RUTGERS
New Jersey Agricultural
Experiment Station

Draft

Impervious Cover Reduction Action Plan
for
Fanwood Borough, Union County, New Jersey

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

October 6, 2015

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Introduction

Located in Union County in central New Jersey, Fanwood Borough covers approximately 1.3 square miles. Figures 1 and 2 illustrate that Fanwood Borough is dominated by urban land uses. A total of 96.6% of the municipality's land use is classified as urban. Of the urban land in Fanwood Borough, medium density residential is the dominant land use (Figure 3).

The New Jersey Department of Environmental Protection's (NJDEP) 2007 land use/land cover geographical information system (GIS) data layer categorizes Fanwood Borough into many unique land use areas, assigning a percent impervious coverage for each delineated area. These impervious cover values were used to estimate the impervious coverage for Fanwood Borough. Based upon the 2007 NJDEP land use/and cover data, approximately 35.9% of Fanwood Borough has impervious cover. This level of impervious cover suggests that the streams in Fanwood Borough are likely non-supporting streams. [1]

Methodology

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

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

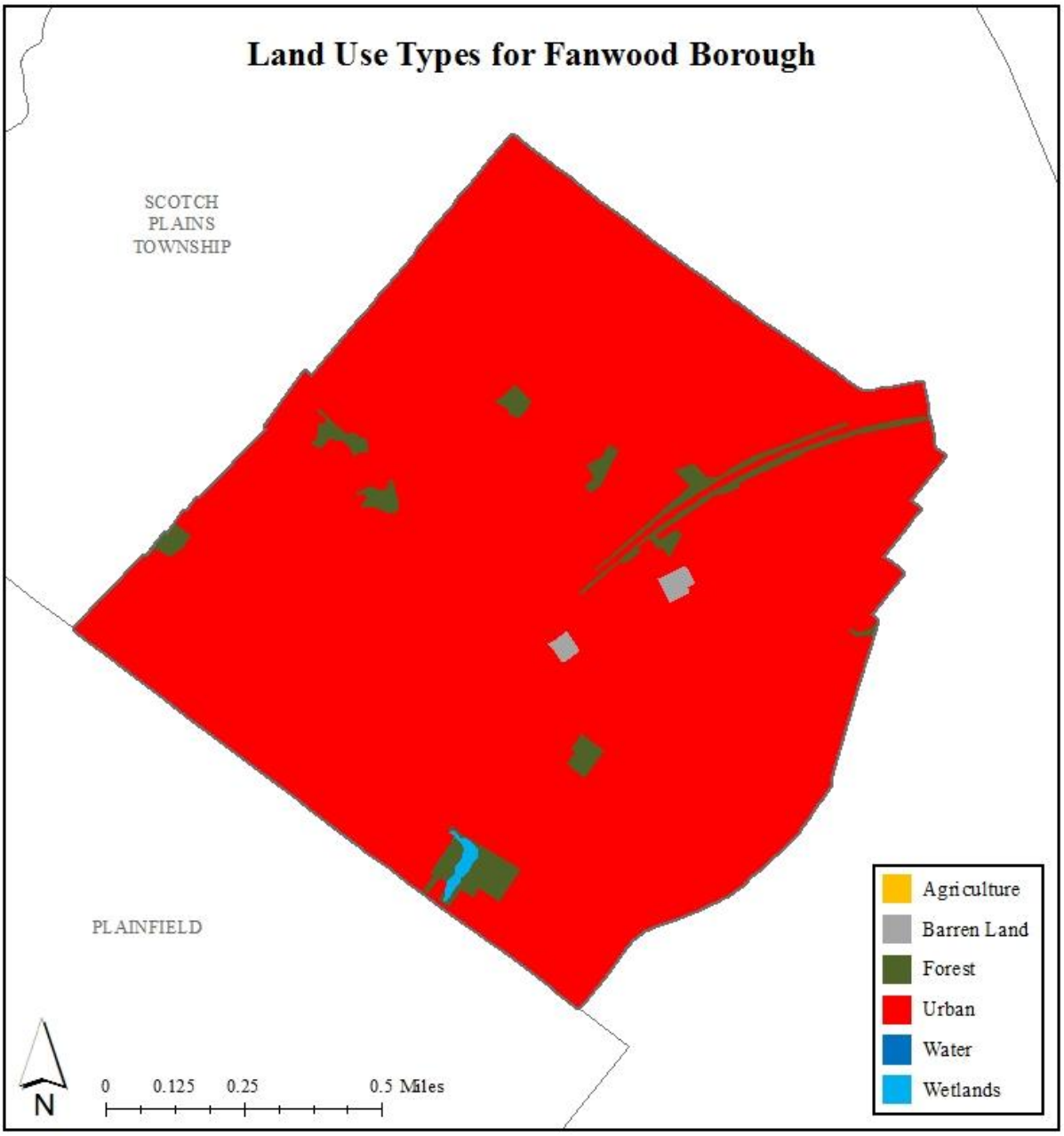


Figure 1: Map illustrating the land use in Fanwood Borough

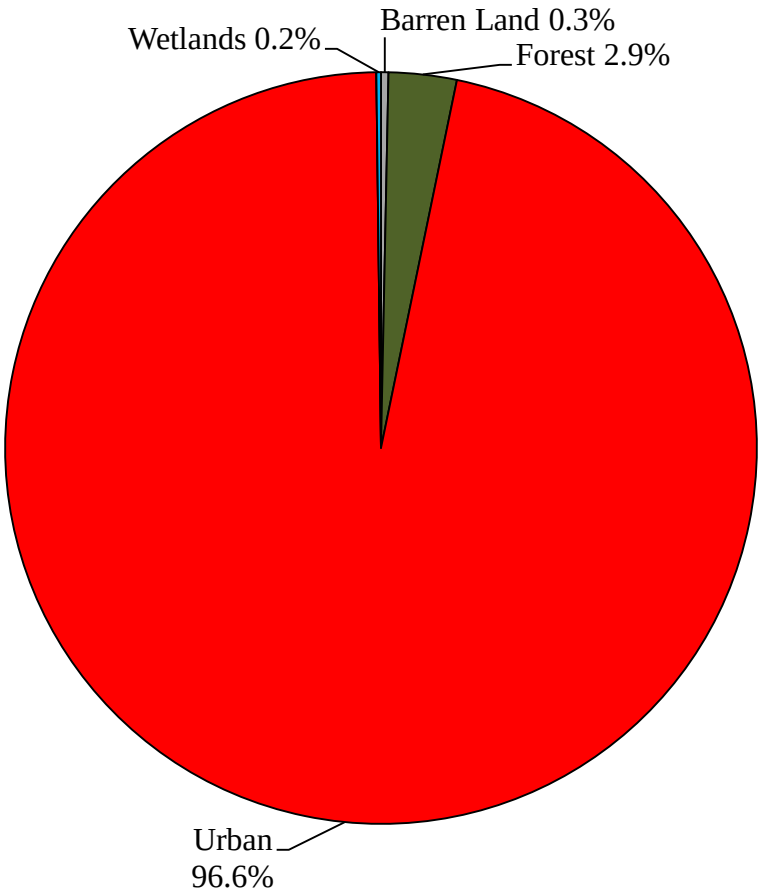


Figure 2: Pie chart illustrating the land use in Fanwood Borough

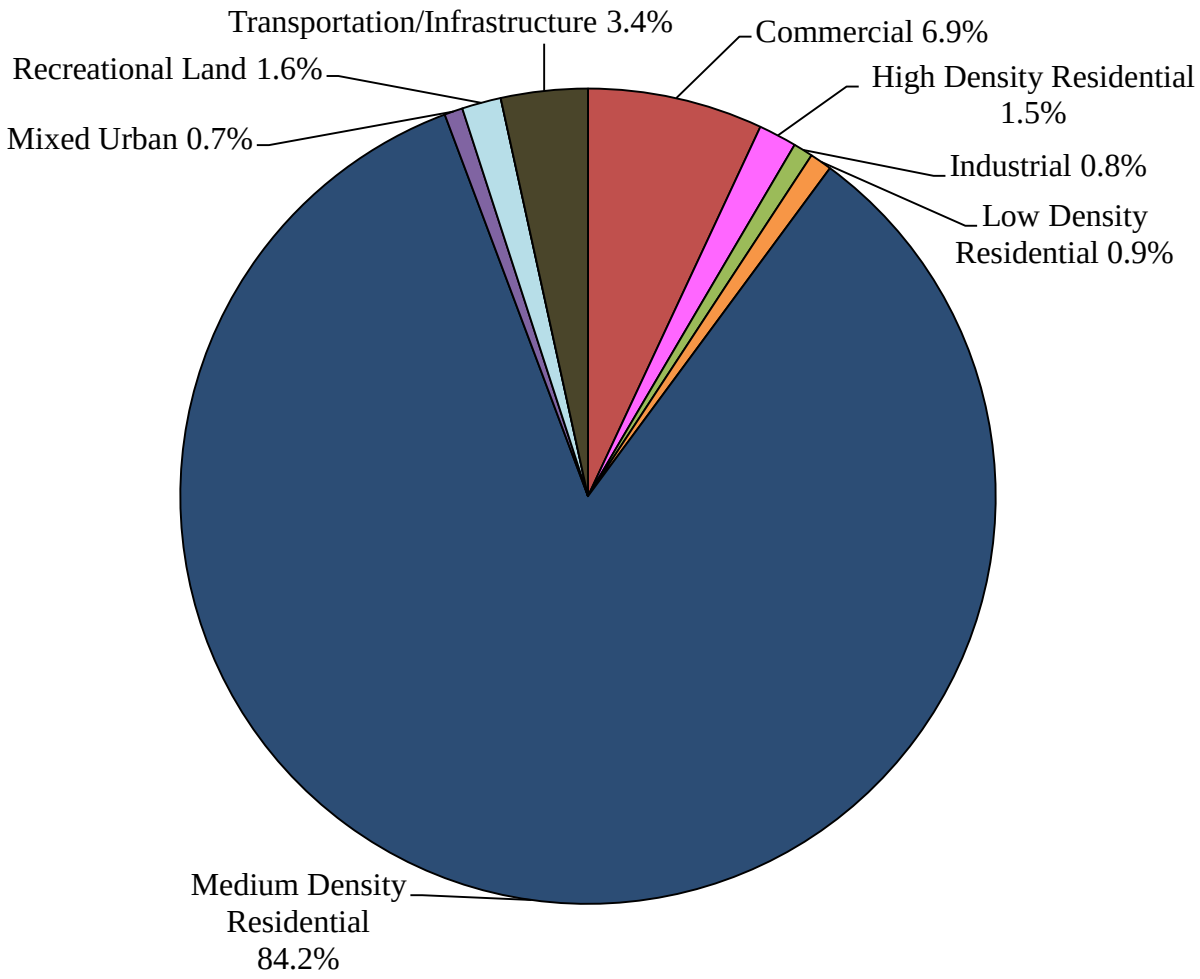


Figure 3: Pie chart illustrating the various types of urban land use in Fanwood Borough

