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OF NEW JERSEY

Impervious Cover Assessment and Reduction Action Plan for Vineland, New Jersey

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Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.

Water Resources Program

The Water Resources Program is one of many specialty programs under Rutgers Cooperative Extension.

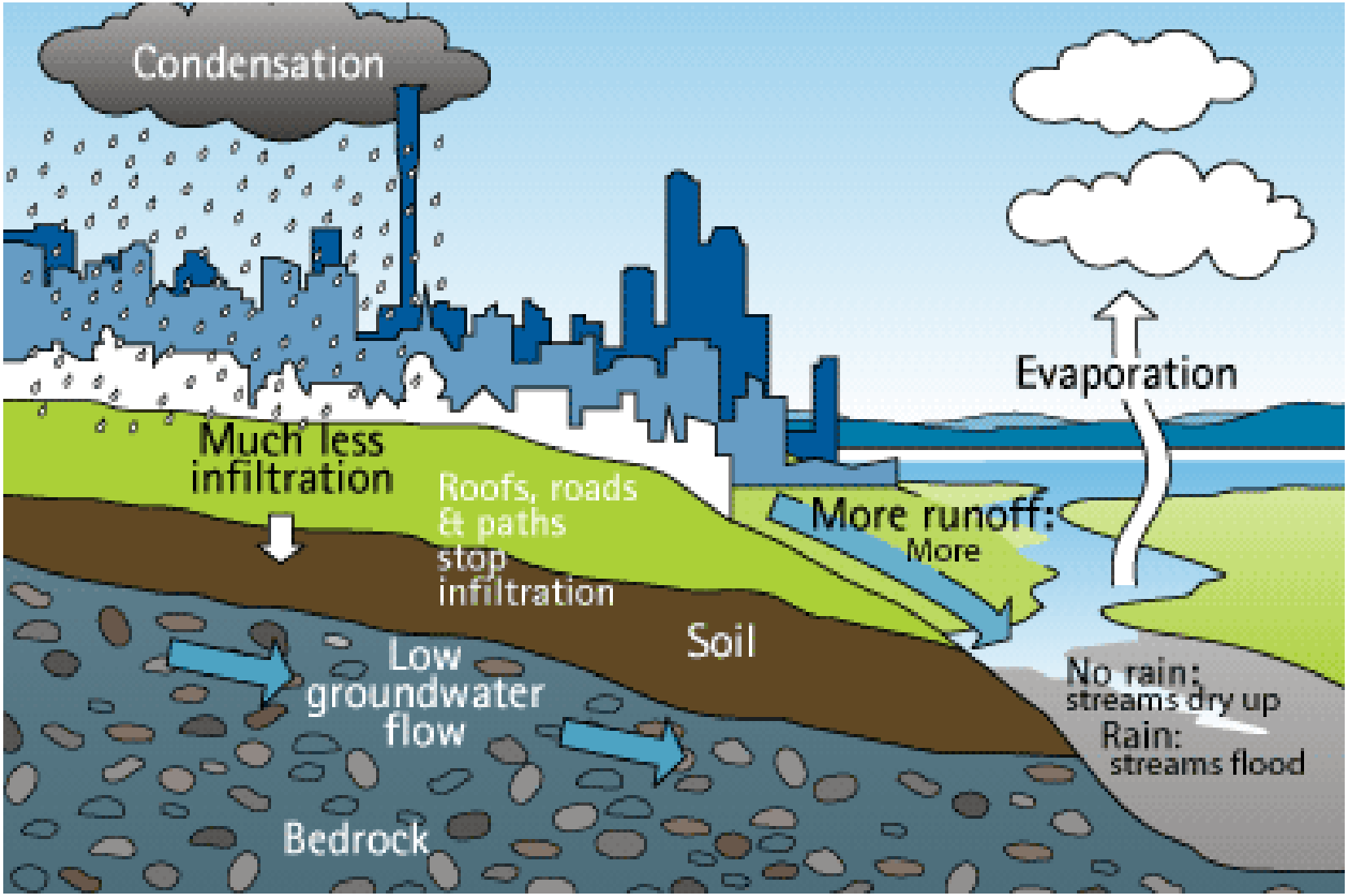
Our Mission is to identify and address community water resources issues using sustainable and practical science-based solutions.

The Water Resources Program serves all of New Jersey, working closely with the County Extension Offices.

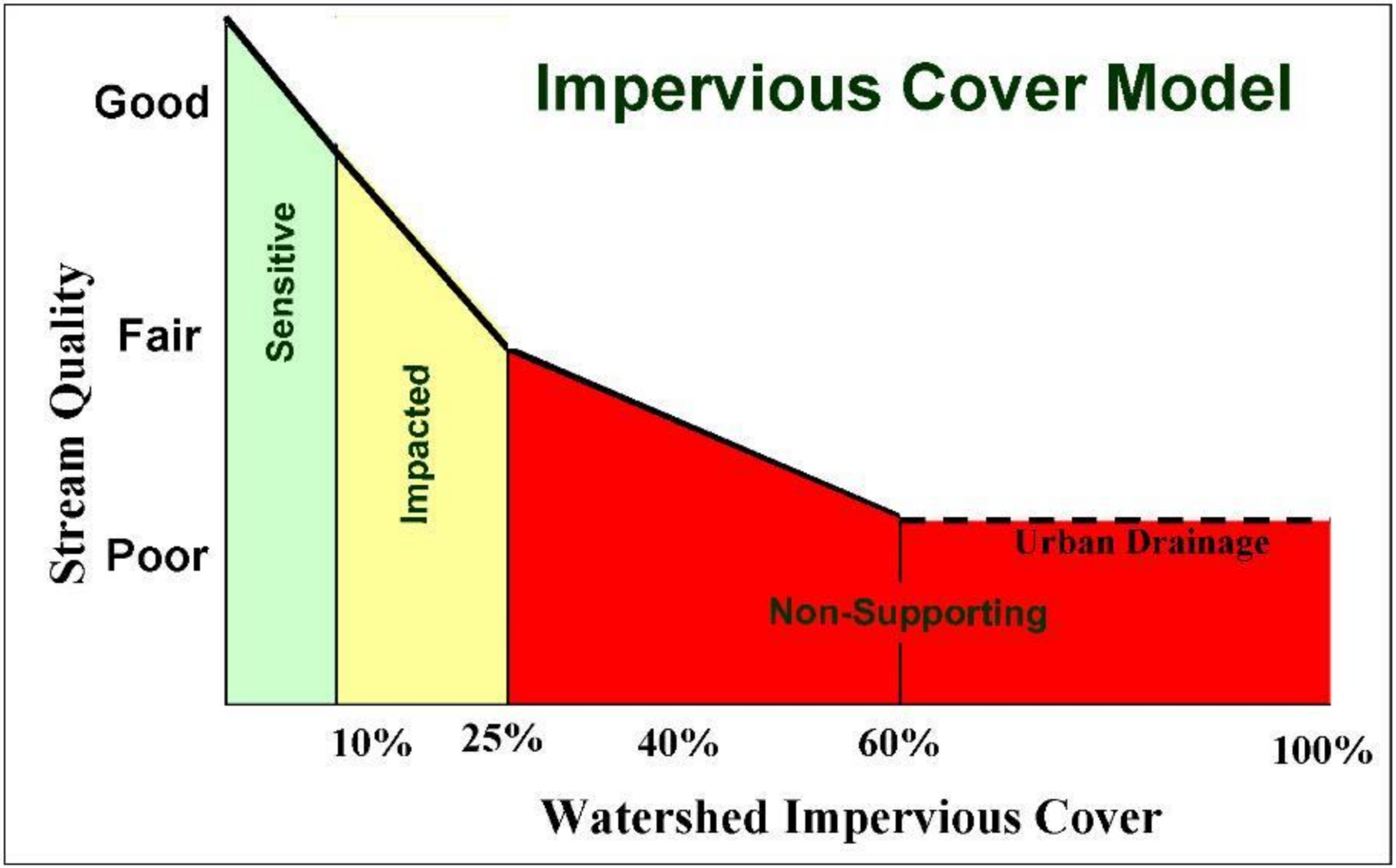
The Impact of Development on Stormwater Runoff

