Impervious Cover Reduction Action Plan
for
Mount Arlington Borough, Morris County, New Jersey

Prepared for Mount Arlington Borough by the
Rutgers Cooperative Extension Water Resources Program

August 10, 2016

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Introduction

Located in Morris County in northern New Jersey, Mount Arlington Borough covers approximately 2.80 square miles. Figures 1 and 2 illustrate that Mount Arlington Borough is dominated by urban land uses. A total of 47.3% of the municipality's land use is classified as urban. Of the urban land in Mount Arlington Borough, medium density residential 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 Mount Arlington 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 Mount Arlington Borough. Based upon the 2012 NJDEP land use/land cover data, approximately 22.71% of Mount Arlington Borough has impervious cover. This level of impervious cover suggests that the streams in Mount Arlington Borough are likely impacted streams. [1]

Methodology

Mount Arlington Borough 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.

[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

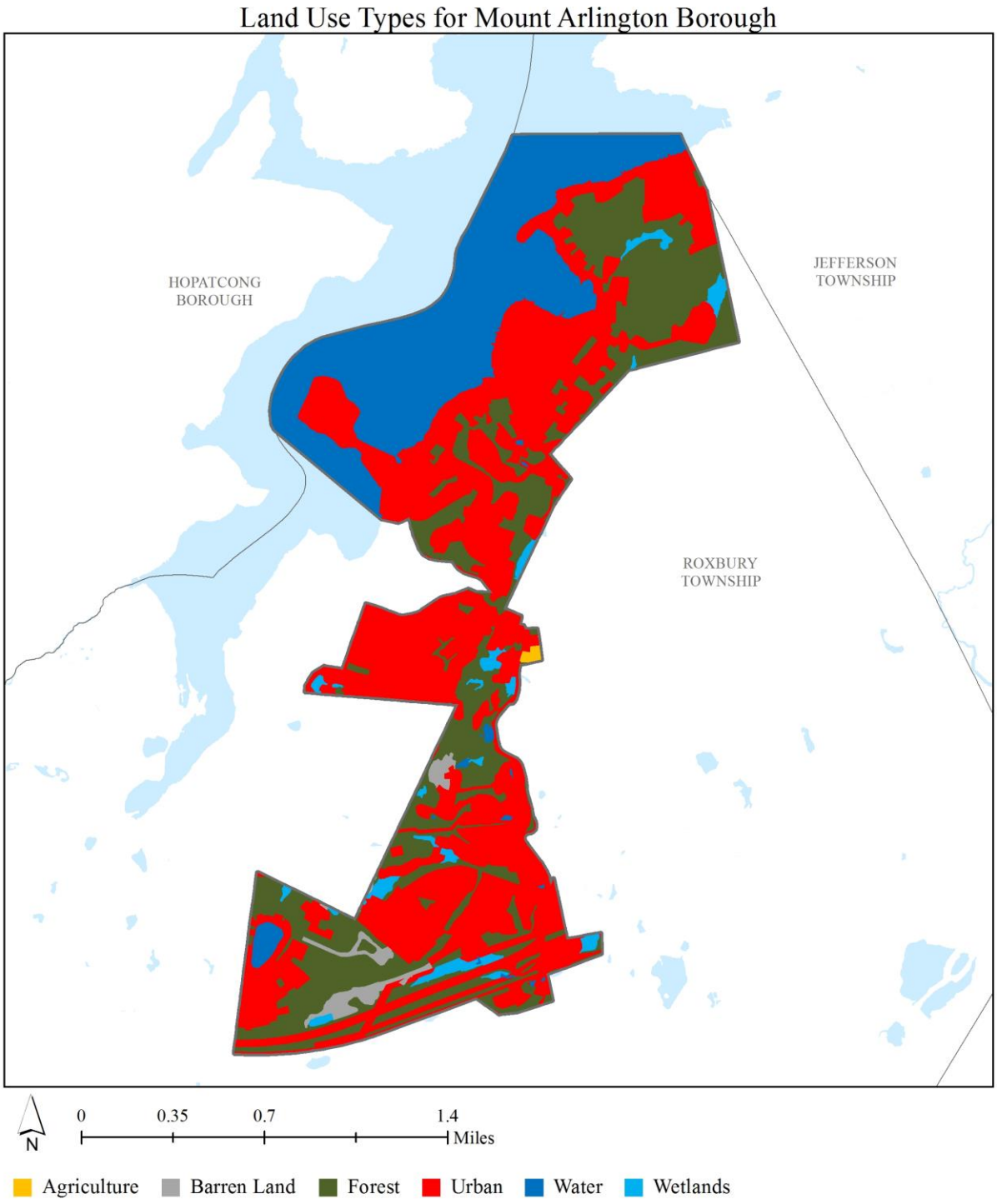


Figure 1: Map illustrating the land use in Mount Arlington Borough

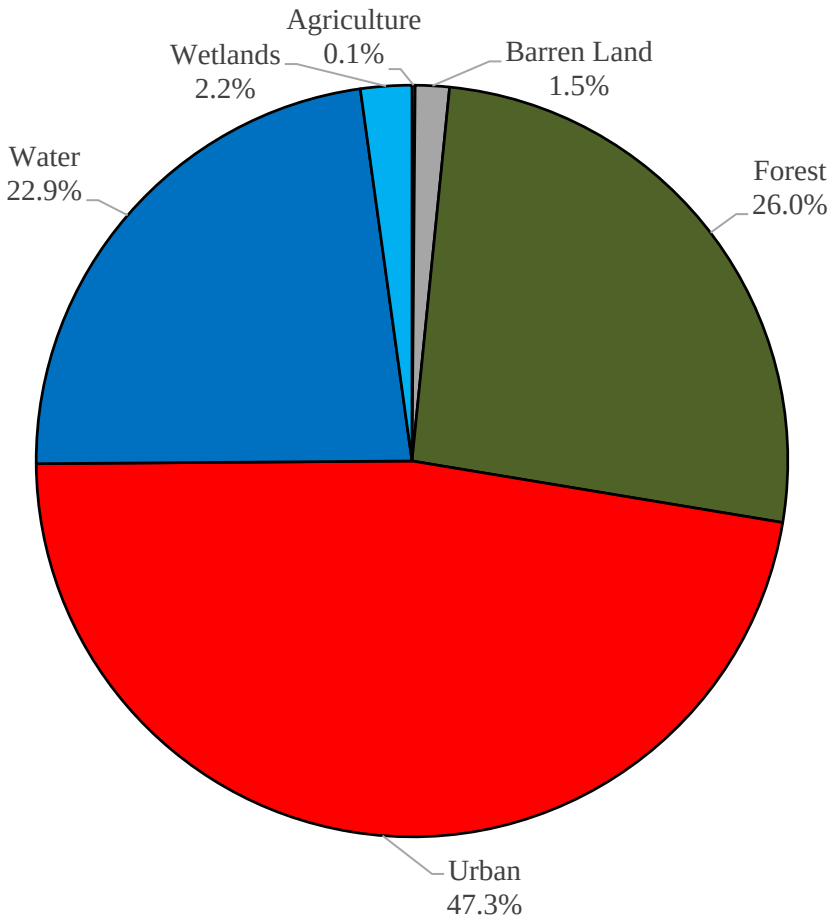


Figure 2: Pie chart illustrating the land use in Mount Arlington Borough

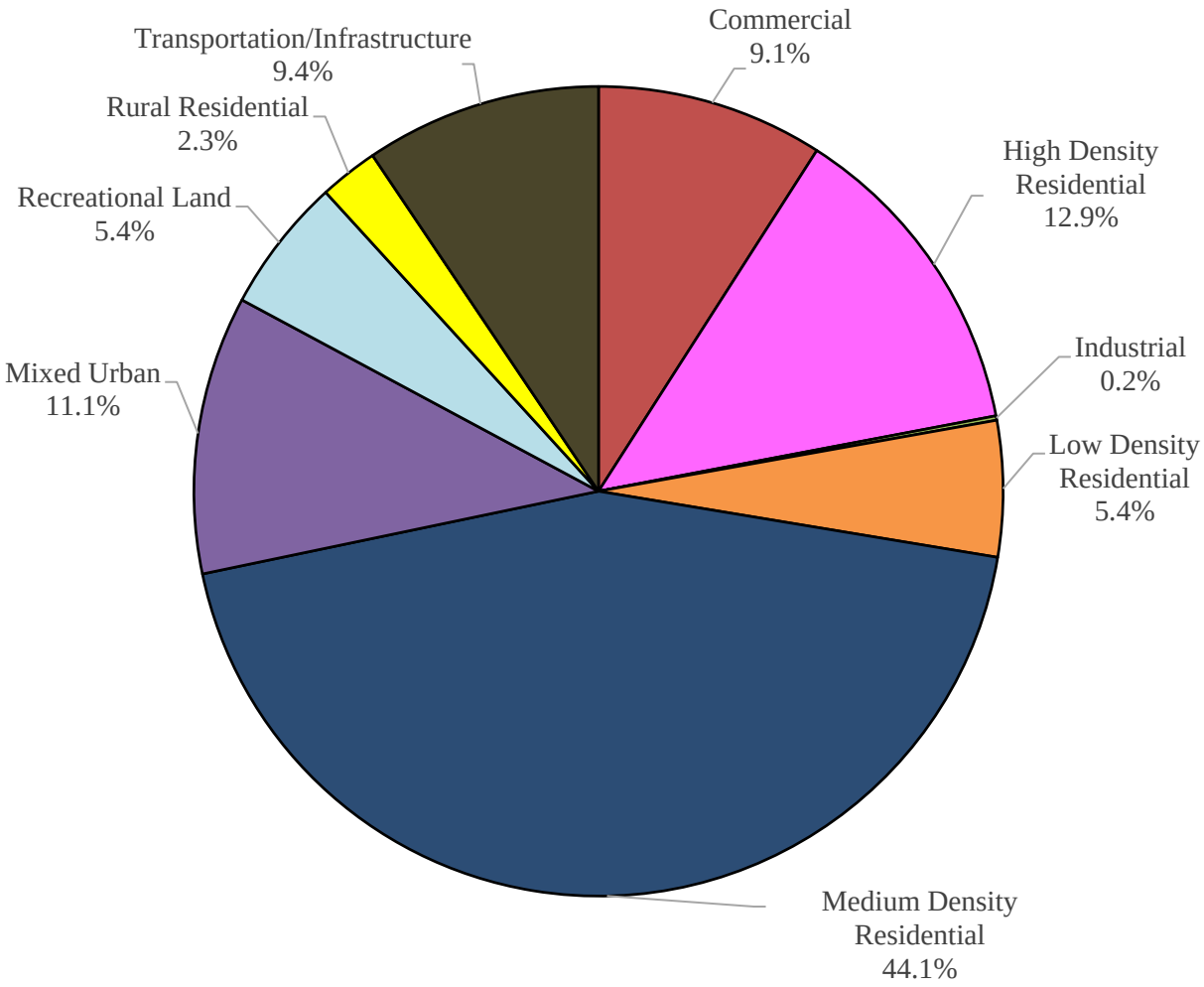


