APPENDIX

A. GREEN INFRASTRUCTURE STRATEGIES

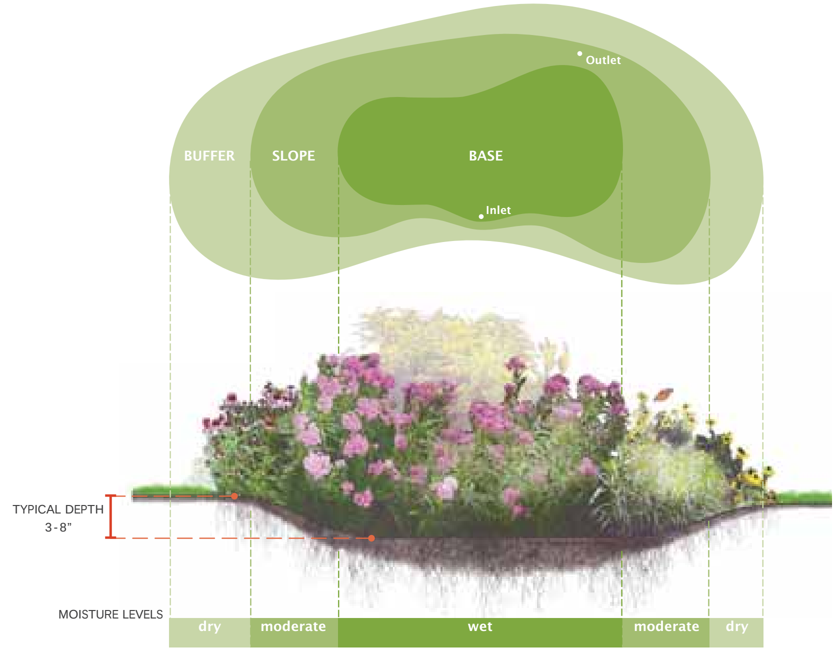
Green infrastructure strategies address the primary task of managing water quantity and quality while providing a wealth of ancillary benefits such as opportunities for water conservation and reuse, wildlife habitat, plant diversity, open green space, improved air quality and urban heat island effect reductions. These strategies are often also referred to as stormwater best management practices (BMPs).

Rain Gardens

A rain garden is a landscaped, shallow depression that captures, treats, and infiltrates stormwater runoff. The rain garden removes pollutants from stormwater runoff while recharging groundwater and keeping it out of the combined sewer system. Rain gardens are an important tool for communities and neighborhoods to create diverse, attractive landscapes where people live while protecting the health of the natural environment.

Rain gardens can be readily implemented throughout a community to begin the process of re-establishing the natural processes of the land. Rain gardens:

- Capture stormwater runoff, reducing erosion and sedimentation and the amount of water that flows to our streams and waterways during rain storms
- Protect water quality by filtering out and breaking down pollutants
- Infiltrate runoff and thereby recharge groundwater supplies and provide base flow to nearby streams and waterways
- Provide the opportunity to establish native plant communities to promote biodiversity and habitat for beneficial wildlife



The Environmental Protection Agency (EPA) defines stormwater runoff as the number one threat to water quality in our lakes and streams, and rain gardens are one of the quickest and easiest methods communities can use to reduce runoff, manage flows to combined sewer systems, and protect water resources. Beyond the aesthetic and ecological benefits, rain gardens encourage environmental stewardship and community pride. In addition, using native plant materials in rain gardens is an important way to promote biodiversity and preserve native species in developed communities. When used throughout a community, rain gardens can also provide significant economic benefits by lowering costs for local government and businesses to maintain and upgrade traditional stormwater infrastructure pipes and management basins.[4] Rain gardens can be placed in strategic locations to capture runoff from rooftops and paved areas, including:

- Homes
- Schools
- Churches
- Parking areas
- Community gardens

Water Conservation and Rainwater Harvesting

With an average rainfall of 45 inches per year, New Jersey is often considered a "water rich" state. However, when considering that New Jersey is also the most densely populated state in the country, our current and future demands are likely to exceed the sustainable supply of freshwater resources. Even in areas where water seems abundant, water conservation is important. In addition to saving money on utility bills, water conservation helps prevent water pollution in nearby lakes, rivers, and local watersheds. Water conservation extends the life and reliability of septic systems, public and private infrastructure, and prevents or postpones the need to fund and build expanded public works systems.

New Jersey's water demands are quickly approaching the resource's limits. Water will likely influence the future of New Jersey in regard to the natural environment, the overall landscape, statewide development, local zoning, and the State's economy. With an increase in population, New Jersey is seeing a big jump in potable water consumption particularly due to outdoor water use for lawns and landscaping. It is important to remember that groundwater and freshwater supplies are limited. Residents need to start adopting water saving practices at home to help prevent water shortages. There are many simple and cost-effective ways that individuals can help conserve water.[5]

Outdoor water conservation practices include:

- Plant native plants; they are adapted to New Jersey's soils and climate and need less fertilizer and water to grow and thrive.
- Mulch around garden plants; this will trap and hold water reducing evaporation and moisture loss.
- Water lawns, plants, and gardens early in the morning when evaporation rates are lowest.
- Harvest rainwater by capturing runoff from rooftops and reusing it for watering landscape plantings.

Typical rainwater harvesting systems can store up to 1,000 gallons of water. Harvesting during rainy periods in spring and summer provides a source of water for the drier periods between rain events. Instead of using potable water, residents can save money using the rainwater stored in a rain barrel or cistern. This also reduces the demand on our drinking water supply and infrastructure. In some communities, nearly forty percent of household water consumption is used on domestic irrigation during the growing season.

Rainwater harvesting has proven to be successful. In New York City, 35 rainwater harvesting systems working in NYC's community gardens collect 422,900 gallons of water every year. While individual small-scale construction of rainwater harvesting systems is not enough to significantly impact the environment, a city-wide program promoting and constructing rain barrels and harvesting systems along with rain gardens throughout the city landscape can begin to make a difference.[6]

Rain barrels and cisterns are an effective rainwater harvesting tool and can be an important element in a community-wide green infrastructure program. For every one inch of rain that falls on an eight hundred square foot roof (20' x 40'), nearly 500 gallons of water can be collected. Over an entire year, water running off of this rooftop will total over 20,000 gallons. This sustainable practice reduces the impact a building has on the environment by harvesting stormwater runoff from rooftops, decreasing flow to combined sewer systems and minimizing water pollution flowing into local waterways. They provide an alternative source of water for gardens, lawns, and landscapes thereby reducing the need for potable water.

It is important to note that harvested water in a rain barrel should not be used as a drinking water source. Rainwater should not be collected in a rain barrel if a moss killer was recently used on the roof (up to three months prior). If water quality is a concern, a first flush diverter can be installed to route the first flow of water off the roof away from the rain barrel (see images to the left of a first flush diverter installation). First flush diverters are available for purchase online from rainwater harvesting supply companies. Additionally, before using the harvested rainwater to water a vegetable garden, a sample should be taken and sent to a certified water testing laboratory. Water samples should be taken periodically throughout the growing season to confirm results. Check the NJDEP Data Miner website to search for certified laboratories in your area, www.nj.gov/dep/oqa/certlabs.htm. Recommended tests include metals (zinc, lead, chromium, arsenic), polycyclic aromatic hydrocarbons (PAHs), and pathogens (fecal coliform, and E. coli). Studies have shown that most of metals detected in rooftop runoff are also detected in rainwater that has yet to contact the rooftop. Therefore, these contaminants are unlikely to result in intolerable residues in edible plants, fruits, and vegetables, especially when they bind with soil particles and organic matter on the ground.[7] Regardless, if the water is confirmed to be safe, it is still best to use drip line irrigation to water the roots of the plants. Be sure to thoroughly clean any edible plants harvested with potable water before consumption.

Porous Pavements

Pervious paving systems are paved areas that produce less stormwater runoff than areas paved with conventional paving. This reduction is achieved primarily through the infiltration of a greater portion of the rain falling on the area than would occur with conventional paving. This increased infiltration occurs either through the paving material itself or through void spaces between individual paving blocks known as permeable pavers.

Porous paving systems consist of a porous asphalt or concrete surface course placed over a bed of uniformly graded broken stone. The broken stone bed is placed on an uncompacted earthen subgrade and is used to temporarily store the runoff that moves vertically through the porous asphalt or concrete into the bed. The high rate of infiltration through the porous paving is achieved through the elimination of the finer aggregates that are typically used in conventional paving. The remaining aggregates are bound together with an asphalt or Portland cement binder. The lack of the finer aggregate sizes creates voids in the normally dense paving that allow runoff occurring on the paving to move vertically through the paving and into the void spaces of the broken stone storage bed below. From there, the stored runoff then infiltrates over time into the uncompacted subgrade soils similar to an infiltration basin.

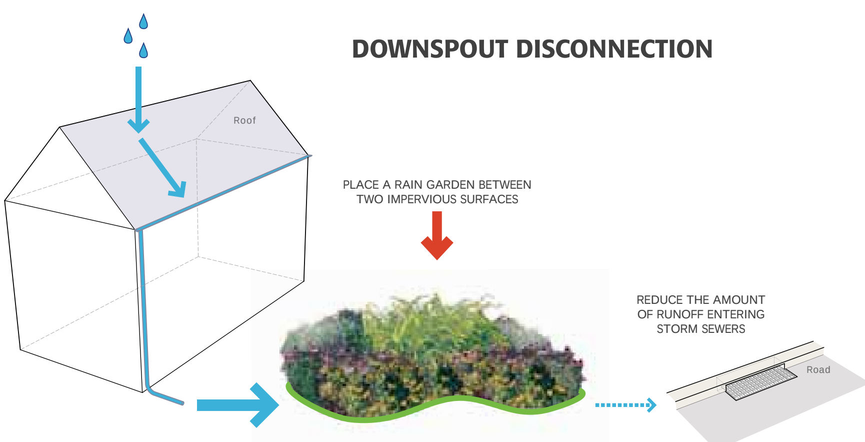
A permeable paver installed over an aggregate base also has a subsurface storage bed and functions in a similar manner to a porous paving system. However, instead of a continuous porous asphalt or concrete surface course, the system's surface consists of impervious concrete paver blocks that either have void spaces cast into their surfaces or interlock in such a way as to create void spaces. These void spaces allow runoff from the impervious paver surface to collect and move vertically past the individual pavers into the broken stone storage bed below. Similar to a porous paving system, the runoff stored in the broken stone storage bed, which also provides structural support to the pavers, then infiltrates over time into the uncompacted subgrade soils.[8]

Green Roofs

Green roofs can be effectively used to reduce stormwater runoff from commercial, industrial, and residential buildings. In contrast to traditional asphalt or metal roofing, green roofs absorb, store, and later evapotranspire initial precipitation, thereby acting as a stormwater management system and reducing overall peak flow discharge to a storm sewer system.

In urban areas with combined sewer systems, stormwater and untreated human and industrial waste are collected in the same pipe. During periods of heavy rainfall and snow melt, these systems can become overwhelmed by the volume of water and overflow into nearby waterbodies resulting in combined sewer overflows (CSOs). Since green roofs can reduce the volume of stormwater discharged, CSOs can also be reduced, thus preventing the discharge of millions of gallons of sewage into local waterways.[9]

Green roofs offer additional benefits including reduction of urban heat island effect, increased thermal insulation and energy efficiency, increased acoustic insulation, and increased durability and lifespan compared to conventional roofs.



Downspout Disconnection

In urban areas, downspouts are commonly connected to drain tiles that feed the sewer system, and the cumulative effect of thousands of connected downspouts can greatly increase the annual number, magnitude, and duration of CSO events. Downspout disconnection is the process of separating roof downspouts from the sewer system and redirecting roof runoff onto pervious surfaces, most commonly a lawn. This reduces the amount of directly connected impervious area in a drainage area.[10]

Ideally, a downspout disconnection plan will work with the existing downspouts on a building. In some cases, however, downspouts can be relocated if the new position would drain to a more appropriate receiving area (e.g., a hedge). Re-pitching the gutters to direct the flow to another corner of the roof is another option. For buildings with internal drainage, disconnecting internal downspouts may be difficult or impractical. Other BMPs such as cisterns or vegetated roofs may be more appropriate in this scenario.

For disconnection to be safe and effective, each downspout must discharge into a suitable receiving area. Runoff must not flow toward building foundations or onto adjacent property. Typical receiving areas for disconnected roof runoff include lawns, gardens, and other existing landscaping such as shrubs. Soil amendments can be used to increase soil permeability if necessary. However, site constraints, such as small or non-existent lawns, may dictate that runoff be directed into a rain garden or, most commonly, an infiltration practice.

Volume reductions occur through infiltration and evapotranspiration in the receiving area. The potential exists for disconnected roof runoff to be completely taken "out of the system" by spreading out and infiltrating over pervious surfaces and BMPs. Stormwater that eventually flows onto an impervious surface and then into the sewer will at least be initially detained by flowing over rough, pervious surfaces such as grass.

Downspout disconnection decreases the peak discharge by reducing the volume of roof runoff that enters the sewer and by increasing the discharge time over which it enters. Also, roofs are inherently distributed over a drainage area. Connected downspouts concentrate and centralize roof runoff, causing peak discharges from individual roofs to accumulate in a relatively small number of man-made conveyances. By contrast, downspout disconnection helps to keep separate the peak discharge from each individual roof.

Roof runoff contains deposited atmospheric pollutants, particles of roofing material, nutrients and bird droppings. The concentrations of these pollutants will be reduced as the stormwater infiltrates and is taken up into plant roots. Also, receiving water quality will improve because CSOs will occur less frequently and with less magnitude as a result of the water quantity benefits of downspout disconnection.

Planter Boxes and Tree Box Filters

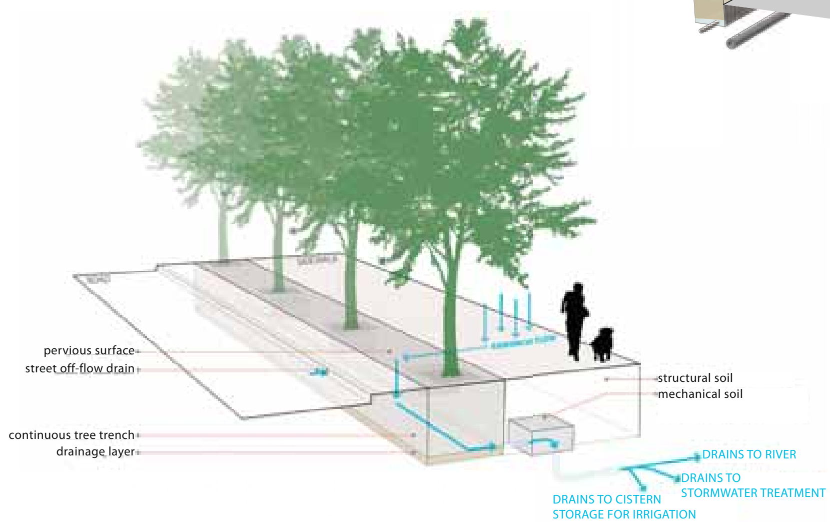
Stormwater planters are small, contained vegetated systems that collect and treat stormwater using a prepared soil media and mulch. These systems serve as small bioretention facilities filtering stormwater through layers of mulch, soil and plant root systems. Treated stormwater can then be infiltrated into existing surrounding soils as groundwater (Infiltration Planter) or, if infiltration is not appropriate, drainage pipes can discharge filtered stormwater into traditional storm sewer infrastructure (Flow-Through Planter).

A flow-through planter is designed to collect stormwater from roof areas and allows it to flow through soil and be used by plants. Flow-through planter systems contain layers of gravel, soil, and vegetation and are directly connected to a roof's gutter and downspout. These systems detain stormwater runoff allowing it to be filtered to remove sediment and pollutants as water infiltrates down through the planter. Planters are typically waterproofed and do not infiltrate runoff into surrounding soils; the system relies on evapotranspiration and short-term storage to manage stormwater flow. Excess water discharges back into the existing downspout connection or storm sewer system. Flow-through planters range in size and shape and can be constructed using a variety of materials, including concrete, brick, plastic lumber, or wood.[11]

Stormwater planters are frequently used in urban communities where space is limited. These systems do not require large amounts of space and can be designed to enhance neighborhoods and communities providing aesthetic appeal and plant materials to the city streetscape and parking lots on both commercial and residential properties. When installed adjacent to buildings, the design and materials can reflect existing architecture. Planters may also be built of concrete or block providing durable, low maintenance units along sidewalks and roadways. An appropriate soil media is necessary to ensure plant growth and successful infiltration. Native plant species and vegetation suited to urban environments are preferable to minimize routine maintenance. Underdrain piping with observation/clean out wells should be installed to connect planter boxes to existing storm sewer systems.[12]

Stormwater tree pits manage stormwater using an underground structure and above ground plantings. The system collects and filters stormwater through layers of mulch, soil and plant root systems where pollutants such as bacteria, nitrogen, phosphorus, heavy metals, oil and grease are retained, degraded and absorbed. These small bioretention systems can then discharge treated stormwater by infiltrating it into the ground or, if infiltration is not appropriate, discharging into the existing storm sewer system. A variety of manufactured tree pit structures are commercially available. These systems typically include a precast concrete box filled with a proprietary soil and media mix and may also include limited plantings consisting of a single tree or a few small shrubs. While the underground components differ, above ground the systems closely resemble traditional street tree plantings and are an effective solution for urban conditions where space is limited and healthy trees are few. Where possible, tree pits should be installed in conjunction with other stormwater BMPs.

Tree box filters are appropriate in many urban and suburban communities throughout the United States and are most effective in locations where available space is limited. The systems can be installed to infiltrate into surrounding soils or as closed chambers where infiltration is undesirable or not possible. In areas with heavy clay soils, sites with high groundwater, and areas with highly contaminated runoff, infiltration is typically not appropriate. Tree box filters are frequently installed along urban sidewalks and streetscapes. In densely developed communities, tree box filters are an appropriate tool for an integrated streetscape design where multiple systems transform isolated street trees into stormwater management facilities.[13]



Stormwater Curb Extensions

Conventional curb extensions, or bump outs, are typically paved areas that extend from the sidewalk and are designed to calm traffic and improve pedestrian safety. The design of a stormwater curb extension is an alteration to that of the traditional curb extension. A stormwater curb extension incorporates curb openings, vegetation, and appropriate soil amendments that allow the curb extension to function as a stormwater facility. Stormwater runoff is filtered through the vegetation and soil media and can be stored to sustain nearby trees or be conveyed to an underdrain system.

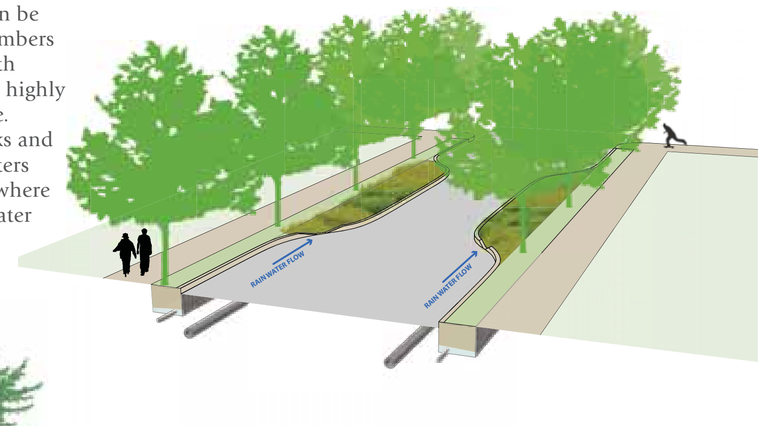


Photo Credit: Jessica Franzini, NJTF
(bottom photo)

Greenways, Open Space, and Landscape Plantings

Landscape plantings, including trees, shrubs, perennials and grasses, can help to manage stormwater by diverting runoff from the storm sewer system via infiltration, evapotranspiration, and filtration. Plant materials, including leaves, branches, and stems intercept rainfall before the water hits the ground and can become runoff. Much of the rainfall collected by healthy landscape plantings can easily evaporate into the air and never reach the storm sewer system. In addition, healthy plants minimize stormwater runoff by promoting infiltration into the soil and through evapotranspiration, the process by which water is taken up by a plant's roots and transpired through its leaves. A healthy landscape with diverse plantings and quality soils can effectively filter stormwater runoff.[14]

In urban and suburban communities, the temperature of stormwater runoff increases as it flows over heated impermeable surfaces like concrete, asphalt, and roofs. When this water enters nearby surface waterways, it can increase the temperature of a stream, lake or river, adversely affecting aquatic health. This thermal pollution can have a dramatic effect on natural systems, biota, and diversity. To address this issue, landscapes in densely developed communities are being designed to capture stormwater so more can infiltrate into soils and less stormwater runs off directly to waterways. In these landscapes, a key factor is planting trees to provide canopy interception, when rainfall is caught by leaves and stored or evaporated back into the atmosphere so less water reaches the ground and becomes stormwater runoff. This brief retention of rainwater, or rainfall interception, is affected by intensity and duration of rain events, tree species and local climate. Studies of rainfall interception indicate that interception rates are primarily dependent on the type and amount of leaves. Studies have shown that a mature deciduous tree (deciduous trees, such as sweet gums, lose leaves during the winter) can intercept 500–700 gallons of water per year. Mature evergreen trees (evergreens, such as magnolias or pines, retain their leaves year round) can intercept more than 4,000 gallons per year.[15]

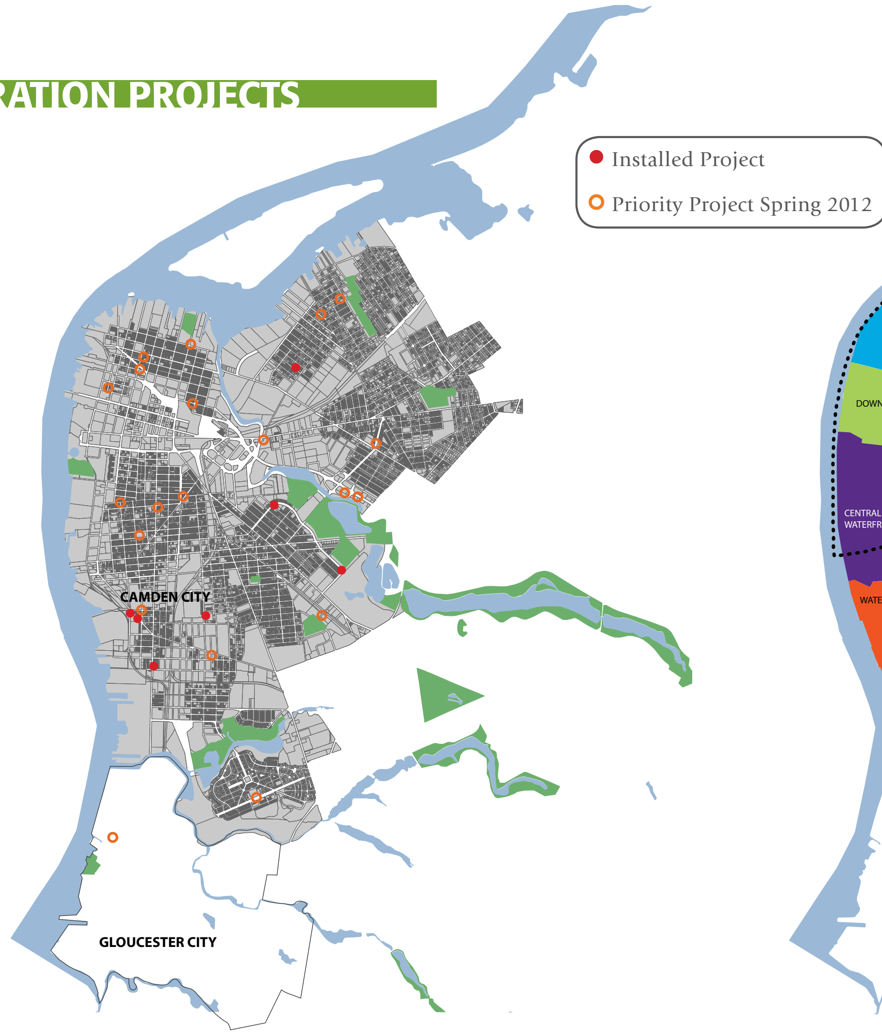
Trees also increase infiltration of rainwater into soil. Tree roots absorb rainwater, returning it to the atmosphere via transpiration after the tree has filtered potential pollutants. When trees use soil moisture, more rainwater is able to infiltrate into and percolate through the soil. Roots of trees help to reduce soil erosion minimizing sediment pollution. Tree roots also take up nutrients, a common stormwater pollutant, reducing nutrient loads in stormwater runoff.

