



**Draft**

**Impervious Cover Reduction Action Plan  
for  
Ocean Township, Monmouth, New Jersey**

*Prepared for Ocean Township by the  
Rutgers Cooperative Extension Water Resources Program*

February 10, 2016



## Table of Contents

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

### Attachment: 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 Monmouth County in east central New Jersey, Ocean Township covers approximately 11 square miles northwest of Asbury Park. Figures 1 and 2 illustrate that Ocean Township is dominated by urban land uses. A total of 75.0% of the municipality's land use is classified as urban. Of the urban land in Ocean Township, 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 Ocean Township 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 Ocean Township. Based upon the 2007 NJDEP land use/land cover data, approximately 26.9% of Ocean Township has impervious cover. This level of impervious cover suggests that the streams in Ocean Township are likely non-supporting streams.<sup>1</sup>

## **Methodology**

Ocean Township contains portions of four 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.

---

<sup>1</sup> 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

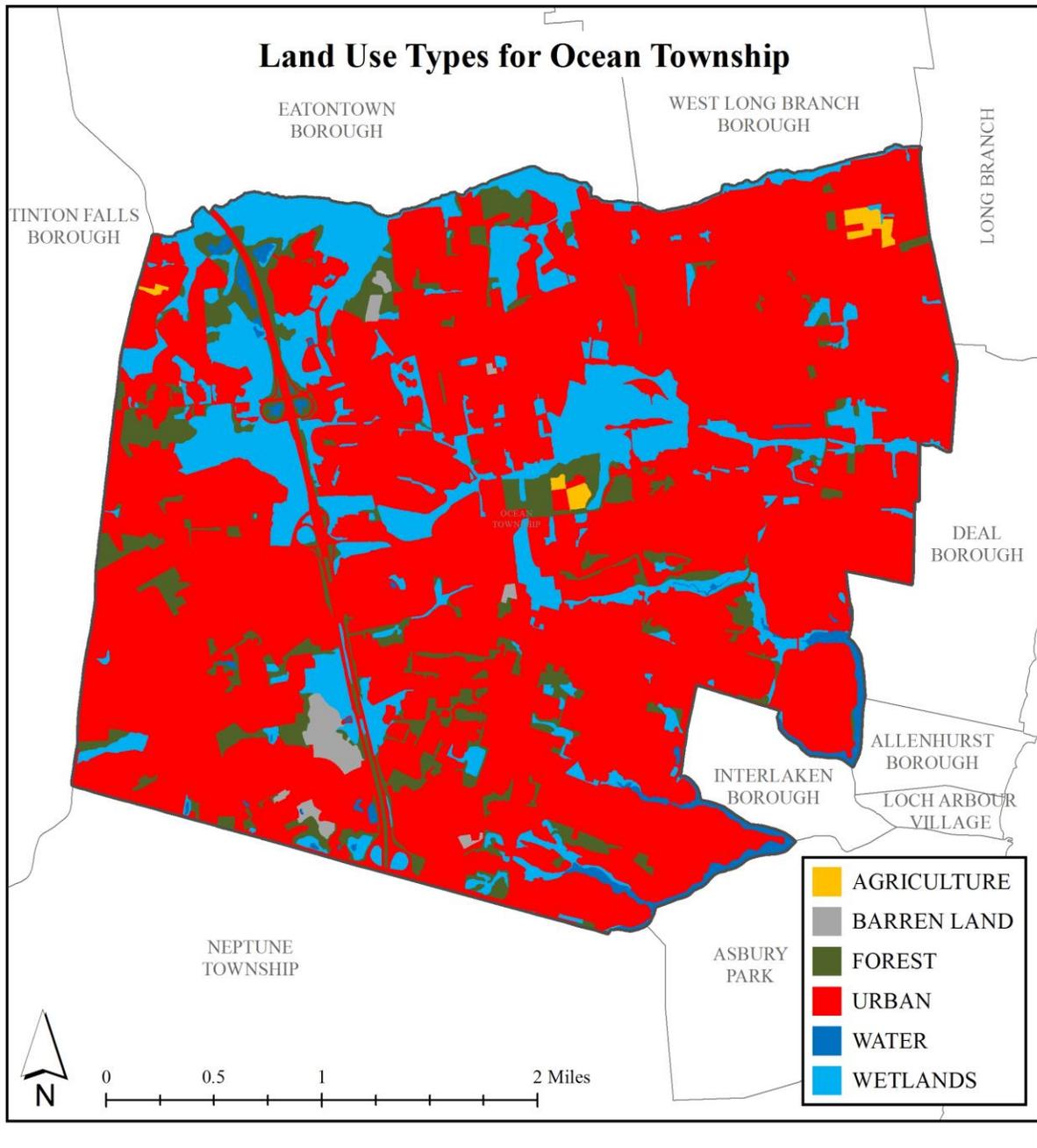


Figure 1: Map illustrating the land use in Ocean Township

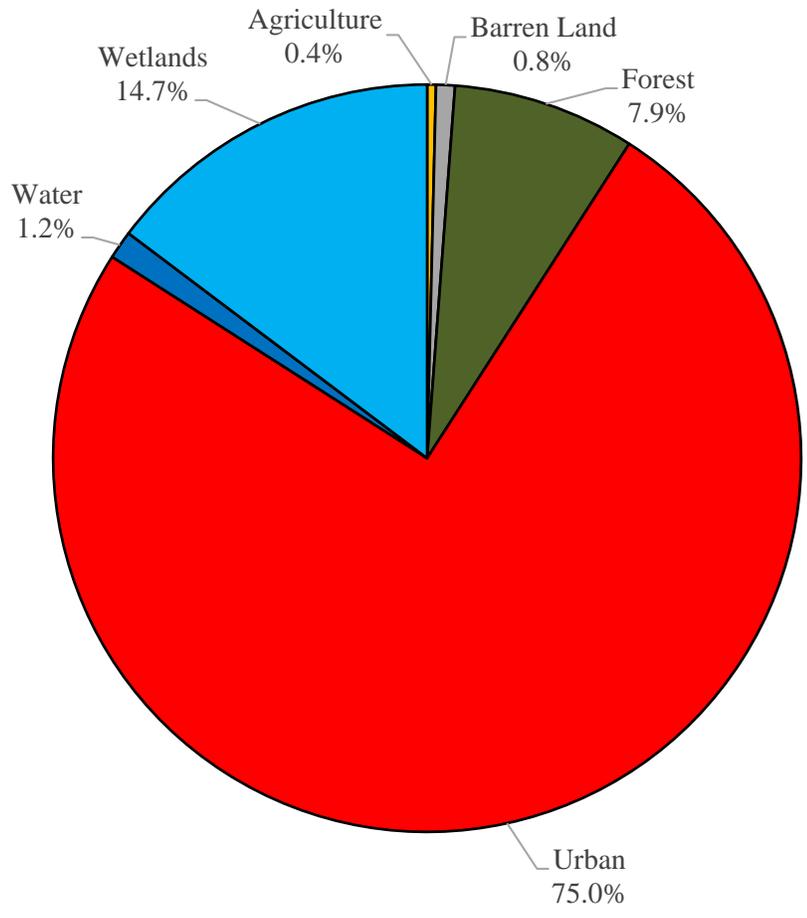


Figure 2: Pie chart illustrating the land use in Ocean Township

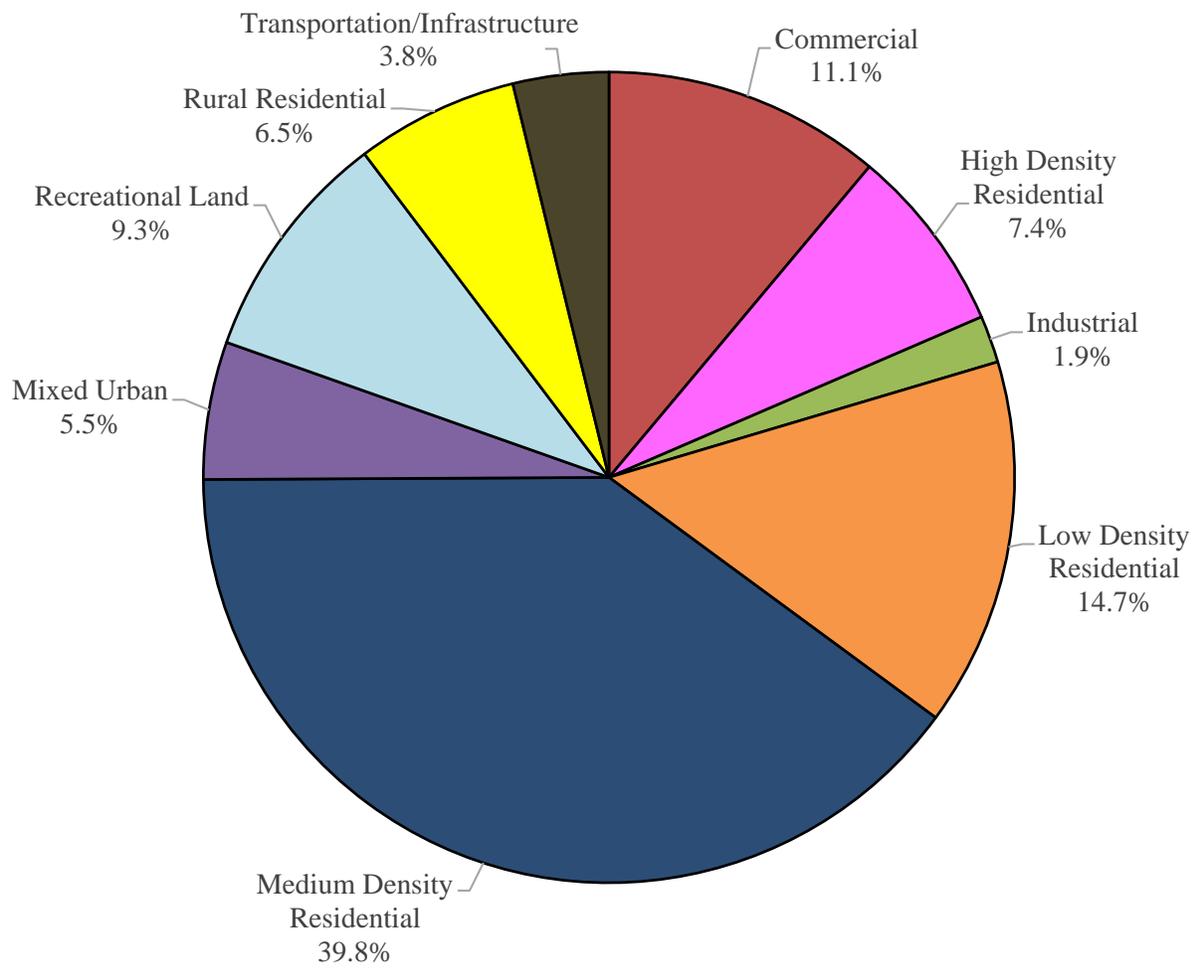


Figure 3: Pie chart illustrating the various types of urban land use in Ocean Township

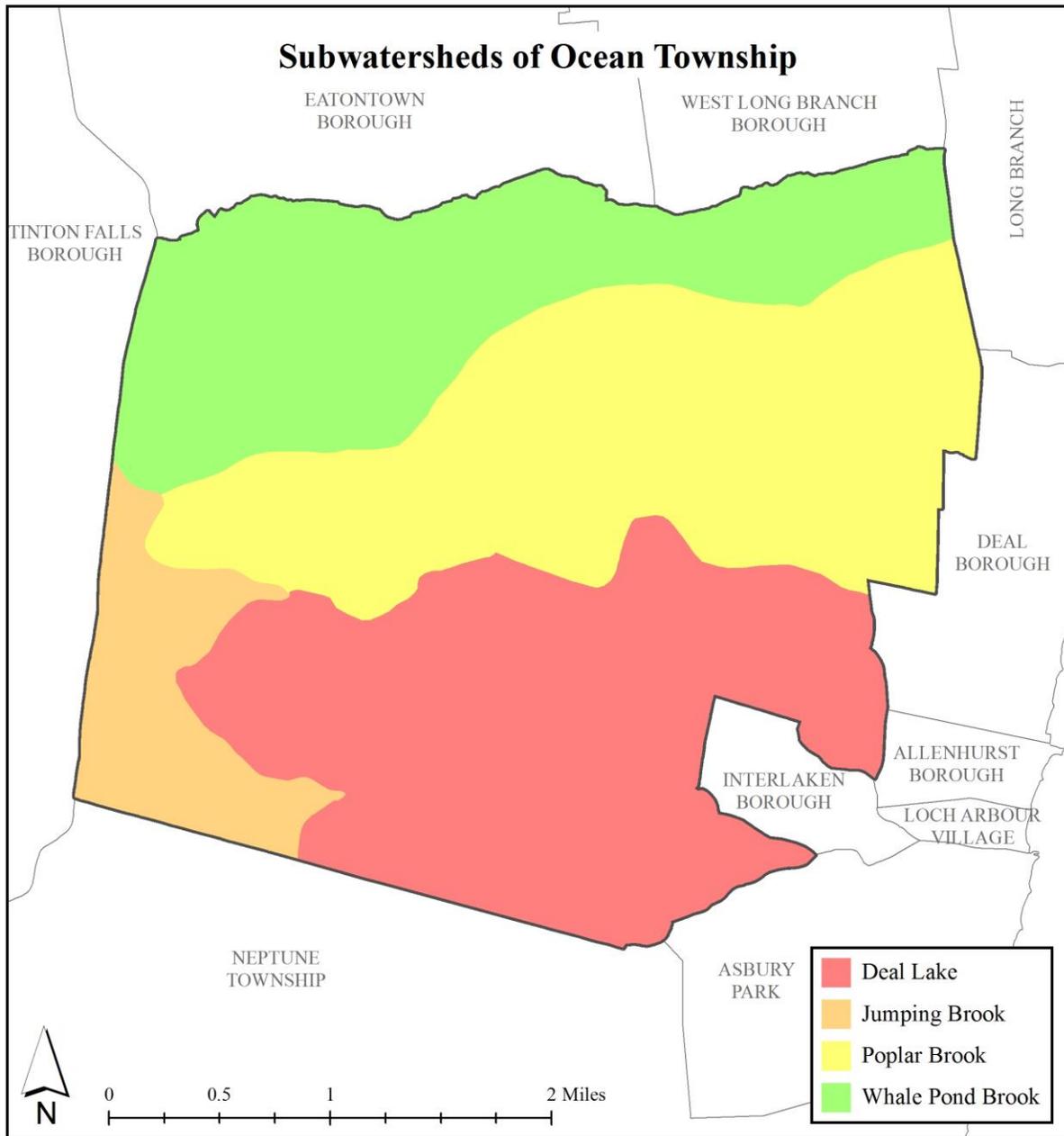


Figure 4: Map of the subwatersheds in Ocean Township

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 Ocean Township 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<sup>2</sup>

<b>Land Cover</b>	<b>TP load (lbs/acre/yr)</b>	<b>TN load (lbs/acre/yr)</b>	<b>TSS load (lbs/acre/yr)</b>
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

---

<sup>2</sup> 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<sup>3</sup>. A wide range of green infrastructure practices have been evaluated for the potential project sites in Ocean Township. 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.



