RUTGERS
New Jersey Agricultural
Experiment Station

Impervious Cover Reduction Action Plan
for
Town of Phillipsburg, Warren County, New Jersey

Prepared for the Town of Phillipsburg by the
Rutgers Cooperative Extension Water Resources Program

November 3, 2016

WILLIAM PENN
FOUNDATION

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Introduction

Located in Warren County in northern New Jersey, the Town of Phillipsburg covers approximately 3.3 square miles. Figures 1 and 2 illustrate that Phillipsburg is dominated by urban land uses. A total of 77.9% of the municipality's land use is classified as urban. Of the urban land in Phillipsburg, high density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2007 land use/land cover geographical information system (GIS) data layer categorizes Phillipsburg 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 Phillipsburg. Based upon the 2007 NJDEP land use/land cover data, approximately 37.0% of Phillipsburg has impervious cover. This level of impervious cover suggests that the streams in Phillipsburg are non-supporting streams. [1]

Methodology

Phillipsburg contains portions of two 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

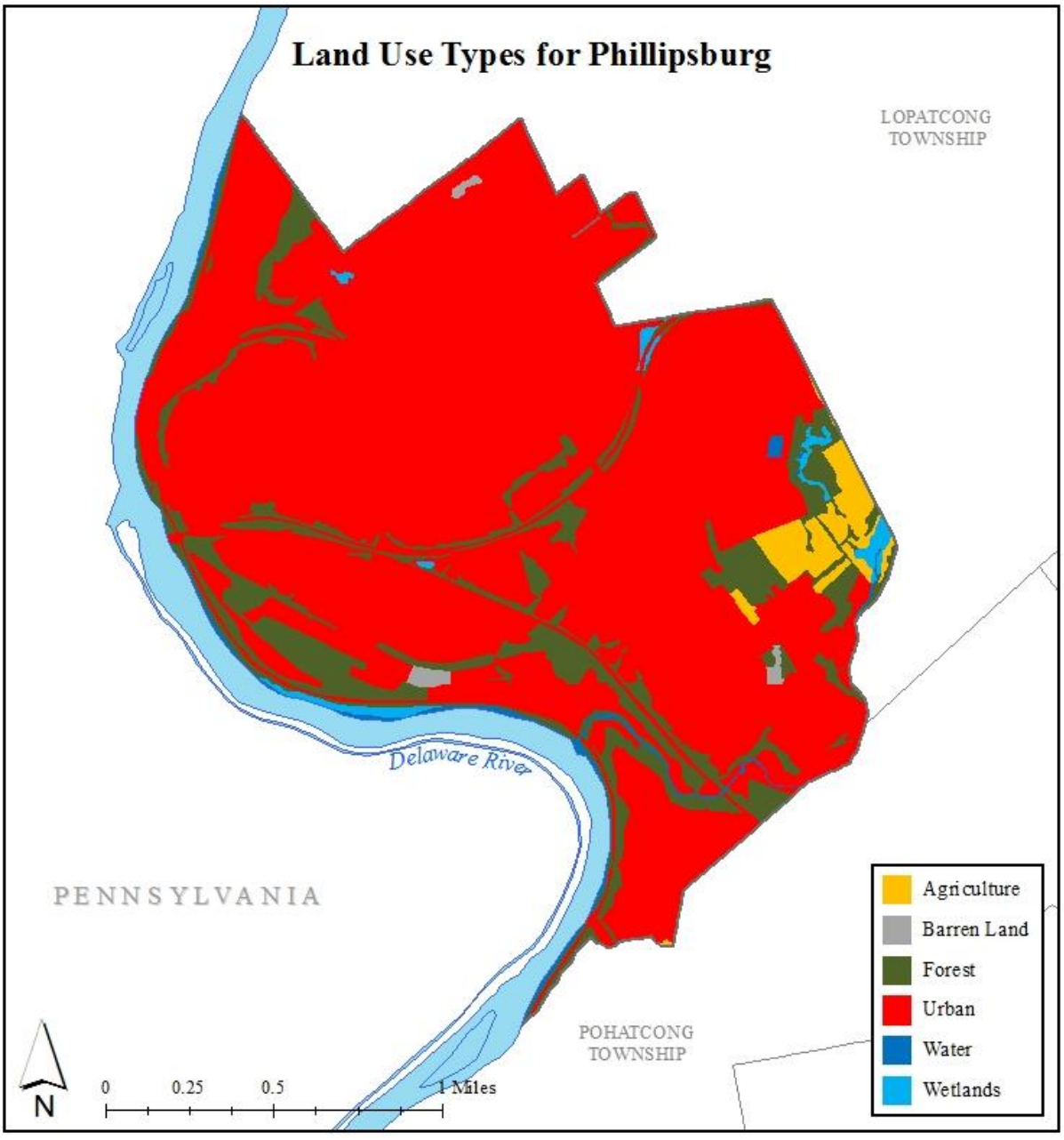


Figure 1: Map illustrating the land use in Phillipsburg

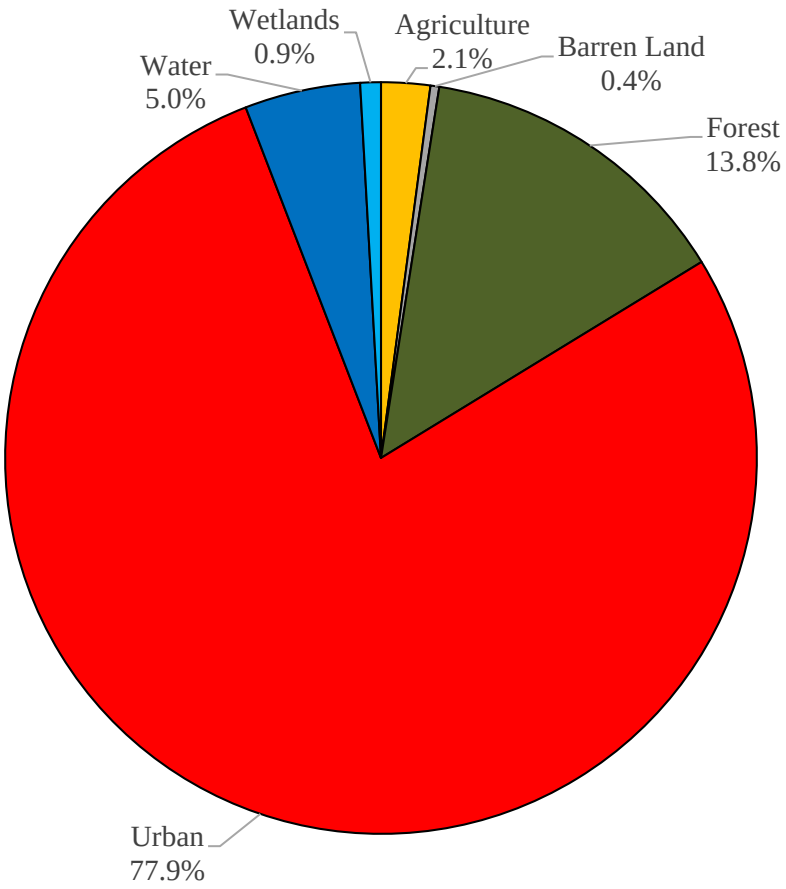


Figure 2: Pie chart illustrating the land use in Phillipsburg

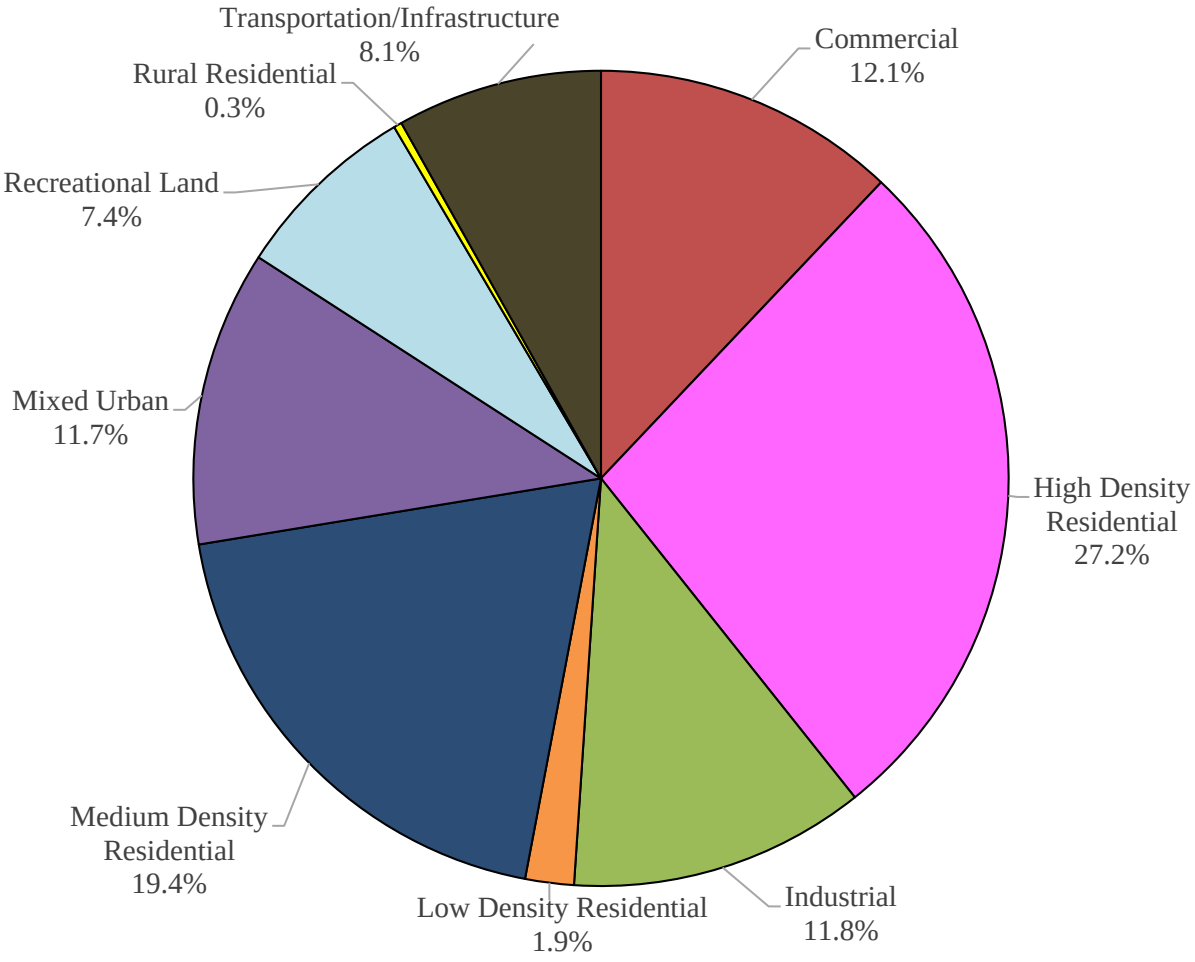


Figure 3: Pie chart illustrating the various types of urban land use in Phillipsburg

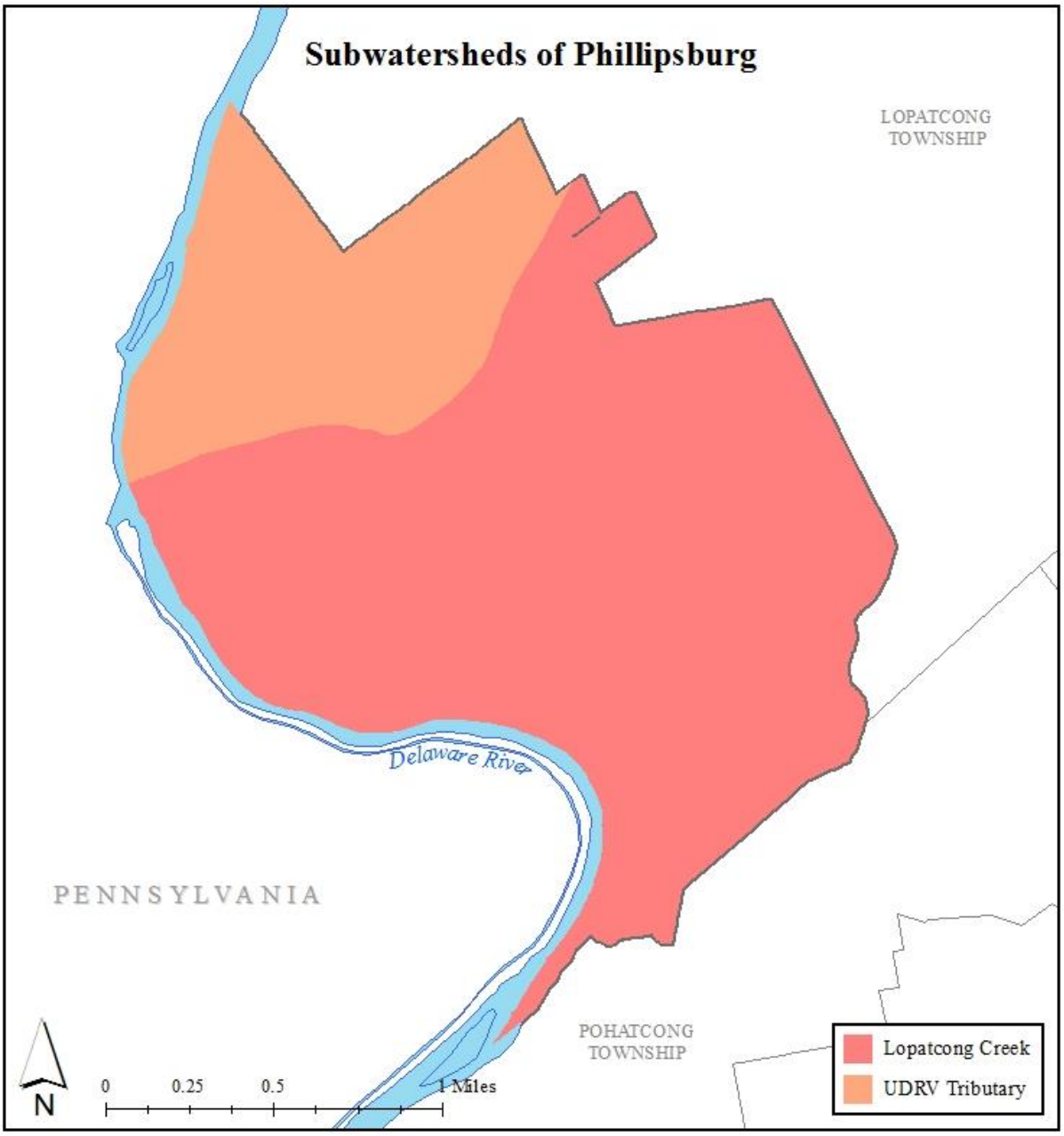


Figure 4: Map of the subwatersheds in Phillipsburg

For each potential project site, specific aerial loading coefficients for commercial land use were used to determine the annual runoff loads for total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS) from impervious surfaces (Table 1). These are the same aerial loading coefficients that NJDEP uses in developing total maximum daily loads (TMDLs) for impaired waterways of the state. The percentage of impervious cover for each site was extracted from the 2007 NJDEP land use/land cover database. For impervious areas, runoff volumes were determined for the water quality design storm (1.25 inches of rain over two-hours) and for the annual rainfall total of 44 inches.

