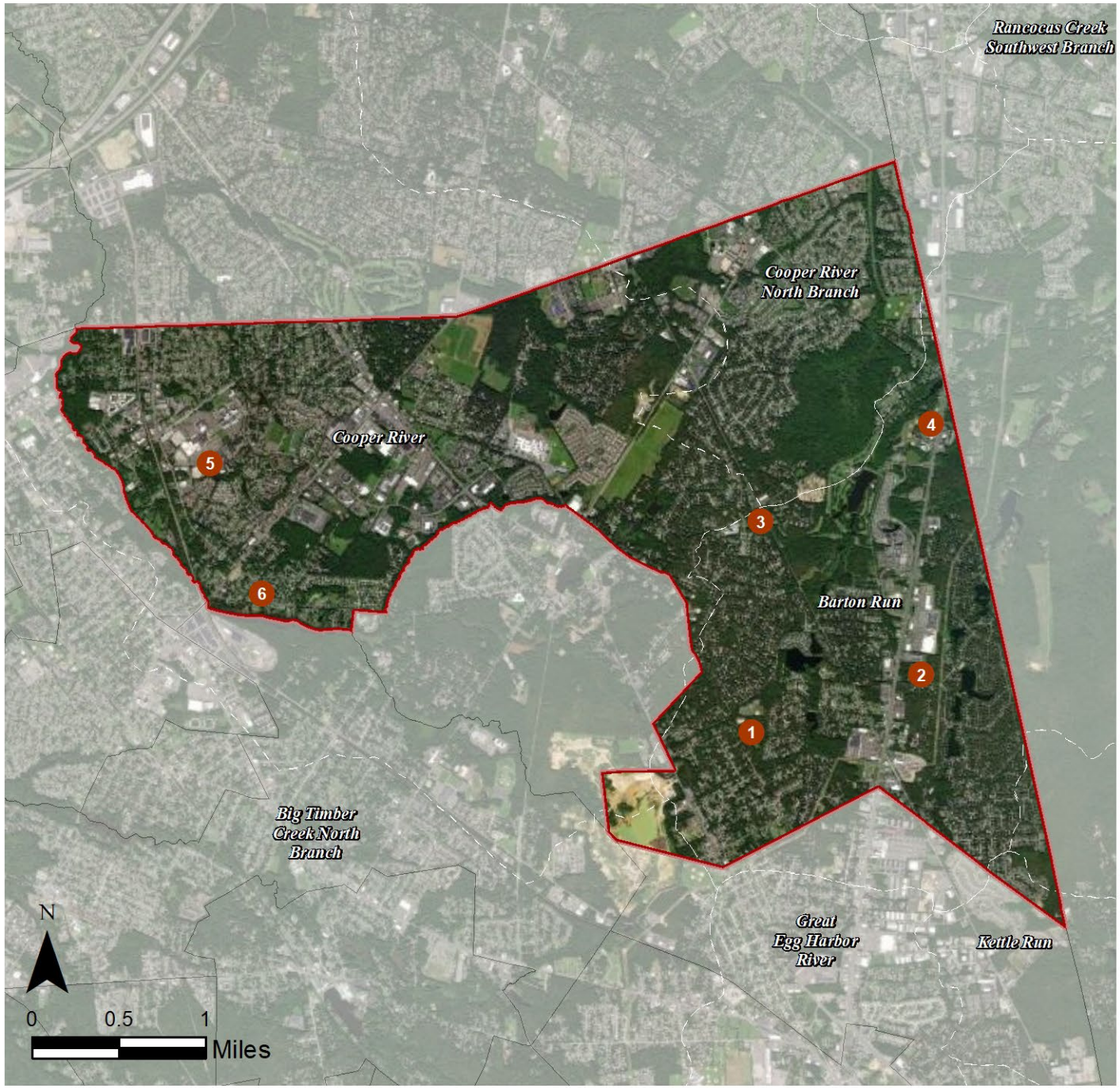
VOORHEES TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BARTON RUN SUBWATERSHED

1. Edward T. Hamilton Elementary School
2. Signal Hill Elementary School
3. Voorhees Fire Department Station Cooper Road
4. Voorhees Board of Education

SITES WITHIN THE COOPER RIVER SUBWATERSHED

5. Camden County Library M. Allan Vogelson Regional Branch
6. Voorhees Fire Department South Burnt Mill Road

EDWARD T. HAMILTON ELEMENTARY SCHOOL

Subwatershed: Barton Run

Site Area: 825,065 sq. ft.

