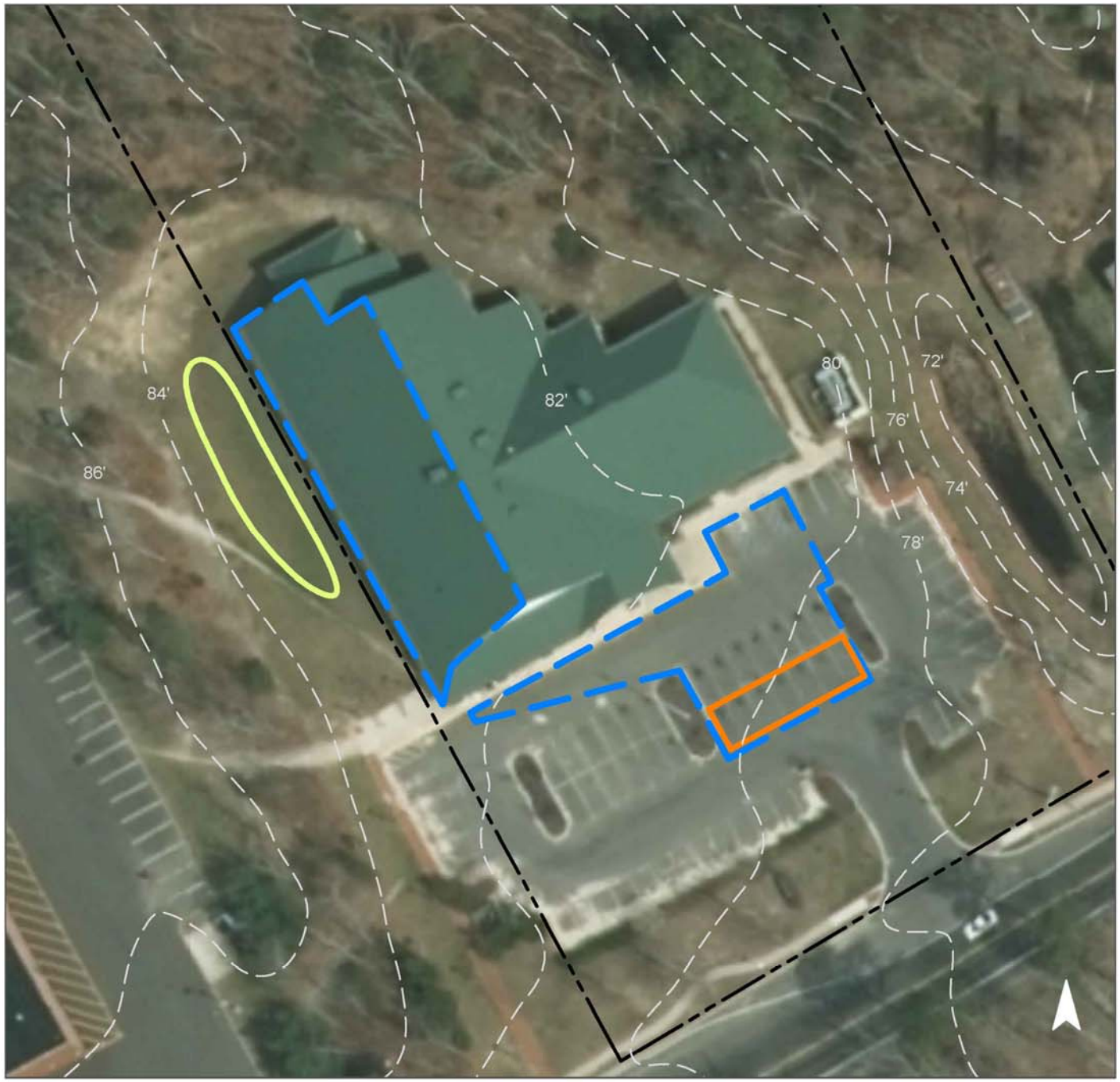


A rain garden can be installed in the turfgrass area west of the building to capture, treat, and infiltrate stormwater runoff from the roof. Parking spots on the east side of the lot closest to the entrance from the road can be converted into pervious pavement to allow stormwater flowing from the pavement to slowly infiltrate into the ground. 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"
30	54,858	2.6	27.7	251.9	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	0.195	33	14,340	0.54	1,875	$9,375
Pervious pavement	0.274	46	20,090	0.76	1,080	$27,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pemberton Community Library

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

0 30' 60'

Pemberton Township Municipal Building

Subwatershed: Pemberton / Ft. Dix Tributaries

Site Area: 391,028 sq. ft.

