RUTGERS
New Jersey Agricultural
Experiment Station

Draft

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

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

November 16, 2015

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Introduction

Located in Union County in central New Jersey, Mountainside Borough covers approximately 4.0 square miles. Figures 1 and 2 illustrate that Mountainside Borough is dominated by urban land uses. A total of 60.5% of the municipality's land use is classified as urban. Of the urban land in Mountainside 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 Mountainside 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 Mountainside Borough. Based upon the 2007 NJDEP land use/land cover data, approximately 21.7% of Mountainside Borough has impervious cover. This level of impervious cover suggests that the streams in Mountainside Borough are likely impacted.[1]

Methodology

Mountainside 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

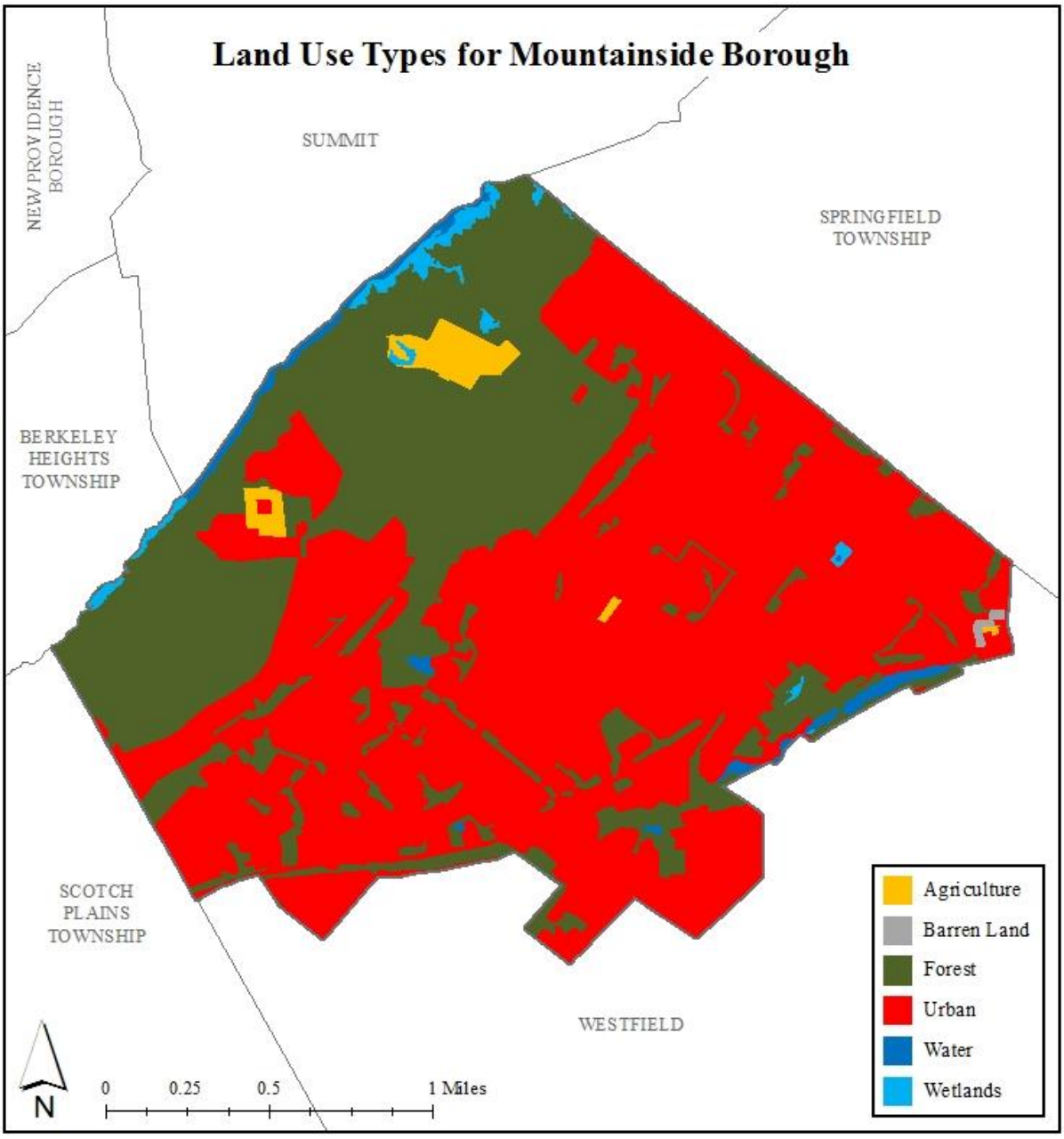


Figure 1: Map illustrating the land use in Mountainside Borough

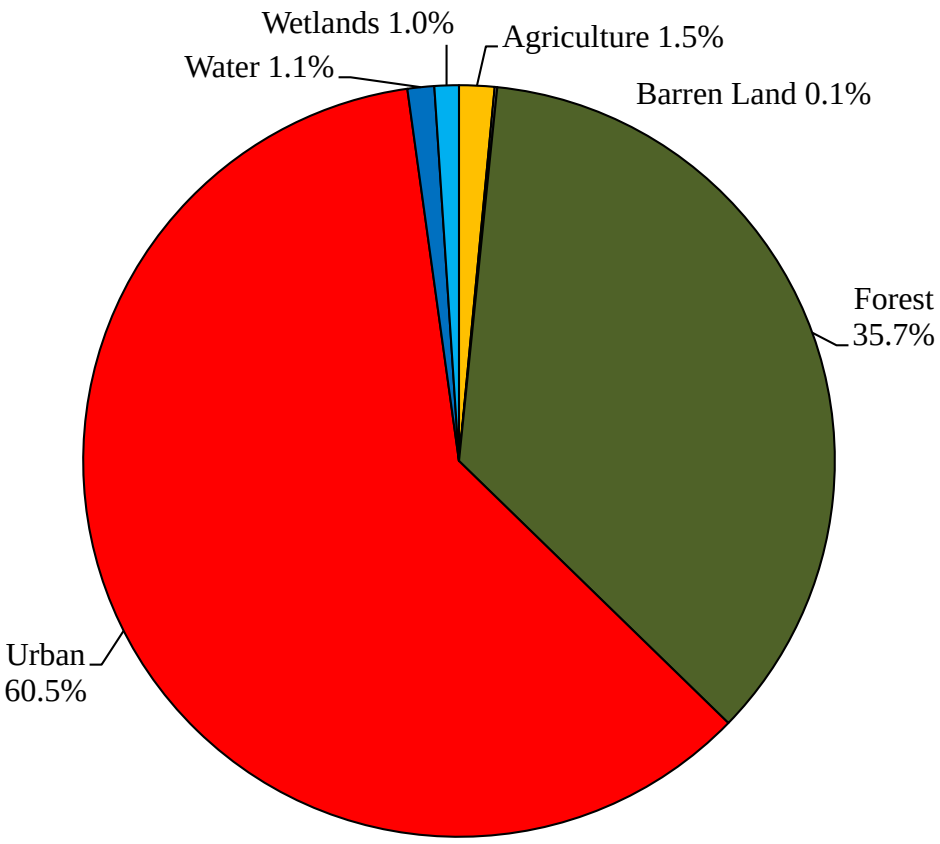


Figure 2: Pie chart illustrating the land use in Mountainside Borough

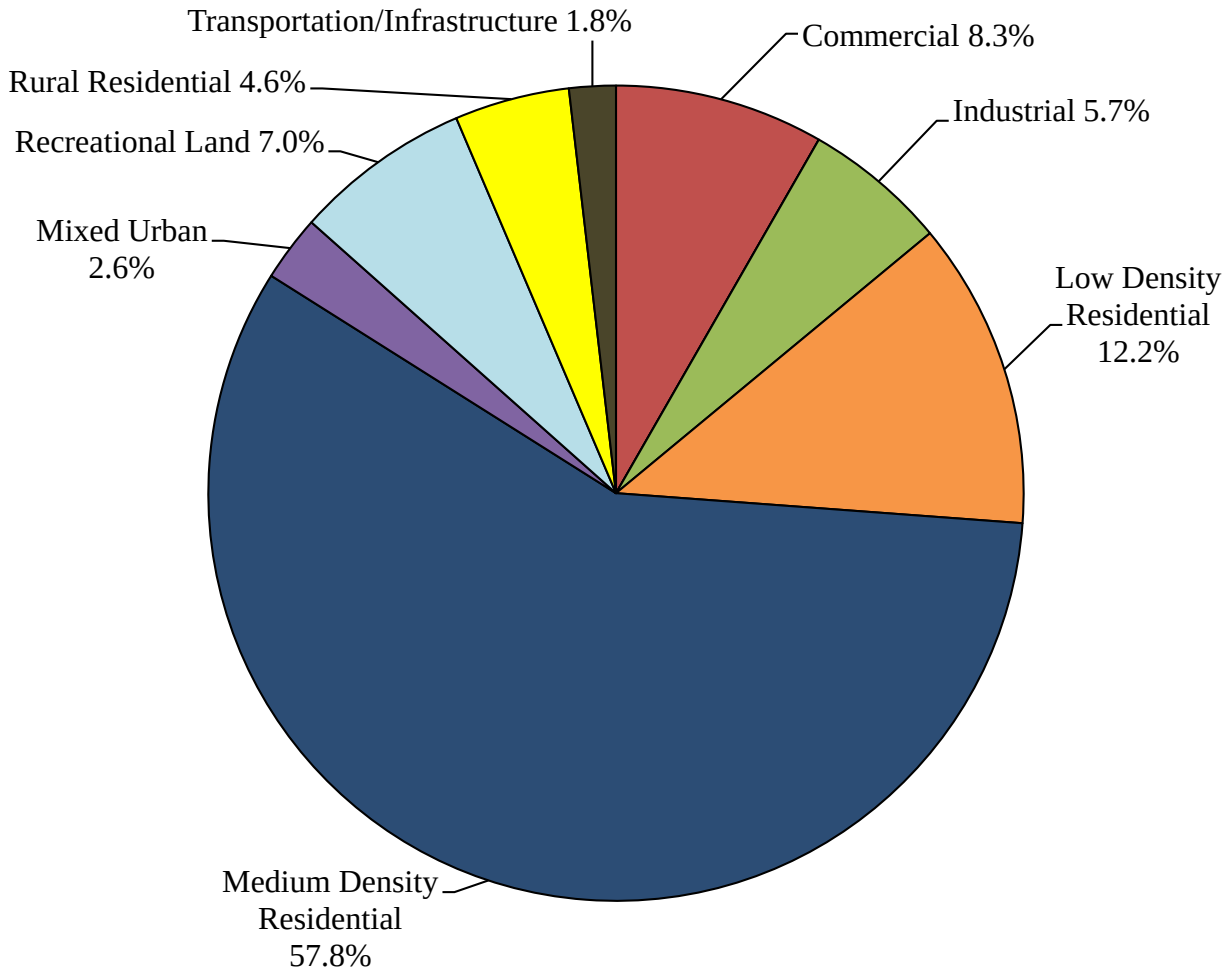


Figure 3: Pie chart illustrating the various types of urban land use in Mountainside Borough

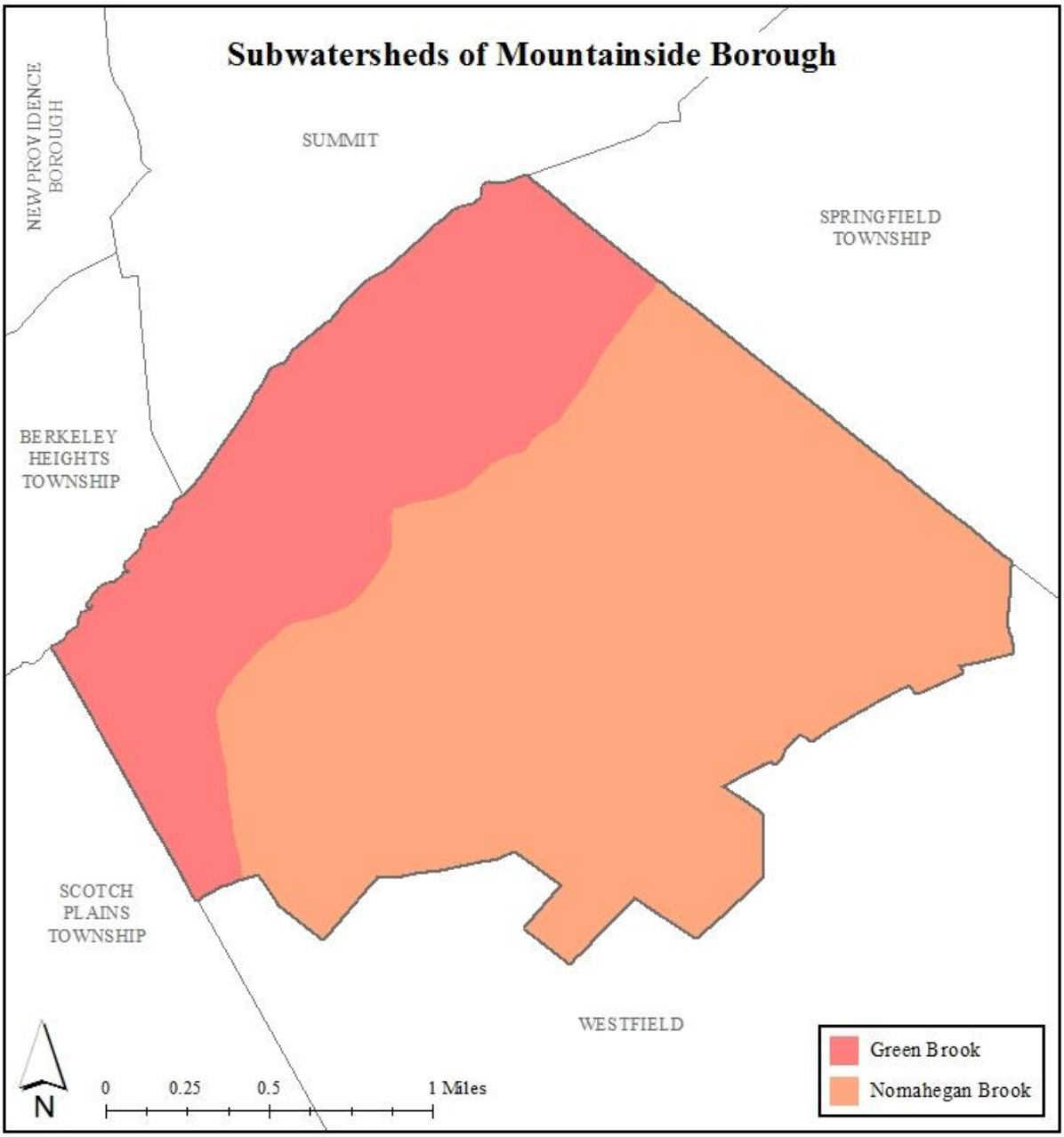


Figure 4: Map of the subwatersheds in Mountainside Borough

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 Mountainside 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 Mountainside 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

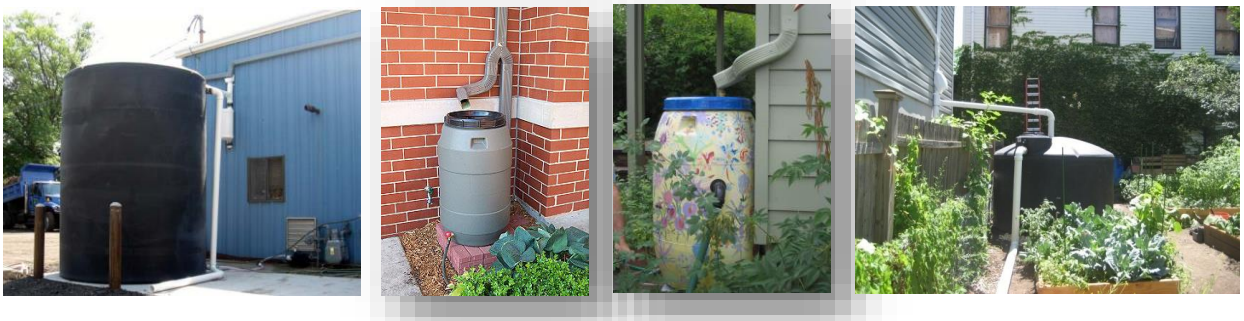
These are landscaped features that are designed to capture, treat, and infiltrate stormwater runoff. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating a wildlife habitat while managing stormwater runoff. Bioretention systems also can be used in soils 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.

