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Draft

Impervious Cover Reduction Action Plan for Bedminster Township, Somerset County, New Jersey

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

October 8, 2020

Highlands Council
New Jersey

ACKNOWLEDGEMENTS:

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

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New Jersey

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Introduction

Located in Somerset County, New Jersey, Bedminster Township covers approximately 26.3 square miles. Figures 1 and 2 illustrate that Bedminster Township is dominated by forest land use. A total of 21.3% of the municipality's land use is classified as urban. Of the urban land in Bedminster Township, rural residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2015 land use/land cover geographical information system (GIS) data layer categorizes Bedminster 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 Bedminster Township. Based upon the 2015 NJDEP land use/land cover data, approximately 5.3% of Bedminster Township has impervious cover. This level of impervious cover suggests that the streams in Bedminster Township likely range from sensitive to impacted streams. [1]

Methodology

Bedminster Township contains portions of five subwatersheds (Figure 4). For this impervious cover reduction action plan, projects have been identified in one 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.

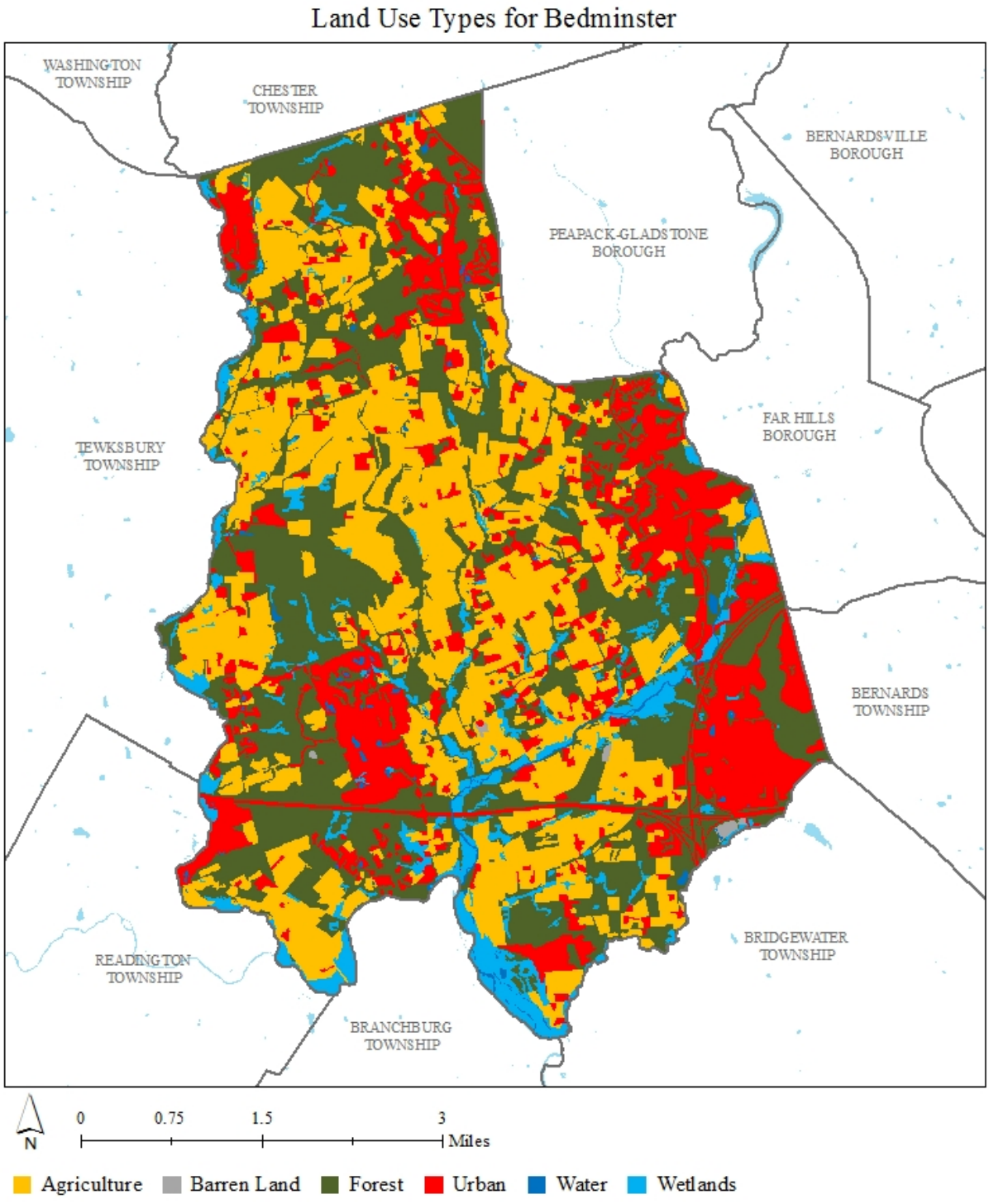


Figure 1: Map illustrating the land use in Bedminster Township

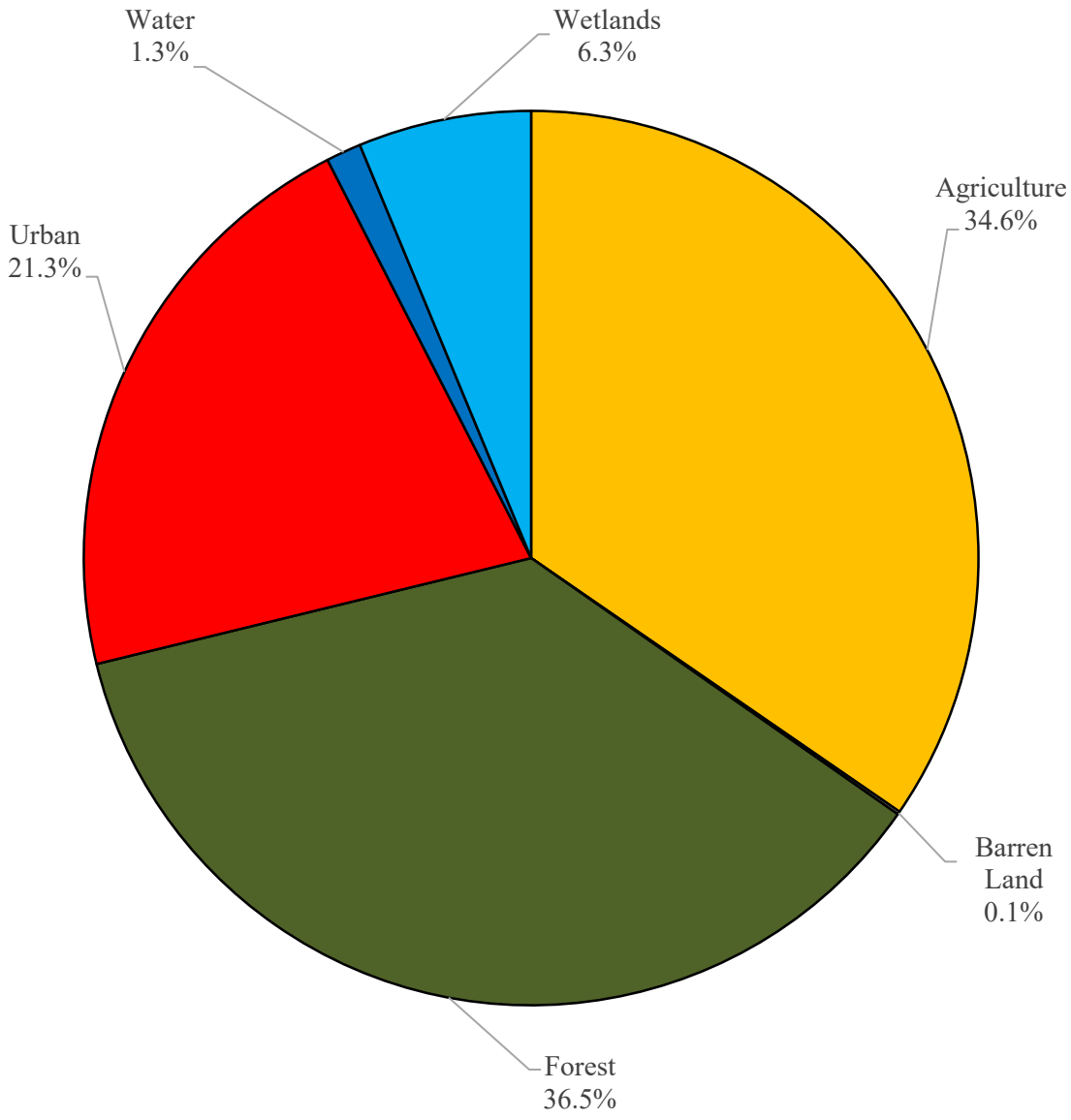


Figure 2: Pie chart illustrating the land use in Bedminster Township

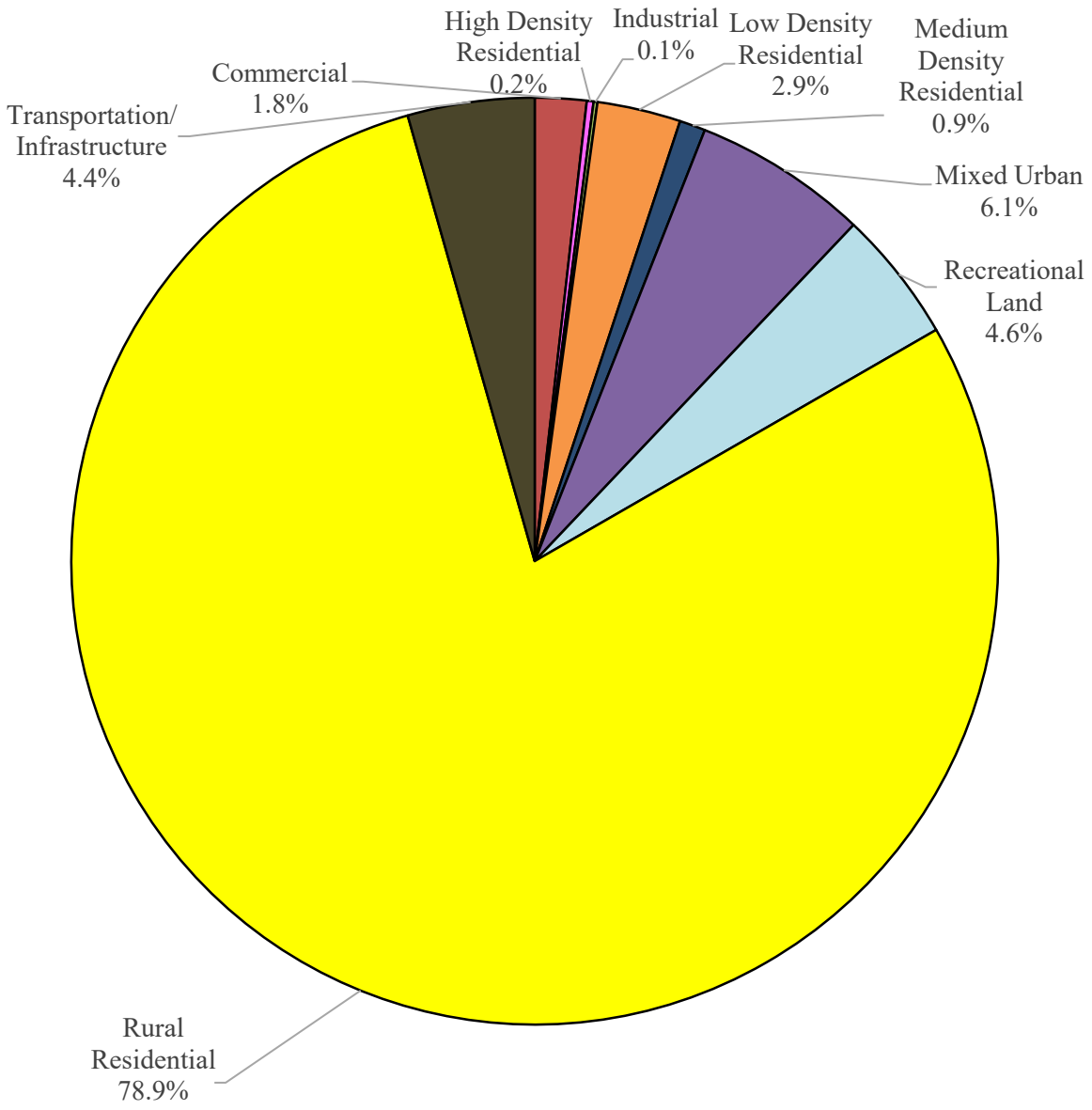


Figure 3: Pie chart illustrating the various types of urban land use in Bedminster Township