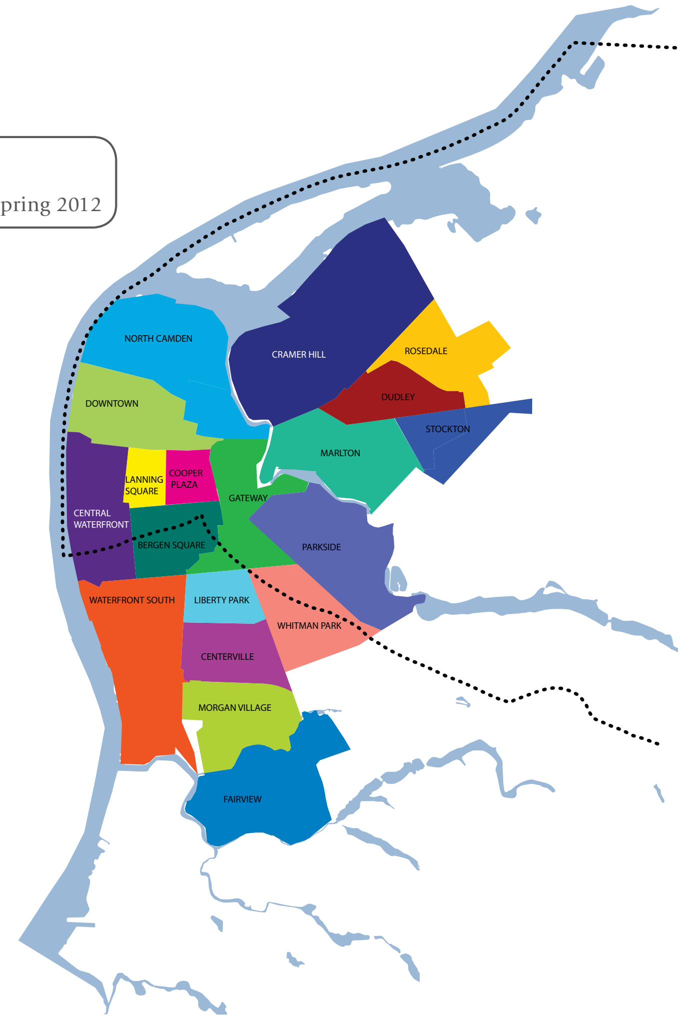
The combination of trees, shrubs, perennials, and grasses in a "Greenway" along waterways sustains hydrological function while improving stormwater management effectiveness in a community. Healthy greenways protect public infrastructure facilities such as roads, bridges and culverts, sewer and water lines, parks, trails, and public facilities and buildings. Dysfunctional floodplains and waterways, which are not mapped or protected, can threaten the integrity and stability of public infrastructure during major storm events. Functional stream and river systems seasonally flood, some years over more of their floodplain than others. Drainage swales from uplands, in combination with lower floodplain areas, infiltrate rainwater into groundwater aquifers. These wet "hydrological greenways" perform best when the landscape consists of deep-rooted native vegetation. Their function is compromised when they are built upon or converted to lawn. When this occurs they pass on their lost capacity for flood storage to downstream communities expanding the floodplain of the next property owner. When stormwater is not infiltrated to groundwater aquifers, it is lost to the local community and becomes an increasingly expensive, lost resource flowing into waterways. A protected greenway network, with good infiltration and stormwater storage capacity, is a simple and cost-effective strategy for protecting public infrastructure.[16]

B. NEIGHBORHOOD DEMONSTRATION PROJECTS

Over the past year, multiple demonstration projects have been identified that will provide the foundation for a city-wide green infrastructure program. The RCE Water Resources Program staff, with assistance from NJTF and numerous local organizations and residents, visited each of the City's 20 unique neighborhoods to evaluate the need and opportunities for green infrastructure. In total, over 40 projects were selected, incorporating every one of the City's neighborhoods. Implementation of these efforts will be a priority to accomplish the first steps of a city-wide program. More details for each of these demonstration projects are presented in Appendix B and include site locations, photos, potential community partners, green infrastructure strategies and preliminary designs.

Eight of the demonstration projects have already been constructed this past year, which include 11 rain gardens that are designed to capture, treat, and infiltrate over 800,000 gallons of stormwater each year. The RCE Water Resources Program is eager to continue to lead the people of Camden with in-the-ground green infrastructure projects that beautify the City as well as mitigate environmental concerns.





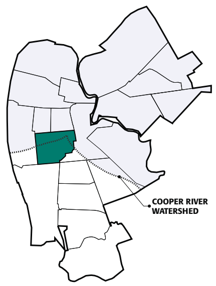
List of Demonstration Projects

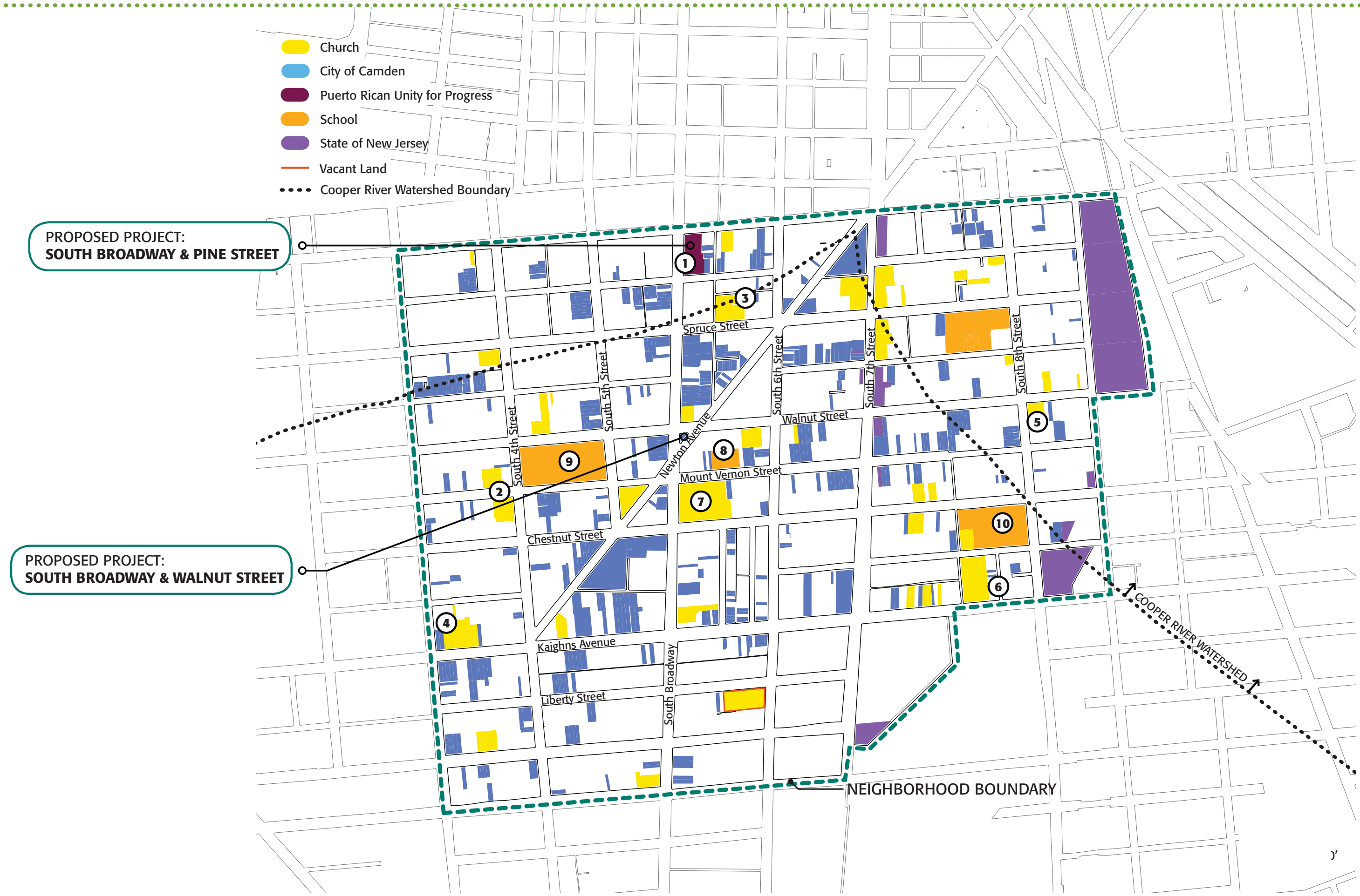
● Installed Project

○ Priority Project Spring 2012

* denotes a site that is not included in this Study. The site survey will be completed Spring 2011.

BERGEN SQUARE





POTENTIAL PARTNERSHIP OPPORTUNITIES

1. PUERTO RICAN UNITY FOR PROGRESS

CHURCH

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

SCHOOL

8. South Camden Alternative School
9. US Wiggins Elementary School
10. Whittier Elementary School

BERGEN SQUARE

SOUTH BROADWAY & PINE STREET

PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION

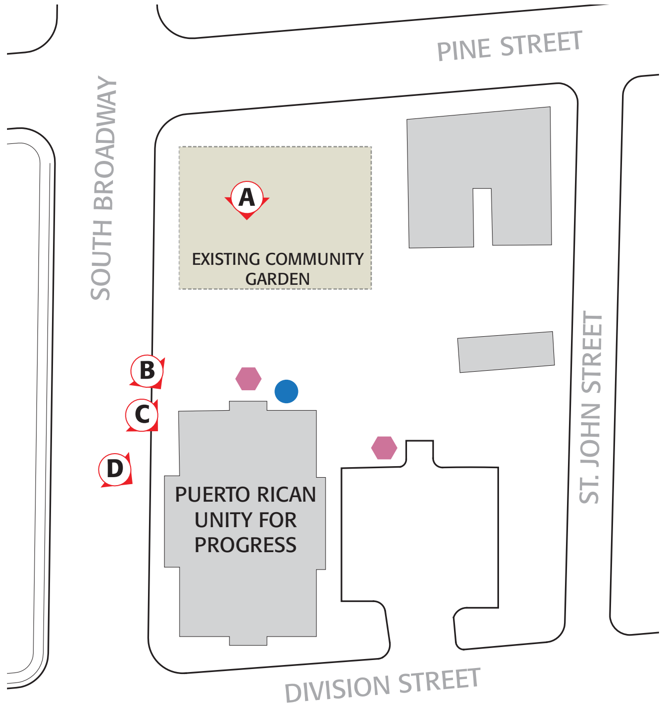
This project proposes to install two rain gardens and a rainwater harvesting system at the Puerto Rican Unity for Progress Center. The above ground cistern, designed to capture and store between 500-1,500 gallons of rainwater from the building's rooftop, will help irrigate the community gardens located on the site. In addition, rain gardens will manage both the overflow from the rainwater harvesting system as well as the stormwater runoff from the building's parking lot. This project would complement the existing NJTF tree and shrub plantings on the site.

POTENTIAL COMMUNITY PARTNERS

Puerto Rican Unity for Progress

PROPOSED GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- rainwater harvesting
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:60

SITE LOCATION

GREEN INFRASTRUCTURE KEY:

- RAIN GARDEN
- RAINWATER HARVESTING/RAIN BARRELS

SITE PHOTOS

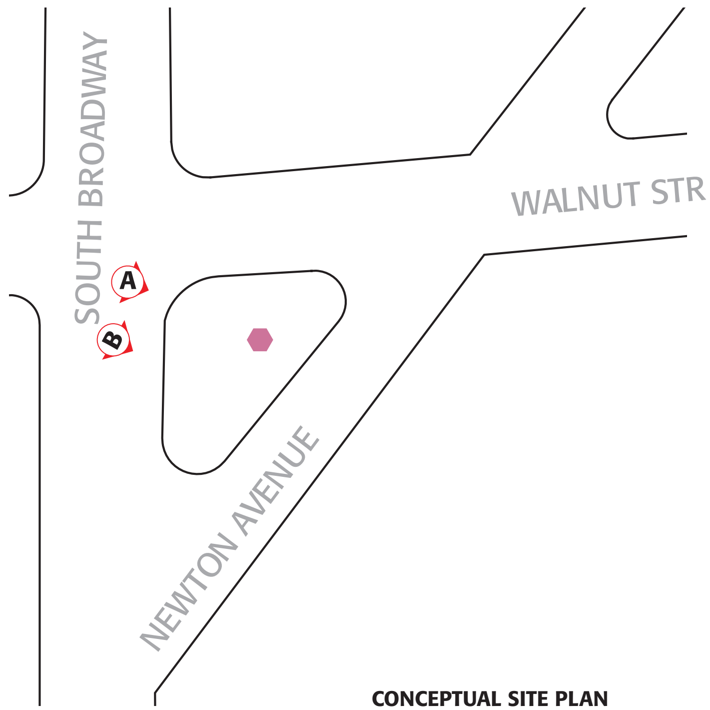
BERGEN SQUARE
SOUTH BROADWAY & WALNUT STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION

This project includes a rain garden, strategically located within a busy intersection of Bergen Square, to capture the stormwater runoff from three converging streets. In addition to functioning as a stormwater management BMP, this rain garden will improve the aesthetic qualities of this neighborhood. Native plants planted in this sunny location could include species such as Black-eyed Susan, Purple Coneflower, False Sunflower, and Wild Bergamont.

GREEN INFRASTRUCTURE STRATEGIES

- rain garden



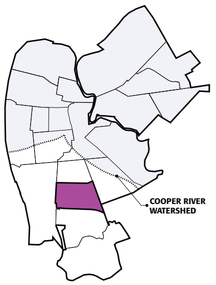
CONCEPTUAL SITE PLAN
SCALE = 1:50

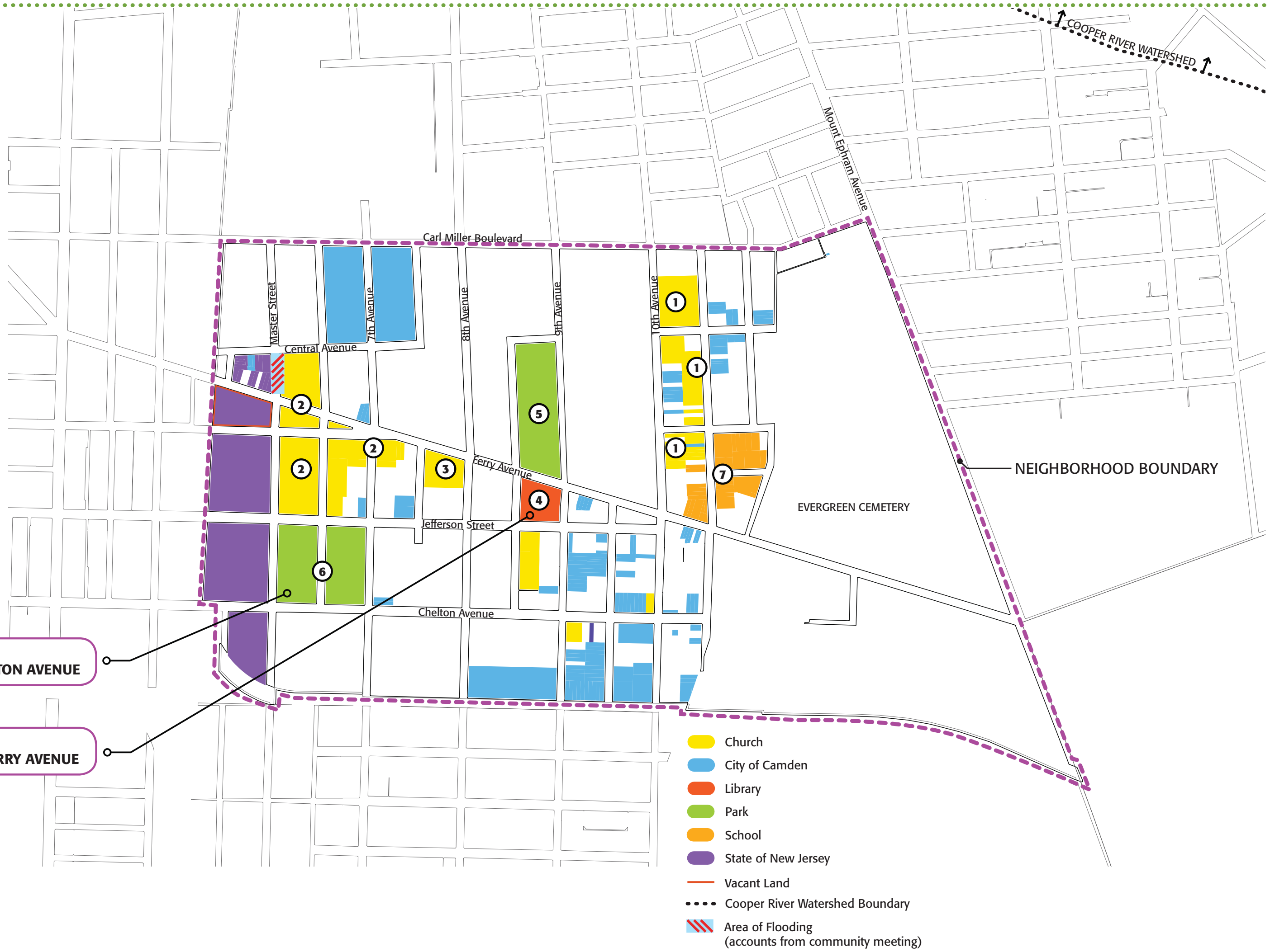
SITE LOCATION

GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS

CENTERVILLE





POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. 10th Street Baptist Church
2. Antioch Baptist Church
3. Ferry Avenue United Methodist Church

LIBRARY

4. Ferry Avenue Branch Library

PARK

5. Elijah Perry Park
6. Staley Park

SCHOOL

7. RT Cream School

PROPOSED PROJECT:
MASTER STREET & CHELTON AVENUE

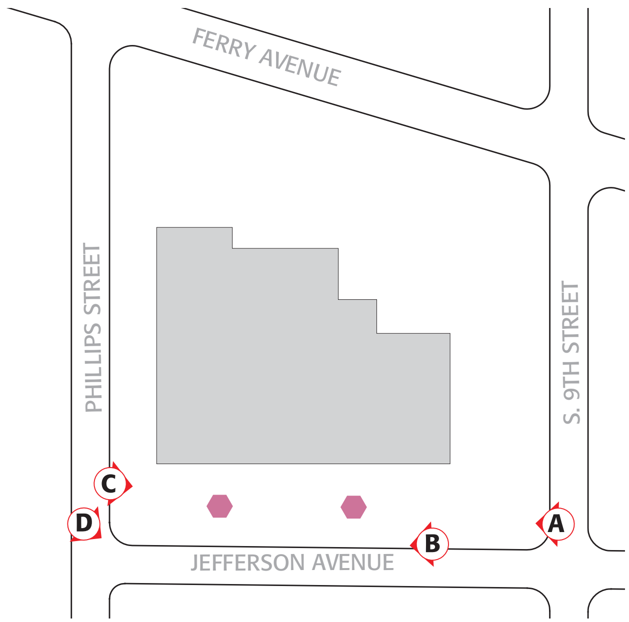
PROPOSED PROJECT:
SOUTH 9th STREET & FERRY AVENUE

CENTERVILLE
SOUTH 9TH STREET & FERRY AVENUE
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
This project, located at the Camden County Ferry Avenue Branch Library, will disconnect the rooftop runoff and prevent it from flowing directly into the CSO system. Two rain gardens will be designed to capture, filter, and infiltrate the first one-inch of rainfall. Native herbaceous species planted within these rain gardens should be adapted to dry, sunny sites. This project could be an appropriate location for a rain garden training workshop.

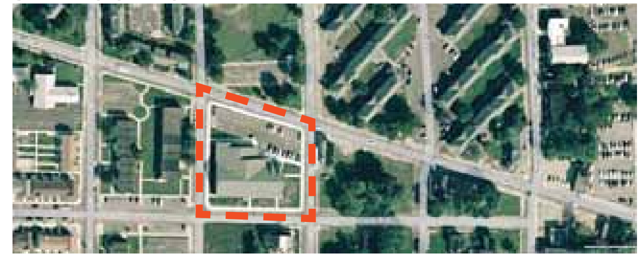
POTENTIAL COMMUNITY PARTNERS
Ferry Avenue Branch Library

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:80

SITE LOCATION



GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

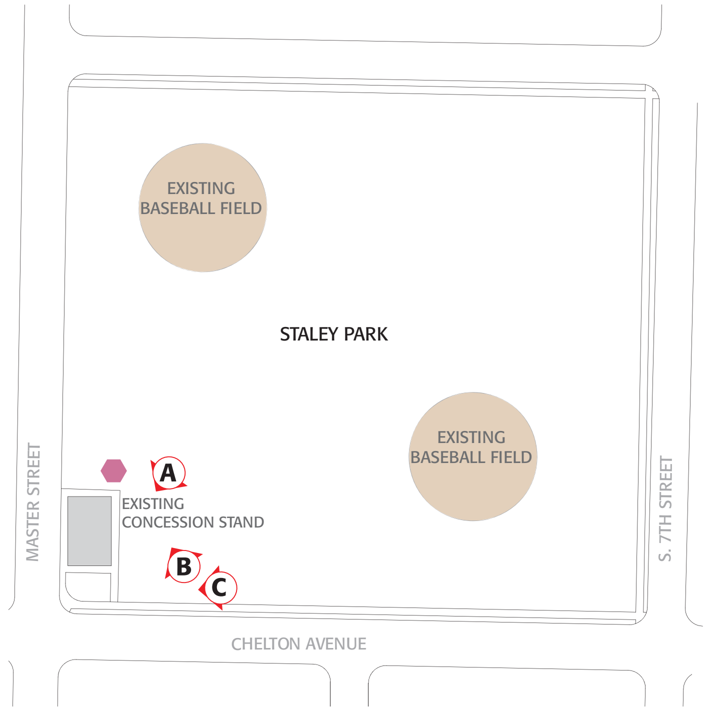
SITE PHOTOS

CENTERVILLE
MASTER STREET & CHELTON AVENUE

PROJECT DESCRIPTION
A demonstration rain garden is proposed at Camden City's Staley Park to capture, filter, and infiltrate stormwater runoff from a small concession building. The rain garden will disconnect stormwater runoff from the CSO system while enhancing the public park.