<sup>3</sup> 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](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.<sup>4</sup>

---

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

## **Conclusion**

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

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

**a. Green Infrastructure Sites**

# OCEAN TOWNSHIP: GREEN INFRASTRUCTURE SITES



## SITES WITHIN THE DEAL LAKE SUBWATERSHED:

1. Municipal Garage of Ocean Township
2. Northern Shore District United Methodist Church

## SITES WITHIN THE POPLAR BROOK SUBWATERSHED:

3. Monmouth County Library, Ocean Township Branch
4. Ocean Township Little League
5. Ocean Township Municipal Office / Police Department

## SITES WITHIN THE WHALE POND BROOK SUBWATERSHED:

6. First United Methodist Church
7. Oakhurst Independent Hose Co No. 1
8. Ocean Township Community Pool
9. Township of Ocean Senior Center
10. US Post Office
11. Wayside United Methodist Church

## **b. Proposed Green Infrastructure Concepts**

# MUNICIPAL GARAGE OF OCEAN TOWNSHIP



**Subwatershed:** Deal Lake

**Site Area:** 159,158 sq. ft.

**Address:** 3605 Sunset Avenue  
Ocean Township, NJ

**Block and Lot:** Block 142, Lot 39, 50

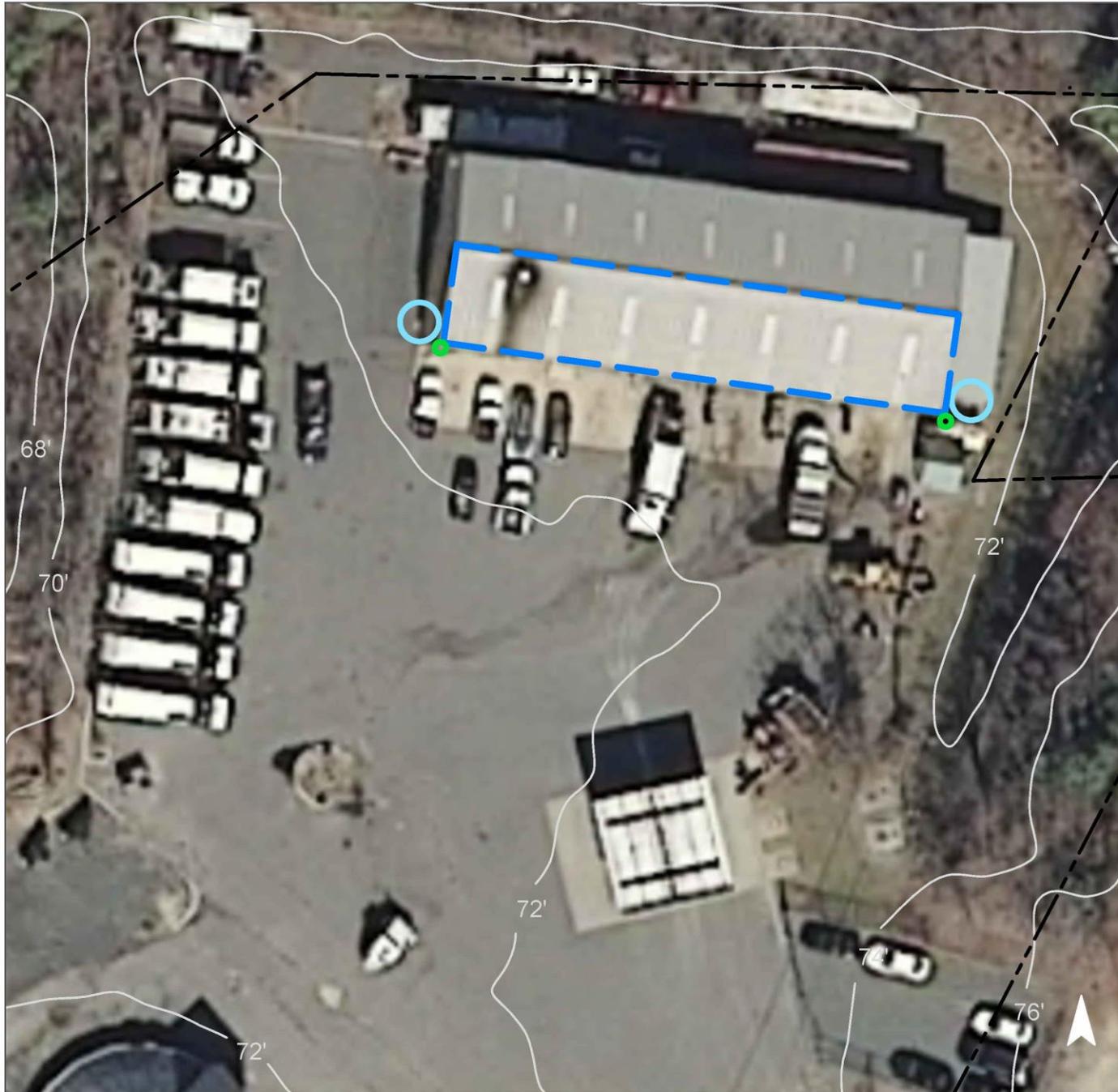


Cisterns can be installed by the building to harvest rainwater. The water can be used to wash the vehicles on site. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

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"
29	45,541	2.2	23.0	209.1	0.035	1.25

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
Rainwater harvesting systems	0.088	15	6,000	0.24	6,000 (gal)	\$12,000

# GREEN INFRASTRUCTURE RECOMMENDATIONS



**Municipal Garage of Ocean Township**

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



# NORTHERN SHORE DISTRICT UNITED METHODIST CHURCH



**Subwatershed:** Deal Lake

**Site Area:** 55,035 sq. ft.

**Address:** 1001 Wickapecko Drive  
Ocean Township, NJ 07712

**Block and Lot:** Block 140, Lot 81



Runoff from the parking lot is directed to the stream behind the building. Parking spots can be replaced with porous asphalt to capture and infiltrate stormwater. The installation of a rain garden adjacent to the building can 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"
57	31,629	1.5	16.0	145.2	0.025	0.87

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.028	5	2,072	0.08	490	\$2,450
Pervious pavements	0.515	86	37,804	1.42	5,260	\$131,500

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Northern Shore District United Methodist Church

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



# MONMOUTH COUNTY LIBRARY, OCEAN TOWNSHIP BRANCH



**Subwatershed:** Poplar Brook  
**Site Area:** 182,215 sq. ft.  
**Address:** 701 Deal Road  
Ocean Township, NJ 07712  
**Block and Lot:** Block 33, Lot 17.01

