



# Green Infrastructure Planning for Madison, New Jersey

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# Insights to Stormwater Problems

- Stringent stormwater regulations on new development has not improved water quality
- We must retrofit existing older development with stormwater management to reduce impairments to our waterways
- Green infrastructure is a great tool to retrofit existing older development



# Green Infrastructure in New Jersey

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# 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 restore the natural water cycle.



## Bioretention Systems

- Rain Gardens
- Bioswales
- Stormwater Planters
- Curb Extensions
- Tree Filter Boxes

## Permeable Pavements

## Rainwater Harvesting

- Rain Barrels
- Cisterns

## Dry Wells

## Rooftop Systems

- Green Roofs
- Blue Roofs

# Green Infrastructure Practices



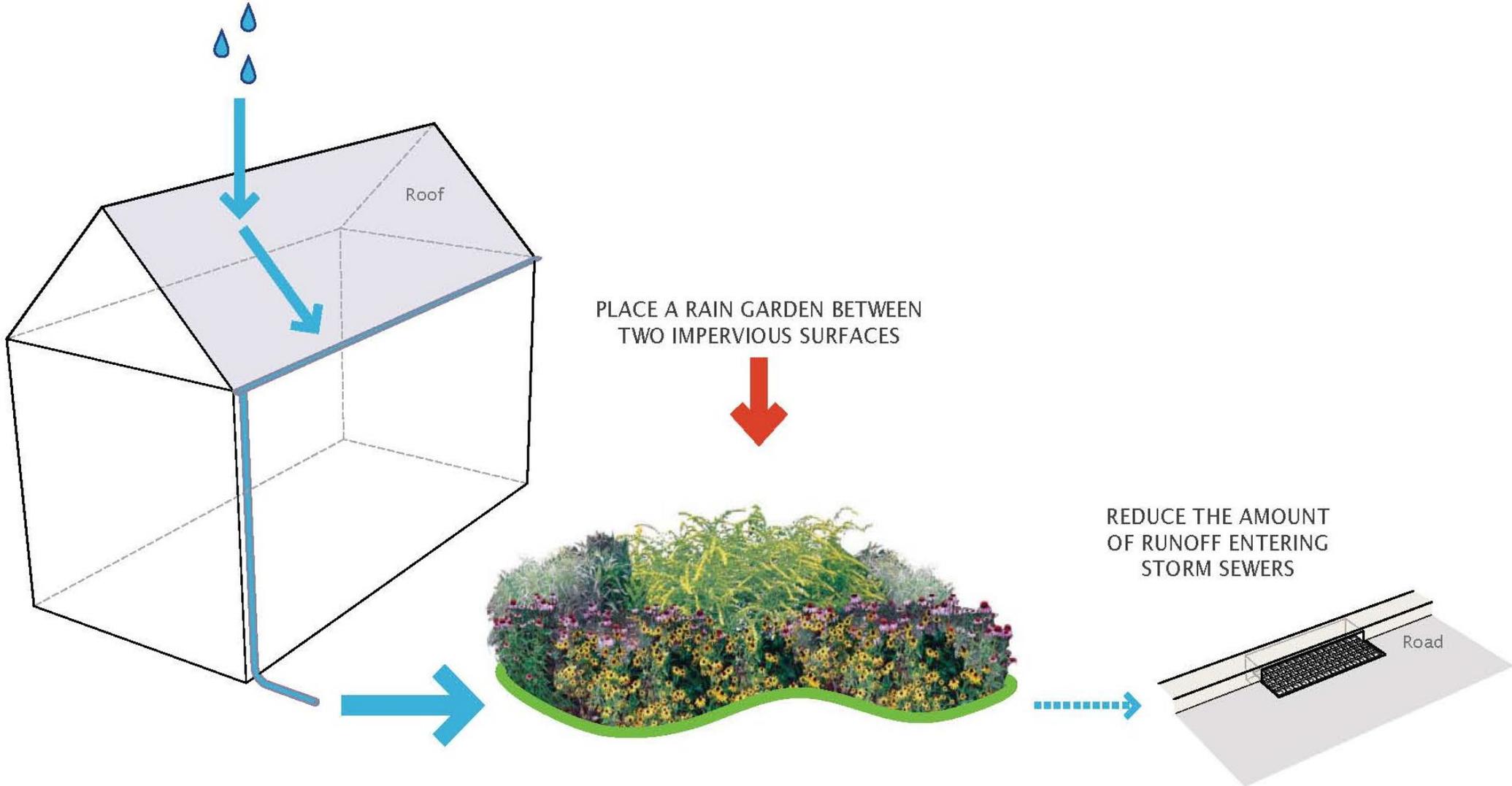
Parker Urban Greenscapes, 2009.