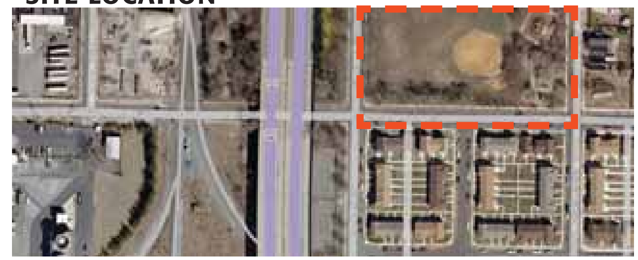
POTENTIAL COMMUNITY PARTNERS
Staley Park

GREEN INFRASTRUCTURE STRATEGIES:
- rain garden
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:120

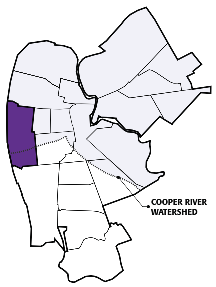
SITE LOCATION



GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS

CENTRAL WATERFRONT



POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Holy Trinity Baptist Church
2. Macedonia African Methodist Episcopal Church
3. Mount Zion Highway of Holiness

PARK

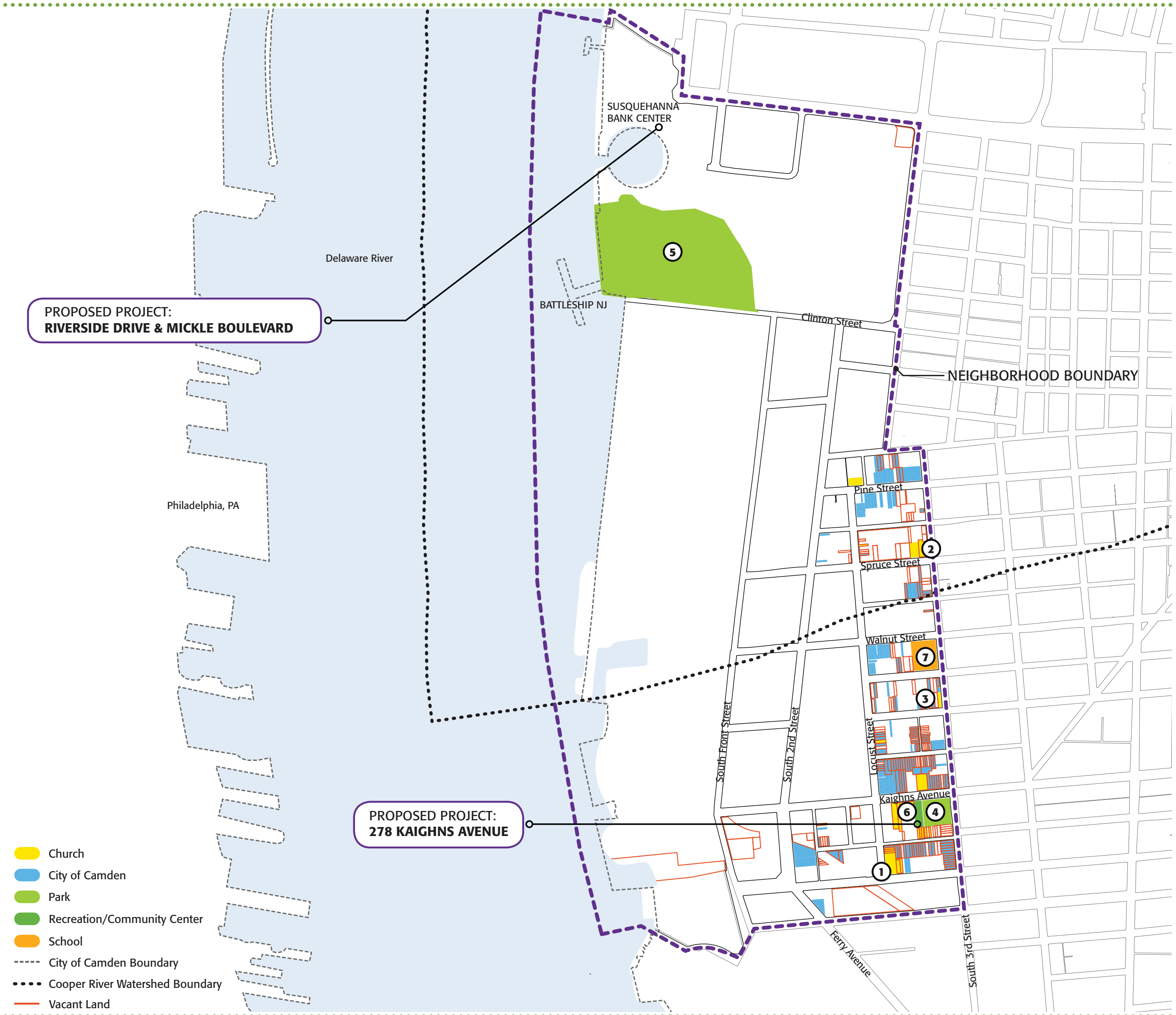
4. 3rd & Knights Park
5. Wiggins Waterfront Park

RECREATION/COMMUNITY CENTER

6. Neighborhood Center United

SCHOOL

7. Fetters Alternative High School

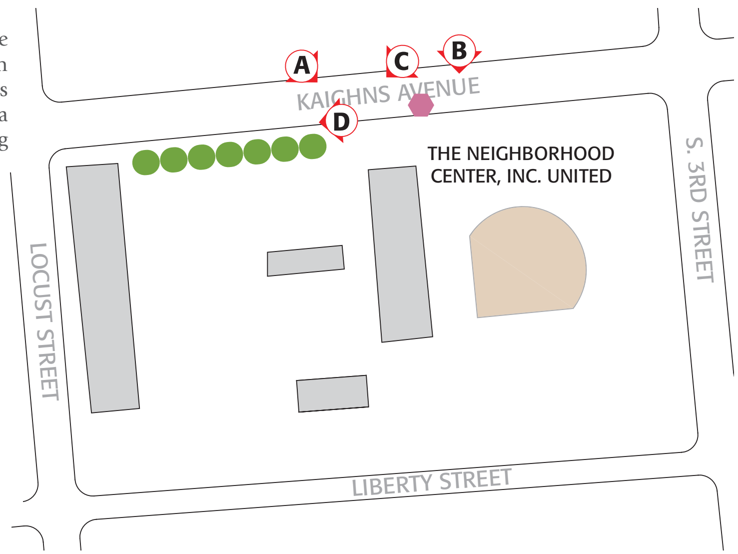


CENTRAL WATERFRONT
278 KAIGHNS AVENUE

PROJECT DESCRIPTION
A rain garden and tree plantings are proposed on the site of the Neighborhood Center. The rain garden will capture rainwater from the building's rooftop and add visual interest to the building's entranceway. The additional trees planted within the playground area will increase canopy cover and provide shade for the children playing in the space.

POTENTIAL COMMUNITY PARTNERS
The Neighborhood Center, Inc. United

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- TREE PLANTINGS

SITE PHOTOS


A


B


C


D

CENTRAL WATERFRONT
RIVERSIDE DRIVE & MICKLE BOULEVARD

PROJECT DESCRIPTION
A bioretention swale is proposed along the existing gravel walking path adjacent to the Wiggins Park Marina. The site will be enhanced using soil amendments to promote infiltration of overland runoff and will be landscaped with native grasses and flowering species to create an attractive and functional landscape feature.

POTENTIAL COMMUNITY PARTNERS
Wiggins Park Marina

GREEN INFRASTRUCTURE STRATEGIES
- rain garden

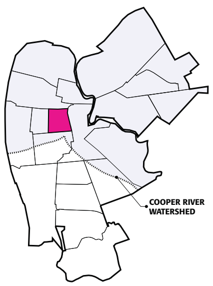
CONCEPTUAL SITE PLAN
SCALE = 1:150

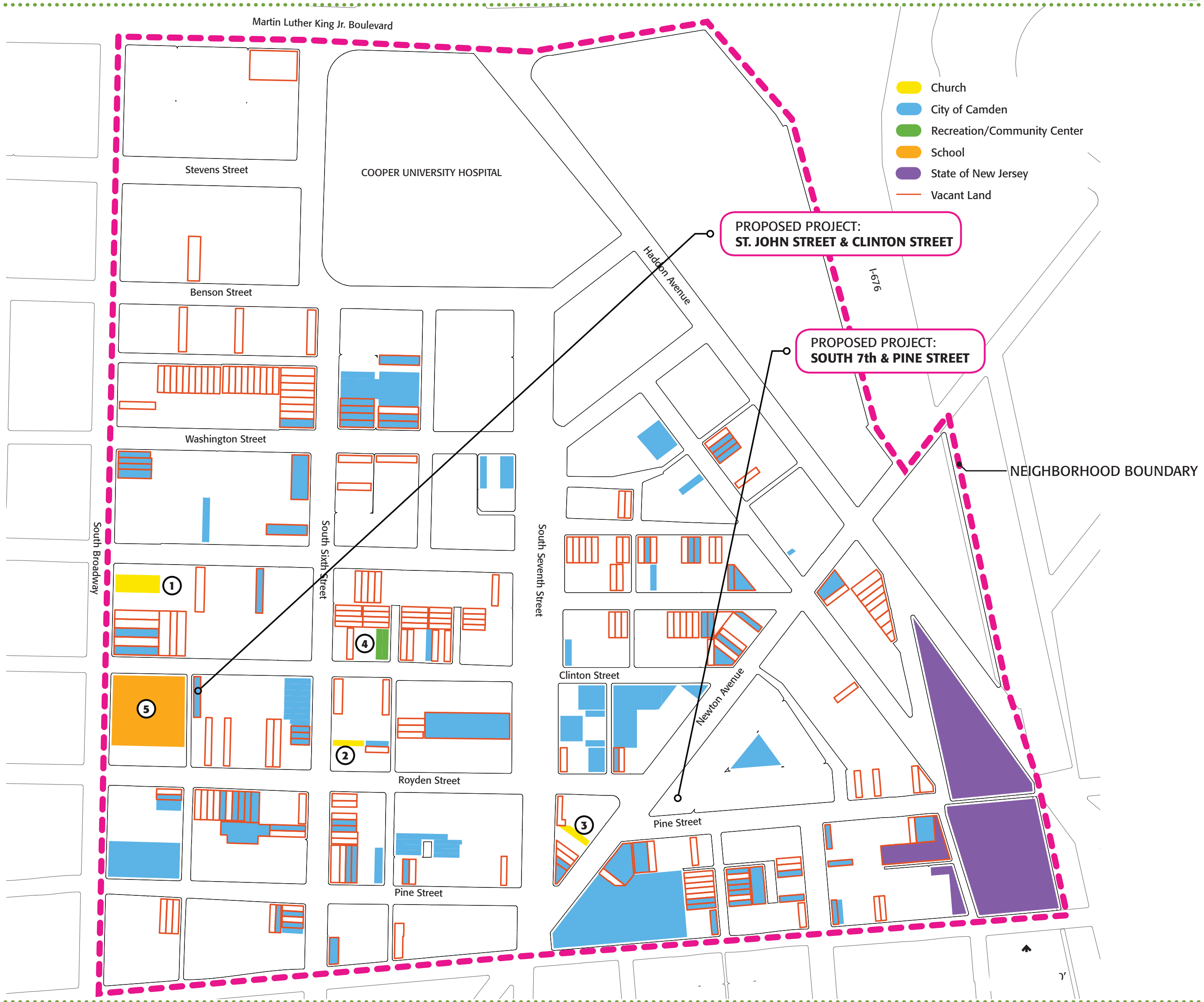
SITE LOCATION

GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS

COOPER PLAZA





POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Faith Baptist Church
2. Gethsemane Baptist Church
3. New Mickle Baptist Church

RECREATION CENTER

4. Sikora Center

SCHOOL

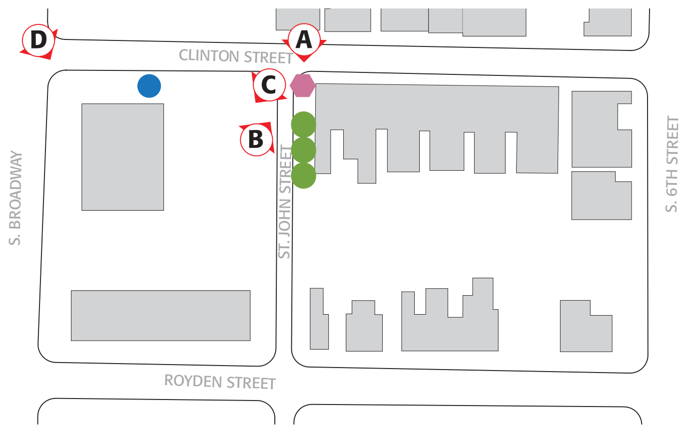
5. Broadway Elementary School

COOPER PLAZA
ST. JOHN STREET & CLINTON STREET

PROJECT DESCRIPTION
A rain garden and tree plantings are proposed on the vacant lot adjacent to The Broadway School. In addition to improving on-site infitration and increasing tree canopy, this project has the opportunity to become an outdoor learning space for the school and an open green space for the community. To provide irrigation for the site, rain barrels will be used to collect rainwater from the rooftop of the school.

POTENTIAL COMMUNITY PARTNERS
The Broadway School

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- rainwater harvesting



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- RAINWATER HARVESTING/RAIN BARRELS
- TREE PLANTINGS

SITE PHOTOS


COOPER PLAZA

SOUTH 7TH STREET & PINE STREET

PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION

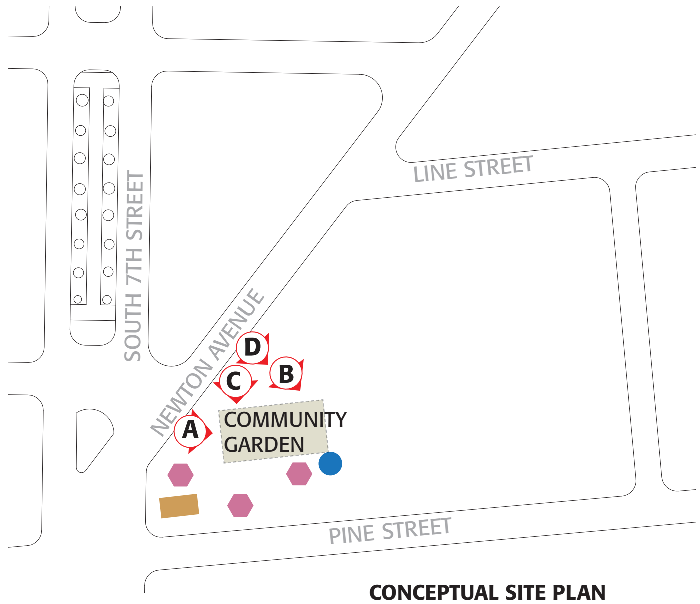
This project, known as Cooper Sprouts, aims to revitalize a large vacant lot adjacent to an existing community garden. The site will have several rain gardens collecting roadway runoff from Pine Street, South 7th Street, and Newton Avenue. New pervious paved walkways and sidewalks will improve pedestrian ciculation around the site. NJTF planted trees on the site in fall 2011.

POTENTIAL COMMUNITY PARTNERS

Cooper Lanning Civic Association
Cooper University Hospital

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- rainwater harvesting
- pervious pavers



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- RAINWATER HARVESTING/RAIN BARRELS
- PERVIOUS PAVERS

SITE PHOTOS

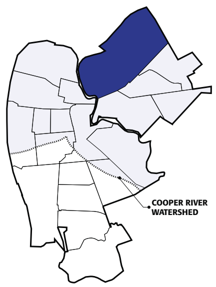
A

B

C

D

CRAMER HILL



POTENTIAL PARTNERSHIP OPPORTUNITIES

1. CCMUA

CHURCH

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

COMMUNITY CENTER

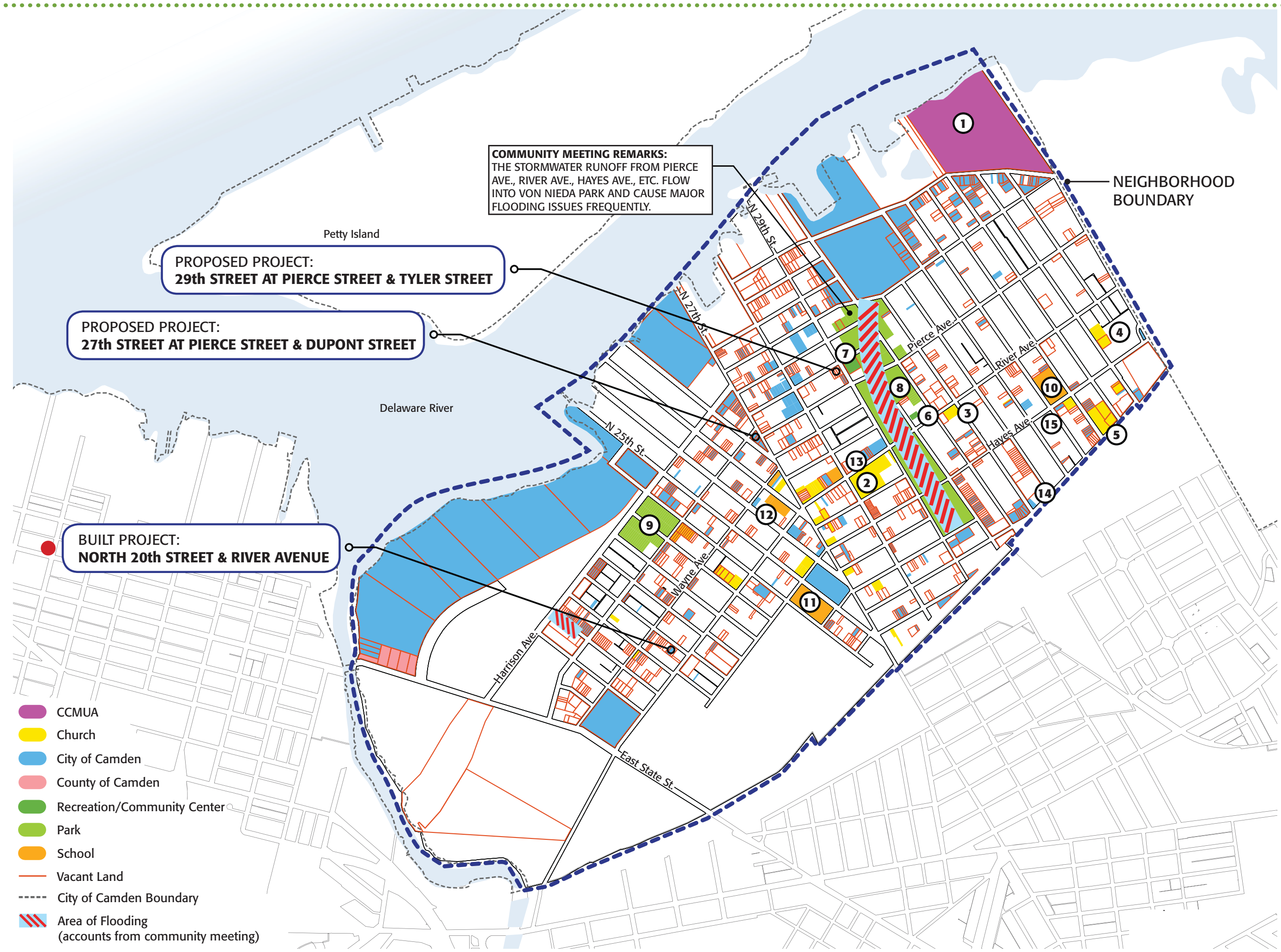
6. Cramer Hill Community Center
7. Cramer Hill Boys Club

PARK

8. Von Nieda 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



CRAMER HILL

29TH STREET BETWEEN PIERCE STREET & TYLER STREET

PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION

This project proposes to direct stormwater into a large rain garden (bioretention swale) located on the vacant ½ acre lot between Pierce Avenue and Tyler Street. The bioretention SWALE should be offset from 29th Street by at least ten feet. Currently, stormwater runoff runs directly down these streets and into Von Nieda Park, which is frequently severely flooded. This proejct would alleviate some of that flooding. A row of street trees planted along 29th Street will work in coordination with the bioswale to improve ground infiltration.

POTENTIAL COMMUNITY PARTNERS

Cramer Hill CDC

GREEN INFRASTRUCTURE STRATEGIES

- bioswale

SITE LOCATION

SITE PHOTOS

CRAMER HILL
NORTH 20TH STREET & RIVER AVENUE
INSTALLED SPRING 2011

PROJECT DESCRIPTION
This community garden retrofit design focuses on redirecting the stormwater from North 20th Street into two rain gardens via curb cuts. Once in the rain gardens, the stormwater runoff flows through piping into an underground water cistern. The proposed cistern (not yet built) will hold water, and if not utilized, the water will slowly percolate into the ground. This BMP design will manage water quality and quantity, provide irrigation for the community garden, improve the air quality, and reduce the urban heat island effect.

COMMUNITY PARTNERS
Cramer Hill CDC

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- rainwater harvesting

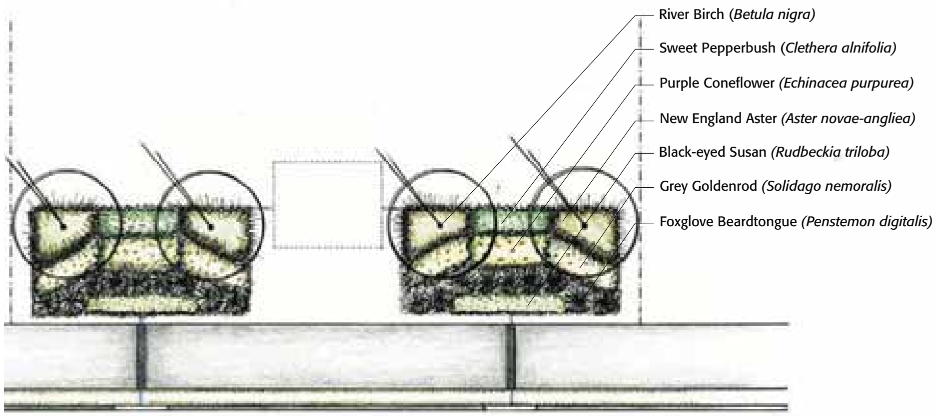
SITE LOCATION

SITE PHOTOS

CRAMER HILL

NORTH 20TH STREET & RIVER AVENUE

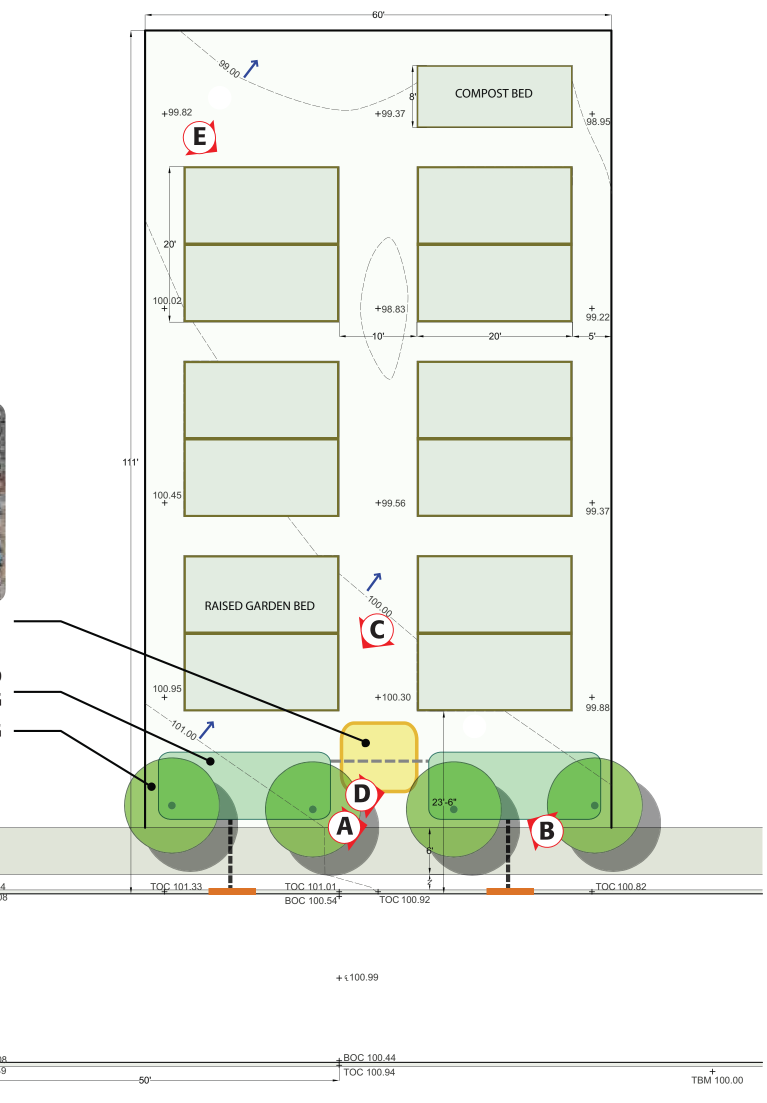
INSTALLED SPRING 2011



PLANTING PLAN

SITE PLAN

SCALE = 1:20



CRAMER HILL
27TH STREET AT PIERCE STREET & DUPONT STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
This project consists of a rain garden and an underground infiltration system for an existing community garden site. The system would capture stormwater near the corner of Pierce Avenue and 27th Street, direct it into the rain garden, and then infiltrate into an underground stormwater detention chamber. A pump within this chamber could potentially provide irrigation water for the community garden. This project would complement the existing NJTF tree and shrub planting located on the site.