More development → *More impervious surfaces* → *More stormwater runoff*

The Urban Hydrologic Cycle



Original ICM developed based on 200+ reports and papers



Reference: Tom Schueler and Lisa Fraley-McNeal, Symposium on Urbanization and Stream Ecology, May 23 and 24, 2008

Green Infrastructure

…an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly

Green Infrastructure projects:

- capture
- filter
- absorb
- reuse

stormwater to maintain or mimic natural systems and treat runoff as a resource

Green Infrastructure includes:

- green roofs
- rainwater harvesting
- tree filter/planter boxes
- rain gardens/bioretention systems
- permeable pavements
- vegetated swales or bioswales
- natural retention basins
- trees & urban forestry
- green streets









Parker Urban Greenscapes. 2009.

It’s all about managing impervious surfaces !

Eliminate it !

Change it !

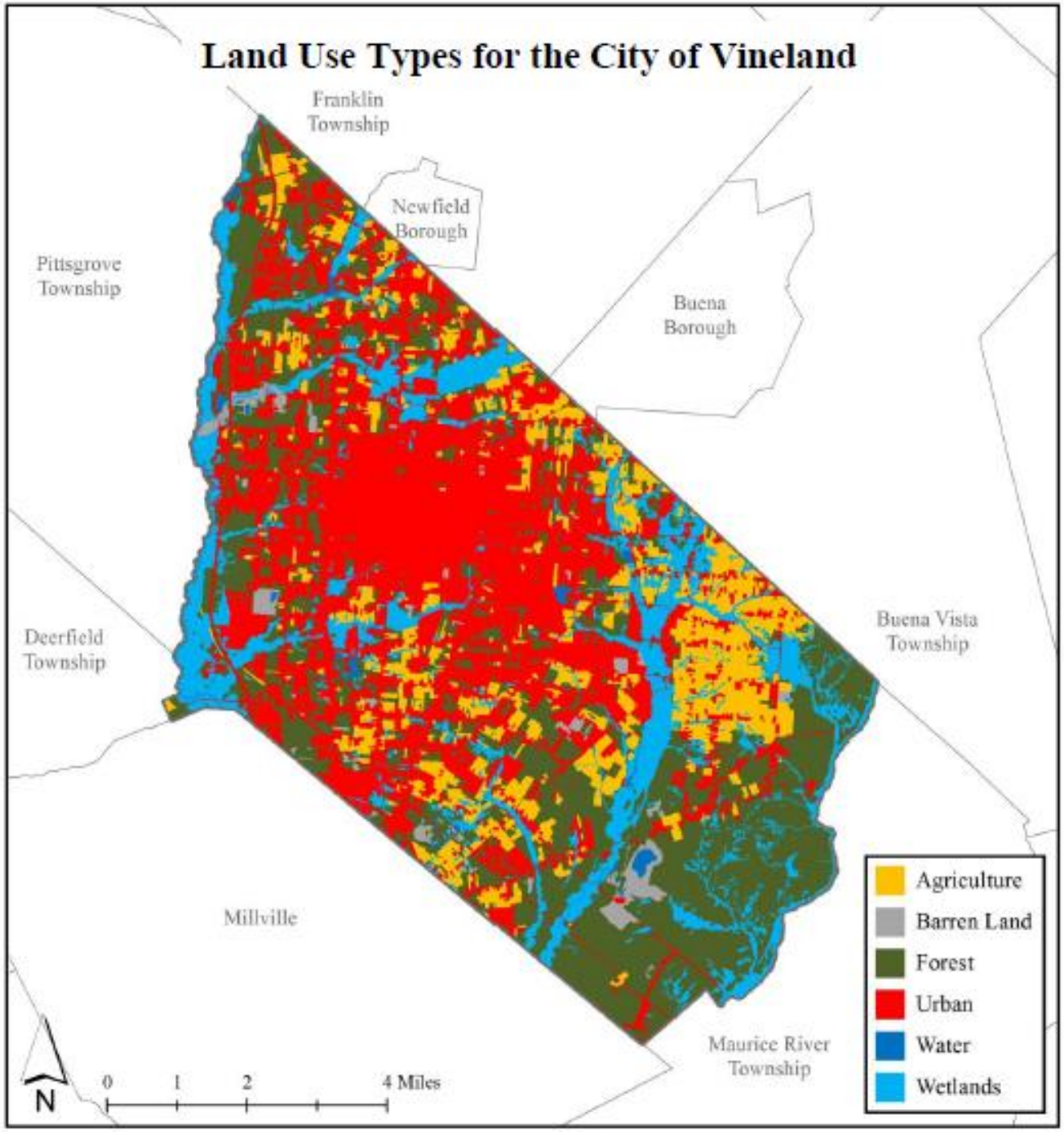
Disconnect it !

