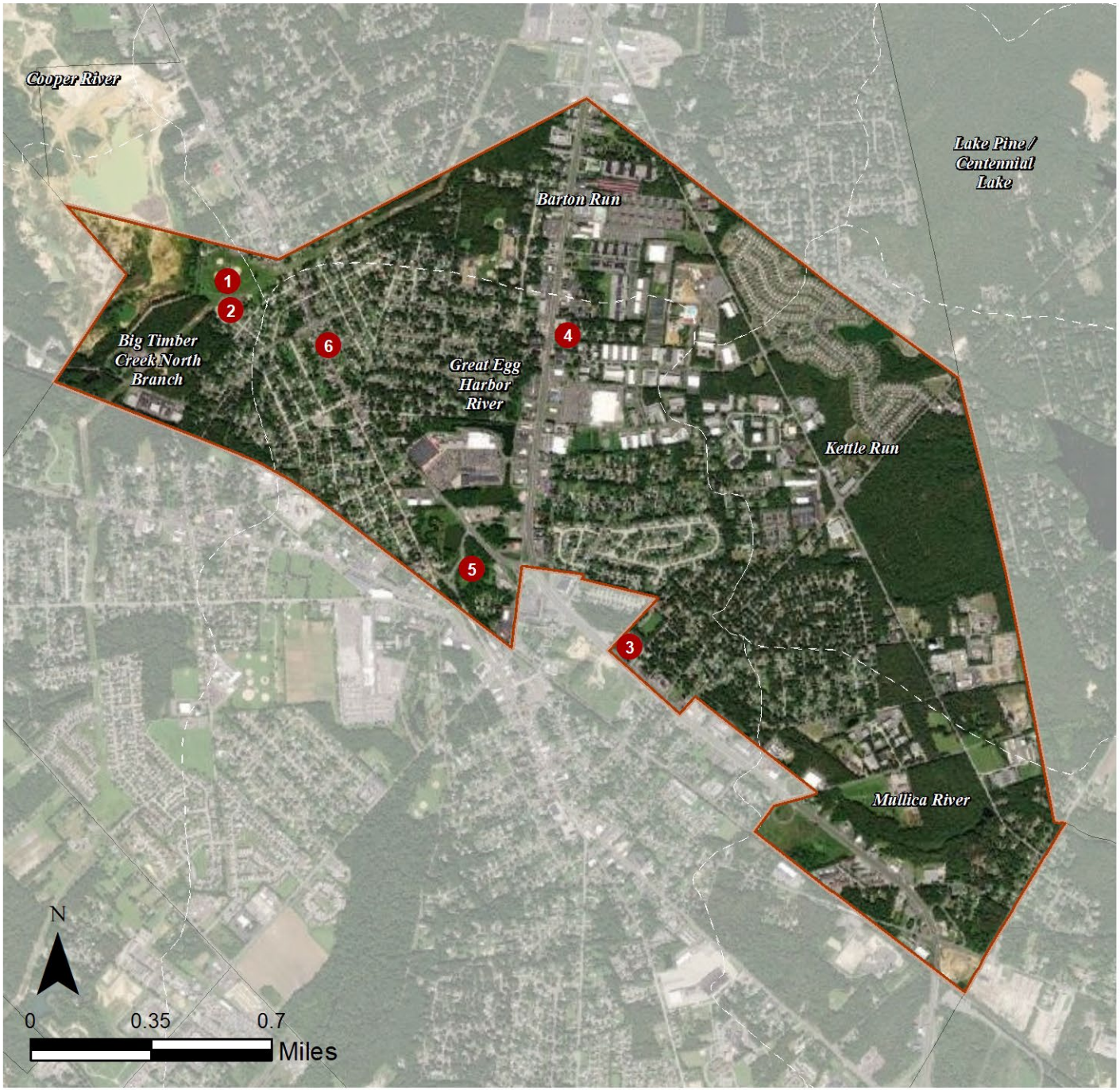
BERLIN TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BIG TIMBER CREEK NORTH BRANCH SUBWATERSHED

1. Berlin Park

2. Berlin Township Senior Citizens

SITES WITHIN THE GREAT EGG HARBOR RIVER SUBWATERSHED

3. Berlin Township Police Department

4. Farmers Insurance – James Watkins

5. Fellowship Baptist Church

6. Fire District 1 Berlin Township

BERLIN PARK

Subwatershed: Big Timber Creek

Site Area: 625,645 sq. ft.

