RUTGERS
New Jersey Agricultural
Experiment Station

# Impervious Cover Reduction Action Plan
# for
# Pilesgrove Township, Salem County, New Jersey

*Prepared for Pilesgrove Township by the*
*Rutgers Cooperative Extension Water Resources Program*

April 30, 2015

WILLIAM PENN
FOUNDATION

ANJEC
Local Environment Matters

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## Introduction

Located in Salem County New Jersey, Pilesgrove Township covers nearly 35.0 square miles. Figures 1 and 2 illustrate that Pilesgrove Township is dominated by agricultural land uses. Only 12.7% of the municipality's land use is classified as urban (Figure 2). Of the urban land in Pilesgrove Township, rural 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 Pilesgrove 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 Pilesgrove Township. Based upon the 2007 NJDEP land use/land cover data, approximately 2.2% of Pilesgrove Township has impervious cover. This level of impervious cover suggests that the streams in Pilesgrove Township are likely considered to be sensitive streams.[1]

## Methodology

Pilesgrove Township contains portions of six watersheds (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

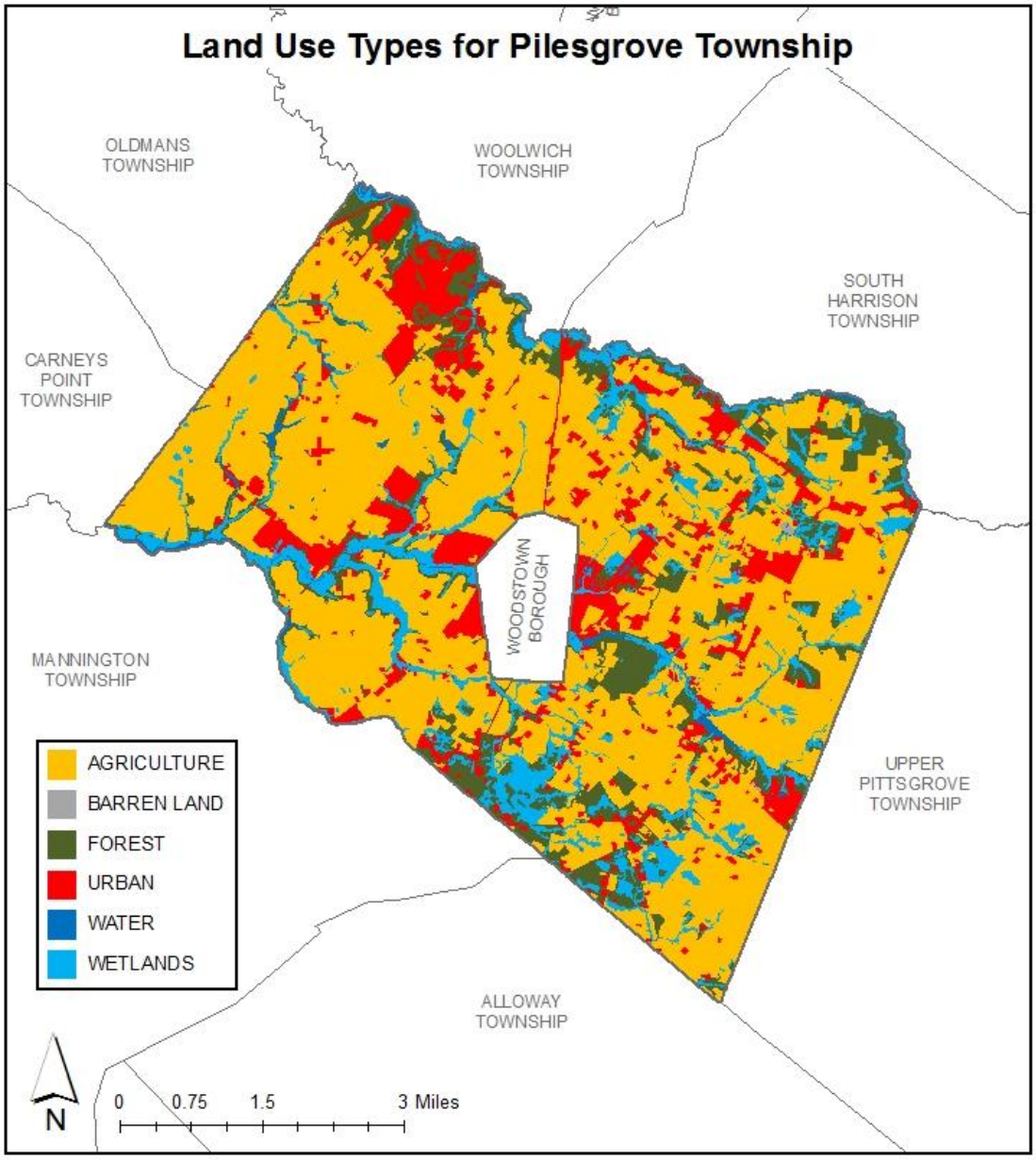



Figure 1: Map illustrating the land use in Pilesgrove Township

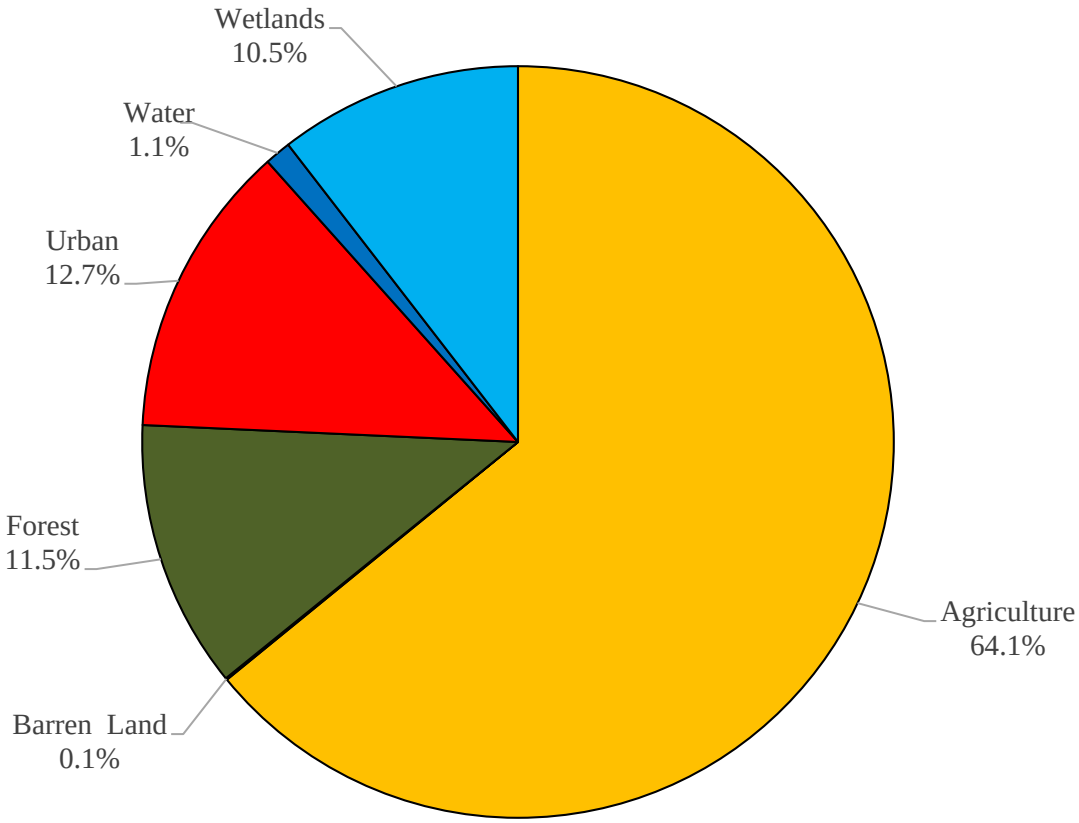



Figure 2: Pie chart illustrating the land use in Pilesgrove Township

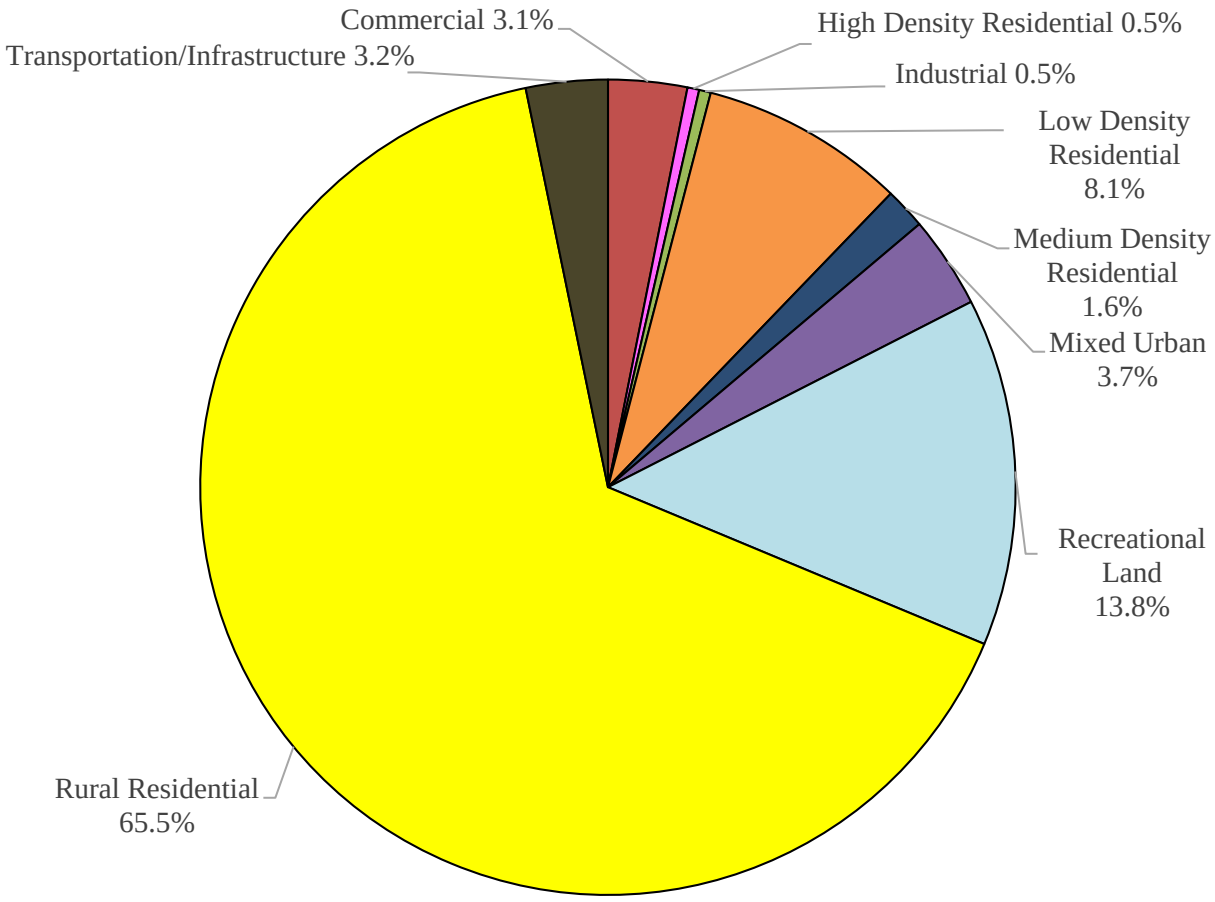



Figure 3: Pie chart illustrating the various types of urban land use in Pilesgrove Township