Preliminary soil assessments were conducted for each potential project site identified in Phillipsburg 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 Phillipsburg. Each practice is discussed below.

Disconnected downspouts

This is often referred to as simple disconnection. A downspout is simply disconnected, prevented from draining directly to the roadway or storm sewer system, and directed to discharge water to a pervious area (i.e., lawn).

Pervious pavements

There are several types of permeable pavement systems including porous asphalt, pervious concrete, permeable pavers, and grass pavers. These surfaces are hard and support vehicle traffic but also allow water to infiltrate through the surface. They have an underlying stone layer to store stormwater runoff and allow it to slowly seep into the ground.




[3] United States Environmental Protection Agency (USEPA), 2013. Watershed Assessment, Tracking, and Environmental Results, New Jersey Water Quality Assessment Report. http://ofmpub.epa.gov/waters10/attains_state.control?p_state=NJ

Bioretention systems/rain gardens

These are landscaped features that are designed to capture, treat, and infiltrate stormwater runoff. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating wildlife habitat while managing stormwater runoff. Bioretention systems also can be used in soils that do not quickly infiltrate by incorporating an underdrain into the system.

Downspout planter boxes

These are wooden boxes with plants installed at the base of a downspout that provide an opportunity to beneficially reuse rooftop runoff.

Rainwater harvesting systems (cistern or rain barrel)

These systems capture rainwater, mainly from rooftops, in cisterns or rain barrels. The water can then be used for watering gardens, washing vehicles, or for other non-potable uses.

Bioswale

Bioswales are landscape features that convey stormwater from one location to another while removing pollutants and providing water an opportunity to infiltrate.

