RUTGERS
New Jersey Agricultural Experiment Station

Draft

Impervious Cover Reduction Action Plan for Upper Pittsgrove Township, Salem County, New Jersey

Prepared for Upper Pittsgrove Township by the Rutgers Cooperative Extension Water Resources Program

January 28, 2019

Table of Contents

Introduction

Located in Salem County, Upper Pittsgrove Township covers approximately 40.4 square miles. Figures 1 and 2 illustrate that Upper Pittsgrove Township is dominated by agricultural land uses. A total of 8.9% of the municipality's land use is classified as urban. Of the urban land in Upper Pittsgrove Township, rural residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2012 land use/land cover geographical information system (GIS) data layer categorizes Upper Pittsgrove 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 Upper Pittsgrove Township. Based upon the 2012 NJDEP land use/land cover data, approximately 1.6% of Upper Pittsgrove Township has impervious cover. This level of impervious cover suggests that the streams in Upper Pittsgrove Township are sensitive streams. [1]

Methodology

Upper Pittsgrove Township contains portions of 10 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.

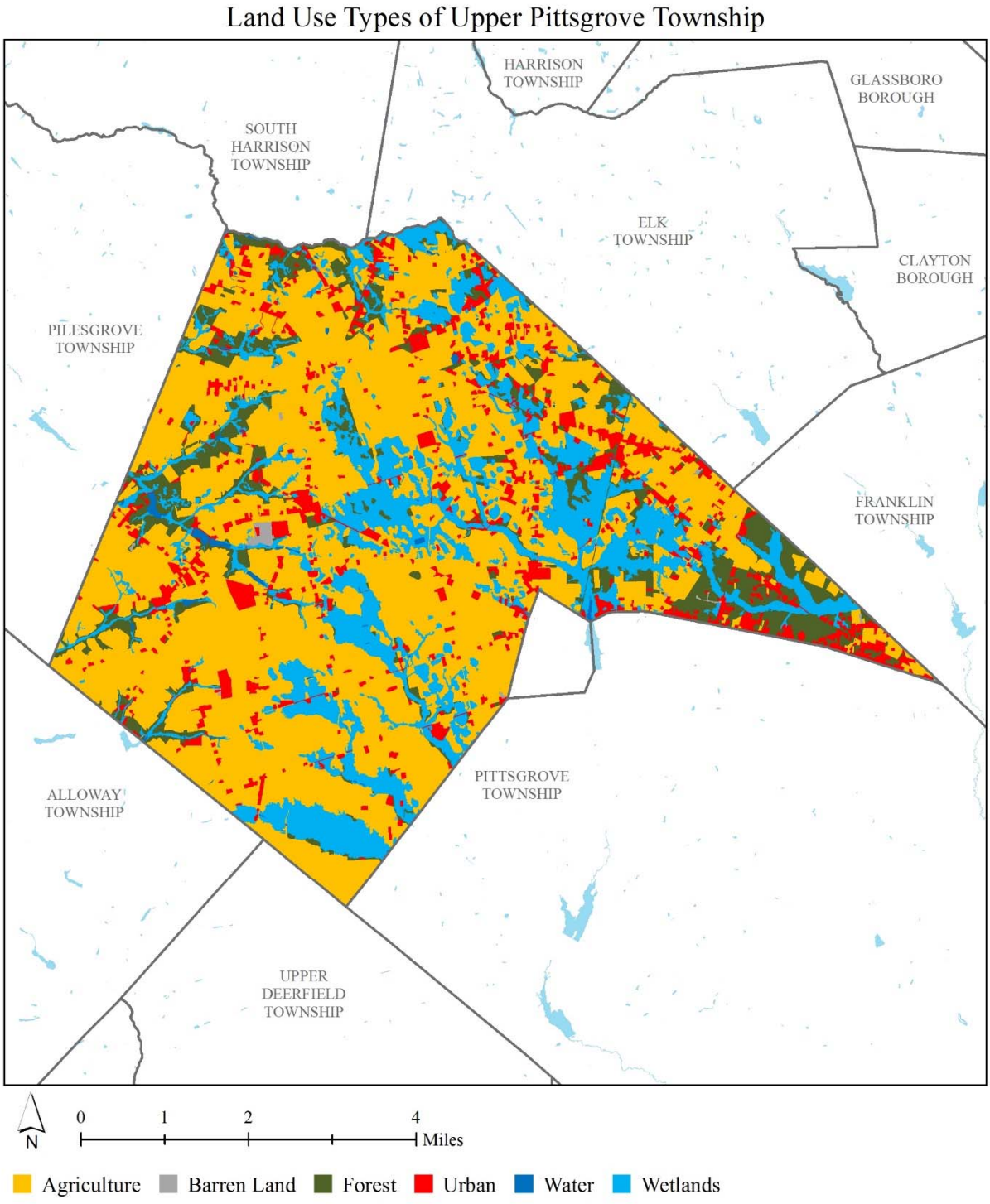


Figure 1: Map illustrating the land use in Upper Pittsgrove Township

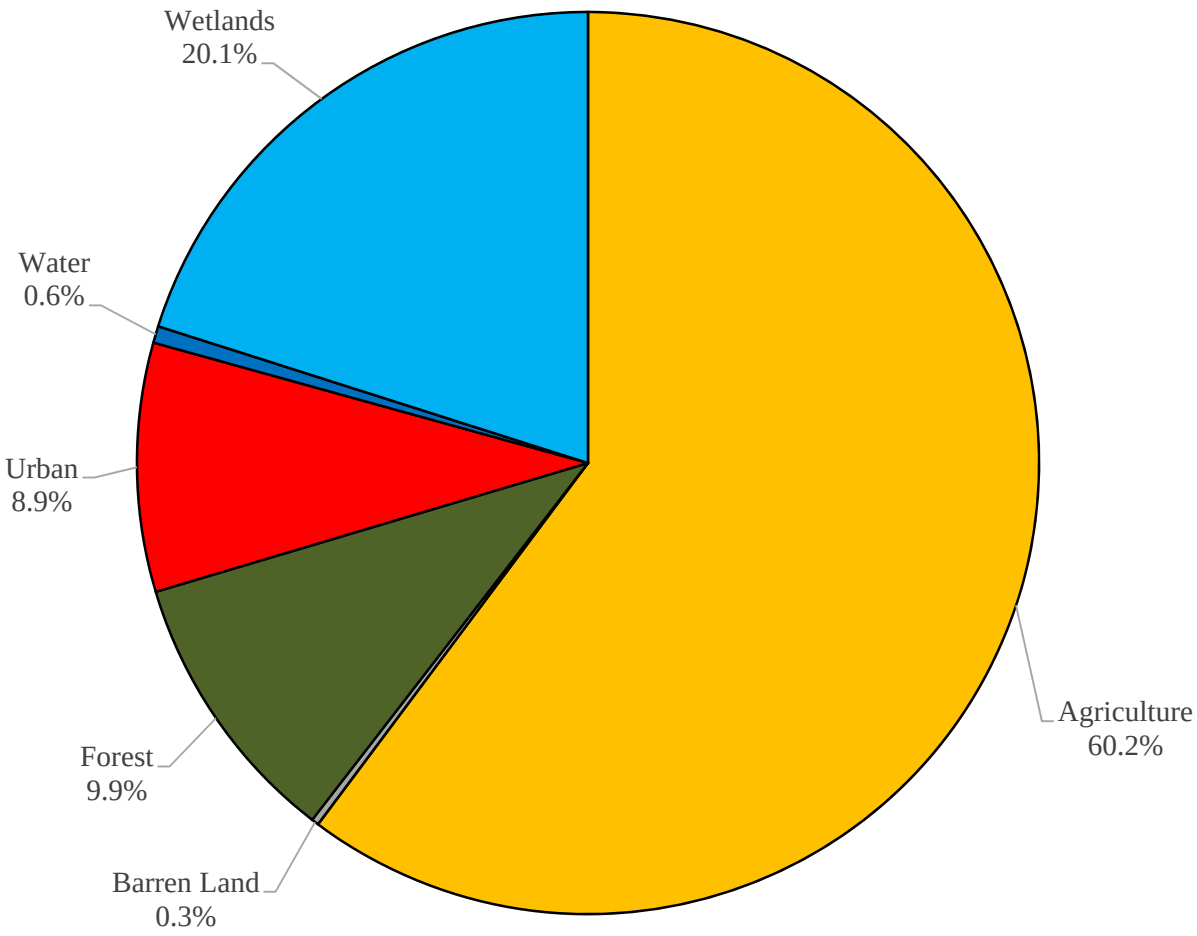


Figure 2: Pie chart illustrating the land use in Upper Pittsgrove Township

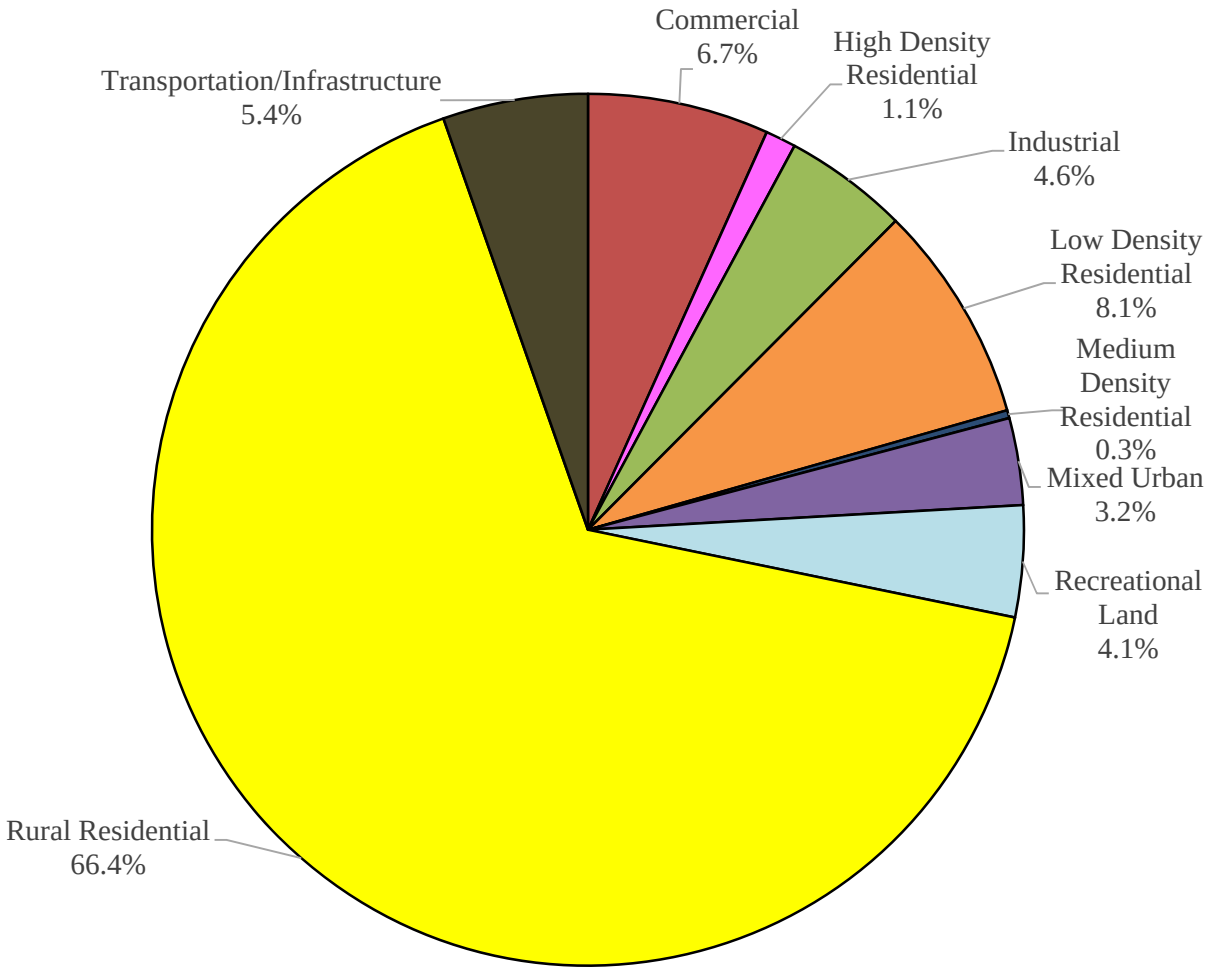


Figure 3: Pie chart illustrating the various types of urban land use in Upper Pittsgrove Township