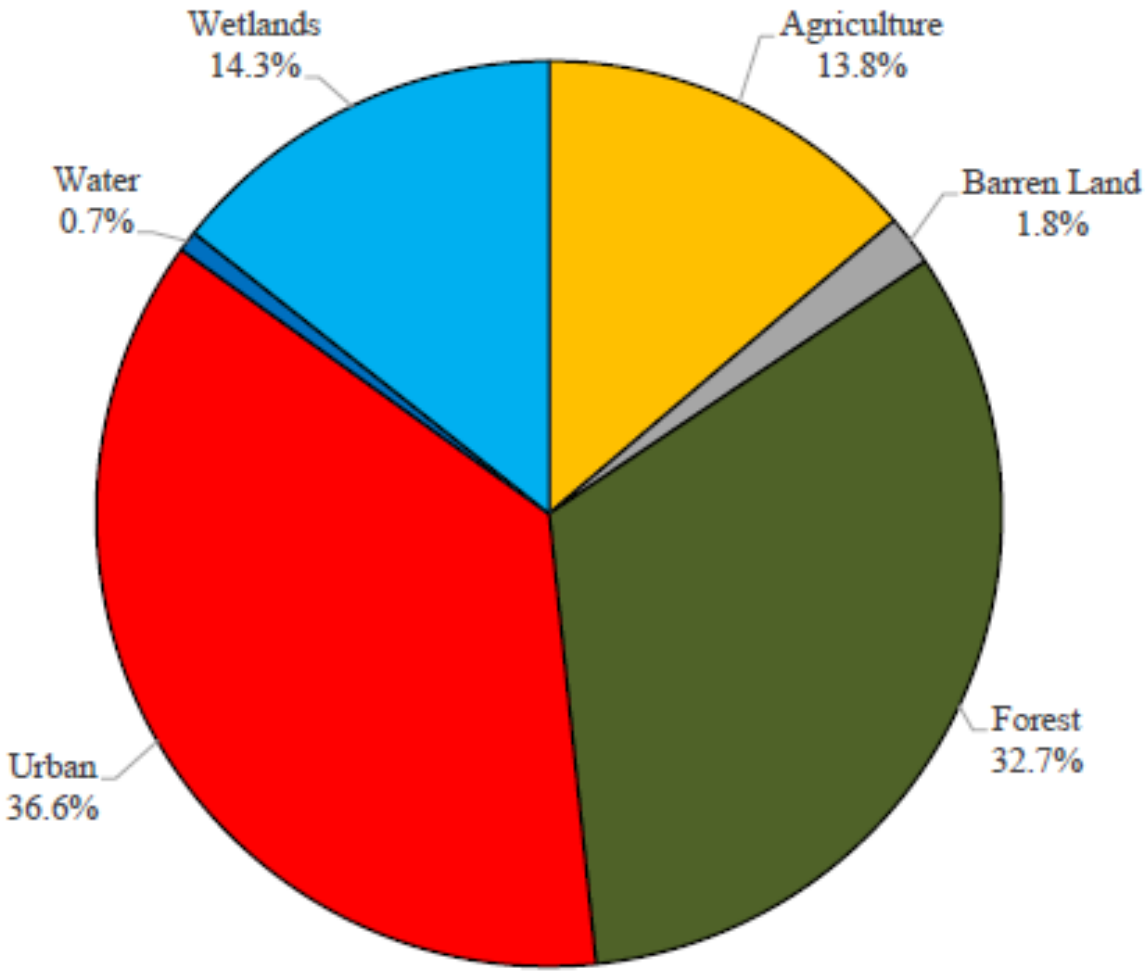
Reuse it !

