



**Impervious Cover Reduction Action Plan
for
Frenchtown Borough, Hunterdon County, New Jersey**

*Prepared for Frenchtown Borough by the
Rutgers Cooperative Extension Water Resources Program*

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Table of Contents

Introduction	1
Methodology	1
Green Infrastructure Practices	8
Potential Project Sites	10
Conclusion	11

Appendix A: Climate Resilient Green Infrastructure

- a. Green Infrastructure Sites
- b. Proposed Green Infrastructure Concepts
- c. Summary of Existing Conditions
- d. Summary of Proposed Green Infrastructure Practices

Introduction

Located in Hunterdon County in northwest New Jersey, Frenchtown Borough covers approximately 1.2 square miles. Figures 1 and 2 illustrate that Frenchtown Borough is dominated by forest land uses. A total of 37.5% of the municipality's land use is classified as urban. Of the urban land in Frenchtown Borough, commercial is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2012 land use/land cover geographical information system (GIS) data layer categorizes Frenchtown Borough into many unique land use areas, assigning a percent impervious cover for each delineated area. These impervious cover values were used to estimate the impervious coverage for Frenchtown Borough. Based upon the 2012 NJDEP land use/land cover data, approximately 11.7% of Frenchtown Borough has impervious cover. This level of impervious cover suggests that the streams in Frenchtown Borough are likely impacted streams.¹

Methodology

Frenchtown Borough contains portions of three subwatersheds (Figure 4). For this impervious cover reduction action plan, projects have been identified in each of these watersheds. Initially, aerial imagery was used to identify potential project sites that contain extensive impervious cover. Field visits were then conducted at each of these potential project sites to determine if a viable option exists to reduce impervious cover or to disconnect impervious surfaces from draining directly to the local waterway or storm sewer system. During the site visit, appropriate green infrastructure practices for the site were determined. Sites that already had stormwater management practices in place were not considered.

¹ Caraco, D., R. Claytor, P. Hinkle, H. Kwon, T. Schueler, C. Swann, S. Vysotsky, and J. Zielinski. 1998. Rapid Watershed Planning Handbook. A Comprehensive Guide for Managing Urbanizing Watersheds. Prepared by Center For Watershed Protection, Ellicott City, MD. Prepared for U.S. Environmental Protection Agency, Office of Wetlands, Oceans and Watersheds and Region V. October 1998