Address: 500 Pemberton Browns Mills Road
Pemberton, NJ 08068

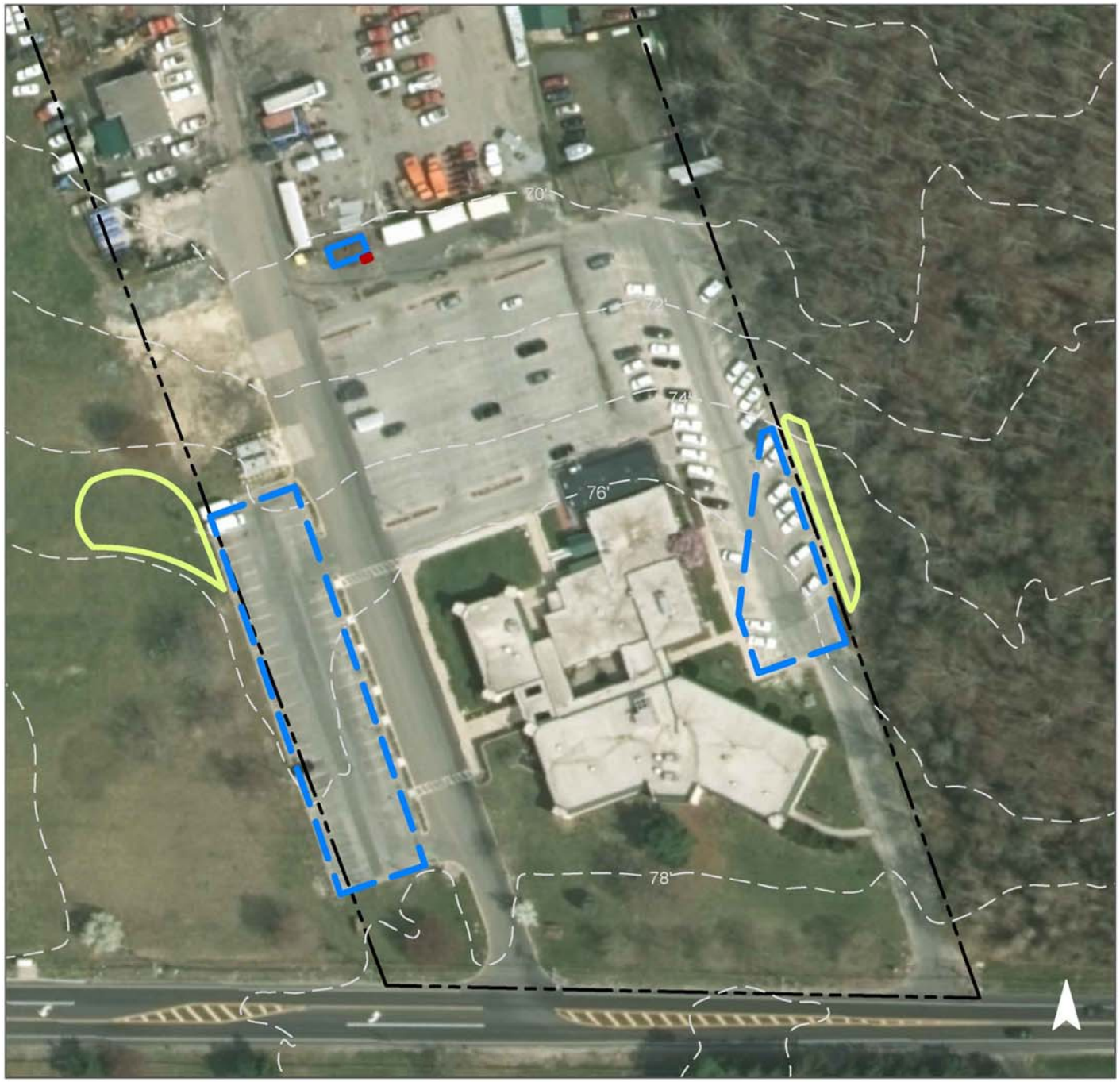
Block and Lot: Block 812, Lot 9.02

Rain gardens can be installed in turfgrass at the edges of the parking lots to capture, treat, and infiltrate stormwater runoff from the parking lots. A planter box can be installed on the shed in the back parking lot to provide an opportunity to beneficially reuse rooftop runoff as a demonstration project. 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"
57	224,790	10.8	113.5	1,032.1	0.175	6.17