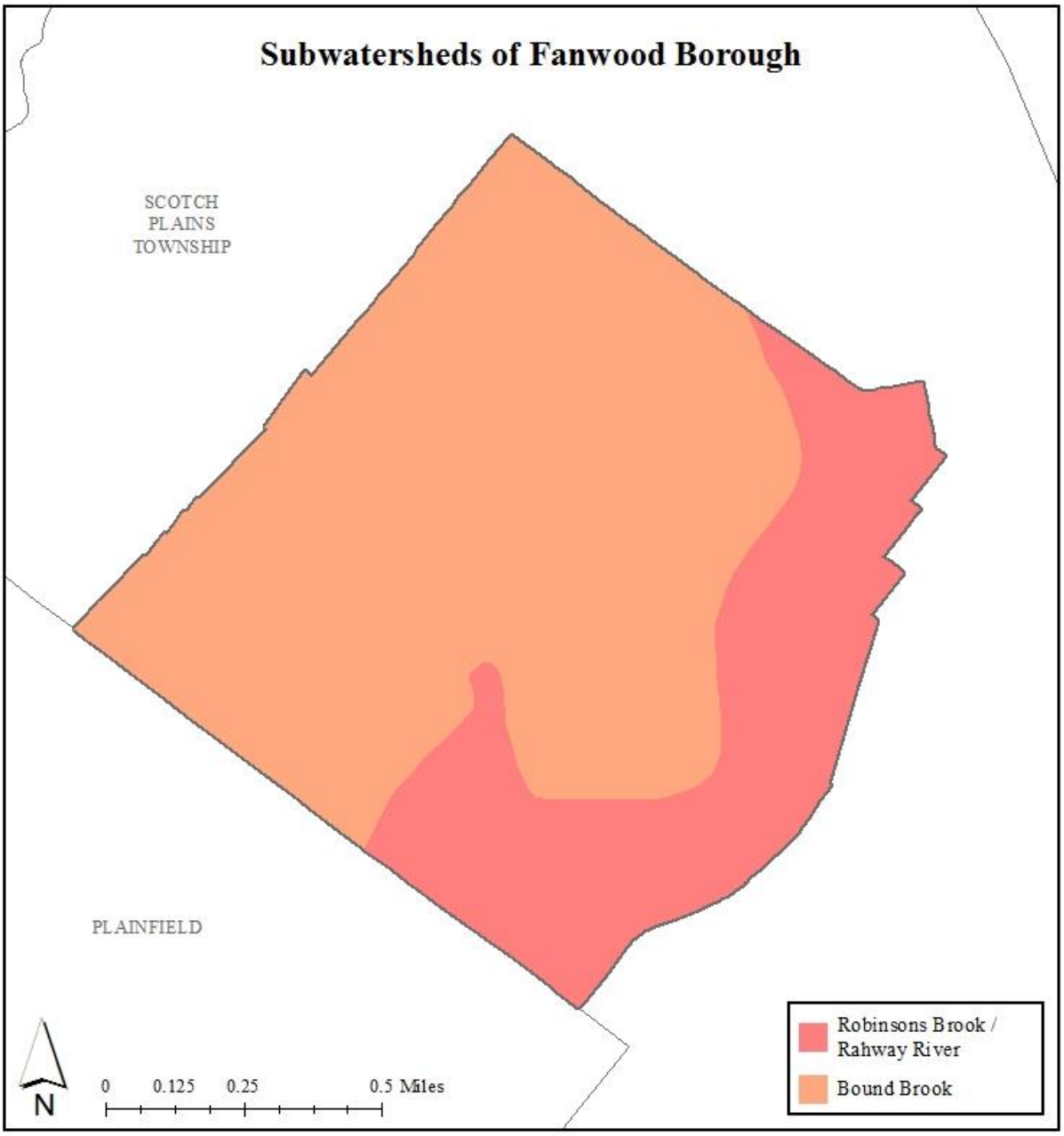


Figure 4: Map of the subwatersheds in Fanwood Borough

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

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

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

Table 1: Aerial Loading Coefficients[2]

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

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

Green Infrastructure Practices

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

Disconnected downspouts

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

Pervious pavements

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




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

Bioretention systems/rain gardens

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

Downspout planter boxes

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

Rainwater harvesting systems (cistern or rain barrel)

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

Bioswale

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

Stormwater planters

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

Tree filter boxes

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

Potential Project Sites

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

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

Conclusion

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

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

a. Overview Map of the Project

FANWOOD BOROUGH: CLIMATE RESILIENT GREEN INFRASTRUCTURE FOR THE RARITAN BASIN

b. Green Infrastructure Sites

FANWOOD: GREEN INFRASTRUCTURE SITES

SITES WITHIN THE BOUND BROOK SUBWATERSHED:

1. A&P Supermarket
2. Chelsea Senior Living
3. Dhammakaya Meditation Center
4. Fanwood Borough Hall and Rescue Squad
5. Fanwood NJ Transit
6. Fanwood Presbyterian Church
7. Forest Road Park
8. La Grande Park
9. Shopping Plaza

SITES WITHIN THE RAHWAY RIVER ROBINSONS BRANCH SUBWATERSHED:

10. Memorial Funeral Home
11. Woodside Chapel

c. Proposed Green Infrastructure Concepts

A&P SUPERMARKET

Subwatershed: **Bound Brook**

Site Area: **100,907 sq. ft.**

Address: **105 South Avenue**
Fanwood, NJ 07023

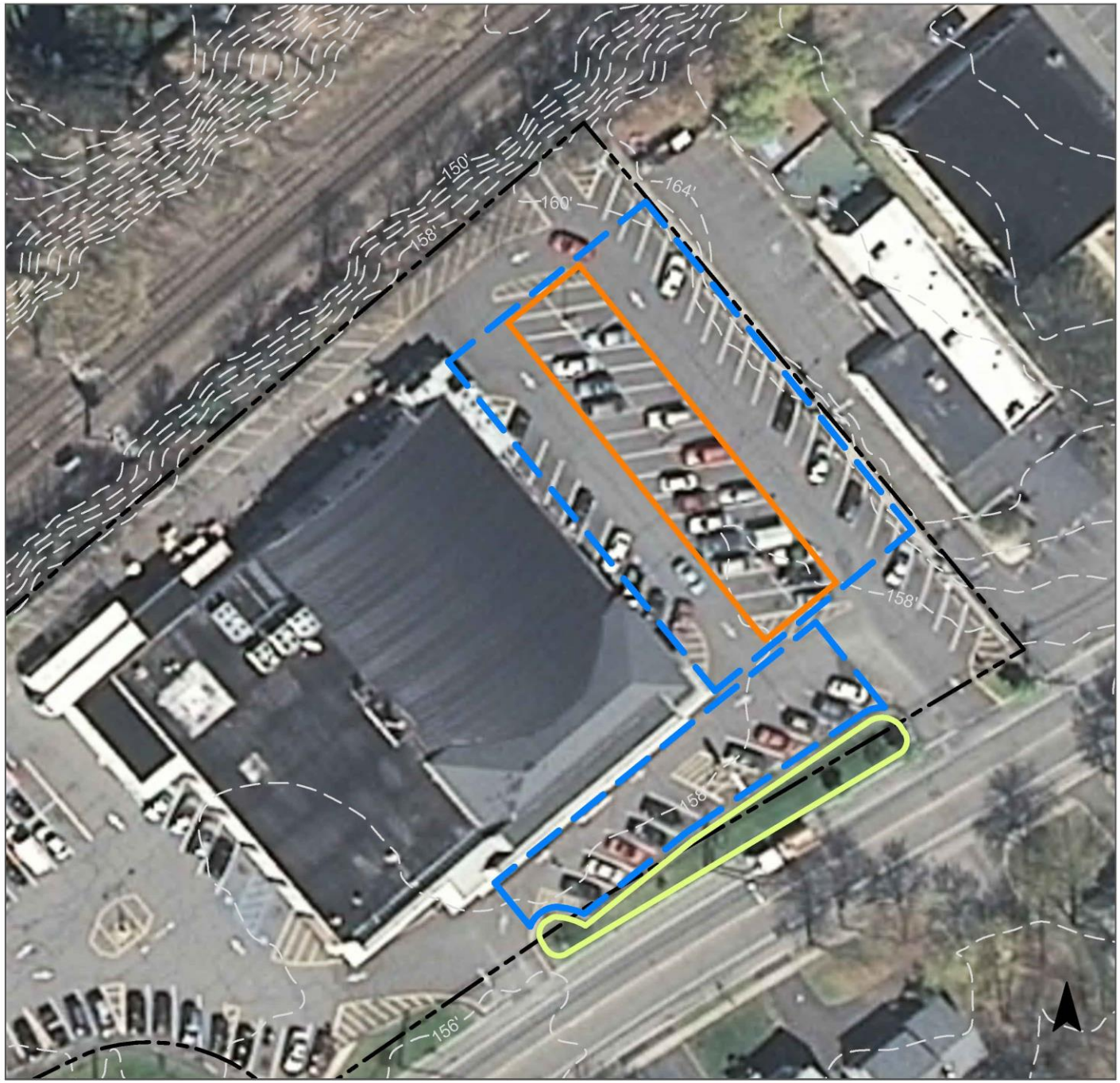
Block and Lot: **Block 55, Lot 12**

Parking spaces can be replaced with porous asphalt to infiltrate stormwater. A rain garden can also be installed in the turf grass island south of the store to capture, treat and infiltrate parking lot runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
90	90,816	4.4	45.9	417.0	0.071	2.49

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.141	24	10,681	0.40	2,080	$10,400
Pervious pavements	0.434	73	32,860	1.23	5,772	$144,300

GREEN INFRASTRUCTURE RECOMMENDATIONS



A&P Supermarket

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

0 30' 60'