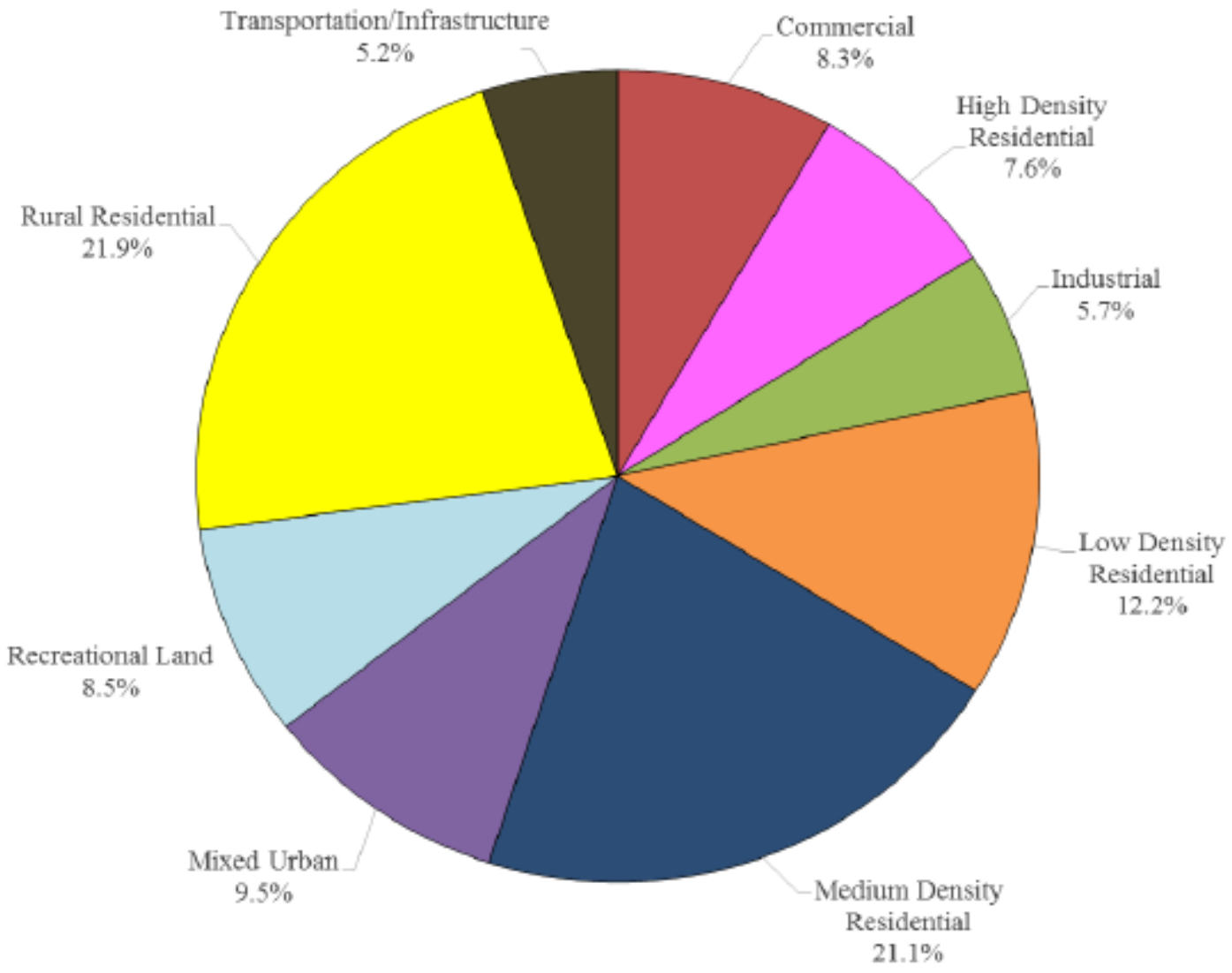
Impervious Cover Assessment

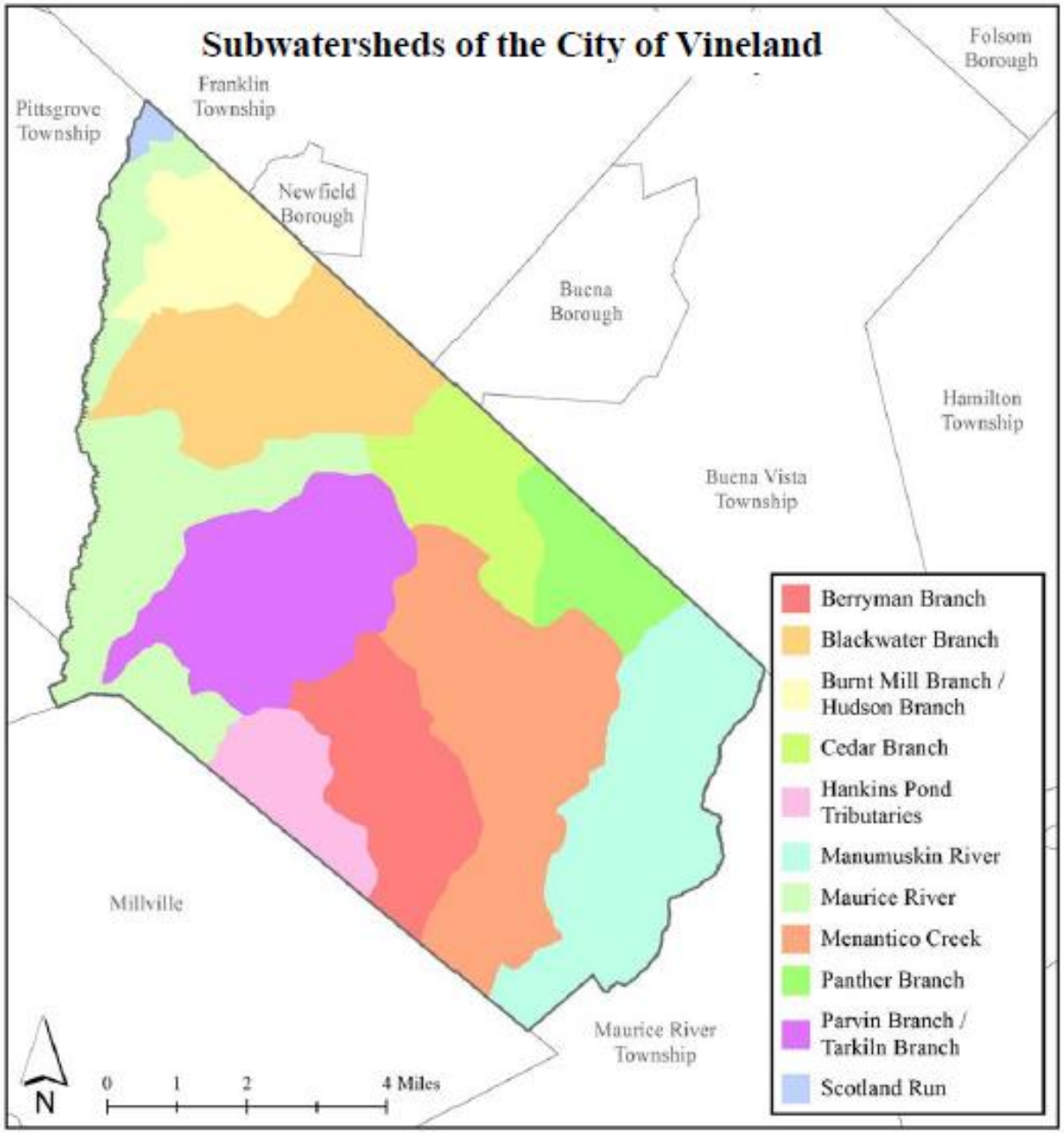
Impervious Cover Assessment

- Analysis completed by watershed and by municipality
- Use 2012 Land Use data to determine impervious cover
- Calculate runoff volumes for water quality, 2, 10 and 100 year design storm and annual rainfall
- Contain three concept designs


Land Use Types for the City of Vineland
Franklin Township
Newfield Borough
Pittsgrove Township
Buena Borough
Deerfield Township
Buena Vista Township
Millville
Maurice River Township
Agriculture
Barren Land
Forest
Urban
Water
Wetlands
N
0
1
2
4 Miles


Wetlands
14.3%
Agriculture
13.8%
Water
0.7%
Barren Land
1.8%
Urban
36.6%
Forest
32.7%


Transportation/Infrastructure
5.2%
Commercial
8.3%
High Density
Residential
7.6%
Rural Residential
21.9%
Industrial
5.7%
Low Density
Residential
12.2%
Recreational Land
8.5%
Mixed Urban
9.5%
Medium Density
Residential
21.1%


Subwatersheds of the City of Vineland
Folsom Borough
Franklin Township
Pittsgrove Township
Newfield Borough
Buena Borough
Hamilton Township
Buena Vista Township
Millville
Maurice River Township
Berryman Branch
Blackwater Branch
Burnt Mill Branch / Hudson Branch
Cedar Branch
Hankins Pond Tributaries
Manumuskin River
Maurice River
Menantico Creek
Panther Branch
Parvin Branch / Tarkiln Branch
Scotland Run
N
0
1
2
4 Miles

Watershed	Total Area (ac)	Impervious Cover (ac)	%
Berryman Branch	3,841.2	283.7	7.4%
Blackwater Branch	5,255.8	732.9	14.0%
Burnt Mill Branch / Hudson Branch	2,456.2	280.5	11.5%
Cedar Branch	2,687.2	345.6	13.0%
Hankins Pond Tributaries	1,837.4	287.5	15.7%
Manumuskin River	6,456.1	51.7	0.8%
Maurice River	6,389.9	1,074.5	17.0%
Menantico Creek	7,370.8	520.4	7.2%
Panther Branch	1,960.5	76.2	3.9%
Parvin Branch / Tarkiln Branch	5,714.5	1,324.1	23.3%
Scotland Run	179.9	10.5	6.1%
Total	44,149.3	4,987.7	11.4%

Subwatershed	NJ Water Quality Storm (MGal)	Annual Rainfall of 44" (MGal)	2-Year Design Storm (3.3”) (MGal)	10-Year Design Storm (4.9”) (MGal)	100-Year Design Storm (7.8”) (MGal)
Berryman Branch	9.6	339.3	25.4	39.3	67.9
Blackwater Branch	24.9	875.7	65.7	101.5	175.1
Burnt Mill Branch / Hudson Branch	9.5	335.7	25.2	38.9	67.1
Cedar Branch	11.7	413.4	31.0	47.9	82.7
Hankins Pond Tributaries	9.7	342.9	25.7	39.7	68.6
Manumuskin River	1.8	62.1	4.7	7.2	12.4
Maurice River	36.5	1,284.3	96.3	148.9	256.9
Menantico Creek	17.6	621.2	46.6	72.0	124.2
Panther Branch	2.6	90.8	6.8	10.5	18.2
Parvin Branch / Tarkiln Branch	44.9	1,581.8	118.6	183.3	316.4
Scotland Run	0.4	13.1	1.0	1.5	2.6
Total	169.3	5,959.2	446.9	690.7	1,191.8

