Green Infrastructure Champions Program

This program is partially funded by the Rutgers New Jersey Agricultural Experiment Station, The Geraldine R. Dodge Foundation, NJ Sea Grant Consortium, The William Penn Foundation and is a collaboration of the Rutgers Cooperative Extension Water Resources Program and the Green Infrastructure Subcommittee of Jersey Water Works.

RUTGERS
New Jersey Agricultural Experiment Station

Sea Grant
NJ Sea Grant Consortium

Please enter your full name and affiliation in the chat. This is how will take attendance.

The Geraldine R. DODGE FOUNDATION
IMAGINE A BETTER NEW JERSEY

JERSEY WATER WORKS
Smart infrastructure. Strong communities.

WILLIAM PENN FOUNDATION

Green Infrastructure Champion Training: Part 5
“Green Infrastructure Planning and Implementation for Sustainable Jersey Points”

March 11, 2022
Virtual Class

RUTGERS
New Jersey Agricultural Experiment Station

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

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

Green Infrastructure

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

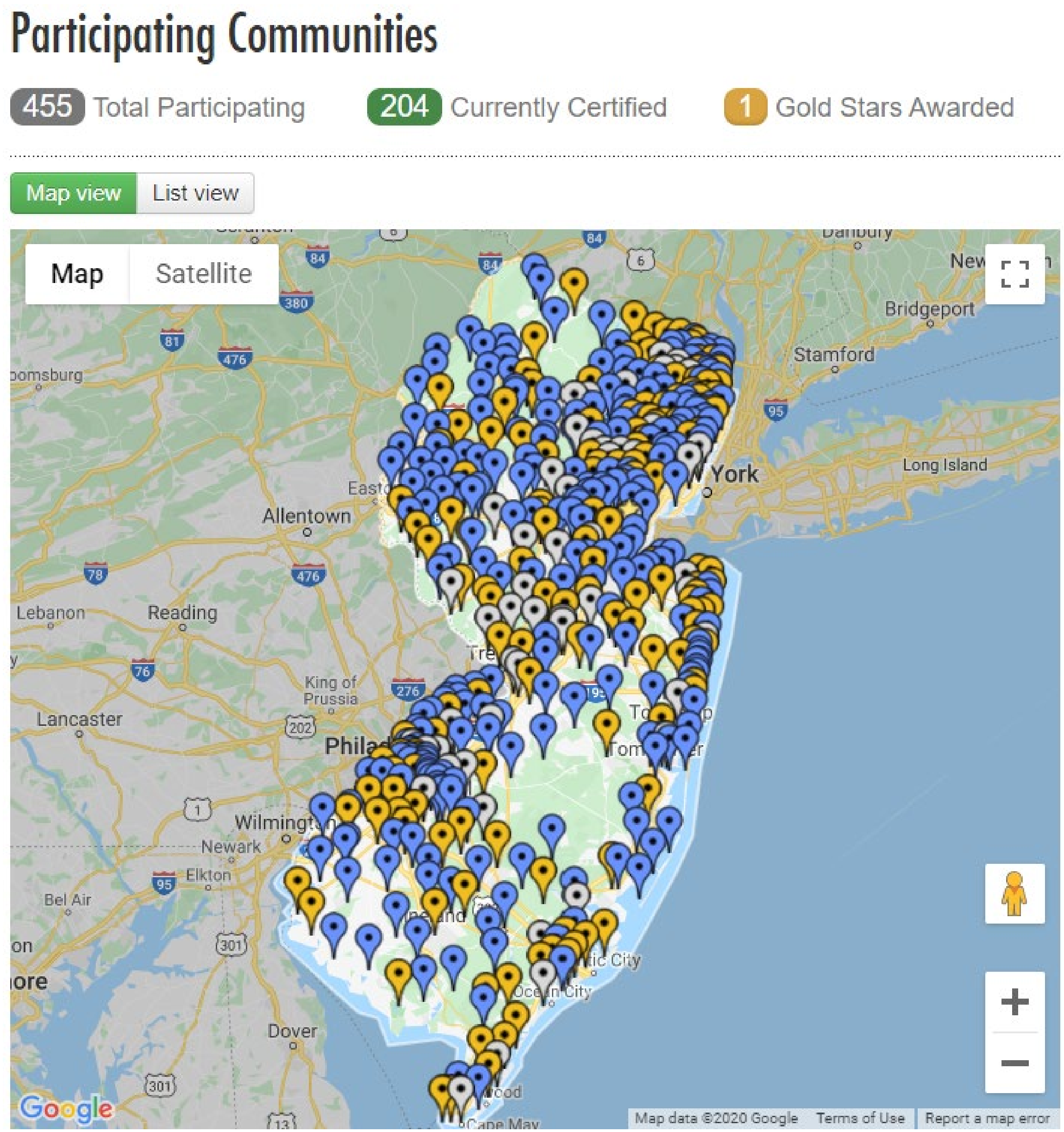
Green Infrastructure projects:

- capture,
- filter,
- absorb, and
- reuse

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

Sustainable Jersey

Sustainable Jersey is a nonprofit organization that provides tools, training, and financial incentives to support communities as they pursue sustainability programs.



http://www.sustainablejersey.com/

RSS

Sign in or sign up.

SUSTAINABLE JERSEY® • CERTIFIED •

A Better Tomorrow, One Community at a Time

ABOUT | ACTIONS & CERTIFICATION | EVENTS & TRAININGS | GRANTS & RESOURCES | MEDIA & COMMUNICATIONS | SUPPORT US | REGISTER

HEADLINES

Eight North Jersey Municipalities to Receive Complete Streets Assistance
MAR 11, 2020

Help is on the Way for NJ Floodplains: 15 Towns Receive Reforestation Grants
FEB 05, 2020

UPCOMING EVENTS

2020 New Jersey Sustainability Summit
Bell Works
JUN 12, 2020 - 08:00 AM TO 04:15 PM

14th Annual Mercer

ABOUT SUSTAINABLE JERSEY

Sustainable Jersey is a nonprofit organization that provides tools, training and financial incentives

PARTICIPATING COMMUNITIES

View the map of Sustainable Jersey communities. Search the completed actions database and sort by county, actions and certification status! View

Sustainable Jersey Action Categories

- Arts & Creative Culture
- Brownfields
- Community Partnership & Outreach
- Diversity & Equity
- Emergency Management & Resiliency
- Energy
- Food
- Green Design
- Health & Wellness
- Innovation Projects
- Land Use & Transportation
- Local Economies
- Natural Resources
- Operations & Maintenance
- Public Information & Engagement
- Sustainability & Climate Planning
- Waste Management

Land Use & Transportation Action Item

- Sustainable Land Use Pledge (10 Points)
- Build-Out Analysis (10 Points)
- Bicycle and Pedestrian Audits (5 Points)
- Bicycle and or Pedestrian Plan (10 Points)
- Adopt a Complete Streets Policy (10 Points)
- Institute Complete Streets (10 Points)
- Effective Parking Management (10 Points)
- Green Infrastructure Planning (5 Points)
- Green Infrastructure Implementation (10 Points)
- Enhanced Stormwater Management Control Ordinance (10 Points)
- Green Building and Environmental Sustainability Element (10 Points)
- Historic Preservation Element (10 Points)
- Smart Workplaces (5 Points)
- Transit-Oriented Development Supportive Zoning (20 Points)

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A Better Tomorrow, One Community at a Time

Green Infrastructure Planning

5 Points | 10 Points | 20 Points

New Action February 2018

See Handouts

SUSTAINABLE JERSEY • CERTIFIED •
A Better Tomorrow, One Community at a Time

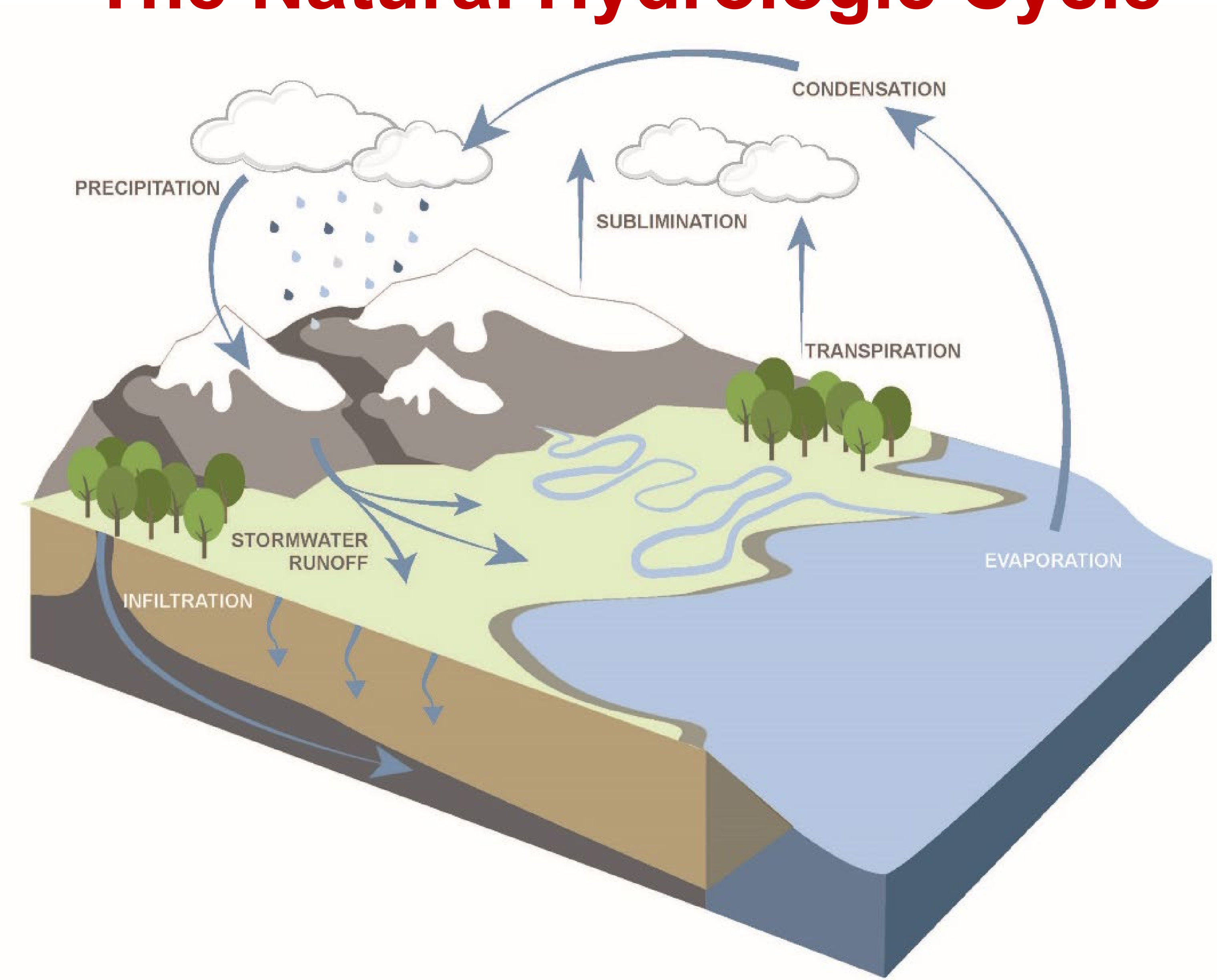
Green Infrastructure Implementation

10 Points | 15 Points | 20 Points

New Action February 2018

What is a green infrastructure plan (and why do we need one)?

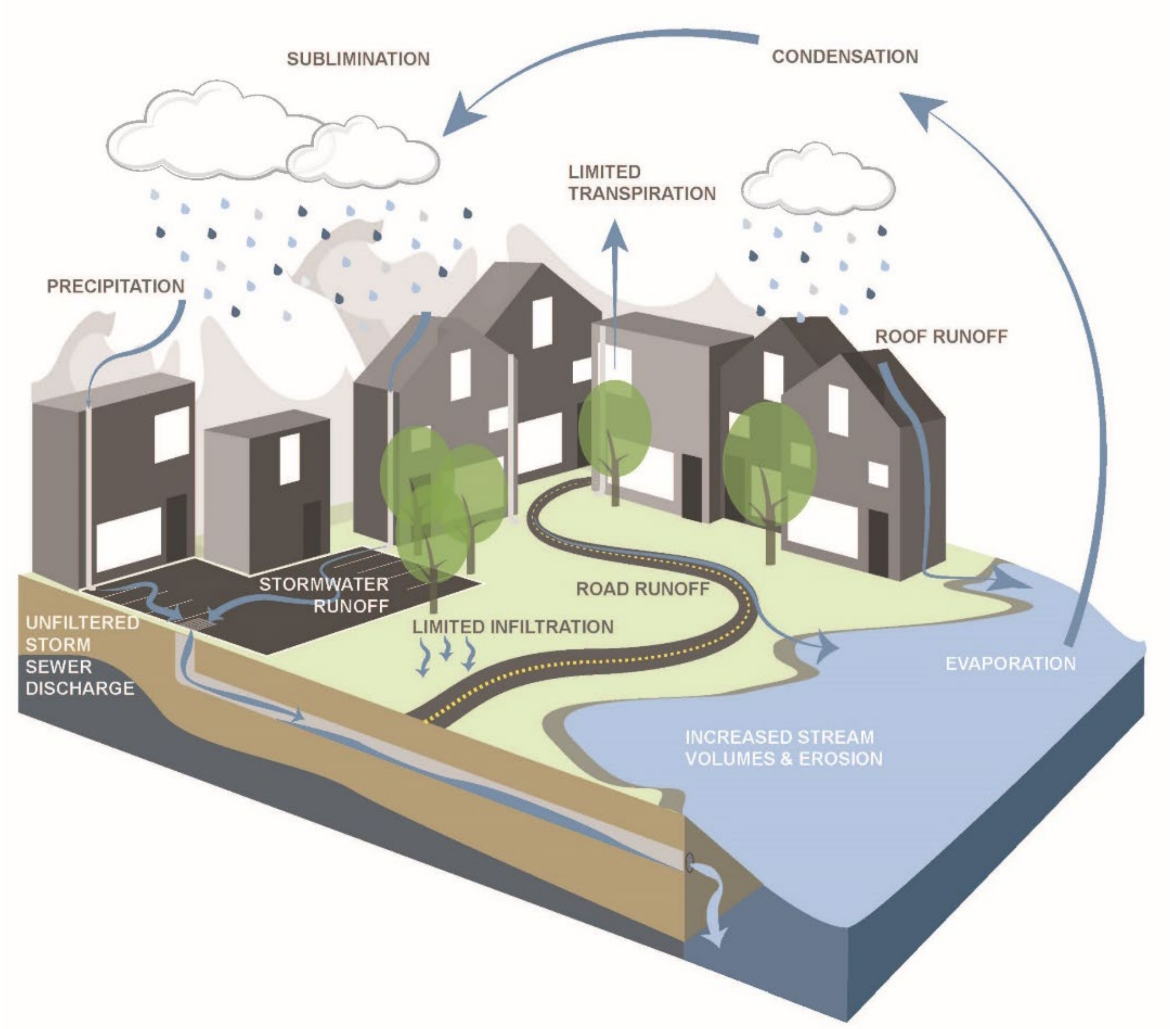
The Natural Hydrologic Cycle



+ impervious surfaces =

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

The Urban Hydrologic Cycle



+ green infrastructure =

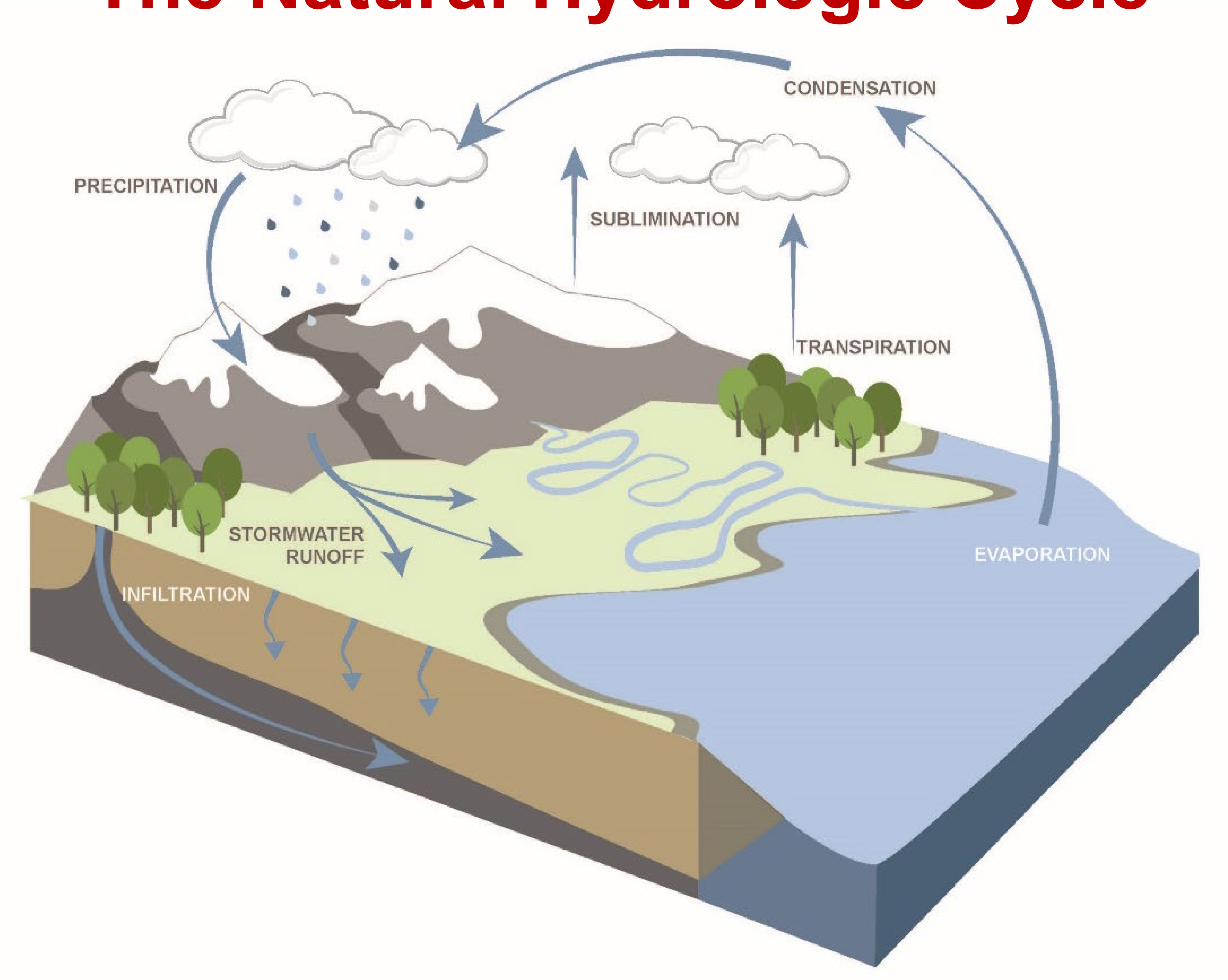
- Green Roofs
- Rainwater Harvesting
- Tree Filter/Planter Boxes
- Rain Gardens/Bioretention Systems
- Permeable Pavements
- Vegetated Swales or Bioswales
- Natural Retention Basins
- Green Streets