COMMUNITY PARTNERS
Cramer Hill CDC

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- rainwater harvesting

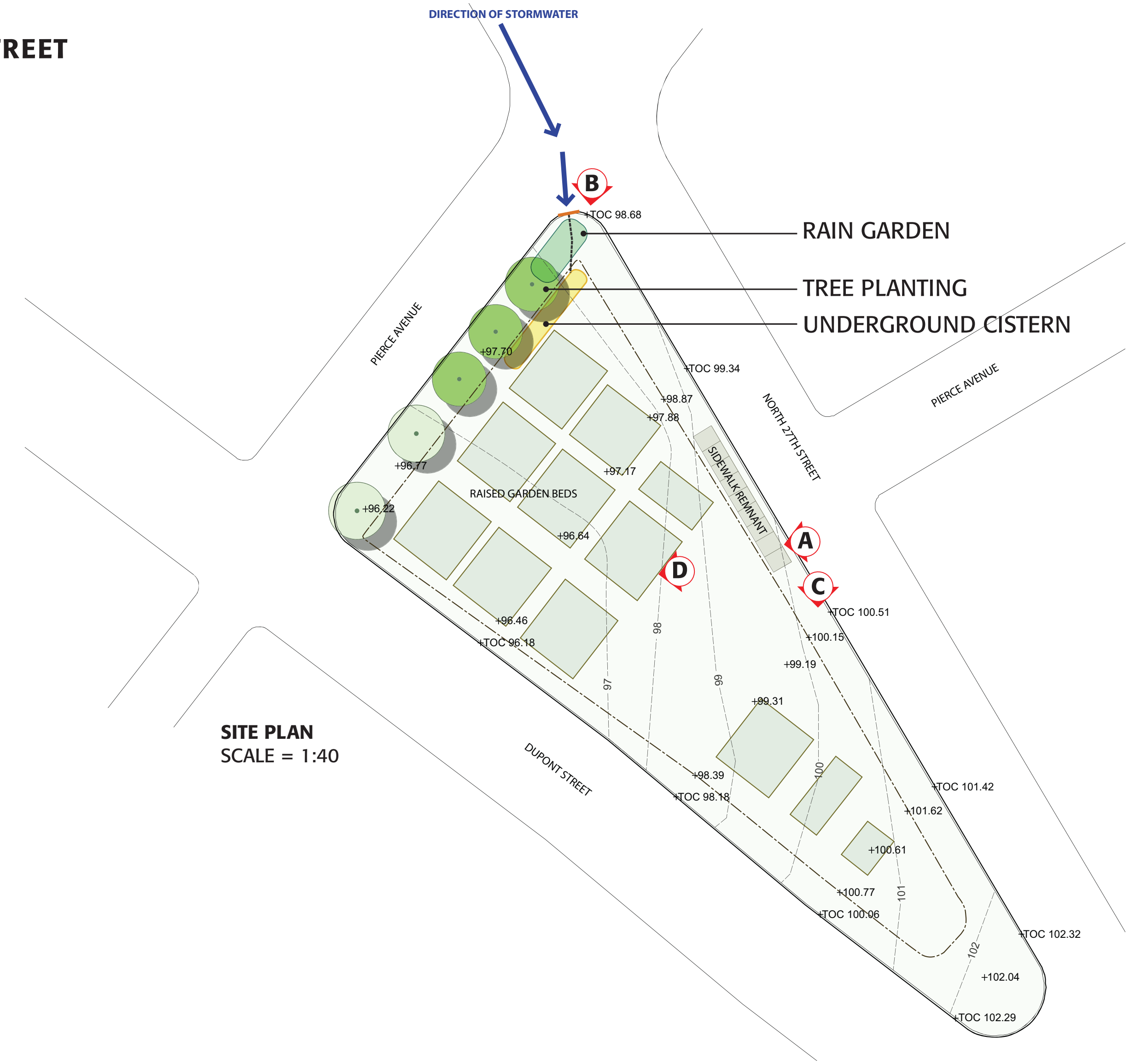
SITE LOCATION

SITE PHOTOS

CRAMER HILL

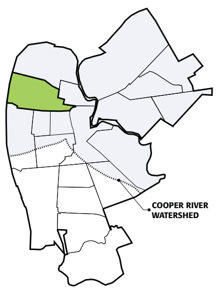
27TH STREET AT PIERCE STREET & DUPONT STREET

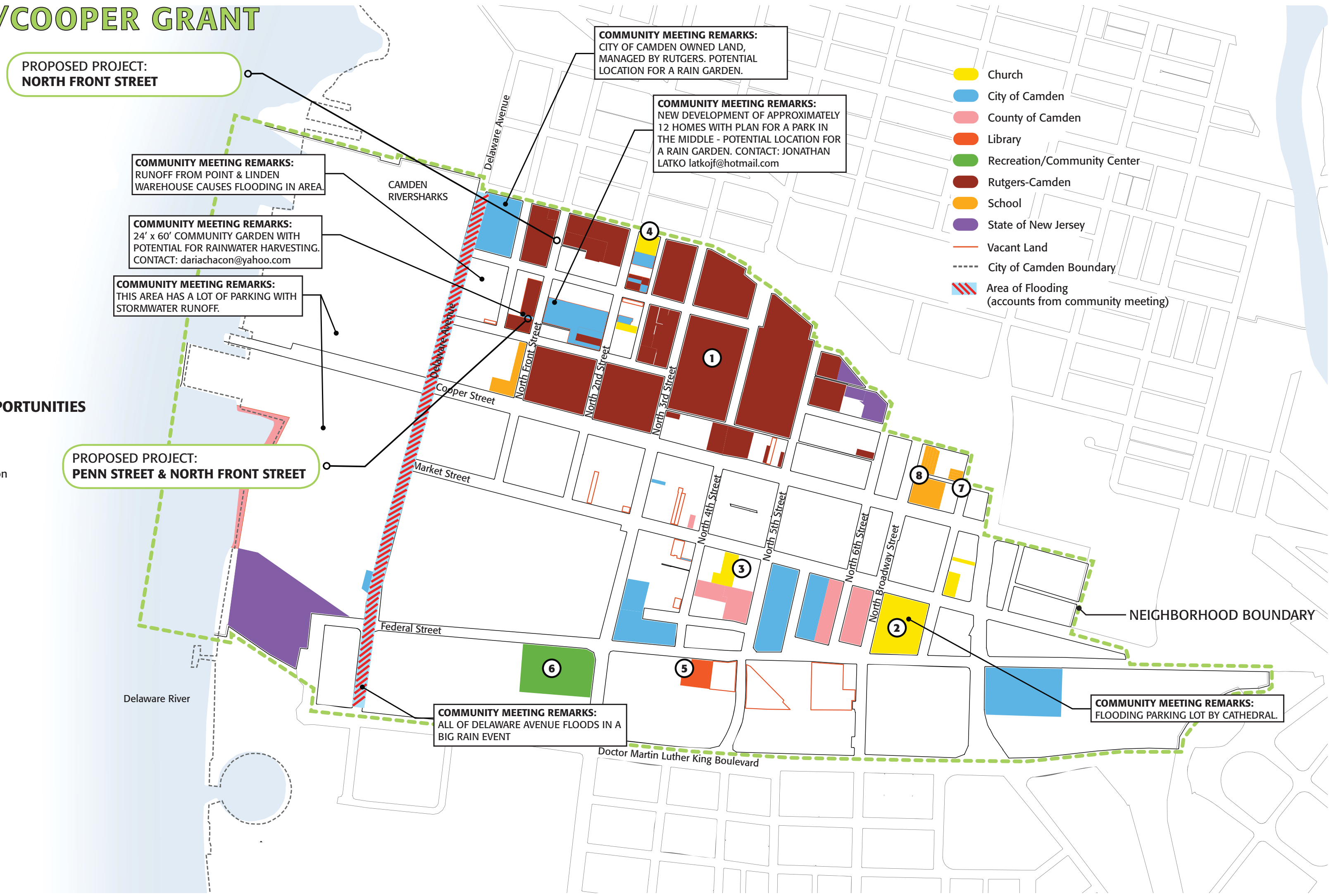
PRIORITY PROJECT SPRING 2012



SITE PLAN
SCALE = 1:40

DOWNTOWN/COOPER GRANT





POTENTIAL PARTNERSHIP OPPORTUNITIES

1. RUTGERS-CAMDEN

CHURCH

2. Cathedral of Immaculate Conception
3. Saint Paul's Episcopal Church
4. Victory Temple Community Church

LIBRARY

5. Camden Free Library

RECREATION/COMMUNITY CENTER

6. YMCA

SCHOOL

7. Leap Academy Charter School
8. Rowan University

DOWNTOWN/COOPER GRANT
NORTH FRONT STREET

PROJECT DESCRIPTION
This project consists of two curb extensions, located on either side of North Front Street. Stormwater runoff will flow into these slightly depressed, vegetated swales and will infiltrate into the ground before it has a chance to enter the existing storm sewer inlet. Not only does a curb extension function as a stormwater management BMP, but it also improves pedestrian safety.

POTENTIAL COMMUNITY PARTNERS
Cooper Grant Neighborhood Association
Rutgers-Camden

GREEN INFRASTRUCTURE STRATEGIES
- curb extensions

CONCEPTUAL SITE PLAN
SCALE = 1:100

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
STORMWATER CURB EXTENSION

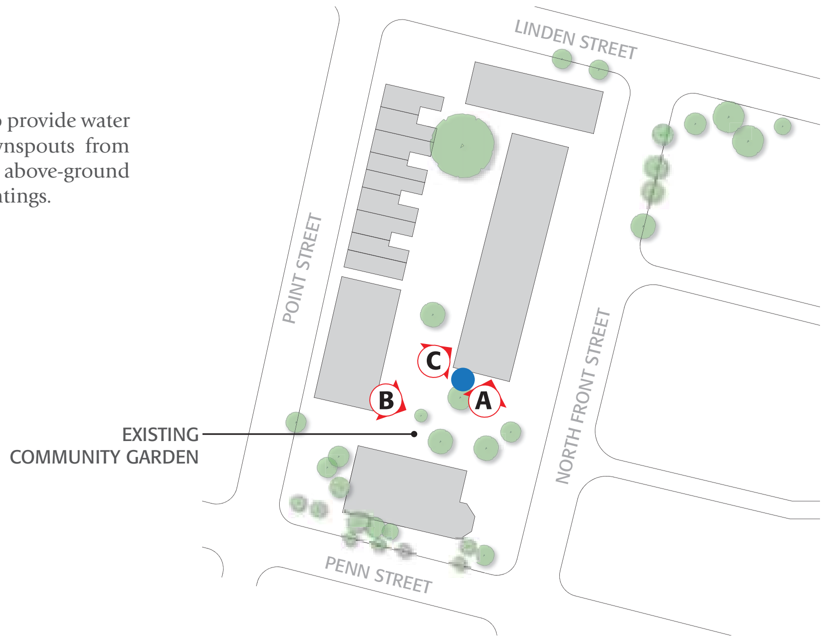
SITE PHOTOS


DOWNTOWN/COOPER GRANT
PENN STREET & NORTH FRONT STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
A 500 gallon rainwater harvesting system is proposed to provide water for the community garden located at this site. Downspouts from adjacent residential buildings will be diverted into an above-ground cistern, providing a free source of water for garden plantings.

POTENTIAL COMMUNITY PARTNERS
Cooper Grant Neighborhood Association
Rutgers-Camden

GREEN INFRASTRUCTURE STRATEGIES
- rainwater harvesting
- downspout disonnection

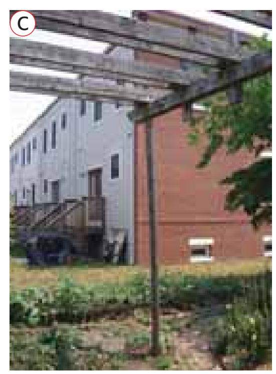


CONCEPTUAL SITE PLAN
SCALE = 1:100

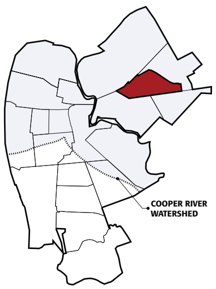
SITE LOCATION

GREEN INFRASTRUCTURE KEY:
● RAINWATER HARVESTING/RAIN BARRELS

SITE PHOTOS



EAST CAMDEN - DUDLEY



POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Calvary Bible Protestant Church
2. Saint Joseph's Catholic Church
3. Saint John's Baptist Church
4. Spanish Pentecostal Church
5. Victory Baptist Church
6. Hosanna AME Church

PARK

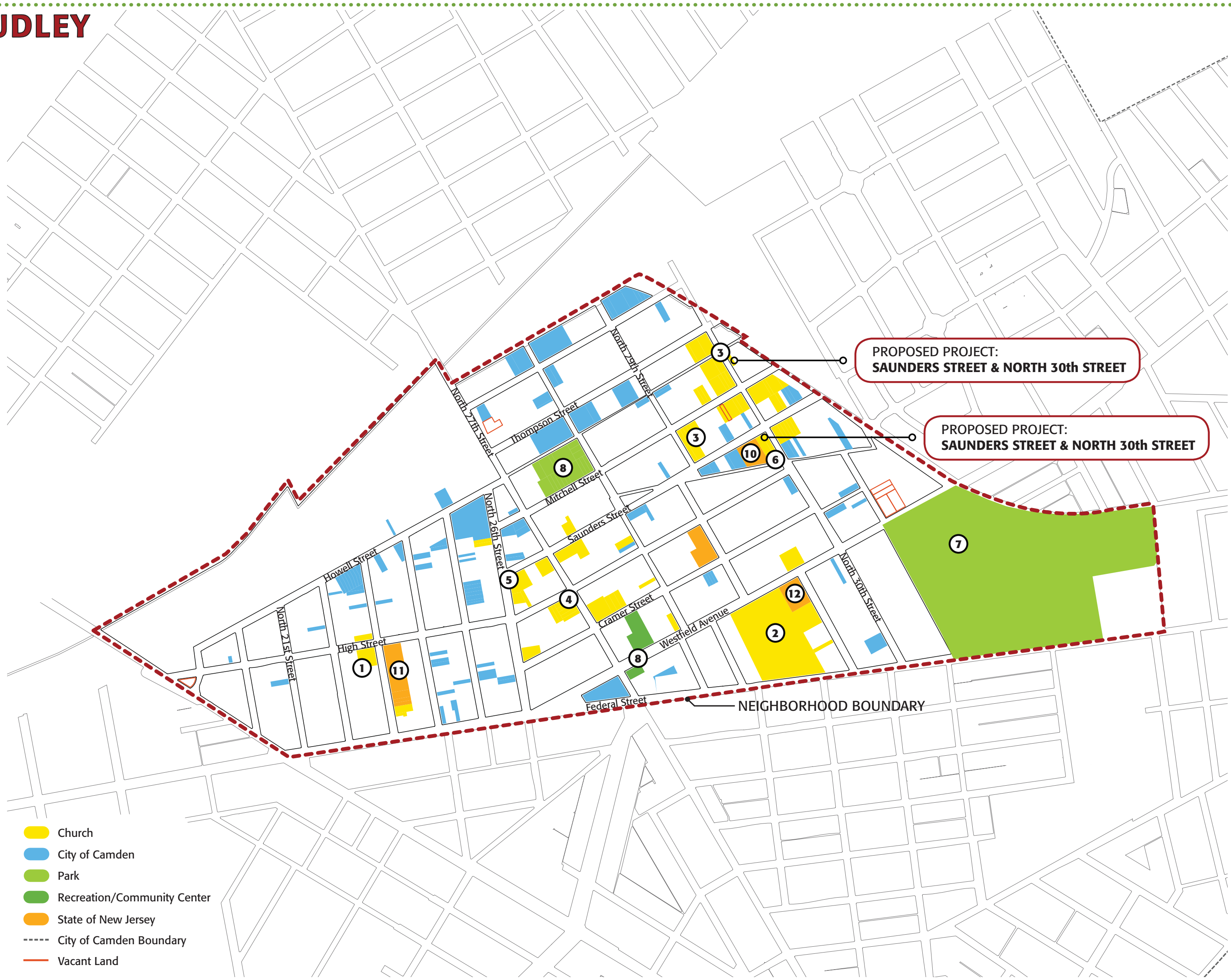
7. Dudley Grange Park
8. Roger Williams Memorial Park

RECREATION/COMMUNITY CENTER

9. Hispanic Family Centers of Southern Jersey

SCHOOL

10. Catto School
11. Dudley School
12. Saint Joseph's Catholic School

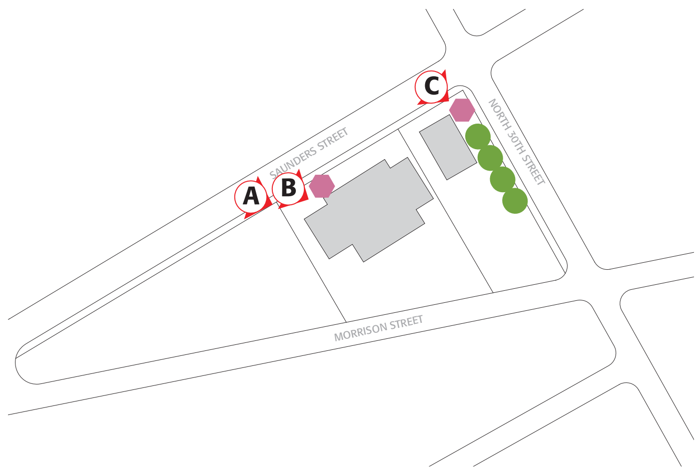


EAST CAMDEN - DUDLEY
SAUNDERS STREET & NORTH 30TH STREET

PROJECT DESCRIPTION
A rain garden and tree planting are proposed at the Catto Elementary School and adjacent Hosanna AME Church. The two properties provide multiple opportunities to disconnect rooftop runoff from flowing directly into the CSO system. Tree plantings along North 30th Street will also improve soil infiltration, provide shade, and improve the neighborhood's aesthetic character.

POTENTIAL COMMUNITY PARTNERS
Catto School
Hosanna AME Church

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- downspout disonnection



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- TREE PLANTINGS

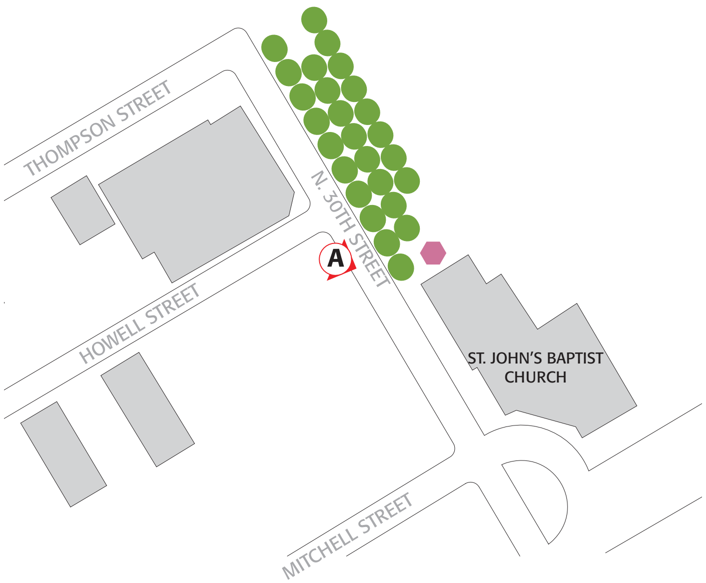
SITE PHOTOS

EAST CAMDEN - DUDLEY
THOMPSON STREET AT NORTH 30TH STREET

PROJECT DESCRIPTION
A rain garden and tree plantings are proposed at the site of St. John's Baptist Church. Along with the environmental benefits of increased infiltration, reduced soil erosion, and reducing nutrient loads in stormwater runoff, planting a dense group of trees in this location will block the community's view of the adjacent industrial area.

POTENTIAL COMMUNITY PARTNERS
St. John's Baptist Church

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- downspout disconnection



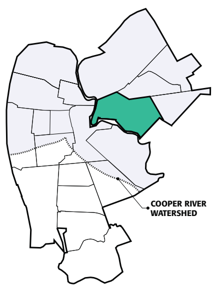
CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- TREE PLANTINGS

SITE PHOTOS

EAST CAMDEN - MARLTON



POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

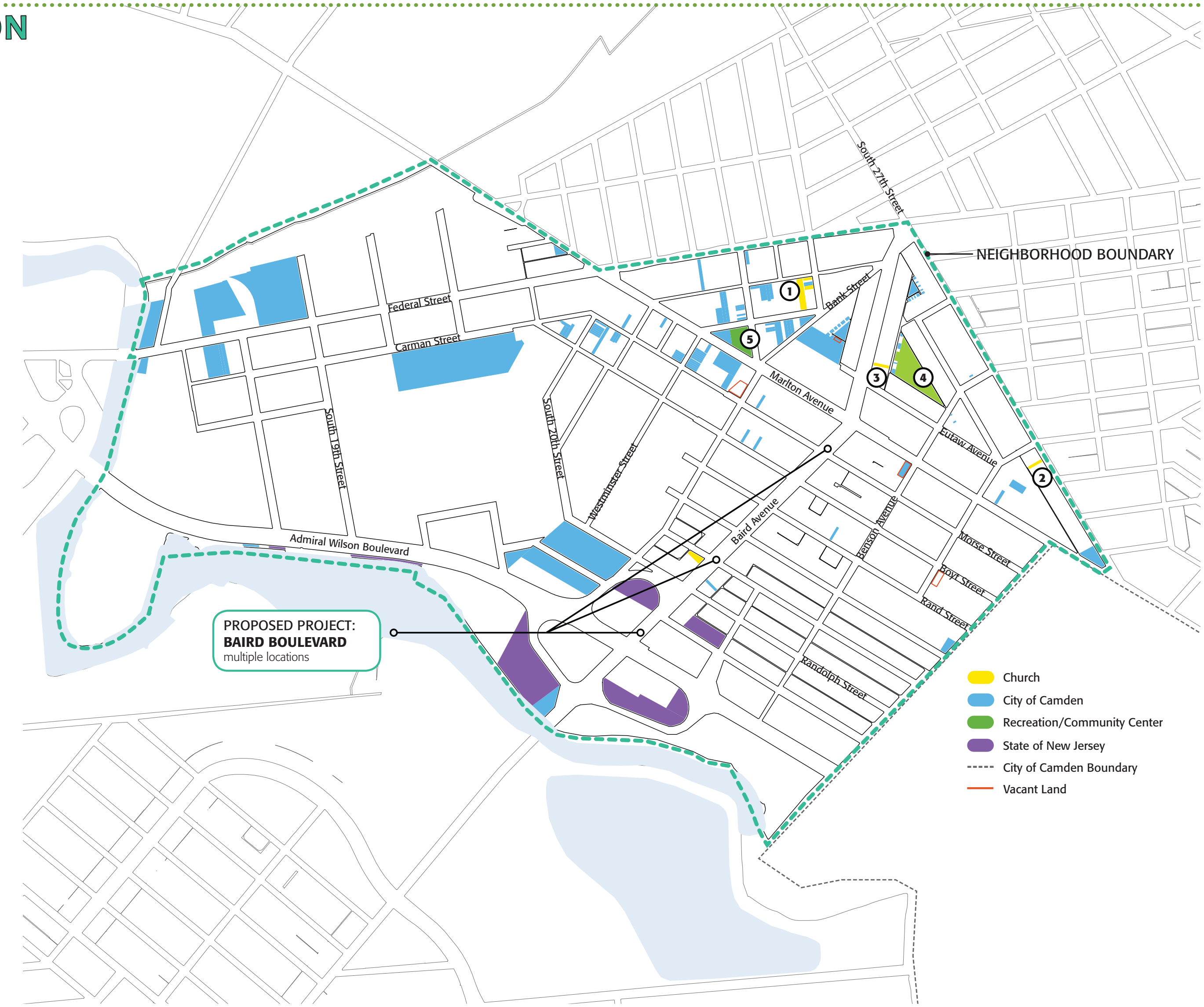
1. Federation of Pentecostal Churches
2. Holy Temple Church
3. Scott Methodist Church

PARK

4. Mickel/Eutaw Park

RECREATION/COMMUNITY CENTER

5. Iglesia Pentecostal Recreation Center



EAST CAMDEN - MARLTON

BAIRD BOULEVARD

PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION

There appears to be multiple opportunities for rain gardens, bioretention swales, and tree plantings in various locations along the vacant median of Baird Boulevard. Necessary efforts include excavating the existing soils, amending soils to promote infiltration, installing curb cuts, and planting low maintenance, native plants. Not only will these functioning systems reduce localized flooding, but they will also improve the aesthetic quality of this busy boulevard and minimize required landscape maintenance of the road right-of-way.