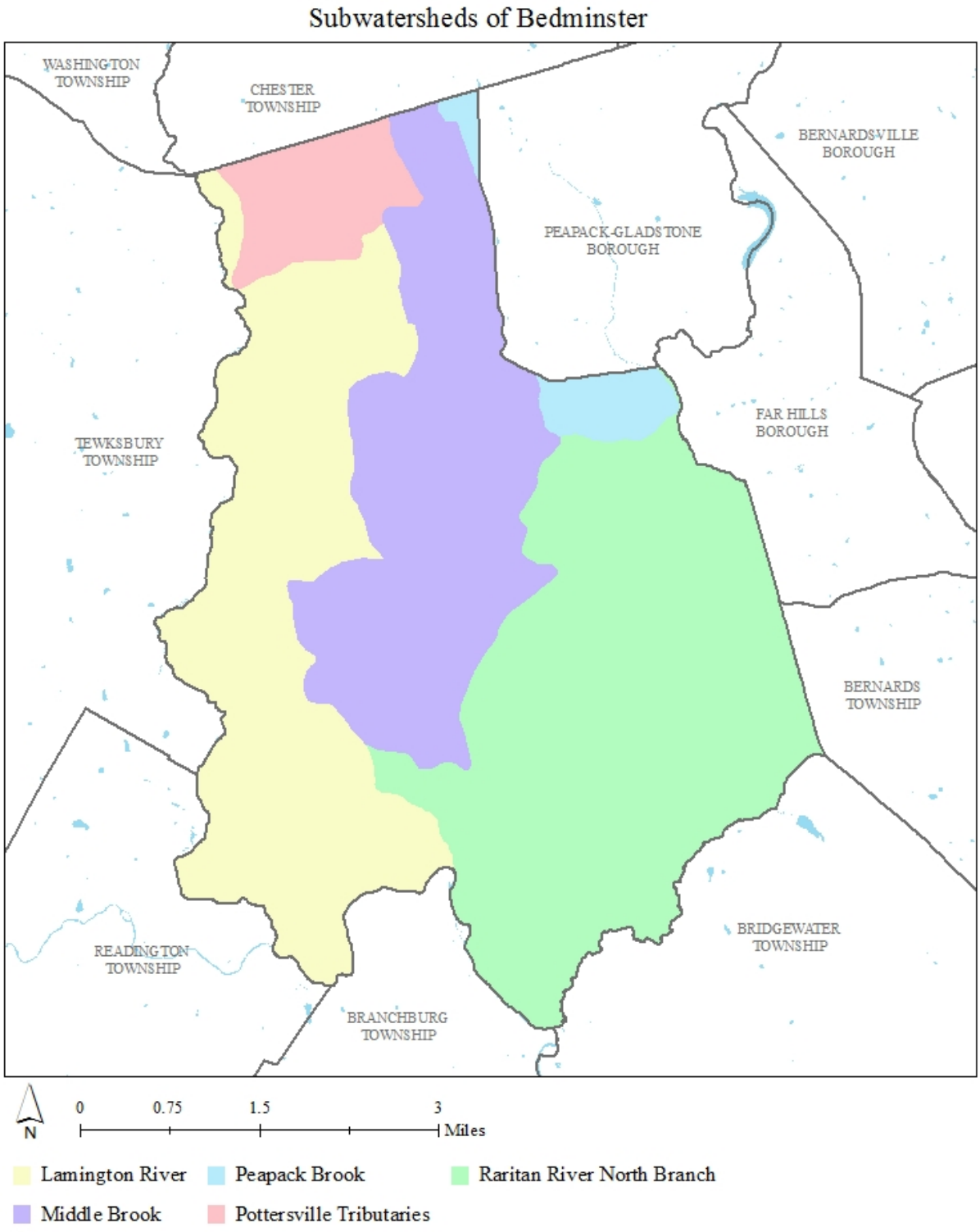


Figure 4: Map of the subwatersheds in Bedminster Township

For each potential project site, specific aerial loading coefficients for commercial land use were used to determine the annual runoff loads for total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS) from impervious surfaces (Table 1). These are the same aerial loading coefficients that NJDEP uses in developing total maximum daily loads (TMDLs) for impaired waterways of the state. The percentage of impervious cover for each site was extracted from the 2015 NJDEP land use/land cover database. For impervious areas, runoff volumes were determined for the water quality design storm (1.25 inches of rain over two-hours) and for the annual rainfall total of 44 inches.

Preliminary soil assessments were conducted for each potential project site identified in Bedminster Township using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, which utilizes regional and statewide soil data to predict soil types in an area. Several key soil parameters were examined (e.g., natural drainage class, saturated hydraulic conductivity of the most limiting soil layer (K_{sat}), depth to water table, and hydrologic soil group) to evaluate the suitability of each site's soil for green infrastructure practices. In cases where multiple soil types were encountered, the key soil parameters were examined for each soil type expected at a site.

For each potential project site, drainage areas were determined for each of the green infrastructure practices proposed at the site. These green infrastructure practices were designed to manage the 2-year design storm, enabling these practices to capture 95% of the annual rainfall. Runoff volumes were calculated for each proposed green infrastructure practice. The reduction in TSS loading was calculated for each drainage area for each proposed green infrastructure practice using the aerial loading coefficients in Table 1. The maximum volume reduction in stormwater runoff for each green infrastructure practice for a storm was determined by calculating the volume of runoff captured from the 2-year design storm. For each green infrastructure practice, peak discharge reduction potential was determined through hydrologic modeling in HydroCAD. For each green infrastructure practice, a cost estimate is provided. These costs are based upon the square footage of the green infrastructure practice and the real cost of green infrastructure practice implementation in New Jersey.

Table 1: Aerial Loading Coefficients[2]

Land Cover	TP load (lbs/acre/yr)	TN load (lbs/acre/yr)	TSS load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/Transitional Area	0.5	5	60

[2] New Jersey Department of Environmental Protection (NJDEP), Stormwater Best Management Practice Manual, 2004.

Green Infrastructure Practices

Green infrastructure is an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure projects capture, filter, absorb, and reuse stormwater to maintain or mimic natural systems and to treat runoff as a resource. As a general principle, green infrastructure practices use soil and vegetation to recycle stormwater runoff through infiltration and evapotranspiration. When used as components of a stormwater management system, green infrastructure practices such as bioretention, green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits. In addition to effectively retaining and infiltrating rainfall, these practices can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits[3]. A wide range of green infrastructure practices have been evaluated for the potential project sites in Bedminster Township. Each practice is discussed below.

Disconnected downspouts

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

Pervious pavements

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

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

Bioretention systems/rain gardens

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

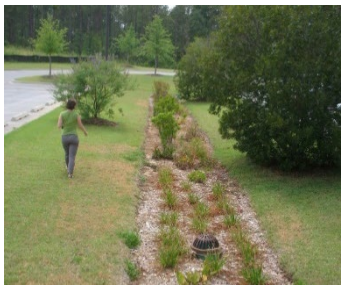
Downspout planter boxes

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

Rainwater harvesting systems (cistern or rain barrel)

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

Bioswale



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

Stormwater planters

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

Tree filter boxes

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

Potential Project Sites

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

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

Conclusion

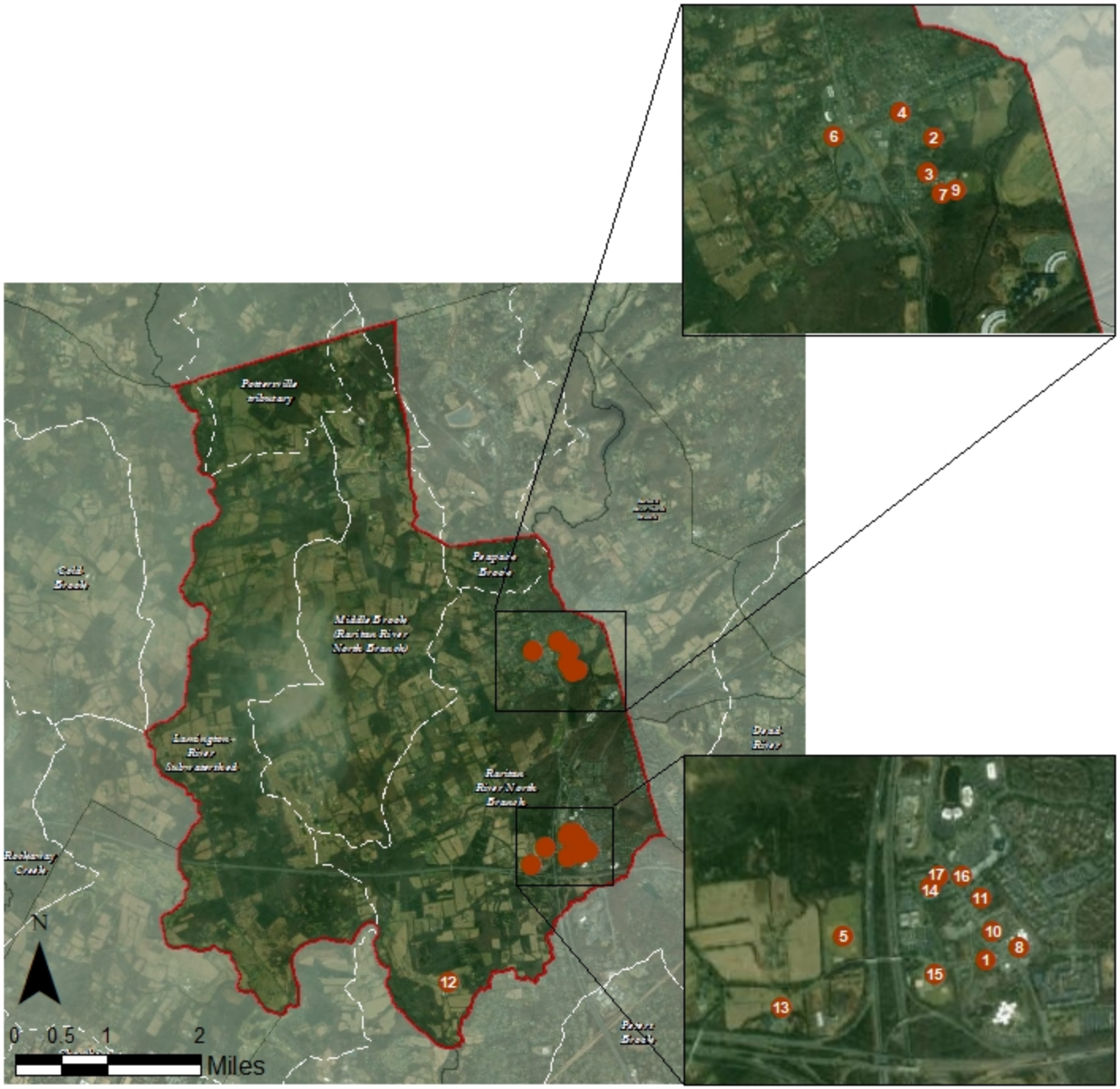
This impervious cover reduction action plan is meant to provide the municipality with a blueprint for implementing green infrastructure practices that will reduce the impact of stormwater runoff from impervious surfaces. These projects can be implemented by a wide variety of people such as boy scouts,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

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

Appendix A: Climate Resilient Green Infrastructure

a. Green Infrastructure Sites

BEDMINSTER TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE RARITAN RIVER NORTH BRANCH SUBWATERSHED

1. Annie's Deli
2. Bedminster Public School
3. Bedminster Township Municipal Court
4. Bedminster USPS
5. Burnt Mills Park
6. Clarence Dillon Public Library
7. Far Hills-Bedminster Fire Department
8. Fresh Market
9. Miller Lane Park
10. Oasis Day Spa
11. Pluckemin USPS
12. Somerset Airport
13. Somerset Hills Learning Institute
14. Sordoni Construction Company
15. The Center for Contemporary Art
16. The Hills Village Center
17. The Pluckemin Inn

b. Proposed Green Infrastructure Concepts

ANNIE'S DELI

Subwatershed: Raritan River North Branch

Site Area: 14,130 sq. ft.