Land Use Types for Frenchtown Borough

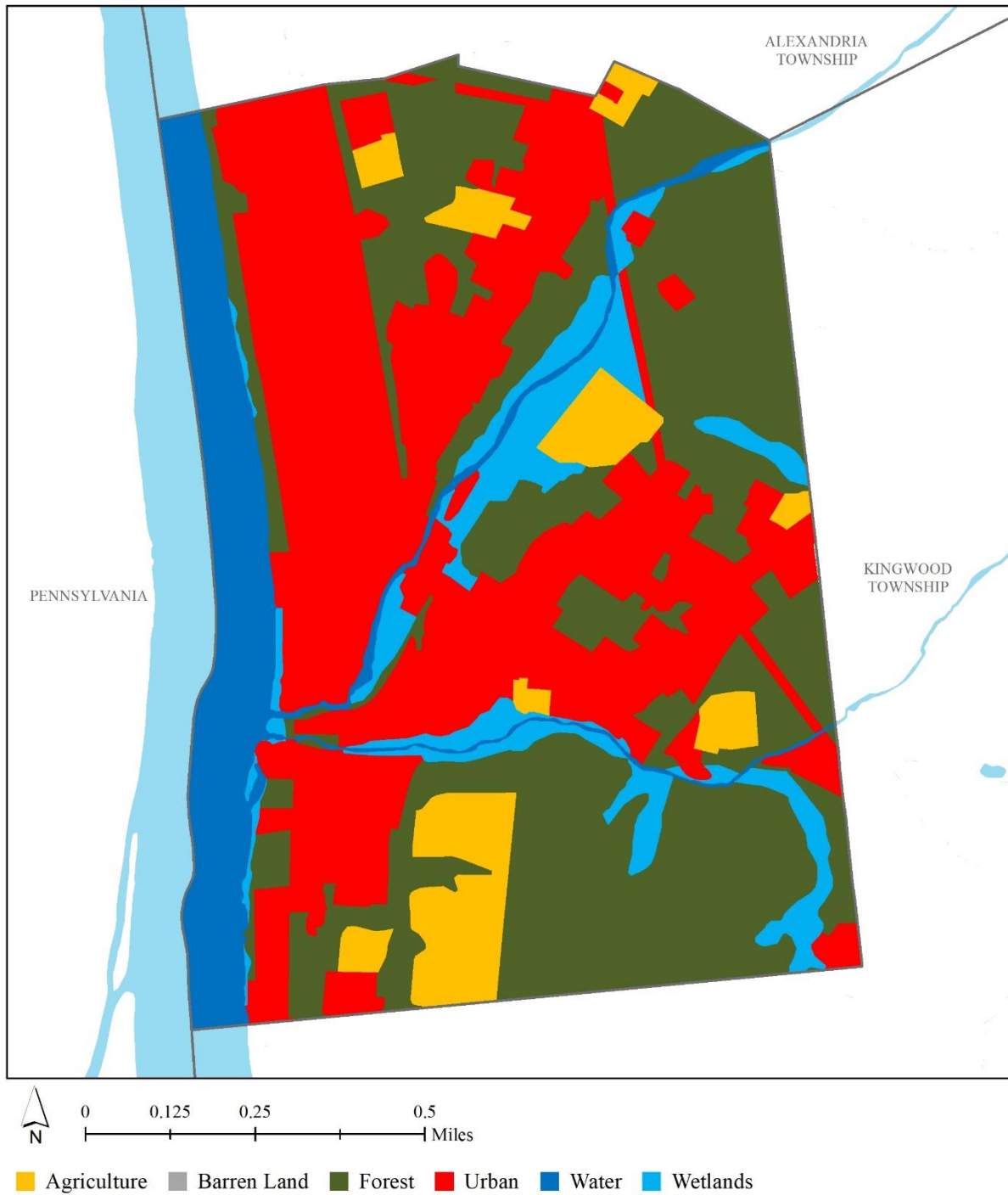


Figure 1: Map illustrating the land use in Frenchtown Borough

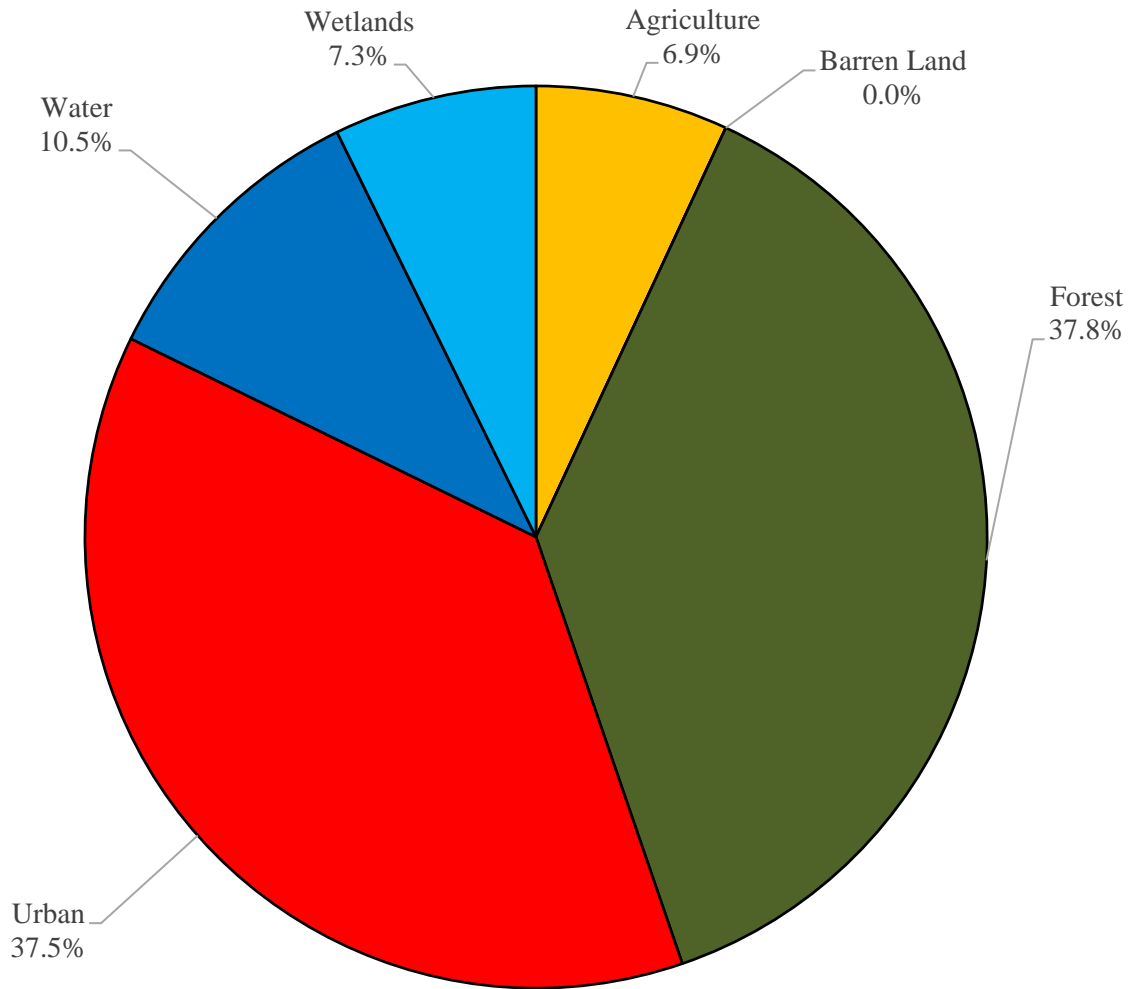


Figure 2: Pie chart illustrating the land use in Frenchtown Borough

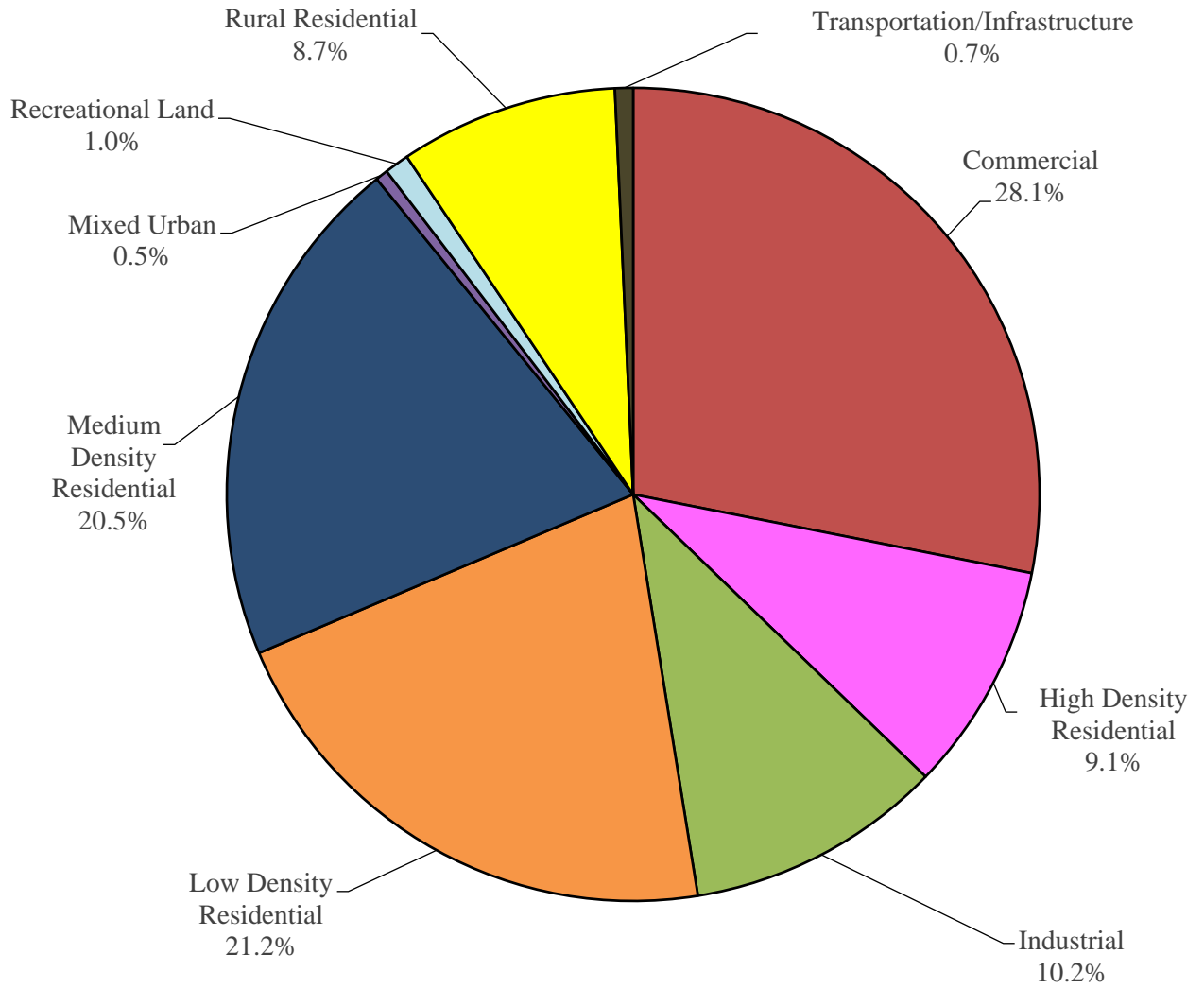


Figure 3: Pie chart illustrating the various types of urban land use in Frenchtown Borough

Subwatersheds of Frenchtown Borough

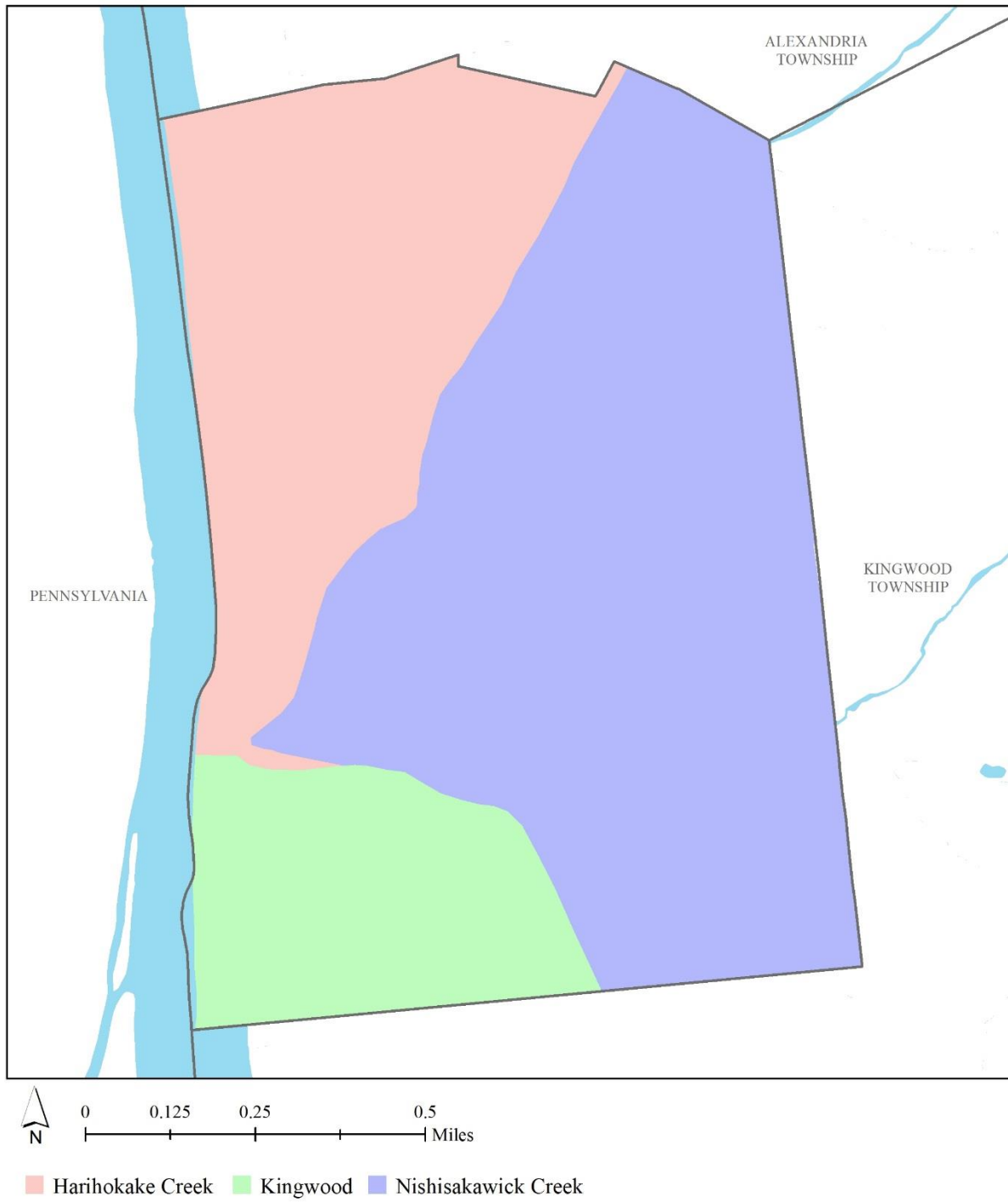


Figure 4: Map of the subwatersheds in Frenchtown Borough

For each potential project site, specific aerial loading coefficients for commercial land use were used to determine the annual runoff loads for total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS) from impervious surfaces (Table 1). These are the same aerial loading coefficients that NJDEP uses in developing total maximum daily loads (TMDLs) for impaired waterways of the state. The percentage of impervious cover for each site was extracted from the 2012 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 Frenchtown Borough using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey, which utilizes regional and statewide soil data to predict soil types in an area. Several key soil parameters were examined (e.g., natural drainage class, saturated hydraulic conductivity of the most limiting soil layer (K_{sat}), depth to water table, and hydrologic soil group) to evaluate the suitability of each site's soil for green infrastructure practices. In cases where multiple soil types were encountered, the key soil parameters were examined for each soil type expected at a site.

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

Table 1: Aerial Loading Coefficients²

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 benefits³. A wide range of green infrastructure practices have been evaluated for the potential project sites in Frenchtown Borough. Each practice is discussed below.

Disconnected downspouts

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



Pervious pavements

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



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

Bioretention systems/rain gardens

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



Downspout planter boxes

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



Rainwater harvesting systems (cistern or rain barrel)

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



Bioswale

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



Stormwater planters

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



Tree filter boxes

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



Potential Project Sites

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

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

Conclusion

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

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

Appendix A: Climate Resilient Green Infrastructure
a. Green Infrastructure Sites

FRENCHTOWN BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE HARIHOKAKE CREEK SUBWATERSHED

1. ArtYard
2. Frenchtown Free Library/Borough Clerk/Ambulance
3. Frenchtown Market
4. Frenchtown Presbyterian Church
5. Frenchtown United Methodist Church
6. Lovin' Oven
7. Old Frenchtown Field
8. Secret Garden Montessori

SITES WITHIN THE KINGWOOD TOWNSHIP (WARFORD - LITTLE NISHISAKAWICK) SUBWATERSHED

9. Frenchtown Villa Apartments: The Commons

SITES WITHIN THE NISHISAKAWICK CREEK SUBWATERSHED

10. Frenchtown Free Parking
11. Frenchtown Park
12. Frenchtown Post Office
13. Living Hope Ministries
14. The National Hotel

b. Proposed Green Infrastructure Concepts

ARTYARD



Subwatershed: Harihokake Creek

Site Area: 42,230 sq. ft.