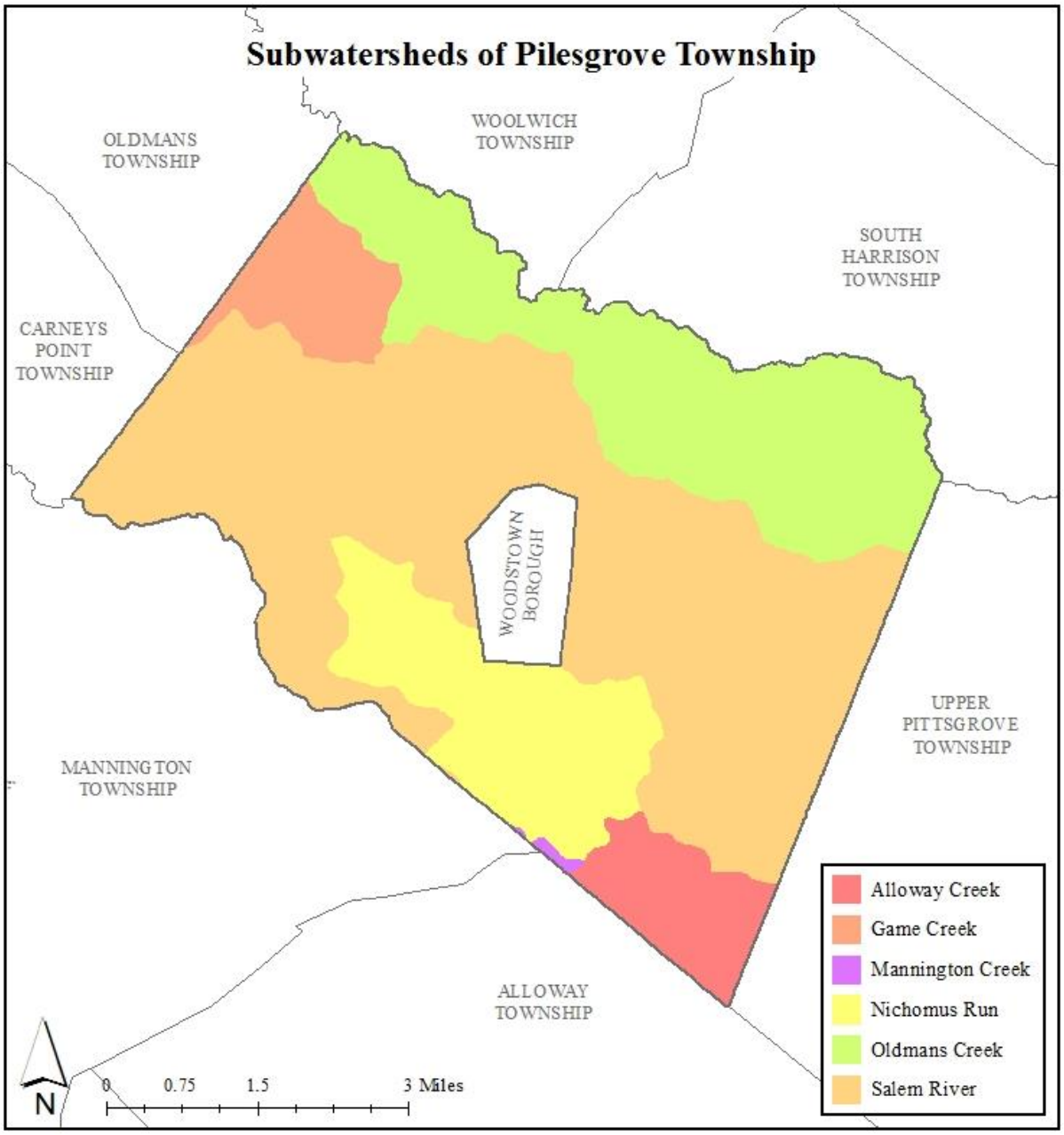



Figure 4: Map of the subwatersheds in Pilesgrove Township

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 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 Pilesgrove 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 Pilesgrove 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

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

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

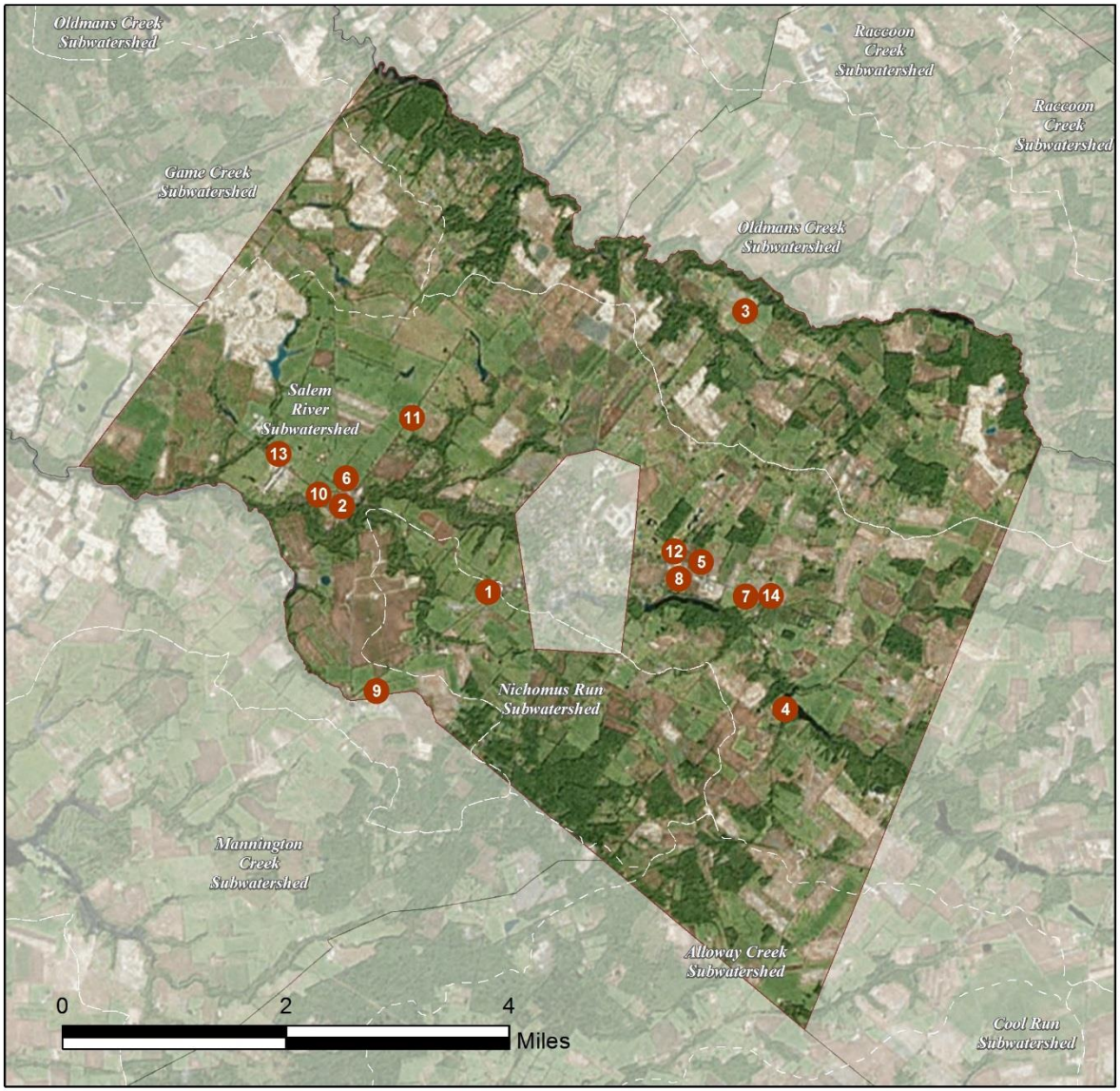
## Conclusion

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

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

## a. Green Infrastructure Sites

## PILESGROVE TOWNSHIP: GREEN INFRASTRUCTURE SITES




**SITES WITHIN THE NICHOMUS RUN SUBWATERSHED:**

1 Acme

2 Tri-County Veterinary Hospital

**SITES WITHIN THE OLDMANS CREEK SUBWATERSHED:**

3 Woodstown Preschool Academy

**SITES WITHIN THE SALEM RIVER SUBWATERSHED:**

4 Camp Crockett County Park

5 Franklin Bank

6 Fulton Bank of New Jersey

7 Lighthouse Christian Center

8 Pilesgrove Municipal Building

9 Salem County Public Works

10 Sharptown United Methodist Church

11 The Church of Jesus Christ of Latter-Day Saints

12 Wood Lanes

13 Woodstown NJ State Police Station

14 Woodstown Veterinary Hospital

# b. Proposed Green Infrastructure Concepts

# Acme

857 NJ 45 Pilesgrove, NJ 08098
Block 64, Lot 5
296,686 sq. ft.
Nichomus Run Subwatershed

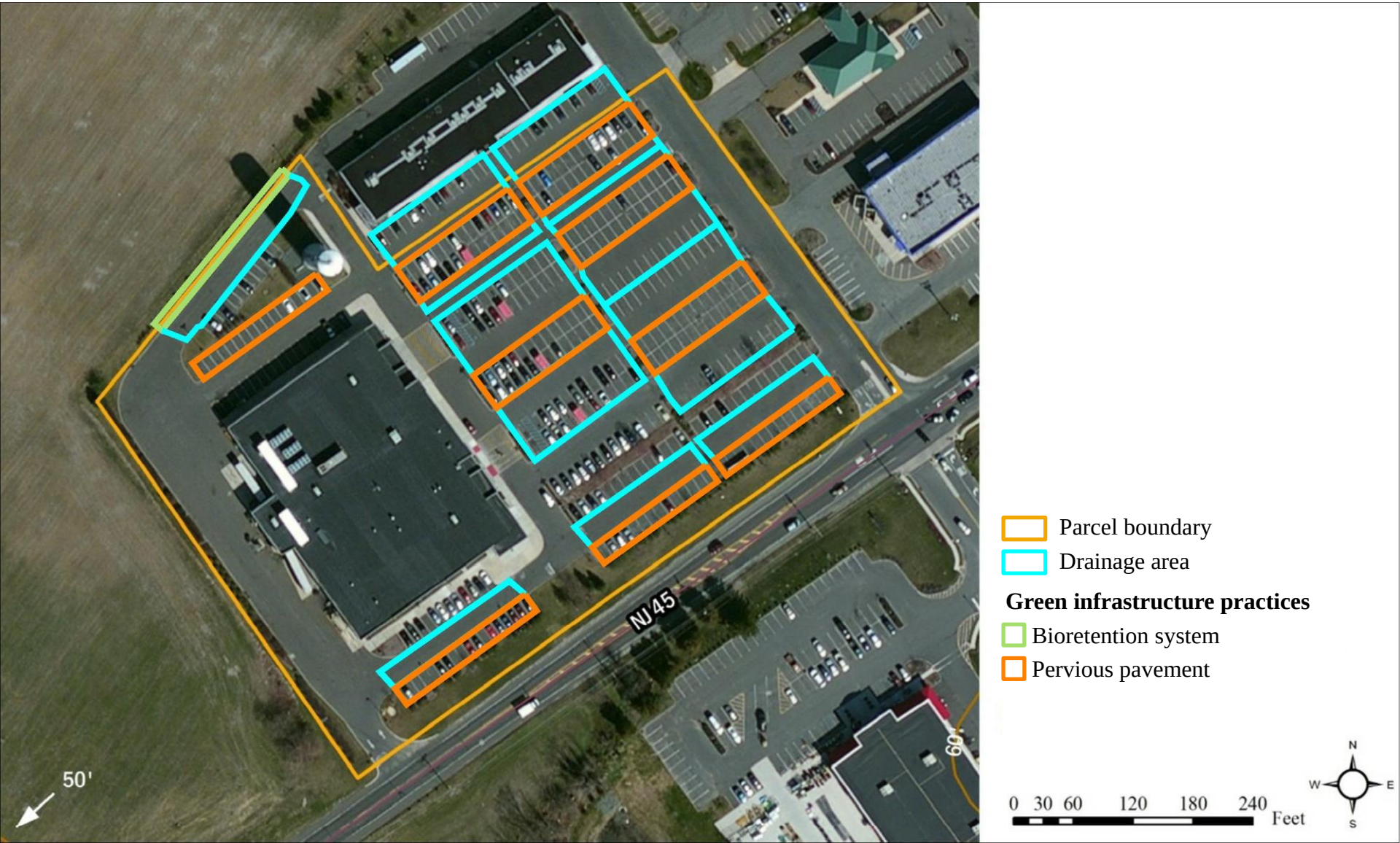
Parking spaces could be repaved with pervious pavement to intercept runoff prior to storm drains, thereby reducing loads to storm sewers. Bioretention systems could also be utilized to collect runoff. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