Figure 3: Pie chart illustrating the various types of urban land use in Mount Arlington Borough

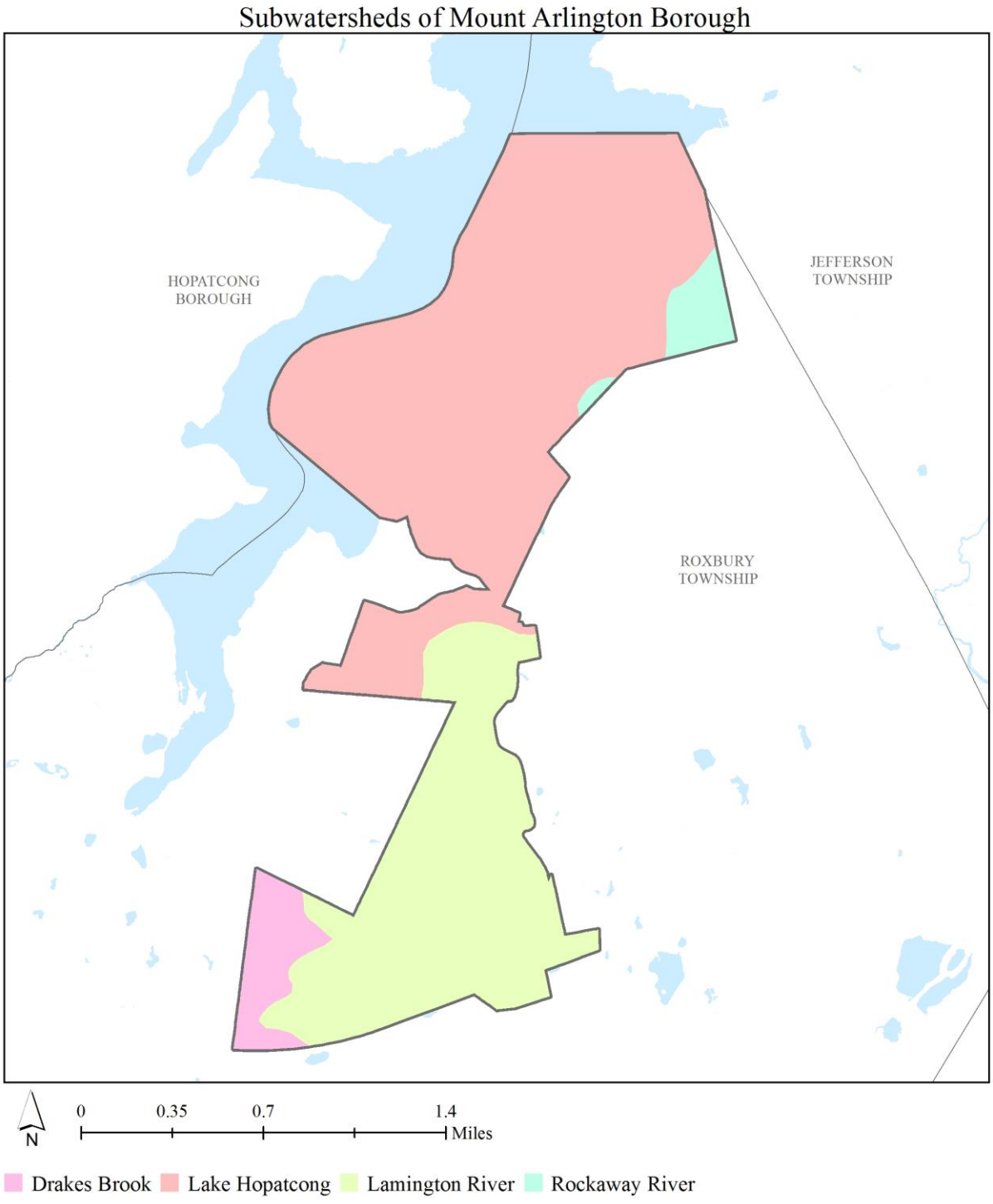


Figure 4: Map of the subwatersheds in Mount Arlington Borough

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 Mount Arlington 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 Mount Arlington 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

Attachment 1 contains information on potential project sites where green infrastructure practices could be installed. The recommended green infrastructure practices 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*.

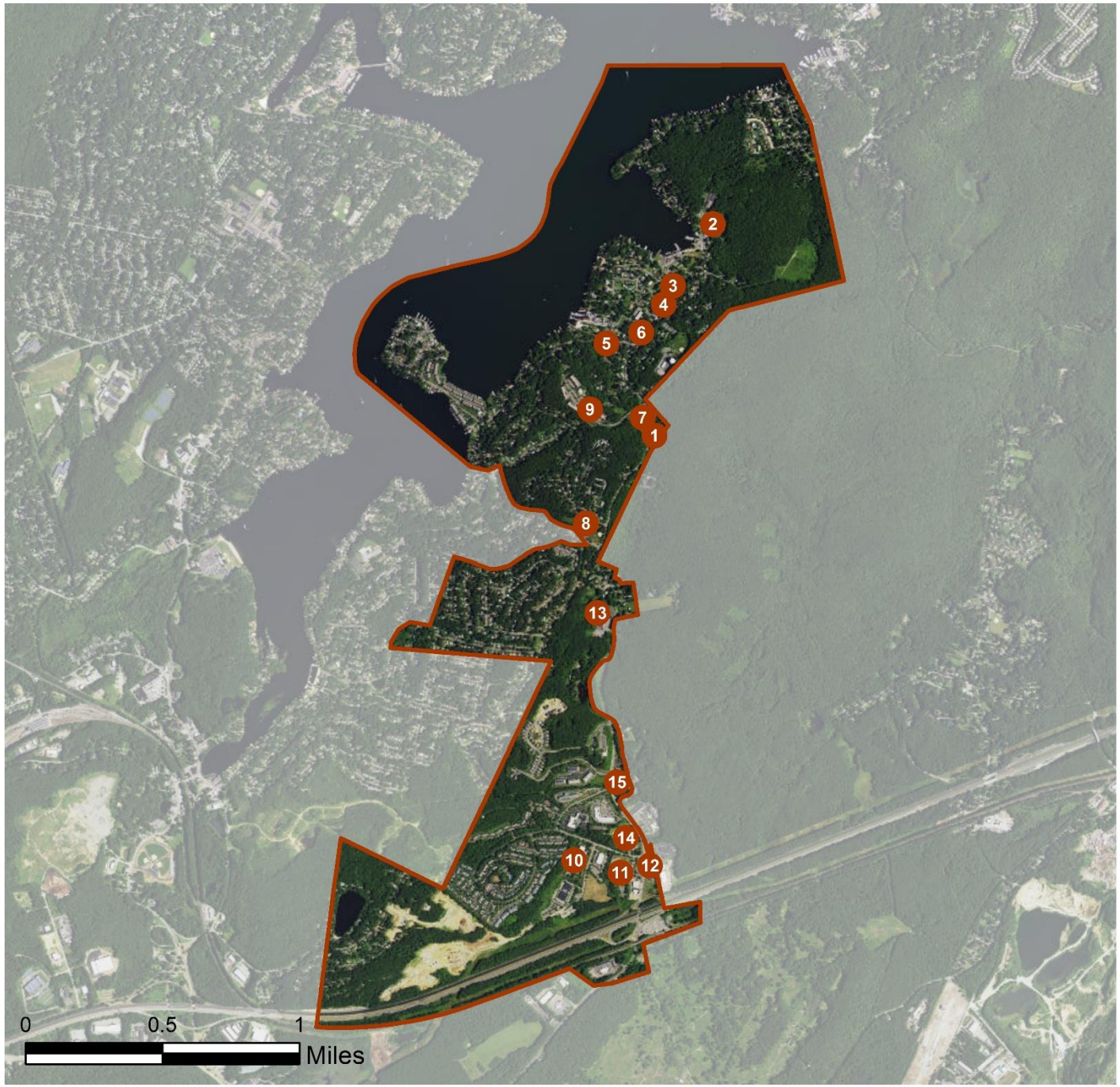
Conclusion

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. Green Infrastructure Sites

MOUNT ARLINGTON BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE LAKE HOPATCONG SUBWATERSHED:

1. Bagel Mike's
2. Edith M. Decker Elementary School
3. Mount Arlington Borough Hall
4. Mount Arlington Fire Department
5. Mount Arlington Police Department
6. Mount Arlington Post Office
7. Mount Arlington Public Library
8. Mount Arlington Public School
9. Ridgeview Lane

SITES WITHIN THE LAMINGTON RIVER SUBWATERSHED:

10. Caring Partners-Morris Sussex
11. Courtyard Rockaway-Mount Arlington
12. Davy's Dogs
13. Elks Lodge
14. Guaranteed Rate of Mount Arlington
15. Professional Building

b. Proposed Green Infrastructure Concepts

BAGEL MIKE'S

Subwatershed: Lake Hopatcong

Site Area: 27,519 sq. ft.

