RUTGERS
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Experiment Station

Draft

Impervious Cover Reduction Action Plan
for
Alexandria Township, Hunterdon County, New Jersey

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

October 15, 2020

Highlands Council
New Jersey

ACKNOWLEDGEMENTS:

This document has been prepared by the Rutgers Cooperative Extension Water Resources Program, with funding and direction from the New Jersey Highlands Water Protection and Planning Council and the New Jersey Agricultural Experiment Station, to highlight green infrastructure opportunities within Alexandria Township. We would like to thank the New Jersey Highlands Water Protection and Planning Council, the New Jersey Agricultural Experiment Station, and Alexandria Township for their input and support in creating this document.

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New Jersey

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Introduction

Located in Hunterdon County, New Jersey, Alexandria Township covers approximately 27.64 square miles. Figures 1 and 2 illustrate that Alexandria Township is dominated by agriculture land use. A total of 20.6% of the municipality's land use is classified as urban. Of the urban land in Alexandria Township, rural residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2015 land use/land cover geographical information system (GIS) data layer categorizes Alexandria 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 Alexandria Township. Based upon the 2015 NJDEP land use/land cover data, approximately 2.7% of Alexandria Township has impervious cover. This level of impervious cover suggests that the streams in Alexandria Township likely sensitive streams. [1]

Methodology

Alexandria Township contains portions of seven subwatersheds (Figure 4). For this impervious cover reduction action plan, projects have been identified in three 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] Schuler, T.R., L. Fraley-McNeal, and K. Cappiella. 2009. Is Impervious Cover Still Important? Review of Recent Research. *Journal of Hydrologic Engineering* 14 (4): 309-315.