Stormwater planters

Stormwater planters are vegetated structures that are built into the sidewalk to intercept stormwater runoff from the roadway or sidewalk. Many of these planters are designed to allow the water to infiltrate into the ground while others are designed simply to filter the water and convey it back into the stormwater sewer system.

Tree filter boxes

These are pre-manufactured concrete boxes that contain a special soil mix and are planted with a tree or shrub. They filter stormwater runoff but provide little storage capacity. They are typically designed to quickly filter stormwater and then discharge it to the local sewer system.

Potential Project Sites

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

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

Conclusion

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

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

a. Green Infrastructure Sites

PHILLIPSBURG TOWN: GREEN INFRASTRUCTURE SITES

SITES WITHIN THE LOPATCONG CREEK SUBWATERSHED:

1. Andover-Morris Elementary School
2. Blessed Hope Church
3. Green Street Elementary School
4. Phillipsburg Fire Department
5. Phillipsburg Free Public Library & Town Office
6. Phillipsburg Middle School
7. St. Philip & St. James Church

SITES WITHIN THE UPPER DELAWARE RIVER VALLEY TRIBUTARY

8. Phillipsburg High School
9. Pilgrim Presbyterian Church
10. Wesley United Methodist Church

b. Proposed Green Infrastructure Concepts

ANDOVER-MORRIS ELEMENTARY SCHOOL

Subwatershed: Lopatcong Creek

Site Area: 182,048 sq. ft.

Address: 712 South Main Street
Phillipsburg, NJ 08865

Block and Lot: Block 2505, Lot 10, 11, 13

Installing a rain garden in front of the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
41	74,605	3.6	37.7	342.5	0.058	2.05

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.090	15	6,597	0.25	865	$4,325

GREEN INFRASTRUCTURE RECOMMENDATIONS

Andover-Morris Elementary School

- bioretention system
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

BLESSED HOPE CHURCH

Subwatershed: Lopatcong Creek

Site Area: 75,333 sq. ft.

Address: 42 Mercer Street
Phillipsburg, NJ 08865

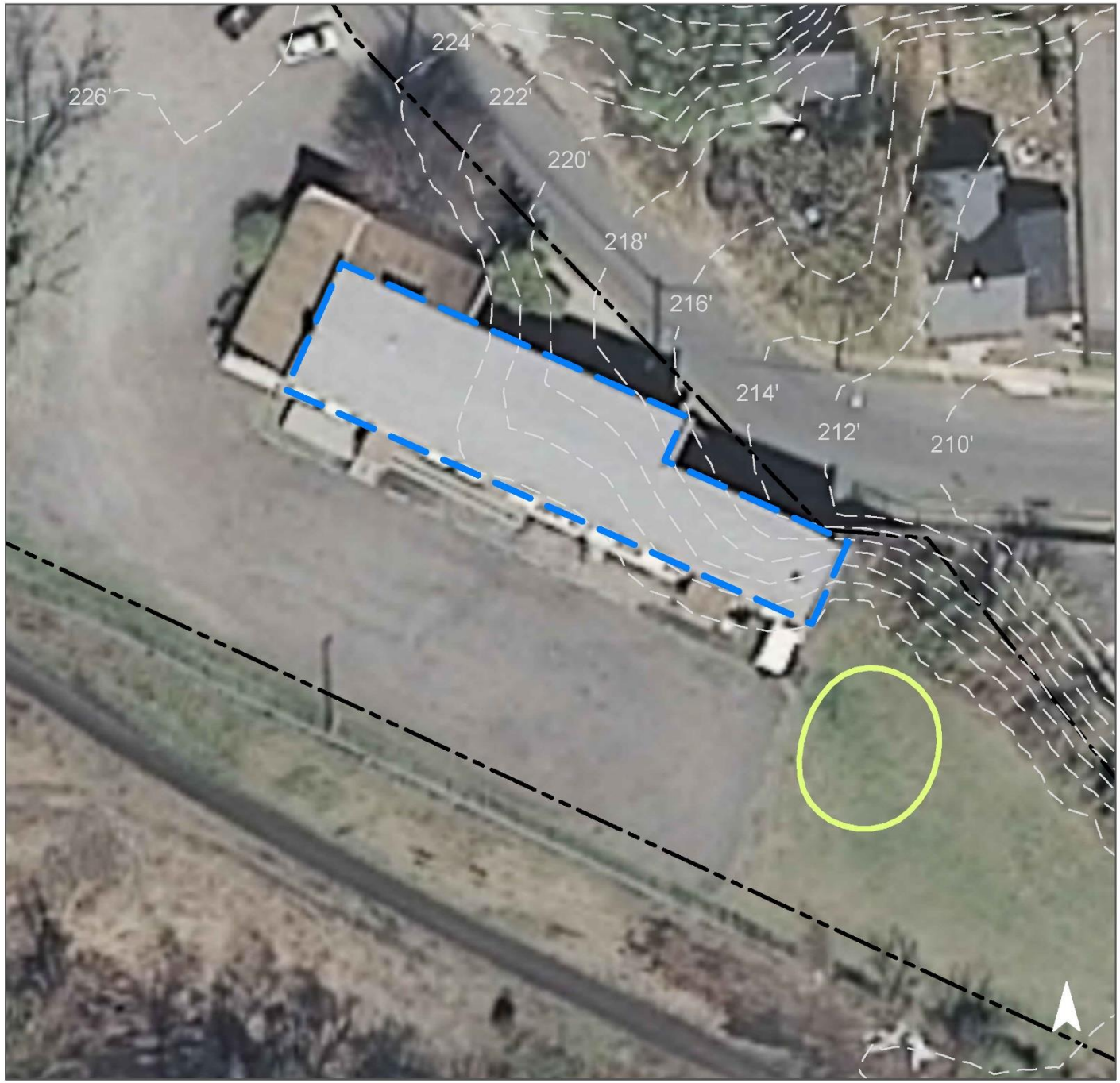
Block and Lot: Block 1502, Lot 3, 4, 5

Installing a rain garden adjacent to the building can capture, treat, and infiltrate roof runoff from the existing disconnected downspouts that are routed to the turfgrass 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"
42	31,492	1.5	15.9	144.6	0.025	0.86

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	0.125	21	9,178	0.34	1,200	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Blessed Hope Church

- bioretention system
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

GREEN STREET ELEMENTARY SCHOOL

Subwatershed: Lopatcong Creek

Site Area: 150,124 sq. ft.