It is all about  
controlling runoff  
from impervious  
surfaces



# Option 1: Capture Stormwater in a Rain Garden



# Lots of Rain Gardens





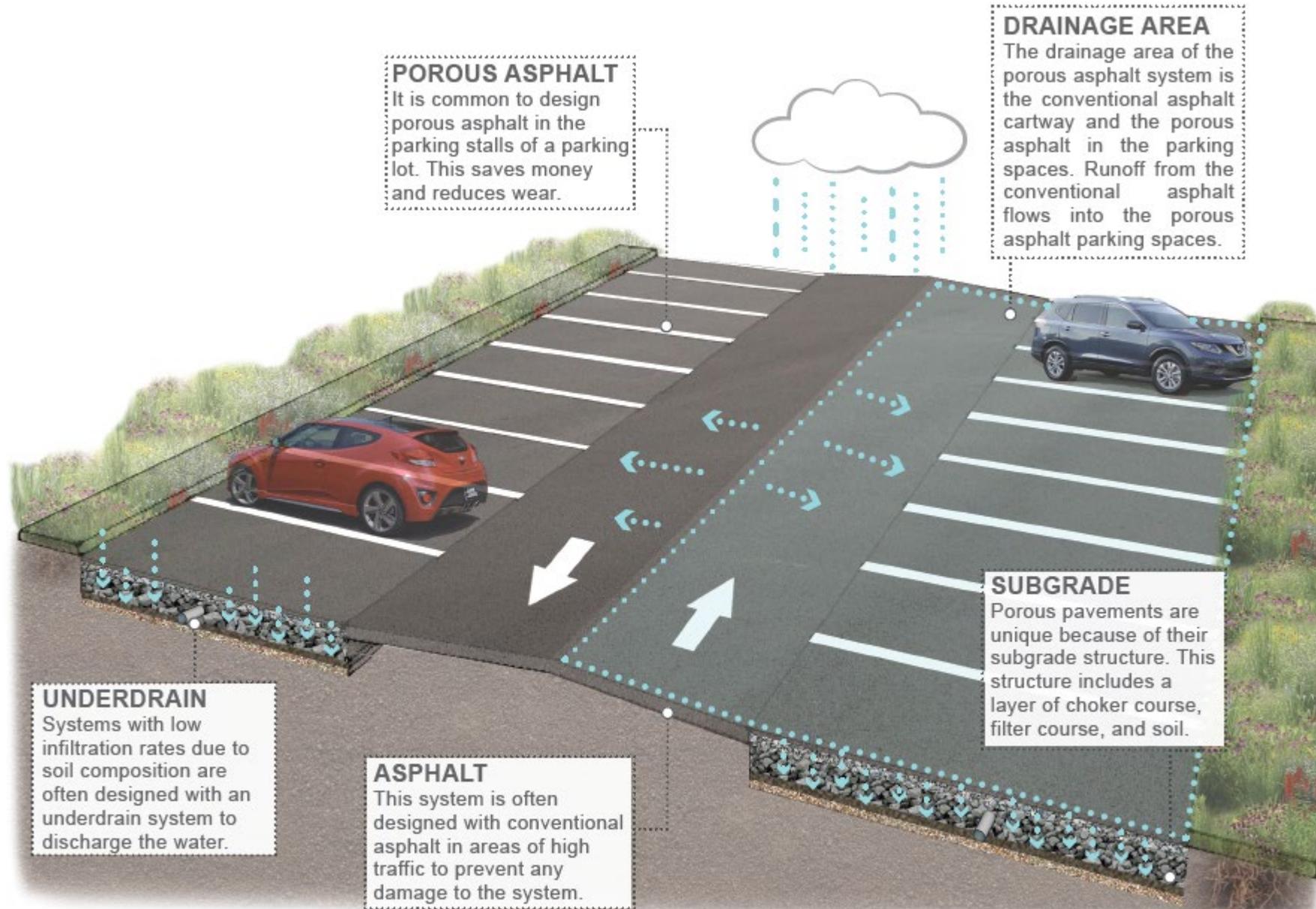
**Rain Garden**  
This garden is designed to capture and filter rainwater from the roof of the building. It helps to reduce runoff and prevent erosion. The plants in this garden are chosen for their ability to absorb and filter pollutants from the water. This garden is a great example of how we can use nature to solve environmental problems.





