RUTGERS
New Jersey Agricultural
Experiment Station

Draft

Impervious Cover Reduction Action Plan
for
New Brunswick City, Middlesex County, New Jersey

Prepared for New Brunswick City by the
Rutgers Cooperative Extension Water Resources Program

October 6, 2015

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Introduction

Located in Middlesex County in central New Jersey, New Brunswick City covers approximately 5.8 square miles east of Franklin. Figures 1 and 2 illustrate that New Brunswick City is dominated by urban land uses. A total of 76.8% of the municipality's land use is classified as urban. Of the urban land in New Brunswick City, high 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 New Brunswick City 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 New Brunswick City. Based upon the 2007 NJDEP land use/land cover data, approximately 49.1% of New Brunswick City has impervious cover. This level of impervious cover suggests that the streams in New Brunswick City are likely non-supporting streams.[1]

Methodology

New Brunswick City 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 storm water 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

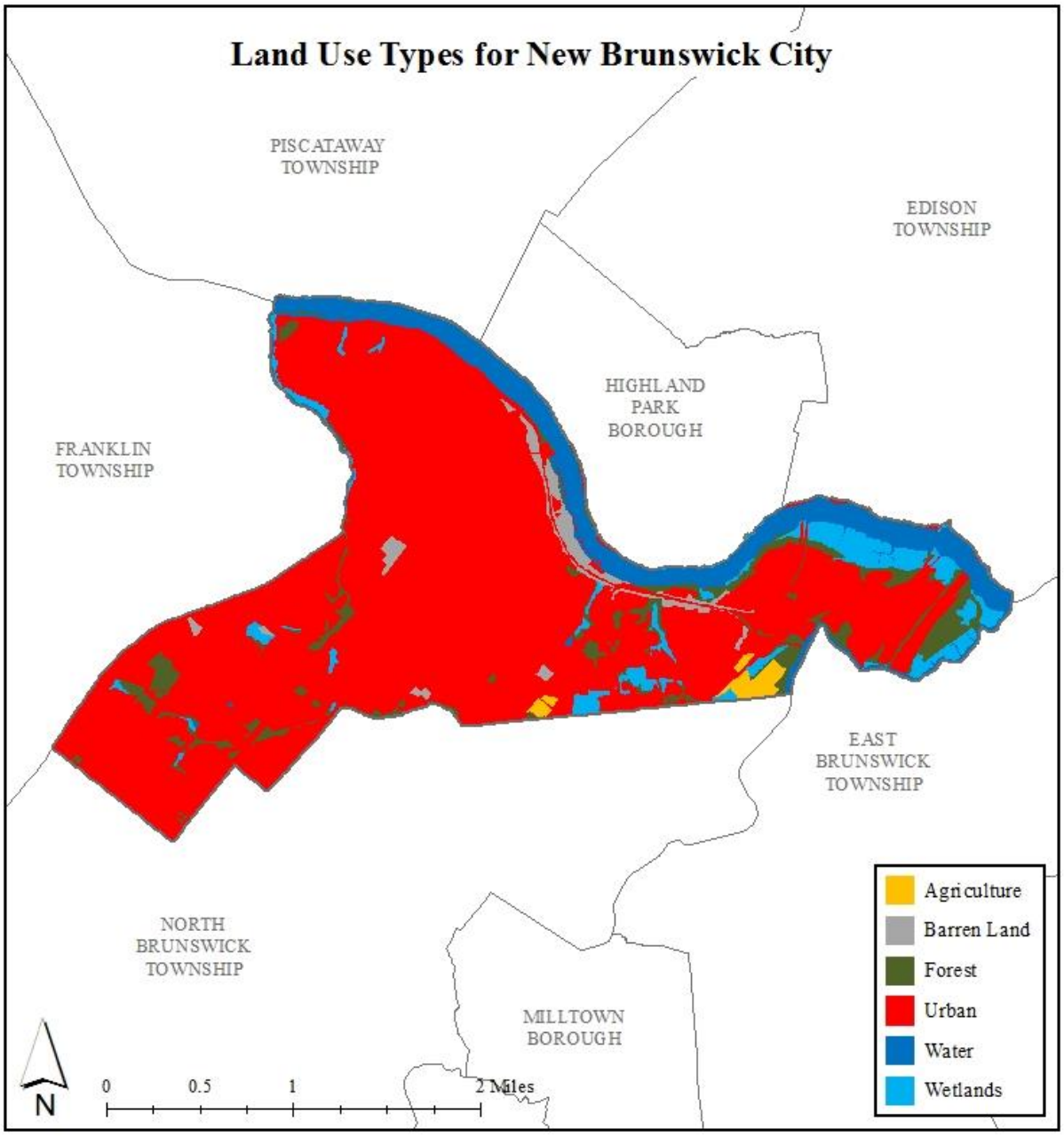


Figure 1: Map illustrating the land use in New Brunswick City

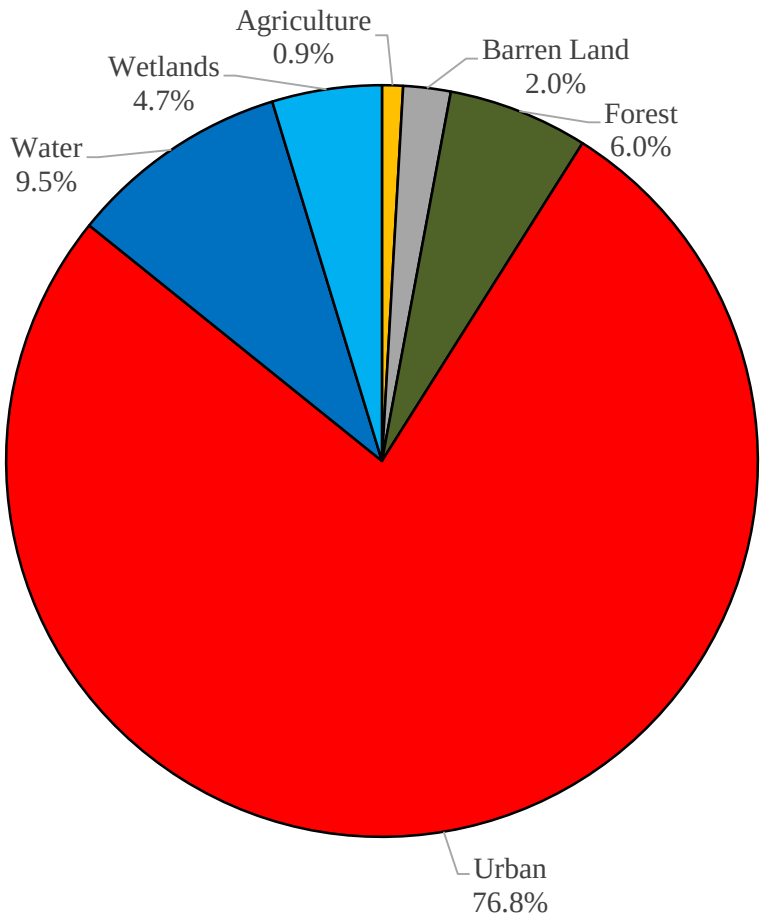


Figure 2: Pie chart illustrating the land use in New Brunswick City

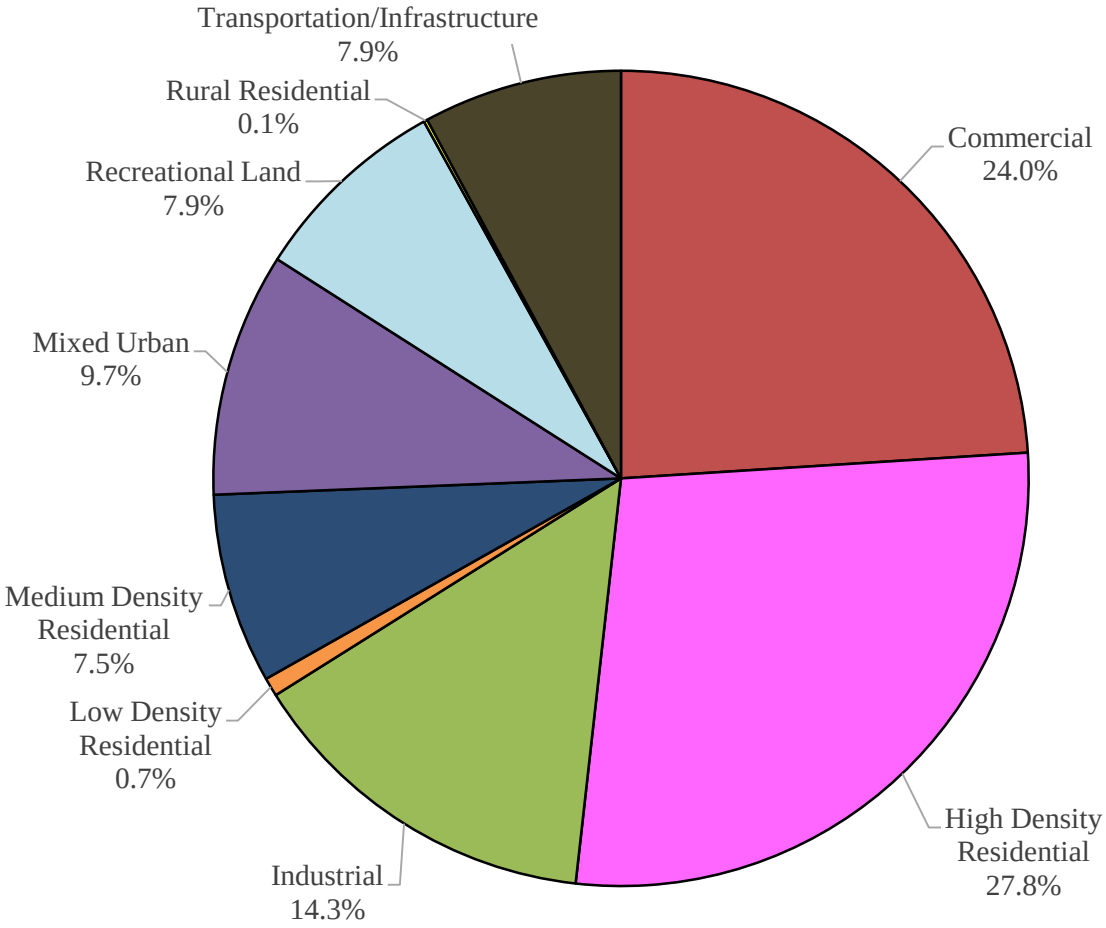


Figure 3: Pie chart illustrating the various types of urban land use in New Brunswick City

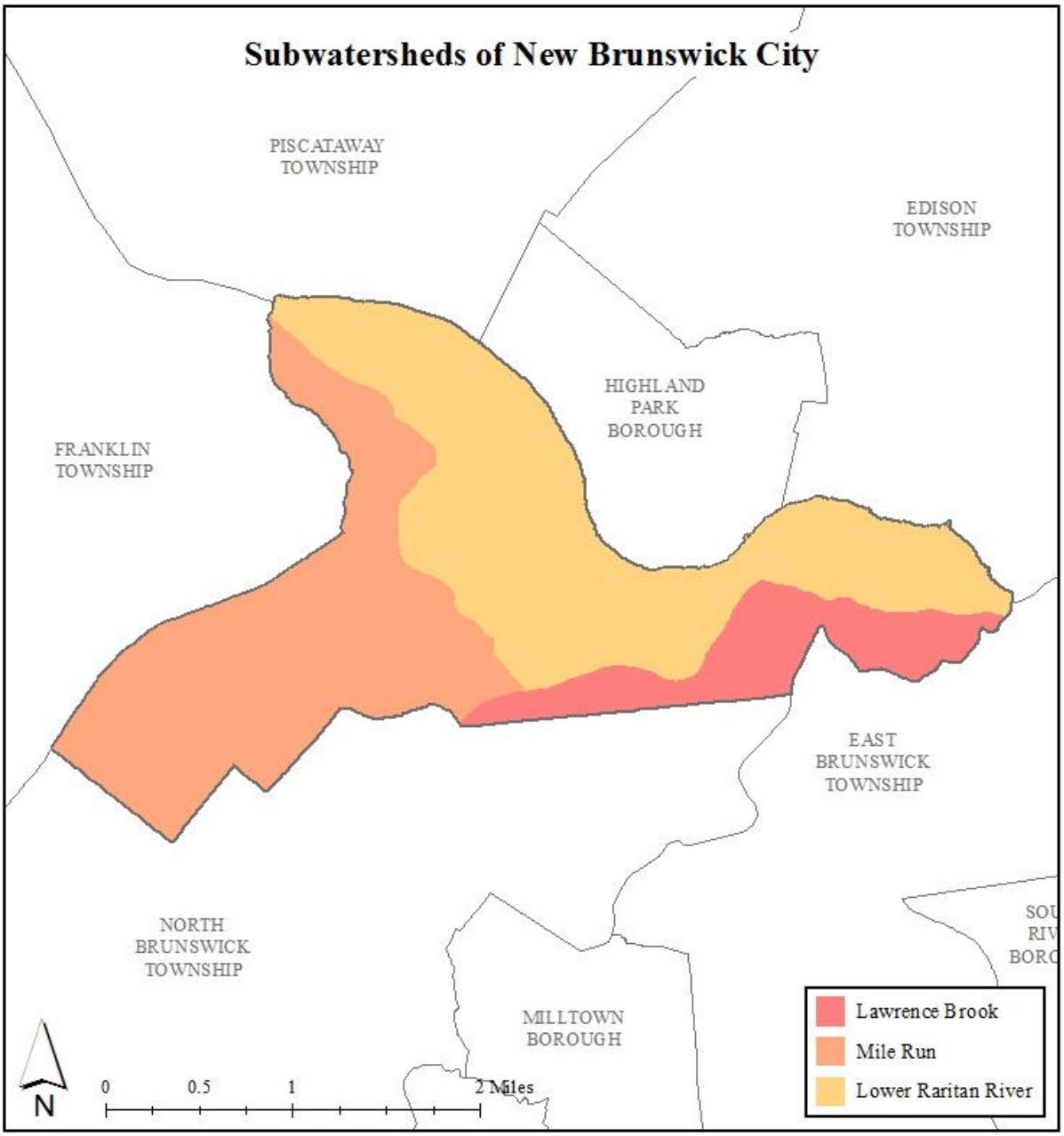


Figure 4: Map of the subwatersheds in New Brunswick City

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 New Brunswick City 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 New Brunswick City. 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*.