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	0.558	93	40,920	1.54	5,350	$26,750
Planter box	n/a	1	n/a	n/a	1 (box)	$1,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pemberton Township Municipal Building

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

0 50' 100'

Friendship AME Church

Subwatershed: Pole Bridge Brook

Site Area: 84,395 sq. ft.

Address: 711 Lakehurst Road
Browns Mills, NJ 08015

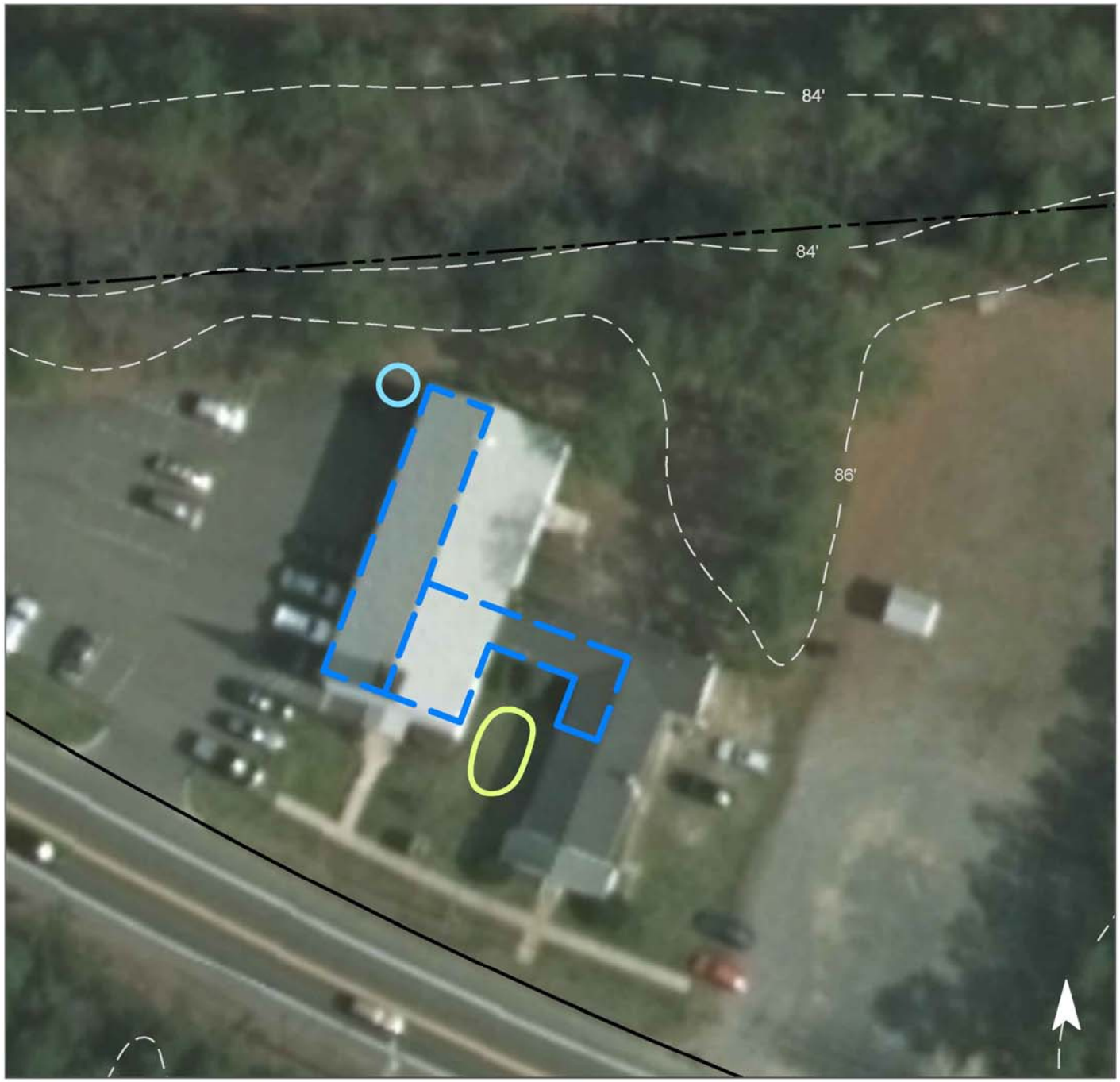
Block and Lot: Block 896, Lots 12, 13

A rain garden can be installed in the front of the building to capture, treat, and infiltrate rooftop runoff. A cistern can be installed along the building to reduce flooding by capturing rooftop runoff, which can later be reused for washing cars or watering 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"
32	26,895	1.3	13.6	123.5	0.021	0.74

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	0.030	5	2,210	0.08	290	$1,450
Rainwater harvesting	0.035	6	1,000	0.04	1,000 (gal)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Friendship AME Church

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

0 20' 40'

Pemberton Township Recreation Department

Subwatershed: Pole Bridge Brook

Site Area: 32,648 sq. ft.

Address: 69 Tensaw Drive
Browns Mills, NJ 08015

Block and Lot: Block 648, Lot 16.02

A rain garden can be installed at the east side of the building closest to the handicap parking spaces to allow stormwater runoff from the roof to infiltrate the ground and reduce the amount of 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"
30	9,794	0.5	4.9	45.0	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	0.036	6	2,620	0.10	345	$1,725

GREEN INFRASTRUCTURE RECOMMENDATIONS

Pemberton Township Recreation Department

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

0 15' 30'

Korean Baptist Church

Subwatershed: Rancocas Creek North Branch

Site Area: 241,196 sq. ft.

Address: 535 Lakehurst Road
Browns Mills, NJ 08015

Block and Lot: Block 857, Lot 21

A section of parking spaces can be converted into pervious pavement to allow the stormwater runoff from the roof and pavement to infiltrate into the ground. 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"
