RUTGERS
New Jersey Agricultural
Experiment Station

Draft

Impervious Cover Reduction Action Plan
for
Woodstown Borough, Salem County, New Jersey

Prepared for Woodstown Borough by the
Rutgers Cooperative Extension Water Resources Program

April 30, 2015

Introduction

Located in Salem County, New Jersey, Woodstown Borough covers just over 1.5 square miles in southern New Jersey. Figures 1 and 2 illustrate that Woodstown Borough is dominated by urban land uses. A total of 66.1% of the municipality's land use is classified as urban. Of the urban land in Woodstown Borough, medium 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 Woodstown Borough 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 Woodstown Borough. Based upon the 2007 NJDEP land use/land cover data, approximately 20.7% of Woodstown Borough has impervious cover. This level of impervious cover suggests that the streams in Woodstown Borough are likely impacted.[1]

Methodology

Woodstown Borough contains portions of two 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

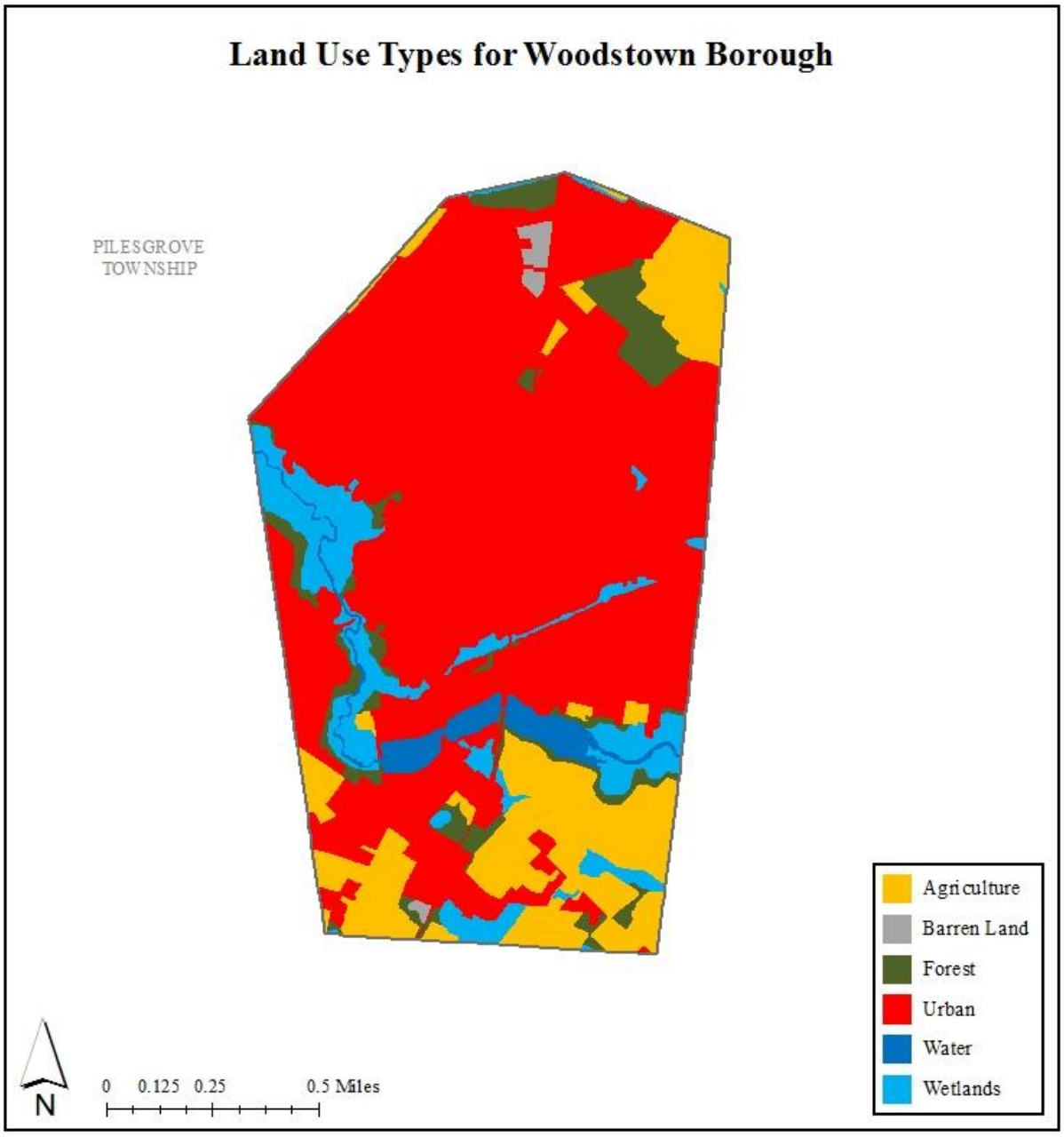


Figure 1: Map illustrating the land use in Woodstown Borough

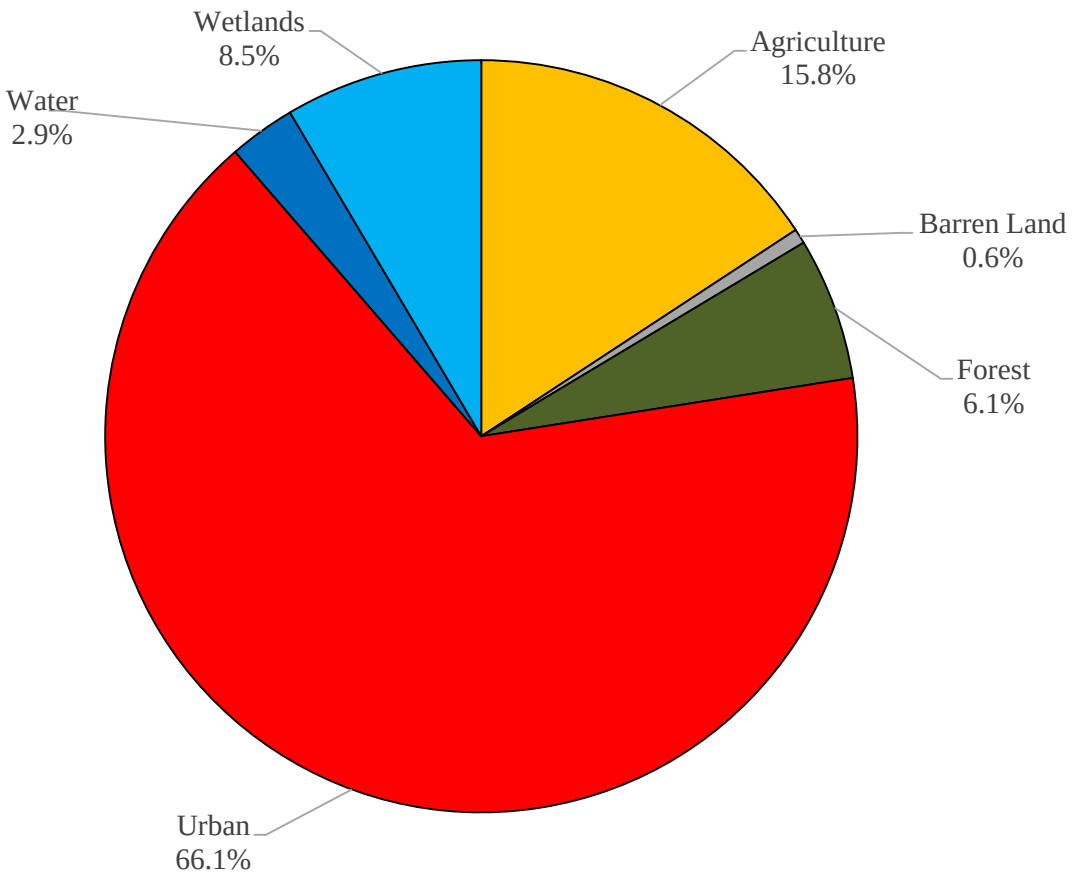


Figure 2: Pie chart illustrating the land use in Woodstown Borough

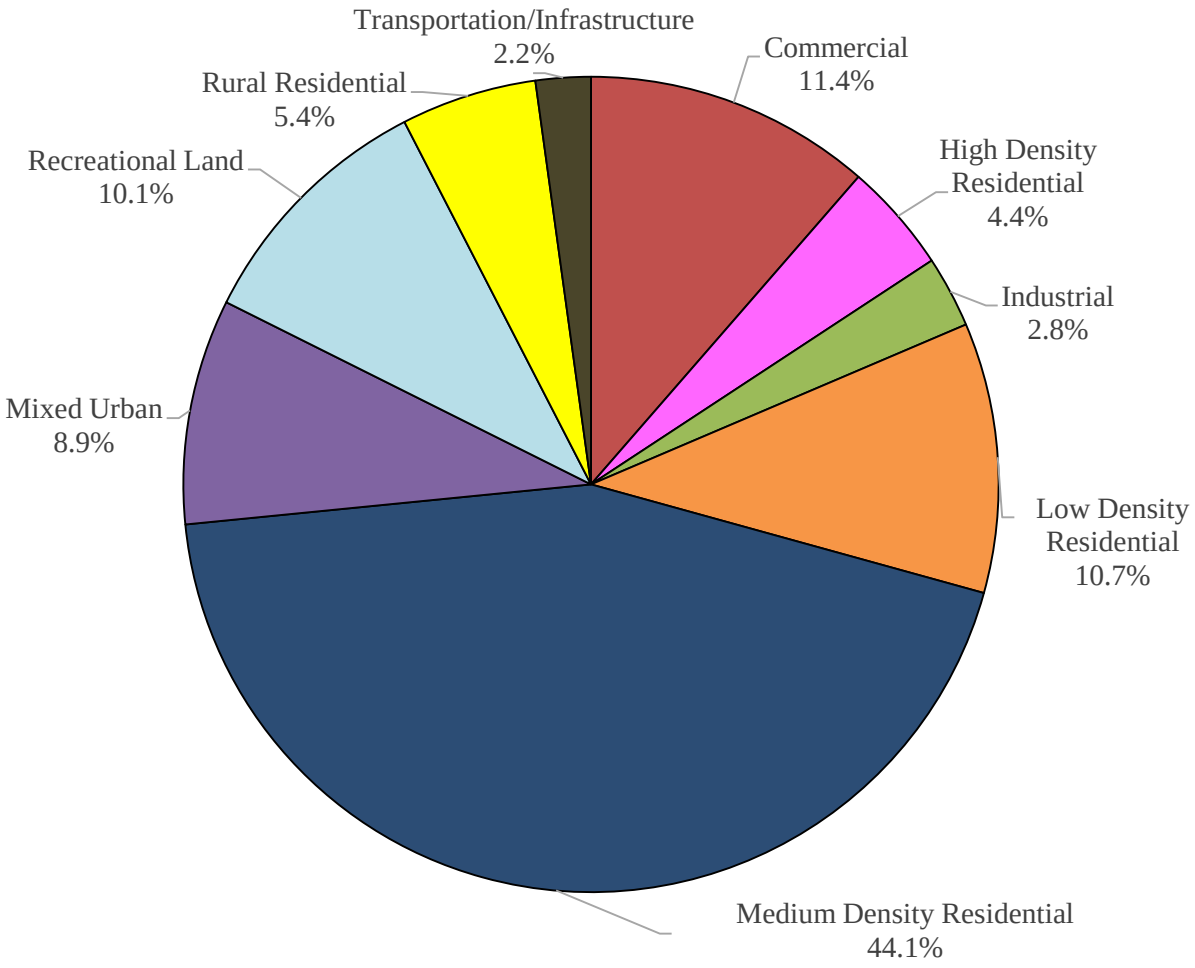


Figure 3: Pie chart illustrating the various types of urban land use in Woodstown Borough

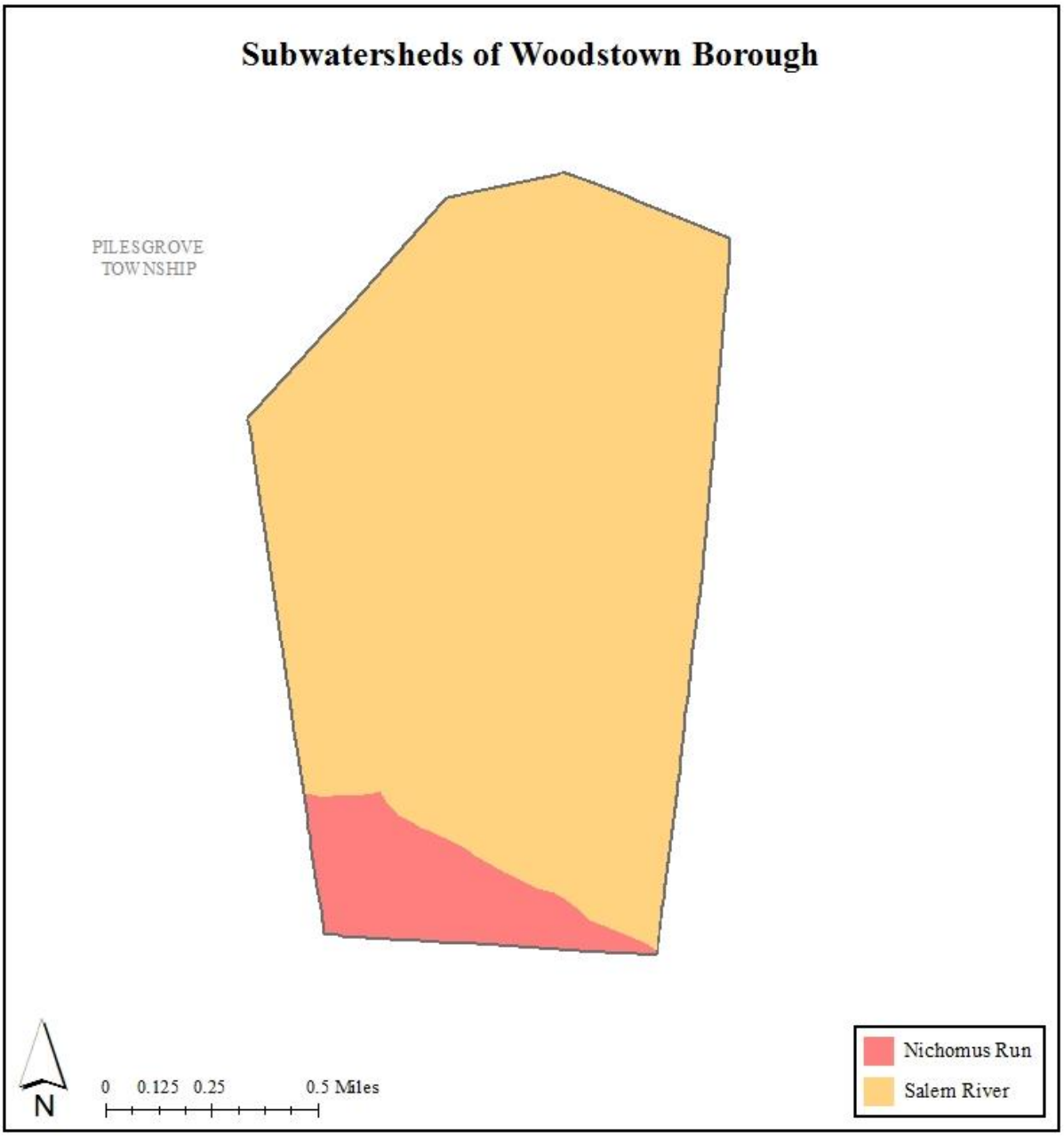


Figure 4: Map of the subwatersheds in Woodstown Borough