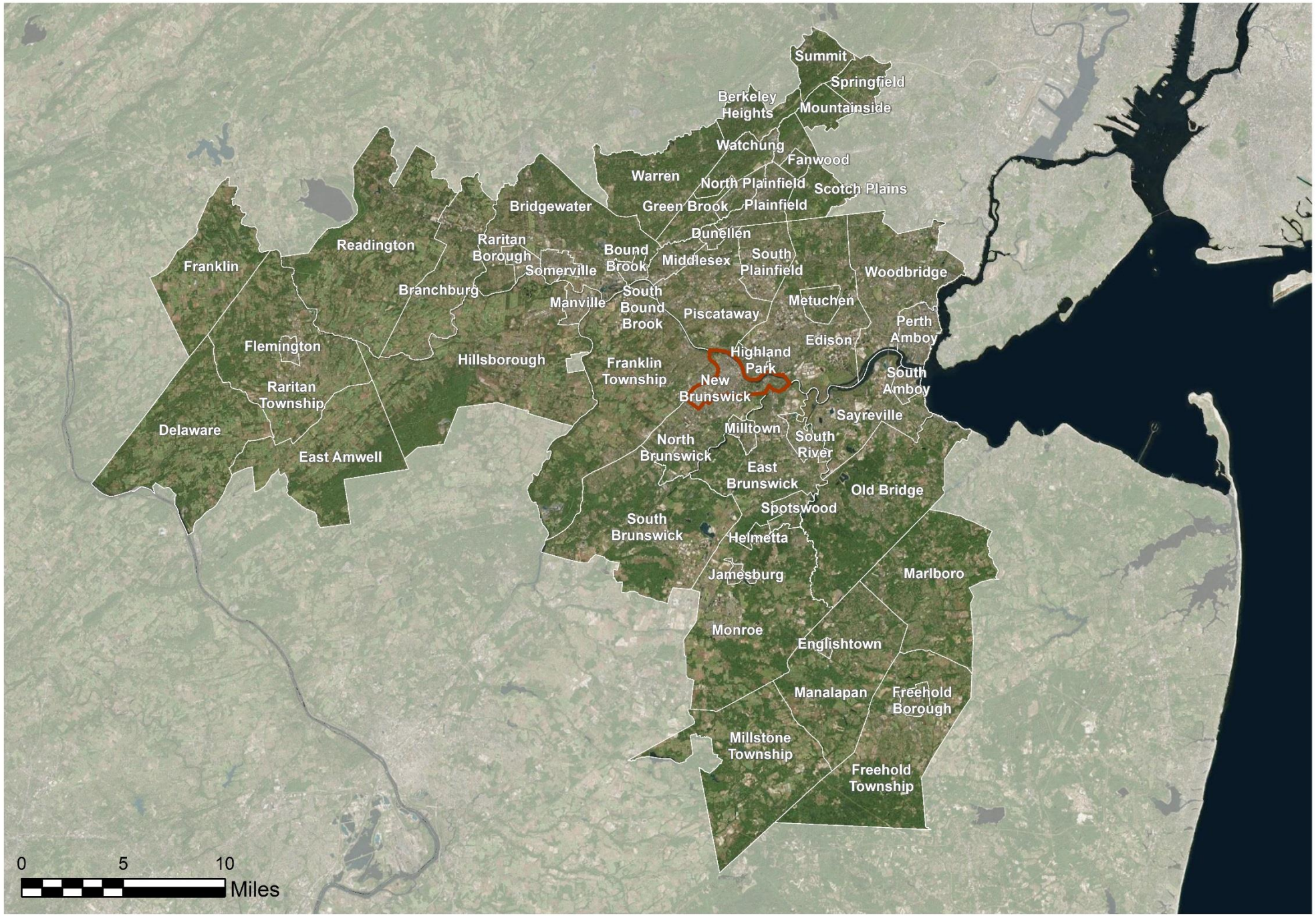
Conclusion

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.

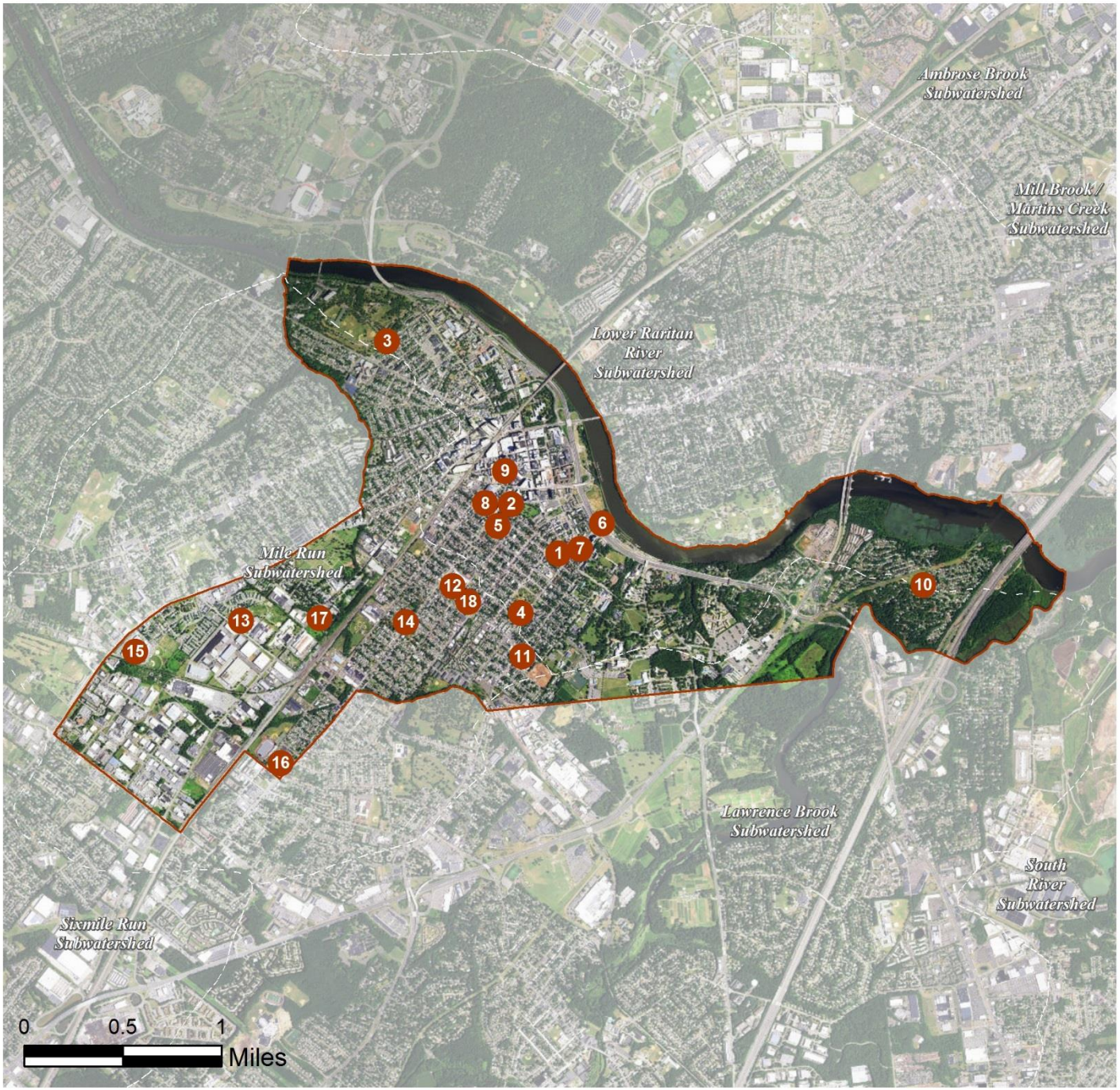
a. Overview Map of the Project

NEW BRUNSWICK: CLIMATE RESILIENT GREEN INFRASTRUCTURE FOR THE RARITAN BASIN



b. Green Infrastructure Sites

NEW BRUNSWICK: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE LOWER RARITAN RIVER SUBWATERSHED:

1. Lord Stirling Elementary School
2. New Brunswick Free Public Library
3. New Brunswick Senior Citizen Resource Center
4. Paul Robeson Community School
5. Presbyterian Church of New Brunswick
6. Rail-Arts-River: Boyd Park
7. Rail-Arts-River: Commercial Avenue and George Street
8. Roosevelt Elementary School
9. US Post Office
10. Woodrow Wilson Elementary School

SITES WITHIN THE MILE RUN SUBWATERSHED:

11. Esperanza Gardens / Farmer's Market
12. Livingston Elementary School
13. McKinley Community School
14. New Brunswick English Seventh-Day Adventist Church
15. New Brunswick High School
16. New Brunswick Middle School
17. New Brunswick Public Works Department
18. Saint Alban's Episcopal Church

c. Proposed Green Infrastructure Concepts

LORD STIRLING ELEMENTARY SCHOOL

Subwatershed: Lower Raritan River

Site Area: 123,687 sq. ft.

Address: 101 Redmond Street
New Brunswick, NJ 08901

Block and Lot: Block 136, Lot 4.02

The building has internal drainage. Parking spaces can be replaced with porous asphalt to allow stormwater to infiltrate. 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	105,132	5.1	53.1	482.7	0.082	2.88

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.414	69	30,369	1.14	6,683	$167,075

GREEN INFRASTRUCTURE RECOMMENDATIONS

Lord Stirling Elementary School

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

0 50' 100'

NEW BRUNSWICK FREE PUBLIC LIBRARY

Subwatershed: Lower Raritan River

Site Area: 50,335 sq. ft.

