GREEN INFRASTRUCTURE FEASIBILITY STUDY

HARRISON

RUTGERS
New Jersey Agricultural
Experiment Station

PASSAIC VALLEY SEWERAGE COMMISSION

"Protecting Public Health and the Environment"

ACKNOWLEDGEMENTS

Designed to highlight green infrastructure opportunities within the Town of Harrison, this document has been prepared by the Rutgers Cooperative Extension Water Resources Program with funding and direction by the Passaic Valley Sewerage Commission and the New Jersey Agricultural Experiment Station.

We would like to thank the Passaic Valley Sewerage Commission, the New Jersey Agricultural Experiment Station, and the Town of Harrison for their input and support in creating this document.

RUTGERS
New Jersey Agricultural Experiment Station

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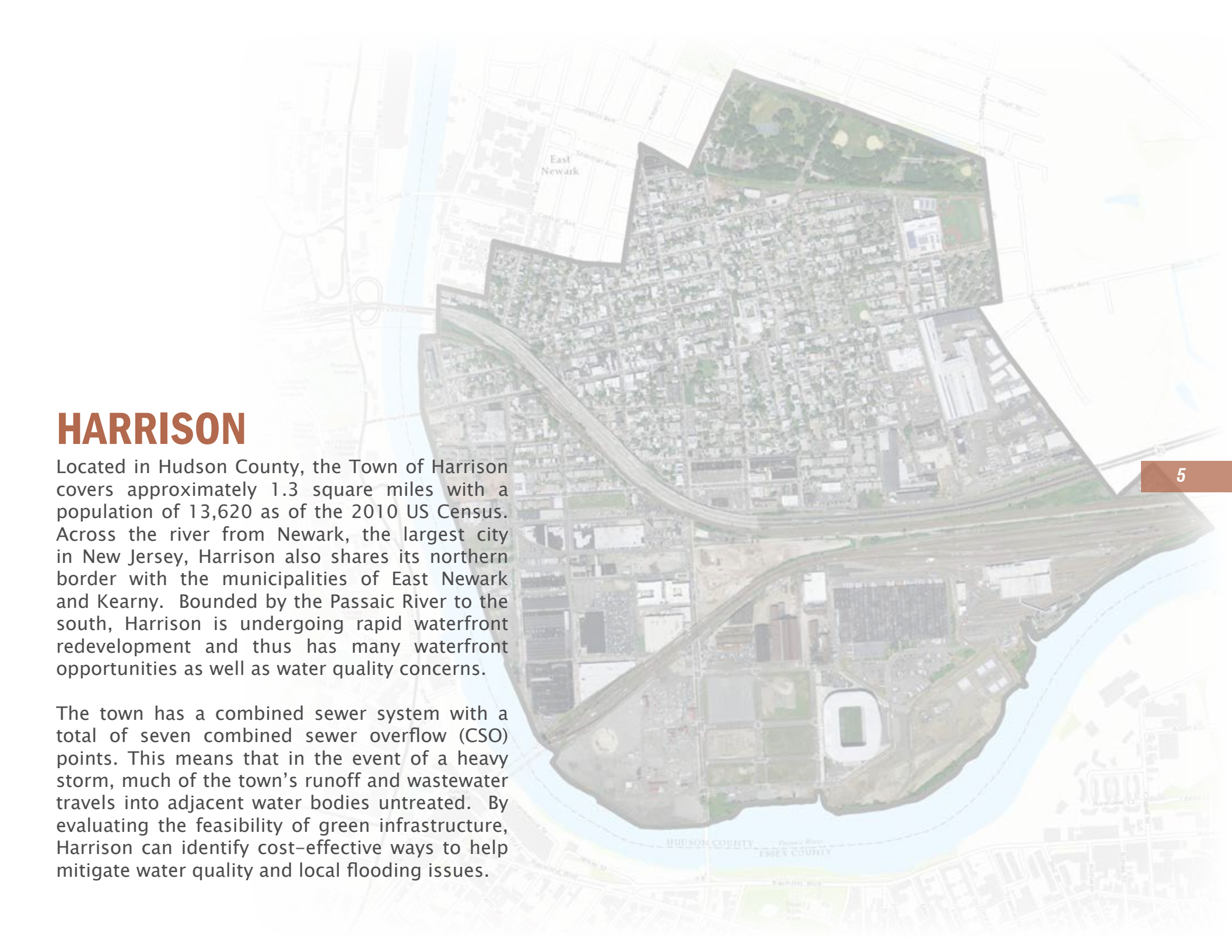
INTRODUCTION

In 2013, the Passaic Valley Sewerage Commission (PVSC) began a new initiative to assist the 48 municipalities within its jurisdiction to manage flooding and eliminate combined sewer overflows. With municipalities spread across five counties, PVSC is dedicated to leading efforts throughout the PVSC Sewerage District by using green infrastructure to intercept stormwater runoff, reduce combined sewer overflows (CSOs), manage existing water infrastructure, and minimize frequent flooding events. To help with this effort, PVSC has entered into a partnership with the Rutgers Cooperative Extension (RCE) Water Resources Program.

Harrison is a community with a combined sewer system which carries both wastewater and stormwater in the same pipes. During heavy rain or snow melt, combined sewer systems often cannot manage all of the water and overflow, causing a combined sewer overflow (CSO) event. When overflows or CSO events occur, stormwater that has been mixed with untreated wastewater is discharged into local waterways, carrying with it many contaminants. By using cost-effective green infrastructure practices, Harrison can begin to reduce the negative impacts of stormwater runoff and pressure on the local infrastructure, while also increasing resiliency to CSO events and protecting the health of our waterways.

This feasibility study is intended to be used as a guide for the community of Harrison to begin implementing green infrastructure practices while demonstrating to residents and local leaders the benefits of and opportunities for better managing stormwater runoff.

Rutgers University professor, Tobiah Horton, reviews a rain garden design with a homeowner.



HARRISON

Located in Hudson County, the Town of Harrison covers approximately 1.3 square miles with a population of 13,620 as of the 2010 US Census. Across the river from Newark, the largest city in New Jersey, Harrison also shares its northern border with the municipalities of East Newark and Kearny. Bounded by the Passaic River to the south, Harrison is undergoing rapid waterfront redevelopment and thus has many waterfront opportunities as well as water quality concerns.

The town has a combined sewer system with a total of seven combined sewer overflow (CSO) points. This means that in the event of a heavy storm, much of the town's runoff and wastewater travels into adjacent water bodies untreated. By evaluating the feasibility of green infrastructure, Harrison can identify cost-effective ways to help mitigate water quality and local flooding issues.

WHAT IS STORMWATER?