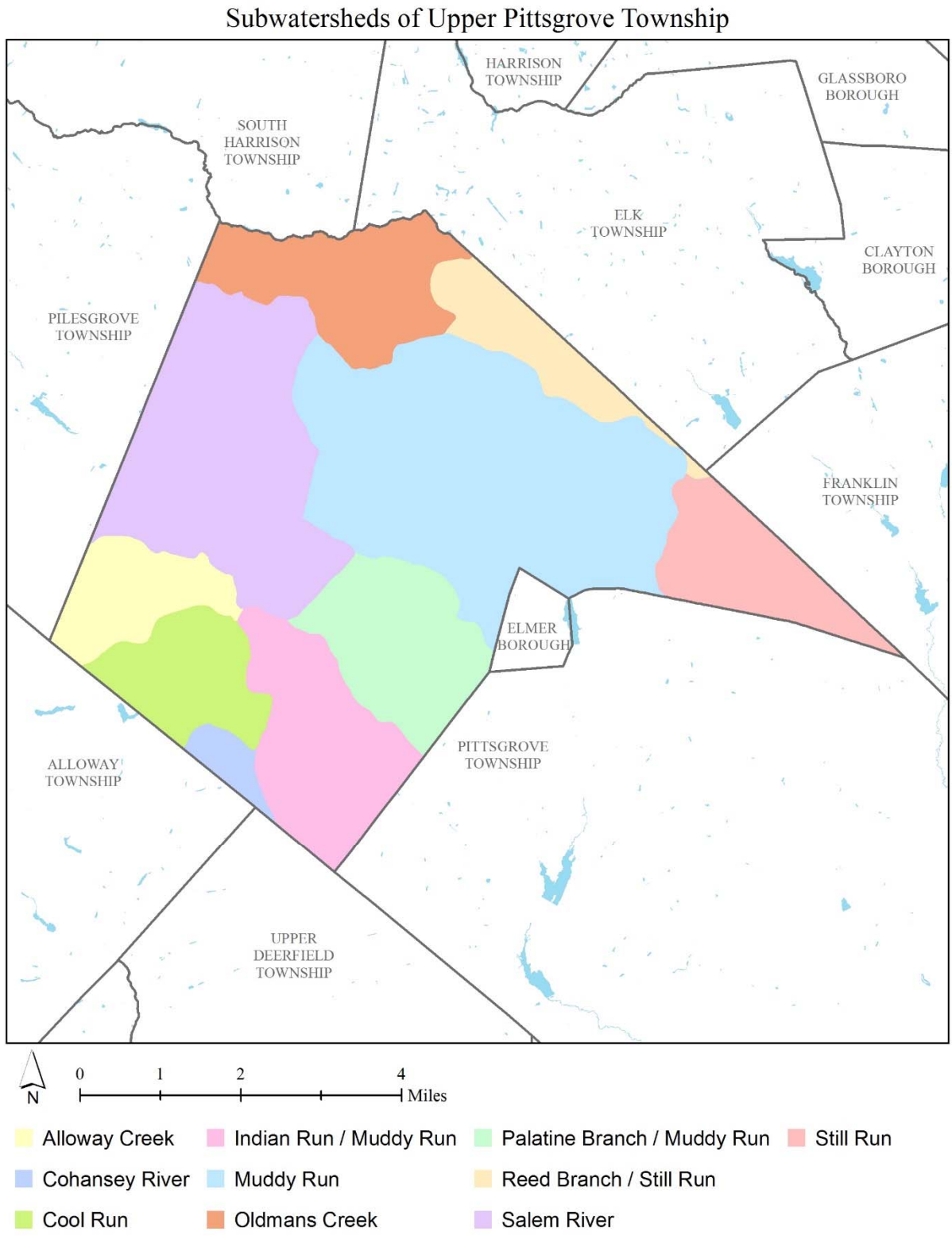


Figure 4: Map of the subwatersheds in Upper Pittsgrove Township

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 Upper Pittsgrove 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 Upper Pittsgrove 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*.