Address: 60 Livingston Avenue
New Brunswick, NJ 08901

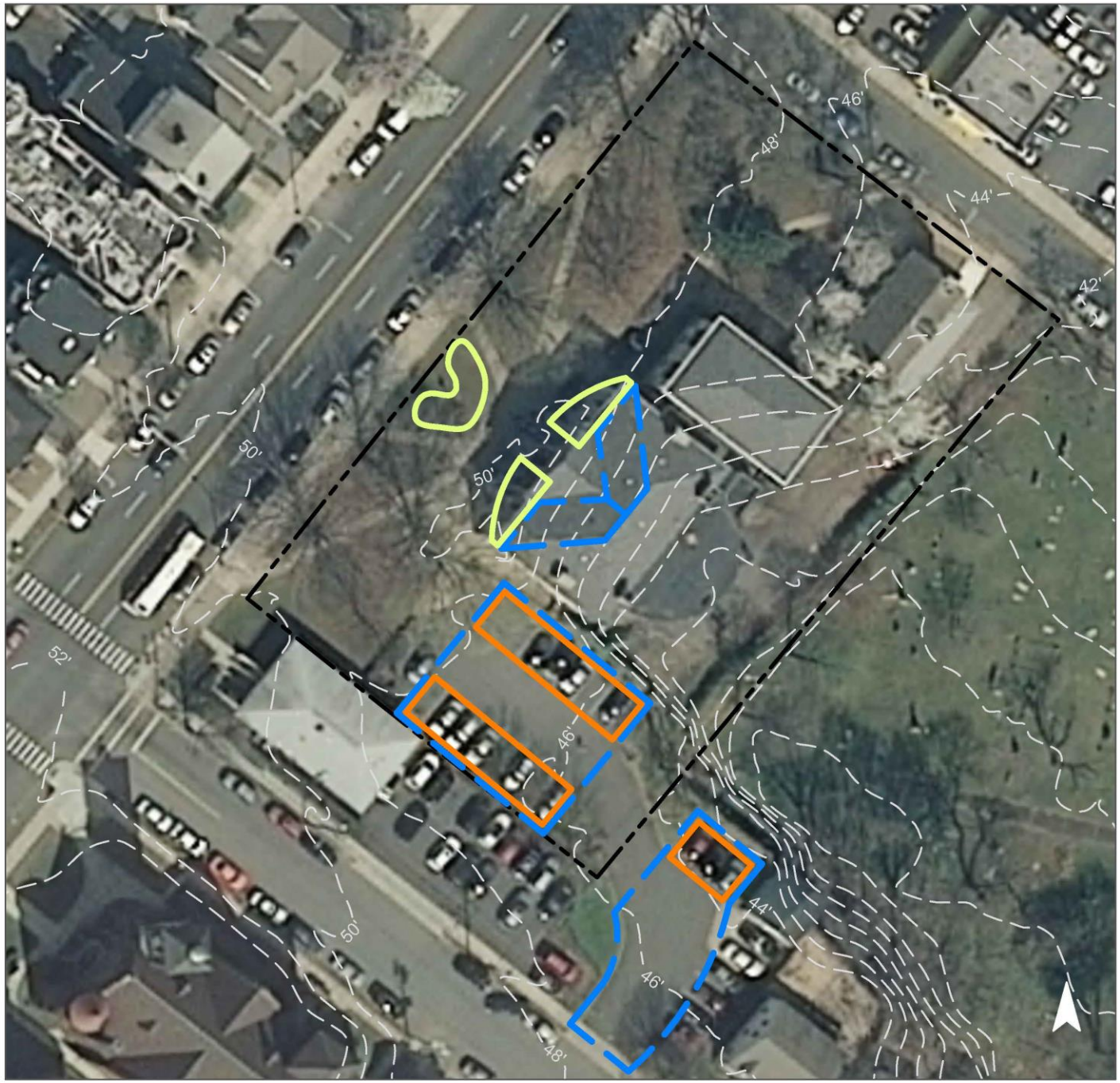
Block and Lot: Block 132, Lot 17.02

Bioretention systems can capture, treat, and infiltrate stormwater runoff in front of the library. Parking spaces can also be converted into pervious pavement to capture 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"
87	43,753	2.1	22.1	200.9	0.034	1.20

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.032	5	2,379	0.09	1,280	$6,400
Pervious pavements	0.217	36	15,932	0.60	2,989	$74,725

GREEN INFRASTRUCTURE RECOMMENDATIONS



New Brunswick Free Public Library

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

0 30' 60'

NEW BRUNSWICK SENIOR CITIZEN RESOURCE CENTER

Subwatershed: Lower Raritan River

Site Area: 37,404 sq. ft.

Address: 81 Huntington Street
New Brunswick, NJ 08901

Block and Lot: Block 402, Lot 14.01

Two bioretention systems can be installed to capture, treat, and infiltrate rooftop runoff in front of the building. A preliminary soil assessment suggests that more soil testing would be required before determining the soils 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	22,293	1.4	14.9	135.7	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	0.040	7	2,947	0.11	419	$2,095

GREEN INFRASTRUCTURE RECOMMENDATIONS

New Brunswick Senior Citizen Resource Center

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

0 25' 50'

PAUL ROBESON COMMUNITY SCHOOL

Subwatershed: Lower Raritan River

Site Area: 334,921 sq. ft.

Address: 199 Commercial Avenue
New Brunswick, NJ 08901

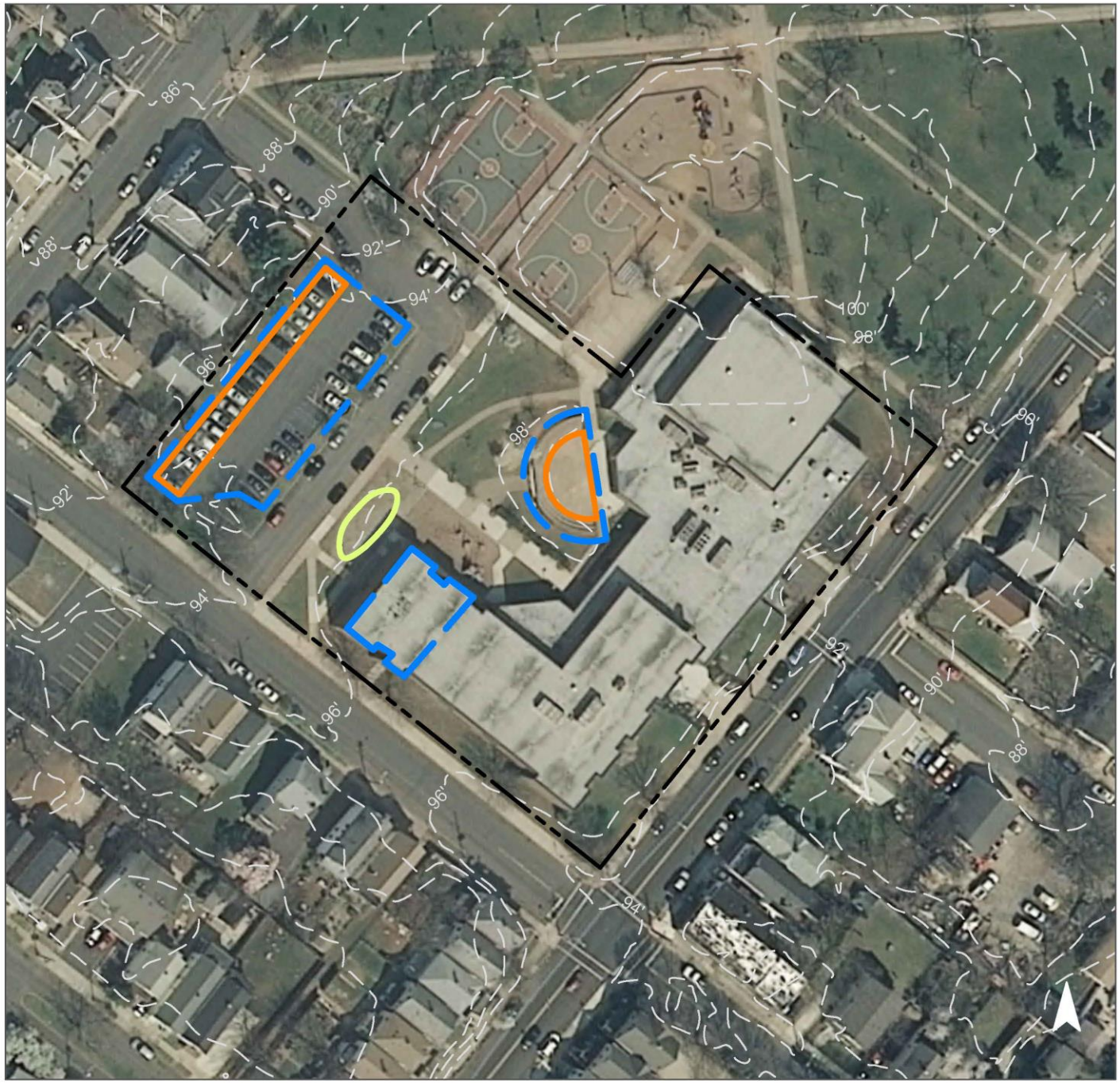
Block and Lot: Block 211, Lot 41

A bioretention system can be installed on the northeast side of the school to capture, treat, and infiltrate rooftop runoff. The outdoor concrete stage base, and a row of parking spaces, can also 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"
34	112,768	5.4	57.0	517.9	0.088	3.09

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.086	14	6,313	0.24	826	$4,130
Pervious pavements	0.404	68	29,621	1.11	4,526	$113,150

GREEN INFRASTRUCTURE RECOMMENDATIONS



Paul Robeson Community School

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

0 50' 100'

PRESBYTERIAN CHURCH OF NEW BRUNSWICK

Subwatershed: Lower Raritan River

Site Area: 38,489 sq. ft.

Address: 100 Livingston Avenue
New Brunswick, NJ 08901

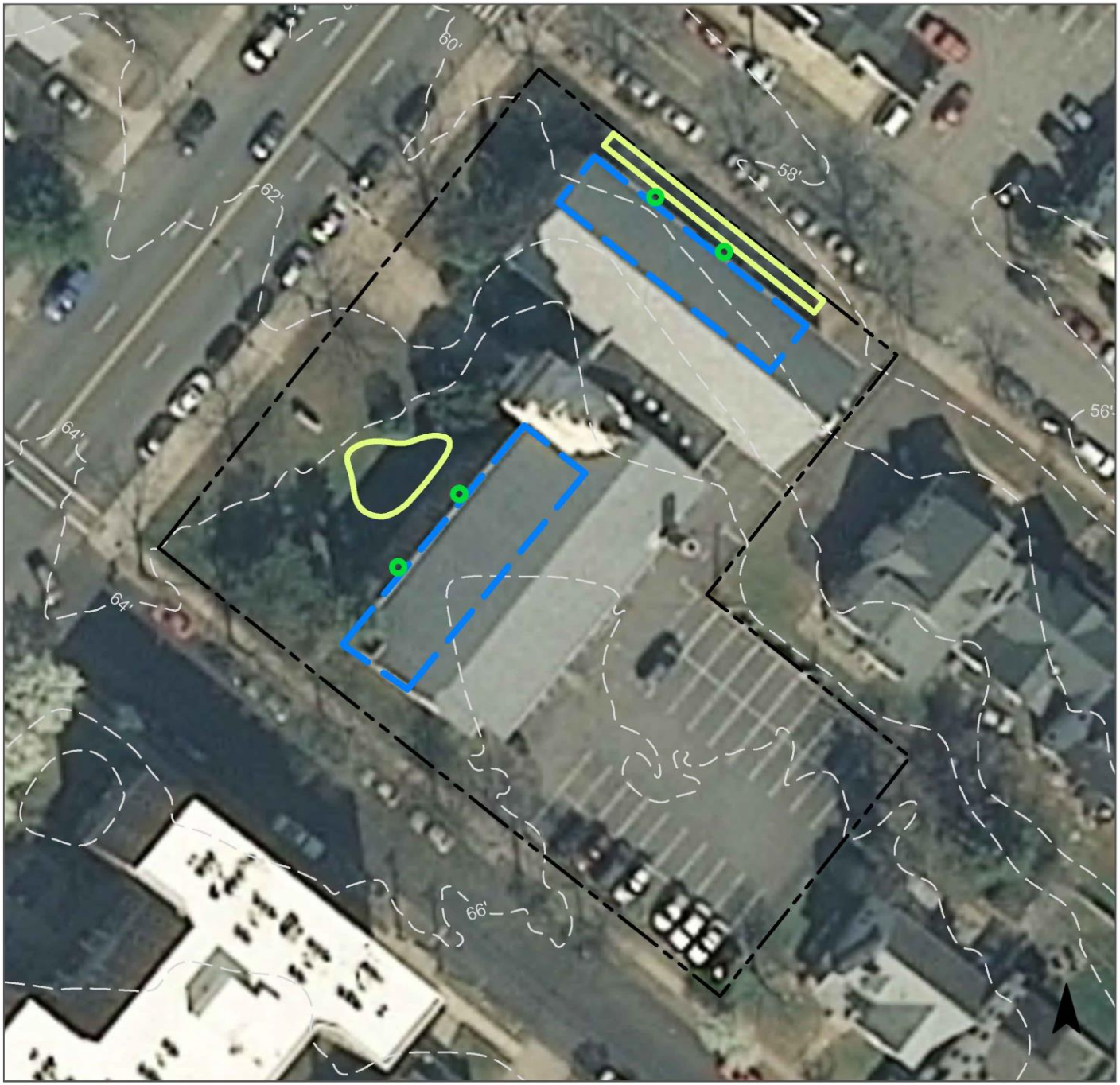
Block and Lot: Block 149, Lot 11.01

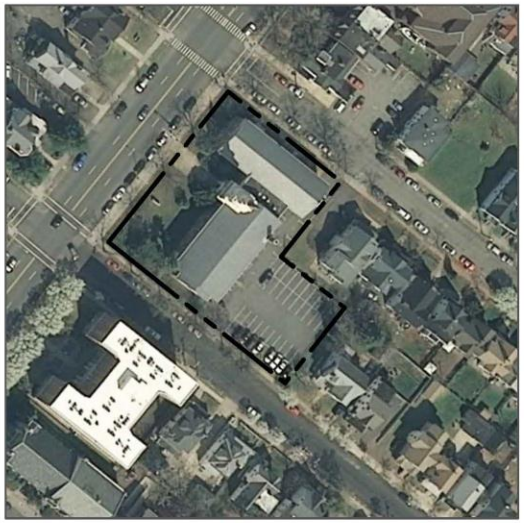
Two bioretention systems can be installed to capture, treat, and infiltrate rooftop runoff by disconnecting and redirecting downspouts into them. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
90	34,640	1.7	17.5	159.0	0.027	0.95

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.105	18	7,727	0.29	1,030	$5,150

GREEN INFRASTRUCTURE RECOMMENDATIONS





Presbyterian Church of New Brunswick

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

0 25' 50'

RAIL-ARTS-RIVER: BOYD PARK

Subwatershed: Lower Raritan River

Site Area: 624,162 sq. ft.