Address: 13 Front Street
Frenchtown, NJ 08825

Block and Lot: Blocks 55; 57, Lots 14, 15



The properties which are to be the future site of an ArtYard facility has a strip of parking which can be converted to porous pavement along the north side of the large building. The runoff from the small paved area can be captured by two rain gardens before entering storm drains. Downspout planter boxes can capture and slow the release of roof runoff from the smaller building. 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	38,150	1.8	19.3	175.2	0.030	1.05

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.081	14	6,120	0.23	780	\$3,900
Downspout planter boxes	n/a	3	n/a	n/a	4	\$4,000
Pervious pavement	0.130	22	9,870	0.37	900	\$22,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



ArtYard

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



FRENCHTOWN FREE PUBLIC LIBRARY/ BOROUGH HALL/ AMBULANCE



Subwatershed: Harihokake Creek

Site Area: 20,533 sq. ft.

Address: 29 2nd Street
Frenchtown, NJ 08825

Block and Lot: Block 37, Lots 17, 18, 19

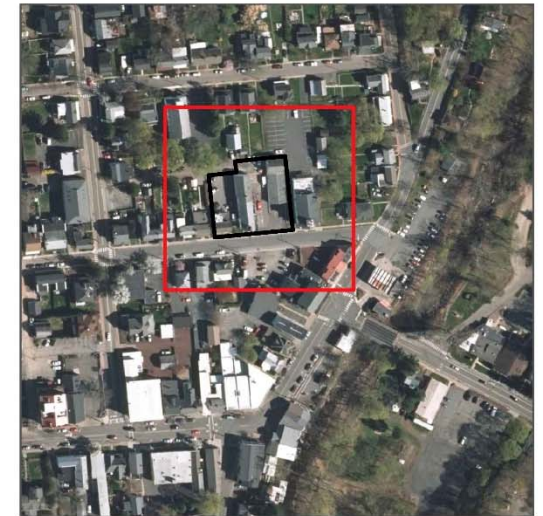
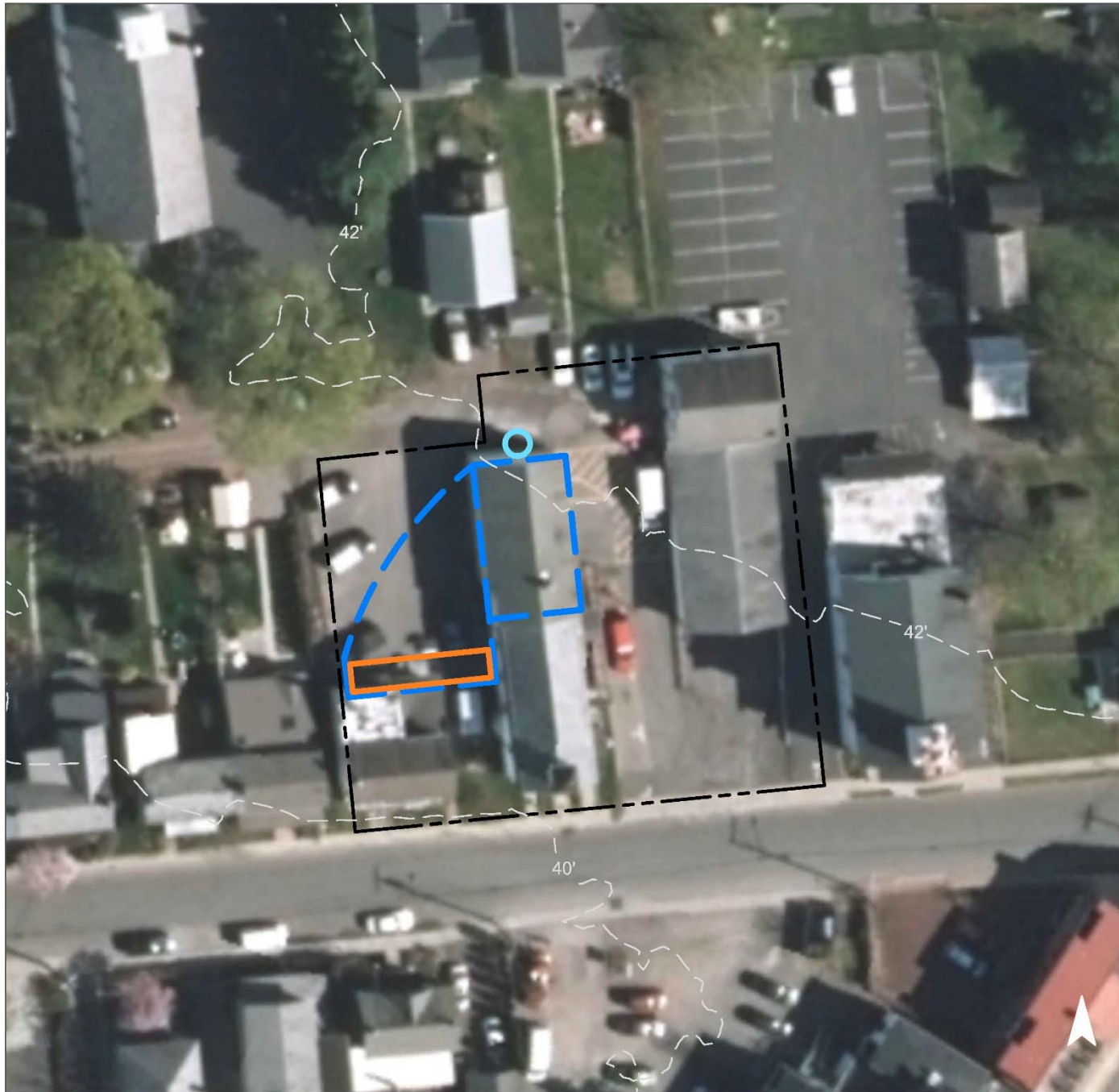


The runoff from the roof of the ambulance building can be captured with a cistern and reused to clean vehicles or for other non-potable uses. The runoff from the parking lot can be captured with a porous pavement section at the south end of the lot. A preliminary soil assessment suggests that the soils 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"
84	17,245	0.8	8.7	79.2	0.013	0.47

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
Pervious pavement	0.059	10	4,440	0.17	400	\$10,000
Rainwater harvesting	0.039	7	1,200	0.04	1,200 (gal)	\$2,400

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Free Library / Borough Clerk / Ambulance

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



FRENCHTOWN MARKET



Subwatershed: Harihokake Creek

Site Area: 36,465 sq. ft.

Address: 28 6th Street
Frenchtown, NJ 08825

Block and Lot: Block 23, Lot 1.01



The Frenchtown Market has a strip of parking spaces near the entrance that can be converted to porous asphalt to capture runoff from the driveway and rooftop. On the east side of the building another strip of parking spaces can be converted to capture runoff from the roof by disconnecting the downspouts into them. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.





Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
95	34,642	1.7	17.5	159.1	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
Pervious pavement	0.313	52	23,690	0.89	2,650	\$66,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Market

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



FRENCHTOWN PRESBYTERIAN CHURCH



Subwatershed: Harihokake Creek

Site Area: 27,650 sq. ft.