Address: 23 Northgate Drive
Voorhees, NJ 08043

Block and Lot: Block 230.01, Lot 43

A rain garden can be installed west of the building to capture, treat, and infiltrate the stormwater runoff from the rooftop. 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"
22	182,950	8.8	92.4	840.0	0.143	5.02

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	0.145	24	10,680	0.40	1,395	$6,975

GREEN INFRASTRUCTURE RECOMMENDATIONS

Edward T. Hamilton Elementary School

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

0 25' 50'

SIGNAL HILL ELEMENTARY SCHOOL

Subwatershed: Barton Run

Site Area: 730,150 sq. ft.

Address: 3 Signal Hill Drive
Voorhees, NJ 08043

Block and Lot: Block 229.06, Lot 70

Pervious pavement can be installed in the parking lot west of the building to capture and infiltrate the stormwater runoff from 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	232,035	11.2	117.2	1,065.4	0.181	6.36

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	0.175	29	12,890	0.48	1,200	$30,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Signal Hill Elementary School

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

0 25' 50'

VOORHEES FIRE DEPARTMENT STATION COOPER ROAD

Subwatershed: Barton Run

Site Area: 105,240 sq. ft.

Address: 423 Cooper Road
Voorhees, NJ 08043

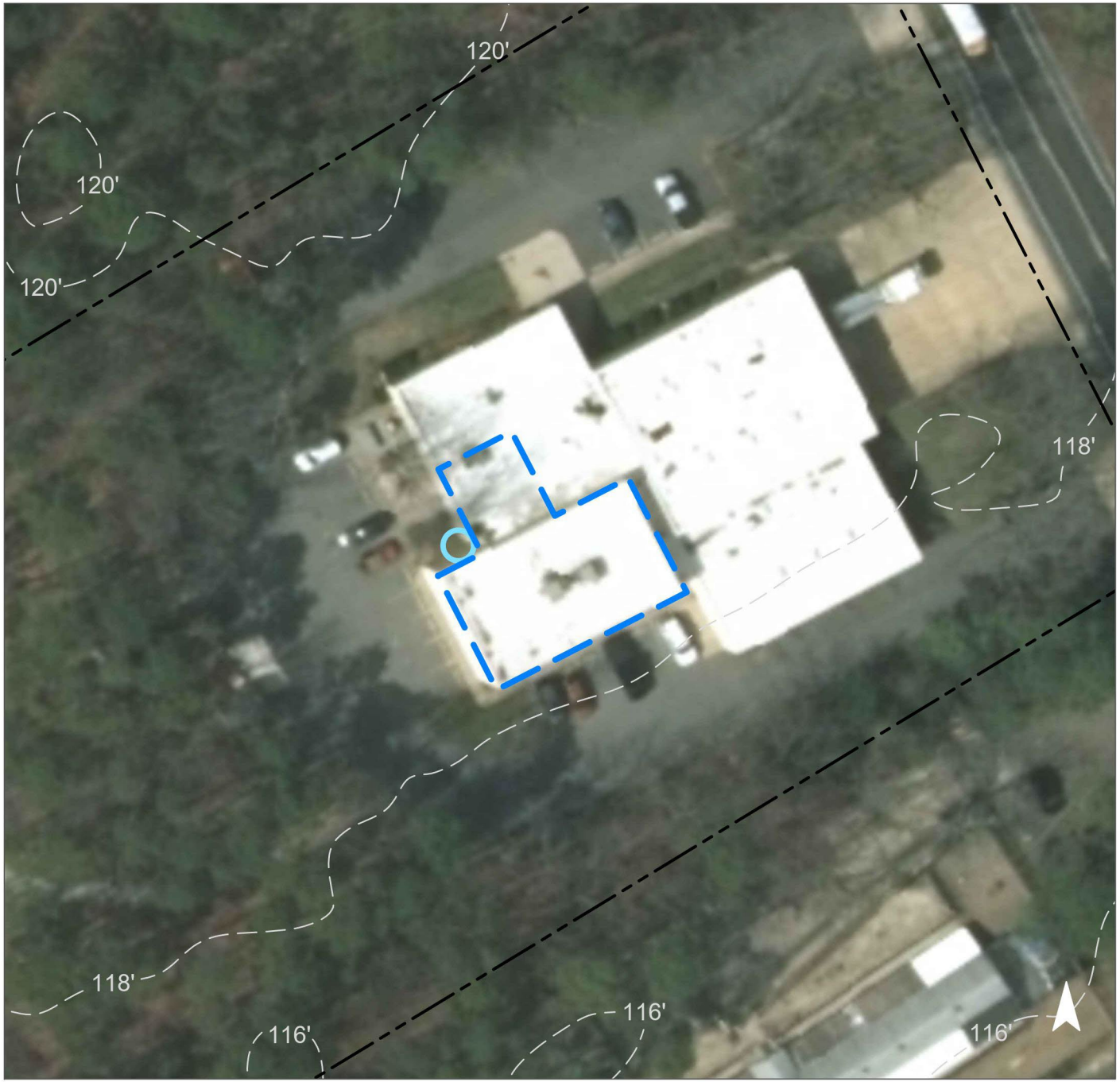
Block and Lot: Block 230.27, Lot 50

A cistern can be installed on the west side of the building to collect water from a nearby downspout. The water from the cistern can be used for non-potable uses such as 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"
40	42,100	2.0	21.3	193.3	0.033	1.15

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (gal.)	Estimated Cost
Rainwater harvesting	0.98	16	3,000	0.11	3,000	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Voorhees Fire Department
Station Cooper Road

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

0 25' 50'

VOORHEES BOARD OF EDUCATION

Subwatershed: Barton Run

Site Area: 291,435 sq. ft.

Address: 329 NJ-73
Voorhees, NJ 08043

Block and Lot: Block 222, Lot 22

A rain garden can be installed on the north side of the parking lot to capture, treat, and infiltrate runoff from 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"
23	66,010	3.2	33.3	303.1	0.051	1.81

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention system	0.209	35	15,390	0.58	2,005	$10,025

GREEN INFRASTRUCTURE RECOMMENDATIONS

Voorhees Board of Education

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

0 25' 50'

CAMDEN COUNTY LIBRARY M. ALLEN VOGELSON REGIONAL BRANCH

Subwatershed: Cooper River

Site Area: 55,050 sq. ft.