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 Woodstown Borough 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 Woodstown Borough. Each practice is discussed below.

Disconnected downspouts

This is often referred to as simple disconnection. A downspout is simply disconnected and 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 a list of 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 is 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]

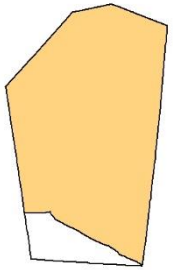
[4] New Jersey Administrative Code, N.J.A.C. 7:8, Stormwater Management, Statutory Authority: N.J.S.A. 12:5-3, 13:1D-1 et seq., 13:9A-1 et seq., 13:19-1 et seq., 40:55D-93 to 99, 58:4-1 et seq., 58:10A-1 et seq., 58:11A-1 et seq. and 58:16A-50 et seq., *Date last amended: April 19, 2010*.

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.

Attachment 1: Potential Project Sites



Salem River Watershed

1. Loyal Order of the Moose Lodge 932
2. Heritage's Dairy Stores
3. Catholic Community of the Holy Spirit
4. Woodstown Friends Meeting Church
5. Woodstown Public Works Lot
6. US Post Office
7. Adams Funeral Home
8. Woodstown Square / Woodstown Family Center
9. Reliance Fire Company
10. Woodstown-Pilesgrove Library
11. Woodstown High School
12. Friends Village at Woodstown
13. Mary S. Shoemaker Elementary School
14. First Baptist Church
15. Chestnut Run Pool Association
16. Asbury United Methodist Church
17. McDonald's
18. Railroad (along W. Wilson Ave.)