CHELSEA SENIOR LIVING

Subwatershed: **Bound Brook**

Site Area: **85,867 sq. ft.**

Address: **295 South Avenue**
Fanwood, NJ 07023

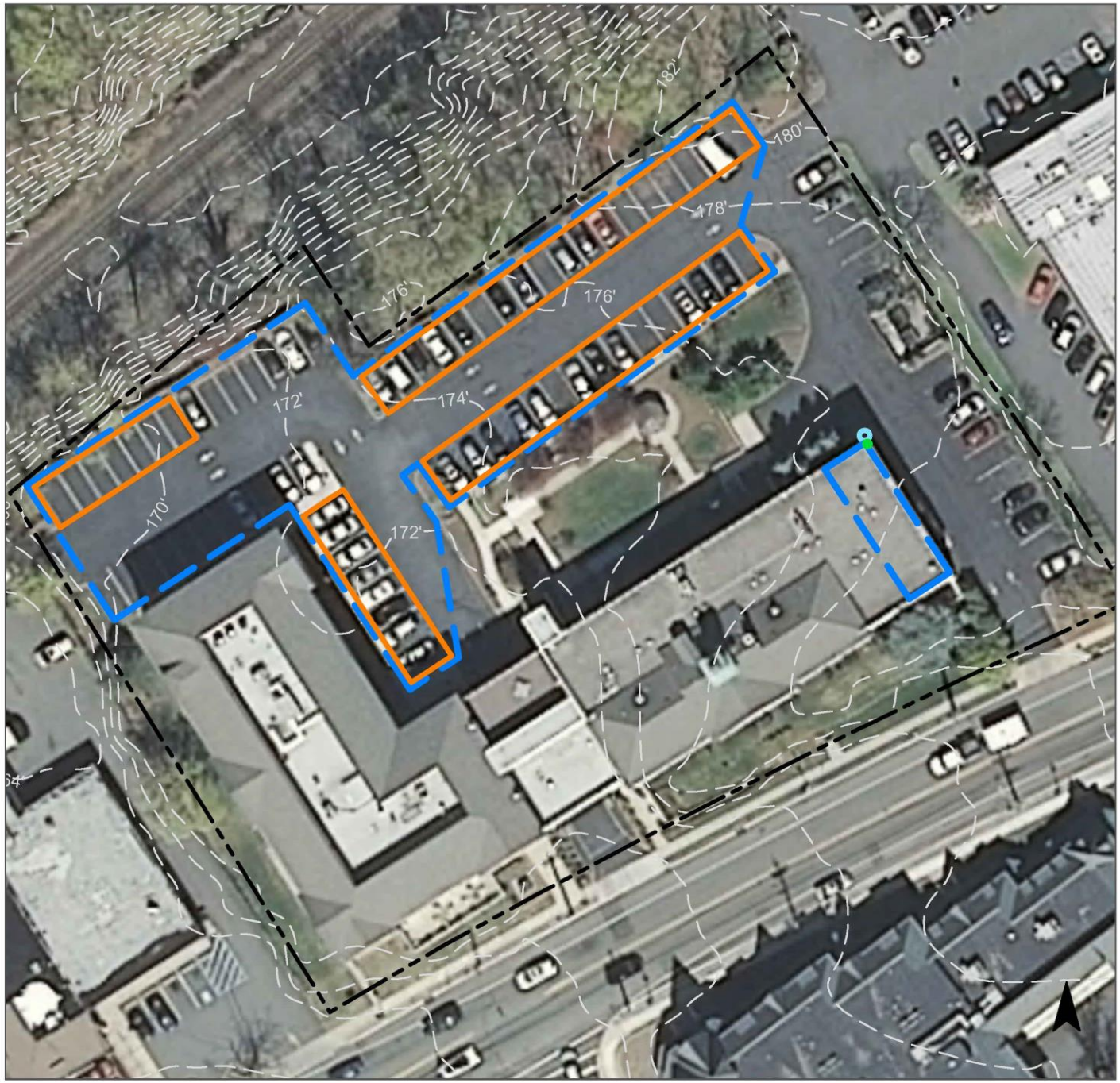
Block and Lot: **Block 66, Lot 6**

Parking spaces can be repaved with porous asphalt to reduce impervious cover and infiltrate stormwater. A downspout at the east corner of the building can also be disconnected into a cistern to harvest rainwater that the residents can use for watering the existing plants. 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"
88	75,602	3.6	38.2	347.1	0.059	2.07

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
Pervious pavements	0.589	99	44,633	1.68	8,857	$221,425
Rainwater harvesting systems	0.030	5	1,080	0.09	1,080 (gal)	$2,160

GREEN INFRASTRUCTURE RECOMMENDATIONS



Chelsea Senior Living

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

0 30' 60'

DHAMMAKAYA MEDITATION CENTER

Subwatershed: **Bound Brook**

Site Area: **18,077 sq. ft.**

Address: **257 Midway Avenue**
Fanwood, NJ 07023

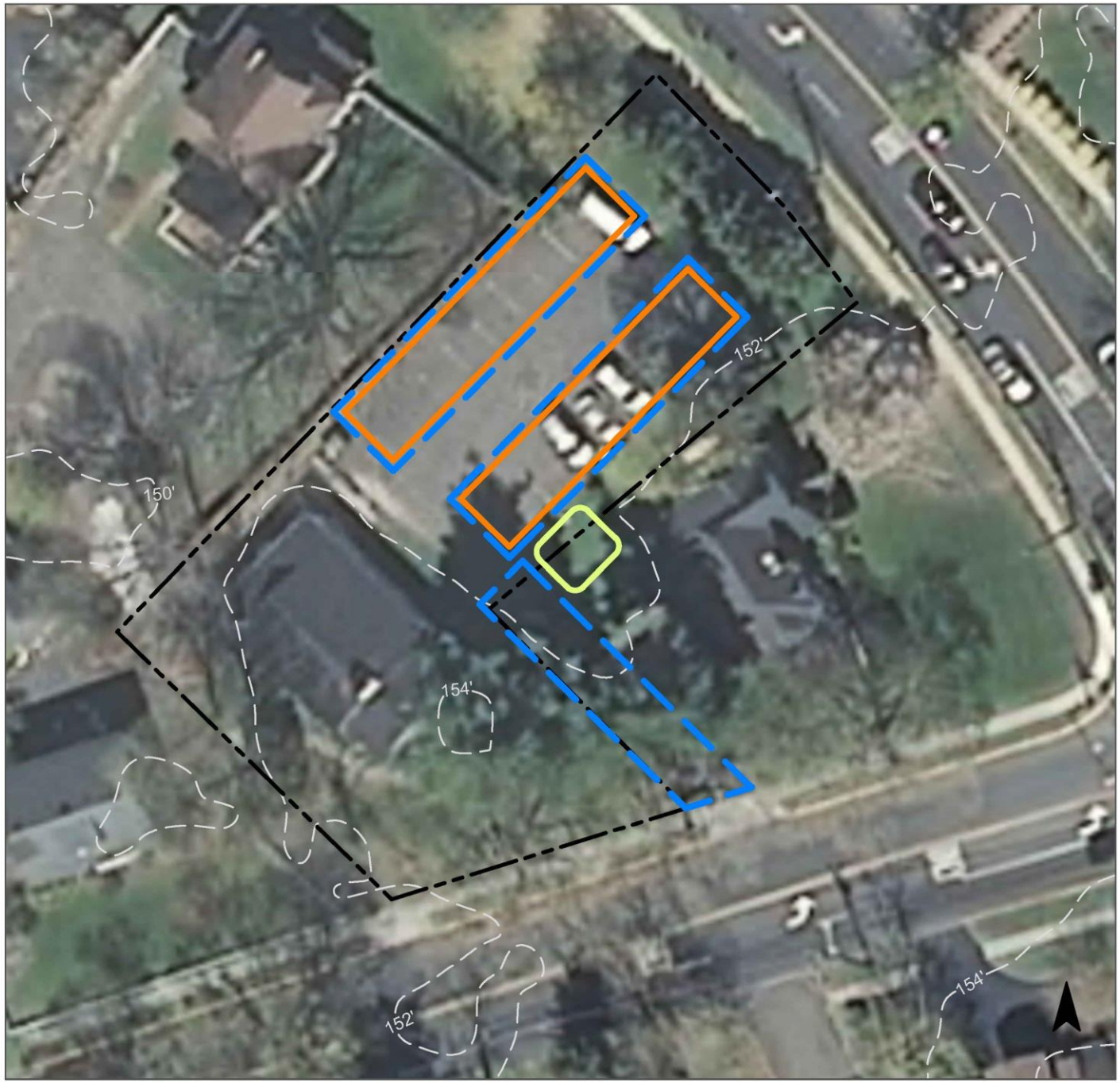
Block and Lot: **Block 10, Lot 24**

Parking spaces can be replaced with pervious pavement to infiltrate runoff. A rain garden can also capture, treat and infiltrate stormwater. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
68	12,242	0.6	6.2	56.2	0.010	0.34

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.033	6	2,536	0.10	280	$1,400
Pervious pavements	0.102	17	7,757	0.29	3,900	$97,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Dhammakaya Meditation Center

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

0 20' 40'