| Impervious Cover | | Existing Loads from Impervious Cover (lbs/yr) | | | Runoff Volume from Impervious Cover (Mgal) | |
|---|---|---|---|---|---|---|
| % | sq. ft. | TP | TN | TSS | For the 1.25" Water Quality Storm | For an Annual Rainfall of 44" |
| 89 | 264,274 | 12.7 | 133.5 | 1,213.4 | 0.210 | 7.25 |

| 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 | 0.132 | 22 | 9,664 | 0.32 | 1,270 | $6,350 |
| Pervious pavement | 2.671 | 447 | 195,789 | 6.53 | 16,020 | $400,500 |

# Acme

857 NJ 45 Pilesgrove, NJ 08098
Block 64, Lot 5
296,686 sq. ft.
Nichomus Run Subwatershed



# Tri-County Veterinary Hospital

816 US 40, Pilesgrove, NJ 08098
Block 65, Lot 7.02
439,214 sq. ft.
Nichomus Run Subwatershed

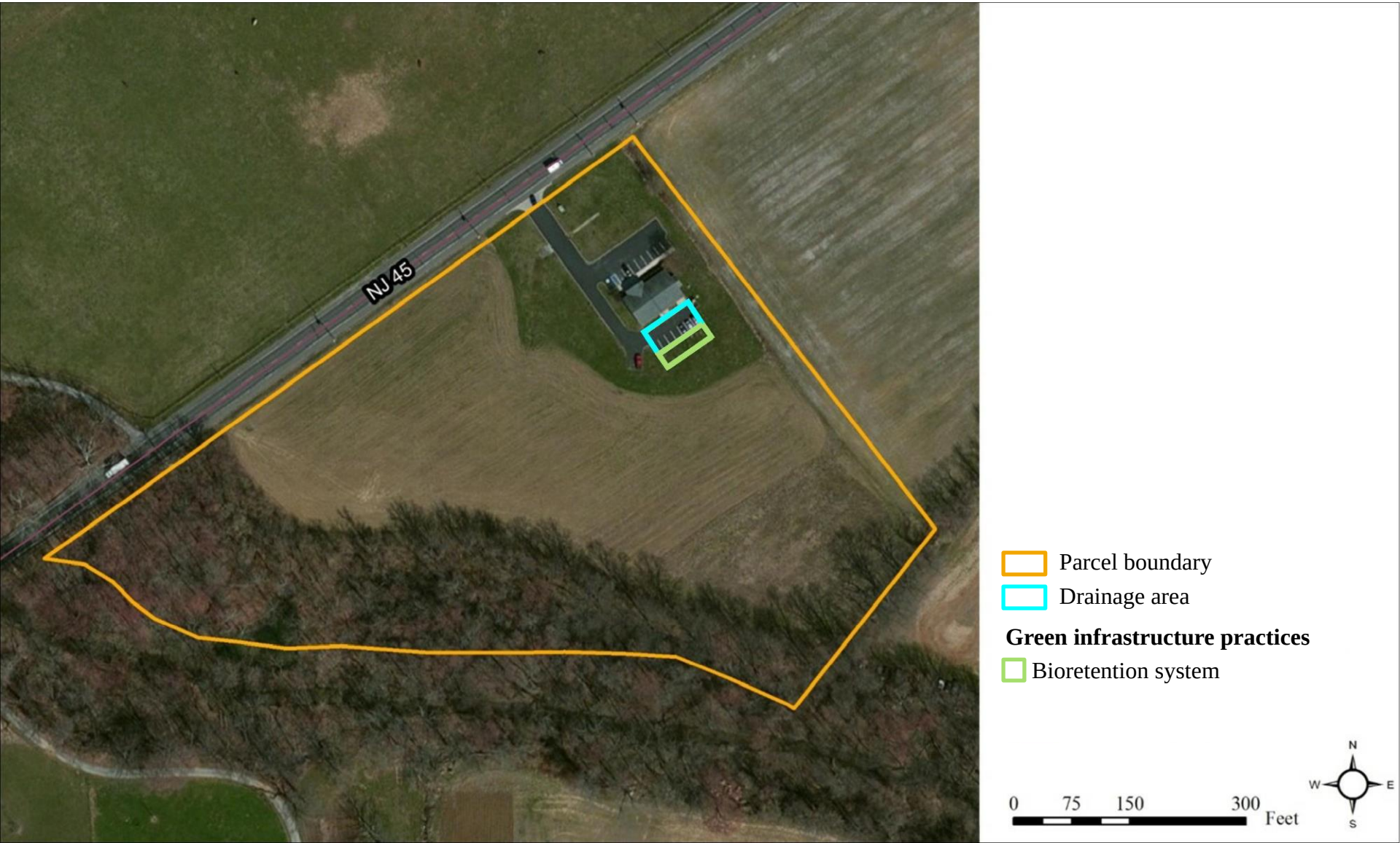
One or more bioretention systems could be installed along the rear parking lot to manage its stormwater runoff. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

| 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 | 19,980 | 1.0 | 10.1 | 91.7 | 0.020 | 0.55 |

| 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 | 0.061 | 10 | 4,466 | 0.15 | 590 | $2,950 |

# Tri-County Veterinary Hospital

816 US 40, Pilesgrove, NJ 08098
Block 65, Lot 7.02
439,214 sq. ft.
Nichomus Run Subwatershed



# Woodstown Preschool Academy

343 Lincoln Road, Pilesgrove, NJ 08098
Block 9, Lot 3.03
123,844 sq. ft.
Oldmans Creek Subwatershed

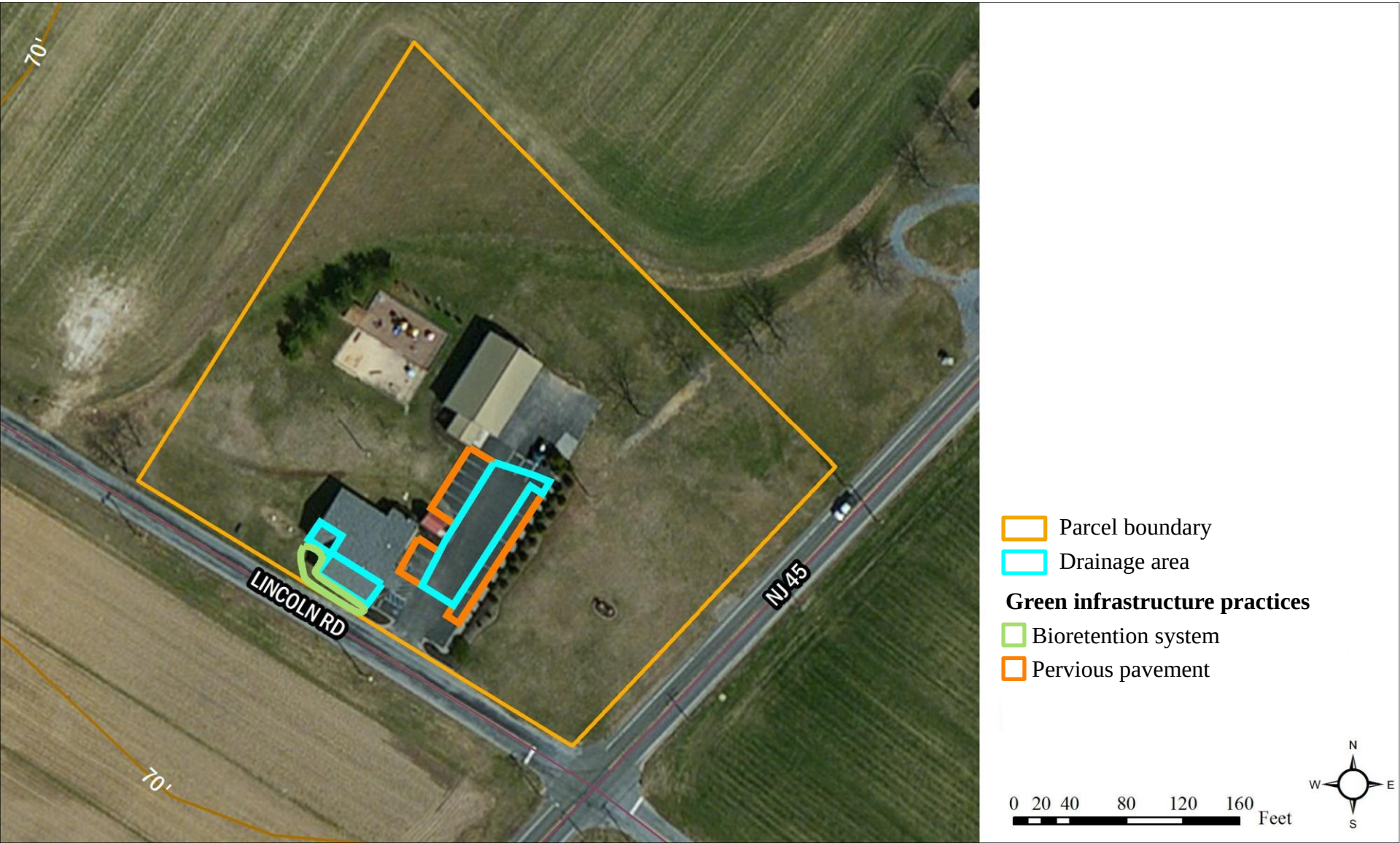
The buildings' downspouts could be routed to bioretention systems for improved infiltration and aesthetic appeal. The parking lot's runoff could be better managed by pervious pavement. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics 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" |
| 17 | 20,748 | 1.0 | 10.5 | 95.3 | 0.020 | 0.57 |

| 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 | 0.027 | 5 | 1,990 | 0.07 | 260 | $1,300 |
| Pervious pavement | 0.151 | 25 | 11,079 | 0.37 | 900 | $22,500 |