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1. Loyal Order of the Moose Lodge 932

13 Bypass Rd. Woodstown, NJ 08098
Block 14.01, Lot 3
82,459 sq. ft.
Salem River Watershed

The entire front roof and parking lot can be discharged to bioretention systems. The roof of the pavilion could be routed to a rainwater harvesting system. 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	53,554	2.58	27.05	245.89	0.04	1.47

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 systems	0.429	72	31,431	1.05	4,120	$20,600
Rainwater harvesting systems	0	3	2,311	0.08	5,000	$10,000

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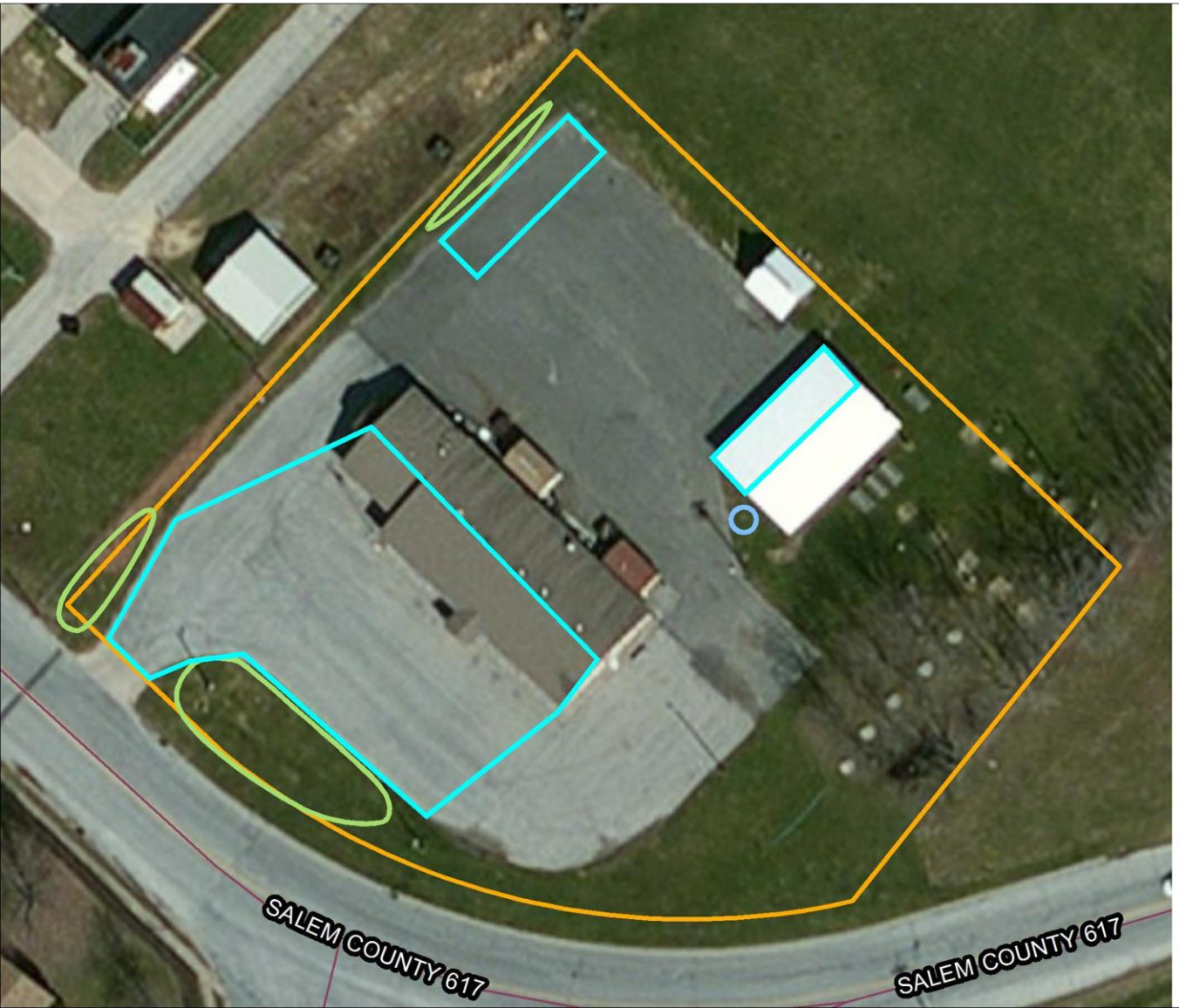
1. Loyal Order of the Moose Lodge 932

13 Bypass Rd. Woodstown, NJ 08098
Block 14.01, Lot 3
82,459 sq. ft.
Salem River Watershed



Parcel boundary
Drainage area

Green infrastructure practices

Bioretention systems
Rainwater harvesting systems

0 25 50 100 Feet

N
W E
S

2. Heritage's Dairy Stores

199 Pole Tavern Woodstown Rd. Woodstown, NJ 08098
Block 15.02, Lot 33
42,352 sq. ft.
Salem River Watershed

Runoff from the building's rooftop could be routed to a bioretention system on its eastern side. The parking spaces in the lot can be repaved 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"
43	18,210	0.88	9.20	83.61	0.01	0.50

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretenion systems	0.081	13	3,411	0.20	2,310	$11,550
Pervious pavement	0.241	40	17,660	0.59	480	$12,000

2. Heritage's Dairy Stores

199 Pole Tavern Woodstown Rd. Woodstown, NJ 08098
Block 15.02, Lot 33
42,352 sq. ft.
Salem River Watershed

3. Catholic Community of the Holy Spirit

2 Lamplighter Dr. Woodstown, 08098
Block 15, Lot 30
540,403 sq. ft.
Salem River Watershed

Runoff from the southernmost roofs of the building could be routed to bioretention systems. Downspouts could be fitted to downspout planter boxes. Multiple parking spaces could be repaved with 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"
28	151,127	7.29	76.33	693.88	0.12	4.14

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	0.211	35	15,431	0.51	1,890	$9,450
Downspout planter boxes	0.018	3	1,316	0.04	170	$850
Pervious pavement	0.090	15	6,590	0.22	540	$13,500

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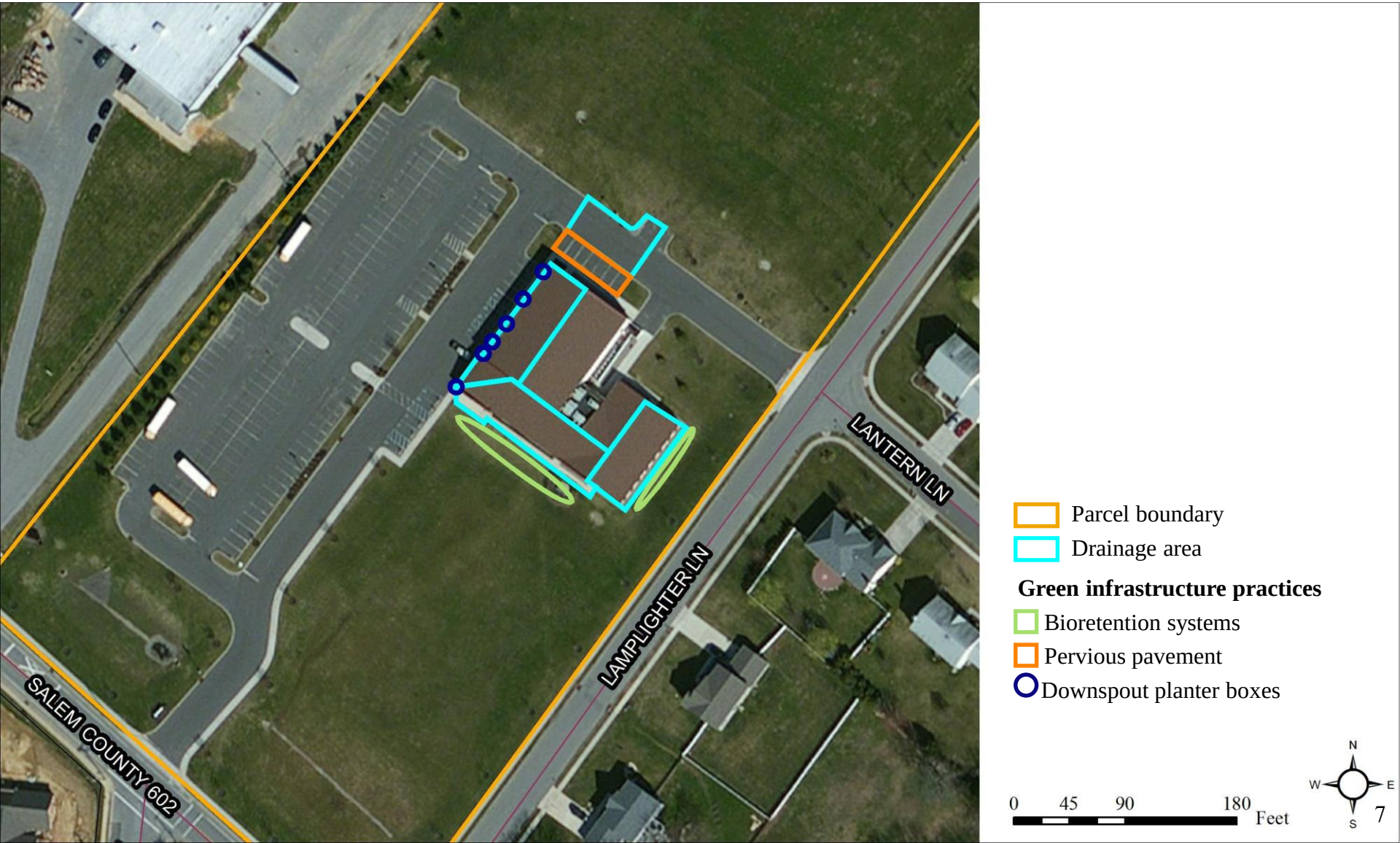
3. Catholic Community of the Holy Spirit