The Natural Hydrologic Cycle

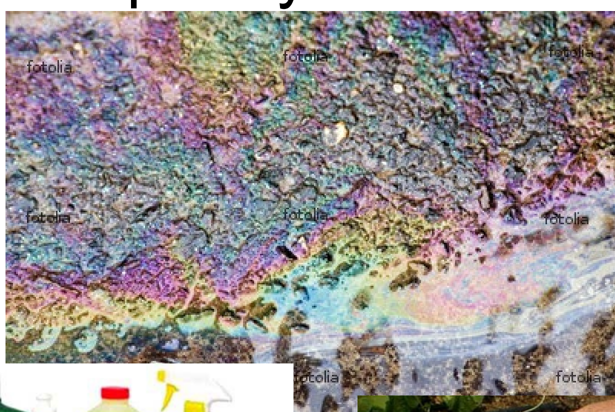


Water Quantity Impacts of Urbanization

- Disruption of natural water balance
  - Less infiltration
  - More runoff
  - Less evapotranspiration (maybe)
- Increased flood peaks
  - Flashy streams
  - More frequent flooding
  - Increased bankfull flows (more erosion and downcutting)
- Lower dry weather flows

Water Quality Impacts of Urbanization (increased nonpoint source pollution)

- Oil and grease from cars
- Fertilizers
- Animal waste
- Grass clippings
- Septic systems
- Sewage leaks
- Household cleaning products
- Litter
- Agriculture





Sustainable Jersey
Green Infrastructure Planning Action

1. Impervious Cover Assessment (ICA)
   (5 points)

2. Green Infrastructure Action Plan (a.k.a. Impervious Cover Reduction Action Plan or RAP)
   (5 points)

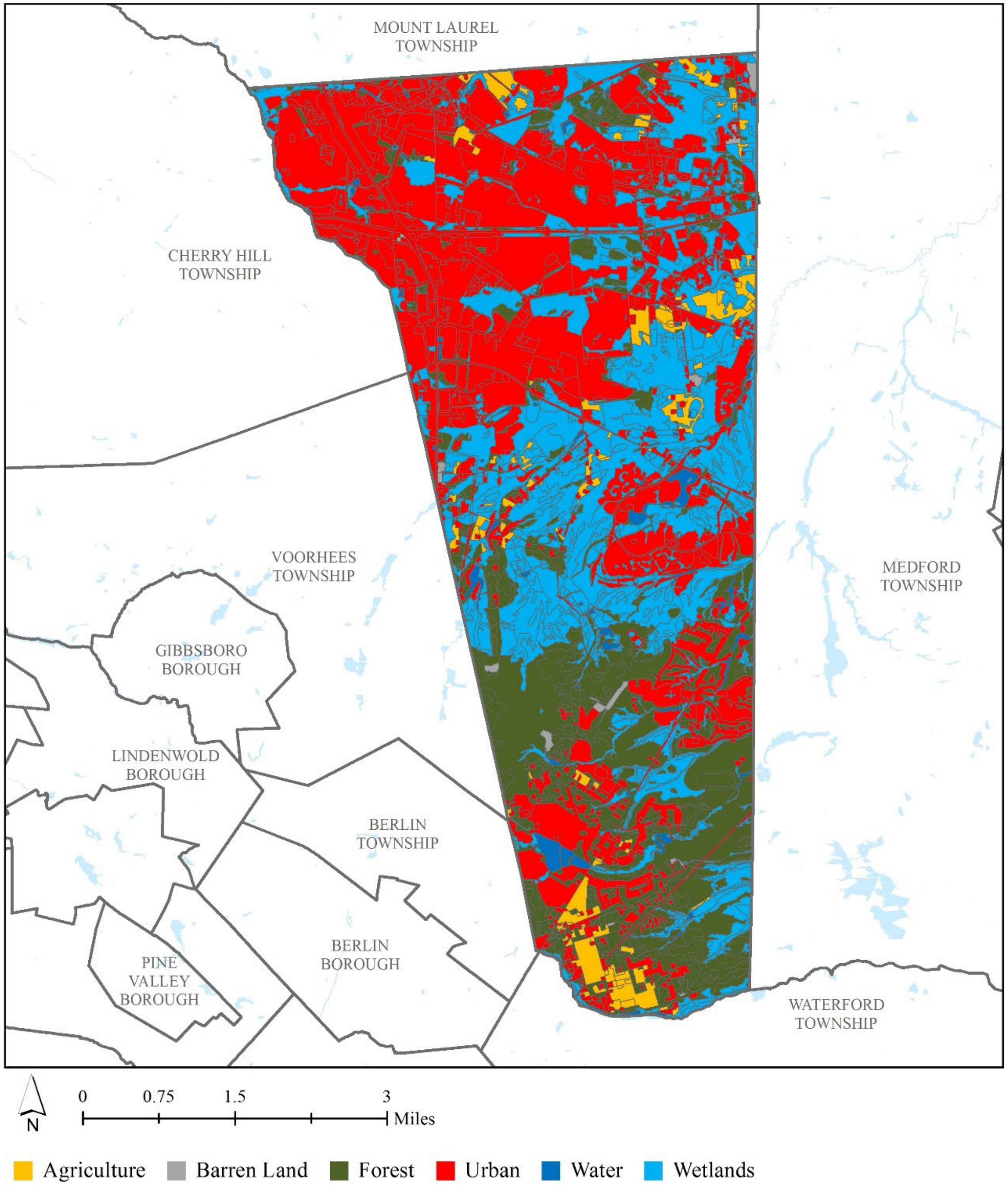
3. Green Infrastructure Strategic Plan (a.k.a. Green Infrastructure Feasibility Study)
   (10 points)

Impervious Cover Assessment (ICA)

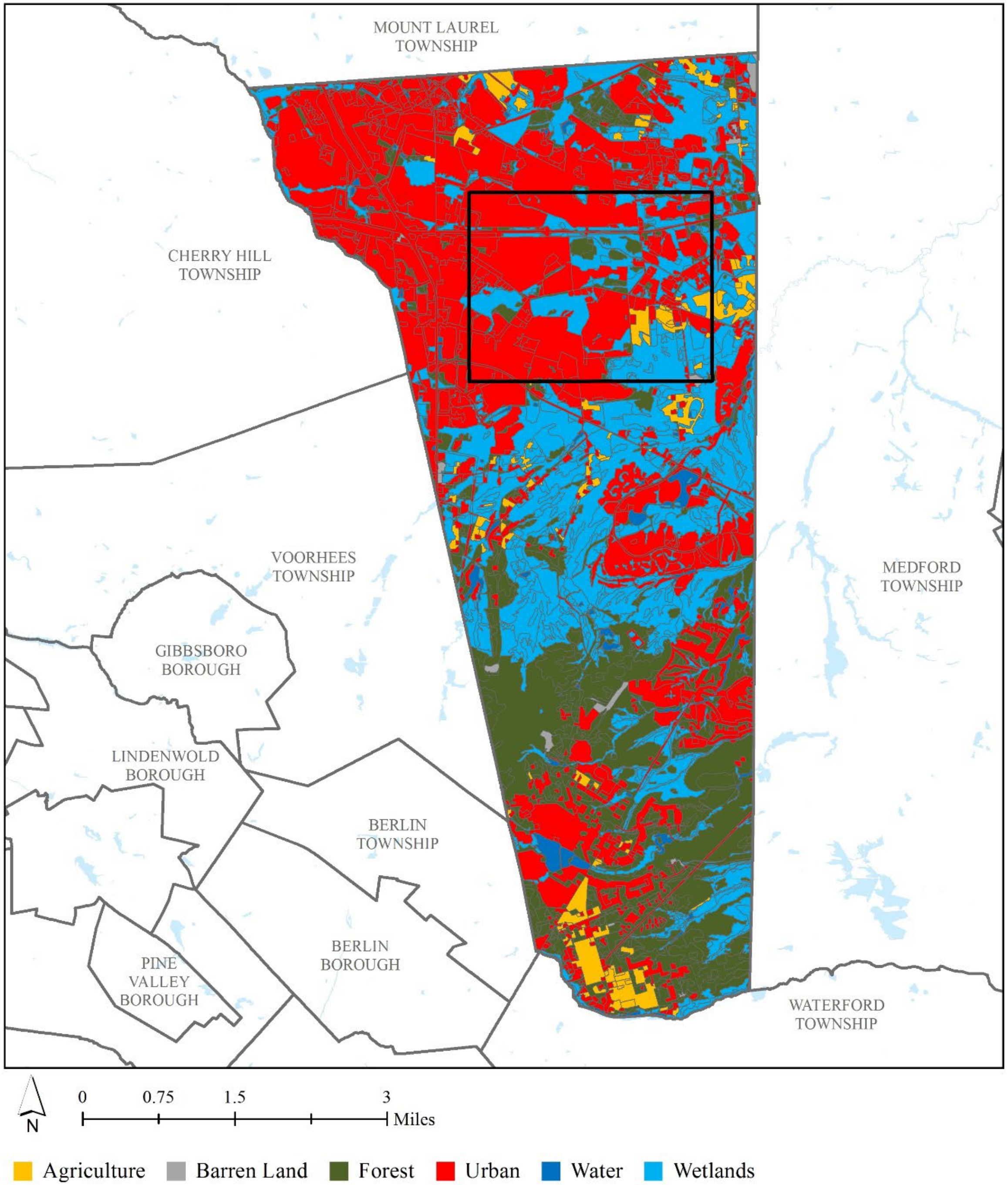
Impervious Cover Assessment

- Analysis completed by watershed and by municipality
- Use 2015 Land Use data to determine impervious cover
- Calculate runoff volumes for water quality, 2-, 10- and 100-year design storm and annual rainfall
- Contains three concept designs