10/12/2013

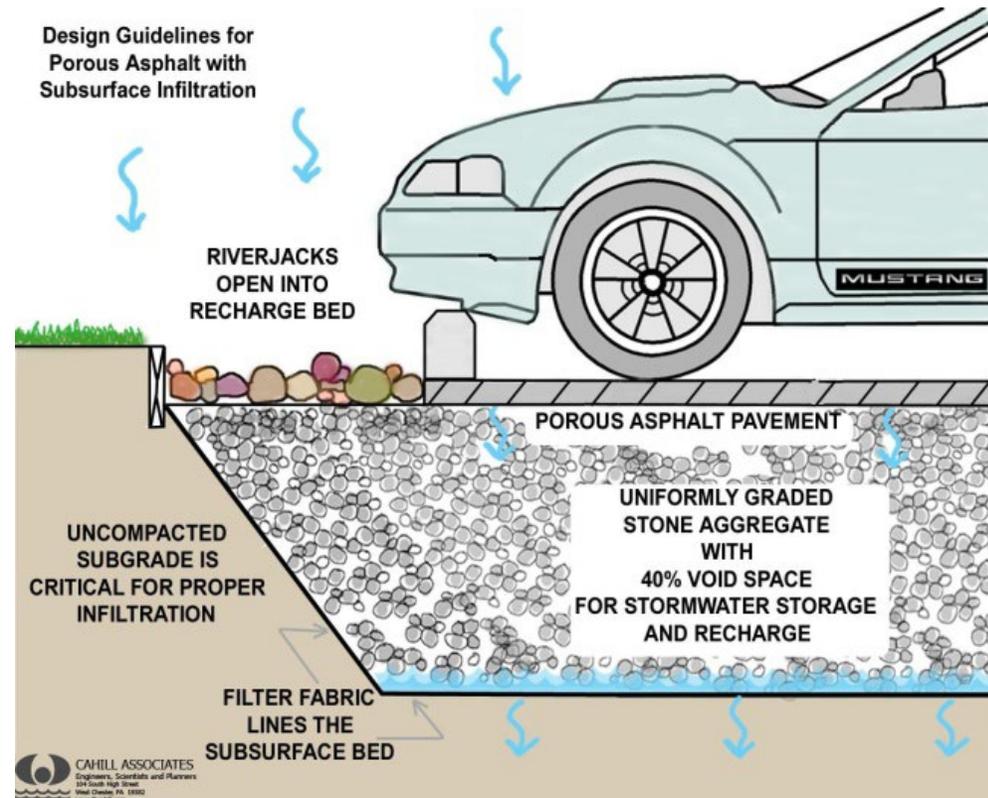
# Option 2: Convert to Permeable Pavement