2 Lamplighter Dr. Woodstown, 08098
Block 15, Lot 30
540,403 sq. ft.
Salem River Watershed



4. Woodstown Friends Meeting Church

104 N. Main St. Woodstown, NJ 08908
Block 2, Lot 24
150,469 sq. ft.
Salem River Watershed

The pavement is in poor condition. The parking spaces in the lot could be repaved with pervious pavement to better manage the lot's 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"
29	43,101	2.08	21.77	197.89	0.03	1.18

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	0.482	81	35,343	1.18	2,890	$72,250

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4. Woodstown Friends Meeting Church

104 N. Main St. Woodstown, NJ 08908
Block 2, Lot 24
150,469 sq. ft.
Salem River Watershed

5. Woodstown Public Works Lot

25 West Ave. Woodstown, NJ 08098
Block 21, Lot 26
34,623 sq. ft.
Salem River Watershed

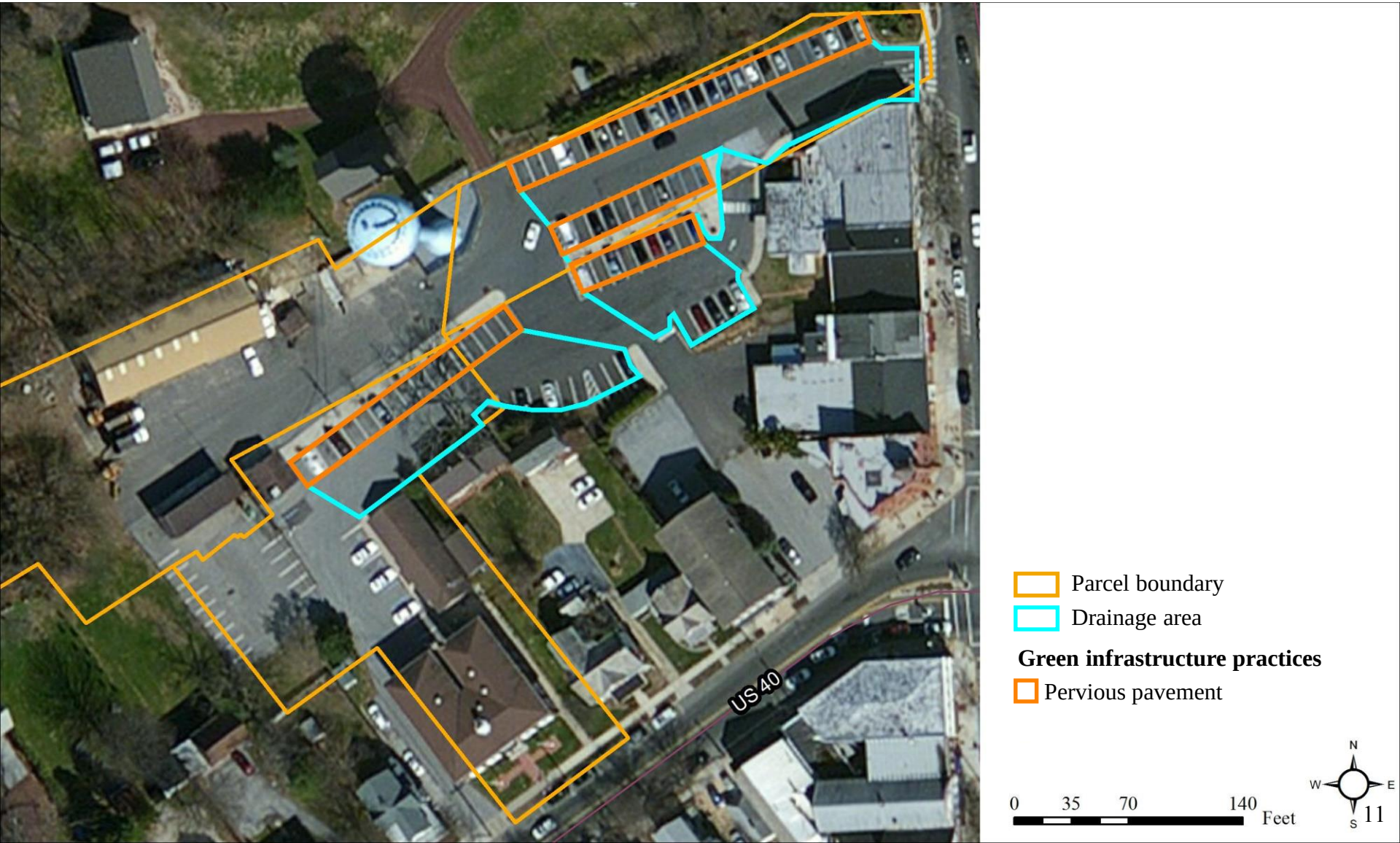
At this site, there are many opportunities to disconnect the parking lot from draining directly to the storm sewer system by installing sections of pervious pavement. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

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"
75	25,909	1.25	13.09	118.96	0.02	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
Pervious pavement	0.781	131	57,267	1.91	4,690	$117,250

5. Woodstown Public Works Lot

25 West Ave. Woodstown, NJ 08098
Block 21, Lot 26
34,623 sq. ft.
Salem River Watershed



6. US Post Office

35 East Ave. Woodstown, NJ 08098
Block 22, Lot 8
23,997 sq. ft.
Salem River Watershed

Portions of the building's roof and parking lot can be directed to pervious pavement. Runoff from the western driveway can be captured in a bioretention system. 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"
75	17,998	0.87	9.09	82.64	0.01	0.49

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.035	6	2,558	0.09	340	$1,700
Pervious pavement	0.069	12	5,064	0.17	410	$10,250