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- tree plantings

CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:

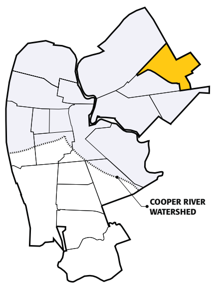
- RAIN GARDEN
- TREE PLANTINGS

SITE PHOTOS

A

B

EAST CAMDEN - ROSEDALE



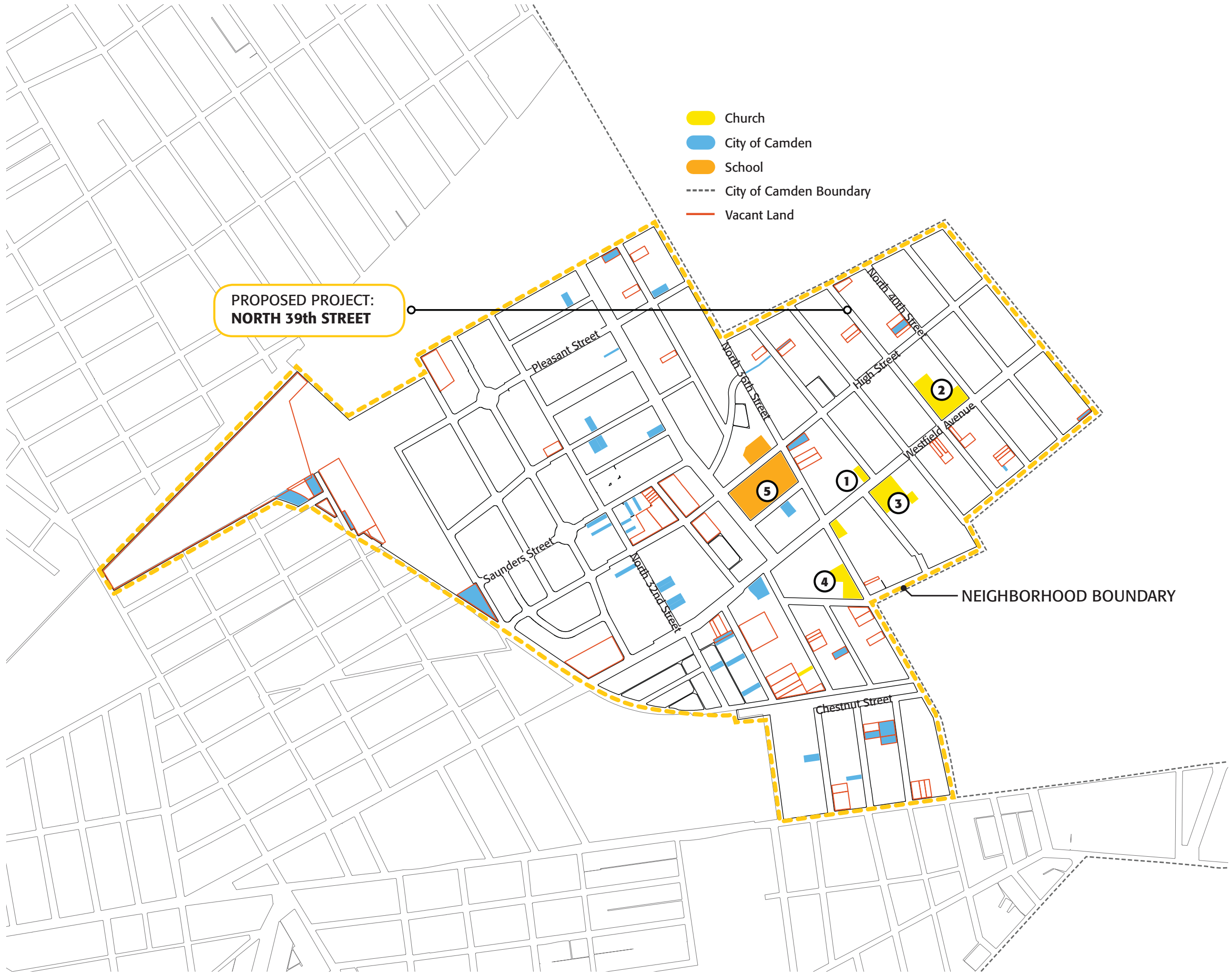
POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Congregation of Yahweh
2. Bethel United Methodist Church
3. Rosedale Baptist Church
4. Temple of Love Christian Center

SCHOOL

5. Davis Elementary School



EAST CAMDEN - ROSEDALE

NORTH 39TH STREET

(various locations throughout the neighborhood)

PROJECT DESCRIPTION

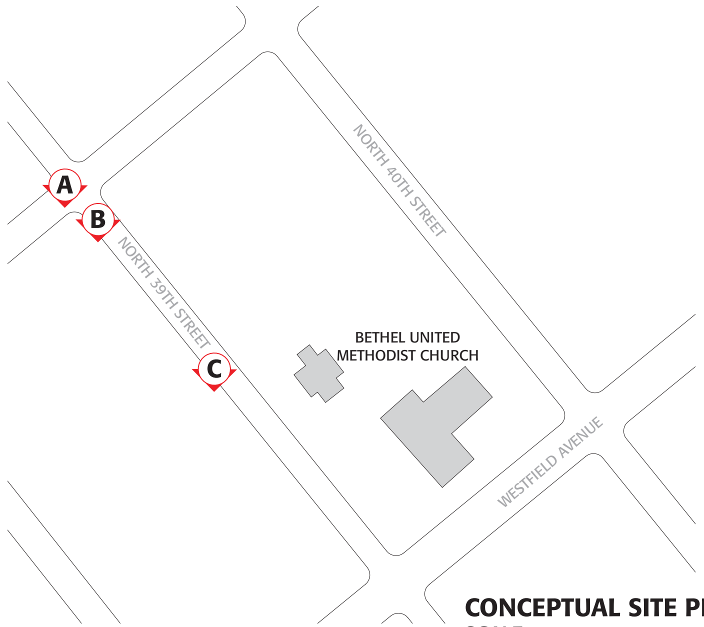
Site visits to this neighborhood revealed that many small garden plots existed, particularly in the residential area around North 39th Street. This project addresses the need to water these gardens. A neighborhood-wide rain barrel and water conservation program will engage local gardeners and community organizations. Through a neighborhood flier campaign, residents will be invited to participate in a water conservation education program and *Build-a-Rain Barrel* workshop, which could be run in partnership with The CfET.

POTENTIAL COMMUNITY PARTNERS

Bethel United Methodist Church
The CfET

GREEN INFRASTRUCTURE STRATEGIES

- rainwater harvesting
- downspout disconnection
- water conservation education program



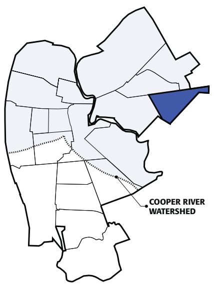
CONCEPTUAL SITE PLAN

SCALE = 1:150

Example of a residential rainwater harvesting system

SITE PHOTOS

EAST CAMDEN - STOCKTON



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

EAST CAMDEN - STOCKTON
FREEMONT AVENUE & BURWOOD AVENUE

PROJECT DESCRIPTION

This project consists of installing a rain garden at the East Camden Middle School. Working with students and staff, a demonstration rain garden will be designed and installed to capture, filter, and infiltrate parking lot runoff. An existing curb cut can be used as the inlet for the rain garden, which will capture and store parking lot runoff. Native herbaceous species planted within this rain garden should be adapted to shade conditions. This project could include a water conservation education program with the school.

POTENTIAL COMMUNITY PARTNERS

Woodrow Wilson High School (3100 Federal Street)
East Camden Middle School (3064 Stevens Street)

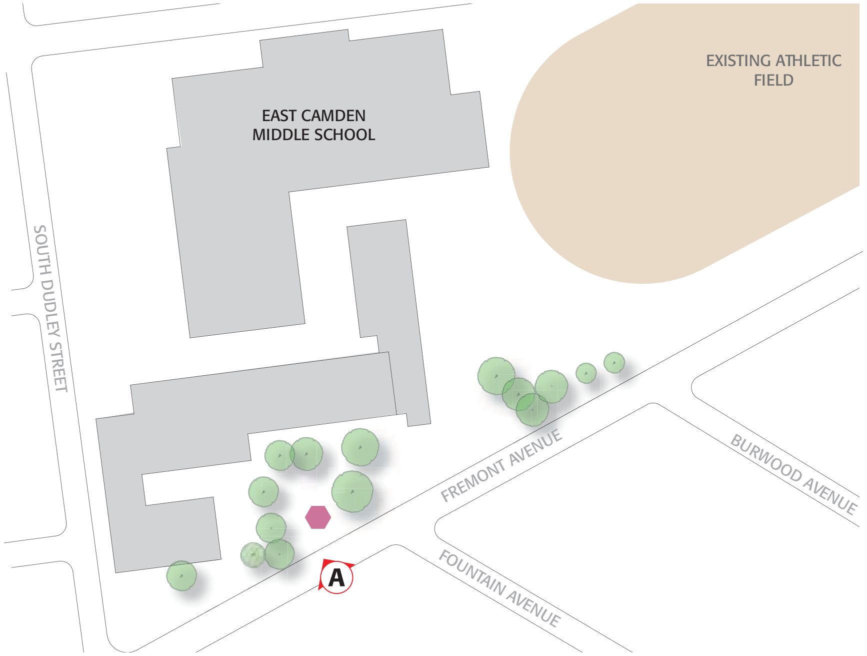
GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- water conservation education program

SITE LOCATION

GREEN INFRASTRUCTURE KEY:

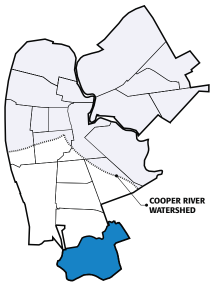
RAIN GARDEN



CONCEPTUAL SITE PLAN
SCALE = 1:150

SITE PHOTOS

FAIRVIEW



POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Fairview Community Baptist Church
2. Saint Joan of Arc Church
3. Fairview Village Methodist Church

LIBRARY

4. Fairview Branch Library

PARK

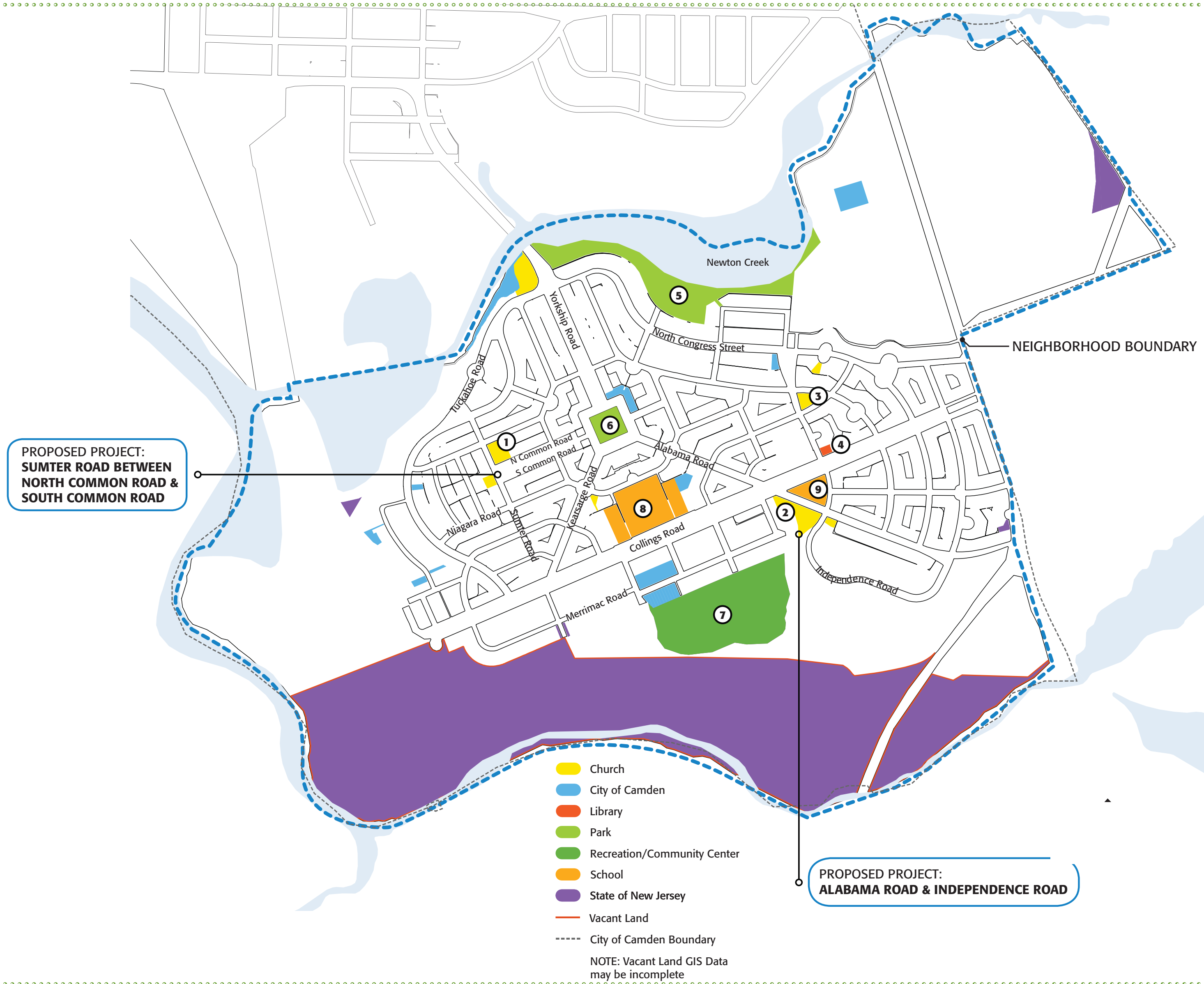
5. Camden County Park
6. Yorkship Square

RECREATION/COMMUNITY CENTER

7. Union Field

SCHOOL

8. Yorkship Elementary School
9. Freedom Academy Charter School



FAIRVIEW
SUMTER ROAD & NORTH COMMON ROAD

PROJECT DESCRIPTION
This project includes rain gardens and tree plantings. At the Fairview Community Baptist Church, downspouts will be disconnected and directed to discharge rooftop runoff into a rain garden. In the common green, rain gardens will be designed and constructed to divert roadway runoff before it flows into the storm sewer drain. These rain gardens and accompanying tree plantings will improve stormwater management effectiveness and provide aesthetic interest for this historic neighborhood.

POTENTIAL COMMUNITY PARTNERS
Fairview Community Baptist Church

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings

CONCEPTUAL SITE PLAN
SCALE = 1:80

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
RAIN GARDEN
TREE PLANTINGS

SITE PHOTOS


A


B


C

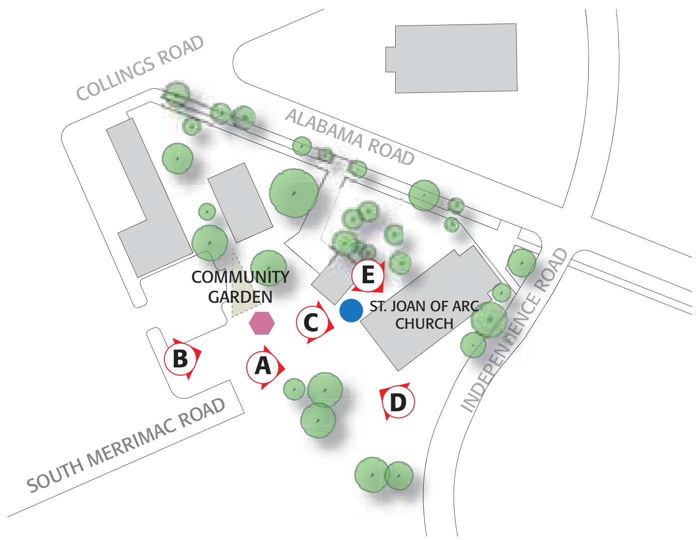

D

FAIRVIEW
ALABAMA ROAD & INDEPENDENCE ROAD

PROJECT DESCRIPTION
A rainwater harvesting system and rain garden are proposed for this community garden site. Rooftop runoff from the adjacent St. Joan of Arc Church will be directed into a 1,000-1,500 gallon above-ground cistern to provide water for the community garden. A rain garden, positioned next to the community garden, will capture the stormwater runoff flowing to the site from South Merrimac Road.

POTENTIAL COMMUNITY PARTNERS
St. Joan of Arc Church

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- RAINWATER HARVESTING/RAIN BARRELS

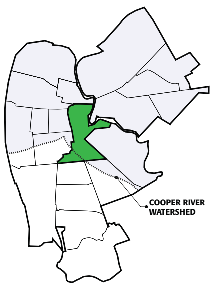
SITE PHOTOS
A

B

C

D


GATEWAY



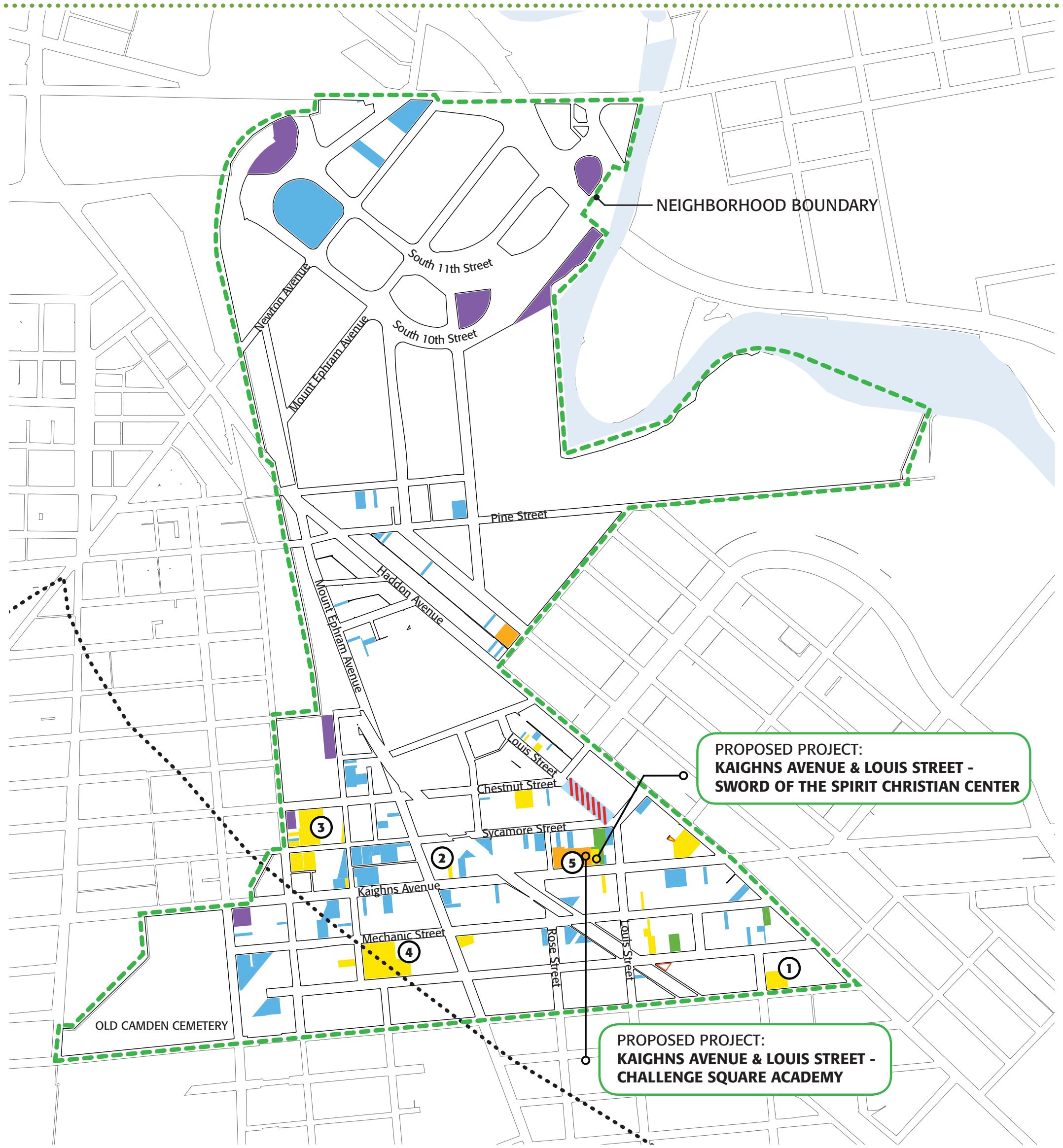
POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Christian Pentecostal Church
2. Refuge Church of Christ
3. Rock of Ages Holy Church
4. Saint Joseph's Church

SCHOOL

5. Challenge Square Academy



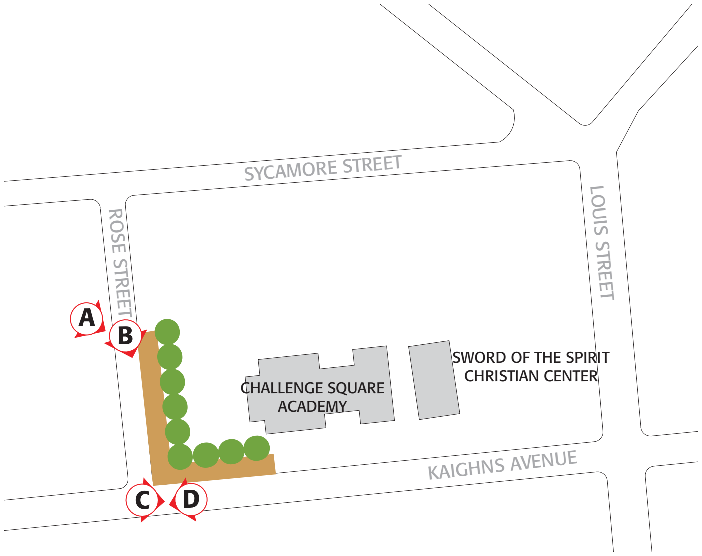
- Church
- City of Camden
- Recreation/Community Center
- School
- State of New Jersey
- Cooper River Watershed Boundary
- Vacant Land
- Area of Flooding (accounts from community meeting)

GATEWAY
KAIGHNS AVENUE & LOUIS STREET - CHALLENGE SQUARE ACADEMY

PROJECT DESCRIPTION
This project proposes to reduce the impervious surfaces and stormwater runoff volume from the large paved playground and site area surrounding the Challenge Square Academy. Currently, over 12,000 square feet of the site is paved with concrete. Green infrastructure opportunities include replacing impervious concrete areas with pervious paving materials and infiltration systems. In addition, tree plantings with tree filter boxes will increase canopy cover, reduce urban heat island effect, manage stormwater runoff, improve the appearance of Challenge Square Academy, and provide shade for the school's basketball court.

POTENTIAL COMMUNITY PARTNERS
Challenge Square Academy Playground

GREEN INFRASTRUCTURE STRATEGIES
- tree plantings
- pervious pavers



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- TREE PLANTINGS
- PERVIOUS PAVERS

SITE PHOTOS

A


B


C


D


GATEWAY
KAIGHNS AVENUE & LOUIS STREET - SWORD OF THE SPIRIT CHRISTIAN CENTER

PROJECT DESCRIPTION

This project consists of the installation of a rain garden, located at the rear of the building and adjacent to the site's parking lot, to disconnect the rooftop runoff from the CSO system. A rain garden consisting entirely of native shrub species would be most appropriate for this location.

POTENTIAL COMMUNITY PARTNERS

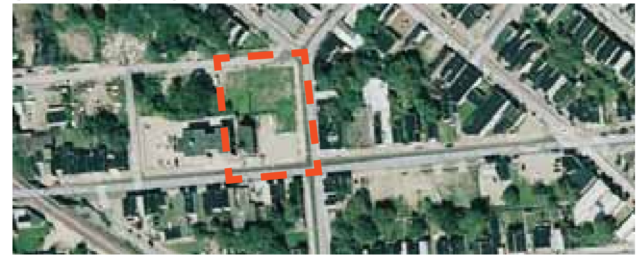
Sword of the Spirit Christian Center

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- downspout disconnection

CONCEPTUAL SITE PLAN
SCALE = 1:120

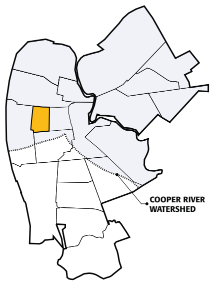
SITE LOCATION



GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS

LANNING SQUARE



COMMUNITY MEETING REMARKS:
BESIDES A FEW CLOGGED STORM SEWER DRAINS, LANNING SQUARE DOES NOT HAVE SERIOUS FLOODING PROBLEMS. INSTEAD, THERE IS A NEED RAINWATER HARVESTING SYSTEMS FOR COMMUNITY GARDENS.
CONTACT: MARY RODRIGUEZ, RESIDENT

POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Broadway United Methodist Church
2. Church of the Living God
3. Emanuel United Pentecostal Church
4. New Mickle Baptist Church
5. Saint John's Episcopal Church

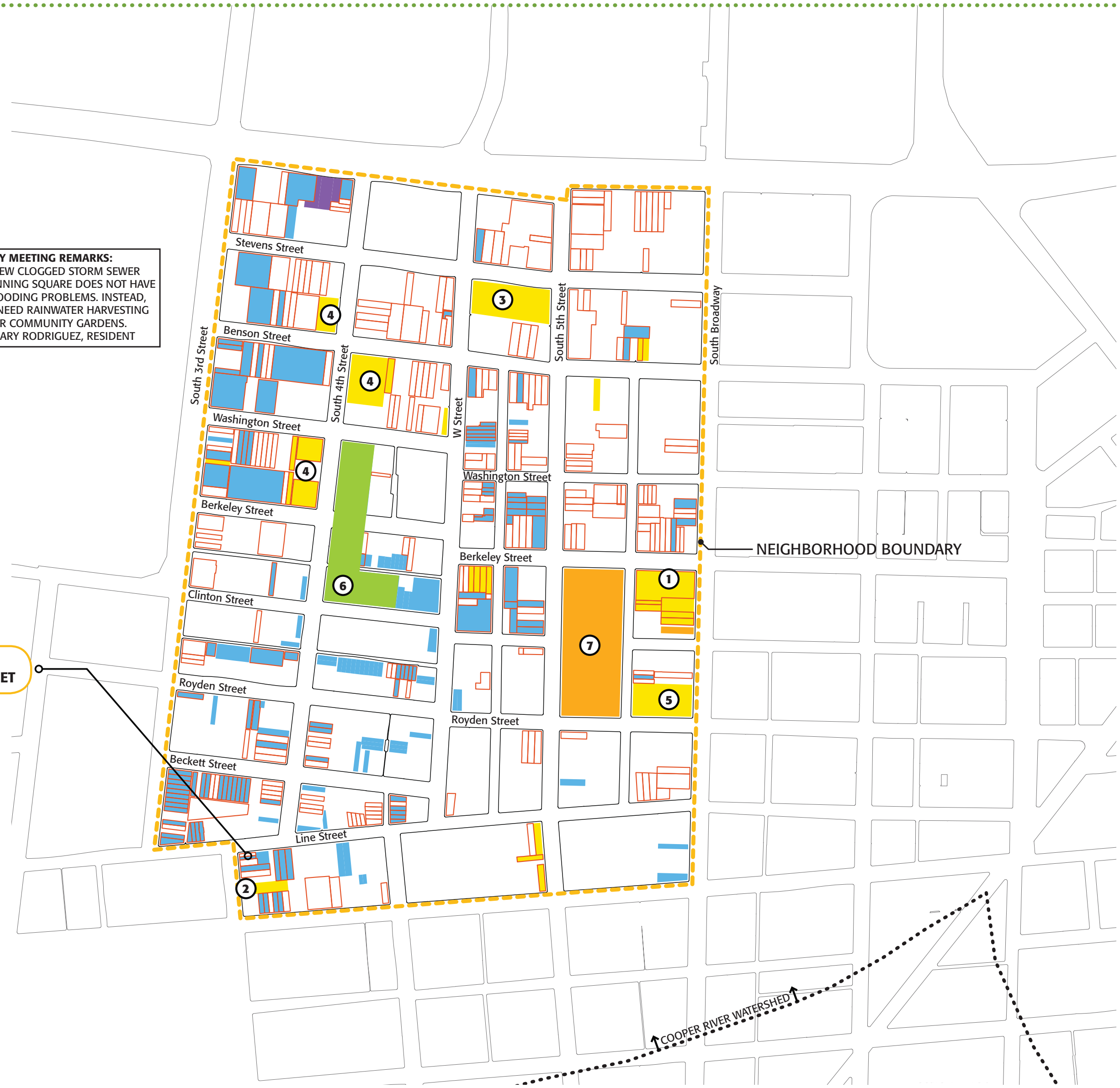
PARK

6. 4th & Washington Park

SCHOOL

8. Lanning Square Elementary School

PROPOSED PROJECT:
SOUTH 3rd STREET & LINE STREET



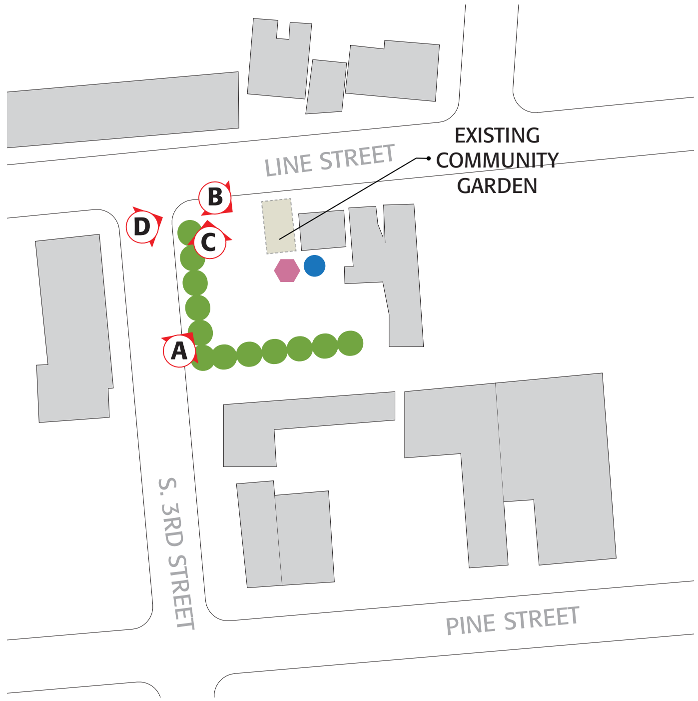
- Church
- City of Camden
- Park
- School
- State of New Jersey
- Vacant Land
- Cooper River Watershed Boundary

LANNING SQUARE
SOUTH 3RD STREET & LINE STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
Responses from this community have indicated that rainwater harvesting for their community gardens would be the most beneficial stormwater BMP. To create a substantial source of water for the community garden, rooftop runoff from an adjacent residential building will be directed into a 1,000 gallon above-ground cistern. Tree and shrub plantings along South 3rd Street and Line Street will capture, filter, and infiltrate stormwater runoff from the vacant lot and will also beautify the neighborhood.