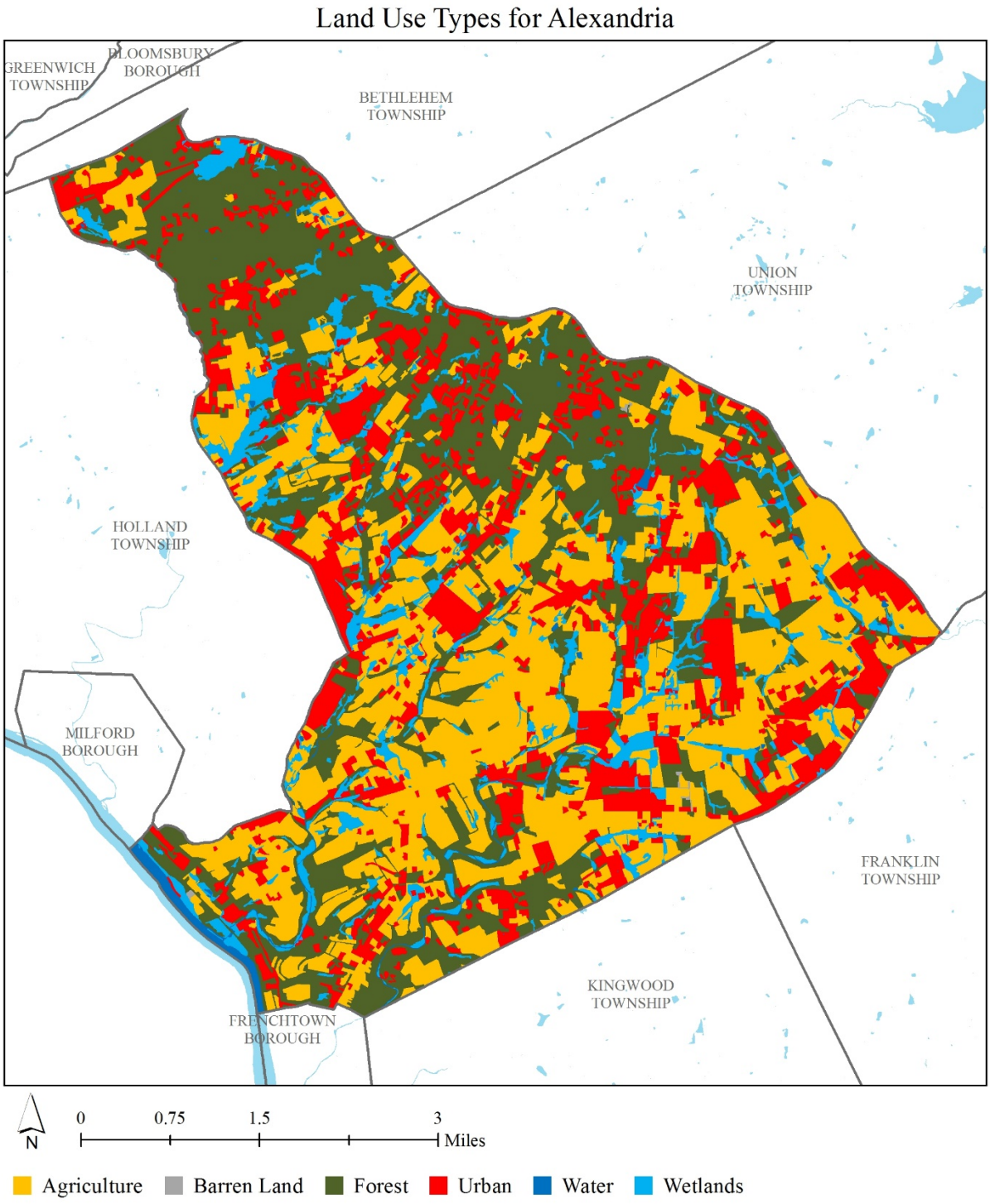


Figure 1: Map illustrating the land use in Alexandria Township

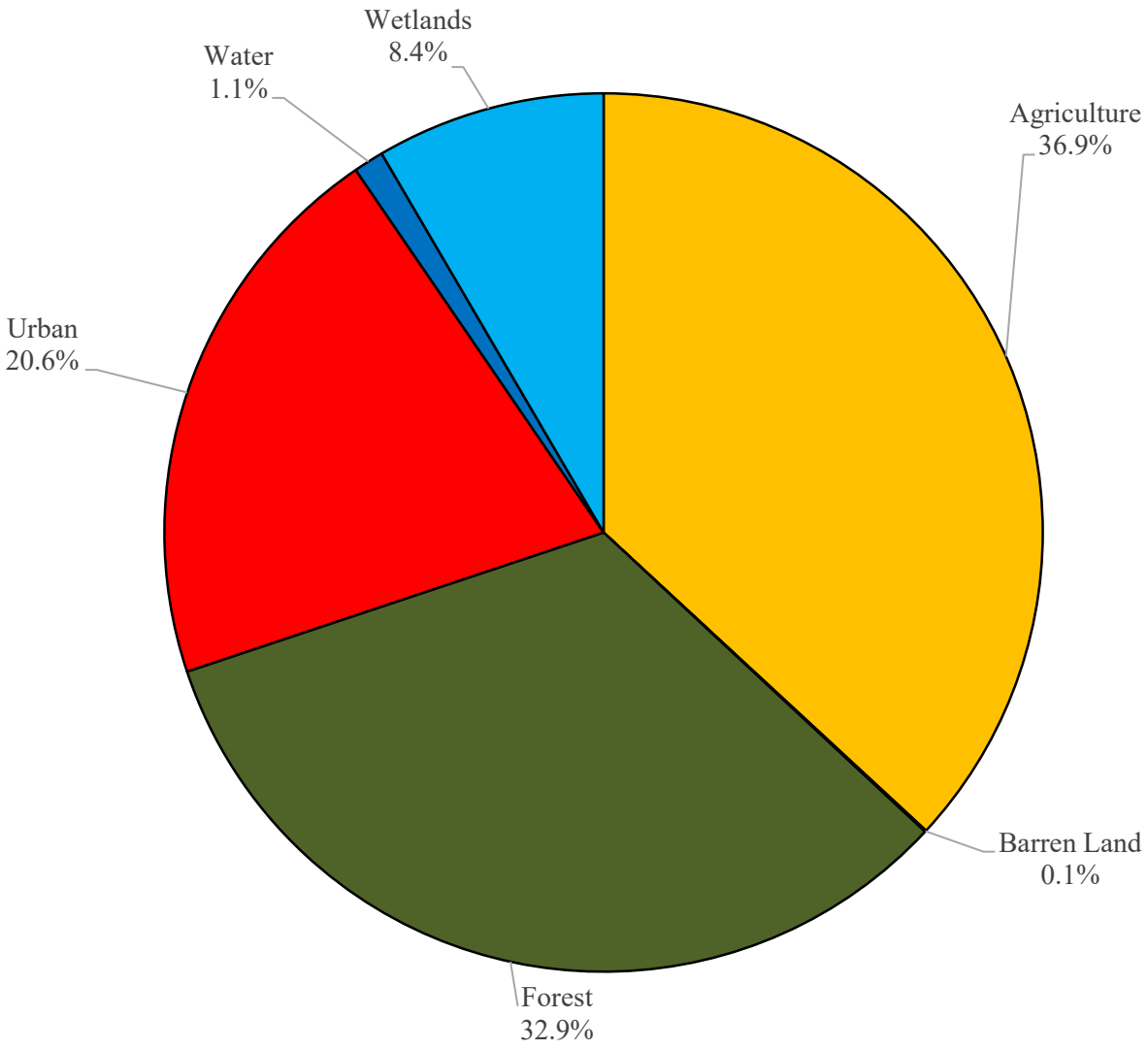


Figure 2: Pie chart illustrating the land use in Alexandria Township

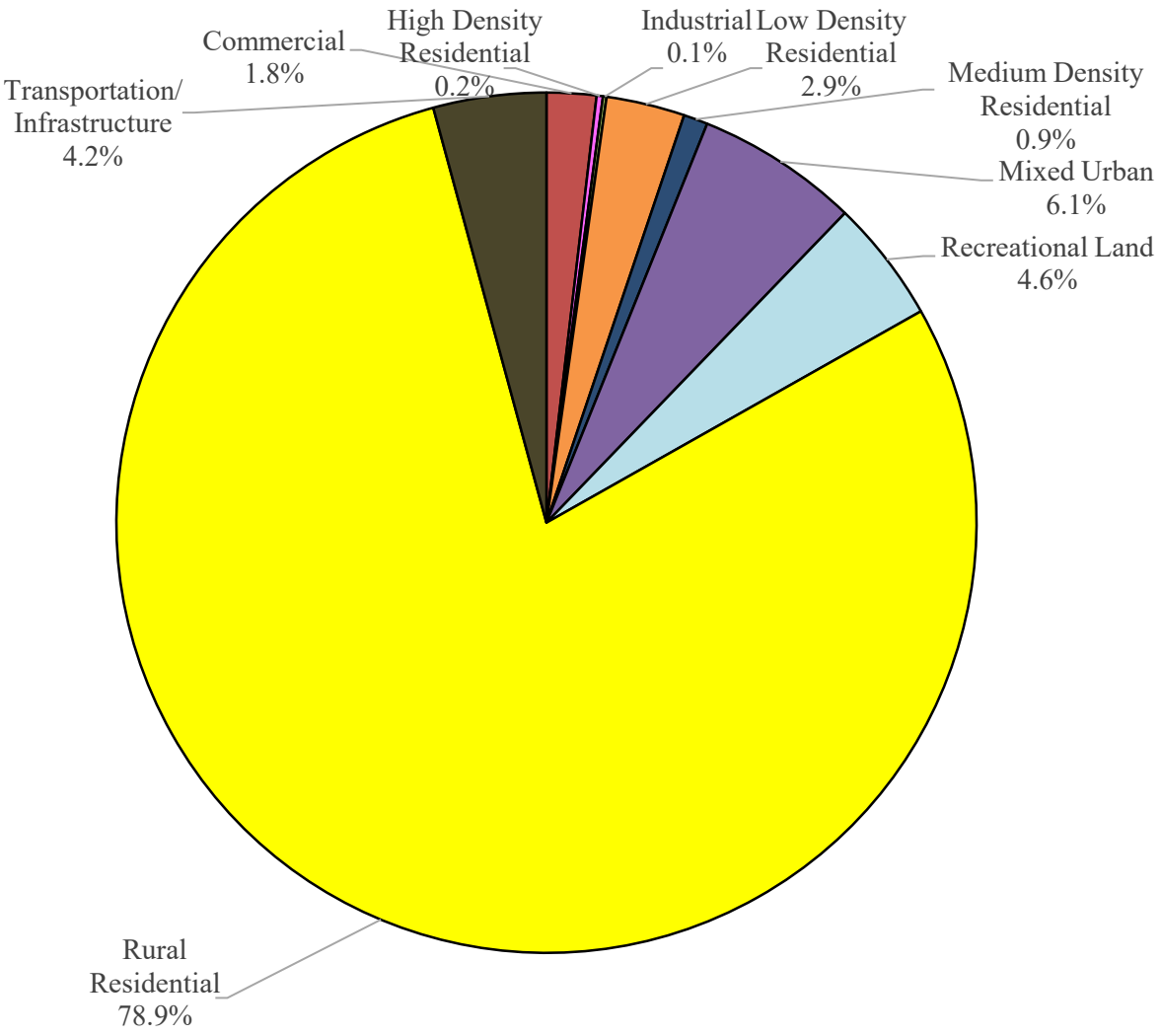


Figure 3: Pie chart illustrating the various types of urban land use in Alexandria Township

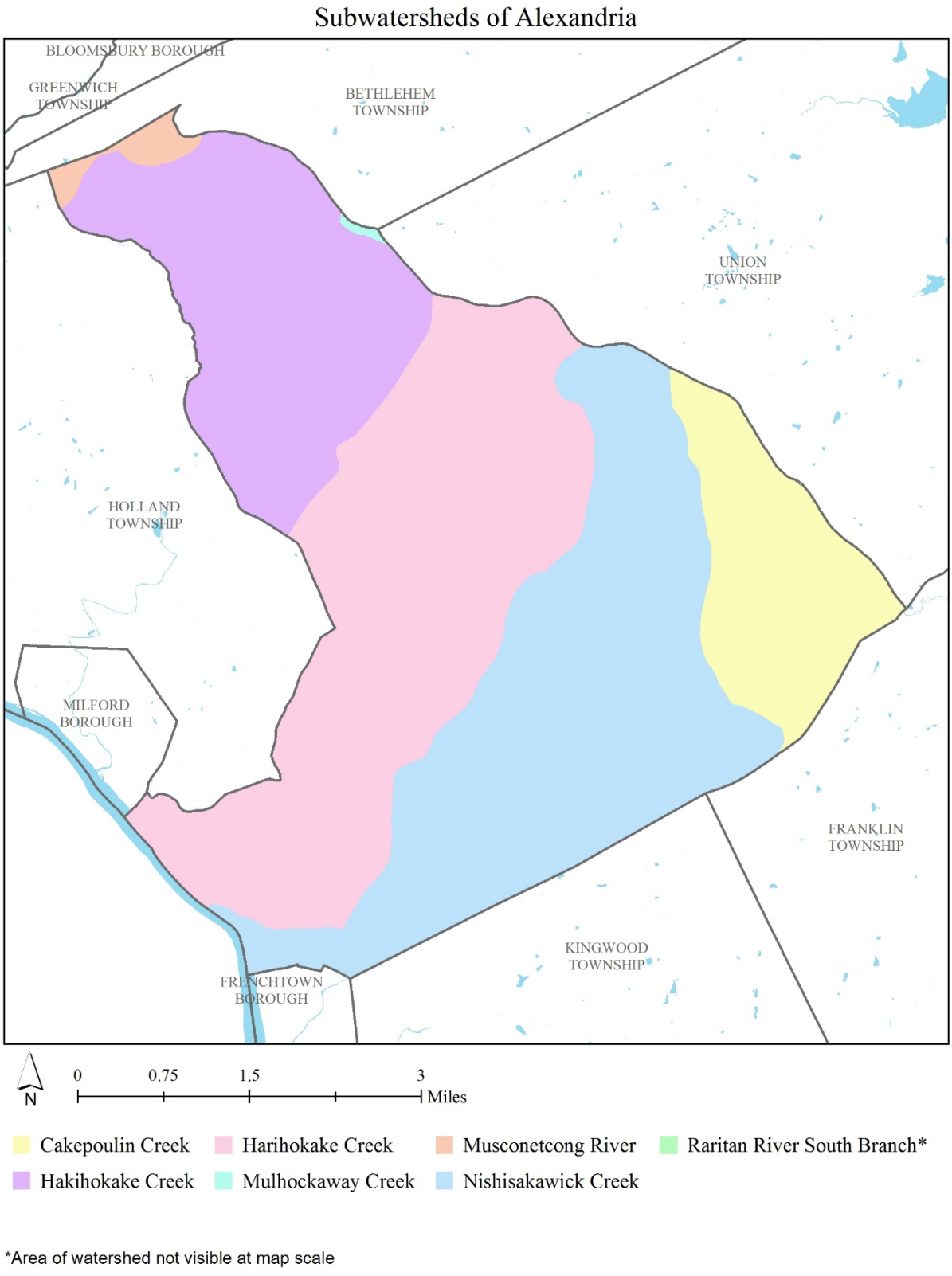


Figure 4: Map of the subwatersheds in Alexandria Township

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 2015 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 Alexandria 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 principle, 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 Alexandria 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.