# Woodstown Preschool Academy

343 Lincoln Road, Pilesgrove, NJ 08098
Block 9, Lot 3.03
123,844 sq. ft.
Oldmans Creek Subwatershed



# Camp Crockett County Park

148 Avis Mill Road, Pilesgrove, NJ 08098
Block 81, Lot 14
2,246,029 sq. ft.
Salem River Subwatershed

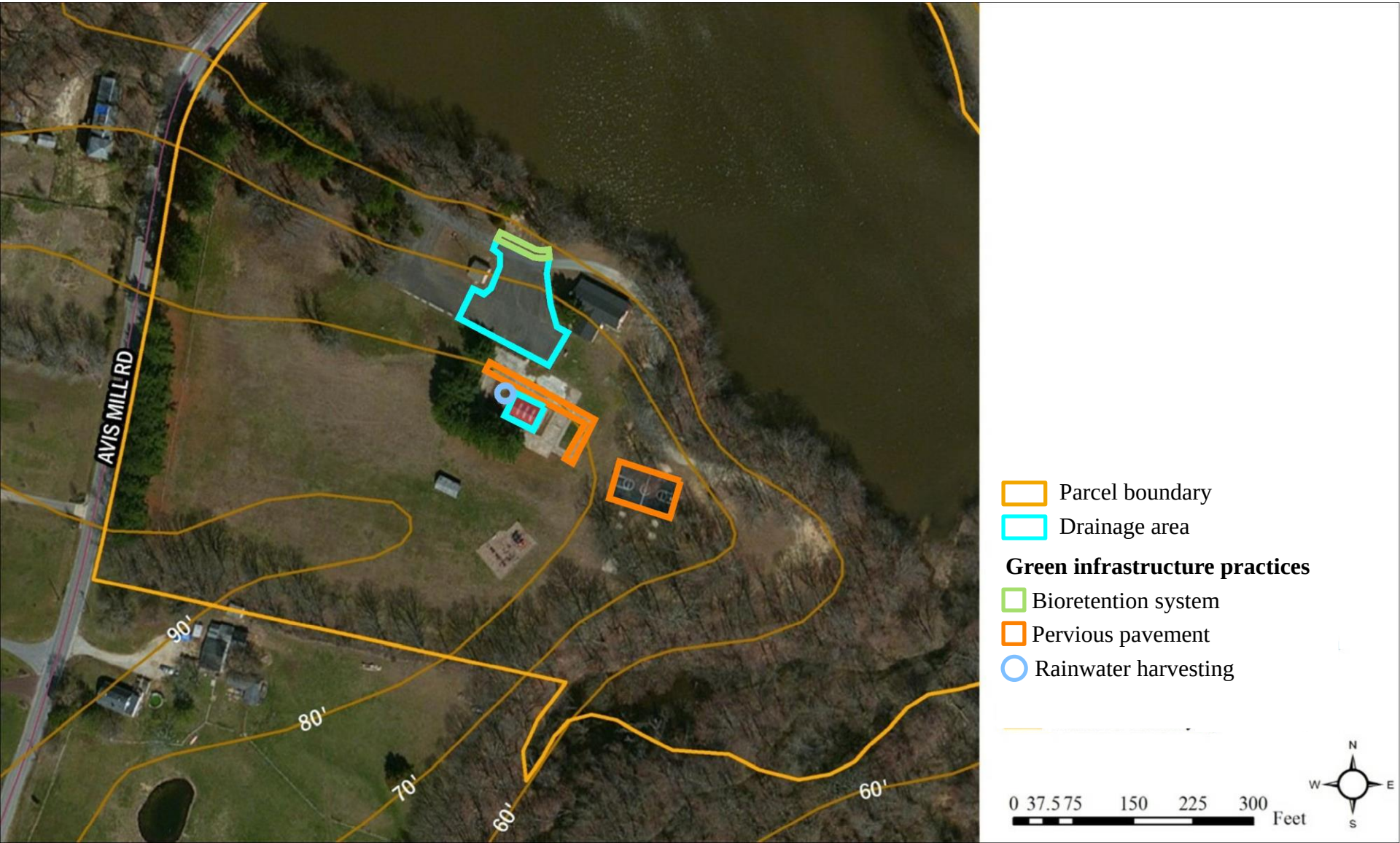
The site's paved surfaces could be repaved with pervious pavement. Buildings could use rainwater harvesting systems to collect their runoff. Bioretention systems could be implemented to intercept runoff before it reaches the nearby lake. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing 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" |
| 2 | 49,301 | 2.4 | 24.9 | 226.4 | 0.040 | 1.35 |

| 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 | 0.283 | 47 | 20,757 | 0.69 | 2,720 | $13,600 |
| Pervious pavement | 0.157 | 26 | 11,512 | 0.38 | 940 | $23,500 |
| Rainwater harvesting | 0.016 | 3 | 2,446 | 0.08 | 5,000 (gal) | $10,000 |

# Camp Crockett County Park

148 Avis Mill Road, Pilesgrove, NJ 08098
Block 81, Lot 14
2,246,029 sq. ft.
Salem River Subwatershed



# Franklin Bank

1179 US 40 Pilesgrove, NJ 08098
Block 40, Lot 12.06
119,518 sq. ft.
Salem River Subwatershed

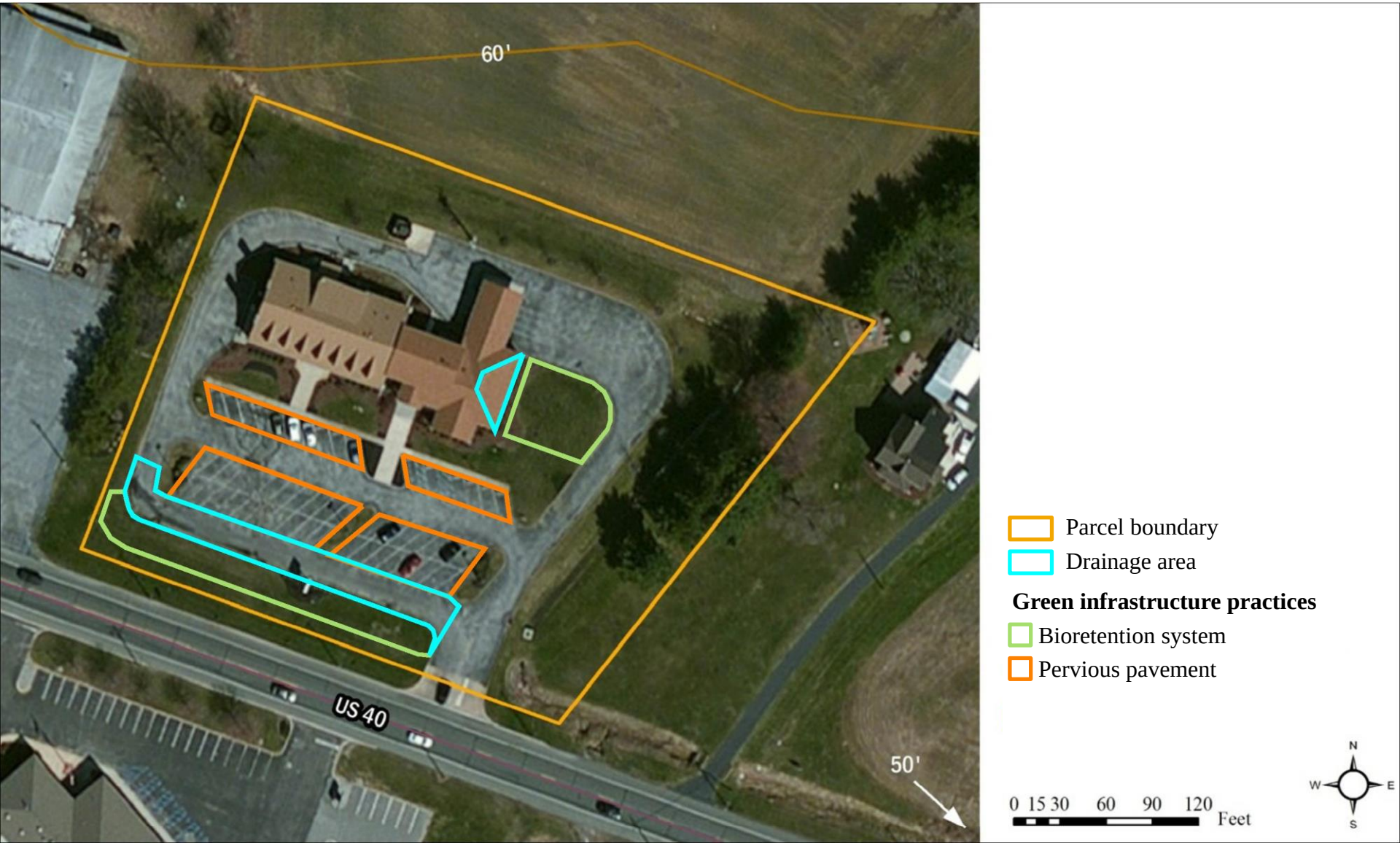
All of the parking spaces could be repaved with pervious pavement. The building and portions of the paved lot could be routed to bioretention systems. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

| 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" |
| 55 | 65,539 | 3.2 | 33.1 | 300.9 | 0.050 | 1.80 |

| 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 | 0.151 | 25 | 11,093 | 0.37 | 1,450 | $7,250 |
| Pervious pavement | 0.260 | 44 | 19,059 | 0.64 | 1,560 | $39,000 |

# Franklin Bank

1179 US 40 Pilesgrove, NJ 08098
Block 40, Lot 12.06
119,518 sq. ft.
Salem River Subwatershed



# Fulton Bank of New Jersey

843 US 40 Pilesgrove, NJ 08098
Block 25, Lot 11.01
110,387 sq. ft.
Salem River Subwatershed

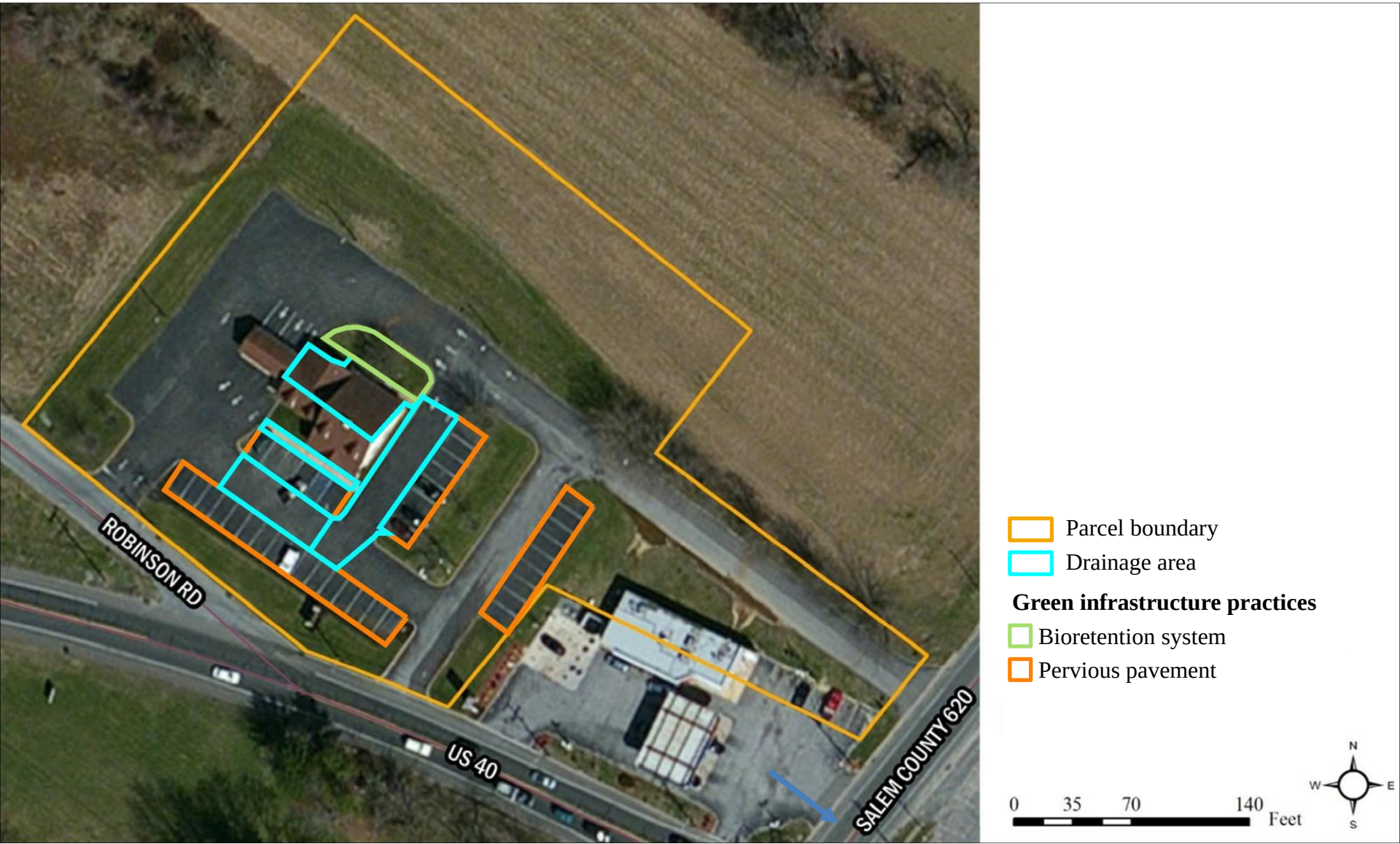
Stormwater runoff from the sidewalk and parking lot can be discharged to pervious pavement. A bioretention system can be installed to capture roof runoff. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

