# GREEN INFRASTRUCTURE INITIATIVE

an effort of the Rutgers Cooperative Extension Water Resources Program

water.rutgers.edu



# WATER RESOURCES PROGRAM

The Water Resources Program is one of many specialty programs under Rutgers Cooperative Extension (RCE). The goal of the RCE Water Resources Program is to provide solutions for the water quality and quantity issues that New Jersey faces today. This is accomplished through research, project development, assessment, and extension. In addition to preparing and distributing Fact Sheets, we provide educational programming in the form of lectures, seminars, and workshops as part of our outreach to citizens. With New Jersey Agriculture Experiment Station funding and other State and Federal sources, we conduct research and demonstration projects that will ultimately be used by stakeholders to improve and protect water resources in New Jersey.

## The Green Infrastructure Initiative

Water and sewer infrastructure systems in many communities throughout New Jersey are reaching the end of their functional life and will need repair and replacement over the next decade. Opportunities exist to reduce costs for replacing this aging infrastructure using new techniques and technologies, better preparing the state for a sustainable future. Infrastructure planning and design approaches are needed that reduce demand on existing infrastructure, extend its functional life where possible, and provide cost-effective and sustainable solutions that conserve and protect water resources while improving the quality of life of our citizens.

The Green Infrastructure Initiative works to establish partnerships to provide targeted assistance to communities throughout New Jersey. Examples of our ongoing efforts, include:

- Sustainable South Bronx Training and Demonstration Projects
- Environmental Justice for the City of Newark
- The Cooper River Stormwater Education & Implementation Plan
- Green Infrastructure for Camden

### WATER RESOURCES PROGRAM

RESEARCH

Integrating research, education, and extension Delivering innovative solutions based on sound science Working with communities and residents Solving water resources issues for New Jersey





# WHAT IS GREEN INFRASTRUCTURE?

Green infrastructure is an approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. Green Infrastructure management approaches and technologies infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies. USEPA. 2009. Green Infrastructure Manual.

At the largest scale, the preservation and restoration of natural landscape features (such as forests, floodplains and wetlands) are critical components of green stormwater infrastructure. By protecting these ecologically sensitive areas, communities can improve water quality while providing wildlife habitat and opportunities for outdoor recreation.

Green infrastructure design approaches effectively divert stormwater from the sewer system and direct it to areas where it can be infiltrated, evapotranspirated or re-used. Green infrastructure is designed to keep rainwater out of the sewer system so that it does not contribute to a sewer overflow and also to reduce the amount of untreated stormwater discharging to surface waters. These approaches are often referred to as "green infrastructure" because soil and vegetation are used instead of, or in addition to, pipes, pumps, storage tunnels, and other "hard infrastructure."



Rain Garden Installation South Bronx, NY



Rain Barrel Workshop Lincoln Park, Newark, NJ





Water Harvesting System Samuel Mickle Elementary School East Greenwich, NJ



# **EXAMPLES OF GREEN INFRASTRUCTURE & DESIGN APPROACHES**

# SITE

- Green Roofs
- · Rainwater Harvesting
- Downspout Disconnection
- Planter Boxes
- Rain Gardens
- · Permeable Pavements
- Vegetated Swales
- Natural Retention Basins

# NEIGHBORHOOD

- Green Parking
- · Green Streets & Highways
- Pocket Wetlands
- Trees & Urban Forestry
- Brownfield Redevelopment
- Infill & Redevelopment

# WATERSHED

- Riparian Buffers
- Habitat Preservation & Restoration





Vegetated Swales

**Green Roofs** 



Permeable Pavements



Rainwater Harvesting



# THE COOPER RIVER STORMWATER EDUCATION & IMPLEMENTATION PLAN

The RCE Water Resources Program in partnership with the Camden County Soil Conservation District is working to implement the Regional Stormwater Management Plan for the Cooper River Watershed. The Plan has identified opportunities for the implementation of stormwater best management practices and management strategies to reduce peak flows from high frequency storms. Priorities include targeting stakeholder groups who can take an active role in addressing impairments via small scale and grass-roots projects striving to demonstrate and evaluate effectiveness of rain garden educational programs at the watershed scale.