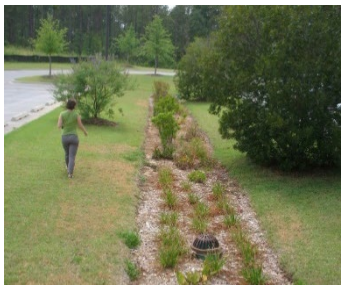
Downspout planter boxes

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

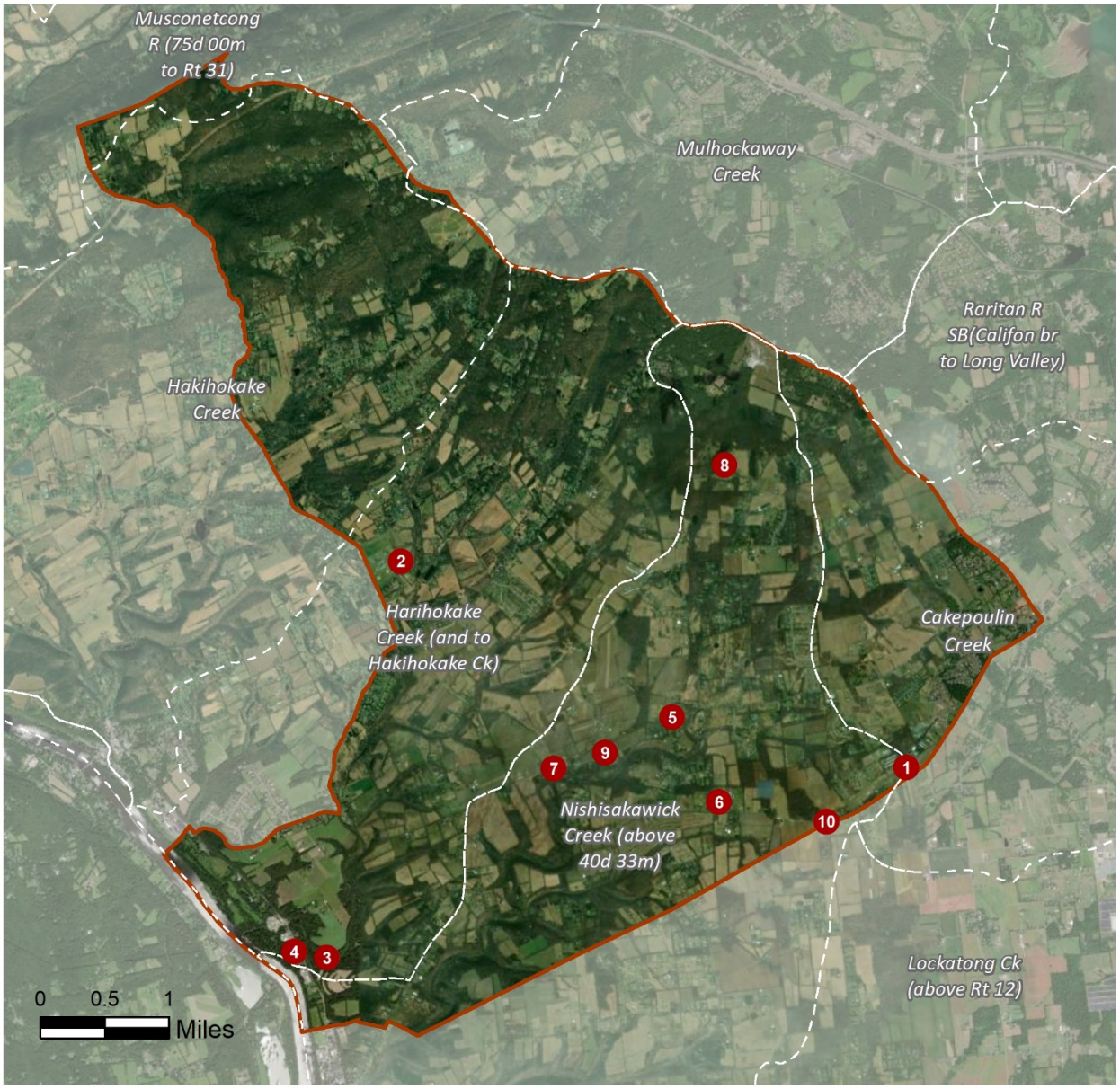
This impervious cover reduction action plan is meant to provide the municipality with a blueprint for implementing green infrastructure practices that will reduce the impact of stormwater runoff from impervious surfaces. These projects can be implemented by a wide variety of people such as boy scouts,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

Appendix A: Climate Resilient Green Infrastructure

a. Green Infrastructure Sites

ALEXANDRIA TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE CAKEPOULIN CREEK SUBWATERSHED

1. Sky Manor

SITES WITHIN THE HARIHOKAKE CREEK SUBWATERSHED

2. Alexandria Park
3. Bo Bo Kitchen II
4. Delaware River Tubing

SITES WITHIN THE NISHISAKAWICK CREEK SUBWATERSHED

5. Alexandria Middle School
6. Delaware Valley Regional High School
7. Everittstown United Methodist Church
8. Iglesia Fraterindad Christian Camp Tecumseh
9. Lester D. Wilson Elementary School
10. St. Thomas Episcopal Church

b. Proposed Green Infrastructure Concepts

SKY MANOR AIRPORT

Subwatershed: Cakepoilin Creek

Site Area: 2,556,982 sq. ft.

