RUTGERS
New Jersey Agricultural
Experiment Station

Draft

Impervious Cover Reduction Action Plan for Chester Borough, Morris County, New Jersey

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

January 7, 2021

Highlands Council
New Jersey

ACKNOWLEDGEMENTS:

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

RUTGERS
New Jersey Agricultural Experiment Station

Highlands Council
New Jersey

Table of Contents

Introduction

Located in Morris County, New Jersey, Chester Borough covers approximately 1.60 square miles. Figures 1 and 2 illustrate that Chester Borough is dominated by urban land use. A total of 67.8% of the municipality's land use is classified as urban. Of the urban land in Chester Borough, low density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2015 land use/land cover geographical information system (GIS) data layer categorizes Chester 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 Chester Borough. Based upon the 2015 NJDEP land use/land cover data, approximately 23.1% of Chester Borough has impervious cover. This level of impervious cover suggests that the streams in Chester Borough likely range from being impacted to non-supporting streams. [1]

Methodology

Chester Borough contains portions of three 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] Schuler, T.R., L. Fraley-McNeal, and K. Cappiella. 2009. Is Impervious Cover Still Important? Review of Recent Research. *Journal of Hydrologic Engineering* 14 (4): 309-315.

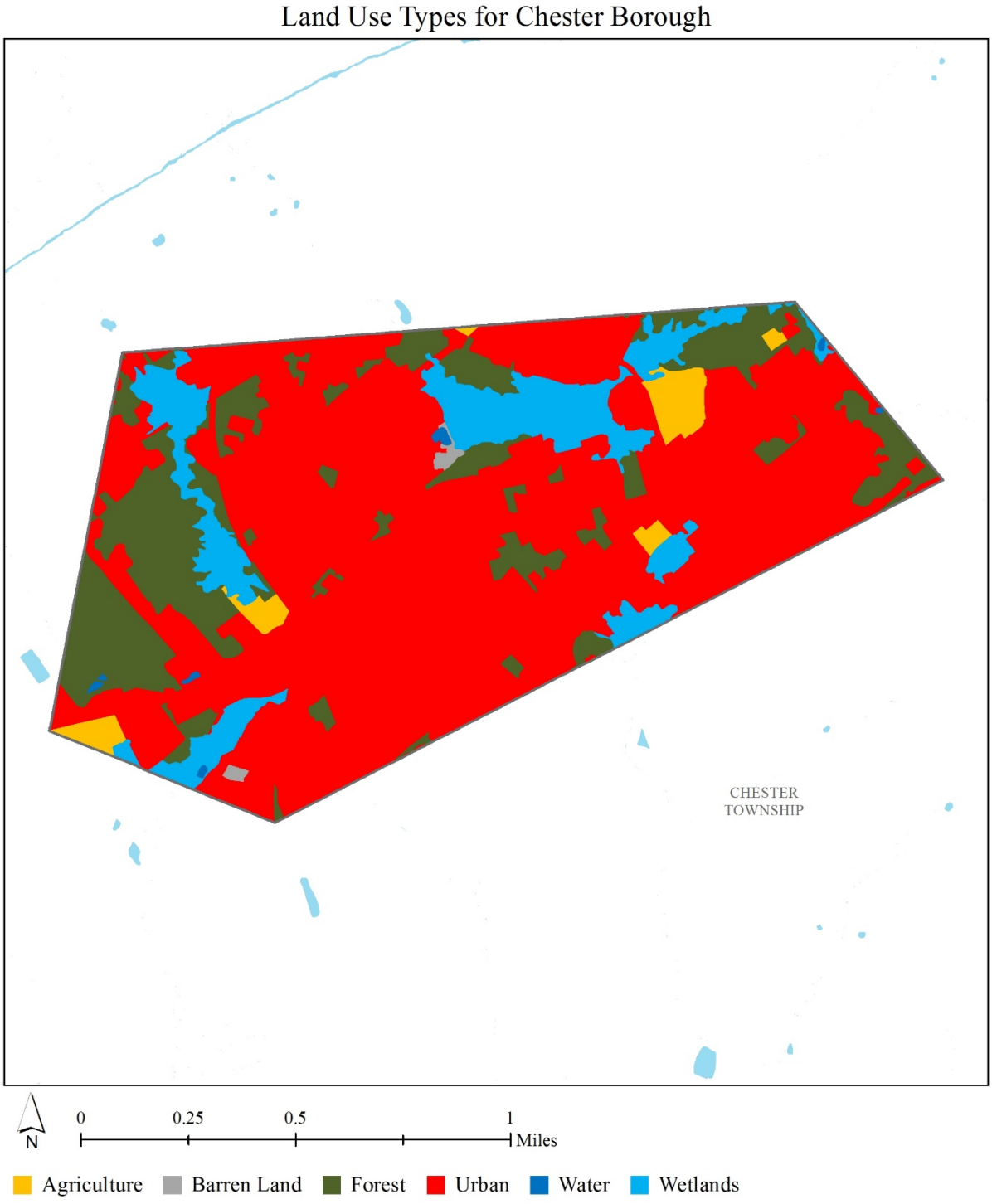


Figure 1: Map illustrating the land use in Chester Borough

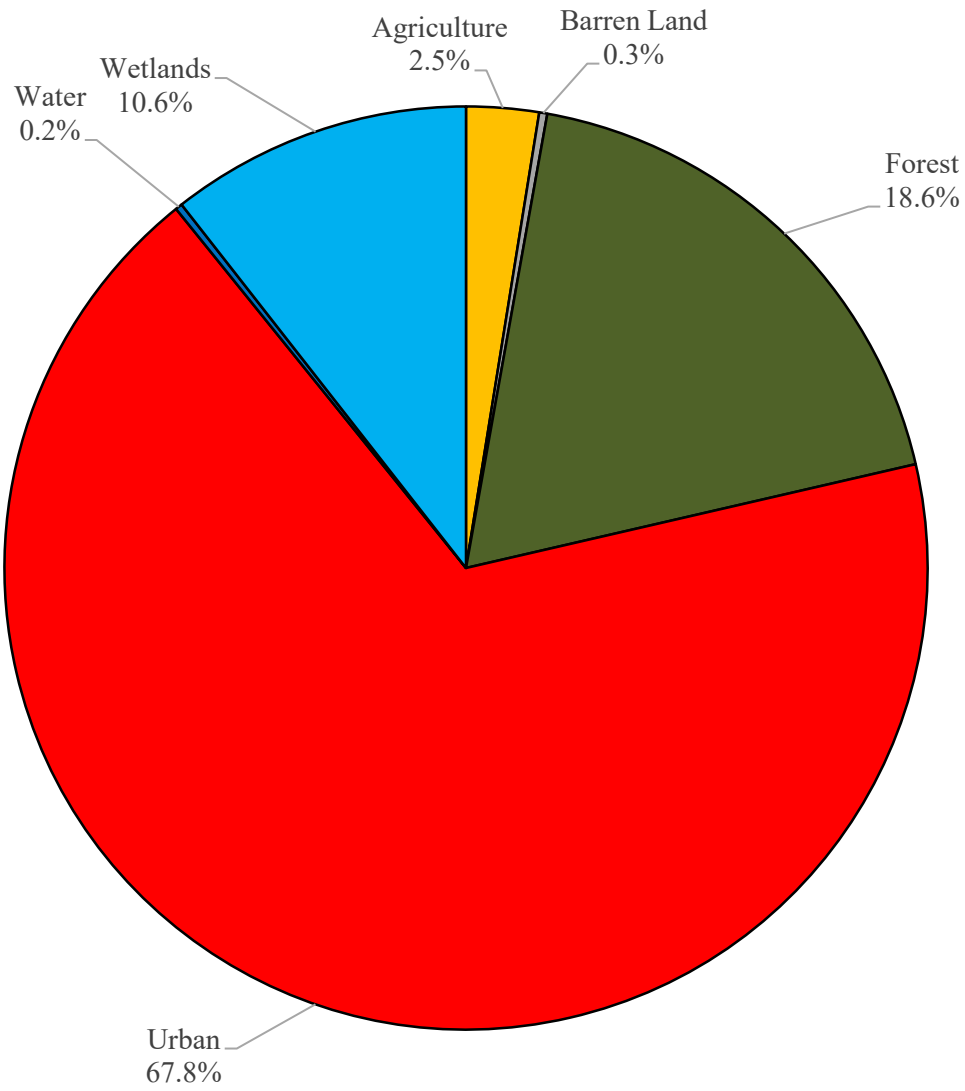


Figure 2: Pie chart illustrating the land use in Chester Township

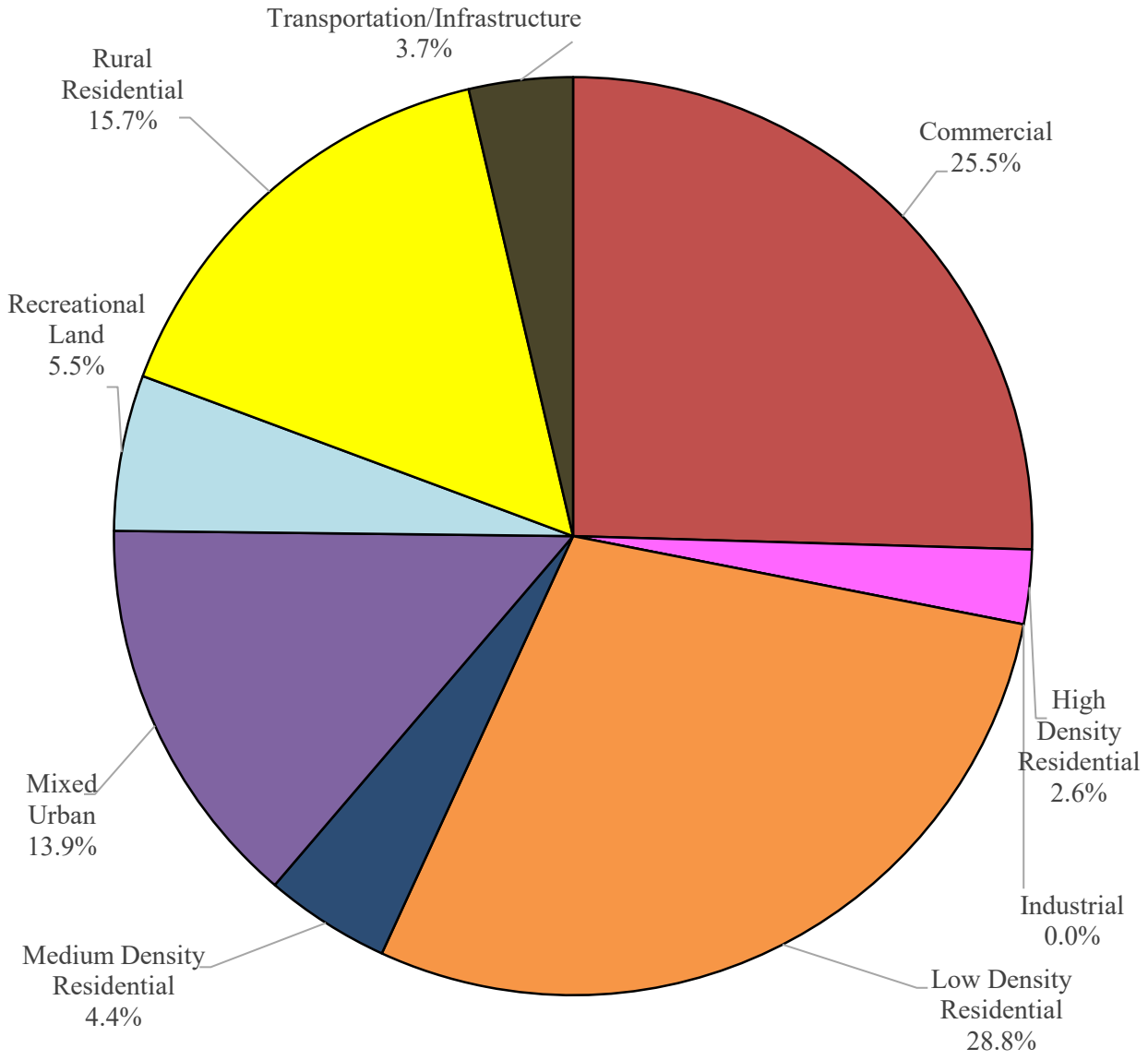


Figure 3: Pie chart illustrating the various types of urban land use in Chester Borough

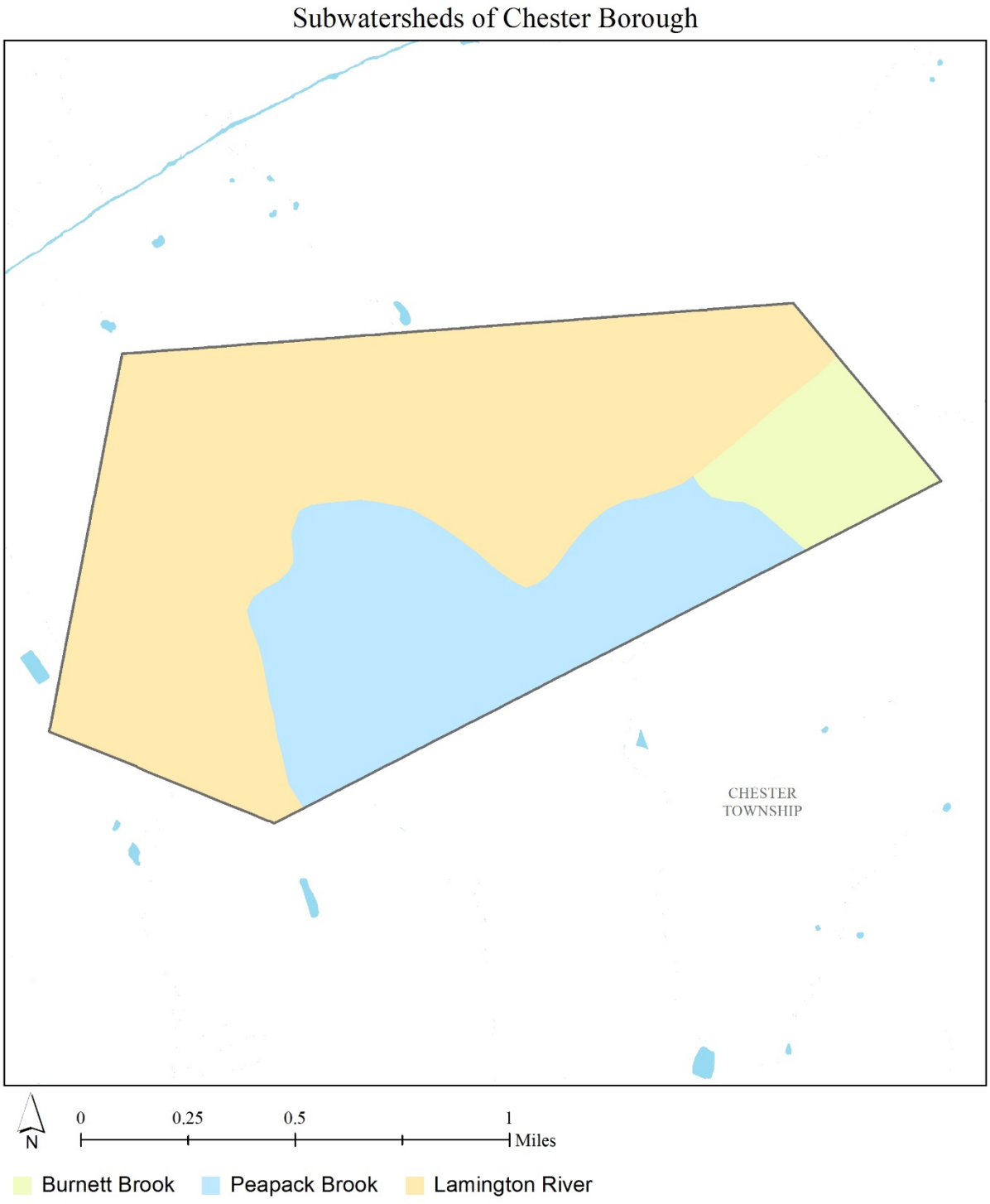


Figure 4: Map of the subwatersheds in Chester Borough

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 2015 NJDEP land use/land cover database. For impervious areas, runoff volumes were determined for the water quality design storm (1.25 inches of rain over two-hours) and for the annual rainfall total of 44 inches.

Preliminary soil assessments were conducted for each potential project site identified in Chester 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 principle, green infrastructure practices use soil and vegetation to recycle stormwater runoff through infiltration and evapotranspiration. When used as components of a stormwater management system, green infrastructure practices such as bioretention, green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits. In addition to effectively retaining and infiltrating rainfall, these practices can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits[3]. A wide range of green infrastructure practices have been evaluated for the potential project sites in Chester Borough. Each practice is discussed below.