FANWOOD BOROUGH HALL & RESCUE SQUAD

Subwatershed: **Bound Brook**

Site Area: **210,459 sq. ft.**

Address: **75 North Martine Avenue**
Fanwood, NJ 07023

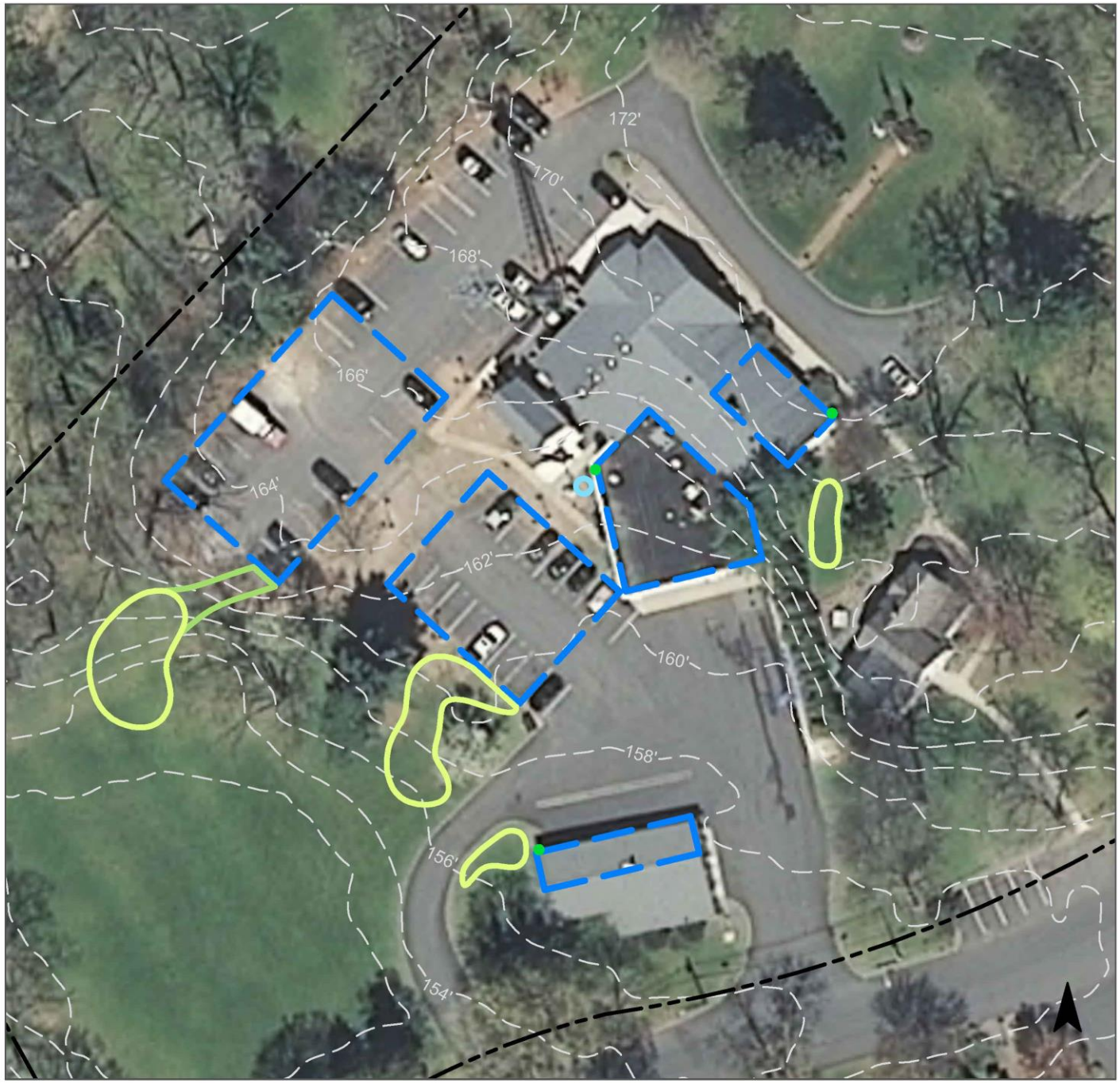
Block and Lot: **Block 32, Lot 4**

A bioswale and rain gardens can capture, treat and infiltrate parking lot and roof runoff. On the southwest side of the main building, a downspout that drains into a catch basin can also be redirected into a cistern. The harvested rainwater can be used for washing emergency vehicles. 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"
33	70,338	3.4	35.5	322.9	0.055	1.93

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	0.280	47	21,183	0.80	3,296	$16,480
Bioswales	0.034	6	2,566	0.10	413	$2,065
Rainwater harvesting systems	0.073	12	2,618	0.21	2,618 (gal)	$5,236

GREEN INFRASTRUCTURE RECOMMENDATIONS



Fanwood Borough Hall & Rescue Squad

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

0 30' 60'

FANWOOD NJ TRANSIT

Subwatershed: **Bound Brook**

Site Area: **255,085 sq. ft.**

Address: **233 South Avenue**
Fanwood, NJ 07023

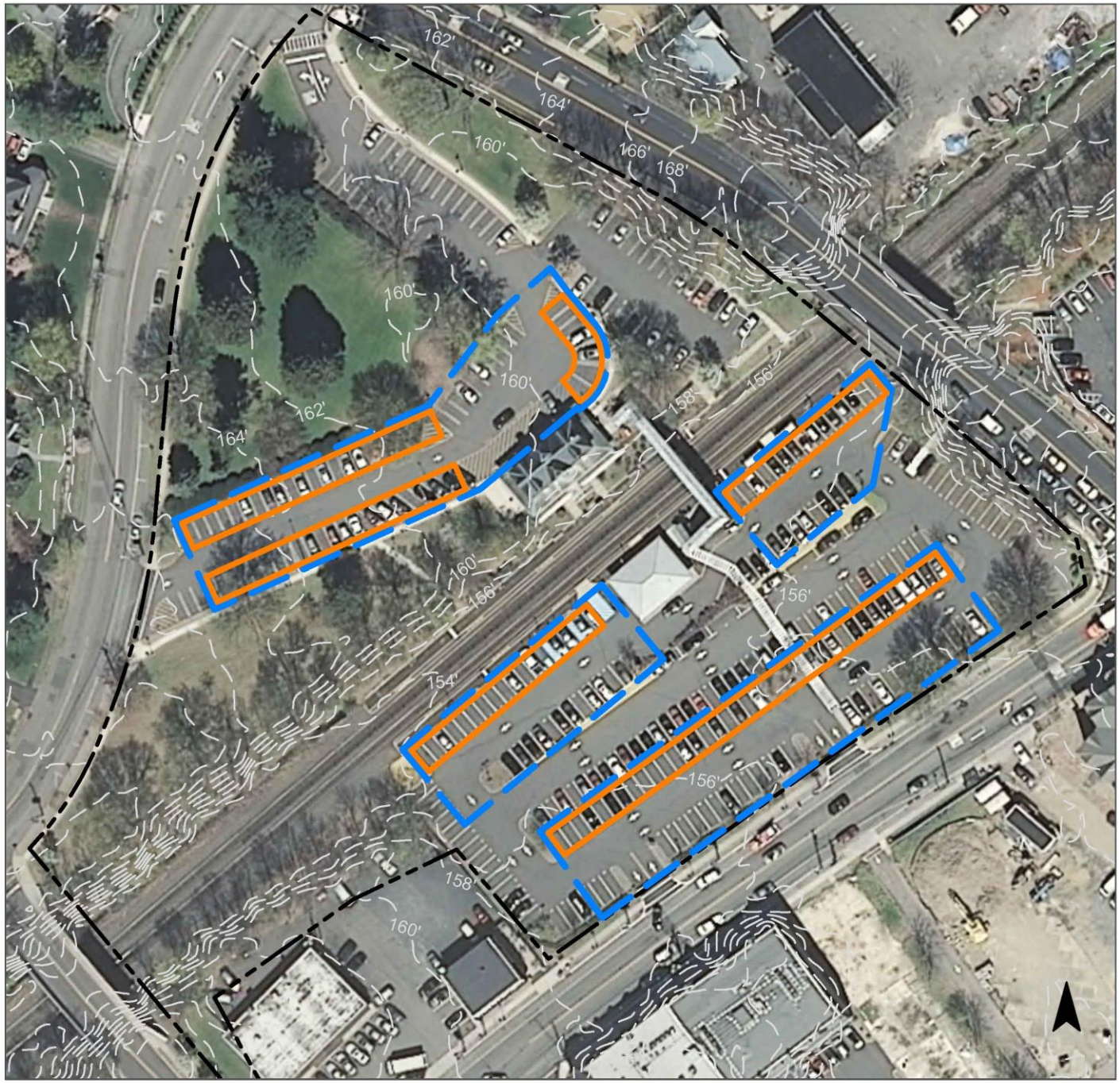
Block and Lot: **Blocks 62, Lot 2**

The driveway and parking lot are pitched toward several catch basins draining to local waterways. Parking spaces can be repaved with porous asphalt to promote stormwater infiltration in the parking lots on either side of the train tracks. 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"
68	172,983	8.3	87.4	794.2	0.135	4.74