When rainfall hits the ground, it can soak into the ground or flow across the surface. When rainfall flows across a surface, it is called "stormwater" runoff. Pervious surfaces allow stormwater to readily soak into the soil and recharge groundwater. An impervious surface can be any material that has been placed over soil that prevents water from soaking into the ground. Impervious surfaces include paved roadways, parking lots, sidewalks, and rooftops. As impervious areas increase, so does the amount of stormwater runoff. New Jersey has many problems due to stormwater runoff from impervious surfaces, including:

- POLLUTION: According to the 2010 New Jersey Water Quality Assessment Report, 90% of the assessed waters in New Jersey are impaired. Urban-related stormwater runoff is listed as the most probable source of impairment (USEPA, 2013). As stormwater flows over the ground, it picks up pollutants, including animal waste, excess fertilizers, pesticides and other toxic substances. These pollutants are carried to waterways.
- FLOODING: Over the past decade, the state has seen an increase in flooding. Communities around the state have been affected by these floods. The amount of damage caused also has increased greatly with this trend, costing billions of dollars over this time span.
- EROSION: Increased stormwater runoff causes an increase in stream velocity. The increased velocity after storm events erodes stream banks and shorelines, degrading water quality. This erosion can damage local roads and bridges and cause harm to wildlife.

A local reservoir


Purple Coneflower


Pervious Pavers

To protect and repair our waterways, reduce flooding, and stop erosion, stormwater runoff has to be better managed. Impervious surfaces need to be disconnected with green infrastructure to prevent stormwater runoff from flowing directly into New Jersey's waterways. Disconnection redirects runoff from paving and rooftops to pervious areas in the landscape.

A community garden that harvests and recycles rainwater

Rain barrel workshop participants

A rain garden after planting

WHAT IS GREEN INFRASTRUCTURE?

Green infrastructure is an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure projects capture, filter, absorb, and reuse stormwater to maintain or mimic natural systems and to treat runoff as a resource. As a general principle, green infrastructure practices use soil and vegetation to recycle stormwater runoff through infiltration and evapotranspiration. When used as components of a stormwater management system, green infrastructure practices such as bioretention, green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits. In addition to effectively retaining and infiltrating rainfall, these technologies can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits (USEPA, 2013).

GLOSSARY OF GREEN INFRASTRUCTURE TERMINOLOGY

A ***DISCONNECTED:***

Disconnected refers to channeling water from gutters and pipes that collect runoff to somewhere other than a sewer drain where it can be filtered.

B ***DEPAVING:***

Depaving is the process of removing hardscape such as asphalt or concrete.

C ***INFILTRATION:***

Infiltration occurs when water on the ground's surface is absorbed into the soil below. Plants promote infiltration.

D ***IMPERVIOUS SURFACE:***

An impervious surface is one that water cannot penetrate.

E ***RUNOFF:***

Runoff is water from precipitation that flows across land and paved surfaces before entering local waterways or sewer systems.

