RUTGERS
New Jersey Agricultural
Experiment Station

Green Infrastructure Opportunities
for
the CSO 16 Sewershed in
City of Perth Amboy, Middlesex County, New Jersey

Prepared for the City of Perth Amboy by the
Rutgers Cooperative Extension Water Resources Program

December 2021

ACKNOWLEDGEMENTS:

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RUTGERS
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Introduction

Located in Middlesex County, New Jersey, the City of Perth Amboy has a sewer system that includes both a combined sewer system and municipal separate storm sewer system (MS4). During wet weather events, stormwater runoff entering the combined sewer system can mix with untreated raw sewage and directly overflow into the Arthur Kill and Raritan Bay. The City of Perth Amboy has 16 combined sewer overflow (CSO) outfalls that discharge to the Arthur Kill and Raritan Bay. Figure 1 identifies Perth Amboy's sewersheds, or drainage areas, and their corresponding CSO outfalls. The sewershed that contributes to CSO P-016, or CSO 16, is 578 acres. CSO 16 is the largest CSO by volume in Perth Amboy, discharging over 100 million gallons in the typical year, according to Perth Amboy's CSO Long Term Control Plan (LTCP). CSO 16 contributes 26% (the highest percentage) of the total CSO volume in Perth Amboy and overflows approximately 61 times per year, according to the LTCP. The outfall for CSO 16 is located at the end of 2nd Street, adjacent to and upstream of the non-bathing beaches along Sadowski Parkway between 2nd Street and High Street. The LTCP and the City of Perth Amboy acknowledge that reducing discharges at the CSO 16 outfall also align with public interest in establishing bathing-safe beaches in Perth Amboy.

In 2014 and 2015, the Rutgers Cooperative Extension (RCE) Water Resources Program completed an impervious cover assessment (ICA), an impervious cover reduction action plan (RAP), and a green infrastructure feasibility study for the City of Perth Amboy. These previous reports illustrate ways that impervious cover can be reduced and stormwater runoff from impervious surfaces can be managed through the installation of green infrastructure practices. Sites where green infrastructure practices could be implemented were recommended city-wide and organized by subwatershed. The previous reports identified 27 sites where green infrastructure practices could be implemented city-wide. Out of those 27 sites, projects were subsequently completed at nine sites, with some locations utilizing multiple types of green infrastructure practices. The present study is an assessment for the sewershed of CSO 16 using land use and impervious cover data. Twenty-five sites were identified and included in this report for their potential to manage stormwater runoff through green infrastructure practices and reduce the impact of impervious surfaces that drain to CSO 16.

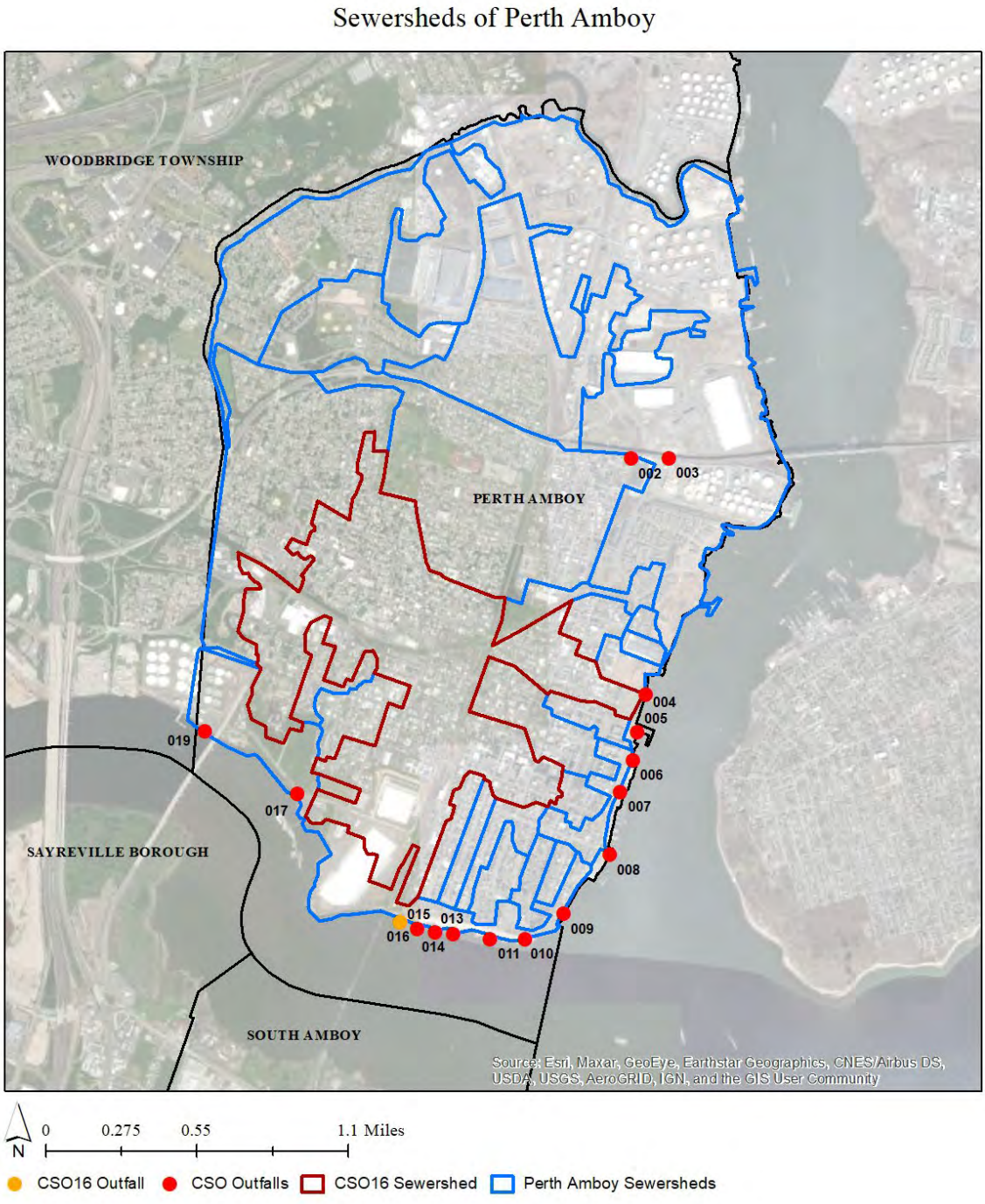


Figure 1: Map of the sewersheds in Perth Amboy

Impervious Cover Analysis

Figures 2 and 3 illustrate that the CSO 16 sewershed is dominated by urban land uses. A total of 98.3% of the sewershed's land use is classified as urban. Of the urban land in the CSO 16 sewershed, high density residential is the dominant land use (Figure 4). The New Jersey Department of Environmental Protection's (NJDEP) 2015 land use/land cover geographical information system (GIS) data layer categorizes the CSO 16 sewershed into several 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 the CSO 16 sewershed. Based upon the 2015 NJDEP land use/land cover data, approximately 80% of the CSO 16 sewershed has impervious cover (Table 1).

Table 1: Impervious cover analysis for Perth Amboy CSO 16 sewershed

Sewershed	Total Area		Land Use Area		Water Area		Impervious Cover		
	(ac)	(mi^2)	(ac)	(mi^2)	(ac)	(mi^2)	(ac)	(mi^2)	(%)
CSO 16	578	0.9	576	0.9	2	0.0	461	0.7	80.0%

In developed landscapes, stormwater runoff from parking lots, driveways, sidewalks, and rooftops flows to drainage pipes that feed the sewer system. The cumulative effect of these impervious surfaces and thousands of connected downspouts reduces the amount of water that can infiltrate into soils and greatly increases the volume and rate of runoff that flows to waterways. Stormwater runoff volumes (specific to Perth Amboy, Middlesex County) associated with impervious surfaces were calculated for the following storms: the New Jersey water quality design storm of 1.25 inches of rain over two hours, an annual rainfall of 44 inches, the 2-year design storm (3.38 inches of rain over 24 hours), the 10-year design storm (5.00 inches of rain over 24 hours), and the 100-year design storm (8.03 inches of rain over 24 hours). These runoff volumes are summarized in Table 2. A substantial amount of rainwater drains from impervious surfaces in the CSO 16 sewershed.