Address: 20 4th Street
Frenchtown, NJ 08825

Block and Lot: Block 31, Lots 3, 4

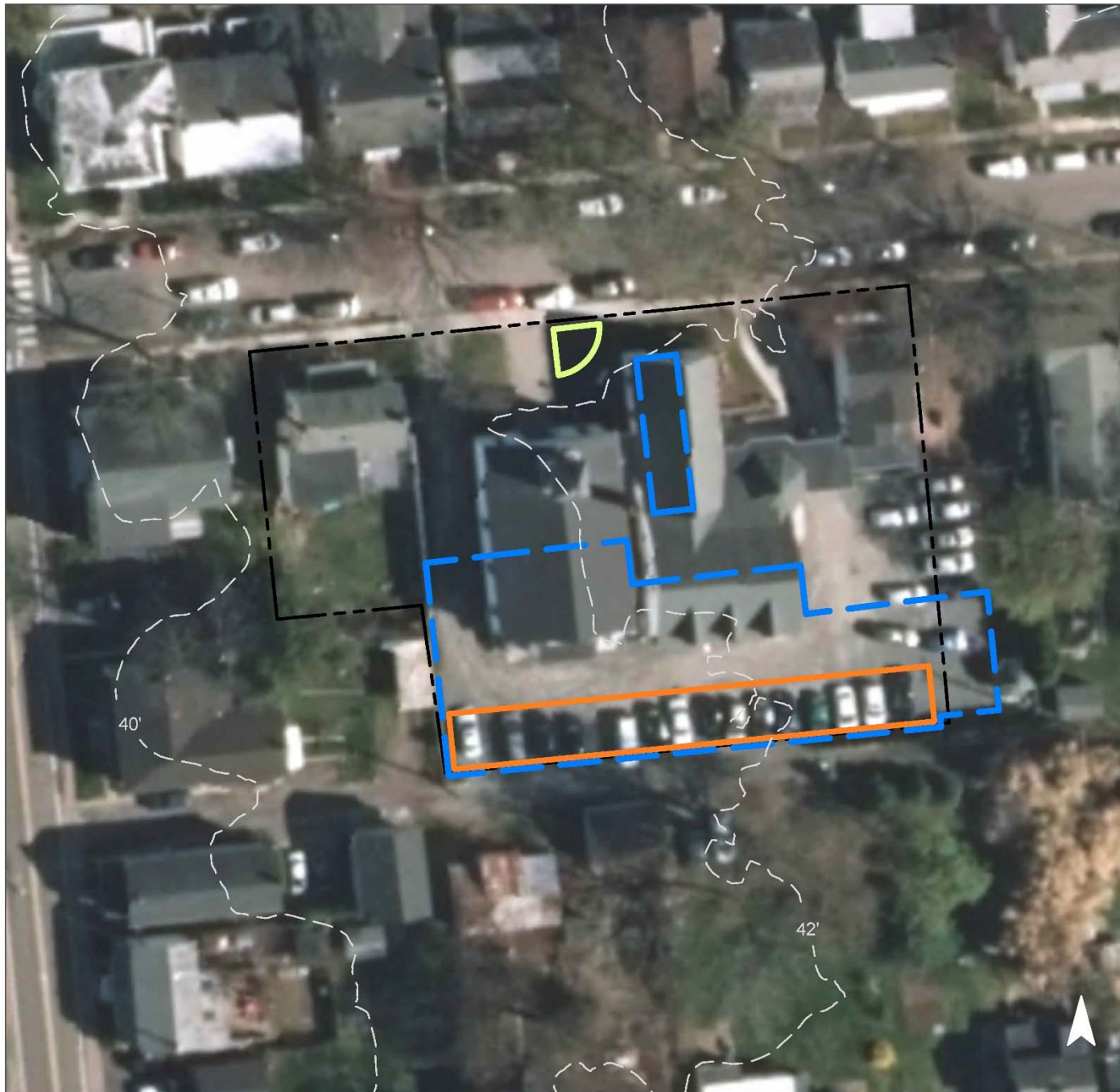


The Presbyterian Church has a gravel parking lot with compacted soil underneath it. This lot would be a good candidate for repaving parking spaces with porous pavement, which could capture runoff from the parking lot and roof of the building. A preliminary soil assessment suggests that the soils have 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"
81	22,500	1.1	11.4	103.3	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 system	0.017	3	1,290	0.05	165	\$825
Pervious pavement	0.261	44	19,740	0.74	2,800	\$70,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Presbyterian Church

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



FRENCHTOWN UNITED METHODIST CHURCH



Subwatershed: Harihokake Creek
Site Area: 19,309 sq. ft.
Address: 16 3rd Street
Frenchtown, NJ 08825
Block and Lot: Block 37, Lot 4

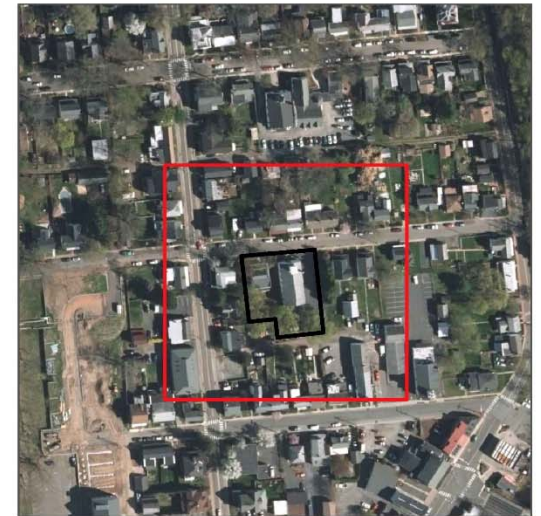
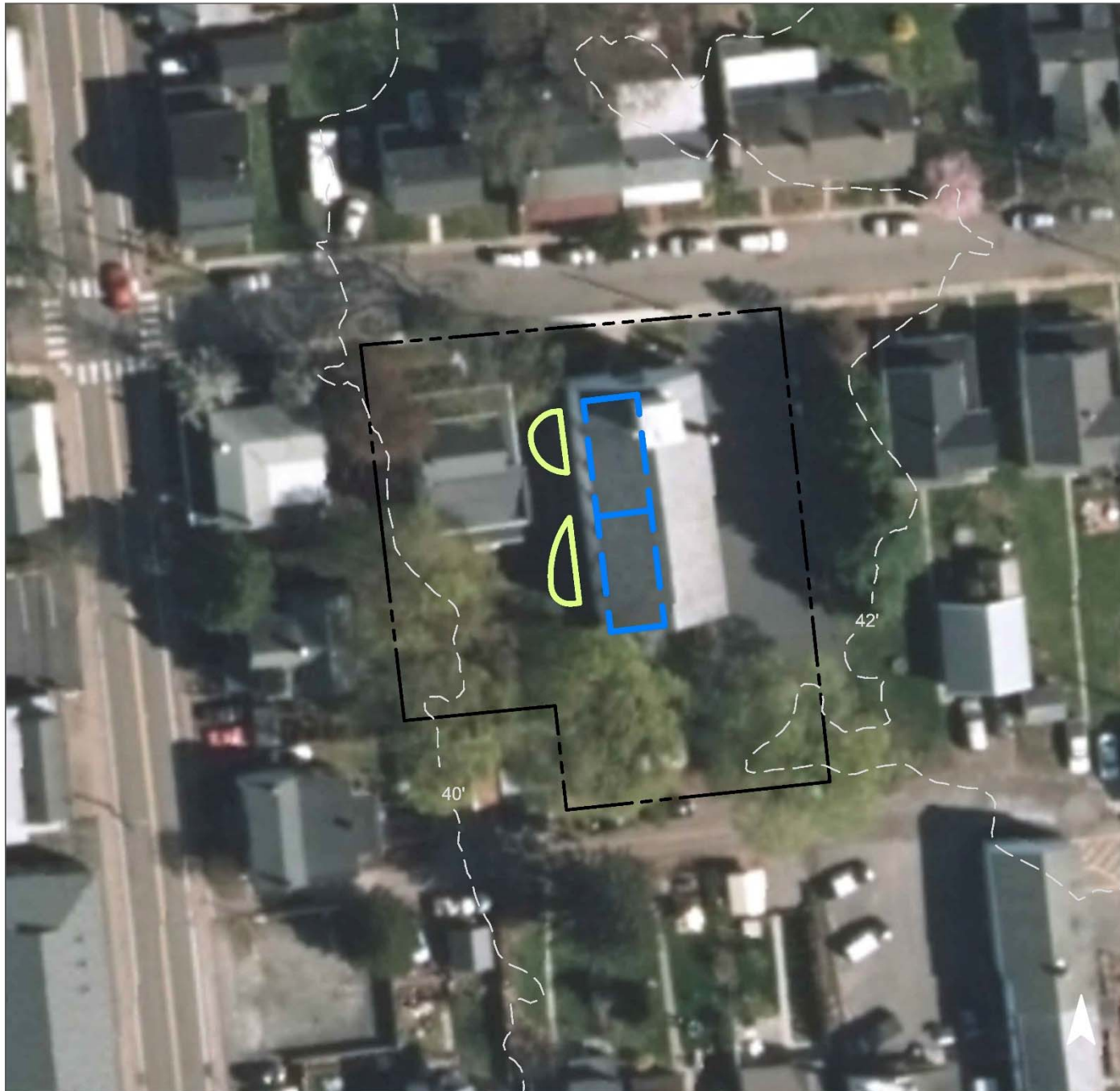


The downspouts from the roof of the building can be disconnected to flow into rain gardens which will capture, infiltrate, and filter runoff from the roof. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.





Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
60	11,598	0.6	5.9	53.3	0.009	0.32

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 systems	0.034	6	2,570	0.10	330	\$1,650

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown United Methodist Church

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



LOVIN' OVEN



Subwatershed: Harihokake Creek
Site Area: 75,263 sq. ft.
Address: 62 Trenton Avenue
Frenchtown, NJ 08825
Block and Lot: Block 59, Lot 4

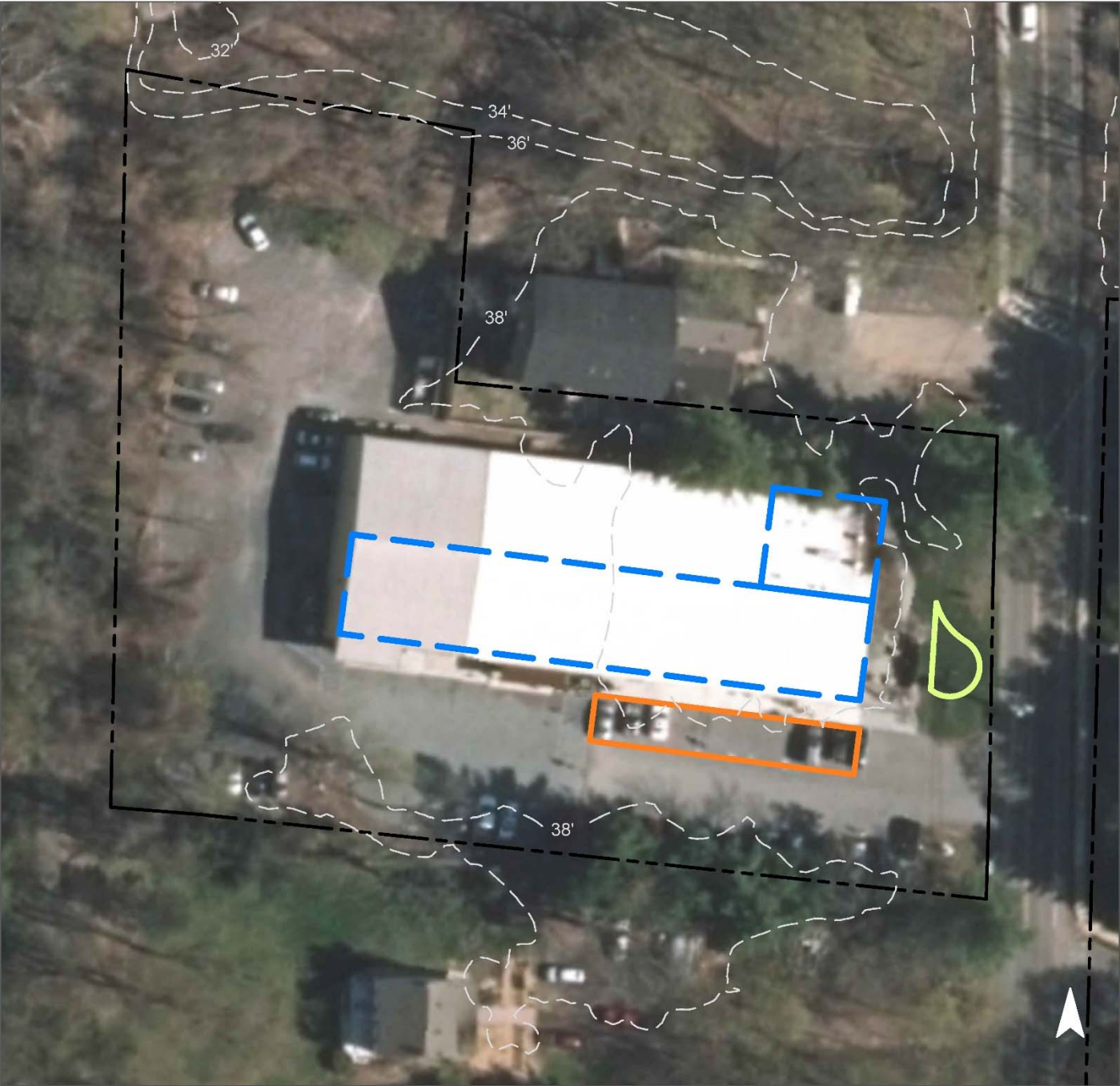


The parking area next to the building can be converted to porous pavement to capture runoff from the roof. A rain garden can be installed in the front lawn to capture, treat, and infiltrate runoff from the front section of the roof. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.






Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
72	54,546	2.6	27.5	250.4	0.043	1.50

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	0.044	7	3,360	0.13	425	\$2,125
Pervious pavement	0.208	35	15,790	0.59	1,875	\$46,875

GREEN INFRASTRUCTURE RECOMMENDATIONS



Lovin' Oven

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



OLD FRENCHTOWN FIELD



Subwatershed: Harihokake Creek
Site Area: 353,801 sq. ft.
Address: 12th Street & Harrison Street
Frenchtown, NJ 08825
Block and Lot: Block 3, Lot 1.01



Three rain gardens can be installed along 12th street at the edge of the field to capture, treat, and infiltrate road runoff and to reduce nearby flooding during large storm events. 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"
9	32,242	1.6	16.3	148.0	0.025	0.88

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
Bioretention systems	0.078	13	5,920	0.22	750	\$3,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Old Frenchtown Field

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



SECRET GARDEN MONTESSORI SCHOOL

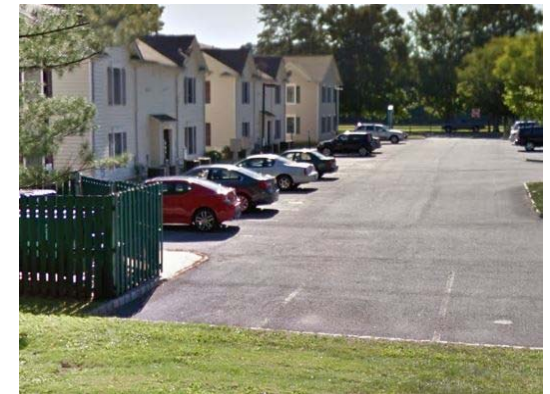


Subwatershed: Harihokake Creek

Site Area: 71,000 sq. ft.

Address: 1110 Harrison Street
Frenchtown, NJ 08825

Block and Lot: Block 4, Lot 1

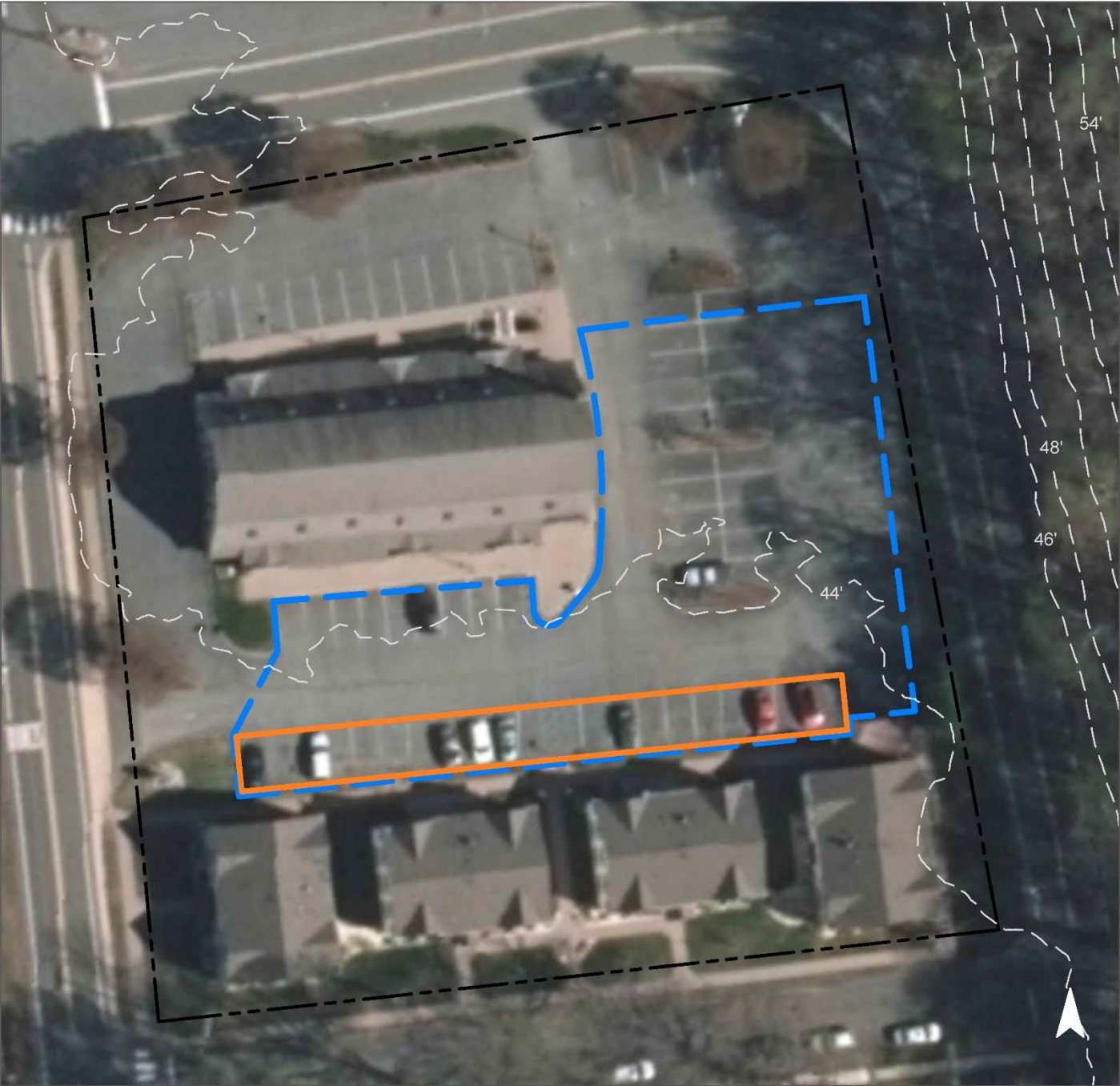


The section of parking spaces in front of the apartment building which shares the property can be converted to porous parking to capture and infiltrate parking lot runoff and to reduce nearby flooding during large storm events. A preliminary soil assessment suggests that the soils have suitable drainage 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	63,900	3.1	32.3	293.4	0.050	1.75

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	0.519	87	39,280	1.47	3,550	\$88,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



**Secret Garden
Montessori School**

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



FRENCHTOWN VILLA APARTMENTS: THE COMMONS



Subwatershed: Kingwood Township (Warford – Little Nishisakawick)

Site Area: 281,431 sq. ft.

Address: 59 Trenton Avenue
Frenchtown, NJ 08825

Block and Lot: Block 52, Lot 32



Rain gardens can be installed between buildings and walkways to capture, treat, and infiltrate roof runoff by disconnecting downspouts and redirecting them into the rain gardens. 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"
53	148,787	7.2	75.1	683.1	0.116	4.08

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	0.109	18	8,290	0.31	1,050	\$5,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Villa Apartments: The Commons

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



FRENCHTOWN FREE PARKING



Subwatershed: Nishisakawick Creek

Site Area: 303,583 sq. ft.