WE LOOK HERE FIRST:

- ✓Schools
- ✓House of Worship
- ✓Libraries
- ✓Municipal Building
- ✓Public Works
- ✓Firehouses
- ✓Post Offices
- ✓Elks or Moose Lodge
- ✓Parks/ Recreational Fields

- 20 to 40 sites are entered into a PowerPoint
- Site visits are conducted

City of Vineland
Impervious Cover Assessment
Landis Intermediate School, 61 West Landis Avenue

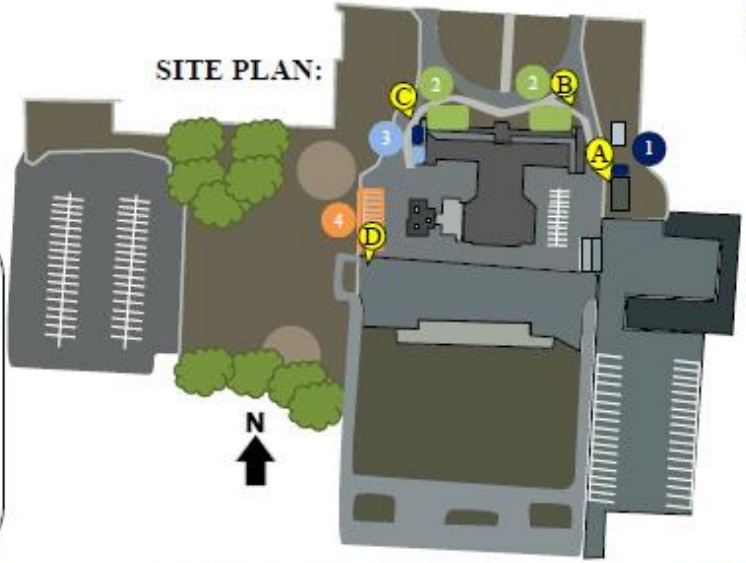
PROJECT LOCATION:

A

B

RUTGERS
New Jersey Agricultural Experiment Station

SITE PLAN:



C

D

1 **DOWNSPOUT PLANTER BOX:** Two downspout planter boxes can be installed outside a building east of the school. These are wooden boxes with plants installed at the base of a downspout that provide an opportunity to beneficially reuse rooftop runoff.

2 **BIORETENTION SYSTEM:** Two rain gardens can be installed on the north side of the school. The rain gardens would reduce runoff and erosion and allow stormwater infiltration.

3 **RAINWATER HARVESTING SYSTEM:** Rainwater can be harvested from the roof of the building and stored in a rain barrel. The water can be used to water the school garden.

4 **POROUS PAVEMENT:** Porous pavement can be installed in the western parking lot near the baseball field. Porous pavement promotes groundwater recharge and filters stormwater.

1 DOWNSPOUT PLANTER BOX

2 BIORETENTION SYSTEM

3 RAINWATER HARVESTING SYSTEM

4 POROUS PAVEMENT

City of Vineland

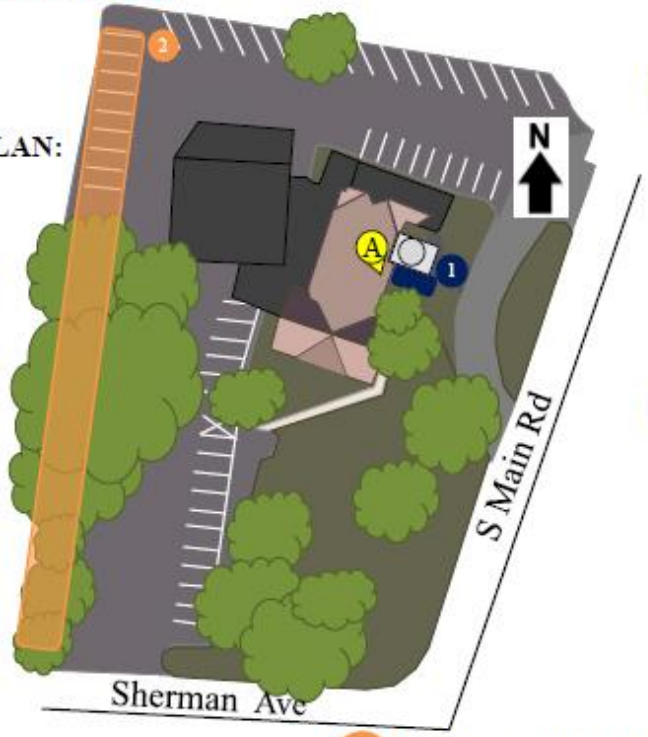
Impervious Cover Assessment

South Vineland United Methodist Church, 2724 South Main Road

RUTGERS
New Jersey Agricultural Experiment Station

PROJECT LOCATION:

SITE PLAN:



A

B

1 **DOWNSPOUT PLANTER BOX:** A downspout planter box can be installed on the eastern side of the church. This is a wooden box with plants installed at the base of a downspout that can provide an opportunity to beneficially reuse rooftop runoff.

2 **POROUS PAVEMENT:** Porous pavement can be installed to replace the parking spots along the west side of the lot. Porous pavement promotes groundwater recharge and filters stormwater.

1 DOWNSPOUT PLANTER BOX

2 POROUS PAVEMENT

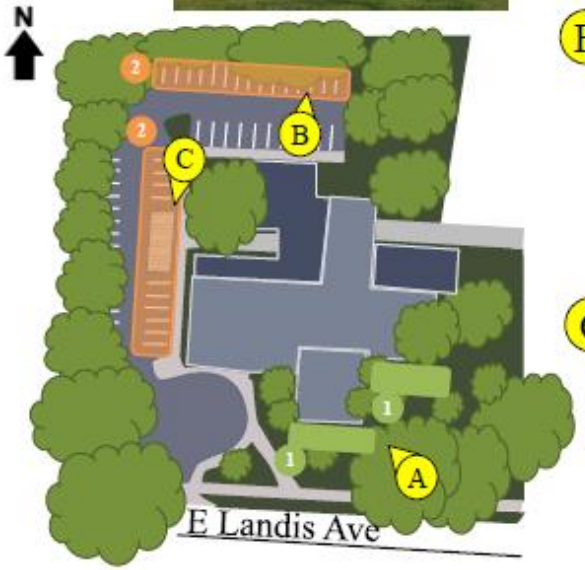
City of Vineland

Impervious Cover Assessment

Vineland Public Library, 1058 East Landis Avenue

PROJECT LOCATION:

SITE PLAN:



A

B

C

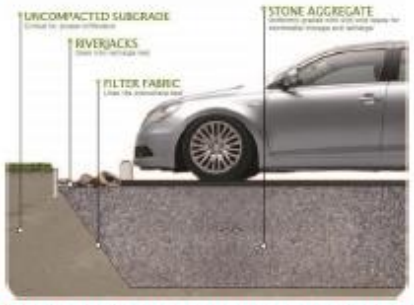
1 **BIORETENTION SYSTEM:** Bioretention systems could be installed adjacent to the library. The bioretention systems would reduce sediment and nutrient loading to the local waterway and increase groundwater recharge.