| 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" |
| 64 | 70,238 | 3.4 | 35.5 | 322.5 | 0.060 | 1.93 |

| 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 | 0.052 | 9 | 3,837 | 0.13 | 500 | $2,500 |
| Pervious pavement | 0.325 | 54 | 23,786 | 0.79 | 1,950 | $48,750 |

# Fulton Bank of New Jersey

843 US 40 Pilesgrove, NJ 08098
Block 25, Lot 11.01
110,387 sq. ft.
Salem River Subwatershed



# Lighthouse Christian Center

90 Fox Road, Pilesgrove, NJ 08098
Block 80, Lot 2.03
125,820 sq. ft.
Salem River Subwatershed

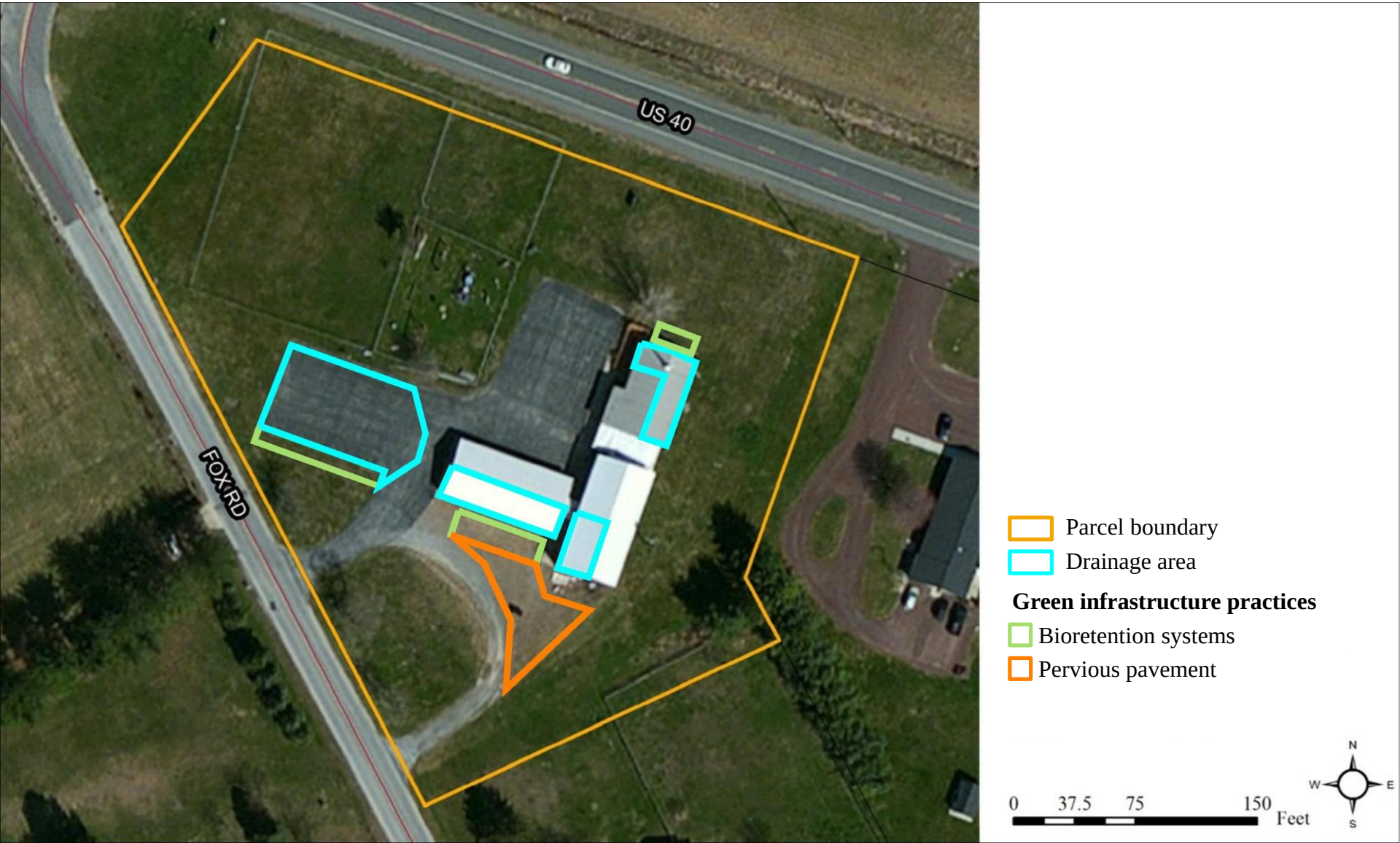
Bioretention systems could be installed in grass areas to treat runoff from the building and its paved lot. Grass pavers could replace compacted and eroded unpaved surfaces to enhance infiltration. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing 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" |
| 34 | 42,766 | 2.1 | 21.6 | 196.4 | 0.030 | 1.17 |

| Recommended Green Infrastructure Practices | Recharge Potential (Mgal/yr) | TSS Removal Potential (lbs/yr) | Maximum Volume Reduction Potential (gal/storm) | Peak Discharge Reduction Potential (cu. ft./second) | Estimated Size (sq. ft.) | Estimated Cost |
|---|---|---|---|---|---|---|
| Bioretention systems | 0.217 | 36 | 15,925 | 0.53 | 2,090 | $10,450 |
| Pervious pavement | 0.062 | 10 | 4,548 | 0.15 | 370 | $9,250 |

# Lighthouse Christian Center

90 Fox Road, Pilesgrove, NJ 08098
Block 80, Lot 2.03
125,820 sq. ft.
Salem River Subwatershed



# Pilesgrove Municipal Building

1180 US 40 Pilesgrove, NJ 08098
Block 38, Lot 12
194,917 sq. ft.
Salem River Subwatershed

Runoff from the parking lots could be collected in bioretention systems. Rainwater harvesting systems could collect the runoff from building rooftops. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing 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" |
| 69 | 134,659 | 6.5 | 68.0 | 618.3 | 0.100 | 3.69 |

| 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 | 0.251 | 42 | 18,431 | 0.61 | 2,410 | $12,050 |
| Rainwater harvesting | 0.130 | 13 | 5,000 | 0.20 | 5,000 (gal) | $10,000 |

# Pilesgrove Municipal Building

1180 US 40 Pilesgrove, NJ 08098
Block 38, Lot 12
194,917 sq. ft.
Salem River Subwatershed

# Salem County Public Works

153 Cemetery Road, Woodstown, NJ 08098
Block 67, Lot 1
942,413 sq. ft.
Salem River Subwatershed

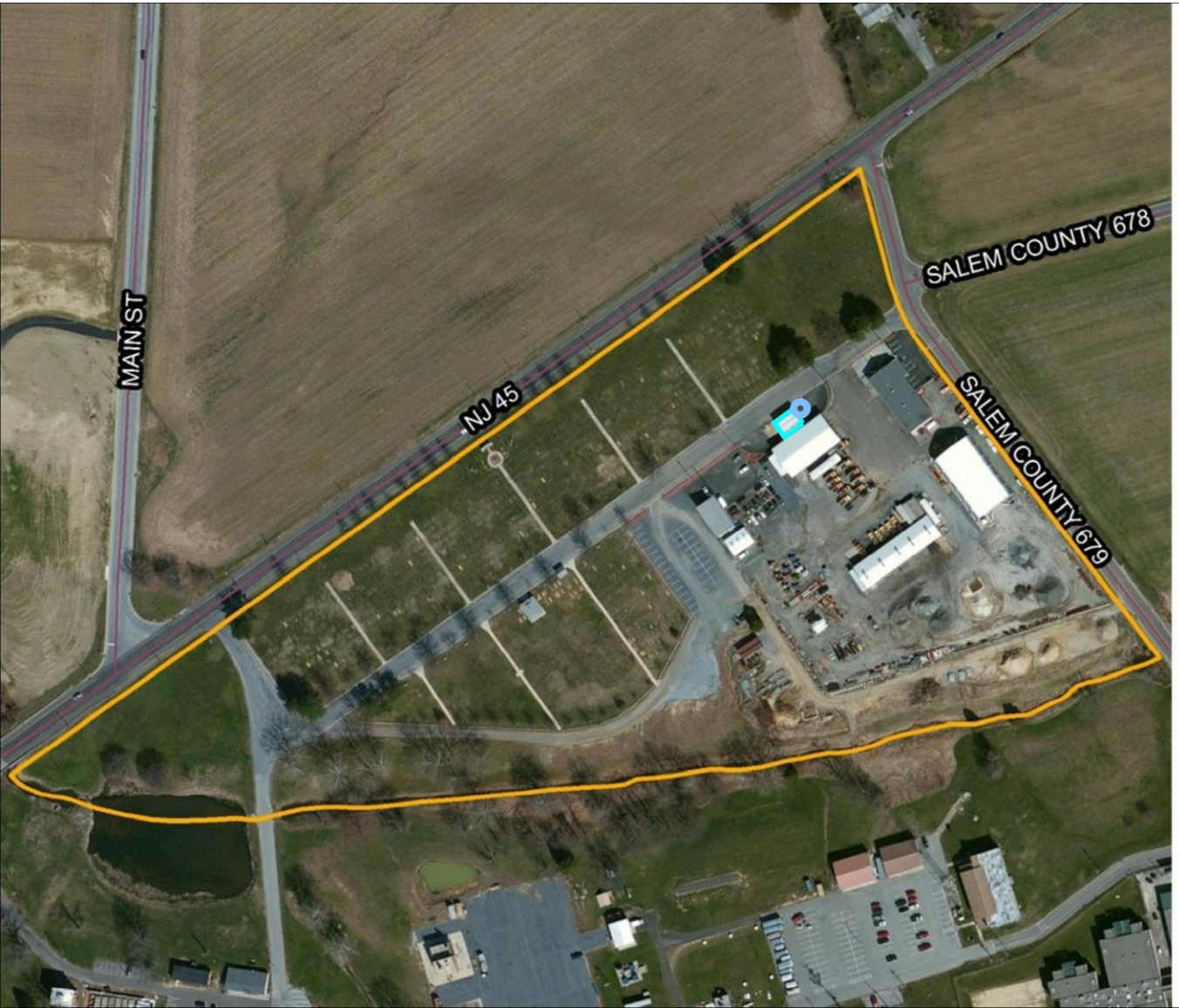
The downspout can be disconnected and routed to a rainwater harvesting system for washing trucks. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing soil's suitability for green infrastructure.