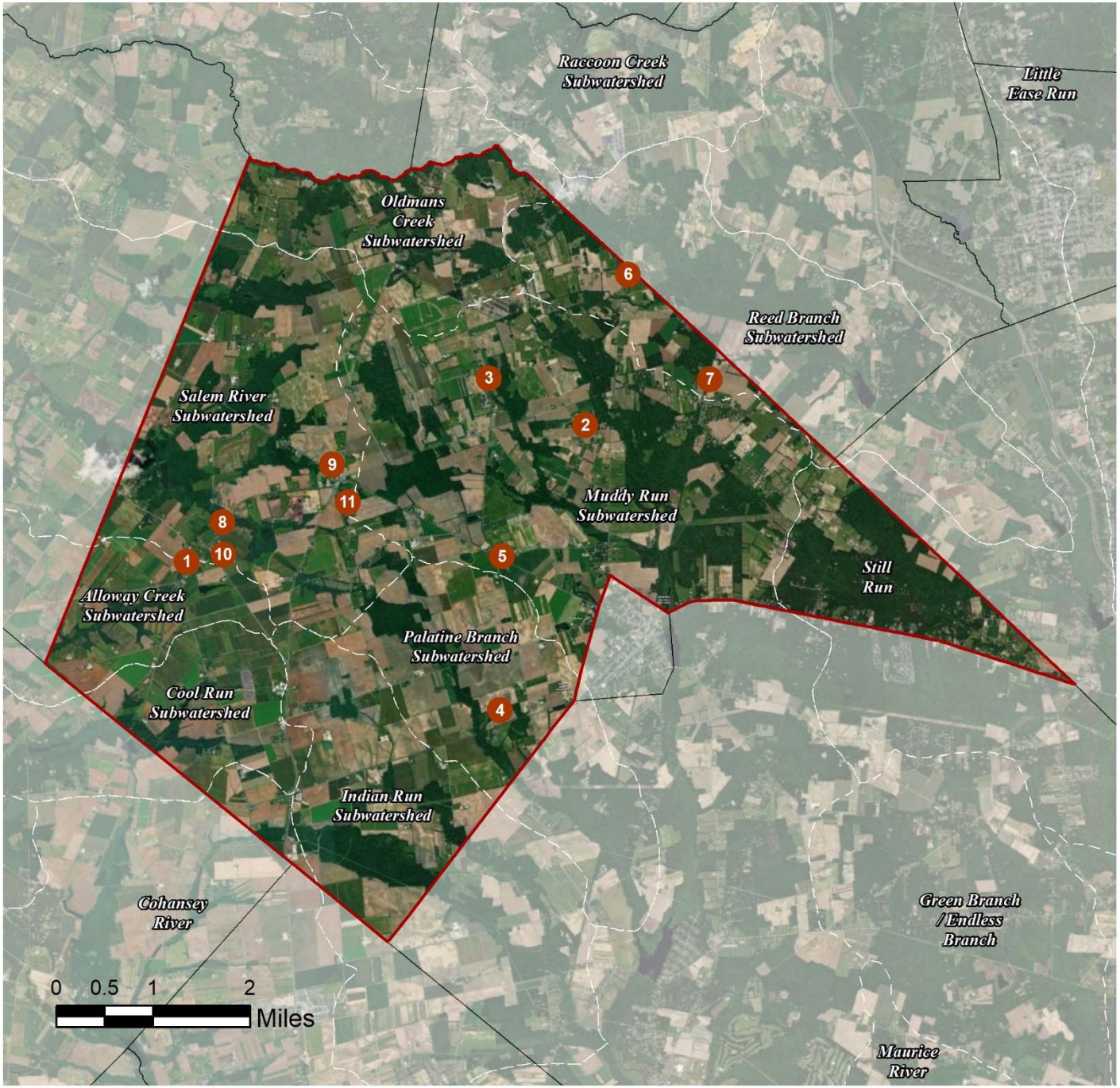
Conclusion

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

UPPER PITTSGROVE: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE ALLOWAY CREEK SUBWATERSHED

1. Pittsgrove Presbyterian Church

SITES WITHIN THE MUDDY RUN SUBWATERSHED

2. Friendship United Methodist Church
3. Upper Pittsgrove School

SITES WITHIN THE PALATINE SUBWATERSHED

4. Appel Farm Arts & Music Center
5. Grace Bible Church

SITES WITHIN THE REED BRANCH SUBWATERSHED

6. Monroeville Vineyard & Winery
7. Monroeville Volunteer Fire Company

SITES WITHIN THE SALEM RIVER SUBWATERSHED

8. Daretown School
9. Faith Orthodox Presbyterian Church
10. Pittsgrove Baptist Church
11. Upper Pittsgrove Municipal Complex

b. Proposed Green Infrastructure Concepts

Pittsgrove Presbyterian Church

Subwatershed: Alloway Creek

Site Area: 1,049,898 sq. ft.

Address: 312 Daretown Road
Elmer, NJ 08318

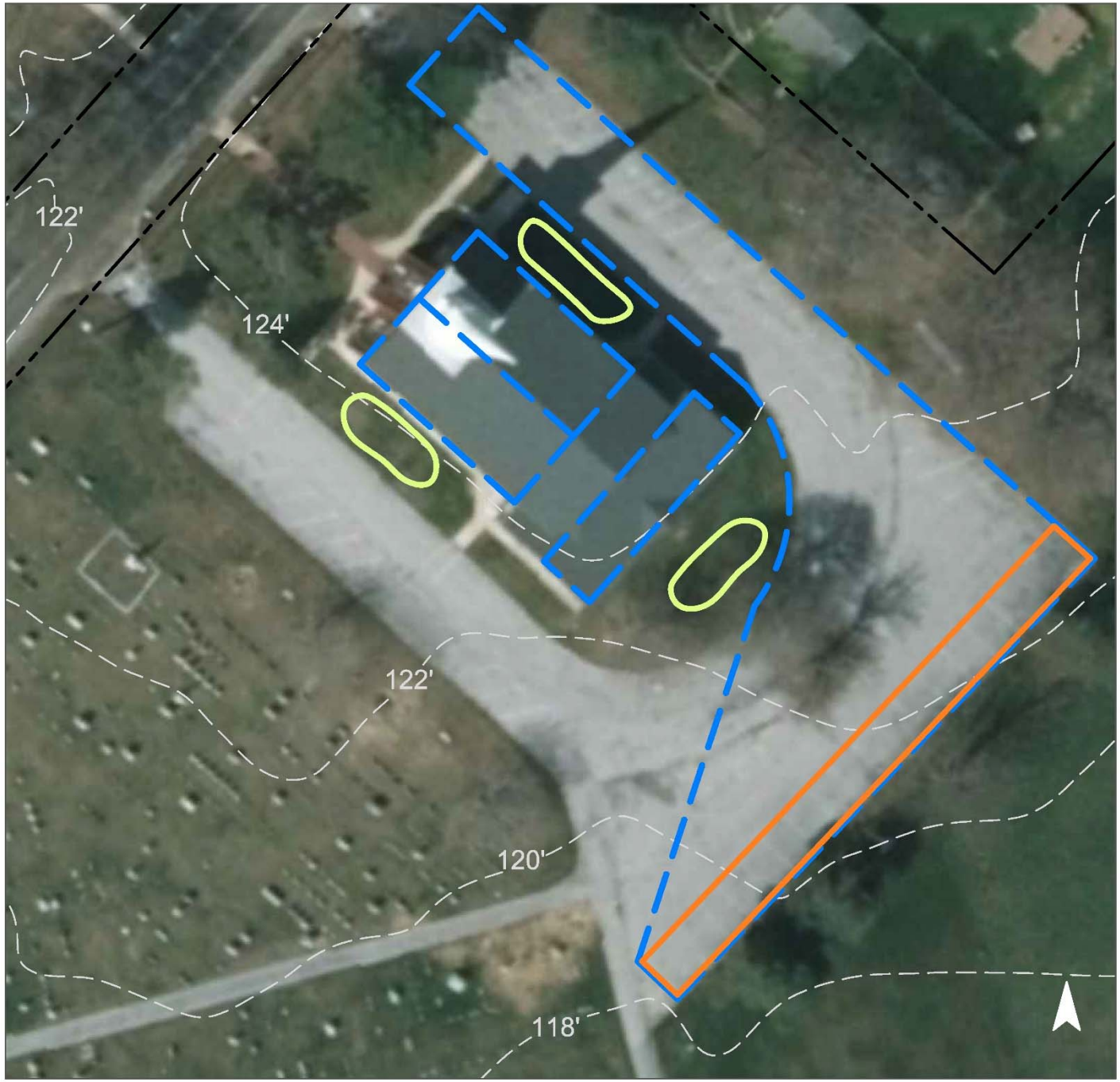
Block and Lot: Block 59; 65, Lot 1; 22

Three rain gardens can be installed in the grassed area adjacent to the church building to capture runoff from the roof of the building. Pervious pavement can also be installed in the parking spaces at the back of the building to capture and treat runoff from the surrounding pavement. 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"
7	78,557	3.8	39.7	360.7	0.061	2.15

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	0.141	24	10,380	0.39	1,370	$6,850
Pervious pavement	0.482	81	35,370	1.33	3,575	$17,875

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pittsgrove Presbyterian Church

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

0 25' 50'

Friendship United Methodist Church

Subwatershed: Muddy Run

Site Area: 379,620 sq. ft.

Address: 149 Friendship Road
Monroeville, NJ 08343

Block and Lot: Block 45; 47, Lot 1; 4

Pervious pavement can be installed north of the church building over the strip of asphalt at the edge of the turfgrass. Stormwater runoff from the roof of the building as well as the surrounding asphalt can be captured and treated by the pervious pavement. A small rain garden can be installed near the west building to capture runoff from the building's rooftop. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
7	26,320	1.3	13.3	120.8	0.021	0.72

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	0.016	3	1,140	0.04	150	$750
Pervious pavement	0.200	33	14,680	0.55	1,440	$36,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Friendship United Methodist Church

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

0 25' 50'

Upper Pittsgrove School

Subwatershed: Muddy Run

Site Area: 1,263,882 sq. ft.