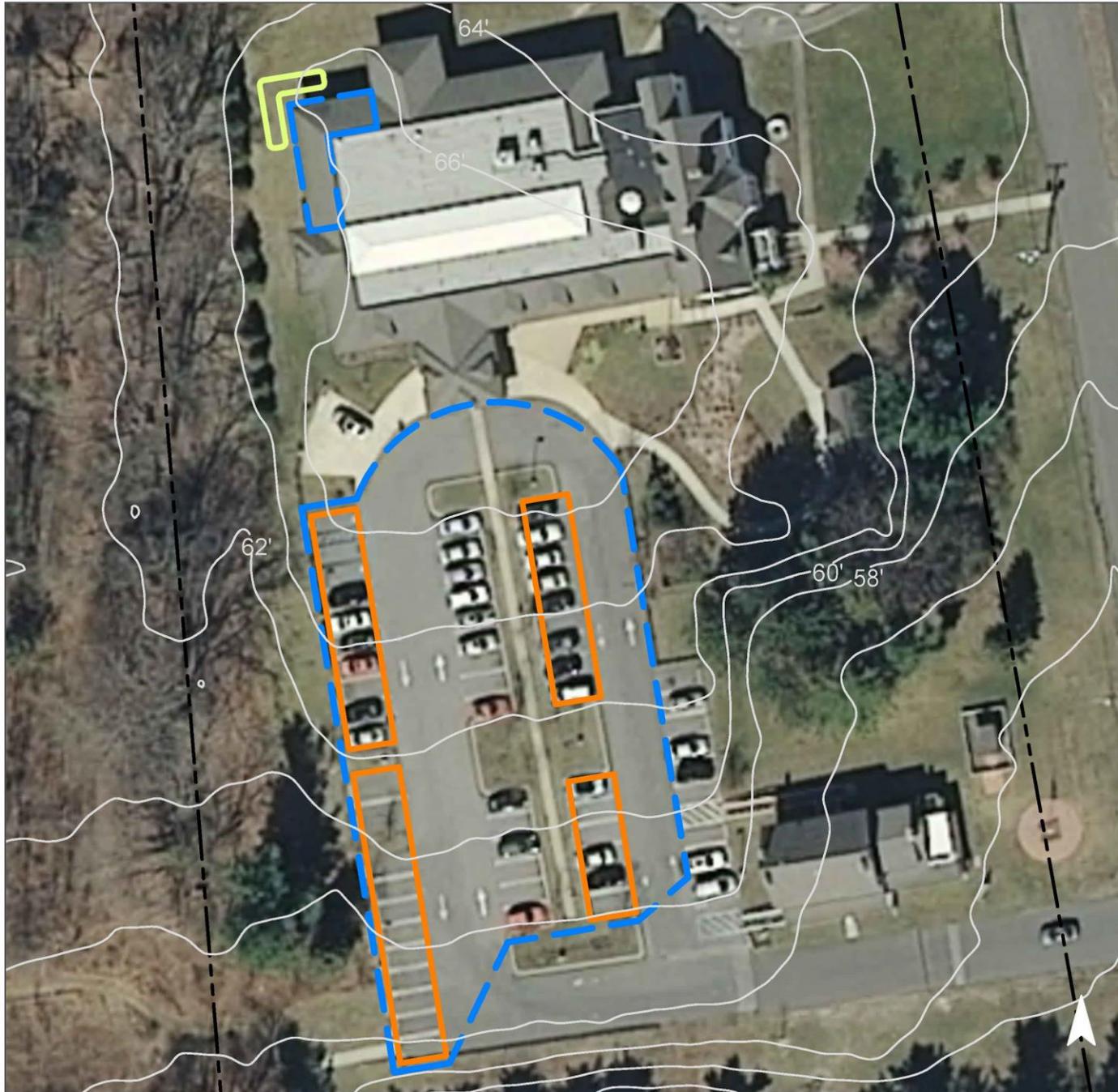


Selected sections of parking can be replaced with porous asphalt to capture and infiltrate stormwater generated by the parking lot. A rain garden can be installed off of the northwest corner of the building to capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
39	70,804	3.4	35.8	325.1	0.055	1.94

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.024	4	1,750	0.07	285	\$1,425
Pervious pavements	0.672	112	49,286	1.85	6,095	\$152,375

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Monmouth County Library, Ocean Township Branch

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



# OCEAN TOWNSHIP LITTLE LEAGUE



**Subwatershed:** Poplar Brook  
**Site Area:** 221,088 sq. ft.  
**Address:** 2811 Logan Road  
Ocean Township, NJ 07712  
**Block and Lot:** Block 194, Lot 1

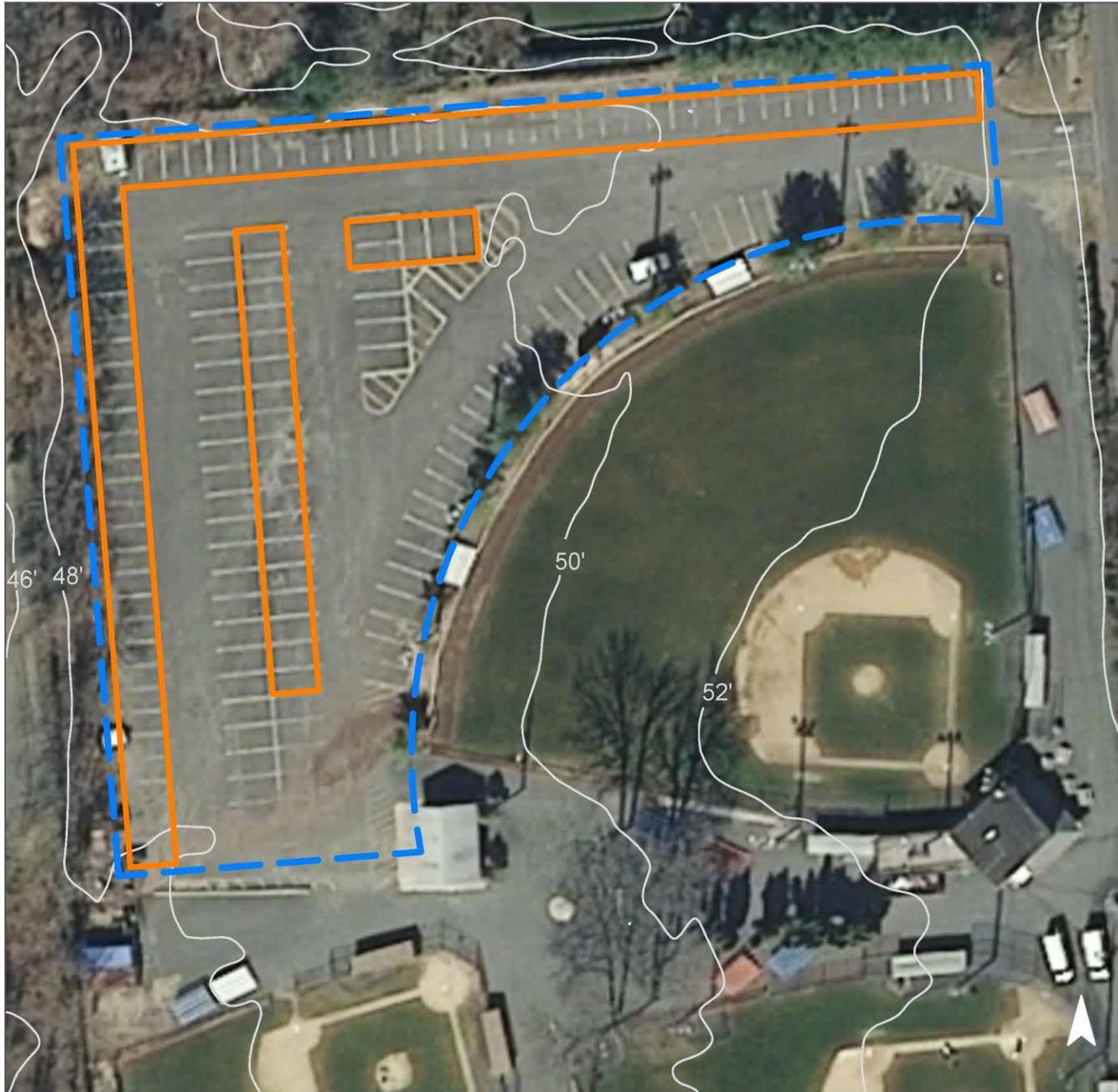


The parking lot was in poor condition at the time of the assessment. Multiple rows of parking can be replaced with porous asphalt to capture and infiltrate stormwater. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
38	85,012	4.1	42.9	390.3	0.066	2.33

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 pavements	1.476	247	108,325	4.07	15,195	\$379,875

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Ocean Township Little League

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



# OCEAN TOWNSHIP MUNICIPAL OFFICE / POLICE DEPARTMENT



**Subwatershed:** Poplar Brook  
**Site Area:** 142,624 sq. ft.  
**Address:** 399 Monmouth Road  
Oakhurst, NJ 07755  
**Block and Lot:** Block 25, Lot 2