29	69,665	3.4	35.2	319.9	0.054	1.91

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
Pervious pavement	0.380	64	27,920	1.05	3,650	$89,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Korean Baptist Church

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

0 20' 40'

Pemberton Post Office

Subwatershed: Rancocas Creek North Branch

Site Area: 35,498 sq. ft.

Address: 27 Dearborn Avenue
Browns Mills, NJ 08015

Block and Lot: Blocks 540 (Lots 15-27) & 541 (Lots 1 & 61)

Parking spaces in front of the building can be converted into pervious pavement to allow the stormwater runoff from the road, roof, and parking lot to infiltrate the ground. The current conditions of the parking lot are poor; there are visible signs of erosion due to stormwater and cracking through the area. 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"
66	23,467	1.1	11.9	107.7	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
Pervious pavement	0.158	26	11,560	0.43	1,080	$27,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Pemberton Post Office

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

0 15' 30'

Pemberton Township Senior Center

Subwatershed: Rancocas Creek North Branch

Site Area: 31,807 sq. ft.

Address: 300 Brook Street
Browns Mills, NJ 08015

Block and Lot: Block 537, Lots 2-14

A rain garden can be installed in the turfgrass on the east side of the building to allow the stormwater runoff from the roof to infiltrate the ground. The strip of parking spaces on the far east side of the building can be converted into pervious pavement to capture and allow the stormwater from the roof and pavement to infiltrate into the ground. 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	27,036	1.3	13.7	124.1	0.021	0.74

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	1,680	0.06	220	$1,100
Pervious pavement	0.314	53	23,020	0.86	2,150	$53,750

GREEN INFRASTRUCTURE RECOMMENDATIONS

Pemberton Township Senior Center

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

0 15' 30'

Rowan College at Burlington County - Pemberton Campus

Subwatershed: Rancocas Creek North Branch

Site Area: 7,627,762 sq. ft.