Address: 1000 Green Street
Phillipsburg, NJ 08865

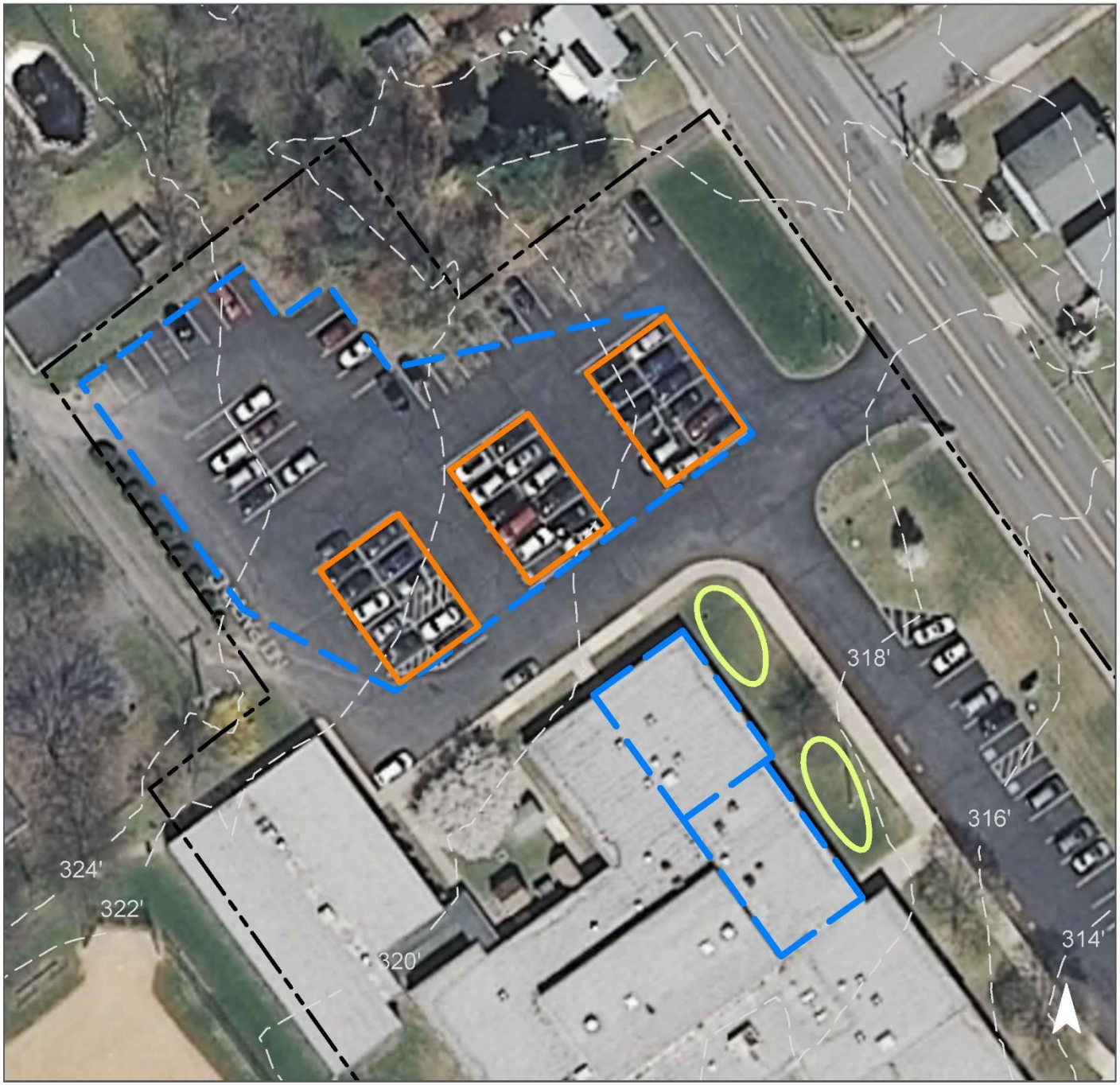
Block and Lot: Block 2703, Lot 5

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

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
74	110,710	5.3	55.9	508.3	0.086	3.04

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	0.135	23	9,941	0.37	1,300	$6,500
Pervious pavement	0.625	105	45,882	1.72	6,150	$153,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Green Street Elementary School

- bioretention system
- pervious pavement
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

PHILLIPSBURG FIRE DEPARTMENT

Subwatershed: Lopatcong Creek

Site Area: 8,937 sq. ft.

Address: 765 Columbus Avenue
Phillipsburg, NJ 08865

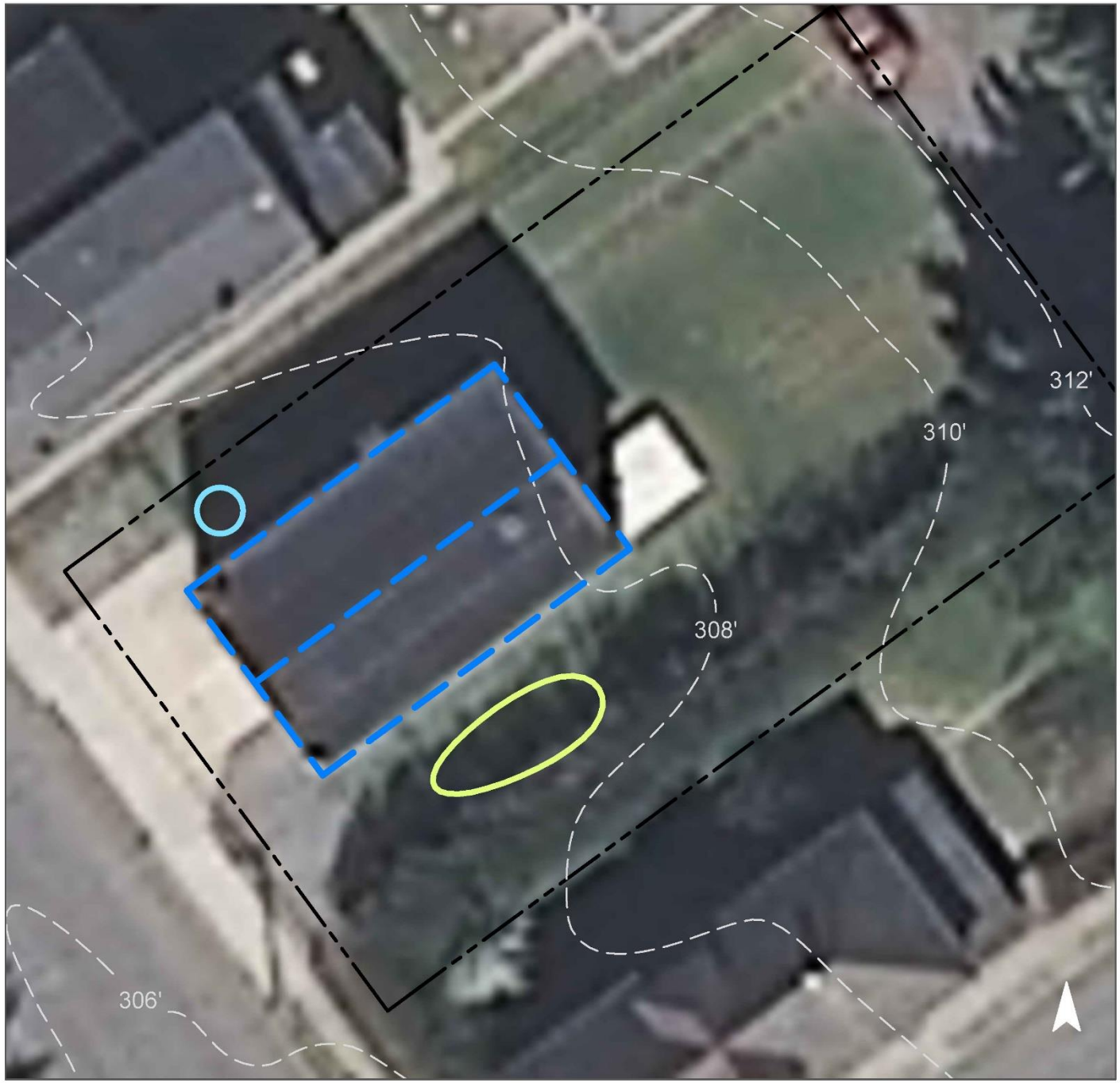
Block and Lot: Block 2311, Lot 4

Rainwater can be harvested by installing a cistern on the north side of the building. The water can be used for washing vehicles or for other non-potable uses. A rain garden can be installed on the south side to capture runoff from the other half of the 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"
40	3,575	0.2	1.8	16.4	0.003	0.10

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	0.039	3	1,436	0.05	190	$950
Rainwater harvesting	0.020	3	1,436	0.05	1,500 (gal)	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Phillipsburg Fire Department

- bioretention system
- rainwater harvesting
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 10' 20'

PHILLIPSBURG FREE PUBLIC LIBRARY & TOWN OFFICE

Subwatershed: Lopatcong Creek

Site Area: 116,416 sq. ft.