Address: 190 Lucas Avenue
West Berlin, NJ 08091

Block and Lot: Block 515, Lot 1

A large section of parking spaces can be converted to porous asphalt to capture and infiltrate stormwater runoff from the parking lot. A cistern can be installed near the center building for non-potable reuse of stormwater. A rain garden can be installed in the turfgrass area between multiple walkways 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"
21	129,020	6.2	65.2	592.4	0.101	3.54

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	0.045	8	3,330	0.13	435	$2,175
Pervious pavement	0.233	39	17,190	0.65	1,600	$40,000
Rainwater harvesting	0.008	1	500	0.02	500 (gal)	$1,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Berlin Park

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

0 50' 100'

BERLIN TOWNSHIP SENIOR CITIZENS

Subwatershed: Big Timber Creek

Site Area: 152,830 sq. ft.

Address: 240 Pine Avenue
West Berlin, NJ 08091

Block and Lot: Block 527, Lot 6

Two downspout planter boxes can be installed in the corner of the building to treat 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"
25	38,810	1.9	19.6	178.2	0.030	1.06

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 (units)	Estimated Cost
Planter boxes	n/a	2	n/a	n/a	2 (boxes)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Berlin Township Senior Citizens

- planter box
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 10' 20'

BERLIN TOWNSHIP POLICE DEPARTMENT

Subwatershed: Great Egg Harbor River

Site Area: 142,610 sq. ft.

Address: 135 NJ-73
West Berlin, NJ 08091

Block and Lot: Block 1402, Lot 1.01

A rain garden can be installed in the existing detention basin to capture, treat, and infiltrate the stormwater runoff from the parking lot. A section of parking spaces north of the building can be converted to porous pavement to capture and infiltrate runoff from surrounding parking lot areas. 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	115,575	5.6	58.4	530.6	0.090	3.17

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	0.219	37	16,140	0.61	2,105	$10,525
Pervious pavement	0.113	19	8,290	0.31	800	$20,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Berlin Township Police Department

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

0 30' 60'

FARMERS INSURANCE – JAMES WATKINS

Subwatershed: Great Egg Harbor River

Site Area: 37,965 sq. ft.