Address: 23 Race Street
Frenchtown, NJ 08825

Block and Lot: Block 16, Lot 9

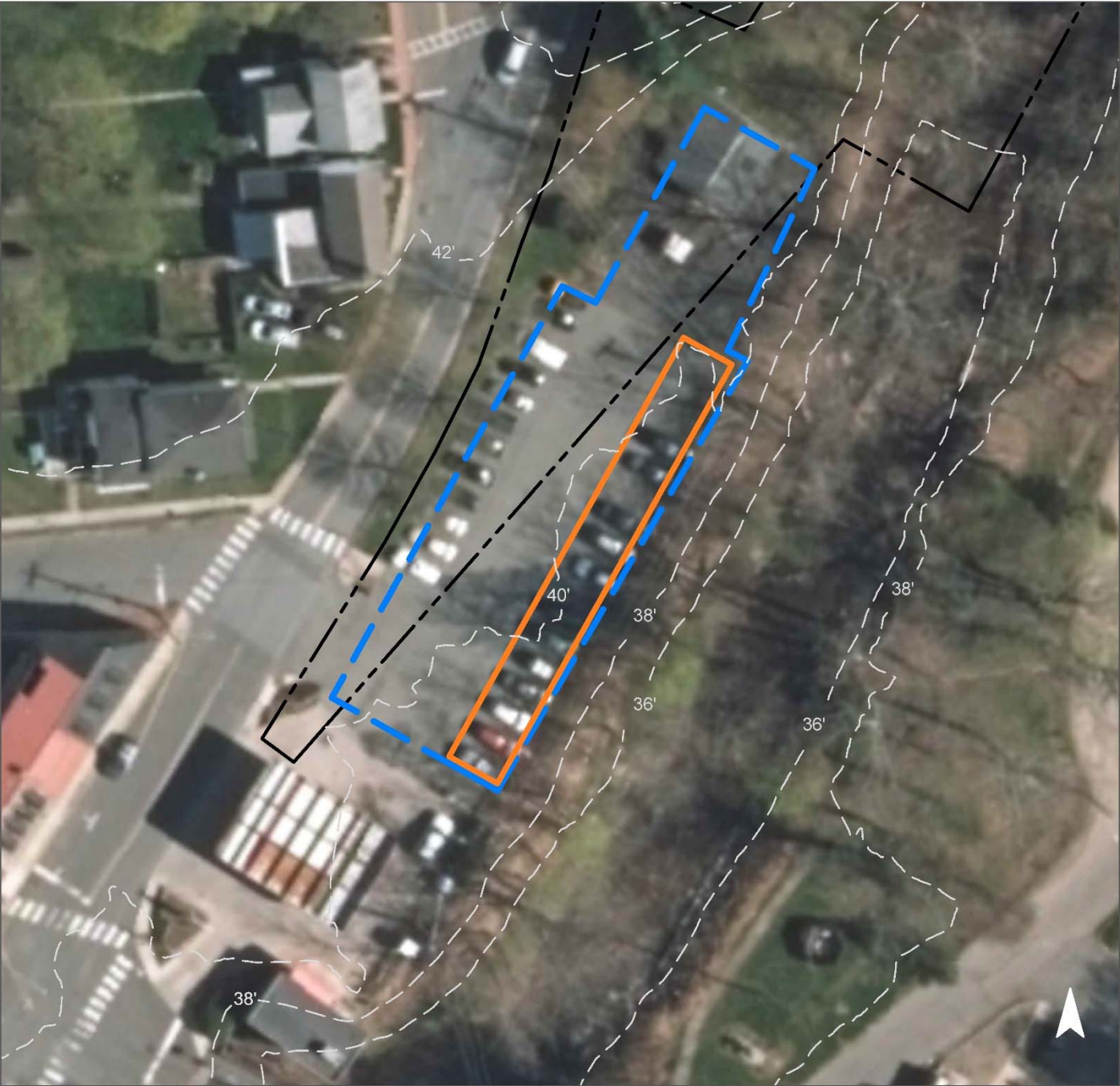


A section of parking spaces can be converted to porous pavement to capture runoff from the rest of the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.





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"
4	13,370	0.6	6.8	61.4	0.010	0.37

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	0.336	56	25,460	0.96	2,800	\$70,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Free Parking

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



FRENCHTOWN PARK



Subwatershed: Nishisakawick Creek

Site Area: 657,925 sq. ft.

Address: 7 Creek Road
Frenchtown, NJ 08825

Block and Lot: Block 16, Lot 13

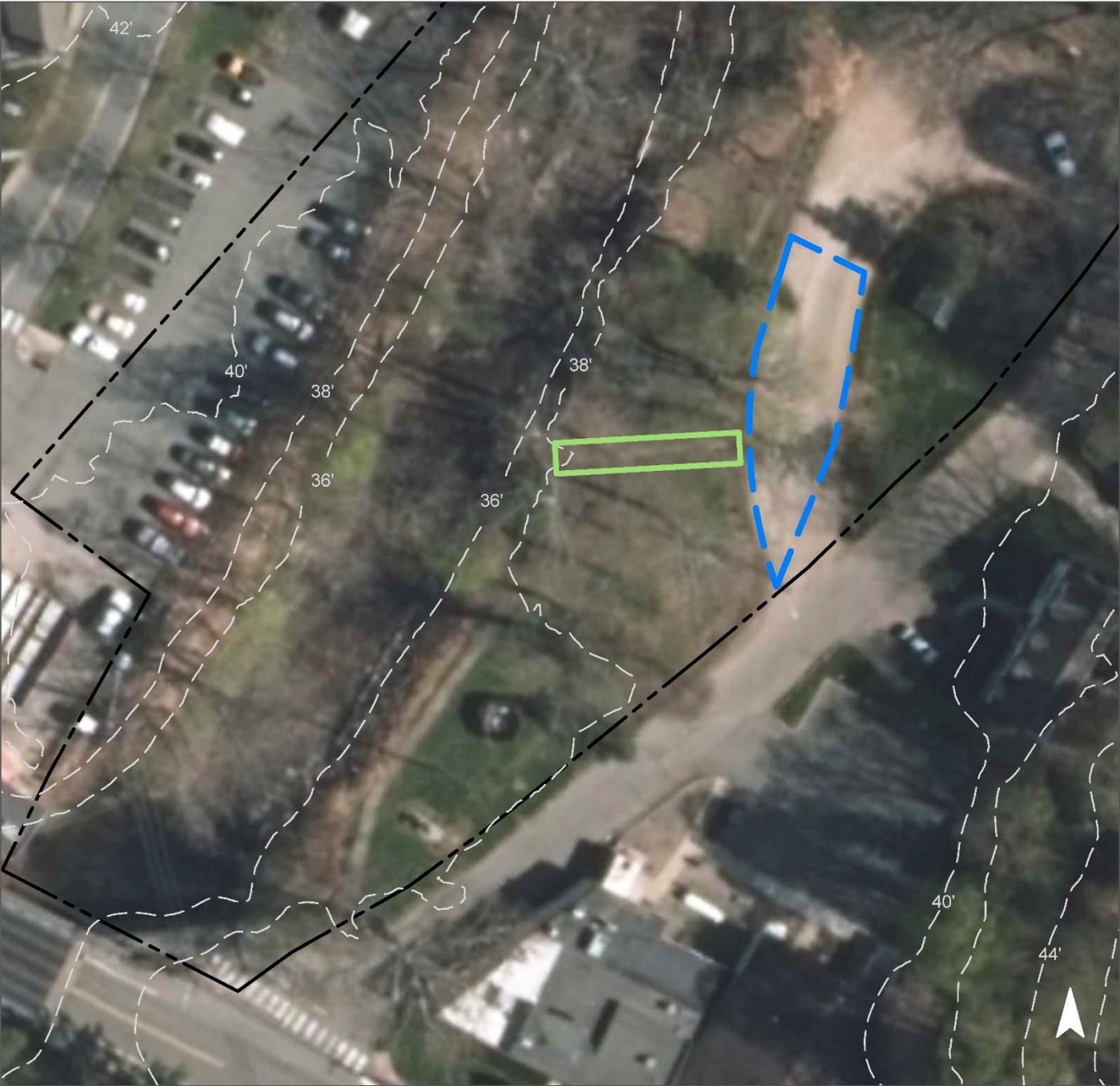


An existing ditch caused by erosion from a culvert can be converted to a bioswale to diminish the erosion issue as well infiltrate and treat runoff before directly entering the Nishisakawick Creek. A preliminary soil assessment suggests that more soil testing would be required before determining the 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	34,838	1.7	17.6	160.0	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
Bioswale	0.063	10	4,730	0.18	600	\$3,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Park

-  bioswale
-  drainage area
-  property line
-  2015 Aerial: NJOIT, OGIS



FRENCHTOWN POST OFFICE



Subwatershed: Nishisakawick Creek

Site Area: 11,049 sq. ft.

Address: 16 Trenton Avenue
Frenchtown, NJ 08825

Block and Lot: Block 55, Lot 13

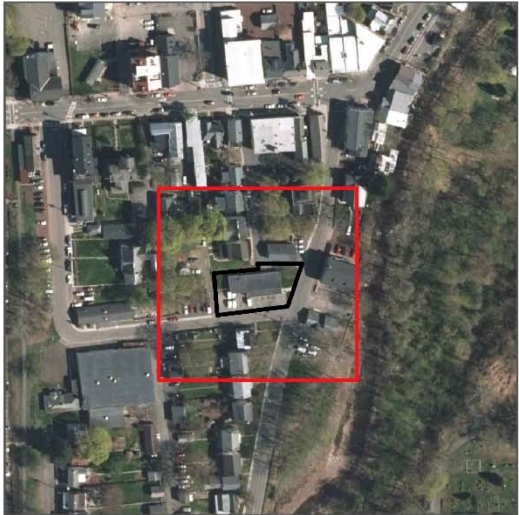
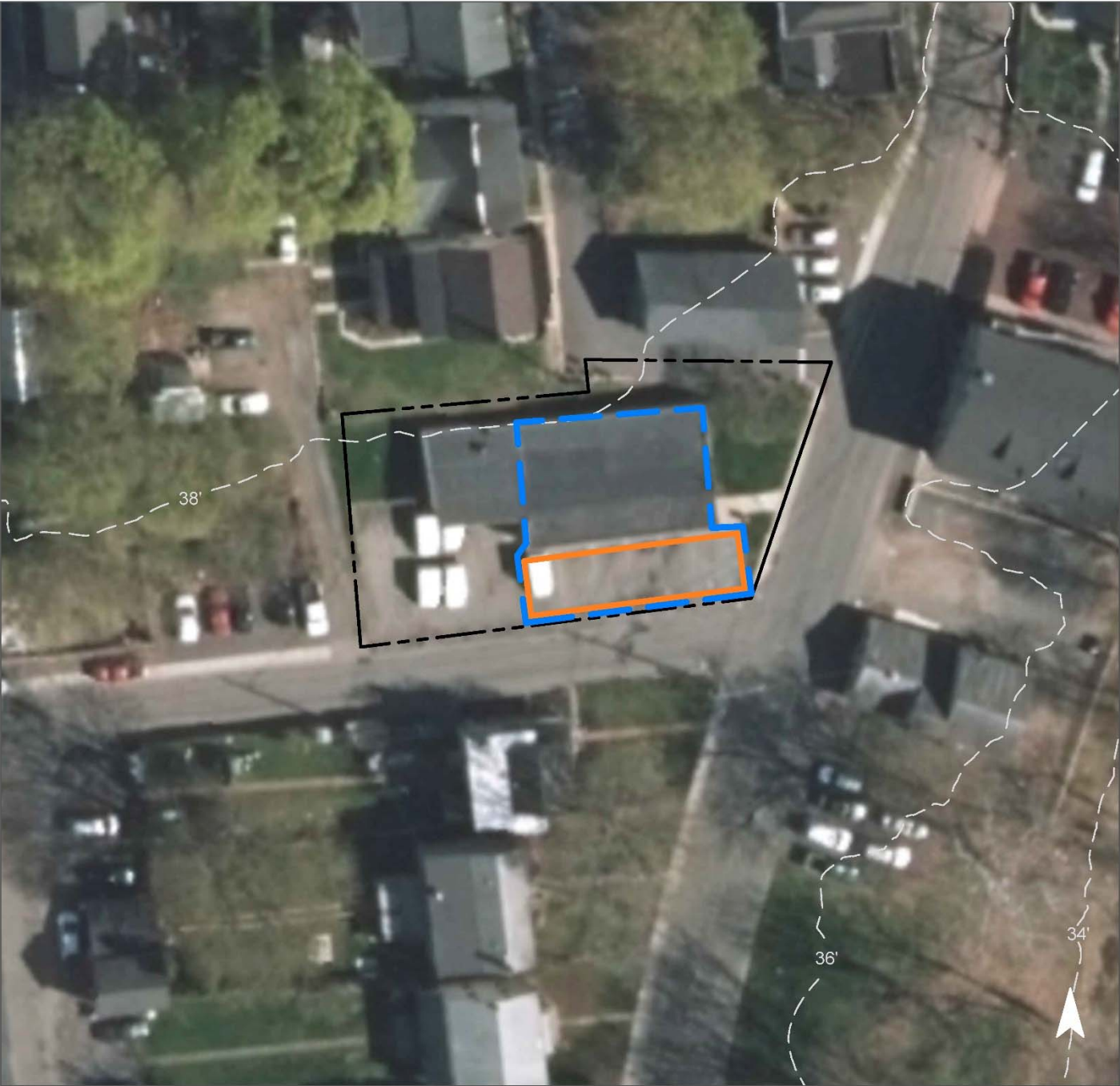