Address: 200 Broubalow Way
Phillipsburg, NJ 08865

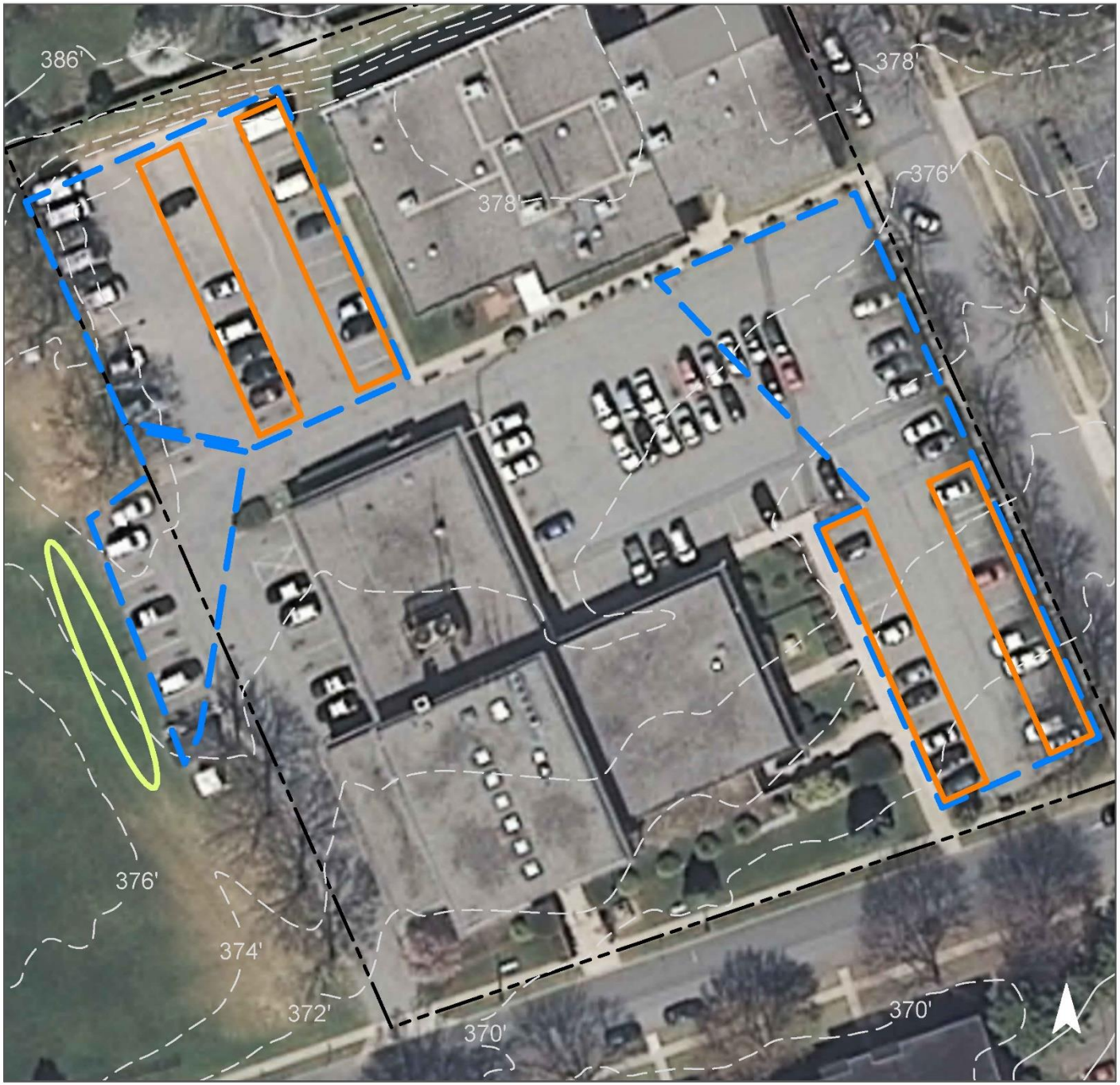
Block and Lot: Block 506, Lot 1

Installing a rain garden to the west of the building can capture, treat, and infiltrate roof runoff. Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. 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"
85	98,789	4.8	49.9	453.6	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 system	0.111	19	8,123	0.31	1,065	$5,325
Pervious pavement	0.737	123	54,103	2.03	8,420	$210,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Phillipsburg Free Public Library& Town Office

- bioretention system
- pervious pavement
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

PHILLIPSBURG MIDDLE SCHOOL

Subwatershed: Lopatcong Creek

Site Area: 833,572 sq. ft.

Address: 525 Warren Street
Phillipsburg, NJ 08865

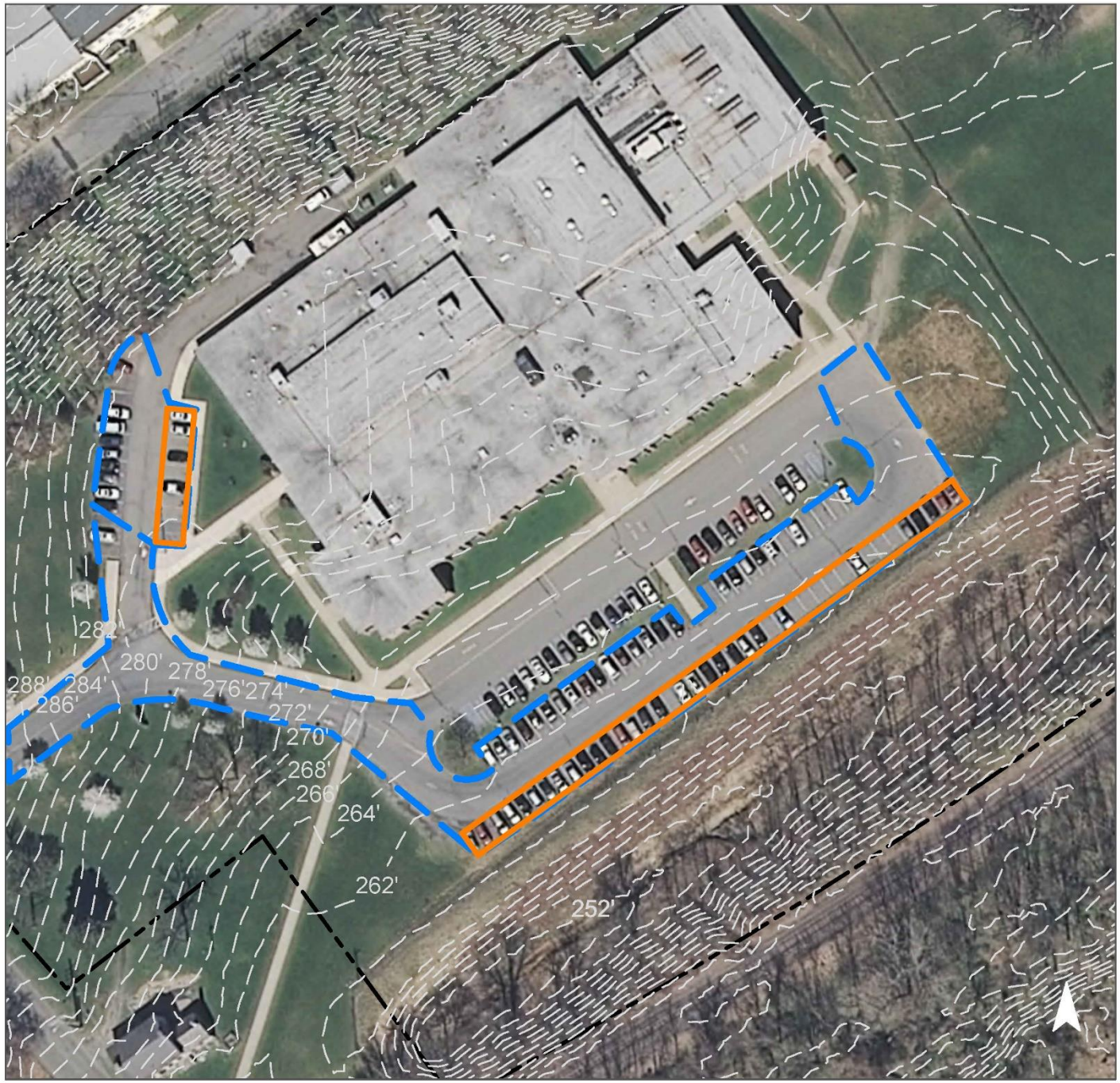
Block and Lot: Block 1701, Lot 13, 14

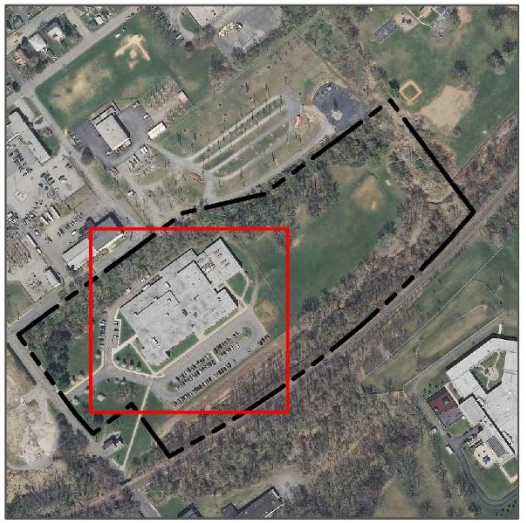
Parking spots to the west and south side of the building can be replaced with porous asphalt which will capture and infiltrate stormwater from the parking lot and driveway that slopes toward the southeast. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
22	181,956	8.8	91.9	835.4	0.142	4.99

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	1.177	197	86,342	3.25	8,710	$217,750

GREEN INFRASTRUCTURE RECOMMENDATIONS





Phillipsburg Middle School

- pervious pavement
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 50' 100'

ST. PHILIP & ST. JAMES CHURCH

Subwatershed: Lopatcong Creek

Site Area: 23,890 sq. ft.