A

B

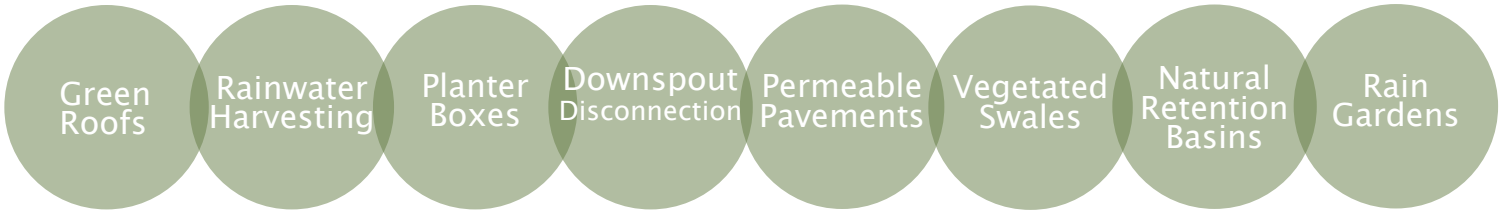
C

D

E

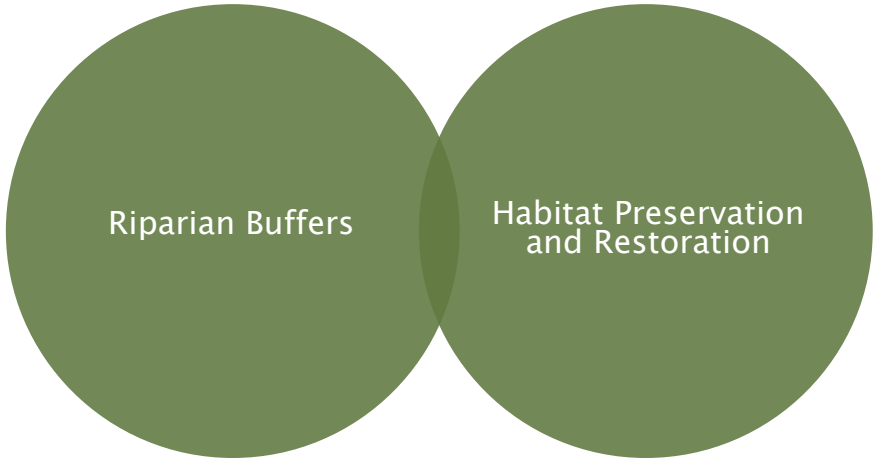
GREEN INFRASTRUCTURE STRATEGIES

SITE



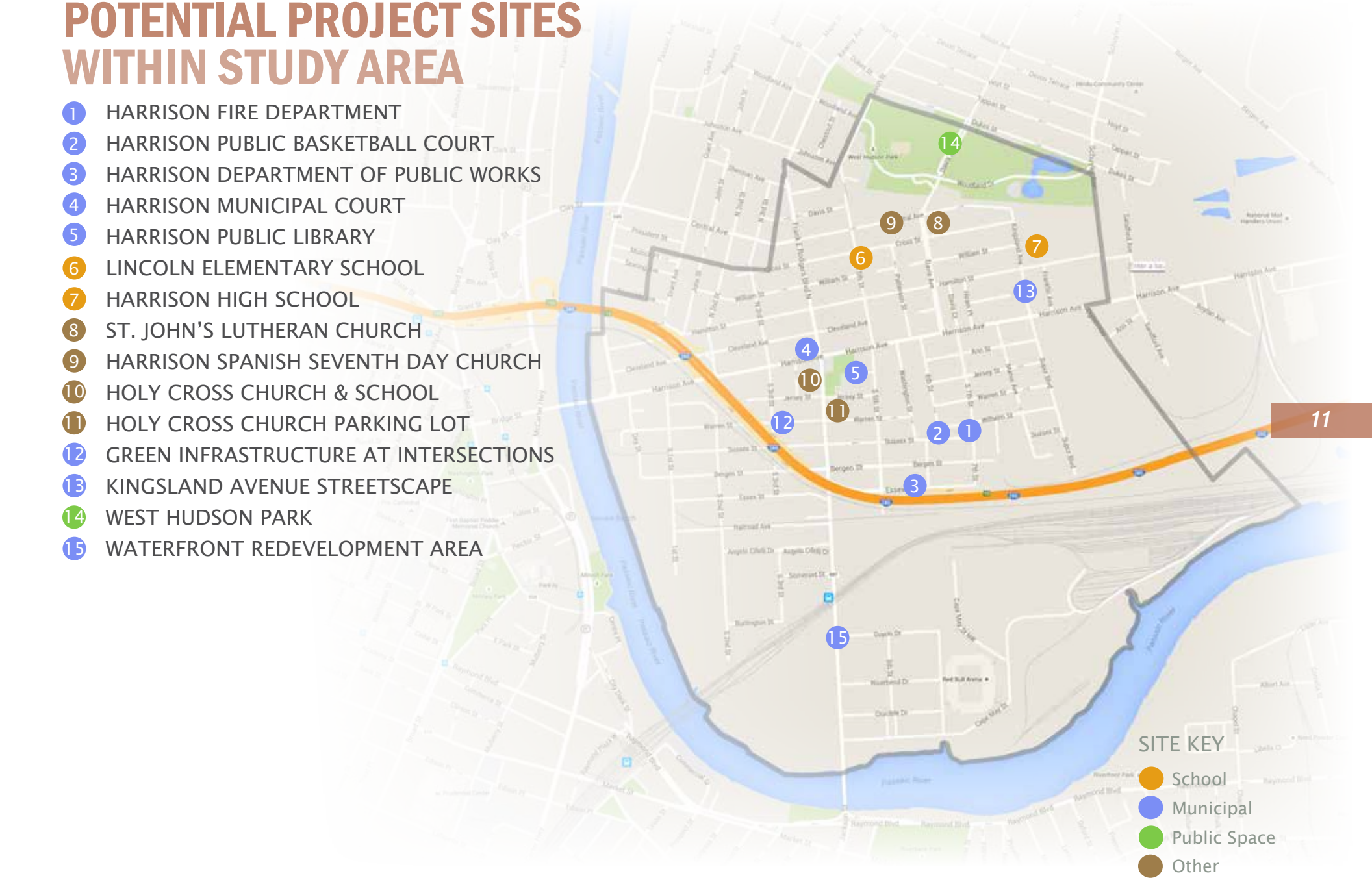
NEIGHBORHOOD

WATERSHED



POTENTIAL PROJECT SITES WITHIN STUDY AREA

1. HARRISON FIRE DEPARTMENT
2. HARRISON PUBLIC BASKETBALL COURT
3. HARRISON DEPARTMENT OF PUBLIC WORKS
4. HARRISON MUNICIPAL COURT
5. HARRISON PUBLIC LIBRARY
6. LINCOLN ELEMENTARY SCHOOL
7. HARRISON HIGH SCHOOL
8. ST. JOHN'S LUTHERAN CHURCH
9. HARRISON SPANISH SEVENTH DAY CHURCH
10. HOLY CROSS CHURCH & SCHOOL
11. HOLY CROSS CHURCH PARKING LOT
12. GREEN INFRASTRUCTURE AT INTERSECTIONS
13. KINGSLAND AVENUE STREETSCAPE
14. WEST HUDSON PARK
15. WATERFRONT REDEVELOPMENT AREA

