Draft

Impervious Cover Reduction Action Plan for West Long Branch Borough, Monmouth County, New Jersey

Prepared for West Long Branch Borough by the Rutgers Cooperative Extension Water Resources Program

February 8, 2016

Table of Contents

Introduction

Located in Somerset County in central New Jersey, West Long Branch Borough covers approximately 2.9 square miles west of the City of Long Branch. Figures 1 and 2 illustrate that West Long Branch Borough is dominated by urban land use. A total of 90.6% of the municipality's land use is classified as urban. Of the urban land use in West Long Branch Borough, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection (NJDEP) 2007 land use/land cover geographical information system (GIS) data layer categorizes West Long Branch 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 West Long Branch Borough. Based upon the NJDEP 2007 land use/land cover data, approximately 32.3% of West Long Branch Borough has impervious cover. This level of impervious cover suggests that the streams in West Long Branch Borough are likely non-supporting.[1]

Methodology

West Long Branch Borough contains portions of two 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

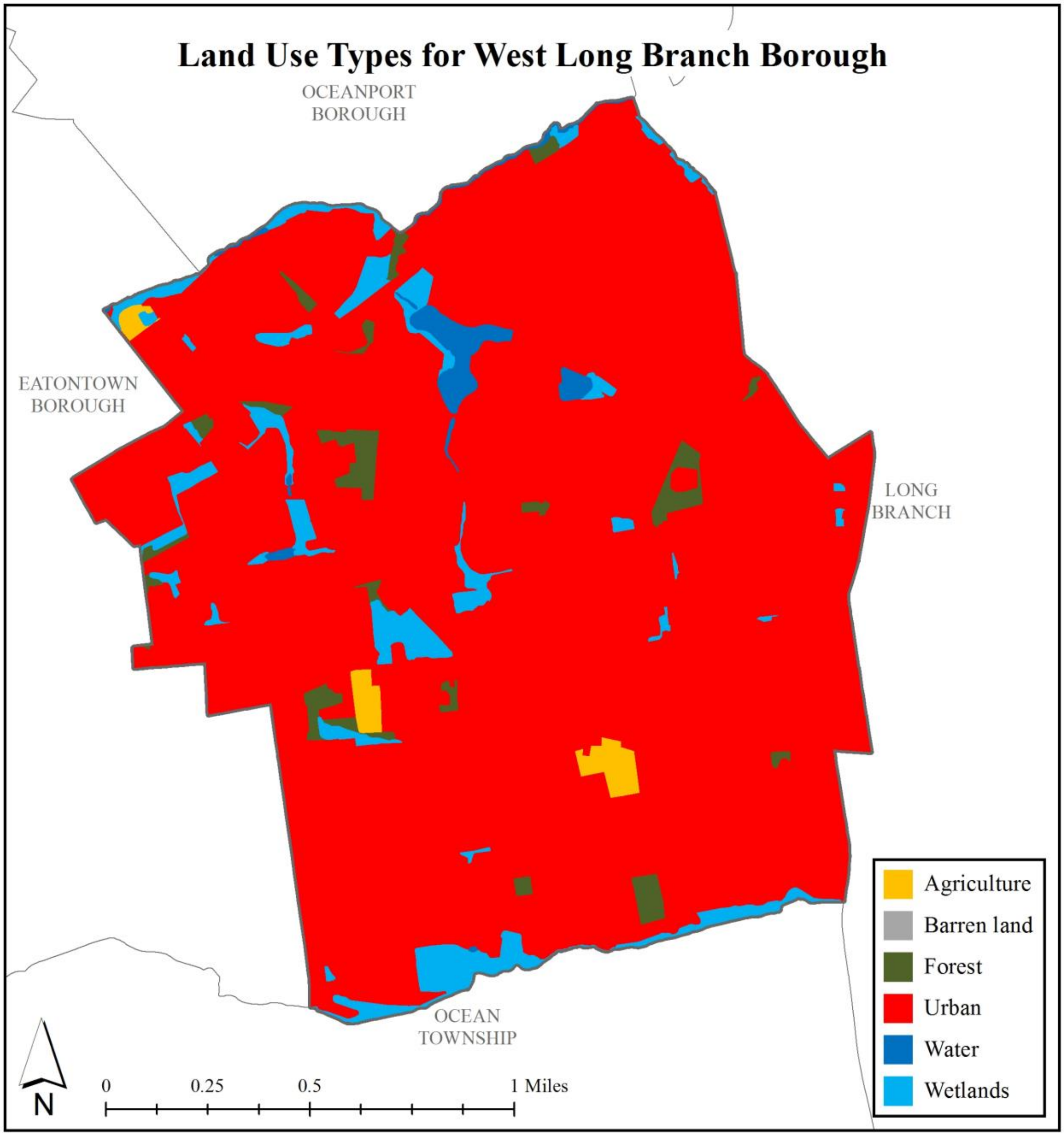


Figure 1: Map illustrating the land use in West Long Branch Borough

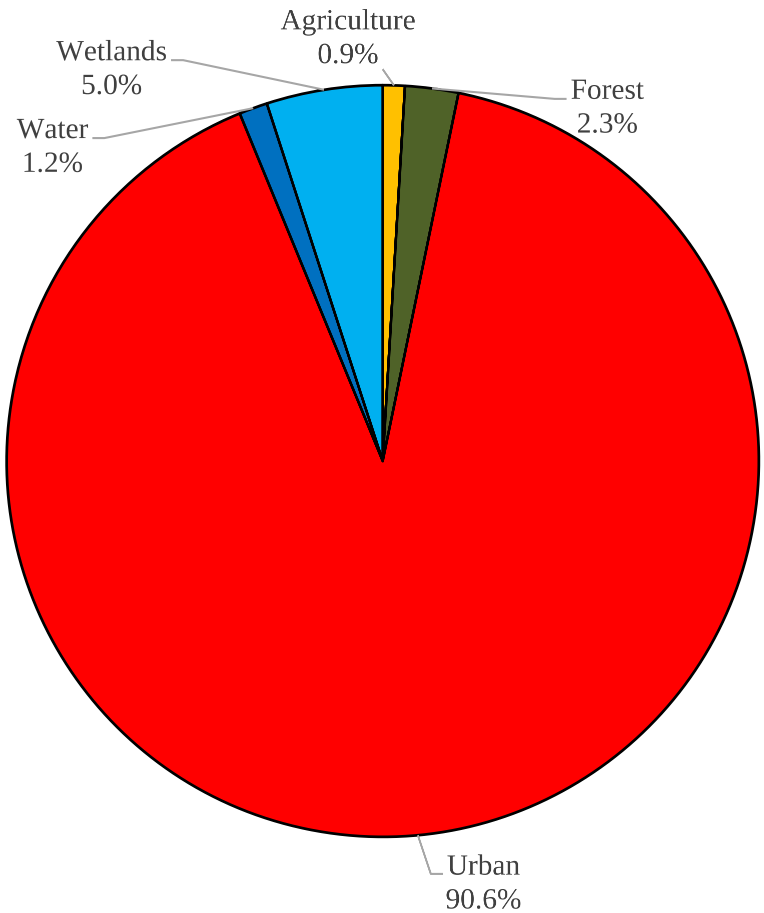


Figure 2: Pie chart illustrating the land use in West Long Branch Borough

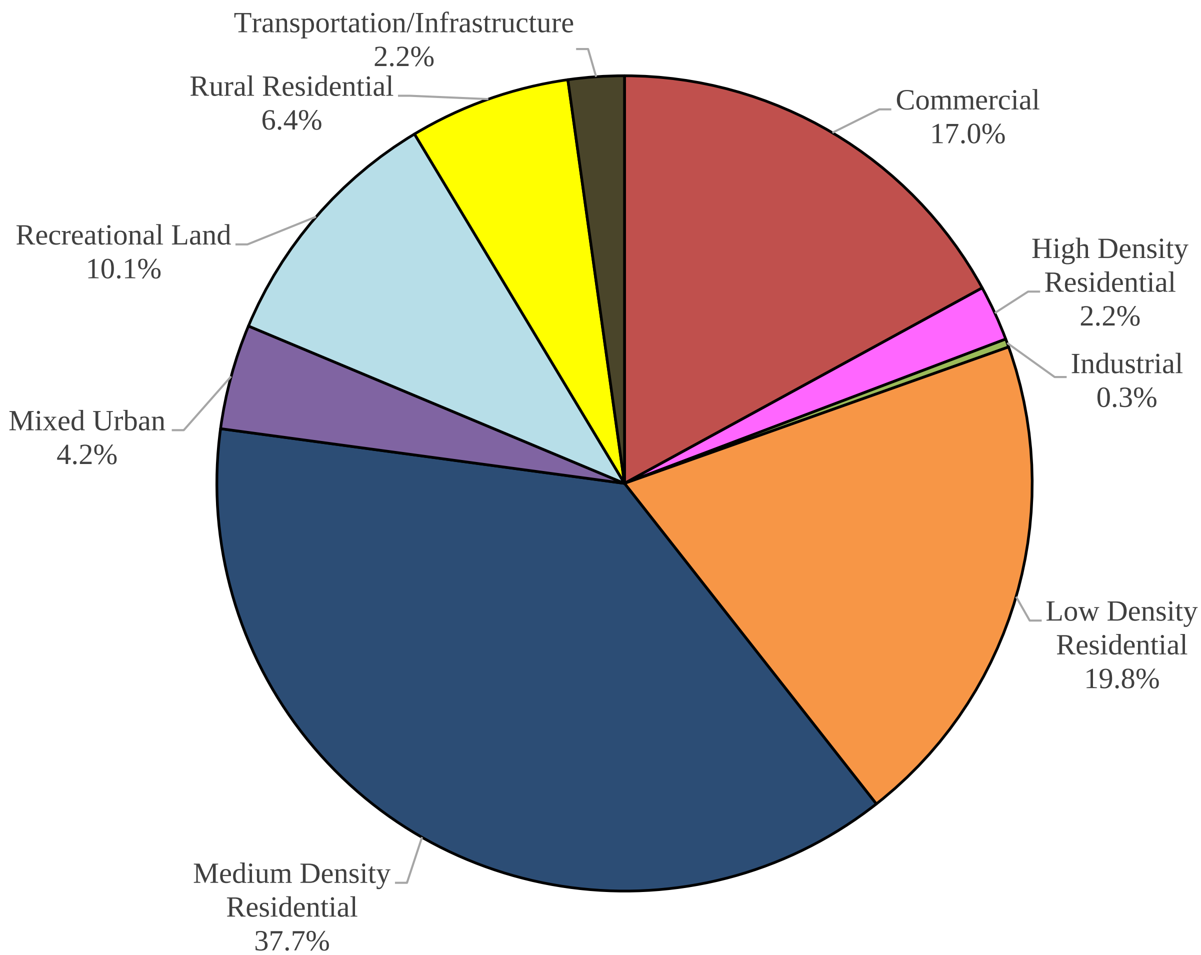


Figure 3: Pie chart illustrating the various types of urban land use in West Long Branch Borough

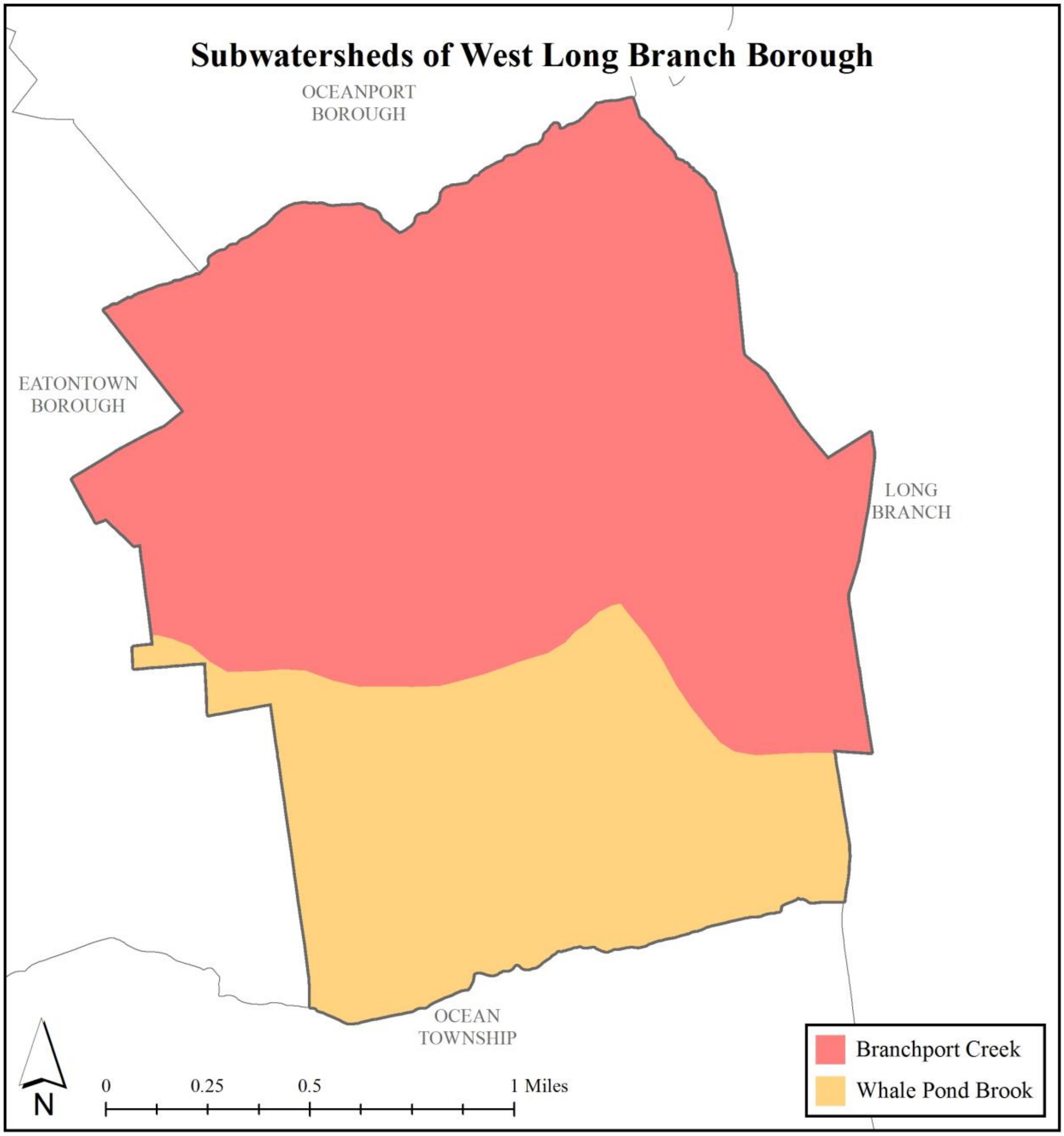


Figure 4: Map of the subwatersheds in West Long Branch Borough

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 West Long Branch 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 West Long Branch 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 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*.