Multiple rows of parking can be replaced with porous asphalt to capture and infiltrate stormwater. On the south side of the building a rain garden can be installed and two downspouts can be disconnected and redirected into it 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"
73	103,950	5.0	52.5	477.3	0.081	2.85

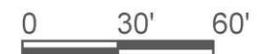
Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.022	4	1,608	0.06	230	\$1,150
Pervious pavements	1.404	235	103,022	3.87	13,935	\$348,375

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Ocean Township Municipal Office / Police Department

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



# FIRST UNITED METHODIST CHURCH



**Subwatershed:** Whale Pond Brook

**Site Area:** 144,895 sq. ft.

**Address:** 103 Monmouth Road  
Oakhurst, NJ 07755

**Block and Lot:** Block 20, Lot 1

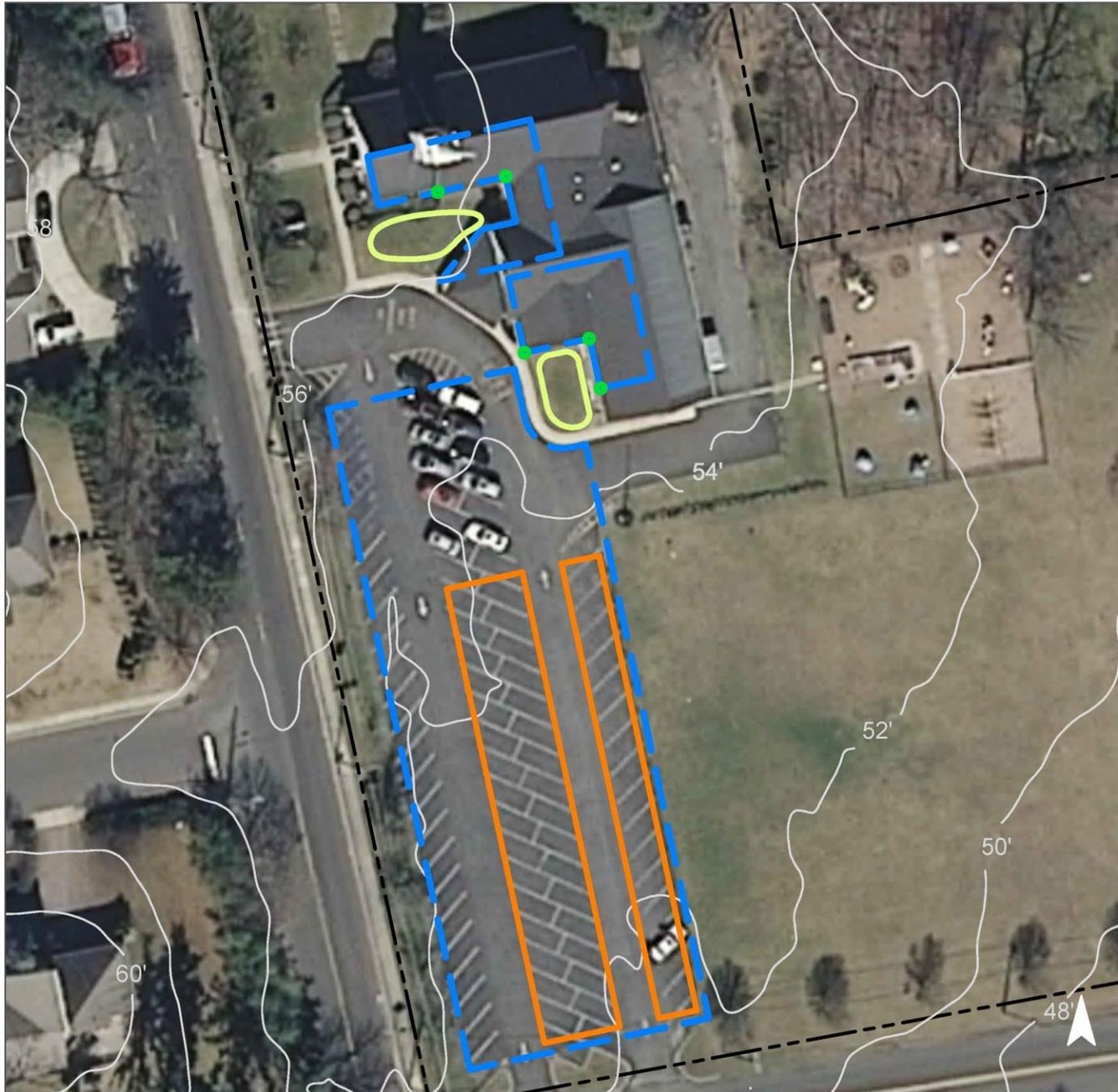


Parking spots south of the church can be replaced with porous asphalt to capture and infiltrate stormwater. Installing rain gardens adjacent to the building can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for 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"
43	61,626	3.0	31.1	282.9	0.048	1.69

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	0.101	17	7,428	0.28	970	\$4,850
Pervious pavements	0.629	105	46,122	1.73	8,100	\$202,500

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## First United Methodist Church