Address: 203 Laurel Road
Voorhees, NJ 08043

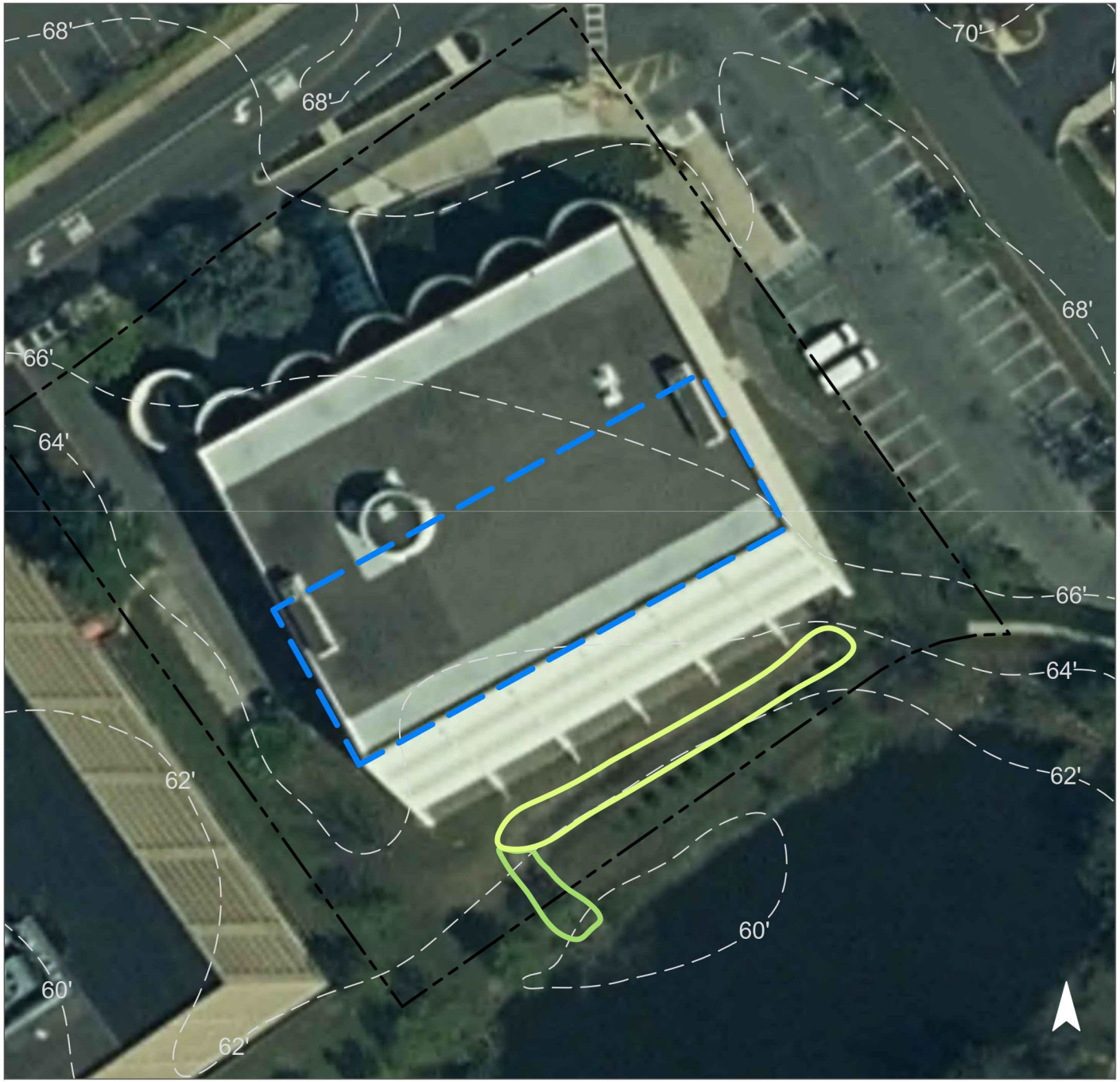
Block and Lot: Block 150.02, Lot 1.07

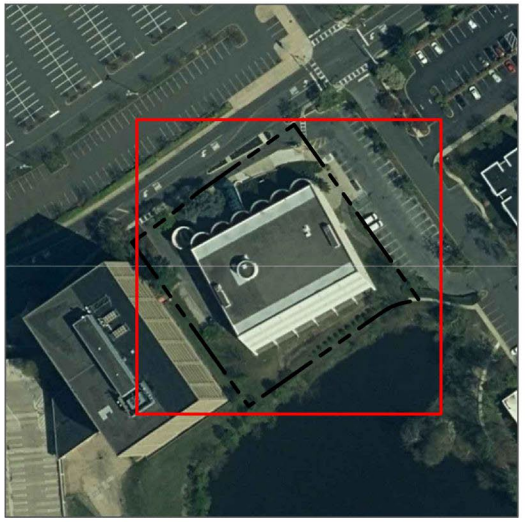
An existing rocky waterway on the south side of the building that leads to a lake can be converted to a rain garden which leads to a bioswale. Five disconnected downspouts on the south side of the building can be led into the rain garden. The rain garden will help promote infiltration of the stormwater and any excess will flow through the bioswale which will filter it before it enters the lake. 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"
83	45,760	2.2	23.1	210.1	0.036	1.26

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
Bioretention system	0.153	26	11,280	0.42	1,470	$7,350
Bioswale	0.042	5	1,500	0.11	400	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS





Camden County Library M. Allan Vogelson Regional Branch

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

0 25' 50'

VOORHEES FIRE DEPARTMENT SOUTH BURNT MILL ROAD

Subwatershed: Cooper River

Site Area: 63,260 sq. ft.

Address: 2002 South Burnt Mill Road
Voorhees, NJ 08043

Block and Lot: Block 185, Lot 13

Two rain gardens can be installed north and south of the walkway into the station to capture, treat, and infiltrate the stormwater runoff from their respective areas of the parking lot. A cistern can be installed north of the building to collect water from a nearby downspout. The water from the cistern can be used for non-potable uses such as 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"
91	57,255	2.8	28.9	262.9	0.045	1.57

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	0.044	7	3,270	0.12	425	$2,125
Rainwater harvesting	0.090	15	3,000	0.11	3,000 (gal)	$6,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Voorhees Fire Department
South Burnt Mill Road

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

0 15' 30'