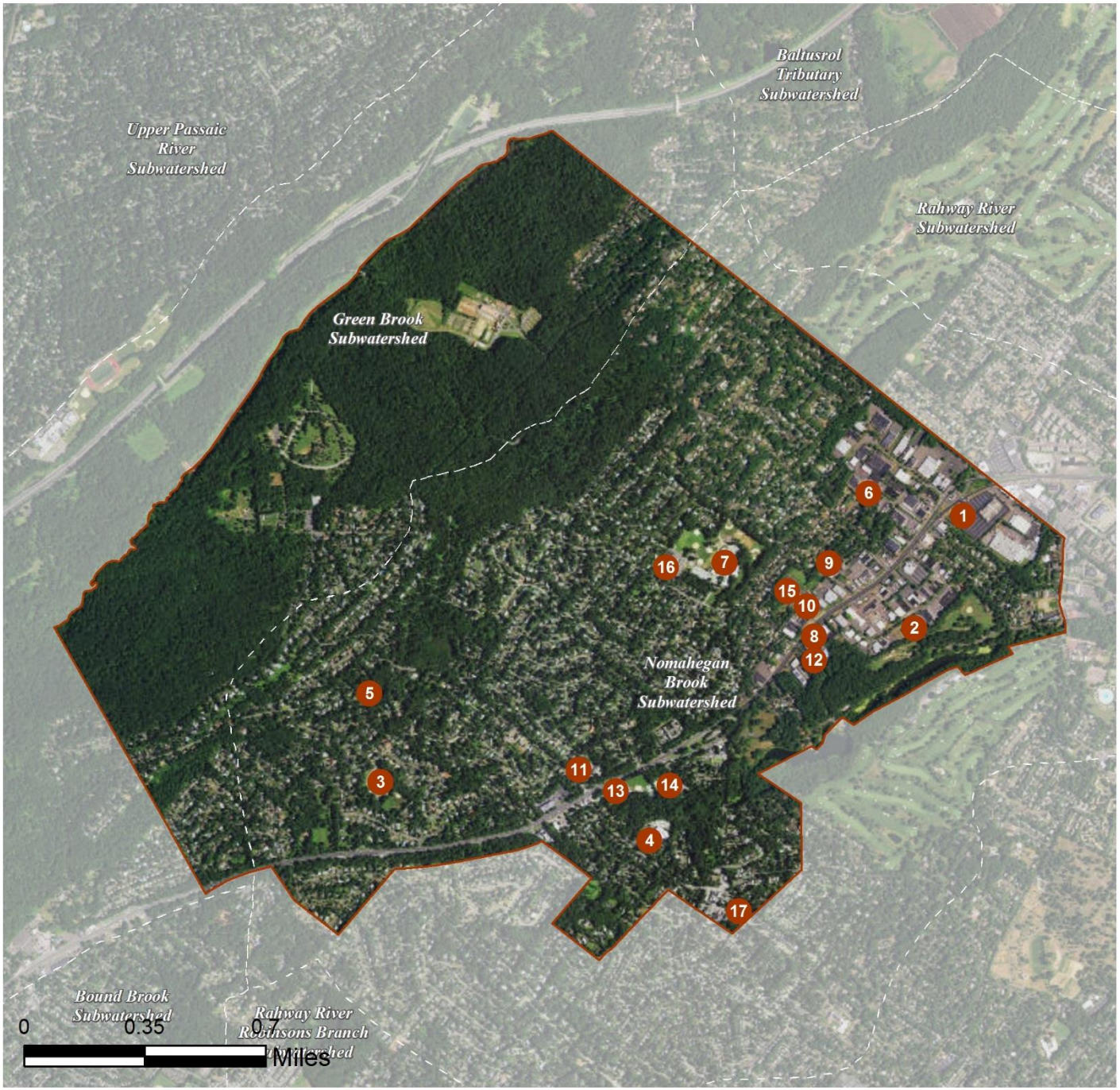
Additionally, development projects that are in need of providing off-site compensation for stormwater impacts can use the projects in this plan as a starting point. The municipality can quickly convert this impervious cover reduction action plan into a stormwater mitigation plan and incorporate it into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

a. Overview Map of the Project

MOUNTAINSIDE BOROUGH: CLIMATE RESILIENT GREEN INFRASTRUCTURE FOR THE RARITAN BASIN

b. Green Infrastructure Sites

MOUNTAINSIDE BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE NOMAHEGAN BROOK SUBWATERSHED:

1. AMC Loews Moutainside 10
2. Arc Kohler School
3. Beechwood School
4. Children's Specialized Hospital
5. Community Presbyterian Church
6. Cornerstone Day School
7. Deerfield Middle School
8. Elks Lodge
9. Gastro-Surgi Center of NJ
10. ManorCare Health Services - Mountainside
11. Mountainside Fire Department
12. Mountainside Indoor Tennis Center
13. Mountainside Municipal Building
14. Mountainside Swimming Pool
15. Oasis Church
16. Our Lady of Lourdes
17. US Post Office

c. Proposed Green Infrastructure Concepts

AMC LOEWS MOUNTAINSIDE 10

Subwatershed: Nomahegan Brook

Site Area: 457,753 sq. ft.

Address: 1021 US 22
Mountainside, NJ 07092

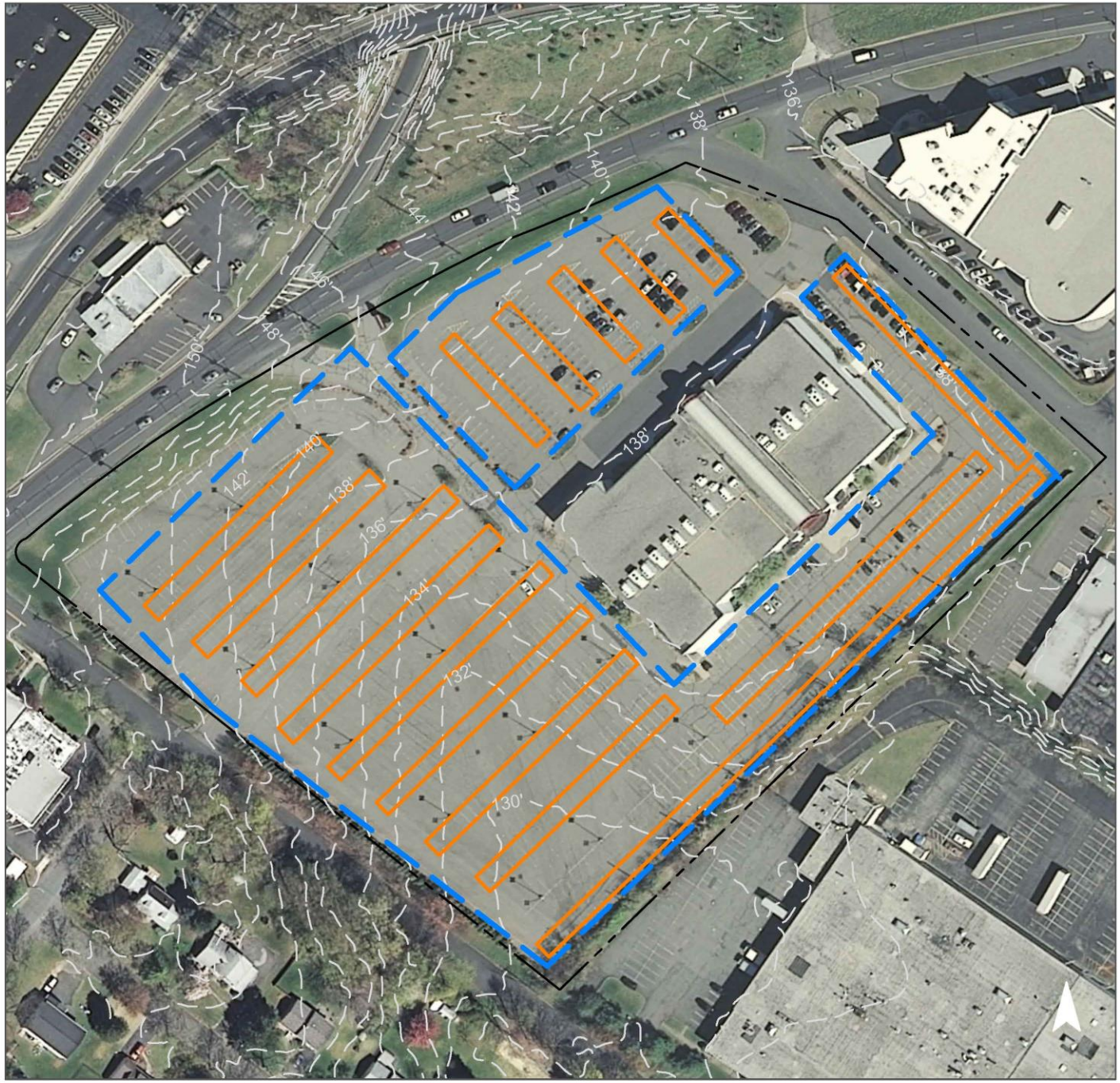
Block and Lot: Block 24.J, Lot 1

The large parking lot contains many catch basins to which most of the stormwater drains. Pervious pavement can replace existing parking spaces to capture 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"
90	410,623	19.8	207.4	1,885.3	0.320	11.26

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	7.524	1,260	570,013	21.40	77,941	$1,948,525

GREEN INFRASTRUCTURE RECOMMENDATIONS



AMC Loews Mountainside 10

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

0 75' 150'

ARC KOHLER SCHOOL

Subwatershed: Nomahegan Brook

Site Area: 140,535 sq. ft.