# 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

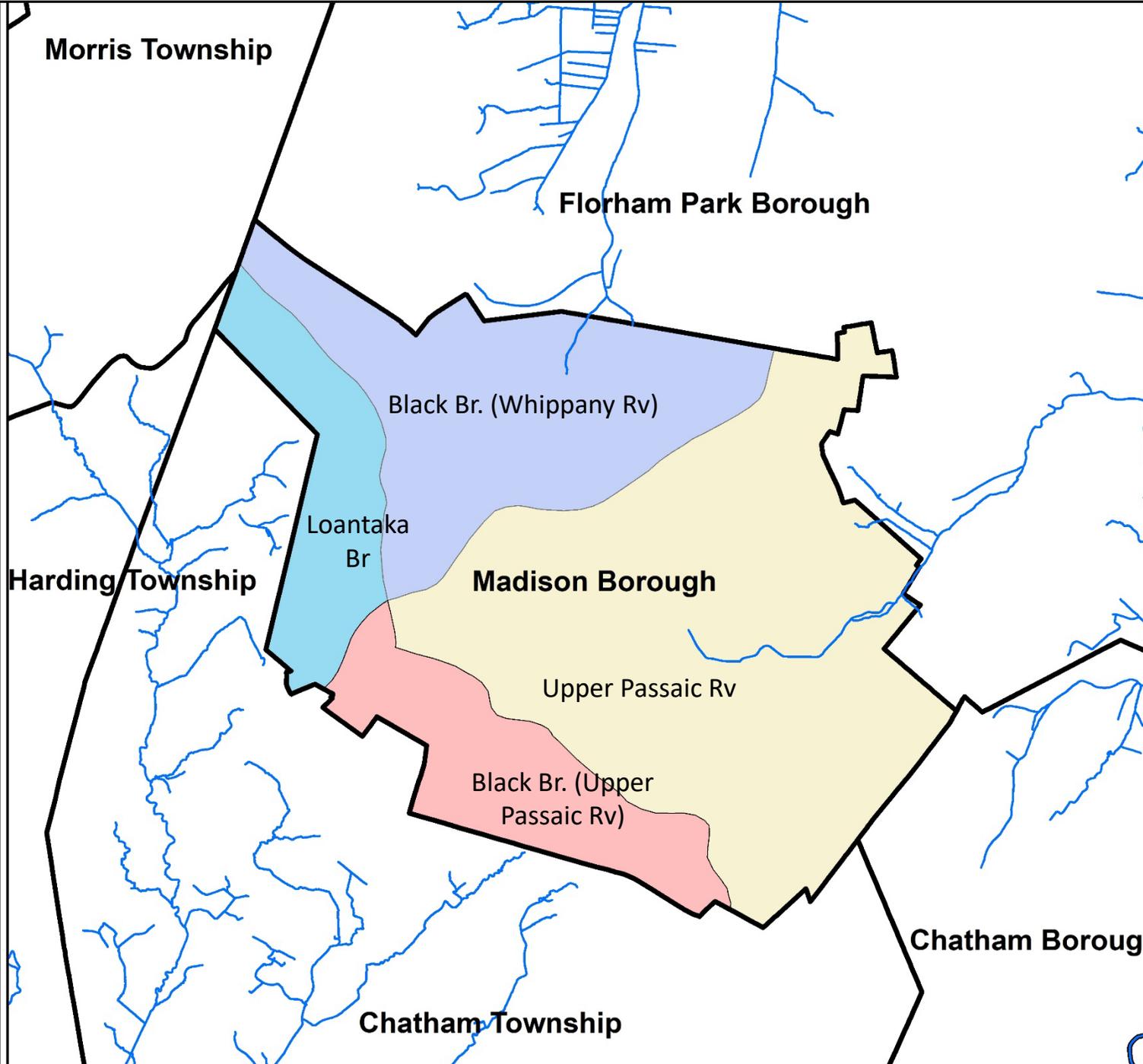


# Porous Asphalt





Grass Pavers



**Morris Township**

**Florham Park Borough**

Black Br. (Whippany Rv)

Loantaka  
Br

**Madison Borough**

**Harding Township**

Upper Passaic Rv

Black Br. (Upper  
Passaic Rv)

**Chatham Boroug**

**Chatham Township**

<b>Watershed</b>	<b>Total Area (ac)</b>	<b>Impervious Cover (ac)</b>	<b>%</b>
<b>Loantaka Brook (Upper Passaic Rv)</b>	279.2	47.6	17.05%
<b>Black Brook (Upper Passaic Rv)</b>	355.9	106.7	29.98%
<b>Upper Passaic River</b>	1,401.60	536.1	38.25%
<b>Black Brook (Whippany Rv)</b>	668.6	255.6	38.23%
<b>Total</b>	2,705.3	946	34.97%

<b>Subwatershed</b>	<b>NJ Water Quality Storm 1.25" (MGal)</b>	<b>Annual Rainfall of 50" (MGal)</b>	<b>2-Year Design Storm (4.35") (MGal)</b>	<b>10-Year Design Storm (6.71") (MGal)</b>	<b>100-Year Design Storm (12.19") (MGal)</b>
<b>Loantaka Brook (Upper Passaic Rv)</b>	0.22	8.64	0.75	1.16	2.11
<b>Black Brook (Upper Passaic Rv)</b>	0.48	19.37	1.68	2.60	4.72
<b>Upper Passaic River</b>	2.43	97.30	8.47	13.06	23.72
<b>Black Brook (Whippany Rv)</b>	1.16	46.39	4.04	6.23	11.31
<b>Total</b>	<b>4.29</b>	<b>171.70</b>	<b>14.94</b>	<b>23.04</b>	<b>41.86</b>