6. US Post Office

35 East Ave. Woodstown, NJ 08098
Block 22, Lot 8
23,997 sq. ft.
Salem River Watershed

7. Adams Funeral Home

64 Broad St. Woodstown, NJ 08098
Block 23, Lot 1
58,557 sq. ft.
Salem River Watershed

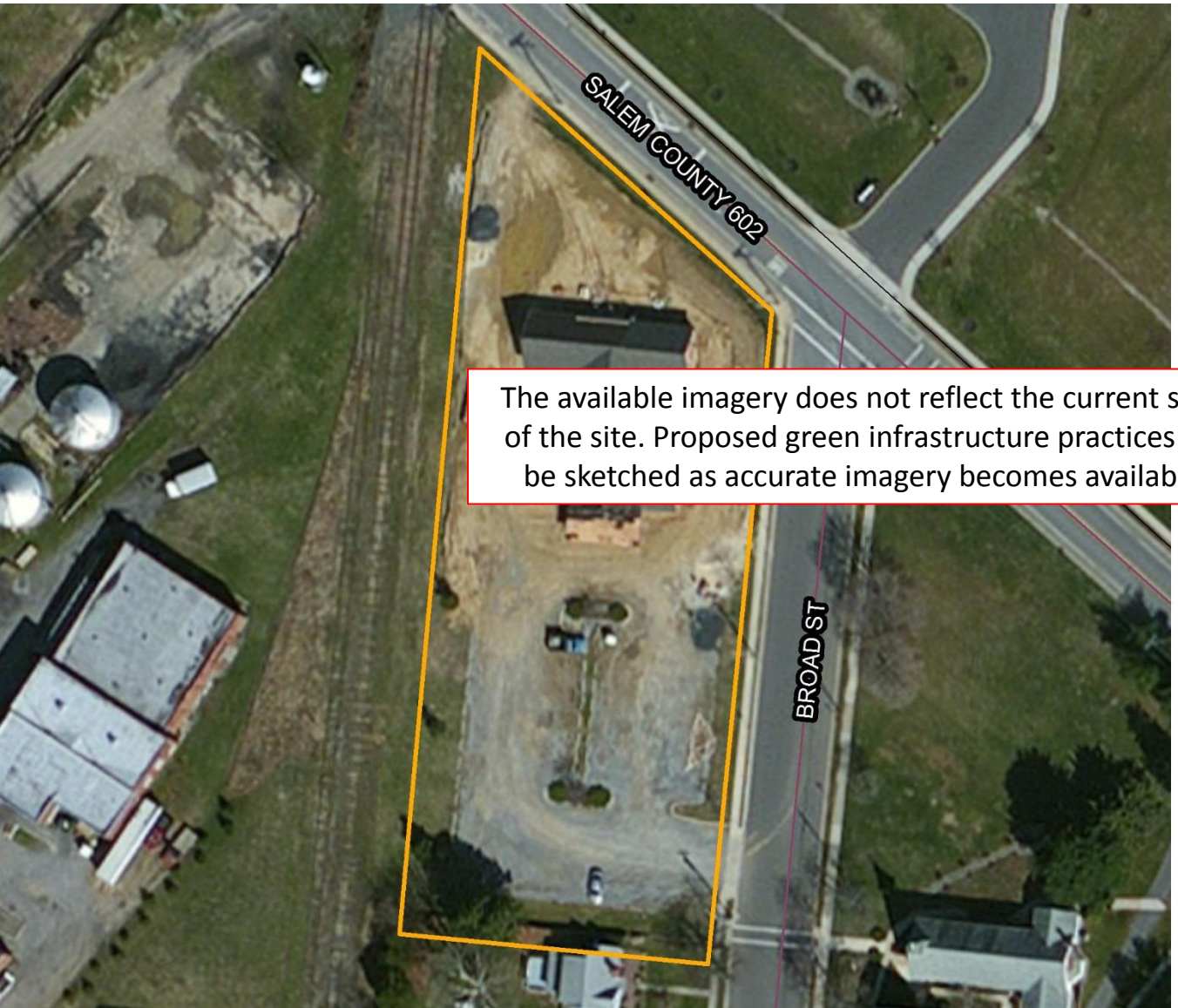
The parking lot is in good condition; however, pervious pavement can be installed when replacement becomes necessary. Stormwater from rooftops can be routed to bioretention systems alongside walkways of the building. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure. Aerial imagery is currently not available for this site, and proposed green infrastructure practices could not be calculated.

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	18,283	0.88	9.23	83.94	0.01	0.50

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	-	-	-	-	-	-
Pervious pavement	-	-	-	-	-	-

7. Adams Funeral Home

64 Broad St. Woodstown, NJ 08098
Block 23, Lot 1
58,557 sq. ft.
Salem River Watershed



8. Woodstown Square / Woodstown Family Center

125 East Ave. Woodstown, NJ 08098
Block 24, Lot 2
102,907 sq. ft.
Salem River Watershed

Multiple parking sections could be replaced with pervious pavement, which would enhance groundwater recharge and reduce pollutant loads to storm sewers. 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%	65,921	3.18	33.29	302.67	0.05	1.81

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	0.795	133	58,299	1.94	4,770	$119,250

8. Woodstown Square / Woodstown Family Center

125 East Ave. Woodstown, NJ 08098
Block 24, Lot 2
102,907 sq. ft.
Salem River Watershed

Parcel boundary
Drainage area

Green infrastructure practices

Pervious pavement

0 30 60 120 Feet

N W E S

9. Reliance Fire Company

25 Broad St. Woodstown, NJ 08098
Block 24, Lot 21
28,386 sq. ft.
Salem River Watershed

The roof's runoff could be stored in a rainwater harvesting system be used for washing trucks. A bioretention system could be installed to manage runoff from the northern lot. The eastern portion of the lot could be replaced with grass pavers. 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"
75	21,256	1.02	10.74	97.59	0.02	0.58

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	0.026	4	1,892	0.06	5,000	$10,000
Pervious pavement	0.011	2	838	0.03	70	$1,750
Rainwater harvesting systems	0	11	9,933	0.33	250	$1,250

9. Reliance Fire Company

25 Broad St. Woodstown, NJ 08098
Block 24, Lot 21
28,386 sq. ft.
Salem River Watershed

Parcel boundary
Drainage area

Green infrastructure practices

Bioretention systems
Pervious pavement
Rainwater harvesting systems

0 25 50 100 Feet

N
W E
S

10. Woodstown-Pilesgrove Library

14 School Ln. Woodstown, NJ 08098
Block 24, Lot 6
20,063 sq. ft.
Salem River Watershed

At this site, bioretention systems can be installed along the western and eastern sides of the building to treat 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"
25	5,017	0.24	2.53	23.03	0	0.14

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	0.319	53	23,375	0.78	3,060	$15,300

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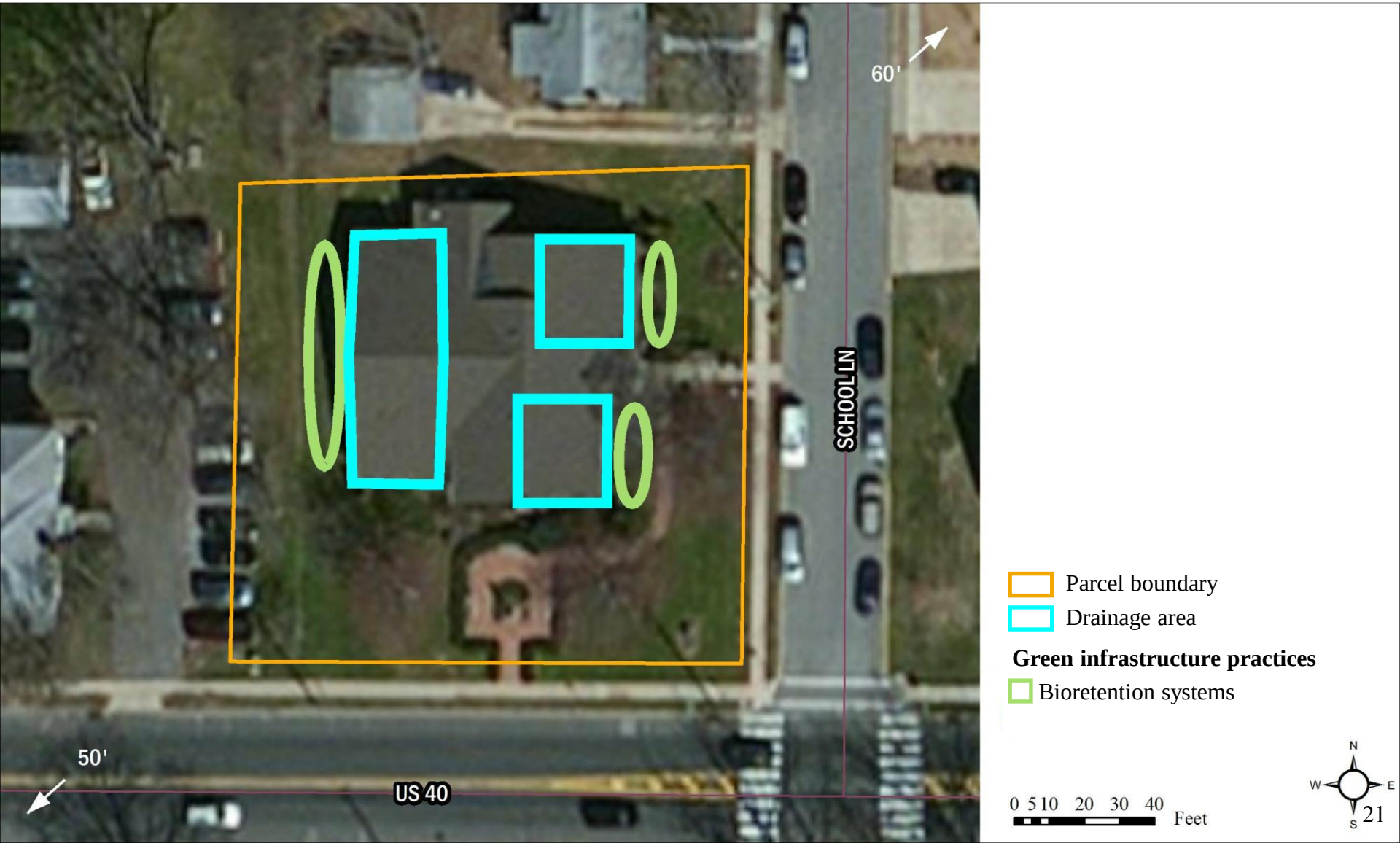
10. Woodstown-Pilesgrove Library