Address: 2095 Burnt Mills Road
Bedminster, NJ 07921

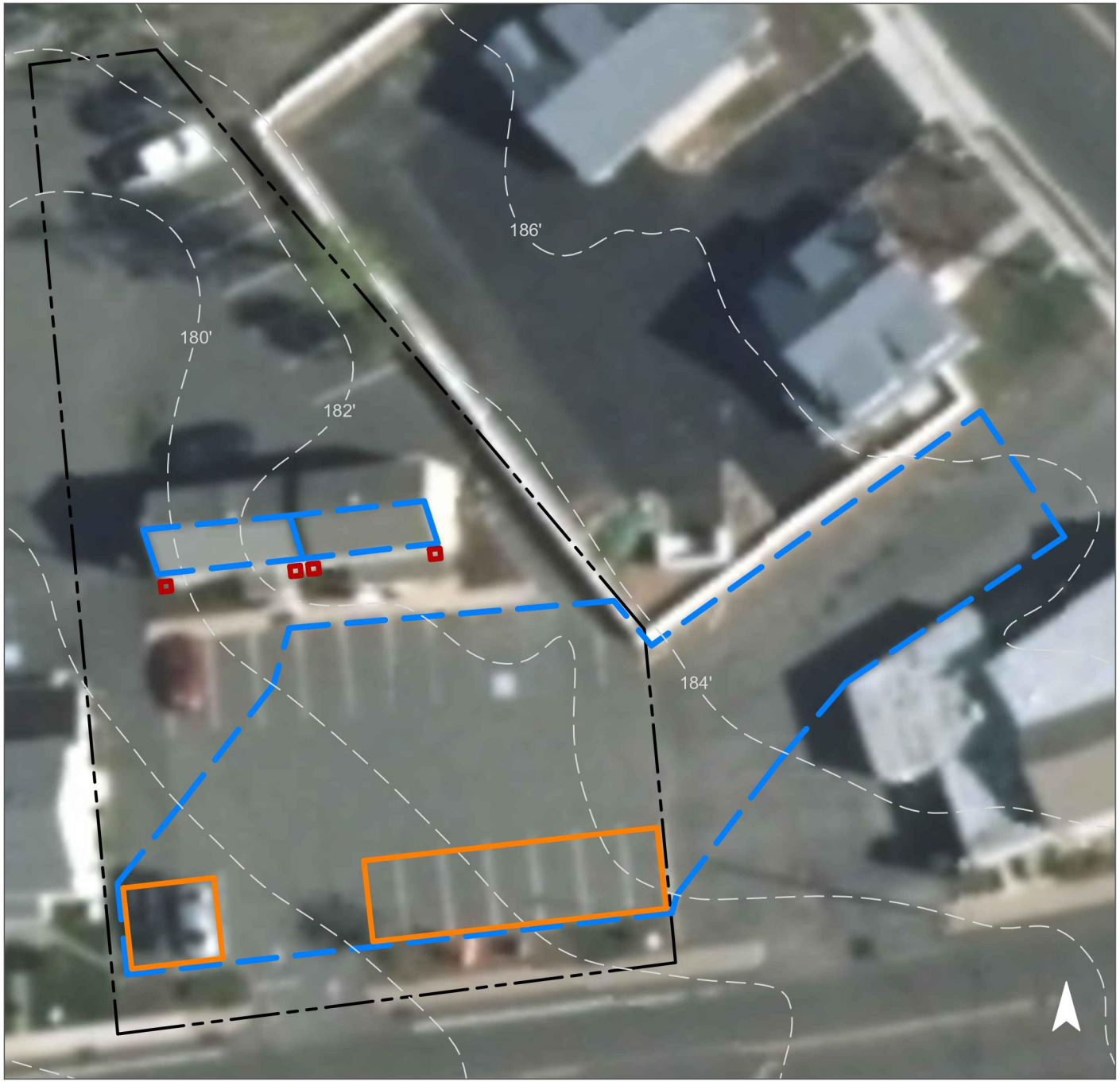
Block and Lot: Block 57, Lot 19

Parking spaces located in the south section of the parking lot can be replaced with pervious pavement to capture and infiltrate stormwater. Downspouts at Annie's Deli can be disconnected and directed into downspout planter boxes to capture and filter rooftop runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
85	12,012	0.6	6.1	55.1	0.009	0.33

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	0.226	38	16,570	0.73	1,440	$36,000
Planter boxes	n/a	2	n/a	n/a	4 (boxes)	$4,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Annie's Deli

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

0 15' 30'

BEDMINSTER PUBLIC SCHOOL

Subwatershed: Raritan River North Branch

Site Area: 1,345,130 sq. ft.

Address: 234 Somerville Road
Bedminster, NJ 07921

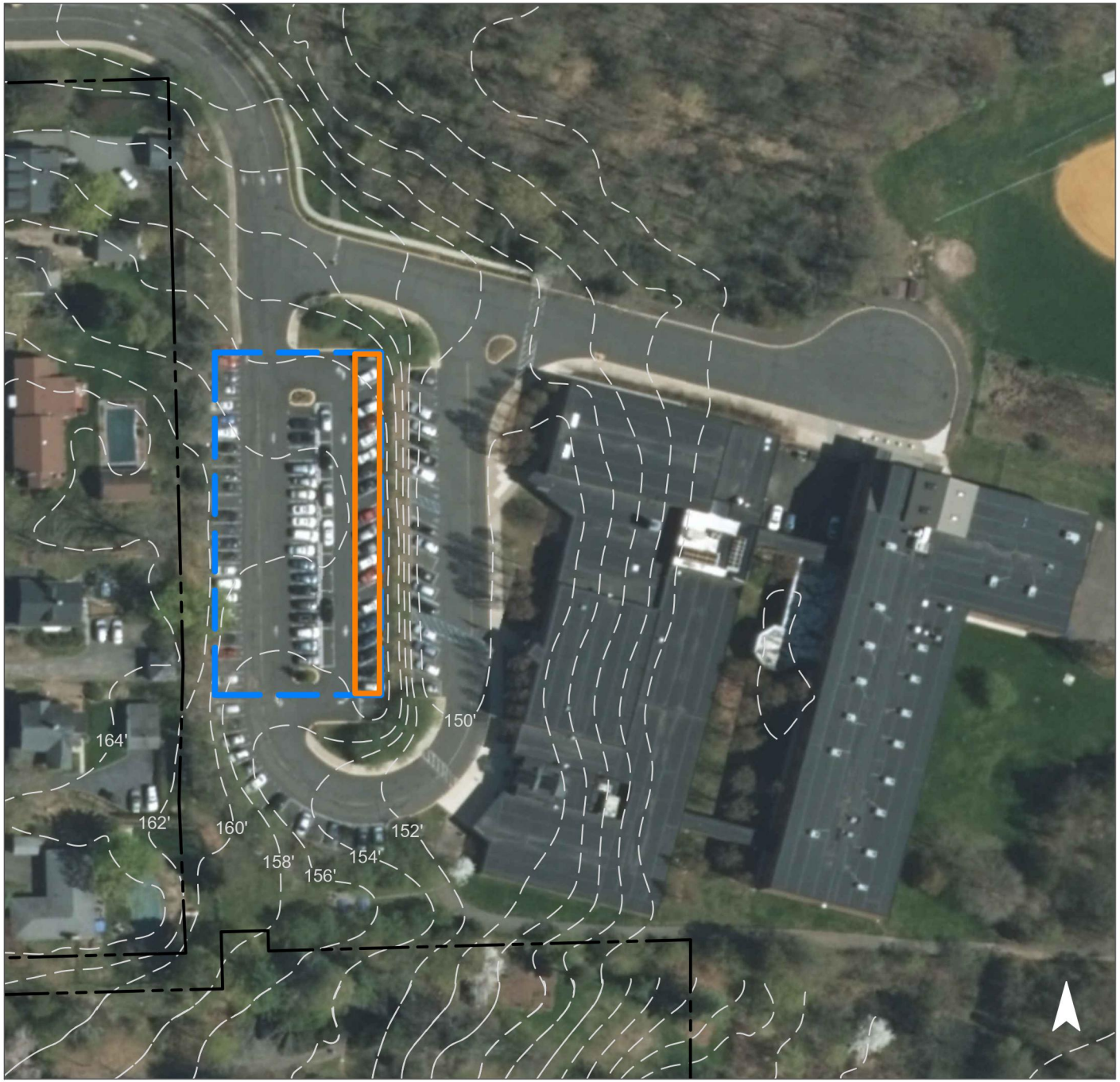
Block and Lot: Block 36, Lot 1

Pervious pavement can be installed in the front parking lot of the building to capture storm water runoff from the parking lot. A preliminary soil assessment suggests that the soil is suitable for green infrastructure implementations.

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"
19	251,990	12.1	127.3	1,157.0	0.196	6.91

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	0.636	107	46,690	2.06	4,300	$107,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Bedminster Public School

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

0 50' 100'

BEDMINSTER TOWNSHIP MUNICIPAL COURT

Subwatershed: Raritan River North Branch

Site Area: 802,900 sq. ft.

Address: 55 Miller Lane
Bedminster, NJ 07921

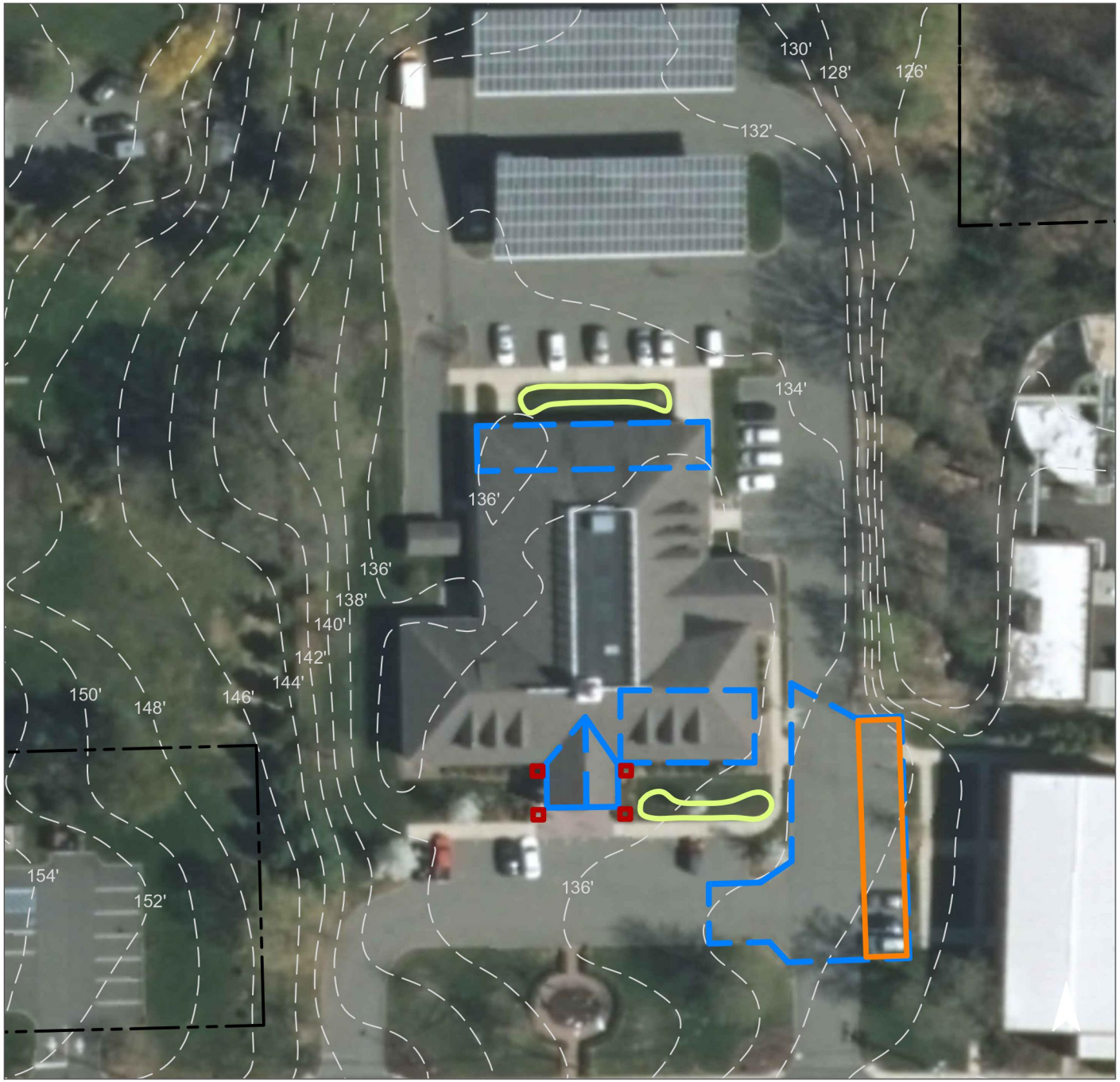
Block and Lot: Block 36, Lots 10,11,12,14

Bioretention systems can be installed to capture, treat, and infiltrate rooftop runoff on the north and south of the building. Pervious pavement can be installed in the southeast corner of the parking lot to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
25	203,380	9.8	102.7	933.8	0.158	5.58

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	0.081	14	5,955	0.26	795	$3,975
Pervious pavement	0.138	23	10,115	0.45	1,710	$42,750
Planter boxes	n/a	3	n/a	n/a	4 (boxes)	$4,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Bedminster Municipal Court

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

0 30' 60'

BEDMINSTER USPS

Subwatershed: Raritan River North Branch

Site Area: 29,710 sq. ft.