Address: Route 18 North
New Brunswick, NJ 08901

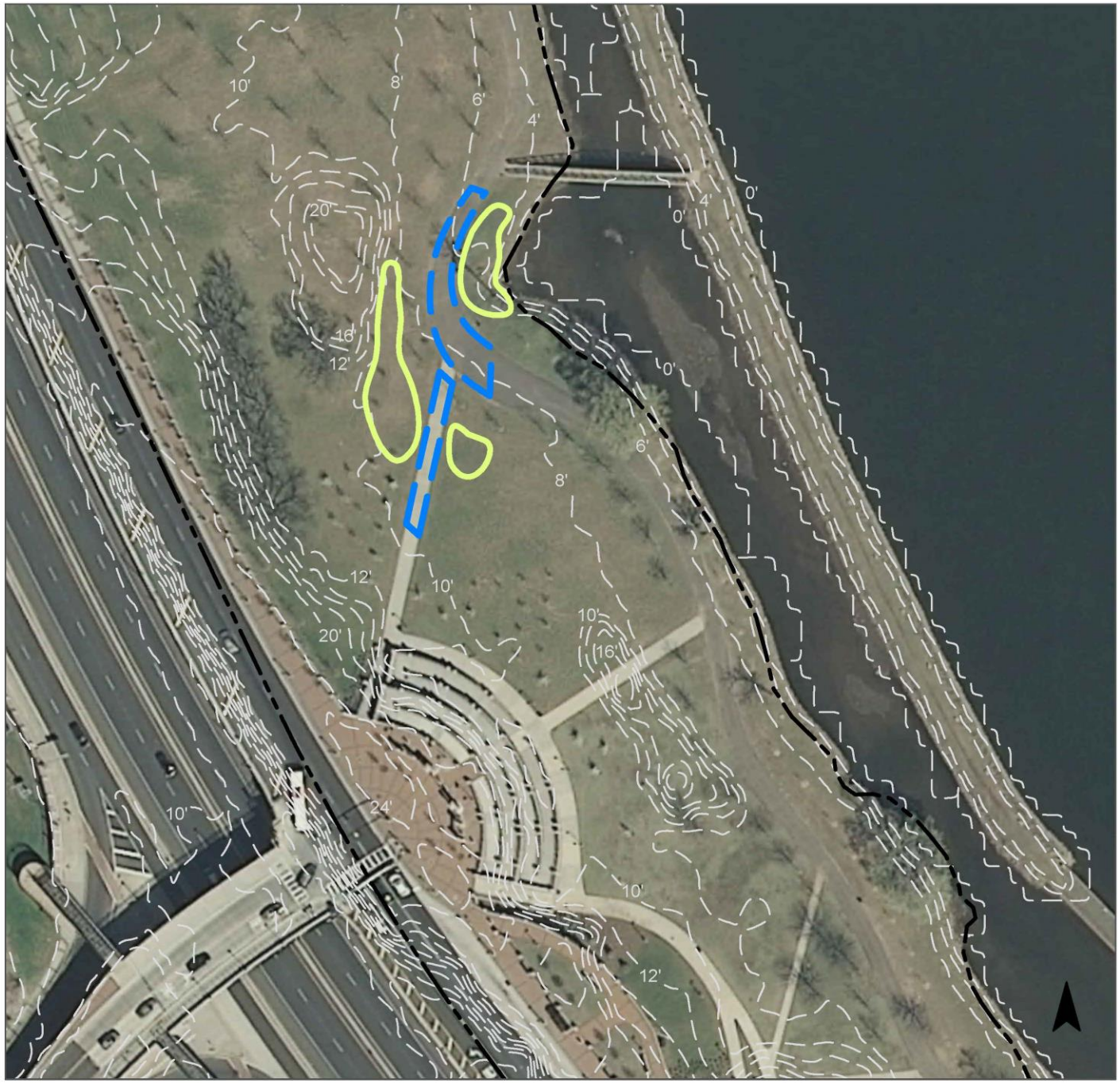
Block and Lot: Block 1.01, Lot 1.01

Bioretention systems can be installed to capture, treat, and infiltrate sidewalk runoff and act as flood storage. 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"
5	33,058	1.6	16.7	151.8	0.026	0.91

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
Bioretention systems	0.085	14	6,216	0.23	4,700	$23,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Rail-Arts-River: Boyd Park

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

0 50' 100'

RAIL-ARTS-RIVER: COMMERCIAL AVENUE AND GEORGE STREET

Subwatershed: Lower Raritan River

Site Area: 72,932 sq. ft.

Address: 55 Commercial Avenue
New Brunswick, NJ 08901

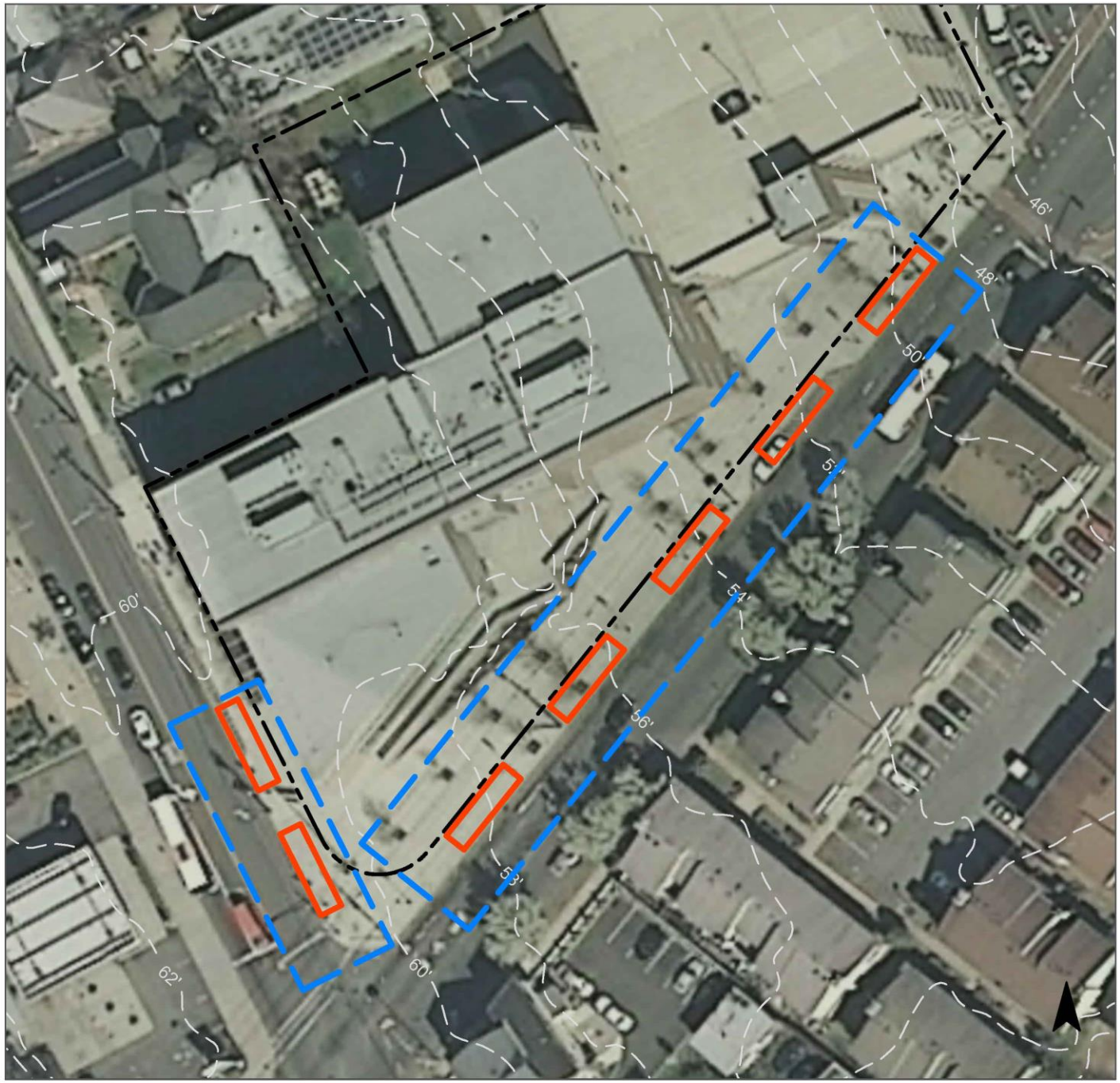
Block and Lot: Block 124.01, Lot 1.01

Stormwater planters can be installed to infiltrate sidewalk and road 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"
90	65,638	3.2	33.2	301.4	0.051	1.80

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
Stormwater planters	0.573	96	42,060	1.58	2,800	$280,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Rail-Arts-River: Commerical Avenue and George Street

- stormwater planters
- drainage areas
- property line
- 2012 Aerial: NJOIT, OGIS

0 50' 100'

ROOSEVELT ELEMENTARY SCHOOL

Subwatershed: Lower Raritan River

Site Area: 69,938 sq. ft.

Address: 83 Livingston Avenue
New Brunswick, NJ 08901

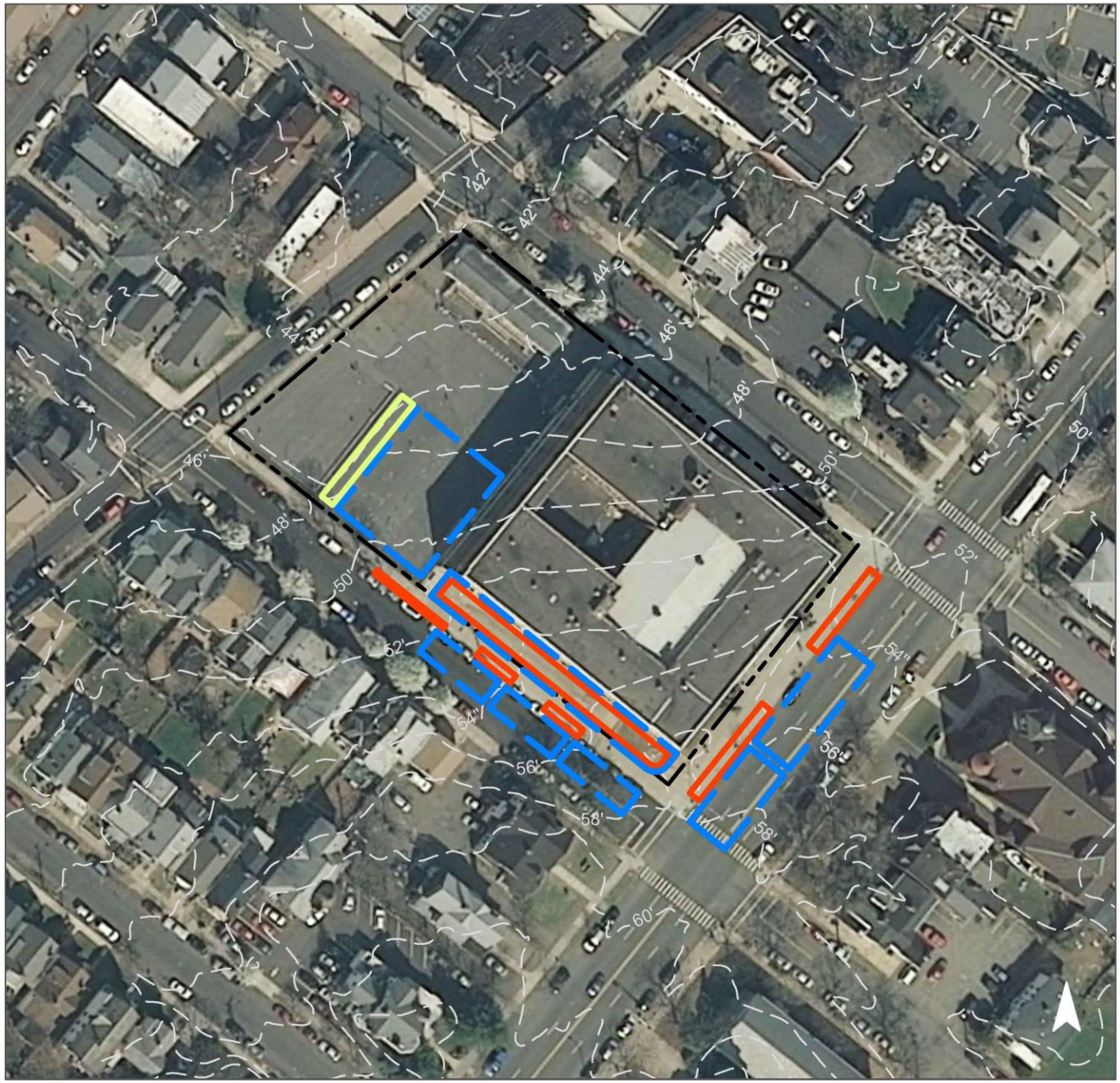
Block and Lot: Block 142, Lot 1.01

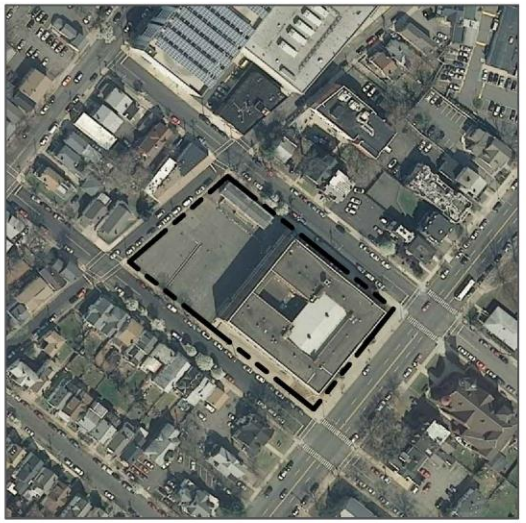
A rain garden can be installed to capture, treat and infiltrate runoff from the play area. Stormwater planters can also be installed around the perimeter of the school to capture, treat, and infiltrate stormwater. A preliminary soil assessment suggests that more soil testing would be required before 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"
100	69,938	3.4	35.3	321.1	0.054	1.92

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	0.155	26	11,377	0.43	785	$3,925
Stormwater planters	0.283	47	20,742	0.78	1,160	$116,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





Roosevelt Elementary School

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

0 50' 100'

US POST OFFICE

Subwatershed: Lower Raritan River

Site Area: 47,050 sq. ft.