2 **POROUS PAVEMENT:** Porous pavement could be installed in two locations of the parking lot. Porous pavement promotes groundwater recharge and filters stormwater.

EDUCATIONAL PROGRAM: The RCE Water Resources Program's, *Stormwater Management in Your Backyard* can be delivered to educate the public about stormwater management and engage them in designing and building the bioretention systems.

1 BIORETENTION SYSTEM

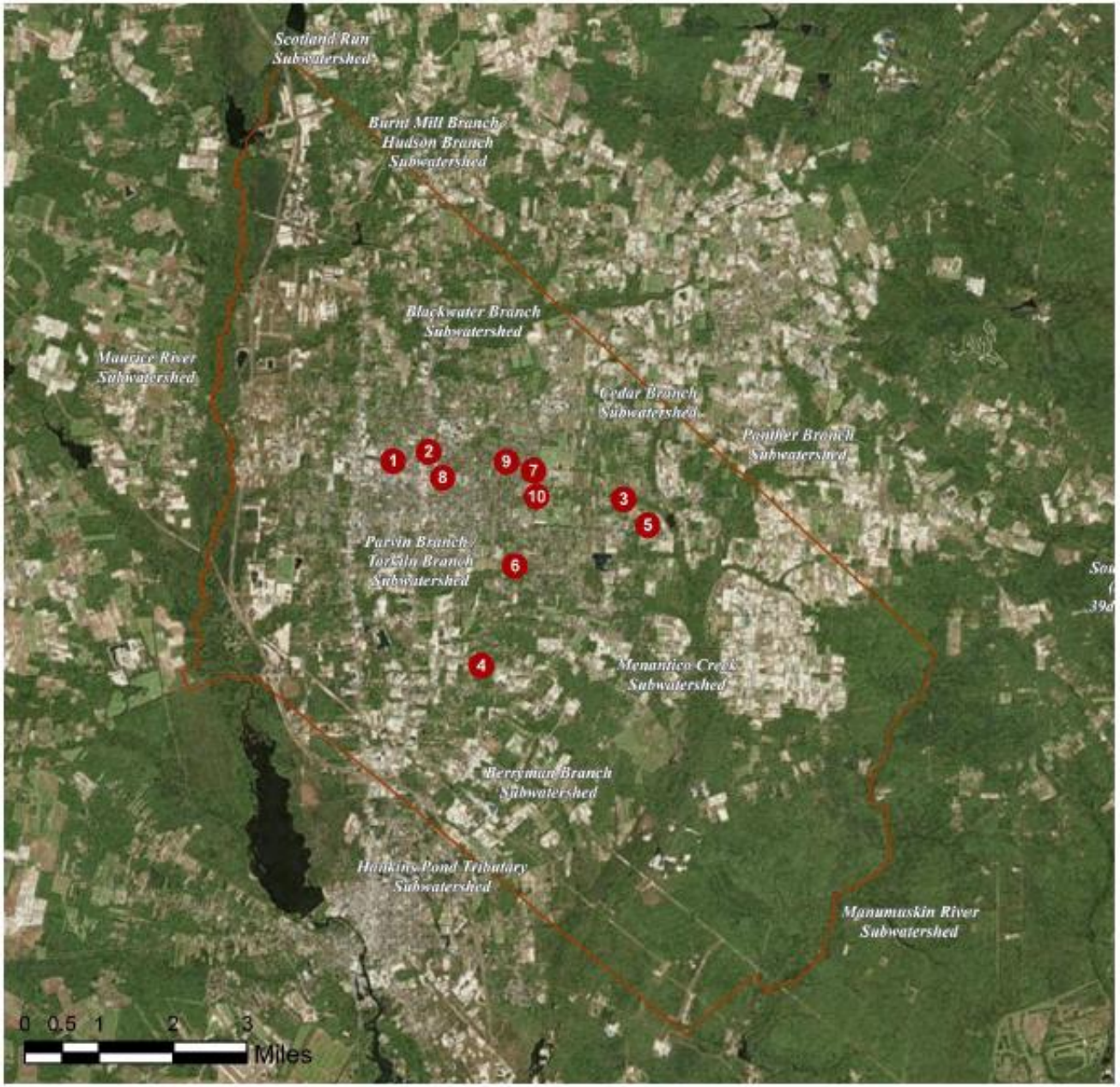
2 POROUS PAVEMENT



EDUCATIONAL PROGRAM

Impervious Cover Reduction Action Plan

CITY OF VINELAND: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE MAURICE RIVER SUBWATERSHED:

1. Landis Intermediate School
2. Vineland Fire Department

SITES WITHIN THE MENANTICO CREEK SUBWATERSHED:

3. Chestnut Assembly of God
4. South Vineland Methodist Church
5. Vineland High School

SITES WITHIN THE PARVIN BRANCH/TARKILN BRANCH SUBWATERSHED:

6. Magnolia Shopping Court
7. Vine Haven Adventist School
8. Vineland Learning Complex
9. Vineland Public Library
10. Vineland YMCA

VINELAND FIRE DEPARTMENT

Subwatershed: Maurice River

Site Area: 45,000 sq. ft.