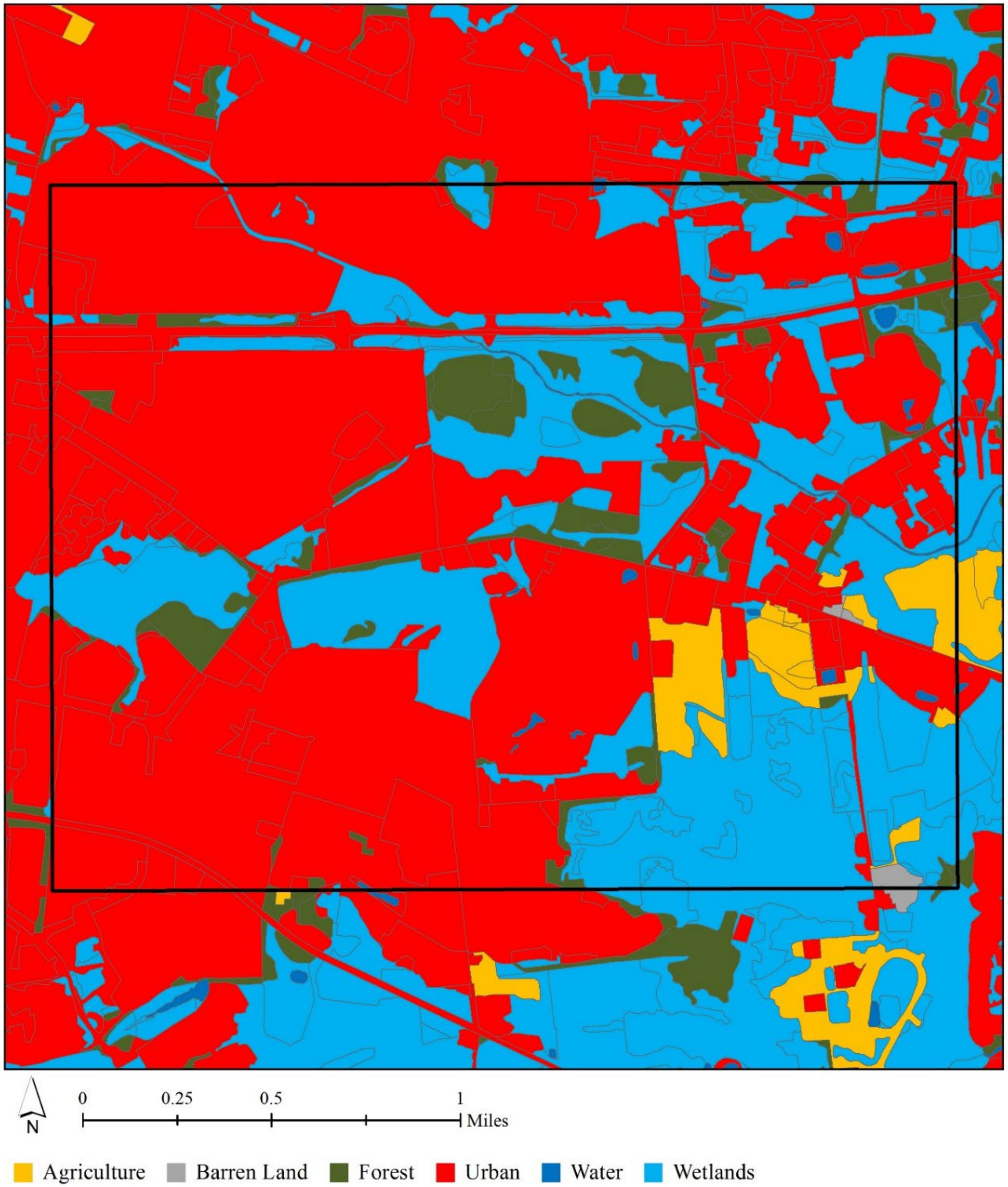
Land Use of Evesham Township



Land Use of Evesham Township



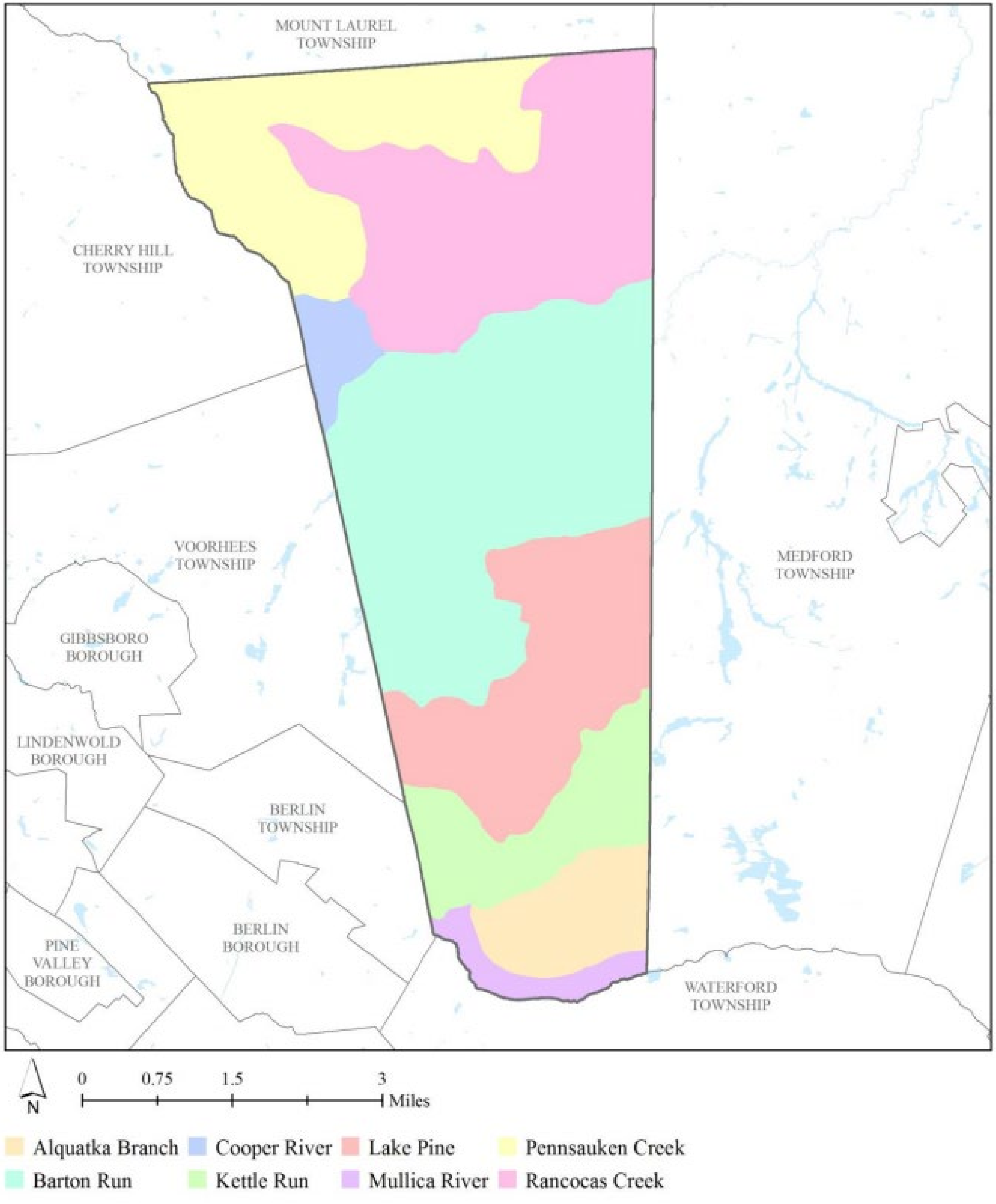
Land Use of Evesham Township

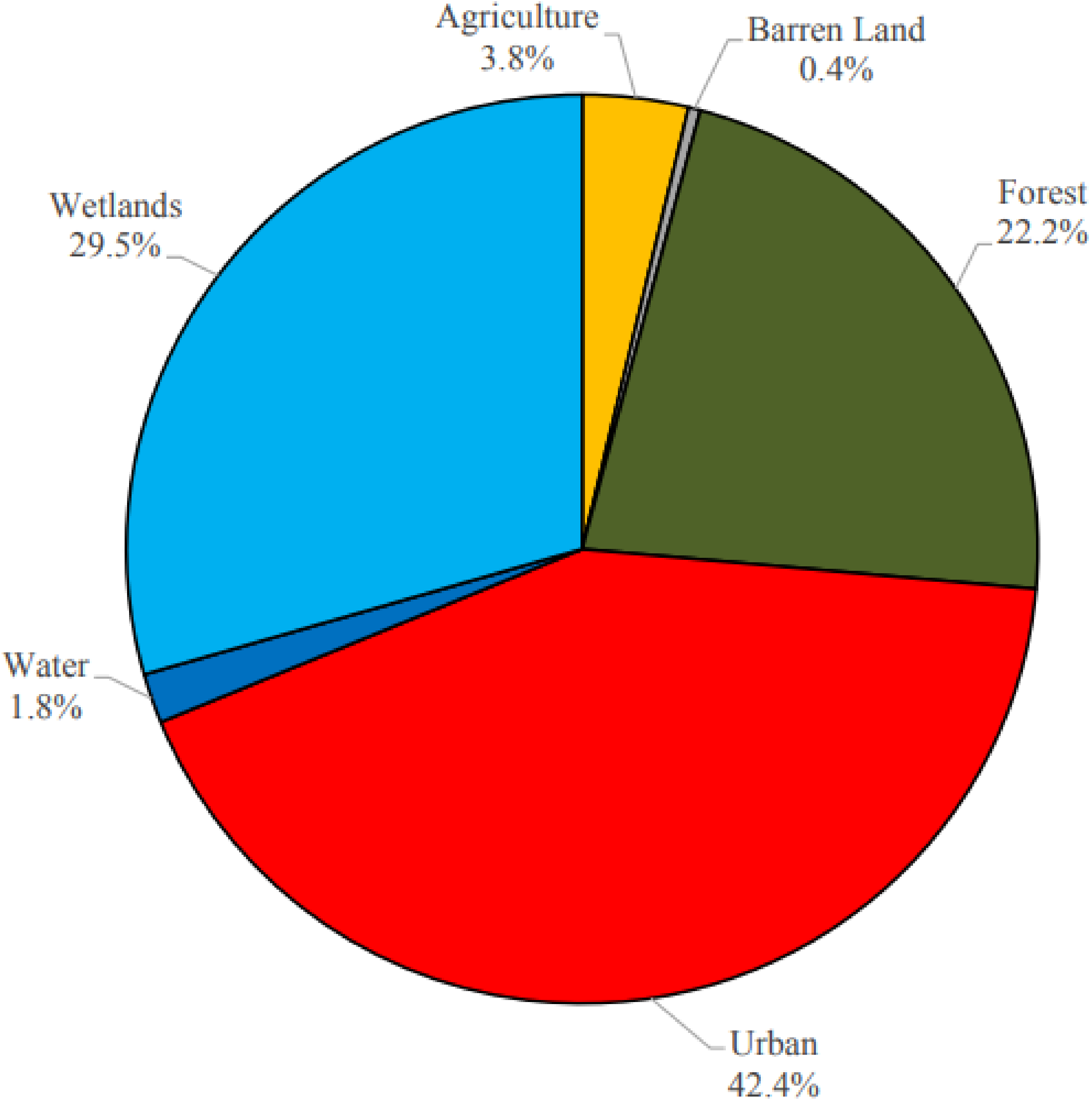


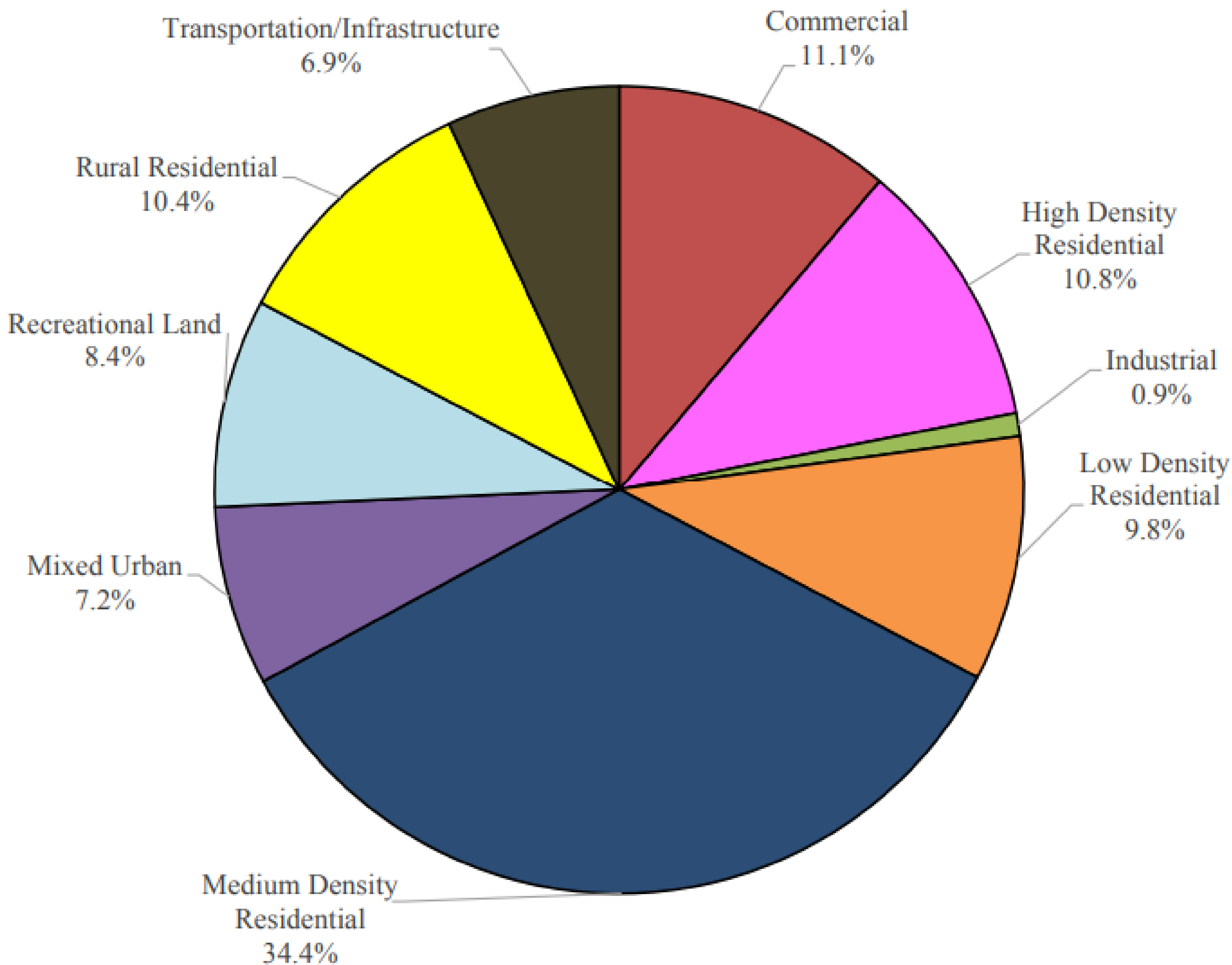
Information from GIS

Acres	LU15	LABEL15	TYPE15	IS15	ISACRES15
5.74	1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	URBAN	36.48	2.095
1.18	1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	URBAN	13.64	0.161
12.42	1200	COMMERCIAL/SERVICES	URBAN	76.54	9.503
1.07	1200	COMMERCIAL/SERVICES	URBAN	99.72	1.066

Subwatersheds of Evesham Township




Agriculture
3.8%
Barren Land
0.4%
Forest
22.2%
Wetlands
29.5%
Water
1.8%
Urban
42.4%


Transportation/Infrastructure
6.9%
Commercial
11.1%
High Density
Residential
10.8%
Industrial
0.9%
Low Density
Residential
9.8%
Medium Density
Residential
34.4%
Mixed Urban
7.2%
Recreational Land
8.4%
Rural Residential
10.4%

Watershed	Total Area (ac)	Impervious Cover (ac)	%
Alquatka Branch	1,026.8	14.3	1.4%
Barton Run	5,669.5	515.6	9.3%
Cooper River	415.0	184.5	45.0%
Kettle Run	1,509.0	99.5	6.9%
Lake Pine	2,857.2	180.9	6.4%
Mullica River	383.2	16.8	4.5%
Pennsauken Creek	2,951.5	1,025.8	35.1%
Rancocas Creek	4,116.9	846.9	20.7%
Total	18,929.1	2,884.3	15.5%

Calculate stormwater runoff volumes from impervious surfaces

IC (ac) x 43,560 ft^2/ac x rainfall (ft) x 7.48 gal/ft^3 = gallons of runoff

Divide by 1,000,000 to get millions of gallons (Mgal)

Note: Calculation is only for stormwater runoff volume from impervious surfaces. During heavy rainfall events, the soil becomes saturated and the entire municipality acts like an impervious surface.

Subwatershed	NJ Water Quality Storm (MGal)	Annual Rainfall of 44" (MGal)	2-Year Design Storm (3.3") (MGal)	10-Year Design Storm (5.0") (MGal)	100-Year Design Storm (8.2") (MGal)
Alquatka Branch	0.5	17.0	1.4	2.0	3.2
Barton Run	17.5	616.0	49.0	72.8	116.2
Cooper River	6.3	220.4	17.5	26.1	41.6
Kettle Run	3.4	118.9	9.5	14.0	22.4
Lake Pine	6.1	216.1	17.2	25.5	40.8
Mullica River	0.6	20.1	1.6	2.4	3.8
Pennsauken Creek	34.8	1,225.5	97.5	144.8	231.2
Rancocas Creek	28.7	1,011.8	80.5	119.6	190.9
Total	97.9	3,445.9	274.1	407.2	650.0

Green Infrastructure Action Plan (a.k.a. Impervious Cover Reduction Action Plan or RAP)

Green Infrastructure Action Plan

ICA (Tier1) + the following:

1. Community engagement
2. Potential green infrastructure sites
3. Site level analysis including concept plans, information sheets, and project costs
4. Investment/funding strategy for green infrastructure projects
5. Short-term 5-year goal

1. Community Engagement

2. Identify Potential Green Infrastructure Site

- Sites with impervious surfaces that are directly connected
- Sites with a lawn area that can be converted to accept stormwater runoff
- Sites with highly visibility – good educational opportunities
- Sites in impaired watersheds
- Sites on municipal owned land/public land
- Sites that provide partnership opportunities

WE LOOK HERE FIRST:

- ✓Schools
- ✓Houses 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

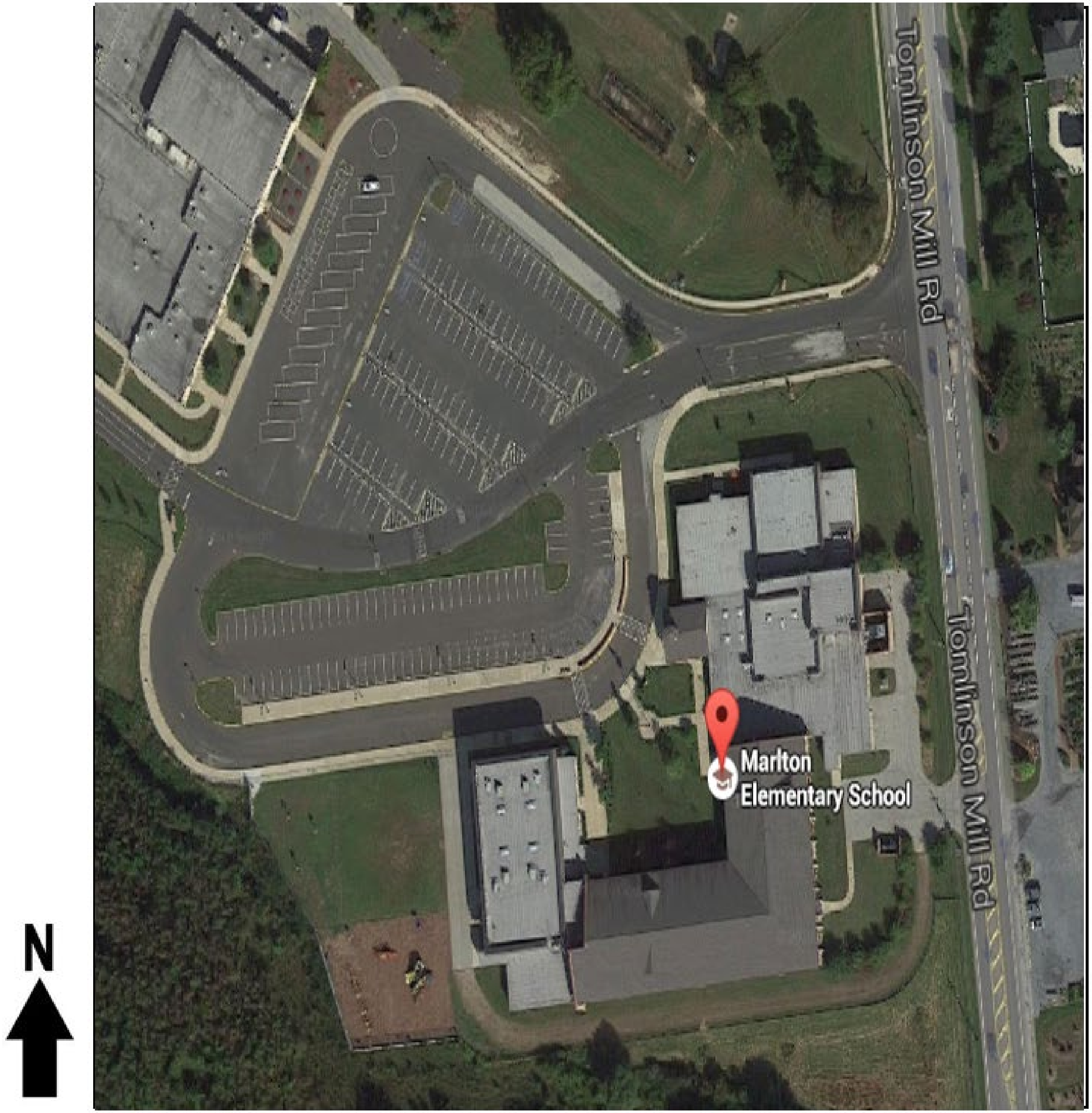
Let’s get started!
Download aerial photograph of “Look Here First Sites”

- Go to Google or Bing Maps
- Type in address
- Aerial or birds eye view
- “Snip It”
- Insert into PowerPoint
- “Crop It”

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

Marlton Elementary School

190 Tomlinson Mill Rd,
Evesham Township, NJ 08053



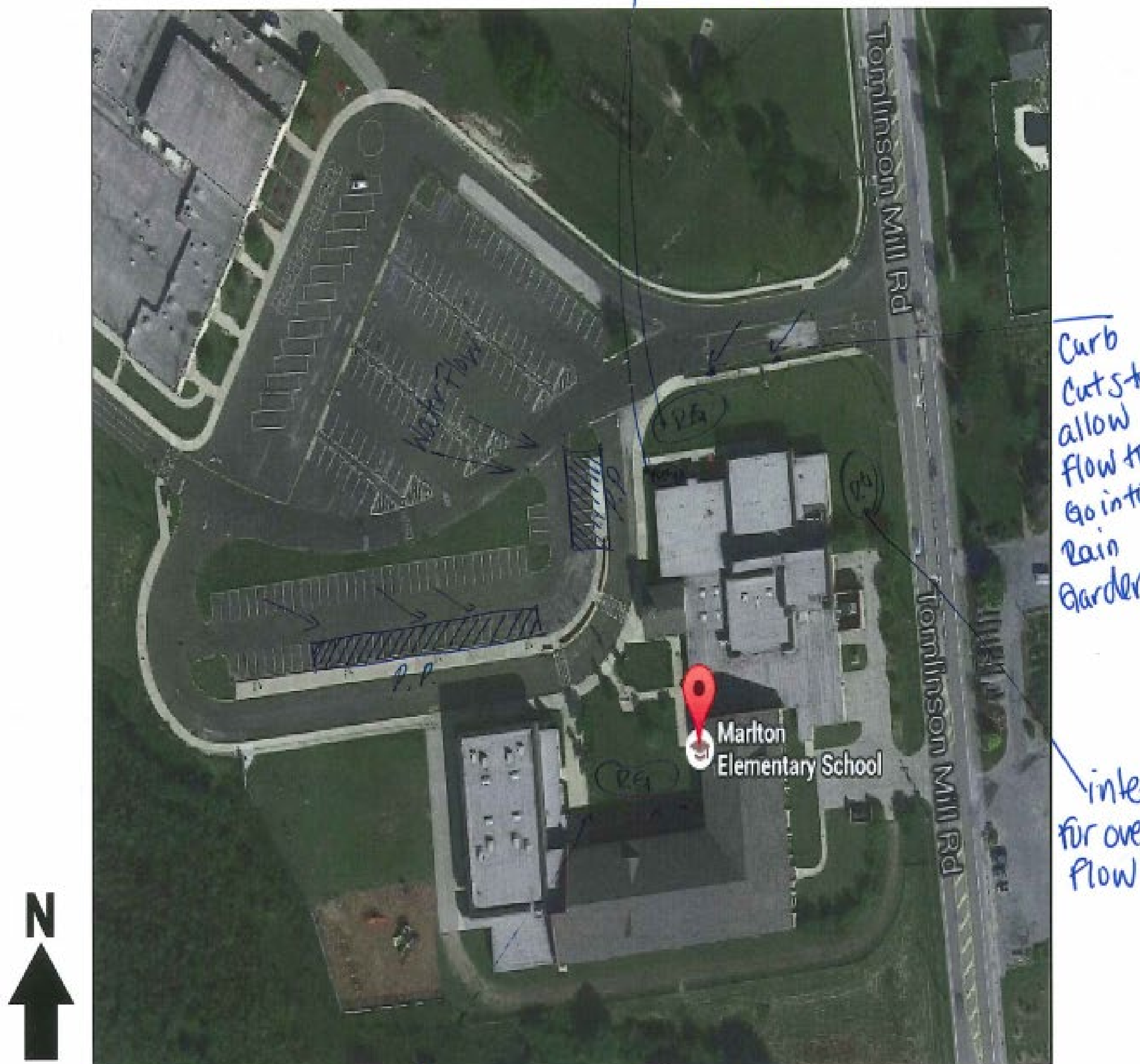
Marlton Elementary School

190 Tomlinson Mill Rd,
Evesham Township, NJ 08053

P.P. = Porous Pavement

RG. = Rain Garden

P.P. Look at Contours for parking lots to see flow of run off

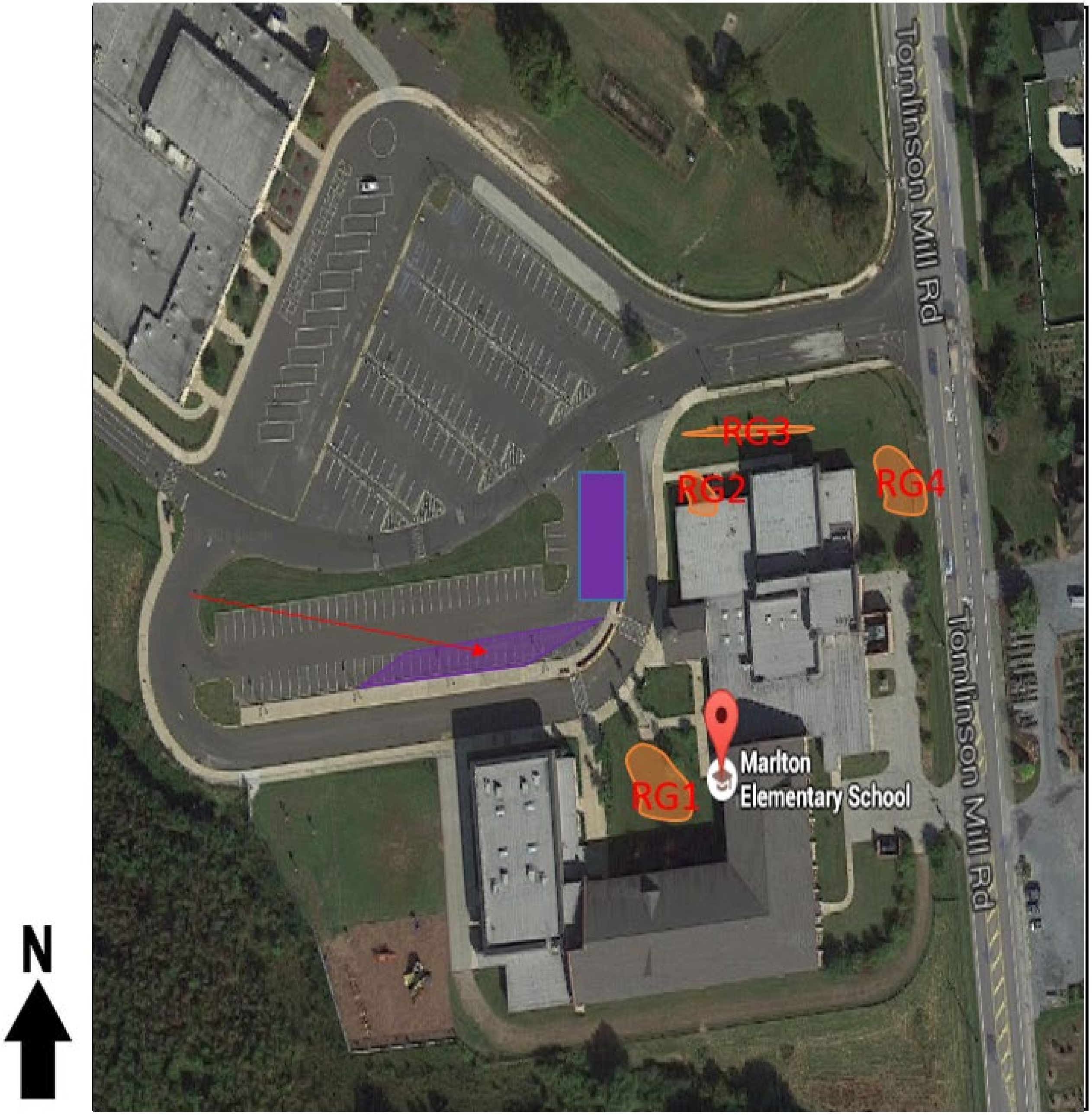


Disconnect downspouts to go into Rain Garden

Marlton Elementary School

190 Tomlinson Mill Rd,
Evesham Township, NJ 08053

1) Porous pavement?
2) Rain Gardens
3) Red arrow (Water Flow)