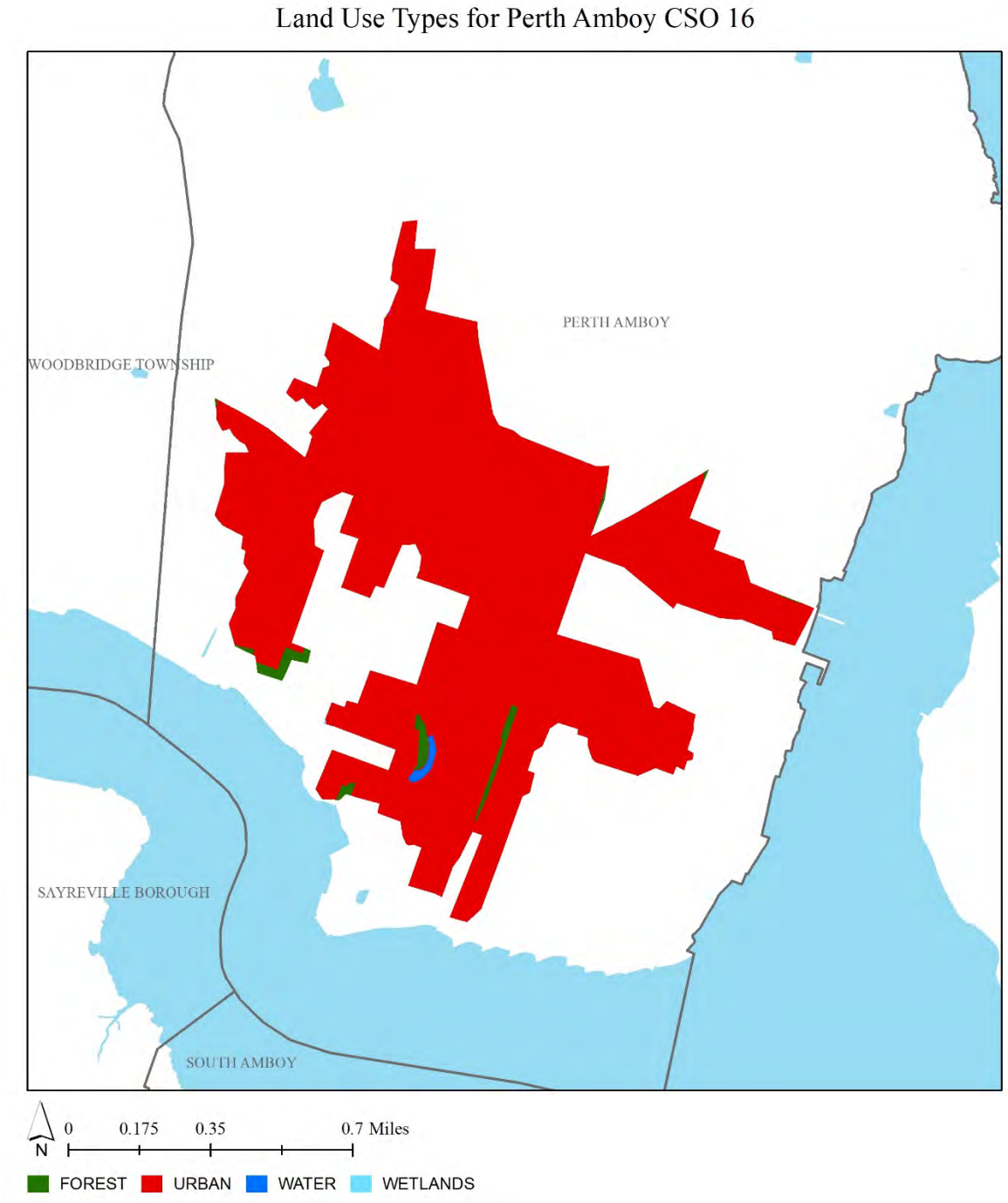


Figure 2: Map illustrating the land use in Perth Amboy CSO 16 sewershed

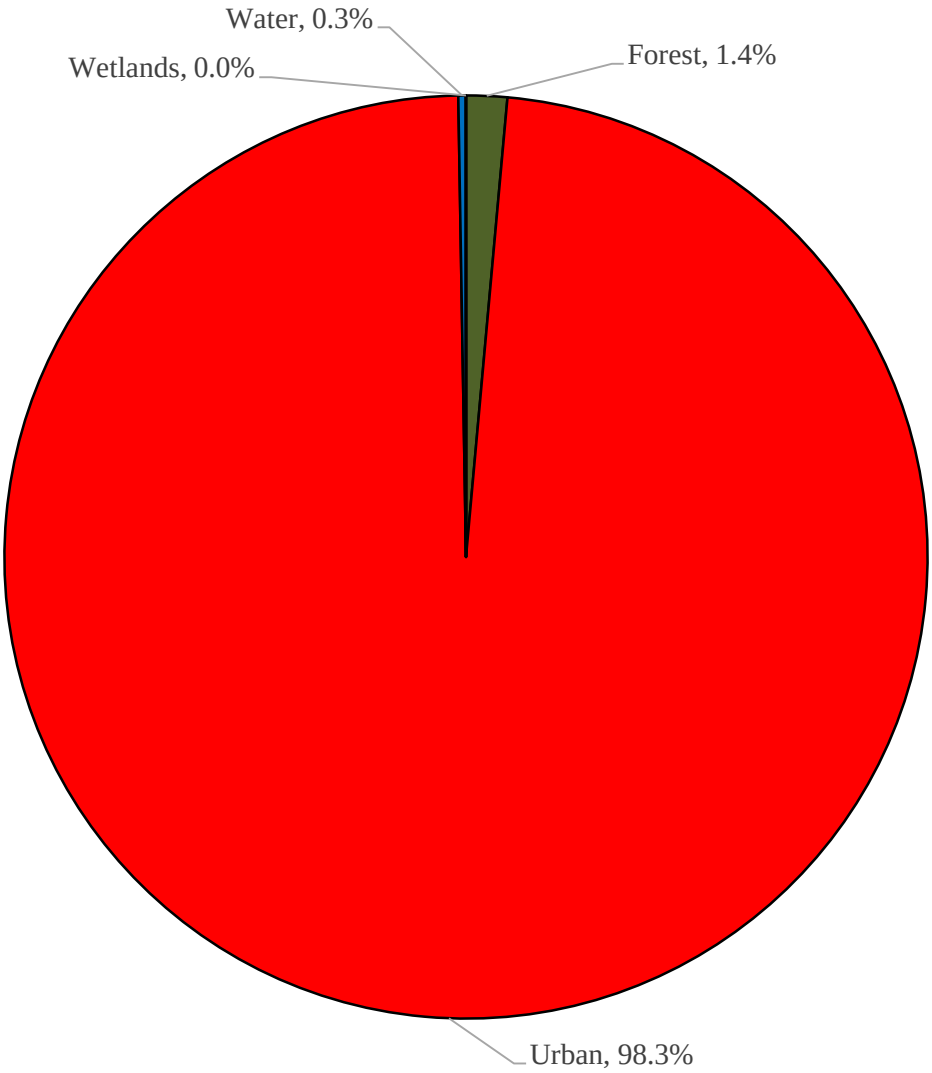


Figure 3: Pie chart illustrating the land use in Perth Amboy CSO 16 sewershed

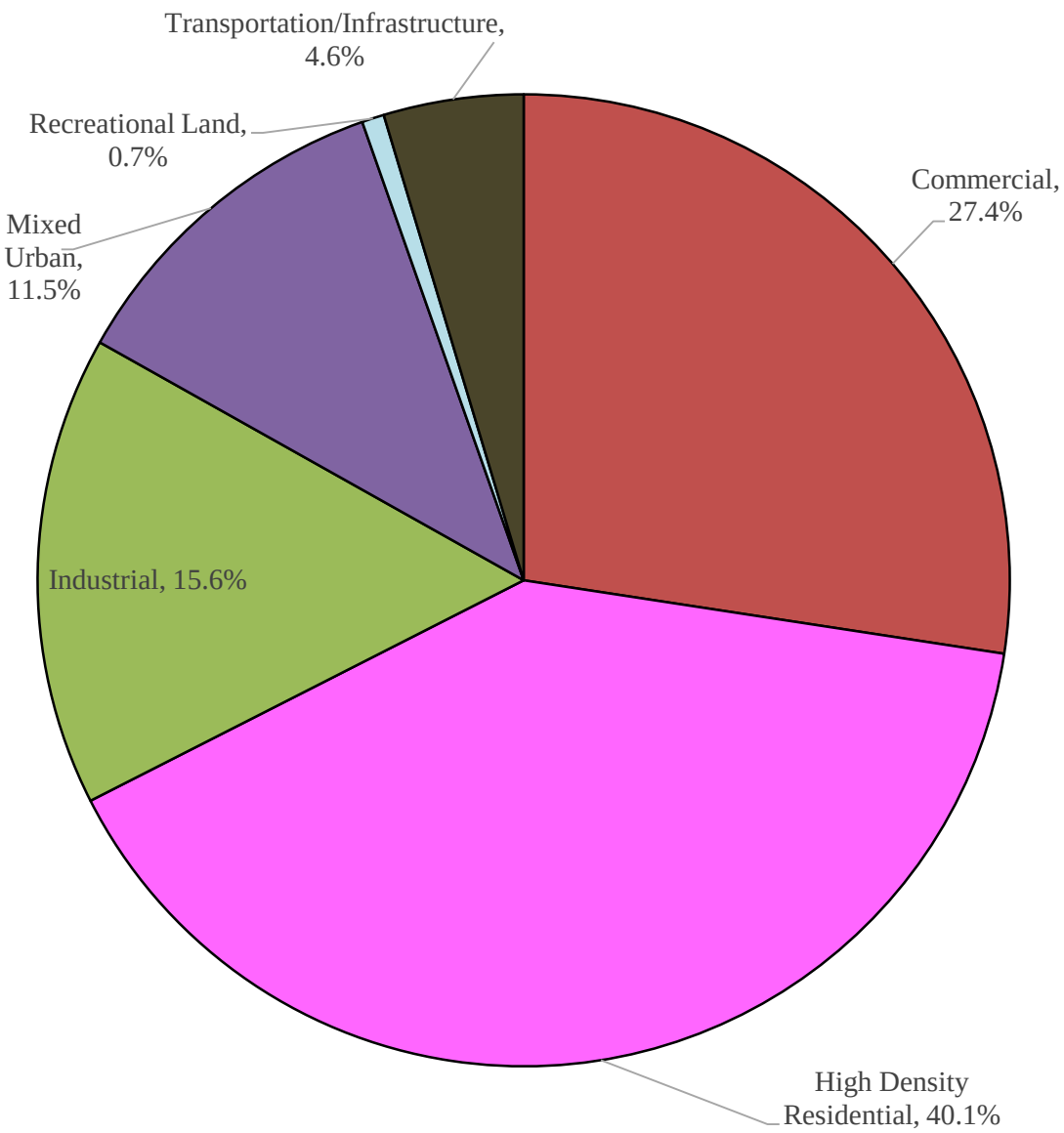


Figure 4: Pie chart illustrating the various types of urban land use in Perth Amboy CSO 16 sewershed

Table 2: Stormwater runoff volumes from impervious surfaces in Perth Amboy CSO 16 sewershed

Sewershed	Total Runoff Volume for the 1.25" NJ Water Quality Storm (MGal)	Total Runoff Volume for the NJ Annual Rainfall of 44" (MGal)	Total Runoff Volume for the 2-Year Design Storm (3.35") (MGal)	Total Runoff Volume for the 10-Year Design Storm (5.12") (MGal)	Total Runoff Volume for the 100-Year Design Storm (8.63") (MGal)
CSO 16	15.7	551.1	42.0	64.1	108.1

The next step is to set a reduction goal for impervious area in the CSO 16 sewershed. A 10% reduction would be a reasonably achievable reduction for the sewershed. While it may be difficult to eliminate paved areas or replace paved areas with permeable pavement, it is relatively easy to identify impervious surfaces that can be disconnected using green infrastructure practices. The RCE Water Resources Program recommends that all green infrastructure practices that are installed to disconnect impervious surfaces should be designed for the 2-year design storm (3.38 inches of rain over 24 hours). Although this results in management practices that are slightly over-designed by NJDEP standards, which require systems to be designed for the New Jersey water quality storm (1.25 inches of rain over two hours), these systems will be able to handle the projected increase in storm intensities that are expected to occur due to climate change. By designing green infrastructure management practices for the 2-year design storm, management of 95% of the annual rainfall volume can be achieved (Table 3).

Table 3: Impervious cover reductions in Perth Amboy CSO 16 sewershed

Sewershed	Recommended Impervious Area Reduction (10%) (ac)	Annual Runoff Volume Reduction[1] (Mgal)
CSO 16	46.1	52.3

[1] Annual Runoff Volume Reduction =
Acres of IC x 43,560 ft^2/ac x 44 in x (1 ft/12 in)x 0.95 x (7.48 gal/ft^3) x (1 MGal/1,000,000 gal)
All BMPs should be designed to capture the first 3.35 inches of rain from each storm. This would allow the BMP to capture 95% of the annual rainfall of 44 inches

Site Assessment Methodology

The CSO 16 sewershed is the drainage area to the CSO discharge outfall referred to as P-016 in the LTCP and referred to here as CSO 16. For this plan, projects have been identified only in the CSO 16 sewershed. Aerial imagery initially was studied to identify potential project sites that contain extensive impervious cover. Field inspections were conducted to determine if viable options exist at the sites to reduce impervious cover or to disconnect impervious surfaces from draining directly to the storm sewer system. During the field inspections, appropriate green infrastructure practices for the sites were recommended. Sites that already had green infrastructure stormwater management practices in place were not considered.

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 4). These are the same aerial loading coefficients that NJDEP uses in developing total maximum daily loads (TMDLs) for impaired waterways of the state. The percentage of impervious cover for each site was extracted from the 2015 NJDEP land use/land cover database. For impervious areas, runoff volumes were determined for the New Jersey water quality design storm (1.25 inches of rain over two hours) and for the average annual rainfall total of 44 inches.

Preliminary soil assessments were conducted for each potential project site identified in the CSO 16 sewershed 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 (Ksat), 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, allowing for the capture of 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 4. 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 4: 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, February 2004, Page 3-11.

Green Infrastructure Practices

Green infrastructure is an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure projects capture, filter, absorb, and reuse stormwater to maintain or mimic natural systems and to treat runoff as a resource. As a general principle, green infrastructure practices use soil and vegetation to recycle stormwater runoff through infiltration and evapotranspiration. When used as components of a stormwater management system, green infrastructure practices such as bioretention, green roofs, porous pavement, rain gardens, and vegetated swales can yield 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 the CSO 16 sewershed. The practices are discussed below.

Disconnected downspouts

This is often referred to as simple disconnection. A downspout is simply disconnected 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 are designed with an underlying stone layer to retain stormwater runoff and allow it to slowly seep into the ground.

[3] United States Environmental Protection Agency (USEPA). 2015. Benefits of Green Infrastructure. http://www.epa.gov/greeninfrastructure/benefits-green-infrastructure

Bioretention systems/rain gardens

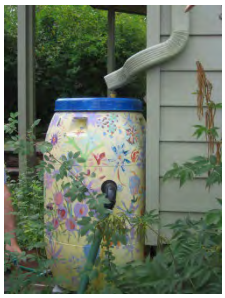
These are landscaped features that are designed to capture, treat, and infiltrate stormwater runoff. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating wildlife habitat while managing stormwater runoff. Bioretention systems also can be used in soils that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

Downspout planter boxes

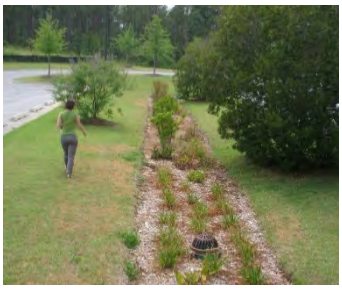
These are large wooden boxes that house a variety of water-retaining and/or filtering plants. When installed at the base of a downspout, water is captured by the plants which reduces stormwater runoff volume, provides a water source for the vegetation, and provides a small patch of habitat and food sources for birds and insects.

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. Bioswales are often designed for larger scale sites where water needs time to move and slowly infiltrate into the groundwater. Much like rain garden systems, bioswales can also be designed with an underdrain pipe that allows excess water to discharge to the nearest catch basin or existing stormwater system.

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. Tree filter boxes filter stormwater runoff but provide little storage capacity. They are typically designed to quickly filter stormwater and then discharge it to the local sewer system.

Potential Project Sites

Appendix A contains information on potential project sites where green infrastructure practices could be installed with a focus on existing site conditions. The recommended green infrastructure practices and the drainage area that the green infrastructure practices can treat are identified for each potential project site. For each practice, recharge potential, TSS removal potential, maximum volume reduction potential per storm, peak reduction potential, and estimated project costs are provided. This information will be especially useful in instances where proposed development projects cannot satisfy the New Jersey stormwater management requirements (N.J.A.C. 7:8).

Conclusion

This document 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. By focusing on the CSO 16 sewershed, the projects proposed can help to reduce or manage the impervious surfaces that contribute stormwater runoff to the largest CSO (by volume) in Perth Amboy.

These projects could be implemented by the City of Perth Amboy to meet green infrastructure goals in the CSO Long Term Control Plan and could be used to achieve Sustainable Jersey certification. The installation of the projects could be completed as a part of a municipal green infrastructure program through capital improvements or by grants for infrastructure and resiliency. The RCE Water Resources has developed a set of green infrastructure design and construction details in the Green Infrastructure Guidance Manual for New Jersey, available on our website for download (water.rutgers.edu). These details can be utilized by municipal officials and the Department of Public Works to assess a site, design, and install green infrastructure practices in-house.

These projects can also be implemented in part through a variety of volunteer group efforts, such as the Perth Amboy Green Team, scouting organizations, corporate volunteerism, faith-based groups, school groups, watershed groups, and other active community organizations. 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 green infrastructure action plan into a stormwater mitigation plan and incorporate it into a municipal stormwater control ordinance.