Address: 601 Pemberton Browns Mills Road
Pemberton, NJ 08068

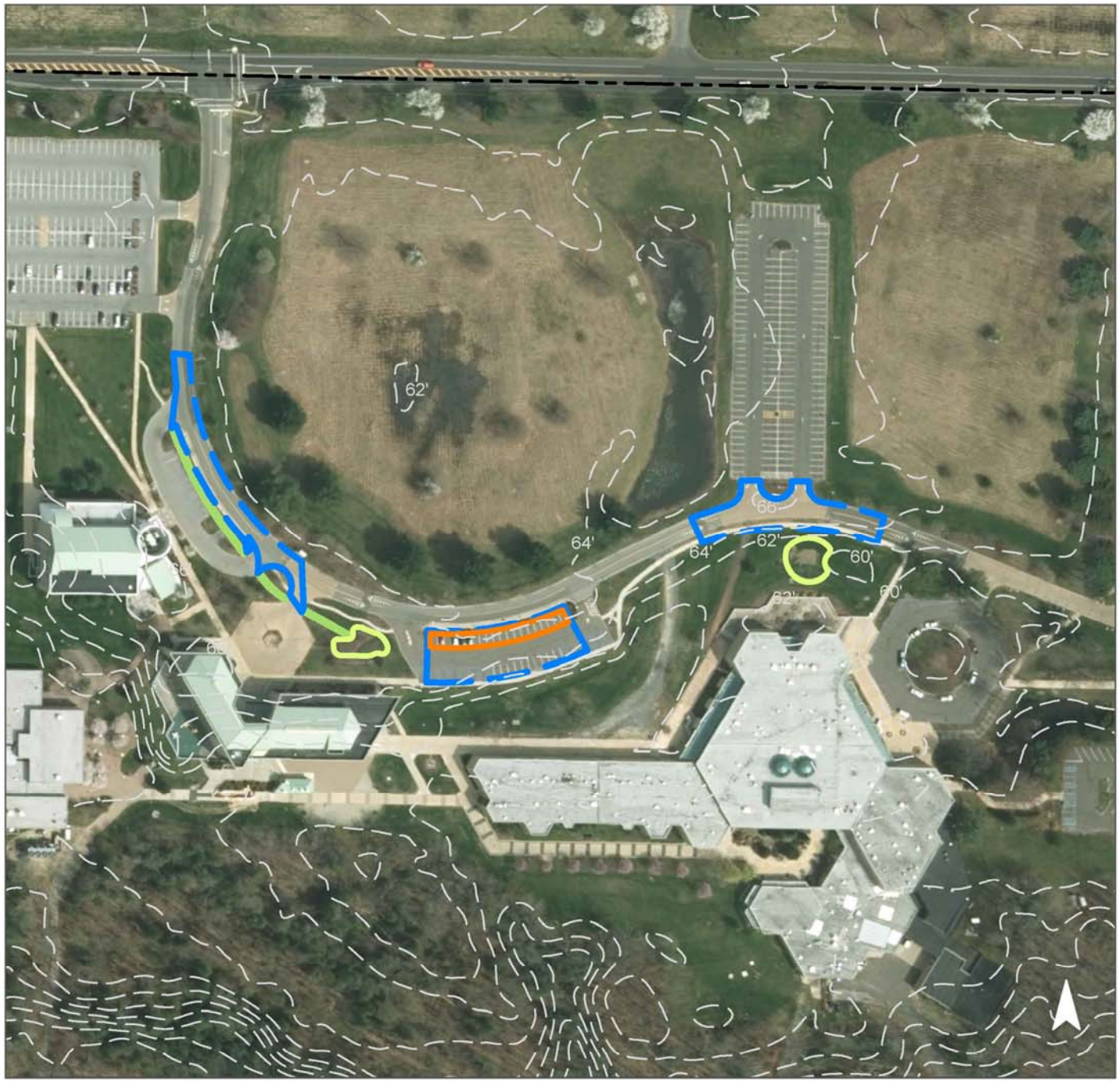
Block and Lot: Block 843, Lot 10

A rain garden can be created in front of the north entrance to the Lewis M. Parker College Center to capture stormwater runoff from the roadway and sidewalk. A bioswale can be enhanced off of the sidewalk in the depressed area starting from the William K. McDaniel Integrated Learning Resource Center stretching to the Visitor Parking Lot #3. A rain garden can be installed at the end of the bioswale to capture excess runoff. A section of parking spaces can be converted to porous pavement to capture and infiltrate runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
16	1,212,971	58	613	5,569	0.945	33