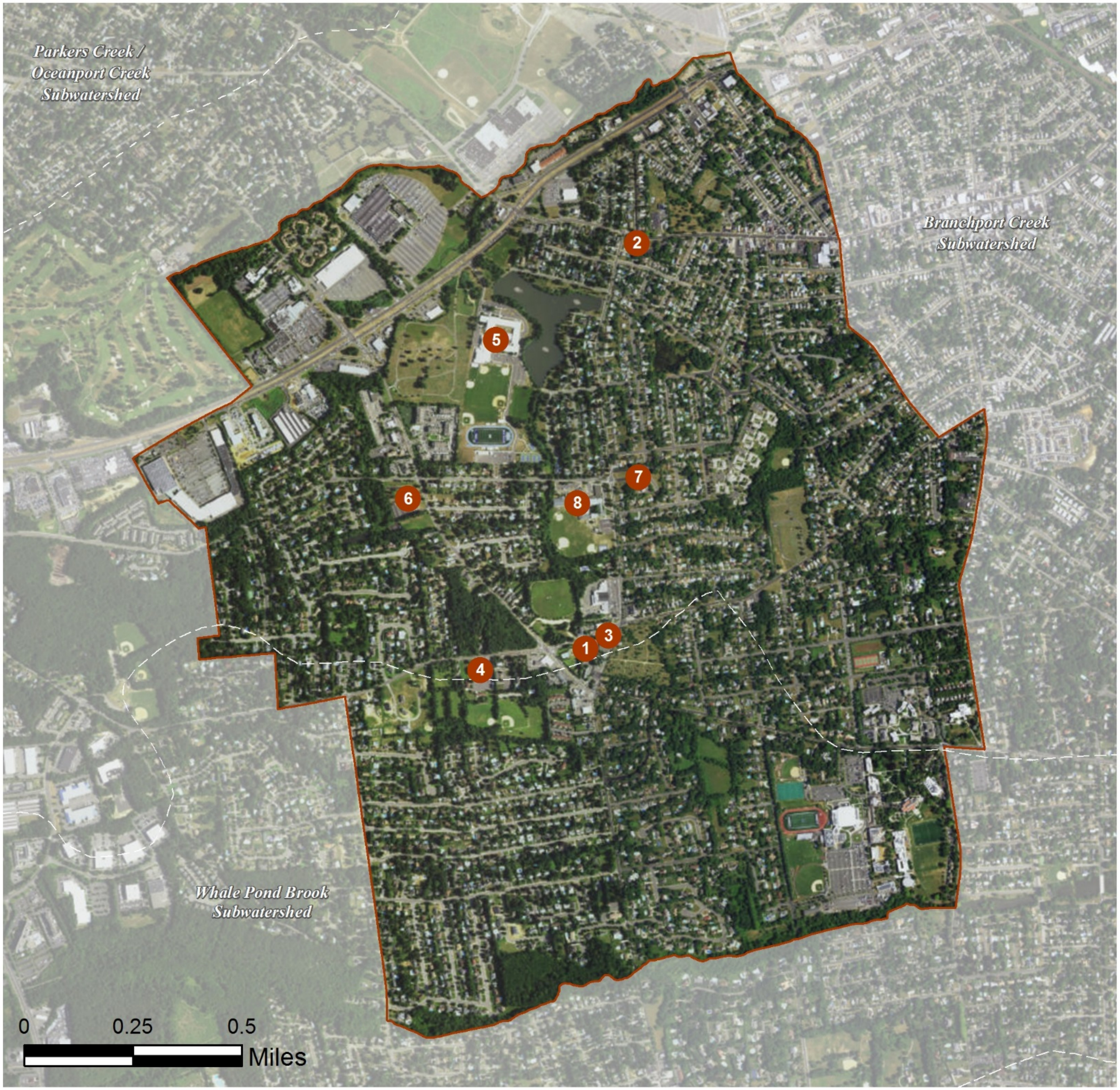
Conclusion

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

WEST LONG BRANCH BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BRANCHPORT CREEK SUBWATERSHED:

1. Frank Antonides Elementary School
2. Lutheran Church Reformation
3. Old First United Methodist Church
4. Saint Jerome's Catholic Church and School
5. Shore Regional High School
6. Sovereign Bank
7. West Long Branch Community Center
8. West Long Branch Public School

b. Proposed Green Infrastructure Concepts

FRANK ANTONIDES ELEMENTARY SCHOOL

Subwatershed: Branchport Creek

Site Area: 107,870 sq. ft.

Address: 198-208 Wall Street
West Long Branch, NJ 07764

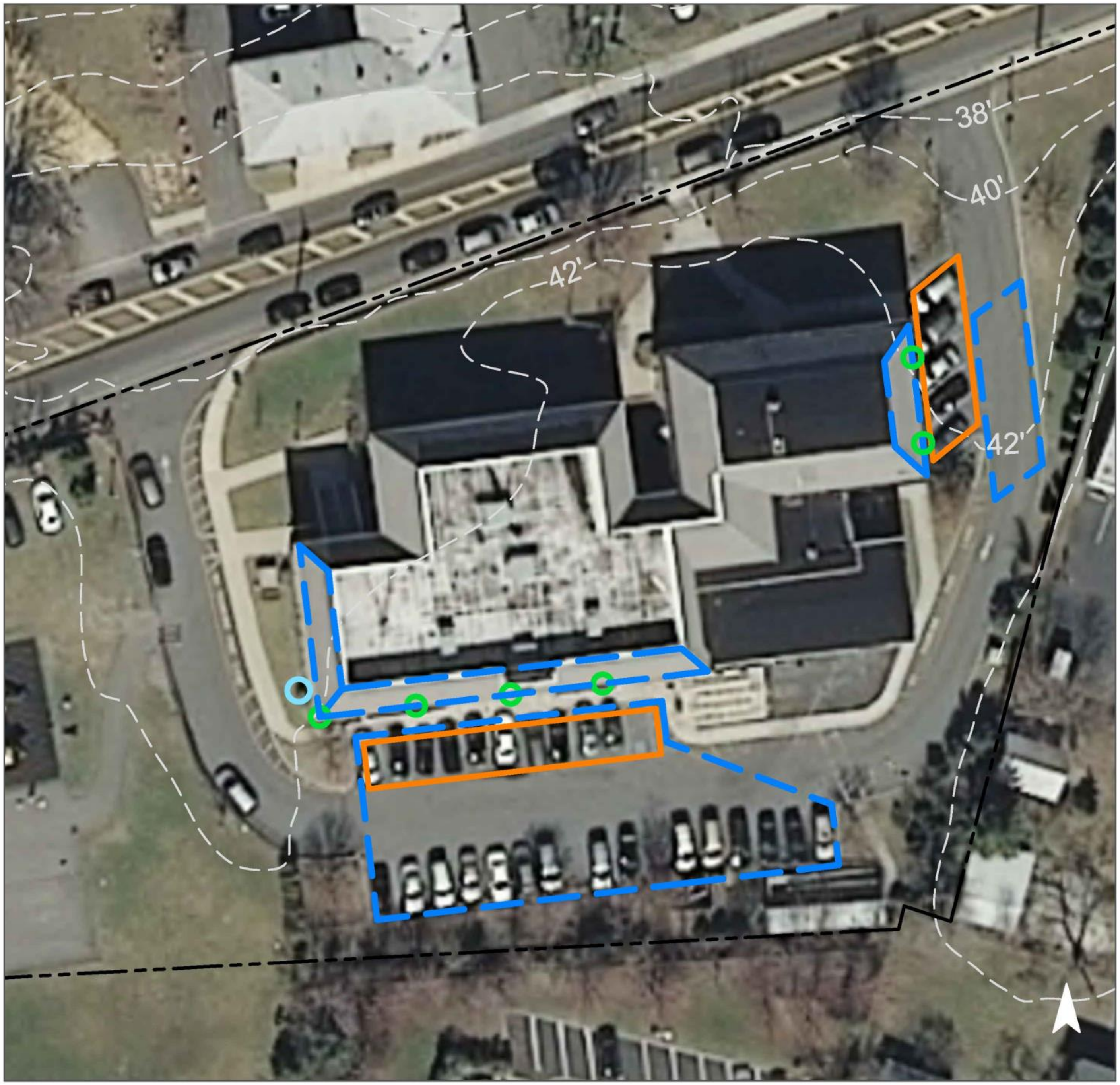
Block and Lot: Block 20, Lot 13, 15

Parking spots can be replaced with pervious pavement to capture and infiltrate parking lot and roof runoff. A cistern can be installed adjacent to the building to harvest rainwater that can be used to conduct car wash fundraisers 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"
56	60,568	2.9	30.6	278.1	0.047	1.66