Appendix A: Climate Resilient Green Infrastructure

a. Green Infrastructure Sites

PERTH AMBOY CSO 16: GREEN INFRASTRUCTURE SITES

SITES WITHIN THE CSO 16 SEWERSHED

1. Acelero Learning Center
2. Alexander F. Jankowski Community Center
3. Dekoff's Perth Amboy Lock Co.
4. Dr. Herbert N. Richardson Elementary School
5. Emilia Santa Maria Lucero
6. Great Grace Evangelistic Ministries Inc.
7. Holy Trinity Church
8. Jefferson Street Parking
9. Perth Amboy Christian Center
10. Perth Amboy Train Station
11. Raritan Bay Medical Center: Emergency Room
12. Redeemed Christian Church of God
13. Robert N. Wilentz Elementary School
14. St. John the Baptist Carpatho-Russian Orthodox Church
15. St. Nicholas Byzantine Catholic Church
16. The Church of Jesus Christ of Latter-day Saints
17. Thomas M. Peterson Elementary School
18. Iglesia Pentecostal Un Nuevo Renacer Inc.
19. Walgreens

ROADWAY SITES WITHIN THE CSO 16 SEWERSHED

20. 2nd Street and Gordon Street
21. 2nd Street and Lewis Street
22. 2nd Street and Patterson Street
23. Broad Street and State Street
24. Fayette Street and Prospect Street
25. Fayette Street and Watson Avenue

CSO 16 Sewershed Boundary

Perth Amboy Boundary

b. Proposed Green Infrastructure Concepts

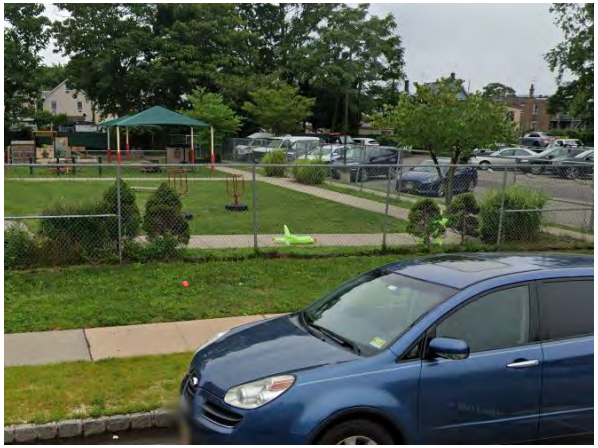
Acelero Learning Center

Subwatershed: Lower Raritan River

Site Area: 59,860 sq. ft.

Address: 132 2nd Street
Perth Amboy, NJ 08861

Block and Lot: Block 17, Lots 43, 46 – 59



A rain garden can be installed in the turfgrass area south of the building outside the fence to capture, treat, and infiltrate the stormwater runoff from the roadway. A section of the parking lot can be converted to pervious pavement to help capture and infiltrate the stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
81	48,265	2.3	24.4	221.6	0.038	1.32

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.022	4	1,670	0.06	215	$1,075
Pervious pavement	0.263	44	19,580	0.72	1,800	$45,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Acelero Learning Center

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

0 30' 60'

Alexander F. Jankowski Community Center

Subwatershed: Lower Raritan River

Site Area: 45,145 sq. ft.

Address: 1 Olive Street
Perth Amboy, NJ 08861

Block and Lot: Block 40, Lot 1.01

Parking spaces in the parking lot to the south of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A rain garden can be installed south of the building 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"
87	39,090	1.9	19.7	179.5	0.030	1.07

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 system	0.061	10	4,540	0.17	585	$2,925
Pervious pavement	0.263	44	19,580	0.72	1,800	$45,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Alexander F. Jankowski Community Center

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

0 25' 50'

Dekoff's Perth Amboy Lock Co.

Subwatershed: Lower Raritan River

Site Area: 8,700 sq. ft.

Address: 319 Madison Avenue
Perth Amboy, NJ 08861

Block and Lot: Block 122, Lots 23 – 25

Downspout planter boxes can be installed on the northern side of the building to treat the stormwater runoff from the rooftop. 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"
96	8,320	0.4	4.2	38.2	0.006	0.23

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
Planter boxes	n/a	2	n/a	n/a	3 (boxes)	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Dekoff's Perth Amboy Lock Co.

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

0 15' 30'

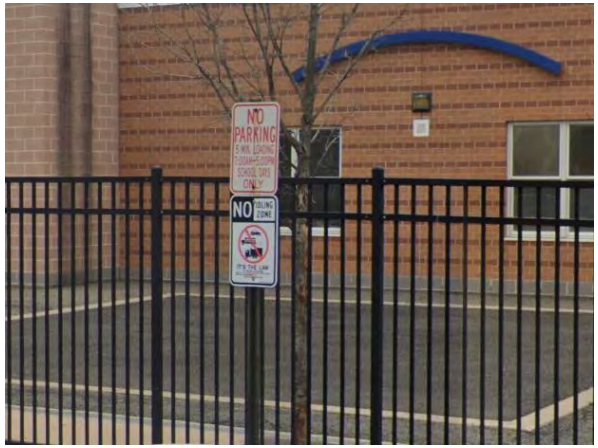
Dr. Herbert N. Richardson Elementary School

Subwatershed: Lower Raritan River

Site Area: 171,910 sq. ft.

Address: 318 Stockton Street
Perth Amboy, NJ 08861

Block and Lot: Block 114, Lot 2.01



The pavement to the west of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the rooftop and paved area. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
91	157,285	7.6	79.4	722.1	0.123	4.31

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
Pervious pavement	0.088	15	6,550	0.24	600	$15,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Dr. Herbert N. Richardson Elementary School

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

0 15' 30'

Emilia Santa Maria Lucero

Subwatershed: Lower Raritan River

Site Area: 22,485 sq. ft.

Address: 516 Lawrie Street
Perth Amboy, NJ 08861

Block and Lot: Block 198,
Lots 1 – 5, 48 – 51

The southern parking spaces can be converted to pervious pavement to capture and infiltrate the stormwater runoff from both the rooftop and parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
93	20,855	1.0	10.5	95.8	0.016	0.57

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	0.204	34	15,230	0.56	1,400	$35,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Emilia Santa Maria Lucero

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

0 20' 40'

Great Grace Evangelistic Ministries Inc.

Subwatershed: Arthur Kill Waterfront

Site Area: 7,500 sq. ft.

Address: 351 Lawrie Street
Perth Amboy, NJ 08861

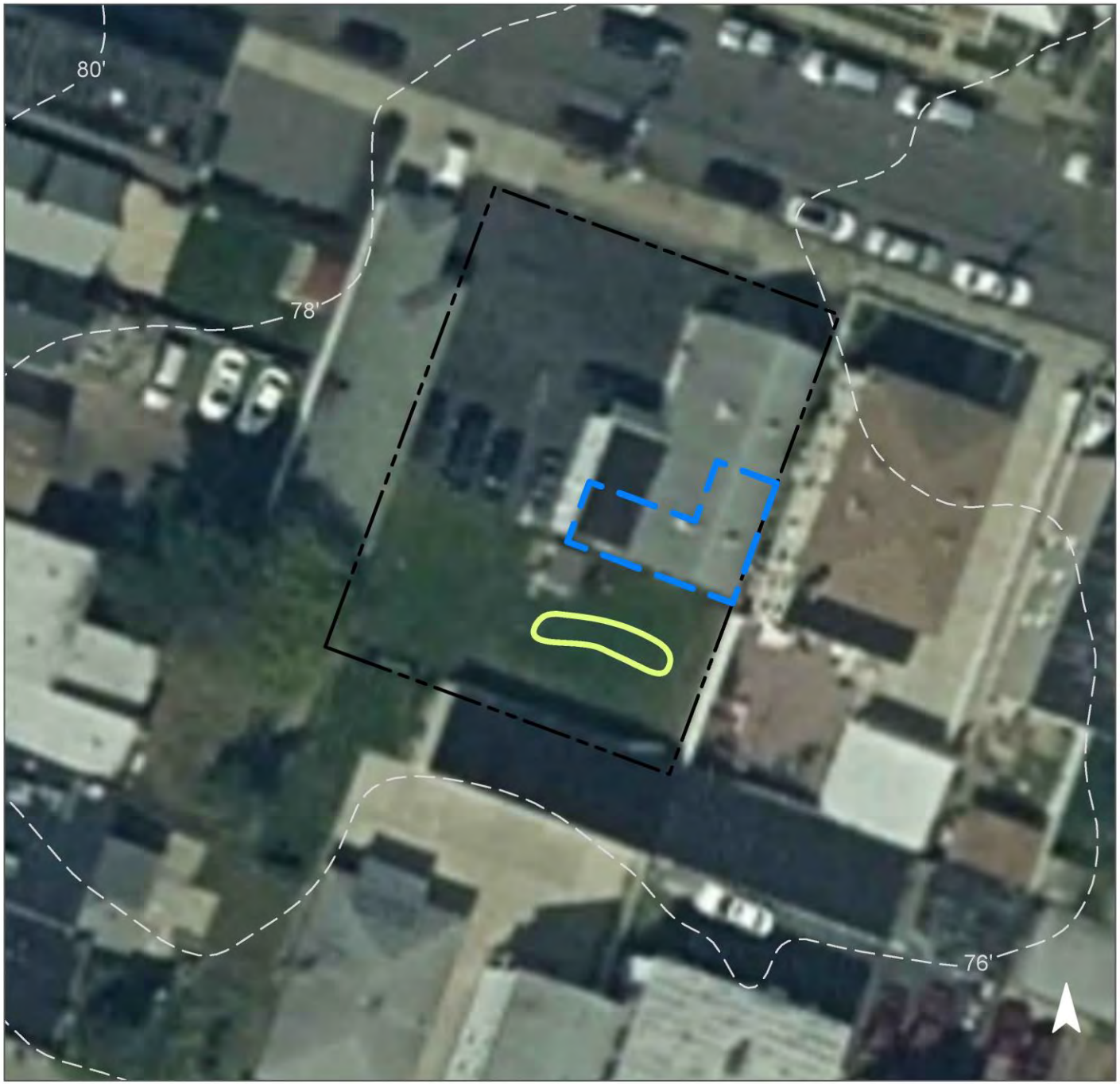
Block and Lot: Block 208, Lots 35 - 37

A rain garden can be installed on the south of the building to capture, treat, and infiltrate stormwater runoff from the rooftop. 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"
93	6,980	0.3	3.5	32.1	0.005	0.19

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.017	3	1,240	0.05	160	$800

GREEN INFRASTRUCTURE RECOMMENDATIONS



Great Grace Evangelistic Ministries Inc.

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

0 15' 30'

Holy Trinity Church

Subwatershed: Arthur Kill Waterfront

Site Area: 40,540 sq. ft.

Address: 315 Lawrie Street
Perth Amboy, NJ 08861

Block and Lot: Block 216, Lot 1

Two rain gardens can be installed on the east and west sides of the building to capture, treat, and infiltrate the stormwater runoff from the rooftop; to do so, the existing downspouts will need to be disconnected. A strip of pervious pavement can be installed in the southeast corner of the parking lot to help capture and infiltrate the stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
87	35,180	1.7	17.8	161.5	0.027	0.96

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	0.120	20	8,920	0.34	1,150	$5,750
Pervious pavement	0.322	54	24,000	0.89	2,200	$55,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Holy Trinity Church

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

0 20' 40'

Jefferson Street Parking

Subwatershed: Lower Raritan River

Site Area: 13,280 sq. ft.