Address: 332 Howard Boulevard
Mount Arlington, NJ 07856

Block and Lot: Block 43, Lot 7.01

Stormwater from the rooftops of Vinny & Sons Pizza and Bagel Mike's building runs directly onto the parking lot. The parking spaces along the building can be replaced with pervious pavement to allow water to infiltrate through the surface. 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	22,345	1.1	11.3	102.6	0.017	0.61

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	0.287	48	22,395	0.84	2,800	$70,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Bagel Mike's

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

0 20' 40'

EDITH M. DECKER ELEMENTARY SCHOOL

Subwatershed: Lake Hopatcong

Site Area: 695,030 sq. ft.

Address: 446 Howard Boulevard
Mount Arlington, NJ 07856

Block and Lot: Block 8, Lot 5.01

A large amount of runoff is generated by the parking lot during storm events, causing erosion issues in the grass area along the parking lot. Two bioretention systems can be installed in the grass area to help mitigate the erosion problem. A third bioretention system can be built in the island located in the parking lot to manage more of the stormwater runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
12	81,192	3.9	41.0	372.8	0.063	2.23

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.391	65	30,541	1.14	3,900	$19,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

Edith M. Decker Elementary School

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

0 25' 50'

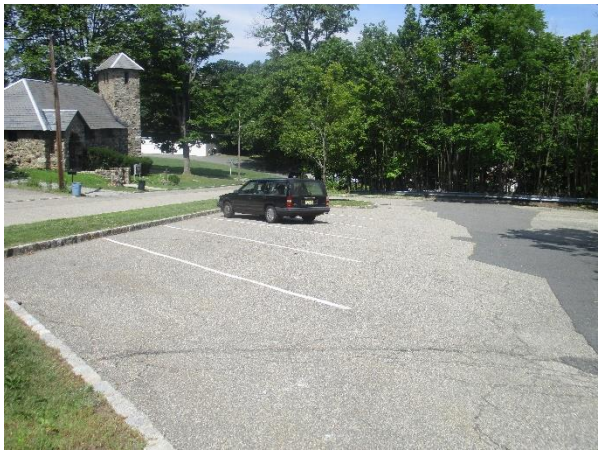
MOUNT ARLINGTON BOROUGH HALL

Subwatershed: Lake Hopatcong

Site Area: 39,732 sq. ft.

Address: 419 Howard Boulevard
Mount Arlington, NJ 07856

Block and Lot: Block 10, Lot 78

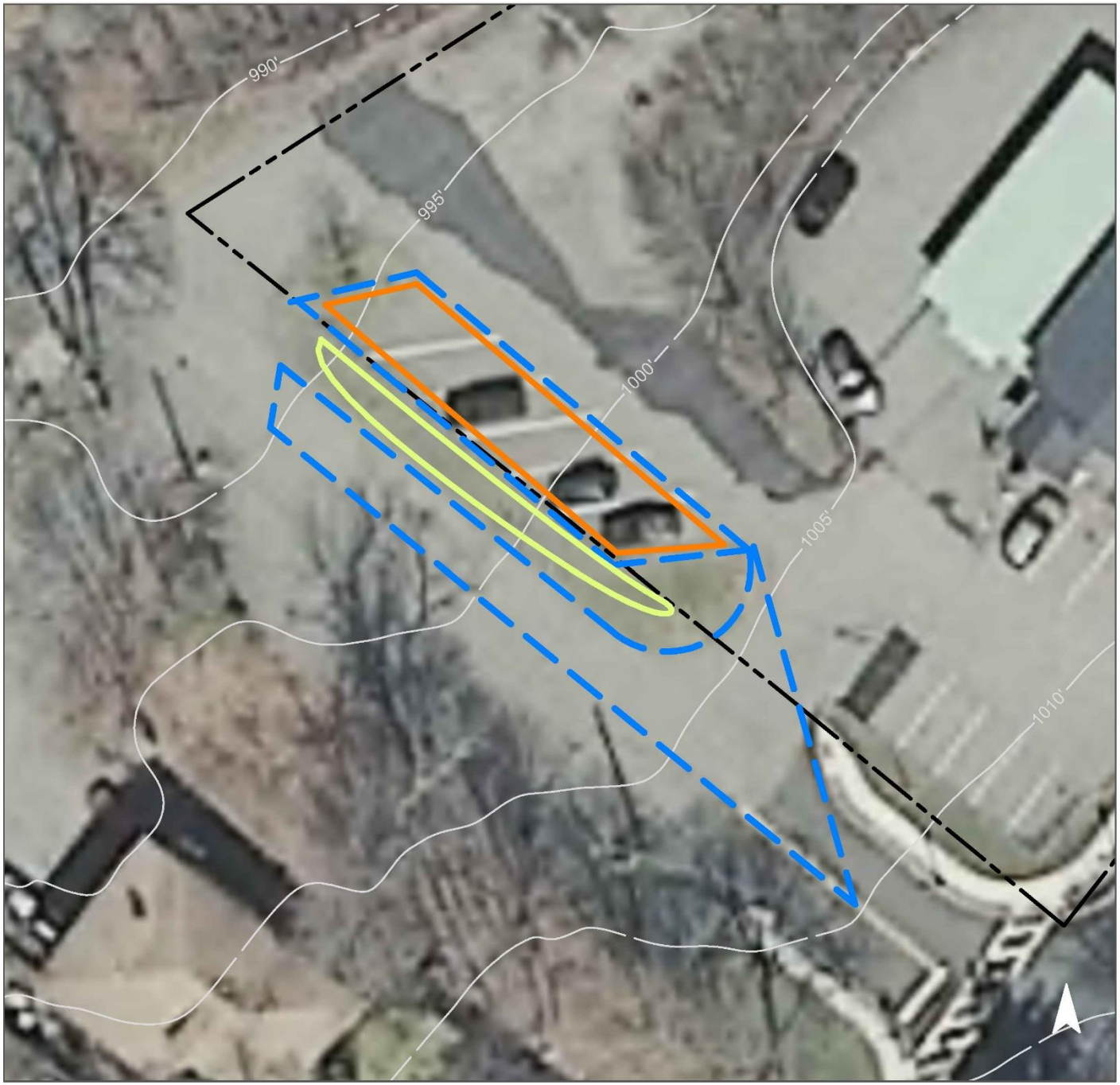


A bioretention system can be implemented in the grass area alongside Edgemere Avenue. The parking spaces next to this grass area can be replaced with pervious pavement. Bioretention systems and porous pavement can be installed to capture, treat, and infiltrate stormwater runoff. A preliminary soil assessment 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"
56	22,089	1.1	11.2	101.4	0.017	0.61

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.057	10	4,481	0.17	850	$4,250
Pervious pavement	0.044	7	3,463	0.13	1,700	$42,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Mount Arlington Borough Hall

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

0 15' 30'

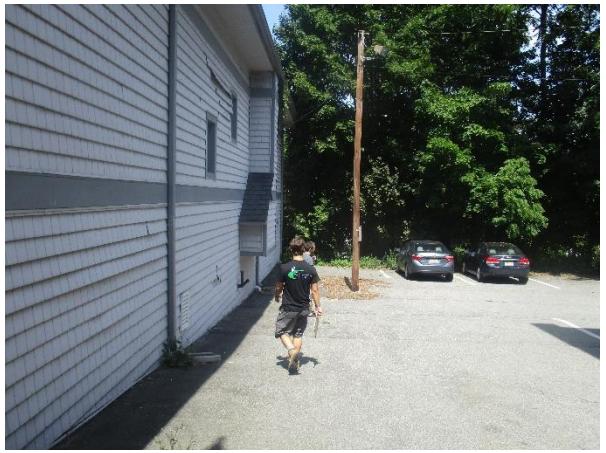
MOUNT ARLINGTON FIRE DEPARTMENT

Subwatershed: Lake Hopatcong

Site Area: 7,513 sq. ft.