POTENTIAL COMMUNITY PARTNERS
Mary Rodriguez (resident)

GREEN INFRASTRUCTURE STRATEGIES
- rainwater harvesting
- tree plantings
- downspout disconnection



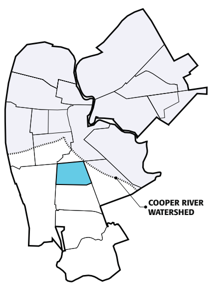
CONCEPTUAL SITE PLAN
SCALE = 1:80

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- RAINWATER HARVESTING/RAIN BARRELS
- TREE PLANTINGS

SITE PHOTOS

LIBERTY PARK



POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. First Nazarene Baptist Church
2. Community Baptist Church
3. Saint Joseph's Catholic Church

PARK

4. Judge Robert Johnson Park (The Pink Elephant Park)
5. Warsaw & Thurman Park

SCHOOL

6. Bonsall Annex School
7. Bonsall Elementary School
8. Due Season Charter School
9. Sumner Elementary School

BUILT PROJECTS (2):
JACKSON STREET & NORTH 8th STREET

LIBERTY PARK

JACKSON STREET & NORTH 8TH STREET

INSTALLED SPRING 2010

PROJECT DESCRIPTION

This demonstration rain garden, the first to be built in Camden, was installed at the Sumner Elementary School in spring 2010. The project disconnects rooftop runoff from directly discharging into the CSO system and serves as an outdoor learning environment for students and teachers.

COMMUNITY PARTNERS

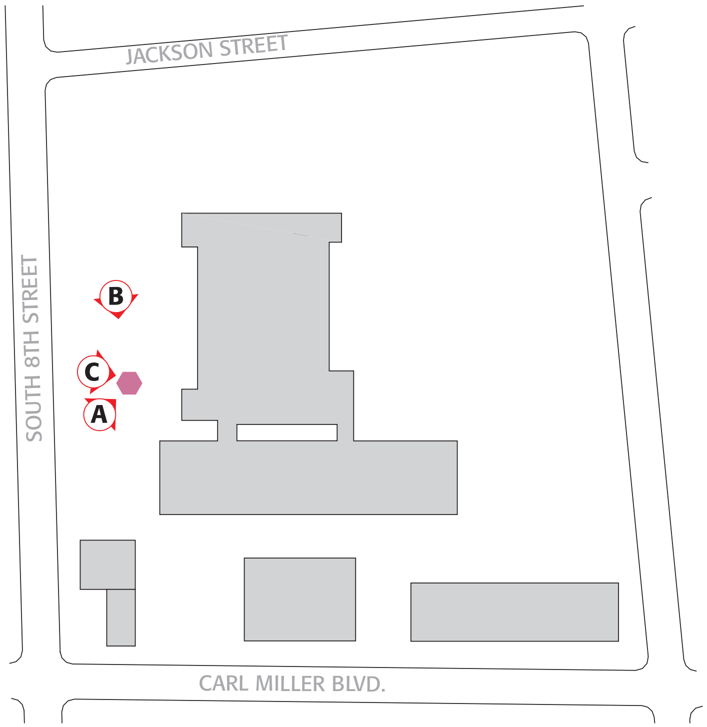
Sumner Elementary School

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- downspout disconnection
- water conservation education program

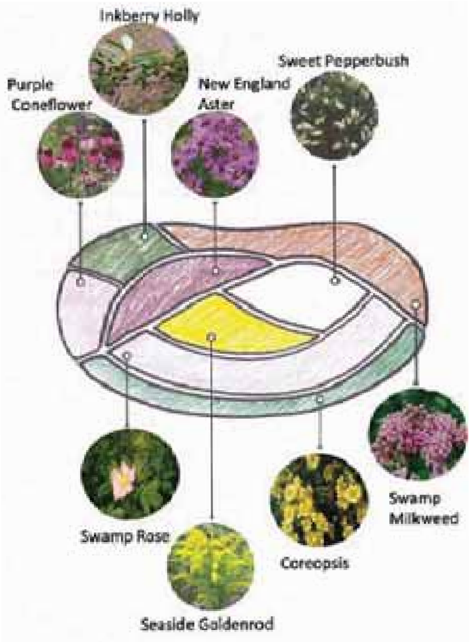
GREEN INFRASTRUCTURE KEY:

RAIN GARDEN



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION



PLANTING PLAN
(for both Sumner Elementary School rain gardens)

SITE PHOTOS

LIBERTY PARK
JACKSON STREET & NORTH 8TH STREET
INSTALLED SPRING 2011

PROJECT DESCRIPTION

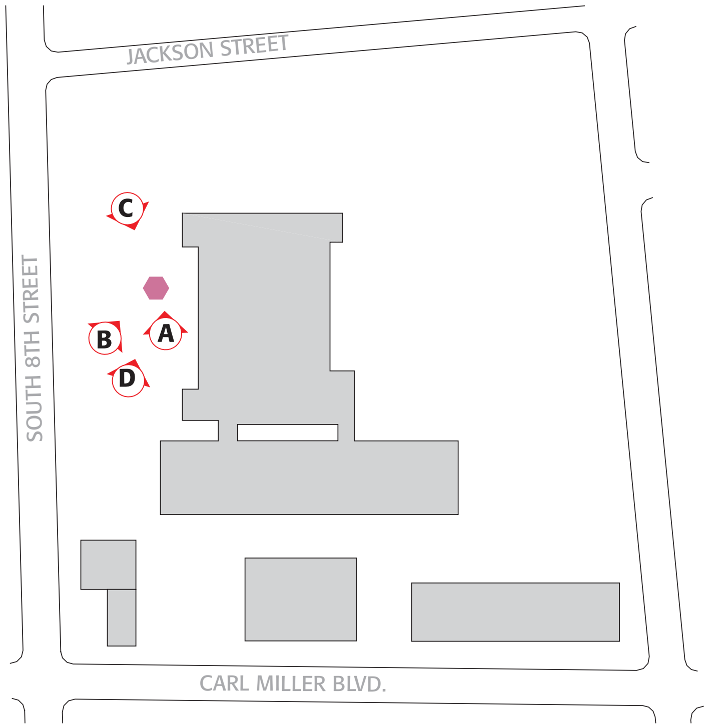
This project was the second rain garden installed at the Sumner Elementary School. In conjunction with the Stormwater Management in Your Schoolyard educational program, fourth grade students helped to install this rain garden. This rain garden contains the same plant species as the first rain garden.

COMMUNITY PARTNERS

Sumner Elementary School

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- downspout disconnection
- water conservation education program



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS

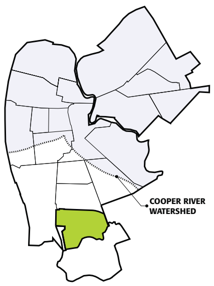
A

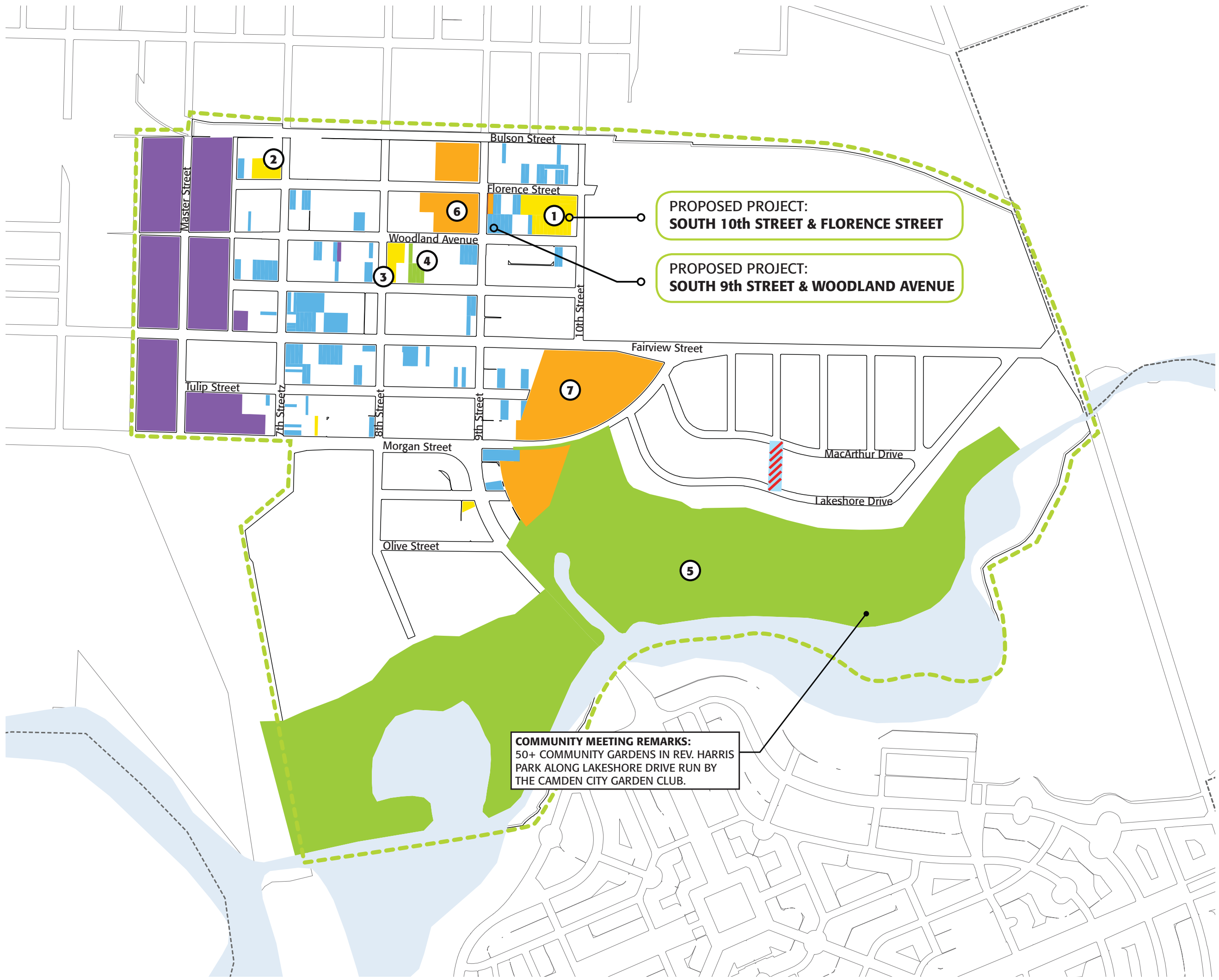

B


C


D


MORGAN VILLAGE





POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. Harris Temple Zion Church
2. Saint Matthews Church
3. Woodland Avenue Presbyterian Church

PARK

4. 8th & Woodland Park
5. Reverend Harris Park

SCHOOL

6. HB Wilson School
7. Project SEED

Church
City of Camden
Park
School
State of New Jersey
City of Camden Boundary
Area of Flooding
(accounts from community meeting)

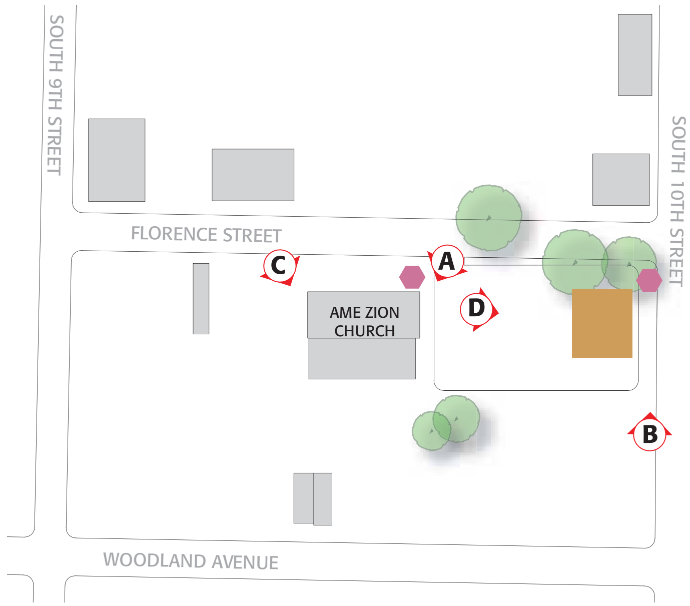
NOTE: Vacant Land GIS Data
may be incomplete

MORGAN VILLAGE
SOUTH 10TH STREET & FLORENCE STREET

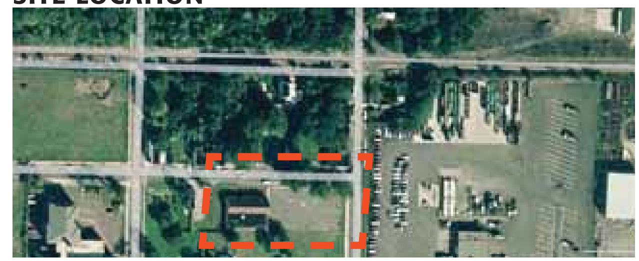
PROJECT DESCRIPTION
This project consists of several green infrastructure strategies for the Harris Temple AME Zion Church property. Rooftop runoff will be directed into a rain garden located at the front entrance way of the church. In addition, the deteriorating parking area will be replaced with pervious paving. A large rain garden, or bioretention swale, will be built next to the pervious paving, along South 10th Street. This will capture additional stormwater runoff before it leaves the site and enters the storm sewer system.

POTENTIAL COMMUNITY PARTNERS
Harris Temple AME Zion Church

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- pervious pavers
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- PERVIOUS PAVERS

SITE PHOTOS


MORGAN VILLAGE

SOUTH 9TH STREET & WOODLAND AVENUE

PROJECT DESCRIPTION

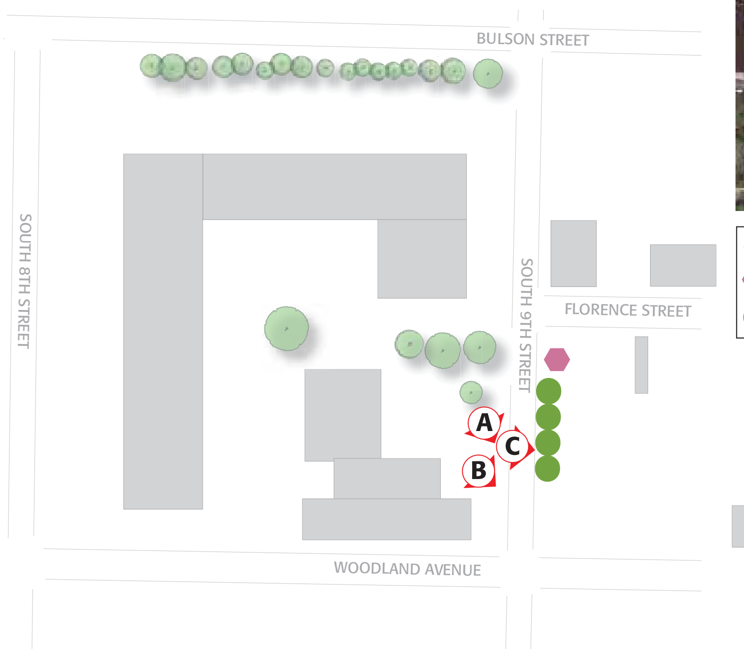
A rain garden and tree plantings are proposed on vacant land owned by the City of Camden. The rain garden, with curb cuts to direct the stormwater runoff into the rain garden, will capture runoff from South 9th Street. Depending upon the interest of the local community, the site could include an area for community garden plots. In addition, this project could collaborate with the nearby H. B. Wilson Elementary school for an environmental education program.

POTENTIAL COMMUNITY PARTNERS

Henry Braid Wilson Elementary School

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- tree plantings



CONCEPTUAL SITE PLAN
SCALE = 1:150

SITE LOCATION

GREEN INFRASTRUCTURE KEY:

- RAIN GARDEN
- TREE PLANTINGS

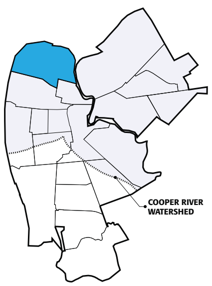
SITE PHOTOS

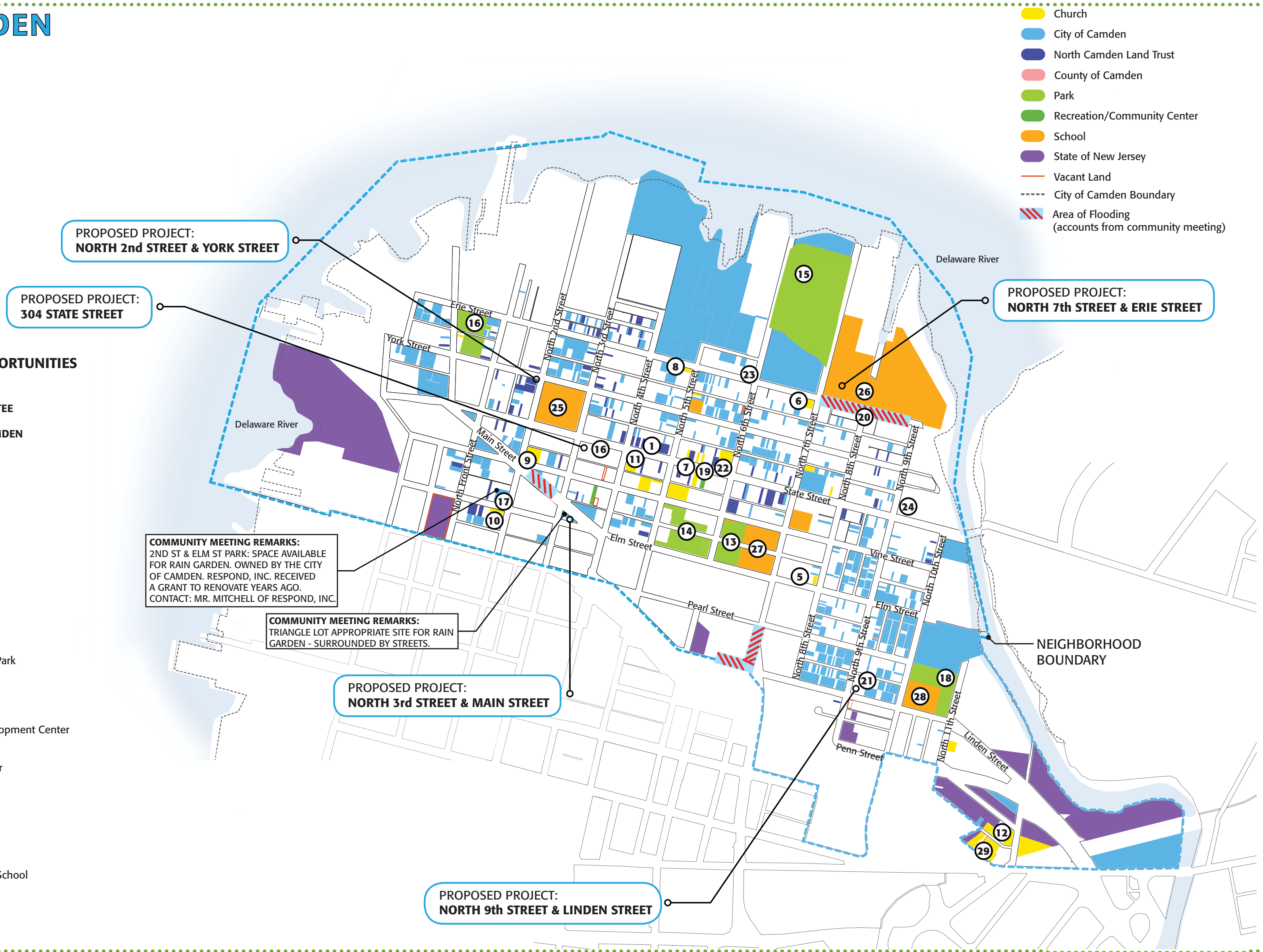
A

B

C

NORTH CAMDEN





POTENTIAL PARTNERSHIP OPPORTUNITIES

RESPOND, INC. (See locations below)

1. SAVE OUR WATERFRONT
2. NORTH CAMDEN GREENING COMMITTEE
3. C.O.L.T.
4. CONCERNED CITIZENS OF NORTH CAMDEN

CHURCH

5. Apostolic Christian Church of God
6. Holy Church of Mount Carmel
7. Holy Name Roman Catholic Church
8. Iglesia Pentecostal Ungida de Dios
9. Mount Zion Baptist Church
10. St. Paul's Episcopal Church
11. Grace Lutheran Church
12. Mount Calvary Baptist Church

PARK

13. Northeast School Park
14. Northgate II Park
15. Pine Poynt Park
16. Second & Erie - Compensation
17. Camden Towne Civic Association Park
18. Cornelius Martin Park

RECREATION/COMMUNITY CENTER

19. Respond, Inc. - Main Office
20. Respond, Inc. - New Worker Development Center
21. Respond, Inc. - Senior Center
22. HopeWorks N Camden
23. City of Camden Community Center
24. Camden Lutheran Housing

SCHOOL

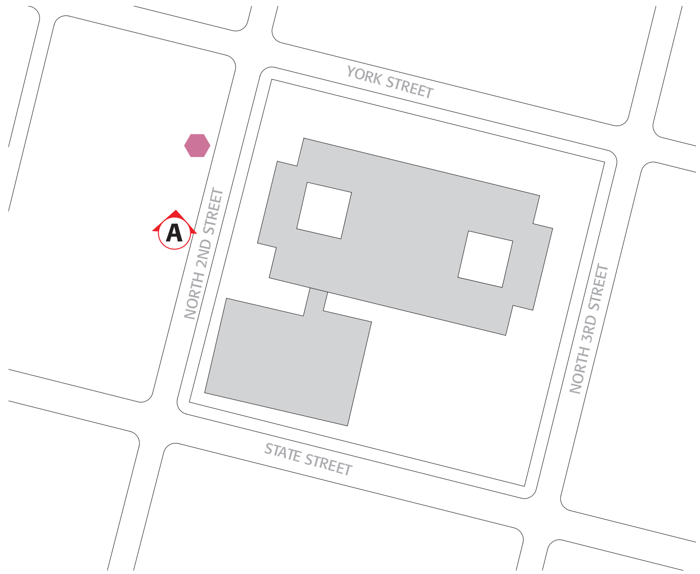
25. Cooper's Poynt School
26. Pine Poynt School
27. Rafael Cordero Molina School
28. Powell Elementary School
29. Environment Community Charter School

NORTH CAMDEN
NORTH 2ND STREET & YORK STREET

PROJECT DESCRIPTION
A demonstration rain garden is proposed for a vacant lot adjacent to Cooper's Poynt School. Two curb cuts along North 2nd Street will direct stormwater into the rain garden. The herbaceous species planted within the rain garden will complement the relatively young tree plantings existing on site. Partnering with staff and students at the school, the rain garden will be constructed to serve as a learning opportunity and outdoor classroom.