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
Pervious pavements	1.598	268	121,079	4.55	18,220	$455,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Fanwood NJ Transit

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

0 50' 100'

FANWOOD PRESBYTERIAN CHURCH

Subwatershed: **Bound Brook**

Site Area: **87,059 sq. ft.**

Address: **74 S Martine Avenue**
Fanwood, NJ 07023

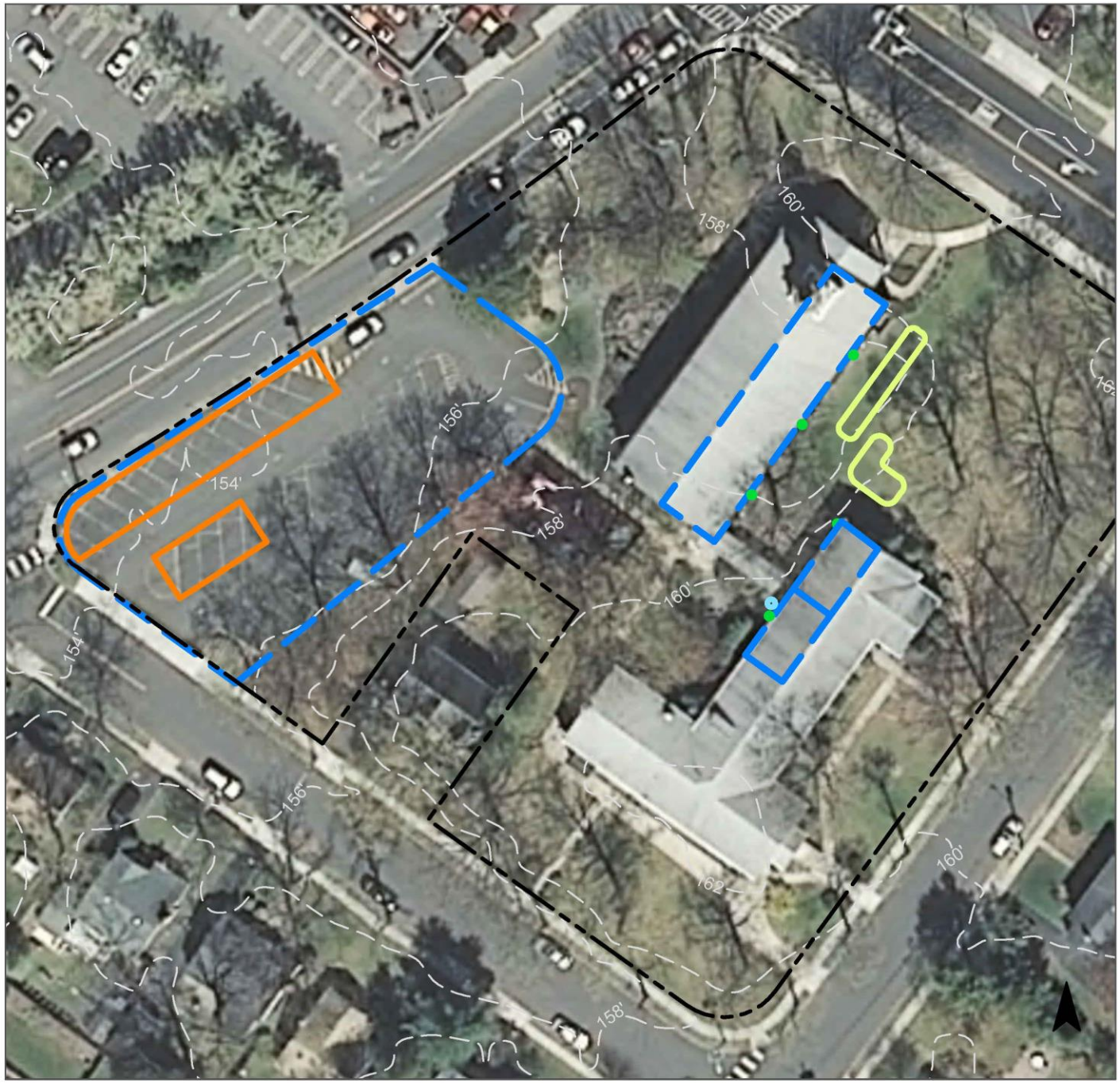
Block and Lot: **Block 87, Lot 2**

Parking spaces can be replaced with porous asphalt to infiltrate stormwater. Rain gardens can capture, treat and infiltrate roof runoff. Additional roof runoff can be harvested with a cistern to water the landscaping around the property. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
90	78,353	3.8	39.6	359.7	0.061	2.15

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	0.091	15	6,934	0.26	717	$3,585
Pervious pavements	0.418	70	31,640	1.19	3,010	$75,250
Rainwater harvesting systems	0.015	3	542	0.04	542 (gal)	$1,085

GREEN INFRASTRUCTURE RECOMMENDATIONS



Fanwood Presbyterian Church

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

0 30' 60'