Address: 235 Pine Tavern Road
Monroeville, NJ 08343

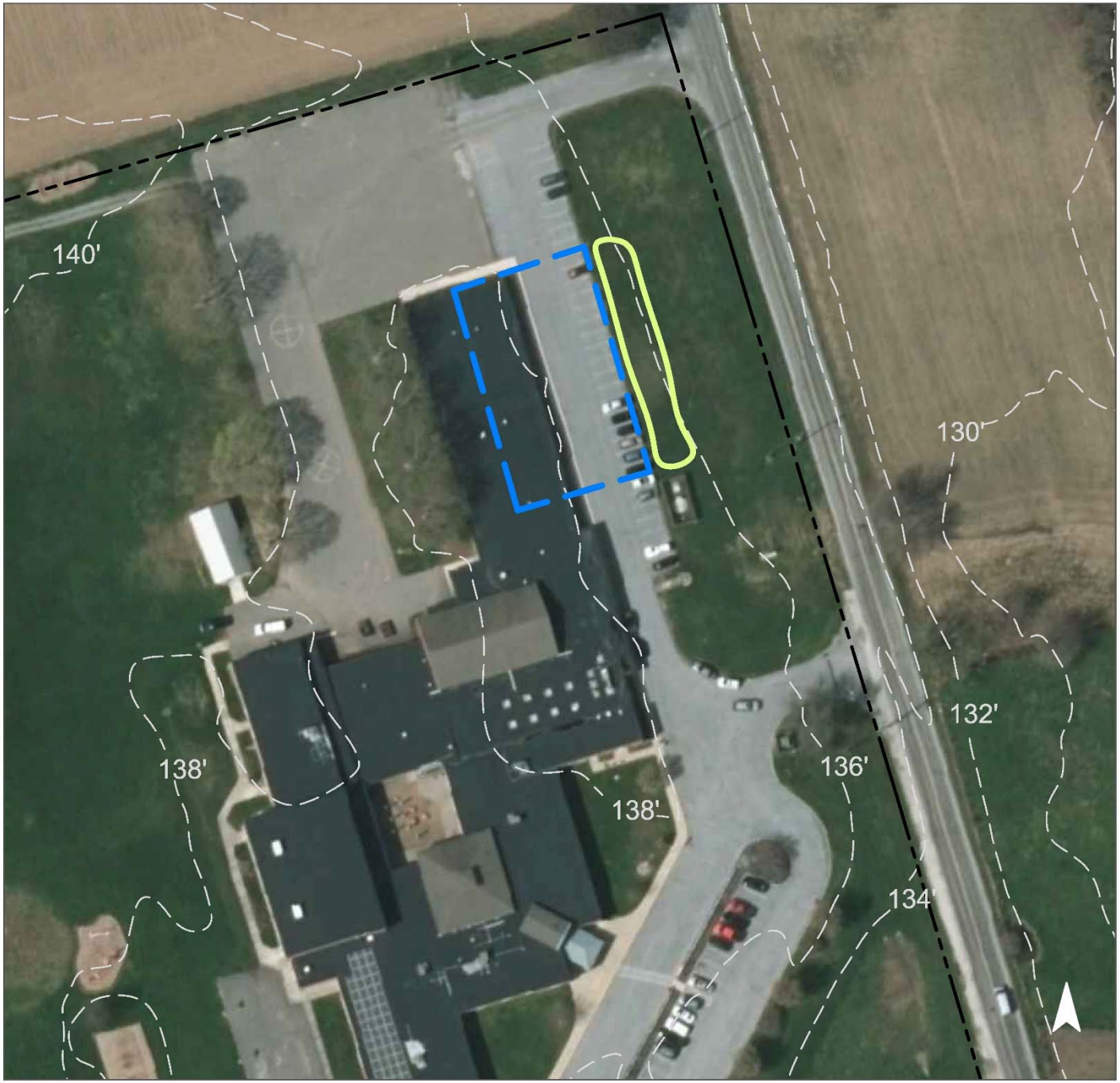
Block and Lot: Block 38, Lot 9

A rain garden can be installed in the turfgrass area across the school to capture, treat, and infiltrate runoff from the roof and 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"
22	277,998	13.4	140.4	1,276.4	0.217	7.62

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 system	0.244	41	17,890	0.67	1,440	$36,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Upper Pittsgrove School

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

0 50' 100'

Appel Farm Arts & Music Center

Subwatershed: Palatine Branch

Site Area: 4,859,468 sq. ft.