| 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" |
| 20 | 190,705 | 9.2 | 96.3 | 875.6 | 0.150 | 5.23 |

| Recommended Green Infrastructure Practices | Recharge Potential (Mgal/yr) | TSS Removal Potential (lbs/yr) | Maximum Volume Reduction Potential (gal/storm) | Peak Discharge Reduction Potential (cu. ft./second) | Estimated Size (sq. ft.) | Estimated Cost |
|---|---|---|---|---|---|---|
| Rainwater harvesting | 0.014 | 2 | 2,154 | 0.07 | 5,000 (gal) | $10,000 |

# Salem County Public Works

153 Cemetery Road, Woodstown, NJ 08098
Block 67, Lot 1
942,413 sq. ft.
Salem River Subwatershed




Parcel boundary
Drainage area

**Green infrastructure practices**

Rainwater harvesting

0 120 240 480 Feet

N
W E
S

# Sharptown United Methodist Church

24 Church Street, Pilesgrove, NJ 08098
Block 53, Lot 7
63,841 sq. ft.
Salem River Subwatershed

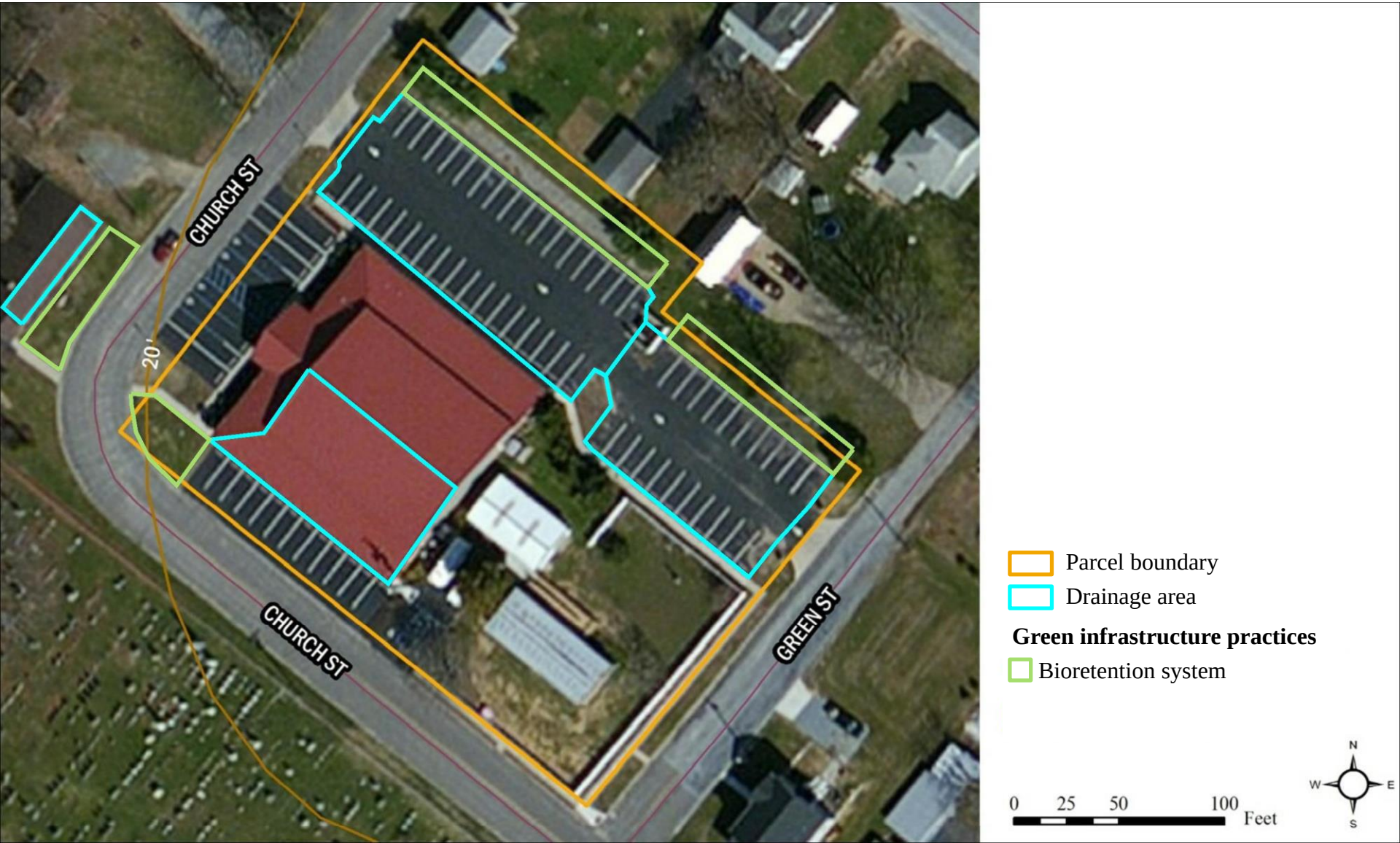
Much of the parking lot and rooftops can be discharged to bioretention systems. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

| 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 | 47,360 | 2.3 | 23.9 | 217.5 | 0.040 | 1.30 |

| 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 systems | 0.458 | 77 | 33,548 | 1.12 | 4,390 | $21,950 |

# Sharptown United Methodist Church

24 Church Street, Pilesgrove, NJ 08098
Block 53, Lot 7
63,841 sq. ft.
Salem River Subwatershed



# The Church of Jesus Christ of Latter-day Saints

1194 Kings Highway, Pilesgrove, NJ 08098
Block 30, Lot 10.03
361,643 sq. ft.
Salem River Subwatershed

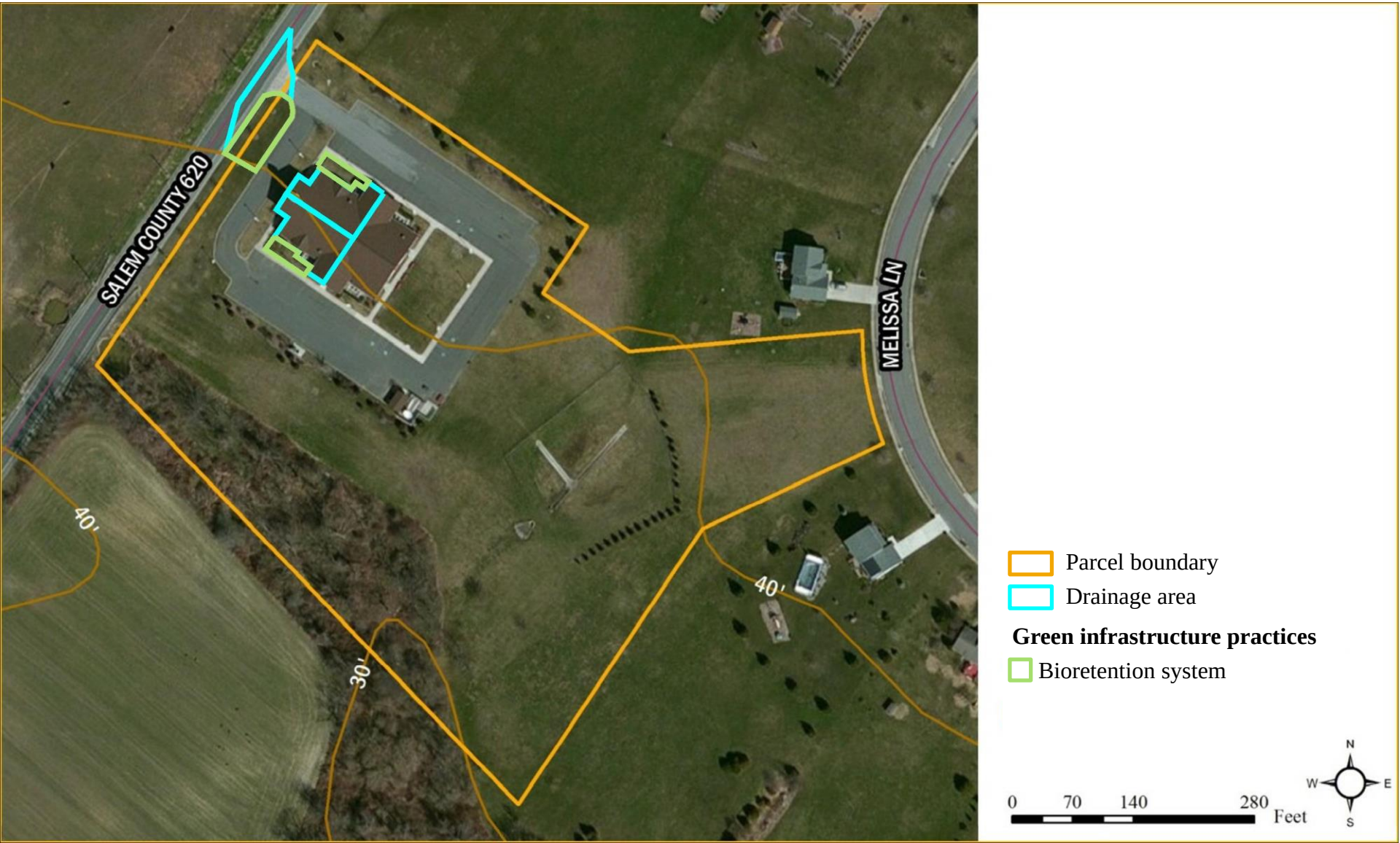
Stormwater runoff from the roof can be captured in bioretention systems. Bioretention systems can be installed to intercept road runoff before it reaches the nearby river. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing soil's suitability 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" |
| 23 | 81,664 | 3.9 | 41.2 | 375.0 | 0.064 | 2.24 |

| 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 | 22,739 | 0.76 | 2,980 | $14,900 |