Address: 1137 Globe Avenue
Mountainside, NJ 07092

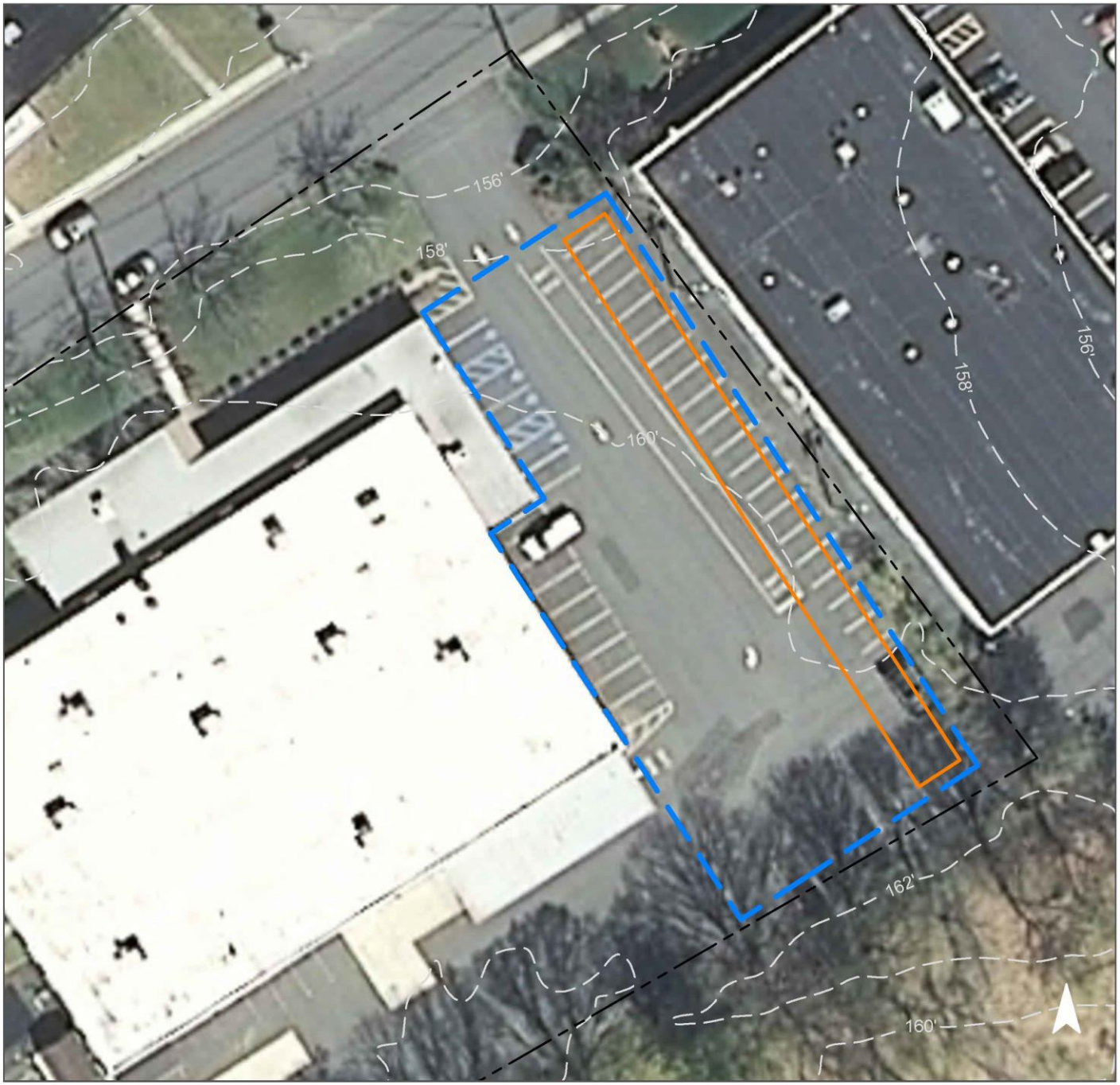
Block and Lot: Block 23.C, Lot 8.Q

The school has disconnected downspouts flowing directly onto the parking lot on the eastern side of the school. Parking spaces can be replaced with pervious pavement to capture 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"
60	83,934	4.0	42.4	385.4	0.065	2.30

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
Pervious pavements	0.498	83	37,722	1.42	3,403	$85,075

GREEN INFRASTRUCTURE RECOMMENDATIONS



Arc Kohler School

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

0 25' 50'

BEECHWOOD SCHOOL

Subwatershed: Nomahegan Brook

Site Area: 364,868 sq. ft.

Address: 1497 Woodacres Drive
Mountainside, NJ 07092

Block and Lot: Block 3.A, Lot 10

A bioretention system could be built off of the southern side of the school to capture, treat, and infiltrate roof runoff from the nearby downspouts. In both parking lots parking spaces can be replaced with pervious pavement 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"
24	88,113	4.2	44.5	404.6	0.069	2.42

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.152	25	11,482	0.43	1,023	$5,115
Pervious pavements	0.629	105	47,625	1.79	6,243	$156,075

GREEN INFRASTRUCTURE RECOMMENDATIONS

Beechwood School

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

0 40' 80'

CHILDREN'S SPECIALIZED HOSPITAL

Subwatershed: Nomahegan Brook

Site Area: 342,256 sq. ft.

Address: 150 New Providence Road
Mountainside, NJ 07092

Block and Lot: Block 14, Lot 19

This site contains three parking areas in front of the hospital building. Many of the parking spots can be replaced with pervious pavement to collect and infiltrate runoff. A bioretention system can also be installed to capture, treat, and infiltrate rooftop 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"
59	203,043	9.8	102.5	932.2	0.158	5.57

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.022	4	1,638	0.06	236	$1,180
Pervious pavements	0.887	149	67,238	2.52	7,407	$185,175

GREEN INFRASTRUCTURE RECOMMENDATIONS

Children's Specialized Hospital

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

0 50' 100'

COMMUNITY PRESBYTERIAN CHURCH

Subwatershed: Nomahegan Brook

Site Area: 192,751 sq. ft.

Address: 1449 Deer Path
Mountainside, NJ 07092

Block and Lot: Block 3.I, Lot 23

The church parking lot runoff primarily drains to turf grass on the east side of the site. Pervious pavement can be installed in parking spots to capture and infiltrate stormwater being generated by the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
32	61,524	3.0	31.1	282.5	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
Pervious pavements	0.734	123	55,569	2.09	7,476	$186,900

GREEN INFRASTRUCTURE RECOMMENDATIONS

Community Presbyterian Church

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

0 25' 50'

CORNERSTONE DAY SCHOOL

Subwatershed: Nomahegan Brook

Site Area: 53,825 sq. ft.

Address: 1101 Bristol Road
Mountainside, NJ 07092

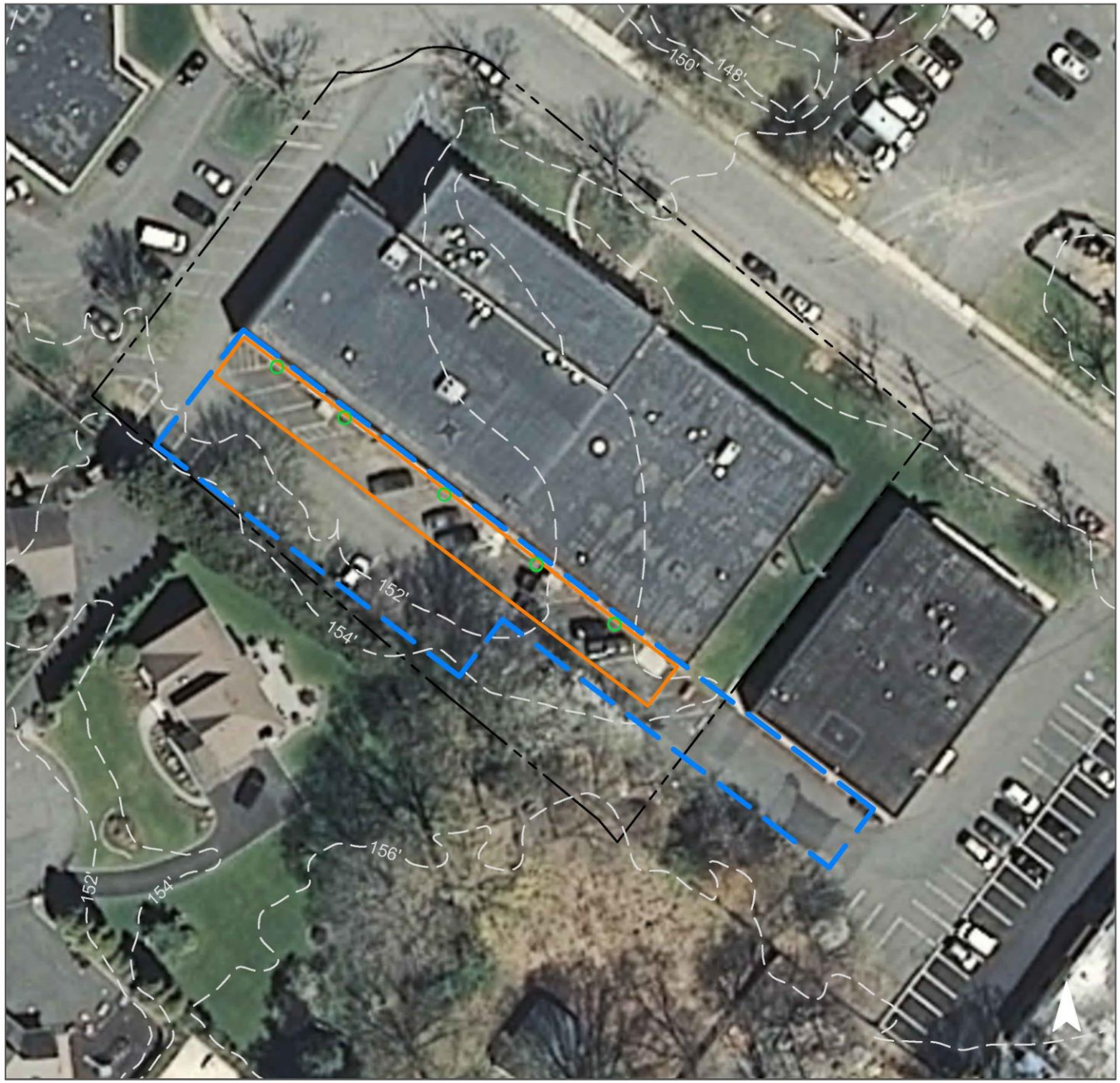
Block and Lot: Block 7.D, Lot 42

There are multiple connected downspouts along the southwest side of the building that can be disconnected and the parking spaces on the southwest side can be replaced with pervious pavement to capture 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"
85	45,510	2.2	23.0	209.0	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
Pervious pavements	0.344	58	26,053	0.98	4,137	$103,425