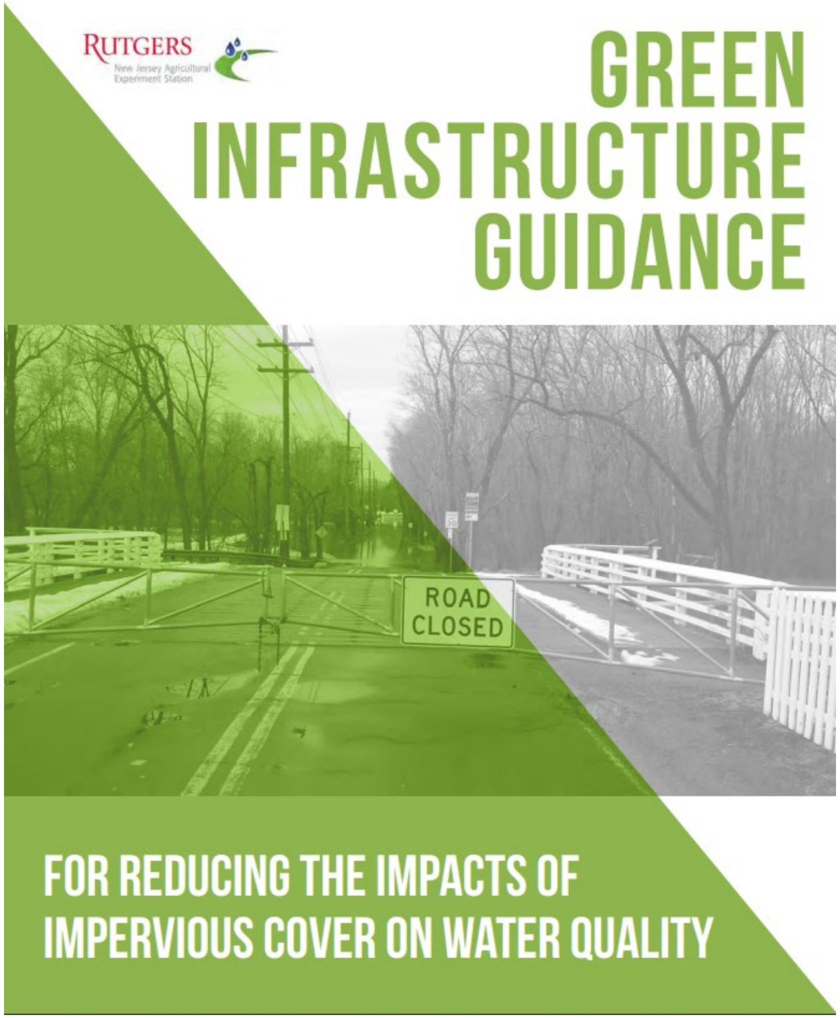
RG2

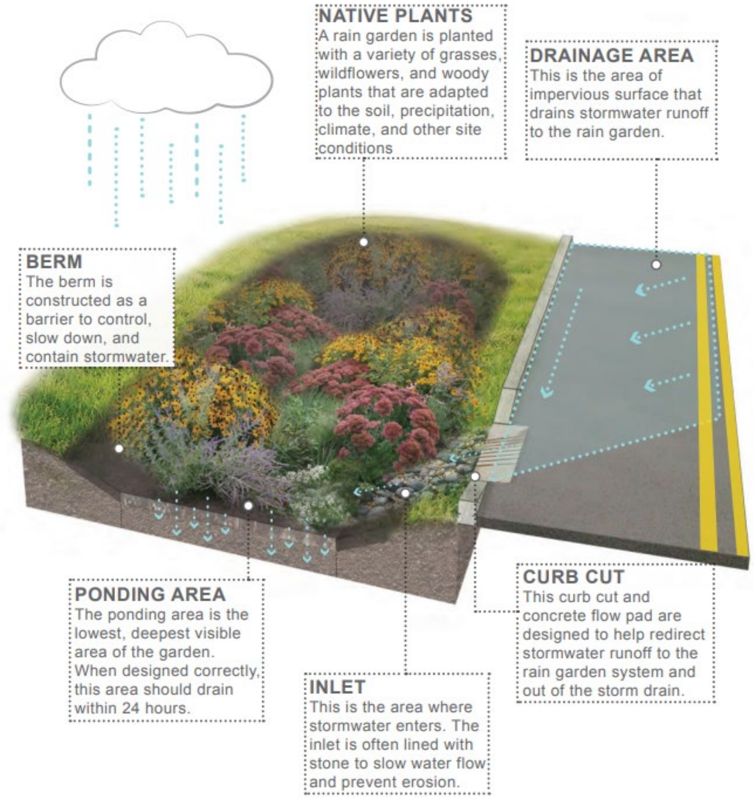
Rain Garden: disconnect downspouts and install rain garden

Green Infrastructure Manual:
http://water.rutgers.edu/GreenInfrastructureGuidanceManual.html

Green Infrastructure Brochure:

http://water.rutgers.edu/Green_Infrastructure_Guidance_Manual/GI-Brochure_PRINT-FRIENDLY.pdf





Green Infrastructure CHECKLIST: http://water.rutgers.edu/GreenInfrastructureGuidanceManual.html

Also found on pages132-135 in the Manual

RUTGERS New Jersey Agricultural Experiment Station

Green Infrastructure
Site Assessment Checklist

GENERAL INFORMATION			Site ID:
Name person(s) completing assessment:			Date:
Location Address and Cross Streets:	Neighborhood:		
Name of Nearest Waterway:	Property Owner / Tax Parcel ID/Street Segment:		
Contact Information:			
SITE DESCRIPTION			
Description of site and relative visibility to the public (public or private property, lot size, current use, streetscape, etc):			

OBSERVATIONS	NOTES/REMARKS
1) What is the source of stormwater runoff and where does it flow (on map or aerial photo indicate water flow direction and existing storm drains)? Is there a noticeable source or deposit of sediment?	
2) What is the direction and relative slope of the site and/or street? (indicate on map or aerial photo)	
3) Where on the site are impervious areas and estimate area in square feet (i.e. rooftops, parking lots, sidewalks)? For streetscapes, what is the building setback and/or sidewalk width?	
4) Do paved areas appear to be in poor condition (cracks, settling, vegetation growth, etc.) or do they appear newly paved or reconstructed?	
5) Does stormwater runoff from impervious areas flow directly to the sewer system (such as roof runoff directed into a storm drain)?	
6) Are there opportunities to redirect and disconnect runoff (downspouts, grassed areas, tree pits, curb extensions)?	
7) How many stormwater catch basins are visible? Note location on maps and general condition, i.e. clogged, functioning, shallow (< 3 ft), or deep (>3 ft)?	
8) Is there evidence of ponding water at the site or flooding in streets or intersections? (indicate reason; i.e. due to clogged drains, high water table, etc.)	
9) Are there mature trees/vegetation at the site? What types of plants would be appropriate at the site (sun or shade tolerant, height or site line restrictions)?	
10) Where are utilities on the site or in the right of way that could conflict with construction (sewer pipes, utility poles, water, gas, etc)?	
11) Does pedestrian safety need to be addressed? Will parking or bus stops be impacted by construction?	

RUTGERS New Jersey Agricultural Experiment Station

Green Infrastructure
Site Assessment Checklist

Choose suggested BMPs or indicate other. Include site photos and a description of recommended BMP location.

RAIN GARDENS	YES	NO	COMMENTS
1) Are there visible, exterior downspouts on any buildings?			
2) Are there unpaved areas suitable for landscaping?			
3) Is the site subject to ponding or flooding?			
RAIN WATER HARVESTING	**YES**	**NO**	**COMMENTS**
1) Are there nearby buildings with visible exterior downspouts?			
2) Is there a community garden nearby or other use for collected rainwater?			
TREE PITS, TRENCHES, AND STREETSCAPE STRATEGIES	**YES**	**NO**	**COMMENTS**
1) Does stormwater flow across sidewalks or along the curb?			
2) Are there existing trees, landscaping or tree pits near the street?			
2) Can water be directed from the street/curb into adjacent areas?			
POROUS PAVEMENT	**YES**	**NO**	**COMMENTS**
1) Are there large areas of pavement on the site and are any paved areas not heavily used (i.e. fire lane, overflow)?			
2) Are existing impervious areas in poor condition and in need of replacement?			
CURB EXTENSIONS AND STORMWATER PLANTERS	**YES**	**NO**	**COMMENTS**
1) Is this a heavily used pedestrian crossing? Are there pedestrian crosswalks that would be safer if shortened?			
2) Is the intersection or street at a location where stormwater can be collected before it enters a storm drain?			
OTHER STRATEGIES	**YES**	**NO**	**COMMENTS**

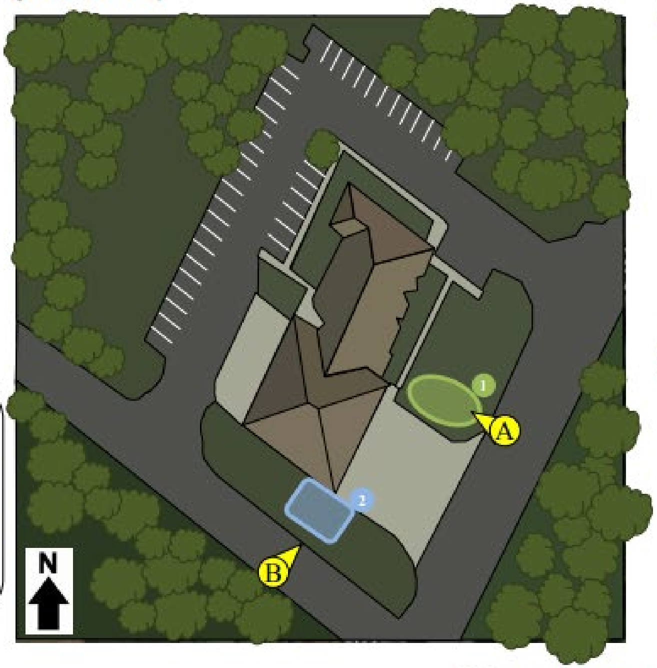
3. Site level analysis including concept plans, information sheets, and costs

Concept Plans

Evesham Township
Impervious Cover Assessment
Kettle Run Fire Rescue, 498 Hopewell Road

PROJECT LOCATION:

SITE PLAN:



A

B

1. **BIORETENTION SYSTEM:** A rain garden can be used to capture, treat, and infiltrate runoff from the roof of the building. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating wildlife habitat while managing stormwater .

2. **RAINWATER HARVESTING SYSTEM:** A cistern can capture stormwater that drains from the building's rooftop. Connecting the downspouts to the cistern will allow the stormwater to be harvested and used for cleaning fire trucks.

1 BIORETENTION SYSTEM

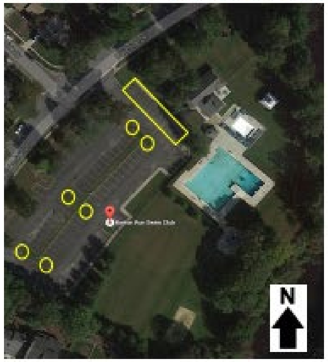
2 RAINWATER HARVESTING SYSTEM

Evesham Township

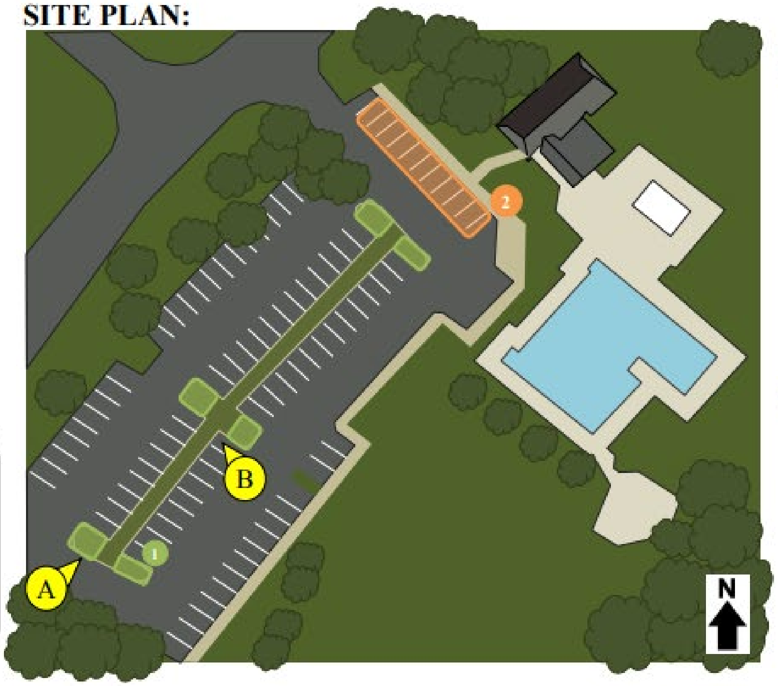
Impervious Cover Assessment

Barton Run Swim Club, 100 Lakeside Drive

PROJECT LOCATION:



SITE PLAN:



A

B

1. **BIORETENTION SYSTEM:** On this property rain gardens can be used to reduce sediment and nutrient loading on local waterways by retrofitting the parking islands. The rain gardens will capture, treat, and infiltrate runoff from the parking lot.

2. **POROUS PAVEMENT:** Parking spaces close to the pool house can be converted to porous asphalt. Porous pavement promotes groundwater recharge and filters stormwater.

1 BIORETENTION SYSTEM

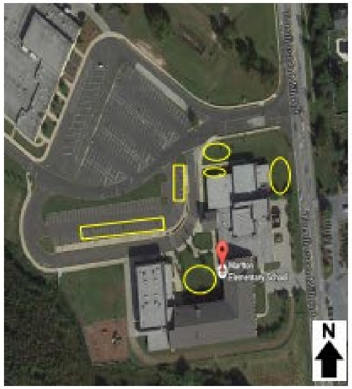
2 POROUS PAVEMENT

Evesham Township

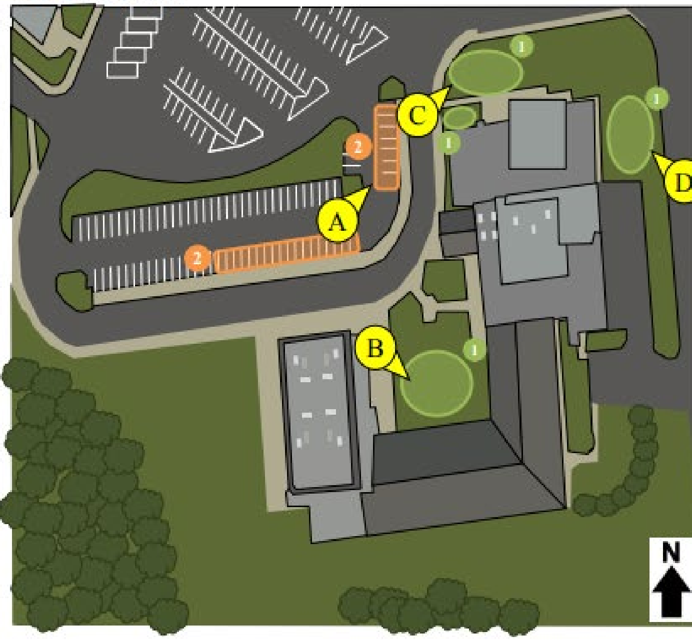
Impervious Cover Assessment

Marlton Elementary School, 190 Tomlinson Mill Road

PROJECT LOCATION:



SITE PLAN:



1 **BIORETENTION SYSTEM:** On this property rain gardens can be used to reduce sediment and nutrient loading to the local waterway and increase groundwater recharge. There are opportunities to install rain gardens near entrances to the school.

2 **POROUS PAVEMENT:** Porous pavement promotes groundwater recharge and filters stormwater. The parking spots close to the school can be retrofitted with porous pavement.

A

B

C

D

1 BIORETENTION SYSTEM

2 POROUS PAVEMENT

Information Sheets

Marlton Elementary School
Green Infrastructure Information Sheet

Location: 190 Tomlinson Mill Road Evesham Township, NJ 08053	**Municipality:** Evesham Township **Subwatershed:** Barton Run
Green Infrastructure Description: bioretention system (rain garden) porous pavement	**Targeted Pollutants:** total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) in surface runoff
Mitigation Opportunities: recharge potential: yes stormwater peak reduction potential: yes total suspended solids removal potential: yes	**Stormwater Captured and Treated Per Year:** bioretention system #1: 234,446 gal. bioretention system #2: 35,331 gal. bioretention system #3: 117,562 gal. bioretention system #4: 128,192 gal. porous pavement #1: 517,980 gal. porous pavement #2: 133,362 gal.

Existing Conditions and Issues:
Marlton Elementary School is surrounded by impervious surface such as asphalt and concrete. The downspouts on the building are connected directly to the sewer system. Bringing runoff from the roof and parking lots directly into the sewer systems leads to sediment and other solids being dumped into local waterways as nonpoint source pollution. High volumes of rain in the sewer system also contributes to flooding.