Address: 251 Somerville Road
Bedminster, NJ 07921

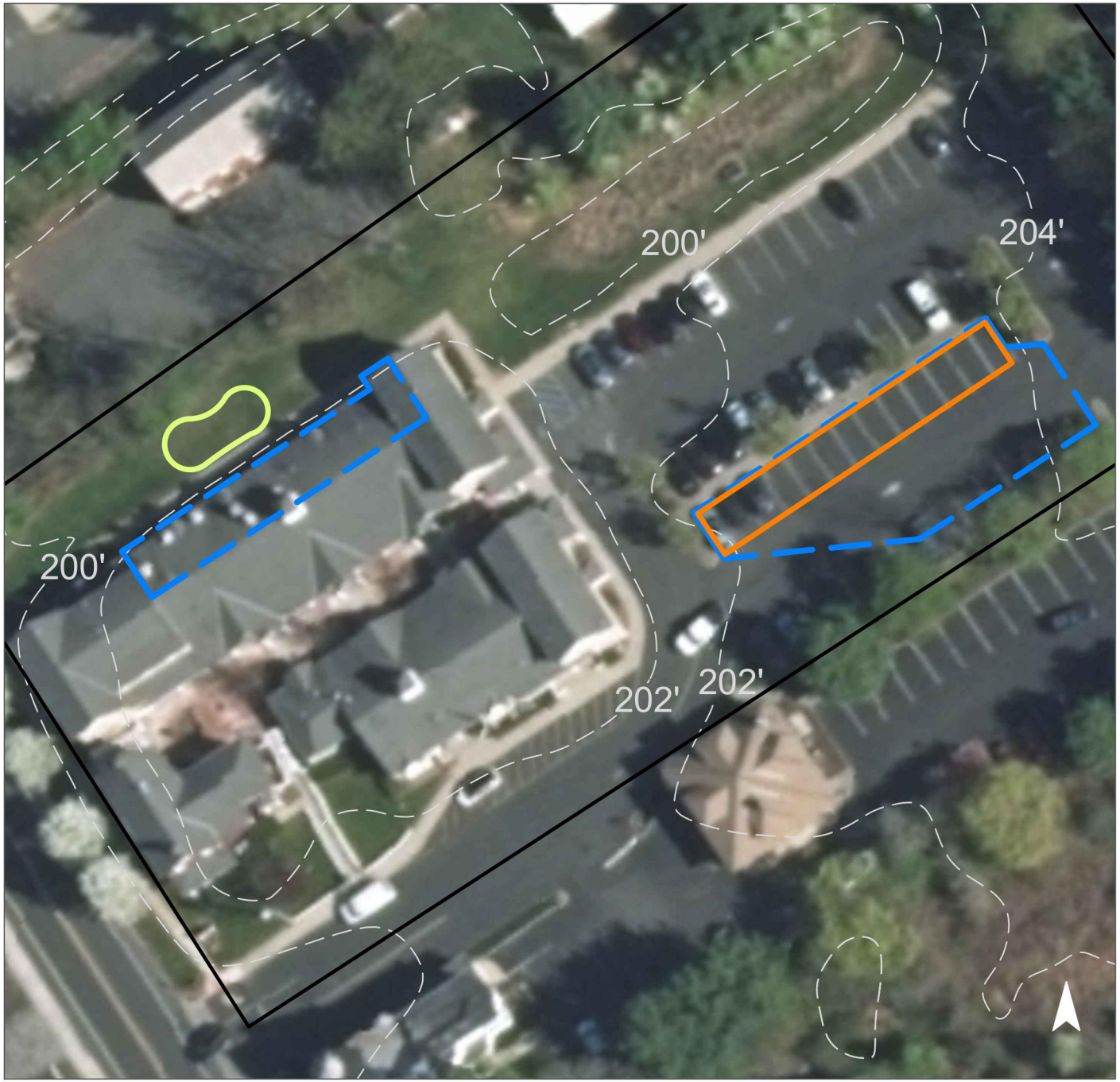
Block and Lot: Block 33, Lot 11

A rain garden can be installed east of the building to capture runoff from the building's roof. Additionally, pervious pavement can be installed in the parking lot to capture stormwater before it reaches the drain. 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"
83	24,750	1.2	12.5	113.6	0.019	0.68

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	3,785	0.17	500	$1,875
Pervious pavement	0.132	22	9,709	0.43	2,070	$51,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Bedminster USPS

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

0 25' 50'

BURNT MILLS PARK

Subwatershed: Raritan River North Branch

Site Area: 483,140 sq. ft.

Address: 1850 Burnt Mills Road
Bedminster, NJ 07921

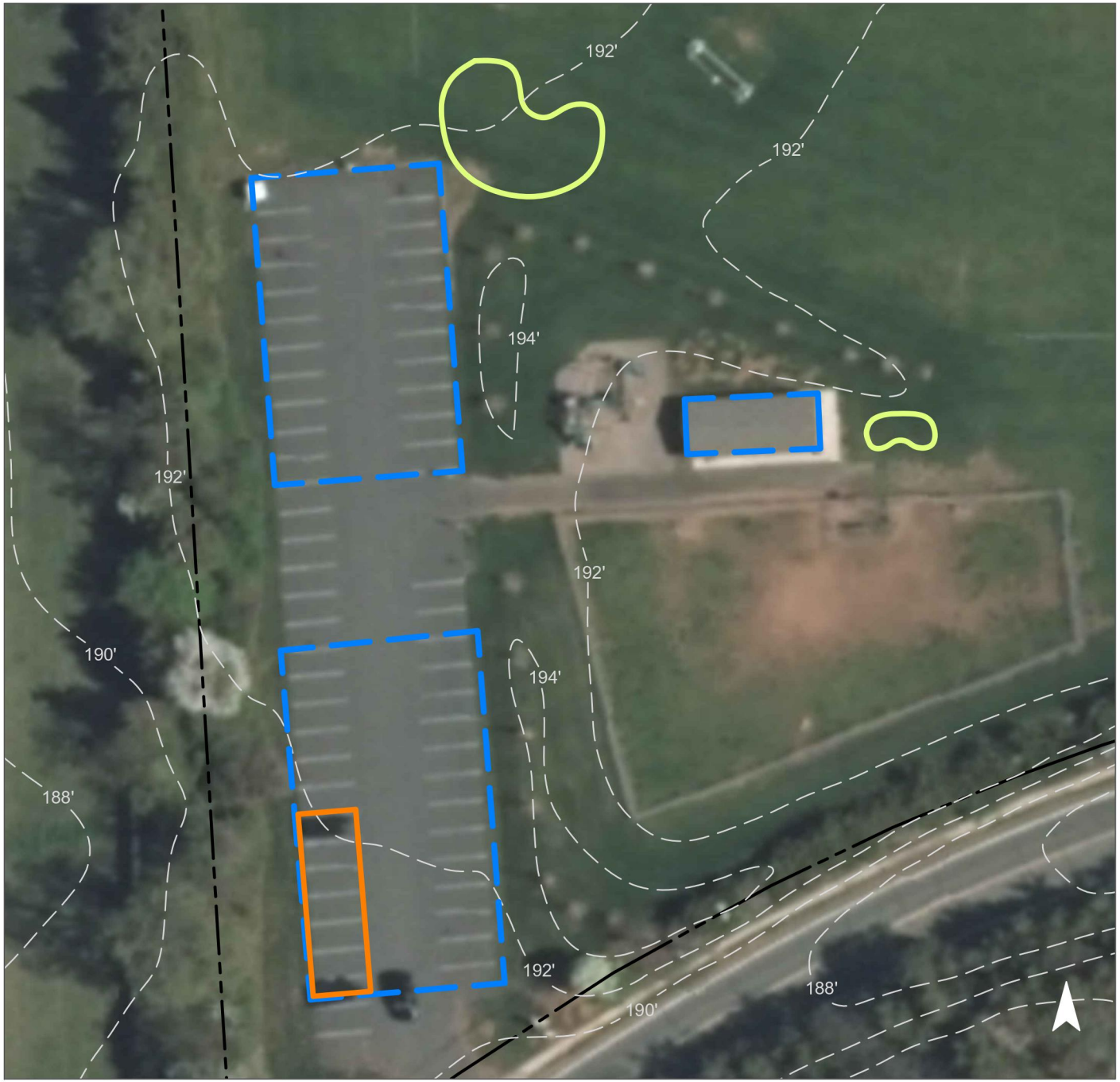
Block and Lot: Block 54, Lot 5

Bioretention systems can be installed to capture, treat, and infiltrate parking lot and rooftop runoff. Potential locations are in the northeast corner of the parking lot and the easternmost side of the structure shown in the above right image. Pervious pavement can be installed in the southwest corner of the parking lot to manage pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
10	47,790	2.3	24.1	219.4	0.037	1.31

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	0.183	31	13,405	0.59	1,805	$9,025
Pervious pavement	0.193	32	14,175	0.62	1,300	$32,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Burnt Mills Park

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

0 25' 50'

CLARENCE DILLON PUBLIC LIBRARY

Subwatershed: Raritan River North Branch

Site Area: 70,850 sq. ft.

Address: 2336 Lamington Road
Bedminster, NJ 07921

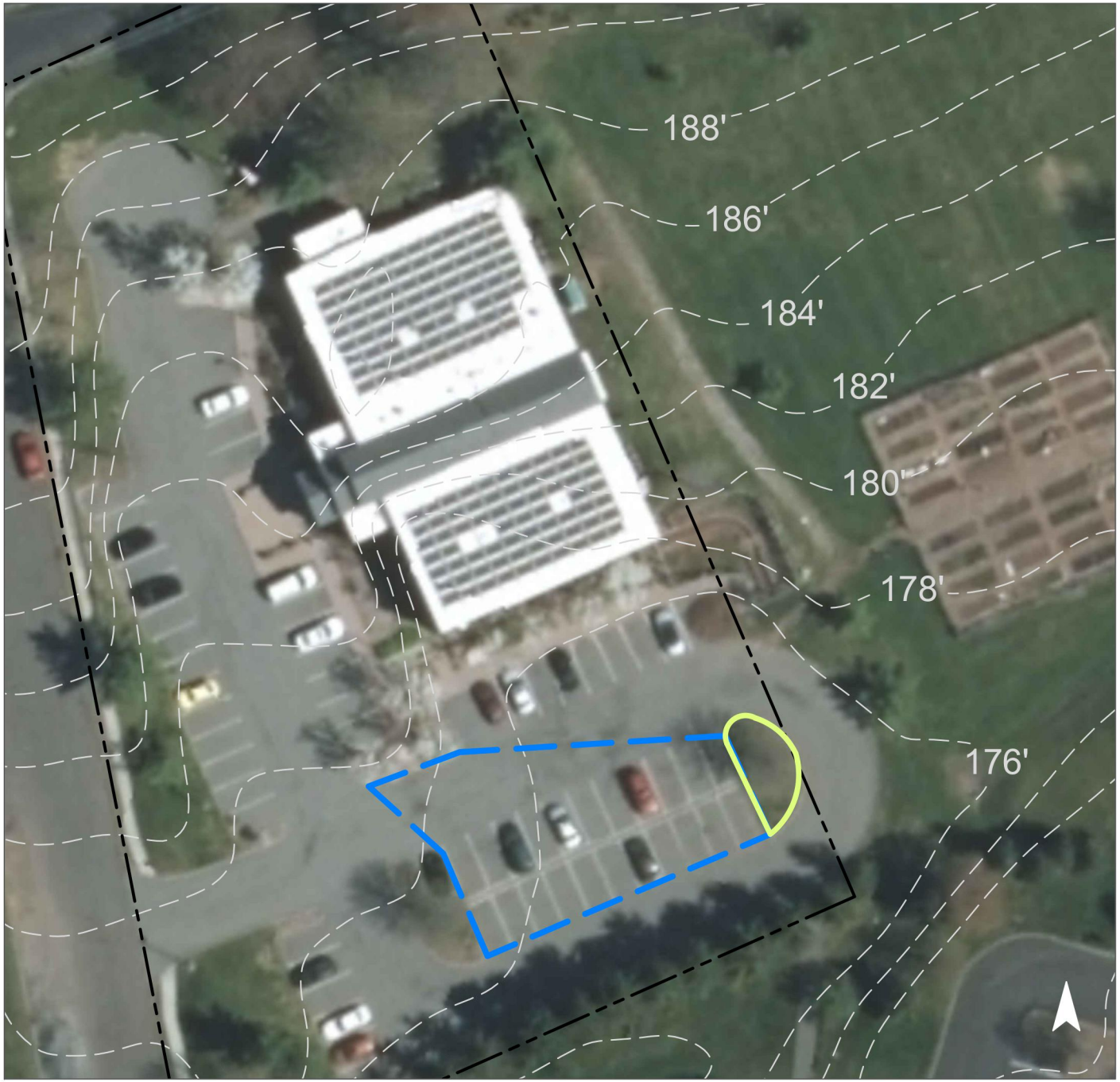
Block and Lot: Block 41, Lot 16.01

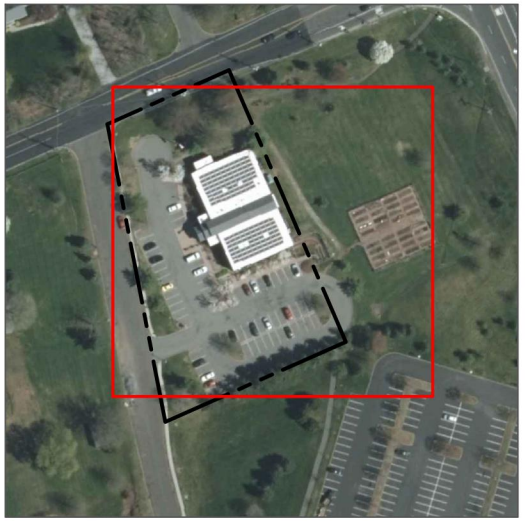
A rain garden can be installed on the eastern island in the parking lot to capture stormwater runoff from the impervious surface. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
72	51,040	2.5	25.8	234.4	0.040	1.40

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	0.143	24	10,520	0.46	560	$2,810

GREEN INFRASTRUCTURE RECOMMENDATIONS





Clarence Dillon Public Library

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

0 25' 50'

FAR HILLS-BEDMINSTER FIRE DEPARTMENT

Subwatershed: Raritan River North Branch

Site Area: 1,088,910 sq. ft.