GREEN INFRASTRUCTURE RECOMMENDATIONS



Cornerstone Day School

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

0 30' 60'

DEERFIELD MIDDLE SCHOOL

Subwatershed: **Nomahegan Brook**

Site Area: **866,154 sq. ft.**

Address: **302 Central Avenue**
Mountainside, NJ 07092

Block and Lot: **Block 5.U, Lot 23**

Multiple rows of parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater. Off of the eastern most section of the school a bioretention system can be installed to capture, treat, and infiltrate rooftop and pavement 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"
32	280,388	13.5	141.6	1,287.4	0.218	7.69

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	0.228	38	17,271	0.65	2,400	$12,000
Pervious pavements	0.579	97	43,900	1.65	11,962	$299,050

GREEN INFRASTRUCTURE RECOMMENDATIONS

Deerfield Middle School

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

0 75' 150'

ELKS LODGE

Subwatershed: Nomahegan Brook

Site Area: 49,280 sq. ft.

Address: 1193 US 22
Mountainside, NJ 07092

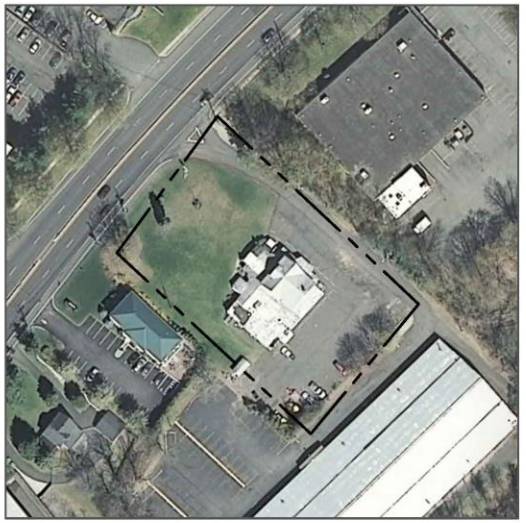
Block and Lot: Block 23.C, Lot 6.A

Parking spaces southeast of the building can be replaced with pervious pavement to capture and infiltrate stormwater generated by the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
59	29,268	1.4	14.8	134.4	0.023	0.80

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 pavements	0.417	70	31,603	1.19	4,272	$106,850

GREEN INFRASTRUCTURE RECOMMENDATIONS



Elks Lodge

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

0 25' 50'

GASTRO-SURGI CENTER OF NEW JERSEY

Subwatershed: Nomahegan Brook

Site Area: 56,206 sq. ft.

Address: 1132 Spruce Drive
Mountainside, NJ 07092

Block and Lot: Block 5.T, Lot 24.05

Parking spaces south of the building can be replaced with pervious pavement 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"
42	23,531	1.1	11.9	108.0	0.018	0.65

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	0.235	39	37,647	1.41	5,139	$128,475

GREEN INFRASTRUCTURE RECOMMENDATIONS

Gastro-Surgi Center of New Jersey

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

0 20' 40'

MANORCARE HEALTH SERVICES- MOUNTAINSIDE

Subwatershed: Nomahegan Brook

Site Area: 155,368 sq. ft.

Address: 1180 US 22
Mountainside, NJ 07092

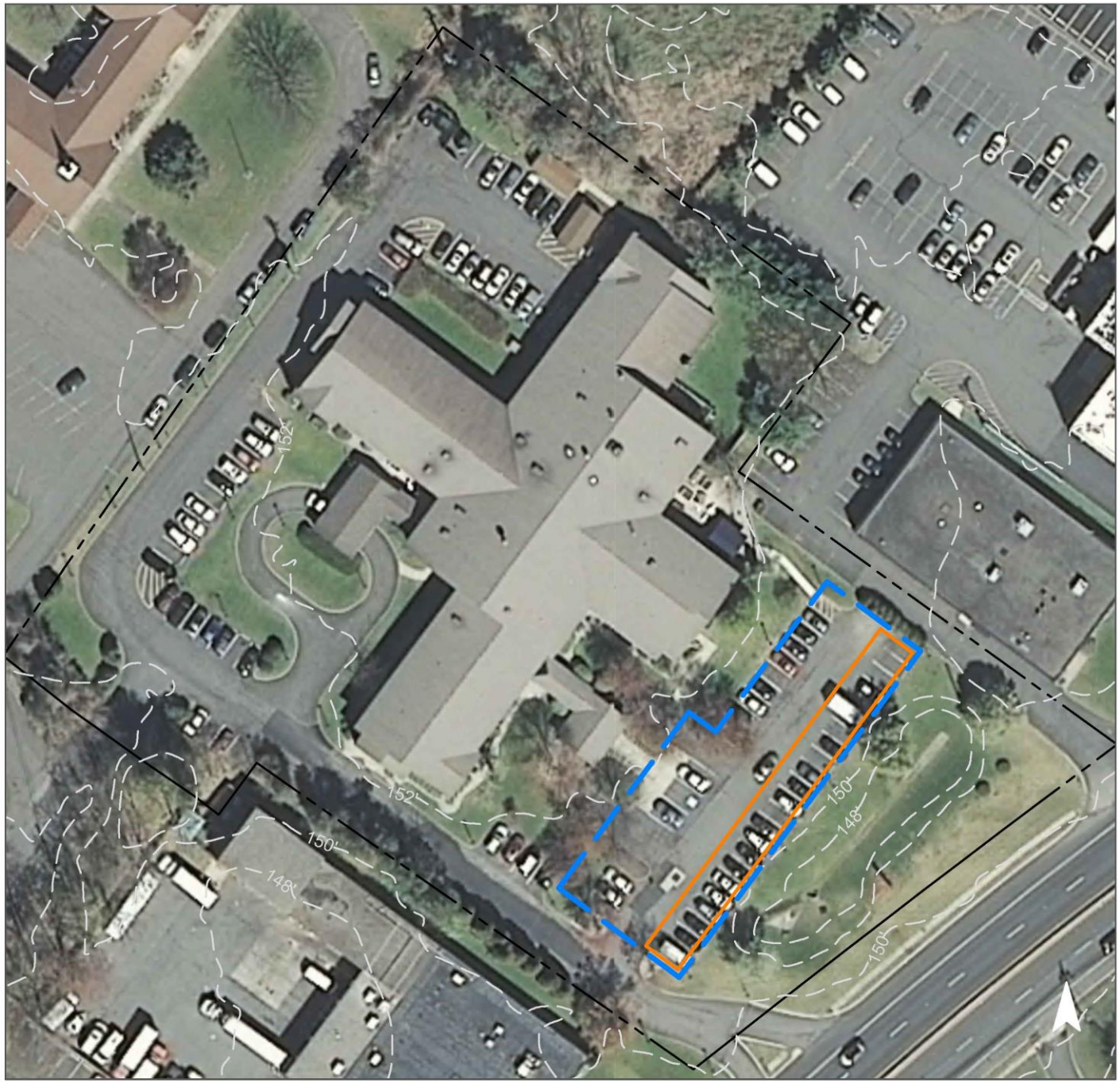
Block and Lot: Block 5.T, Lot 42

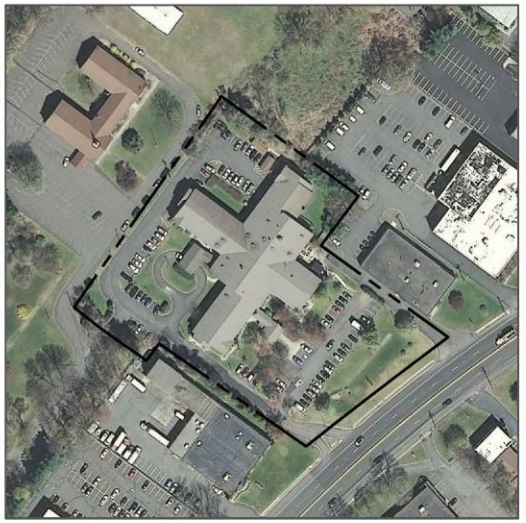
Parking spaces located southeast of the building can be replaced with pervious pavement to capture and infiltrate stormwater generated by the parking lot. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
77	119,561	5.8	60.4	548.9	0.093	3.28

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	0.391	65	29,628	1.11	4,330	$108,250

GREEN INFRASTRUCTURE RECOMMENDATIONS





ManorCare Health Services - Mountainside

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

0 40' 80'

MOUNTAINSIDE FIRE DEPARTMENT

Subwatershed: Nomahegan Brook

Site Area: 65,961 sq. ft.