Address: 86 Bayard Street
New Brunswick, NJ 08901

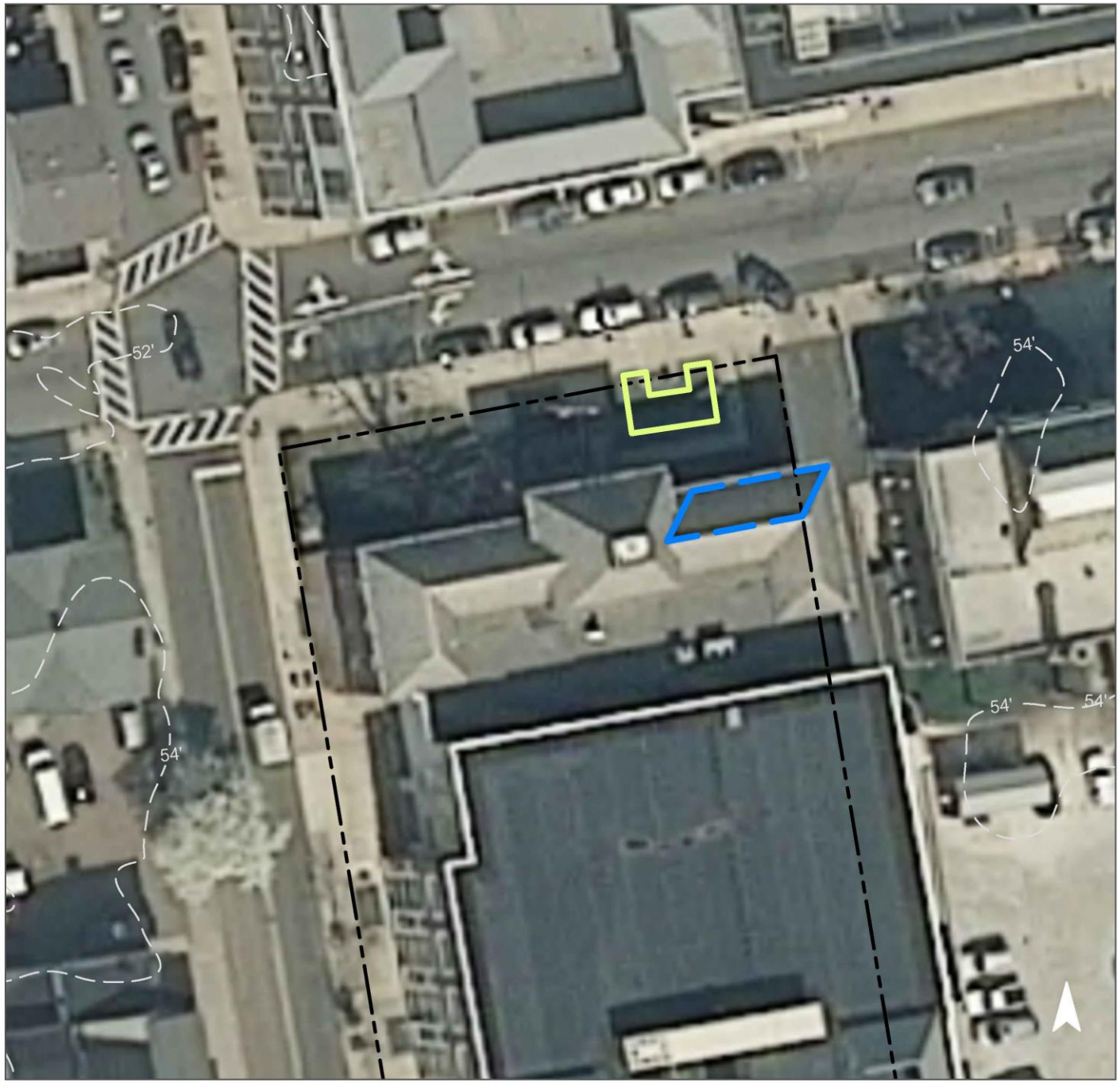
Block and Lot: Block 12, Lot 9.02

A bioretention system can be installed in front of the post office to capture, treat, and infiltrate rooftop runoff by redirecting the nearby downspout into it. 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	44,698	2.2	22.6	205.2	0.035	1.23

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	0.011	2	808	0.03	282	$1,410

GREEN INFRASTRUCTURE RECOMMENDATIONS



US Post Office

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

0 20' 40'

WOODROW WILSON ELEMENTARY SCHOOL

Subwatershed: Lower Raritan River

Site Area: 176,921 sq. ft.

Address: 133 Tunison Road
New Brunswick, NJ 08901

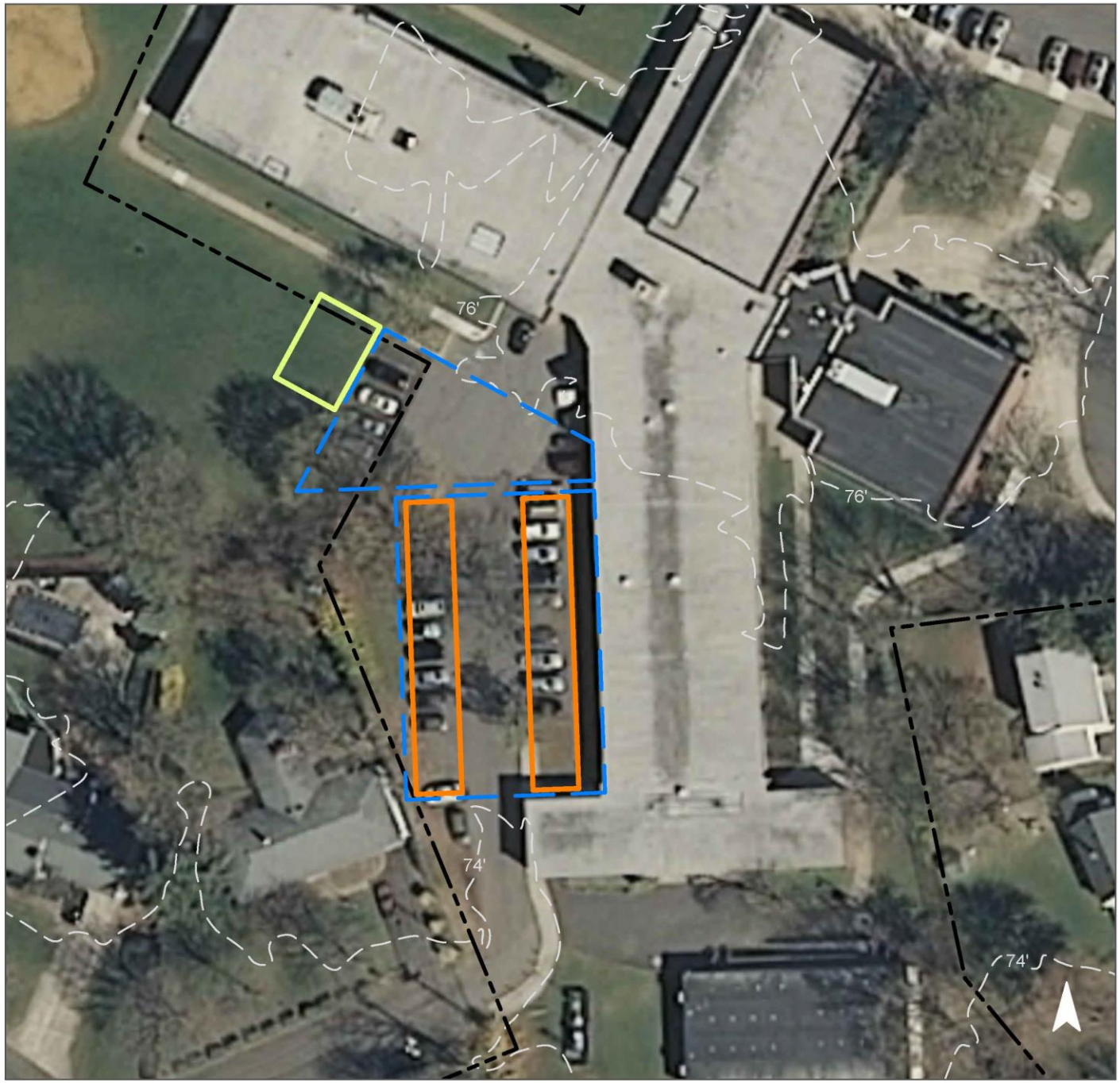
Block and Lot: Block 718, Lot 23.01

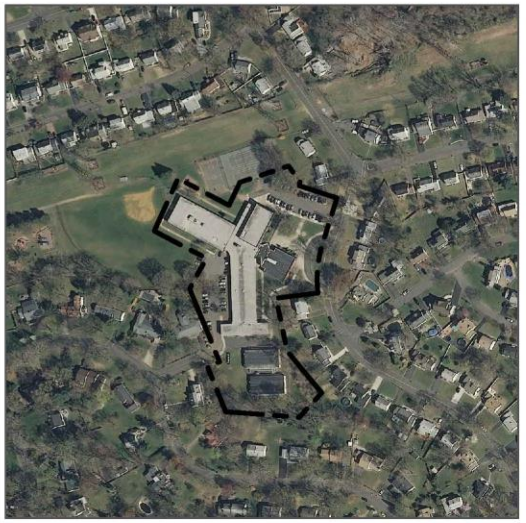
Parking spaces can be replaced with pervious pavement to infiltrate stormwater. A rain garden can also capture, treat and infiltrate runoff. A preliminary soil assessment suggests that soils have suitable drainage characteristics for green infrastructure.

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"
63	111,858	5.4	56.5	513.6	0.087	3.07

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	0.116	19	8,512	0.32	987	$4,935
Pervious pavements	0.242	41	17,758	0.67	4,129	$103,225

GREEN INFRASTRUCTURE RECOMMENDATIONS





Woodrow Wilson Elementary School

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

0 30' 60'

ESPERANZA GARDENS / FARMER'S MARKET

Subwatershed: **Mile Run**

Site Area: **493,094 sq. ft.**

Address: **178 Jones Avenue**
New Brunswick, NJ 08901

Block and Lot: **Block 233.01, Lot 1**

Bioretention systems can be installed to capture, treat, and infiltrate stormwater runoff. One can be built along the driveway, and the other can be constructed in the western corner of the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
22	107,299	5.2	54.2	492.7	0.084	2.94

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.294	49	21,580	0.81	2,228	$11,140

GREEN INFRASTRUCTURE RECOMMENDATIONS

Esperanza Gardens/ Farmer's Market

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

0 50' 100'