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.238	40	18,057	0.49	2,340	$58,500
Rainwater harvesting systems	0.036	6	1,000	0.08	1,000 (gal)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frank Antonides Elementary School

disconnected downspouts
pervious pavements
rainwater harvesting
drainage areas
property line
2012 Aerial: NJOIT, OGIS

0 25' 50'

LUTHERAN CHURCH REFORMATION

Subwatershed: Branchport Creek

Site Area: 75,879 sq. ft.

Address: 992 Broadway Road
West Long Branch, NJ 07764

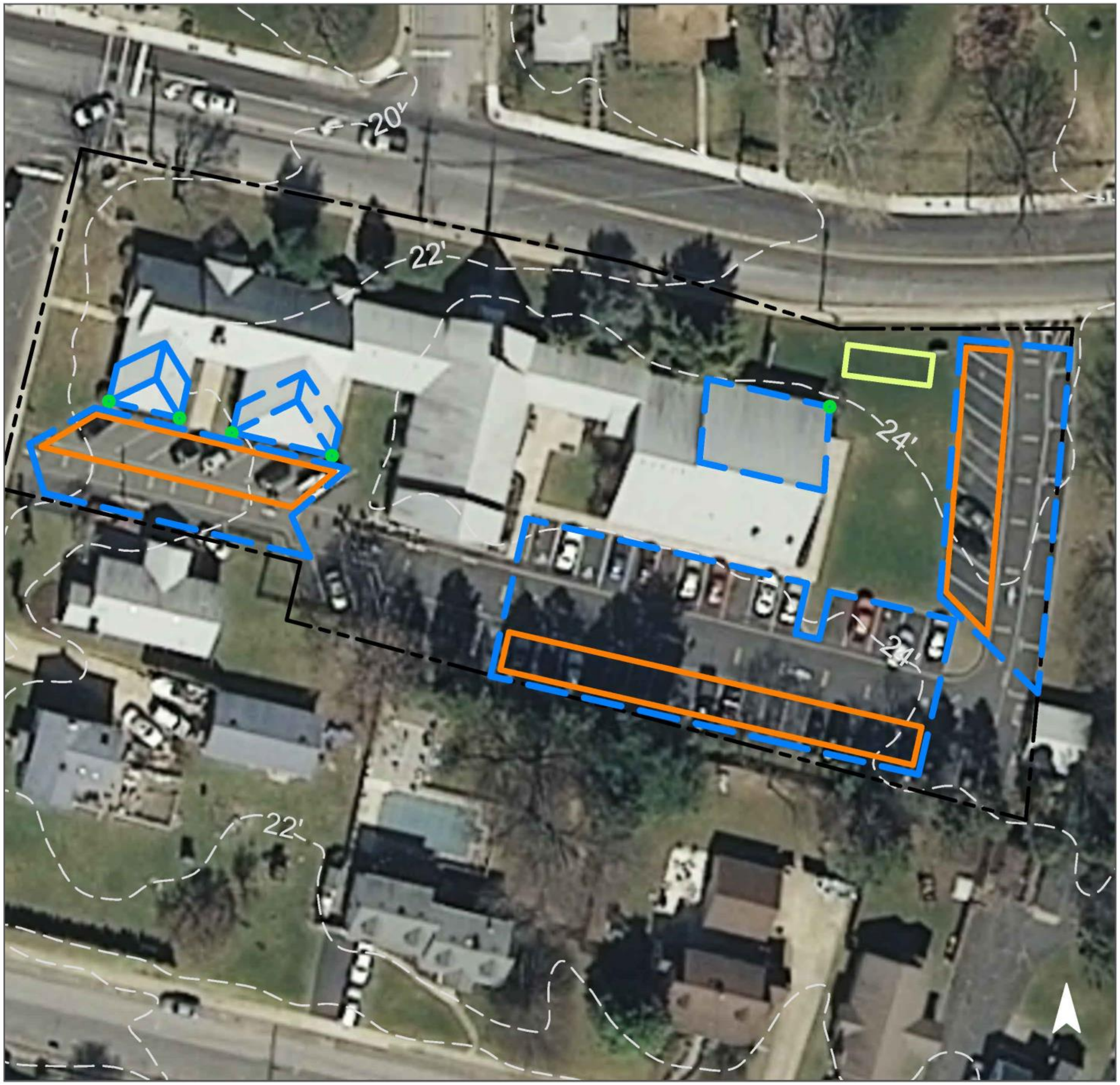
Block and Lot: Block 79, Lot 2, 3, 4

Parking spots can be replaced with pervious pavement to capture and infiltrate stormwater. A rain garden can be installed off of the northeast corner of the church to capture, treat, and infiltrate runoff. 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"
80	60,700	2.9	30.7	278.7	0.047	1.66

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.042	7	3,194	0.09	400	$2,000
Pervious pavements	0.547	92	41,439	1.13	6,100	$152,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Lutheran Church Reformation

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

0 30' 60'

OLD FIRST UNITED METHODIST CHURCH

Subwatershed: Branchport Creek

Site Area: 42,414 sq. ft.