Address: 110 North 4th Street
Vineland, NJ 08360

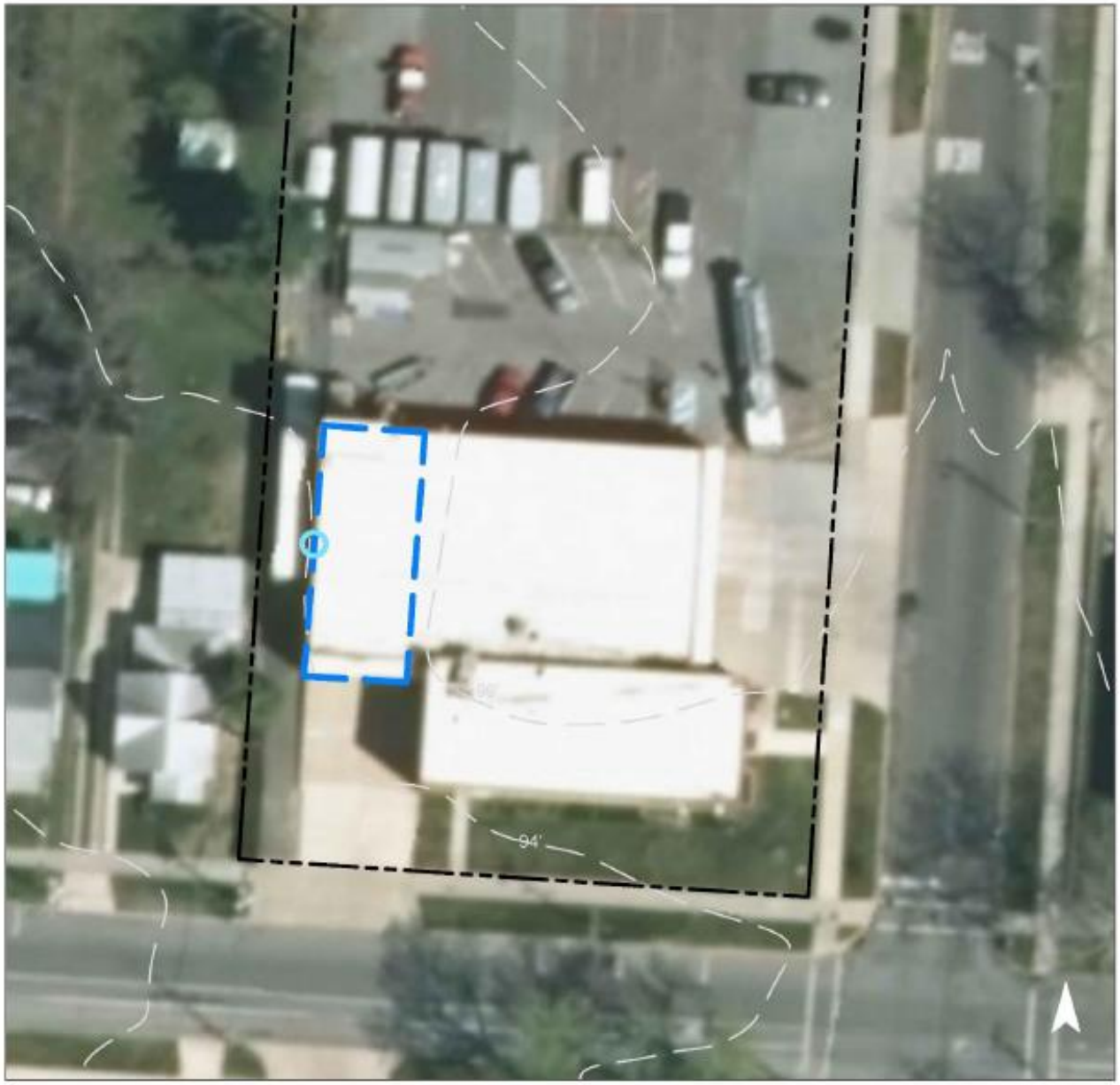
Block and Lot: Block 2914, Lots 8-12

Stormwater is currently directed to a small garden on the south side of the building and to the sidewalk. Downspouts can be directed to a cistern on the west side of the building to capture rainwater, which can be used for washing the firetrucks. 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"
94	42,380	2.0	21.4	194.6	0.033	1.16

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Rainwater harvesting	0.046	8	1,000	0.09	1,000 (gal)	$2,000

GREEN INFRASTRUCTURE RECOMMENDATIONS



Vineland Fire Department

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

0 20' 40'

CHESTNUT ASSEMBLY OF GOD

Subwatershed: Menantico Creek

Site Area: 1,124,291 sq. ft.

Address: 2554 East Chestnut Avenue
Vineland, NJ 08361

Block and Lot: Block 4405, Lot 30

Stormwater is currently directed to the parking lot and retention basins on the east and west side of the property. Parking spots by the southeastern side of the building can be replaced with pervious pavement to capture and infiltrate stormwater. Downspouts can be disconnected and directed to a rain garden adjacent to the building, which can capture, treat, and infiltrate roof runoff. A preliminary soil assessment suggests that the soils have very 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	238,673	11.5	120.5	1,095.8	0.186	6.55

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	0.183	31	13,404	0.36	1,755	$8,775
Pervious pavement	0.835	140	61,261	1.67	10,820	$270,500

GREEN INFRASTRUCTURE RECOMMENDATIONS

Chestnut Assembly of God

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

0 50' 100'

VINELAND PUBLIC LIBRARY

Subwatershed: Parvin / Tarkiln Branch

Site Area: 90,238 sq. ft.

Address: 1058 East Landis Avenue
Vineland, NJ 08360

Block and Lot: Block 3116, Lot 27

Stormwater is currently directed through connected downspouts to eight storm drains on the property. Parking spots by the north and west side of the building can be replaced with pervious pavement to capture and infiltrate stormwater. Downspouts can be disconnected and directed to rain gardens adjacent to the building, which can capture, treat, and infiltrate roof runoff as well as provide an educational opportunity. A preliminary soil assessment suggests that the soils have very 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	58,744	2.8	29.7	269.7	0.046	1.61

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 systems	0.126	21	18,535	0.50	1,390	$6,950
Pervious pavement	0.536	90	39,307	1.07	3,400	$85,000

GREEN INFRASTRUCTURE RECOMMENDATIONS

Vineland Public Library

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

0 30' 60'

www.water.rutgers.edu/Projects/William_Penn/Vineland/index.html

City of Vineland

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ALL SITES | MAURICE RIVER | MENANTICO CREEK | PARVIN BRANCH / TARKILN BRANCH