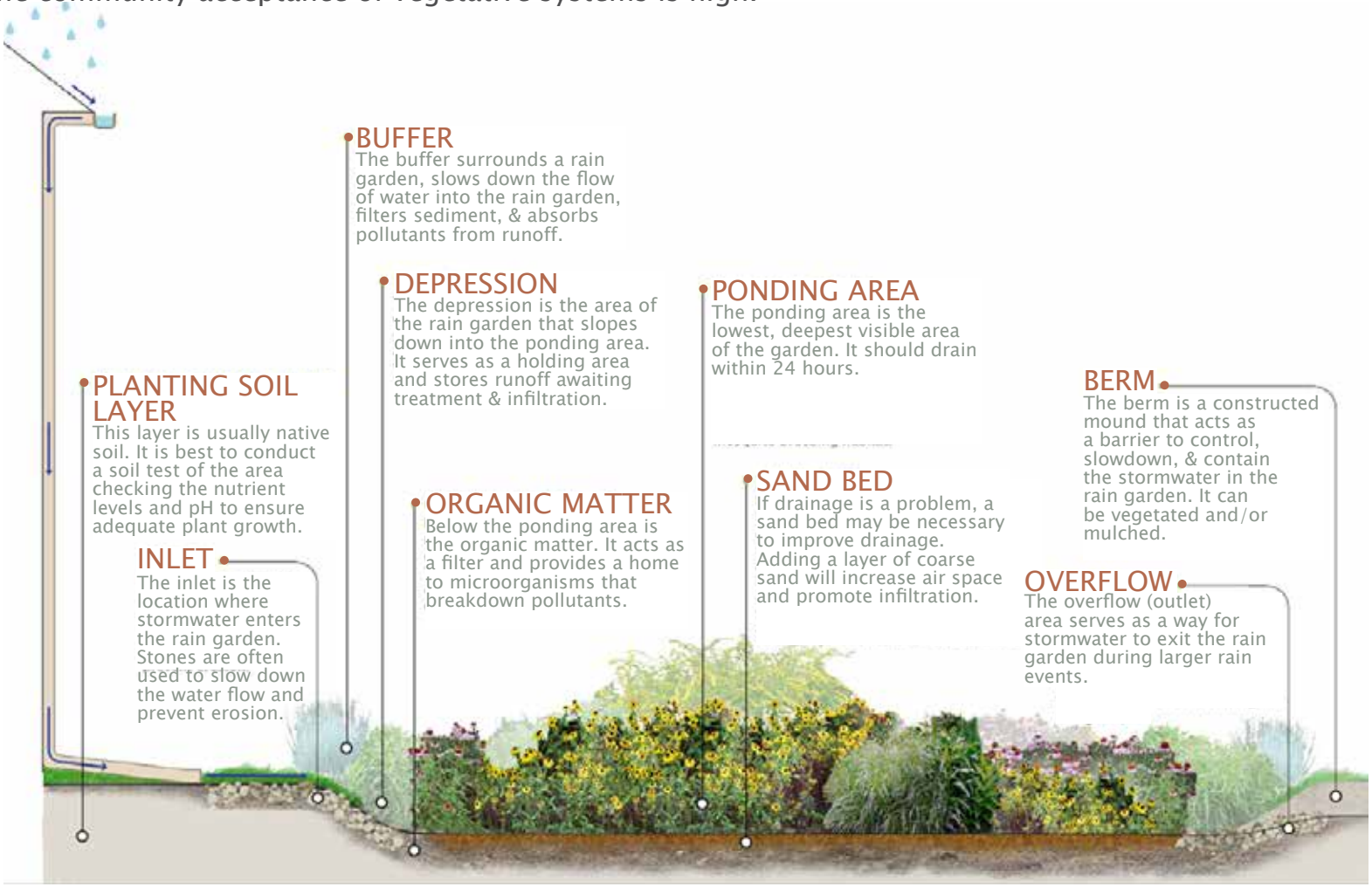



STATE OF
NEW JERSEY
DEPARTMENT OF
ENVIRONMENTAL
PROTECTION

GREEN INFRASTRUCTURE SYSTEMS

VEGETATED SYSTEMS

Vegetative systems primarily focus on reducing water quality impacts and less on reducing flooding. These systems are typically located close to the sources of runoff and can manage the smaller storms of several inches. The main treatment mechanisms are infiltration, filtration, and evapotranspiration. These systems do an excellent job at removing total suspended solids, nutrients and pathogens. Construction costs for vegetated systems are typically low to moderate when compared to other green infrastructure practices. Since these systems often can be incorporated into existing landscapes and enhance aesthetics, the community acceptance of vegetative systems is high.



RAIN GARDEN DIAGRAM

VEGETATED SYSTEM SUITABILITY

Rain gardens are shallow landscaped depressions designed to capture, treat, and infiltrate stormwater runoff. Rain gardens can be readily installed throughout a community to begin re-establishing the natural processes of the landscape. Rain gardens:

- Capture stormwater runoff, reducing soil 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 recharge groundwater supplies by providing base flow to nearby streams and waterways
- Enhance and increase green space and vegetated cover

Rain gardens are a simple way communities can begin to reduce stormwater runoff, manage flows to sewer systems, and protect water resources. Rain gardens can be placed in strategic locations to capture runoff from rooftops and paved areas, including:

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

VEGETATED SYSTEM SUITABILITY: EXAMPLE PROJECT SITE

Several buildings along Church Square have downspouts that are directly connected into the sewer system.

VEGETATED SYSTEM SUITABILITY: EXAMPLE PROJECT SITE

Rain gardens are suitable for downspout disconnection at several locations on this site.

RAINWATER HARVESTING SYSTEMS

Rainwater harvesting systems focus on the conservation, capture, storage and reuse of rainwater. These systems are located close to residential and commercial buildings. Construction costs are low to moderate, depending on the size of the system, compared to other green infrastructure practices. Since these systems can be easily incorporated into the built landscape, the community acceptance of rainwater harvesting systems is moderate to high. Rainwater harvesting systems include rain barrels and cisterns.

RAIN BARREL DIAGRAM

INLET
Rainwater collected in gutters is released into the barrel here

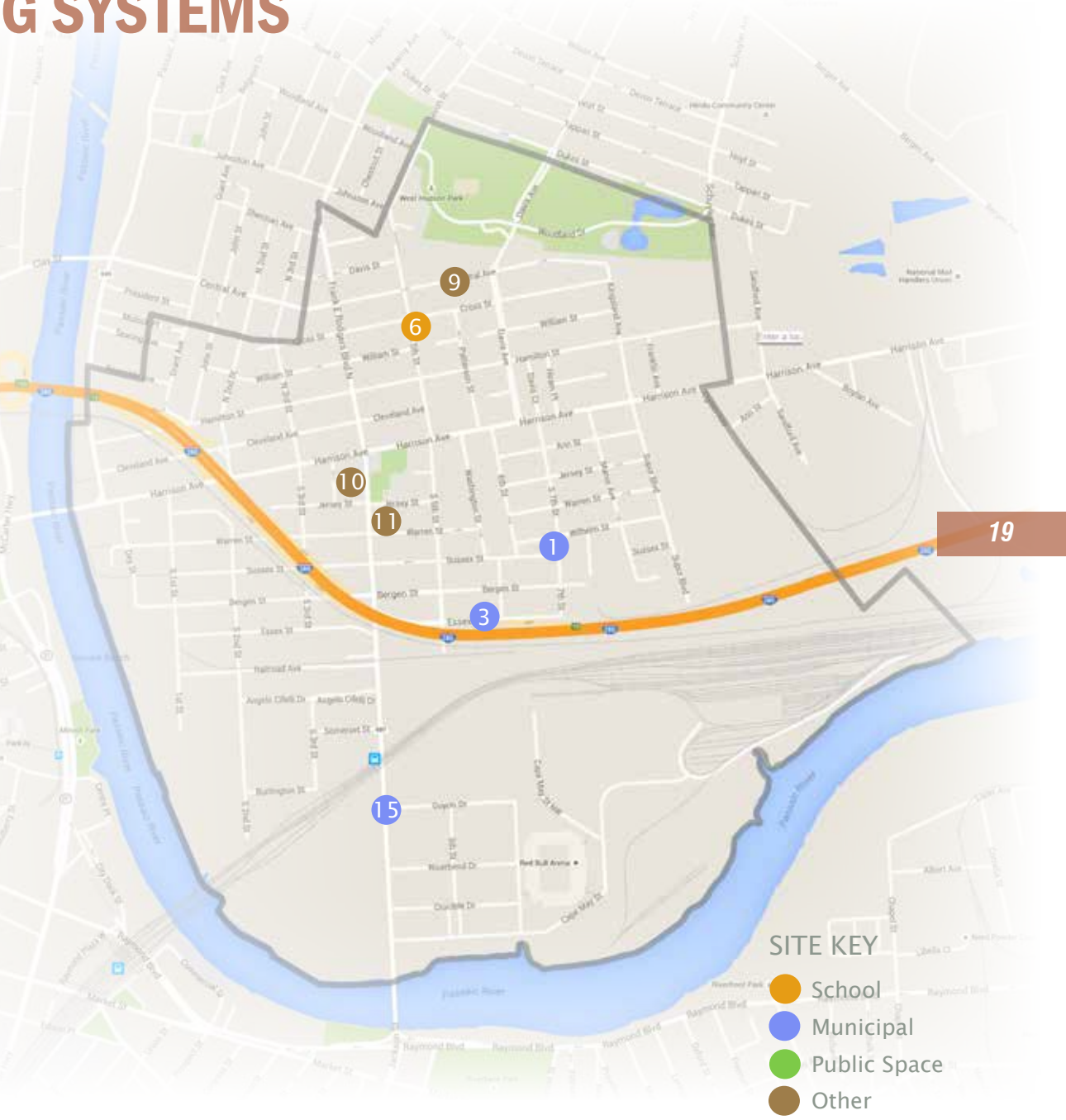
OVERFLOW OUTLET
Releases water when the rain barrel reaches capacity

SPIGOT
Valve that opens and closes barrel's water flow

RAINWATER HARVESTING SYSTEMS SUITABILITY

Typical rainwater harvesting systems can store up to 5,000 gallons of water. Harvesting during the rainy months of spring and summer provides a source of water during hot and dry periods between rain storms. 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 drinking water supplies and related infrastructure.