Proposed Solution(s):
Two areas of porous pavement have been proposed within the school parking lot near the catch basins so that the runoff can infiltrate into the ground, instead of going directly to local waterways via the catch basins. The porous pavement would be in parking spaces to avoid the strain of vehicular traffic.

Four potential rain garden sites were identified. The first garden could be located inside the lawn area at the school entrance. The downspouts from the three sides of the building surrounding the rain garden can be redirected so that the rainfall from the roof can be captured, treated, and filtered by the rain garden instead of flowing into the sewer system. The second rain garden can also treat runoff from the roof. The third rain garden could collect stormwater from the vehicle entrance via curb cuts and trench drains. The final rain garden proposal is on the northeastern side of the building and will also use downspouts to capture runoff from.

Anticipated Benefits:
Since the bioretention systems are designed to capture, treat, and infiltrate the entire 2-year design storm (3.4 inches of rain over 24 hours), these systems are estimated to achieve a 95% pollutant load reduction for TN, TP, and TSS. Bioretention systems would also provide ancillary benefits, such as enhanced wildlife and aesthetic appeal to the local residents of Evesham Township.

Marlton Elementary School
Green Infrastructure Information Sheet

Porous pavement allows stormwater to infiltrate through to soil layers which will promote groundwater recharge as well as intercept and filter stormwater runoff. The porous pavement system will achieve the same level of pollutant load reduction for TN, TP and TSS as the bioretention system.

Possible Funding Sources:
mitigation funds from local developers
NJDEP grant programs
Municipality of Evesham Township
Local social and community groups

Partners/Stakeholders:
Evesham Township
Marlton Elementary School
local community groups
residents
students and parents
Rutgers Cooperative Extension

Estimated Cost:
Rain garden #1 would need to be approximately 2,250 square feet. At $5 per square foot, the estimated cost is $11,250.
Rain garden #2 would need to be approximately 339 square feet. At $5 per square foot, the estimated cost is $1,695.
Rain garden #3 would need to be approximately 1,128 square feet. At $5 per square foot, the estimated cost is $5,640.
Rain garden #4 would need to be approximately 1,230 square feet. At $5 per square foot, the estimated cost is $6,150.

The porous asphalt #1 would cover 3,550 square feet and have a 2-foot stone reservoir under the surface. At $25 per square foot, the cost of the porous asphalt system would be $88,750.
The porous asphalt #2 would cover 914 square feet and have a 2-foot stone reservoir under the surface. At $25 per square foot, the cost of the porous asphalt system would be $22,850.

The total cost of the project will thus be approximately $136,335.

Estimated Project Costs

Estimated Cost:

Rain garden #1 would need to be approximately 2,250 square feet. At $5 per square foot, the estimated cost is $11,250.

Rain garden #2 would need to be approximately 339 square feet. At $5 per square foot, the estimated cost is $1,695.

Rain garden #3 would need to be approximately 1,128 square feet. At $5 per square foot, the estimated cost is $5,640.

Rain garden #4 would need to be approximately 1,230 square feet. At $5 per square foot, the estimated cost is $6,150.

The porous asphalt #1 would cover 3,550 square feet and have a 2-foot stone reservoir under the surface. At $25 per square foot, the cost of the porous asphalt system would be $88,750.

The porous asphalt #2 would cover 914 square feet and have a 2-foot stone reservoir under the surface. At $25 per square foot, the cost of the porous asphalt system would be $22,850.

The total cost of the project will thus be approximately $136,335.

SITES WITHIN THE BARTON RUN SUBWATERSHED:

EVESHAM TOWNSHIP: GREEN INFRASTRUCTURE SITES

1. Barton Run Swim Club
2. Cherokee High School
3. Evesham Fire/Rescue 223/227
4. Evesham Township Municipal Court
5. King's Grant Community Room
6. Marlton Elementary School
7. Memorial Park
8. Richard L. Rice Elementary School
9. Villa Royal Association

SITES WITHIN THE LAKE PINE SUBWATERSHED:

10. Kettle Run Fire/Rescue 225/228
11. Links Golf Course

SITES WITHIN THE PENNSAUKEN CREEK SUBWATERSHED:

12. Evesham Fire/Rescue 221/229

SITES WITHIN THE RANCOCAS CREEK SUBWATERSHED:

13. Christ Presbyterian Church
14. Frances S. DeMasi Elementary School
15. Marlton Assembly of God
16. Marlton Post Office
17. Robert B. Jaggard Elementary School
18. St. Joan of Arc Parish and School

RUTGERS
New Jersey Agricultural Experiment Station

MARLTON ELEMENTARY SCHOOL

Subwatershed: Barton Run

Site Area: 2,037,458 sq. ft.

Address: 190 Tomlinson Mill Road
Evesham, NJ 08053

Block and Lot: Block 39, Lot 1.01, 1.02

Stormwater is currently directed to existing catch basins. Parking spots by the north and west buildings can be replaced with porous asphalt to capture and infiltrate stormwater runoff from the parking lot. Rain gardens adjacent to the building can capture, treat, and infiltrate roof runoff before it reaches the existing 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"
26	526,875	25.4	266.1	2,419.1	0.411	14.45

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	0.516	86	39,068	1.47	4,950	$24,750
Pervious pavement	0.651	109	49,331	1.85	4,465	$111,625

GREEN INFRASTRUCTURE RECOMMENDATIONS

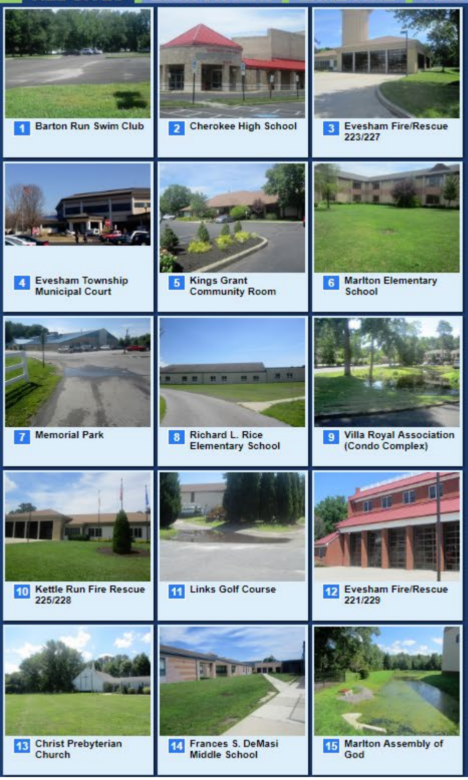
Marlton Elementary School

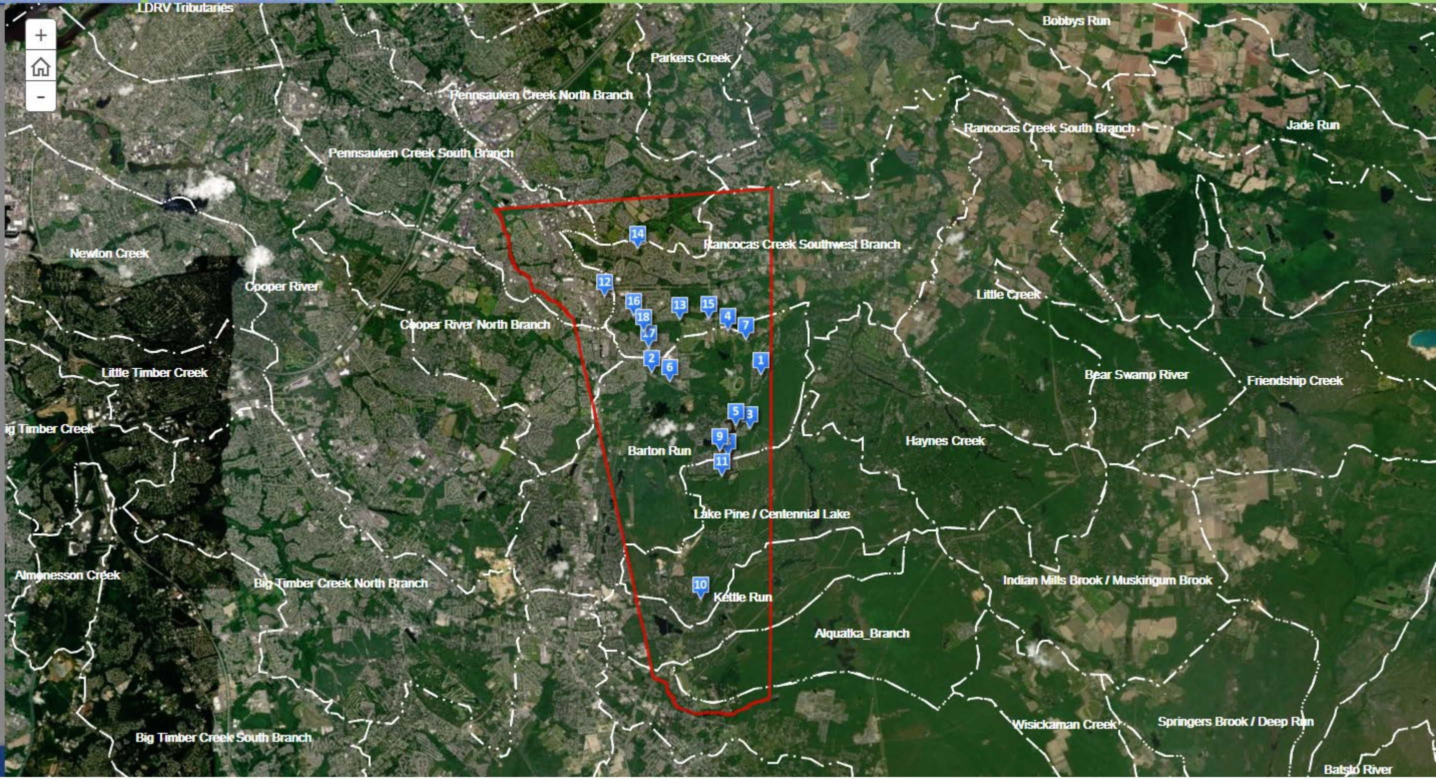
- bioretention system
- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

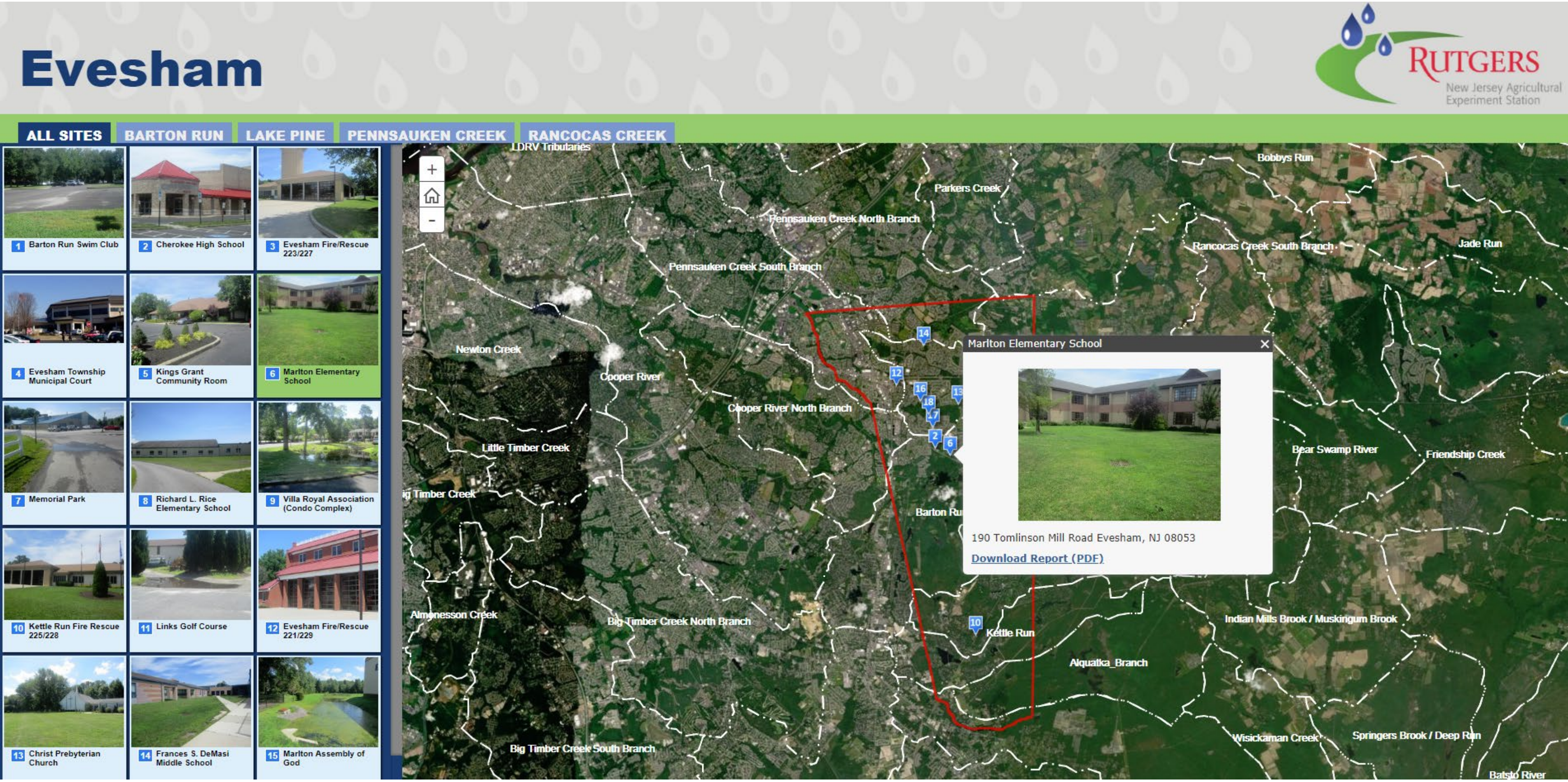
0 50' 100'

Evesham

ALL SITES | BARTON RUN | LAKE PINE | PENNSAUKEN CREEK | RANCOCAS CREEK






Evesham
RUTGERS
New Jersey Agricultural Experiment Station
ALL SITES
BARTON RUN
LAKE PINE
PENNSAUKEN CREEK
RANCOCAS CREEK
1 Barton Run Swim Club
2 Cherokee High School
3 Evesham Fire/Rescue 223/227
4 Evesham Township Municipal Court
5 Kings Grant Community Room
6 Marlton Elementary School
7 Memorial Park
8 Richard L. Rice Elementary School
9 Villa Royal Association (Condo Complex)
10 Kettle Run Fire Rescue 225/228
11 Links Golf Course
12 Evesham Fire/Rescue 221/229
13 Christ Prebyterian Church
14 Frances S. DeMasi Middle School
15 Marlton Assembly of God
Marlton Elementary School
190 Tomlinson Mill Road Evesham, NJ 08053
Download Report (PDF)
LDRV Tributaries
Bobbys Run
Parkers Creek
Pennsauken Creek North Branch
Rancocas Creek South Branch
Jade Run
Pennsauken Creek South Branch
Newton Creek
Cooper River
Cooper River North Branch
Little Timber Creek
Bear Swamp River
Friendship Creek
Barton Run
Almonesson Creek
Big Timber Creek North Branch
Kettle Run
Indian Mills Brook / Muskingum Brook
Alquatka_Branch
Big Timber Creek South Branch
Wisickaman Creek
Springers Brook / Deep Run
Batsto River

4. Investment/funding strategy for green infrastructure projects

1. Township Funding: Capital Improvement Fund and Tree Fund
2. Volunteers – Scouts, community groups, etc.
3. Local, State, and/or Federal Grants
   - National Fish and Wildlife Foundation
   - US EPA
   - NJDEP
   - Sustainable Jersey
   - ANJEC
4. Stormwater Utility
5. Incentive Programs – any ideas?

5. Short term (5 years) goal

Existing Municipal Impervious Cover	Recommended Short Term (less than 5 years) Impervious Cover Management Goal (%)	Recommended Short Term Impervious Cover Management Goal (acres)
0% to 10%	1%	10 acres
10.1% to 25%	2%	15 acres
>25%	5%	20 acres

Green Infrastructure Strategic Plan (a.k.a. Green Infrastructure Feasibility Study)

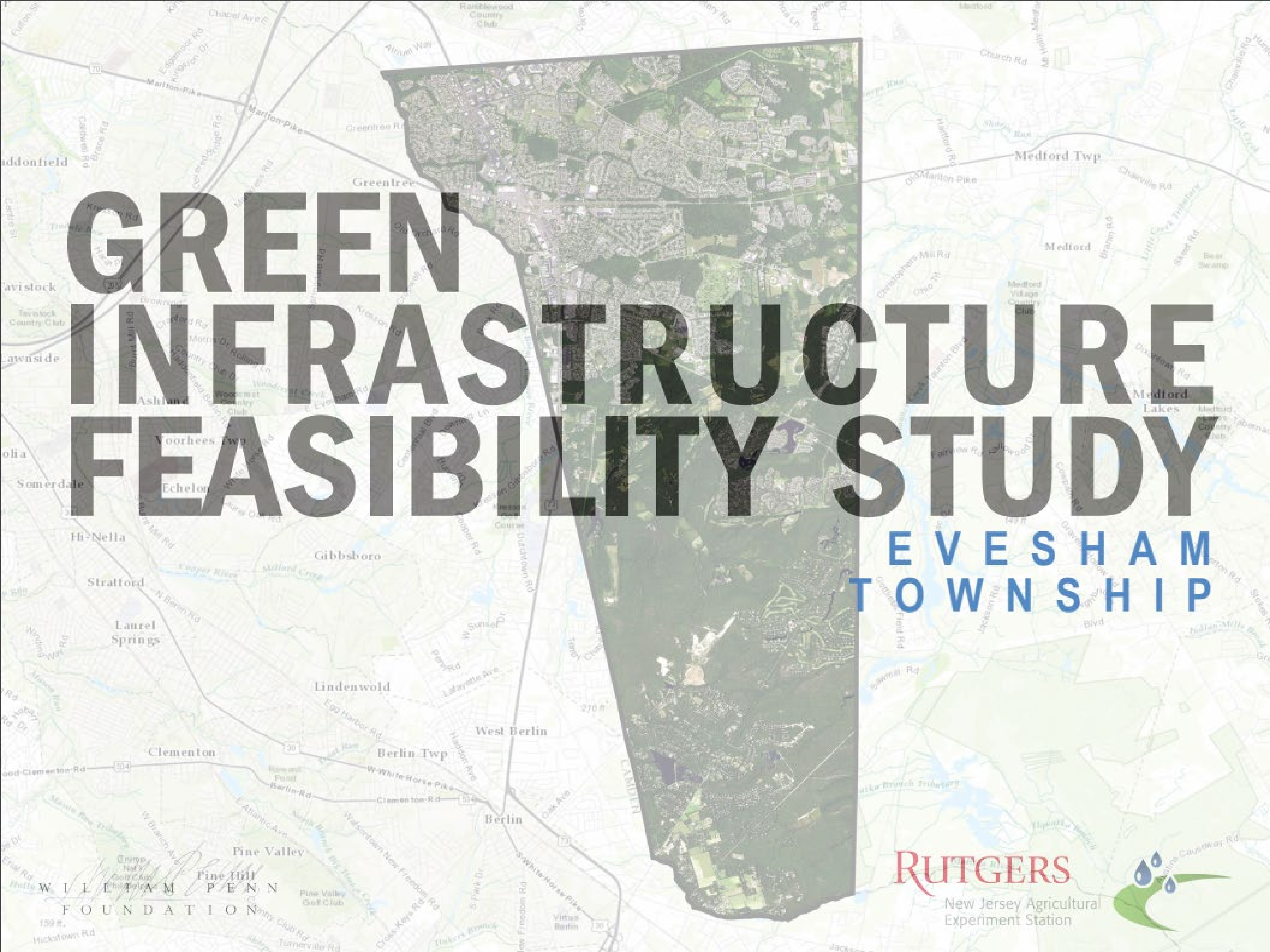
Green Infrastructure Strategic Plan

ICA (Tier 1) and Green Infrastructure Action Plan (Tier 2) + the following:

- Additional green infrastructure sites
- Policy recommendations
- Water quality and quantify benefits
- Implementation agenda
- Long-term 5-20 year goals

GREEN INFRASTRUCTURE FEASIBILITY STUDY

EVESHAM TOWNSHIP



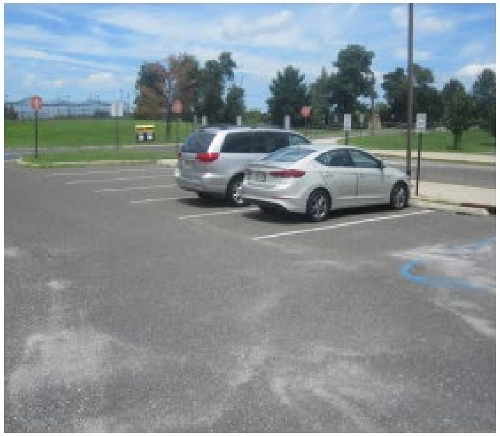
WILLIAM PENN FOUNDATION

RUTGERS
New Jersey Agricultural Experiment Station

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

0' 50' 100'

190 Tomlinson Mill Road
Evesham, NJ 08053



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CURRENT CONDITION

CONCEPT DESIGN

CURRENT CONDITION

CONCEPT DESIGN

Policy Recommendations

- Update stormwater management plan and stormwater control ordinance to incorporate green infrastructure requirements
- Update municipal master plan
- Update zoning ordinance to eliminate barriers for green infrastructure
- Use Center for Watershed Protection "The Code and Ordinance Worksheet" to assess your local code/ordinances (https://owl.cwp.org/mdocs-posts/better-site-design-code-and-ordinance-cow-worksheet-2017-update/)

Street Width

2. Are curb extensions that narrow the roadway (such as pinchpoints, gateways, and chicanes) permissible?
3. Are permeable paving materials allowable on low-use streets and/or parking lanes?