Address: 409 Howard Boulevard
Mount Arlington, NJ 07856

Block and Lot: Block 25, Lot 3

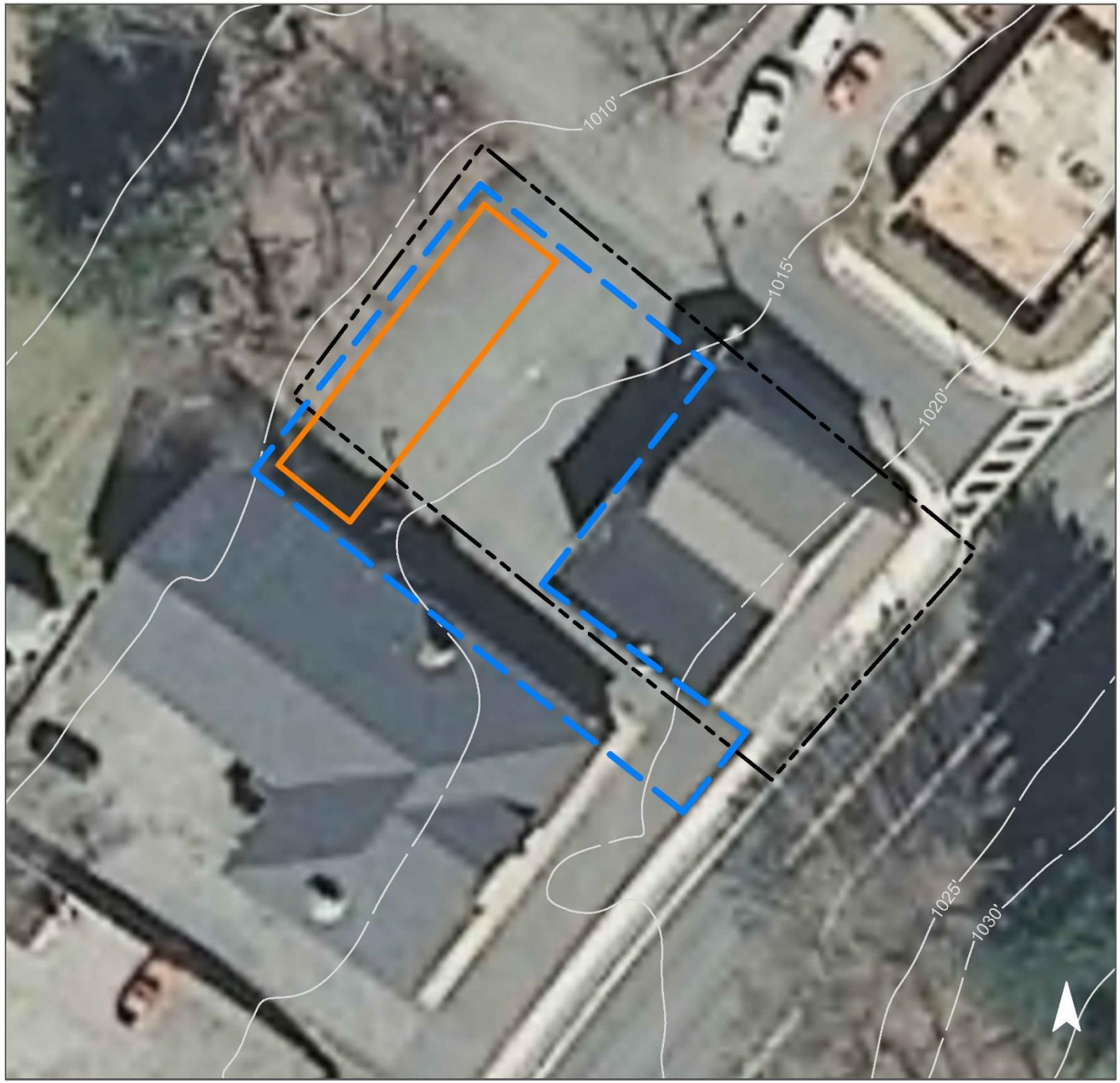


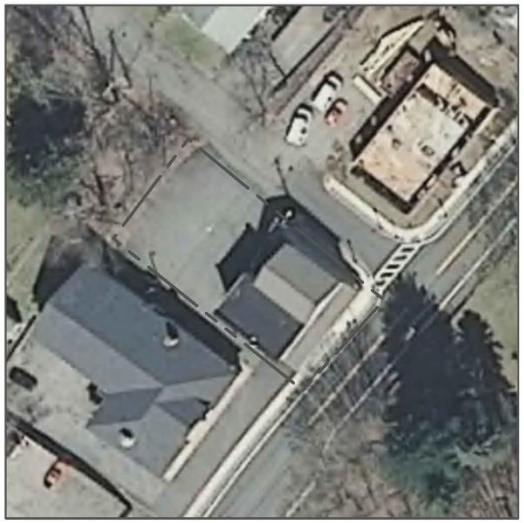
A large amount of runoff is generated by the parking lot during storm events. The parking spaces farthest from the building can be replaced with pervious pavement to allow water to infiltrate through the surface. A preliminary soil assessment suggests that the soils have suitable drainage characteristics 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"
70	5,237	0.3	2.6	24.0	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	0.109	18	8,550	0.32	1,300	$32,500

GREEN INFRASTRUCTURE RECOMMENDATIONS





Mount Arlington Fire Department

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

0 15' 30'

MOUNT ARLINGTON POLICE DEPARTMENT

Subwatershed: Lake Hopatcong

Site Area: 16,561 sq. ft.

Address: 520 Altenbrand Avenue
Mount Arlington, NJ 07856

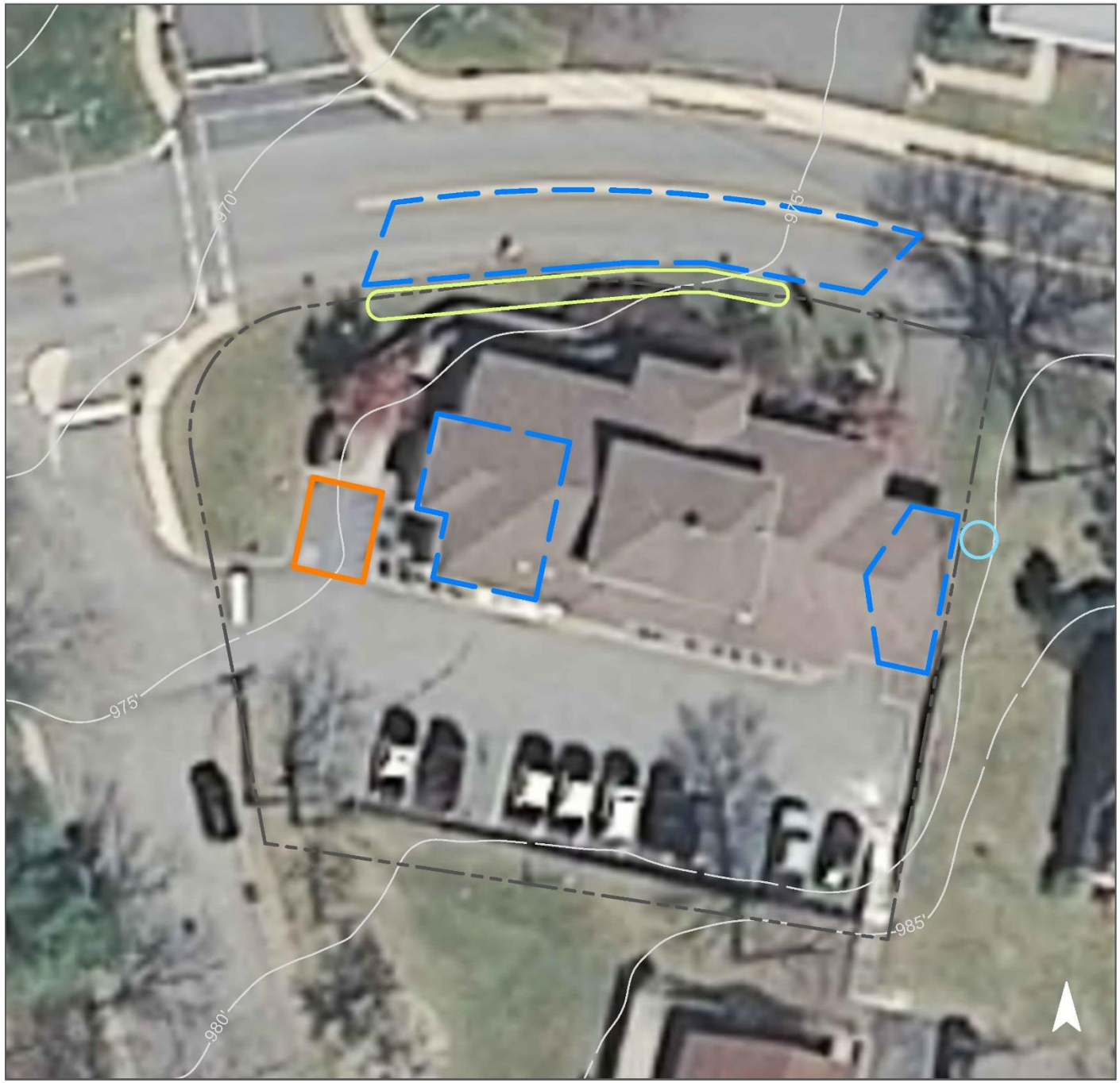
Block and Lot: Block 33, Lot 2

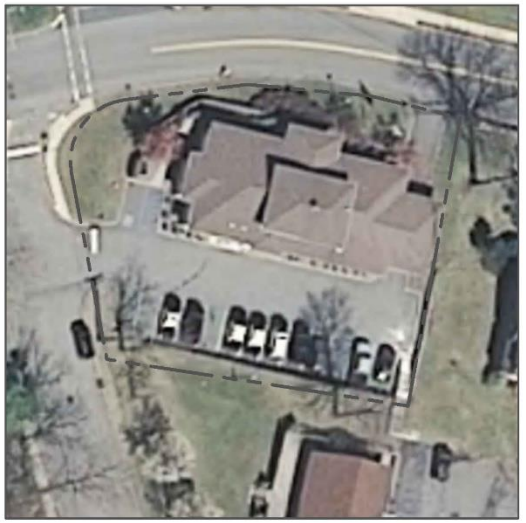
Stormwater runoff from Altenbrand Avenue is directed into a catch basin without any possibility for infiltration. A bioretention system can be implemented in the grass area alongside Altenbrand Avenue. A curb cut will allow this system to manage runoff from the street. Parking spaces adjacent to the building can be replaced with porous asphalt to intercept and infiltrate rainwater from the roof. A cistern could capture water from the rooftop for reuse in watering the landscaping or washing vehicles. 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"
65	10,765	0.5	5.4	49.4	0.008	0.30