With funding provided through the NJDEP 319h grant program, the project will demonstrate and evaluate how rain garden educational programs can improve water quality and quantity within the Cooper River Watershed. Efforts are focused on three main objectives and will include the implementation of 50 rain gardens throughout the watershed:

- Implementing a Stormwater Management in Your School Yard program in at least three school systems. Providing the opportunity for students to apply their science, math, and communication skills to real-world environmental problems;
- Educate stakeholders to install and manage rain gardens using the Stormwater Management In Your Backyard program;
- Training New Jersey Landscape Professionals through a rain garden installation certification program and providing the industry leaders with the knowledge to offer rain garden installations to their clients.







Rain Garden Installation Cherry Hill Department of Public Works Cherry Hill, NJ May 11, 2010







# GREEN INFRASTRUCTURE FOR CAMDEN



# **OVERVIEW**

The Camden County Municipal Utilities Authority (CCMUA) in partnership with the Rutgers Cooperative Extension Water Resources Program proposes to pilot a community-based initiative implementing green infrastructure projects throughout the City of Camden and Gloucester City to reduce impacts to waterways and neighborhoods from combined sewer overflows, flooding, and sewer backups into private properties. The initial target will be to implement pilot rain garden and green infrastructure projects to prevent one (1) million gallons of stormwater from reaching the combined sewers in the City of Camden and Gloucester City. The program will include:

- Educating community leaders, businesses, and residents on the benefits and opportunities for green infrastructure projects;
- Providing training to local contractors and residents on green infrastructure installation techniques; and
- Establishing a network of community-based organizations to provide capacity for continual growth and expansion of the program.















# WHAT IS A RAIN GARDEN?





# **RAIN GARDEN BENEFITS**

- Protect communities from flooding and combined sewer overflows
- Control stormwater and nonpoint source pollution while adding to the aesthetics of the landscape
- Can be placed in strategic areas to capture rainfall and disconnect roof and impervious runoff from storm sewer system
- $\cdot\,$  Reduced maintenance costs
- $\cdot\,$  Recharge groundwater sources
- Use native plants that are water and climate tolerant requiring minimal maintenance
- Provide valuable wildlife habitat for beneficial insects and songbirds





## SUMNER ELEMENTARY SCHOOL Rain Garden



Sumner Elementary School 1600 South 8th St Camden, NJ

# **Plant List**

Purple Coneflower (*Echinacea purpurea*) Inkberry Holly (*Ilex glabra*) New England Aster (*Aster novae-angliae*) Sweet Pepperbush (*Clethra alnifolia*) Swamp Rose (*Rosa palustris*) Seaside Goldenrod (*Solidago sempervirens*) Coreopsis (*Coreopsis lanceolata*) Swamp Milkweed (*Asclepias incarnata*)





Sea Grant



# Rain Garden Design

- 250 square feet
- 6 inches deep
- 12 inches of soil excavated
- 3 inches of topsoil/compost added to amend existing soils
- 3 inches of mulch spread
- Collects rooftop runoff from the downspout located at the corner of the building.

# Rain Garden Layout





## **CCMUA FERRY AVENUE** Conceptual Site Plan

This rain garden will be constructed to capture and treat runoff from surrounding roadways to reduce nuisance street flooding in this low-lying neighborhood and protect water quality of the nearby waterways.



### CAMDEN GREEN GATEWAY PROJECT Project Overview

The RCE Water Resources Program has partnered with the CCMUA to develop a community-based open space plan for the former fueling station located at the corner of Broadway and Chelton Avenue. The CCMUA is leading an effort with support from NJDEP to remediate this corner property and provide a "Green Gateway Entry" to the community of Waterfront South. The RCE Water Resources Program is preparing the conceptual design plan outlining recommended improvements for the property to serve as an open space amenity to the local community. This "Green Solution" will integrate rain gardens into the site to reduce stormwater discharges to the combined sewer system and protect water quality. The rain gardens will be constructed with support from local residents to serve as a demonstration for other neighborhoods throughout Camden on how cost-effective green infrastructure solutions can be integrated into parks and open spaces as well as reclaimed vacant and abandoned properties once demolition, debris removal, and clean up is completed. Including green infrastructure techniques and technologies as part of redevelopment programs in New Jersey's urban communities provide multiple environmental benefits and can help local communities realize the potential of underutilized sites making them a true community amenity and resource for local residents.