Address: 197 Locust Avenue
West Long Branch, NJ 07764

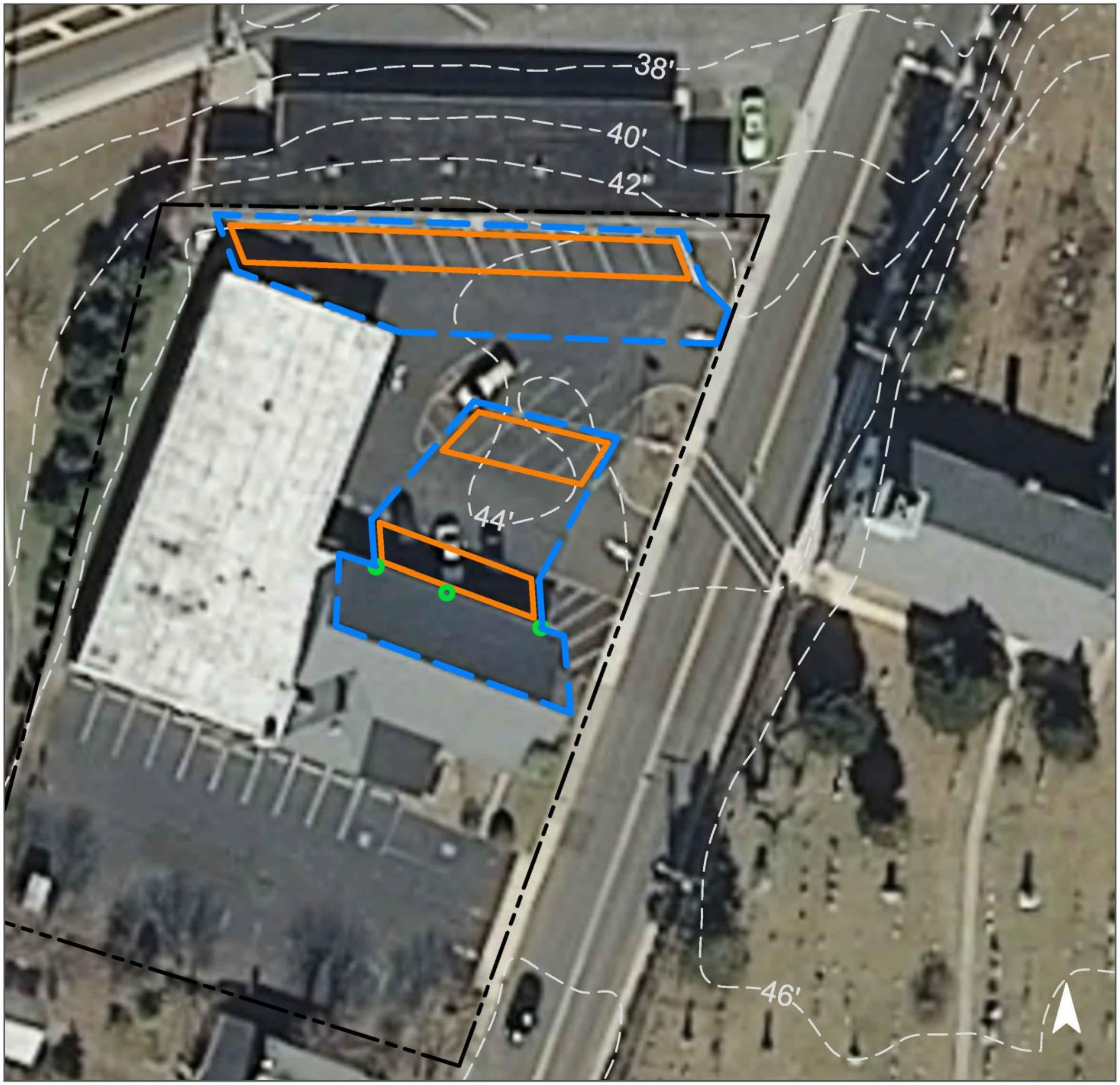
Block and Lot: Block 20, Lot 1, 2, 3

Pervious pavement can be used to replace existing parking spots to capture and infiltrate stormwater runoff. 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	40,275	1.9	20.3	184.9	0.031	1.10

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
Pervious pavements	0.175	29	13,217	0.36	1,950	$48,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Old First United Methodist Church

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

0 20' 40'

SAINT JEROME'S CATHOLIC CHURCH AND SCHOOL

Subwatershed: **Branchport Creek**

Site Area: **384,555 sq. ft.**

Address: **250 Wall Street**
West Long Branch, NJ 07764

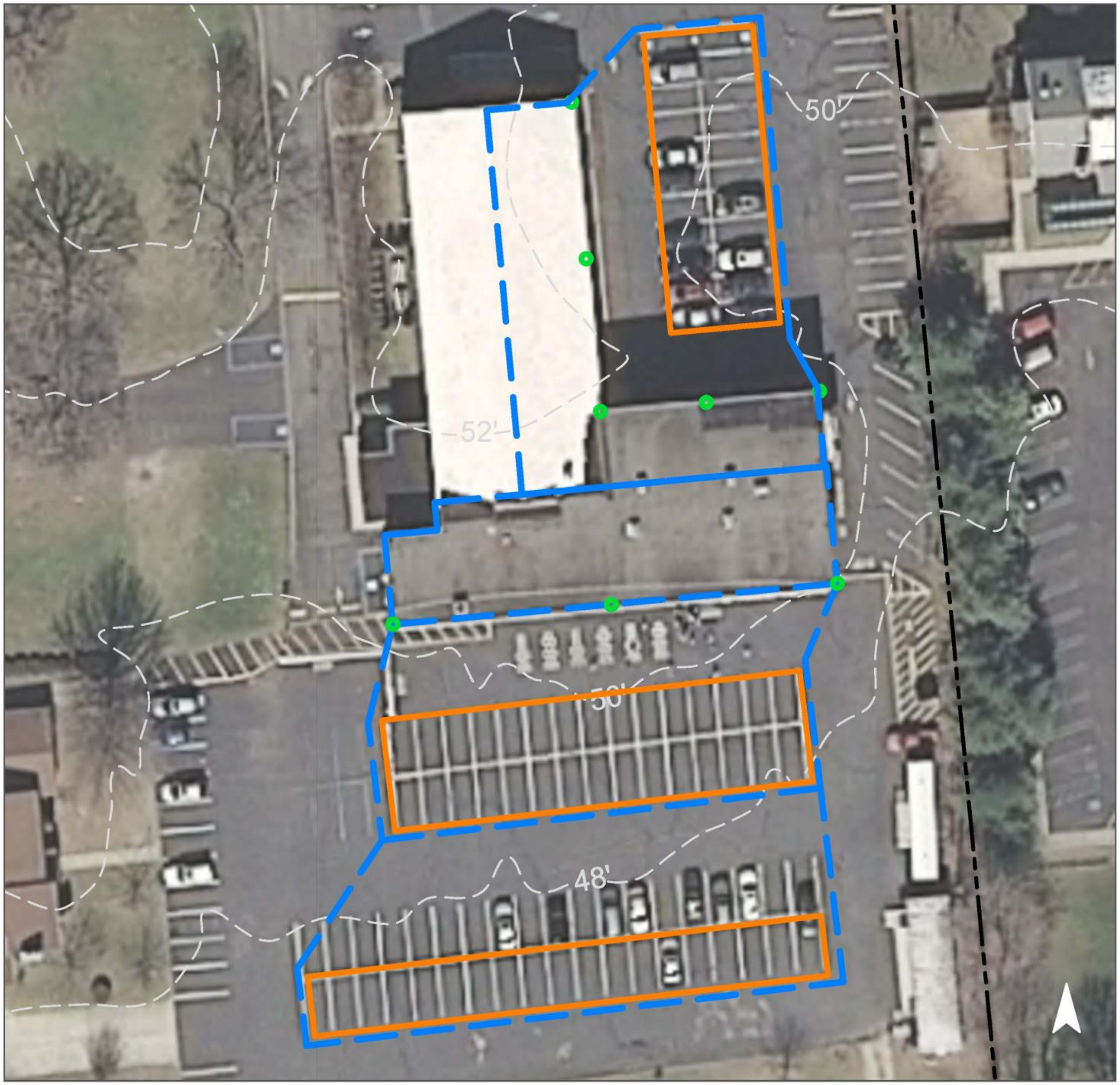
Block and Lot: **Block 60, Lot 83**

Several parking spots located in the east and south sections of the site 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"
26	100,997	4.9	51.0	463.7	0.079	2.77

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	1.015	170	76,835	2.09	11,900	$297,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Saint Jerome's Catholic Church and School

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

0 25' 50'

SHORE REGIONAL HIGH SCHOOL

Subwatershed: Branchport Creek

Site Area: 832,344 sq. ft.