Address: 196 Jefferson Street
Perth Amboy, NJ 08861

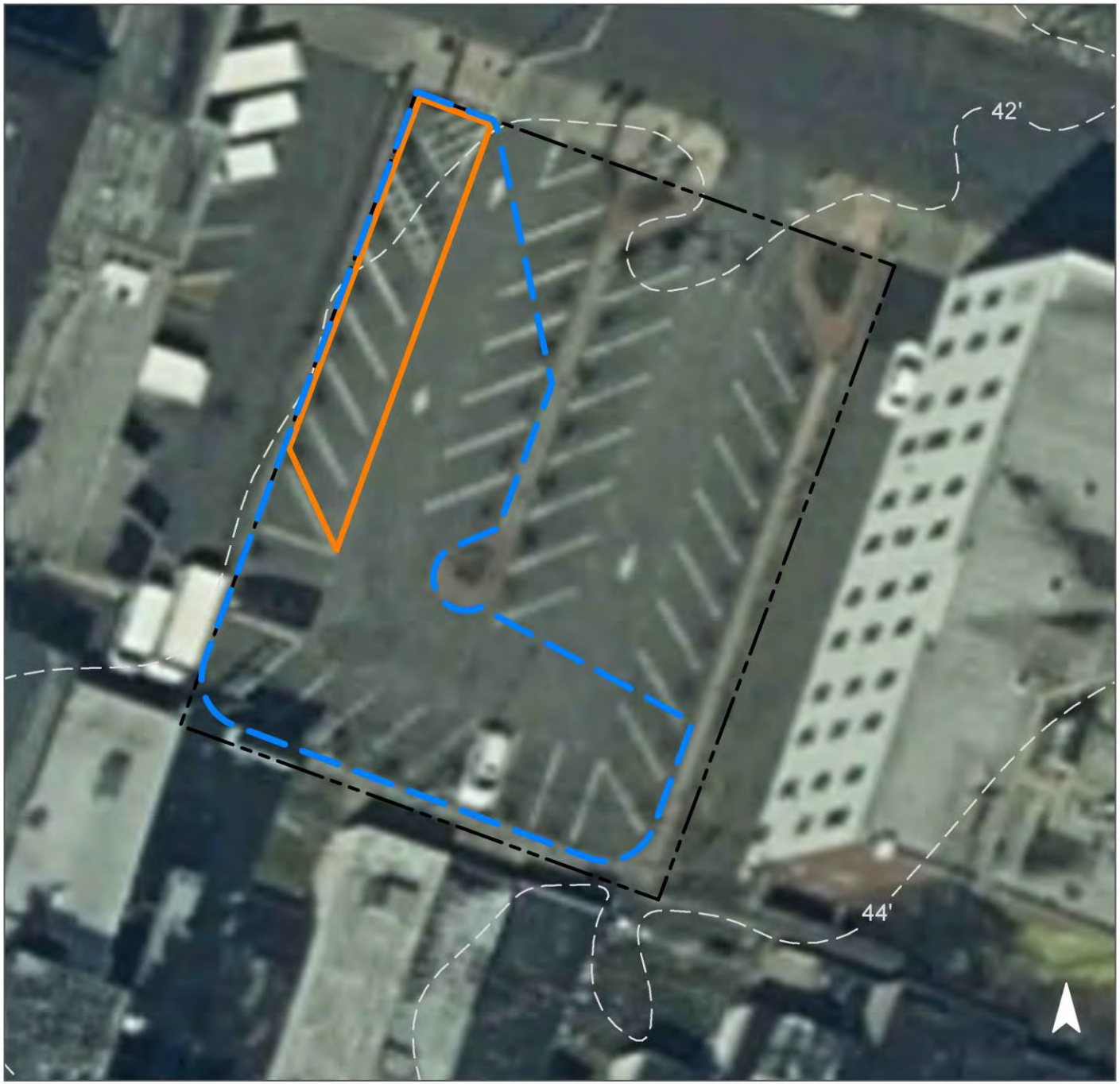
Block and Lot: Block 122, Lot 30

Western parking spaces in the parking lot can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
96	12,705	0.6	6.4	58.3	0.010	0.35

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	0.176	30	13,140	0.49	1,335	$33,375

GREEN INFRASTRUCTURE RECOMMENDATIONS



Jefferson Street Parking

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

0 15' 30'

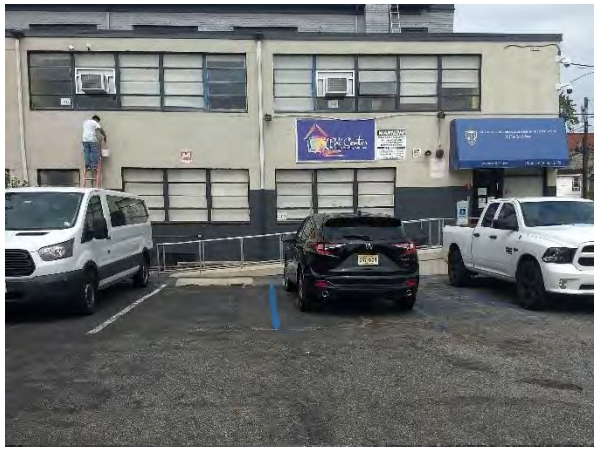
Perth Amboy Christian Center

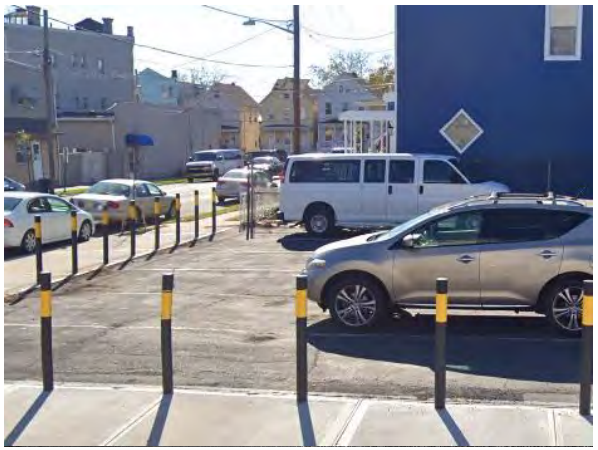
Subwatershed: Arthur Kill Waterfront

Site Area: 14,750 sq. ft.

Address: 299 Barclay Street
Perth Amboy, NJ 08861

Block and Lot: Block 168, Lots 23 - 28



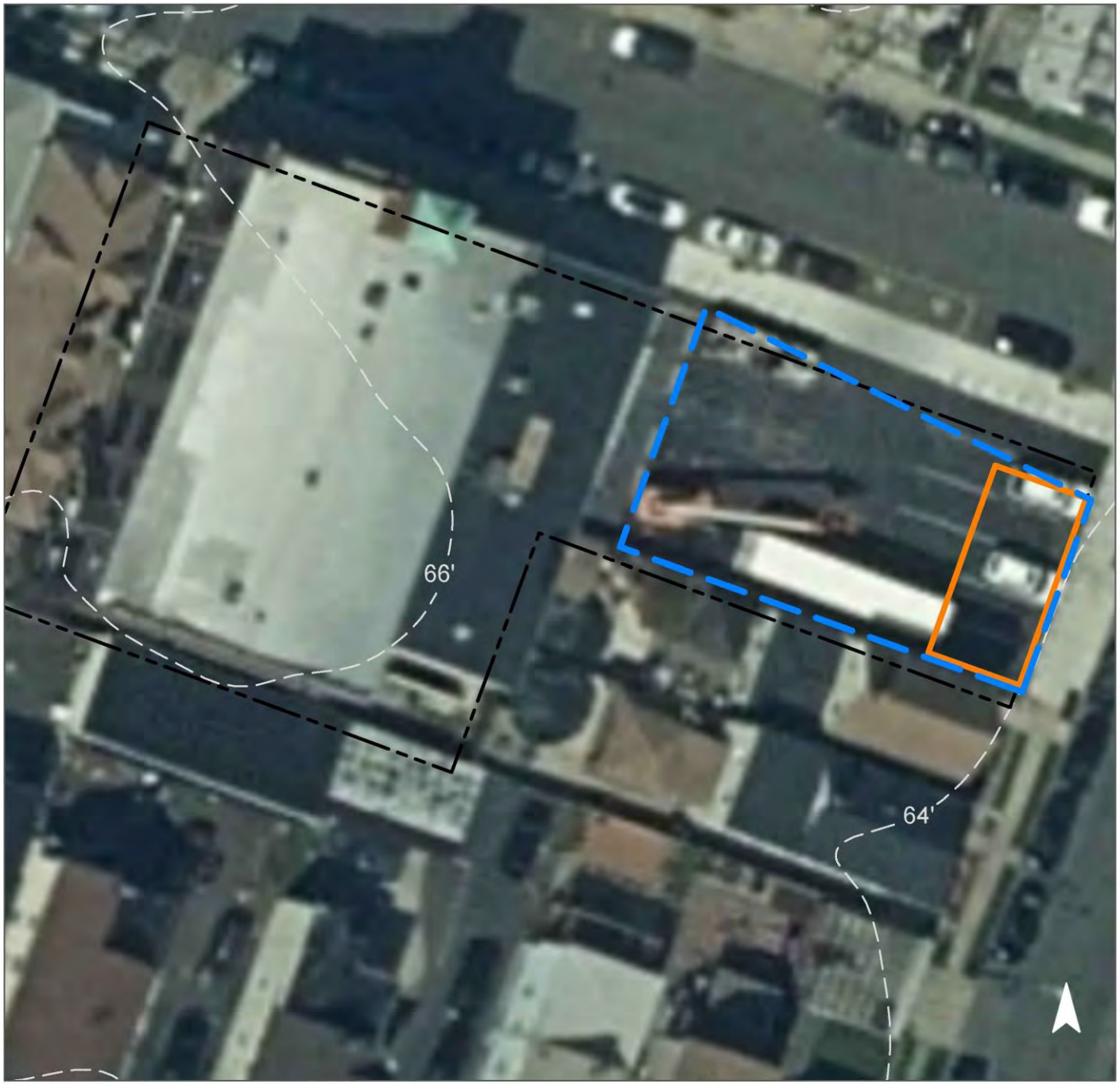


Eastern parking spaces in the parking lot can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
81	11,975	0.6	6.0	55.0	0.009	0.33

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	0.098	16	7,350	0.27	800	$20,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Perth Amboy Christian Center

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

0 15' 30'

Perth Amboy Train Station

Subwatershed: Lower Raritan River

Site Area: 148,430 sq. ft.

Address: 249 Smith Street
Perth Amboy, NJ 08861

Block and Lot: Block 62, Lot 1
Block 11, Lots 1.09, 1.10, 1.15
Block 63, Lot 6.02

Parking spaces in the north and south portion of the parking lot can be converted to pervious pavement to help capture and infiltrate the stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
70	104,375	5.0	52.7	479.2	0.081	2.86

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
Pervious pavement	0.342	57	25,500	0.94	2,400	$60,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Perth Amboy Train Station

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

0 50' 100'

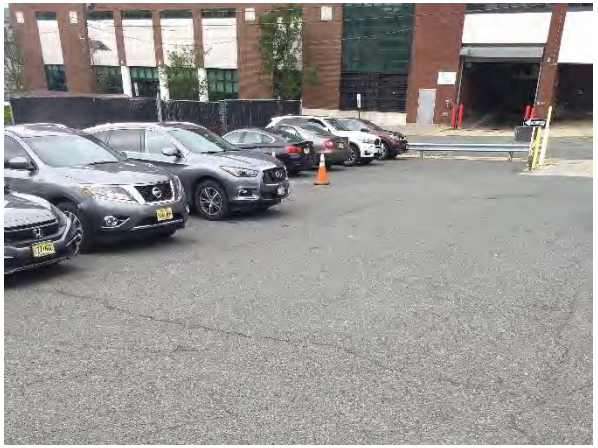
Raritan Bay Medical Center: Emergency Room

Subwatershed: Lower Raritan River

Site Area: 136,470 sq. ft.

Address: 530 New Brunswick Avenue
Perth Amboy, NJ 08861

Block and Lot: Block 198, Lots 17 – 22
Block 199, Lot 2

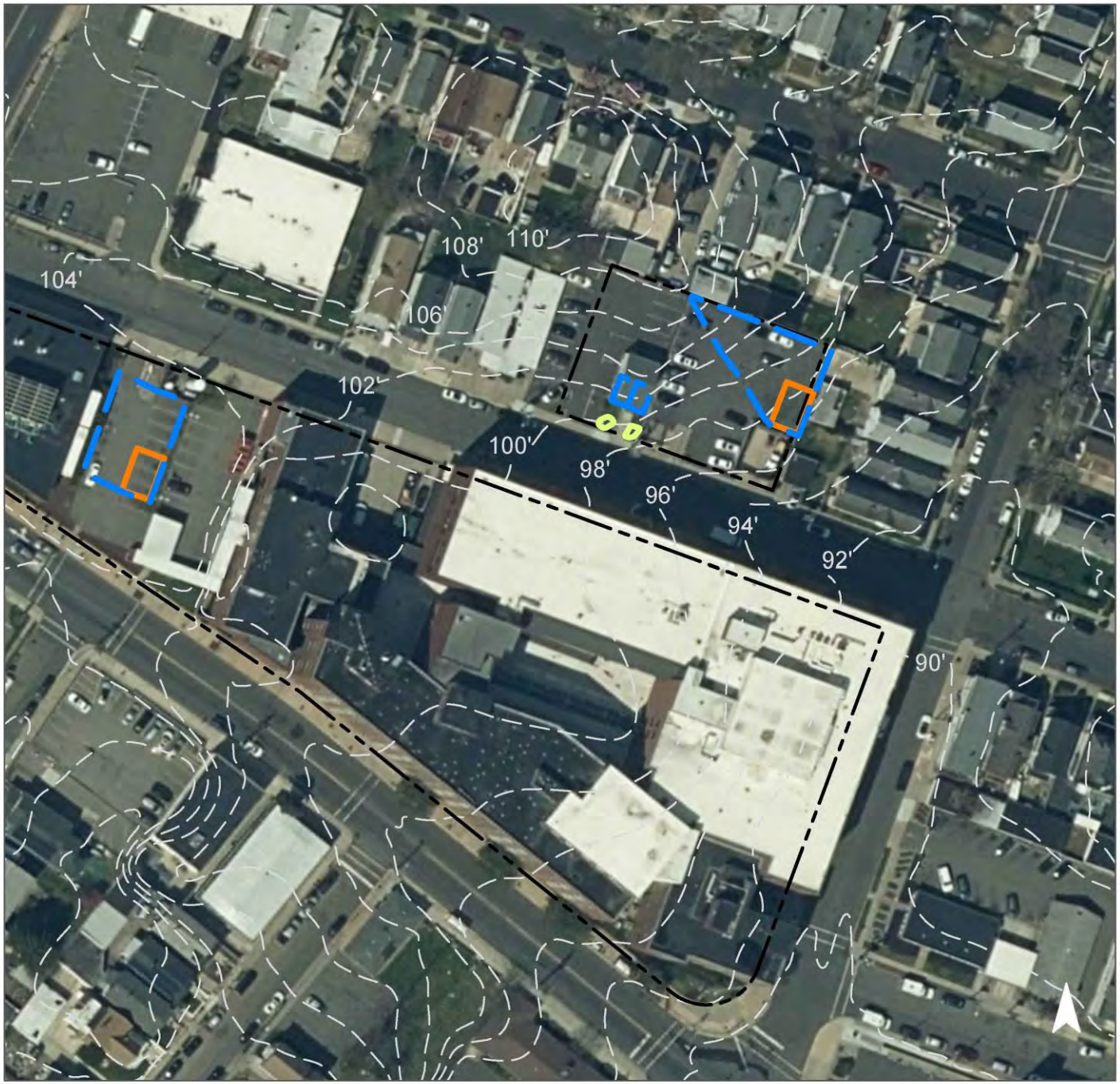


Parking spaces in the parking lots west and north of the building can be converted to porous pavement to capture and infiltrate stormwater runoff from the parking lots. Two rain gardens can be installed on either side of the front entrance to the administrative building located along the parking lot to the north of the medical center. 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"
93	126,645	6.1	64.0	581.5	0.099	3.47

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	720	0.03	90	$450
Pervious pavement	0.175	29	13,050	0.48	1,200	$30,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Raritan Bay Medical Center: Emergency Room

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

0 50' 100'

Redeemed Christian Church of God

Subwatershed: Arthur Kill Waterfront

Site Area: 7,030 sq. ft.