Right-of-Way Width

7. If street trees are required, is the planting area required to be at least 6 feet to provide sufficient rooting space to support large trees?

Cul-de-Sacs

10. Can a landscaped island be created within the cul-de-sac?
    - Yes, and the cul-de-sac must be graded to the island with an overflow to the storm drain system, so that it can be used for stormwater treatment (2 pts.)
    - Yes, but curbing is required or the island must be raised, limiting its use for stormwater treatmen (1 pt.)

Vegetated Open Channels

12. Are open section vegetated channels allowed where density, topography, soils, and slope permit?
13. Are runoff reduction practices permissible within curb extensions or landscape strips?

Parking Lots

24. Can pervious materials be used for parking areas, including spillover or special event parking? (2 pts.)

Parking Lot Runoff

26. Is a minimum percentage of a parking lot required to be landscaped? (2 pts.)
27. Is the use of runoff reduction practices within landscaped areas, setbacks, or parking areas allowed? (give yourself 2 pts.)
28. Are flush curbs and/or curb cuts and depressed landscaped areas allowed so that runoff can be directed into vegetated landscaped islands or runoff reduction practices?

Parking Lot Runoff (cont'd)

29. Are dimensions for landscaped areas sufficient to plant large trees?
    - Yes, a minimum width 6 feet or greater is specified
    - No, a minimum width less than 6 feet is specified
30. Do vegetated stormwater management areas count toward required landscape minimums?

Sidewalks

42. Are alternative sidewalk designs that provide sufficient soil rooting volume for street trees (e.g., pop-outs or bulb-outs, curving sidewalks, tree islands) allowed?

43. Are alternative sidewalk construction materials that increase infiltration allowed?

Driveways

45. Can pervious materials (e.g., grass, gravel, permeable pavers, etc.) be used for residential driveways? (2 pts.)

Rooftop Runoff

56. Can downspouts be disconnected such that rooftop runoff flows to storage tanks, pervious areas, runoff reduction practices, etc.? (2 pts.)
57. Do current grading or drainage requirements allow for temporary ponding of stormwater on front yards or rooftops? (2 pts.)
58. Is temporary storage of rainwater in storage tanks (e.g., rain barrels or cisterns) permitted?

Rooftop Runoff (cont'd)

59. Do the stormwater BMP design specifications for green roofs address structural concerns (e.g., how to determine design load of roof)?
60. Do local plumbing codes allow harvested rainwater for exterior uses such as irrigation and non-potable interior uses such as toilet flushing?

Buffer Systems
and
Buffer Management
and
Clearing and Grading

Tree Conservation

78. Are trees and native plant materials permissible for landscaping in yards, common areas, and other open spaces?
    - Yes, some portion of landscaping must include trees and other native vegetation provided in recommended species list (2 pts.)
    - Yes, trees and native vegetation are allowed per recommended species list (1 pt.)
    - No, landscaping ordinance requires turfgrass or includes vegetation height standards that preclude the use of native plants

Stormwater Outfalls

83. Does the stormwater code contain special treatment criteria for discharges to impaired or sensitive waters, such as natural wetlands, lakes, trout streams, nutrient-sensitive estuaries, drinking water supplies, etc.? (2 pts.)

Stormwater Codes

86. Do codes define rainwater harvesting and establish acceptable uses for rainwater (e.g., irrigation and toilet flushing) and corresponding treatment requirements?
87. Does the stormwater code include specific standards to reduce post-construction runoff volume (not just peak rate)?
    - Yes, runoff/volume reduction is required for most new development and redevelopment sites (2 pts.)
    - Yes, the standards apply to some sites or are included as an alternative compliance method (1 pt.)

Stormwater Codes (cont'd)

88. Does the code require or have incentives for consideration of runoff reduction concepts early in the site planning process?

- Yes, there are provisions for a pre-application meeting or similar (2 pts.)
- Yes, but the meetings are not mandatory for applicants (1 pt.)

Off-Site Compliance

94. If off-site stormwater compliance is authorized, is some percentage of treatment required on-site?
    - Yes, applicants must provide on-site treatment to some level and provide documentation (2 pts.)
    - No, many sites have automatic access to off-site compliance

Long term (5 to 20 years) goal

Existing Municipal Impervious Cover	Recommended Long Term (5 to 20 years) Impervious Cover Management Goal (%)	Recommended Long Term Impervious Cover Management Goal (acres)
0% to 10%	2%	25 acres
10.1% to 25%	5%	50 acres
>25%	10%	80 acres

Implementation Agenda

- Funding piece from Tier 2
- Maintenance and Monitoring
- Responsible Parties
- Timeframe

Maintenance and Monitoring

- Every green infrastructure practice must have a maintenance plan
- Annual inspections required
- NJDEP provides guidance on maintenance and monitoring of green infrastructure practices. Go to: https://www.njstormwater.org/maintenance_guidance.htm

Responsible Parties

- Municipality
- Municipal Utility Authority
- Stormwater Utility
- Non-publicly owned property – memorandum of understanding (MOU) identifies responsibly parties

Timeframe

- Depends on available resources (Funding and Labor)
- Good idea to have a targeted number of projects per year

How green infrastructure works

30 slides have been added to the end of this presentation about how green infrastructure works. You have already seen these slides in the first presentation.

How to use your green infrastructure plan

Impervious Cover Assessment

- Draws attention to problems
- Identifies impervious cover criteria (i.e., 2%, 10%, and 25%)
- Provides some concepts for green infrastructure opportunities
- Great conversation starter

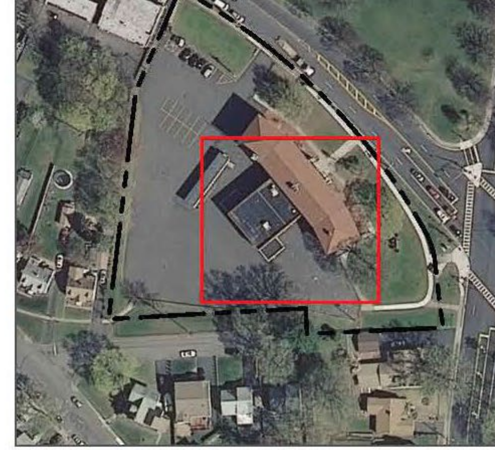
Green Infrastructure Action Plan

- Identifies 10 to 20 projects on public or quasi-public lands
- Gives municipality examples of types of projects needed to fix problem
- Moves the conversation to project choice instead of willingness to do a project
- Sets realistic goals


Vineland Public Library


Vineland Public Library

Belleville Elementary School #10



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

0' 20' 40'

RUTGERS
New Jersey Agricultural Experiment Station

527 Belleville Avenue,
Belleville, NJ 07109

"Protecting Public Health and the Environment"

RUTGERS

New Jersey Agricultural Experiment Station

Resources for You!

http://water.rutgers.edu/Projects/GreenInfrastructureChampions/GIC.html


QUESTIONS?

How green infrastructure works

http://water.rutgers.edu/Projects/Paraprofessionals/ASLA
Video_LeveragingTheLandscapeToManageWater v2012.wmv

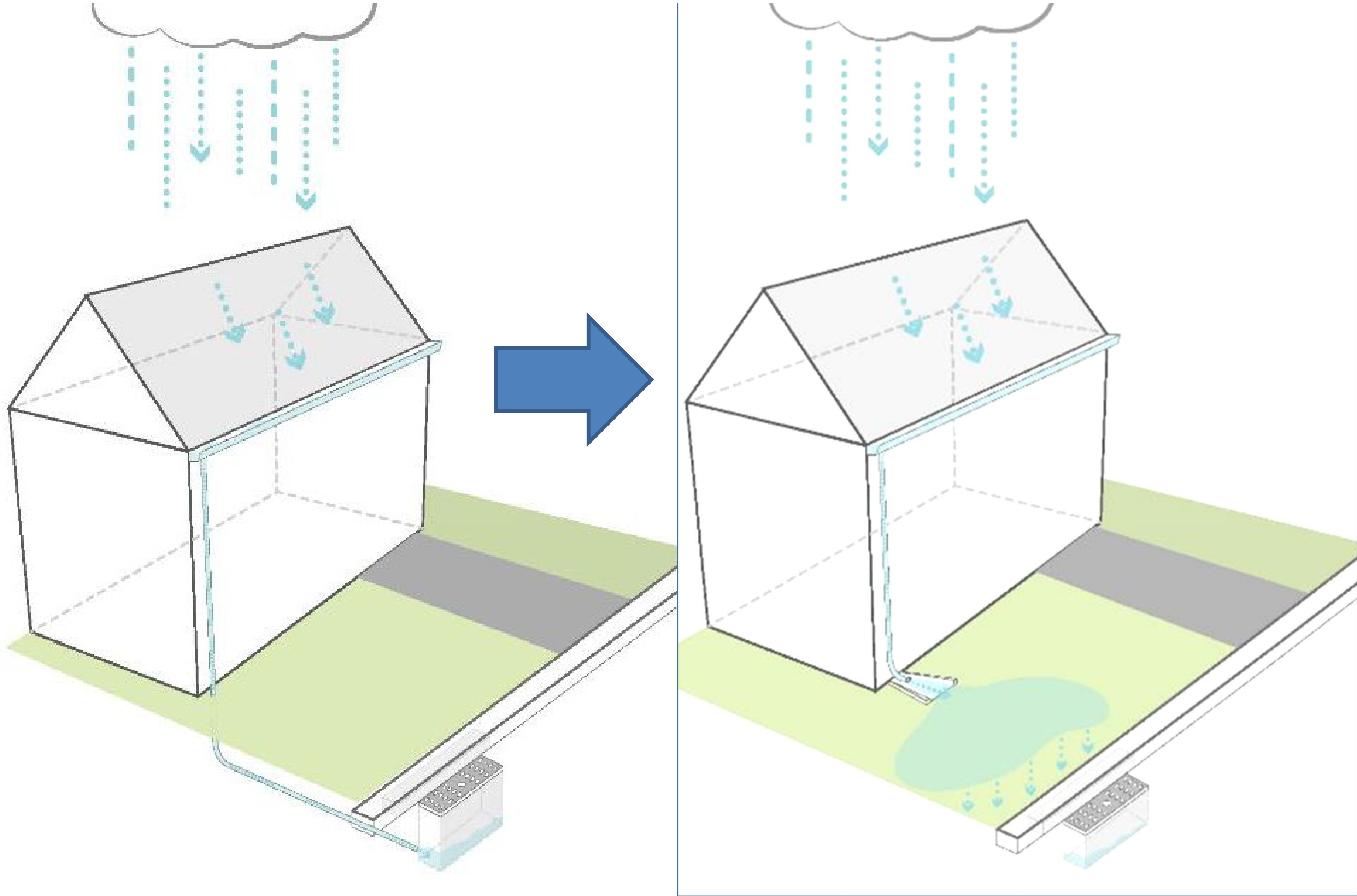
It is all about controlling runoff from impervious surfaces