Address: 430 South Main Street
Phillipsburg, NJ 08865

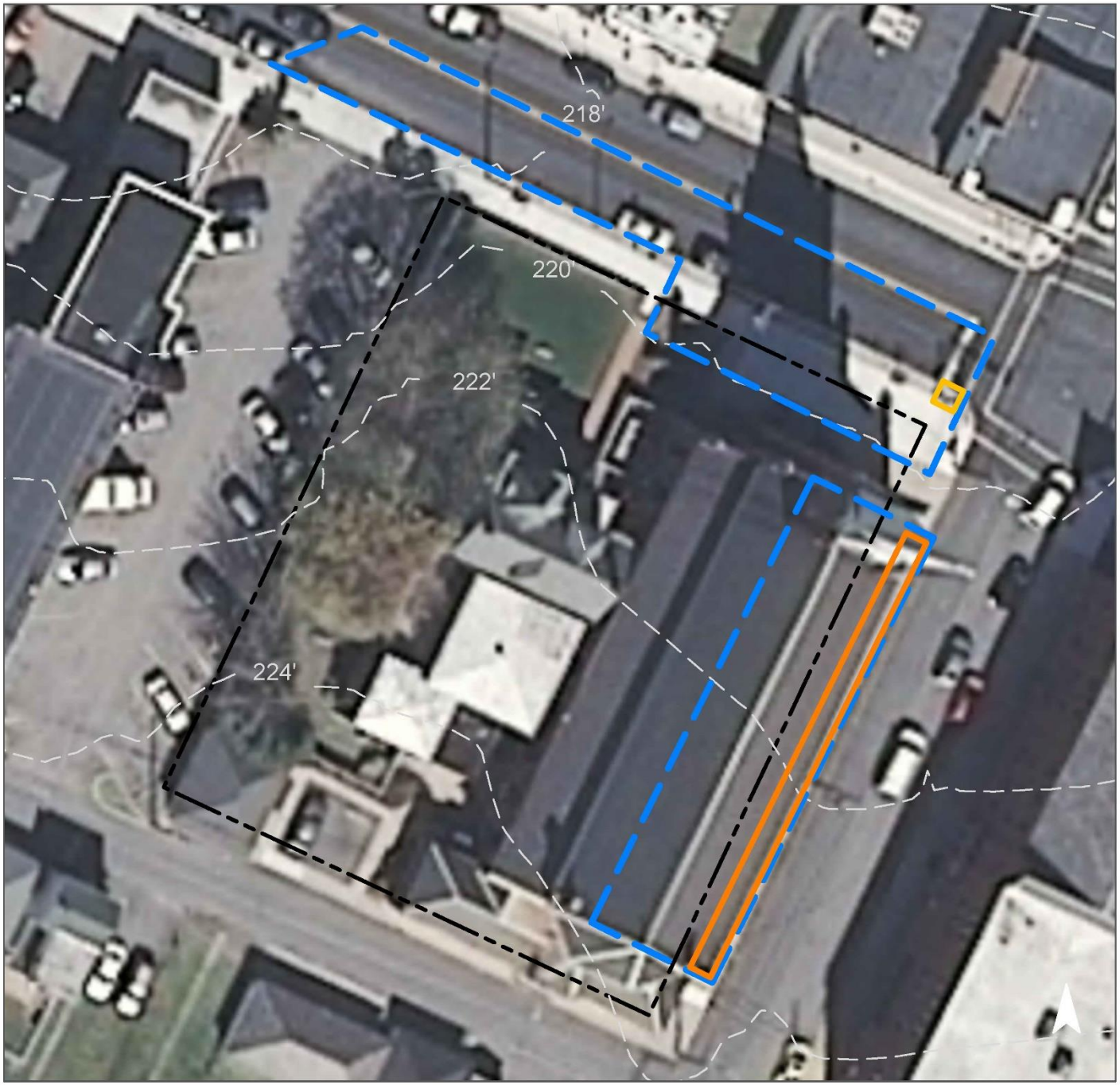
Block and Lot: Block 1509, Lot 5

The sidewalk to the east of the building can be replaced with porous asphalt to capture and infiltrate stormwater. A tree filter box along the road in front of the building can capture and treat roadway and sidewalk 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"
95	22,695	1.1	11.5	104.2	0.018	0.62

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	0.060	10	4,398	0.17	760	$19,000
Tree filter box	0.140	23	n/a	n/a	36	$10,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



St. Philip & St. James Church

- pervious pavement
- tree filter box
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

PHILLIPSBURG HIGH SCHOOL

Subwatershed: Upper Delaware River Valley Tributary

Site Area: 1,147,289 sq. ft.

Address: 200 Hillcrest Boulevard Phillipsburg, NJ 08865

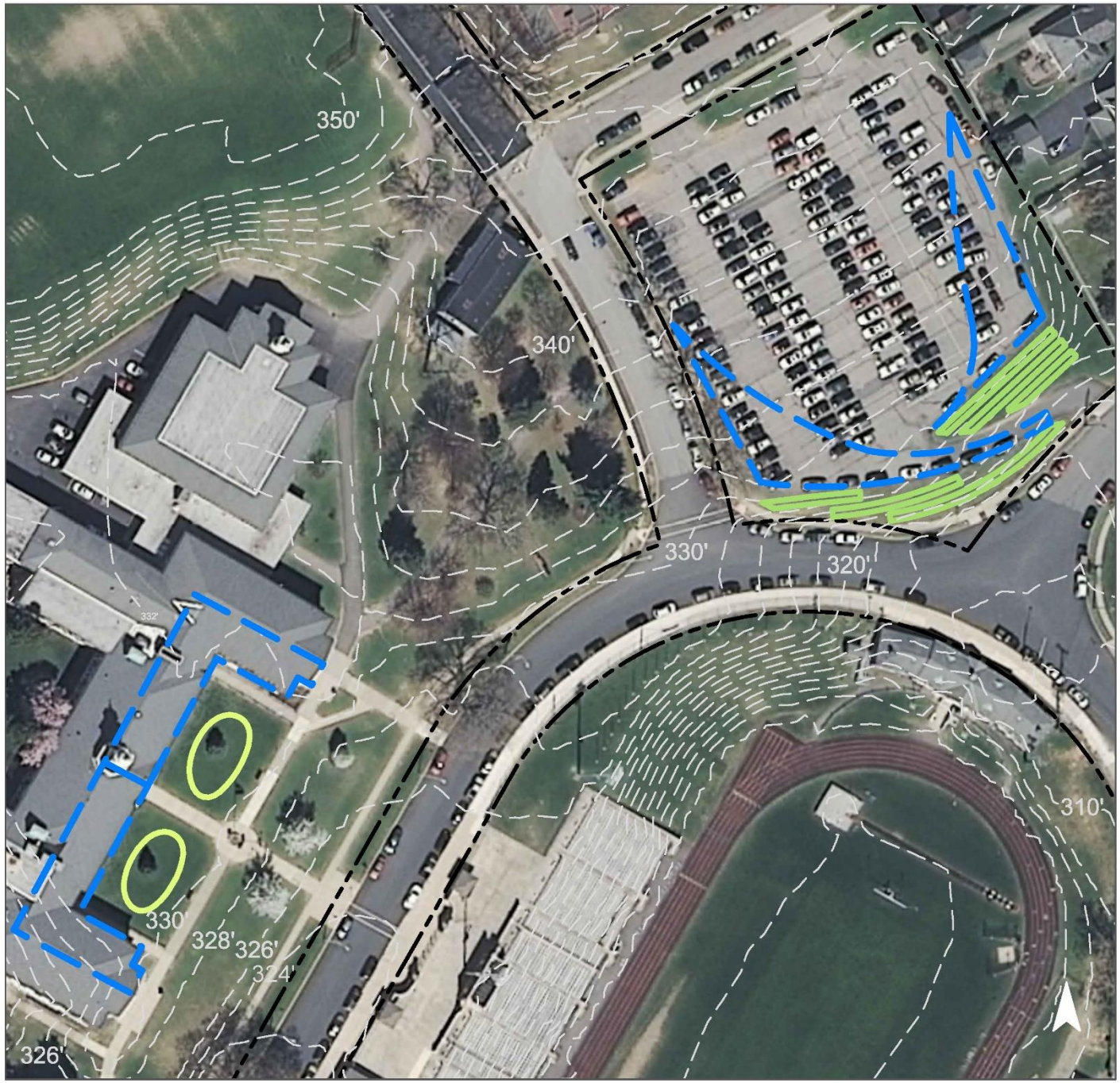
Block and Lot: Block 701; 703, Lot 1;1

Installing two rain gardens in front of the building can capture, treat, and infiltrate roof runoff by directing existing disconnected downspouts into them. Terraced bioswales can be constructed south of the main parking lot on the sloped area to help stabilize the slope and capture stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
38	431,820	20.8	218.1	1,982.6	0.336	11.84

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 systems	0.297	50	21,759	0.82	2,845	$14,225
Bioswales	0.264	44	19,306	0.73	2,525	$12,625

GREEN INFRASTRUCTURE RECOMMENDATIONS



Phillipsburg High School

- bioretention system
- bioswale
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 50' 100'

PILGRIM PRESBYTERIAN CHURCH

Subwatershed: Upper Delaware River Valley Tributary

Site Area: 137,416 sq. ft.