Address: 493 Amboy Avenue
Perth Amboy, NJ 08861

Block and Lot: Block 205, Lots 1 - 3

Downspout planter boxes can be installed south of the building on the connected downspouts to treat the stormwater from the rooftop before it is discharged to the street. 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"
86	6,070	0.3	3.1	27.9	0.005	0.17

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
Planter boxes	n/a	2	n/a	n/a	3 (boxes)	$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Redeemed Christian Church of God

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

0 15' 30'

Robert N. Wilentz Elementary School

Subwatershed: Lower Raritan River

Site Area: 180,965 sq. ft.

Address: 51 1st Street
Perth Amboy, NJ 08861

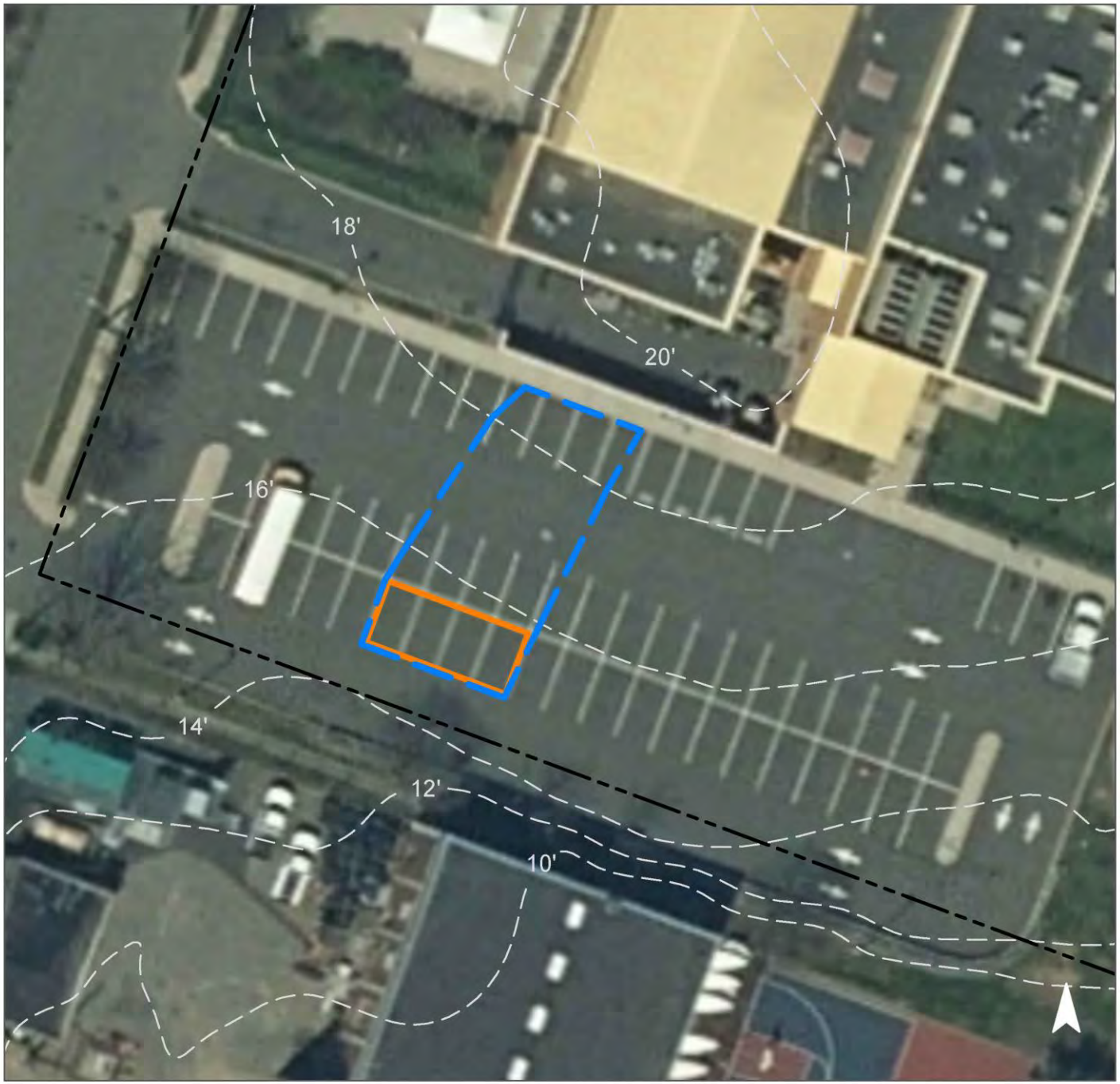
Block and Lot: Block 9, Lots 1 & 2

A section of the parking lot spaces can be converted to pervious pavement to intercept the stormwater flowing into the catch basin. 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	154,345	7.4	78.0	708.7	0.120	4.23

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
Pervious pavement	0.079	13	5,860	0.22	720	$18,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Robert N. Wilentz Elementary School

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

0 20' 40'

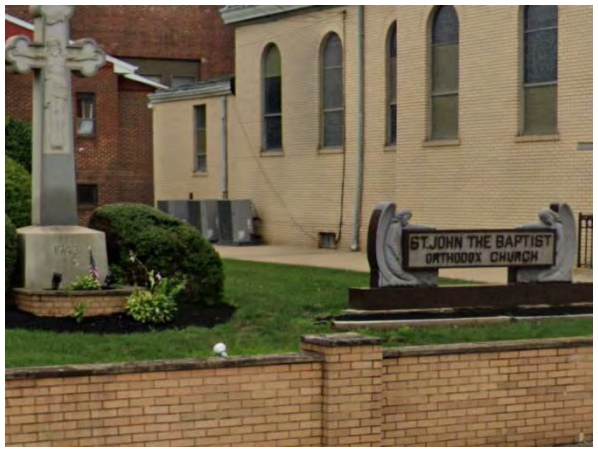
St. John the Baptist Carpatho-Russian Orthodox Church

Subwatershed: Arthur Kill Waterfront

Site Area: 30,380 sq. ft.

Address: 145 Broad Street
Perth Amboy, NJ 08861

Block and Lot: Block 147,
Lots 24 – 28 & 55



A rain garden can be installed in the central area between the buildings 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	24,070	1.2	12.2	110.5	0.019	0.66

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 system	0.051	9	3,790	0.14	510	$2,975

GREEN INFRASTRUCTURE RECOMMENDATIONS

St. John the Baptist Carpatho-Russian Orthodox Church

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

0 20' 40'

St. Nicholas Byzantine Catholic Church

Subwatershed: Arthur Kill Waterfront

Site Area: 10,340 sq. ft.

Address: 320 Washington Street
Perth Amboy, NJ 08861

Block and Lot: Block 168, Lots 1 – 4

A rain garden can be installed in the courtyard to the west of the building to capture, treat, and infiltrate the stormwater runoff from the rooftop from the connected downspouts. 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"
87	8,970	0.4	4.5	41.2	0.007	0.25

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.062	10	4,950	0.17	595	$2,975

GREEN INFRASTRUCTURE RECOMMENDATIONS

St. Nicholas Byzantine Catholic Church

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

0 15' 30'

The Church of Jesus Christ of Latter-day Saints

Subwatershed: Lower Raritan River

Site Area: 14,985 sq. ft.

Address: 271 Maple Street
Perth Amboy, NJ 08861

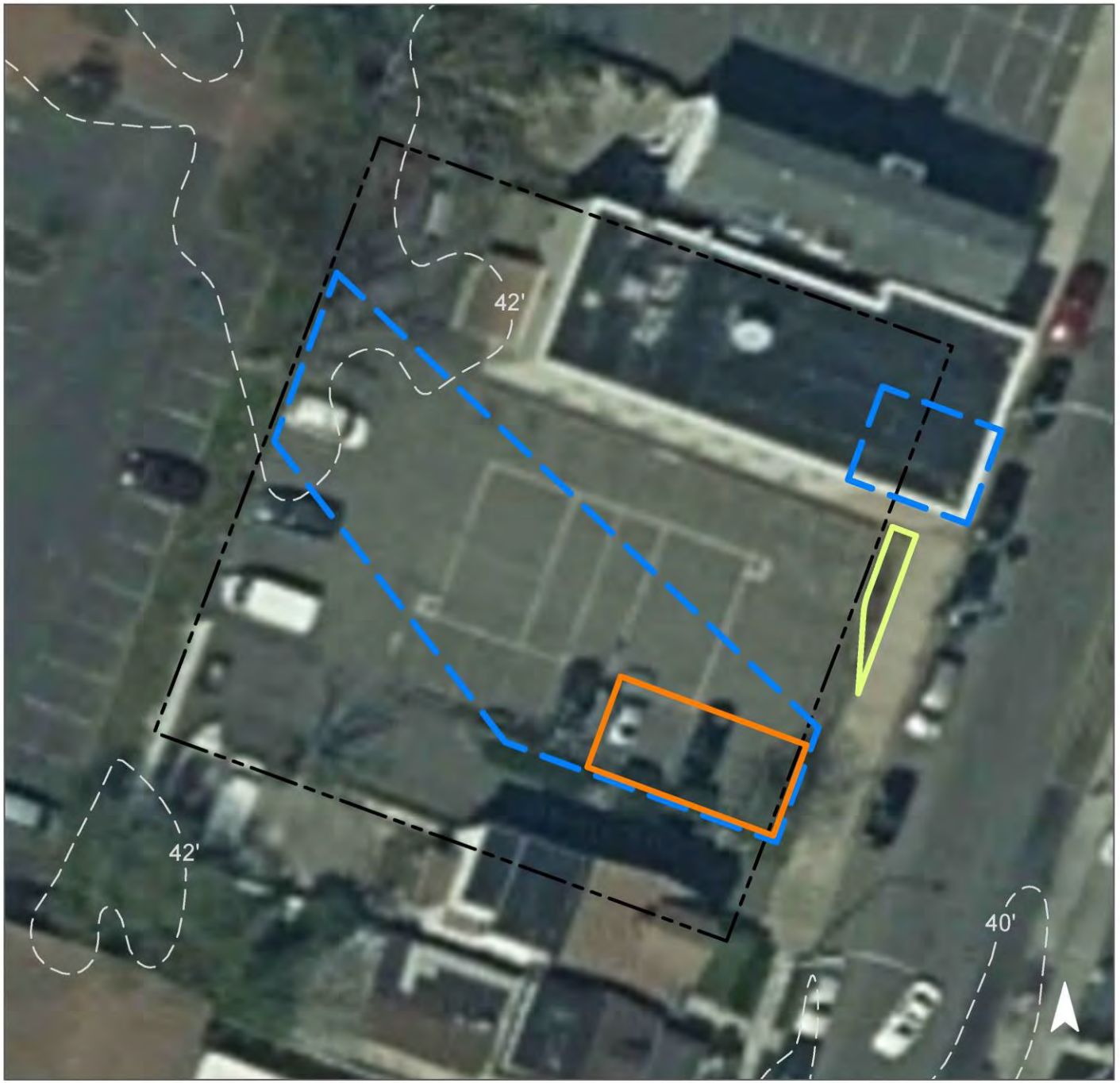
Block and Lot: Block 62, Lots 10 – 14

The existing planter bed can be converted to a rain garden to capture, treat, and infiltrate the stormwater from the existing downspout. A section of the parking lot spaces in the southeastern corner can be converted to pervious pavement to capture and infiltrate the stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
85	154,350	7.4	78.0	708.7	0.120	4.23

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 system	0.013	2	950	0.04	125	$625
Pervious pavement	0.105	18	7,830	0.29	720	$18,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



The Church of Jesus Christ of Latter-day Saints

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

0 15' 30'

Thomas M. Peterson Elementary School

Subwatershed: Lower Raritan River

Site Area: 30,180 sq. ft.