Chelton Avenue Existing Conditions April 22, 2010



Chelton Avenue Construction Progress June 21, 2010

Rutgers Inter Jersey Agricultural Equinment Station

# THE GREEN GATEWAY CHELTON AVENUE Existing Site Conditions





# THE GREEN GATEWAY **CHELTON AVENUE**

Proposed Site Plan



New Jersey Agricultura Experiment Station

/ater Resources Program







City of Camden, NJ



### POTENTIAL PARTNERSHIP OPPORTUNITIES 1. CCMUA

### CHURCH

- 2. Saint Anthony of Padua 3. Church of Saint Andrew
- Alpha Community Baptist Church
  Congregation of Yahweh

### COMMUNITY CENTER

6. Cramer Hill Community Center 7. Cramer Hill Boys Club

### PARK

8. Von Neida Park 9. 22nd and Harrison Park

### SCHOOL

- 10. Sharp Elementary School 11. Veteran's Memorial Middle School
- 12. Washington Elementary School
- 13. Saint Anthony of Padua School 14. Camden's Promise Charter School
- 15. Camden Academy Charter High School



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Community Partnership Project Sponsored By:

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# Sponsored By:

City of Camden, NJ



### North Camden

The North Camden Greening Committee, part of the North Camden Neighborhood Plan for community revitalization, was formed to plan for clean, safe and green neighborhood parks. The North Camden Greening Committee consists of members from the community, the New Jersey Tree Foundation, Save Our Waterfront, Respond Inc., The Camden Town Civic Association, the Walt Whitman Center for the Arts, the Department of Landscape Architecture at Rutgers University/New Brunswick, and the Walter Rand Institute for Public Affairs at Rutgers-Camden.

-The Senator Walter Rand Institute of Public Affairs Regional Planning + Community Development, Rutgers-Camden

### POTENTIAL PARTNERSHIP OPPORTUNITIES

1. NORTH CAMDEN LAND TRUST

### CHURCH

- 2. Apostolic Christian Church of God
- 3. Holy Church of Mount Carmel
- 4. Holy Name Roman Catholic Church
- 5. Iglesia Pentecostal Ungida de Dios
- 6. Mount Zion Baptist Church 7. St. Paul's Episcopal Church

### PARK

- 8. Northeast School Park 9. Northgate II Park
- 10. Pine Poynt Park
- 11. Second & Erie Compensation

### **RECREATION/COMMUNITY CENTER**

12. Respond, Inc.

### SCHOOL

13. Cooper's Point School 14. Pine Poynt School 15. Rafael Cordero Molina School





Church









City of Camden, NJ



### POTENTIAL PARTNERSHIP OPPORTUNITIES

### CHURCH

- Baptist Temple Church
  Faith Tabernacle Church
  Federation of Pentecostal Church
- 4. Friendship Baptist Church
- 5. Saint Bartholomew Roman Catholic Church 6. Shalom Baptist Church

### SCHOOL

- 7. South Camden Alternative School 8. US Wiggins Elementary School 9. Whittier Elementary School



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City of Camden, NJ

Marlton COOPER RIVER

### POTENTIAL PARTNERSHIP OPPORTUNITIES

### CHURCH

- Federation of Pentecostal Churches
  Holy Temple Church
  Scott Methodist Church

### PARK

4. Mickel/Eutaw Park

### **RECREATION/COMMUNITY CENTER**

5. Iglesia Pentecostal Recreation Center



City of Camden, NJ



### POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Bible Baptist Fellowship Church 2. Holy Temple of Our Lord Jesus

PARK

3. Green Alberta Woods

**RECREATION/COMMUNITY CENTER** 

4. Respond, Inc.

### SCHOOL

5. Cramer School 6. Woodrow Wilson High School









City of Camden, NJ



### POTENTIAL PARTNERSHIP OPPORTUNITIES

### CHURCH

- Christian Pentecostal Church
  Refuge Church of Christ
  Rock of Ages Holy Church
  Saint Joseph's Church

### SCHOOL

5. Challenge Square Academy





City of Camden, NJ



### POTENTIAL PARTNERSHIP OPPORTUNITIES

### CHURCH

- Congregation of Yahweh
  Bethel United Methodist Church
  Rosedale Baptist Church
  Temple of Love Christian Center

### SCHOOL

5. Davis Elementary School



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