14 School Ln. Woodstown, NJ 08098
Block 24, Lot 6
20,063 sq. ft.
Salem River Watershed



11. Woodstown High School

140 Pole Tavern Woodstown Rd. Woodstown, NJ 08098
Block 27, Lot 22
1,871,330 sq. ft.
Salem River Watershed

Stormwater from the southern roof can be conveyed to a terraced bioretention system. Sections of pervious pavement and a bioretention system would prevent runoff from flowing directly to the 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"
20	365,410	17.62	184.55	1,677.73	0.28	10.02

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	0.518	87	37,983	1.27	4,970	$24,850
Pervious pavement	0.641	107	46,959	1.57	3,840	$96,000

11. Woodstown High School

140 Pole Tavern Woodstown Rd. Woodstown, NJ 08098
Block 27, Lot 22
1,871,330 sq. ft.
Salem River Watershed

Parcel boundary
Drainage area

Green infrastructure practices

Bioretention systems
Pervious pavement

0 65 130 260 Feet

N
W E
S

12. Friends Village at Woodstown

Friends Dr. Woodstown, NJ 08098
Block 27, Lot 64
Block 36, Lot 8 (Pilesgrove, NJ)
1,132,498 sq. ft. (All parcels)
Salem River Watershed

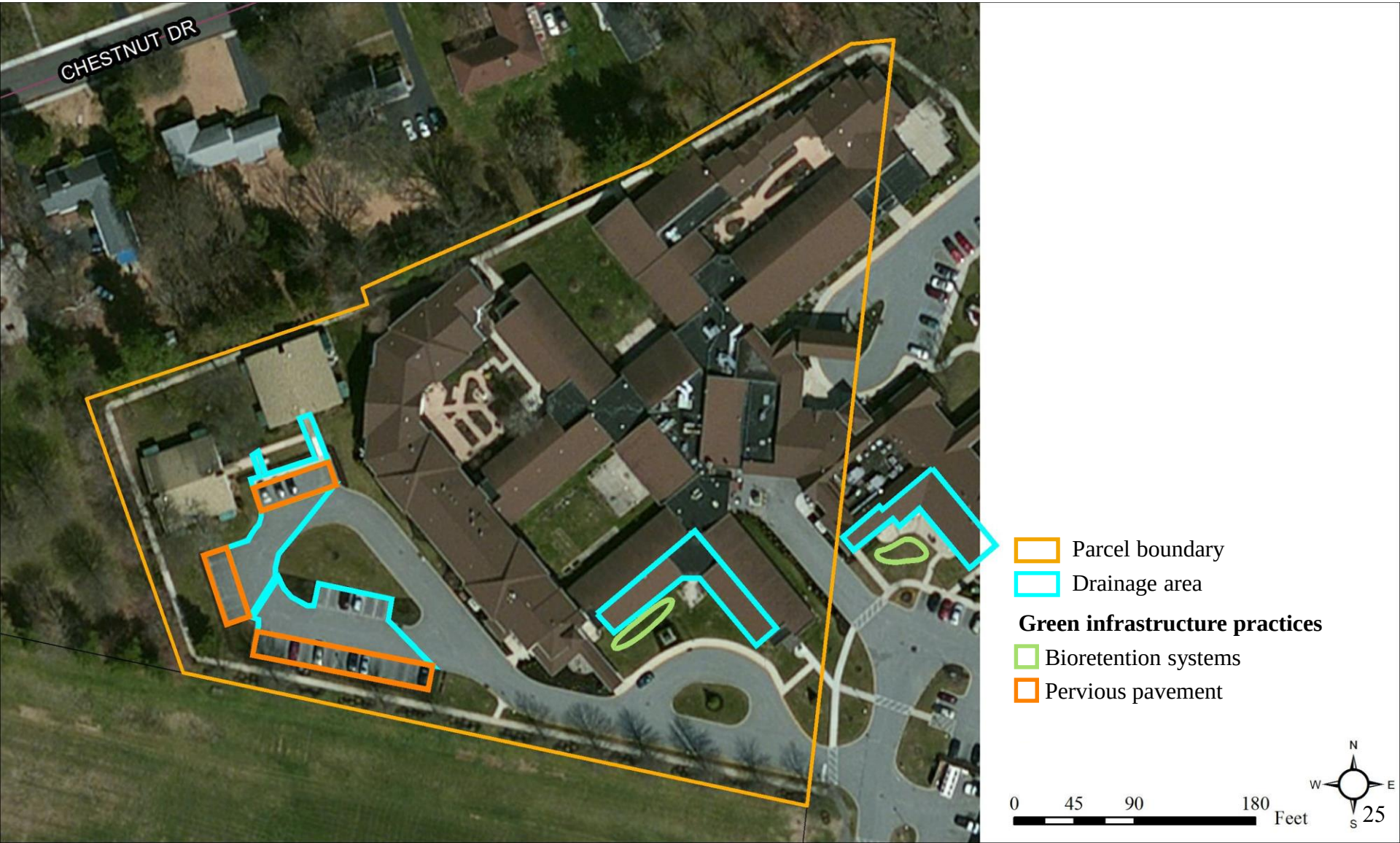
Each building's runoff can be conveyed through disconnected downspouts to bioretention systems. Parking spaces can be repaved with pervious pavement to capture runoff. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green 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"
47	534,697	25.78	230.05	2,454.99	0.42	14.66

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	0.161	27	11,781	0.39	1,540	$7,700
Pervious pavement	0.305	51	22,343	0.75	1,830	$45,750

12. Friends Village at Woodstown

Friends Dr. Woodstown, NJ 08098
Block 27, Lot 64
203,764 sq. ft.
Salem River Watershed



13. Mary S. Shoemaker Elementary School

201 E. Millbrooke Ave. Woodstown, NJ 08098
Block 27, Lot 65
177,287 sq. ft.
Salem River Watershed

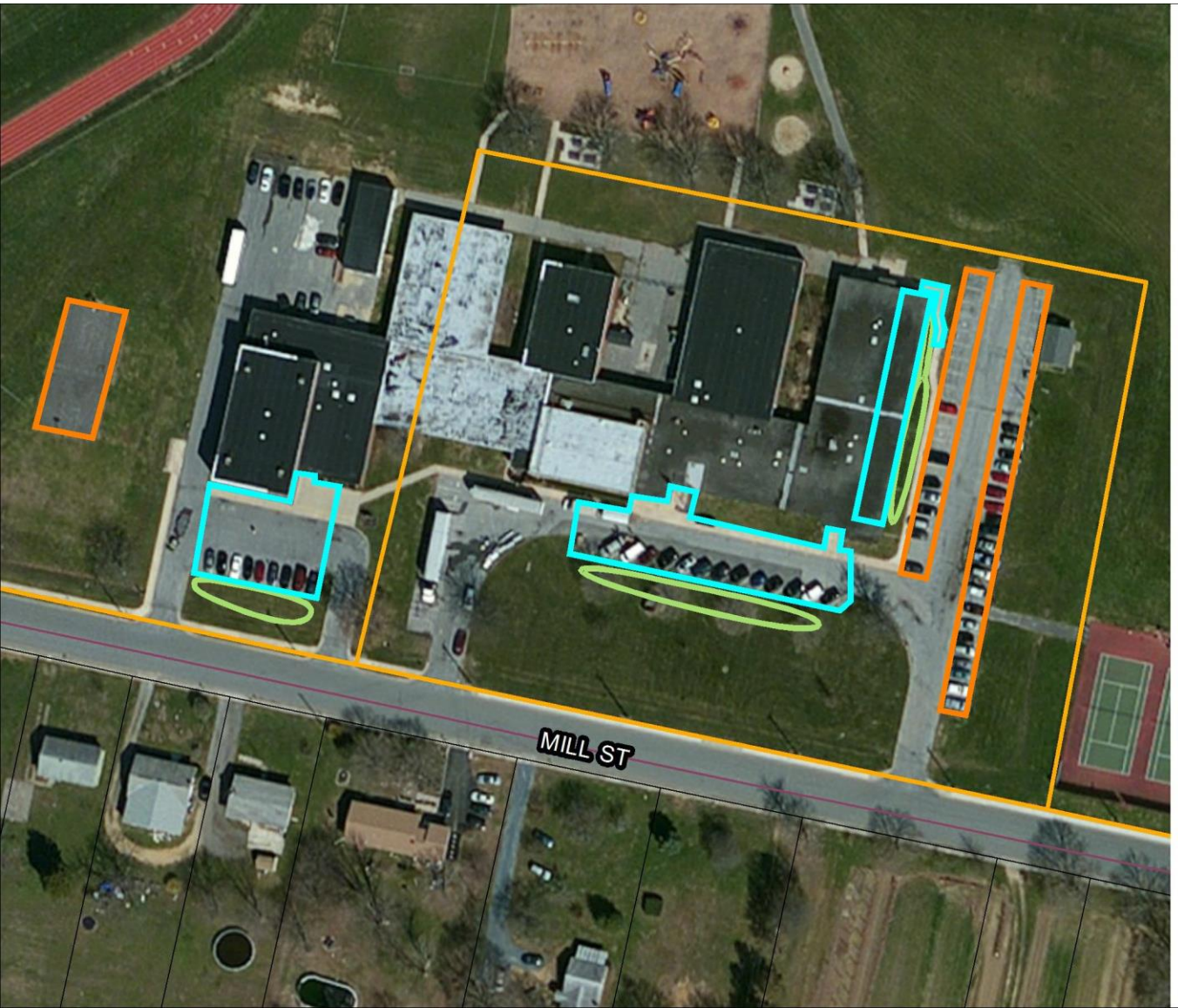
Two sections of parking spaces and a basketball court can be replaced with pervious pavement. Bioretention systems could be used to manage runoff from the school's roof or parking lots. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics 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"
56	99,564	4.8	50.29	457.14	0.08	2.73