LIVINGSTON ELEMENTARY SCHOOL

Subwatershed: **Mile Run**

Site Area: **49,923 sq. ft.**

Address: **206 Delavan Street**
New Brunswick, NJ 08901

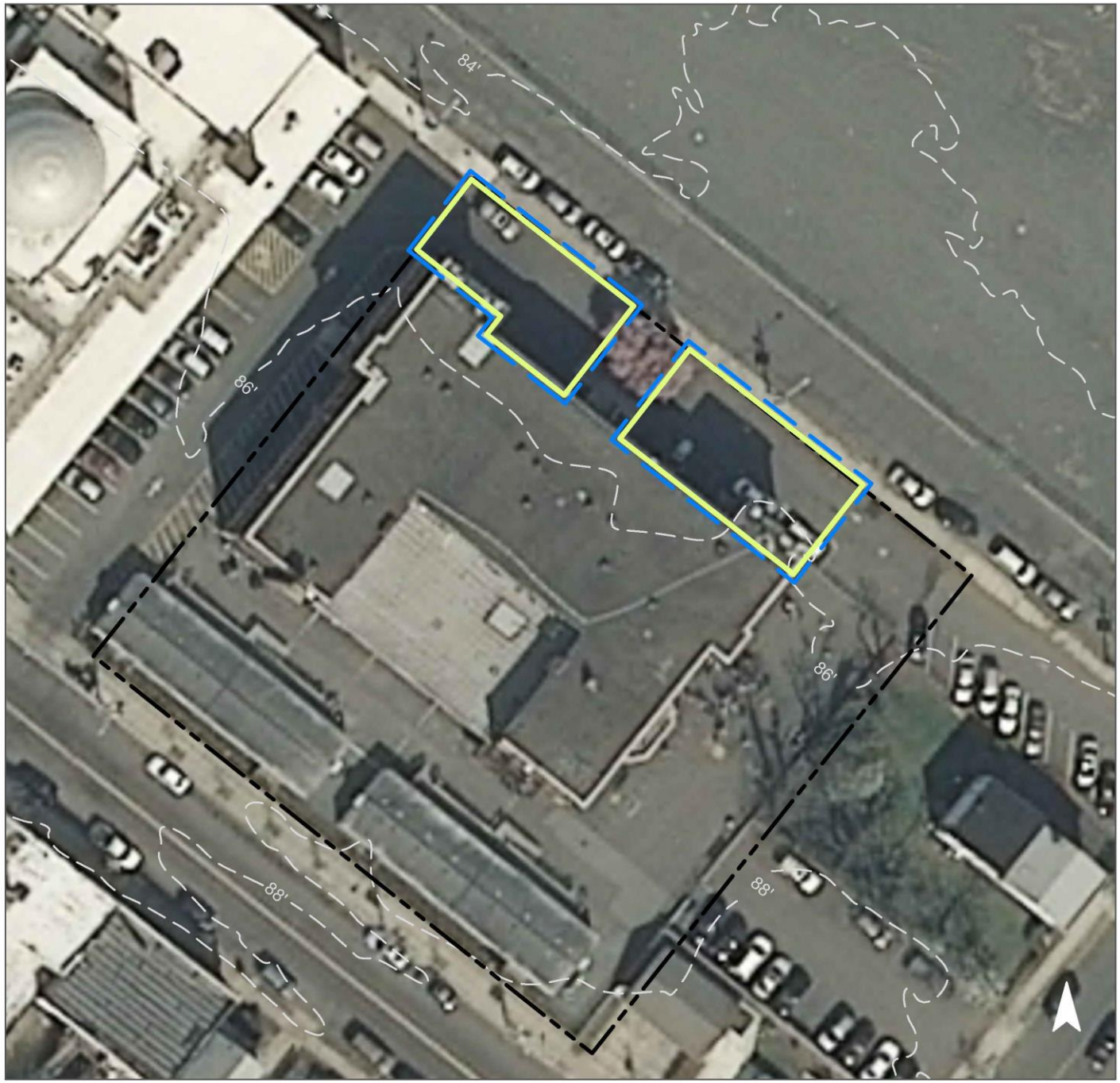
Block and Lot: **Block 228, Lot 9.01**

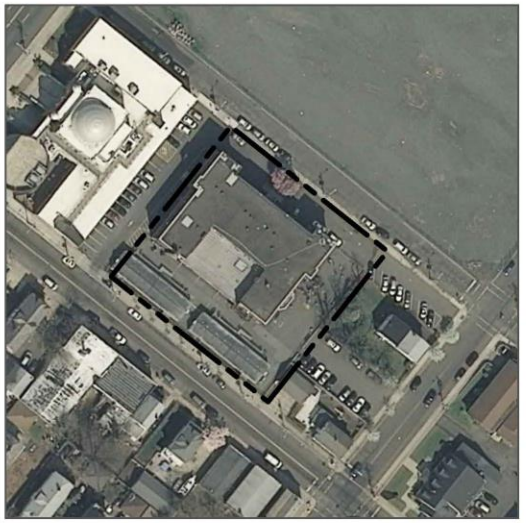
Almost all of the elementary school is made up of impervious cover, including asphalt in front of the entrance. This area can be depaved and converted into rain gardens to capture, treat and infiltrate runoff. A preliminary soil assessment suggests that more soil testing would be required before determining 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"
98	48,830	2.4	24.7	224.2	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 systems	0.151	25	11,063	0.42	5,700	$28,500

GREEN INFRASTRUCTURE RECOMMENDATIONS





Livingston Elementary School

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

0 25' 50'

MCKINLEY COMMUNITY SCHOOL

Subwatershed: Mile Run

Site Area: 121,864 sq. ft.

Address: 15 Van Dyke Avenue
New Brunswick, NJ 08901

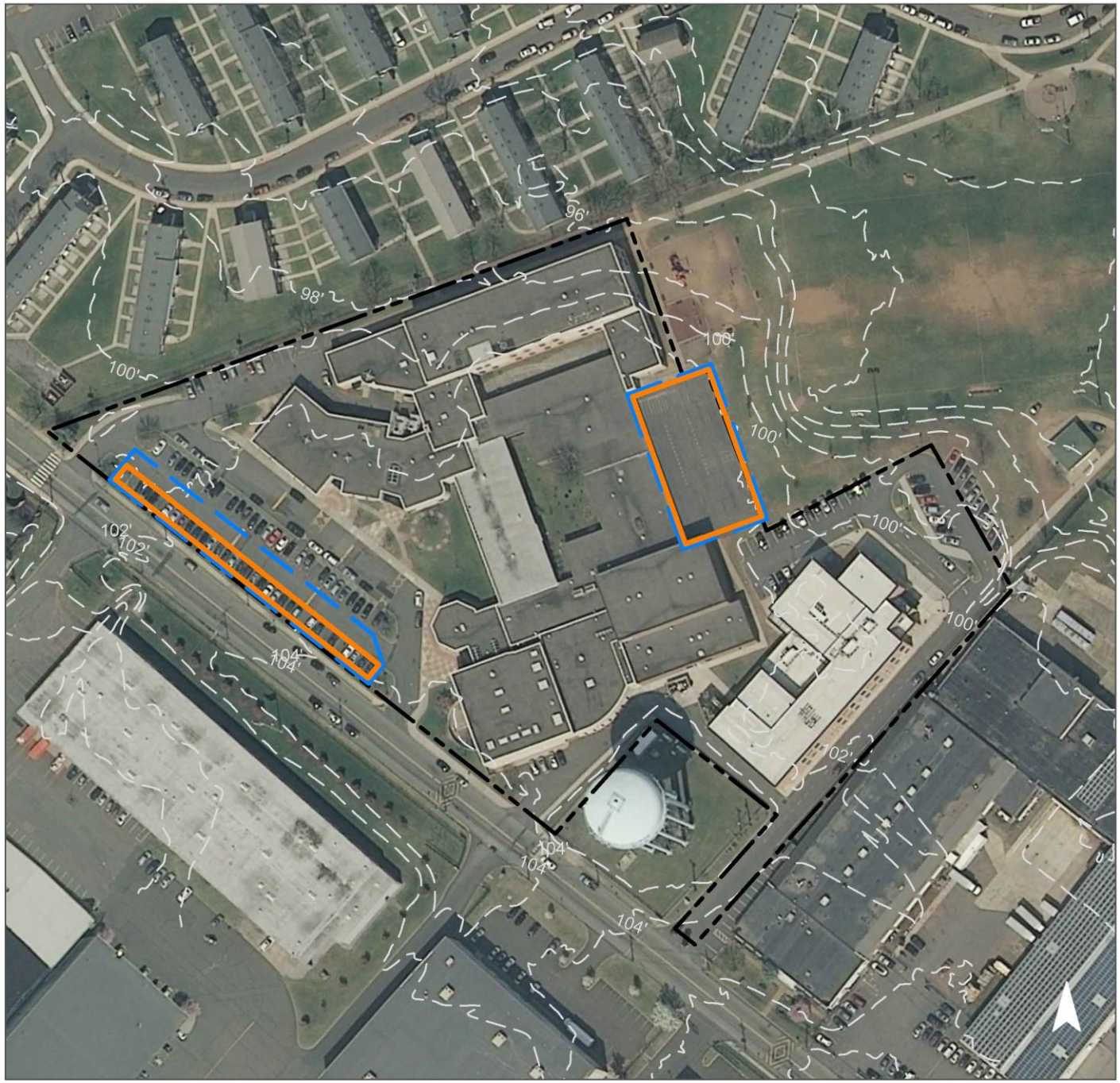
Block and Lot: Block 596, Lot 5.04

Parking spaces and the asphalt adjacent to the playground can be converted into pervious pavement to 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"
65	78,611	3.8	39.7	360.9	0.061	2.16

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
Pervious pavements	0.651	109	47,782	1.80	17,753	$443,825

GREEN INFRASTRUCTURE RECOMMENDATIONS



McKinley Community School

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

0 75' 150'

NEW BRUNSWICK ENGLISH SEVENTH-DAY ADVENTIST CHURCH

Subwatershed: Mile Run

Site Area: 25,352 sq. ft.

Address: 339 Livingston Avenue
New Brunswick, NJ 08901

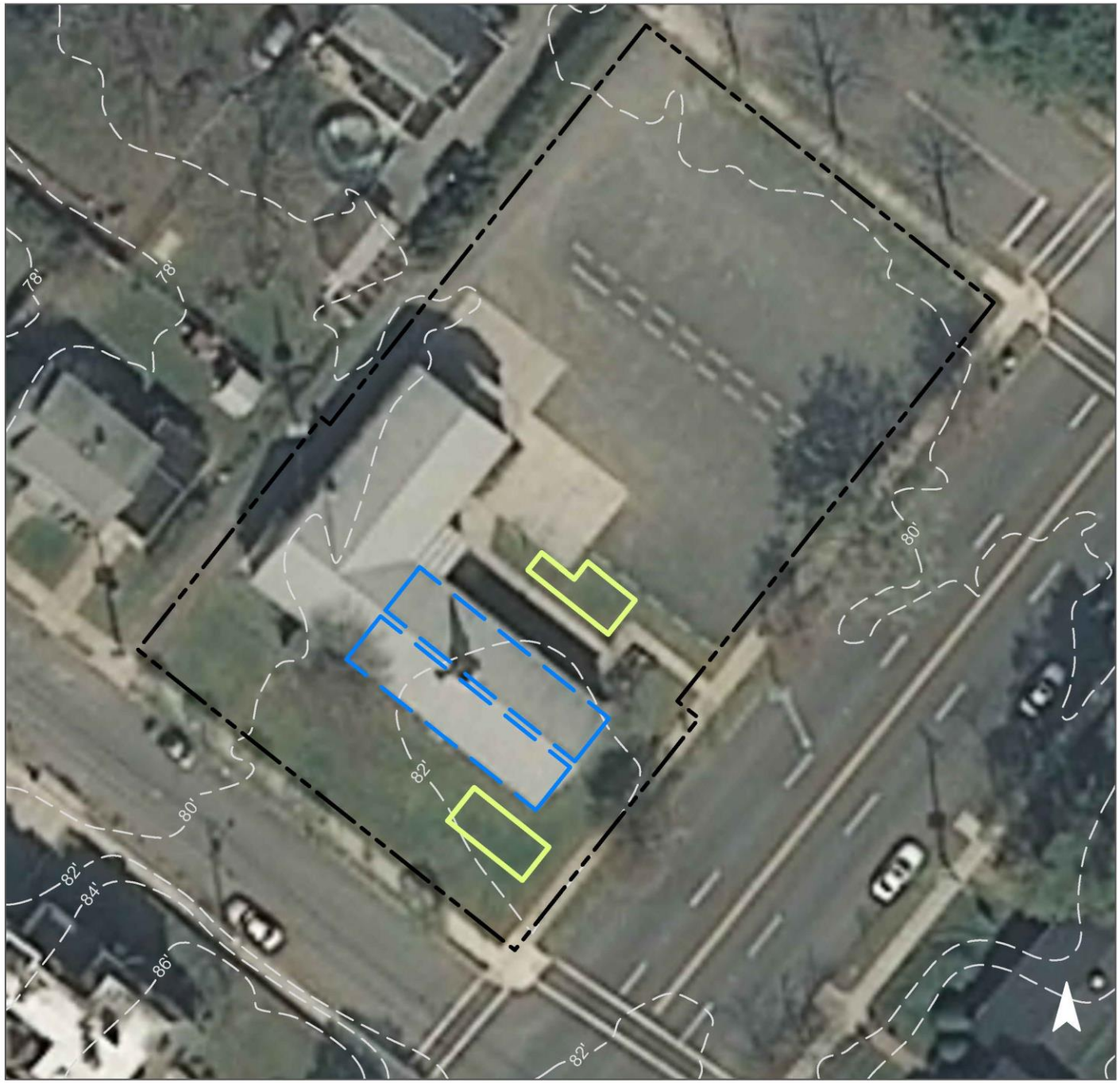
Block and Lot: Block 287, Lot 1.01

The parking lot is made of gravel and should remain pervious. Two bioretention systems can also be installed to capture, treat, and infiltrate stormwater runoff from the roof. 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	21,549	1.0	10.1	92.0	0.017	0.59

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	0.047	8	3,411	0.13	447	$2,235

GREEN INFRASTRUCTURE RECOMMENDATIONS



New Brunswick English Seventh-Day Adventist Church

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

0 20' 40'

NEW BRUNSWICK HIGH SCHOOL

Subwatershed: Mile Run

Site Area: 1,115,952 sq. ft.