# The Church of Jesus Christ of Latter-day Saints

1194 Kings Highway, Pilesgrove, NJ 08098
Block 30, Lot 10.03
361,643 sq. ft.
Salem River Subwatershed



# Wood Lanes

1173 US 40 Pilesgrove, NJ 08098
Block 40, Lot 12.05
118,567 sq. ft.
Salem River Subwatershed

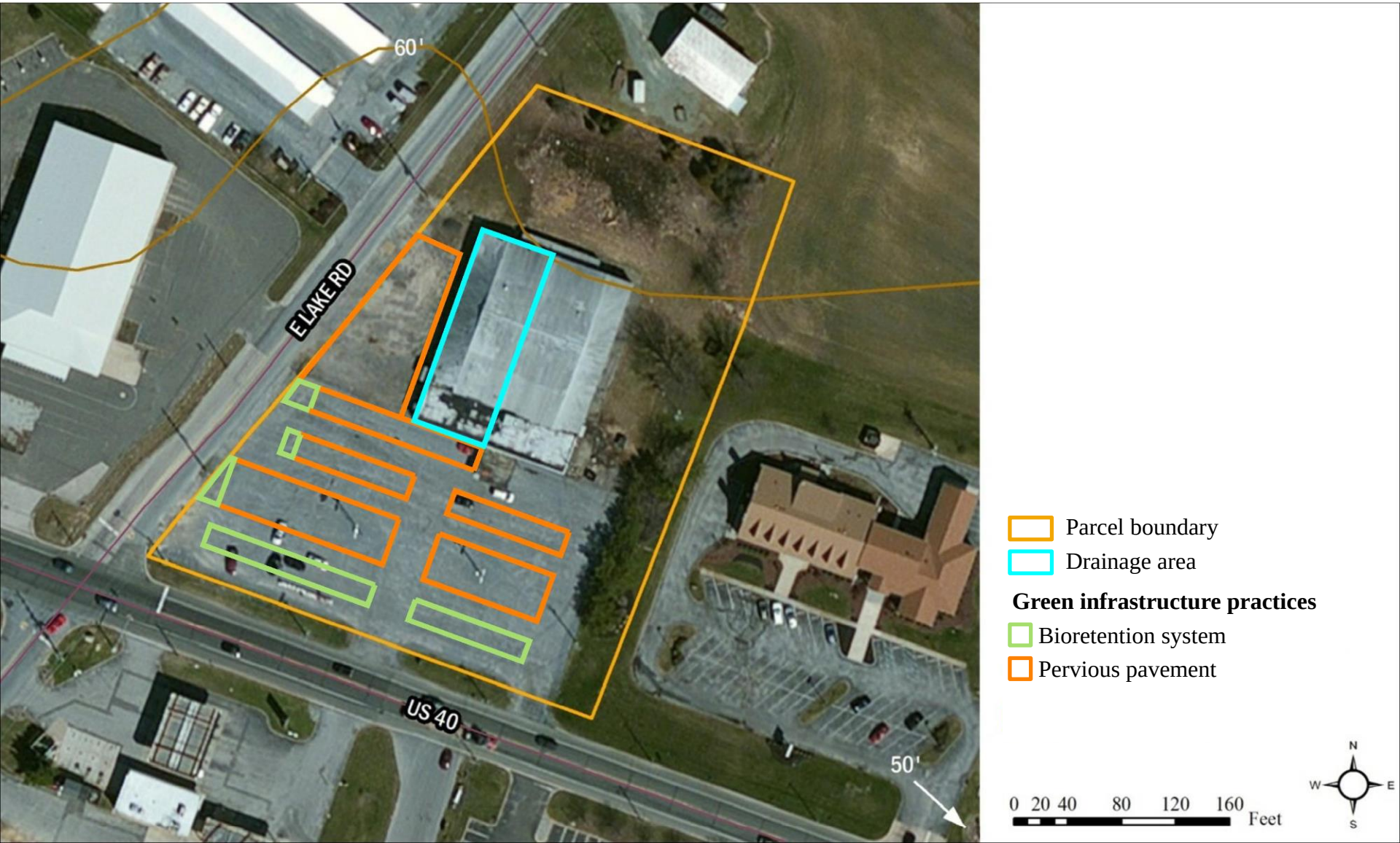
Grass pavers could be installed along the western edge of the building to treat its runoff. The parking lot could be retrofitted with bioretention systems and pervious pavement. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics 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" |
| 69 | 82,292 | 4.0 | 41.6 | 377.8 | 0.060 | 2.26 |

| Recommended Green Infrastructure Practices | Recharge Potential (Mgal/yr) | TSS Removal Potential (lbs/yr) | Maximum Volume Reduction Potential (gal/storm) | Peak Discharge Reduction Potential (cu. ft./second) | Estimated Size (sq. ft.) | Estimated Cost |
|---|---|---|---|---|---|---|
| Bioretention systems | 0.113 | 19 | 8,310 | 0.28 | 1,090 | $5,450 |
| Pervious pavement | 0.764 | 128 | 56,003 | 1.87 | 4,580 | $114,500 |

# Wood Lanes

1173 US 40 Pilesgrove, NJ 08098
Block 40, Lot 12.05
118,567 sq. ft.
Salem River Subwatershed



# Woodstown NJ State Police Station

769 US 40 Pilesgrove, NJ 08098
Block 24, Lot 11.01
120,550 sq. ft.
Salem River Subwatershed

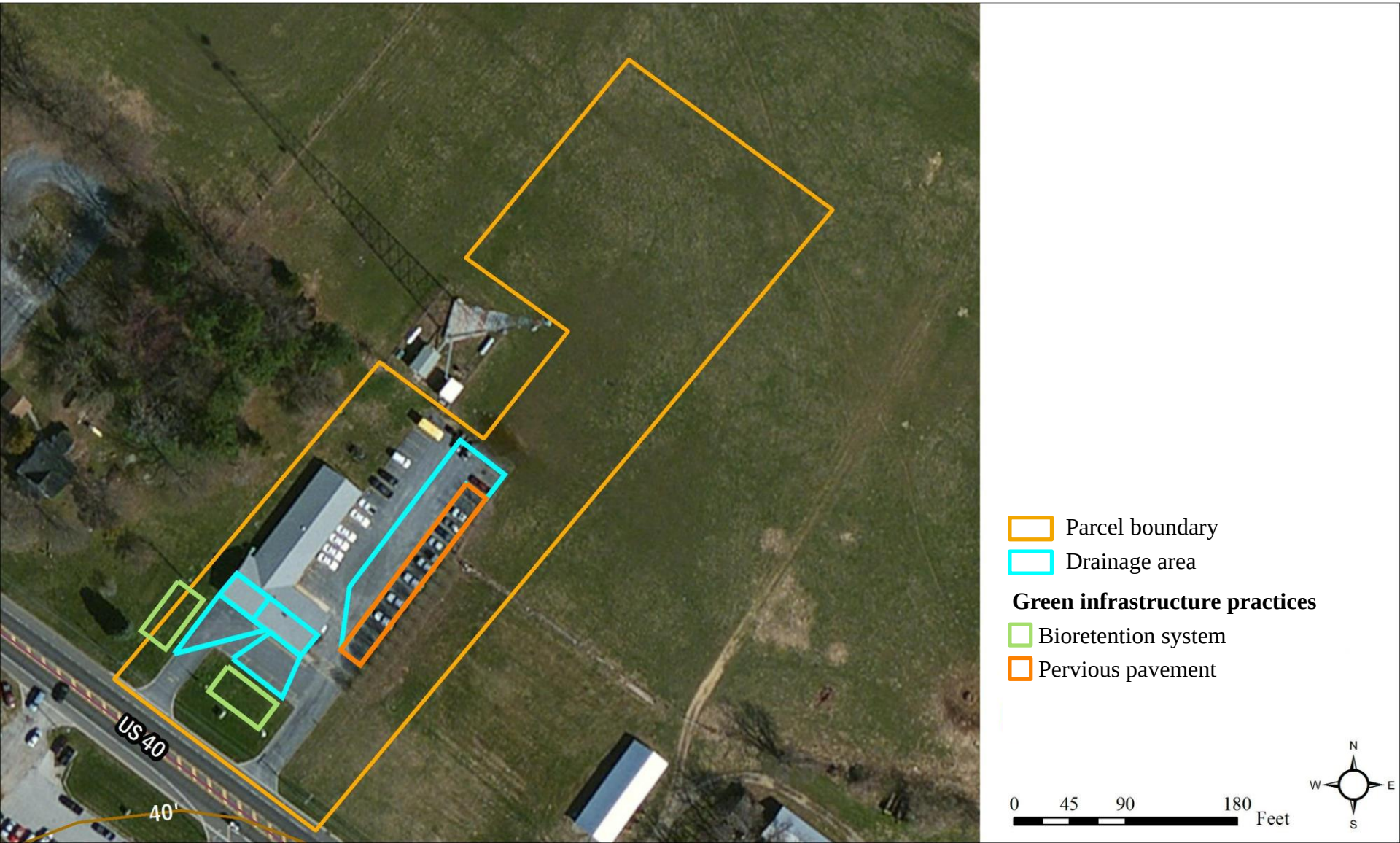
Bioretention systems installed in the grass would receive runoff from the roof and driveway via curb cuts. The rear parking lot could be retrofitted with pervious pavement. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing soil's suitability 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" |
| 31 | 36,889 | 1.8 | 18.6 | 169.4 | 0.030 | 1.01 |

| 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 | 0.121 | 20 | 8,841 | 0.29 | 1,160 | $5,800 |
| Pervious pavement | 0.211 | 35 | 15,469 | 0.52 | 3,360 | $84,000 |

# Woodstown NJ State Police Station

769 US 40 Pilesgrove, NJ 08098
Block 24, Lot 11.01
120,550 sq. ft.
Salem River Subwatershed



# Woodstown Veterinary Hospital

1250 US 40 Woodstown, NJ 08098
Block 80, Lot 2.04
67,784 sq. ft.
Salem River Subwatershed

A bioretention system could be installed in the front lawn to treat the driveway's runoff and enhance the site's aesthetic appeal. A preliminary soil assessment for this site suggests that more soil testing would be required to determine the existing 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" |
| 38 | 26,047 | 1.3 | 13.2 | 119.6 | 0.020 | 0.71 |

| 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 | 0.029 | 5 | 2,117 | 0.07 | 280 | $1,400 |

# Woodstown Veterinary Hospital

1250 US 40 Woodstown, NJ 08098
Block 80, Lot 2.04
67,784 sq. ft.
Salem River Subwatershed

# c. Summary of Existing Conditions

## Summary of Existing Site Conditions

| Subwatershed/Site Name/GI Practice/ Total Site Info | Area (ac) | Area (SF) | Lot | Block | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NICHOMUS RUN SUBWATERSHED** | **16.89** | **735,900** | | | **13.7** | **143.6** | **1,305.1** | | **6.53** | **284,254** | **0.221** | **7.80** |
| **Acme** | | | | | | | | | | | | |
| **Total Site Info** | 6.81 | 296,686 | 5 | 64 | 12.7 | 133.5 | 1,213.4 | 89 | 6.07 | 264,274 | 0.206 | 7.25 |
| **Tri-County Veterinary Hospital** | | | | | | | | | | | | |
| **Total Site Info** | 10.08 | 439,214 | 7.02 | 65 | 1.0 | 10.1 | 91.7 | 5 | 0.46 | 19,980 | 0.016 | 0.55 |
| **OLDMANS CREEK SUBWATERSHED** | **2.84** | **123,844** | | | **1.0** | **10.5** | **95.3** | | **0.48** | **20,748** | **0.016** | **0.57** |
| **Woodstown Preschool Academy** | | | | | | | | | | | | |
| **Total Site Info** | 2.84 | 123,844 | 3.03 | 9 | 1.0 | 10.5 | 95.3 | 17 | 0.48 | 20,748 | 0.016 | 0.57 |
| **SALEM RIVER SUBWATERSHED** | **102.65** | **4,471,469** | | | **39.9** | **417.9** | **3,799.2** | | **19.00** | **827,460** | **0.645** | **22.69** |
| **Camp Crockett County Park** | | | | | | | | | | | | |
| **Total Site Info** | 51.56 | 2,246,029 | 14 | 81 | 2.4 | 24.9 | 226.4 | 2 | 1.13 | 49,301 | 0.038 | 1.35 |
| **Franklin Bank** | | | | | | | | | | | | |
| **Total Site Info** | 2.74 | 119,518 | 12.06 | 40 | 3.2 | 33.1 | 300.9 | 55 | 1.50 | 65,539 | 0.051 | 1.80 |
| **Fulton Bank of New Jersey** | | | | | | | | | | | | |
| **Total Site Info** | 2.53 | 110,387 | 11.01 | 25 | 3.4 | 35.5 | 322.5 | 64 | 1.61 | 70,238 | 0.055 | 1.93 |
| **Lighthouse Christian Center** | | | | | | | | | | | | |
| **Total Site Info** | 2.89 | 125,820 | 2.03 | 80 | 2.1 | 21.6 | 196.4 | 34 | 0.98 | 42,766 | 0.033 | 1.17 |
| **Pilesgrove Municipal Building** | | | | | | | | | | | | |
| **Total Site Info** | 4.47 | 194,917 | 12 | 38 | 6.5 | 68.0 | 618.3 | 69 | 3.09 | 134,659 | 0.105 | 3.69 |
| **Salem County Public Works** | | | | | | | | | | | | |
| **Total Site Info** | 21.63 | 942,413 | 1 | 67 | 9.2 | 96.3 | 875.6 | 20 | 4.38 | 190,705 | 0.149 | 5.23 |