Summary of Existing Conditions

	Subwatershed/Site Name/Total Site Info/GI Practice	Area (ac)	Area (SF)	Block	Lot	I.C. %	I.C. Area (ac)	I.C. Area (SF)	Existing Annual Loads (Commercial)			Runoff Volumes from I.C.		Runoff Volumes from I.C.	
									TP (lb/yr)	TN (lb/yr)	TSS (lb/yr)	Water Quality Storm (1.25" over 2-hours) (cu.ft.)	Annual (cu.ft.)	Water Quality Storm (1.25" over 2-hours) (Mgal)	Annual (Mgal)
	Barton Run Sites	**44.81**	**1,951,890**				**12.01**	**523,095**	**25.2**	**264.2**	**2401.7**	**54,489**	**1,918,015**	**0.408**	**14.35**
1	**Edward T. Hamilton Elementary School**														
	Total Site Info	**18.94**	**825,065**	**230.01**	**43**	**22.174**	**4.20**	**182,950**	**8.8**	**92.4**	**840.0**	**19,057**	**670,817**	**0.143**	**5.02**
2	**Signal Hill Elementary School**														
	Total Site Info	**16.76**	**730,150**	**229.06**	**70**	**31.7791**	**5.33**	**232,035**	**11.2**	**117.2**	**1065.4**	**24,170**	**850,795**	**0.181**	**6.36**
3	**Voorhees Fire Department Station Cooper Road**														
	Total Site Info	**2.42**	**105,240**	**230.27**	**50**	**40.0038**	**0.97**	**42,100**	**2.0**	**21.3**	**193.3**	**4,385**	**154,367**	**0.033**	**1.15**
4	**Voorhees Board of Education**														
	Total Site Info	**6.69**	**291,435**	**222**	**22**	**22.65**	**1.52**	**66,010**	**3.2**	**33.3**	**303.1**	**6,876**	**242,037**	**0.051**	**1.81**
	Cooper River Sites	**2.72**	**118,310**				**2.36**	**103,015**	**5.0**	**52.0**	**473.0**	**10,731**	**377,722**	**0.080**	**2.83**
5	**ımden County Library M. Allan Vogelson Regional Bran**														
	Total Site Info	**1.26**	**55,050**	**150.02**	**1.07**	**83.1244**	**1.05**	**45,760**	**2.2**	**23.1**	**210.1**	**4,767**	**167,787**	**0.036**	**1.26**
6	**Voorhees Fire Department South Burnt Mill Road**														
	Total Site Info	**1.45**	**63,260**	**185**	**13**	**90.5074**	**1.31**	**57,255**	**2.8**	**28.9**	**262.9**	**5,964**	**209,935**	**0.045**	**1.57**

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	Unit Cost ($/unit)	Unit	Total Cost ($)	I.C. Treated %
	Barton Run Sites	**24,090**	**0.55**	**0.628**	**105**	**41,960**	**1.57**				**$53,000**	**5%**
1	**Edward T. Hamilton Elementary School**											
	Bioretention system	5,570	0.13	0.145	24	10,680	0.40	1,395	$5	SF	$6,975	3%
	Total Site Info	**5,570**	**0.13**	**0.145**	**24**	**10,680**	**0.40**				**$6,975**	**3%**
2	**Signal Hill Elementary School**											
	Pervious pavement	6,720	0.15	0.175	29	12,890	0.48	1,200	$25	SF	$30,000	3%
	Total Site Info	**6,720**	**0.15**	**0.175**	**29**	**12,890**	**0.48**				**$30,000**	**3%**
3	**Voorhees Fire Department Station Cooper Road**											
	Rainwater harvesting	3,775	0.09	0.098	16	3,000	0.11	3,000	$2	gal	$6,000	9%
	Total Site Info	**3,775**	**0.09**	**0.098**	**16**	**3,000**	**0.11**				**$6,000**	**9%**
4	**Voorhees Board of Education**											
	Bioretention system	8,025	0.18	0.209	35	15,390	0.58	2,005	$5	SF	$10,025	12%
	Total Site Info	**8,025**	**0.18**	**0.209**	**35**	**15,390**	**0.58**				**$10,025**	**12%**
	Cooper River Sites	**12,650**	**0.29**	**0.330**	**53**	**19,050**	**0.76**				**$17,475**	**12%**
5	**Camden County Library M. Allan Vogelson Regional Bra**											
	Bioretention system	5,880	0.13	0.153	26	11,280	0.42	1,470	$5	SF	$7,350	13%
	Bioswale	1,600	0.04	0.042	5	1,500	0.11	400	$5	SF	$2,000	3%
	Total Site Info	**7,480**	**0.17**	**0.195**	**31**	**12,780**	**0.53**				**$9,350**	**16%**
6	**Voorhees Fire Department South Burnt Mill Road**											
	Bioretention systems	1,705	0.04	0.044	7	3,270	0.12	425	$5	SF	$2,125	3%
	Rainwater harvesting	3,465	0.08	0.090	15	3,000	0.11	3,000	$2	gal	$6,000	6%
	Total Site Info	**5,170**	**0.12**	**0.135**	**23**	**6,270**	**0.23**				**$8,125**	**9%**