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 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 draining from 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 and decreasing flow to sewer systems. Rain barrels and cisterns provide an alternative source of water for gardens, lawns, and landscaping by reducing the use of potable water supplies.



RAINWATER HARVESTING SYSTEM SUITABILITY: EXAMPLE PROJECT SITE

Roof runoff is internally piped into the ground where it connects to the sewer system.

RAINWATER HARVESTING SYSTEM SUITABILITY: EXAMPLE PROJECT SITE

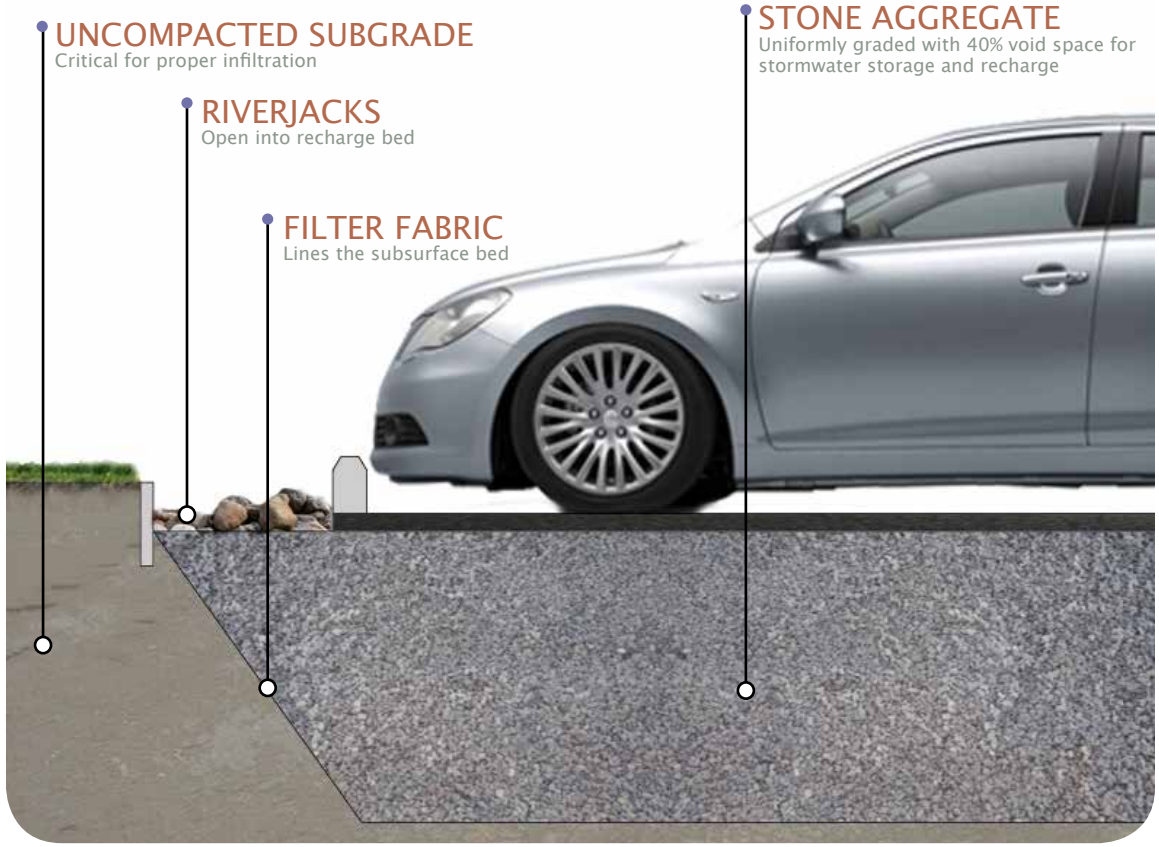
Pending confirmation of the location of the drainage system, rainwater could be harvested in a cistern and used to wash township vehicles on site.

STORAGE, QUANTITY, & INFILTRATION SYSTEMS

Storage, quantity, and infiltration systems primarily focus on storage. These systems are typically located close to runoff sources within residential, commercial, and industrial landscapes. The main treatment mechanism is reducing peak flows of stormwater by storing it before it becomes runoff. Construction costs for storage, quantity, and infiltration are moderate to high when compared to other green infrastructure practices because they require more space and infrastructure and are more laborious to install. Since these systems can be seamlessly incorporated into the built environment and can manage a large quantity of water, the community acceptance of storage, quantity, and infiltration systems is high.