Address: 210 New Providence Road
Mountainside, NJ 07092

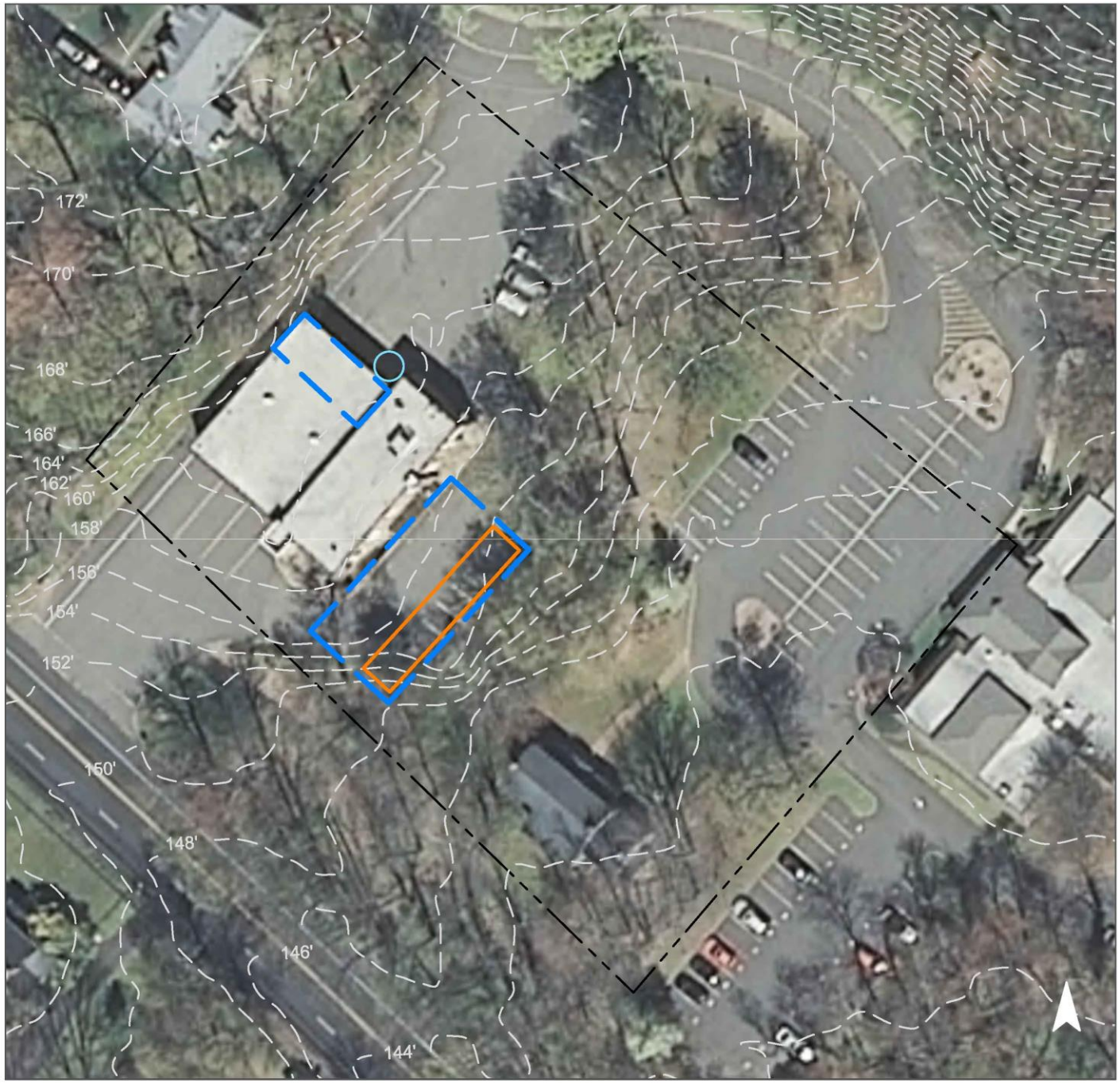
Block and Lot: Block 15.H, Lot 2

Rainwater can be harvested by installing a cistern at the firehouse. The water can be used for cleaning emergency vehicles or for conducting car wash fundraisers. Parking spots east of the building can be replaced with pervious pavement 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"
60	39,298	1.9	19.8	180.4	0.031	1.08

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.042	7	6,717	0.25	1,047	$26,175
Rainwater harvesting systems	0.022	4	800	0.06	800 (gal)	$1,600

GREEN INFRASTRUCTURE RECOMMENDATIONS



Mountainside Fire Department

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

0 30' 60'

MOUNTAINSIDE INDOOR TENNIS CENTER

Subwatershed: **Nomahegan Brook**

Site Area: **117,589 sq. ft.**

Address: **1191 US 22**
Mountainside, NJ 07092

Block and Lot: **Block 23.C, Lot 4**

This site contains a building that has disconnected downspouts on both sides of it. The driveway is highly eroded and could benefit from pervious pavement. Porous asphalt can be used to replace the existing driveway and parking spaces north of the building to capture and infiltrate stormwater generated by the building and 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"
69	81,044	3.9	40.9	372.1	0.063	2.22

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	1.219	204	92,356	3.47	11,874	$296,850

GREEN INFRASTRUCTURE RECOMMENDATIONS

Mountainside Indoor Tennis Center

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

0 50' 100'

MOUNTAINSIDE MUNICIPAL BUILDING

Subwatershed: Nomahegan Brook

Site Area: 67,026 sq. ft.

Address: 1385 US 22
Mountainside, NJ 07092

Block and Lot: Block 14, Lot 26

In the parking lot behind the building runoff flows from the building towards the woods. The parking spaces in this area can be replaced with pervious pavement 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"
56	37,537	1.8	19.0	172.3	0.029	1.03

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.421	70	31,872	1.20	5,971	$149,275

GREEN INFRASTRUCTURE RECOMMENDATIONS

Mountainside Municipal Building

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

0 30' 60'

MOUNTAINSIDE SWIMMING POOL

Subwatershed: Nomahegan Brook

Site Area: 121,258 sq. ft.

Address: 1005 Mountain Avenue
Mountainside, NJ 07092

Block and Lot: Block 14, Lot 1.C

Two rows of parking spaces can be replaced with pervious pavement 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"
69	83,491	4.0	42.2	383.3	0.065	2.29

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	0.969	162	73,431	2.76	10,143	$253,575

GREEN INFRASTRUCTURE RECOMMENDATIONS

Mountainside Swimming Pool

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

0 40' 80'