Disconnected downspouts

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

Pervious pavements

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

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

Bioretention systems/rain gardens

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

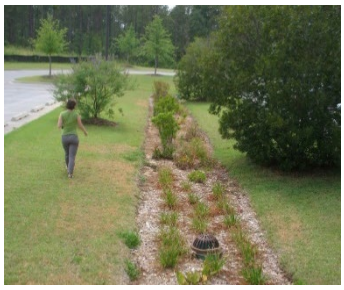
Downspout planter boxes

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

Rainwater harvesting systems (cistern or rain barrel)

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

Bioswale



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

Stormwater planters

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

Tree filter boxes

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

Potential Project Sites

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

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

Conclusion

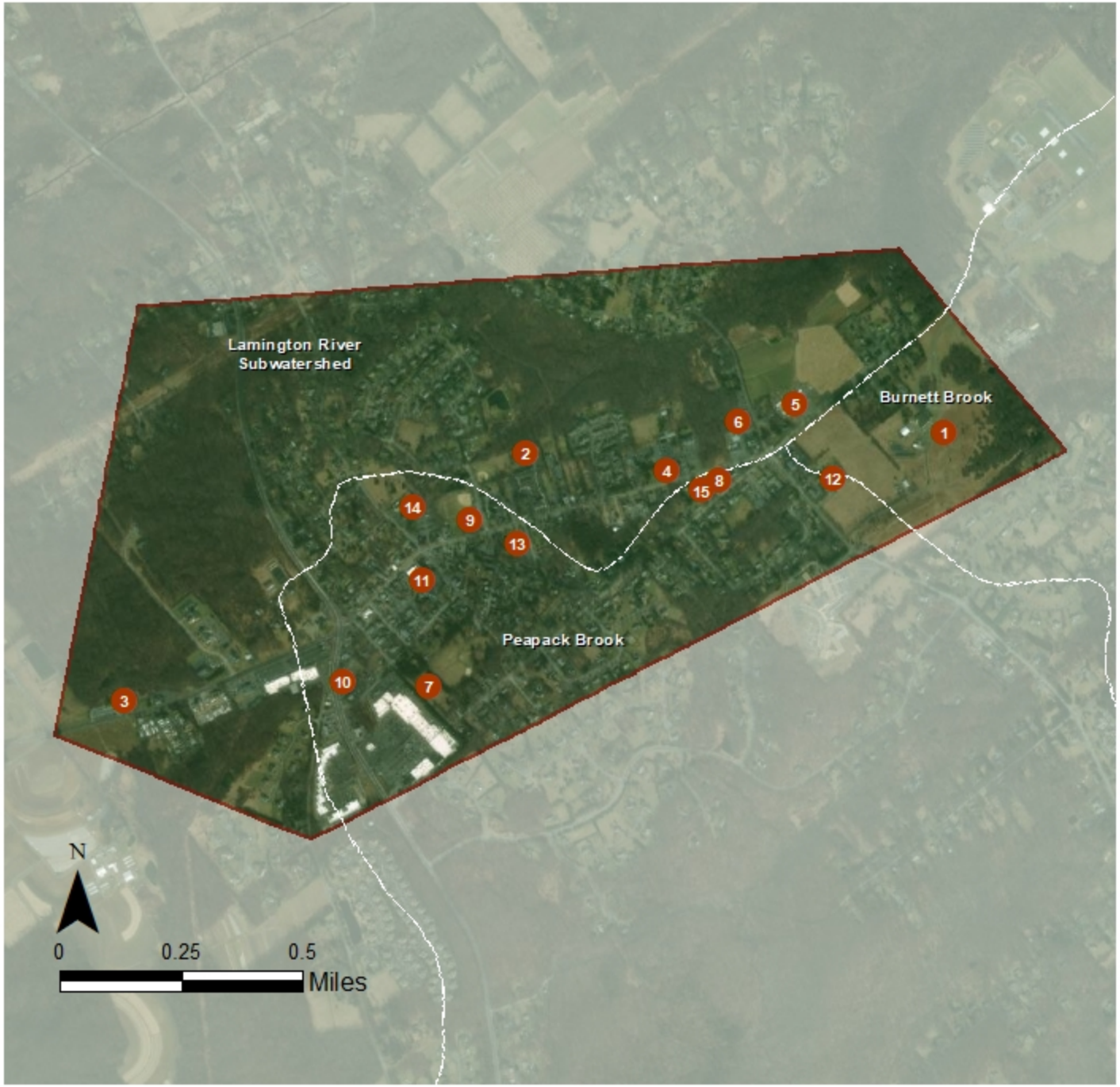
This impervious cover reduction action plan is meant to provide the municipality with a blueprint for implementing green infrastructure practices that will reduce the impact of stormwater runoff from impervious surfaces. These projects can be implemented by a wide variety of people such as boy scouts,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

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

Appendix A: Climate Resilient Green Infrastructure

a. Green Infrastructure Sites

CHESTER BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BURNETT BROOK SUBWATERSHED

1. Chester Borough Office

SITES WITHIN THE LAMINGTON RIVER SUBWATERSHED

2. Chester Senior Housing
3. Chester Library
4. St. Lawrence Church
5. Stony Hill Farm Market
6. Suburban Hills School

SITES WITHIN THE PEAPACK BROOK SUBWATERSHED

7. Borough of Chester Recreation Office
8. Chase Bank
9. Chester Borough Park
10. Chester Diner
11. Chester Fire Company
12. Chester Tennis Club
13. Community Presbyterian Church
14. First Congregational Church
15. United States Postal Service

b. Proposed Green Infrastructure Concepts

CHESTER BOROUGH OFFICE

Subwatershed: Burnett Brook

Site Area: 2,580,960 sq. ft.

Address: 50 North Road
Chester Borough, NJ 07930

Block and Lot: Block 115, Lot 17

Parking spaces in the parking lot to the northeast of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A rain garden can be installed near the catch basin and entrance of the building to capture, treat, and infiltrate stormwater runoff from the roof. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
4	107,535	5.2	54.3	493.7	0.084	2.95

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	0.163	27	11,560	0.43	1,565	$7,825
Pervious pavement	0.189	32	13,390	0.50	1,450	$36,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

Chester Borough Office

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

0 50' 100'

CHESTER SENIOR HOUSING

Subwatershed: Lamington River

Site Area: 171,540 sq. ft.

Address: 1 Cole Court
Chester Borough, NJ 07930

Block and Lot: Block 110, Lot 4

Two rain gardens can be installed west of the two buildings to accumulate and infiltrate stormwater runoff from the buildings. Additionally, porous pavement can be used to capture stormwater from the parking lot in front of the main building. 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"
24	40,325	1.9	20.4	185.1	0.031	1.11

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	0.042	7	2,980	0.11	405	$2,025
Pervious pavement	0.178	30	12,640	0.48	1,450	$36,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

Chester Senior Housing

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

0 30' 60'

CHESTER LIBRARY

Subwatershed: Lamington River

Site Area: 393,550 sq. ft.

Address: 250 West Main Street
Chester, NJ 07930

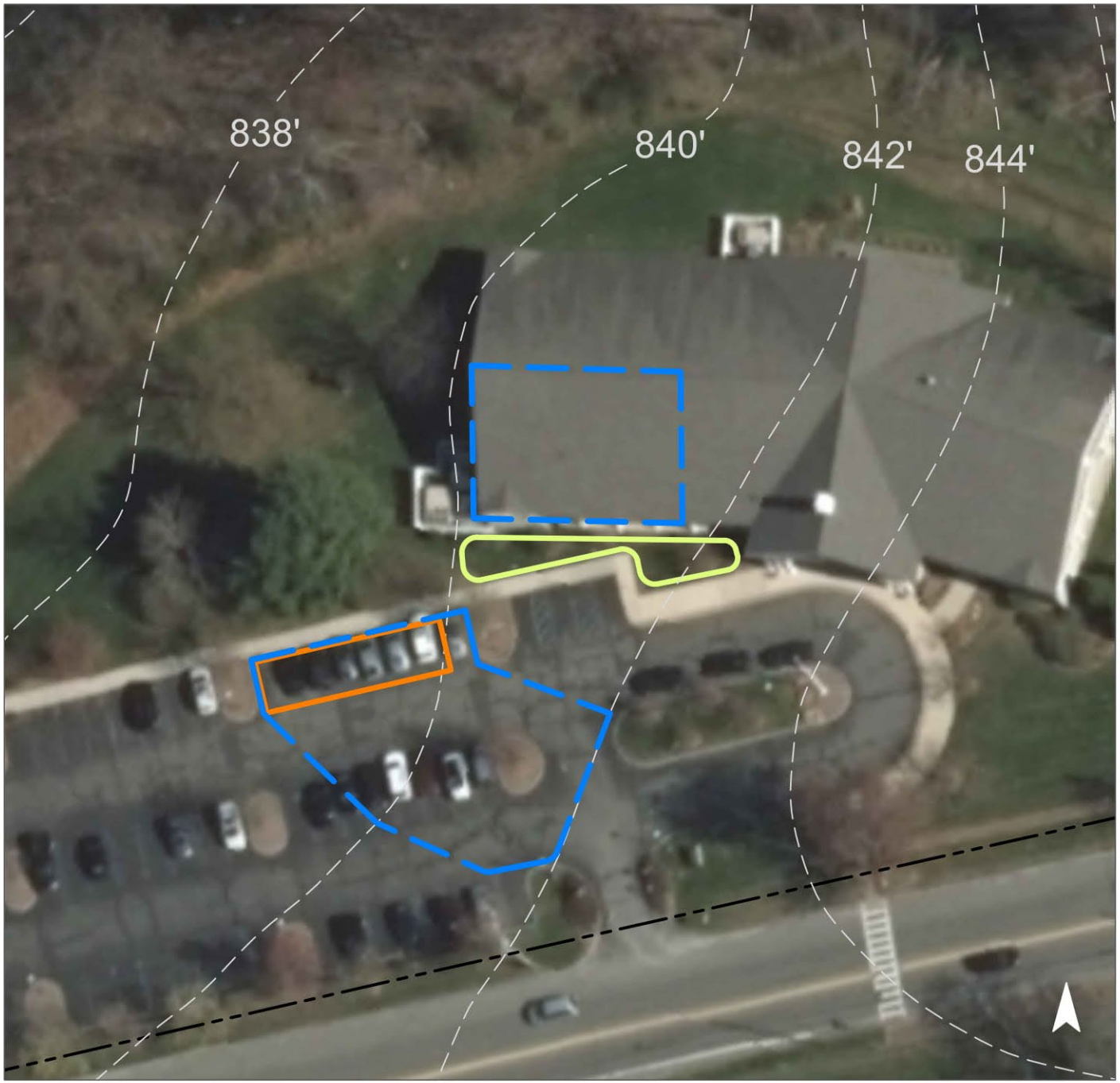
Block and Lot: Block 101, Lot 21

Parking spaces in the parking lot to the west of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot, before it enters the nearby storm drain. A rain garden can be installed south of the building to capture, filter, and infiltrate stormwater runoff from the roof if the front downspouts are disconnected. 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"
17	68,470	3.3	34.6	314.4	0.053	1.88

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	0.089	15	6,310	0.24	860	$4,300
Pervious pavement	0.157	26	11,120	0.42	1,055	$26,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Chester Library

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

0 25' 50'

ST. LAWRENCE CHURCH

Subwatershed: Lamington River

Site Area: 534,640 sq. ft.