Address: 457 Shirley Road, Elmer, NJ 08318

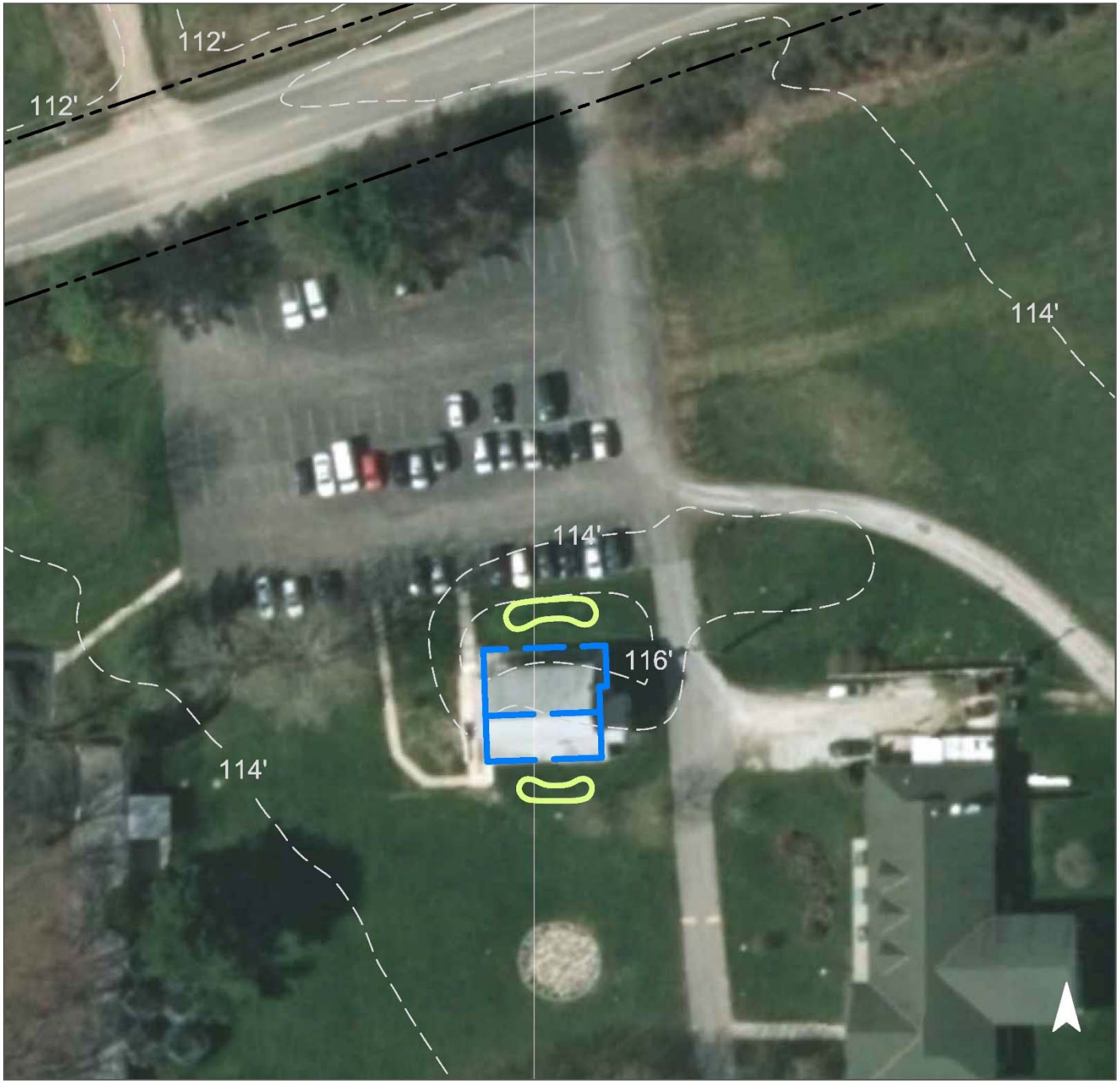
Block and Lot: Block 54; 82, Lot 9; 2, 3

Two rain gardens can be installed in the turfgrass area on each side of the building to capture, treat, and infiltrate runoff from the roof of the building while also providing aesthetic value. 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"
5	223,575	10.8	112.9	1,026.5	0.174	6.13

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	0.052	9	3,820	0.14	500	$2,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Appel Farm Arts & Music Center

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

0 30' 60'

Grace Bible Church

Subwatershed: Palatine Branch

Site Area: 169,908 sq. ft.

Address: 153 Burlington Road
Elmer, NJ 08318

Block and Lot: Block 55, Lot 17

A rain garden can be installed in the turfgrass area between the church building and street, and a second can be installed along the north end of the building. The rain gardens will be able to capture runoff from the roof of the church by directing the downspouts to the gardens while also providing aesthetic value. 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"
10	17,708	0.9	8.9	81.3	0.014	0.49

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	0.062	10	4,540	0.17	600	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Grace Bible Church

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

0 30' 60'

Monroeville Vineyard & Winery

Subwatershed: Reed Branch

Site Area: 1,203,932 sq. ft.

Address: 314 Richwood Road
Monroeville, NJ 08343

Block and Lot: Block 18, Lot 6

A cistern can be installed at the corner of the building to capture and store stormwater runoff from the roof of the building for non-potable uses such as watering the vineyard. A rain garden can also be installed at the front of the main building to capture runoff from the rooftop and provide aesthetic value to the property. 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"
1	11,910	0.6	6.0	54.7	0.009	0.33

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 system	0.023	4	1,720	0.06	225	$1,125
Rainwater harvesting	0.081	14	2,500	0.09	2,500 (gal)	$5,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Monroeville Vineyard & Winery

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

0 30' 60'

Monroeville Volunteer Fire Company

Subwatershed: Reed Branch

Site Area: 28,330 sq. ft.