OASIS CHURCH

Subwatershed: **Nomahegan Brook**

Site Area: **178,318 sq. ft.**

Address: **1180 Spruce Drive**
Mountainside, NJ 07092

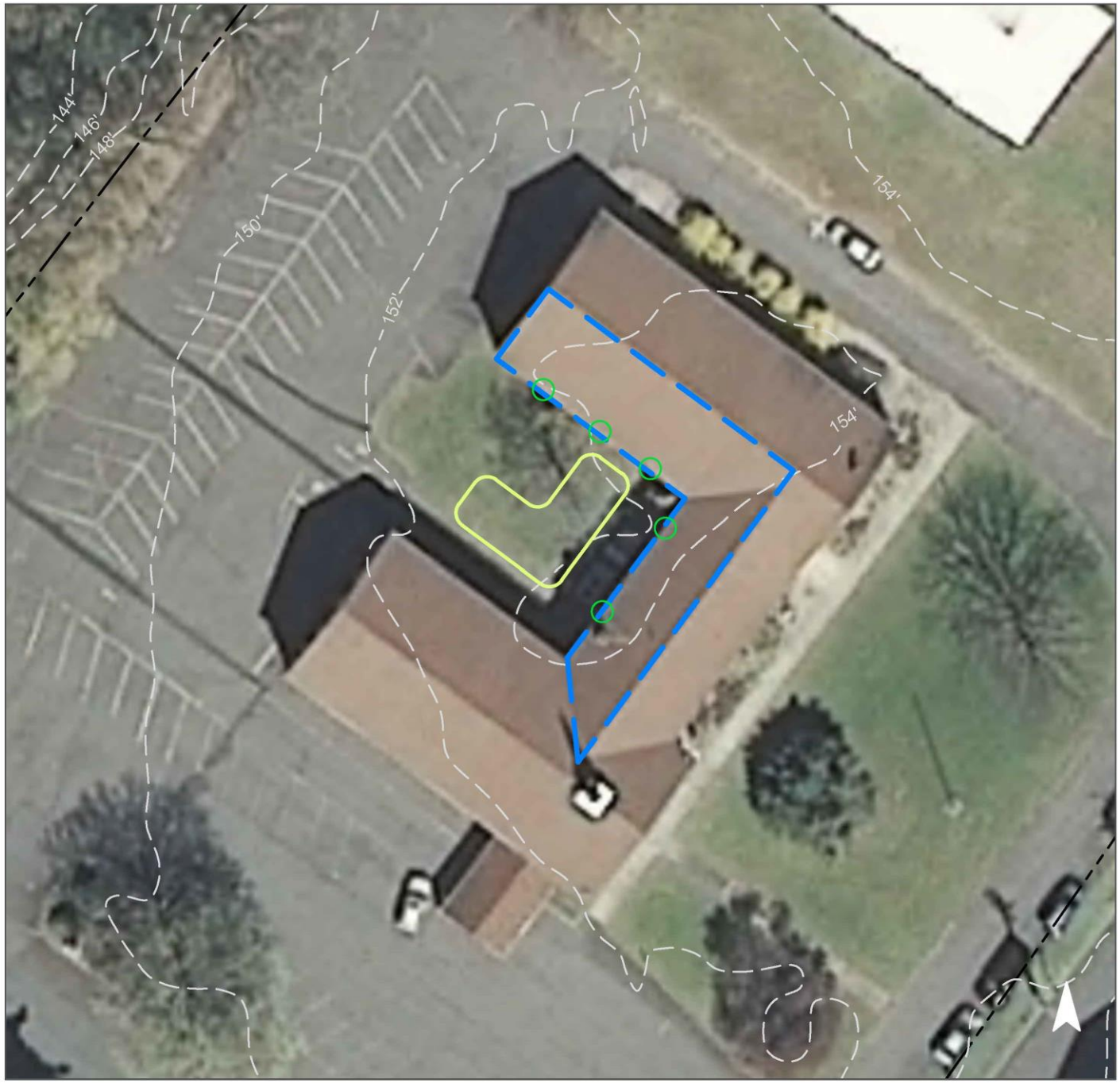
Block and Lot: **Block 5.T, Lot 38**

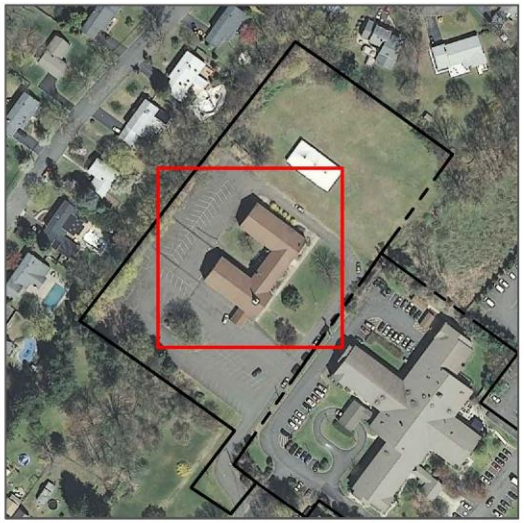
In the back of the church a bioretention system can be installed to capture, treat, and infiltrate rooftop runoff by disconnecting and redirecting multiple downspouts into it. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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"
51	90,350	4.4	45.6	414.8	0.070	2.48

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	794	$3,970

GREEN INFRASTRUCTURE RECOMMENDATIONS





Oasis Church

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

0 20' 40'

OUR LADY OF LOURDES

Subwatershed: **Nomahegan Brook**

Site Area: **429,332 sq. ft.**

Address: **300 Central Avenue**
Mountainside, NJ 07092

Block and Lot: **Block 5.k, Lot 6**

Parking spaces can be replaced with pervious pavement to capture and infiltrate stormwater generated by the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
40	171,144	8.3	86.4	785.8	0.133	4.69

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
Pervious pavements	0.581	97	92,909	3.49	12,958	$323,950

GREEN INFRASTRUCTURE RECOMMENDATIONS

Our Lady of Lourdes

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

0 30' 60'

US POST OFFICE

Subwatershed: Nomahegan Brook

Site Area: 15,191 sq. ft.

Address: 604 Sherwood Parkway
Mountainside, NJ 07092

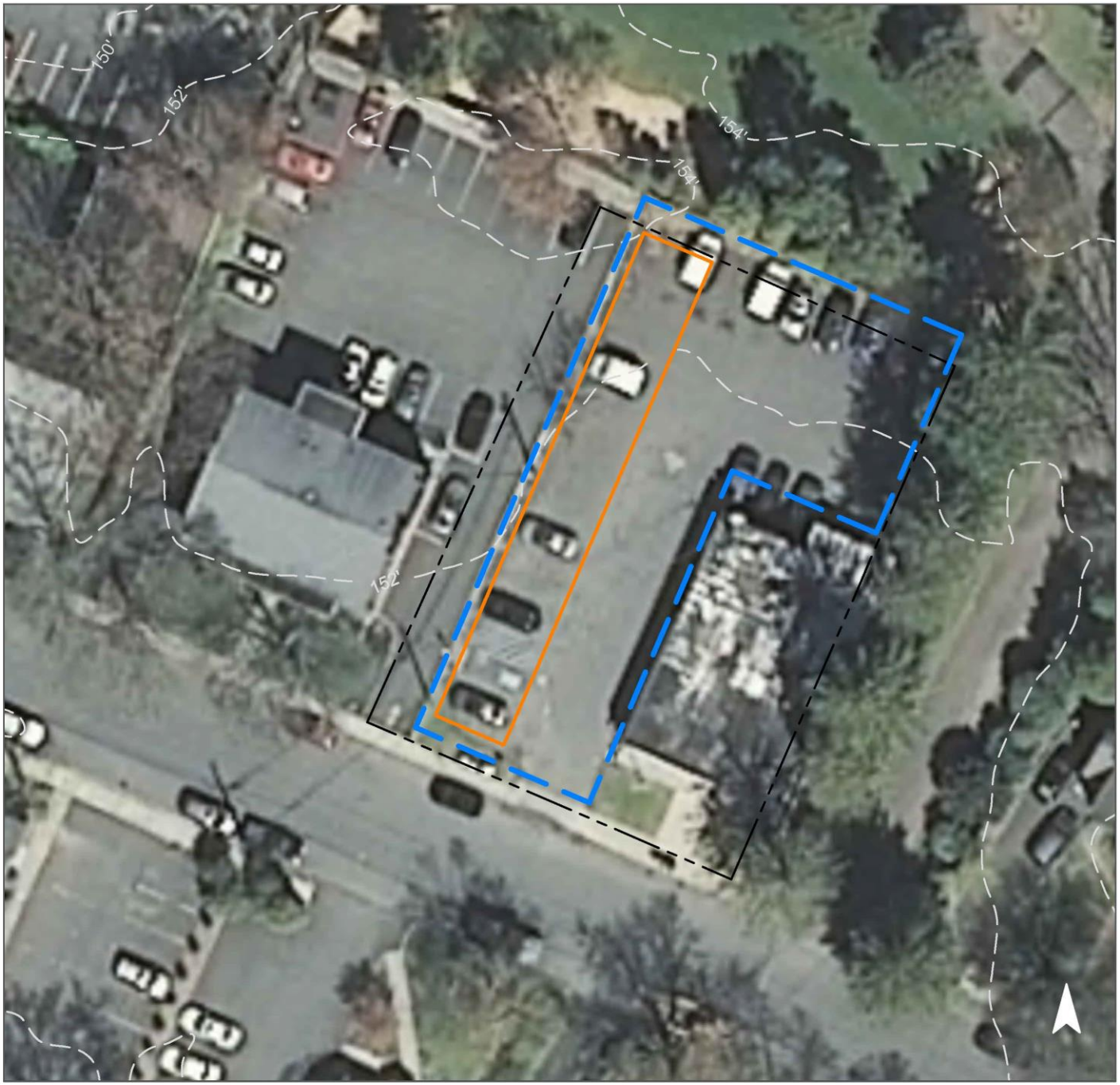
Block and Lot: Block 21, Lot 27.B

Parking spaces east of the building can be replaced with pervious pavement to capture 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"
80	12,153	0.6	6.1	55.8	0.009	0.33

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Pervious pavements	0.121	20	19,328	0.73	2,681	$67,025

GREEN INFRASTRUCTURE RECOMMENDATIONS



US Post Office

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

0 20' 40'