Address: 375 Main Street
Chester, NJ 07930

Block and Lot: Block 110, Lot 32

A rain garden can be installed west of the building behind the parking lot to capture, treat, and infiltrate stormwater runoff from the roof. 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	116,365	5.6	58.8	534.3	0.091	3.19

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.214	36	15,160	0.57	2,050	$10,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

St. Lawrence Church

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

0 25' 50'

STONY HILL FARM MARKET

Subwatershed: Lamington River

Site Area: 1,466,765 sq. ft.

Address: 15 North Road
Chester Borough, NJ 07930

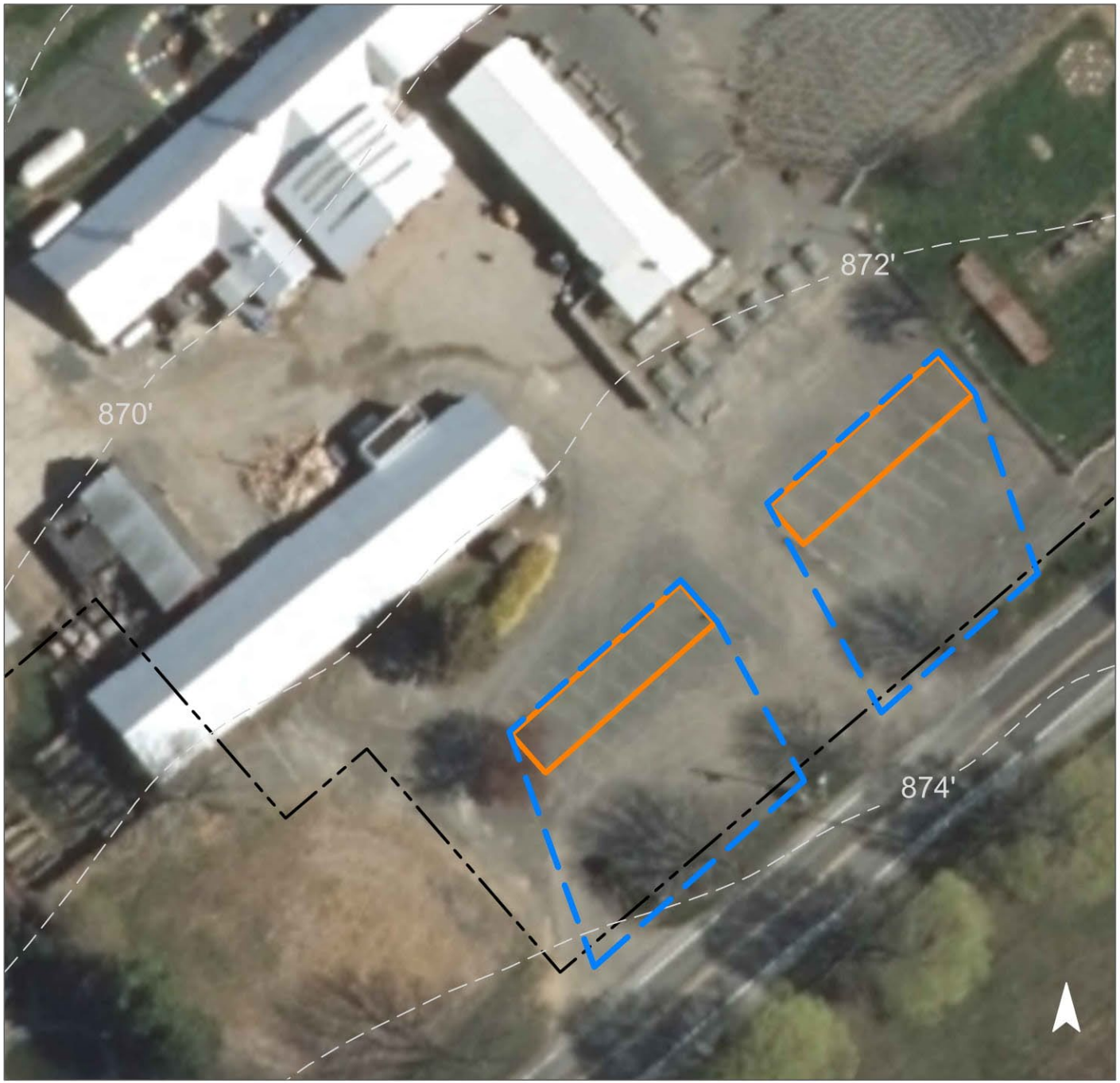
Block and Lot: Block 114, Lot 15

Pervious pavement can be installed in the parking lot to capture the stormwater runoff from the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
3	39,515	1.9	20.0	181.4	0.031	1.08

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	0.316	53	22,460	0.84	2,700	$67,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Stony Hill Farm Market

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

0 25' 50'

SUBURBAN HILLS SCHOOL

Subwatershed: Lamington River

Site Area: 53,755 sq. ft.

Address: 41 Oakdale Road
Chester Borough, NJ 07930

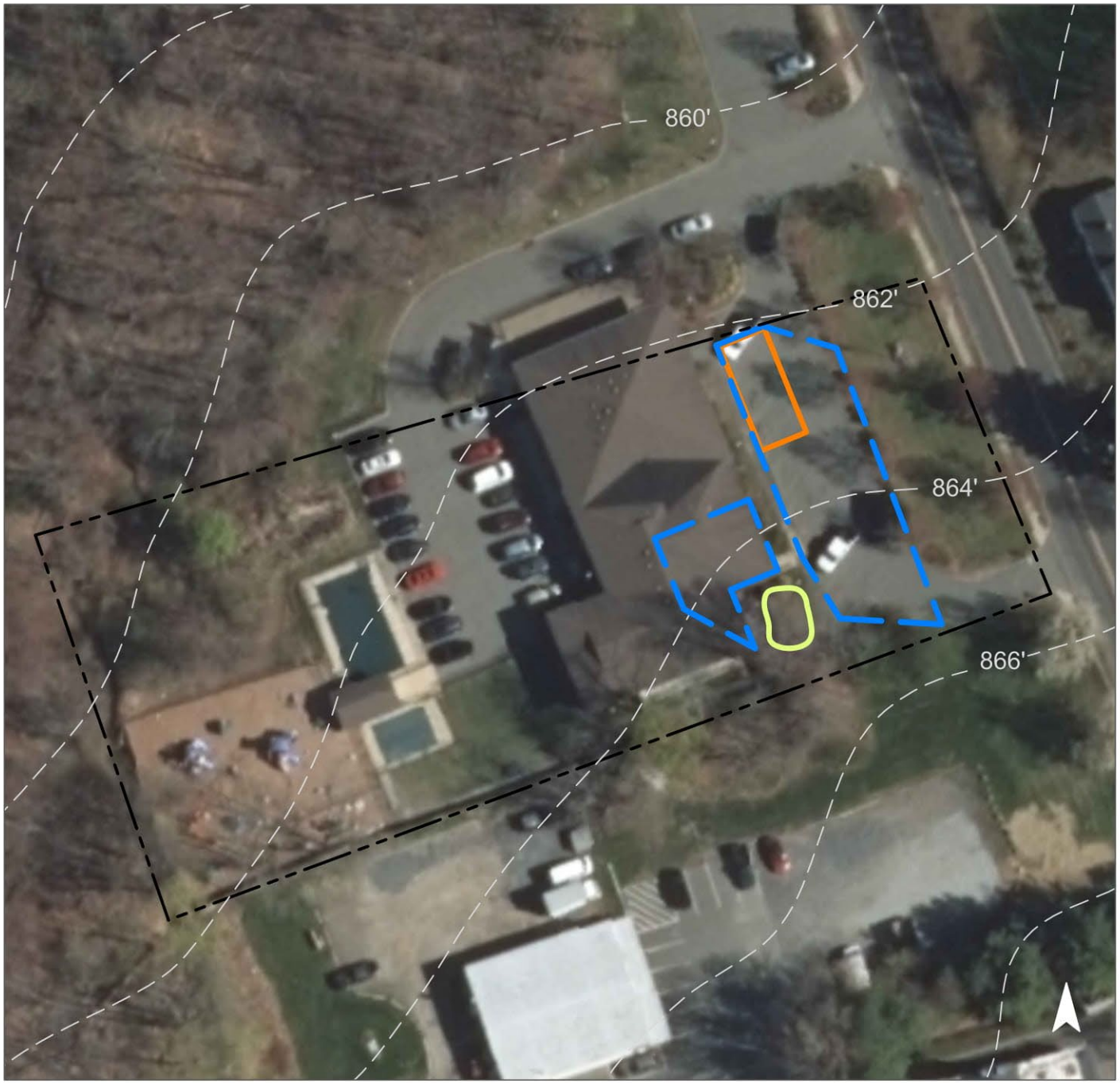
Block and Lot: Block 110, Lot 25

Parking spaces in the parking lot to the northeast of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A rain garden can be installed in the turfgrass area near the entrance of the building to capture, treat, and infiltrate stormwater runoff from the roof. 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"
64	34,200	1.6	17.3	157.0	0.027	0.94

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.038	6	2,690	0.10	365	$1,825
Pervious pavement	0.131	22	9,320	0.35	900	$22,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Suburban Hills School

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

0 30' 60'

BOROUGH OF CHESTER RECREATION OFFICE

Subwatershed: Peapack Brook

Site Area: 84,985 sq. ft.

