Draft

Impervious Cover Reduction Action Plan for Eatontown Borough, Monmouth County, New Jersey

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

February 10, 2016

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Introduction

Located in Monmouth County in central New Jersey, Eatontown Borough covers approximately 5.9 square miles north of Ocean Township. Figures 1 and 2 illustrate that Eatontown Borough is dominated by urban land uses. A total of 78.3% of the municipality's land use is classified as urban. Of the urban land in Eatontown Borough, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2007 land use/land cover geographical information system (GIS) data layer categorizes Eatontown 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 Eatontown Borough. Based upon the 2007 NJDEP land use/land cover data, approximately 34.1% of Eatontown Borough has impervious cover. This level of impervious cover suggests that the streams in Eatontown Borough are non-supporting streams.[1]

Methodology

Eatontown 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] Caraco, D., R. Claytor, P. Hinkle, H. Kwon, T. Schueler, C. Swann, S. Vysotsky, and J. Zielinski. 1998. Rapid Watershed Planning Handbook. A Comprehensive Guide for Managing Urbanizing Watersheds. Prepared by Center For Watershed Protection, Ellicott City, MD. Prepared for U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds and Region V. October 1998

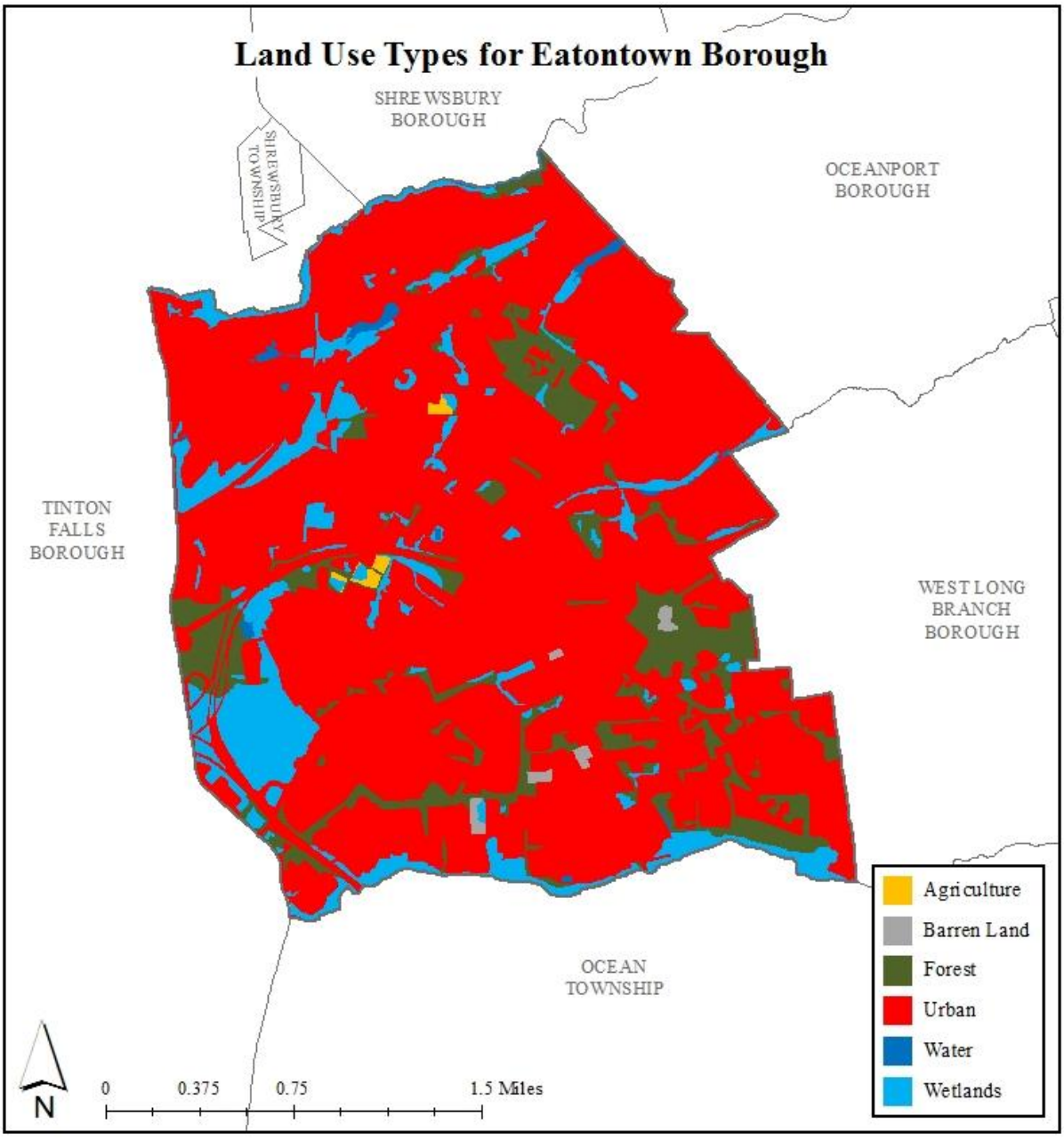


Figure 1: Map illustrating the land use in Eatontown Borough

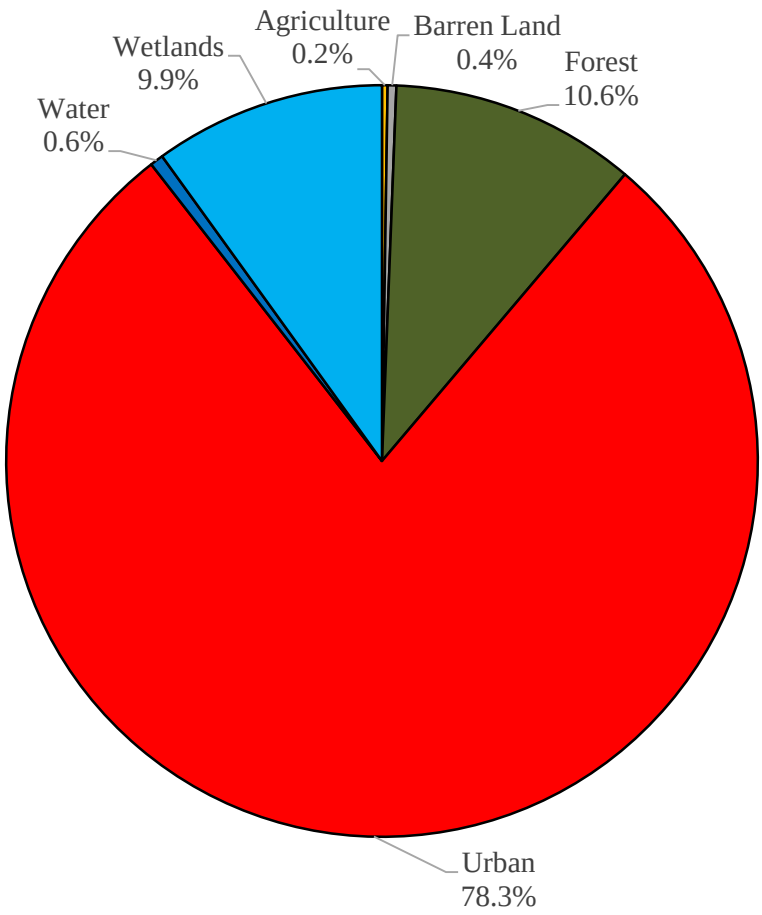


Figure 2: Pie chart illustrating the land use in Eatontown Borough

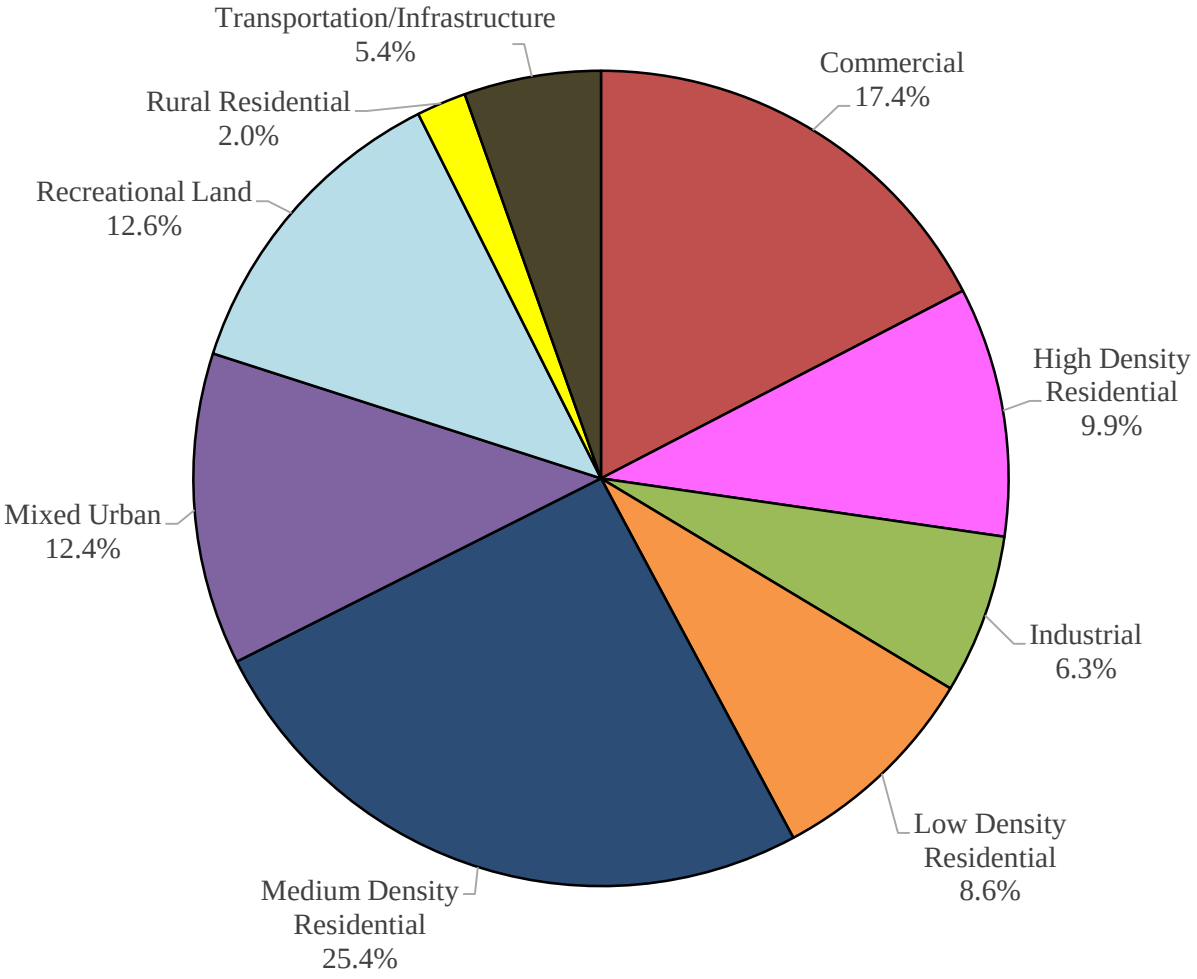