Address: 750 Belvidere Road
Phillipsburg, NJ 08865

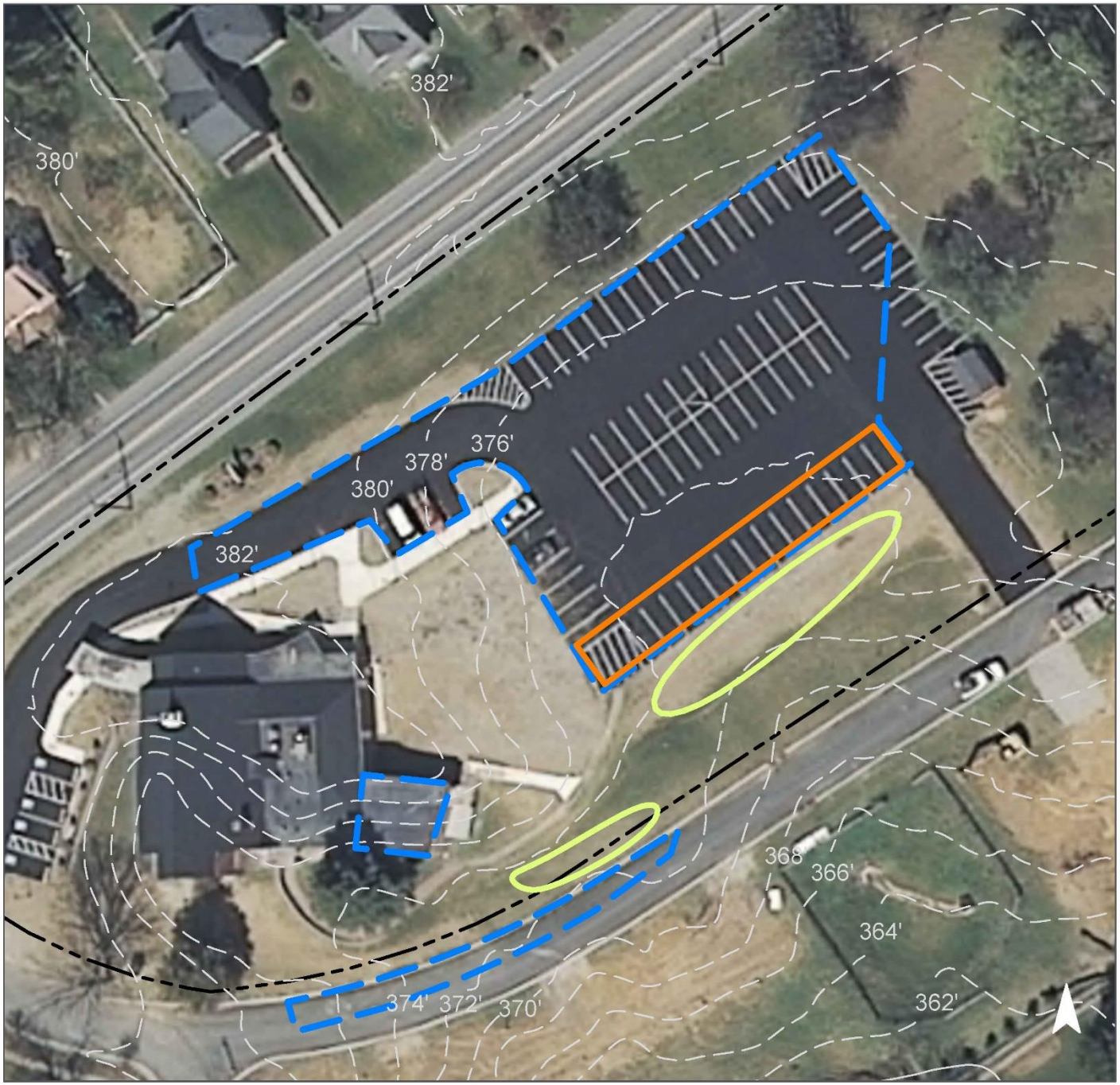
Block and Lot: Block 501, Lot 2

Installing rain gardens adjacent to the building can capture, treat, and infiltrate roof runoff and roadway runoff by implementing a curb cut. Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater with any overflowing runoff discharging into a rain garden in the adjacent grassed 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"
39	53,366	2.6	27.0	245.0	0.042	1.46

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	0.310	52	22,709	0.85	2,970	$14,850
Pervious pavement	0.402	67	29,501	1.11	2,755	$68,875

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pilgrim Presbyterian Church

- bioretention system
- pervious pavement
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

WESLEY UNITED METHODIST CHURCH

Subwatershed: Upper Delaware River Valley Tributary

Site Area: 19,123 sq. ft.