Address: 132 NJ-36
West Long Branch, NJ 07764

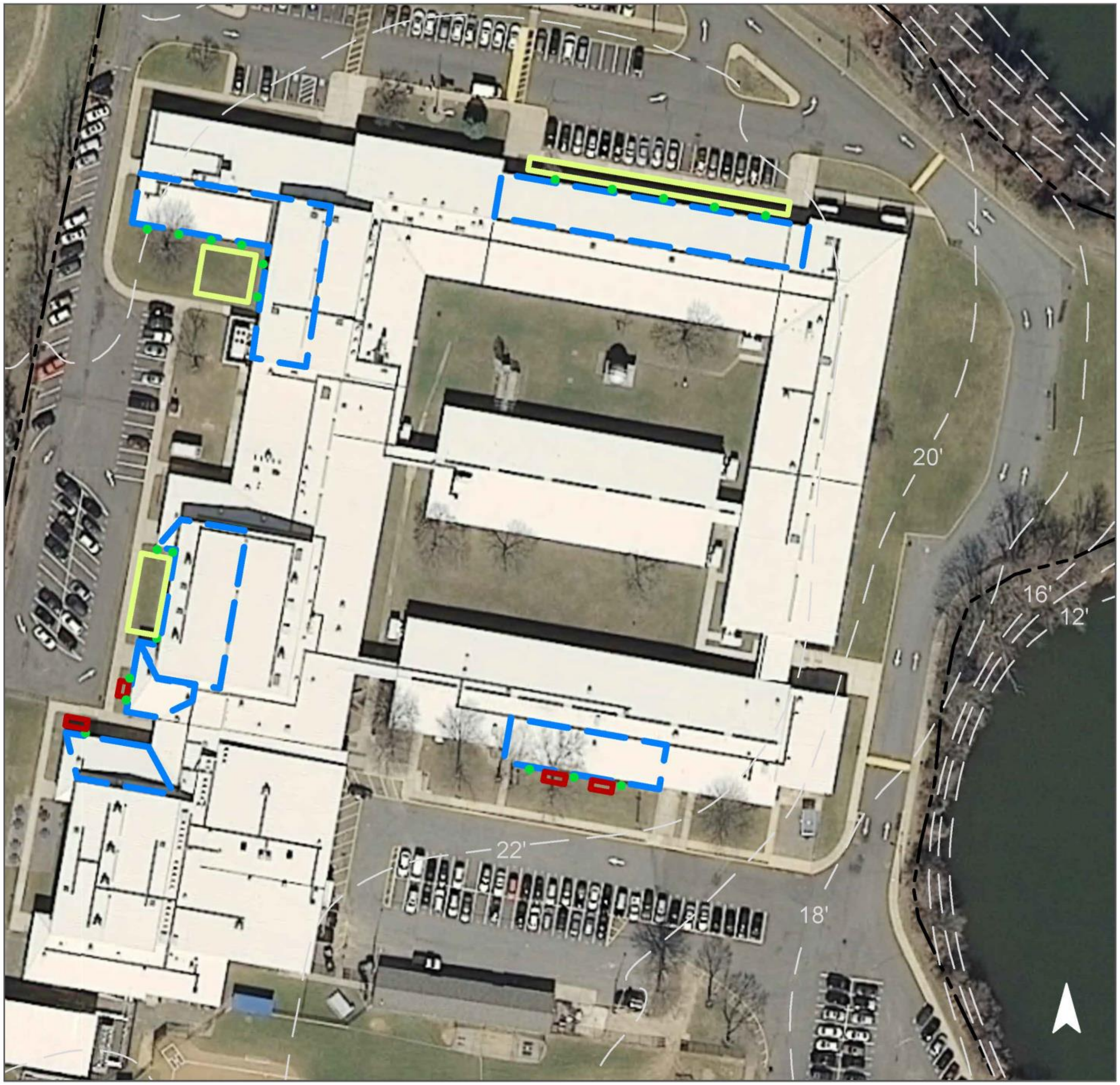
Block and Lot: Block 70, Lot 17

On the north side of the school a rain garden can be installed to treat runoff. Additional rain gardens can be built on the west side of the building to capture, treat, and infiltrate roof runoff. Downspout planter boxes can be constructed around the building to allow roof runoff to be reused. 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"
39	323,304	15.6	163.3	1484.4	0.252	8.87

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.458	77	34,647	0.94	3,500	$17,500
Downspout planter boxes	0.022	3	n/a	n/a	48	$4,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Shore Regional High School

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

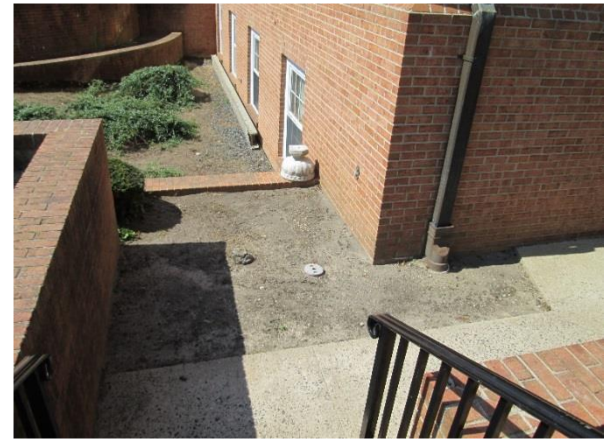
SOVEREIGN BANK

Subwatershed: Branchport Creek

Site Area: 499,202 sq. ft.