PERMEABLE PAVEMENT

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



PERMEABLE PAVEMENT DIAGRAM

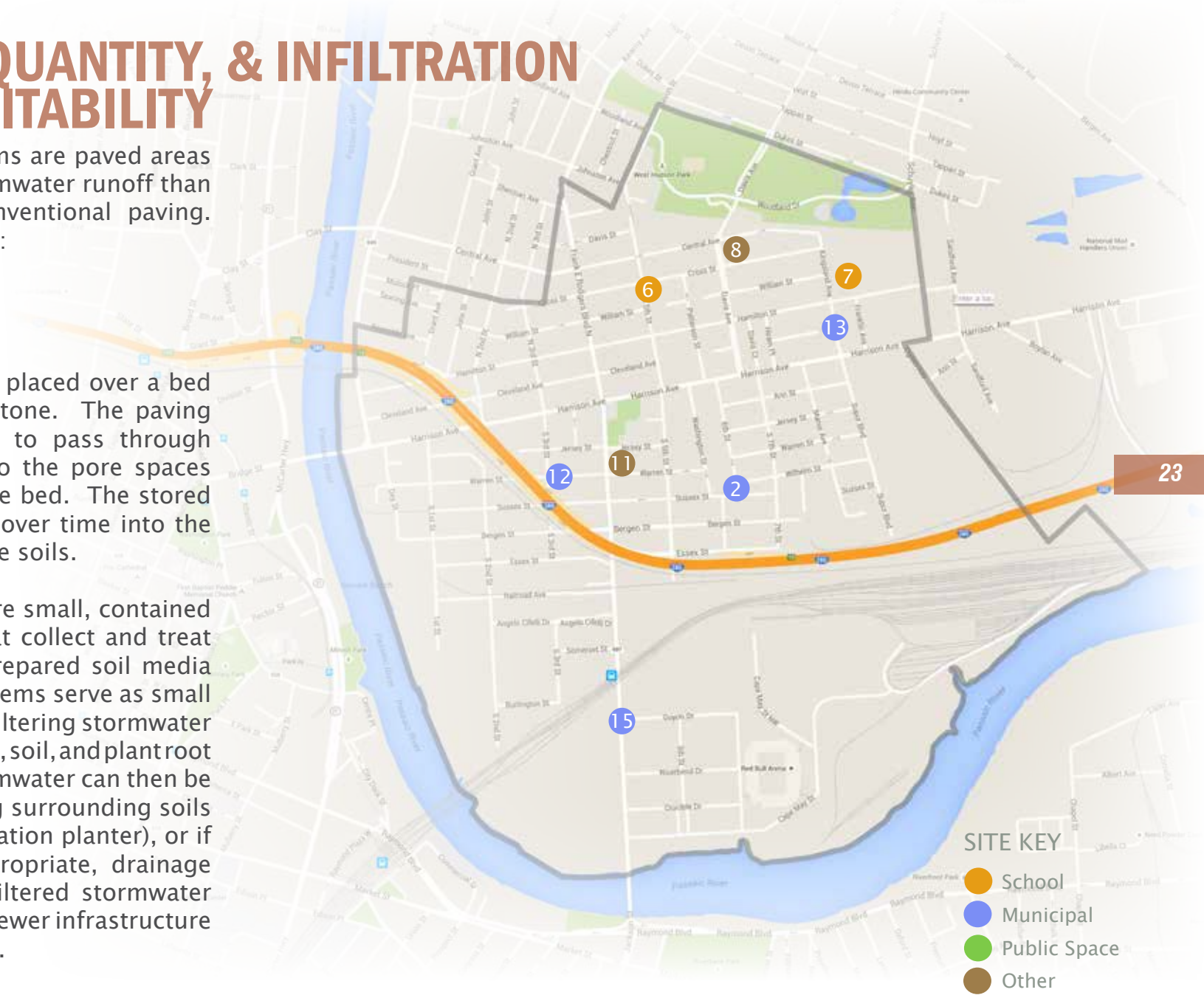
STORAGE, QUANTITY, & INFILTRATION SYSTEM SUITABILITY

Pervious paving systems are paved areas that produce less stormwater runoff than areas paved with conventional paving. These systems include:

- Permeable pavers
- Porous asphalt
- Pervious concrete

The paving material is placed over a bed of uniformly graded stone. The paving materials allow water to pass through and then infiltrate into the pore spaces of the underlying stone bed. The stored runoff then infiltrates over time into the uncompacted subgrade soils.

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).



STORAGE, QUANTITY, & INFILTRATION SYSTEM SUITABILITY: EXAMPLE PROJECT SITE

Stormwater often flows from downspouts directly onto adjacent sidewalks and streets where it then travels into catch basins located at nearby intersections.

STORAGE, QUANTITY, & INFILTRATION SYSTEM SUITABILITY: EXAMPLE PROJECT SITE

Creating curb 'bump-out' stormwater planters at no parking zones will intercept stormwater runoff and provide traffic calming for pedestrians.


TREE
PLANTING

COMMUNITY ENGAGEMENT & EDUCATION

BUILD A RAIN BARREL WORKSHOP

With the Build a Rain Barrel Workshop, community members participate in a short presentation on stormwater management and water conservation and then learn how to build their own rain barrel. Workshop participants work with trained experts to convert 55 gallon plastic food-grade drums into rain barrels. They are quickly able to take an active role in recycling rainwater by installing a rain barrel at their house! Harvesting rainwater has many benefits including saving water, saving money, and preventing basement flooding. By collecting rainwater, homeowners are helping to reduce flooding and pollution in local waterways. When rainwater flows across hard surfaces like rooftops, driveways, roadways, parking lots, and compacted lawns, it carries pollution to our local waterways. Harvesting the rainwater in a rain barrel is just one of the ways homeowners can reduce the amount of rainwater draining from their property and help reduce neighborhood flooding problems.

STORMWATER MANAGEMENT IN YOUR SCHOOLYARD

The *Stormwater Management in Your Schoolyard* program provides educational lectures, hands-on activities, and community-level outreach for students on the topics of water quality issues and stormwater management practices such as rain gardens and rain barrels. Program objectives include the exploration of various aspects of the natural environment on school grounds, the detailed documentation of findings related to these explorations, and the communication of these findings to the school community. As part of this program, several New Jersey State Core Curriculum Content Standards for science (5.1, 5.3, and 5.4), twenty-first century life and careers (9.1, 9.3, and 9.4), and social studies (6.3) are addressed. Every school is unique in its need for stormwater management, so each school's *Stormwater Management in Your Schoolyard* program can be delivered in a variety of ways. This program can be tailored for grades K-8 or 9-12 and can be offered to meet a variety of schedules.