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



# OAKHURST INDEPENDENT HOSE COMPANY NO. 1



**Subwatershed:** Whale Pond Brook

**Site Area:** 73,736 sq. ft.

**Address:** 72 Larkin Place,  
Oakhurst, NJ 07755

**Block and Lot:** Block 26, Lot 2

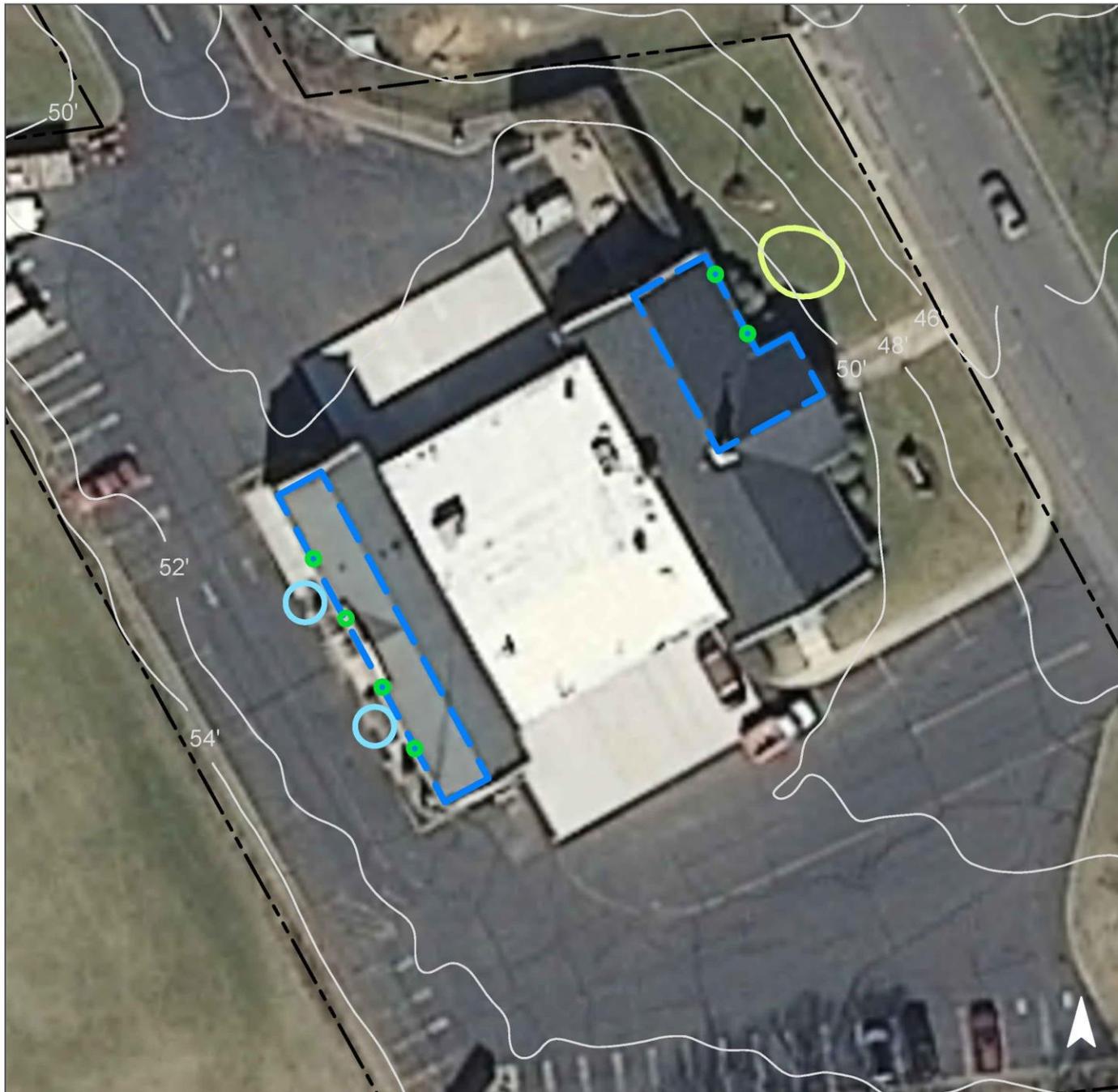


Runoff drains from the fire company to the highway. A rain garden can be installed adjacent to the building to capture, treat, and infiltrate roof runoff. Cisterns can be installed behind the building to harvest rainwater. The water can be used to wash the emergency vehicles on site. A preliminary soil 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"
59	43,863	2.1	22.2	201.4	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	0.030	5	2,177	0.08	290	\$1,450
Rainwater harvesting systems	0.030	5	1,200	0.08	1,200 (gal)	\$2,400

# GREEN INFRASTRUCTURE RECOMMENDATIONS



**Oakhurst Independent  
Hose Company Number 1**

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



# OCEAN TOWNSHIP COMMUNITY POOL



**Subwatershed:** Whale Pond Brook

**Site Area:** 580,000 sq. ft.

**Address:** 615 West Park Avenue  
Ocean Township, NJ 07712

**Block and Lot:** Block 17, Lot 3



Installing a rain garden adjacent to the road can capture, treat, and infiltrate stormwater. Multiple parking areas can be replaced with pervious pavement to allow runoff generated by the parking lot an opportunity to infiltrate. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
33	188,739	9.1	95.3	866.6	0.147	5.18

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
Bioretention systems	0.077	13	5,864	0.22	860	\$4,300
Pervious pavements	2.288	383	173,342	6.51	24,535	\$613,375

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Ocean Township Community Pool

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



# TOWNSHIP OF OCEAN SENIOR CENTER



**Subwatershed:** Whale Pond Brook  
**Site Area:** 259,883 sq. ft.  
**Address:** 615 W Park Avenue  
Oakhurst, NJ 07755  
**Block and Lot:** Block 3, Lot 18

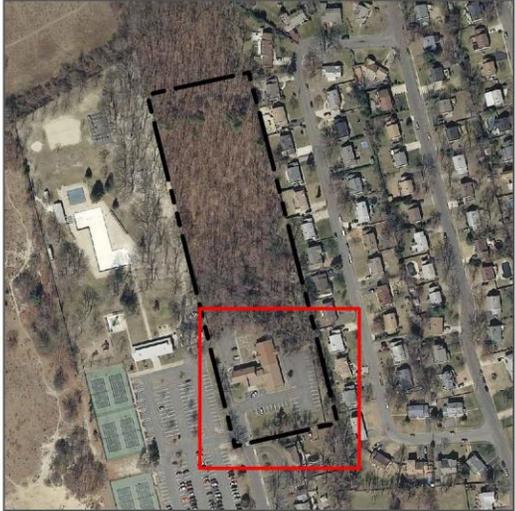
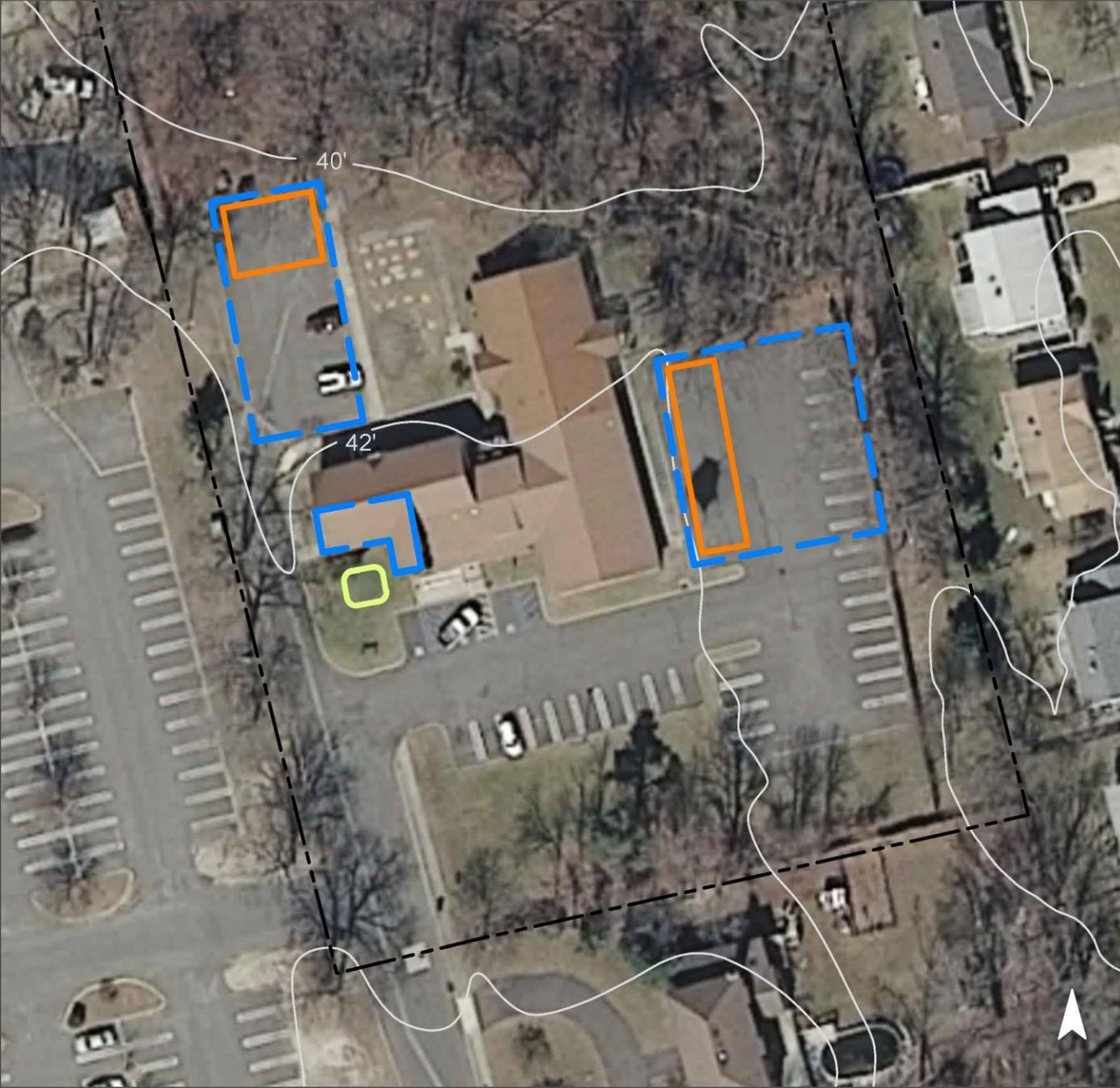