Address: 1000 Somerset Street
New Brunswick, NJ 08901

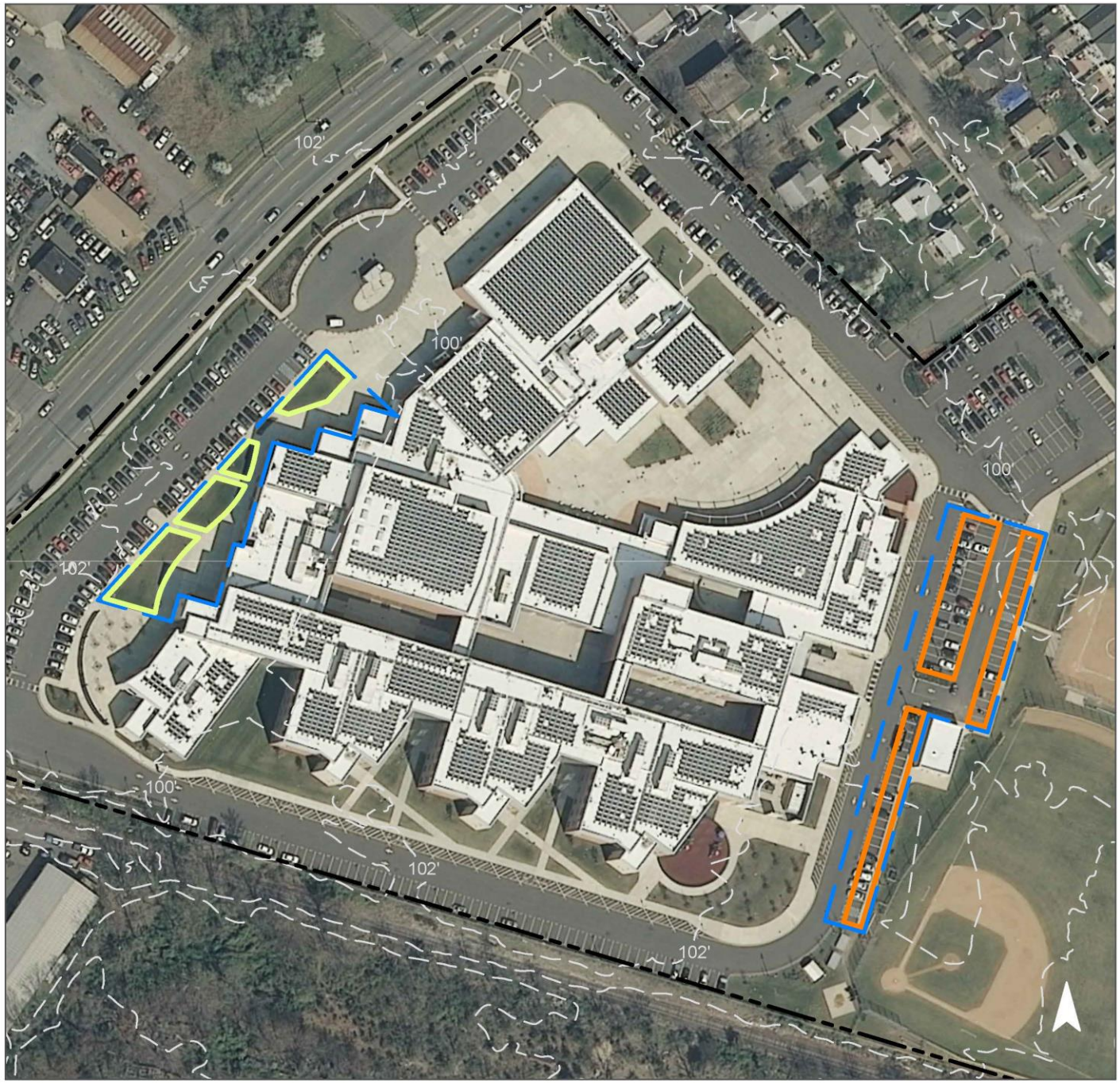
Block and Lot: Block 596.06, Lot 1.01

The high school is new with internal drainage. Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. Rain gardens can also capture, treat, and infiltrate 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"
45	505,499	24.4	255.3	2,320.9	0.394	13.86

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	0.495	83	36,323	1.37	4,164	$20,820
Pervious pavements	0.768	129	56,384	2.12	13,158	$328,950

GREEN INFRASTRUCTURE RECOMMENDATIONS



New Brunswick High School

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

0 75' 150'

NEW BRUNSWICK MIDDLE SCHOOL

Subwatershed: Mile Run

Site Area: 348,662 sq. ft.

Address: 1000 Somerset Street
New Brunswick, NJ 08901

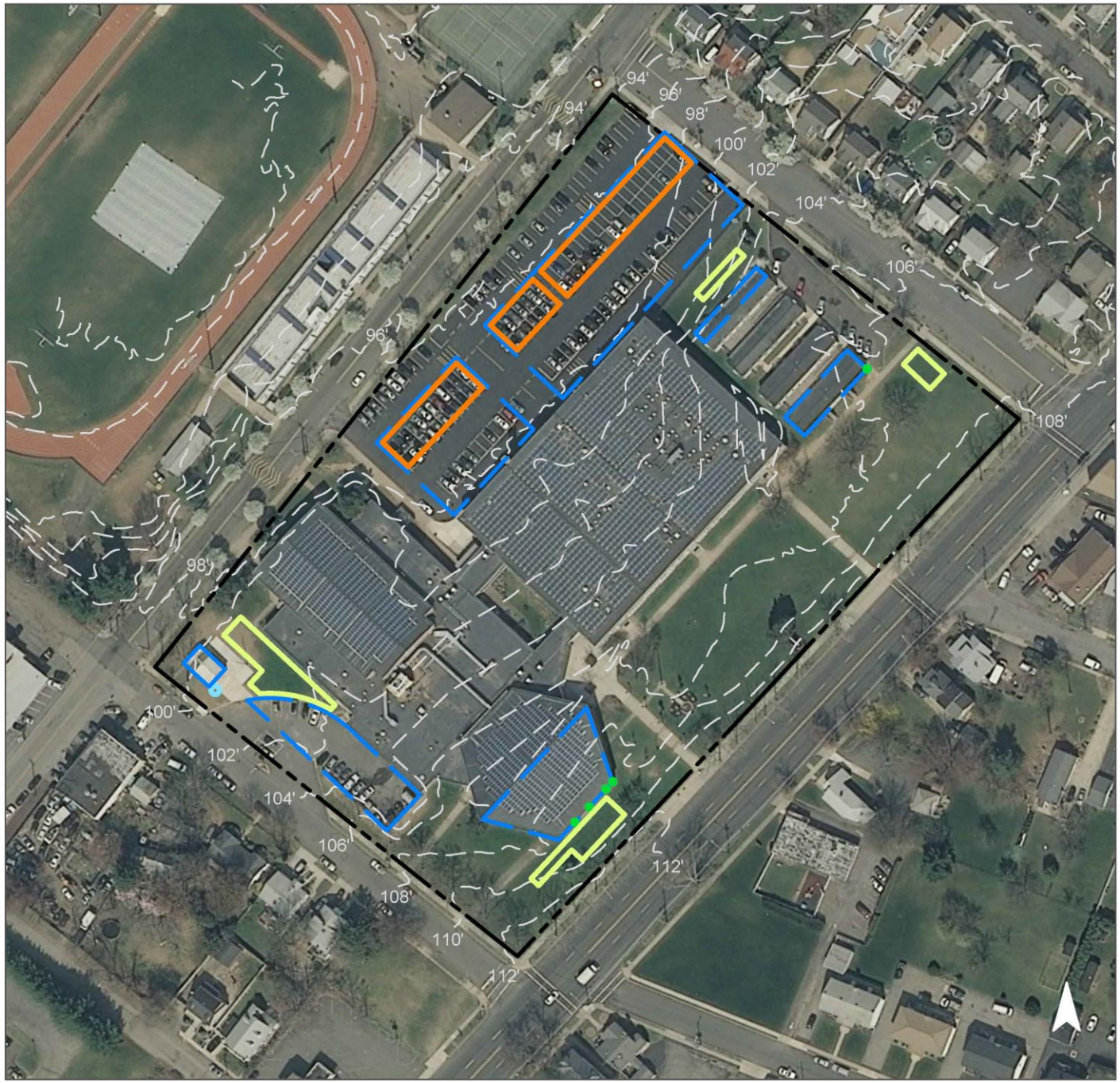
Block and Lot: Block 476.01, Lot 9.01

Bioretention systems can capture, treat, and infiltrate stormwater runoff. Roof runoff can also be harvested from the garage on the southwest side by installing a gutter, downspout, and a cistern. The harvested water can be used for car wash fundraisers and to water adjacent rain gardens. 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"
76	263,296	12.7	133.0	1,208.9	0.205	7.22

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	0.496	83	36,428	1.37	6,333	$31,665
Pervious pavements	1.022	171	74,980	2.82	12,399	$309,975
Rainwater harvesting systems	0.021	4	750	0.06	750 (gal)	$1,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



New Brunswick Middle School

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

0 75' 150'

NEW BRUNSWICK PUBLIC WORKS DEPARTMENT

Subwatershed: Mile Run

Site Area: 428,370 sq. ft.

Address: 400 New Jersey Avenue
New Brunswick, NJ 08901

Block and Lot: Block 242, Lot 10.03

A bioretention system can be installed on the front lawn to capture, treat, and infiltrate stormwater runoff. Roof runoff can also be harvested to wash vehicles by installing a gutter, downspout, and a cistern. 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	723,797	16.3	170.9	1,553.8	0.154	5.41

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	0.044	7	3,239	0.12	467	$2,335
Rainwater harvesting systems	0.038	6	1,350	0.10	1,350 (gal)	$2,700

GREEN INFRASTRUCTURE RECOMMENDATIONS

New Brunswick Public Works Department

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

0 20' 40'

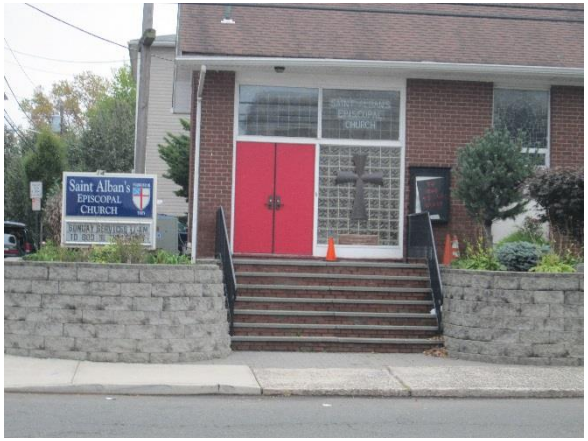
SAINT ALBAN'S EPISCOPAL CHURCH

Subwatershed: Mile Run

Site Area: 7,500 sq. ft.