Downspouts leading from the roof to the sewer system can be redirected to a section of porous pavement next to the building. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.





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"
45	4,972	0.2	2.5	22.8	0.004	0.14

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	0.108	18	8,190	0.31	1,250	\$31,250

GREEN INFRASTRUCTURE RECOMMENDATIONS



Frenchtown Post Office

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



LIVING HOPE MINISTRIES



Subwatershed: Nishisakawick Creek

Site Area: 32,924 sq. ft.

Address: 35 2nd Street
Frenchtown, NJ 08825

Block and Lot: Block 37, Lots 11, 16

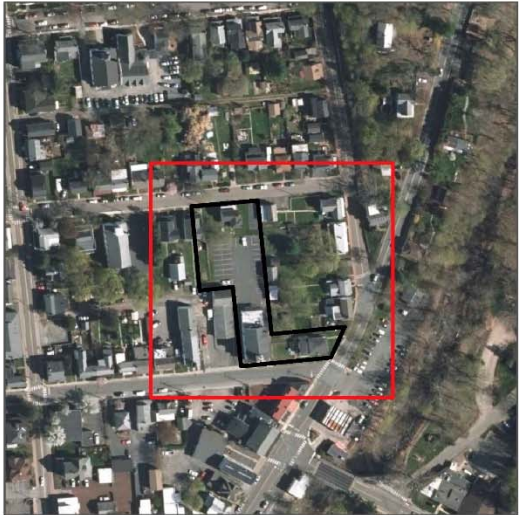
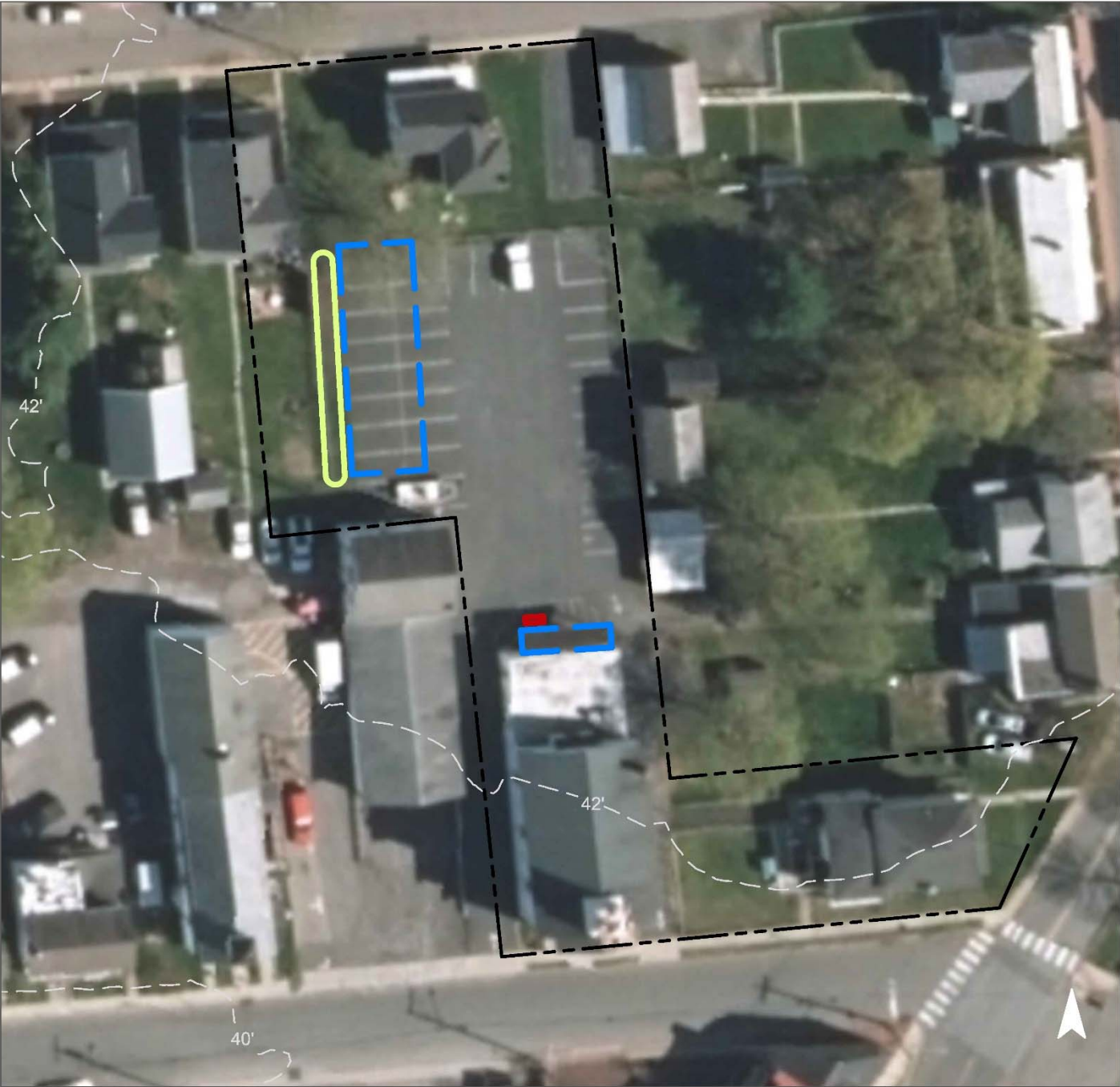


A rain garden can be installed adjacent to the parking lot to capture, treat, and infiltrate runoff from the lot. A downspout planter box can capture and slowly release runoff from the section of roof in the back of the building and be used as a demonstration project. A preliminary soil assessment suggests 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"
63	20,728	1.0	10.5	95.2	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
Bioretention system	0.047	8	3,550	0.13	450	\$2,250
Downspout planter box	n/a	1	n/a	n/a	1	\$1,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Living Hope Ministries

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



THE NATIONAL HOTEL



Subwatershed: Nishisakawick Creek

Site Area: 13,062 sq. ft.