Address: 35 Miller Street
Phillipsburg, NJ 08865

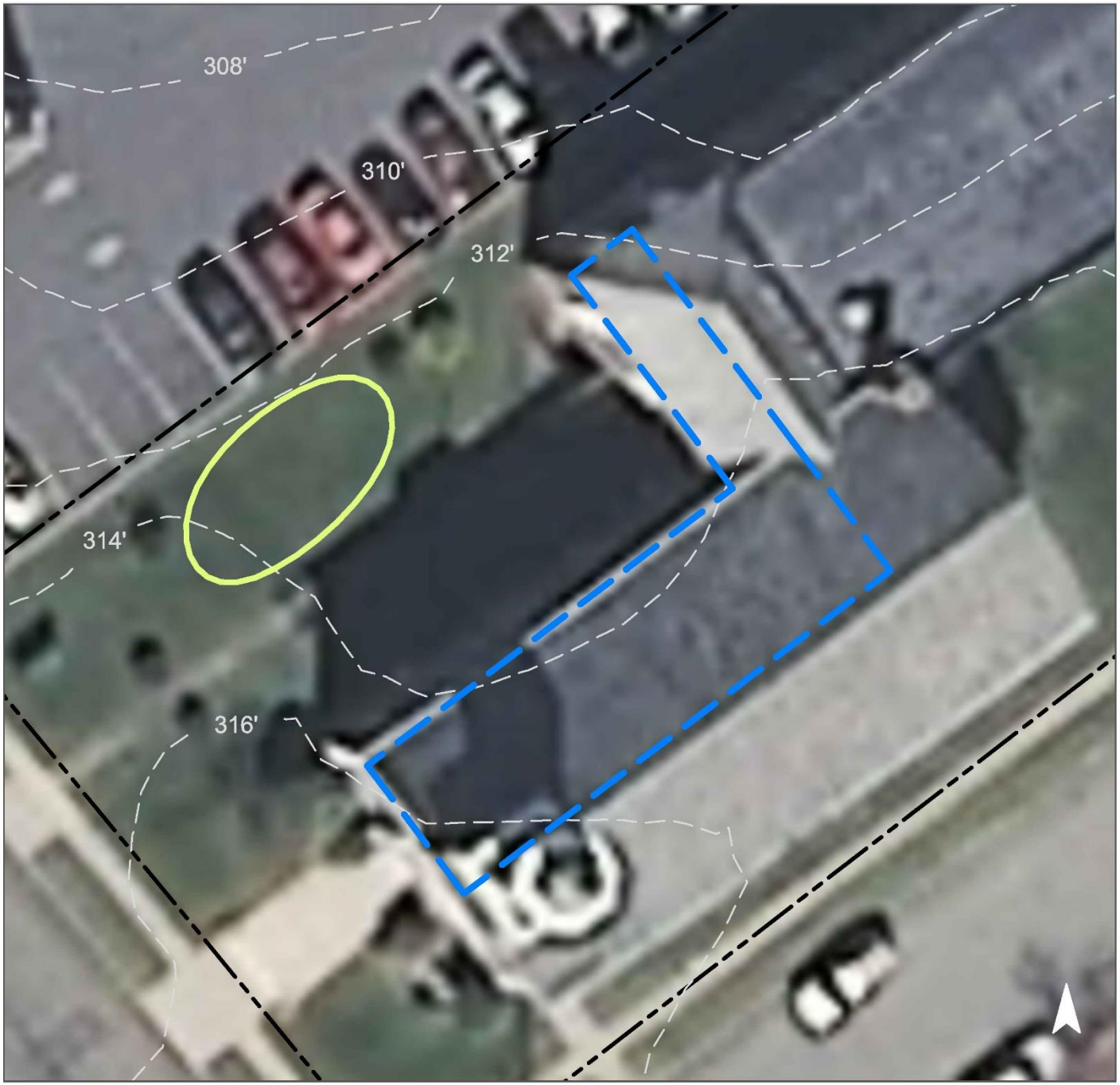
Block and Lot: Block 1227, Lot 3

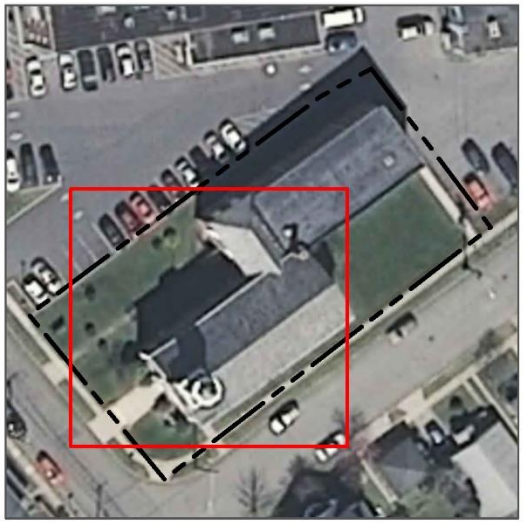
Installing a rain garden adjacent to the building can capture, treat, and infiltrate roof runoff by disconnecting and redirecting downspouts into them. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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"
90	17,211	0.8	8.7	79.0	0.013	0.47

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	0.047	8	3,478	0.13	455	$2,275

GREEN INFRASTRUCTURE RECOMMENDATIONS





Wesley United Methodist Church

- bioretention system
- drainage area
- property line
- 2012 Aerial: NJOIT, OGIS

0 10' 20'

c. Summary of Existing Conditions

Summary of Existing Site Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	Existing Annual Loads TN (lb/yr)	Existing Annual Loads TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
LOPATCONG CREEK SUBWATERSHED	**31.92**	**1,390,320**			**25.3**	**264.6**	**2,405.1**		**12.03**	**523,822**	**0.408**	**14.37**
Andover-Morris Elementary School												
Total Site Info	4.18	182,048	2505	10,11,13	3.6	37.7	342.5	41	1.71	74,605	0.058	2.05
Blessed Hope Church												
Total Site Info	1.73	75,333	1502	3,4,5	1.5	15.9	144.6	42	0.72	31,492	0.025	0.86
Green Street Elementary School												
Total Site Info	3.45	150,124	2703	5	5.3	55.9	508.3	74	2.54	110,710	0.086	3.04
Phillipsburg Fire Department												
Total Site Info	0.21	8,937	2311	4	0.2	1.8	16.4	40	0.08	3,575	0.003	0.10
Phillipsburg Free Public Library & Town Office												
Total Site Info	2.67	116,416	506	1	4.8	49.9	453.6	85	2.27	98,789	0.077	2.71
Phillipsburg Middle School												
Total Site Info	19.14	833,572	1701	13,14	8.8	91.9	835.4	22	4.18	181,956	0.142	4.99
St. Philip & St. James Church												
Total Site Info	0.55	23,890	1509	5	1.1	11.5	104.2	95	0.52	22,695	0.018	0.62
UPPER DELAWARE RIVER VALLEY TRIBUTARY	**29.93**	**1,303,828**			**24.2**	**253.7**	**2,306.7**		**11.53**	**502,397**	**0.391**	**13.78**
Phillipsburg High School												
Total Site Info	26.34	1,147,289	701;703	1;1	20.8	218.1	1,982.6	38	9.91	431,820	0.336	11.84
Pilgrim Presbyterian Church												
Total Site Info	3.15	137,416	501	2	2.6	27.0	245.0	39	1.23	53,366	0.042	1.46
Wesley United Methodist Church												
Total Site Info	0.44	19,123	1227	3	0.8	8.7	79.0	90	0.40	17,211	0.013	0.47

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
	LOPATCONG CREEK SUBWATERSHED	**124,260**	**2.85**	**3.238**	**542**	**227,437**	**8.54**	**30,196**			**$637,100**	**8.9%**
1	**Andover-Morris Elementary School**											
	Bioretention system	3,450	0.08	0.090	15	6,597	0.25	865	5	SF	$4,325	4.6%
	Total Site Info	**3,450**	**0.08**	**0.090**	**15**	**6,597**	**0.25**	**865**			**$4,325**	**4.6%**
2	**Blessed Hope Church**											
	Bioretention system	4,800	0.11	0.125	21	9,178	0.34	1,200	5	SF	$6,000	15.2%
	Total Site Info	**4,800**	**0.11**	**0.125**	**21**	**9,178**	**0.34**	**1,200**			**$6,000**	**15.2%**
3	**Green Street Elementary School**											
	Bioretention systems	5,200	0.12	0.135	23	9,941	0.37	1,300	5	SF	$6,500	4.7%
	Pervious pavement	24,000	0.55	0.625	105	45,882	1.72	6,150	25	SF	$153,750	21.7%
	Total Site Info	**29,200**	**0.67**	**0.761**	**127**	**55,823**	**2.09**	**7,450**			**$160,250**	**26.4%**
4	**Phillipsburg Fire Department**											
	Bioretention system	750	0.02	0.020	3	1,436	0.05	190	5	SF	$950	21.0%
	Rainwater harvesting	750	0.02	0.020	3	1,436	0.05	1,500	2	gal	$3,000	21.0%
	Total Site Info	**1,500**	**0.03**	**0.039**	**7**	**2,872**	**0.10**	**1,690**			**$3,950**	**42.0%**
5	**Phillipsburg Free Public Library & Town Office**											
	Bioretention system	4,250	0.10	0.111	19	8,123	0.31	1,065	5	SF	$5,325	4.3%
	Pervious pavement	28,300	0.65	0.737	123	54,103	2.03	8,420	25	SF	$210,500	28.6%
	Total Site Info	**32,550**	**0.75**	**0.848**	**142**	**62,226**	**2.34**	**9,485**			**$215,825**	**32.9%**
6	**Phillipsburg Middle School**											
	Pervious pavement	45,160	1.04	1.177	197	86,342	3.25	8,710	25	SF	$217,750	24.8%
	Total Site Info	**45,160**	**1.04**	**1.177**	**197**	**86,342**	**3.25**	**8,710**			**$217,750**	**24.8%**
7	**St. Philip & St. James Church**											
	Pervious pavement	2,300	0.05	0.060	10	4,398	0.17	760	25	SF	$19,000	10.1%
	Tree filter box	5,300	0.12	0.14	23	n/a	n/a	36	1	box	$10,000	23.4%
	Total Site Info	**7,600**	**0.17**	**0.198**	**33**	**4,398**	**0.17**	**796**			**$29,000**	**33.5%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
	UPPER DELAWARE RIVER VALLEY TRIBUTARY	**50,610**	**1.16**	**1.319**	**221**	**96,754**	**3.64**	**11,550**			**$112,850**	**3.9%**
8	**Phillipsburg High School**											
	Bioretention systems	11,380	0.26	0.297	50	21,759	0.82	2,845	5	SF	$14,225	2.6%
	Bioswales	10,100	0.23	0.263	44	19,306	0.73	2,525	5	SF	$12,625	2.3%
	Total Site Info	**21,480**	**0.49**	**0.560**	**94**	**41,065**	**1.55**	**5,370**			**$26,850**	**5.0%**
9	**Pilgrim Presbyterian Church**											
	Bioretention systems	11,880	0.27	0.310	52	22,709	0.85	2,970	5	SF	$14,850	22.3%
	Pervious pavement	15,430	0.35	0.402	67	29,501	1.11	2,755	25	SF	$68,875	28.9%
	Total Site Info	**27,310**	**0.63**	**0.712**	**119**	**52,210**	**1.96**	**5,725**			**$83,725**	**51.2%**
10	**Wesley United Methodist Church**											
	Bioretention system	1,820	0.04	0.047	8	3,478	0.13	455	5	SF	$2,275	10.6%
	Total Site Info	**1,820**	**0.04**	**0.047**	**8**	**3,478**	**0.13**	**455**			**$2,275**	**10.6%**