POTENTIAL COMMUNITY PARTNERS
Cooper's Poynt School
Respond, Inc.

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- water conservation education program



CONCEPTUAL SITE PLAN
SCALE = 1:150

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

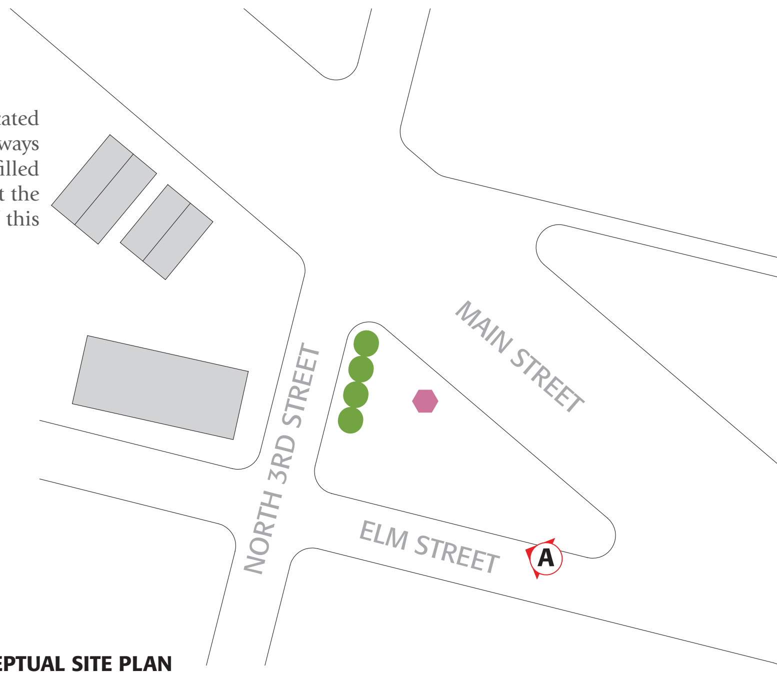
SITE PHOTOS


NORTH CAMDEN
NORTH 3RD STREET & MAIN STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
This project will irrigate the existing plants, planted by NJTF, located on this triangular vacant lot. Runoff from surrounding roadways will be directed into the rain garden through several gravel filled infiltration trenches. Along with infiltrating stormwater runoff at the source, this rain garden will also enhance the visual appeal of this neighborhood.

POTENTIAL COMMUNITY PARTNERS
Respond, Inc.

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings



CONCEPTUAL SITE PLAN
SCALE = 1:80

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- TREE PLANTINGS

SITE PHOTOS

A

NORTH CAMDEN

NORTH 7TH STREET & ERIE STREET

PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION

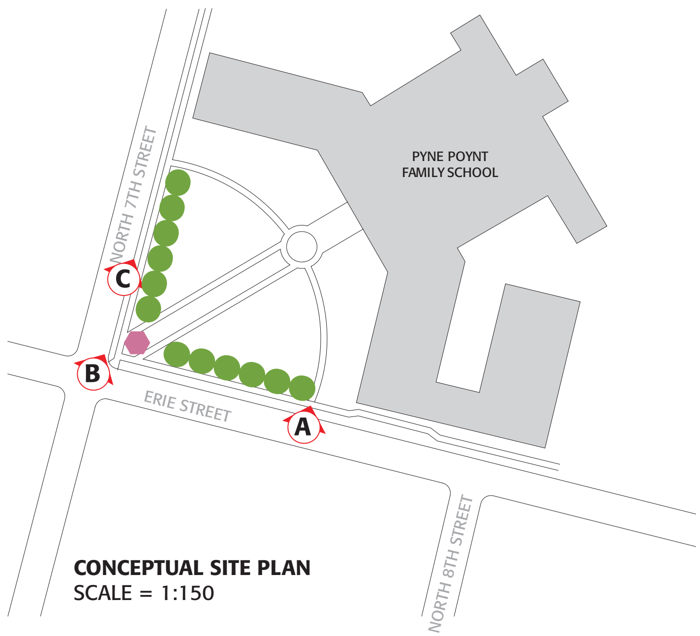
Street tree plantings and tree filter boxes are proposed to intercept stormwater runoff from roadways and to increase canopy cover in the North Camden neighborhood. In addition, a demonstration rain garden is proposed in partnership with the Pyne Poynt Family School to serve as a learning opportunity for staff and students. These efforts will reduce pressure on the CSO system, mitigate urban heat island effect during summer months, and enhance the appearance of the school.

POTENTIAL COMMUNITY PARTNERS

Pyne Poynt Family School
Respond, Inc.

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- tree plantings
- water conservation education program



CONCEPTUAL SITE PLAN
SCALE = 1:150

SITE LOCATION

GREEN INFRASTRUCTURE KEY:

- RAIN GARDEN
- TREE PLANTINGS

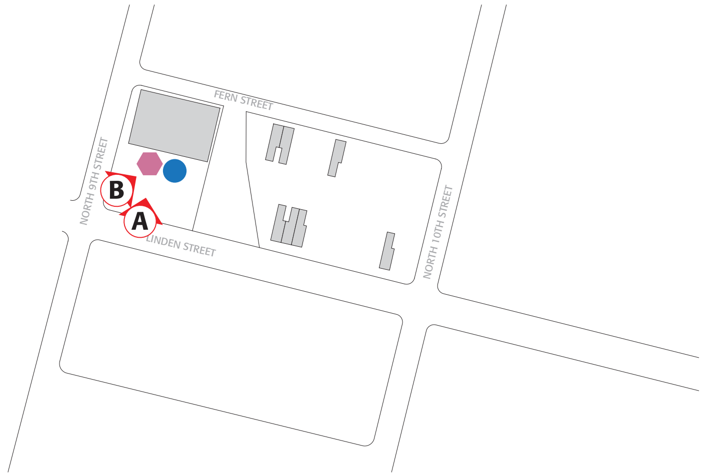
SITE PHOTOS

NORTH CAMDEN
NORTH 9TH STREET & LINDEN STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
A demonstration rain garden and rainwater harvesting system is proposed at the Community Center maintained by Respond, Inc. Rain barrels will be used to capture rooftop runoff for watering raised planter beds. A rain garden will be installed to capture, filter, and infiltrate stormwater runoff from rooftop and paved playground areas.

POTENTIAL COMMUNITY PARTNERS
Respond, Inc.

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- tree plantings
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:20

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
RAIN GARDEN
RAINWATER HARVESTING/RAIN BARRELS

SITE PHOTOS

A

B

NORTH CAMDEN

304 STATE STREET

INSTALLED SPRING 2011

PROJECT DESCRIPTION

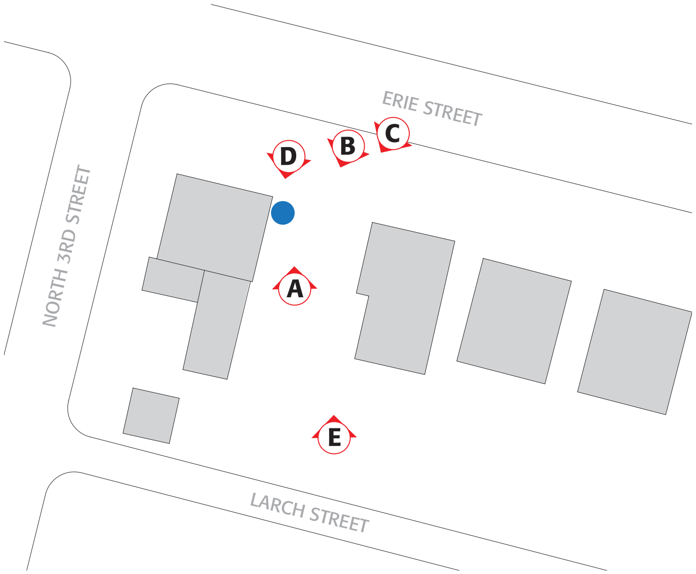
The RCE Water Resources Program worked with Respond, Inc to outfit a community garden with rainwater harvesting capabilities. A central manifold and spigot connect the three 55-gallon drums so that the three barrels act as one bigger barrel, filling and emptying equally and at the same time. The rain barrel system collects runoff from a building located adjacent to the community garden.

POTENTIAL COMMUNITY PARTNERS

Respond, Inc.

GREEN INFRASTRUCTURE STRATEGIES

- rainwater harvesting
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:60

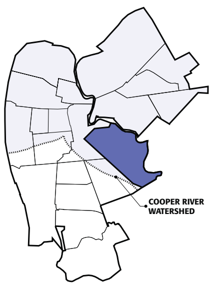
SITE LOCATION

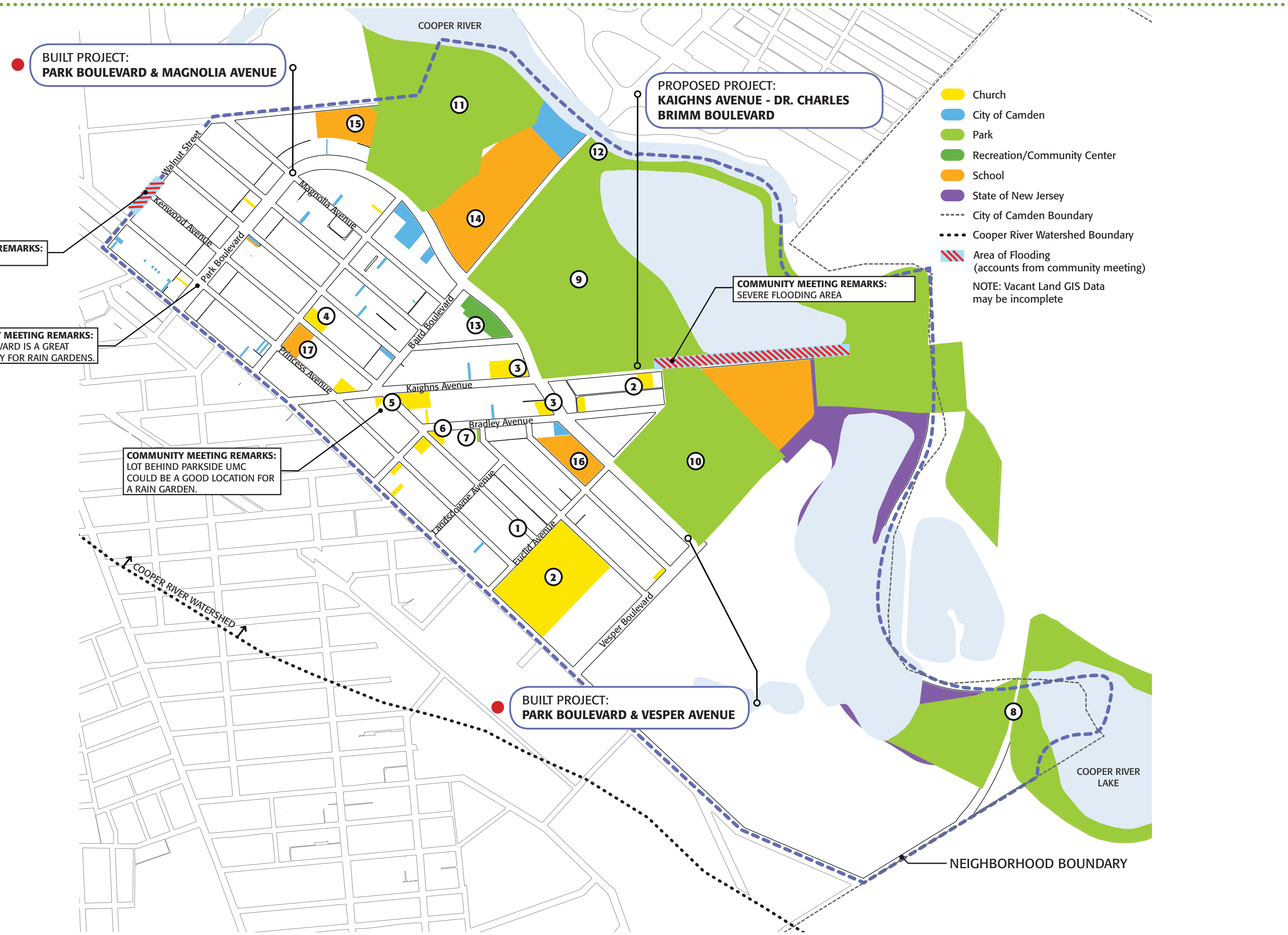
GREEN INFRASTRUCTURE KEY:

● RAINWATER HARVESTING/RAIN BARRELS

SITE PHOTOS

PARKSIDE





POTENTIAL PARTNERSHIP OPPORTUNITIES

1. PARKSIDE BUSINESS & COMMUNITY IN PARTNERSHIP

CHURCH

2. Dominican Sisters Perpetual Rosary
3. First Refuge Missionary Baptist Church
4. Little Rock Baptist
5. Parkside United Methodist Church
6. Saint Paul's Baptist Church

PARK

7. Bradley & Ormand Park
8. Cooper River Park
9. Farnham Park
10. High School Athletic Fields
11. New Camden Park
12. Camden GreenWay Trail

RECREATION/COMMUNITY CENTER

13. Jackson Boys & Girls Club

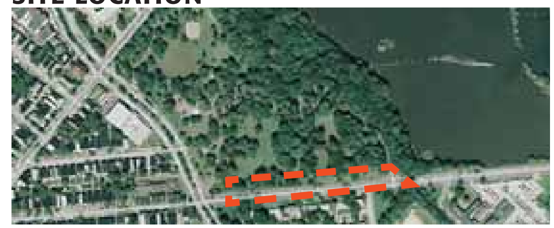
SCHOOL

14. Camden High School
15. Forest Hill Elementary School
16. Hatch Middle School
17. Parkside School

PARKSIDE

KAIGHNS AVENUE (Dr. CHARLES BRIMM BOULEVARD)

SITE LOCATION



GREEN INFRASTRUCTURE KEY:

RAIN GARDEN

PROJECT DESCRIPTION

This project addresses the frequent flooding issues in this area through the installation of a rain garden along Kaighns Avenue. At this location, in Farnham Park, the rain garden will capture the runoff before it has a chance to travel and collect downhill.

POTENTIAL COMMUNITY PARTNERS

PBCIP

GREEN INFRASTRUCTURE STRATEGIES

- rain garden

CONCEPTUAL SITE PLAN

SCALE = 1:200

SITE PHOTOS

PARKSIDE

PARK BOULEVARD & MAGNOLIA AVENUE

INSTALLED SPRING 2011

PROJECT DESCRIPTION

This rain garden, located within the median of Park Boulevard, collects stormwater runoff from both Park Boulevard and Magnolia Avenue. Curb cuts act as both inlets and outlets for the stormwater runoff. The rain garden captures, treats, and infiltrates over 100,000 gallons of stormwater runoff each year. In addition to improving the aesthetic quality of the neighborhood, the native species, such as Butterfly Weed and Sweet Pepperbush, provide valuable habitat for native birds, bees, and butterflies. In addition, NJTF planted two trees and several shrubs around the rain garden.

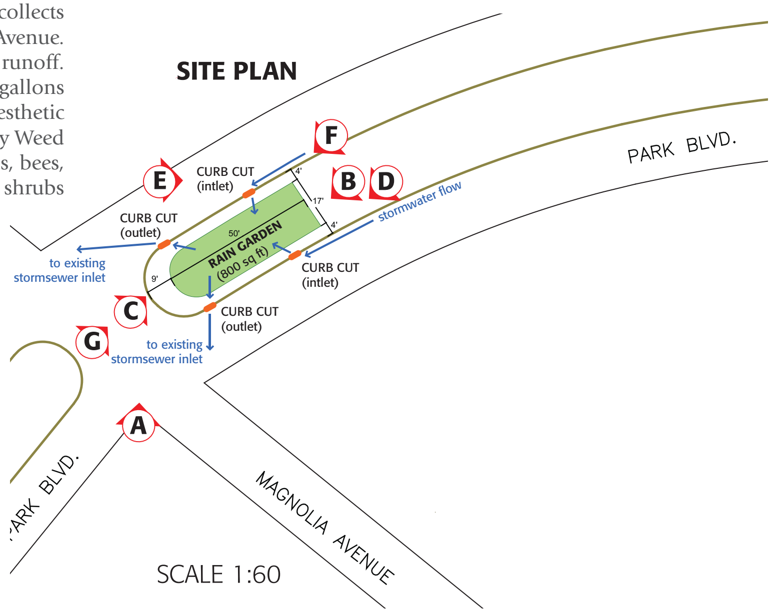
COMMUNITY PARTNERS

PBCIP

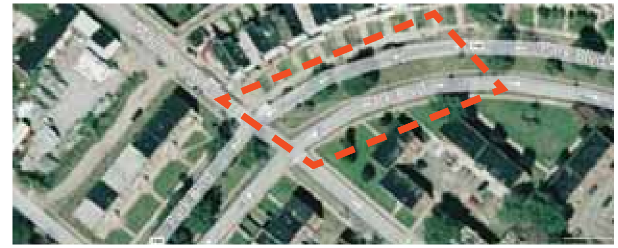
GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- tree plantings

SITE PLAN



SITE LOCATION



GREEN INFRASTRUCTURE KEY:

- RAIN GARDEN
- TREE PLANTINGS

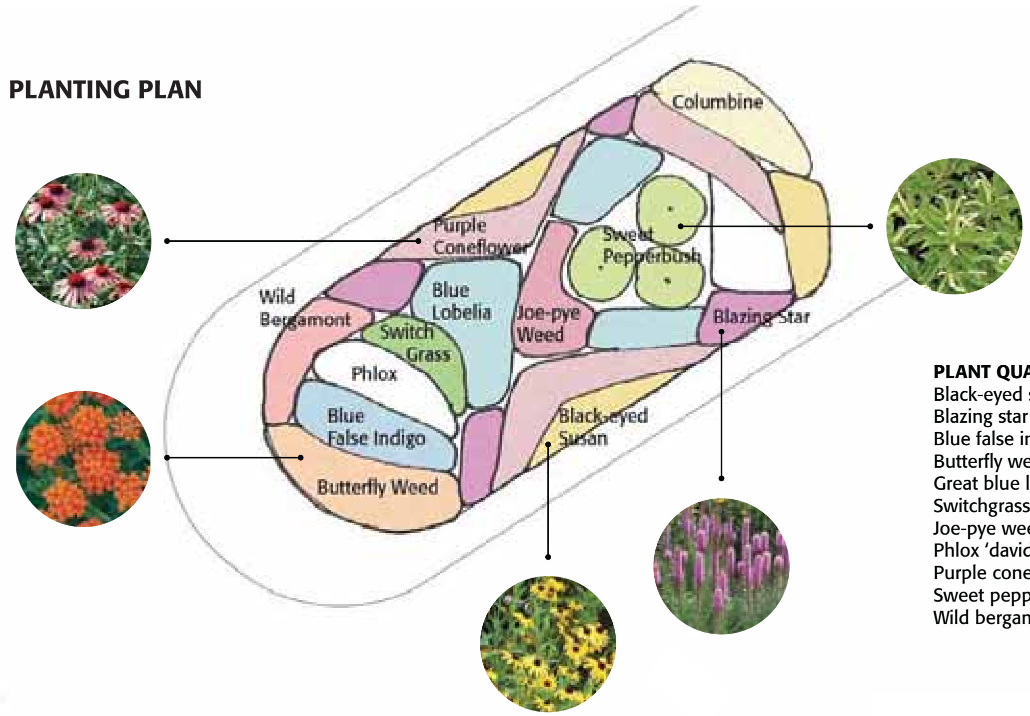
SITE PHOTOS

PARKSIDE

PARK BOULEVARD & MAGNOLIA AVENUE

INSTALLED SPRING 2011

PLANTING PLAN



PLANT QUANTITIES

Black-eyed susan – 15
Blazing star – 15
Blue false indigo – 9
Butterfly weed – 15
Great blue lobelia – 25
Switchgrass – 5
Joe-pye weed 'little joe' – 7
Phlox 'david' – 17
Purple coneflower – 21
Sweet pepperbush – 3
Wild bergamont – 7

SITE PHOTOS

PARKSIDE

PARK BOULEVARD & VESPER BOULEVARD

INSTALLED FALL 2011

PROJECT DESCRIPTION

The residents of this section of Park Boulevard initiated this project after they saw the rain garden built at Park Boulevard and Magnolia Avenue. This rain garden, located in a median, captures stormwater runoff running along Park Boulevard through several curb cuts. Volunteers assisted in planting over 500 herbaceous plugs, which included native plants such as Short-toothed Mountain Mint, Foxglove Beardtongue, and Purple Coneflower. The NJTF planted a Sweetbay Magnolia tree next to the rain garden.