FOREST ROAD PARK

Subwatershed: **Bound Brook**

Site Area: **316,500 sq. ft.**

Address: **158 Forest Road**
Fanwood, NJ 07023

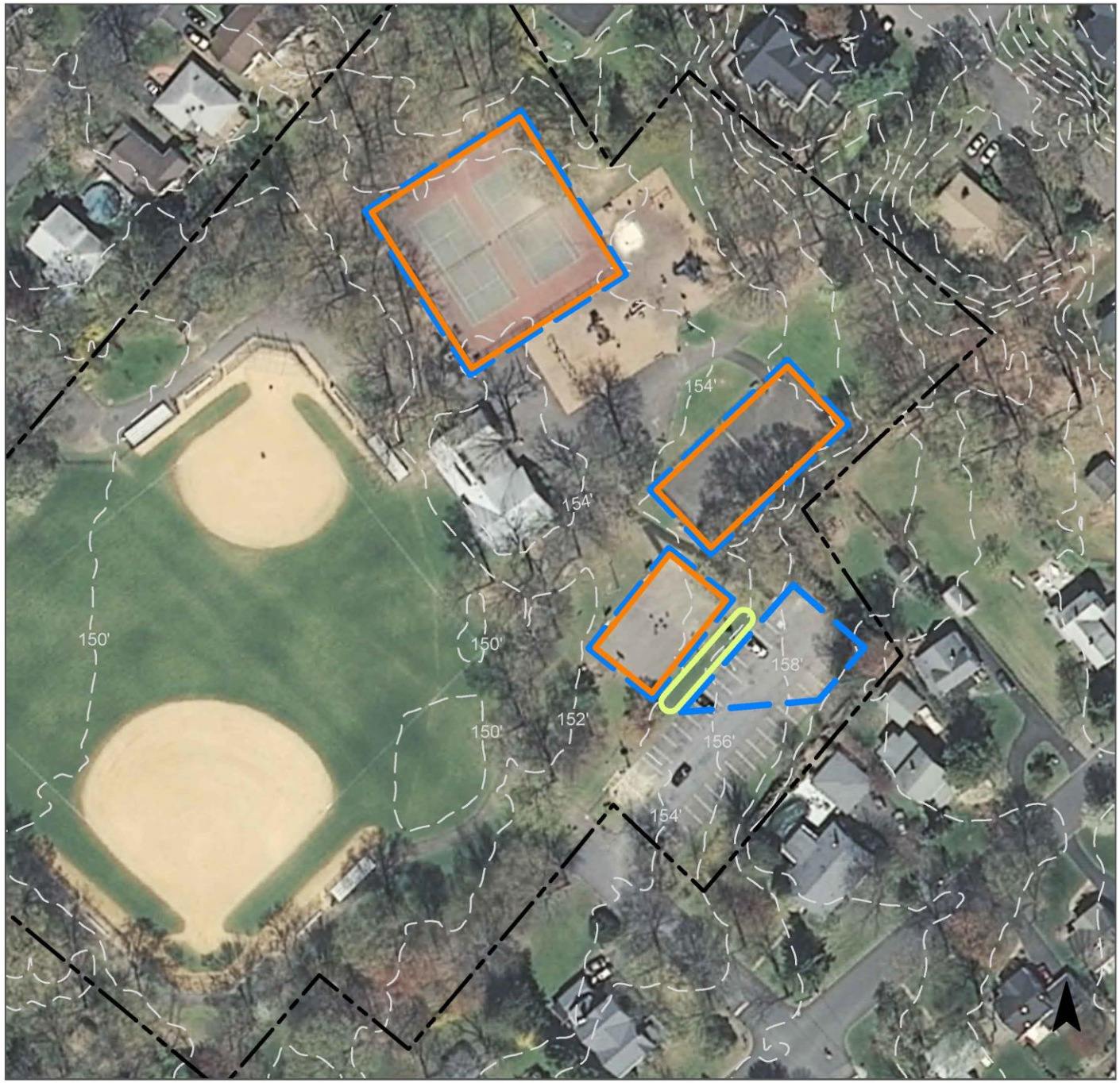
Block and Lot: **Block 15, Lot 8**

Play courts can be converted into pervious pavements to infiltrate stormwater. A rain garden can also capture, treat and infiltrate parking lot runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
21	66,072	3.2	33.4	303.4	0.051	1.81

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	0.128	21	9,672	0.36	1,000	$5,000
Pervious pavements	0.622	104	47,117	1.77	23,800	$595,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Forest Road Park

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

0 50' 100'

LA GRANDE PARK

Subwatershed: **Bound Brook**

Site Area: **351,929 sq. ft.**

Address: **130-140 La Grande Avenue**
Fanwood, NJ 07023

Block and Lot: **Block 83, Lot 7**

Gutters and downspouts can be installed on the pavilion at the center of the park. A bioretention system can then be installed in the adjacent turf grass to capture, treat, and infiltrate 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"
35	123,229	5.9	62.2	565.8	0.096	3.38

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	0.033	5	2,491	0.09	120	$600

GREEN INFRASTRUCTURE RECOMMENDATIONS

La Grande Park

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

0 25' 50'

SHOPPING PLAZA

Subwatershed: **Bound Brook**

Site Area: **25,981 sq. ft.**

Address: **265 South Avenue**
Fanwood, NJ 07023

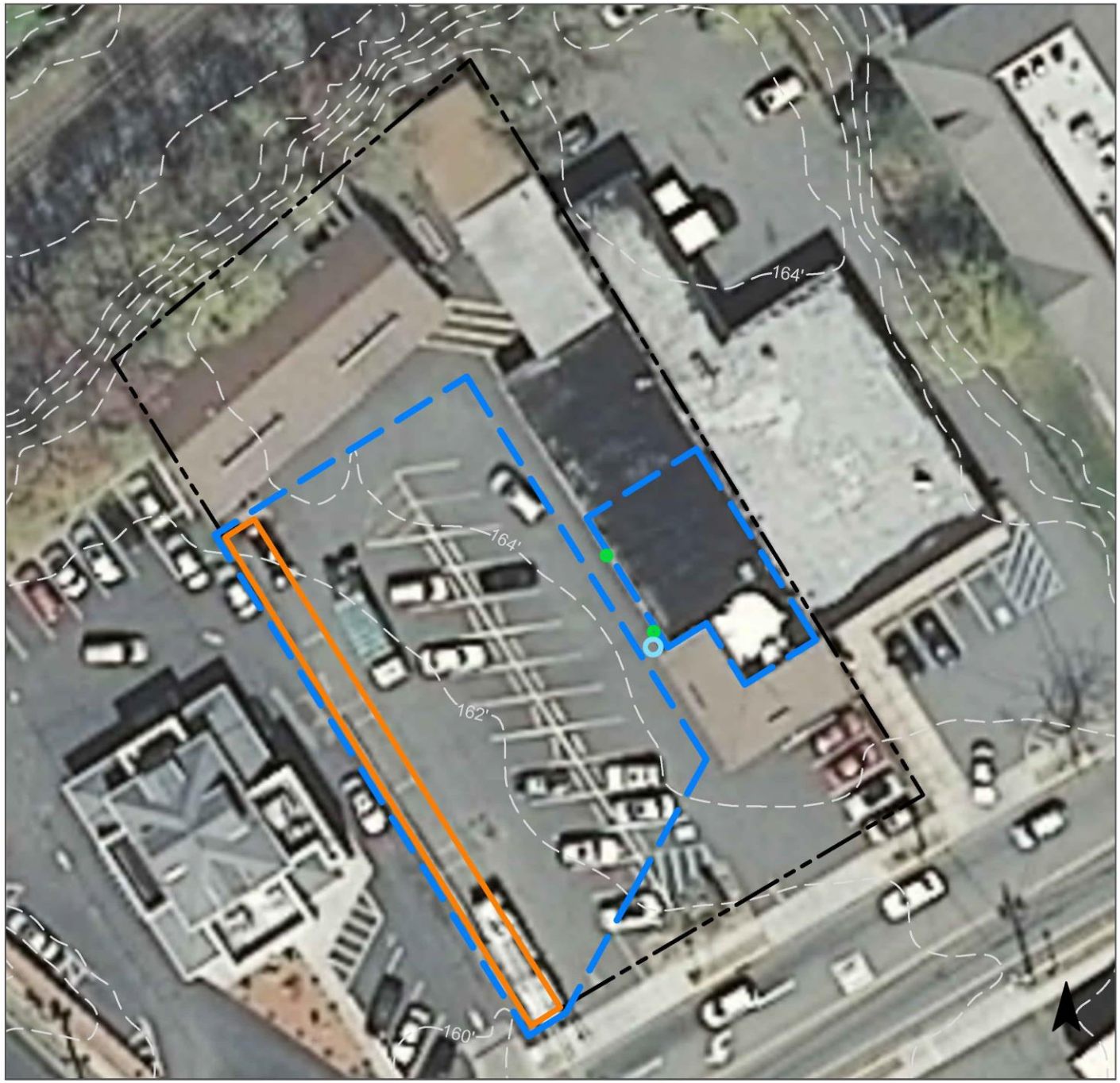
Block and Lot: **Block 66, Lot 2**

The parking lot is pitched toward the southwest end of the site. The parking spaces at this end can be repaved with porous asphalt to capture stormwater runoff. Roof runoff from the florist shop on the east side of the property can be harvested to water the plants displayed outside the shop by installing a cistern or rain barrel. 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	22,573	1.1	11.4	103.6	0.018	0.62

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.277	46	20,974	0.79	1,360	$34,000
Rainwater harvesting systems	0.046	8	1,664	0.13	1,664 (gal)	$3,329

GREEN INFRASTRUCTURE RECOMMENDATIONS



Shopping Plaza

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

0 20' 40'

MEMORIAL FUNERAL HOME

Subwatershed: Rahway River
Robinsons Branch

Site Area: 59,290 sq. ft.

Address: 155 South Avenue
Fanwood, NJ 07023

Block and Lot: Block 55, Lot 15

The parking lot is pitched toward the center. Parking spaces in the center of the lot can be repaved with porous asphalt to help manage stormwater. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
90	53,361	2.6	27.0	245.0	0.042	1.46

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.611	102	46,309	1.74	6,400	$160,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Memorial Funeral Home

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

0 20' 40'

WOODSIDE CHAPEL

Subwatershed: Rahway River Robinsons Branch

Site Area: 68,680 sq. ft.