Address: 31 Race Street
Frenchtown, NJ 08825

Block and Lot: Block 41, Lot 5

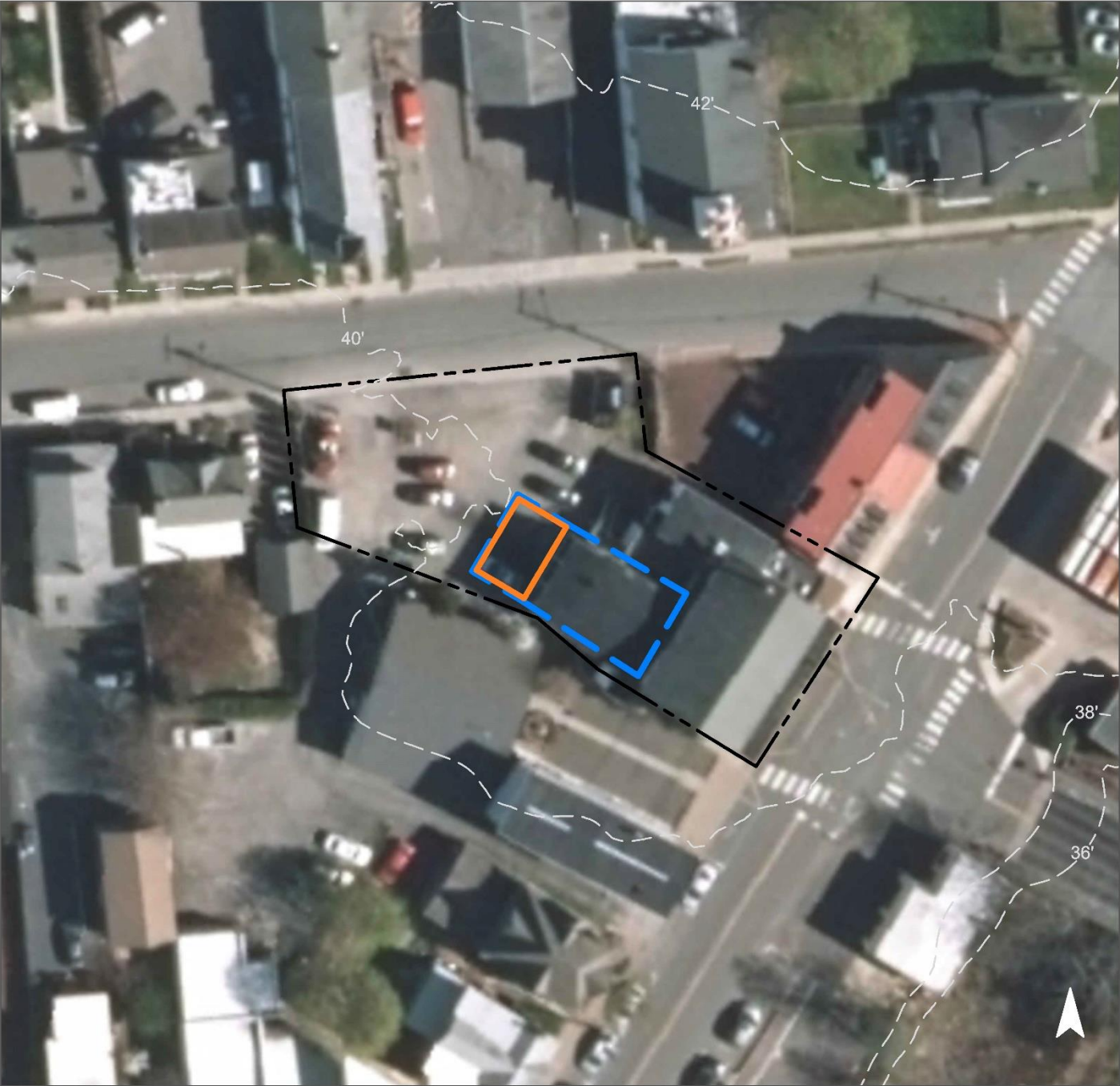


The parking lot is in poor condition and can be repaved with sections of porous parking spaces. The porous parking spaces can capture runoff from some of the parking lot and a section of the roof. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.





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	11,694	0.6	5.9	53.7	0.009	0.32

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
Pervious pavement	0.050	8	3,750	0.14	500	\$12,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



The National Hotel

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



c. Summary of Existing Conditions

Summary of Existing Site 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.	
								TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
HARIHOKAKE CREEK SITES	14.84	646,252				6.31	274,824	13.2	138.8	1,261.8	0.214	7.54
ArtYard												
Total Site Info	0.97	42,230	55;57	14,15;1	90	0.88	38,150	1.8	19.3	175.2	0.030	1.05
Frenchtown Free Public Library/Borough Hall/Ambulance												
Total Site Info	0.47	20,533	37	17,18,19	84	0.40	17,245	0.8	8.7	79.2	0.013	0.47
Frenchtown Market												
Total Site Info	0.84	36,465	23	1.01	95	0.80	34,642	1.7	17.5	159.1	0.027	0.95
Frenchtown Presbyterian Church												
Total Site Info	0.63	27,650	31	3,4	81	0.52	22,500	1.1	11.4	103.3	0.018	0.62
Frenchtown United Methodist Church												
Total Site Info	0.44	19,309	37	4	60	0.27	11,598	0.6	5.9	53.3	0.009	0.32
Lovin' Oven												
Total Site Info	1.73	75,263	59	4	72	1.25	54,546	2.6	27.5	250.4	0.043	1.50
Old Frenchtown Field												
Total Site Info	8.12	353,801	3	1.01	9	0.74	32,242	1.6	16.3	148.0	0.025	0.88
Secret Garden Montessori School												
Total Site Info	1.63	71,000	4	1	90	1.47	63,900	3.1	32.3	293.4	0.050	1.75
KINGWOOD TOWNSHIP (WARFORD - LITTLE NISHISAKAWICK) SITES	6.46	281,431				3.42	148,787	7.2	75.1	683.1	0.116	4.08
Frenchtown Villa Apartments: The Commons												
Total Site Info	6.46	281,431	52	32	53	3.42	148,787	7.2	75.1	683.1	0.116	4.08
NISHISAKAWICK CREEK SITES	23.38	1,018,543				1.97	85,602	4.1	43.2	393.0	0.067	2.35
Frenchtown Free Parking												
Total Site Info	6.97	303,583	16	9	4	0.31	13,370	0.6	6.8	61.4	0.010	0.37

Summary of Existing Site 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.	
								TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
Frenchtown Post Office Total Site Info	0.25	11,049	55	13	45	0.11	4,972	0.2	2.5	22.8	0.004	0.14
Living Hope Ministries Total Site Info	0.76	32,924	37	11,16	63	0.48	20,728	1.0	10.5	95.2	0.016	0.57
The National Hotel Total Site Info	0.30	13,062	41	5	90	0.27	11,694	0.6	5.9	53.7	0.009	0.32

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP	Unit Cost (\$/unit)	Unit	Total Cost (\$)	I.C. Treated %
	Area (SF)	Area (ac)									
HARIHOKAKE CREEK SITES	69,250	1.59	1.782	301	133,270	5.00				\$323,025	25.2%
1 ArtYard											
Bioretention systems	3,100	0.07	0.081	14	6,120	0.23	780	\$5	SF	\$3,900	8.1%
Downspout planter boxes	850	0.02	n/a	3	n/a	n/a	4	\$1,000	box	\$4,000	2.2%
Pervious pavement	5,000	0.11	0.130	22	9,870	0.37	900	\$25	SF	\$22,500	13.1%
Total Site Info	8,950	0.21	0.211	38	15,990	0.60				\$30,400	23.5%
2 Frenchtown Free Public Library/Borough Hall/Ambulance											
Pervious pavement	2,250	0.05	0.059	10	4,440	0.17	400	\$25	SF	\$10,000	13.0%
Rainwater harvesting	1,500	0.03	0.039	7	1,200	0.04	1,200	\$2	gal	\$2,400	8.7%
Total Site Info	3,750	0.09	0.098	16	5,640	0.21				\$12,400	21.7%
3 Frenchtown Market											
Pervious pavement	12,000	0.28	0.313	52	23,690	0.89	2,650	\$25	SF	\$66,250	34.6%
Total Site Info	12,000	0.28	0.313	52	23,690	0.89				\$66,250	34.6%
4 Frenchtown Presbyterian Church											
Bioretention system	650	0.01	0.017	3	1,290	0.05	165	\$5	SF	\$825	2.9%
Pervious pavement	10,000	0.23	0.261	44	19,740	0.74	2,800	\$25	SF	\$70,000	44.4%
Total Site Info	10,650	0.24	0.277	46	21,030	0.79				\$70,825	47.3%
5 Frenchtown United Methodist Church											
Bioretention systems	1,300	0.03	0.034	6	2,570	0.10	330	\$5	SF	\$1,650	11.2%
Total Site Info	1,300	0.03	0.034	6	2,570	0.10				\$1,650	11.2%
6 Lovin' Oven											
Bioretention system	1,700	0.04	0.044	7	3,360	0.13	425	\$5	SF	\$2,125	3.1%
Pervious pavement	8,000	0.18	0.208	35	15,790	0.59	1,875	\$25	SF	\$46,875	14.7%
Total Site Info	9,700	0.22	0.253	42	19,150	0.72				\$49,000	17.8%
7 Old Frenchtown Field											
Bioretention systems	3,000	0.07	0.078	13	5,920	0.22	750	\$5	SF	\$3,750	9.3%
Total Site Info	3,000	0.07	0.078	13	5,920	0.22				\$3,750	9.3%

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	Unit Cost (\$/unit)	Unit	Total Cost (\$)	I.C. Treated %
	Area (SF)	Area (ac)									
8 Secret Garden Montessori School											
Pervious pavement	19,900	0.46	0.519	87	39,280	1.47	3,550	\$25	SF	\$88,750	31.1%
Total Site Info	19,900	0.46	0.519	87	39,280	1.47				\$88,750	31.1%
KINGWOOD TOWNSHIP (WARFORD - LITTLE NISHISAKAWICK) SITES	4,200	0.10	0.109	18	8,290	0.31				\$5,250	2.8%
9 Frenchtown Villa Apartments: The Commons											
Bioretention systems	4,200	0.10	0.109	18	8,290	0.31	1,050	\$5	SF	\$5,250	2.8%
Total Site Info	4,200	0.10	0.109	18	8,290	0.31				\$5,250	2.8%
NISHISAKAWICK CREEK SITES	23,365	0.54	0.603	102	45,680	1.72				\$120,000	27.3%
10 Frenchtown Free Parking											
Pervious pavement	12,900	0.30	0.336	56	25,460	0.96	2,800	\$25	SF	\$70,000	96.5%
Total Site Info	12,900	0.30	0.336	56	25,460	0.96				\$70,000	96.5%
11 Frenchtown Park											
Bioswale	2,400	0.06	0.063	10	4,730	0.18	600	\$5	SF	\$3,000	6.9%
Total Site Info	2,400	0.06	0.063	10	4,730	0.18				\$3,000	6.9%
12 Frenchtown Post Office											
Pervious pavement	4,150	0.10	0.108	18	8,190	0.31	1,250	\$25	SF	\$31,250	83.5%
Total Site Info	4,150	0.10	0.108	18	8,190	0.31				\$31,250	83.5%
13 Living Hope Ministries											
Bioretention system	1,800	0.04	0.047	8	3,550	0.13	450	\$5	SF	\$2,250	8.7%
Downspout planter box	215	0.00	n/a	1	n/a	n/a	1	\$1,000	box	\$1,000	1.0%
Total Site Info	2,015	0.05	0.047	9	3,550	0.13				\$3,250	9.7%
14 The National Hotel											
Pervious pavement	1,900	0.04	0.050	8	3,750	0.14	500	\$25	SF	\$12,500	16.2%
Total Site Info	1,900	0.04	0.050	8	3,750	0.14				\$12,500	16.2%