# SUSTAINABLE MADISON POTENTIAL GREEN INFRASTRUCTURE SITES



## Action Plan Sites:

- Site 1: Madison Recreation Complex
- Site 44: Madison Department of Public Works
- Site 50: Madison Public Library

## Other Selected Target Sites:

- Site 4: Lucy D Field
- Site 5: Utility Building
- Site 8: Apartment Complex (72 Park Avenue)
- Site 9: Apartment Complex (80 Park Avenue)
- Site 15: Rexford S. Tucker Apartments
- Site 19: Danforth Park
- Site 21: Baumgartner Drive Park
- Site 41: Madison Community Pool Corporation
- Site 42: Delbarton Field
- Site 46: Fen Court Park
- Site 51: Public Housing (Belmont Avenue)
- Site 52: Madison Public Safety Complex
- Site 53: Parking Lot (10 Maple Avenue)
- Site 58: Madison Recreation Department
- Site 63: Niles Park

## Unused Analyzed Sites: (Site: Block, Lot)

2: 1001, 73	20: 211, 1	33: 1802, 14	49: 2601, 26
3: 504, 23	22: 209, 21	34: 1701, 2	54: 1504, 2
6: 1102, 24	23: 208, 18	35: 1601, 42	55: 2701, 17
7: 1101, 37	24: 1302, 1	36: 1002, 8	56: 2701, 18
10: 1203, 7	25: 1402, 9	37: 1003, 15	57: 2801, 6
11: 404, 20	26: 1503, 1	38: 1004, 19	59: 2901, 3
12: 404, 48	27: 1505, 1	39: 903, 3	60: 3404, 56
13: 404, 47	28: 1401, 3	40: 903, 3.01	61: 4303, 1
14: 404, 46	29: 1504, 1	43: 2207, 1	62: 4402, 6
16: 402, 1.02	30: 1601, 23	45: 2301, 1	64: 4503, 7
17: 208, 1	31: 1502, 25	47: 3901, 11	
18: 201, 2	32: 1601, 12	48: 3801, 1.01	



# Madison Recreation Complex

**Subwatershed:** Black Brook  
**Site Area:** 2,157,847 sq. ft.  
**Address:** 184 Ridgedale Avenue  
 Madison, NJ 07940  
**Block and Lot:** Block 601, Lot 1.01



Two rain gardens can be installed in the turfgrass area near the entrance of the parking lot to capture, treat, and infiltrate stormwater runoff from the road.

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 50"
15	329,965	15.9	166.6	1,515.0	0.257	10.28

Recommended Green Infrastructure Practices	Drainage Area (sq. ft)	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	11,980	0.355	53	24,990	0.90	2,995	\$29,950

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## MADISON RECREATION COMPLEX

-  bioretention system
-  captured drainage area
-  property line
-  2020 Aerial: NJOIT, OGIS



**BEFORE:**



**AFTER:**



# Madison Department of Public Works

**Subwatershed:** Passaic River

**Site Area:** 1,464,936 sq. ft.

**Address:** 10 John Avenue  
Madison, NJ, 07940

**Block and Lot:** Block 2208, Lot 19



Two rain gardens can be installed in the turfgrass area alongside the northwest and south side of the building to capture, treat, and infiltrate stormwater runoff from the road. A cistern can be installed alongside the north side of the small building on the intersection of John Avenue and Station Road to harvest rainwater for watering plants throughout the town.

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 50"
12	171,591	8.3	86.7	787.8	0.134	5.35

Recommended Green Infrastructure Practices	Drainage Area (sq. ft)	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	4,770	0.141	21	9,950	0.36	1,195	\$11,950
Rainwater harvesting	740	0.022	4	575	0.06	575	\$1,150

# GREEN INFRASTRUCTURE RECOMMENDATIONS



## MADISON DEPARTMENT OF PUBLIC WORKS

-  bioretention system
-  rainwater harvesting
-  captured drainage area
-  property line
-  2020 Aerial: NJOIT, OGIS



**BEFORE:**



**AFTER:**



# GREEN INFRASTRUCTURE RECOMMENDATIONS



## MADISON PUBLIC LIBRARY

-  bioretention system
-  pervious pavement
-  captured drainage area
-  property line
-  2020 Aerial: NJOIT, OGIS



**BEFORE:**



**AFTER:**



# Final Thoughts

- Plans promote action and earn Sustainable Jersey points
- Plans are a conduit for funding
- Plans 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

RUTGERS

New Jersey Agricultural  
Experiment Station



# Questions?

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