Address: 1 Miller Lane
Bedminster, NJ 07921

Block and Lot: Block 36, Lot 19

A cistern can be installed in the southwest corner of the building to allow roof runoff to be reused. A bioretention system can be installed at the northeast corner of the building to capture, treat, and infiltrate rooftop runoff. Pervious pavement can be installed in the parking spaces behind and south of the building to filter and infiltrate pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
4	48,960	2.4	24.7	224.8	0.038	1.34

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	0.250	42	18,300	0.81	2,300	$11,500
Pervious pavement	0.127	21	15,580	0.69	1,500	$37,500
Rainwater harvesting	0.091	15	3,000	0.29	3,000 (gal)	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Far Hills-Bedminster Fire Department

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

0 30' 60'

FRESH MARKET

Subwatershed: Raritan River North Branch

Site Area: 139,930 sq. ft.

Address: 75 Washington Valley Road
Bedminster, NJ 07921

Block and Lot: Block 58, Lot 13, 14

Pervious pavement can be installed within the parking lot to capture stormwater runoff from the impervious surfaces that surround the 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"
95	132,810	6.4	67.1	609.8	0.103	3.64

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	1.039	174	76,235	3.36	8,170	$204,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

Fresh Market

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

0 50' 100'

MILLER LANE PARK

Subwatershed: Raritan River North Branch

Site Area: 617,490 sq. ft.

Address: 75 Miller Lane
Bedminster, NJ 07921

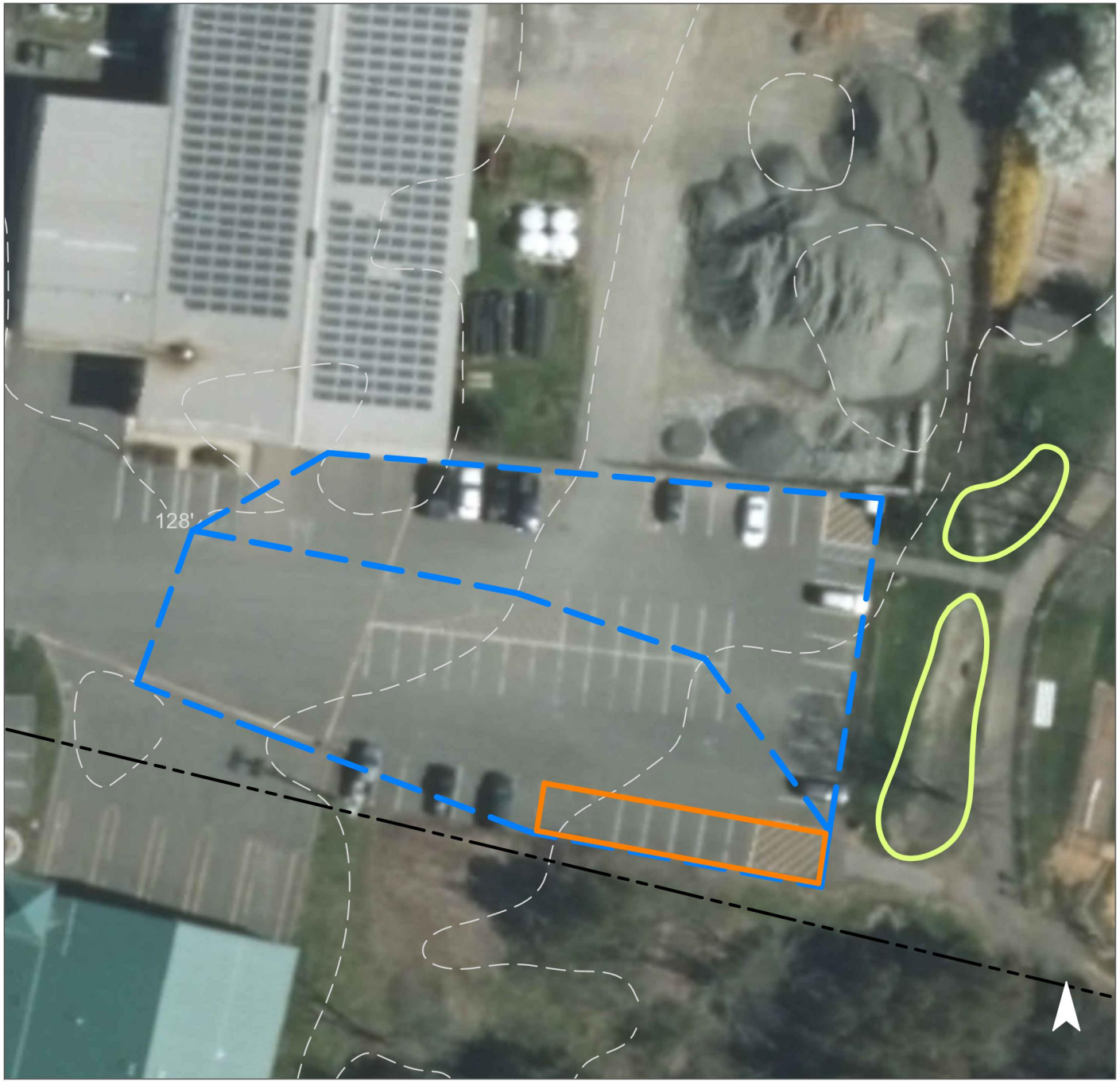
Block and Lot: Block 36, Lot 14

Connected bioretention systems can be installed on the eastern edge of the parking lot to capture, treat, and infiltrate runoff. The systems can be linked by pipes (already installed) shown in the above image. Pervious pavement can be installed in the parking spaces on the southern edge of the parking lot to filter and infiltrate pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
22	133,840	6.5	67.6	614.5	0.104	3.67

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	0.273	46	19,995	0.88	2,640	$13,200
Pervious pavement	0.361	60	26,472	1.17	1,740	$43,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Miller Lane Park

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

0 25' 50'

OASIS DAY SPA

Subwatershed: Raritan River North Branch

Site Area: 10,890 sq. ft.

Address: 274 US Highway 202/206 North
Pluckemin, NJ 07978

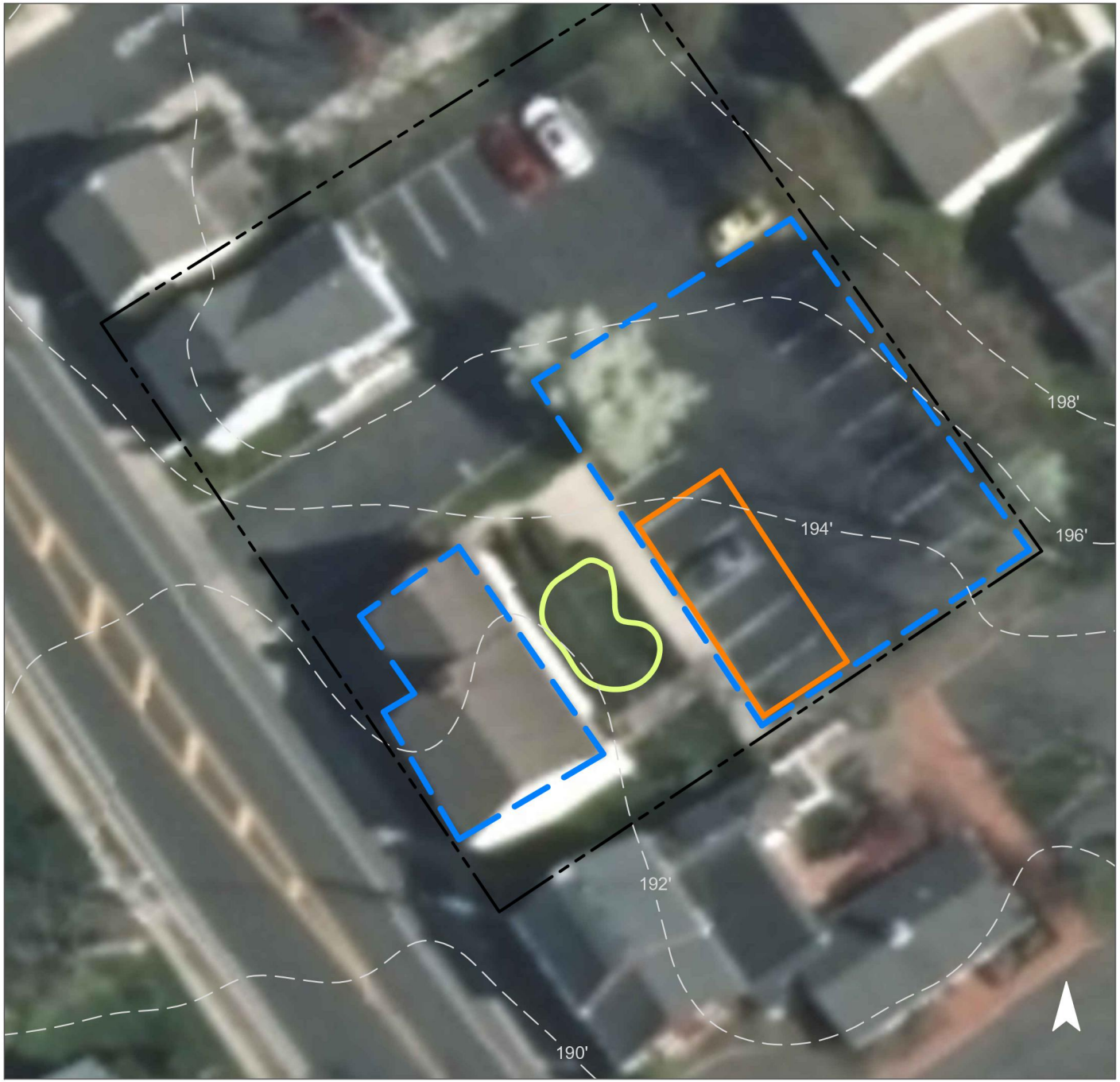
Block and Lot: Block 58, Lots 9 and 10

A bioretention system can be installed northeast of the building, adjacent to the parking lot, to capture, treat, and infiltrate rooftop runoff. The potential site location is shown in the above left image. Pervious pavement can be installed on the southwest side of the parking lot, adjacent to the sidewalk, to capture, filter, and infiltrate pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
85	9,250	0.4	4.7	42.5	0.007	0.25

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	0.036	6	2,655	0.12	360	$1,800
Pervious pavement	0.130	22	9,462	0.42	880	$22,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Oasis Day Spa

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

0 15' 30'

PLUCKEMIN USPS

Subwatershed: Raritan River North Branch

Site Area: 81,890 sq. ft.