Address: 5 Morse Avenue
Fanwood, NJ 07023

Block and Lot: Block 75, Lot 1

Downspouts on the northeast side of the building are already disconnected into adjacent lawn. On the northwest side, a rain garden could be installed where a catch basin is currently located, in order to capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
64	43,834	2.1	22.1	201.3	0.034	1.20

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.036	6	2,723	0.10	370	$1,850

GREEN INFRASTRUCTURE RECOMMENDATIONS

Woodside Chapel

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

0 30' 60'

d. Summary of Existing Conditions

Summary of Existing Site Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	Existing Annual Loads TN (lb/yr)	Existing Annual Loads TSS (lb/yr)	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Runoff Volumes from I.C. Water Quality Storm (1.25" over 2-hours) (Mgal)	Runoff Volumes from I.C. Annual (Mgal)
BOUND BROOK SUBWATERSHED	**33.33**	**1,451,863**			**34.3**	**359.7**	**3,270.0**		**16.35**	**712,208**	**0.555**	**19.53**
A&P Supermarket												
Total Site Info	2.32	100,907	55	12	4.4	45.9	417.0	90	2.08	90,816	0.071	2.49
Chelsea Senior Living												
Total Site Info	1.97	85,867	66	6	3.6	38.2	347.1	88	1.74	75,602	0.059	2.07
Dhammakaya Meditation Center												
Total Site Info	0.41	18,077	10	24	0.6	6.2	56.2	68	0.28	12,242	0.010	0.34
Fanwood Borough Hall & Rescue Squad												
Total Site Info	4.83	210,459	32	4	3.4	35.5	322.9	33	1.61	70,338	0.055	1.93
Fanwood NJ Transit												
Total Site Info	5.86	255,085	62	2	8.3	87.4	794.2	68	3.97	172,983	0.135	4.74
Fanwood Presbyterian Church												
Total Site Info	2.00	87,059	87	2	3.8	39.6	359.7	90	1.80	78,353	0.061	2.15
Forest Road Park												
Total Site Info	7.27	316,500	15	8	3.2	33.4	303.4	21	1.52	66,072	0.051	1.81
La Grande Park												
Total Site Info	8.08	351,929	83	7	5.9	62.2	565.8	35	2.83	123,229	0.096	3.38
Shopping Plaza												
Total Site Info	0.60	25,981	66	2	1.1	11.4	103.6	87	0.52	22,573	0.018	0.62
RAHWAY RIVER ROBINSONS BRANCH SUBWATERSHED	**2.94**	**127,971**			**4.7**	**49.1**	**446.3**		**2.23**	**97,195**	**0.076**	**2.67**
Memorial Funeral Home												
Total Site Info	1.36	59,290	55	15	2.6	27.0	245.0	90	1.23	53,361	0.042	1.46
Woodside Chapel												
Total Site Info	1.58	68,680	75	1	2.1	22.1	201.3	64	1.01	43,834	0.034	1.20

e. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential	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)	(SF)	($)		($)	%
	BOUND BROOK SUBWATERSHED	**189,755**	**4.36**	**4.944**	**828**	**368,027**	**14.08**	**78,742**			**$1,674,314**	**26.6%**
1	**A&P Supermarket**											
	Bioretention systems/rain gardens	5,413	0.12	0.141	24	10,681	0.40	2,080	5	SF	$10,400	6.0%
	Pervious pavements	16,646	0.38	0.434	73	32,860	1.23	5,772	25	SF	$144,300	18.3%
	Total Site Info	**22,059**	**0.51**	**0.575**	**96**	**43,541**	**1.63**	**7,852**			**$154,700**	**24.3%**
2	**Chelsea Senior Living**											
	Pervious pavements	22,610	0.52	0.589	99	44,633	1.68	8,857	25	SF	$221,425	29.9%
	Rainwater harvesting systems	1,155	0.03	0.030	5	1,080	0.09	1,080	2	gal	$2,160	1.5%
	Total Site Info	**23,765**	**0.55**	**0.619**	**104**	**45,713**	**1.77**	**9,937**			**$223,585**	**31.4%**
3	**Dhammakaya Meditation Center**											
	Bioretention systems/rain gardens	1,283	0.03	0.033	6	2,536	0.10	280	5	SF	$1,400	10.5%
	Pervious pavements	3,930	0.09	0.102	17	7,757	0.29	3,900	25	SF	$97,500	32.1%
	Total Site Info	**5,213**	**0.12**	**0.136**	**23**	**10,293**	**0.39**	**4,180**			**$98,900**	**42.6%**
4	**Fanwood Borough Hall & Rescue Squad**											
	Bioretention systems/rain gardens	10,731	0.25	0.280	47	21,183	0.80	3,296	5	SF	$16,480	15.3%
	Bioswales	1,299	0.03	0.034	6	2,566	0.10	413	5	SF	$2,065	1.8%
	Rainwater harvesting systems	2,800	0.06	0.073	12	2,618	0.21	2,618	2	gal	$5,236	3.1%
	Total Site Info	**14,830**	**0.34**	**0.386**	**65**	**26,367**	**1.11**	**6,339**			**$23,781**	**20.2%**
5	**Fanwood NJ Transit**											
	Pervious pavements	61,339	1.41	1.598	268	121,079	4.55	18,220	25	SF	$455,500	35.5%
	Total Site Info	**61,339**	**1.41**	**1.598**	**268**	**121,079**	**4.55**	**18,220**			**$455,500**	**35.5%**
6	**Fanwood Presbyterian Church**											
	Bioretention systems/rain gardens	3,511	0.08	0.091	15	6,934	0.26	717	5	SF	$3,585	4.5%
	Pervious pavements	16,027	0.37	0.418	70	31,640	1.19	3,010	25	SF	$75,250	20.5%
	Rainwater harvesting systems	580	0.01	0.015	3	542	0.04	542	2	gal	$1,085	0.7%
	Total Site Info	**20,118**	**0.46**	**0.524**	**88**	**39,116**	**1.49**	**4,269**			**$79,920**	**25.7%**
7	**Forest Road Park**											
	Bioretention systems/rain gardens	4,898	0.11	0.128	21	9,672	0.36	1,000	5	SF	$5,000	0.7%
	Pervious pavements	23,868	0.55	0.622	104	47,117	1.77	23,800	25	SF	$595,000	36.1%
	Total Site Info	**28,766**	**0.66**	**0.750**	**125**	**56,789**	**2.13**	**24,800**			**$600,000**	**43.5%**

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)	(SF)	($)		($)	%
8	**La Grande Park**											
	Bioretention systems/rain gardens	1,260	0.03	0.033	5	2,491	0.09	120	5	SF	$600	1.0%
	Total Site Info	**1,260**	**0.03**	**0.033**	**5**	**2,491**	**0.09**	**120**			**$600**	**1.0%**
9	**Shopping Plaza**											
	Pervious pavements	10,625	0.24	0.277	46	20,974	0.79	1,360	25	SF	$34,000	47.1%
	Rainwater harvesting systems	1,780	0.04	0.046	8	1,664	0.13	1,664	2	gal	$3,329	7.9%
	Total Site Info	**12,405**	**0.28**	**0.323**	**54**	**22,638**	**0.92**	**3,024**			**$37,329**	**55.0%**
	RAHWAY RIVER ROBINSONS BRANCH SUBWATERSHED	**24,840**	**0.57**	**0.647**	**108**	**49,032**	**1.84**	**6,770**			**$161,850**	**25.6%**
10	**Memorial Funeral Home**											
	Pervious pavements	23,460	0.54	0.611	102	46,309	1.74	6,400	25	SF	$160,000	44.0%
	Total Site Info	**23,460**	**0.54**	**0.611**	**102**	**46,309**	**1.74**	**6,400**			**$160,000**	**44.0%**
11	**Woodside Chapel**											
	Bioretention systems/rain gardens	1,380	0.03	0.036	6	2,723	0.10	370	5	SF	$1,850	3.1%
	Total Site Info	**1,380**	**0.03**	**0.036**	**6**	**2,723**	**0.10**	**370**			**$1,850**	**3.1%**