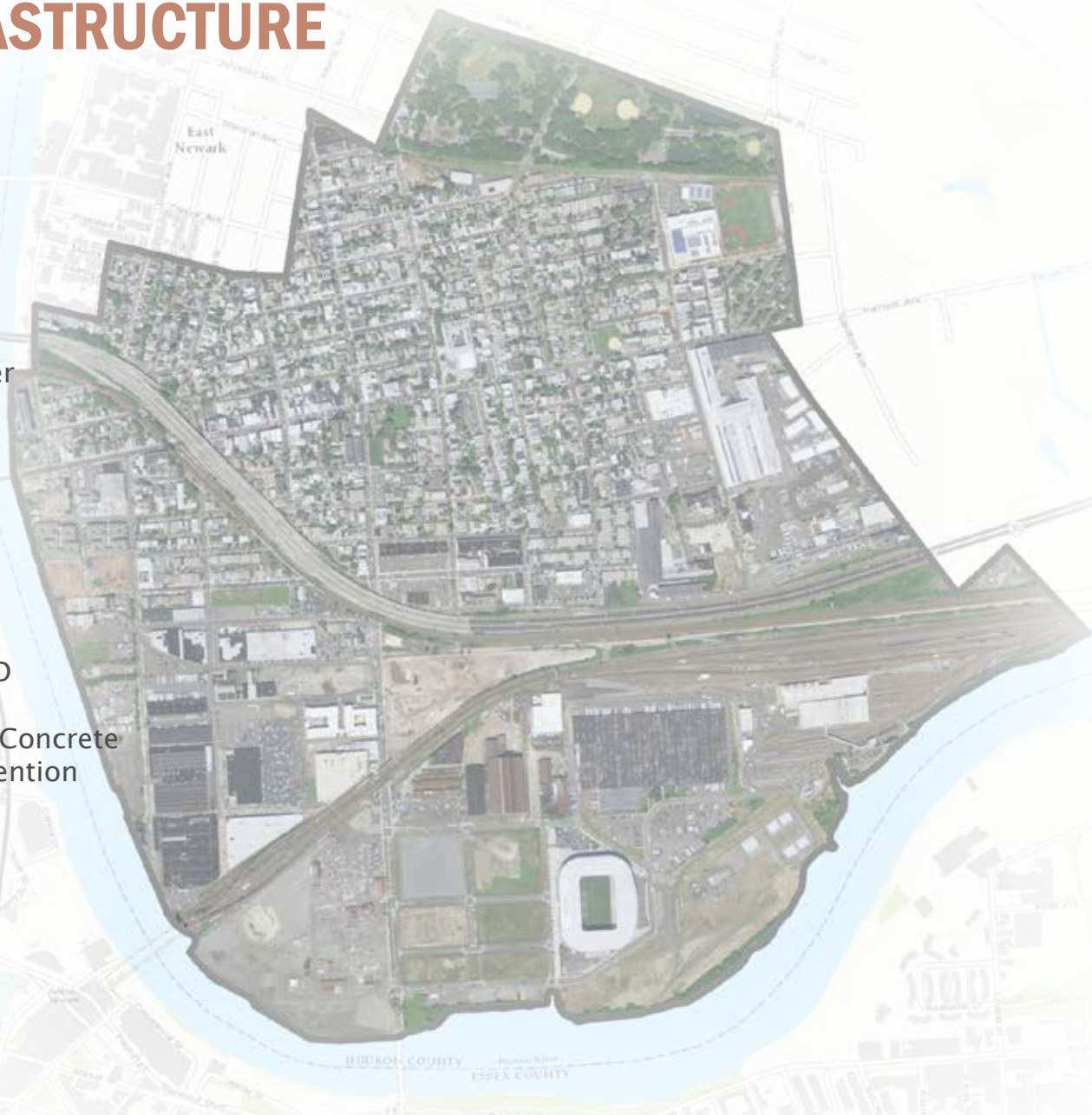

MAINTENANCE PROCEDURES

MAINTAINING HARRISON'S GREEN INFRASTRUCTURE SYSTEMS

1. VEGETATED SYSTEMS
   - Rain Garden
   - Stormwater Planter
   - Bioswale

2. RAINWATER HARVESTING
   - Rain Barrel
   - Cistern

3. STORAGE, QUANTITY, AND INFILTRATION
   - Porous Asphalt & Concrete
   - Underground Detention



VEGETATED SYSTEM MAINTENANCE

RAIN GARDEN:

Weekly

- Water
- Weed
- Inspect for invasive plants, plant health, excessive sediment, and movement of sediment within the rain garden
- Observe the rain garden during rain events and note any successes (Example of success: stormwater runoff picks up oil and grease from the parking lot, flows through a curb cut, and into a rain garden; the rain garden traps the nonpoint source pollutants before they reach the nearby waterway)

Annually

- Mulch in the spring to retain a 3-inch mulch layer in the garden
- Prune during dormant season to improve plant health
- Remove sediment
- Plant
- Test the soil (every 3 years)
- Harvest plants to use in other parts of the landscape
- Clean debris from gutters connected to rain garden
- Replace materials (such as river rock and landscape fabric) where needed

STORMWATER PLANTER

- Very similar maintenance regime to rain gardens

BIOSWALE

- Very similar maintenance regime to rain gardens

RAINWATER HARVESTING SYSTEM MAINTENANCE

RAIN BARREL:

- Keep screen on top and a garden hose attached to the overflow to prevent mosquitoes; change screen every two years
- Remove debris from screen after storms
- Disconnect the barrel in winter; store inside or outside with a cover
- Clean out with long brush and water/dilute bleach solution (~3%)

CISTERN:

- In the fall, prepare your cistern for the winter by diverting flow so that no water can enter and freeze within the tank
- Weekly check: Check for leaks, clogs, obstructions, holes, and vent openings where animals, insects, and rodents may enter; repair leaks with sealant; drain the first flush diverter/ roof washer after every rainfall event
- Monthly check: Check roof and roof catchments to make sure no debris is entering the gutter and downspout directed into the cistern; keep the roof, gutters, and leader inlets clear of leaves; inspect the first flush filter and all of its attachments, making any necessary replacements; inspect cistern cover, screen, overflow pipe, sediment trap, and other accessories while making any necessary replacements

STORAGE, QUANTITY, & INFILTRATION SYSTEM MAINTENANCE

POROUS ASPHALT & CONCRETE:

- Materials cost is ~20-25% more than traditional asphalt or concrete
- Long-term maintenance is required by routine quarterly vacuum sweeping
- Sweeping cost may be off-set by reduced deicing costs
- Asphalt repairs can be made with standard asphalt not to exceed 10% of surface area
- Concrete repairs can be made with standard concrete not to exceed 10% of the surface area

UNDERGROUND DETENTION:

- Periodic inspections of the inlet and outlet areas to ensure correct operation of system
- Clean materials trapped on grates protecting catch basins and inlet area monthly
- Primary maintenance concerns are removal of floatables that become trapped and removal of accumulating sediments within the system; this should be done at least on an annual basis
- Proprietary traps and filters associated with stormwater storage units should be maintained as recommended by the manufacturer
- Any structural repairs required to inlet and outlet areas should be addressed in a timely manner on an as needed basis
- Local authorities may require annual inspection or require that they carry out inspections and maintenance




POTENTIAL PROJECT SITES

HARRISON FIRE DEPARTMENT

634 Sussex Street
Harrison, NJ 07029

The site is located at the Harrison Fire Department at 634 Sussex Avenue. Roof runoff is internally piped into the ground, where it connects to the sewer system. Pending confirmation of the location of the drainage system, rainwater could be harvested in a cistern and used to wash township vehicles on site. The sidewalks along 7th Street appear to be new and have a planting opportunity in an exposed tree pit.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☑ tree pits
- ☐ stormwater planters
- ☐ rain barrels
- ☐ buffers
- ☑ cisterns
- ☐ pervious pavement
- ☐ bioswales
- ☐ depaving