Address: 318 US Highway 206
Pluckemin, NJ 07921

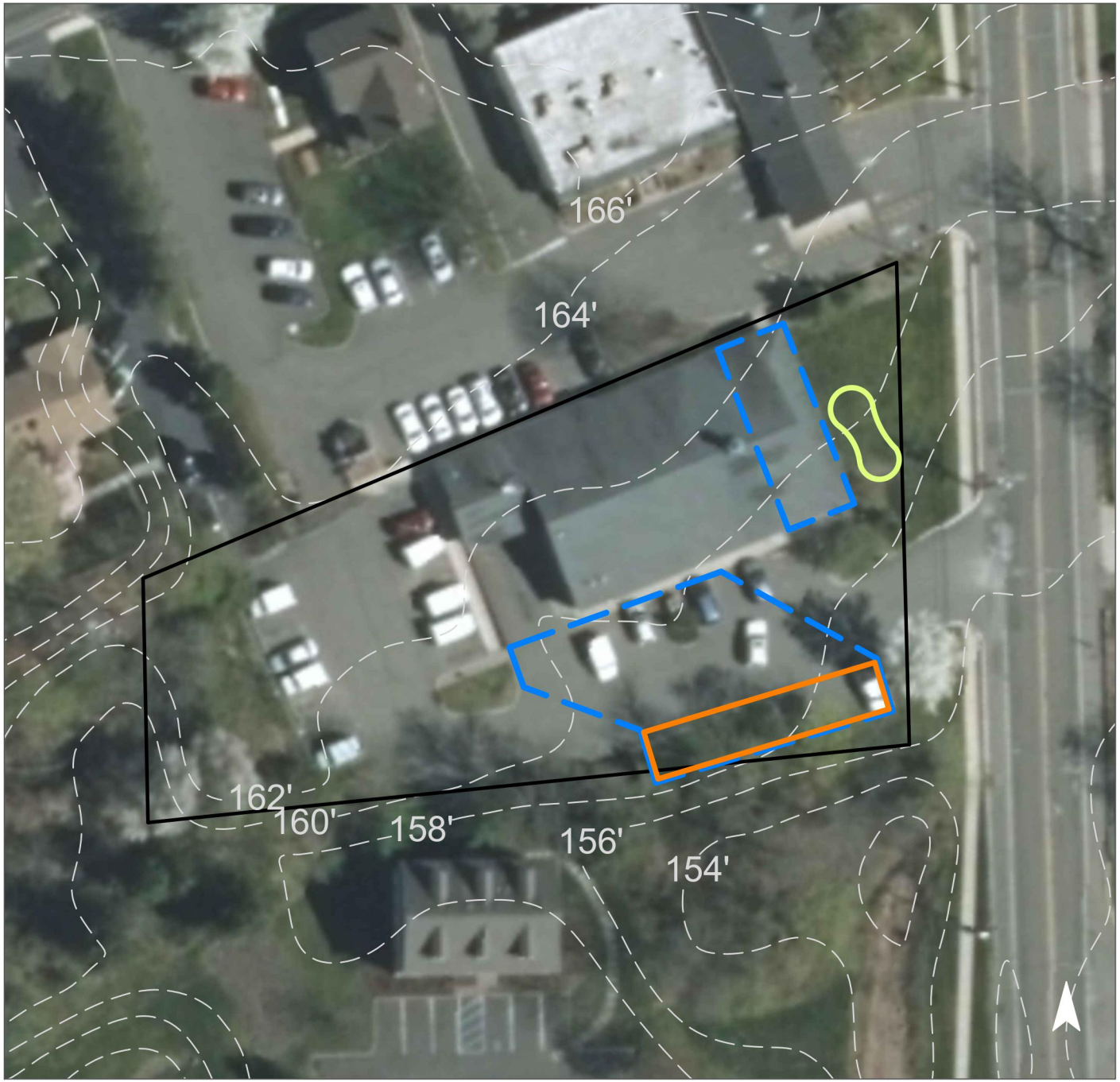
Block and Lot: Block 58, Lot 2

A rain garden can be installed north of the building to capture, treat, and infiltrate stormwater runoff from the rooftop of the building. Additionally, pervious pavement can be installed in the northeast parking lot to capture stormwater from the 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"
100	81,890	3.9	41.4	376.0	0.064	2.25

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	0.038	6	2,798	0.12	360	$1,800
Pervious pavement	0.126	21	9,260	0.41	1,460	$36,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pluckemin USPS

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

0 25' 50'

SOMERSET AIRPORT

Subwatershed: Raritan River North Branch

Site Area: 8,831,920 sq. ft.

Address: 150 Airport Road
Bedminster, NJ 07921

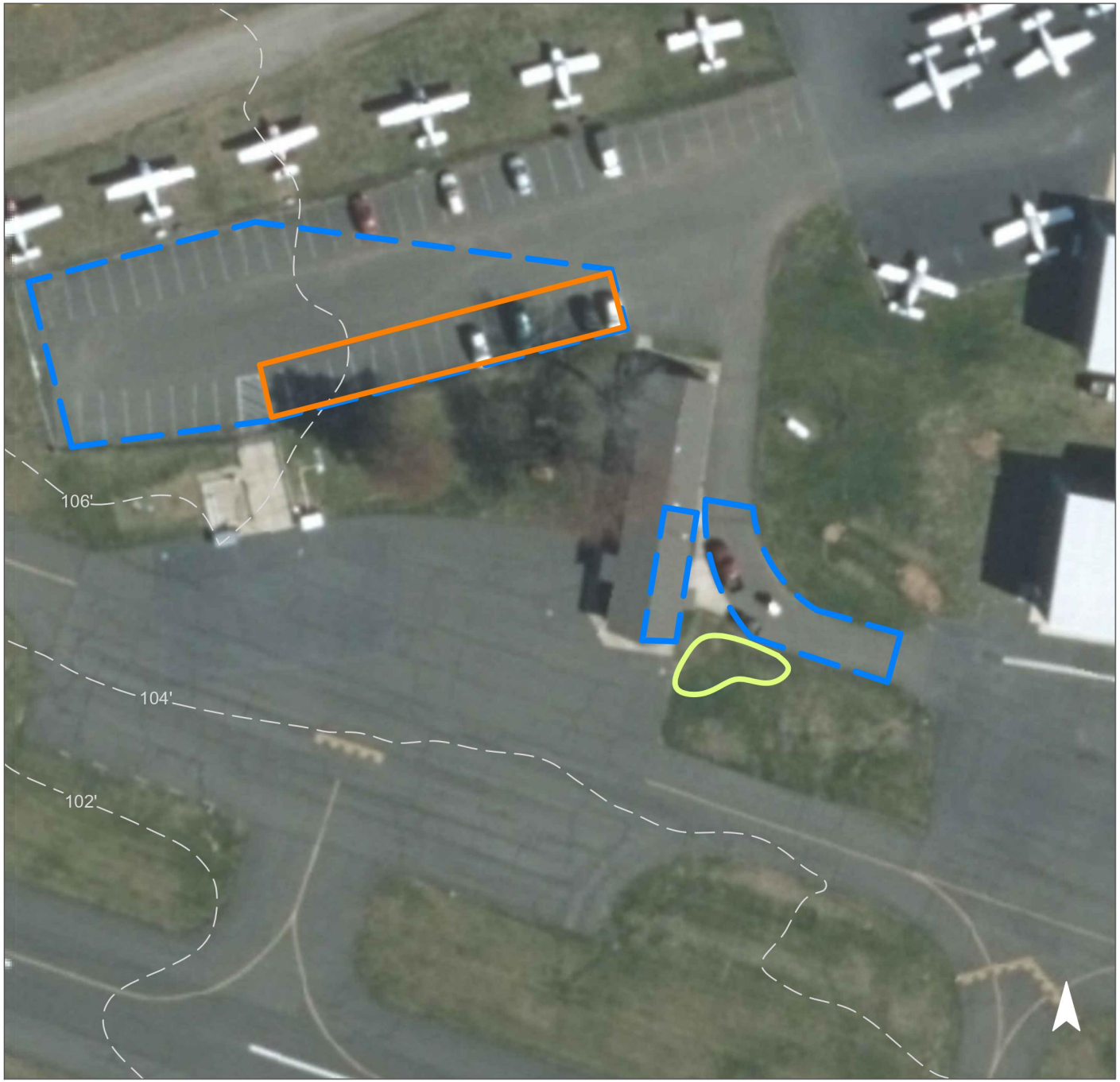
Block and Lot: Block 61, Lot 6

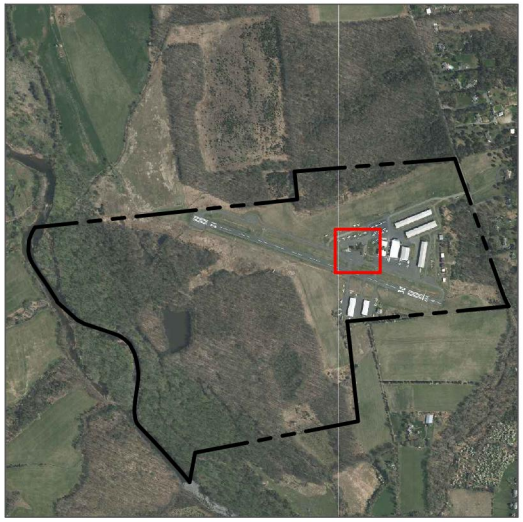
A bioretention system can be installed in the turfgrass located at the southeast corner of the building (shown in the above left image) to capture, treat, and infiltrate rooftop and pavement runoff. Parking spaces can be replaced with pervious pavement to filter and infiltrate stormwater runoff from the parking lot located north of the building shown. 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"
11	953,870	46.0	481.8	4,379.6	0.743	26.16

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	0.070	12	5,161	0.23	675	$1,800
Pervious pavement	0.130	22	9,462	0.42	880	$22,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





Somerset Airport

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

0 30' 60'

SOMERSET HILLS LEARNING INSTITUTE

Subwatershed: Raritan River North Branch

Site Area: 538,250 sq. ft.

Address: 1810 Burnt Mills Road
Bedminster, NJ 07921

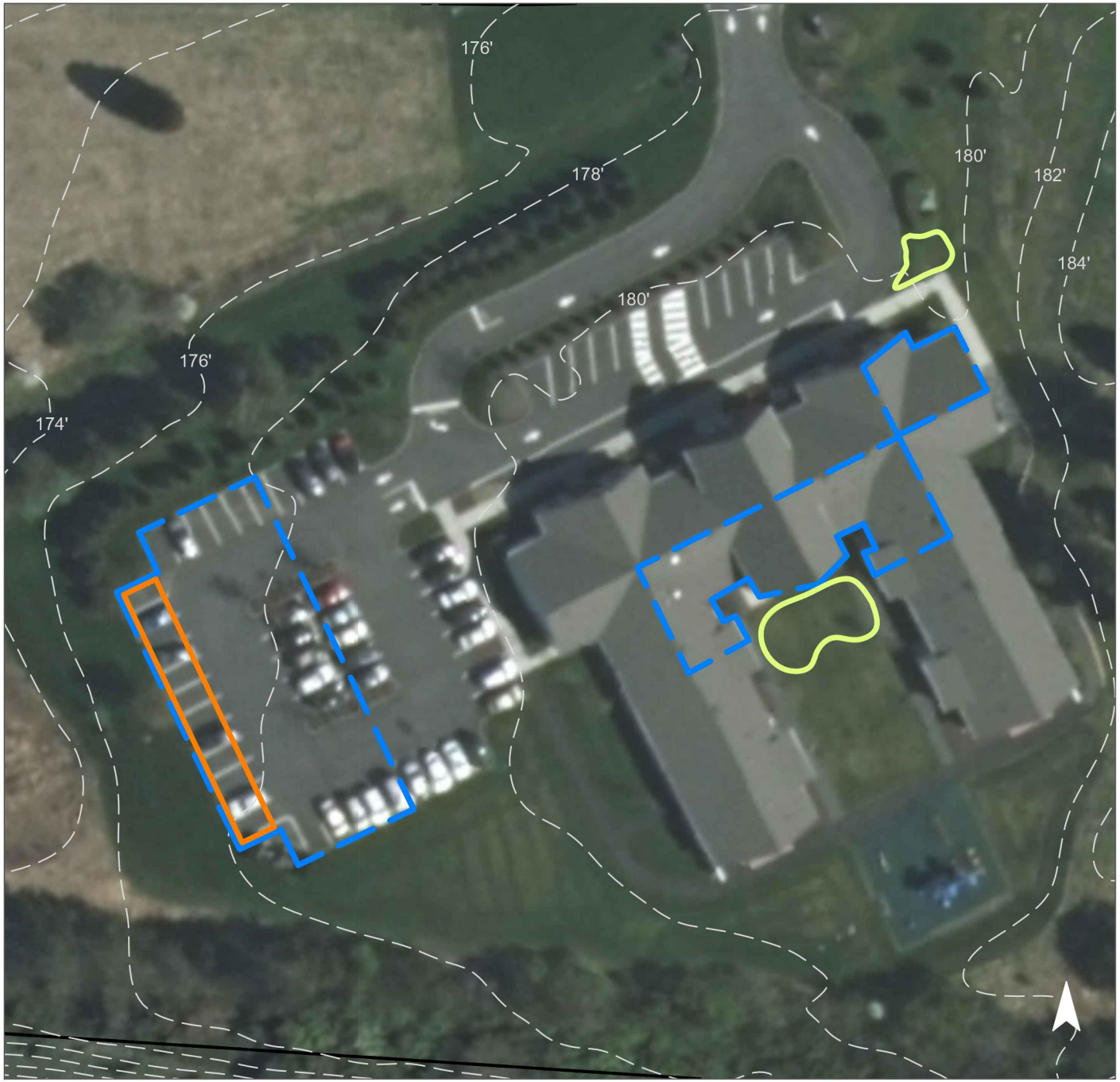
Block and Lot: Block 62.01, Lot 1

Bioretention systems can be installed at the northeast corner of the school (just beyond the corner of the sidewalk seen) and in the center of the courtyard to capture, treat, and infiltrate rooftop runoff. Pervious pavement can be installed at the western edge of the parking lot to manage pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
11	60,808	2.9	30.7	279.2	0.047	1.67

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	0.143	24	10,517	0.46	1,300	$6,500
Pervious pavement	0.243	41	177,840	0.79	2,015	$50,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Somerset Hills Learning Institute

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

0 30' 60'

SORDONI CONSTRUCTION COMPANY

Subwatershed: Raritan River North Branch

Site Area: 107,690 sq. ft.