Sections of the parking lot can be replaced with porous asphalt to capture and infiltrate stormwater. A rain garden can be built off of the southwest corner of the building to capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that more soil testing would be required before 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"
26	67,289	3.2	34.0	308.9	0.052	1.85

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	0.019	3	1,399	0.05	200	\$1,000
Pervious pavements	0.264	44	19,403	0.73	2,250	\$56,250

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Township of Ocean Senior Center

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



# US POST OFFICE



**Subwatershed:** Whale Pond Brook  
**Site Area:** 400,309 sq. ft.  
**Address:** 715 W Park Avenue  
Oakhurst, NJ 07755  
**Block and Lot:** Block 3, Lot 16

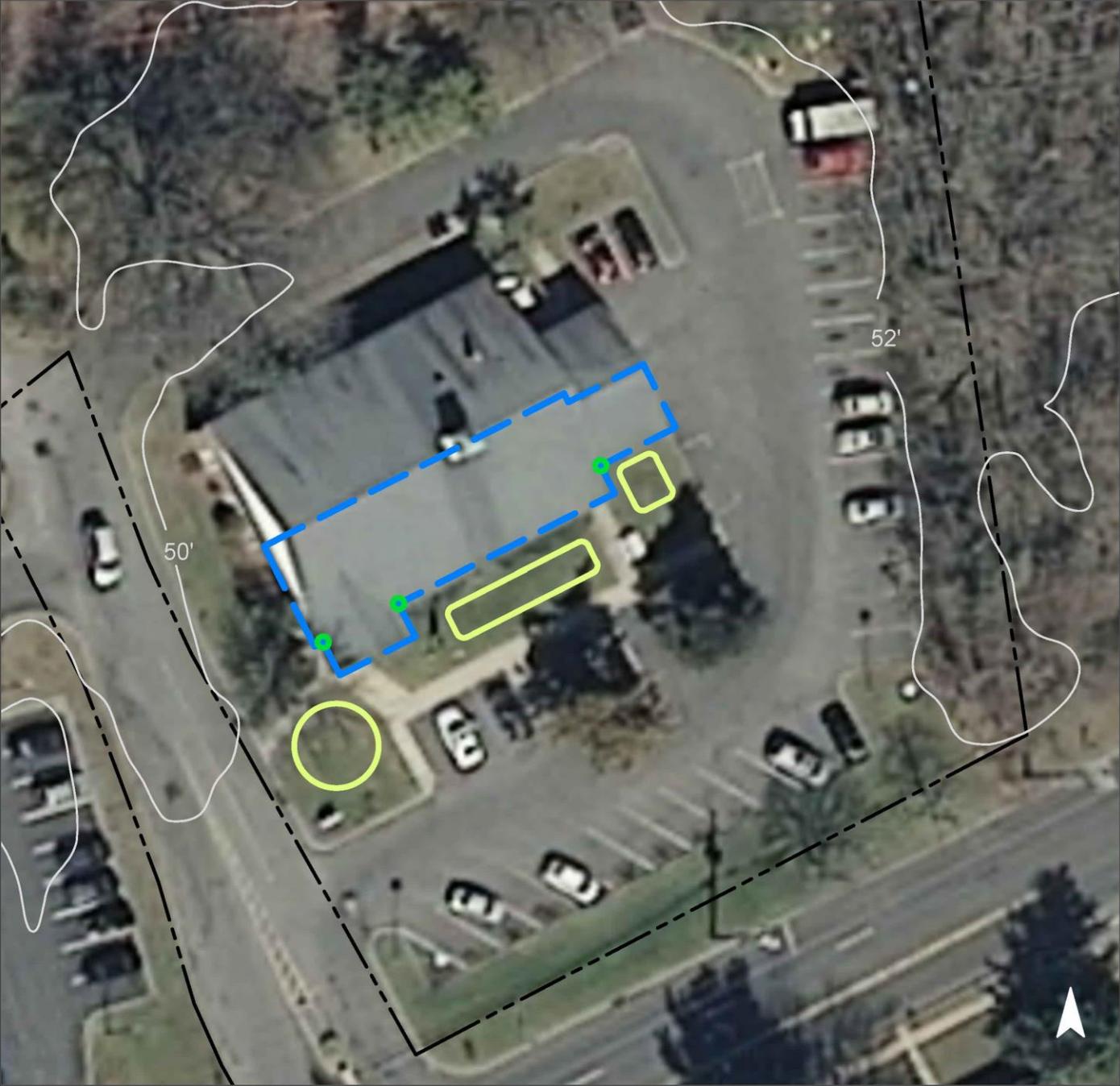


Rain gardens can be built in the turf grass in front of the building to capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
19	74,161	3.6	37.5	340.5	0.058	2.03

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
Bioretention systems	0.082	14	6,044	0.23	860	\$4,300

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## US Post Office

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



# WAYSIDE UNITED METHODIST CHURCH



**Subwatershed:** Whale Pond Brook  
**Site Area:** 113,949 sq. ft.  
**Address:** 1229 W Park Avenue  
Ocean, NJ 07712  
**Block and Lot:** Block 1, Lot 30



Two rain gardens can be installed off of the west side of the church to capture, treat, and infiltrate roof runoff by disconnecting and redirecting downspouts it to 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"
14	16,372	0.8	8.3	75.2	0.013	0.45

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.042	7	3,082	0.12	532	\$2,660

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## Wayside United Methodist Church

-  disconnected downspouts
-  bioretention / rain gardens
-  drainage areas
-  property line
-  2012 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	Existing Annual Loads			I.C. %	I.C. Area (ac)	I.C. Area (SF)	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)
<b>DEAL LAKE SUBWATERSHED</b>	<b>4.92</b>	<b>214,193</b>			<b>3.7</b>	<b>39.0</b>	<b>354.3</b>		<b>1.77</b>	<b>77,170</b>	<b>0.060</b>	<b>2.12</b>
<b>Municipal Garage of Ocean Township Total Site Info</b>	3.65	159,158	142	39,50	2.2	23.0	209.1	29	1.05	45,541	0.035	1.25
<b>Northern Shore District United Methodist Church Total Site Info</b>	1.26	55,035	140	81	1.5	16.0	145.2	57	0.73	31,629	0.025	0.87
<b>POPLAR BROOK SUBWATERSHED</b>	<b>12.53</b>	<b>545,927</b>			<b>12.5</b>	<b>131.2</b>	<b>1,192.7</b>		<b>5.96</b>	<b>259,766</b>	<b>0.202</b>	<b>7.12</b>
<b>Monmouth County Library, Ocean Township Branch Total Site Info</b>	4.18	182,215	33	17.01	3.4	35.8	325.1	39	1.63	70,804	0.055	1.94
<b>Ocean Township Little League Total Site Info</b>	5.08	221,088	194	1	4.1	42.9	390.3	38	1.95	85,012	0.066	2.33
<b>Township of Ocean: Municipal Office Police/ Police Department Total Site Info</b>	3.27	142,624	25	2	5.0	52.5	477.3	73	2.39	103,950	0.081	2.85
<b>WHALE POND BROOK SUBWATERSHED</b>	<b>36.11</b>	<b>1,572,772</b>			<b>21.8</b>	<b>228.3</b>	<b>2,075.5</b>		<b>10.38</b>	<b>452,049</b>	<b>0.352</b>	<b>12.40</b>
<b>First United Methodist Church Total Site Info</b>	1.69	73,736	26	2	2.1	22.2	201.4	59	1.01	43,863	0.034	1.20
<b>Oakhurst Independent Hose Total Site Info</b>	3.33	144,895	20	1,2	3.0	31.1	282.9	43	1.41	61,626	0.048	1.69
<b>Ocean Township Community Pool Total Site Info</b>	13.31	580,000	17	3	9.1	95.3	866.6	33	4.33	188,739	0.147	5.18
<b>Township of Ocean Senior Center Total Site Info</b>	5.97	259,883	3	18	3.2	34.0	308.9	26	1.54	67,289	0.052	1.85
<b>US Post Office Total Site Info</b>	9.19	400,309	3	16	3.6	37.5	340.5	19	1.70	74,161	0.058	2.03
<b>Wayside United Methodist Church Total Site Info</b>	2.62	113,949	1	30	0.8	8.3	75.2	14	0.38	16,372	0.013	0.45