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	0.465	78	34,049	1.14	4,460	$22,300
Pervious pavement	0.335	56	24,519	0.82	2,000	$50,000

13. Mary S. Shoemaker Elementary School

201 E. Millbrooke Ave. Woodstown, NJ 08098
Block 27, Lot 65
177,287 sq. ft.
Salem River Watershed



Parcel boundary
Drainage area

Green infrastructure practices

Bioretention systems
Pervious pavement

0 50 100 200 Feet

N
W E
S

14. First Baptist Church

117 South Main St. Woodstown, NJ 08098
Block 34, Lot 5
58,067 sq. ft.
Salem River Watershed

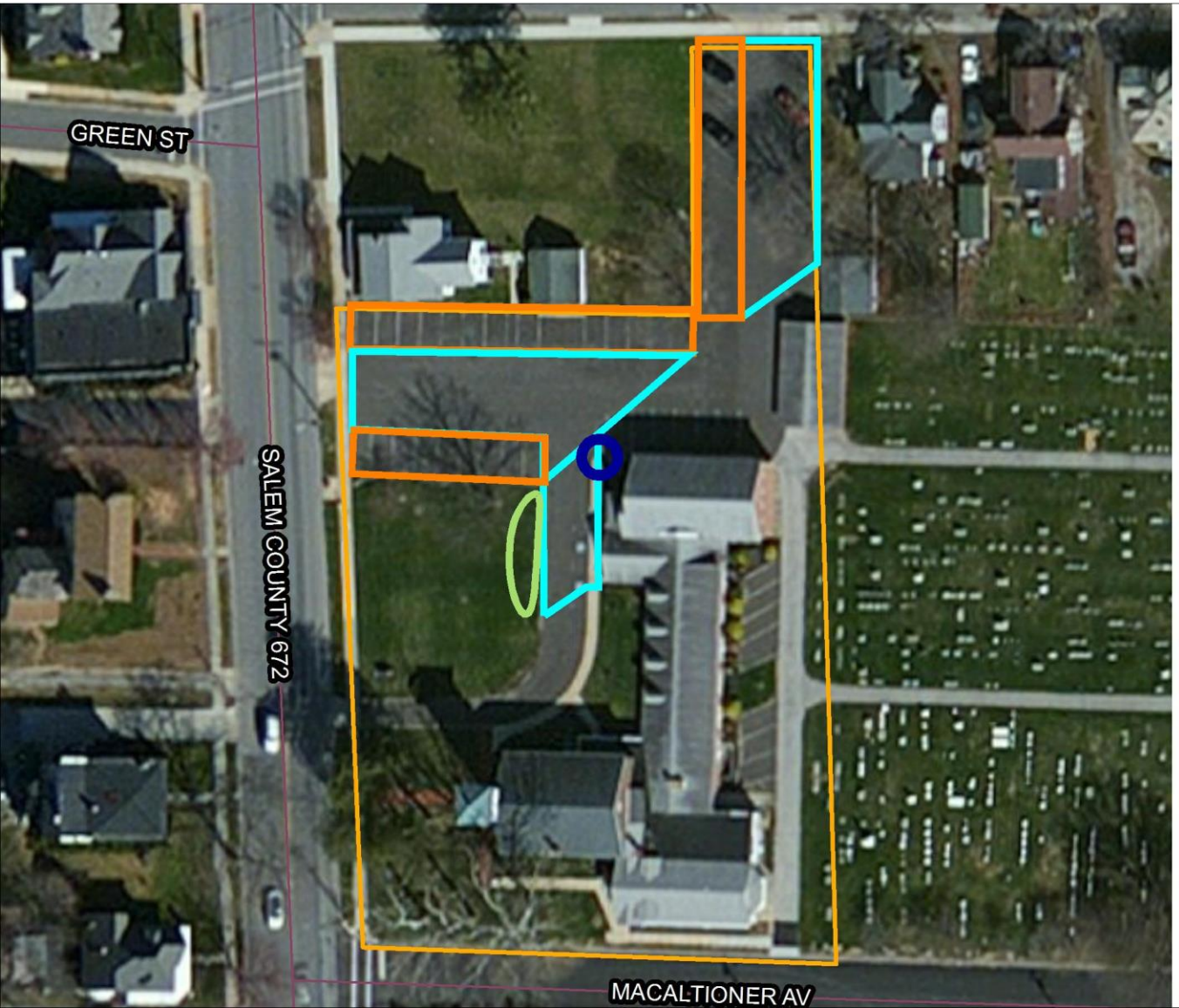
The parking lot's runoff can be captured by sections of pervious pavement. A bioretention system can be installed across the building to treat runoff from the sidewalk and pavement. Downspouts could be fitted to downspout planter boxes. A preliminary soil assessment for this site suggests that the site's 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"
57	33,368	1.61	16.85	153.20	0.03	0.926

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	0.034	6	2,461	0.08	320	$1,600
Downspout planter boxes	0.003	0	209	0.01	30	$150
Pervious pavement	0.348	58	25,529	0.85	2,090	$52,250

14. First Baptist Church

117 South Main St. Woodstown, NJ 08098
Block 34, Lot 5
58,067 sq. ft.
Salem River Watershed



Parcel boundary
Drainage area

Green infrastructure practices

Bioretention systems
Pervious pavement
Downspout planter boxes

0 30 60 120 Feet

N
W E
S

15. Chestnut Run Pool Association

205 South Main St. Woodstown, NJ 08098
Block 35, Lot 11
97,670 sq. ft.
Salem River Watershed

At this site, the impervious parking area can be replaced with pervious pavement to provide pollutant removal and groundwater recharge. 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	19,830	0.96	10.01	91.05	0.02	0.54

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	0.115	19	8,422	0.28	690	$17,250

RUTGERS New Jersey Agricultural Experiment Station

15. Chestnut Run Pool Association

205 South Main St. Woodstown, NJ 08098
Block 35, Lot 11
97,670 sq. ft.
Salem River Watershed

16. Asbury United Methodist Church

149 South Main St. Woodstown, NJ 08098
Block 35, Lot 7
36,460 sq. ft.
Salem River Watershed

Sections of the parking lot can be repaved with pervious pavement. Downspout planter boxes could also be implemented to enhance aesthetic appeal. The building's southern roof could be routed to bioretention systems. 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.