Address: 1 Pluckemin Way
Bedminster, NJ 07921

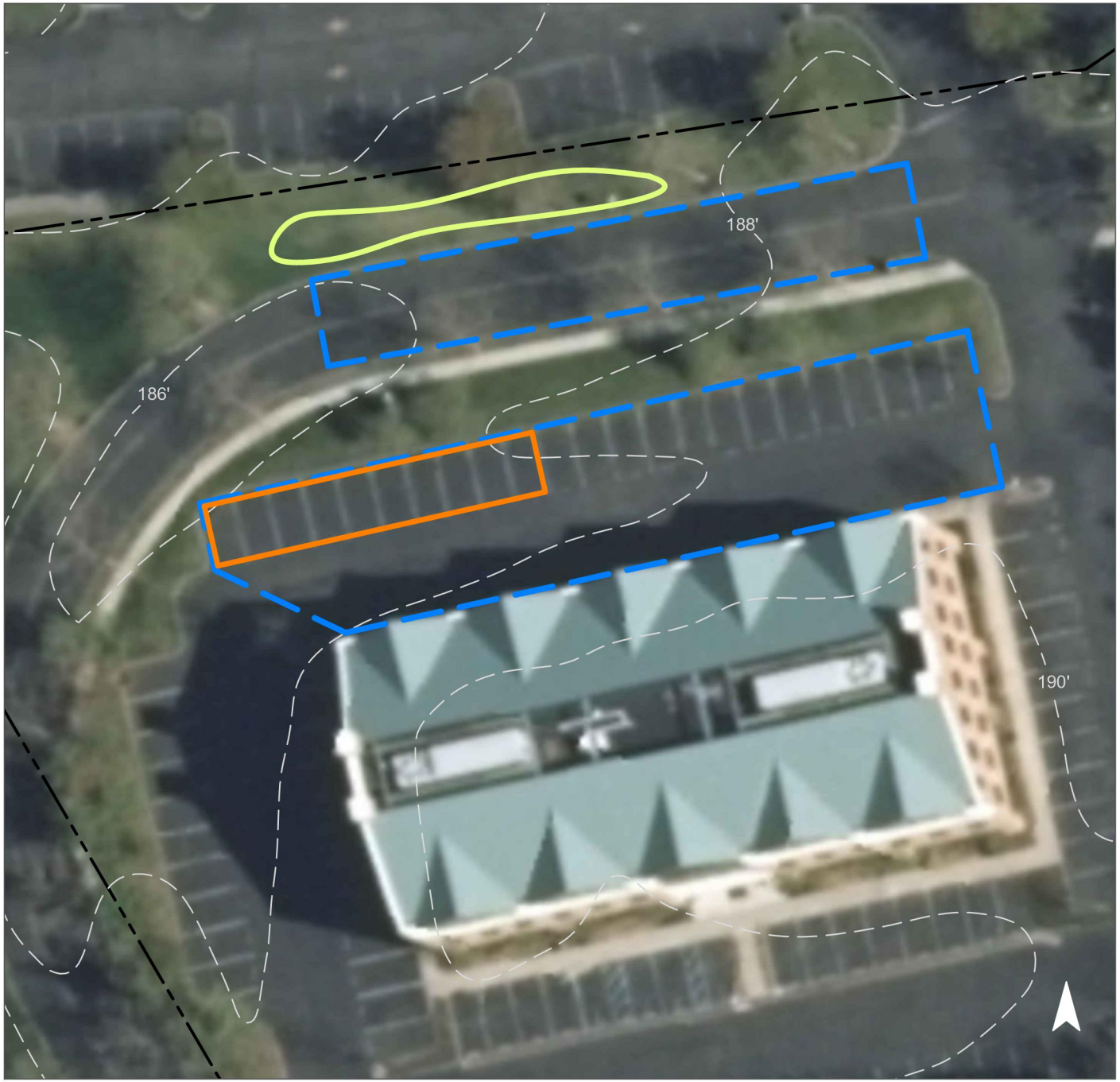
Block and Lot: Block 57, Lot 7

A bioretention system can be installed north of the road in front of the building to manage pavement runoff. Parking spaces north of the building can be replaced with pervious pavement to capture and infiltrate stormwater runoff from the 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"
77	83,420	4.0	42.1	383.0	0.065	2.29

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	0.100	17	7,323	0.32	960	$4,800
Pervious pavement	0.214	36	15,738	0.69	1,620	$40,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Sordoni Construction Co

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

0 20' 40'

THE CENTER FOR CONTEMPORARY ART

Subwatershed: Raritan River North Branch

Site Area: 17,700 sq. ft.

Address: 2020 Burnt Mills Road
Bedminster, NJ 07921

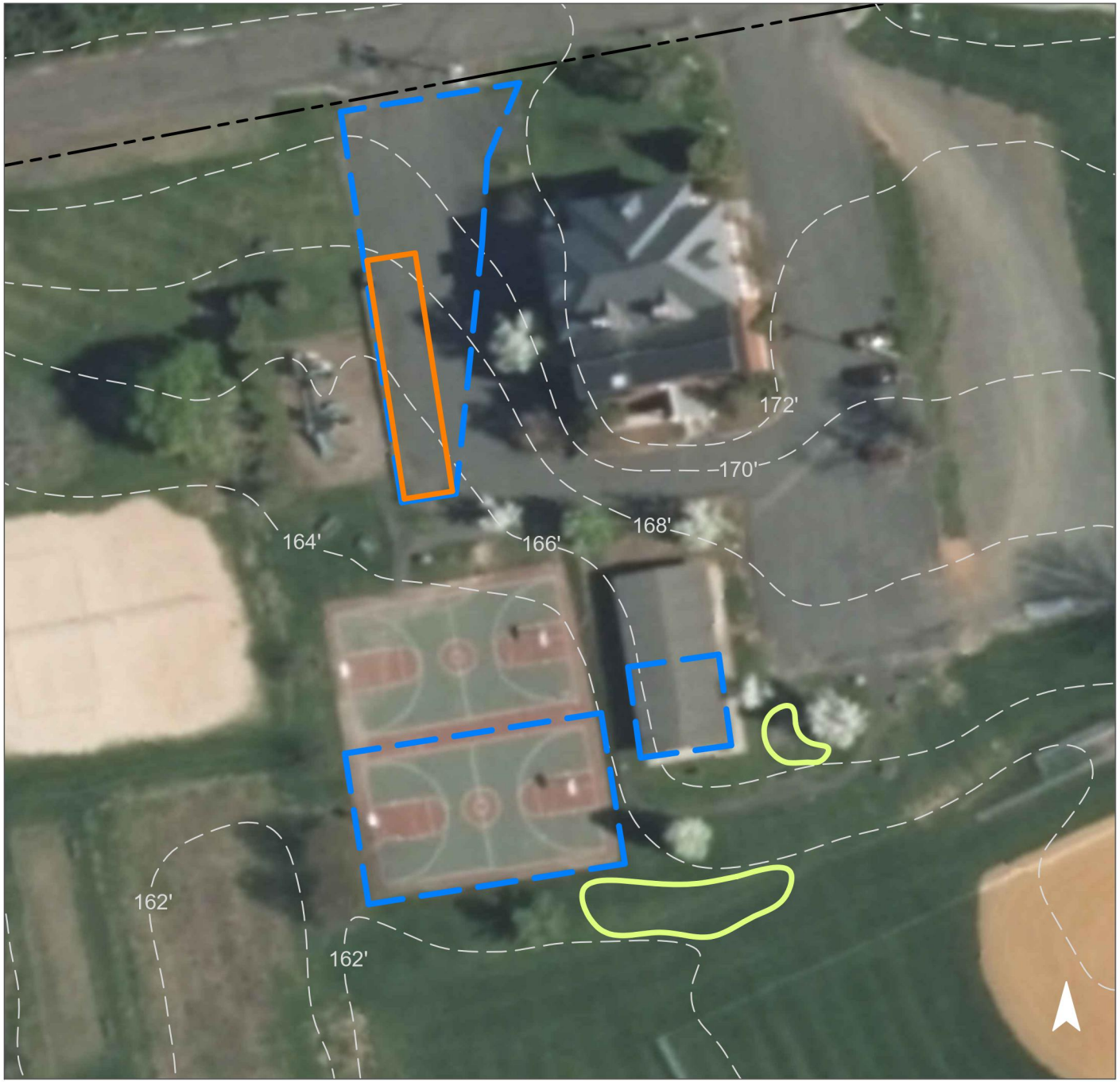
Block and Lot: Block 71, Lot 4

Bioretention systems can be installed southeast of the southernmost building and southeast of the tennis court to capture, treat, and infiltrate rooftop, tennis court, and parking lot runoff. Parking spaces located to the west of the northernmost building can be replaced with pervious pavement to capture and infiltrate stormwater. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
59	10,480	0.5	5.3	48.0	0.008	0.29

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	0.134	22	9,844	0.43	1,290	$6,450
Pervious pavement	0.120	20	8,811	0.39	1,460	$36,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



The Center for Contemporary Art

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

0 25' 50'

THE HILLS VILLAGE CENTER

Subwatershed: Raritan River North Branch

Site Area: 535,740 sq. ft.

Address: 402 Route 206 North
Bedminster, NJ 07921

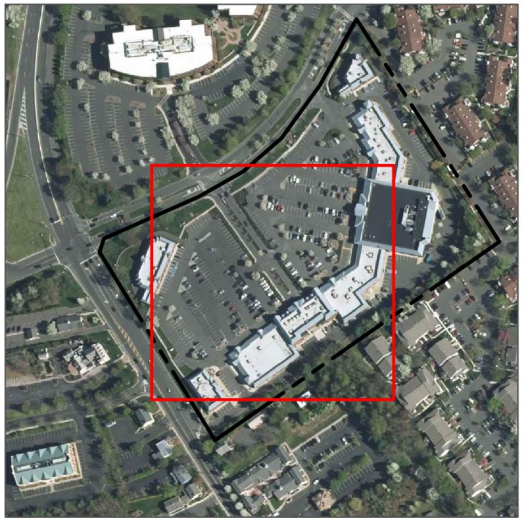
Block and Lot: Block 59.27, Lot 11.1

A bioretention system can be installed on the northwestern side of Pancheros Mexican Grill to capture, treat, and infiltrate rooftop runoff from Pancheros Mexican Grill located in the Hills Village Center. Pervious pavement can be installed in various locations on the northern side of the parking lot to filter and infiltrate pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
84	448,910	21.6	226.7	2,061.1	0.35	12.31

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	0.079	13	5,782	0.25	735	$3,675
Pervious pavement	0.703	118	51,560	2.27	4,925	$123,125

GREEN INFRASTRUCTURE RECOMMENDATIONS



The Hills Village Center

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

0 50' 100'

THE PLUCKEMIN INN

Subwatershed: Raritan River North Branch

Site Area: 66,940 sq. ft.