Address: 274 State Street
Perth Amboy, NJ 08861

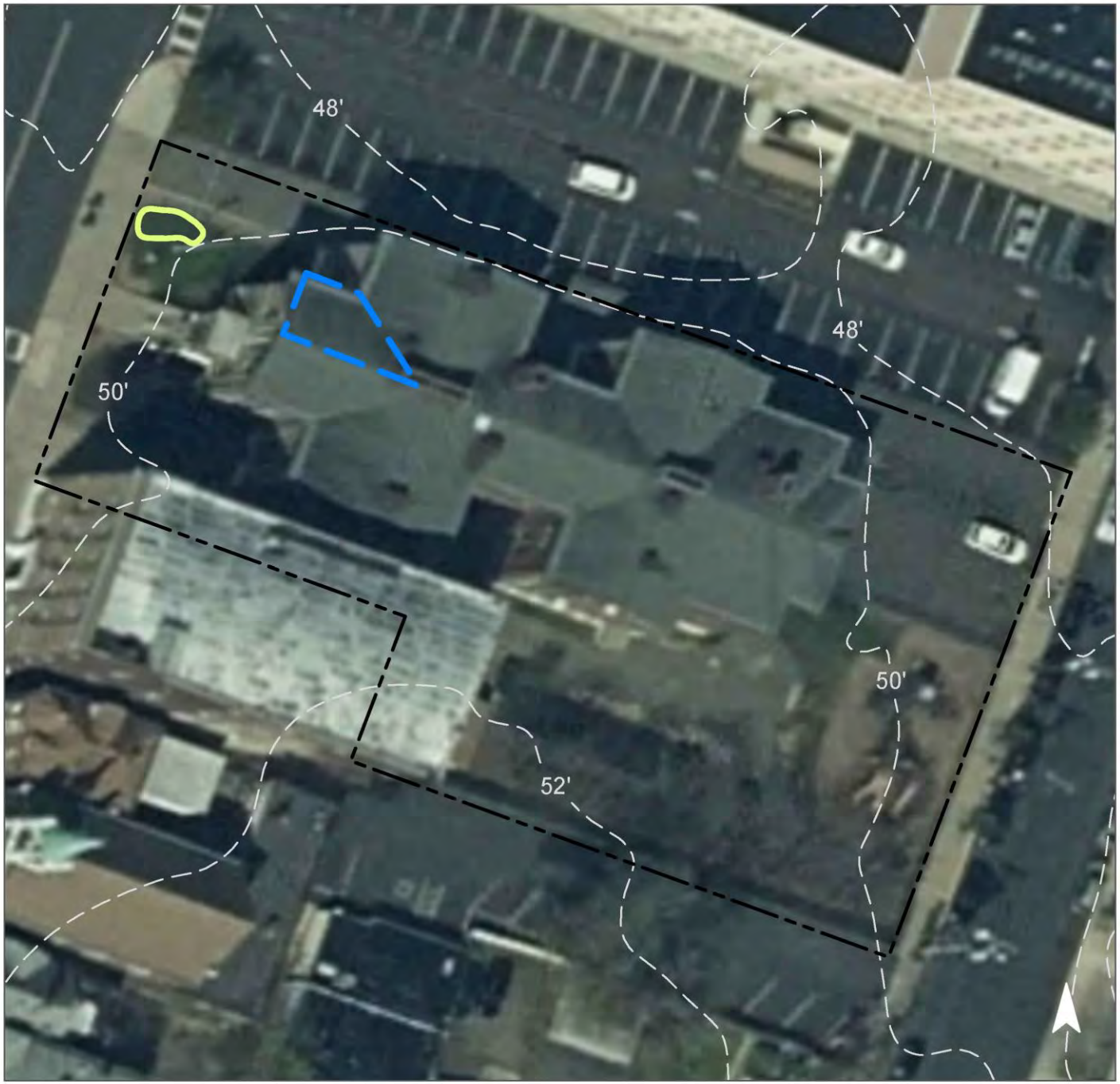
Block and Lot: Block 57, Lot 9

A rain garden can be installed in the turfgrass area near the northwest corner of the building to capture, treat, and infiltrate the stormwater runoff from the downspouts. 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"
96	28,855	1.4	14.6	132.5	0.022	0.79

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.011	2	850	0.03	110	$550

GREEN INFRASTRUCTURE RECOMMENDATIONS



Thomas M. Peterson Elementary School

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

0 20' 40'

Iglesia Pentecostal Un Nuevo Renacer Inc.

Subwatershed: Arthur Kill Waterfront

Site Area: 7,300 sq. ft.

Address: 99 Broad Street
Perth Amboy, NJ 08861

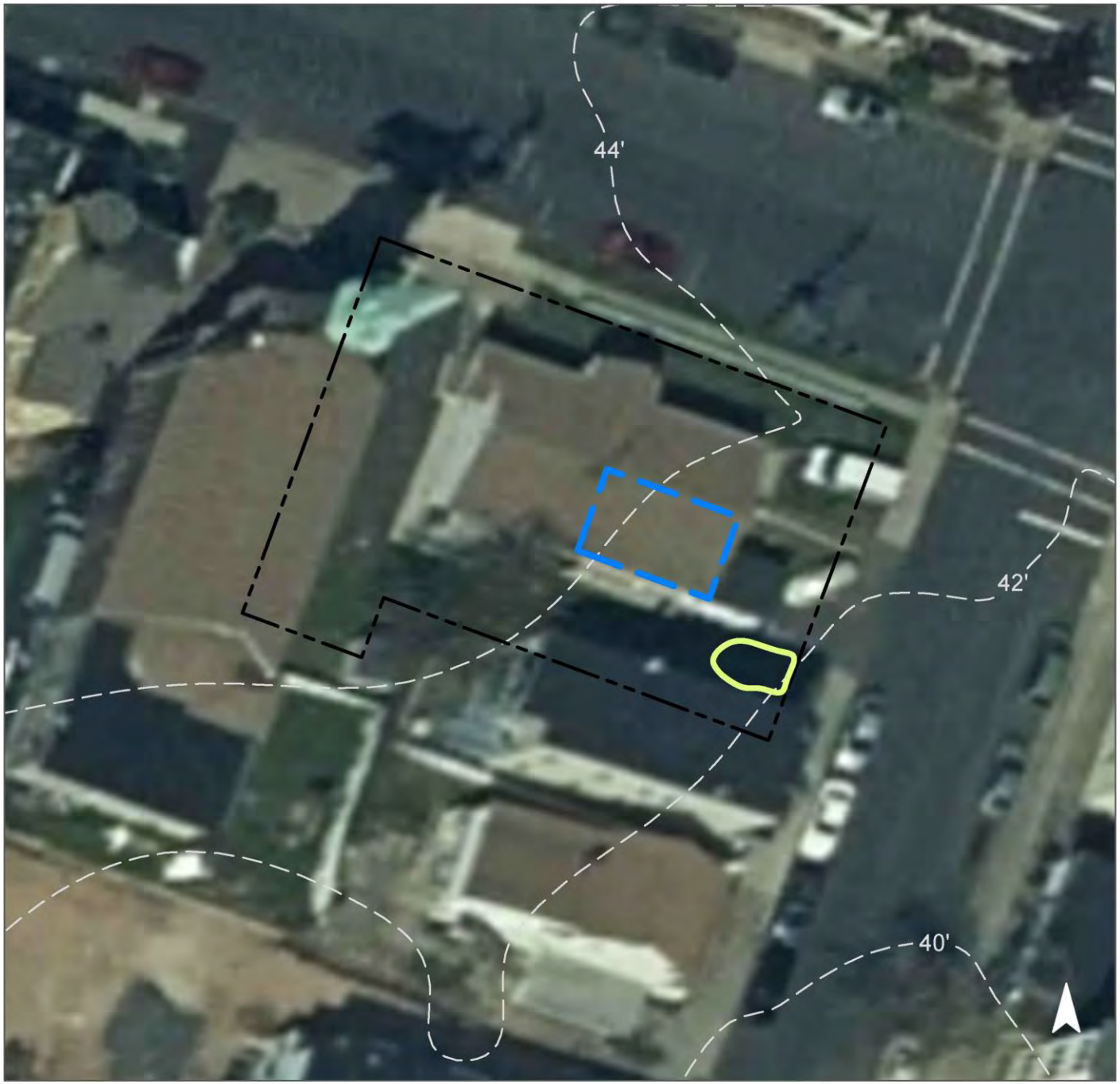
Block and Lot: Block 144, Lot 17.01

A rain garden can be installed near the driveway to capture, treat, and infiltrate stormwater runoff from the roof using the extended downspout pipe. 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	5,785	0.3	2.9	26.6	0.005	0.16

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.012	2	910	0.03	115	$575

GREEN INFRASTRUCTURE RECOMMENDATIONS



Iglesia Pentecostal Un Nuevo Renacer Inc.

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

0 15' 30'

Walgreens

Subwatershed: Lower Raritan River

Site Area: 55,925 sq. ft.

Address: 520 Convery Boulevard
Perth Amboy, NJ 08861

Block and Lot: Block 197, Lots 1 & 30

Parking lot spaces to the east and west of the building can be converted to pervious pavement to capture and infiltrate the stormwater runoff from the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
93	51,885	2.5	26.2	238.2	0.040	1.42

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 pavement	0.378	63	28,190	1.04	2,600	$65,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Walgreens

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

0 30' 60'

2nd Street and Gordon Street

Subwatershed: Lower Raritan River

Site Area: 31,975 sq. ft.

Address: Perth Amboy, NJ 08861

Block and Lot: n/a

The grass strip on the east side of 2nd street, north of Gordon Street, can be converted to a stormwater planter to capture, treat, and infiltrate the stormwater runoff from the roadway. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
84	26,910	1.3	13.6	123.6	0.021	0.74

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 planter	0.087	15	6,510	0.24	320	$24,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

2nd Street and Gordon Street

- stormwater planter
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

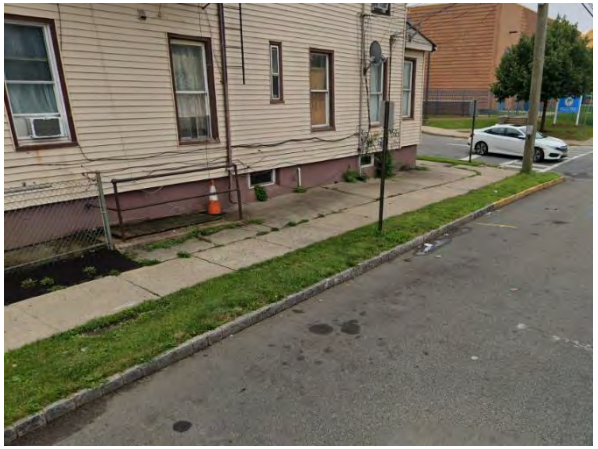
2nd Street and Lewis Street

Subwatershed: Lower Raritan River

Site Area: 47,710 sq. ft.