1 Landis Intermediate School


2 Vineland Fire Department


3 Chestnut Assembly of God


4 South Vineland Methodist Church


5 Vineland High School

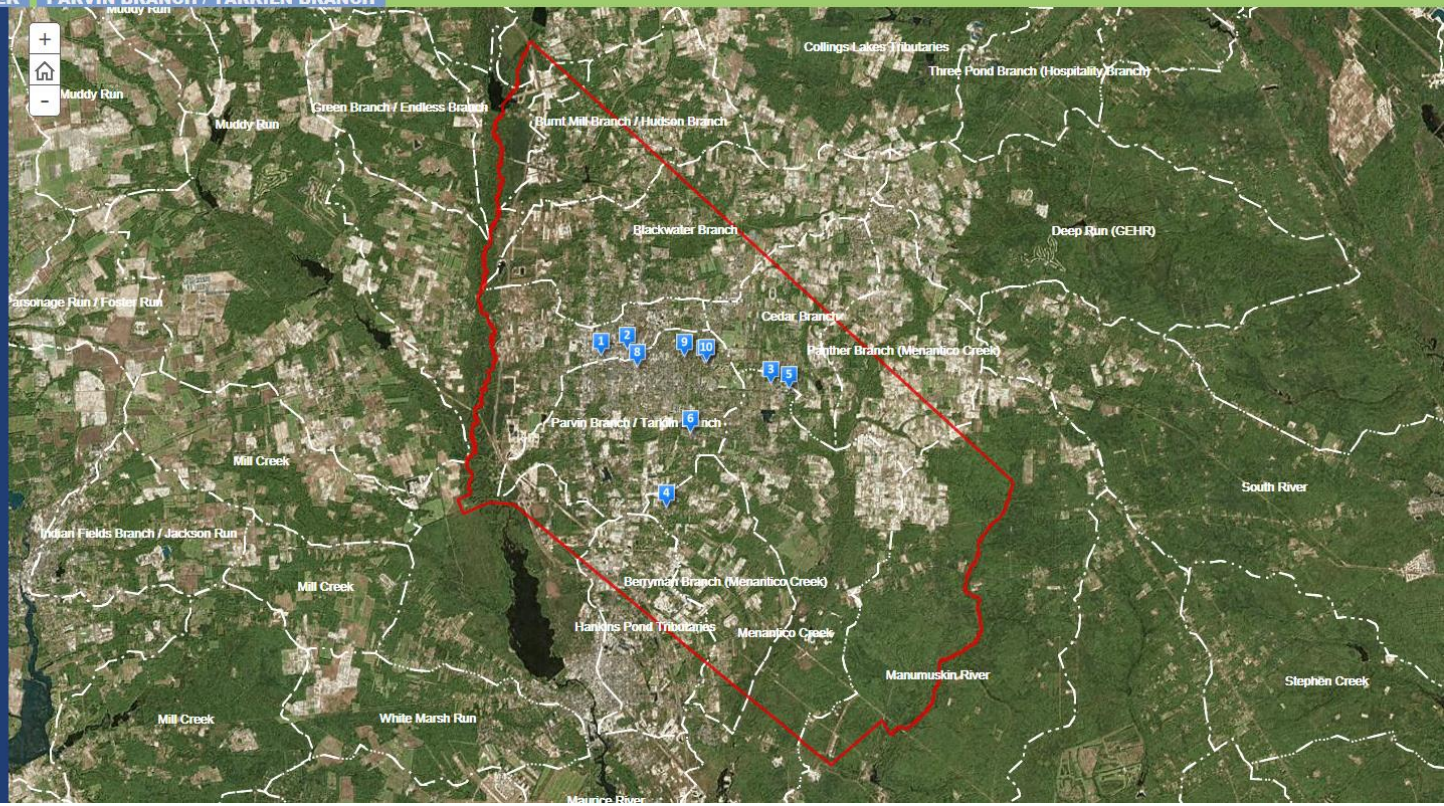

6 Magnolia Shopping Court


7 Vine Haven Adventist School


8 Vineland Learning Complex


9 Vineland Public Library


10 Vineland YMCA



www.water.rutgers.edu/Projects/William_Penn/Vineland/index.html

City of Vineland

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New Jersey Agricultural Experiment Station

ALL SITES | MAURICE RIVER | MENANTICO CREEK | PARVIN BRANCH / TARKILN BRANCH


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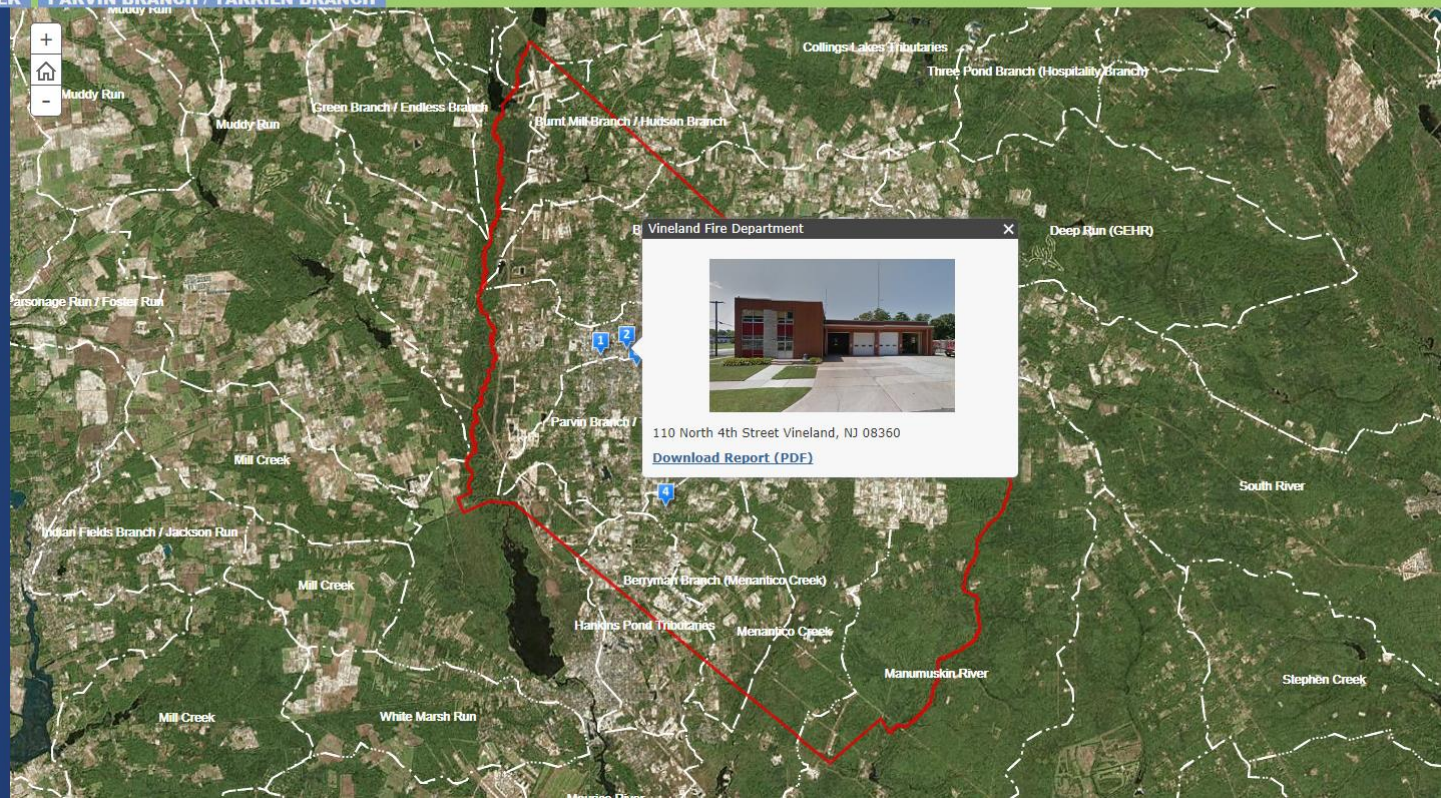

ICA/RAP Final Thoughts

- Plans promote action
- Plans are a conduit for funding
- Impervious cover reduction action plan provide sites for developers to offset impacts
- Wide range in cost of projects (Eagle Scout projects to economic stimulus money projects)
- Foundation for stormwater utilities, watershed restoration plans, stormwater mitigation plan, and/or integrated water quality plans

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Final Thoughts

- Planning needs to be quick, simple and inexpensive
- Plans are conduits for funding
- All opportunities need to be field verified
- Local champions are needed to get projects in the ground
- It takes time to develop relationships

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Questions?