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)
NOMAHEGAN BROOK SUBWATERSHED	**84.34**	**3,673,671**			**89.7**	**939.7**	**8,542.3**		**42.71**	**1,860,512**	**1.450**	**51.03**
AMC Loews Mountainside 10												
Total Site Info	10.51	457,753	24.J	1	19.8	207.4	1,885.3	90	9.43	410,623	0.320	11.26
Arc Kohler School												
Total Site Info	3.23	140,535	23.C	8.Q	4.0	42.4	385.4	60	1.93	83,934	0.065	2.30
Beechwood School												
Total Site Info	8.38	364,868	3.A	10	4.2	44.5	404.6	24	2.02	88,113	0.069	2.42
Children's Specialized Hospital												
Total Site Info	7.86	342,256	14	19	9.8	102.5	932.2	59	4.66	203,043	0.158	5.57
Community Presbyterian Church												
Total Site Info	4.42	192,751	3.I	23	3.0	31.1	282.5	32	1.41	61,524	0.048	1.69
Cornerstone Day School												
Total Site Info	1.24	53,825	7.D	42	2.2	23.0	209.0	85	1.04	45,510	0.035	1.25
Deerfield Middle School												
Total Site Info	19.88	866,154	5.U	23	13.5	141.6	1,287.4	32	6.44	280,388	0.218	7.69
Elks Lodge												
Total Site Info	1.13	49,280	23.C	6.A	1.4	14.8	134.4	59	0.67	29,268	0.023	0.80
Gastro-Surgi Center of New Jersey												
Total Site Info	1.29	56,206	5.T	24.05	1.1	11.9	108.0	42	0.54	23,531	0.018	0.65
ManorCare Health Services - Mountainside												
Total Site Info	3.57	155,368	5.T	42	5.8	60.4	548.9	77	2.74	119,561	0.093	3.28
Mountainside Fire Department												
Total Site Info	1.51	65,961	15.H	2	1.9	19.8	180.4	60	0.90	39,298	0.031	1.08
Mountainside Indoor Tennis Center												
Total Site Info	2.70	117,589	23.C	4	3.9	40.9	372.1	69	1.86	81,044	0.063	2.22

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)
Mountainside Municipal Building												
Total Site Info	1.54	67,026	14	26	1.8	19.0	172.3	56	0.86	37,537	0.029	1.03
Mountainside Swimming Pool												
Total Site Info	2.78	121,258	14	1.C	4.0	42.2	383.3	69	1.92	83,491	0.065	2.29
Oasis Church												
Total Site Info	4.09	178,318	5.T	38	4.4	45.6	414.8	51	2.07	90,350	0.070	2.48
Our Lady of Lourdes												
Total Site Info	9.86	429,332	5.k	6	8.3	86.4	785.8	40	3.93	171,144	0.133	4.69
US Post Office												
Total Site Info	0.35	15,191	21	27.B	0.6	6.1	55.8	80	0.28	12,153	0.009	0.33

e. Summary of Proposed Green Infrastructure Practices

Summary of Proposed Green Infrastruture 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 %
	NOMAHEGAN BROOK SUBWATERSHED	**659,339**	**15.14**	**16.091**	**2,694**	**1,300,666**	**48.88**	**182,239**			**$4,448,515**	**35.4%**
1	**AMC Loews Mountainside 10**											
	Pervious pavements	288,765	6.63	7.524	1,260	570,013	21.40	77,941	25	SF	$1,948,525	70.3%
	Total Site Info	**288,765**	**6.63**	**7.524**	**1,260**	**570,013**	**21.40**	**77,941**			**$1,948,525**	**70.3%**
2	**Arc Kohler School**											
	Pervious pavements	19,111	0.44	0.498	83	37,722	1.42	3,403	25	SF	$85,075	22.8%
	Total Site Info	**19,111**	**0.44**	**0.498**	**83**	**37,722**	**1.42**	**3,403**			**$85,075**	**22.8%**
3	**Beechwood School**											
	Bioretention systems/ rain gardens	5,817	0.13	0.152	25	11,482	0.43	1,023	5	SF	$5,115	6.6%
	Pervious pavements	24,126	0.55	0.629	105	47,625	1.79	6,243	25	SF	$156,075	27.4%
	Total Site Info	**29,943**	**0.69**	**0.780**	**131**	**59,107**	**2.22**	**7,266**			**$161,190**	**34.0%**
4	**Children's Specialized Hospital**											
	Bioretention systems/ rain gardens	831	0.02	0.022	4	1,638	0.06	236	5	SF	$1,180	0.4%
	Pervious pavements	34,062	0.78	0.887	149	67,238	2.52	7,407	25	SF	$185,175	16.8%
	Total Site Info	**34,893**	**0.80**	**0.909**	**152**	**68,876**	**2.58**	**7,643**			**$186,355**	**17.2%**
5	**Community Presbyterian Church**											
	Pervious pavements	28,152	0.65	0.734	123	55,569	2.09	7,476	25	SF	$186,900	45.8%
	Total Site Info	**28,152**	**0.65**	**0.734**	**123**	**55,569**	**2.09**	**7,476**			**$186,900**	**45.8%**
6	**Cornerstone Day School**											
	Pervious pavements	13,198	0.30	0.344	58	26,053	0.98	4,137	25	SF	$103,425	29.0%
	Total Site Info	**13,198**	**0.30**	**0.344**	**58**	**26,053**	**0.98**	**4,137**			**$103,425**	**29.0%**
7	**Deerfield Middle School**											
	Bioretention systems/ rain gardens	8,750	0.20	0.228	38	17,271	0.65	2,400	5	SF	$12,000	3.1%
	Pervious pavements	22,240	0.51	0.579	97	43,900	1.65	11,962	25	SF	$299,050	7.9%
	Total Site Info	**30,990**	**0.71**	**0.807**	**135**	**61,171**	**2.30**	**14,362**			**$311,050**	**11.1%**
8	**Elks Lodge**											
	Pervious pavements	16,011	0.37	0.417	70	31,603	1.19	4,274	25	SF	$106,850	54.7%
	Total Site Info	**16,011**	**0.37**	**0.417**	**70**	**31,603**	**1.19**	**4,274**			**$106,850**	**54.7%**

Summary of Proposed Green Infrastruture 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	**Gastro-Surgi Center of New Jersey**											
	Pervious pavements	19,070	0.44	0.235	39	37,647	1.41	5,139	25	SF	$128,475	81.0%
	Total Site Info	**19,070**	**0.44**	**0.235**	**39**	**37,647**	**1.41**	**5,139**			**$128,475**	**81.0%**
10	**ManorCare Health Services - Mountainside**											
	Pervious pavements	15,008	0.34	0.391	65	29,628	1.11	4,330	25	SF	$108,250	12.6%
	Total Site Info	**15,008**	**0.34**	**0.391**	**65**	**29,628**	**1.11**	**4,330**			**$108,250**	**12.6%**
11	**Mountainside Fire Department**											
	Pervious pavements	3,404	0.08	0.042	7	6,717	0.25	1,047	25	SF	$26,175	8.7%
	Rainwater harvesting systems	830	0.02	0.022	4	800	0.06	800	2	gal	$1,600	2.1%
	Total Site Info	**4,234**	**0.10**	**0.064**	**11**	**7,517**	**0.31**	**1,847**			**$27,775**	**10.8%**
12	**Mountainside Indoor Tennis Center**											
	Pervious pavements	46,788	1.07	1.219	204	92,356	3.47	11,874	25	SF	$296,850	57.7%
	Total Site Info	**46,788**	**1.07**	**1.219**	**204**	**92,356**	**3.47**	**11,874**			**$296,850**	**57.7%**
13	**Mountainside Municipal Building**											
	Pervious pavements	16,148	0.37	0.421	70	31,872	1.20	5,971	25	SF	$149,275	43.0%
	Total Site Info	**16,148**	**0.37**	**0.421**	**70**	**31,872**	**1.20**	**5,971**			**$149,275**	**43.0%**
14	**Mountainside Swimming Pool**											
	Pervious pavements	37,199	0.85	0.969	162	73,431	2.76	10,143	25	SF	$253,575	44.6%
	Total Site Info	**37,199**	**0.85**	**0.969**	**162**	**73,431**	**2.76**	**10,143**			**$253,575**	**44.6%**
15	**Oasis Church**											
	Bioretention systems/ rain gardens	2,972	0.07	0.077	13	5,864	0.22	794	5	SF	$3,970	3.3%
	Total Site Info	**2,972**	**0.07**	**0.077**	**13**	**5,864**	**0.22**	**794**			**$3,970**	**3.3%**
16	**Our Lady of Lourdes**											
	Pervious pavements	47,066	1.08	0.581	97	92,909	3.49	12,958	25	SF	$323,950	27.5%
	Total Site Info	**47,066**	**1.08**	**0.581**	**97**	**92,909**	**3.49**	**12,958**			**$323,950**	**27.5%**
17	**US Post Office**											
	Pervious pavements	9,791	0.22	0.121	20	19,328	0.73	2,681	25	SF	$67,025	80.6%
	Total Site Info	**9,791**	**0.22**	**0.121**	**20**	**19,328**	**0.73**	**2,681**			**$67,025**	**80.6%**