Figure 3: Pie chart illustrating the various types of urban land use in Eatontown Borough

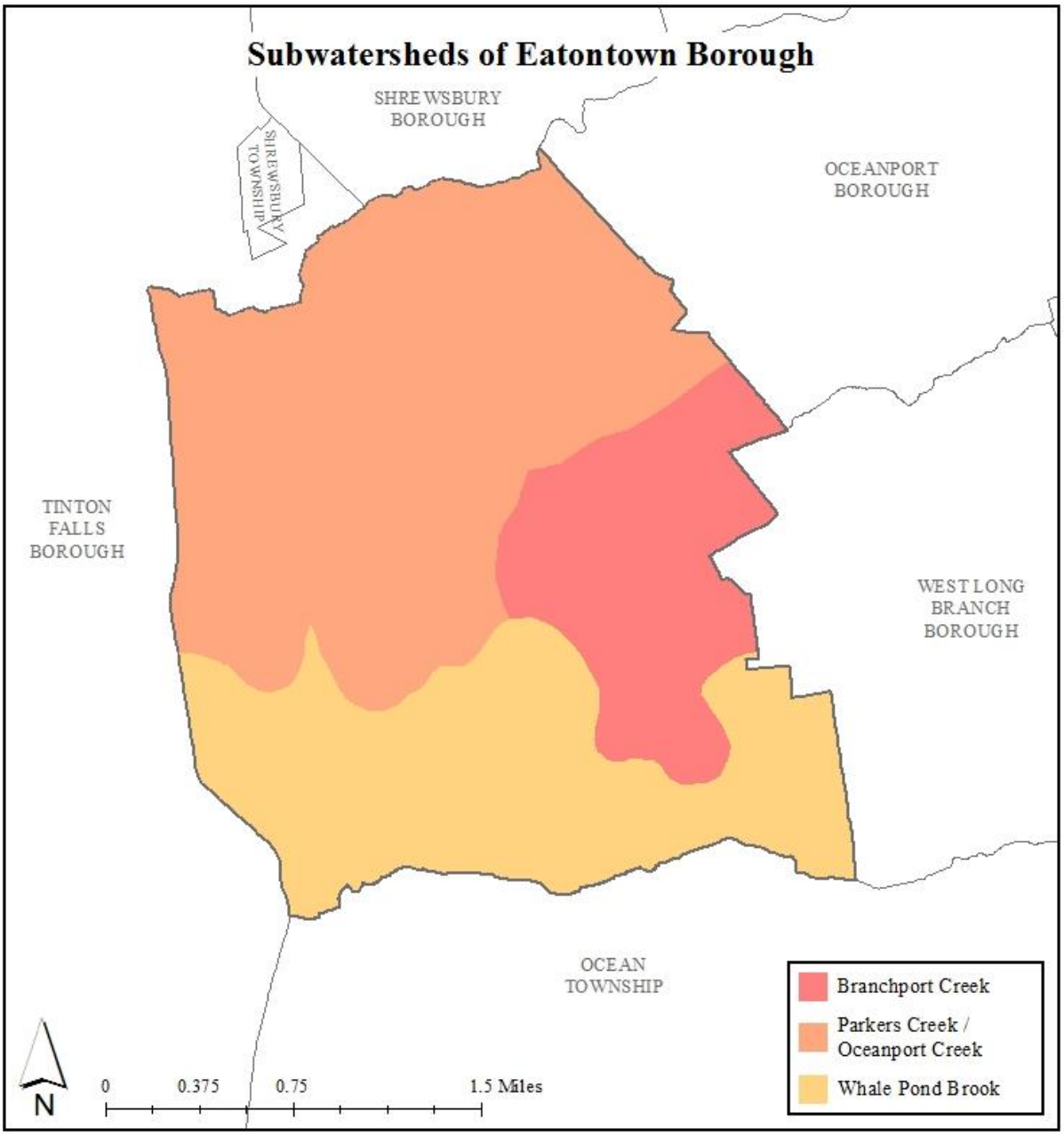


Figure 4: Map of the subwatersheds in Eatontown Borough

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

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

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

Table 1: Aerial Loading Coefficients[2]

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

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

Green Infrastructure Practices

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

Disconnected downspouts

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

Pervious pavements

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




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

Bioretention systems/rain gardens

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

Downspout planter boxes

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

Rainwater harvesting systems (cistern or rain barrel)

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

Bioswale

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

Stormwater planters

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

Tree filter boxes

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

Potential Project Sites

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

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

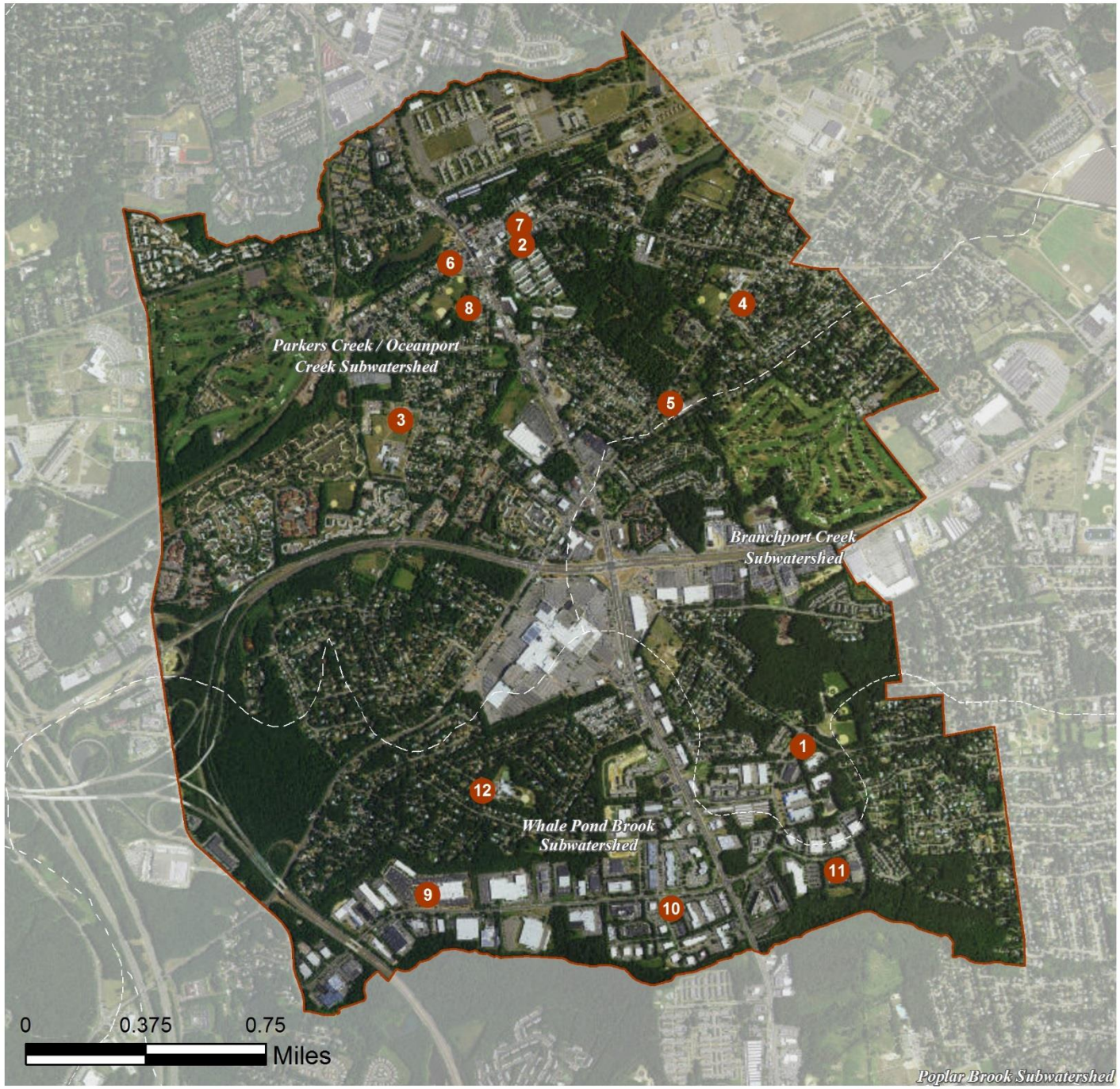
Conclusion

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

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

a. Green Infrastructure Sites

EATONTOWN BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BRANCHPORT CREEK SUBWATERSHED:

1. Kindercare Learning Center

SITES WITHIN THE PARKERS CREEK / OCEANPORT CREEK SUBWATERSHED:

2. Immaculate Conception Korean
3. Margaret L. Vetter Elementary School / Memorial Middle School
4. Meadowbrook Elementary School
5. Monmouth Grace United Methodist Church
6. Municipal Parking
7. Saint James Memorial Episcopal Church
8. Wolcott Park

SITES WITHIN THE WHALE POND BROOK SUBWATERSHED:

9. Hawkswood School
10. Illanos Cafe
11. Reliable Couriers
12. Woodmere Elementary School

b. Proposed Green Infrastructure Concepts

KINDERCARE LEARNING CENTER

Subwatershed: **Branchport Creek**

Site Area: **74,284 sq. ft.**

Address: **60 Industrial Way East**
Eatontown, NJ 07724

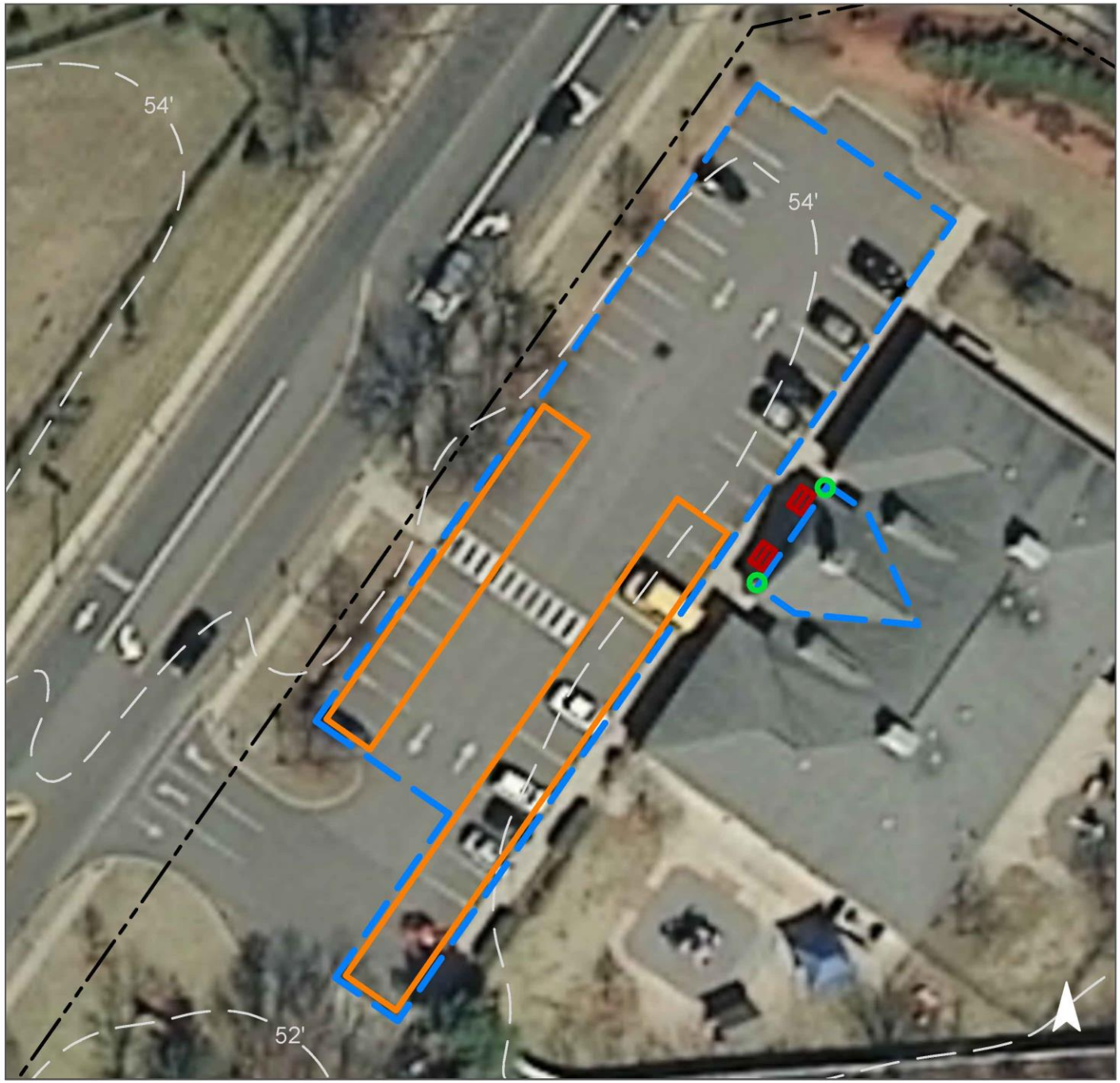
Block and Lot: **Block 3901, Lot 1**

Downspout planter boxes can be constructed by the entrance to allow roof runoff to be reused. Parking spots can be replaced with porous asphalt 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"
79	58,536	2.8	29.6	268.8	0.046	1.61

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
Downspout planter boxes	0.022	3	n/a	n/a	48	$4,000
Pervious pavements	0.358	60	27,140	1.02	3,835	$95,875

GREEN INFRASTRUCTURE RECOMMENDATIONS



Kindercare Learning Center

- disconnected downspouts
- pervious pavements
- downspout planter boxes
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

IMMACULATE CONCEPTION KOREAN

Subwatershed: Parkers Creek / Oceanport Creek

Site Area: 37,260 sq. ft.