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	0.336	56	24,660	0.93	3,300	$16,500
Bioswale	0.065	11	4,623	0.20	1,200	$6,000
Pervious pavement	0.347	58	25,420	0.96	3,400	$85,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Rowan College at Burlington County - Pemberton Campus

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

0 100' 200'

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)
	BUCKS COVE RUN / CRANBERRY BRANCH SUBWATERSHED	**6.34**	**275,977**				**3.16**	**137,456**	**6.6**	**69.4**	**631.1**	**0.107**	**3.77**
1	**Kingdom Hall of Jehovah's Witnesses**												
	Total Site Info	1.48	64,432	894	53, 54.01	60	0.89	38,755	1.9	19.6	177.9	0.030	1.06
2	**St. Mark Baptist Church**												
	Total Site Info	4.86	211,545	894	1.01	47	2.27	98,701	4.8	49.8	453.2	0.077	2.71
	ONG RUN / JACKS RUN SUBWATERSHED	**4.23**	**184,259**				**1.26**	**54,858**	**2.6**	**27.7**	**251.9**	**0.043**	**1.50**
3	**Pemberton Community Library**												
	Total Site Info	4.23	184,259	530	11.13	30	1.26	54,858	2.6	27.7	251.9	0.043	1.50
	PEMBERTON / FORT DIX TRIBUTARIES SUBWATERSHED	**8.98**	**391,028**				**5.16**	**224,790**	**10.8**	**113.5**	**1,032.1**	**0.175**	**6.17**
4	**Pemberton Borough Municipal Building**												
	Total Site Info	8.98	391,028	812	9.02	57	5.16	224,790	10.8	113.5	1,032.1	0.175	6.17
	POLE BRIDGE BROOK SUBWATERSHED	**2.69**	**117,044**				**0.84**	**36,690**	**1.8**	**18.5**	**168.5**	**0.029**	**1.01**
5	**Friendship AME Church**												
	Total Site Info	1.94	84,395	896	12,13	32	0.62	26,895	1.3	13.6	123.5	0.021	0.74
6	**Pemberton Township Recreation Department**												
	Total Site Info	0.75	32,648	648	16.02	30	0.22	9,794	0.5	4.9	45.0	0.008	0.27
	RANCOCAS CREEK NORTH BRANCH SUBWATERSHED	**182.19**	**7,936,263**				**30.60**	**1,333,140**	**64.3**	**673.3**	**6,120.9**	**1.039**	**36.56**
7	**Korean Baptist Church**												
	Total Site Info	5.54	241,196	857	21	29	1.60	69,665	3.4	35.2	319.9	0.054	1.91
8	**Pemberton Post Office**												
	Total Site Info	0.81	35,498	540,541	1,15-27,61	66	0.54	23,467	1.1	11.9	107.7	0.018	0.64

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)
9	**Pemberton Township Senior Center**												
	Total Site Info	0.73	31,807	537	2-14	85	0.62	27,036	1.3	13.7	124.1	0.021	0.74
10	**Rowan College at Burlington County - Pemberton Campus**												
	Total Site Info	175.11	7,627,762	843	10	16	27.85	1,212,971	58.5	612.6	5,569.2	0.945	33.27