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	0.039	6	3,037	0.11	670	$3,350
Pervious pavement	0.027	4	2,079	0.08	250	$6,250
Rainwater harvesting	0.010	2	808	0.03	1,000 (gal)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





Mount Arlington Police Department

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

0 15' 30'

MOUNT ARLINGTON POST OFFICE

Subwatershed: Lake Hopatcong

Site Area: 41,505 sq. ft.

Address: 385 Howard Boulevard
Mount Arlington, NJ 07856

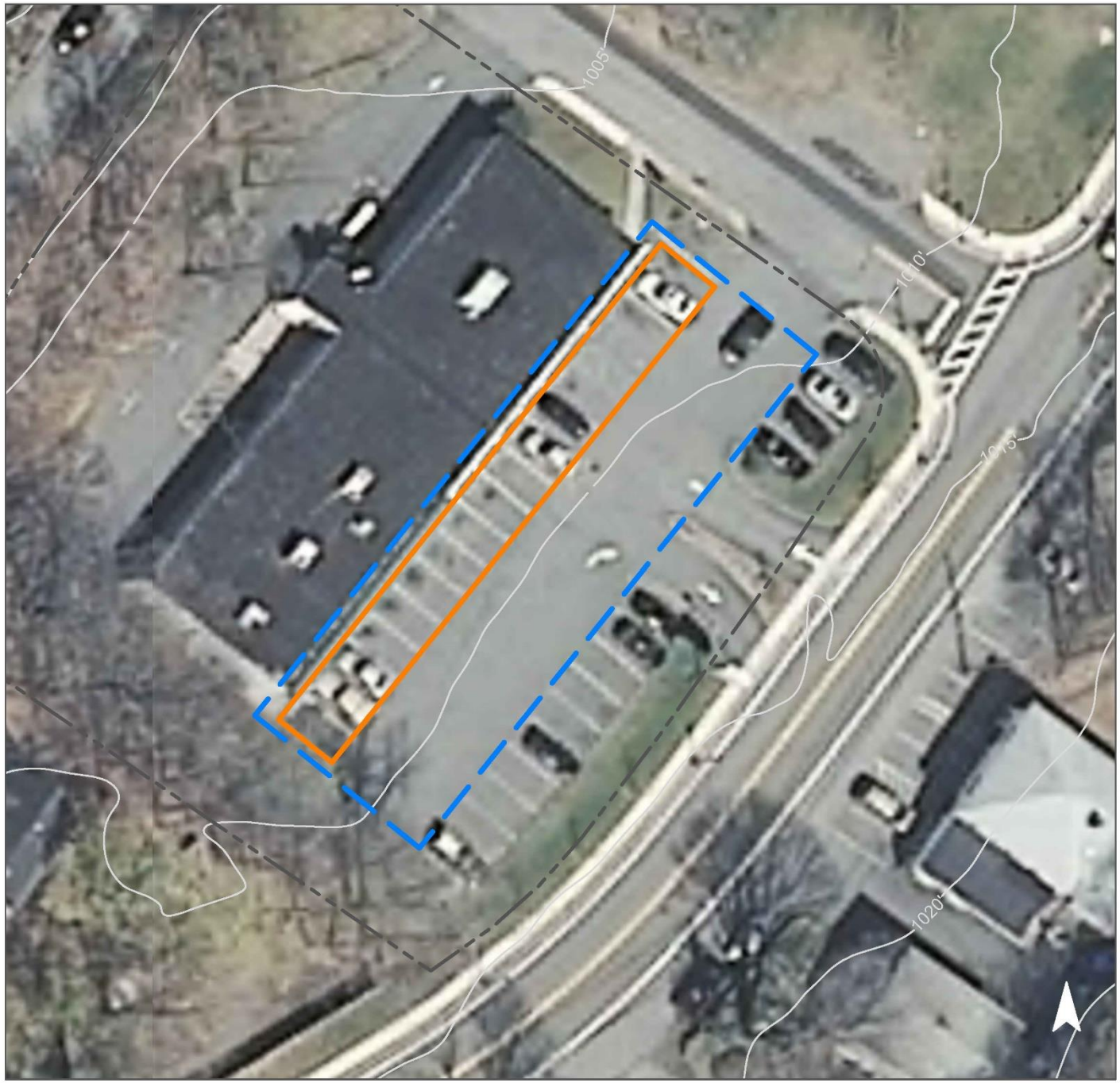
Block and Lot: Block 29, Lot 1

A large amount of runoff is generated by the parking lot during storm events. The parking spaces closest to the building can be replaced with pervious pavement to allow water to infiltrate through the surface. 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"
68	28,296	1.4	14.3	129.9	0.022	0.78

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	0.240	40	18,730	0.70	2,900	$72,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Mount Arlington Post Office

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

0 20' 40'

MOUNT ARLINGTON PUBLIC LIBRARY

Subwatershed: Lake Hopatcong

Site Area: 110,016 sq. ft.

Address: 333 Howard Boulevard
Mount Arlington, NJ 07856

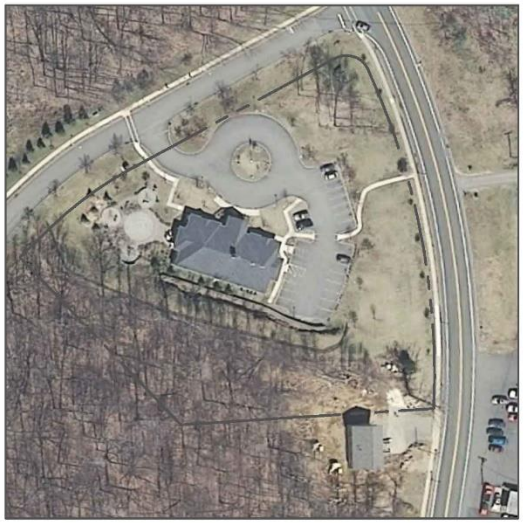
Block and Lot: Block 47, Lot 1

The parking spaces could be replaced with porous asphalt to manage runoff from the parking lot. A bioretention system can be implemented in the grass area near the northeast corner of the library, and a second bioretention system can be implemented in the southeast corner of the building. Bioretention systems and porous pavement can be installed to capture, treat, and infiltrate stormwater 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"
26	28,490	1.4	14.4	130.8	0.022	0.78

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	2,648	0.10	350	$1,750
Pervious pavement	0.287	48	22,395	0.84	2,750	$68,750

GREEN INFRASTRUCTURE RECOMMENDATIONS



Mount Arlington Public Library

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

0 20' 40'