Address: Perth Amboy, NJ 08861

Block and Lot: n/a

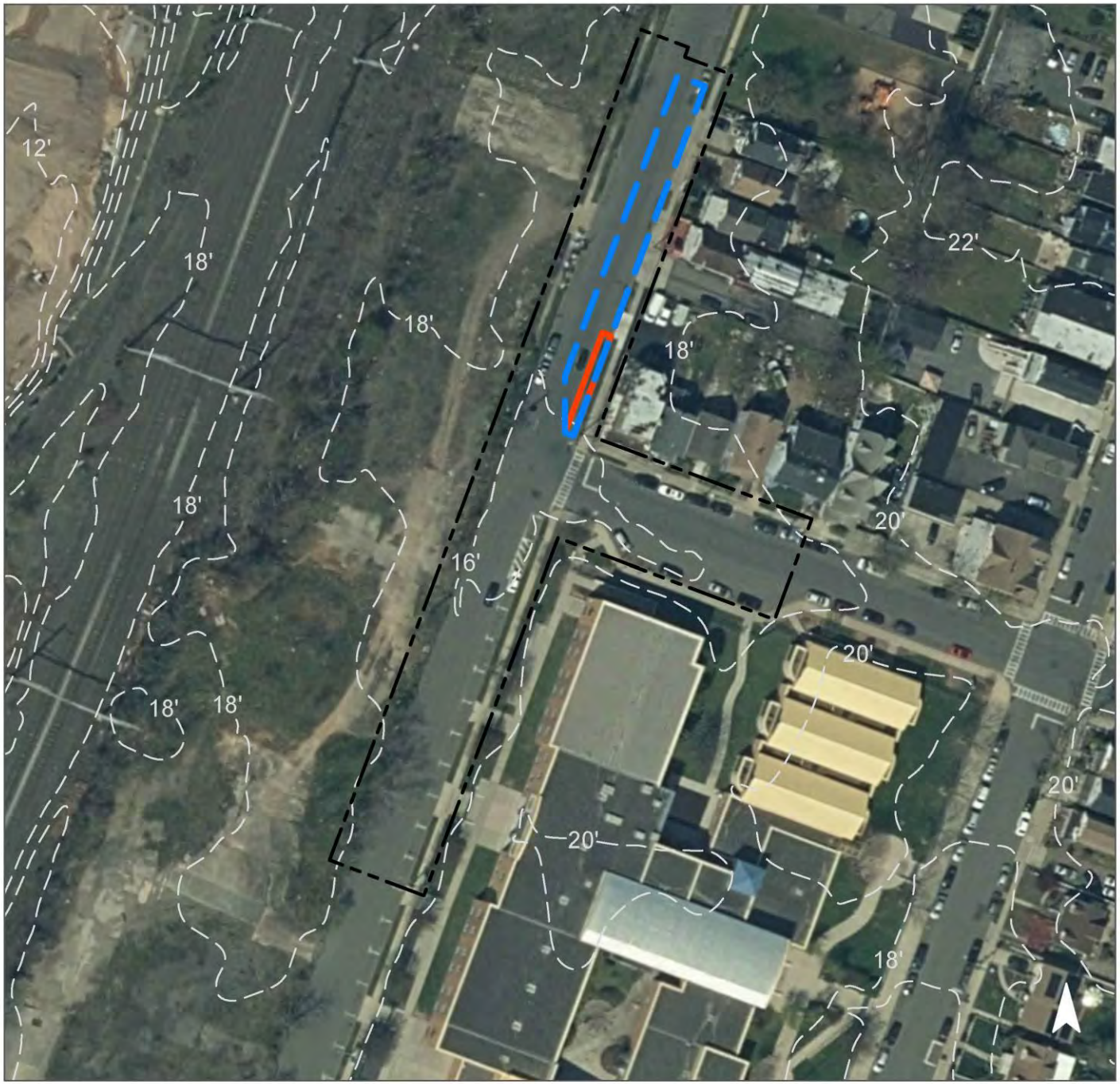


A stormwater planter can be installed on the eastern side of 2nd Street north of Lewis Street to capture, treat, and infiltrate the stromwater from the roadway. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
82	39,985	1.9	20.2	183.6	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
Stormwater planter	0.115	19	8,560	0.32	420	$31,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



2nd Street and Lewis Street

- stormwater planter
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 50' 100'

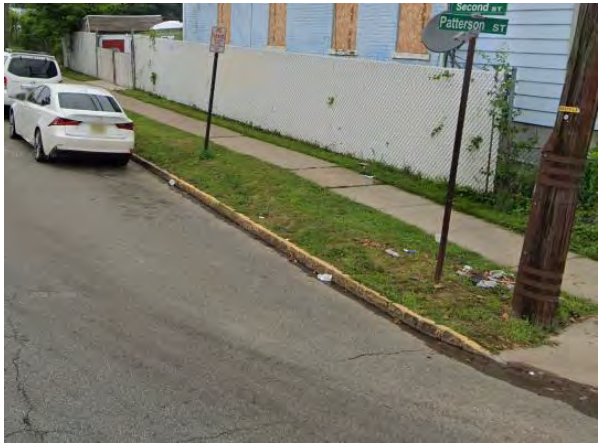
2nd Street and Patterson Street

Subwatershed: Lower Raritan River

Site Area: 45,840 sq. ft.

Address: Perth Amboy, NJ 08861

Block and Lot: n/a



A stormwater planter can be installed at the eastern section of 2nd Street north of Patterson Street to capture, treat, and infiltrate the stormwater runoff from the roadway. Additional stormwater planters can be installed on either side of Patterson Street near the intersection. 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"
82	37,630	1.8	19.0	172.8	0.029	1.03

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	0.148	25	11,020	0.41	540	$40,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

2nd Street and Patterson Street

- stormwater planter
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 20' 40'

Broad Street and State Street

Subwatershed: Arthur Kill Waterfront

Site Area: 49,305 sq. ft.

Address: Perth Amboy, NJ 08861

Block and Lot: n/a

Multiple stormwater planters can be installed close to the intersection to capture, treat, and infiltrate the stormwater runoff from the roadways. 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"
87	43,070	2.1	21.8	197.7	0.034	1.18

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	0.236	39	17,560	0.66	860	$64,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

Broad Street and State Street

- stormwater planter
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 25' 50'

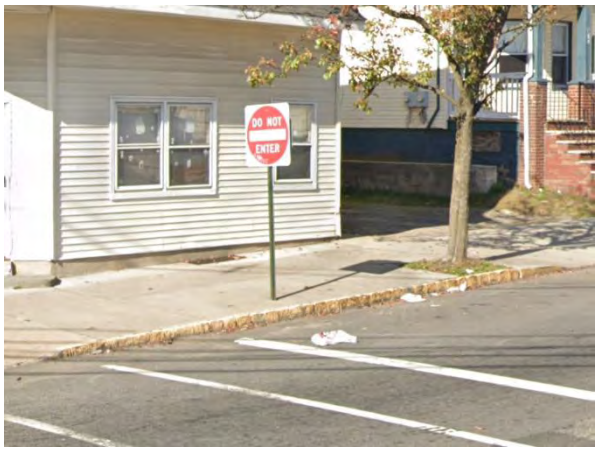
Fayette Street and Prospect Street

Subwatershed: Lower Raritan River

Site Area: 29,455 sq. ft.

Address: Perth Amboy, NJ 08861

Block and Lot: n/a



An extended tree pit, which is partially in the roadway and partially in the sidewalk, can be installed north of the intersection to capture, treat, and infiltrate the stormwater runoff from the roadway. 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"
87	25,630	1.2	12.9	117.7	0.020	0.70

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Extended tree pit	0.048	8	3,610	0.14	300	$22,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

Fayette Street and Prospect Street

- extended tree pit
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 15' 30'

Fayette Street and Watson Avenue

Subwatershed: Lower Raritan River

Site Area: 30,980 sq. ft.

Address: Perth Amboy, NJ 08861

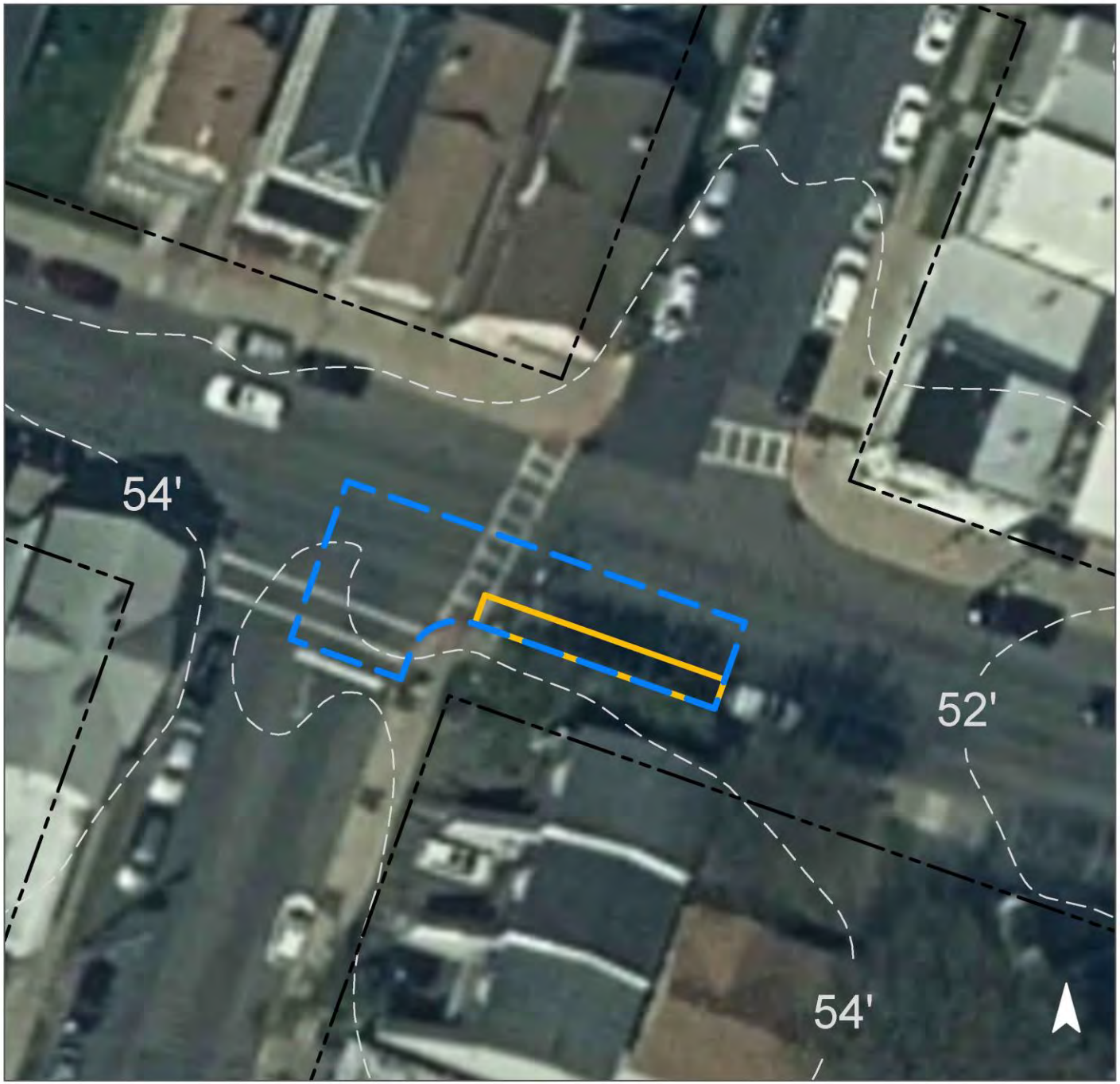
Block and Lot: n/a

An extended tree pit can be installed in the roadway to capture, treat, and infiltrate the stormwater runoff from the street. 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"
87	26,935	1.3	13.6	123.7	0.021	0.74

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
Extended tree pit	0.040	7	2,990	0.11	250	$18,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Fayette Street and Watson Avenue

- extended tree pit
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 15' 30'

c. Summary of Existing Conditions

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			Runoff Volumes from I.C.		Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Annual (cu.ft.)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
	CSO 16 Sites	**23.10**	**1,006,175**				**19.88**	**865,908**	**41.7**	**437.3**	**3975.7**	**90,199**	**3,174,996**	**0.675**	**23.75**
1	**Acelero Learning Center**														
	Total Site Info	**1.37**	**59,862**	**17**	**43, 46 - 59**	**81**	**1.11**	**48,263**	**2.3**	**24.4**	**221.6**	**5,027**	**176,964**	**0.038**	**1.32**
2	**Alexander F. Jankowski Community Center**														
	Total Site Info	**1.04**	**45,145**	**40**	**1.01**	**87**	**0.90**	**39,091**	**1.9**	**19.7**	**179.5**	**4,072**	**143,334**	**0.030**	**1.07**
3	**Dekoff's Perth Amboy Lock Co.**														
	Total Site Info	**0.20**	**8,698**	**122**	**23 - 25**	**96**	**0.19**	**8,319**	**0.4**	**4.2**	**38.2**	**867**	**30,503**	**0.006**	**0.23**
4	**Dr. Herbert N. Richardson Elementary School**														
	Total Site Info	**3.95**	**171,912**	**114**	**2.01**	**91**	**3.61**	**157,284**	**7.6**	**79.4**	**722.1**	**16,384**	**576,708**	**0.123**	**4.31**
5	**Emilia Santa Maria Lucero**														
	Total Site Info	**0.52**	**22,483**	**198**	**1 - 5, 48 - 51**	**93**	**0.48**	**20,855**	**1.0**	**10.5**	**95.8**	**2,172**	**76,468**	**0.016**	**0.57**
6	**Great Grace Evangelistic Ministries Inc.**														
	Total Site Info	**0.17**	**7,500**	**208**	**35 - 37**	**93**	**0.16**	**6,982**	**0.3**	**3.5**	**32.1**	**727**	**25,601**	**0.005**	**0.19**
7	**Holy Trinity Park**														
	Total Site Info	**0.93**	**40,542**	**216**	**1**	**87**	**0.81**	**35,178**	**1.7**	**17.8**	**161.5**	**3,664**	**128,986**	**0.027**	**0.96**
8	**Jefferson Street Parking**														
	Total Site Info	**0.30**	**13,281**	**122**	**30**	**96**	**0.29**	**12,703**	**0.6**	**6.4**	**58.3**	**1,323**	**46,578**	**0.010**	**0.35**
9	**Perth Amboy Christian Center**														
	Total Site Info	**0.34**	**14,751**	**168**	**23 - 28**	**81**	**0.27**	**11,974**	**0.6**	**6.0**	**55.0**	**1,247**	**43,905**	**0.009**	**0.33**
10	**Perth Amboy Train Station**														
	Total Site Info	**3.41**	**148,428**	**62; 11; 639, 1.10, 1.15**		**70**	**2.40**	**104,376**	**5.0**	**52.7**	**479.2**	**10,873**	**382,712**	**0.081**	**2.86**
11	**Raritan Bay Medical Center: Emergency Room**														
	Total Site Info	**3.13**	**136,469**	**198; 199**	**17 - 22; 2**	**93**	**2.91**	**126,647**	**6.1**	**64.0**	**581.5**	**13,192**	**464,372**	**0.099**	**3.47**
12	**Redeemed Christian Church of God**														
	Total Site Info	**0.16**	**7,027**	**205**	**1 - 3**	**86**	**0.14**	**6,068**	**0.3**	**3.1**	**27.9**	**632**	**22,249**	**0.005**	**0.17**
13	**Robert N. Wilentz Elementary School**														
	Total Site Info	**4.15**	**180,965**	**9**	**1 - 2**	**85**	**3.54**	**154,347**	**7.4**	**78.0**	**708.7**	**16,078**	**565,939**	**0.120**	**4.23**
14	**St. John the Baptist Carpatho-Russian Orthodox Church**														
	Total Site Info	**0.70**	**30,381**	**147**	**24 - 28, 55**	**79**	**0.55**	**24,068**	**1.2**	**12.2**	**110.5**	**2,507**	**88,249**	**0.019**	**0.66**
15	**St. Nicholas Byzantine Catholic Church**														
	Total Site Info	**0.24**	**10,337**	**168**	**1 - 4**	**87**	**0.21**	**8,968**	**0.4**	**4.5**	**41.2**	**934**	**32,883**	**0.007**	**0.25**
16	**The Church of Jesus Christ of Latter-day Saints**														
	Total Site Info	**0.34**	**14,985**	**62**	**10 - 14**	**95**	**0.33**	**14,260**	**0.7**	**7.2**	**65.5**	**1,485**	**52,287**	**0.011**	**0.39**
17	**Thomas M. Peterson Elementary School**														
	Total Site Info	**0.69**	**30,182**	**57**	**9**	**96**	**0.66**	**28,856**	**1.4**	**14.6**	**132.5**	**3,006**	**105,805**	**0.022**	**0.79**
18	**Iglesia Pentecostal Un Nuevo Renacer Inc.**														
	Total Site Info	**0.17**	**7,302**	**144**	**17.01**	**79**	**0.13**	**5,784**	**0.3**	**2.9**	**26.6**	**603**	**21,208**	**0.005**	**0.16**
19	**Walgreens**														
	Total Site Info	**1.28**	**55,925**	**197**	**1, 30**	**93**	**1.19**	**51,885**	**2.5**	**26.2**	**238.2**	**5,405**	**190,245**	**0.040**	**1.42**