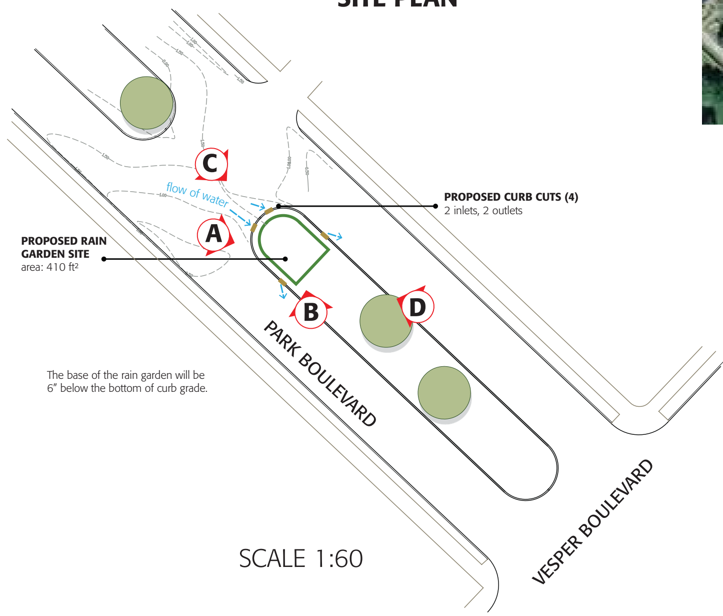
COMMUNITY PARTNERS

PBCIP

GREEN INFRASTRUCTURE STRATEGIES

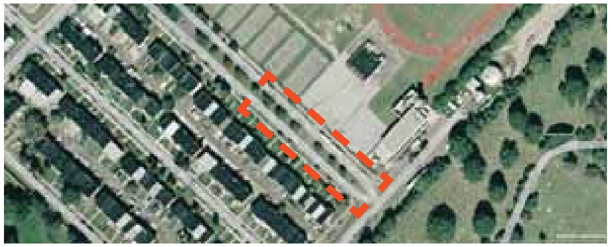
- rain garden
- tree plantings

SITE PLAN



SCALE 1:60

SITE LOCATION



SITE PHOTOS

A

B

C

D

PARKSIDE

PARK BOULEVARD & VESPER BOULEVARD

INSTALLED FALL 2011

PLANTING PLAN

GROUND COVERS:

AnVi *Andropogon virginicus*
Broomsedge

PyMu *Pycnanthemum muticum*
Short-toothed Mountain Mint

SoFW *Solidago rugosa* 'Fireworks'
Fireworks Goldenrod

INTERPLANTED SPECIES:

PeDi *Penstemon digitalis*
Foxglove Beardtongue

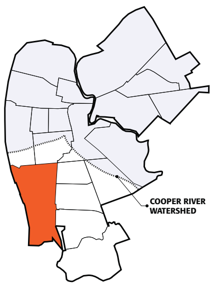
AsIn *Asclepias incarnata*
Butterfly Milkweed

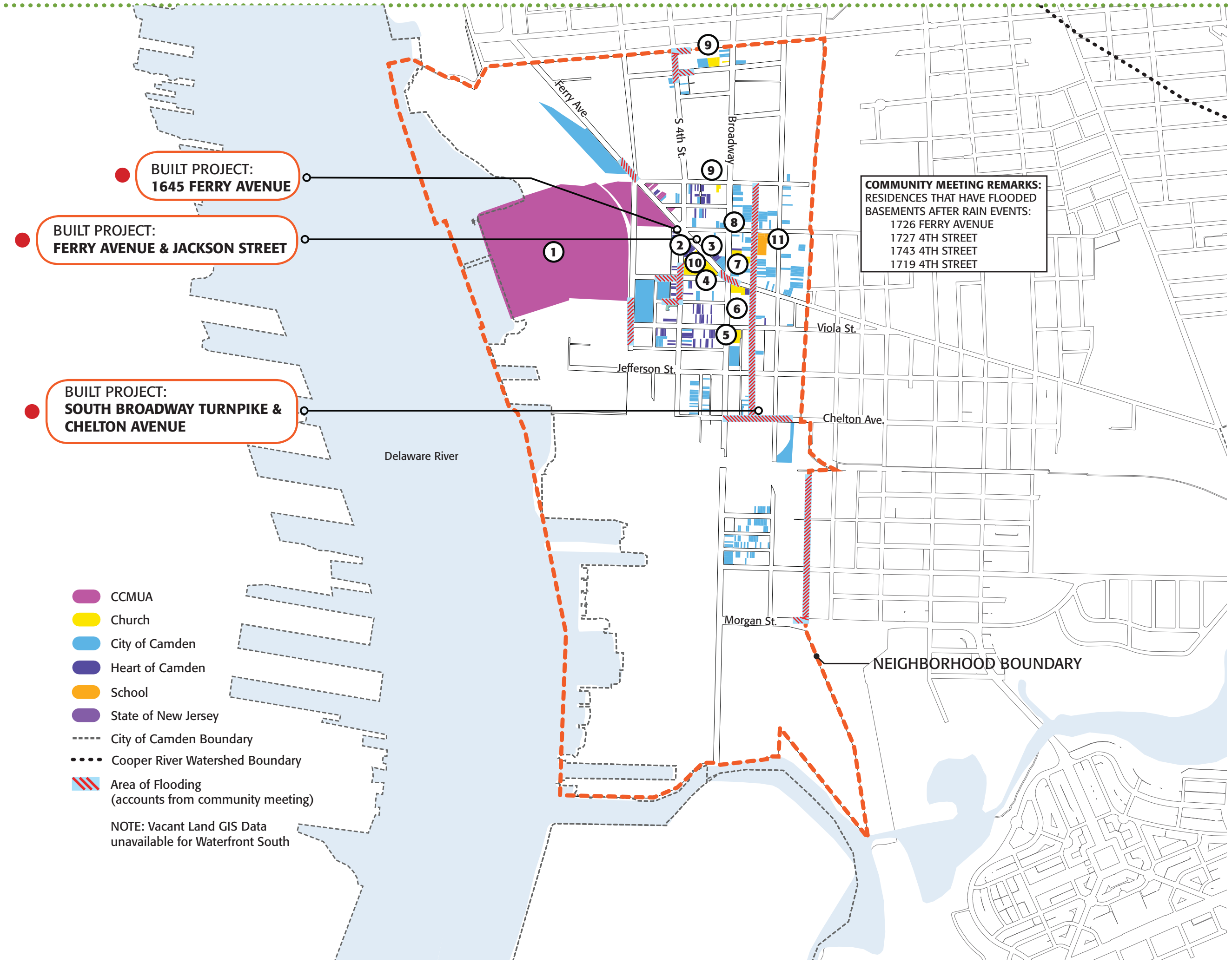
EcPu *Echinacea purpurea*
Purple Coneflower

VeHa *Verbena hastata*
Blue Vervain

VeLe *Veronica* 'Iron Butterfly'

WATERFRONT SOUTH





POTENTIAL PARTNERSHIP OPPORTUNITIES

1. CCMUA
2. HEART OF CAMDEN
3. THE CENTER FOR ENVIRONMENTAL TRANSFORMATION

CHURCH

3. Sacred Heart Church
4. Church of Our Saviour
5. Holy Bethel Church
6. South Camden Christian Fellowship
7. Holy Trinity Pentecostal Church
8. New Hope Temple Assemblies of Christ
9. The First Church of Deliveries

SCHOOL

10. Sacred Heart School
11. Creative Arts High School

WATERFRONT SOUTH
FERRY AVENUE & JACKSON STREET
INSTALLED SUMMER 2011

PROJECT DESCRIPTION

In collaboration with CCMUA, The CfET started a native plant nursery to grow plants for the use in green infrastructure projects in the City of Camden. The RCE Water Resources Program provided The CfET 1,000 native plant plugs. Once the plants reach an appropriate size, the plants will be purchased from the nursery and planted in new rain garden projects throughout Camden. Not only does this project provide the rain gardens with healthier, more substantial plant material, but it also offers a potential opportunity to create green jobs in Camden.

POTENTIAL COMMUNITY PARTNERS

The CfET

GREEN INFRASTRUCTURE STRATEGIES

- native plant propogation

SITE LOCATION

PLANT LIST

Blue Lobelia - *Lobelia siphilitica*
Blueflag Iris - *Iris versicolor*
Brown-eyed Susan - *Rudbeckia hirta*
Canadian Goldenrod - *Solidago canadensis*
Cardinal Flower - *Lobelia cardinalis*
False Sunflower - *Heliopsis helianthoides*
Foxglove Beardtongue - *Penstemon digitalis*
New England Aster - *Aster novae-angliae*
Purple Coneflower - *Echinacea purpurea*
Swamp Milkweed - *Asclepias syriaca*
Wild Bergamont - *Monarda fistulosa*

SITE PHOTOS Photo Credits: Andrea Ferich, The CfET

WATERFRONT SOUTH
SOUTH BROADWAY & CHELTON AVENUE
INSTALLED SPRING 2011

PROJECT DESCRIPTION

This project, located at a main entranceway to the Waterfront South neighborhood, creates a new open space amenity for the community. A series of four rain gardens capture stormwater runoff from the surrounding roadways to alleviate the nuisance flooding that routinely plagues the neighborhood. Native trees planted throughout the site also aid in rainwater infiltration. This project serves as a key example of how a stormwater management project can also transform the aesthetic quality of a neighborhood.

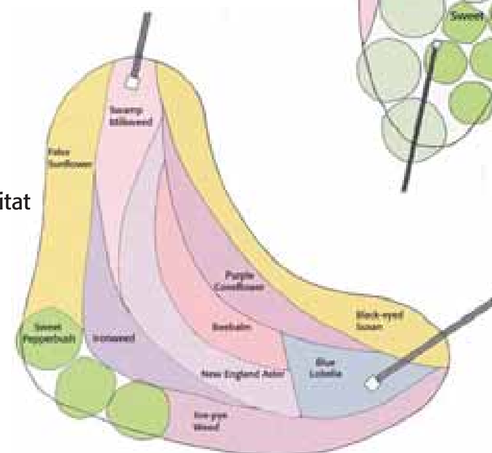
COMMUNITY PARTNERS

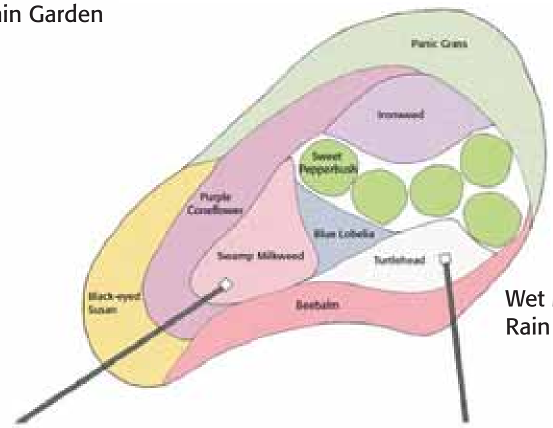
CCMUA

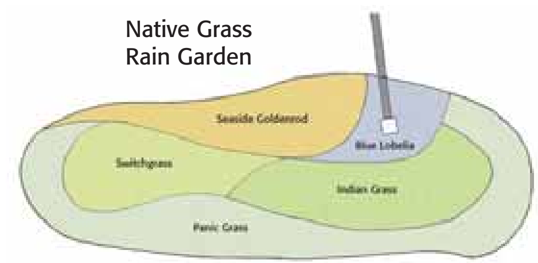
GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- tree plantings

PLANTING PLANS







SITE LOCATION

SITE PHOTOS

Photo Credit: Franklin McLaughlin, NJDEP (center and right photos)

WATERFRONT SOUTH
SOUTH BROADWAY & CHELTON AVENUE
INSTALLED SPRING 2011

SITE PLAN

WATERFRONT SOUTH

1645 FERRY AVENUE

INSTALLED SPRING 2011

PROJECT DESCRIPTION

This project, located on a vacant lot owned by the CCMUA adjacent to its Administration Building, is approximately 800-900 square feet. Two curb cut inlet channels capture, filter, and infiltrate stormwater from the surrounding roadways. The project is located near a low-lying intersection which frequently floods during storm events. The installation of this project was part of a two-day training workshop on rain gardens for landscape professionals. This project included a tree and shrub planting organized by NJTF.

COMMUNITY PARTNERS

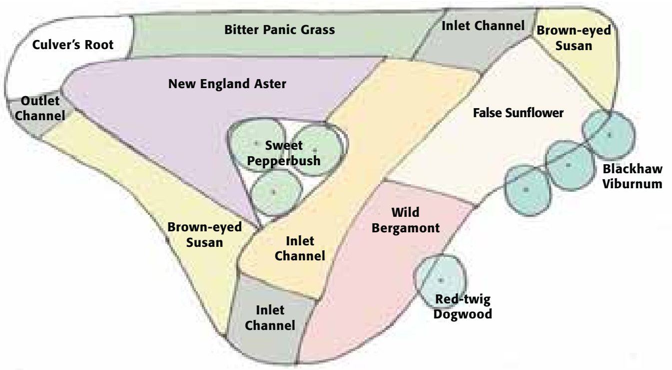
CCMUA

GREEN INFRASTRUCTURE STRATEGIES

- rain garden
- tree plantings
- water conservation education program

SITE LOCATION

PLANTING PLAN



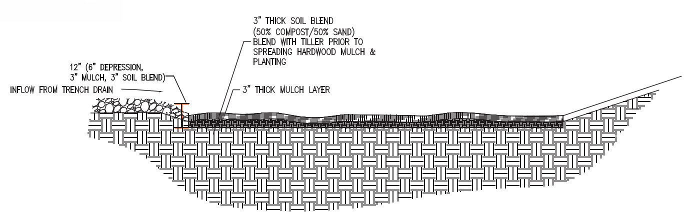
SITE PHOTOS

WATERFRONT SOUTH

1645 FERRY AVENUE

INSTALLED SPRING 2011

SITE PLAN

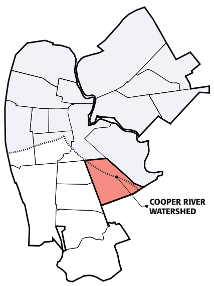


TYPICAL RAIN GARDEN OUTLET SECTION

NTS

A C

WHITMAN PARK



POTENTIAL PARTNERSHIP OPPORTUNITIES

CHURCH

1. 4th Presbyterian Church
2. Antioch Baptist
3. Friendship Baptist Church
4. New Life Lutheran Church

PARK

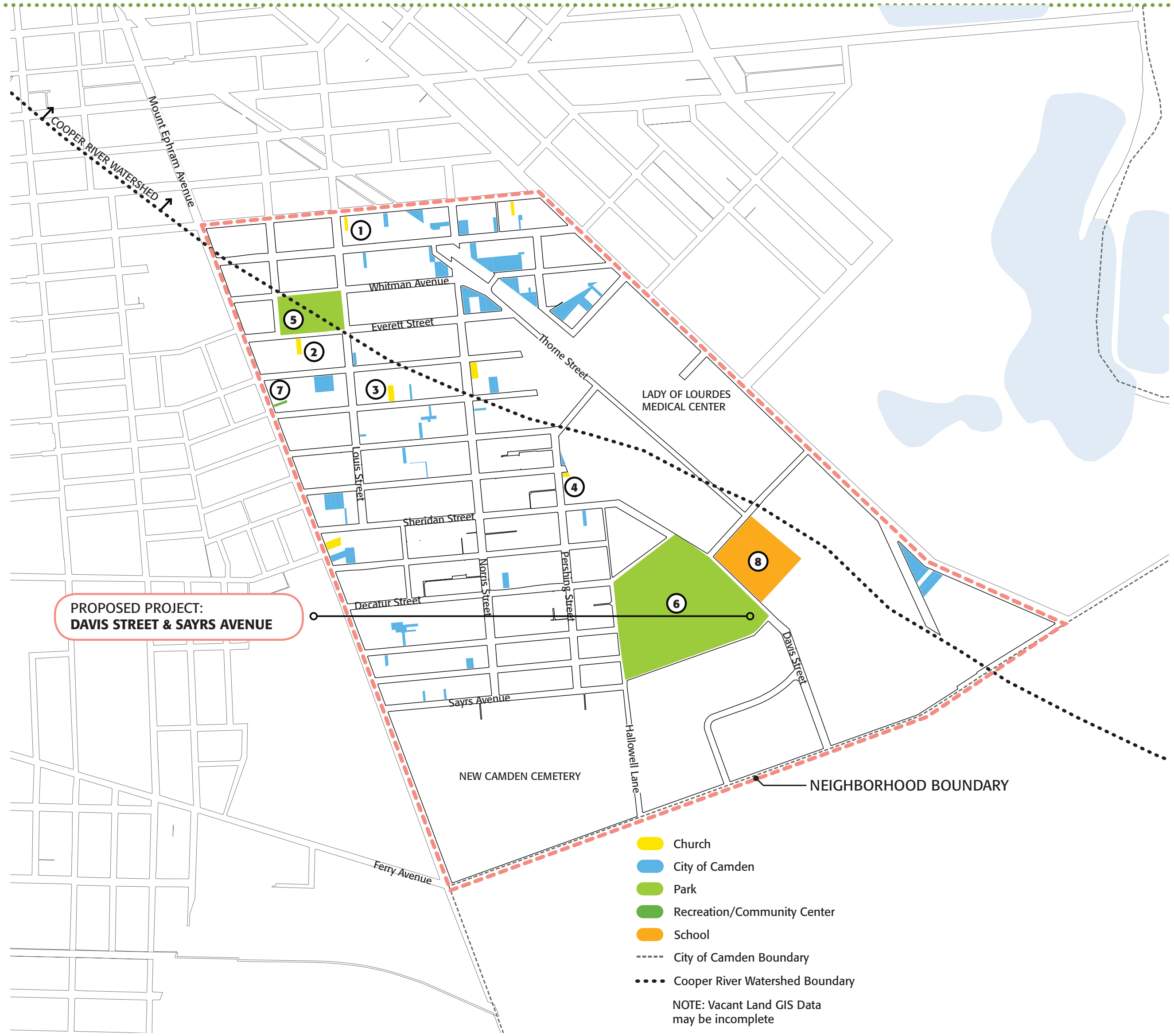
5. Everett & Louis Park
6. Whitman Park

RECREATION/COMMUNITY CENTER

7. Unity Community Center

SCHOOL

8. Charles E. Brimm Medical Arts High School

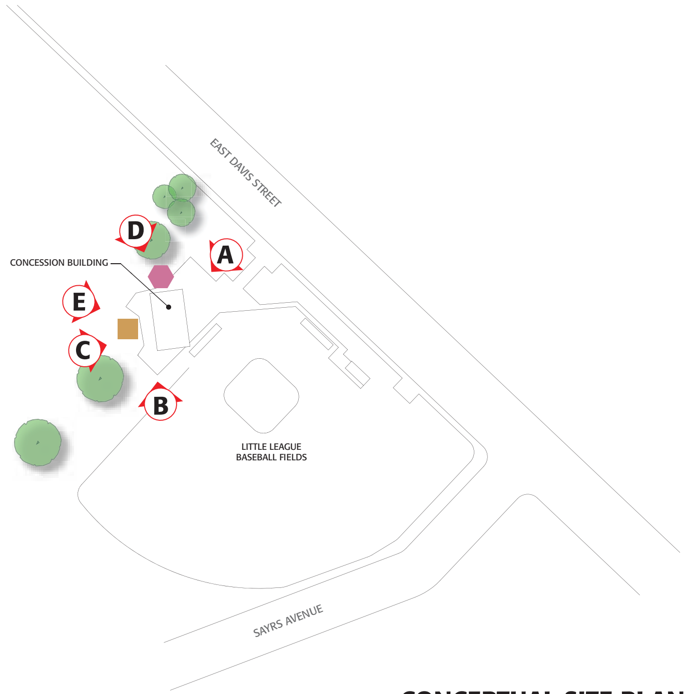


WHITMAN PARK
DAVIS STREET & SAYRS AVENUE

PROJECT DESCRIPTION
This project responds to the visible ponding and flooding issue near the concession/equiptment building of the Little League Baseball fields within Whitman Park. Pervious pavers will replace portions of existing asphalt drives and parking areas near the building. Additionally, rain gardens, or bioretention swales, will capture, filter, and infiltrate stormwater runoff from the building and surrounding concrete areas.

POTENTIAL COMMUNITY PARTNERS
Whitman Park - Little League Baseball

GREEN INFRASTRUCTURE STRATEGIES:
- rain garden
- pervious pavers
- downspout disconnection



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION

GREEN INFRASTRUCTURE KEY:
- RAIN GARDEN
- PERVIOUS PAVERS

SITE PHOTOS

GLOUCESTER CITY

POTENTIAL OPPORTUNITIES OF PARTNERSHIP

CHURCH

1. Church of God
2. Church of the Ascension
3. Church of the Risen King
4. Lighthouse Baptist Church
5. St. Mary's Church
6. Trinity United Methodist Church

COMMUNITY CENTER

7. Nicholson Road Community Place

LIBRARY

8. Gloucester City Public Library

PARK

9. Division Street Playground
10. Johnson Boulevard Recreation Area
11. Johnson Park
12. Martin Lake
13. Middlesex Neighborhood Park
14. Paul Street Playground
15. Proprietors Park
16. Sherman Neighborhood Play L
17. Thompson Street & Lane Avenue Park
18. Washington Street Playlot

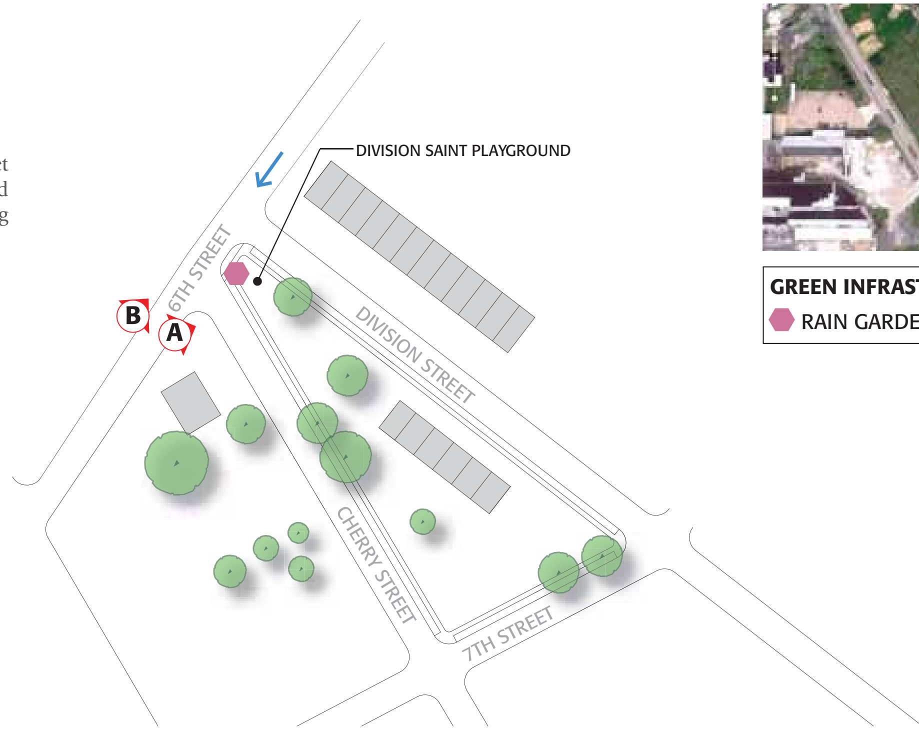
SCHOOL

19. Cold Springs Elementary School
20. Gloucester City Catholic High School
21. Gloucester City High School
22. Highland Park School
23. Mary E. Costello Elementary School
24. St. Mary's Grade School

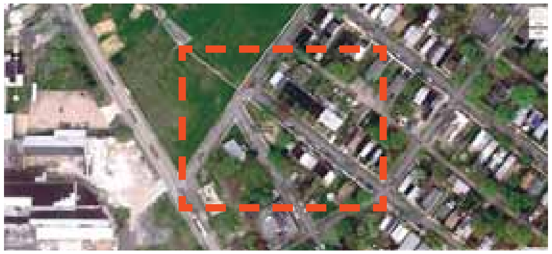
GLOUCESTER CITY
SOUTH 6TH STREET & DIVISION STREET

PROJECT DESCRIPTION
This project consists of a rain garden installation in the Division Street Playground. Stormwater from adjacent roadways will be directed into the site through curb cuts and will reduce the nearby flooding problem.

GREEN INFRASTRUCTURE STRATEGIES
- rain garden



CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS
A

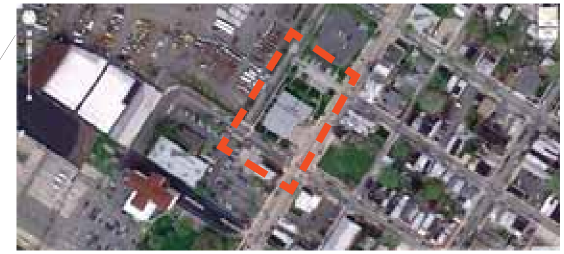

B


GLOUCESTER CITY
NORTH KING STREET & MONMOUTH STREET
PRIORITY PROJECT SPRING 2012

PROJECT DESCRIPTION
Located at the Gloucester City Fire Department Headquarters, this project aims to disconnect the building's downspouts and divert the stormwater into rain gardens located on either side of the building. This project would reduce the volume of runoff running along North King Street, which is an area frequently flooded.

GREEN INFRASTRUCTURE STRATEGIES
- rain garden
- downspout disconnection

CONCEPTUAL SITE PLAN
SCALE = 1:120

SITE LOCATION


GREEN INFRASTRUCTURE KEY:
RAIN GARDEN

SITE PHOTOS


C. REFERENCES

[1] "State & County Quickfacts." *census.gov*. US Census Bureau, 16 Feb. 2011. Web. 28 Aug. 2011.

[2] *njstormwater.org*. New Jersey Department of Environmental Protection, n.d. Web. 2 Sept. 2011.

[3] "Green Infrastructure." *epa.gov*. United States Environmental Protection Agency, 24 August 2009. Web. 27 Aug. 2011.

[4] Obropta, Christopher, et al. "Rain Garden Manual of New Jersey." *water.rutgers.edu*. Rutgers Cooperative Extension Water Resources Program, 14 July 2011. Web. 24 August 2011.

[5] *njwatersavers.rutgers.edu*. New Jersey WaterSavers, n.d. Web. 1 Sept. 2011.

[6] Kafin, Robert and Marcel Van Ooyen. "Rainwater Harvesting." *Grownyc.org*. Council on the Environment of New York City, Aug. 2008. Web. 1 Sept. 2011.

[7] DeBusk, Kathy M., et al. "Water Quality of Rootop Runoff: Implications for Residential Water Harvesting Systems." North Carolina Cooperative Extension fact sheet AG-588-18W, 2009.

[8] "NJ Stormwater Best Management Practices Manual." *njstormwater.org*. New Jersey Department of Environmental Protection, 2011. Web. 2 Sept. 2011.

[9] "Learn the Issues: Green Living." *usepa.gov*. United States Environmental Protection Agency, 2011. Web. 28 Aug. 2011.

[10] *werf.org*. Water Environment Research Foundation, 2011. Web. 26 Aug. 2011.

[11] "Downspout Planters." *phillywatersheds.org*. Philadelphia Water Department, n.d. Web. 26 Aug. 2011.

[12] "Stormwater Planter." *crwa.org*. Charles River Watershed Association, Sept. 2008. Web. 15 Aug. 2011.

[13] "Tree Box Filters." *unh.unhsc.edu*. University of New Hampshire Stormwater Center, 2007. Web. 27 Aug. 2011.

[14] *phillywatersheds.org*. Philadelphia Water Department, n.d. Web. 26 Aug. 2011.

[15] Cappiella et al. "Urban Watershed Forestry Manual."*cwp.org*. Center for Watershed Protection, 2005. Web. 2 Sept. 2011.

[16] "The Northwest Indiana Regional Greenways and Blueways Plan." *greenwaysblueways.com*. Northwestern Indiana Regional Planning Commission, n.d. Web. 2 Sept. 2011.

Waterfront South Rain Garden Park

BEFORE
Summer 2010

AFTER
Summer 2011

Rutgers New Jersey Agricultural Experiment Station · Water Resources Program · Camden SMART