Address: 48 Sky Manor Airport
Pittstown, NJ 08867

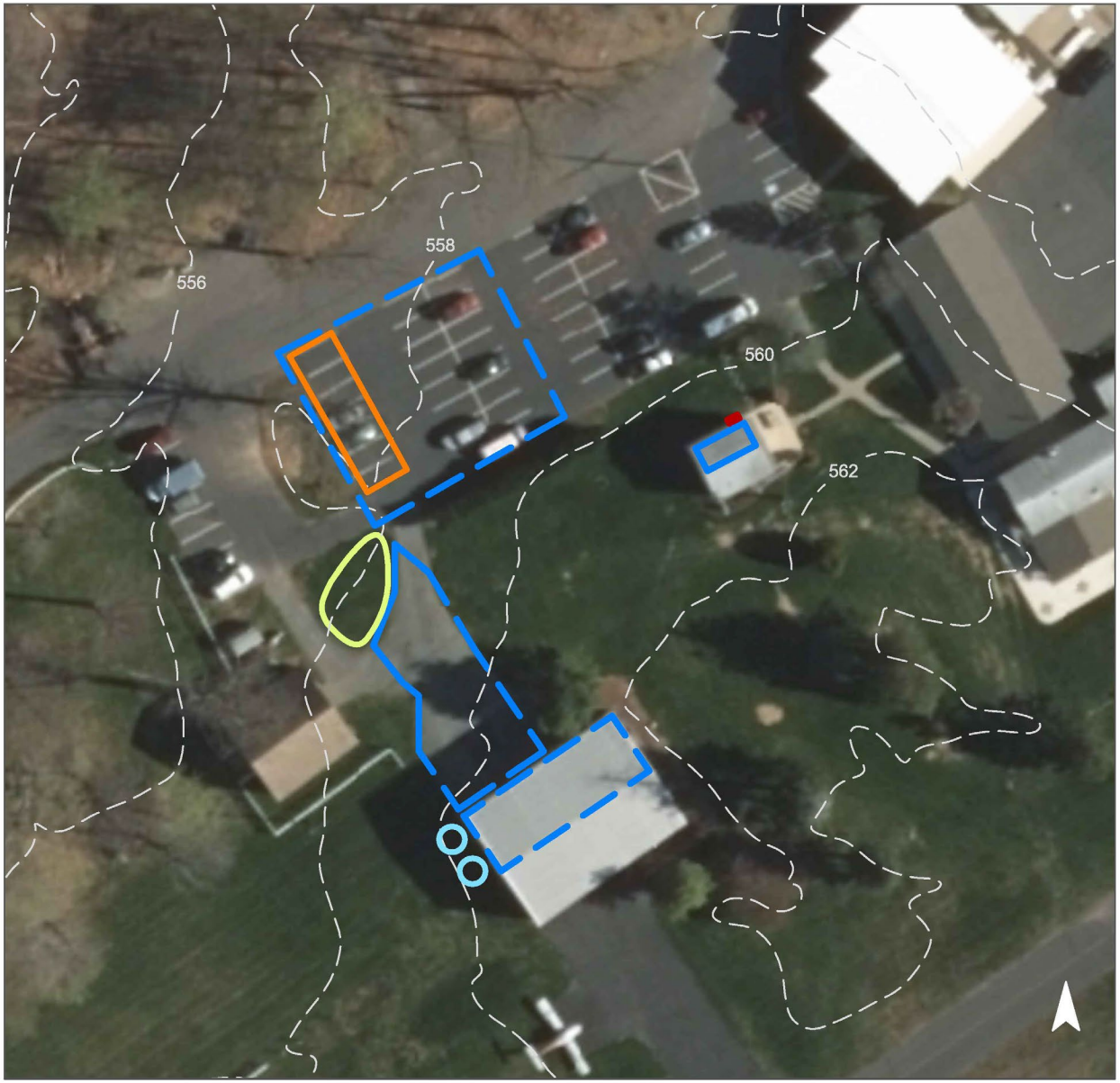
Block and Lot: Block 21 Lot 40

A bioretention system can be installed in the turfgrass area to capture, treat, and infiltrate runoff from the driveway. A section of parking spaces can be converted to porous pavement to capture and infiltrate runoff from the parking lot. Cisterns can be installed near the building on the condition that gutters are installed, and the water captured from rooftop runoff could serve as a means of washing the planes. 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"
27	696,064	33.6	351.5	3,195.9	0.542	19.09

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	0.078	13	5,740	0.22	750	$3,750
Pervious pavement	0.166	28	12,210	0.46	2,625	$65,625
Planter box	n/a	1	n/a	n/a	1	$1,000
Rainwater harvesting	0.048	8	1,500	0.06	1,500 (gal)	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Sky Manor Airport

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

0 30' 60'

ALEXANDRIA PARK

Subwatershed: Harihokake Creek

Site Area: 3,100,109 sq. ft.

Address: 557 County Road 513
Milford, NJ 08848

Block and Lot: Block 7 Lot 24

A bioretention system can be installed to infiltrate the runoff from the roof's large drainage area as well as the stormwater from the downspouts. Planter boxes can be installed to treat the rooftop drainage area as well. To treat the parking lot drainage area, pervious pavement is proposed in the south edge of the south 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"
10	322,385	15.5	162.8	1,480.2	0.251	8.84

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
Bioretention system	0.141	24	10,320	0.39	1,350	$6,750
Pervious pavement	0.141	24	10,320	0.39	1,350	$33,750
Planter boxes	n/a	9	n/a	n/a	11 (boxes)	$11,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Alexandria Park

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

0 50' 100'

BO BO KITCHEN II

Subwatershed: Harihokake Creek

Site Area: 230,512 sq. ft.

Address: 1004 Frenchtown Road
Milford, NJ 08848

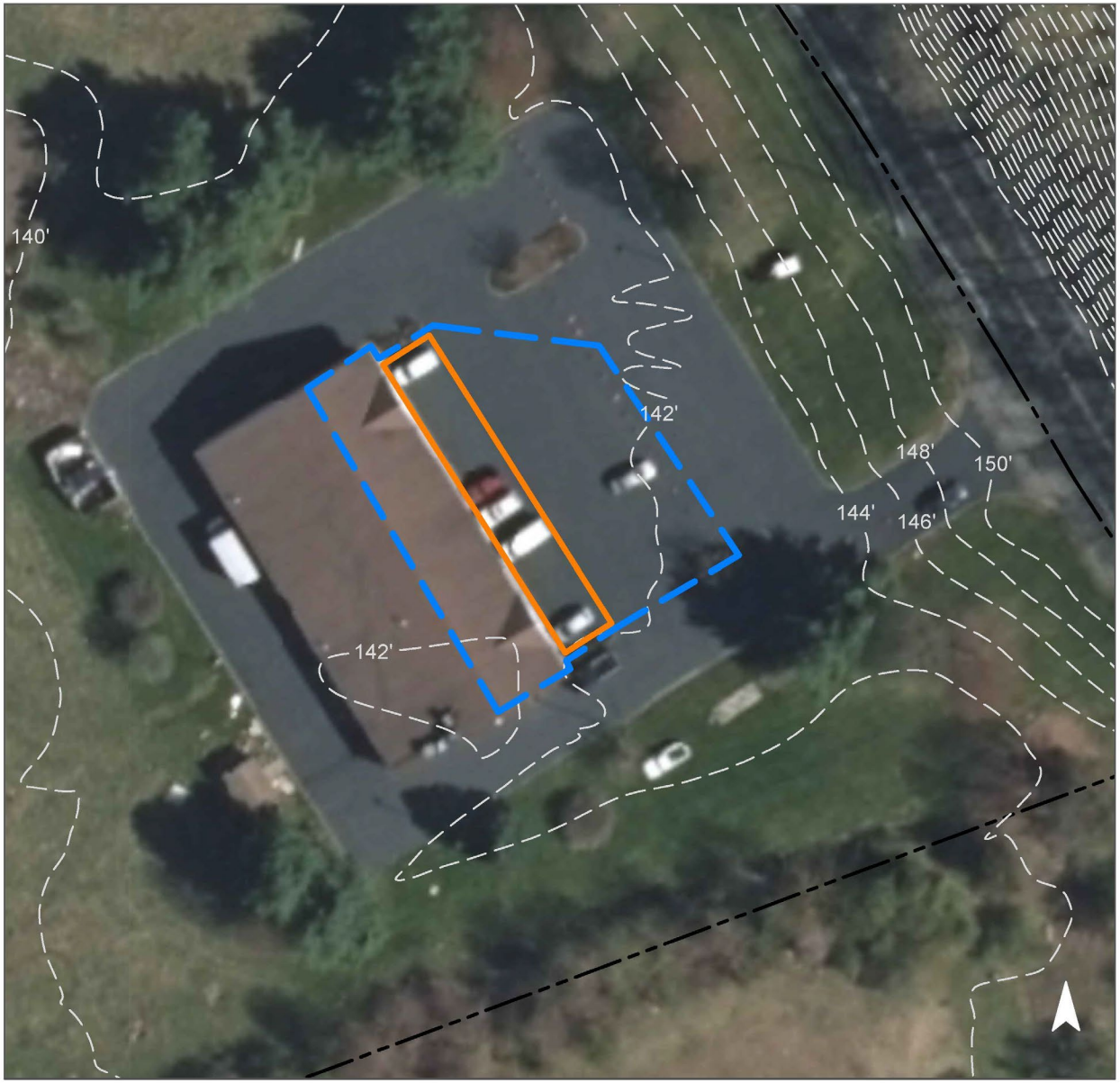
Block and Lot: Block 17 Lot 11

Pervious pavement can be installed at parking spaces adjacent to the building to capture and infiltrate runoff from the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
23	52,171	2.5	26.3	239.5	0.041	1.43

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	0.260	43	19,060	0.72	1,780	$44,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Bo Bo Kitchen II

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

0 25' 50'

DELAWARE RIVER TUBING

Subwatershed: Harihokake Creek

Site Area: 563,685 sq. ft.