Address: 414 Monroeville Road
Monroeville, NJ 08343

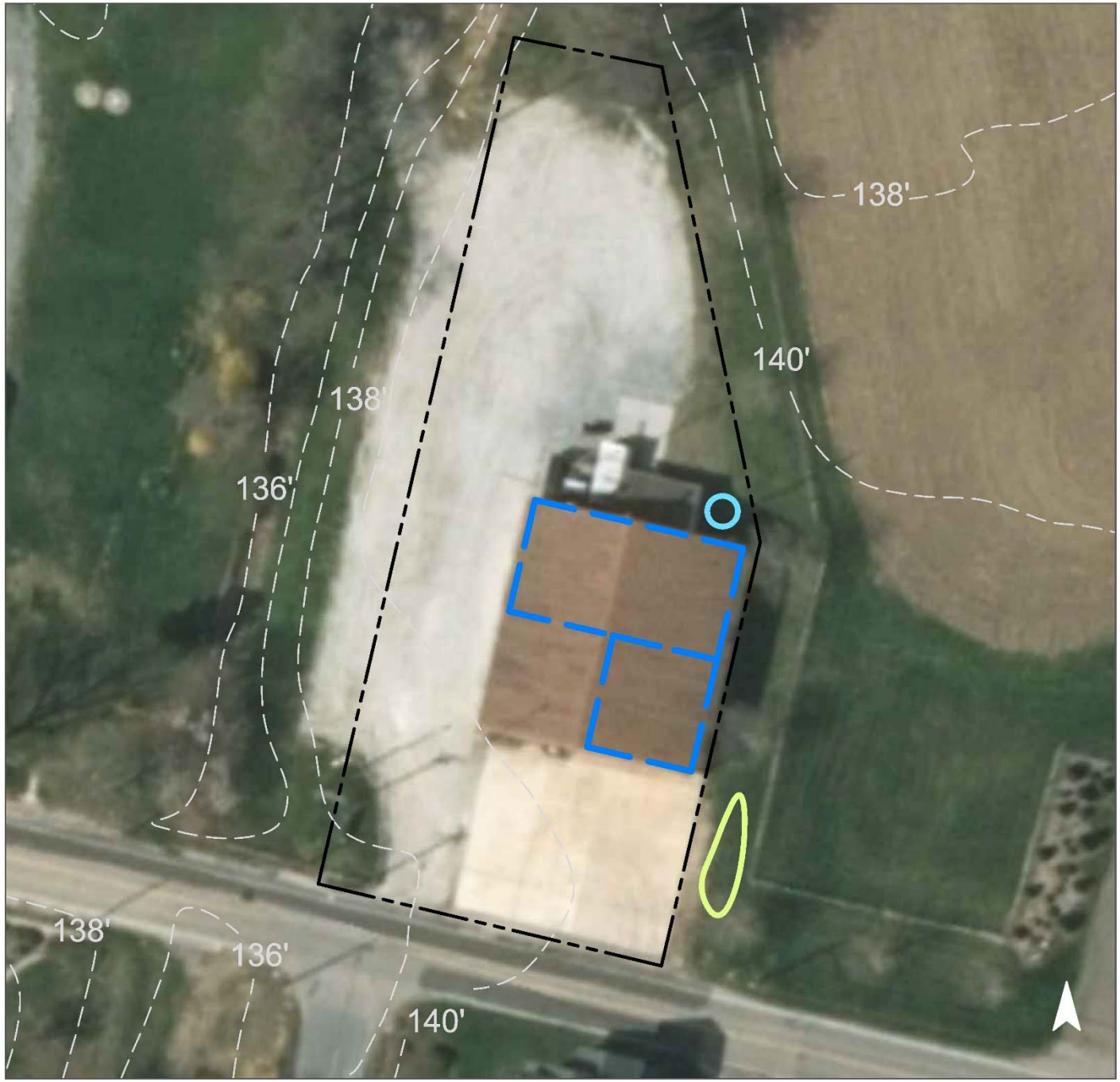
Block and Lot: Block 18, Lot 52

A cistern can be installed behind the building to capture and store stormwater runoff from the roof of the building that could be used to wash fire trucks or for other non-potable uses. A rain garden can additionally be installed along the southeast corner of the building by redirecting nearby downspouts into it. 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"
39	11,087	0.5	5.6	50.9	0.009	0.30

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.034	6	2,480	0.09	325	$1,625
Rainwater harvesting	0.068	11	2,100	0.08	2,100 (gal)	$4,200

GREEN INFRASTRUCTURE RECOMMENDATIONS



Monroeville Volunteer Fire Company

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

0 25' 50'

Daretown School

Subwatershed: Salem River

Site Area: 255,599 sq. ft.

Address: 404 Daretown Road
Elmer, NJ 08318

Block and Lot: Block 60, Lot 2

Pervious pavement can be installed in the parking spaces northeast of the school to capture, treat, and infiltrate runoff from the roof of the building and parking lot instead of flowing into the street and into a nearby catch basin. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
20	49,876	2.4	25.2	229.0	0.039	1.37

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
Pervious pavement	0.339	57	24,860	0.93	2,525	$63,125

GREEN INFRASTRUCTURE RECOMMENDATIONS

Daretown School

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

0 30' 60'

Faith Orthodox Presbyterian Church

Subwatershed: Salem River

Site Area: 485,106 sq. ft.

Address: 545 Daretown Road
Pittsgrove, NJ 08318

Block and Lot: Block 61, Lot 23

A rain garden can be installed in the turfgrass area in front of the building to capture runoff from the parking lot. Pervious pavement can be installed in the strip of parking spaces closest to the road in the other section of the parking lot. Six planter boxes can be placed at the downspouts along the east side of the main building to treat a portion of the building's 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"
13	78,807	3.8	39.8	361.8	0.061	2.16

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.148	25	10,850	0.41	1,425	$7,125
Pervious pavement	0.192	32	14,050	0.53	2,340	$58,500
Planter boxes	n/a	5	n/a	n/a	6 (boxes)	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Faith Orthodox Presbyterian Church

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

0 30' 60'

Pittsgrove Baptist Church

Subwatershed: Salem River

Site Area: 696,419 sq. ft.

Address: 368 Daretown Road
Elmer, NJ 08318

Block and Lot: Block 59, Lot 14, 17

Rain gardens can be installed in the turfgrass area at the front of the church and behind the church. The gardens would capture, treat, and infiltrate runoff from the roof of the building and the parking 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"
5	34,224	1.6	17.3	157.1	0.027	0.94

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	0.107	18	7,840	0.29	1,050	$5,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

Pittsgrove Baptist Church

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

0 30' 60'

Upper Pittsgrove Municipal Complex

Subwatershed: Salem River

Site Area: 64,381 sq. ft.

Address: 550 Daretown Road
Elmer, NJ 08318

Block and Lot: Block 58, Lot 1, 2, 3, 4

Pervious pavement can be installed in the parking spaces along the north end of the parking lot to capture and treat stormwater runoff from the pavement and roof of the building. A cistern can be installed near the southeast corner of the Public Works building to capture roof runoff for non-potable uses. A bioretention system can additionally be installed along the west side of the Public Works building to capture the remaining 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"
71	45,609	2.2	23.0	209.4	0.036	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 system	0.072	12	5,260	0.20	700	$3,500
Pervious pavement	0.315	53	23,140	0.87	2,375	$59,375
Rainwater harvesting	0.074	13	2,200	0.08	2,200 (gal)	$4,400

GREEN INFRASTRUCTURE RECOMMENDATIONS

Upper Pittsgrove Municipal Complex

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

0 30' 60'

c. Summary of Existing Conditions

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			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)
	ALLOWAY CREEK SUBWATERSHED	**24.10**	**1,049,898**				**1.80**	**78,557**	**3.8**	**39.7**	**360.7**	**0.061**	**2.15**
1	**Pittsgrove Presbyterian Church**												
	Total Site Info	24.10	1,049,898	59; 65	1; 22	7	1.80	78,557	3.8	39.7	360.7	0.061	2.15
	MUDDY RUN SUBWATERSHED	**37.73**	**1,643,502**				**6.99**	**304,318**	**14.7**	**153.7**	**1,397.2**	**0.237**	**8.35**
2	**Friendship United Methodist Church**												
	Total Site Info	8.71	379,620	45; 47	1; 4	7	0.60	26,320	1.3	13.3	120.8	0.021	0.72
3	**Upper Pittsgrove School**												
	Total Site Info	29.01	1,263,882	38	9	22	6.38	277,998	13.4	140.4	1,276.4	0.217	7.62
	PALATINE BRANCH SUBWATERSHED	**115.46**	**5,029,376**				**5.54**	**241,283**	**11.6**	**121.9**	**1,107.8**	**0.188**	**6.62**
4	**Appel Farm Arts & Music Center**												
	Total Site Info	111.56	4,859,468	54; 82	9; 2,3	5	5.13	223,575	10.8	112.9	1,026.5	0.174	6.13
5	**Grace Bible Church**												
	Total Site Info	3.90	169,908	55	17	10	0.41	17,708	0.9	8.9	81.3	0.014	0.49
	REED BRANCH SUBWATERSHED	**28.29**	**1,232,263**				**0.53**	**22,997**	**1.1**	**11.6**	**105.6**	**0.018**	**0.63**
6	**Monroeville Vineyard & Winery**												
	Total Site Info	27.64	1,203,932	18	6	1	0.27	11,910	0.6	6.0	54.7	0.009	0.33
7	**Monroeville Volunteer Fire Company**												
	Total Site Info	0.65	28,330	18	52	39	0.25	11,087	0.5	5.6	50.9	0.009	0.30
	SALEM RIVER SUBWATERSHED	**36.74**	**1,600,504**				**4.79**	**208,516**	**10.1**	**105.3**	**957.4**	**0.162**	**5.72**
8	**Daretown School**												
	Total Site Info	5.87	255,599	60	2	20	1.15	49,876	2.4	25.2	229.0	0.039	1.37