**Summary of Existing Site Conditions**

| Subwatershed/Site Name/GI Practice/ Total Site Info | Area (ac) | Area (SF) | Lot | Block | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sharptown United Methodist Church** | | | | | | | | | | | | |
| **Total Site Info** | 1.47 | 63,841 | 7 | 53 | 2.3 | 23.9 | 217.4 | 74 | 1.09 | 47,360 | 0.037 | 1.30 |
| **The Church of Jesus Christ of Latter-day Saints** | | | | | | | | | | | | |
| **Total Site Info** | 8.30 | 361,643 | 10.03 | 30 | 3.9 | 41.2 | 374.9 | 23 | 1.87 | 81,664 | 0.064 | 2.24 |
| **Wood Lanes** | | | | | | | | | | | | |
| **Total Site Info** | 2.72 | 118,567 | 12.05 | 40 | 4.0 | 41.6 | 377.8 | 69 | 1.89 | 82,292 | 0.064 | 2.26 |
| **Woodstown NJ State Police Station** | | | | | | | | | | | | |
| **Total Site Info** | 2.77 | 120,550 | 11.01 | 24 | 1.8 | 18.6 | 169.4 | 31 | 0.85 | 36,889 | 0.029 | 1.01 |
| **Woodstown Veterinary Hospital** | | | | | | | | | | | | |
| **Total Site Info** | 1.56 | 67,784 | 2.04 | 80 | 1.3 | 13.2 | 119.6 | 38 | 0.60 | 26,047 | 0.020 | 0.71 |

# d. Summary of Proposed Green Infrastructure Practices

**Summary of Proposed Green Infrastruture Practices**

| | Subwatershed/Site Name/GI Practice/ Total Site Info | 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 % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **NICHOMUS RUN SUBWATERSHED** | **109,930** | **2.52** | **2.864** | **479** | **209,919** | **7.00** | **17,880** | | | **$409,800** | **38.7%** |
| 1 | **Acme** | | | | | | | | | | | |
| | Bioretention system | 5,060 | 0.12 | 0.132 | 22 | 9,664 | 0.32 | 1,270 | 5 | SF | $6,350 | 1.9% |
| | Pervious pavement | 102,530 | 2.35 | 2.671 | 447 | 195,789 | 6.53 | 16,020 | 25 | SF | $400,500 | 38.8% |
| | **Total Site Info** | **107,590** | **2.47** | **2.803** | **469** | **205,453** | **6.85** | **17,290** | | | **$406,850** | **40.7%** |
| 2 | **Tri-County Veterinary Hospital** | | | | | | | | | | | |
| | Bioretention system | 2,340 | 0.05 | 0.061 | 10 | 4,466 | 0.15 | 590 | 5 | SF | $2,950 | 11.7% |
| | **Total Site Info** | **2,340** | **0.05** | **0.061** | **10** | **4,466** | **0.15** | **590** | | | **$2,950** | **11.7%** |
| | **OLDMANS CREEKSUB WATERSHED** | **6,840** | **0.16** | **0.178** | **30** | **13,069** | **0.44** | **1,160** | | | **$23,800** | **33.0%** |
| 3 | **Woodstown Preschool Academy** | | | | | | | | | | | |
| | Bioretention system | 1,040 | 0.02 | 0.027 | 5 | 1,990 | 0.07 | 260 | 5 | SF | $1,300 | 5.0% |
| | Pervious pavement | 5,800 | 0.13 | 0.151 | 25 | 11,079 | 0.37 | 900 | 25 | SF | $22,500 | 28.0% |
| | **Total Site Info** | **6,840** | **0.16** | **0.178** | **30** | **13,069** | **0.44** | **1,160** | | | **$23,800** | **33.0%** |
| | **SALEM RIVER SUBWATERSHED** | **153,351** | **3.52** | **3.875** | **649** | **285,575** | **9.55** | **46,830** | | | **444,350** | **18.5%** |
| 4 | **Camp Crockett County Park** | | | | | | | | | | | |
| | Bioretention system | 10,870 | 0.25 | 0.283 | 47 | 20,757 | 0.69 | 2,720 | 5 | SF | $13,600 | 22.0% |
| | Pervious pavement | 6,030 | 0.14 | 0.157 | 26 | 11,512 | 0.38 | 940 | 25 | SF | $23,500 | 12.2% |
| | Rainwater harvesting | 1,280 | 0.03 | 0.016 | 3 | 2,446 | 0.08 | 5,000 | 2 | gal | $10,000 | 2.6% |
| | **Total Site Info** | **18,180** | **0.42** | **0.456** | **76** | **34,715** | **1.15** | **8,660** | | | **$47,100** | **36.9%** |
| 5 | **Franklin Bank** | | | | | | | | | | | |
| | Bioretention systems | 5,810 | 0.13 | 0.151 | 25 | 11,093 | 0.37 | 1,450 | 5 | SF | $7,250 | 8.9% |
| | Pervious pavement | 9,980 | 0.23 | 0.260 | 44 | 19,059 | 0.64 | 1,560 | 25 | SF | $39,000 | 15.2% |
| | **Total Site Info** | **15,790** | **0.36** | **0.411** | **69** | **30,152** | **1.01** | **3,010** | | | **$46,250** | **24.1%** |
| 6 | **Fulton Bank of New Jersey** | | | | | | | | | | | |
| | Bioretention system | 2,011 | 0.05 | 0.052 | 9 | 3,837 | 0.13 | 500 | 5 | SF | $2,500 | 2.9% |
| | Pervious pavement | 12,455 | 0.29 | 0.325 | 54 | 23,786 | 0.79 | 1,950 | 25 | SF | $48,750 | 17.7% |
| | **Total Site Info** | **14,466** | **0.33** | **0.377** | **63** | **27,623** | **0.92** | **2,450** | | | **$51,250** | **20.6%** |

**Summary of Proposed Green Infrastruture Practices**

| | Potential Management Area | | Recharge | TSS Removal | Max Volume Reduction | Peak Discharge Reduction | Size of | Unit | | Total | I.C. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Subwatershed/Site Name/GI Practice/ Total Site Info | Area (SF) | Area (ac) | Potential (Mgal/yr) | Potential (lbs/yr) | Potential (gal/storm) | Potential (cfs) | BMP (SF) | Cost ($) | Unit | Cost ($) | Treated % |
| 7 **Lighthouse Christian Center** | | | | | | | | | | | |
| Bioretention systems | 8,340 | 0.19 | 0.217 | 36 | 15,925 | 0.53 | 2,090 | 5 | SF | $10,450 | 19.5% |
| Pervious pavement | 2,380 | 0.05 | 0.062 | 10 | 4,548 | 0.15 | 370 | 25 | SF | $9,250 | 5.6% |
| **Total Site Info** | **10,720** | **0.25** | **0.279** | **47** | **20,473** | **0.68** | **2,460** | | | **$19,700** | **25.1%** |
| 8 **Pilesgrove Municipal Building** | | | | | | | | | | | |
| Bioretention systems | 9,650 | 0.22 | 0.251 | 42 | 18,431 | 0.61 | 2,410 | 5 | SF | $12,050 | 7.2% |
| Rainwater harvesting | 6,415 | 0.15 | 0.079 | 13 | 5,000 | 0.20 | 5,000 | 2 | gal | $10,000 | 4.8% |
| **Total Site Info** | **16,065** | **0.37** | **0.331** | **55** | **23,431** | **0.81** | **7,410** | | | **$22,050** | **11.9%** |
| 9 **Salem County Public Works** | | | | | | | | | | | |
| Rainwater harvesting | 1,130 | 0.03 | 0.014 | 2 | 2,154 | 0.07 | 5,000 | 2 | gal | $10,000 | 0.6% |
| **Total Site Info** | **1,130** | **0.03** | **0.014** | **2** | **2,154** | **0.07** | **5,000** | | | **$10,000** | **0.6%** |
| 10 **Sharptown United Methodist Church** | | | | | | | | | | | |
| Bioretention systems | 17,570 | 0.40 | 0.458 | 77 | 33,548 | 1.12 | 4,390 | 5 | SF | $21,950 | 37.1% |
| **Total Site Info** | **17,570** | **0.40** | **0.458** | **77** | **33,548** | **1.12** | **4,390** | | | **$21,950** | **37.1%** |
| 11 **The Church of Jesus Christ of Latter-day Saints** | | | | | | | | | | | |
| Bioretention systems | 11,910 | 0.27 | 0.310 | 52 | 22,739 | 0.76 | 2,980 | 5 | SF | $14,900 | 14.6% |
| **Total Site Info** | **11,910** | **0.27** | **0.310** | **52** | **22,739** | **0.76** | **2,980** | | | **$14,900** | **14.6%** |
| 12 **Wood Lanes** | | | | | | | | | | | |
| Bioretention systems | 4,350 | 0.10 | 0.113 | 19 | 8,310 | 0.28 | 1,090 | 5 | SF | $5,450 | 5.3% |
| Pervious pavement | 29,330 | 0.67 | 0.764 | 128 | 56,003 | 1.87 | 4,580 | 25 | SF | $114,500 | 35.6% |
| **Total Site Info** | **33,680** | **0.77** | **0.878** | **147** | **64,313** | **2.15** | **5,670** | | | **$119,950** | **40.9%** |
| 13 **Woodstown NJ State Police Station** | | | | | | | | | | | |
| Bioretention systems | 4,630 | 0.11 | 0.121 | 20 | 8,841 | 0.29 | 1,160 | 5 | SF | $5,800 | 12.6% |
| Pervious pavement | 8,100 | 0.19 | 0.211 | 35 | 15,469 | 0.52 | 3,360 | 25 | SF | $84,000 | 22.0% |
| **Total Site Info** | **12,730** | **0.29** | **0.332** | **56** | **24,310** | **0.81** | **4,520** | | | **$89,800** | **34.5%** |
| 14 **Woodstown Veterinary Hospital** | | | | | | | | | | | |
| Bioretention system | 1,110 | 0.03 | 0.029 | 5 | 2,117 | 0.07 | 280 | 5 | SF | $1,400 | 4.3% |
| **Total Site Info** | **1,110** | **0.03** | **0.029** | **5** | **2,117** | **0.07** | **280** | | | **$1,400** | **4.3%** |