Address: 241 Monmouth Road
West Long Branch, NJ 07764

Block and Lot: Block 61, Lot 94

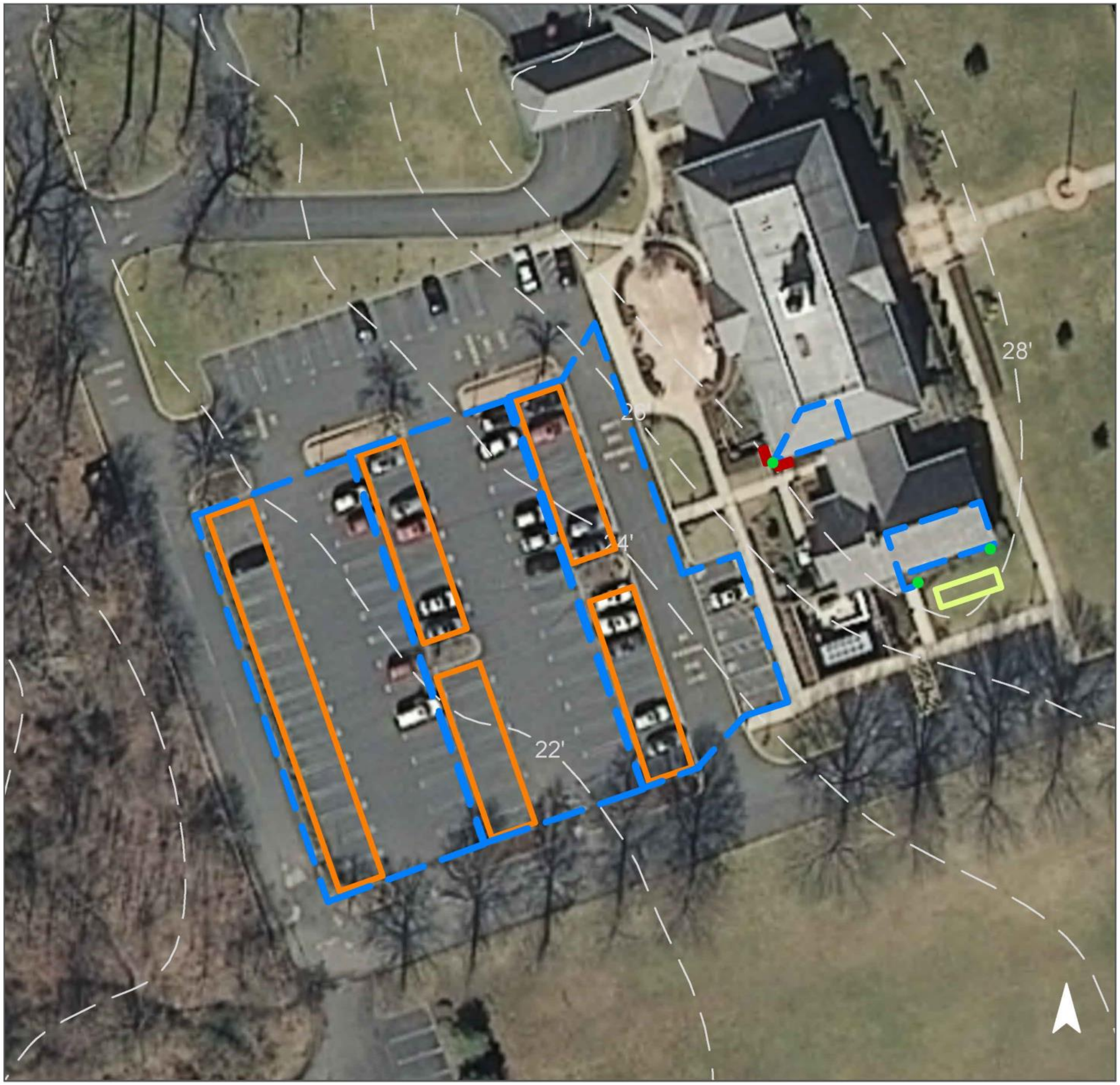


Two downspout planter boxes can be constructed and placed at downspouts to allow roof runoff to be reused. A rain garden can be built in the turf grass south of the building to capture, treat, and infiltrate runoff. parking spots can be replaced with pervious pavement to infiltrate rainwater. A preliminary 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"
29	144,895	7.0	73.2	665.3	0.113	3.97

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	0.018	3	1,384	0.04	180	$900
Downspout planter boxes	0.011	2	n/a	n/a	24	$2,000
Pervious pavements	0.762	127	57,678	1.57	7,960	$199,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Sovereign Bank

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

WEST LONG BRANCH COMMUNITY CENTER

Subwatershed: Branchport Creek

Site Area: 140,600 sq. ft.

Address: 116 Locust Avenue
West Long Branch, NJ 07764

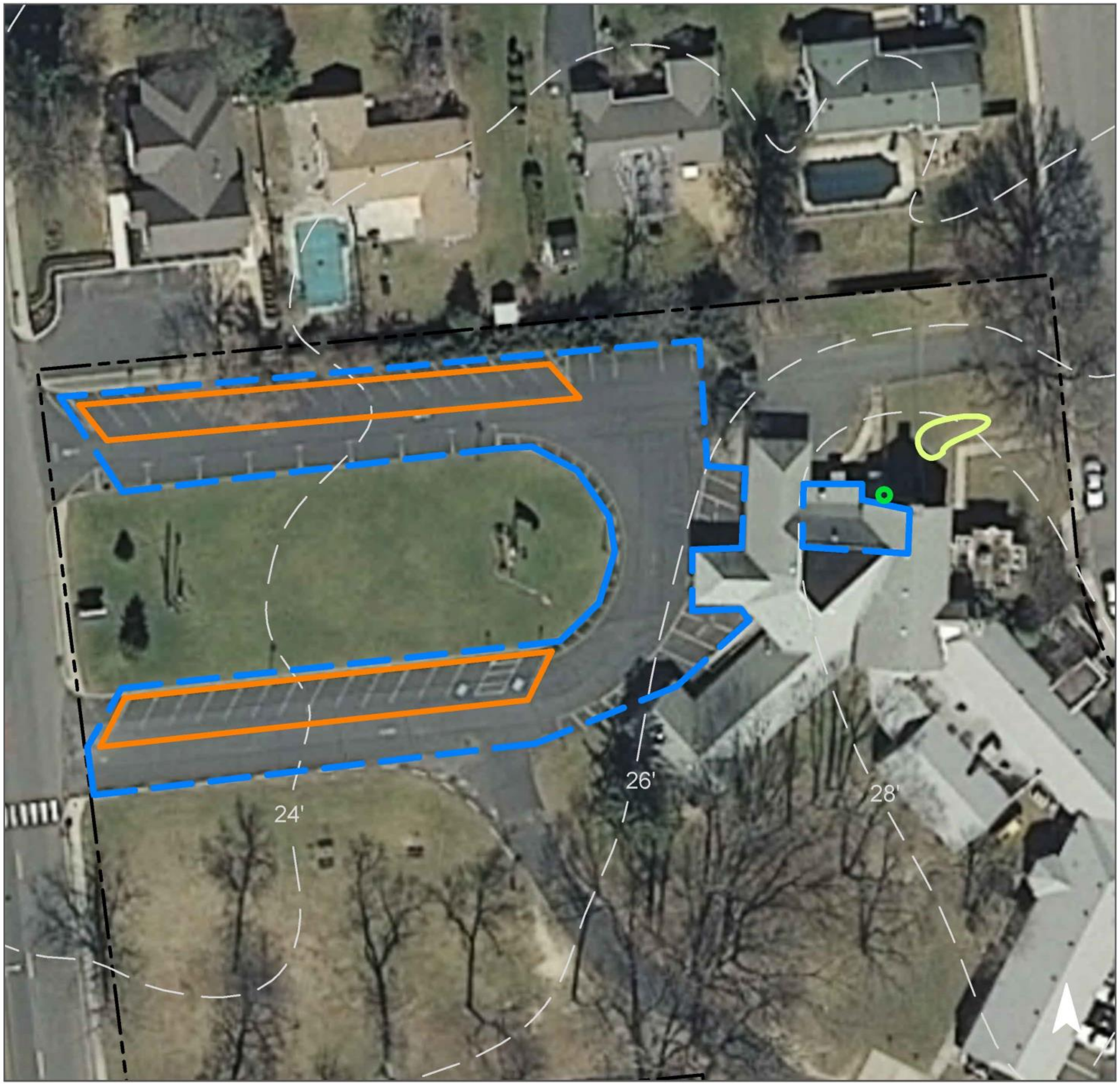
Block and Lot: Block 83, Lot 5, 6, 7, 13, 14, 15

Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. Additionally, a rain garden can be installed near the entrance of the building to capture, treat, and infiltrate roof runoff. 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"
46	64,827	3.1	32.7	297.6	0.051	1.78

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	0.024	4	1,833	0.05	250	$1,250
Pervious pavements	0.564	94	42,696	1.16	5,750	$143,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



West Long Branch Community Center

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

0 30' 60'

WEST LONG BRANCH PUBLIC SCHOOL

Subwatershed: Branchport Creek

Site Area: 723,336 sq. ft.