Address: 64 Broad Street Eatontown, NJ 07724

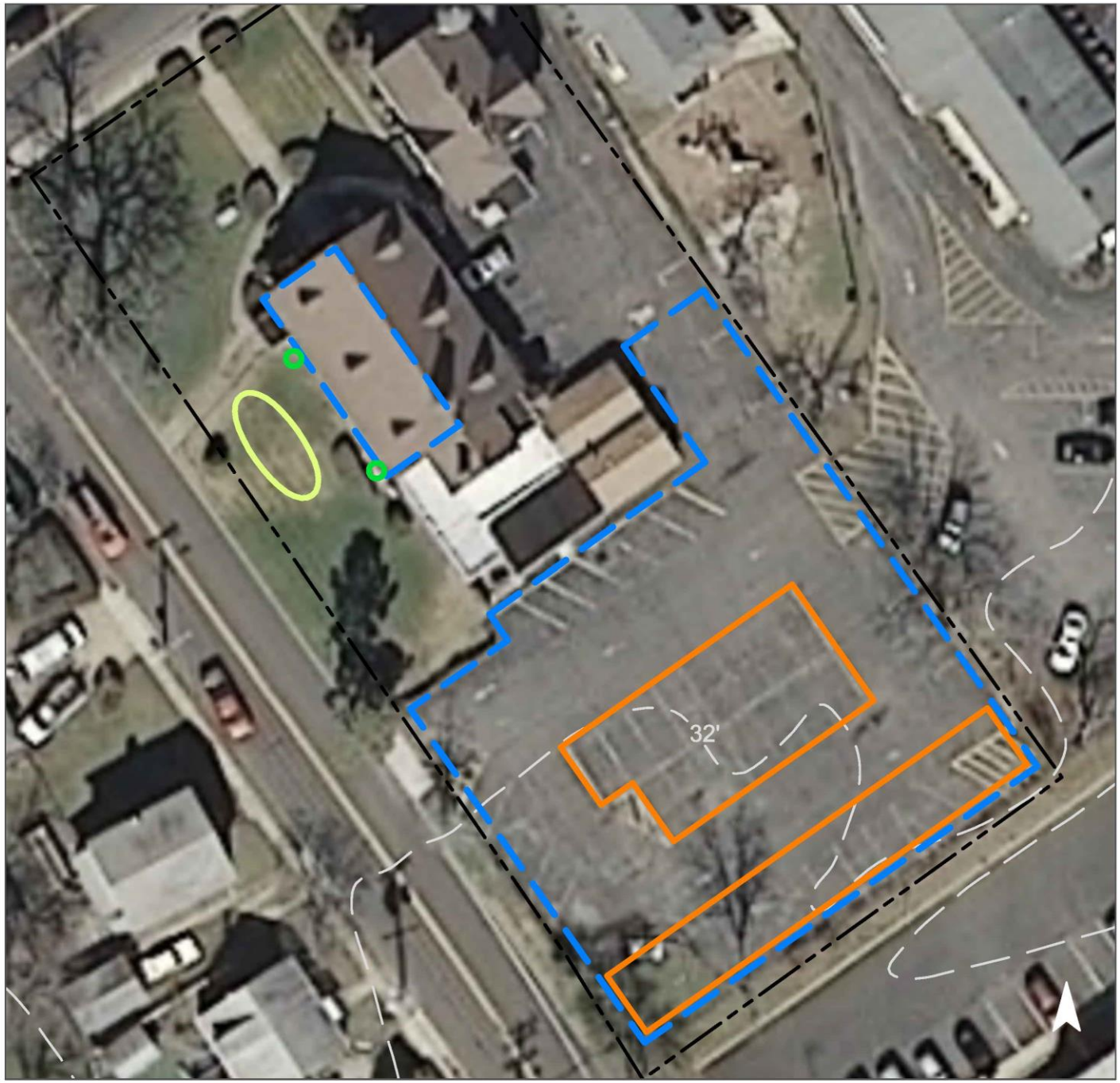
Block and Lot: Block 1002, Lot 1

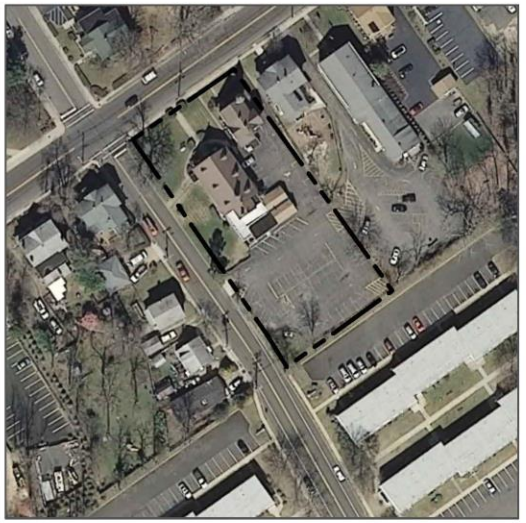
The stormwater runoff drains towards the sidewalk on the west side of the building. A rain garden can be installed between the two downspouts on that side of the building to capture, treat, and infiltrate runoff from the rooftop. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
60	22,356	1.1	11.3	102.6	0.017	0.61

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.034	6	2,600	0.10	345	$1,725
Pervious pavement	0.396	66	30,010	1.13	4,769	$119,225

GREEN INFRASTRUCTURE RECOMMENDATIONS





Immaculate Conception Korean

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

MARGARET L. VETTER ELEMENTARY SCHOOL / MEMORIAL MIDDLE SCHOOL

Subwatershed: Parkers Creek / Oceanport Creek

Site Area: 1,063,688 sq. ft.

Address: 3 & 7 Grant Avenue Eatontown, NJ 07724

Block and Lot: Block 1501, Lot 1

Stormwater runoff drains towards the turf grass west of the parking lot at the elementary school. A bioretention system can be installed to capture, treat, and infiltrate runoff from the parking lot. Parking spaces at the middle school can be replaced with pervious pavement to capture and infiltrate stormwater. Downspout planter boxes can be constructed by the entrance on the east side of the middle school to allow roof runoff to be reused. A bioretention system can be built to treat 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"
31	331,689	16.0	167.5	1,522.9	0.258	9.10

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.647	108	47,467	1.84	6,725	$33,625
Downspout planter boxes	0.022	3	n/a	n/a	48	$4,000
Pervious pavements	0.069	12	5,215	0.20	848	$21,200

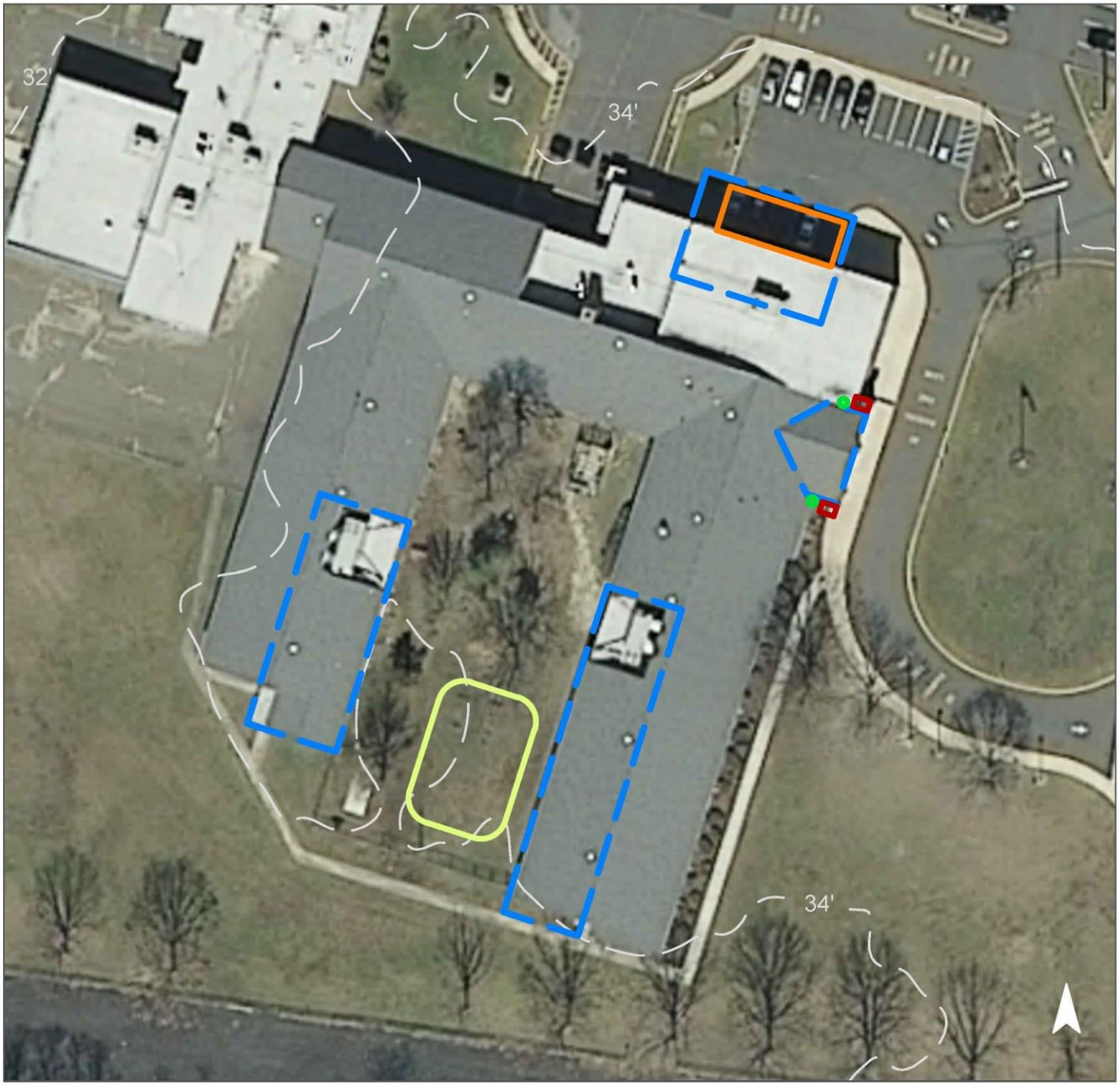
GREEN INFRASTRUCTURE RECOMMENDATIONS

Margaret L. Vetter Elementary School

- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

GREEN INFRASTRUCTURE RECOMMENDATIONS



Memorial Middle School

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- downspout planter boxes
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

MEADOWBROOK ELEMENTARY SCHOOL

Subwatershed: Parkers Creek/ Oceanport Creek

Site Area: 657,125 sq. ft.