Address: 31 Lee Avenue, New Brunswick, NJ 08901

Block and Lot: Block 229, Lot 19.01

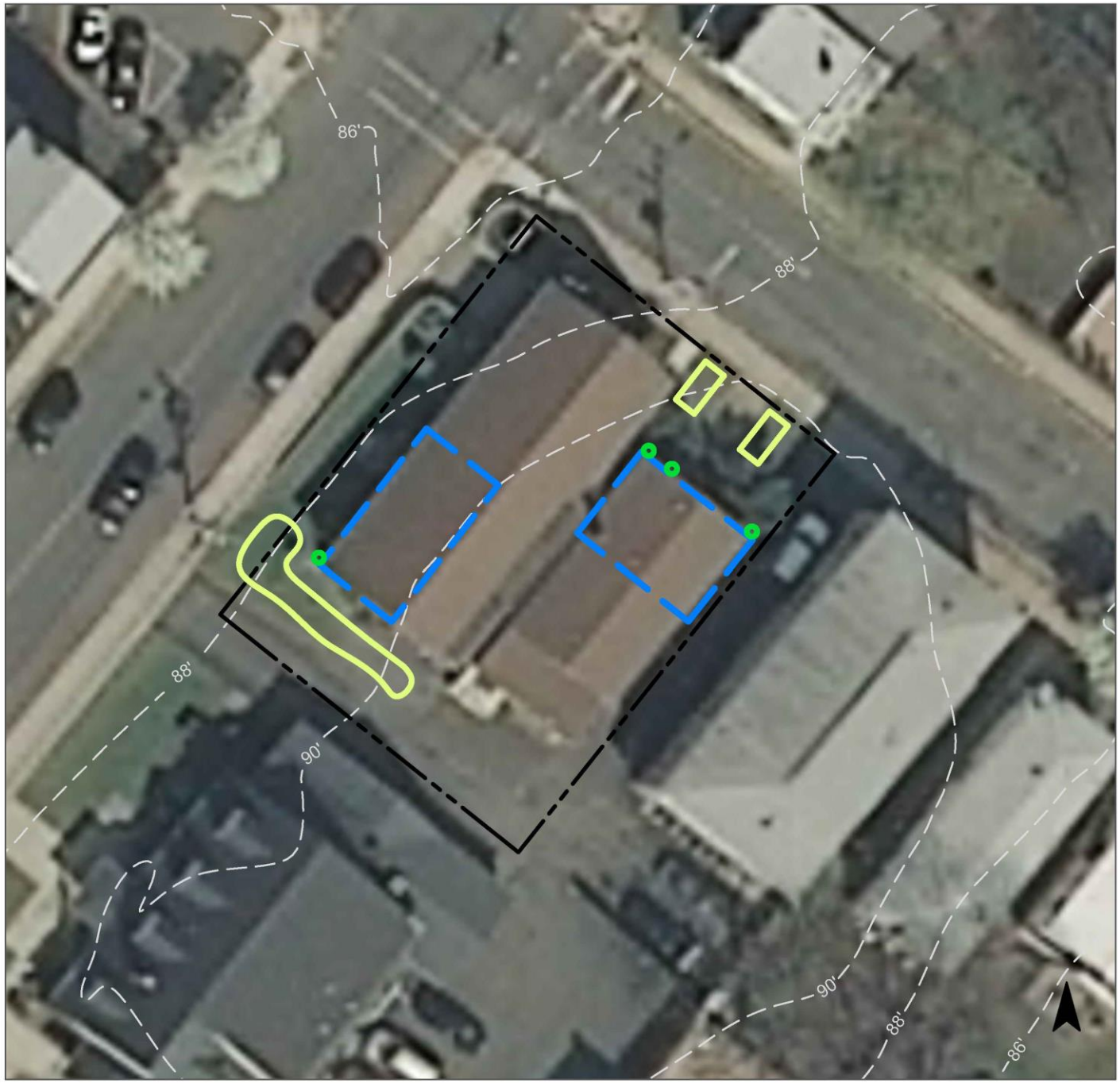


Bioretention systems can be installed to capture, treat, and infiltrate stormwater runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
40	3,000	0.1	1.5	13.8	0.002	0.08

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.031	5	2,259	0.08	378	$1,890

GREEN INFRASTRUCTURE RECOMMENDATIONS



Saint Alban's Episcopal Church

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

0 15' 30'

d. Summary of Existing Conditions

Summary of Existing Site Condidtions

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)
LOWER RARITAN RIVER SUBWATERSHED	**36.18**	**1,575,858**			**31.4**	**328.8**	**2,989.2**		**14.95**	**643,797**	**0.502**	**17.66**
Lord Stirling Elementary School												
Total Site Info	2.84	123,687	136	4.02	5.1	53.1	482.7	85	2.41	105,132	0.082	2.88
New Brunswick Free Public Library												
Total Site Info	1.16	50,355	132	17.02	2.1	22.1	200.9	87	1.00	43,753	0.034	1.20
New Brunswick Senior Citizen Resource Center												
Total Site Info	0.86	37,404	402	14.01	1.4	14.9	135.7	79	0.68	22,293	0.017	0.61
Paul Robeson Community School												
Total Site Info	7.69	334,921	211	41	5.4	57.0	517.9	34	2.59	112,788	0.088	3.09
Presbyterian Church of New Brunswick												
Total Site Info	0.88	38,489	149	11.01	1.7	17.5	159.0	90	0.80	34,640	0.027	0.95
Rail-Arts-River: Boyd Park												
Total Site Info	14.33	624,162	1.01	1.01	1.6	16.7	151.8	5	0.76	33,058	0.026	0.91
Rail-Arts-River: Commercial Avenue and George Street												
Total Site Info	1.67	72,932	124.01	1.01	3.2	33.2	301.4	90	1.51	65,638	0.051	1.80
Roosevelt Elementary School												
Total Site Info	1.61	69,938	142	1.01	3.4	35.3	321.1	100	1.61	69,938	0.054	1.92
US Post Office												
Total Site Info	1.08	47,050	12	9.02	2.2	22.6	205.2	95	1.03	44,698	0.035	1.23
Woodrow Wilson Elementary School												
Total Site Info	4.06	176,921	718	23.01	5.4	56.5	513.6	63	2.57	111,858	0.087	3.07
MILE RUN SUBWATERSHED	**59.47**	**2,590,718**			**65.8**	**689.4**	**6,267.1**		**31.34**	**1,225,483**	**0.955**	**33.61**
Esperanza Gardens / Farmer's Market												
Total Site Info	11.32	493,094	233.01	1	5.2	54.2	492.7	22	2.46	107,299	0.084	2.94

Summary of Existing Site Condidtions

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)
Livingston Elementary School												
Total Site Info	1.15	49,923	228	9.01	2.4	24.7	224.2	98	1.12	48,830	0.038	1.34
McKinley Community School												
Total Site Info	2.80	121,864	596	5.04	3.8	39.7	360.9	65	1.80	78,611	0.061	2.16
New Brunswick English Seventh-Day Adventist Church												
Total Site Info	0.58	25,352	287	1.01	1.0	10.1	92.0	79	0.46	21,549	0.017	0.59
New Brunswick High School												
Total Site Info	25.62	1,115,952	596.06	1.01	24.4	255.3	2,320.9	45	11.60	505,499	0.394	13.86
New Brunswick Middle School												
Total Site Info	8.00	348,662	476.01	9.01	12.7	133.0	1,208.9	76	6.04	263,296	0.205	7.22
New Brunswick Public Works Department												
Total Site Info	9.83	428,370	242	10.03	16.3	170.9	1,553.8	79	7.77	197,399	0.154	5.41
Saint Alban’s Episcopal Church												
Total Site Info	0.17	7,500	229	19.01	0.1	1.5	13.8	40	0.07	3,000	0.002	0.08

e. 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)									
	LOWER RARITAN RIVER SUBWATERSHED	**106,056**	**2.43**	**2.763**	**463**	**202,761**	**7.62**	**32,596**			**$905,720**	**16.5%**
1	**Lord Stirling Elementary School**											
	Pervious pavements	15,884	0.36	0.414	69	30,369	1.14	6,683	25	SF	$167,075	15.1%
	Total Site Info	**15,884**	**0.36**	**0.414**	**69**	**30,369**	**1.14**	**6,683**			**$167,075**	**15.1%**
2	**New Brunswick Free Public Library**											
	Bioretention systems/rain gardens	1,245	0.03	0.032	5	2,379	0.09	1,280	5	SF	$6,400	2.8%
	Pervious pavements	8,334	0.19	0.217	36	15,932	0.60	2,989	25	SF	$74,725	19.0%
	Total Site Info	**9,579**	**0.22**	**0.250**	**42**	**18,311**	**0.69**	**4,269**			**$81,125**	**21.9%**
3	**New Brunswick Senior Citizen Resource Center**											
	Bioretention systems/rain gardens	1,541	0.04	0.040	7	2,947	0.11	419	5	SF	$2,095	6.9%
	Total Site Info	**1,541**	**0.04**	**0.040**	**7**	**2,947**	**0.11**	**419**			**$2,095**	**6.9%**
4	**Paul Robeson Community School**											
	Bioretention systems/rain gardens	3,304	0.08	0.086	14	6,313	0.24	826	5	SF	$4,130	2.9%
	Pervious pavements	15,495	0.36	0.404	68	29,621	1.11	4,526	25	SF	$113,150	13.7%
	Total Site Info	**18,799**	**0.43**	**0.490**	**82**	**35,934**	**1.35**	**5,352**			**$117,280**	**16.7%**
5	**Presbyterian Church of New Brunswick**											
	Bioretention systems/rain gardens	4,041	0.09	0.105	18	7,727	0.29	1,030	5	SF	$5,150	11.7%
	Total Site Info	**4,041**	**0.09**	**0.105**	**18**	**7,727**	**0.29**	**1,030**			**$5,150**	**11.7%**
6	**Rail-Arts-River: Boyd Park**											
	Bioretention systems/rain gardens	3,250	0.07	0.085	14	6,216	0.23	4,700	5	SF	$23,500	9.8%
	Total Site Info	**3,250**	**0.07**	**0.085**	**14**	**6,216**	**0.23**	**4,700**			**$23,500**	**9.8%**
7	**Rail-Arts-River: Commercial Avenue and George Street**											
	Stormwater planters	22,000	0.51	0.573	96	42,060	1.58	2,800	100	SF	$280,000	33.5%
	Total Site Info	**22,000**	**0.51**	**0.573**	**96**	**42,060**	**1.58**	**2,800**			**$280,000**	**33.5%**
8	**Roosevelt Elementary School**											
	Bioretention systems/rain gardens	5,949	0.14	0.155	26	11,377	0.43	785	5	SF	$3,925	8.5%
	Stormwater planters	10,849	0.25	0.283	47	20,742	0.78	1,160	100	SF	$116,000	15.5%
	Total Site Info	**16,798**	**0.39**	**0.438**	**73**	**32,119**	**1.21**	**1,945**			**$119,925**	**24.0%**

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 (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
9	**US Post Office**											
	Bioretention systems/rain gardens	422	0.01	0.011	2	808	0.03	282	5	SF	$1,410	0.9%
	Total Site Info	**422**	**0.01**	**0.011**	**2**	**808**	**0.03**	**282**			**$1,410**	**0.9%**
10	**Woodrow Wilson Elementary School**											
	Bioretention systems/rain gardens	4,453	0.10	0.116	19	8,512	0.32	987	5	SF	$4,935	4.0%
	Pervious pavements	9,289	0.21	0.242	41	17,758	0.67	4,129	25	SF	$103,225	8.3%
	Total Site Info	**13,742**	**0.32**	**0.358**	**60**	**26,270**	**0.99**	**5,116**			**$108,160**	**12.3%**
	MILE RUN SUBWATERSHED	**155,737**	**3.58**	**4.058**	**679**	**295,549**	**11.20**	**65,127**			**$1,185,535**	**12.7%**
11	**Esperanza Gardens / Farmer's Market**											
	Bioretention systems/rain gardens	11,286	0.26	0.294	49	21,580	0.81	2,228	5	SF	$11,140	10.5%
	Total Site Info	**11,286**	**0.26**	**0.294**	**49**	**21,580**	**0.81**	**2,228**			**$11,140**	**10.5%**
12	**Livingston Elementary School**											
	Bioretention systems/rain gardens	5,786	0.13	0.151	25	11,063	0.42	5,700	5	SF	$28,500	11.8%
	Total Site Info	**5,786**	**0.13**	**0.151**	**25**	**11,063**	**0.42**	**5,700**			**$28,500**	**11.8%**
13	**McKinley Community School**											
	Pervious pavements	24,993	0.57	0.651	109	47,782	1.80	17,753	25	SF	$443,825	31.8%
	Total Site Info	**24,993**	**0.57**	**0.651**	**109**	**47,782**	**1.80**	**17,753**			**$443,825**	**31.8%**
14	**New Brunswick English Seventh-day Adventist Church**											
	Bioretention systems/rain gardens	1,786	0.04	0.047	8	3,411	0.13	447	5	SF	$2,235	8.3%
	Total Site Info	**1,786**	**0.04**	**0.047**	**8**	**3,411**	**0.13**	**447**			**$2,235**	**8.3%**
15	**New Brunswick High School**											
	Bioretention systems/rain gardens	18,997	0.44	0.495	83	36,323	1.37	4,164	5	SF	$20,820	3.8%
	Pervious pavements	29,492	0.68	0.768	129	56,384	2.12	13,158	25	SF	$328,950	5.8%
	Total Site Info	**48,489**	**1.11**	**1.263**	**211**	**92,707**	**3.49**	**17,322**			**$349,770**	**9.6%**

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 (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
16	**New Brunswick Middle School**											
	Bioretention systems/rain gardens	19,054	0.44	0.496	83	36,428	1.37	6,333	5	SF	$31,665	7.2%
	Pervious pavements	39,217	0.90	1.022	171	74,980	2.82	12,399	25	SF	$309,975	14.9%
	Rainwater harvesting systems	803	0.02	0.021	4	750	0.06	750	2	gal	$1,500	0.3%
	Total Site Info	**59,074**	**1.36**	**1.539**	**258**	**112,158**	**4.25**	**19,482**			**$343,140**	**22.4%**
17	**New Brunswick Public Works Department**											
	Bioretention systems/rain gardens	1,695	0.04	0.044	7	3,239	0.12	467	5	SF	$2,335	0.9%
	Rainwater harvesting systems	1,447	0.03	0.038	6	1,350	0.10	1,350	2	gal	$2,700	0.7%
	Total Site Info	**3,142**	**0.07**	**0.082**	**14**	**4,589**	**0.22**	**1,817**			**$5,035**	**1.6%**
18	**Saint Alban's Episcopal Church**											
	Bioretention systems/rain gardens	1,181	0.03	0.031	5	2,259	0.08	378	5	SF	$1,890	39.4%
	Total Site Info	**1,181**	**0.03**	**0.031**	**5**	**2,259**	**0.08**	**378**			**$1,890**	**39.4%**