Address: 778 Frenchtown Road
Milford, NJ 08848

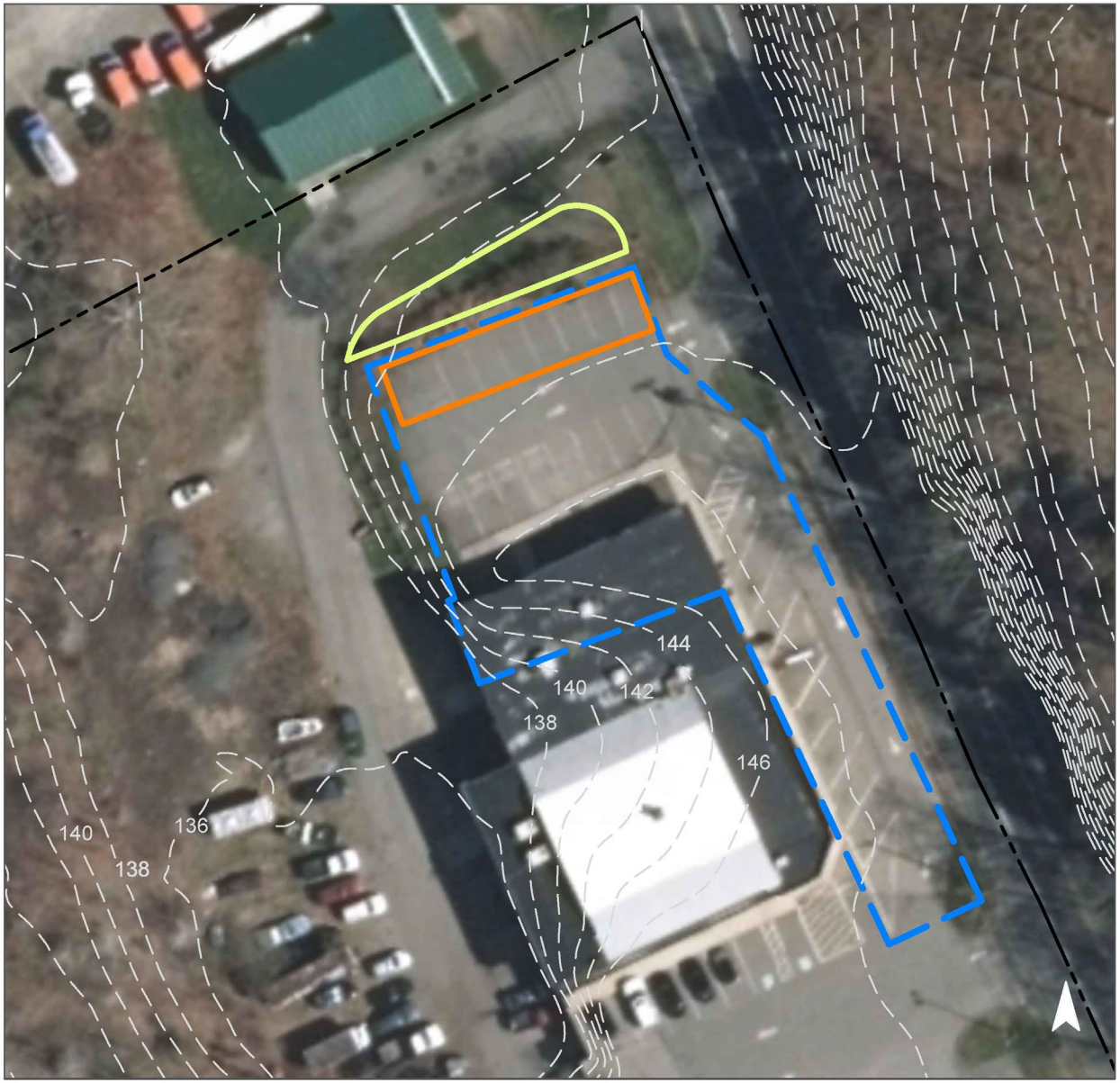
Block and Lot: Block 17 Lot 12

Pervious pavement can be installed in parking spaces to capture runoff from the parking lot and part of the building. A bioretention system can be installed to infiltrate runoff that overflows from the pervious 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"
21	116,169	5.6	58.7	533.4	0.091	3.19

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	0.162	27	11,890	0.45	1,550	$7,750
Pervious pavement	0.251	42	18,410	0.69	1,140	$28,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Delaware River Tubing

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

0 25' 50'

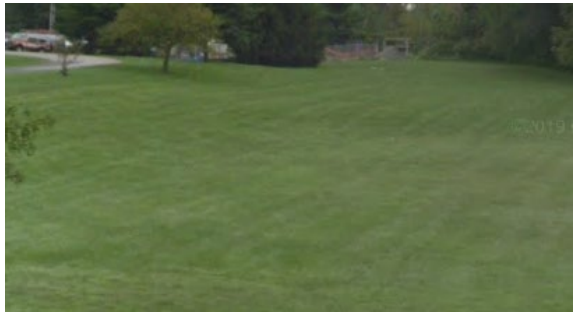
ALEXANDRIA MIDDLE SCHOOL

Subwatershed: Nishisakawick Creek

Site Area: 3,100,109 sq. ft.

Address: 557 Country Road 513
Pittstown, NJ 08867

Block and Lot: Block 12 Lot 9

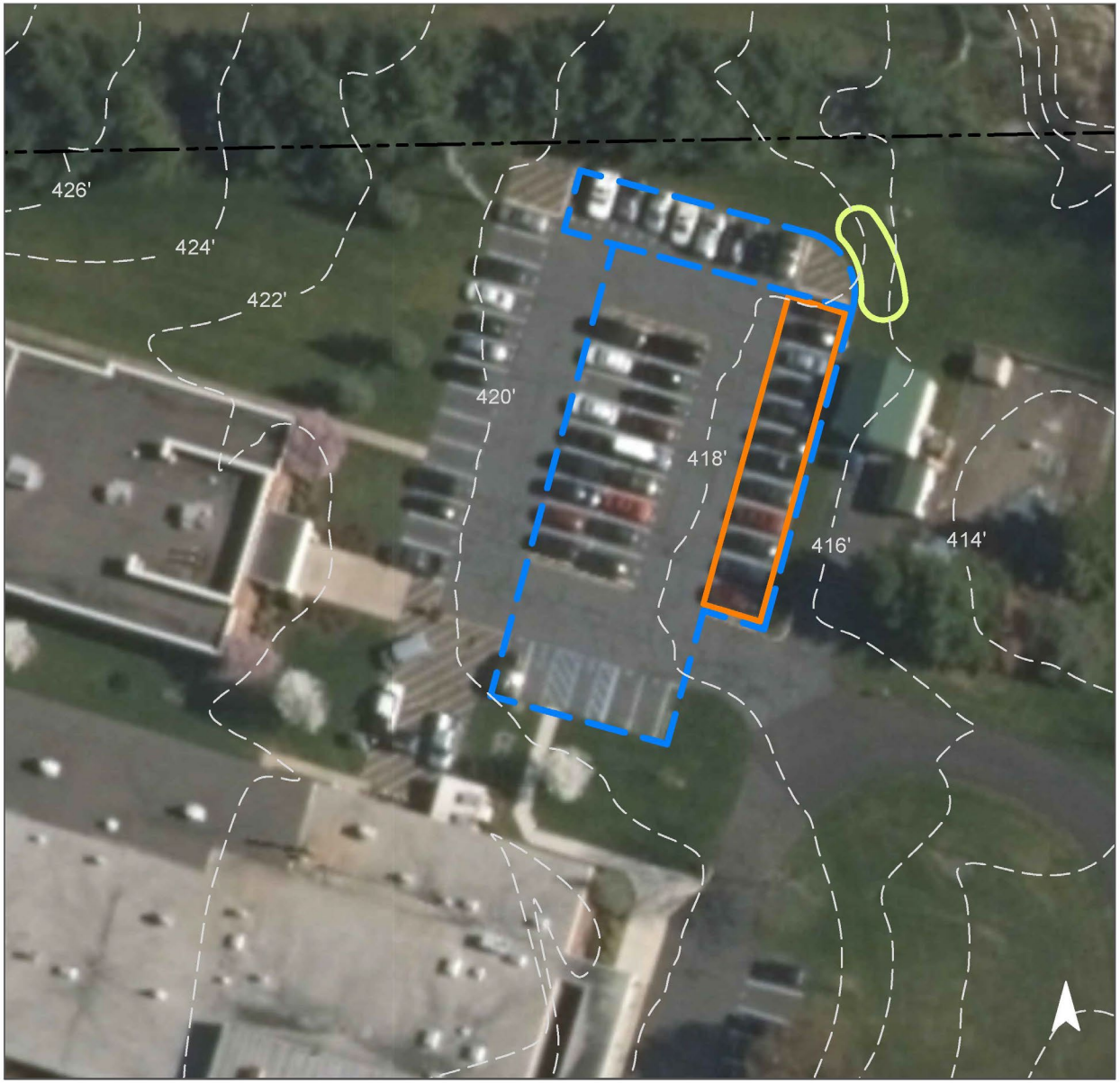


A bioretention system can be installed to capture, treat, and infiltrate stormwater runoff from the parking lot to remediate the erosion and puddling in that area. Runoff from a large area of the parking lot can also be treated with a section of pervious pavement parking spaces. A preliminary soil assessment 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"
15	200,048	9.6	101.0	918.5	0.156	5.49