Step 1: Depave

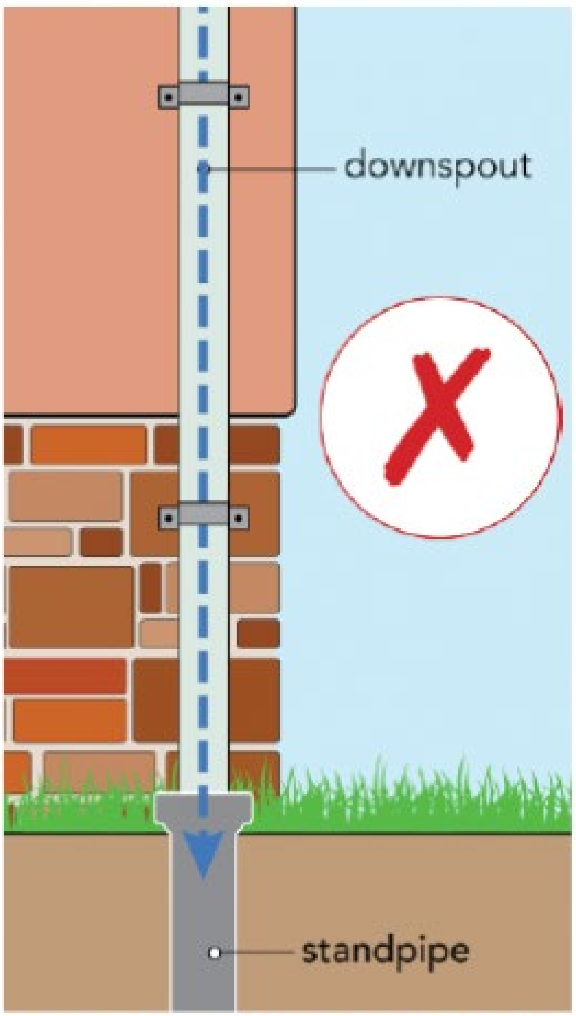




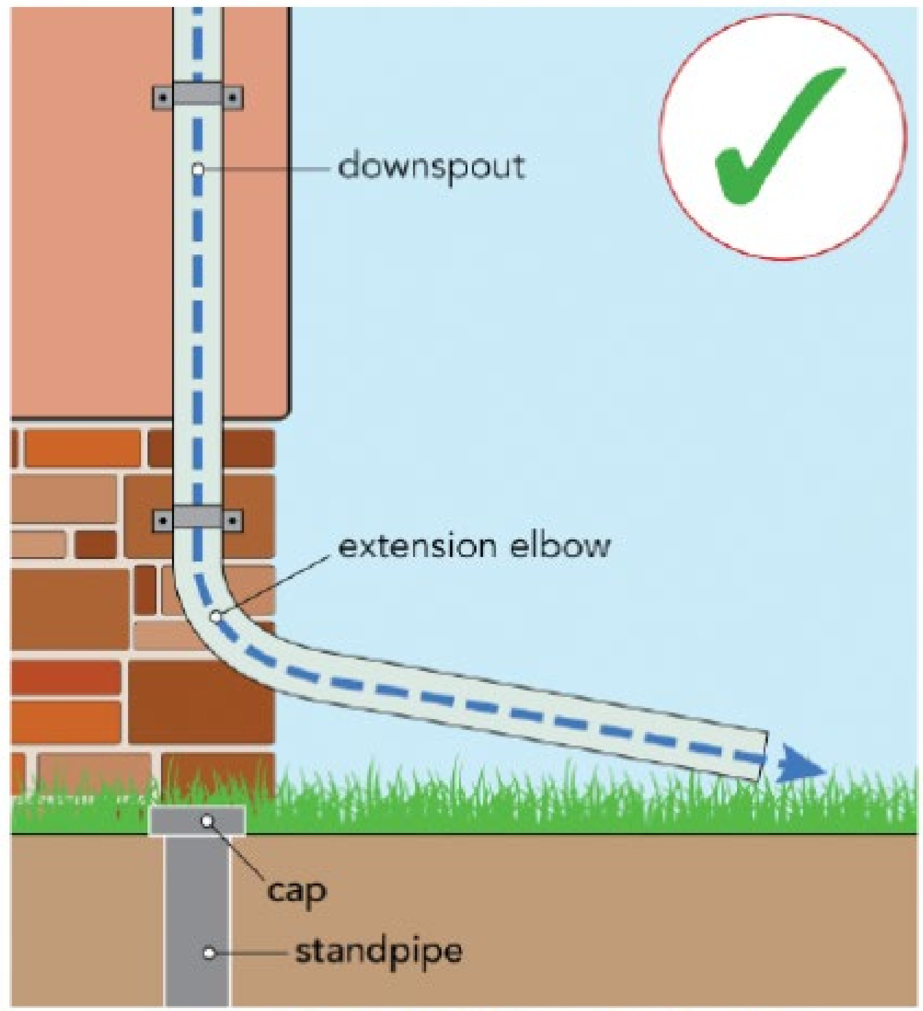

Step 2: Simple Disconnection



Downspout Disconnection

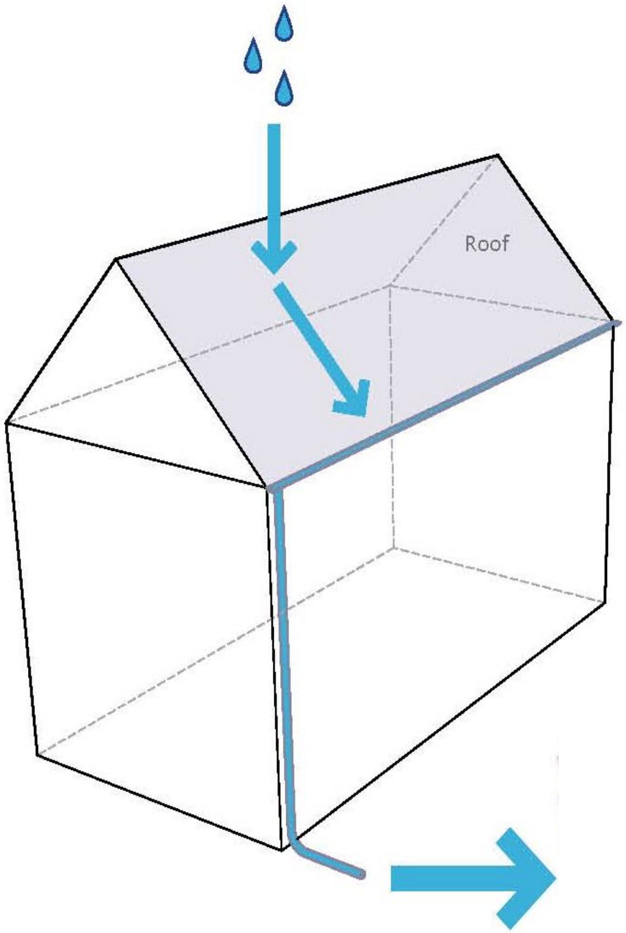


DOWNSPOUT CONNECTED TO SEWER SYSTEM

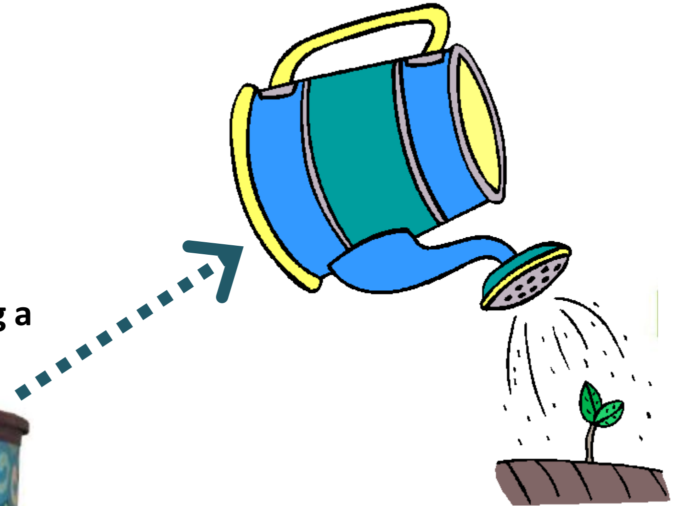


DOWNSPOUT DISCONNECTED FROM SEWER SYSTEM

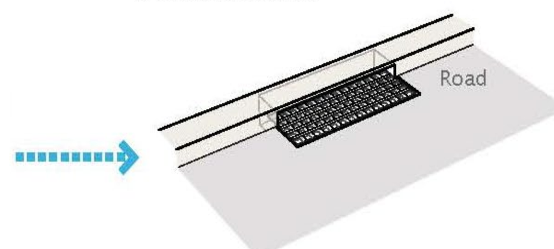
Disconnect to a Rain Barrel or Cistern



Disconnect your downspout by installing a rain barrel



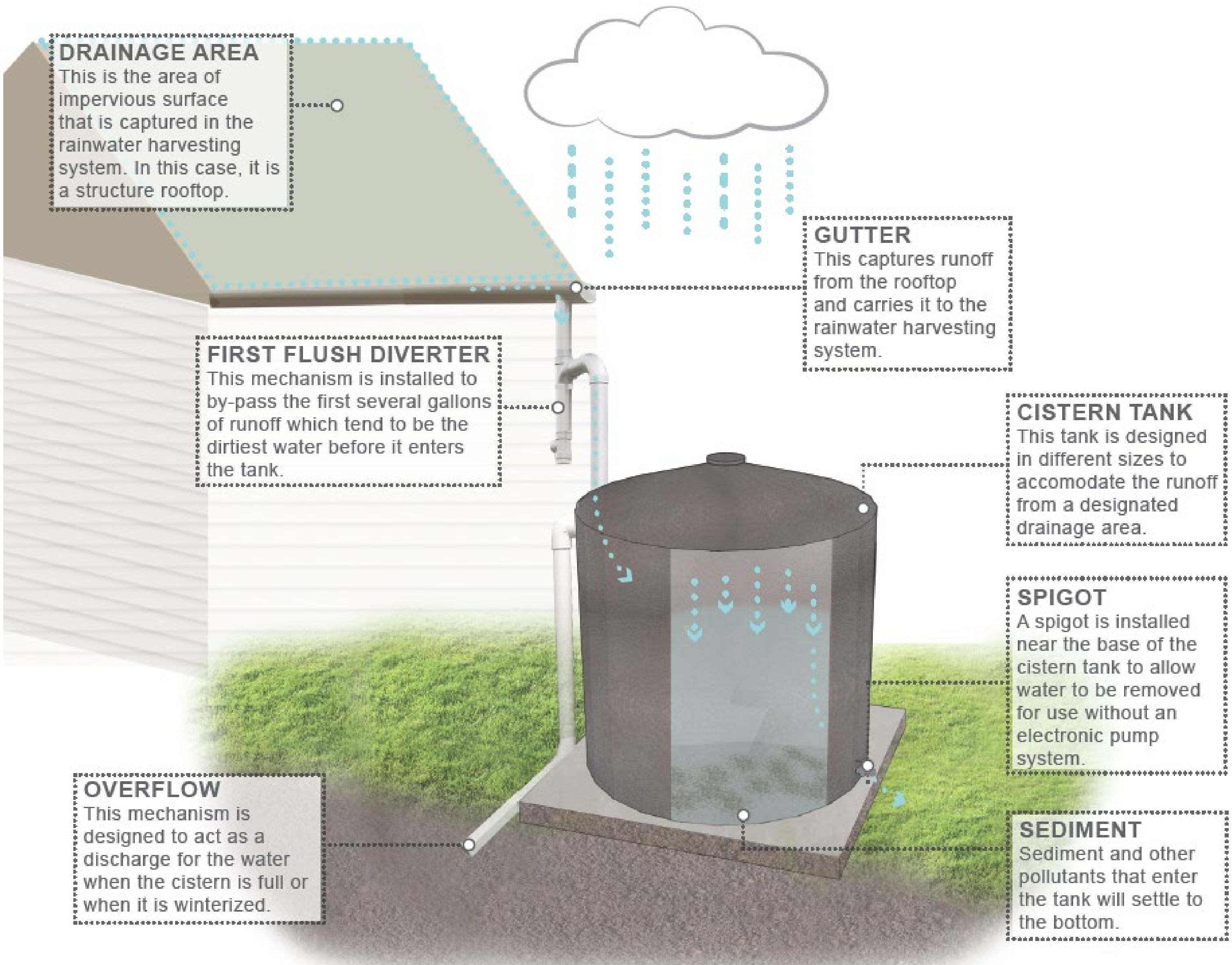
REDUCE THE AMOUNT OF RUNOFF ENTERING STORM SEWERS



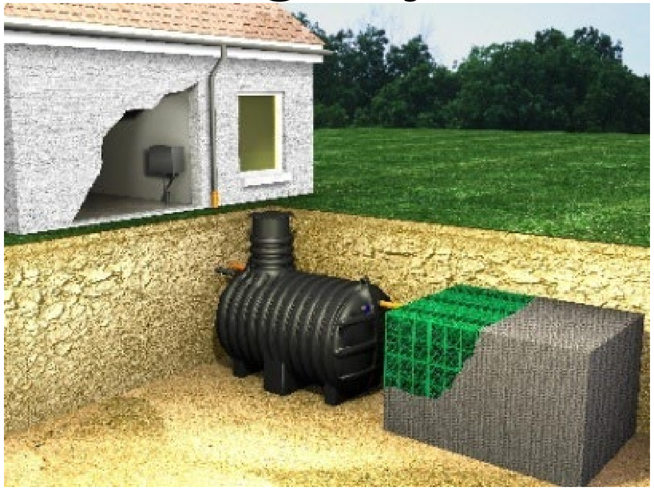
Impervious area is now ***"disconnected"*** from flowing directly into the storm sewer system

So Many Barrels to Choose From…

Rainwater Harvesting Systems

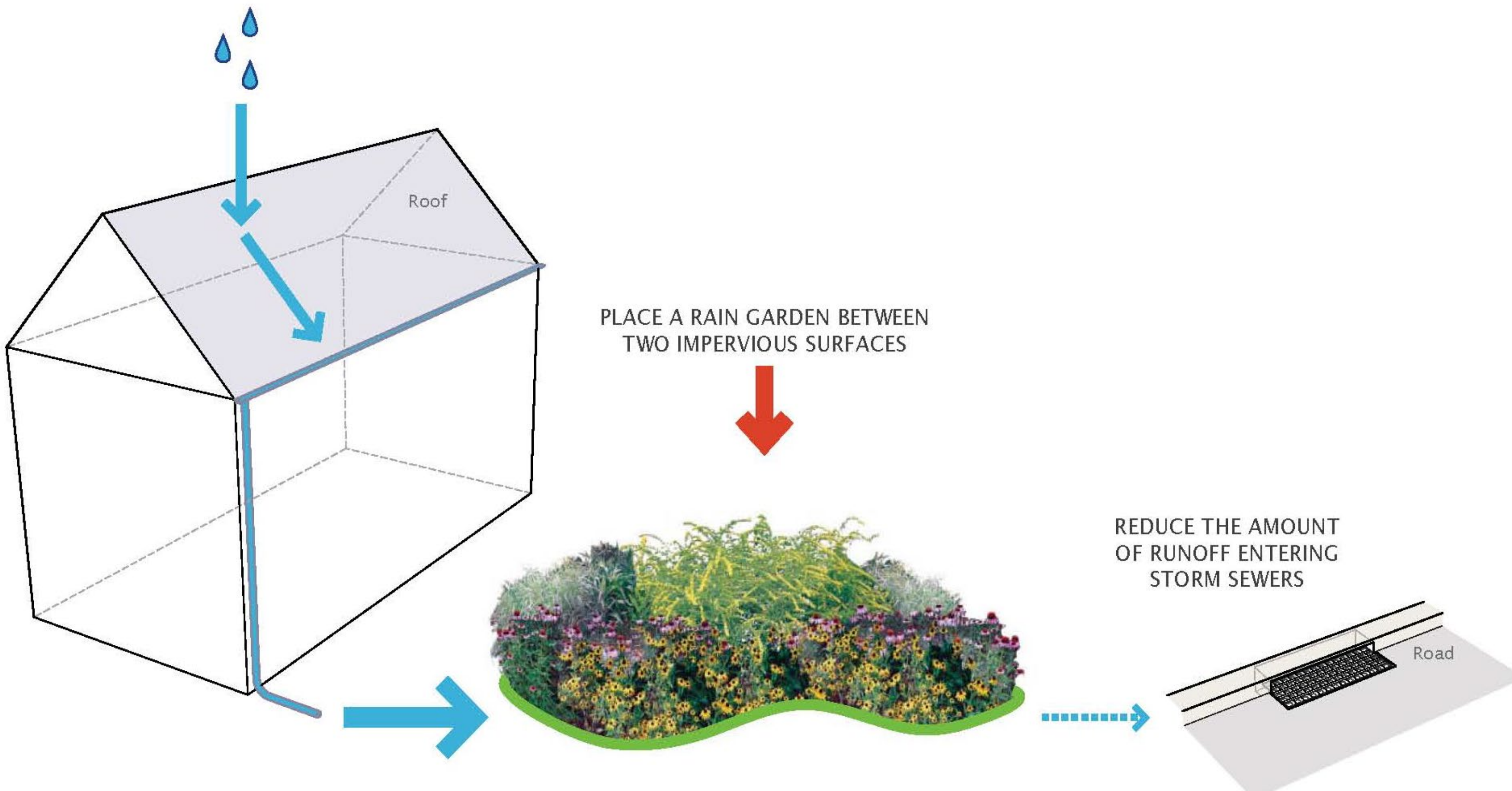


Or Larger Rainwater Harvesting Systems…



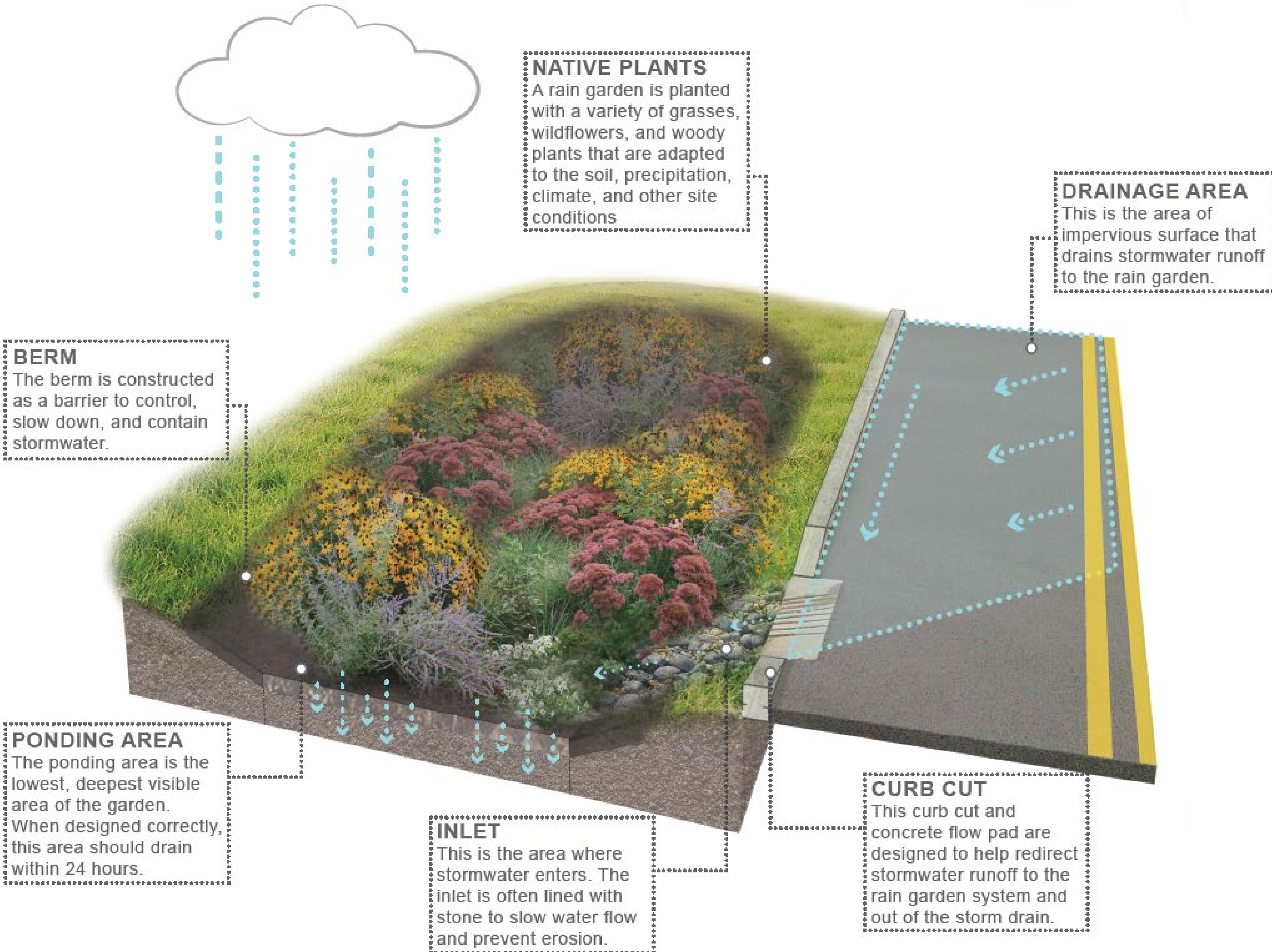

3M
Post-it

Disconnect to a Rain Garden



Rooftop runoff is now ***"disconnected"*** from flowing directly into the storm sewer system