MOUNT ARLINGTON PUBLIC SCHOOL

Subwatershed: **Lake Hopatcong**

Site Area: **478,427 sq. ft.**

Address: **172 Howard Boulevard**
Mount Arlington, NJ 07856

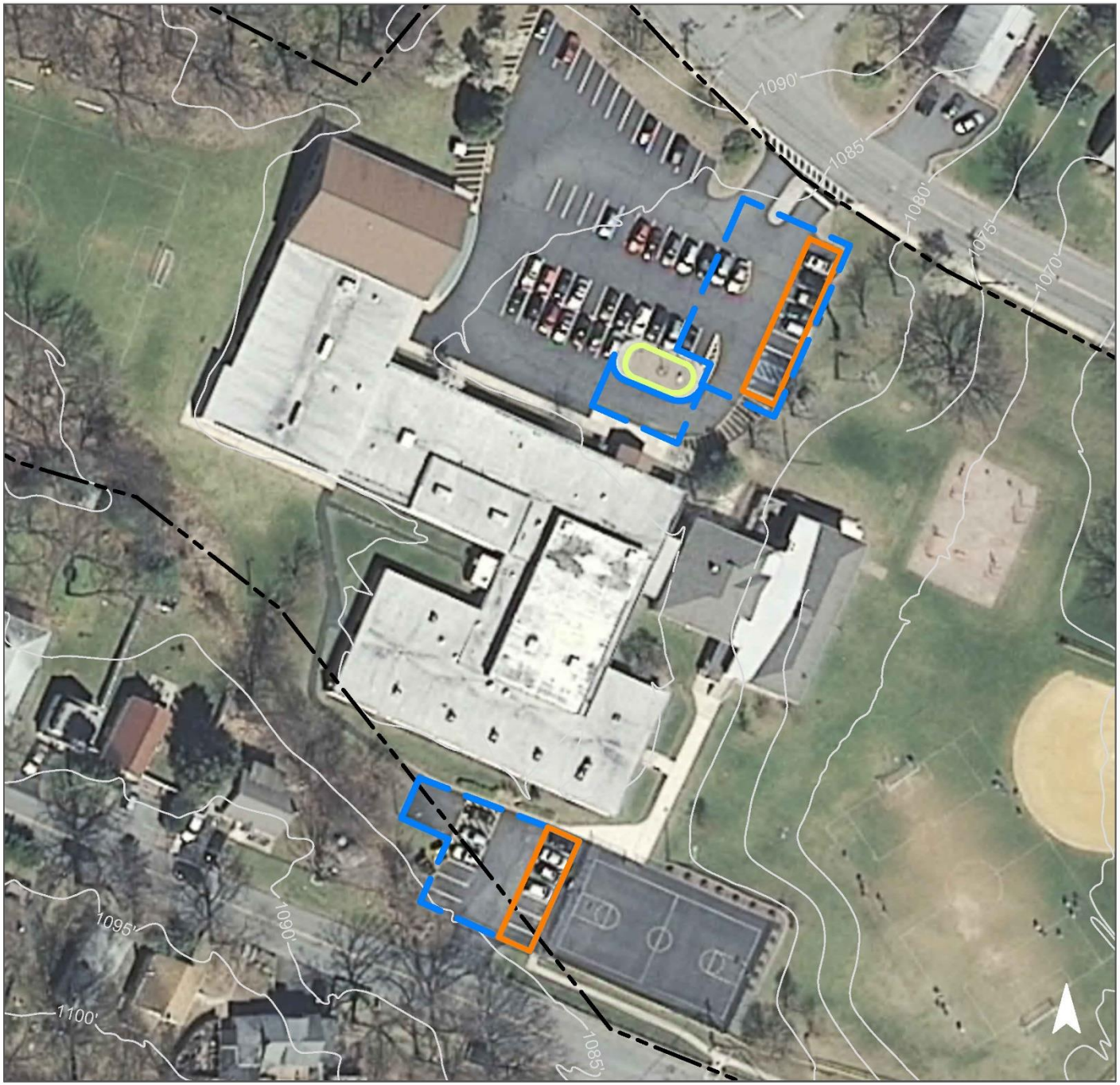
Block and Lot: **Block 121, Lot 59**

A large amount of runoff is generated by the parking lot during storm events. Multiple strips of parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. Additional runoff can be managed by implementing a rain garden in the island located in the front 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"
23	112,153	5.4	56.6	514.9	0.022	0.78

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	0.026	4	2,035	0.08	550	$2,750
Pervious pavement	0.268	45	20,974	0.79	2,700	$67,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Mount Arlington Public School

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

0 40' 80'

RIDGEVIEW LANE

Subwatershed: **Lake Hopatcong**

Site Area: **1,345,785 sq. ft.**

Address: **Ridgeview Lane**
Mount Arlington, NJ 07856

Block and Lot: **Block 49, Lot 1**

A large amount of runoff is generated by the parking lot and the buildings during storm events. Sections of parking spaces can be replaced with pervious pavement to capture, treat, and infiltrate runoff from roofs and the parking lot. Rain gardens can be implemented in the grass islands and alongside buildings. 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"
21	282,028	13.6	142.4	1,294.9	0.220	7.74

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
Bioretention systems	0.125	21	9,776	0.37	1,250	$6,250
Pervious pavement	0.100	17	7,839	0.29	1,150	$28,750

GREEN INFRASTRUCTURE RECOMMENDATIONS

Ridgeview Lane

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

0 50' 100'

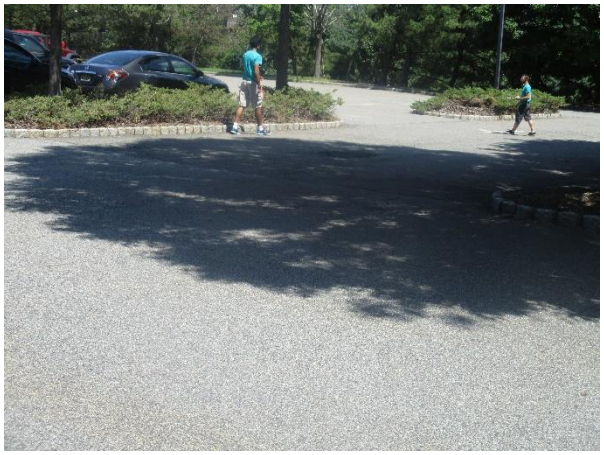
CARING PARTNERS-MORRIS SUSSEX

Subwatershed: Lamington River

Site Area: 288,189 sq. ft.

Address: 200 Valley Road
Mount Arlington, NJ 07856

Block and Lot: Block 61, Lot 23.06

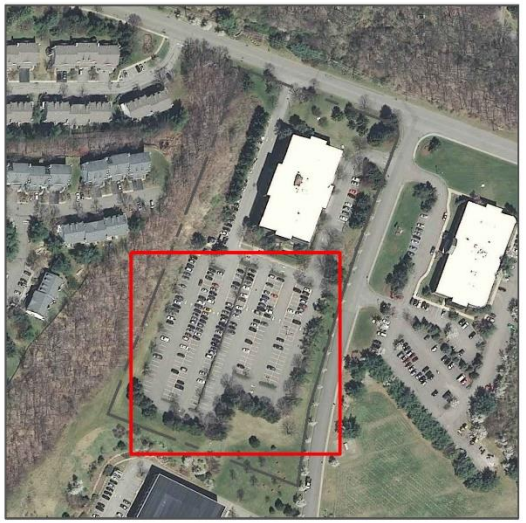


A large amount of runoff is generated by the parking lot during storm events. Two large sections of parking spaces can be replaced with pervious pavement to manage the majority of this runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's 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"
58	166,540	8.0	84.1	764.6	0.130	4.57

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	1.701	285	132,979	5.84	12,000	$300,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Caring Partners - Morris Sussex

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

0 30' 60'

COURTYARD ROCKAWAY-MOUNT ARLINGTON

Subwatershed: Lamington River

Site Area: 415,860 sq. ft.

Address: 15 Howard Boulevard
Mount Arlington, NJ 07856

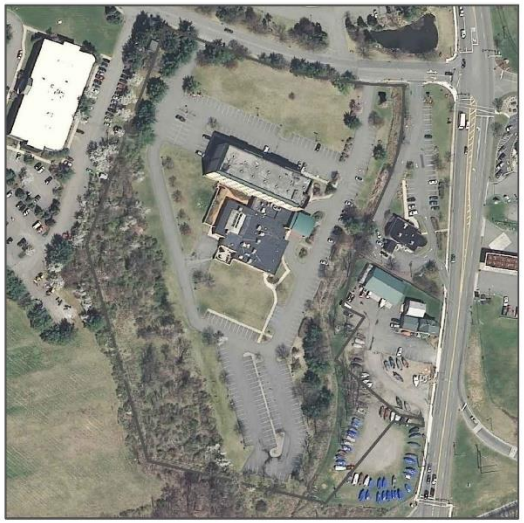
Block and Lot: Block 61, Lot 23.01

A large amount of runoff is generated by the parking lot during storm events. Most of the parking spaces can be replaced with pervious pavement to efficiently manage this stormwater runoff. Two rain gardens can be installed in the grass area along the west side of the building to capture, treat, and infiltrate stormwater runoff from the driveway. 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"
43	178,634	8.6	90.2	820.2	0.139	4.90

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	0.212	36	16,591	0.62	1,550	$7,750
Pervious pavement	1.566	262	122,373	4.59	18,600	$465,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Courtyard Rockaway - Mount Arlington

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

0 50' 100'

DAVY'S DOGS

Subwatershed: Lamington River

Site Area: 23,023 sq. ft.