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 system	0.050	8	3,640	0.14	475	$2,375
Pervious pavement	0.296	50	21,740	0.82	2,030	$50,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Alexandria Middle School

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

0 25' 50'

DELAWARE VALLEY REGIONAL HIGH SCHOOL

Subwatershed: Nishisakawick Creek

Site Area: 5,562,234 sq. ft.

Address: 19 Senator Stout Road
Frenchtown, NJ 08825

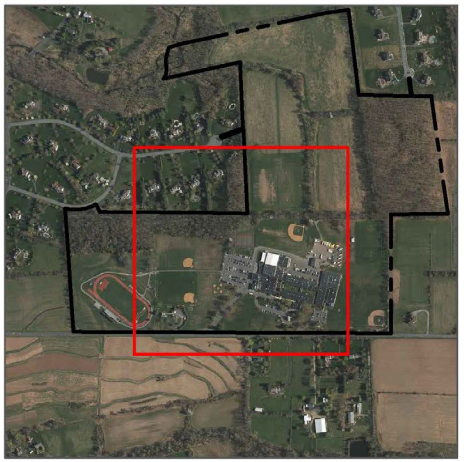
Block and Lot: Block 21 Lot 33

A section of parking spaces can be converted to porous pavement to capture and infiltrate runoff from the parking lot. Overflow runoff can be treated with a rain garden installed in the turfgrass area adjacent to the pervious pavement. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
12	672,505	32.4	339.6	3,087.7	0.524	18.44

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	0.410	69	30,060	1.13	3,930	$19,650
Pervious pavement	0.895	150	65,680	2.47	6,135	$153,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Delaware Valley Regional High School

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

0 50' 100'

EVERITTSTOWN UNITED METHODIST CHURCH

Subwatershed: Nishisakawick Creek

Site Area: 86,695 sq. ft.

Address: 415 County Road 513
Pittstown, NJ 08867

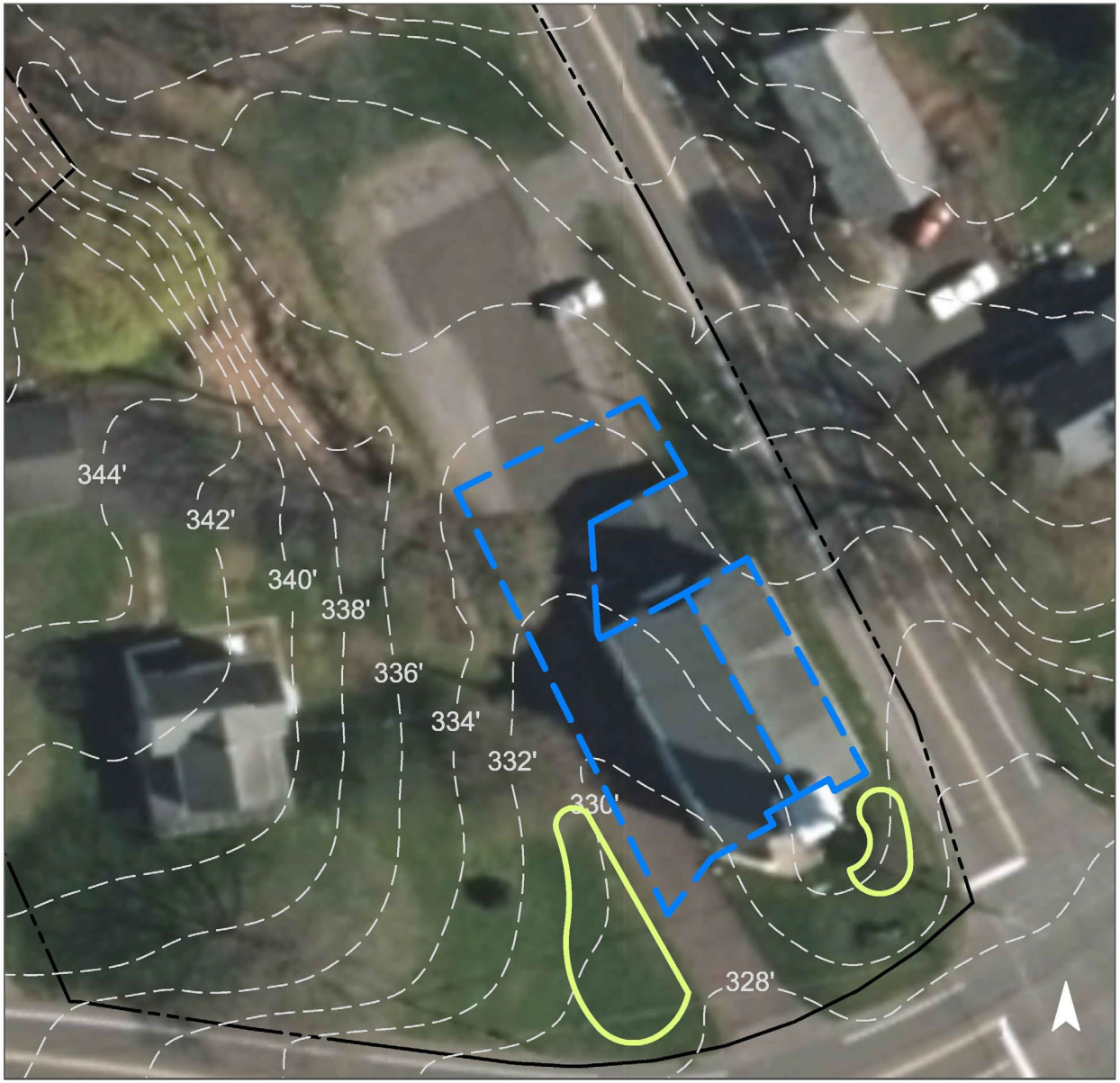
Block and Lot: Block 14 Lot 22

Two rain gardens can be installed in turfgrass areas to capture, treat, and infiltrate rooftop runoff and parking lot runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
27	23,735	1.1	12.0	109.0	0.018	0.65

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	0.152	25	11,170	0.42	1,460	$7,300

GREEN INFRASTRUCTURE RECOMMENDATIONS



Everittstown United Methodist Church

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

0 25' 50'

IGLESIA FRATERNIDAD CHRISTIAN CAMP TECUMSEH

Subwatershed: Nishisakawick Creek

Site Area: 16,150,608 sq. ft.