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			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	**Faith Orthodox Presbyterian Church**												
	Total Site Info	13.41	584,106	61	23	13	1.81	78,807	3.8	39.8	361.8	0.061	2.16
10	**Pittsgrove Baptist Church**												
	Total Site Info	15.99	696,419	59	14, 17	5	0.79	34,224	1.6	17.3	157.1	0.027	0.94
11	**Upper Pittsgrove Municipal Complex**												
	Total Site Info	1.48	64,381	58	1, 2, 3, 4	71	1.05	45,609	2.2	23.0	209.4	0.036	1.25

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 %
	ALLOWAY CREEK SUBWATERSHED	**23,930**	**0.55**	**0.624**	**104**	**45,750**	**1.72**				**$24,725**	**30.5%**
1	**Pittsgrove Presbyterian Church**											
	Bioretention systems	5,430	0.12	0.141	24	10,380	0.39	1,370	$5	SF	$6,850	6.9%
	Pervious pavement	18,500	0.42	0.482	81	35,370	1.33	3,575	$5	SF	$17,875	23.5%
	Total Site Info	**23,930**	**0.55**	**0.624**	**104**	**45,750**	**1.72**				**$24,725**	**30.5%**
	MUDDY RUN SUBWATERSHED	**17,635**	**0.40**	**0.459**	**77**	**33,710**	**1.26**				**$72,750**	**5.8%**
2	**Friendship United Methodist Church**											
	Bioretention system	600	0.01	0.016	3	1,140	0.04	150	$5	SF	$750	0.8%
	Pervious pavement	7,675	0.18	0.200	33	14,680	0.55	1,440	$25	SF	$36,000	29.2%
	Total Site Info	**8,275**	**0.19**	**0.216**	**36**	**15,820**	**0.59**				**$36,750**	**29.9%**
3	**Upper Pittsgrove School**											
	Bioretention system	9,360	0.21	0.244	41	17,890	0.67	1,440	$25	SF	$36,000	3.4%
	Total Site Info	**9,360**	**0.21**	**0.244**	**41**	**17,890**	**0.67**				**$36,000**	**3.4%**
	PALATINE BRANCH SUBWATERSHED	**4,375**	**0.10**	**0.114**	**19**	**8,360**	**0.31**				**$5,500**	**1.8%**
4	**Appel Farm Arts & Music Center**											
	Bioretention systems	2,000	0.05	0.052	9	3,820	0.14	500	$5	SF	$2,500	0.9%
	Total Site Info	**2,000**	**0.05**	**0.052**	**9**	**3,820**	**0.14**				**$2,500**	**0.9%**
5	**Grace Bible Church**											
	Bioretention systems	2,375	0.05	0.062	10	4,540	0.17	600	$5	SF	$3,000	13.4%
	Total Site Info	**2,375**	**0.05**	**0.062**	**10**	**4,540**	**0.17**				**$3,000**	**13.4%**
	REED BRANCH SUBWATERSHED	**7,925**	**0.18**	**0.206**	**35**	**8,800**	**0.32**				**$11,950**	**34.5%**
6	**Monroeville Vineyard & Winery**											
	Bioretention system	900	0.02	0.023	4	1,720	0.06	225	$5	SF	$1,125	1.1%
	Rainwater harvesting	3,100	0.07	0.081	14	2,500	0.09	2,500	$2	gal	$5,000	26.0%
	Total Site Info	**4,000**	**0.09**	**0.104**	**17**	**4,220**	**0.15**				**$6,125**	**27.2%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
7	**Monroeville Volunteer Fire Company**											
	Bioretention system	1,300	0.03	0.034	6	2,480	0.09	325	$5	SF	$1,625	1.7%
	Rainwater harvesting	2,625	0.06	0.068	11	2,100	0.08	2,100	$2	gal	$4,200	23.7%
	Total Site Info	**3,925**	**0.09**	**0.102**	**17**	**4,580**	**0.17**				**$5,825**	**25.3%**
	SALEM RIVER SUBWATERSHED	**49,025**	**1.13**	**1.246**	**214**	**88,200**	**3.31**				**$207,275**	**23.5%**
8	**Daretown School**											
	Pervious pavement	13,000	0.30	0.339	57	24,860	0.93	2,525	$25	SF	$63,125	26.1%
	Total Site Info	**13,000**	**0.30**	**0.339**	**57**	**24,860**	**0.93**				**$63,125**	**26.1%**
9	**Faith Orthodox Presbyterian Church**											
	Bioretention system	5,675	0.13	0.148	25	10,850	0.41	1,425	$5	SF	$7,125	7.2%
	Pervious pavement	7,350	0.17	0.192	32	14,050	0.53	2,340	$25	SF	$58,500	9.3%
	Planter boxes	1,300	0.03	n/a	5	n/a	n/a	6	$1,000	box	$6,000	1.6%
	Total Site Info	**14,325**	**0.33**	**0.339**	**62**	**24,900**	**0.94**				**$71,625**	**18.2%**
10	**Pittsgrove Baptist Church**											
	Bioretention systems	4,100	0.09	0.107	18	7,840	0.29	1,050	$5	SF	$5,250	12.0%
	Total Site Info	**4,100**	**0.09**	**0.107**	**18**	**7,840**	**0.29**				**$5,250**	**12.0%**
11	**Upper Pittsgrove Municipal Complex**											
	Bioretention system	2,750	0.06	0.072	12	5,260	0.20	700	$5	SF	$3,500	6.0%
	Pervious pavement	12,100	0.28	0.315	53	23,140	0.87	2,375	$25	SF	$59,375	26.5%
	Rainwater harvesting	2,750	0.07	0.074	13	2,200	0.08	2,200	$2	gal	$4,400	6.0%
	Total Site Info	**17,600**	**0.41**	**0.461**	**78**	**30,600**	**1.15**				**$67,275**	**38.6%**