Address: 359 US Highway 206
Bedminster, NJ 07921

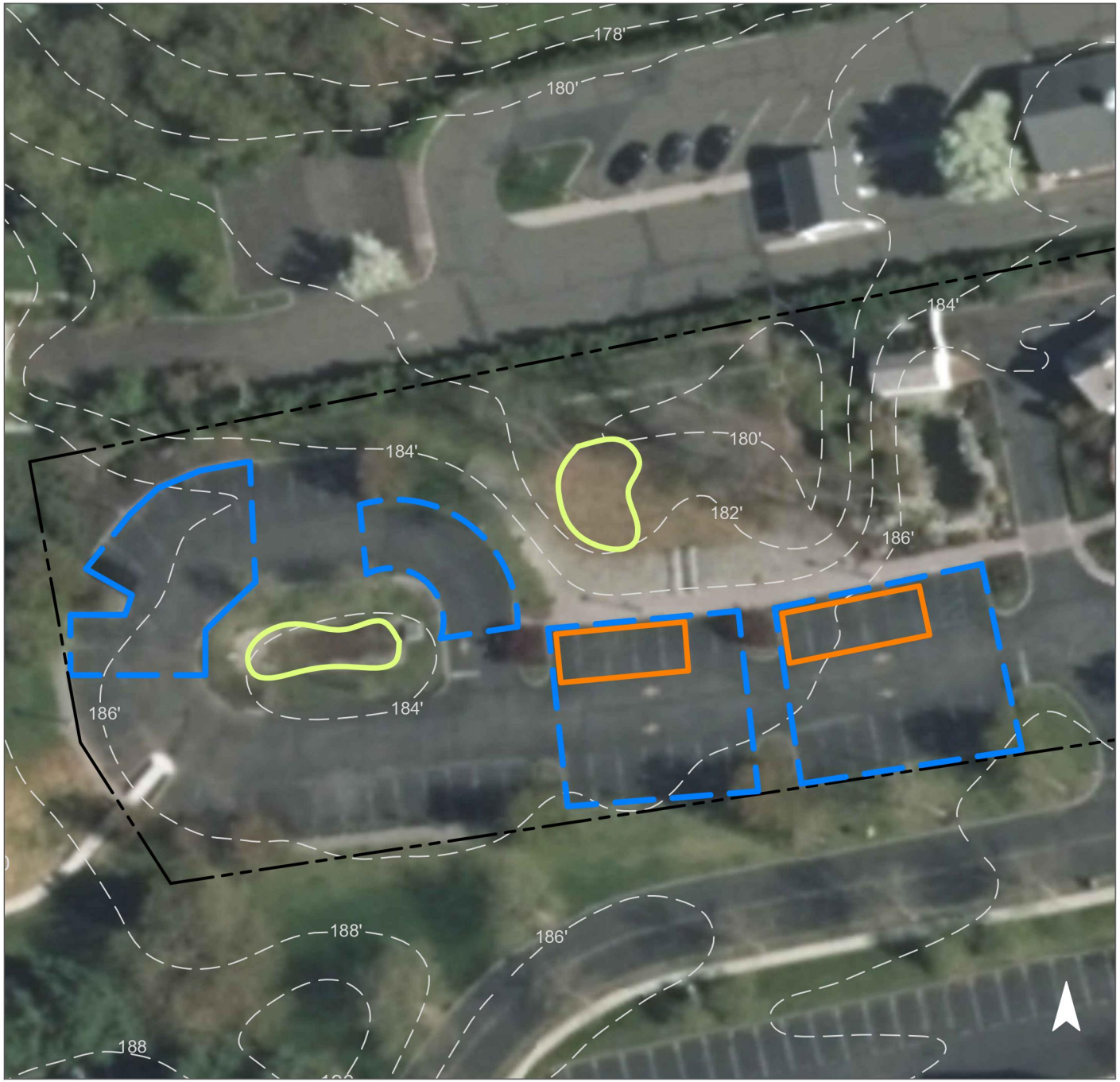
Block and Lot: Block 57, Lot 3

The detention basin in the center of the parking lot can be retrofitted to act as a bioretention system to capture, treat, and infiltrate parking lot runoff. An additional bioretention system can be installed north of the parking lot to capture, treat, and infiltrate additional parking lot runoff. Pervious pavement can be installed in the parking spaces in the northeastern side of the parking lot to infiltrate pavement runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
70	46,870	2.3	23.7	215.2	0.037	1.29

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	0.109	18	8,011	0.35	1,430	$7,150
Pervious pavement	0.208	35	15,244	0.67	1,435	$35,875

GREEN INFRASTRUCTURE RECOMMENDATIONS



The Pluckemin Inn

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

0 25' 50'

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)
1	**Annie's Deli**														
	Total Site Info	0.32	14,130	57	19	85	0.28	12,010	0.6	6.1	55.1	1,251	44,037	0.009	0.33
2	**Bedminster Public School**														
	Total Site Info	30.88	1,345,130	36	1	19	5.78	251,990	12.1	127.3	1,157.0	26,249	923,963	0.196	6.91
3	**Bedminster Township Municipal Court**														
	Total Site Info	18.43	802,900	36	10,11,12,14	25	4.67	203,380	9.8	102.7	933.8	21,185	745,727	0.158	5.58
4	**Bedminster USPS**														
	Total Site Info	0.68	29,710	33	11	83	0.57	24,750	1.2	12.5	113.6	2,578	90,750	0.019	0.68
5	**Burnt Mills Park**														
	Total Site Info	11.09	483,140	54	5	10	1.10	47,790	2.3	24.1	219.4	4,978	175,230	0.037	1.31
6	**Clarence Dillon Public Library**														
	Total Site Info	1.63	70,850	41	16.01	72	1.17	51,040	2.5	25.8	234.3	5,317	187,147	0.040	1.40
7	**Far Hills-Bedminster Fire Department**														
	Total Site Info	25.00	1,088,910	36	19	4	1.12	48,960	2.4	24.7	224.8	5,100	179,520	0.038	1.34
8	**Fresh Market**														
	Total Site Info	3.21	139,930	58	13, 14	95	3.05	132,810	6.4	67.1	609.8	13,834	486,970	0.103	3.64
9	**Miller Lane Park**														
	Total Site Info	14.18	617,490	36	14	22	3.07	133,840	6.5	67.6	614.5	13,942	490,747	0.104	3.67
10	**Oasis Day Spa**														
	Total Site Info	0.25	10,890	58	9, 10	85	0.21	9,250	0.4	4.7	42.5	964	33,917	0.007	0.25
11	**Pluckemin USPS**														
	Total Site Info	1.88	81,890	58	2	100	1.88	81,890	3.9	41.4	376.0	8,530	300,263	0.064	2.25
12	**Somerset Airport**														
	Total Site Info	202.75	8,831,920	61	6	11	21.90	953,870	46.0	481.8	4,379.6	99,361	3,497,523	0.743	26.16
13	**Somerset Hills Learning Institute**														
	Total Site Info	12.36	538,250	62.01	1	11	1.40	60,810	2.9	30.7	279.2	6,334	222,970	0.047	1.67
14	**Sordoni Construction Company**														
	Total Site Info	2.47	107,690	57	7	77	1.92	83,420	4.0	42.1	383.0	8,690	305,873	0.065	2.29
15	**The Center for Contemporary Art**														
	Total Site Info	0.41	17,700	71	4	59	0.24	10,480	0.5	5.3	48.1	1,092	38,427	0.008	0.29
16	**The Hills Village Center**														
	Total Site Info	12.30	535,740	59.27	11.1	84	10.31	448,910	21.6	226.7	2,061.1	46,761	1,646,003	0.350	12.31
17	**The Pluckemin Inn**														
	Total Site Info	1.54	66,940	57	3	70	1.08	46,870	2.3	23.7	215.2	4,882	171,857	0.037	1.29

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 %
	RARITAN RIVER NORTH BRANCH SITES	**32,715**	**0.75**	**0.821**	**142**	**60,214**	**2.65**				**$132,250**	**12.4%**
1	**Annie's Deli**											
	Pervious pavement	8,665	0.20	0.226	38	16,568	0.73	1,440	$25	SF	$36,000	72.1%
	Planter boxes	485	0.01	n/a	2	n/a	n/a	4	$1,000	box	$4,000	4.0%
	Total Site Info	**9,150**	**0.21**	**0.226**	**40**	**16,568**	**0.73**				**$40,000**	**76.2%**
2	**Bedminster Public School**											
	Pervious pavement	24,420	0.56	0.636	107	46,690	2.06	4,300	$25	SF	$107,500	9.7%
	Total Site Info	**24,420**	**0.56**	**0.636**	**107**	**46,690**	**2.06**				**$107,500**	**9.7%**
3	**Bedminster Township Municipal Court**											
	Bioretention systems	3,115	0.07	0.081	14	5,954	0.26	795	$5	SF	$3,975	1.5%
	Pervious pavement	5,290	0.12	0.138	23	10,113	0.45	1,710	$25	SF	$42,750	2.6%
	Planter boxes	735	0.02	n/a	3	n/a	n/a	4	$1,000	box	$4,000	0.4%
	Total Site Info	**9,140**	**0.21**	**0.219**	**39**	**16,067**	**0.71**				**$50,725**	4.5%
5	**Burnt Mills Park**											
	Bioretention systems	7,010	0.16	0.183	31	13,404	0.59	1,805	$5	SF	$9,025	14.7%
	Pervious pavement	7,415	0.17	0.193	32	14,175	0.62	1,300	$25	SF	$32,500	15.5%
	Total Site Info	**14,425**	**0.33**	**0.376**	**63**	**27,579**	**1.21**				**$41,525**	**30.2%**
4	**Bedminster USPS**											
	Bioretention system	1,980	0.05	0.052	9	3,785	0.17	500	$5	SF	$2,500	8.0%
	Pervious pavement	5,080	0.12	0.132	22	9,709	0.43	2,070	$25	SF	$51,750	20.5%
	Total Site Info	**7,060**	**0.16**	**0.184**	**31**	**13,494**	**0.60**				**$54,250**	**28.5%**
6	**Clarence Dillon Public Library**											
	Bioretention system	5,500	0.13	0.143	24	10,517	0.46	562	$5	SF	$2,810	10.8%
	Total Site Info	**5,500**	**0.13**	**0.143**	**24**	**10,517**	**0.46**				**$2,810**	**10.8%**
7	**Far Hills-Bedminster Fire Department**											
	Bioretention system	9,570	0.22	0.249	42	18,296	0.81	2,300	$5	SF	$11,500	19.5%
	Pervious pavement	4,890	0.11	0.127	21	15,581	0.69	1,500	$25	SF	$37,500	10.0%
	Rainwater harvesting	3,500	0.08	0.091	15	3,000	0.29	3,000	$2	gal	$6,000	7.1%
	Total Site Info	**17,960**	**0.41**	**0.468**	**78**	**36,877**	**1.79**				**$55,000**	**36.7%**

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 %
8	**Fresh Market**											
	Pervious pavement	39,875	0.92	1.039	174	76,236	3.36	8,170	$25	SF	$204,250	30.0%
	Total Site Info	**39,875**	**0.92**	**1.039**	**174**	**76,236**	**3.36**				**$204,250**	**30.0%**
9	**Miller Lane Park**											
	Bioretention systems	10,460	0.24	0.273	46	19,994	0.88	2,640	$5	SF	$13,200	7.8%
	Pervious pavement	13,850	0.32	0.361	60	26,472	1.17	1,740	$25	SF	$43,500	10.3%
	Total Site Info	**24,310**	**0.56**	**0.633**	**106**	**46,466**	**2.05**				**$56,700**	**18.2%**
10	**Oasis Day Spa**											
	Bioretention system	1,390	0.03	0.036	6	2,655	0.12	360	$5	SF	$1,800	15.0%
	Pervious pavement	5,000	0.11	0.130	22	9,462	0.42	880	$25	SF	$22,000	54.1%
	Total Site Info	**6,390**	**0.15**	**0.166**	**28**	**12,118**	**0.54**				**$23,800**	**69.1%**
11	**Pluckemin USPS**											
	Bioretention system	1,465	0.03	0.038	6	2,798	0.12	360	$5	SF	$1,800	1.8%
	Pervious pavement	4,845	0.11	0.126	21	9,260	0.41	1,460	$25	SF	$36,500	6%
	Total Site Info	6,310	0.14	0.164	28	12,058	0.53				$38,300	7.7%
12	**Somerset Airport**											
	Bioretention system	2,700	0.06	0.070	12	5,161	0.23	675	$5	SF	$3,375	0.3%
	Pervious pavement	13,310	0.31	0.347	58	25,447	1.12	3,400	$25	SF	$85,000	1.4%
	Total Site Info	**16,010**	**0.37**	**0.417**	**70**	**30,608**	**1.35**				**$88,375**	1.7%
13	**Somerset Hills Learning Institute**											
	Bioretention systems	5,500	0.13	0.143	24	10,517	0.46	1,300	$5	SF	$6,500	9.0%
	Pervious pavement	9,330	0.21	0.243	41	17,840	0.79	2,015	$25	SF	$50,375	15.3%
	Total Site Info	**14,830**	**0.34**	**0.386**	**65**	**28,357**	**1.25**				**$56,875**	**24.4%**
14	**Sordoni Construction Company**											
	Bioretention system	3,830	0.09	0.100	17	7,323	0.32	960	$5	SF	$4,800	4.6%
	Pervious pavement	8,230	0.19	0.214	36	15,738	0.69	1,620	$25	SF	$40,500	9.9%
	Total Site Info	**12,060**	**0.28**	**0.314**	**53**	**23,061**	**1.01**				**$45,300**	14.5%

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
15	**The Center for Contemporary Art**											
	Bioretention systems	5,150	0.12	0.134	22	9,844	0.43	1,290	$5	SF	$6,450	49.1%
	Pervious pavement	4,610	0.11	0.120	20	8,811	0.39	1,460	$25	SF	$36,500	44.0%
	Total Site Info	**9,760**	**0.22**	**0.254**	**43**	**18,655**	**0.82**				**$42,950**	**93.1%**
16	**The Hills Village Center**											
	Bioretention system	3,025	0.07	0.079	13	5,782	0.25	735	$5	SF	$3,675	0.7%
	Pervious pavement	26,970	0.62	0.703	118	51,560	2.27	4,925	$25	SF	$123,125	6.0%
	Total Site Info	**29,995**	**0.69**	**0.782**	**131**	**57,342**	**2.52**				**$126,800**	**6.7%**
17	**The Pluckemin Inn**											
	Bioretention systems	4,190	0.10	0.109	18	8,011	0.35	1,430	$5	SF	$7,150	8.9%
	Pervious pavement	7,975	0.18	0.208	35	15,244	0.67	1,435	$25	SF	$35,875	17.0%
	Total Site Info	**12,165**	**0.28**	**0.317**	**53**	**23,255**	**1.02**				**$43,025**	**26.0%**