Address: 65 Wyckoff Road Eatontown, NJ 07724

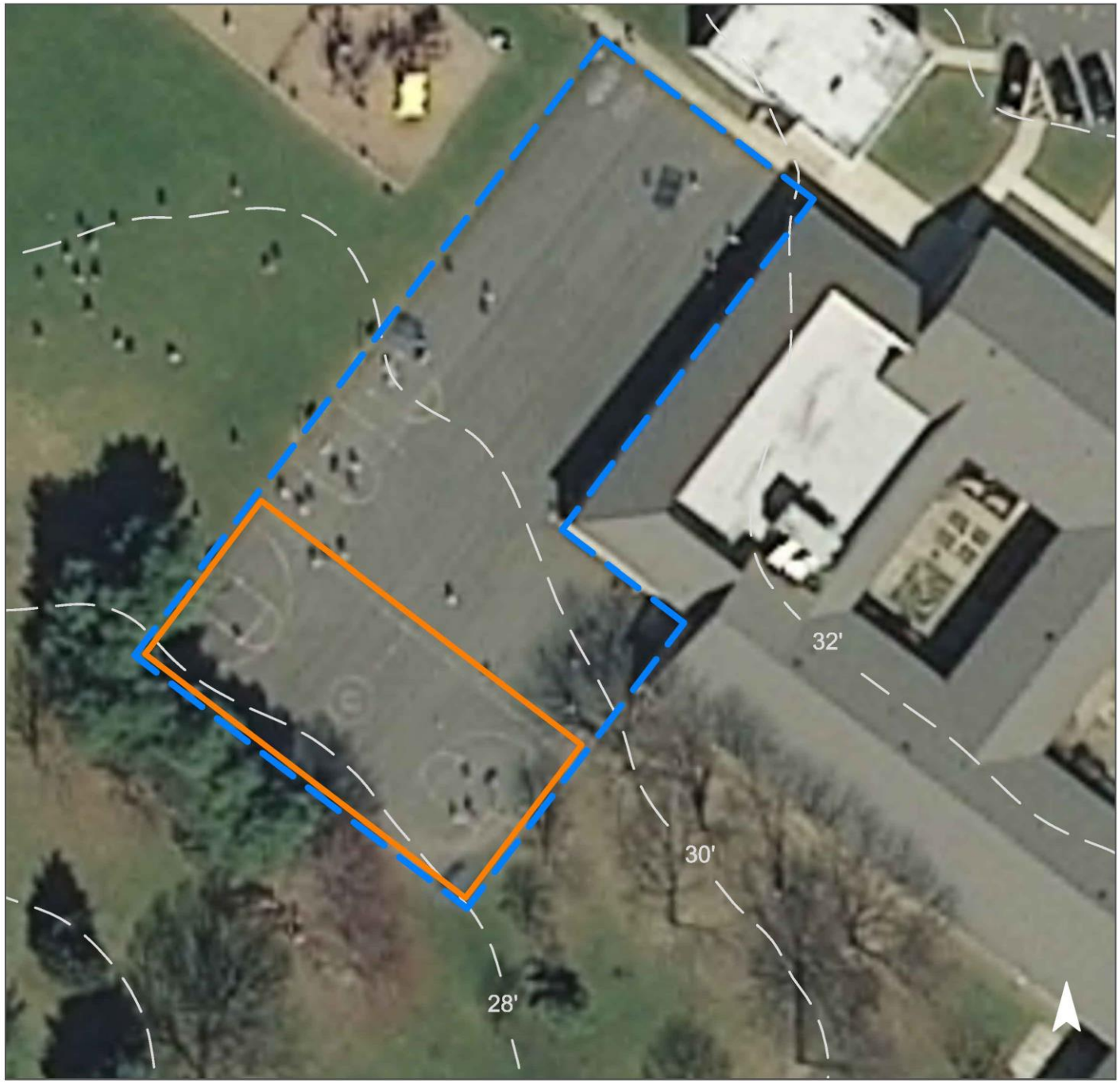
Block and Lot: Block 1201, Lot 19

Pervious pavement can be used to replace the existing asphalt playground to allow stormwater runoff an opportunity to infiltrate. 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"
24	161,299	7.8	81.5	740.6	0.126	4.42

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 pavements	0.465	78	35,255	1.32	5,318	$26,590

GREEN INFRASTRUCTURE RECOMMENDATIONS



Meadowbrook Elementary School

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

MONMOUTH GRACE UNITED METHODIST

Subwatershed: Parkers Creek / Oceanport Creek

Site Area: 227,492 sq. ft.

Address: 76 Wyckoff Road Eatontown, NJ 07724

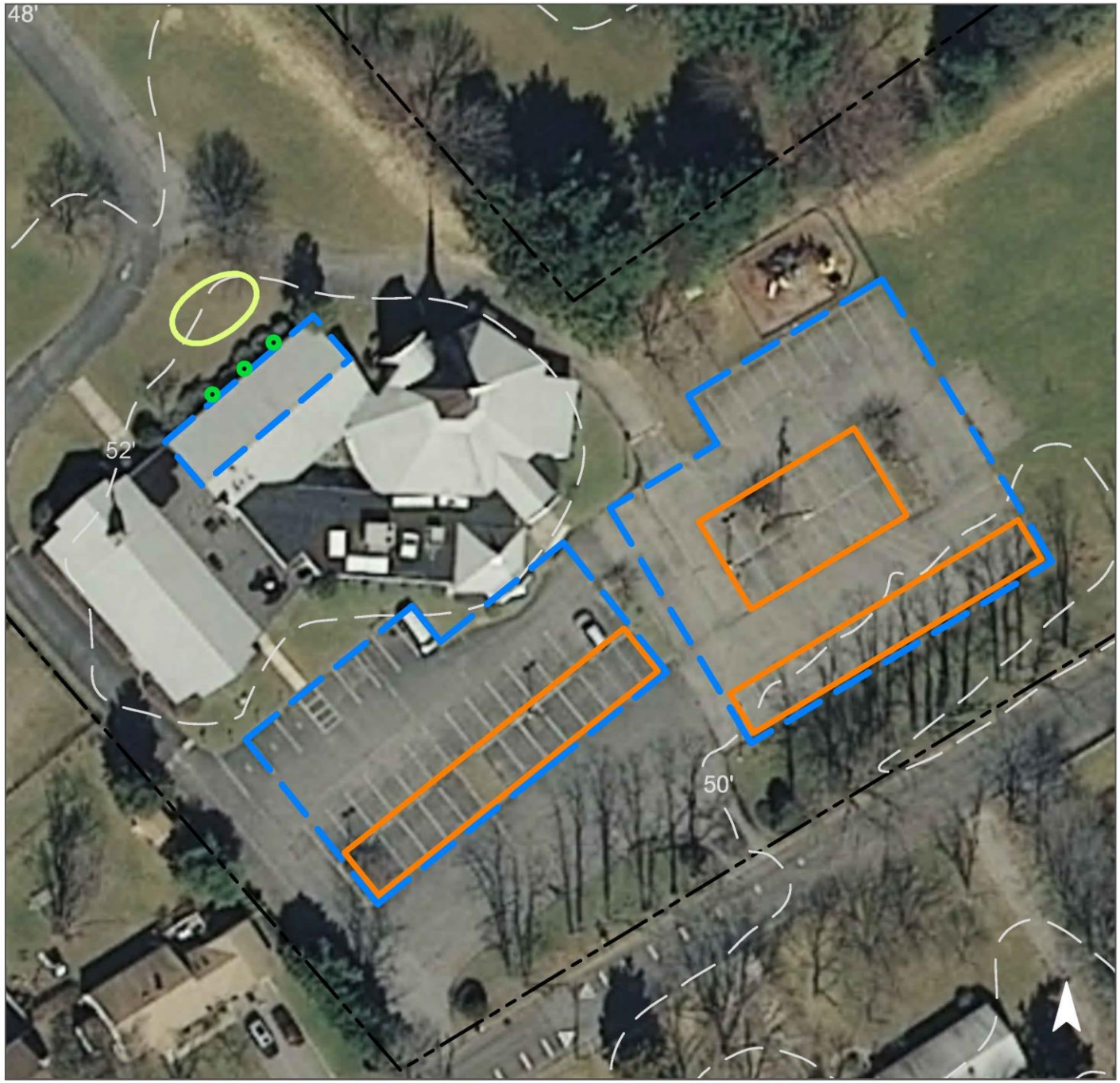
Block and Lot: Block 2501, Lot 11, 12, 33, 34

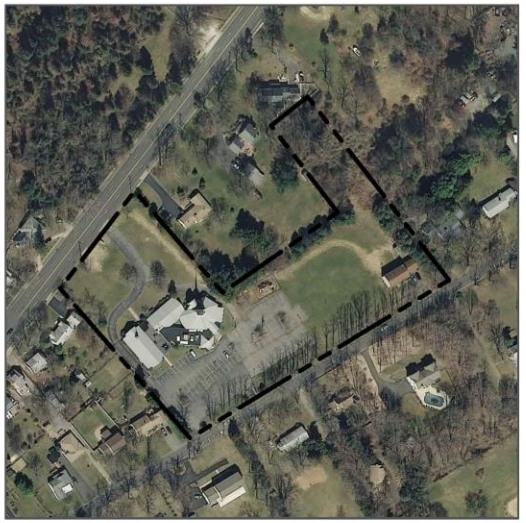
A rain garden can be built in the turf grass in front of the church to capture, treat, and infiltrate roof runoff. Sections of the parking lot can be repaved with porous asphalt to infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for 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"
40	90,881	4.4	45.9	417.3	0.071	2.49

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.045	7	3,375	0.13	628	$3,140
Pervious pavements	7.253	1,214	54,740	2.06	8,426	$210,650

GREEN INFRASTRUCTURE RECOMMENDATIONS





Monmouth Grace United Methodist Church

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

MUNICIPAL PARKING

Subwatershed: Parkers Creek / Oceanport Creek

Site Area: 12,250 sq. ft.

Address: 19 Lewis Street Eatontown, NJ 07724

Block and Lot: Block 401, Lot 67, 68

Parking spots can be replaced with porous asphalt 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"
86	10,500	0.5	5.3	48.2	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
Pervious pavements	0.140	17	7,910	0.30	1,787	$44,675

GREEN INFRASTRUCTURE RECOMMENDATIONS

Municipal Parking

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

SAINT JAMES MEMORIAL EPISCOPAL CHURCH

Subwatershed: Parkers Creek / Oceanport Creek

Site Area: 23,810 sq. ft.