Address: 135 Locust Avenue
West Long Branch, NJ 07764

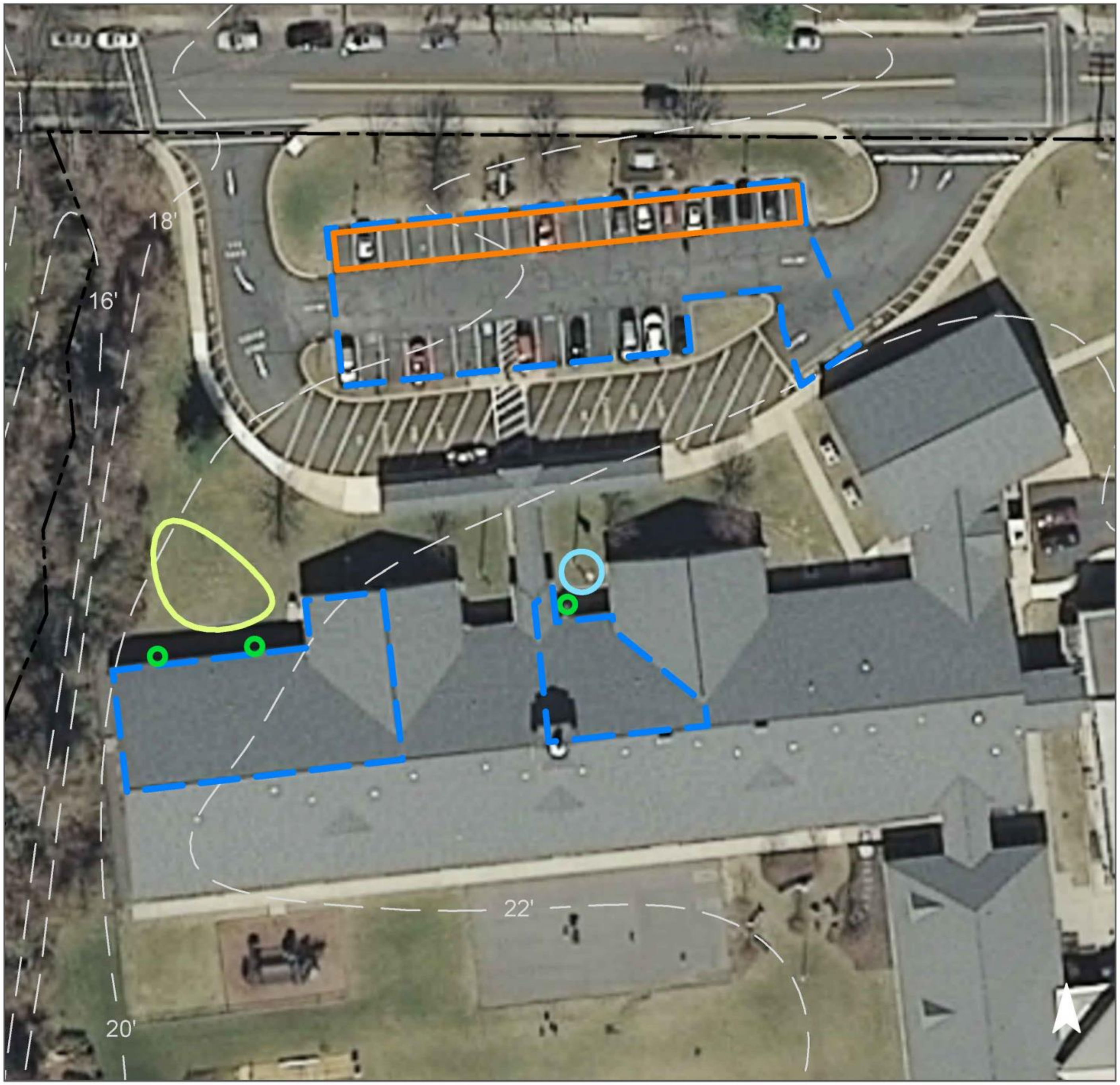
Block and Lot: Block 19, Lot 62,63

A cistern can be installed by the front of the building to harvest rainwater. The water can be used to water the existing landscaping on the site. Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. Additionally, a rain garden can be installed to capture, treat, and infiltrate 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"
36	261,335	12.6	132.0	1199.9	0.204	7.17

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	0.151	25	11,422	0.31	1,360	$6,800
Pervious pavements	0.300	50	22,694	0.62	2,670	$66,750
Rainwater harvesting systems	0.060	10	2,000	0.12	2,000 (gal)	$4,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



West Long Branch Public School

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

0 30' 60'

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)	TN (lb/yr)	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)	Annual (Mgal)
BRANCHPORT CREEK SUBWATERSHED	**64.42**	**2,806,201**			**51.0**	**533.8**	**4,852.6**		**24.26**	**1,056,901**	**0.824**	**28.99**
Frank Antonides Elementary School												
Total Site Info	2.48	107,870	20	13,15	2.9	30.6	278.1	56	1.39	60,568	0.047	1.66
Lutheran Church Reformation												
Total Site Info	1.74	75,879	79	2,3,4	2.9	30.7	278.7	80	1.39	60,700	0.047	1.66
Old First United Methodist Church												
Total Site Info	0.97	42,414	20	1,2,3	1.9	20.3	184.9	95	0.92	40,275	0.031	1.10
Saint Jerome's Catholic Church and School												
Total Site Info	8.83	384,555	60	83	4.9	51.0	463.7	26	2.32	100,997	0.079	2.77
Shore Regional High School												
Total Site Info	19.11	832,344	70	17	15.6	163.3	1,484.4	39	7.42	323,304	0.252	8.87
Sovereign Bank												
Total Site Info	11.46	499,202	61	94	7.0	73.2	665.3	29	3.33	144,895	0.113	3.97
West Long Branch Community Center												
Total Site Info	3.23	140,600	83	5,6,7,13,14,15	3.1	32.7	297.6	46	1.49	64,827	0.051	1.78
West Long Branch Public School												
Total Site Info	16.61	723,336	19	62,63	12.6	132.0	1,199.9	36	6.00	261,335	0.204	7.17

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	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 %
	BRANCHPORT CREEK SUBWATERSHED	**4.386**	**733**	**327,096**	**8.97**	**46,432**			**$948,700**	**6.0%**
1	**Frank Antonides Elementary School**									
	Pervious pavements	0.238	40	18,057	0.49	2,340	25	SF	$58,500	15.1%
	Rainwater harvesting systems	0.036	6	1,000	0.08	1,000	2	gal	$2,000	2.3%
	Total Site Info	**0.238**	**40**	**18,057**	**0.49**	**2,340**			**$2,000**	2.3%
2	**Lutheran Church Reformation**									
	Bioretention systems/rain gardens	0.042	7	3,194	0.09	400	5	SF	$2,000	2.7%
	Pervious pavements	0.547	92	41,439	1.13	6,100	25	SF	$152,500	34.6%
	Total Site Info	**0.589**	**99**	**44,633**	**1.22**	**6,500**			**$154,500**	37.3%
3	**Old First United Methodist Church**									
	Pervious pavements	0.175	29	13,217	0.36	1,950	25	SF	$48,750	16.6%
	Total Site Info	**0.175**	**29**	**13,217**	**0.36**	**1,950**			**$48,750**	16.6%
4	**Saint Jerome's Catholic Church and School**									
	Pervious pavements	1.015	170	76,835	2.09	11,900	25	SF	$297,500	38.6%
	Total Site Info	**1.015**	**170**	**76,835**	**2.09**	**11,900**			**$297,500**	38.6%
5	**Shore Regional High School**									
	Bioretention systems/rain gardens	0.458	77	34,647	0.94	3,500	5	SF	$17,500	5.4%
	Downspout planter boxes	0.022	3	n/a	n/a	48	1000	box	$4,000	0.3%
	Total Site Info	**0.480**	**80**	**34,647**	**0.94**	**3,548**			**$21,500**	5.7%
6	**Sovereign Bank**									
	Bioretention systems/rain gardens	0.018	3	1,384	0.04	180	5	SF	$900	0.5%
	Downspout planter boxes	0.011	2	n/a	n/a	24	1000	box	$2,000	0.3%
	Pervious pavements	0.762	127	57,678	1.57	7,960	25	SF	$199,000	20.2%
	Total Site Info	**0.791**	**132**	**59,062**	**1.61**	**8,164**			**$201,900**	21.0%
7	**West Long Branch Community Center**									
	Bioretention systems/rain gardens	0.024	4	1,833	0.05	250	5	SF	$1,250	1.4%
	Pervious pavements	0.564	94	42,696	1.16	5,750	25	SF	$143,750	33.4%
	Total Site Info	**0.588**	**98**	**44,529**	**1.21**	**6,000**			**$145,000**	34.8%

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	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 %
8	**West Long Branch Public School**									
	Bioretention systems/rain gardens	0.151	25	11,422	0.31	1,360	5	SF	$6,800	2.2%
	Pervious pavements	0.300	50	22,694	0.62	2,670	25	SF	$66,750	4.4%
	Rainwater harvesting systems	0.060	10	2,000	0.12	2,000	2	gal	$4,000	0.9%
	Total Site Info	**0.510**	**85**	**36,116**	**1.05**	**6,030**			**$77,550**	7.5%