Address: 107 Seminary Avenue
Chester, NJ 07930

Block and Lot: Block 127, Lot 13

A rain garden can be installed near the parking lot to the northwest of the building to capture, treat, and infiltrate stormwater runoff from the roof and parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
30	25,525	1.2	12.9	117.2	0.020	0.70

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	6,400	0.24	865	$4,325

GREEN INFRASTRUCTURE RECOMMENDATIONS

Borough of Chester Recreation Office

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

0 20' 40'

CHASE BANK

Subwatershed: Peapack Brook

Site Area: 34,760 sq. ft.

Address: 444 East Main Street
Chester, NJ 07930

Block and Lot: Block 116, Lot 1

A rain garden can be installed north of the building to capture, treat, and infiltrate stormwater runoff from the roof and parking lot. Parking spaces near the catch basin in the rear parking lot can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
65	22,590	1.1	11.4	103.7	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
Bioretention system	0.031	5	2,180	0.08	295	$1,475
Pervious pavement	0.098	16	6,930	0.26	810	$20,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

Chase Bank

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

0 20' 40'

CHESTER BOROUGH PARK

Subwatershed: Peapack Brook

Site Area: 198,640 sq. ft.

Address: 134 Main Street
Chester Borough, NJ 07930

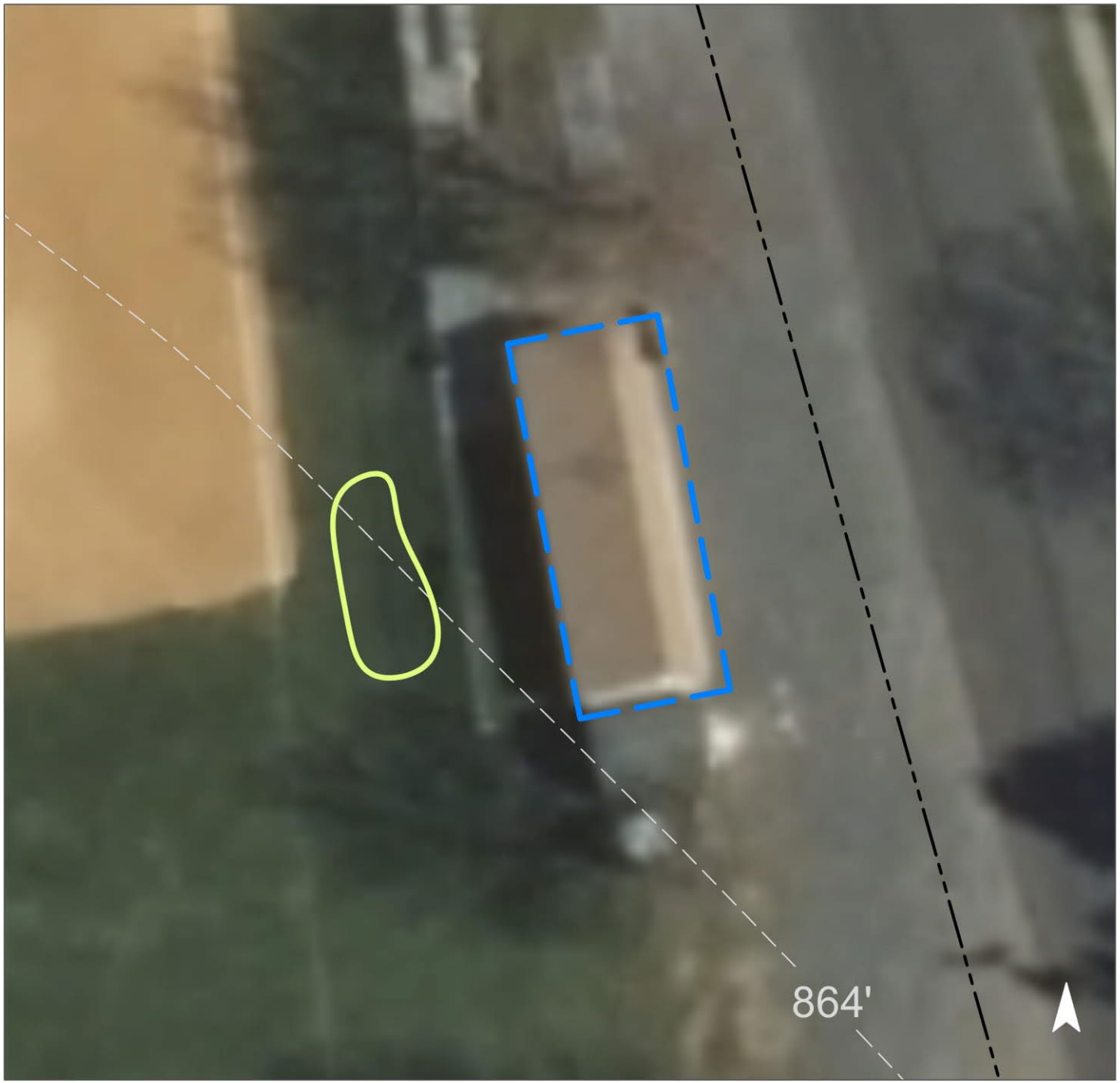
Block and Lot: Block 107, Lots 11, 12, & 13

A rain garden can be installed to the west of the building nearby the baseball field. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
10	19,760	1.0	10.0	90.7	0.015	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
Bioretention system	0.026	4	1,850	0.07	250	$1,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Chester Borough Park

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

0 10' 20'

CHESTER DINER

Subwatershed: Peapack Brook

Site Area: 63,920 sq. ft.