Address: 69 Broad Street Eatontown, NJ 07724

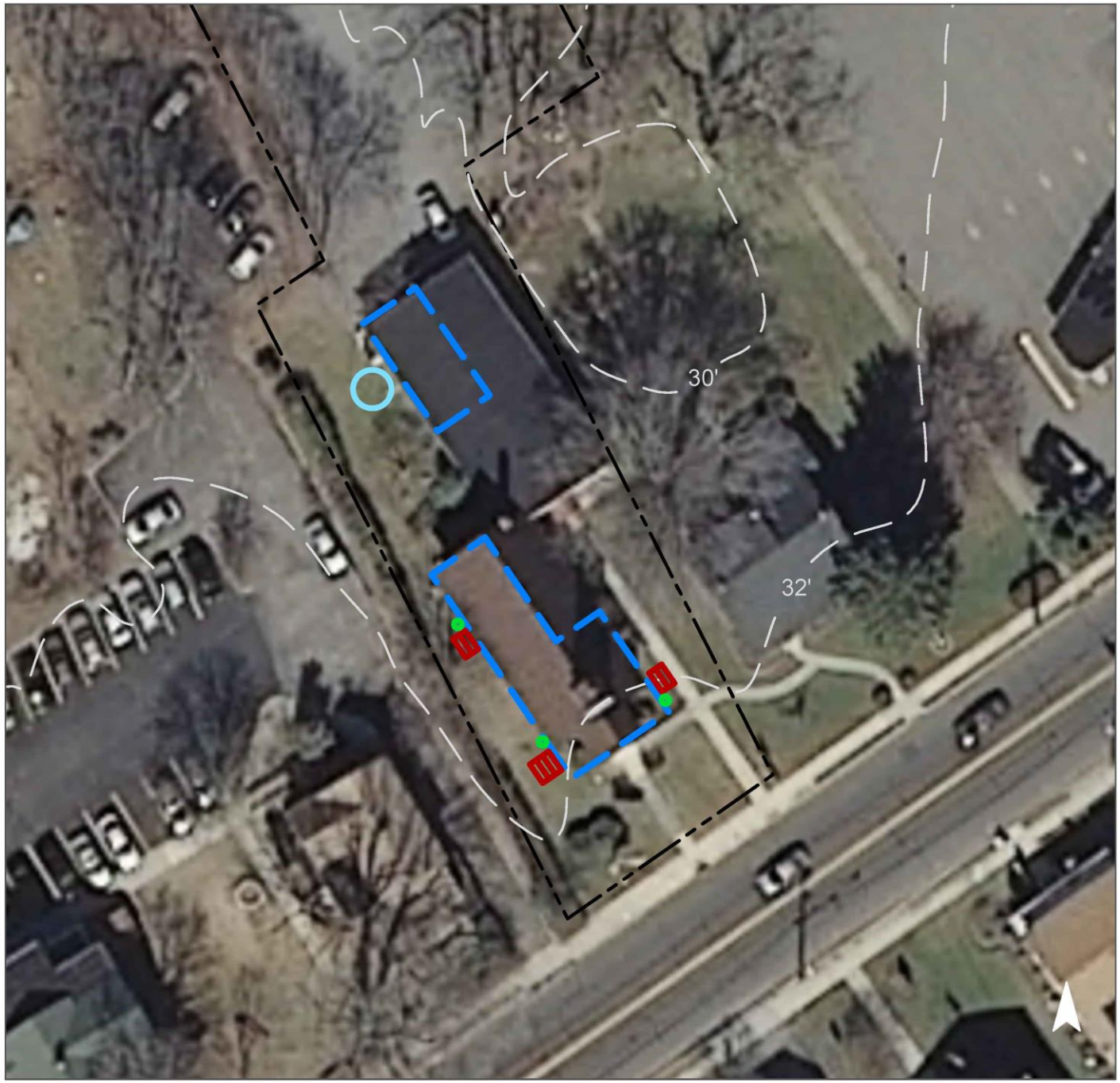
Block and Lot: Block 303, Lot 3, 19

Downspout planter boxes can be constructed around the building to allow roof runoff to be reused. Additionally, a cistern can be installed to harvest rainwater on the northwest side of the church. The water can be used to water the existing landscaping on the site. 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"
60	14,286	0.7	7.2	65.6	0.011	0.39

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
Downspout planter boxes	0.040	6	n/a	n/a	84	$7,000
Rainwater harvesting systems	0.015	2	1000	0.04	1000	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Saint James Memorial Episcopal Church

- disconnected downspouts
- downspout planter boxes
- rainwater harvesting
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

WOLCOTT PARK

Subwatershed: Parkers Creek / Oceanport Creek

Site Area: 475,872 sq. ft.

Address: 99 Willow Street Eatontown, NJ 07724

Block and Lot: Block 902, Lot 37

Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. On the west side of the bathroom facilities building a rain garden can be installed to capture roof runoff by disconnecting and redirecting the nearby downspout into it. 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	47,769	2.3	24.1	219.3	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	0.010	2	755	0.03	100	$500
Pervious pavements	0.172	29	13,010	0.49	1,840	$46,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Wolcott Park

- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

HAWKSWOOD SCHOOL

Subwatershed: **Whale Pond Brook**

Site Area: **688,013 sq. ft.**

Address: **270 Industrial Way West**
Eatontown, NJ 07724

Block and Lot: **Block 3502, Lot 5**

Rain gardens can be installed to capture, treat, and infiltrate roof runoff. Multiple rows of parking spaces can be replaced with porous asphalt to provide stormwater generated by the parking lot an opportunity to infiltrate. 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"
54	370,831	17.9	187.3	1702.6	0.289	10.17

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.349	58	25,435	0.99	3,678	$18,390
Pervious pavements	4.622	774	350,185	13.15	45,382	$1,134,550

GREEN INFRASTRUCTURE RECOMMENDATIONS

Hawkswood School

- disconnected downspouts
- pervious pavements
- bioretention / rain gardens
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 30' 60'

ILLANOS CAFE

Subwatershed: **Whale Pond Brook**

Site Area: **92,656 sq. ft.**

Address: **1 Corbett Way**
Eatontown, NJ 07724

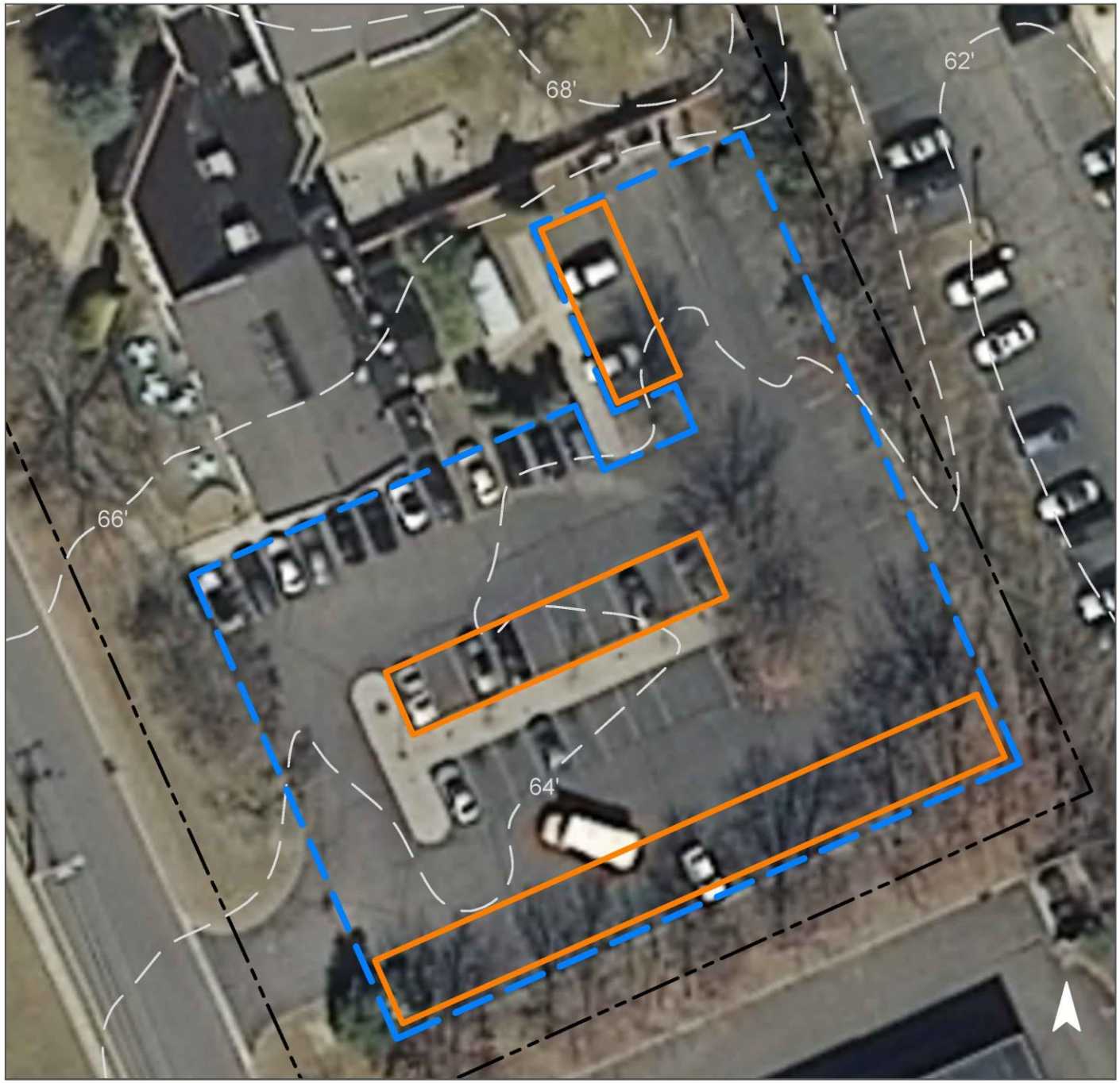
Block and Lot: **Block 3601, Lot 18**

Parking spaces can be replaced with pervious pavement 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"
72	66,935	3.2	33.8	307.3	0.052	1.84

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.683	114	51,710	1.94	5,615	$140,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Illanos Cafe

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 20' 40'

RELIABLE COURIERS

Subwatershed: Whale Pond Brook

Site Area: 313,896 sq. ft.