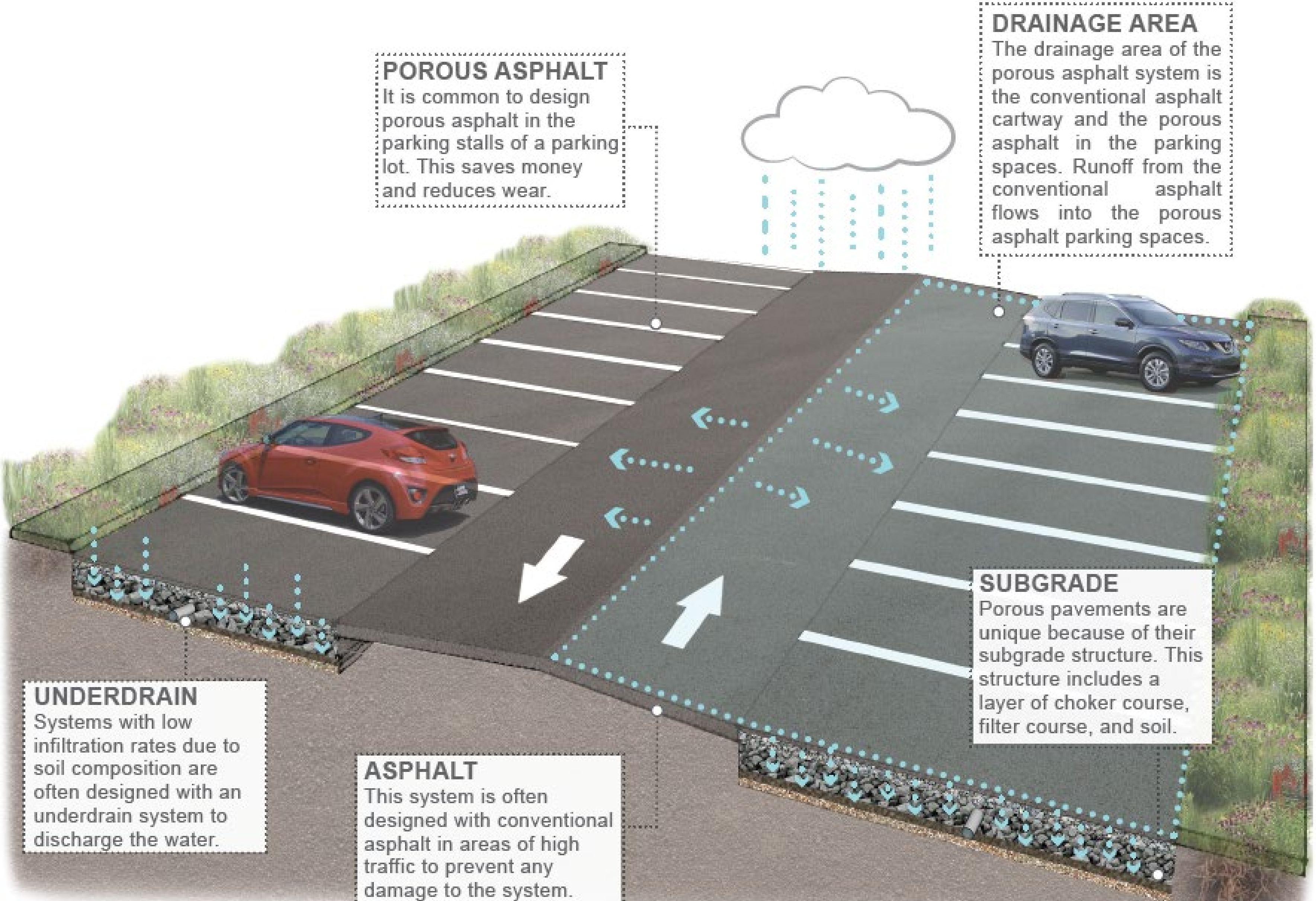
Bioretention Systems/Rain Gardens



Lots of Rain Gardens


116

Step 3: Convert to Permeable Pavement



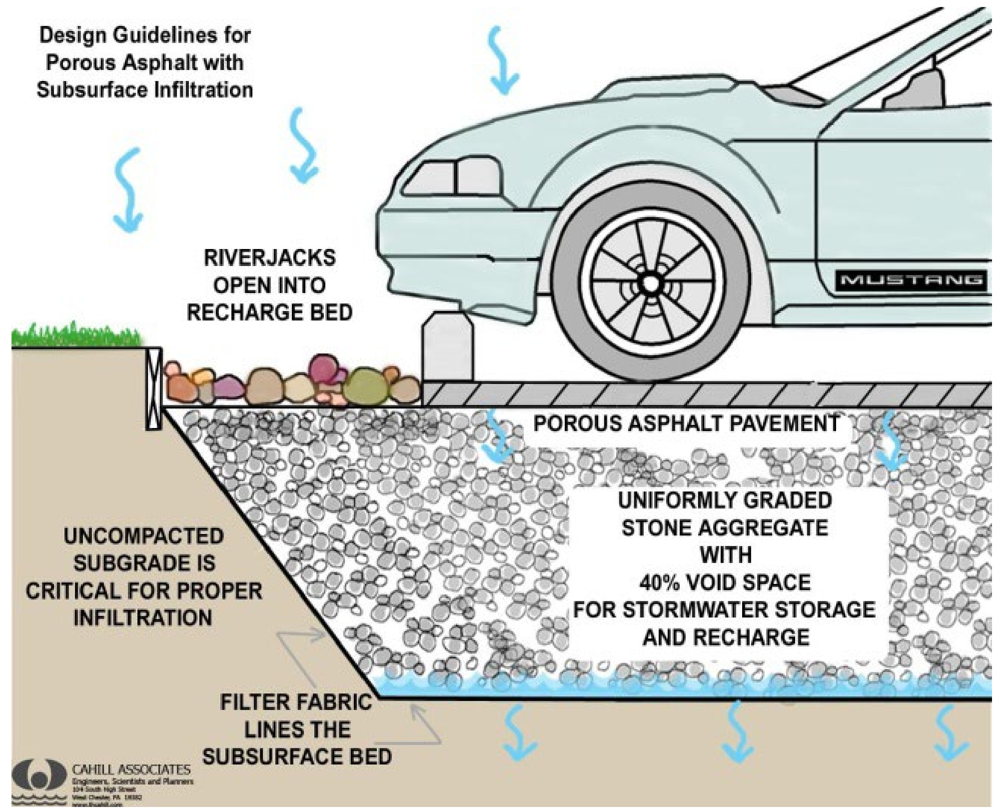
Permeable Pavements

- Underlying stone reservoir
- Porous asphalt and pervious concrete are manufactured without "fine" materials to allow infiltration
- Grass pavers are concrete interlocking blocks with open areas to allow grass to grow
- Ideal application for porous pavement is to treat a low traffic or overflow parking area

ADVANTAGES

- Manage stormwater runoff
- Minimize site disturbance
- Promote groundwater recharge
- Low life cycle costs, alternative to costly traditional stormwater management methods
- Mitigation of urban heat island effect
- Contaminant removal as water moves through layers of system

COMPONENTS



Porous Asphalt


Pervious Concrete

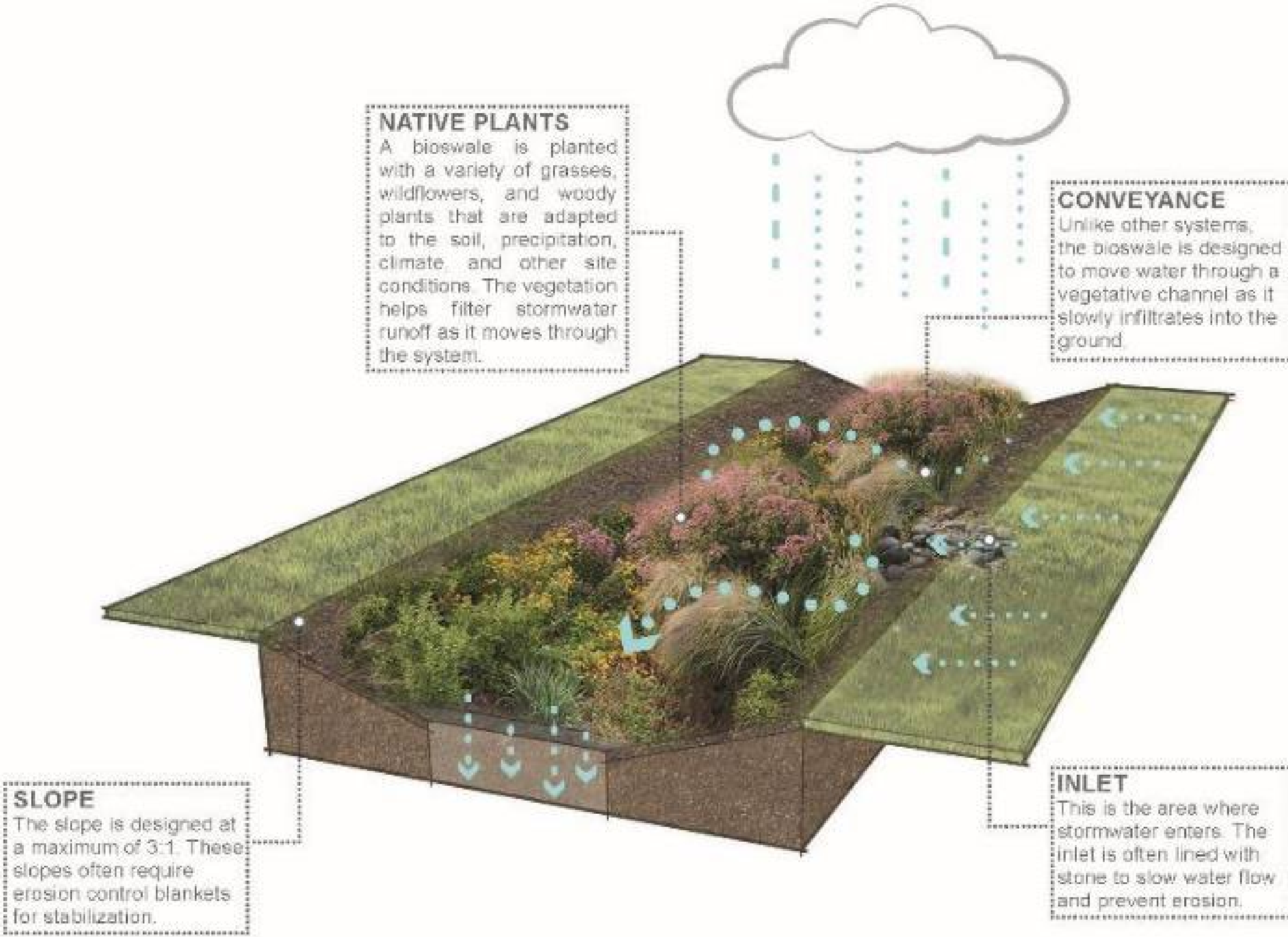

Permeable Pavers


Grass Pavers

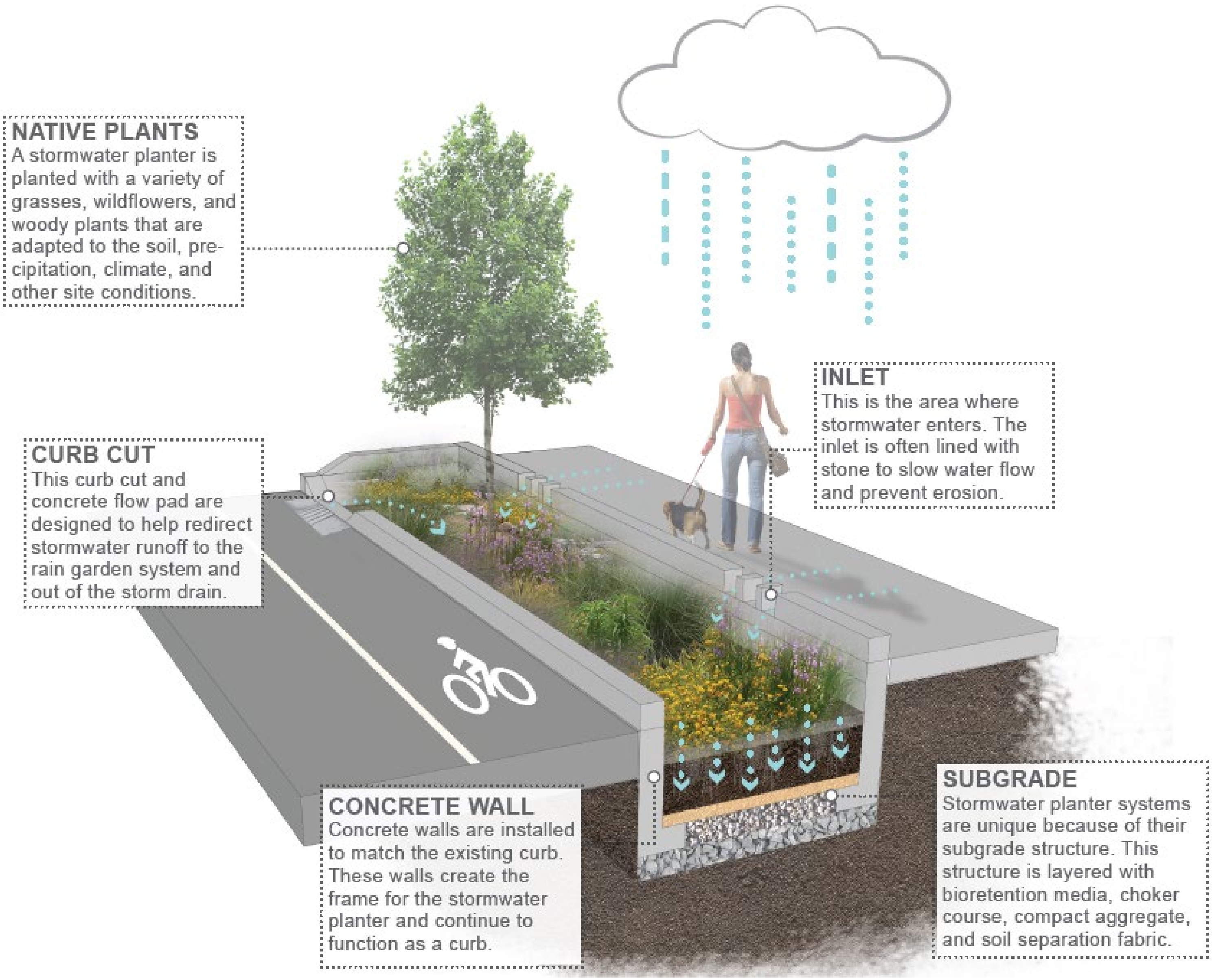
Other Green Infrastructure Practices

- Bioswale
- Stormwater Planters
- Green Roofs

BIOSWALE


NATIVE PLANTS
A bioswale is planted with a variety of grasses, wildflowers, and woody plants that are adapted to the soil, precipitation, climate, and other site conditions. The vegetation helps filter stormwater runoff as it moves through the system.
CONVEYANCE
Unlike other systems, the bioswale is designed to move water through a vegetative channel as it slowly infiltrates into the ground.
SLOPE
The slope is designed at a maximum of 3:1. These slopes often require erosion control blankets for stabilization.
INLET
This is the area where stormwater enters. The inlet is often lined with stone to slow water flow and prevent erosion.

STORMWATER PLANTERS

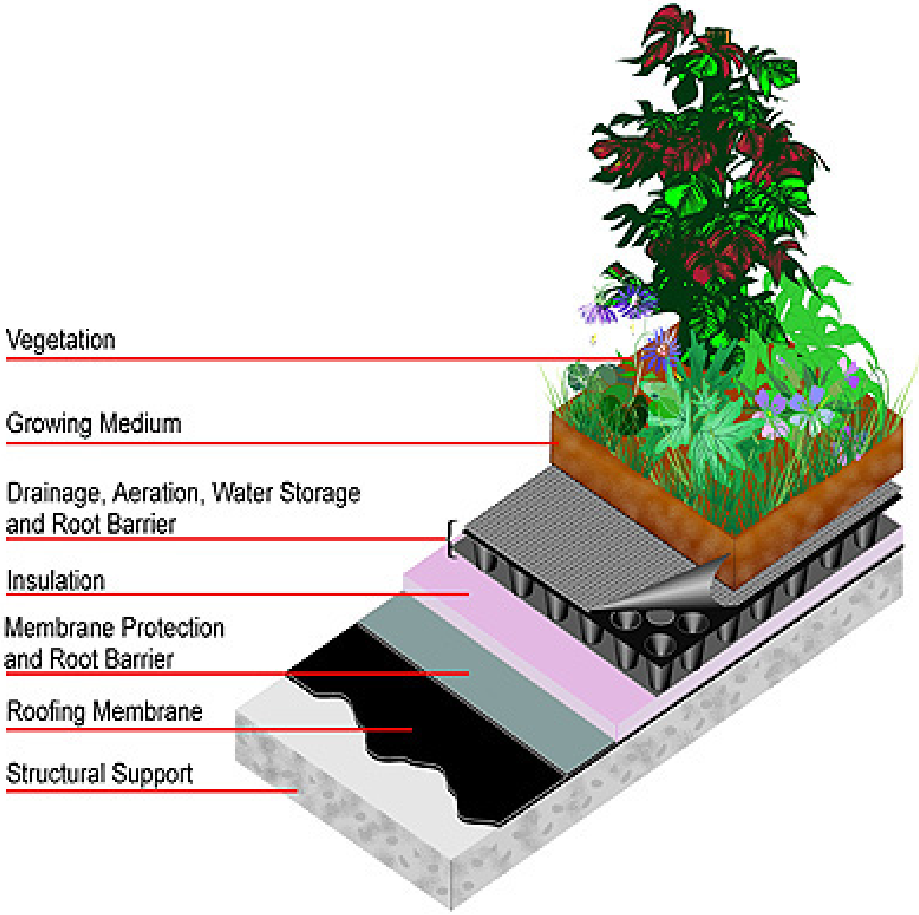


GREEN ROOFS

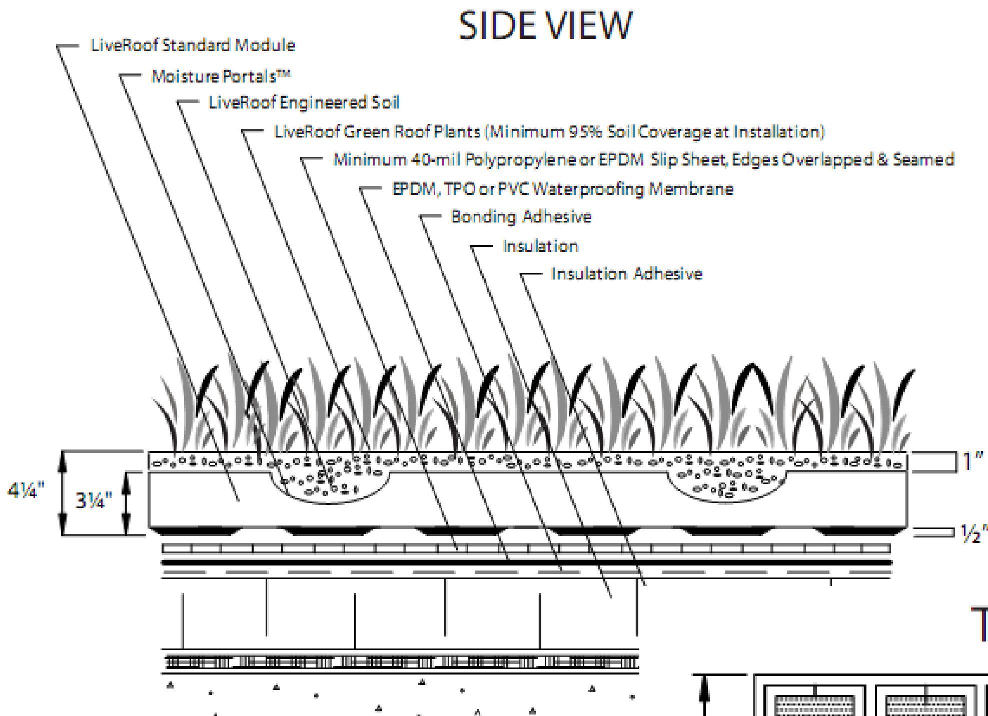
FUNCTIONS

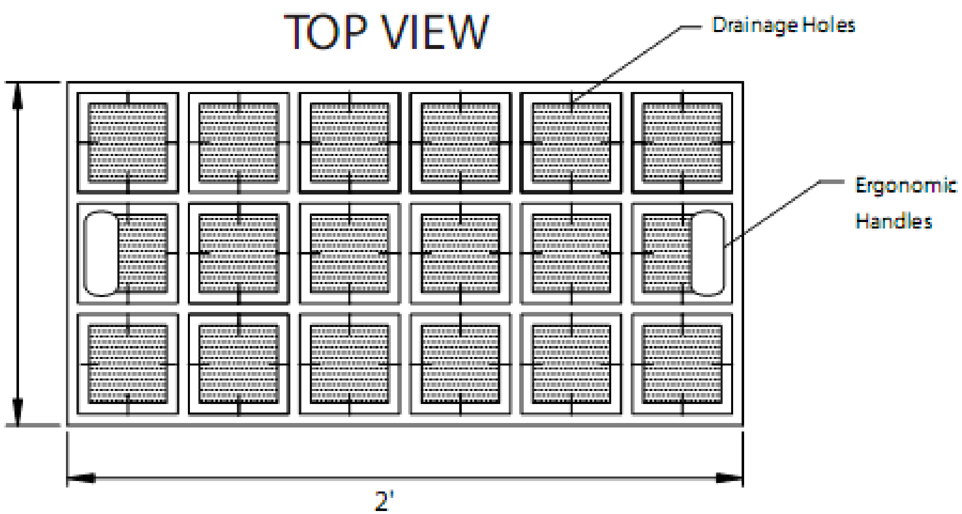
- Improves stormwater management
- Improves air quality
- Temperature regulation (moderation of Urban Heat Island Effect)
- Carbon dioxide/oxygen exchange
- Increased urban wildlife habitat
- Great for new construction

COMPONENTS



Modular System Specifications






QUESTIONS?