Address: 14 Howard Boulevard
Mount Arlington, NJ 07856

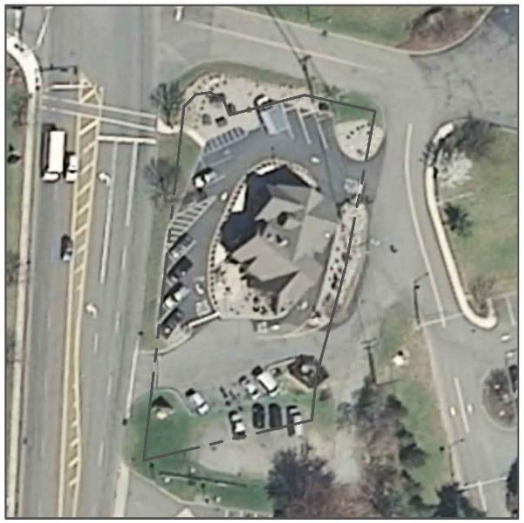
Block and Lot: Block 69, Lot 3

A large amount of runoff is generated by the parking lot during storm events. Parking spaces along the west and south sides of the building can be replaced with pervious pavement to manage this stormwater 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"
95	21,873	1.1	11.0	100.4	0.017	0.60

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	0.156	26	12,215	0.46	2,800	$70,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Davy's Dogs

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

0 20' 40'

ELKS LODGE

Subwatershed: **Lamington River**

Site Area: **331,056 sq. ft.**

Address: **201 Howard Boulevard**
Mount Arlington, NJ 07856

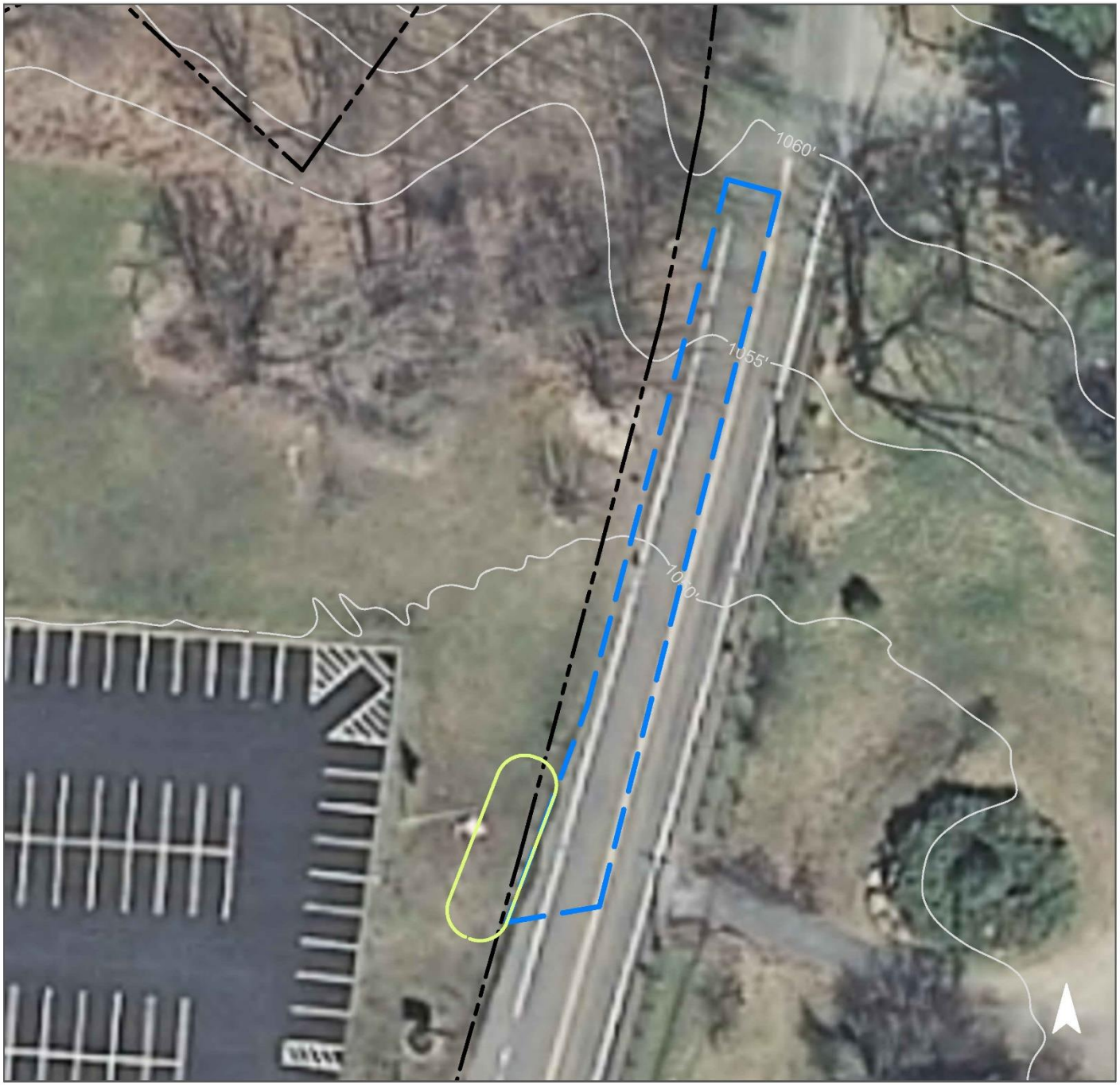
Block and Lot: **Block 61, Lot 15**

A large amount of runoff is generated from Howard Boulevard during storm events. A bioretention system can be implemented in the grass area along the road, and a curb cut will allow this system to capture, treat, and infiltrate stormwater runoff before it reaches the catch basin. 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"
24	79,097	3.8	39.9	363.2	0.062	2.17

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.083	14	6,515	0.24	800	$4,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Elks Lodge

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

0 20' 40'

GUARANTEED RATE OF MOUNT ARLINGTON

Subwatershed: **Lamington River**

Site Area: **442,363 sq. ft.**

Address: **111 Howard Boulevard**
Mount Arlington, NJ 07856

Block and Lot: **Block 61.02, Lot 1**

A large amount of runoff is generated by the parking lot during storm events. Most of the parking spaces can be replaced with pervious pavement to efficiently manage this stormwater runoff. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
56	248,092	12.0	125.3	1,139.1	0.193	6.80

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavement	1.342	225	104,862	3.93	32,600	$815,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Guaranteed Rate of
Mount Arlington

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

0 40' 80'

PROFESSIONAL BUILDING

Subwatershed: **Lamington River**

Site Area: **132,914 sq. ft.**

Address: **22 Howard Boulevard**
Mount Arlington, NJ 07856

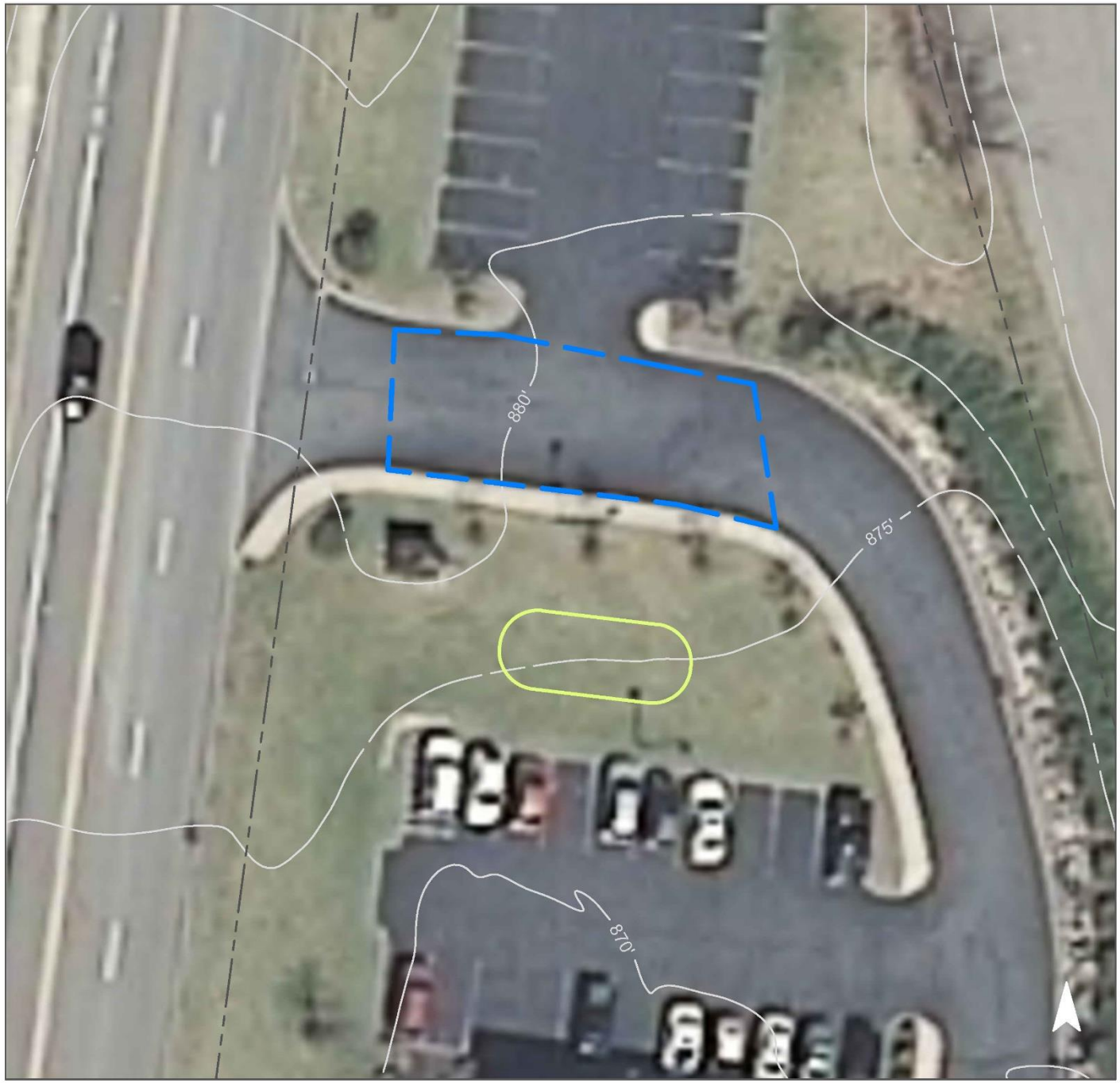
Block and Lot: **Block 61.01, Lot 1**

A bioretention system can be implemented in the grass area between the entrance of the parking lot and the building to capture, treat, and infiltrate stormwater runoff from the driveway. 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"
54	71,528	3.4	36.1	328.4	0.056	1.96