#### **d. Summary of Proposed Green Infrastructure Practices**

**Summary of Porposed Green Infrastruture Practices**

Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost (\$)	Unit	Total Cost (\$)	I.C. Treated %
	Area (SF)	Area (ac)									
<b>DEAL LAKE SUBWATERSHED</b>	<b>24,225</b>	<b>0.56</b>	<b>0.631</b>	<b>106</b>	<b>47,180</b>	<b>1.80</b>	<b>11,750</b>			<b>\$139,950</b>	<b>31.4%</b>
<b>1 Municipal Garage of Ocean Township</b>											
Rainwater harvesting systems	3,365	0.08	0.088	15	6,000	0.25	6,000	2	gal	\$6,000	7.4%
<b>Total Site Info</b>	<b>3,365</b>	<b>0.08</b>	<b>0.088</b>	<b>15</b>	<b>6,000</b>	<b>0.25</b>	<b>6,000</b>			<b>\$6,000</b>	<b>7.4%</b>
<b>2 Northern Shore District United Methodist Church</b>											
Bioretention systems/rain gardens	1,085	0.02	0.028	5	2,140	0.08	490	5	SF	\$2,450	3.4%
Pervious pavements	19,775	0.45	0.515	86	39,040	1.47	5,260	25	SF	\$131,500	62.5%
<b>Total Site Info</b>	<b>20,860</b>	<b>0.48</b>	<b>0.544</b>	<b>91</b>	<b>41,180</b>	<b>1.55</b>	<b>5,750</b>			<b>\$133,950</b>	<b>66.0%</b>
<b>POPLAR BROOK SUBWATERSHED</b>	<b>138,080</b>	<b>3.17</b>	<b>3.598</b>	<b>602</b>	<b>1,229,575</b>	<b>10.23</b>	<b>35,740</b>			<b>\$883,200</b>	<b>53.2%</b>
<b>3 Monmouth County Library, Ocean Township Branch</b>											
Bioretention systems/rain gardens	915	0.02	0.024	4	1,805	0.07	285	5	SF	\$1,425	1.3%
Pervious pavements	25,780	0.59	0.672	112	50,890	1.91	6,095	25	SF	\$152,375	36.4%
<b>Total Site Info</b>	<b>26,695</b>	<b>0.61</b>	<b>0.696</b>	<b>116</b>	<b>52,695</b>	<b>1.98</b>	<b>6,380</b>			<b>\$153,800</b>	<b>37.7%</b>
<b>4 Ocean Township Little League</b>											
Pervious pavements	56,660	1.30	1.476	247	111,850	4.20	15,195	25	SF	\$379,875	66.6%
<b>Total Site Info</b>	<b>56,660</b>	<b>1.30</b>	<b>1.476</b>	<b>247</b>	<b>111,850</b>	<b>4.20</b>	<b>15,195</b>			<b>\$379,875</b>	<b>66.6%</b>
<b>5 Ocean Township Municipal Office / Police Department</b>											
Bioretention systems/rain gardens	840	0.02	0.022	4	1,660	0.06	230	5	SF	\$1,150	0.8%
Pervious pavements	53,885	1.24	1.404	235	1,063,370	3.99	13,935	25	SF	\$348,375	51.8%
<b>Total Site Info</b>	<b>54,725</b>	<b>1.26</b>	<b>1.426</b>	<b>239</b>	<b>1,065,030</b>	<b>4.05</b>	<b>14,165</b>			<b>\$349,525</b>	<b>52.6%</b>
<b>WHALE POND BROOK SUBWATERSHED</b>	<b>140,720</b>	<b>3.23</b>	<b>3.667</b>	<b>614</b>	<b>268,856</b>	<b>10.13</b>	<b>39,797</b>			<b>\$893,085</b>	<b>31.1%</b>
<b>6 First United Methodist Church</b>											
Bioretention systems/rain gardens	3,885	0.09	0.101	17	7,670	0.29	970	5	SF	\$4,850	6.3%
Pervious pavements	24,125	0.55	0.629	105	47,625	1.79	8,100	25	SF	\$202,500	39.1%
<b>Total Site Info</b>	<b>28,010</b>	<b>0.64</b>	<b>0.730</b>	<b>122</b>	<b>55,295</b>	<b>2.08</b>	<b>9,070</b>			<b>\$207,350</b>	<b>45.5%</b>

**Summary of Porposed Green Infrastruture Practices**

Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area		Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost (\$)	Unit	Total Cost (\$)	I.C. Treated %
	Area (SF)	Area (ac)									
<b>7 Oakhurst Independent Hose Company Number 1</b>											
Bioretention systems/rain gardens	1,140	0.03	0.030	5	2,250	0.08	290	5	SF	\$1,450	2.6%
Rainwater harvesting system	1,155	0.03	0.030	5	1,200	0.09	1,200	2	gal	\$2,400	2.6%
<b>Total Site Info</b>	<b>2,295</b>	<b>0.05</b>	<b>0.060</b>	<b>10</b>	<b>3,450</b>	<b>0.17</b>	<b>1,490</b>			<b>\$3,850</b>	<b>5.2%</b>
<b>8 Ocean Township Community Pool</b>											
Bioretention systems/rain gardens	2,970	0.07	0.077	13	5,864	0.22	860	5	SF	\$4,300	1.6%
Pervious pavements	87,815	2.02	2.288	383	173,342	6.51	24,535	25	SF	\$613,375	46.5%
<b>Total Site Info</b>	<b>90,785</b>	<b>2.08</b>	<b>2.365</b>	<b>396</b>	<b>179,206</b>	<b>6.73</b>	<b>25,395</b>			<b>\$617,675</b>	<b>48.1%</b>
<b>9 Township of Ocean Senior Center</b>											
Bioretention systems/rain gardens	4,710	0.11	0.123	21	1,445	0.05	200	5	SF	\$1,000	7.0%
Pervious pavements	10,150	0.23	0.264	44	20,040	0.75	2,250	25	SF	\$56,250	15.1%
<b>Total Site Info</b>	<b>14,860</b>	<b>0.34</b>	<b>0.387</b>	<b>65</b>	<b>21,485</b>	<b>0.80</b>	<b>2,450</b>			<b>\$57,250</b>	<b>22.1%</b>
<b>10 US Post Office</b>											
Bioretention systems/rain gardens	3,160	0.07	0.082	14	6,240	0.23	860	5	SF	\$4,300	4.3%
<b>Total Site Info</b>	<b>3,160</b>	<b>0.07</b>	<b>0.082</b>	<b>14</b>	<b>6,240</b>	<b>0.23</b>	<b>860</b>			<b>\$4,300</b>	<b>4.3%</b>
<b>11 Wayside United Methodist Church</b>											
Bioretention systems/rain gardens	1,610	0.04	0.042	7	3,180	0.12	532	5	SF	\$2,660	9.8%
<b>Total Site Info</b>	<b>1,610</b>	<b>0.04</b>	<b>0.042</b>	<b>7</b>	<b>3,180</b>	<b>0.12</b>	<b>532</b>			<b>\$2,660</b>	<b>9.8%</b>