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			Runoff Volumes from I.C.		Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Annual (cu.ft.)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
	CSO 16 Roadway Sites	**5.42**	**236,264**				**4.60**	**200,158**	**9.6**	**101.1**	**919.0**	**20,850**	**733,914**	**0.156**	**5.49**
20	**2nd Street and Gordon Street Total Site Info**	**0.73**	**31,975**	**n/a**	**n/a**	**84**	**0.62**	**26,911**	**1.3**	**13.6**	**123.6**	**2,803**	**98,674**	**0.021**	**0.74**
21	**2nd Street and Lewis Street Total Site Info**	**1.12**	**48,709**	**n/a**	**n/a**	**82**	**0.92**	**39,986**	**1.9**	**20.2**	**183.6**	**4,165**	**146,615**	**0.031**	**1.10**
22	**2nd Street and Patterson Street Total Site Info**	**1.05**	**45,840**	**n/a**	**n/a**	**82**	**0.86**	**37,631**	**1.8**	**19.0**	**172.8**	**3,920**	**137,981**	**0.029**	**1.03**
23	**Broad Street and State Street Total Site Info**	**1.13**	**49,305**	**n/a**	**n/a**	**87**	**0.99**	**43,068**	**2.1**	**21.8**	**197.7**	**4,486**	**157,917**	**0.034**	**1.18**
24	**Fayette Street and Prospect Street Total Site Info**	**0.68**	**29,455**	**n/a**	**n/a**	**87**	**0.59**	**25,627**	**1.2**	**12.9**	**117.7**	**2,670**	**93,967**	**0.020**	**0.70**
25	**Fayette Street and Watson Avenue Total Site Info**	**0.71**	**30,980**	**n/a**	**n/a**	**87**	**0.62**	**26,935**	**1.3**	**13.6**	**123.7**	**2,806**	**98,760**	**0.021**	**0.74**

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	TSS Removal Potential	Max Volume Reduction Potential	Peak Discharge Reduction Potential	Size of BMP	Unit Cost	Unit	Total Cost	I.C. Treated
		Area (SF)	Area (ac)	(Mgal/yr)	(lbs/yr)	(gal/storm)	(cfs)		($/unit)		($)	%
	CSO 16 Sites	**113,830**	**2.61**	**2.932**	**496**	**218,670**	**8.10**				**$473,150**	**13.1%**
1	**Acelero Learning Center**											
	Bioretention system	860	0.02	0.022	4	1,670	0.06	215	$5	SF	$1,075	1.8%
	Pervious pavement	6,260	0.14	0.163	27	12,160	0.45	1,100	$25	SF	$27,500	13.0%
	Total Site Info	**7,120**	**0.16**	**0.186**	**31**	**13,830**	**0.51**				**$28,575**	**14.8%**
2	**Alexander F. Jankowski Community Center**											
	Bioretention system	2,335	0.05	0.061	10	4,540	0.17	585	$5	SF	$2,925	6.0%
	Pervious pavement	16,250	0.37	0.423	71	31,570	1.17	2,880	$25	SF	$72,000	41.6%
	Total Site Info	**18,585**	**0.43**	**0.484**	**81**	**36,110**	**1.34**				**$74,925**	**47.5%**
3	**Dekoff's Perth Amboy Lock Co.**											
	Planter boxes	645	0.01	n/a	2	n/a	n/a	3	$1,000	box	$3,000	7.8%
	Total Site Info	**645**	**0.01**	**0.000**	**2**	**0**	**0.00**				**$3,000**	**7.8%**
4	**Dr. Herbert N. Richardson Elementary School**											
	Pervious pavement	3,370	0.08	0.088	15	6,550	0.24	600	$25	SF	$15,000	2.1%
	Total Site Info	**3,370**	**0.08**	**0.088**	**15**	**6,550**	**0.24**				**$15,000**	**2.1%**
5	**Emilia Santa Maria Lucero**											
	Pervious pavement	7,840	0.18	0.204	34	15,230	0.56	1,400	$25	SF	$35,000	37.6%
	Total Site Info	**7,840**	**0.18**	**0.204**	**34**	**15,230**	**0.56**				**$35,000**	**37.6%**
6	**Great Grace Evangelistic Ministries Inc.**											
	Bioretention system	640	0.01	0.017	3	1,240	0.05	160	$5	SF	$800	9.2%
	Total Site Info	**640**	**0.01**	**0.017**	**3**	**1,240**	**0.05**				**$800**	**9.2%**
7	**Holy Trinity Park**											
	Bioretention systems	4,590	0.11	0.120	20	8,920	0.34	1,150	$5	SF	$5,750	13.0%
	Pervious pavement	12,350	0.28	0.322	54	24,000	0.89	2,200	$25	SF	$55,000	35.1%
	Total Site Info	**16,940**	**0.39**	**0.441**	**74**	**32,920**	**1.23**				**$60,750**	**48.2%**
8	**Jefferson Street Parking**											
	Pervious pavement	6,765	0.16	0.176	30	13,140	0.49	1,335	$25	SF	$33,375	53.3%
	Total Site Info	**6,765**	**0.16**	**0.176**	**30**	**13,140**	**0.49**				**$33,375**	**53.3%**
9	**Perth Amboy Christian Center**											
	Pervious pavement	3,780	0.09	0.098	16	7,350	0.27	800	$25	SF	$20,000	31.6%

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	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
	Total Site Info	**3,780**	**0.09**	**0.098**	**16**	**7,350**	**0.27**				**$20,000**	**31.6%**
10	**Perth Amboy Train Station**											
	Pervious pavement	13,125	0.30	0.342	57	25,500	0.94	2,400	$25	SF	$60,000	12.6%
	Total Site Info	**13,125**	**0.30**	**0.342**	**57**	**25,500**	**0.94**				**$60,000**	**12.6%**
11	**Raritan Bay Medical Center: Emergency Room**											
	Bioretention systems	370	0.01	0.010	2	720	0.03	90	$5	SF	$450	0.3%
	Pervious pavement	6,715	0.15	0.175	29	13,050	0.48	1,200	$25	SF	$30,000	5.3%
	Total Site Info	**7,085**	**0.16**	**0.185**	**31**	**13,770**	**0.51**				**$30,450**	**5.6%**
12	**Redeemed Christian Church of God**											
	Planter boxes	645	0.01	n/a	2	n/a	n/a	3	$1,000	box	$3,000	10.6%
	Total Site Info	**645**	**0.01**	**0.000**	**2**	**0**	**0.00**				**$3,000**	**10.6%**
13	**Robert N. Wilentz Elementary School**											
	Pervious pavement	3,015	0.07	0.079	13	5,860	0.22	720	$25	SF	$18,000	2.0%
	Total Site Info	**3,015**	**0.07**	**0.079**	**13**	**5,860**	**0.22**				**$18,000**	**2.0%**
14	**St. John the Baptist Carpatho-Russian Orthodox Church**											
	Bioretention system	1,950	0.04	0.051	9	3,790	0.14	510	$5	SF	$2,550	8.1%
	Total Site Info	**1,950**	**0.04**	**0.051**	**9**	**3,790**	**0.14**				**$2,550**	**8.1%**
15	**St. Nicholas Byzantine Catholic Church**											
	Bioretention system	2,390	0.05	0.062	10	4,650	0.17	595	$5	SF	$2,975	26.7%
	Total Site Info	**2,390**	**0.05**	**0.062**	**10**	**4,650**	**0.17**				**$2,975**	**26.7%**
16	**The Church of Jesus Christ of Latter-day Saints**											
	Bioretention system	490	0.01	0.013	2	950	0.04	125	$5	SF	$625	3.4%
	Pervious pavement	4,030	0.09	0.105	18	7,830	0.29	720	$25	SF	$18,000	28.3%
	Total Site Info	**4,520**	**0.10**	**0.118**	**20**	**8,780**	**0.33**				**$18,625**	**31.7%**
17	**Thomas M. Peterson Elementary School**											
	Bioretention system	440	0.01	0.011	2	850	0.03	110	$5	SF	$550	1.5%
	Total Site Info	**440**	**0.01**	**0.011**	**2**	**850**	**0.03**				**$550**	**1.5%**
18	**Iglesia Pentecostal Un Nuevo Renacer Inc.**											
	Bioretention system	465	0.01	0.012	2	910	0.03	115	$5	SF	$575	8.0%
	Total Site Info	**465**	**0.01**	**0.012**	**2**	**910**	**0.03**				**$575**	**8.0%**

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	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
19	**Walgreens**											
	Pervious pavement	14,510	0.33	0.378	63	28,190	1.04	2,600	$25	SF	$65,000	28.0%
	Total Site Info	**14,510**	**0.33**	**0.378**	**63**	**28,190**	**1.04**				**$65,000**	**28.0%**
	CSO 16 Roadway Sites	**25,865**	**0.59**	**0.674**	**113**	**50,250**	**1.88**				**$201,750**	**12.9%**
20	**2nd Street and Gordon Street**											
	Stormwater planter	3,350	0.08	0.087	15	6,510	0.24	320	$75	SF	$24,000	12.4%
	Total Site Info	**3,350**	**0.08**	**0.087**	**15**	**6,510**	**0.24**				**$24,000**	**12.4%**
21	**2nd Street and Lewis Street**											
	Stormwater planter	4,410	0.10	0.115	19	8,560	0.32	420	$75	SF	$31,500	11.0%
	Total Site Info	**4,410**	**0.10**	**0.115**	**19**	**8,560**	**0.32**				**$31,500**	**11.0%**
22	**2nd Street and Patterson Street**											
	Stormwater planters	5,670	0.13	0.148	25	11,020	0.41	540	$75	SF	$40,500	15.1%
	Total Site Info	**5,670**	**0.13**	**0.148**	**25**	**11,020**	**0.41**				**$40,500**	**15.1%**
23	**Broad Street and State Street**											
	Stormwater planters	9,040	0.21	0.236	39	17,560	0.66	860	$75	SF	$64,500	21.0%
	Total Site Info	**9,040**	**0.21**	**0.236**	**39**	**17,560**	**0.66**				**$64,500**	**21.0%**
24	**Fayette Street and Prospect Street**											
	Extended tree pit	1,855	0.04	0.048	8	3,610	0.14	300	$75	SF	$22,500	7.2%
	Total Site Info	**1,855**	**0.04**	**0.048**	**8**	**3,610**	**0.14**				**$22,500**	**7.2%**
25	**Fayette Street and Watson Avenue**											
	Extended tree pit	1,540	0.04	0.040	7	2,990	0.11	250	$75	SF	$18,750	5.7%
	Total Site Info	**1,540**	**0.04**	**0.040**	**7**	**2,990**	**0.11**				**$18,750**	**5.7%**