Address: 399 NJ-73
West Berlin, NJ 08091

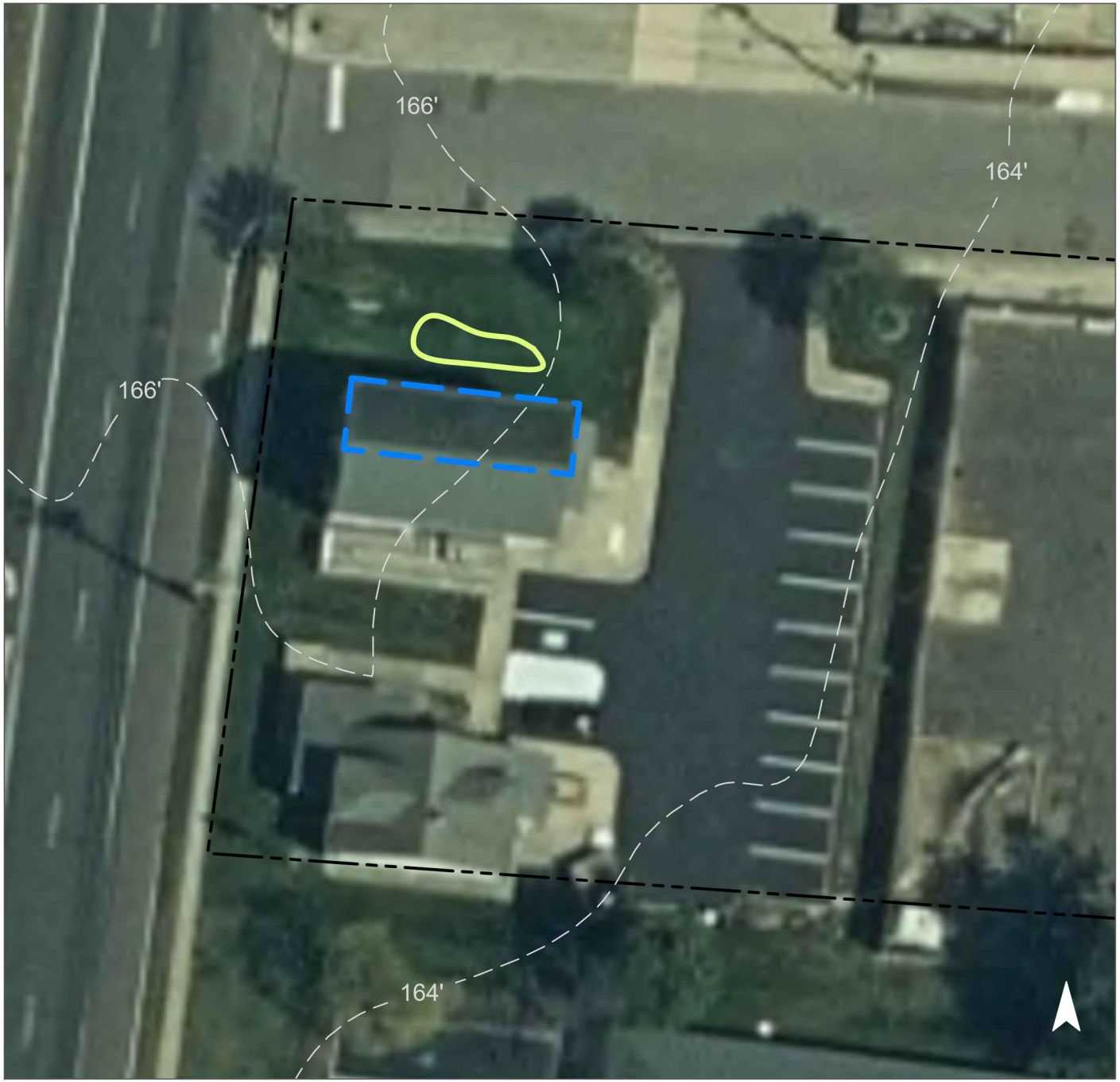
Block and Lot: Block 1101, Lots 1 & 2

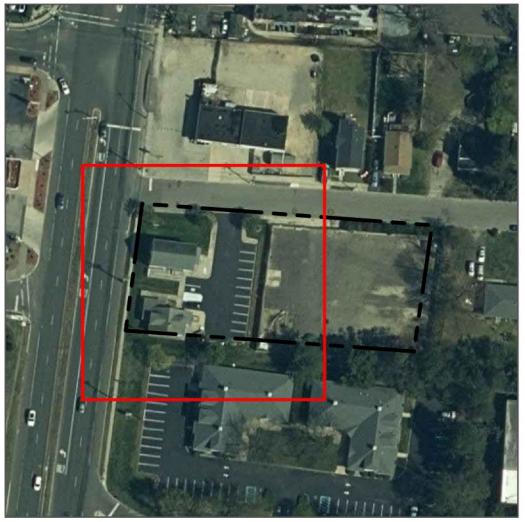
A rain garden can be installed north of the building to capture, treat, and infiltrate stormwater runoff from the rooftop. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

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"
81	30,690	1.5	15.5	140.9	0.024	0.84

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	0.016	3	1,210	0.05	160	$800

GREEN INFRASTRUCTURE RECOMMENDATIONS





Farmers Insurance - James Watkins

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

0 15' 30'

FELLOWSHIP BAPTIST CHURCH

Subwatershed: Great Egg Harbor River

Site Area: 163,265 sq. ft.

Address: 22 Zulker Avenue
West Berlin, NJ 08091

Block and Lot: Block 102, Lot 13

Two rain gardens can be installed south of the building to capture, treat, and infiltrate stormwater runoff from the rooftop. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
21	34,760	1.7	17.6	159.6	0.027	0.95

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	0.123	21	9,070	0.34	1,180	$5,900

GREEN INFRASTRUCTURE RECOMMENDATIONS

Fellowship Baptist Church

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

0 25' 50'

FIRE DISTRICT 1 BERLIN TOWNSHIP

Subwatershed: Great Egg Harbor River

Site Area: 19,125 sq. ft.

Address: 186 Haddon Avenue
West Berlin, NJ 08091

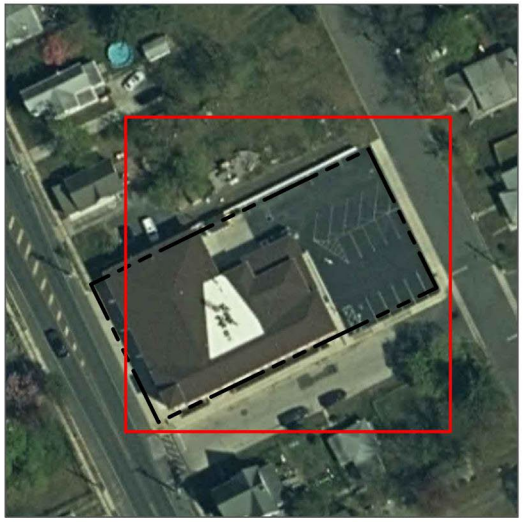
Block and Lot: Block 615, Lot 5

A section of parking spaces can be converted to porous asphalt to capture and infiltrate stormwater runoff from the parking lot. A cistern can be installed to the north of the building to capture stormwater runoff from the rooftop 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"
67	12,835	0.6	6.5	58.9	0.010	0.35

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	0.080	13	5,920	0.22	600	$15,000
Rainwater harvesting	0.028	5	1,000	0.04	1,000 (gal)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Fire District 1 Berlin Township