Address: 65 US-206
Chester Borough, NJ 07930

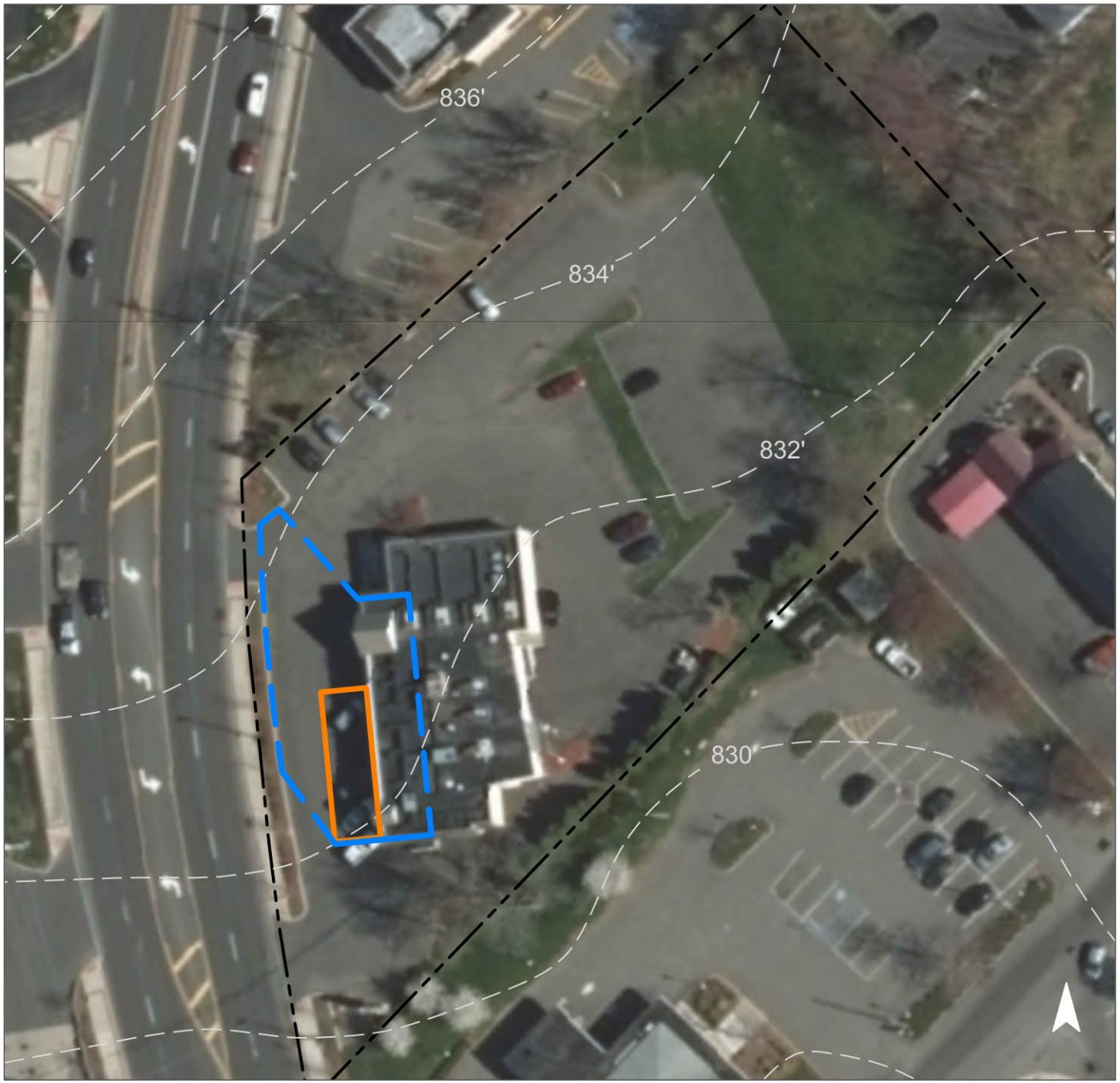
Block and Lot: Block 131, Lot 17

Porous pavement can be installed on the west side of the building to capture and infiltrate stormwater runoff from the building and surrounding area. 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"
75	48,190	2.3	24.3	221.3	0.038	1.32

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	0.155	26	11,000	0.41	1,080	$27,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Chester Diner

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

0 30' 60'

CHESTER FIRE COMPANY

Subwatershed: Peapack Brook

Site Area: 41,880 sq. ft.

Address: 86 Main Street
Chester, NJ 07930

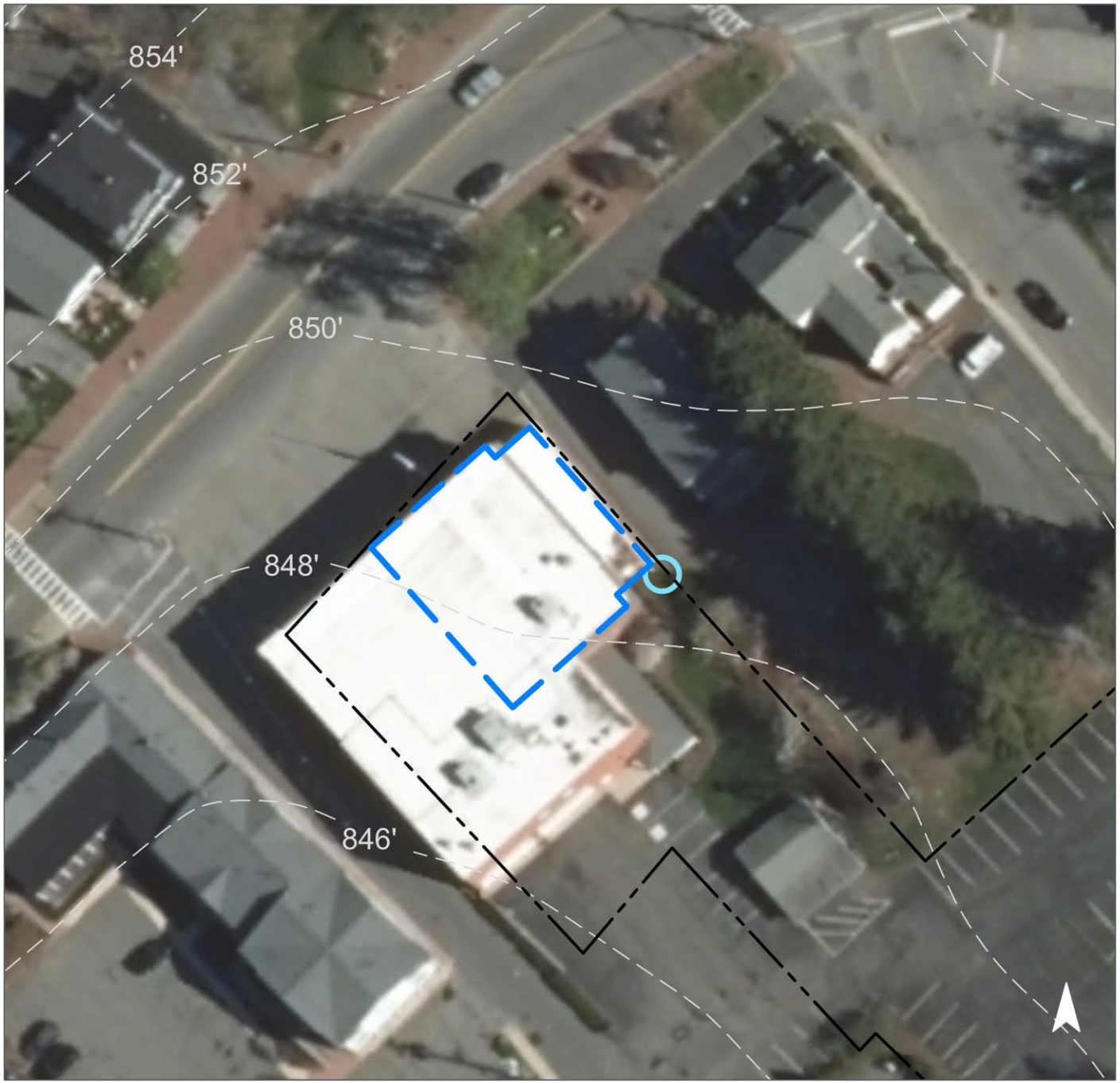
Block and Lot: Block 125, Lots 2, 3, 4, 8

A cistern can be installed at the front downspout to collect and store rainwater runoff from the roof. The collected rainwater can be used for vehicle washing, among other non-potable uses. 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	39,780	1.9	20.1	182.6	0.031	1.09

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Rainwater harvesting	0.115	19	3,430	0.13	3,430 (gal)	$6,860

GREEN INFRASTRUCTURE RECOMMENDATIONS



Chester Fire Company

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

0 25' 50'

CHESTER TENNIS CLUB

Subwatershed: Peapack Brook

Site Area: 91,750 sq. ft.

Address: 581 Main Street
Chester, NJ 07930

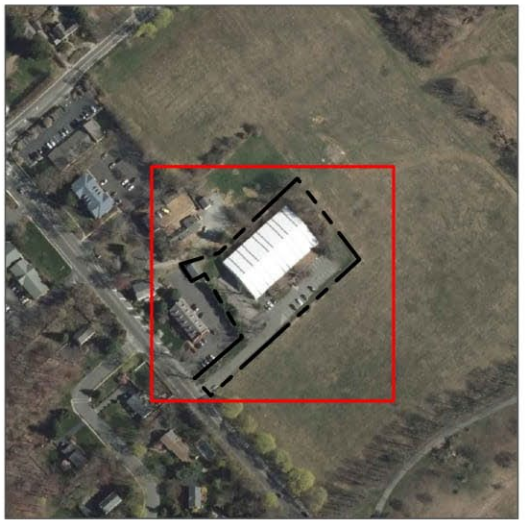
Block and Lot: Block 115, Lot 5

Parking spaces in the parking lot to the south of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the roof via the downspouts, which are disconnected. 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"
59	54,365	2.6	27.5	249.6	0.042	1.49

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
Pervious pavement	0.190	32	13,490	0.51	1,300	$32,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Chester Tennis Club

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

0 30' 60'

COMMUNITY PRESBYTERIAN CHURCH

Subwatershed: Peapack Brook

Site Area: 101,360 sq. ft.