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.053	9	4,174	0.16	500	$2,500

GREEN INFRASTRUCTURE RECOMMENDATIONS



Professional Building

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

0 15' 30'

c. Summary of Existing Conditions

Summary of Existing Conditions

Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	Existing Annual Loads TP (lb/yr)	TN (lb/yr)	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)	Annual (Mgal)
LAKE HOPATCONG SUBWATERSHED	**63.41**	**2,762,087**			**28.6**	**299.3**	**2,720.8**		**13.60**	**592,594**	**0.396**	**13.95**
Bagel Mike's												
Total Site Info	0.63	27,519	43	7.01	1.1	11.3	102.6	81	0.51	22,345	0.017	0.61
Edith M. Decker Elementary School												
Total Site Info	15.96	695,030	8	5.01	3.9	41.0	372.8	12	1.86	81,192	0.063	2.23
Mount Arlington Borough Hall												
Total Site Info	0.91	39,732	10	78	1.1	11.2	101.4	56	0.51	22,089	0.017	0.61
Mount Arlington Fire Department												
Total Site Info	0.17	7,513	25	3	0.3	2.6	24.0	70	0.12	5,237	0.004	0.14
Mount Arlington Police Department												
Total Site Info	0.38	16,561	33	2	0.5	5.4	49.4	65	0.25	10,765	0.008	0.30
Mount Arlington Post Office												
Total Site Info	0.95	41,505	29	1	1.4	14.3	129.9	68	0.65	28,296	0.022	0.78
Mount Arlington Public Library												
Total Site Info	2.53	110,016	47	1	1.4	14.4	130.8	26	0.65	28,490	0.022	0.78
Mount Arlington Public School												
Total Site Info	10.98	478,427	121	59	5.4	56.6	514.9	23	2.57	112,153	0.022	0.78
Ridgeview Lane												
Total Site Info	30.89	1,345,785	49	1	13.6	142.4	1,294.9	21	6.47	282,028	0.220	7.74
LAMINGTON RIVER SUBWATERSHED	**37.50**	**1,633,405**			**36.9**	**386.7**	**3,515.9**		**17.58**	**765,764**	**0.597**	**21.00**
Caring Partners-Morris Sussex												
Total Site Info	6.62	288,189	61	23.06	8.0	84.1	764.6	58	3.82	166,540	0.130	4.57
Courtyard Rockaway-Mount Arlington												
Total Site Info	9.55	415,860	61	23.01	8.6	90.2	820.2	43	4.10	178,634	0.139	4.90

Summary of Existing 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)
Davy's Dogs												
Total Site Info	0.53	23,023	69	3	1.1	11.0	100.4	95	0.50	21,873	0.017	0.60
Elks Lodge												
Total Site Info	7.60	331,056	61	15	3.8	39.9	363.2	24	1.82	79,097	0.062	2.17
Guaranteed Rate of Mount Arlington												
Total Site Info	10.16	442,363	61.02	1	12.0	125.3	1,139.1	56	5.70	248,092	0.193	6.80
Professional Building												
Total Site Info	3.05	132,914	61.01	1	3.4	36.1	328.4	54	1.64	71,528	0.056	1.96

d. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
	LAKE HOPATCONG SUBWATERSHED	**78,455**	**1.80**	**2.044**	**342**	**159,750**	**5.99**	**24,120**			**$428,600**	**12.9%**
1	**Bagel Mike's**											
	Pervious pavement	11,000	0.25	0.287	48	22,395	0.84	2,800	25	SF	$70,000	49.2%
	Total Site Info	**11,000**	**0.25**	**0.287**	**48**	**22,395**	**0.84**	**2,800**			**$70,000**	**49.2%**
2	**Edith M. Decker Elementary School**											
	Bioretention systems	15,000	0.34	0.391	65	30,541	1.14	3,900	5	SF	$19,500	18.5%
	Total Site Info	**15,000**	**0.34**	**0.391**	**65**	**30,541**	**1.14**	**3,900**			**$19,500**	**18.5%**
3	**Mount Arlington Borough Hall**											
	Bioretention system	2,200	0.05	0.057	10	4,481	0.17	850	5	SF	$4,250	5.5%
	Pervious pavement	1,700	0.04	0.044	7	3,463	0.13	1,700	25	SF	$42,500	4.3%
	Total Site Info	**3,900**	**0.09**	**0.102**	**17**	**7,944**	**0.30**	**2,550**			**$46,750**	**9.8%**
4	**Mount Arlington Fire Department**											
	Pervious pavement	4,200	0.10	0.109	18	8,550	0.32	1,300	25	SF	$32,500	80.2%
	Total Site Info	**4,200**	**0.10**	**0.109**	**18**	**8,550**	**0.32**	**1,300**			**$32,500**	**80.2%**
5	**Mount Arlington Police Department**											
	Bioretention system	1,490	0.03	0.039	6	3,037	0.11	670	5	SF	$3,350	13.8%
	Pervious pavement	1,020	0.02	0.027	4	2,079	0.08	250	25	SF	$6,250	9.5%
	Rainwater harvesting	395	0.01	0.010	2	808	0.03	1,000	2	gal	$2,000	0.1%
	Total Site Info	**2,905**	**0.07**	**0.076**	**13**	**5,924**	**0.22**	**1,920**			**$11,600**	**23.4%**
6	**Mount Arlington Post Office**											
	Pervious pavement	9,200	0.21	0.240	40	18,730	0.70	2,900	25	SF	$72,500	32.5%
	Total Site Info	**9,200**	**0.21**	**0.240**	**40**	**18,730**	**0.70**	**2,900**			**$72,500**	**32.5%**
7	**Mount Arlington Public Library**											
	Bioretention systems	1,300	0.03	0.034	6	2,648	0.10	350	5	SF	$1,750	4.6%
	Pervious pavement	11,000	0.25	0.287	48	22,395	0.84	2,750	25	SF	$68,750	38.6%
	Total Site Info	**12,300**	**0.28**	**0.320**	**54**	**25,043**	**0.94**	**3,100**			**$70,500**	**43.2%**
8	**Mount Arlington Public School**											
	Bioretention system	1,000	0.02	0.026	4	2,035	0.08	550	5	SF	$2,750	0.9%
	Pervious pavement	10,300	0.24	0.268	45	20,974	0.79	2,700	25	SF	$67,500	9.2%
	Total Site Info	**11,300**	**0.26**	**0.294**	**49**	**23,008**	**0.87**	**3,250**			**$70,250**	**10.1%**

Summary of Proposed Green Infrastructure Practices

	Subwatershed/Site Name/Total Site Info/GI Practice	Potential Management Area Area (SF)	Potential Management Area Area (ac)	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Max Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cfs)	Size of BMP (SF)	Unit Cost ($)	Unit	Total Cost ($)	I.C. Treated %
9	**Ridgeview Lane**											
	Bioretention systems	4,800	0.11	0.125	21	9,776	0.37	1,250	5	SF	$6,250	1.7%
	Pervious pavement	3,850	0.09	0.100	17	7,839	0.29	1,150	25	SF	$28,750	1.4%
	Total Site Info	**8,650**	**0.20**	**0.225**	**38**	**17,615**	**0.66**	**2,400**			**$35,000**	**3.1%**
	LAMINGTON RIVER SUBWATERSHED	**196,300**	**4.51**	**5.115**	**856**	**399,709**	**15.84**	**68,850**			**$1,664,250**	**25.6%**
10	**Caring Partners-Morris Sussex**											
	Pervious pavement	65,300	1.50	1.701	285	132,979	5.84	12,000	25	SF	$300,000	39.2%
	Total Site Info	**65,300**	**1.50**	**1.701**	**285**	**132,979**	**5.84**	**12,000**			**$300,000**	**39.2%**
11	**Courtyard Rockaway-Mount Arlington**											
	Bioretention systems	8,150	0.19	0.212	36	16,591	0.62	1,550	5	SF	$7,750	4.6%
	Pervious pavement	60,100	1.38	1.566	262	122,373	4.59	18,600	25	SF	$465,000	33.6%
	Total Site Info	**68,250**	**1.57**	**1.778**	**298**	**138,963**	**5.21**	**20,150**			**$472,750**	**38.2%**
12	**Davy's Dogs**											
	Pervious pavement	6,000	0.14	0.156	26	12,215	0.46	2,800	25	SF	$70,000	27.4%
	Total Site Info	**6,000**	**0.14**	**0.156**	**26**	**12,215**	**0.46**	**2,800**			**$70,000**	**27.4%**
13	**Elks Lodge**											
	Bioretention system	3,200	0.07	0.083	14	6,515	0.24	800	5	SF	$4,000	4.0%
	Total Site Info	**3,200**	**0.07**	**0.083**	**14**	**6,515**	**0.24**	**800**			**$4,000**	**4.0%**
14	**Guaranteed Rate of Mount Arlington**											
	Pervious pavement	51,500	1.18	1.342	225	104,862	3.93	32,600	25	SF	$815,000	20.8%
	Total Site Info	**51,500**	**1.18**	**1.342**	**225**	**104,862**	**3.93**	**32,600**			**$815,000**	**20.8%**
15	**Professional Building**											
	Bioretention system	2,050	0.05	0.053	9	4,174	0.16	500	5	SF	$2,500	2.9%
	Total Site Info	**2,050**	**0.05**	**0.053**	**9**	**4,174**	**0.16**	**500**			**$2,500**	**2.9%**