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

0 15' 30'

	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)
	Big Timber Creek North Branch Sites	**17.87**	**778,475**				**3.85**	**167,830**	**8.1**	**84.8**	**770.6**	**17,482**	**615,377**	**0.131**	**4.60**
1	**Berlin Park**														
	Total Site Info	**14.36**	**625,645**	**515**	**1**	**20.6219**	**2.96**	**129,020**	**6.2**	**65.2**	**592.4**	**13,440**	**473,073**	**0.101**	**3.54**
2	**Berlin Township Senior Citizens**														
	Total Site Info	**3.51**	**152,830**	**527**	**6**	**25.3942**	**0.89**	**38,810**	**1.9**	**19.6**	**178.2**	**4,043**	**142,303**	**0.030**	**1.06**
	Great Egg Harbor River Sites	**8.33**	**362,965**				**4.45**	**193,860**	**9.3**	**97.9**	**890.1**	**20,194**	**710,820**	**0.151**	**5.32**
3	**Berlin Township Police Department**														
	Total Site Info	**3.27**	**142,610**	**1402**	**1.01**	**81.0427**	**2.65**	**115,575**	**5.6**	**58.4**	**530.6**	**12,039**	**423,775**	**0.090**	**3.17**
4	**Farmers Insurance - James Watkins**														
	Total Site Info	**0.87**	**37,965**	**1101**	**1,2**	**80.8376**	**0.70**	**30,690**	**1.5**	**15.5**	**140.9**	**3,197**	**112,530**	**0.024**	**0.84**
5	**Fellowship Baptist Church**														
	Total Site Info	**3.75**	**163,265**	**102**	**13**	**21.2905**	**0.80**	**34,760**	**1.7**	**17.6**	**159.6**	**3,621**	**127,453**	**0.027**	**0.95**
6	**Fire District 1 Berlin Township**														
	Total Site Info	**0.44**	**19,125**	**615**	**5**	**67.1111**	**0.29**	**12,835**	**0.6**	**6.5**	**58.9**	**1,337**	**47,062**	**0.010**	**0.35**

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 %
	Big Timber Creek North Branch Sites	**11,405**	**0.26**	**0.286**	**49**	**21,020**	**0.80**				**$45,175**	**7%**
1	**Berlin Park**											
	Bioretention system	1,735	0.04	0.045	8	3,330	0.13	435	$5	SF	$2,175	1%
	Pervious pavement	8,960	0.21	0.233	39	17,190	0.65	1,600	$25	SF	$40,000	7%
	Rainwater harvesting	300	0.01	0.008	1	500	0.02	500	$2	gal	$1,000	0%
	Total Site Info	**10,995**	**0.25**	**0.286**	**48**	**21,020**	**0.80**				**$43,175**	**9%**
2	**Berlin Township Senior Citizens**											
	Planter boxes	410	0.01	n/a	2	n/a	n/a	2	$1,000	box	$2,000	1%
	Total Site Info	**410**	**0.01**	**0.000**	**2**	**0**	**0.00**				**$2,000**	**1%**
	Great Egg Harbor River Sites	**22,265**	**0.51**	**0.580**	**97**	**41,630**	**1.57**				**$54,225**	**11%**
3	**Berlin Township Police Department**											
	Bioretention system	8,415	0.19	0.219	37	16,140	0.61	2,105	$5	SF	$10,525	7%
	Pervious pavement	4,320	0.10	0.113	19	8,290	0.31	800	$25	SF	$20,000	4%
	Total Site Info	**12,735**	**0.29**	**0.332**	**56**	**24,430**	**0.92**				**$30,525**	**11%**
4	**Farmers Insurance - James Watkins**											
	Bioretention system	630	0.01	0.016	3	1,210	0.05	160	$5	SF	$800	2%
	Total Site Info	**630**	**0.01**	**0.016**	**3**	**1,210**	**0.05**				**$800**	**2%**
5	**Fellowship Baptist Church**											
	Bioretention systems	4,725	0.11	0.123	21	9,070	0.34	1,180	$5	SF	$5,900	14%
	Total Site Info	**4,725**	**0.11**	**0.123**	**21**	**9,070**	**0.34**				**$5,900**	**14%**
6	**Fire District 1 Berlin Township**											
	Pervious pavement	3,085	0.07	0.080	13	5,920	0.22	600	$25	SF	$15,000	24%
	Rainwater harvesting	1,090	0.03	0.028	5	1,000	0.04	1,000	$2	gal	$2,000	8%
	Total Site Info	**4,175**	**0.10**	**0.109**	**18**	**6,920**	**0.26**				**$17,000**	**33%**