Address: 12 Christopher Way
Eatontown, NJ 07724

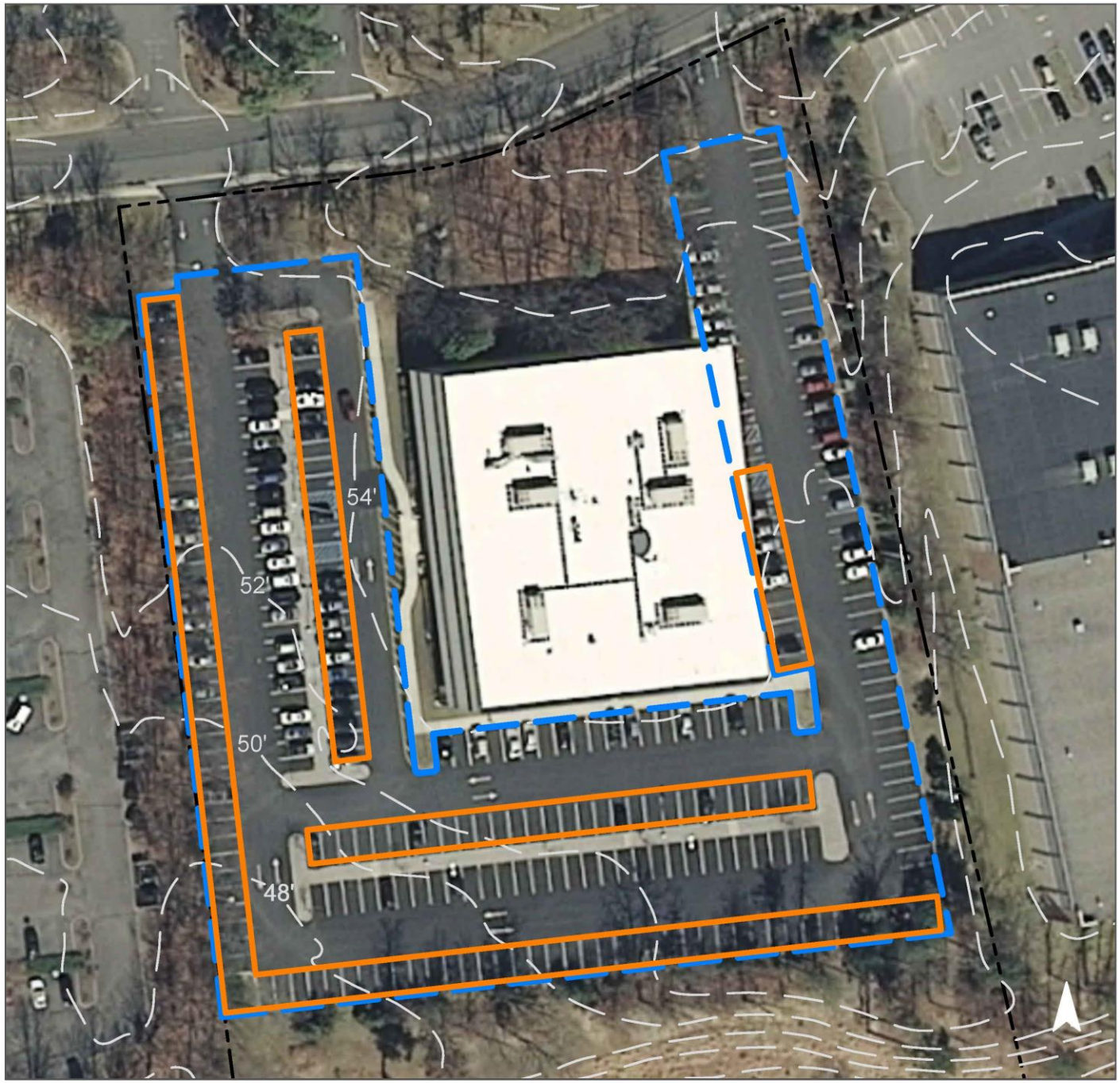
Block and Lot: Block 3901, Lot 45

Parking spaces can be replaced with pervious pavement 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"
51	158,823	7.7	80.2	729.2	0.124	4.36

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 pavements	2.542	426	192,575	7.23	23,975	$599,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Reliable Couriers

- pervious pavements
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 40' 80'

WOODMERE ELEMENTARY SCHOOL

Subwatershed: **Whale Pond Brook**

Site Area: **541,939 sq. ft.**

Address: **65 Raleigh Court**
Eatontown, NJ 07724

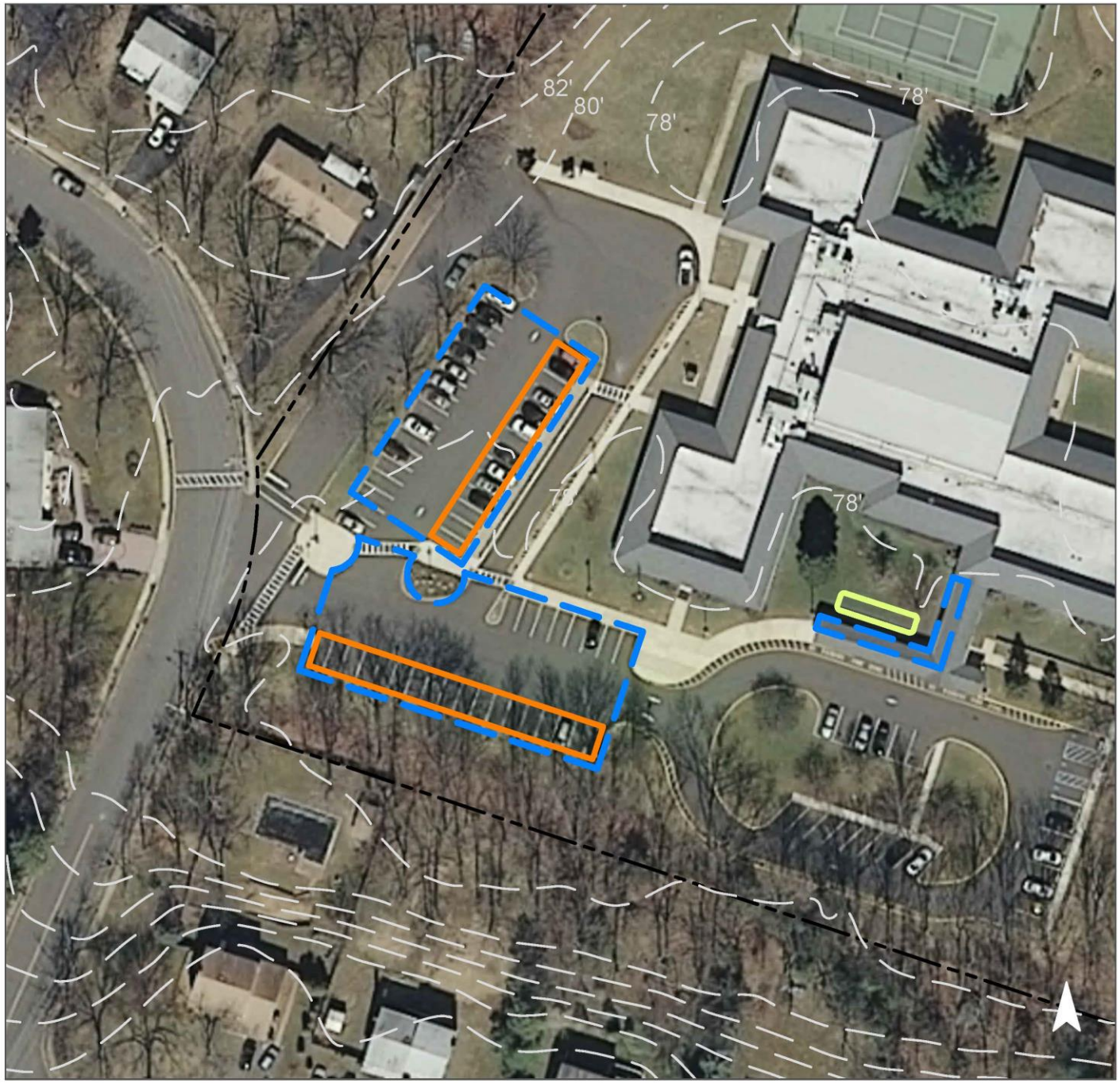
Block and Lot: **Block 3401, Lot 8**

Two rows of parking can be replaced using pervious pavement to provide stormwater an opportunity to infiltrate. A rain garden can be built on the south side of the school to capture, treat and infiltrate runoff from the walkway pavilion. 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"
26	138,553	6.7	70.0	636.1	0.108	3.80