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 %
	BUCKS COVE RUN / CRANBERRY BRANCH SUBWATERSHED	**19,115**	**0.44**	**0.498**	**83**	**36,550**	**1.37**				**$23,900**	**13.9%**
1	**Kingdom Hall of Jehovah's Witnesses**											
	Bioretention system	2,515	0.06	0.066	11	4,810	0.18	630	$5	SF	$3,150	6.5%
	Total Site Info	**2,515**	**0.06**	**0.066**	**11**	**4,810**	**0.18**				**$3,150**	**6.5%**
2	**St. Mark Baptist Church**											
	Bioretention systems	16,600	0.38	0.433	72	31,740	1.19	4,150	$5	SF	$20,750	16.8%
`	**Total Site Info**	**16,600**	**0.38**	**0.433**	**72**	**31,740**	**1.19**				**$20,750**	**16.8%**
	ONG RUN / JACKS RUN SUBWATERSHED	**18,010**	**0.41**	**0.469**	**79**	**34,430**	**1.30**				**$36,375**	**32.8%**
3	**Pemberton Community Library**											
	Bioretention system	7,500	0.17	0.195	33	14,340	0.54	1,875	$5	SF	$9,375	13.7%
	Pervious pavement	10,510	0.24	0.274	46	20,090	0.76	1,080	$25	SF	$27,000	19.2%
	Total Site Info	**18,010**	**0.41**	**0.469**	**79**	**34,430**	**1.30**				**$36,375**	**32.8%**
	PEMBERTON / FORT DIX TRIBUTARIES SUBWATERSHED	**21,615**	**0.50**	**0.558**	**94**	**40,920**	**1.54**				**$27,750**	**9.6%**
4	**Pemberton Township Municipal Building**											
	Bioretention systems	21,400	0.49	0.558	93	40,920	1.54	5,350	$5	SF	$26,750	9.5%
	Planter box	215	0.00	n/a	1	n/a	n/a	1	$1,000	box	$1,000	0.1%
	Total Site Info	**21,615**	**0.50**	**0.558**	**94**	**40,920**	**1.54**				**$27,750**	**9.6%**
	POLE BRIDGE BROOK SUBWATERSHED	**3,890**	**0.09**	**0.101**	**17**	**5,830**	**0.22**				**$5,175**	**10.6%**
5	**Friendship AME Church**											
	Bioretention system	1,160	0.03	0.030	5	2,210	0.08	290	$5	SF	$1,450	4.3%
	Rainwater harvesting	1,360	0.03	0.035	6	1,000	0.04	1,000	$2	gal	$2,000	5.1%
	Total Site Info	**2,520**	**0.06**	**0.066**	**11**	**3,210**	**0.12**				**$3,450**	**9.4%**
6	**Pemberton Township Recreation Department**											
	Bioretention system	1,370	0.03	0.036	6	2,620	0.10	345	$5	SF	$1,725	14.0%
	Total Site Info	**1,370**	**0.03**	**0.036**	**6**	**2,620**	**0.10**				**$1,725**	**14.0%**

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 %
	RANCOCAS CREEK NORTH BRANCH SUBWATERSHED	**62,270**	**1.43**	**1.622**	**272**	**118,883**	**4.49**				**$278,350**	**96.9%**
7	**Korean Baptist Church**											
	Pervious pavement	14,600	0.34	0.380	64	27,920	1.05	3,560	$25	SF	$89,000	21.0%
	Total Site Info	**14,600**	**0.34**	**0.380**	**64**	**27,920**	**1.05**				**$89,000**	**21.0%**
8	**Pemberton Post Office**											
	Pervious pavement	6,050	0.14	0.158	26	11,560	0.43	1,080	$25	SF	$27,000	25.8%
	Total Site Info	**6,050**	**0.14**	**0.158**	**26**	**11,560**	**0.43**				**$27,000**	**25.8%**
9	**Pemberton Township Senior Center**											
	Bioretention system	880	0.02	0.023	4	1,680	0.06	220	$5	SF	$1,100	3.3%
	Pervious pavement	12,040	0.28	0.314	53	23,020	0.86	2,150	$25	SF	$53,750	44.5%
	Total Site Info	**12,920**	**0.30**	**0.337**	**56**	**24,700**	**0.92**				**$54,850**	**47.8%**
10	**Rowan College at Burlington County - Pemberton Campus**											
	Bioretention systems	12,900	0.30	0.336	56	24,660	0.93	3,300	$5	SF	$16,500	1.06%
	Bioswale	2,500	0.06	0.065	11	4,623	0.20	1,200	$5	SF	$6,000	0.21%
	Pervious pavement	13,300	0.31	0.347	58	25,420	0.96	3,400	$25	SF	$85,000	1.1%
	Total Site Info	**28,700**	**0.66**	**0.748**	**125**	**54,703**	**2.09**				**$107,500**	**2.37%**