Address: 445 Mechlin Corner Road
Pittstown, NJ 08867

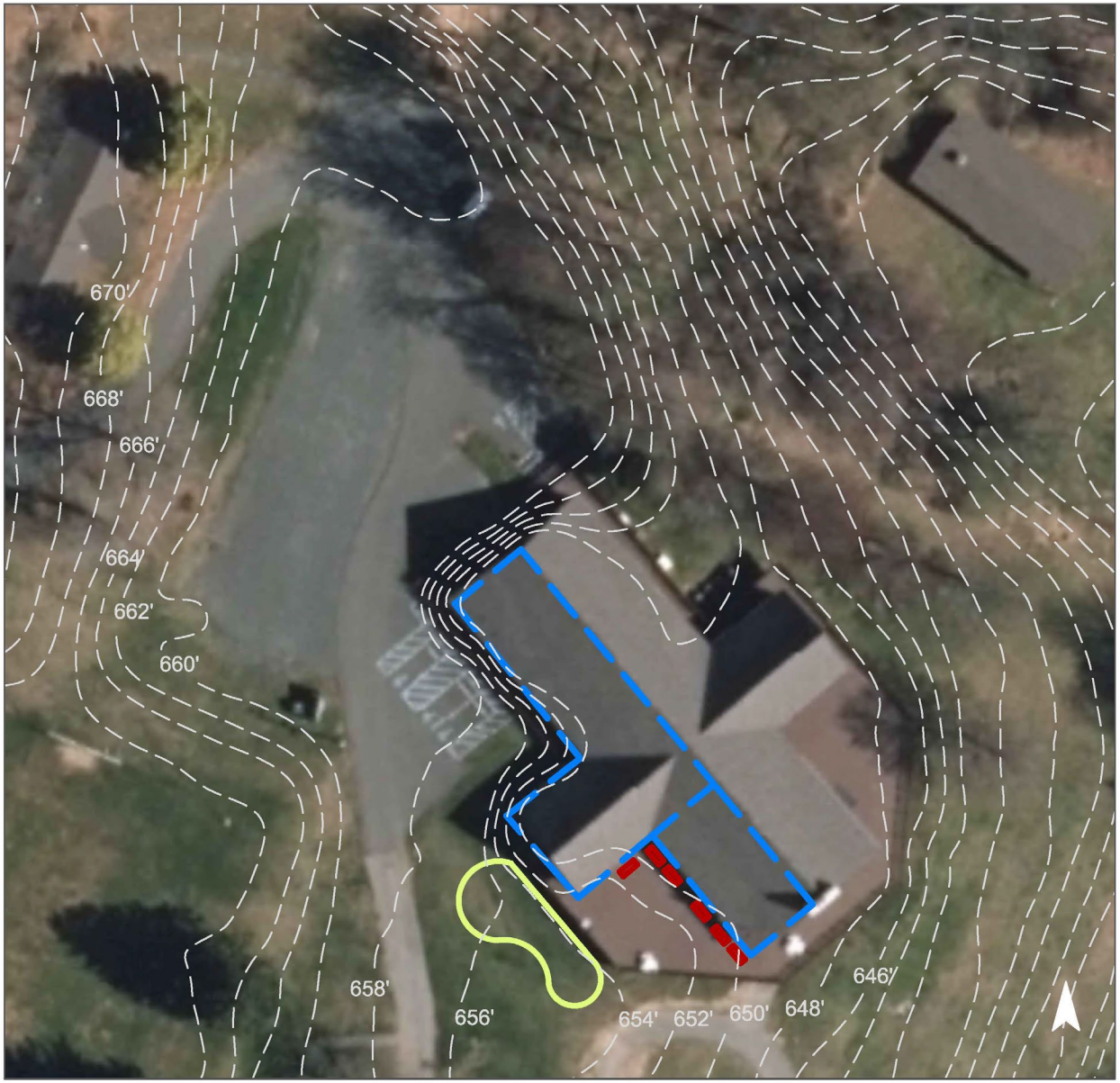
Block and Lot: Block 10 Lot 46

A bioretention system can be installed near the deck of the main building to capture, treat, and infiltrate stormwater runoff from the roof. Planter boxes can be installed along the front of the building to treat the rooftop drainage area as well. 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"
4	688,721	33.2	347.8	3,162.2	0.537	18.89

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
Bioretention system	0.101	17	7,410	0.28	970	$4,850
Planter boxes	n/a	5	n/a	n/a	6 (boxes)	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Iglesia Fraternidad
Christian Camp Tecumseh

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

0 25' 50'

LESTER D. WILSON ELEMENTARY SCHOOL

Subwatershed: Nishisakawick Creek

Site Area: 352,803 sq. ft.

Address: 525 Country Road 513
Pittstown, NJ 08867

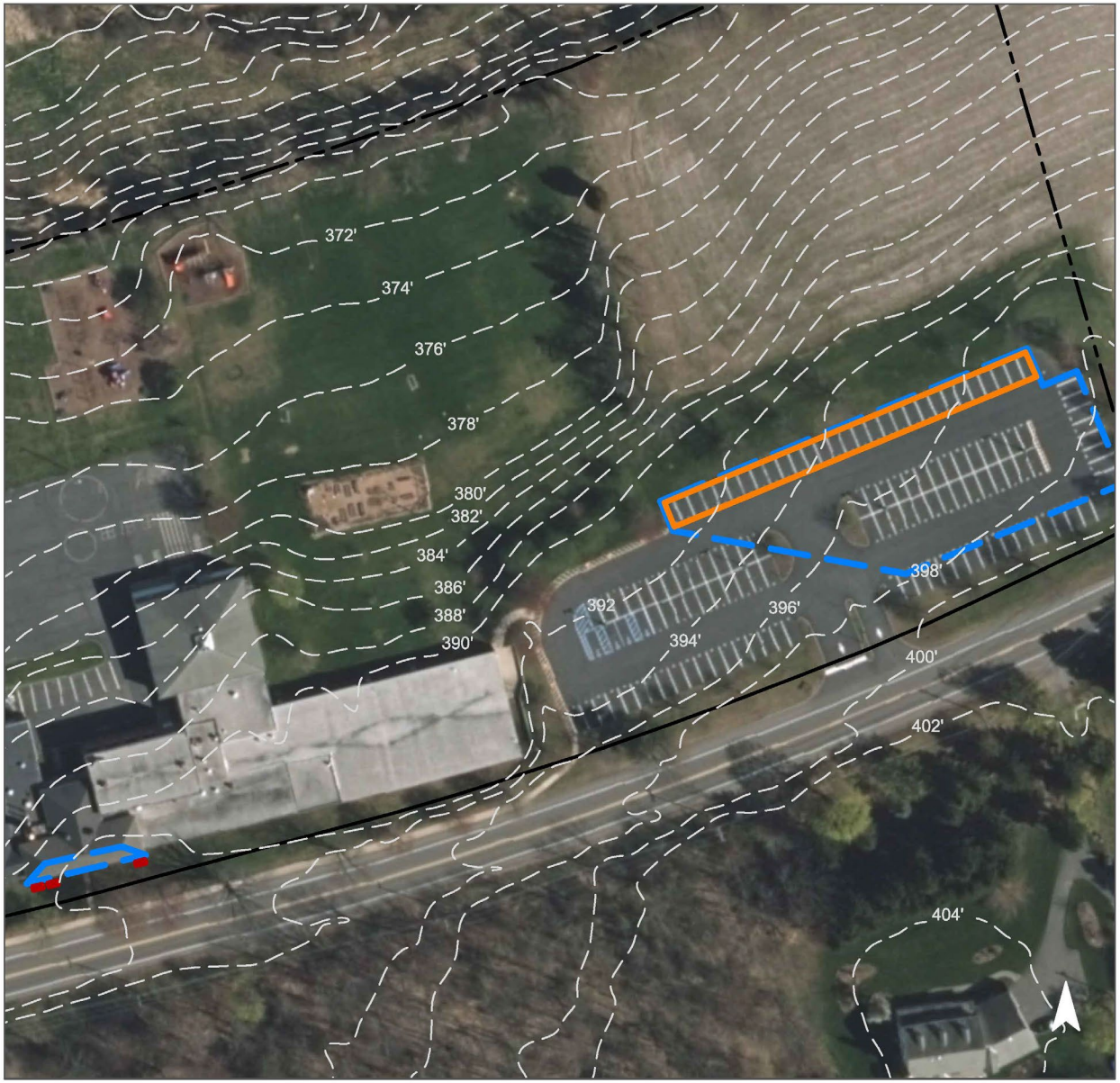
Block and Lot: Block 12 Lot 15

A bioretention system can be installed to capture, treat, and infiltrate stormwater runoff from the parking lot. Downspout planter boxes can be installed at the building on the west side of the property to capture and treat rooftop runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
33	117,142	5.6	59.2	537.8	0.091	3.21

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	0.648	108	47,550	1.79	4,440	$111,000
Planter boxes	n/a	2	n/a	n/a	3 (boxes)	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Lester D. Wilson Elementary School

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

0 50' 100'

ST. THOMAS EPISCOPAL CHURCH

Subwatershed: Nishisakawick Creek

Site Area: 51,200 sq. ft.