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.021	4	1,620	0.06	390	$1,950
Pervious pavements	0.541	91	41,000	1.54	1,840	$46,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Woodmere Elementary School

- pervious pavements
- bioretention / rain gardens
- drainage areas
- 2012 Aerial: NJOIT, OGIS

0 40' 80'

c. Summary of Existing Conditions

Summary of Existing Site Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	Existing Annual Loads TN (lb/yr)	Existing Annual Loads TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
BRANCHPORT CREEK SUBWATERSHED	**1.71**	**74,284**			**2.8**	**29.6**	**268.8**		**1.34**	**58,536**	**0.046**	**1.61**
Kindercare Learning Center												
Total Site Info	1.71	74,284	3,901	1	2.8	29.6	268.8	79	1.34	58,536	0.046	1.61
PARKERS CREEK/ OCEANPORT CREEK SUBWATERSHED	**57.33**	**2,497,496**			**32.7**	**342.8**	**3,116.5**		**15.58**	**678,780**	**0.529**	**18.62**
Immaculate Conception Korean												
Total Site Info	0.86	37,260	1,002	1	1.1	11.3	102.6	60	0.51	22,356	0.017	0.61
Margaret L. Vetter Elementary School / Memorial Middle School												
Total Site Info	24.42	1,063,688	1,501	1	16.0	167.5	1,522.9	31	7.61	331,689	0.258	9.10
Meadowbrook Elementary School												
Total Site Info	15.09	657,125	1,201	19	7.8	81.5	740.6	25	3.70	161,299	0.126	4.42
Monmouth Grace United Methodist Church												
Total Site Info	5.22	227,492	2,501	11,12,33,34	4.4	45.9	417.3	40	2.09	90,881	0.071	2.49
Municipal Parking												
Total Site Info	0.28	12,250	401	67,68	0.5	5.3	48.2	86	0.24	10,500	0.008	0.29
Saint James Memorial Episcopal Church												
Total Site Info	0.55	23,810	303	3,19	0.7	7.2	65.6	60	0.33	14,286	0.011	0.39
Wolcott Park												
Total Site Info	10.92	475,872	902	37	2.3	24.1	219.3	10	1.10	47,769	0.037	1.31
WHALE POND BROOK SUBWATERSHED	**37.57**	**1,636,505**			**35.4**	**371.3**	**3,375.3**		**16.88**	**735,143**	**0.573**	**20.16**
Hawkswood School												
Total Site Info	15.79	688,013	3,502	5	17.9	187.3	1,702.6	54	8.51	370,831	0.289	10.17
Illanos Café												
Total Site Info	2.13	92,656	3,601	18	3.2	33.8	307.3	72	1.54	66,935	0.052	1.84

Summary of Existing Site Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads			I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C.	
					TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)				Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
Reliable Couriers												
Total Site Info	7.21	313,896	3,901	45	7.7	80.2	729.2	51	3.65	158,823	0.124	4.36
Woodmere Elementary School												
Total Site Info	12.44	541,939	3,401	8	6.7	70.0	636.1	26	3.18	138,553	0.108	3.80

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
		Area (SF)	Area (ac)									
	BRANCHPORT CREEK SUBWATERSHED	**14,600**	**0.34**	**0.380**	**63**	**27,140**	**1.02**	**3,883**			**$99,875**	**24.9%**
1	**Kindercare Learning Center**											
	Downspout planter boxes	850	0.02	0.022	3	n/a	n/a	48	1,000	box	$4,000	1.5%
	Pervious pavements	13,750	0.32	0.358	60	27,140	1.02	3,835	25	SF	$95,875	23.5%
	Total Site Info	**14,600**	**0.34**	**0.380**	**63**	**27,140**	**1.02**	**3,883**			**$99,875**	**24.9%**
	PARKERS CREEK/ OCEANPORT CREEK SUBWATERSHED	**105,337**	**2.42**	**2.745**	**458**	**200,937**	**7.64**	**31,918**			**$520,330**	**15.1%**
2	**Immaculate Conception Korean**											
	Bioretention systems/rain gardens	1,320	0.03	0.034	6	2,600	0.10	345	5	SF	$1,725	5.9%
	Pervious pavements	15,200	0.35	0.396	66	30,010	1.13	4,769	25	SF	$119,225	68.0%
	Total Site Info	**16,520**	**0.38**	**0.430**	**72**	**32,610**	**1.23**	**5,114**			**$120,950**	**73.9%**
3	**Margaret L. Vetter Elementary School / Memorial Middle School**											
	Bioretention systems/rain gardens	24,830	0.57	0.647	108	47,467	1.84	6,725	5	SF	$33,625	7.5%
	Downspout planter boxes	850	0.02	0.022	3	n/a	n/a	48	1,000	box	$4,000	0.3%
	Pervious pavements	2,645	0.06	0.069	12	5,215	0.20	848	25	SF	$21,200	0.8%
	Total Site Info	**28,325**	**0.65**	**0.738**	**123**	**52,682**	**2.04**	**7,621**			**$58,825**	**8.5%**
4	**Meadowbrook Elementary School**											
	Pervious pavements	17,860	0.41	0.465	78	35,255	1.32	5,318	5	SF	$26,590	11.1%
	Total Site Info	**17,860**	**0.41**	**0.465**	**78**	**35,255**	**1.32**	**5,318**			**$26,590**	**11.1%**
5	**Monmouth Grace United Methodist Church**											
	Bioretention systems/rain gardens	1,710	0.04	0.045	7	3,375	0.13	628	5	SF	$3,140	1.5%
	Pervious pavements	27,833	0.64	0.725	121	54,740	2.06	8,426	25	SF	$210,650	25.0%
	Total Site Info	**29,543**	**0.68**	**0.770**	**129**	**58,115**	**2.19**	**9,054**			**$213,790**	**26.5%**
6	**Municipal Parking**											
	Pervious pavements	4,005	0.09	0.104	17	7,910	0.30	1,787	25	SF	$44,675	38.1%
	Total Site Info	**4,005**	**0.09**	**0.104**	**17**	**7,910**	**0.30**	**1,787**			**$44,675**	**38.1%**
7	**Saint James Memorial Episcopal Church**											
	Rainwater harvesting systems	570	0.01	0.015	2	600	0.04	1,000	2	gal	$2,000	4.0%
	Downspout planter boxes	1,540	0.04	0.040	6	n/a	n/a	84	1,000	box	$7,000	10.8%
	Total Site Info	**2,110**	**0.05**	**0.055**	**8**	**600**	**0.04**	**1,084**			**$9,000**	**14.8%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
		Area (SF)	Area (ac)									
8	**Wolcott Park**											
	Bioretention systems/rain gardens	384	0.01	0.010	2	755	0.03	100	5	SF	$500	0.8%
	Pervious pavements	6,590	0.15	0.172	29	13,010	0.49	1,840	25	SF	$46,000	13.8%
	Total Site Info	**6,974**	**0.16**	**0.182**	**30**	**13,765**	**0.52**	**1,940**			**$46,500**	**14.6%**
	WHALE POND BROOK SUBWATERSHED	**336,130**	**7.72**	**8.758**	**1,466**	**663,525**	**24.91**	**80,880**			**$1,940,640**	**20.5%**
9	**Hawkswood School**											
	Bioretention systems/rain gardens	13,390	0.31	0.349	58	26,435	0.99	3,678	5	SF	$18,390	3.6%
	Pervious pavements	177,400	4.07	4.622	774	350,185	13.15	45,382	25	SF	$1,134,550	47.8%
	Total Site Info	**190,790**	**4.38**	**4.971**	**832**	**376,620**	**14.14**	**49,060**			**$1,152,940**	**51.4%**
10	**Illanos Café**											
	Pervious pavements	26,195	0.60	0.683	114	51,710	1.94	5,615	25	SF	$140,375	39.1%
	Total Site Info	**26,195**	**0.60**	**0.683**	**114**	**51,710**	**1.94**	**5,615**			**$140,375**	**39.1%**
11	**Reliable Couriers**											
	Pervious pavements	97,555	2.24	2.542	426	192,575	7.23	23,975	25	SF	$599,375	61.4%
	Total Site Info	**97,555**	**2.24**	**2.542**	**426**	**192,575**	**7.23**	**23,975**			**$599,375**	**61.4%**
12	**Woodmere Elementary School**											
	Bioretention systems/rain gardens	820	0.02	0.021	4	1,620	0.06	390	5	SF	$1,950	0.6%
	Pervious pavements	20,770	0.48	0.541	91	41,000	1.54	1,840	25	SF	$46,000	15.0%
	Total Site Info	**21,590**	**0.50**	**0.563**	**94**	**42,620**	**1.60**	**2,230**			**$47,950**	**15.6%**