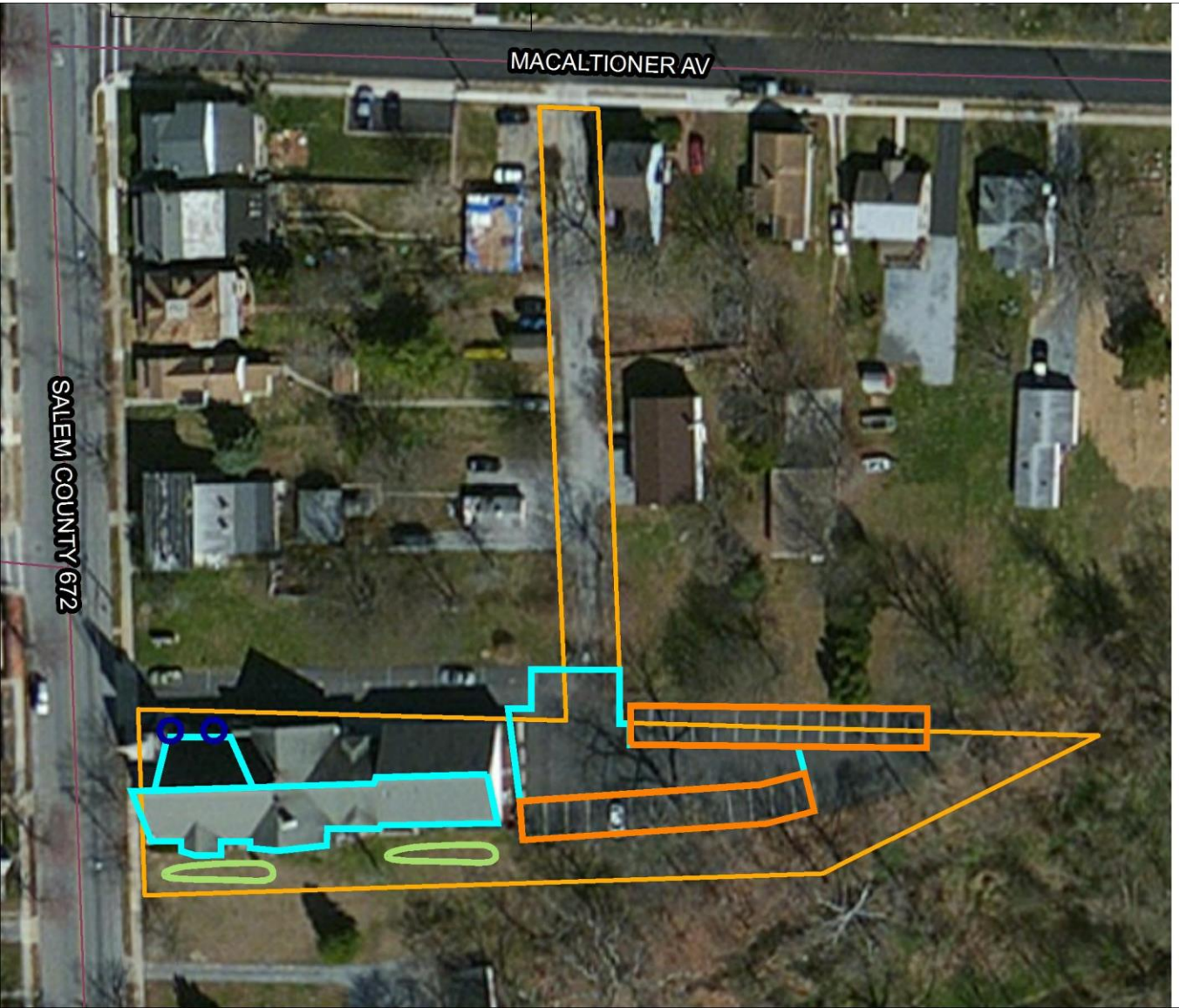
Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
62	22,677	1.09	11.45	104.12	0.02	0.62

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
Bioretention systems	0.103	17	7,577	0.25	990	$4,950
Downspout planter boxes	0.006	1	441	0.01	60	$300
Pervious pavement	0.325	54	23,831	0.79	1,950	$48,750

RUTGERS New Jersey Agricultural Experiment Station

16. Asbury United Methodist Church

149 South Main St. Woodstown, NJ 08098
Block 35, Lot 7
36,460 sq. ft.
Salem River Watershed



Parcel boundary
Drainage area

Green infrastructure practices

Bioretention systems
Pervious pavement
Downspout planter boxes

0 30 60 120 Feet

N
W E
S

17. McDonald's

400 West Ave Woodstown, NJ 08098
Block 40, Lot 58
Block 63, Lot 1.06 (Pilesgrove, NJ)
60,752 sq. ft. (All parcels)
Salem River Watershed

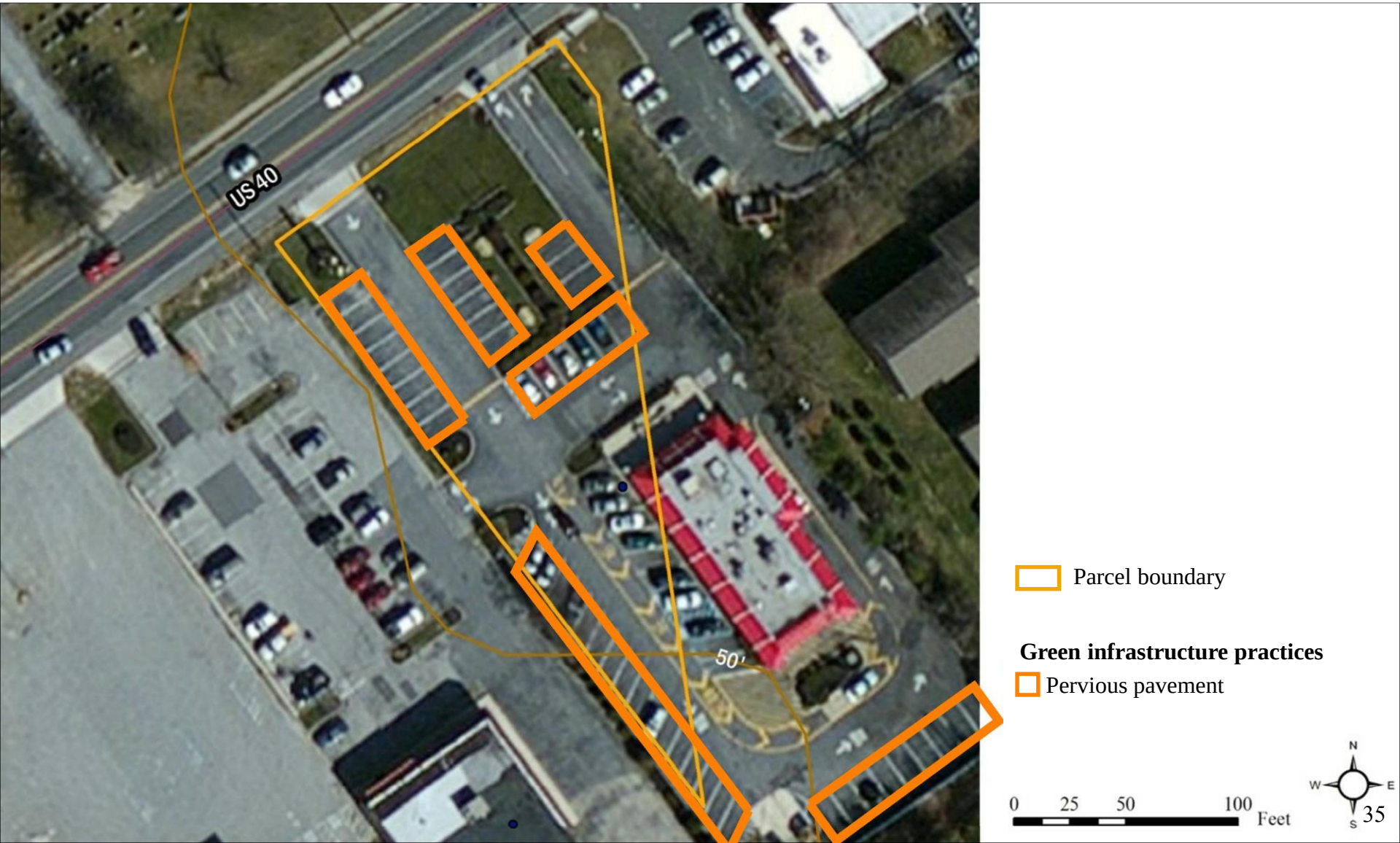
Stormwater runoff from the parking lot can be captured by sections of pervious pavement. A preliminary soil assessment for this site suggests that the site's existing soils have suitable drainage characteristics for green infrastructure.

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"
89	54,116	2.61	27.34	248.47	0.04	1.48

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	0.242	40	17,705	0.59	1,450	$36,250

17. McDonald's

400 West Ave Woodstown, NJ 08098 (in Pilesgrove Township)
Block 63, Lot 1.06
26,773 sq. ft.
Salem River Watershed



18. Railroad (along W. Wilson Ave.)

West Wilson Ave. Woodstown, NJ 08098
Block 500, Lot 5
22,534 sq. ft.
Salem River Watershed

Stormwater runoff from the road can be treated with a series of bioretention systems installed alongside the train tracks. 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"
16	3,642	0.18	1.84	16.72	0	0.1

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	0.128	21	9,395	0.31	1,230	$6,150

18. Railroad (along W. Wilson Ave.)

West Wilson Ave. Woodstown, NJ 08098
Block 500, Lot 5
22,534 sq. ft.
Salem River Watershed