Address: 98 Sky Manor Road
Pittstown, NJ 08867

Block and Lot: Block 21 Lot 37

Planter boxes can be installed at the front of the building to capture and treat stormwater runoff from the rooftop. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
26	13,097	0.6	6.6	60.1	0.010	0.36

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
Planter boxes	n/a	2	n/a	n/a	3 (boxes)	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

St. Thomas Episcopal Church

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

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) TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Runoff Volumes from I.C. Annual (cu.ft.)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
	CAKEPOILIN CREEK SITES	**58.75**	**2,558,982**				**15.98**	**696,064**	**33.6**	**351.5**	**3,195.9**	**72,507**	**2,552,235**	**0.542**	**19.09**
1	**Sky Manor Airport**														
	Total Site Info	58.75	2,558,982	21	40	27	15.98	696,064	33.6	351.5	3,195.9	72,507	2,552,235	0.542	19.09
	HARIHOKAKE CREEK SITES	**89.40**	**3,894,306**				**11.27**	**490,725**	**23.7**	**247.8**	**2,253.1**	**51,117**	**1,799,324**	**0.382**	**13.46**
2	**Alexandria Park**														
	Total Site Info	71.17	3,100,109	7	24	10	7.40	322,385	15.5	162.8	1,480.2	33,582	1,182,078	0.251	8.84
3	**Bo Bo Kitchen II**														
	Total Site Info	5.29	230,512	17	11	23	1.20	52,171	2.5	26.3	239.5	5,434	191,293	0.041	1.43
4	**Delaware River Tubing**														
	Total Site Info	12.94	563,685	17	12	21	2.67	116,169	5.6	58.7	533.4	12,101	425,953	0.091	3.19
	NISHISAKAWICK SITES	**530.31**	**23,504,359**				**39.38**	**1,715,247**	**82.7**	**866.3**	**7,875.3**	**178,672**	**6,289,239**	**1.336**	**47.04**
5	**Alexandria Middle School**														
	Total Site Info	29.86	1,300,819	12	9	15	4.59	200,048	9.6	101.0	918.5	20,838	733,508	0.156	5.49
6	**Delaware Valley Regional High School**														
	Total Site Info	127.69	5,562,234	21	33	12	15.44	672,505	32.4	339.6	3,087.7	70,053	2,465,852	0.524	18.44
7	**Everittstown United Methodist Church**														
	Total Site Info	1.99	86,695	14	22	27	0.54	23,735	1.1	12.0	109.0	2,472	87,028	0.018	0.65
8	**Iglesia Fraterndad Christian Camp Tecumseh**														
	Total Site Info	370.77	16,150,608	10	46	4	15.81	688,721	33.2	347.8	3,162.2	71,742	2,525,309	0.537	18.89
9	**Lester D. Wilson Elementary School**														
	Total Site Info	8.10	352,803	12	15	33	2.69	117,142	5.6	59.2	537.8	12,202	429,522	0.091	3.21
10	**St. Thomas Episcopal Church**														
	Total Site Info	1.18	51,200	21	37	26	0.30	13,097	0.6	6.6	60.1	1,364	48,021	0.010	0.36

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 %
	CAKEPOILIN CREEK SITES	**11,445**	**0.26**	**0.293**	**50**	**19,450**	**0.74**				**$73,375**	**1.6%**
1	**Sky Manor Airport**											
	Bioretention system	3,000	0.07	0.078	13	5,740	0.22	750	$5	SF	$3,750	0.4%
	Pervious pavement	6,390	0.15	0.166	28	12,210	0.46	2,625	$25	SF	$65,625	0.9%
	Planter box (downspout)	215	0.00	n/a	1	n/a	n/a	1	$1,000	box	$1,000	0.0%
	Rainwater harvesting	1,840	0.04	0.048	8	1,500	0.06	1,500	$2	gal	$3,000	0.3%
	Total Site Info	**11,445**	**0.26**	**0.293**	**50**	**19,450**	**0.74**				**$73,375**	**1.6%**
	HARIHOKAKE CREEK SITES	**38,975**	**0.89**	**0.954**	**168**	**70,000**	**2.64**				**$132,250**	**7.9%**
2	**Alexandria Park**											
	Bioretention system	5,400	0.12	0.141	24	10,320	0.39	1,350	$5	SF	$6,750	1.7%
	Pervious pavement	5,400	0.12	0.141	24	10,320	0.39	1,350	$25	SF	$33,750	1.7%
	Planter box (downspout)	2,360	0.05	n/a	9	n/a	n/a	11	$1,000	box	$11,000	0.7%
	Total Site Info	**13,160**	**0.30**	**0.281**	**56**	**20,640**	**0.78**				**$51,500**	**4.1%**
3	**Bo Bo Kitchen II**											
	Pervious pavement	9,970	0.23	0.260	43	19,060	0.72	1,780	$25	SF	$44,500	19.1%
	Total Site Info	**9,970**	**0.23**	**0.260**	**43**	**19,060**	**0.72**				**$44,500**	**19.1%**
4	**Delaware River Tubing**											
	Bioretention system	6,215	0.14	0.162	27	11,890	0.45	1,550	$5	SF	$7,750	5.3%
	Pervious pavement	9,630	0.22	0.251	42	18,410	0.69	1,140	$25	SF	$28,500	8.3%
	Total Site Info	**15,845**	**0.36**	**0.413**	**69**	**30,300**	**1.14**				**$36,250**	**13.6%**
	NISHISAKAWICK SITES	**100,515**	**2.31**	**2.552**	**437**	**187,250**	**7.05**				**$361,300**	**5.9%**
5	**Alexandria Middle School**											
	Bioretention system	1,900	0.04	0.050	8	3,640	0.14	475	$5	SF	$2,375	0.9%
	Pervious pavement	11,370	0.26	0.296	50	21,740	0.82	2,030	$25	SF	$50,750	5.7%
	Total Site Info	**13,270**	**0.30**	**0.346**	**58**	**25,380**	**0.96**				**$53,125**	**6.6%**

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 %
6	**Delaware Valley Regional High School**											
	Bioretention system	15,725	0.36	0.410	69	30,060	1.13	3,930	$5	SF	$19,650	2.3%
	Pervious pavement	34,355	0.79	0.895	150	65,680	2.47	6,135	$25	SF	$153,375	5.1%
	Total Site Info	**50,080**	**1.15**	**1.305**	**218**	**95,740**	**3.60**				**$173,025**	**7.4%**
7	**Everittstown United Methodist Church**											
	Bioretention system	5,840	0.13	0.152	25	11,170	0.42	1,460	$5	SF	$7,300	24.6%
	Total Site Info	**5,840**	**0.13**	**0.152**	**25**	**11,170**	**0.42**				**$7,300**	**24.6%**
8	**Iglesia Fraterndad Christian Camp Tecumseh**											
	Bioretention system	3,875	0.09	0.101	17	7,410	0.28	970	$5	SF	$4,850	0.6%
	Planter box (downspout)	1,290	0.03	n/a	5	n/a	n/a	6	$1,000	box	$6,000	0.2%
	Total Site Info	**5,165**	**0.12**	**0.101**	**22**	**7,410**	**0.28**				**$10,850**	**0.7%**
9	**Lester D. Wilson Elementary School**											
	Pervious pavement	24,870	0.57	0.648	108	47,550	1.79	4,440	$25	SF	$111,000	21.2%
	Planter box (downspout)	645	0.01	n/a	2	n/a	n/a	3	$1,000	box	$3,000	0.6%
	Total Site Info	**25,515**	**0.59**	**0.648**	**111**	**47,550**	**1.79**				**$114,000**	**21.8%**
10	**St. Thomas Episcopal Church**											
	Planter box (downspout)	645	0.01	n/a	2	n/a	n/a	3	$1,000	box	$3,000	4.9%
	Total Site Info	**645**	**0.01**	**0.000**	**2**	**0**	**0.00**				**$3,000**	**4.9%**