Address: 220 Main Street
Chester, NJ 07930

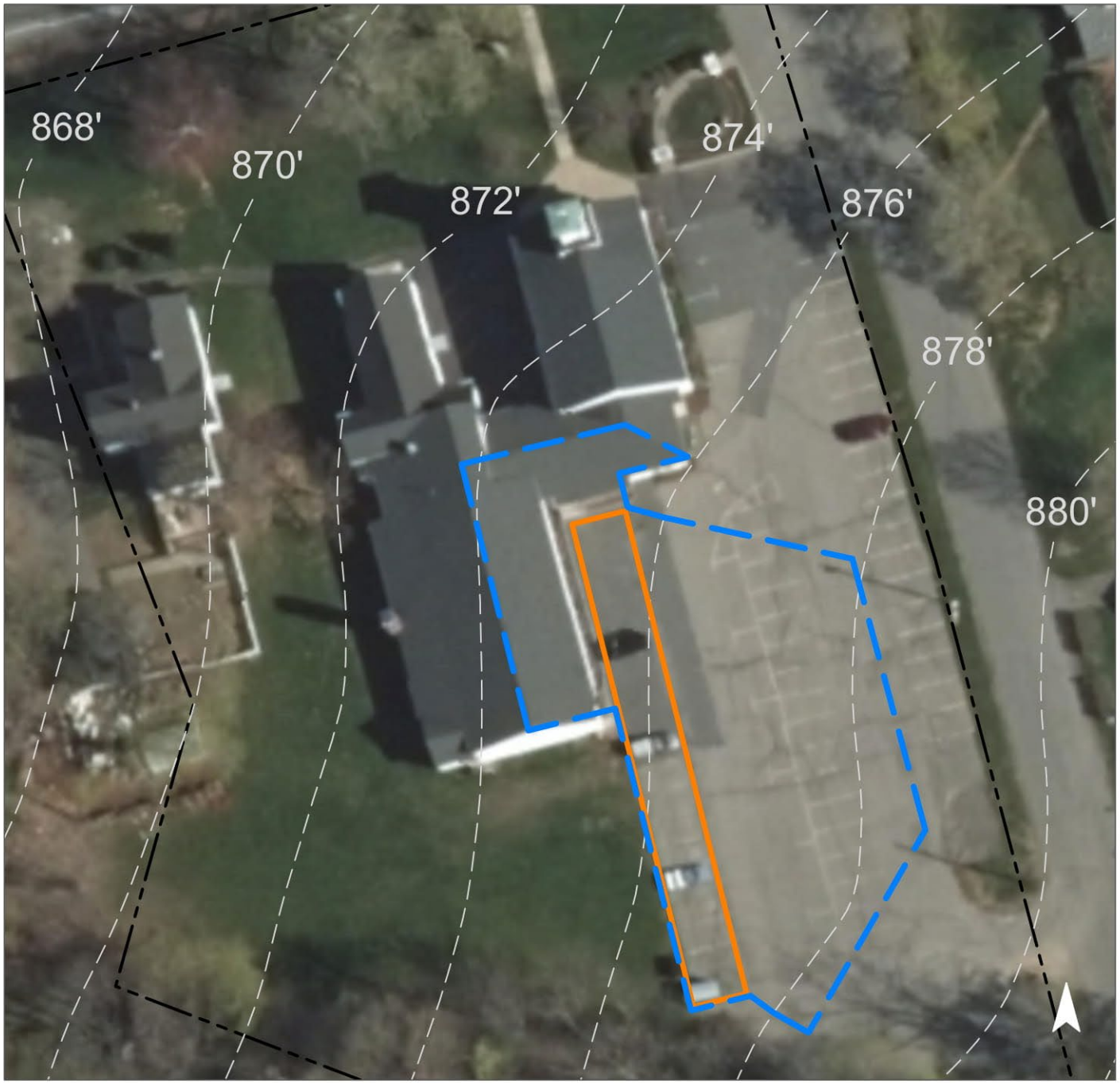
Block and Lot: Block 123, Lot 6

Parking spaces in the parking lot to the southwest of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot and downspouts. 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"
75	80,040	3.9	40.4	367.5	0.062	2.20

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	0.428	72	30,400	1.14	2,935	$73,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Community Presbyterian Church

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

0 25' 50'

First Congregational Church

Subwatershed: Peapack Brook

Site Area: 100,660 sq. ft.

Address: 30 Hillside Road
Chester, NJ 07930

Block and Lot: Block 107, Lot 18

Parking spaces in the parking lot to the south/front of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
92	92,850	4.5	46.9	426.3	0.072	2.55

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
Pervious pavement	0.110	18	7,850	0.29	810	$20,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

First Congregational Church

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

0 25' 50'

UNITED STATES POSTAL SERVICE

Subwatershed: Peapack Brook

Site Area: 47,570 sq. ft.

Address: 1 Sentry Lane
Chester, NJ 07930

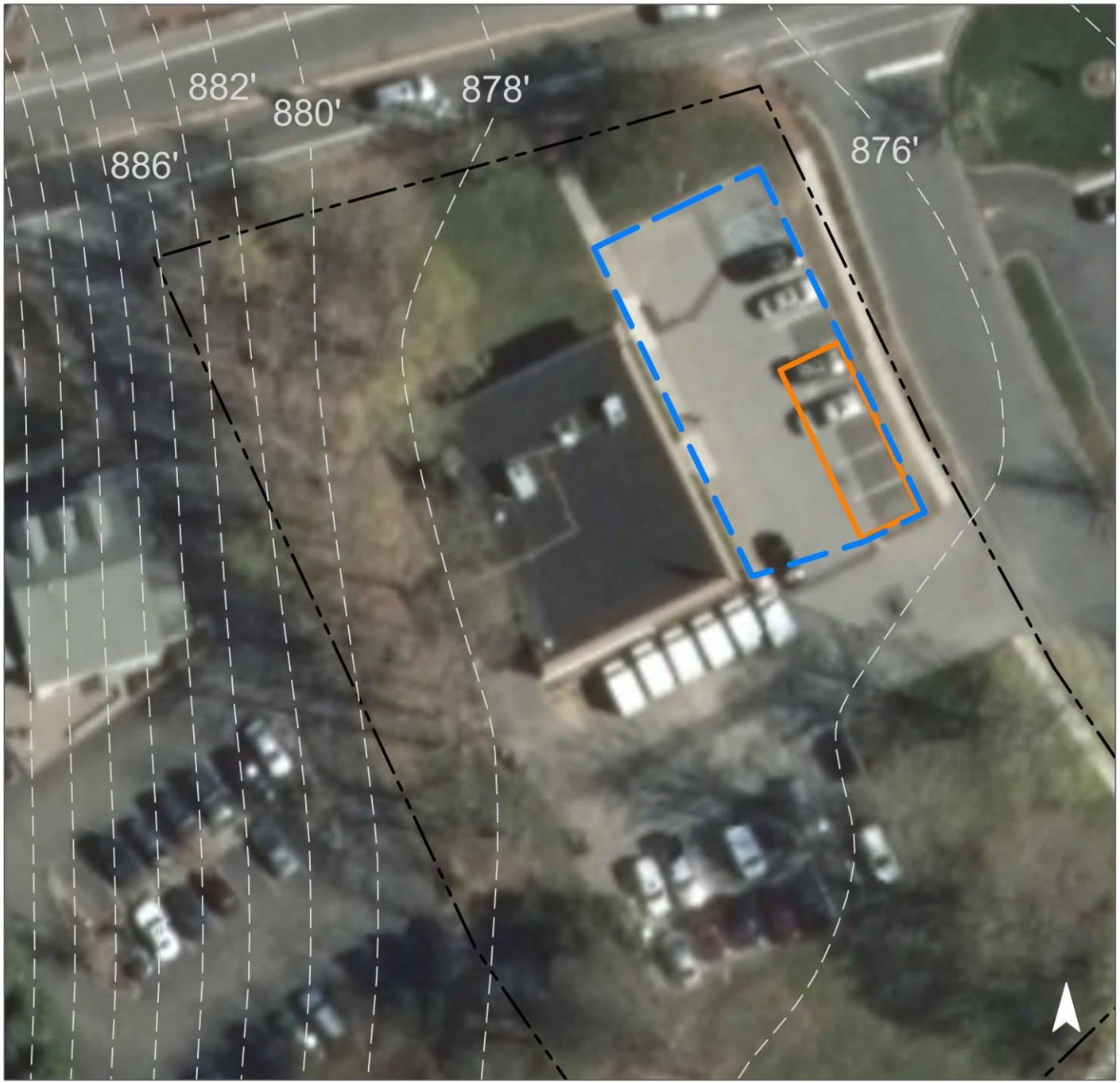
Block and Lot: Block 119, Lot 15

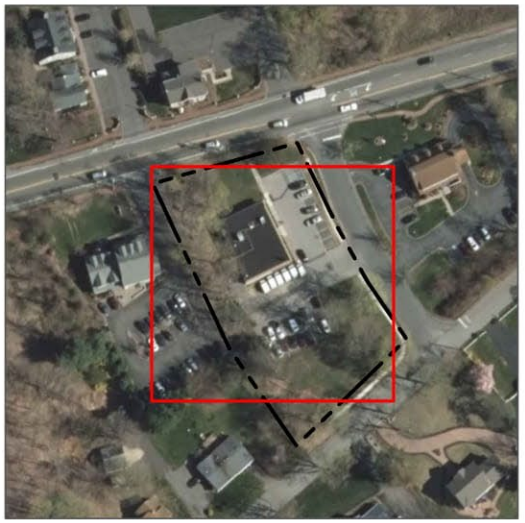
Parking spaces in the parking lot to the east of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot and the downspout. A septic system in the turfgrass area north of the building limits rain garden opportunities. A preliminary soil assessment 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"
62	29,480	1.4	14.9	135.4	0.023	0.81

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	0.123	21	8,750	0.33	900	$22,500

GREEN INFRASTRUCTURE RECOMMENDATIONS





United States Postal Service

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

0 20' 40'

c. Summary of Existing Conditions

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			Runoff Volumes from I.C.		Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Annual (cu.ft.)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
	BURNETT BROOK SUBWATERSHED SITES	**59.25**	**2,580,960**				**2.47**	**107,535**	**5.2**	**54.3**	**493.7**	**11,202**	**394,295**	**0.0838**	**2.95**
1	**Chester Borough Office**														
	Total Site Info	59.25	2,580,960	115	17	4.16647	2.47	107,535	5.2	54.3	493.7	11,202	394,295	0.0838	2.95
	LAMINGTON RIVER SUBWATERSHED SITES	**60.15**	**2,620,250**				**6.86**	**298,875**	**14.4**	**150.9**	**1372.2**	**31,133**	**1,095,875**	**0.2329**	**8.20**
2	**Chester Senior Housing**														
	Total Site Info	3.94	171,540	110	48	23.5076	0.93	40,325	1.9	20.4	185.1	4,201	147,858	0.0314	1.11
3	**Chester Library**														
	Total Site Info	9.03	393,550	101	21	17.398	1.57	68,470	3.3	34.6	314.4	7,132	251,057	0.0533	1.88
4	**Saint Lawrence Church**														
	Total Site Info	12.27	534,640	110	32	21.7651	2.67	116,365	5.6	58.8	534.3	12,121	426,672	0.0907	3.19
5	**Stony Hill Farm Market**														
	Total Site Info	33.67	1,466,765	114	15	2.69402	0.91	39,515	1.9	20.0	181.4	4,116	144,888	0.0308	1.08
6	**Suburban Hills School**														
	Total Site Info	1.23	53,755	110	25	63.622	0.79	34,200	1.6	17.3	157.0	3,563	125,400	0.0266	0.94
	PEAPACK BROOK SUBWATERSHED SITES	**5.82**	**253,375**				**3.27**	**412,580**	**19.9**	**208.4**	**1894.3**	**42,977**	**1,512,793**	**0.3215**	**11.32**
7	**Borough of Chester Recreation Office**														
	Total Site Info	1.95	84,985	127	13	30.0349	0.59	25,525	1.2	12.9	117.2	2,659	93,592	0.0199	0.70
8	**Chase Bank**														
	Total Site Info	0.80	34,760	116	1	64.9885	0.52	22,590	1.1	11.4	103.7	2,353	82,830	0.0176	0.62
9	**Chester Borough Park**														
	Total Site Info	4.56	198,640	107	11, 12, 13	9.94764	0.45	19,760	1.0	10.0	90.7	2,058	72,453	0.0154	0.54
10	**Chester Diner**														
	Total Site Info	1.47	63,920	131	7	75.3911	1.11	48,190	2.3	24.3	221.3	5,020	176,697	0.0375	1.32
11	**Chester Fire Company**														
	Total Site Info	0.96	41,880	125	2,3,4,8	94.9857	0.91	39,780	1.9	20.1	182.6	4,144	145,860	0.0310	1.09
12	**Chester Tennis Club**														
	Total Site Info	2.11	91,750	115	5	59.2534	1.25	54,365	2.6	27.5	249.6	5,663	199,338	0.0424	1.49
13	**Community Presbyterian Church**														
	Total Site Info	2.33	101,360	123	6	78.9661	1.84	80,040	3.9	40.4	367.5	8,338	293,480	0.0624	2.20

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			Runoff Volumes from I.C.		Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Annual (cu.ft.)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
14	**First Congregational Church**														
	Total Site Info	2.31	100,660	107	18	92.2412	2.13	92,850	4.5	46.9	426.3	9,672	340,450	0.0723	2.55
15	**United States Postal Service**														
	Total Site Info	1.09	47,570	119	15	61.9718	0.68	29,480	1.4	14.9	135.4	3,071	108,093	0.0230	0.81

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
	BURNETT BROOK SUBWATERSHED SITES	**13,490**	**0.31**	**0.351**	**59**	**24,950**	**0.93**				**$44,075**	**12.54%**
1	**Chester Borough Office**											
	Bioretention system	6,250	0.14	0.163	27	11,560	0.43	1565	5	SF	$7,825	5.81%
	Pervious pavement	7,240	0.17	0.189	32	13,390	0.5	1450	25	SF	$36,250	6.73%
	Total Site Info	**13,490**	**0.31**	**0.351**	**59**	**24,950**	**0.93**				**$44,075**	**12.54%**
	LAMINGTON RIVER SUBWATERSHED SITES	**44,695**	**1.03**	**1.165**	**195**	**82,680**	**3.11**				**$171,025**	**14.95%**
2	**Chester Senior Housing**											
	Bioretention systems	1,610	0.04	0.042	7	2,980	0.11	405	5	SF	$2,025	3.99%
	Pervious pavement	6,835	0.16	0.178	30	12,640	0.48	1450	25	SF	$36,250	16.95%
	Total Site Info	**8,445**	**0.19**	**0.220**	**37**	**15,620**	**0.59**				**$38,275**	**20.94%**
3	**Chester Library**											
	Bioretention system	3,410	0.08	0.089	15	6,310	0.24	860	5	SF	$4,300	4.98%
	Pervious pavement	6,010	0.14	0.157	26	11,120	0.42	1055	25	SF	$26,375	8.78%
	Total Site Info	**9,420**	**0.22**	**0.245**	**41**	**17,430**	**0.66**				**$30,675**	**13.76%**
4	**Saint Lawrence Church**											
	Bioretention system	8,195	0.19	0.214	36	15,160	0.57	2050	5	SF	$10,250	7.04%
	Total Site Info	**8,195**	**0.19**	**0.214**	**36**	**15,160**	**0.57**				**$10,250**	**7.04%**
5	**Stony Hill Farm Market**											
	Pervious pavement	12,145	0.28	0.316	53	22,460	0.84	2700	25	SF	$67,500	30.74%
	Total Site Info	**12,145**	**0.28**	**0.316**	**53**	**22,460**	**0.84**				**$67,500**	**30.74%**
6	**Suburban Hills School**											
	Bioretention system	1,450	0.03	0.038	6	2,690	0.1	365	5	SF	$1,825	4.24%
	Pervious pavement	5,040	0.12	0.131	22	9,320	0.35	900	25	SF	$22,500	14.74%
	Total Site Info	**6,490**	**0.15**	**0.169**	**28**	**12,010**	**0.45**				**$24,325**	**18.98%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
	PEAPACK BROOK SUBWATERSHED SITES	**52,435**	**1.20**	**1.366**	**229**	**92,280**	**3.46**				**$209,785**	**12.71%**
7	**Borough of Chester Recreation Office**											
	Bioretention system	3,460	0.08	0.090	15	6,400	0.24	865	5	SF	$4,325	13.56%
	Total Site Info	**3,460**	**0.08**	**0.090**	**15**	**6,400**	**0.24**				**$4,325**	**13.56%**
8	**Chase Bank**											
	Bioretention system	1,180	0.03	0.031	5	2,180	0.08	295	5	SF	$1,475	5.22%
	Pervious pavement	3,750	0.09	0.098	16	6,930	0.26	810	25	SF	$20,250	16.60%
	Total Site Info	**4,930**	**0.11**	**0.128**	**22**	**9,110**	**0.34**				**$21,725**	**21.82%**
9	**Chester Borough Park**											
	Bioretention system	1,000	0.02	0.026	4	1,850	0.07	250	5	SF	$1,250	5.06%
	Total Site Info	**1,000**	**0.02**	**0.026**	**4**	**1,850**	**0.07**				**$1,250**	**5.06%**
10	**Chester Diner**											
	Pervious pavement	5,950	0.14	0.155	26	11,000	0.41	1080	25	SF	$27,000	12.35%
	Total Site Info	**5,950**	**0.14**	**0.155**	**26**	**11,000**	**0.41**				**$27,000**	**12.35%**
11	**Chester Fire Company**											
	Rainwater harvesting	4,400	0.10	0.115	19	3,430	0.13	3430	2	gal	$6,860	11.06%
	Total Site Info	**4,400**	**0.10**	**0.115**	**19**	**3,430**	**0.13**				**$6,860**	**11.06%**
12	**Chester Tennis Club**											
	Pervious pavement	7,290	0.17	0.190	32	13,490	0.51	1300	25	SF	$32,500	13.41%
	Total Site Info	**7,290**	**0.17**	**0.190**	**32**	**13,490**	**0.51**				**$32,500**	**13.41%**
13	**Community Presbyterian Church**											
	Pervious pavement	16,435	0.38	0.428	72	30,400	1.14	2935	25	SF	$73,375	20.53%
	Total Site Info	**16,435**	**0.38**	**0.428**	**72**	**30,400**	**1.14**				**$73,375**	**20.53%**
14	**First Congregational Church**											
	Pervious pavement	4,240	0.10	0.110	18	7,850	0.29	810	25	SF	$20,250	4.57%
	Total Site Info	**4,240**	**0.10**	**0.110**	**18**	**7,850**	**0.29**				**$20,250**	**4.57%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
15	**United States Postal Service**											
	Pervious pavement	4,730	0.11	0.123	21	8,750	0.33	900	25	SF	$22,500	16.04%
	Total Site Info	**4,730**	**0.11**	**0.123**	**21**	**8,750**	**0.33**				**$22,500**	**16.04%**