PUBLIC BASKETBALL COURT

600 Sussex Street
Harrison, NJ 07029

This site is a municipal recreation facility containing a basketball court and a playground. The court is graded to drain over the sidewalk and into catch basins on adjacent streets. Stormwater runoff can be intercepted in pervious strips or stormwater planters along the pavement edges, parallel to the court fence. Although the condition of the pavement is good at this time, pervious pavement should be considered when repaving.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☐ rain barrels
- ☑ pervious pavement
- ☐ tree pits
- ☐ buffers
- ☐ bioswales
- ☑ stormwater planters
- ☐ cisterns
- ☐ depaving

PUBLIC BASKETBALL COURT

600 Sussex Street
Harrison, NJ 07029

600 Essex Street
Harrison, NJ 07029

The site is located at the garage of the Harrison Department of Public Works. Parking for township service vehicles is located at the east face of the building and is surrounded by a security fence on all sides. Roof runoff is captured and externally piped into the ground where it flows directly into the sewer system. Downspouts can be disconnected and diverted into a cistern. Rainwater harvested from the cistern tank can be used to wash the township vehicles on site.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☐ rain barrels
- ☐ pervious pavement
- ☐ tree pits
- ☐ buffers
- ☐ bioswales
- ☐ stormwater planters
- ☑ cisterns
- ☐ depaving

600 Essex Street
Harrison, NJ 07029


N

The site is a multi-building municipal center. Adjacent to the court building, the annex has a single downspout that is visible, which connects directly into the ground. This piping can be rerouted and diverted into a rain garden located within the turf grass lawn.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [ ] rain barrels
- [ ] pervious pavement
- [ ] tree pits
- [ ] buffers
- [ ] bioswales
- [ ] stormwater planters
- [ ] cisterns
- [ ] depaving

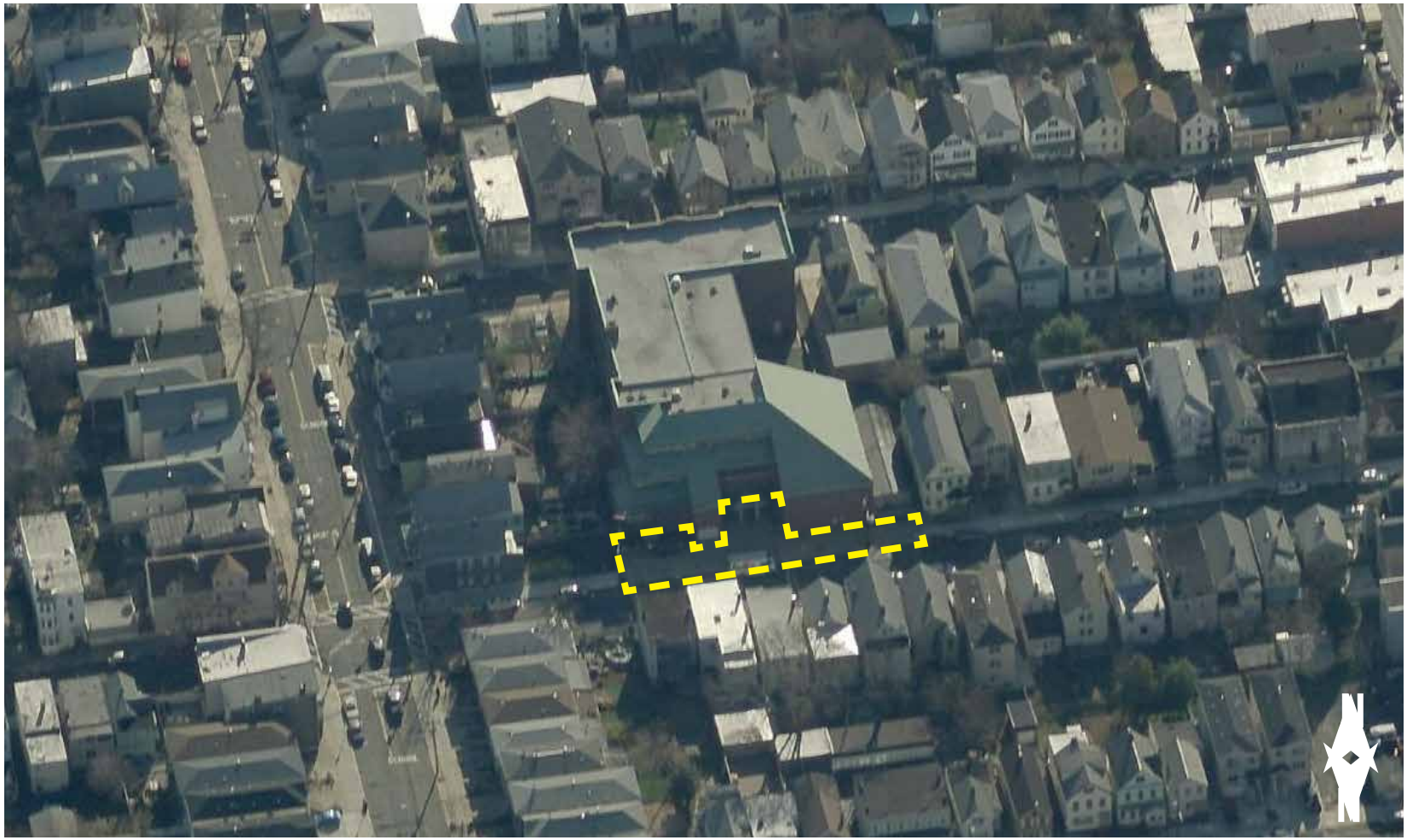

N



The site is a public library building located in a public park and municipal complex. Downspouts at the northwest and northeast front corners could be disconnected into rain gardens in surrounding lawn areas.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [ ] rain barrels
- [ ] pervious pavement
- [ ] tree pits
- [ ] buffers
- [ ] bioswales
- [ ] stormwater planters
- [ ] cisterns
- [ ] depaving



The site is a public elementary school located along Cross Street. The entrance has external downspouts connected to underground piping. Raised stormwater planter boxes could be placed along the wall to divert rooftop runoff.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☐ rain barrels
- ☐ pervious pavement
- ☐ tree pits
- ☐ buffers
- ☐ bioswales
- ☑ stormwater planters
- ☐ cisterns
- ☐ depaving

HARRISON HIGH SCHOOL

800 Hamilton Street
Harrison, NJ 07029

Harrison High School is a recently constructed public school building. The structure has internally fed drainage, tree plantings, and large quantities of impervious surface. Parking islands in the rear of the building are potential demonstration sites for curb cuts with either rain gardens or bioswales. Such practices could intercept runoff from the asphalt parking lot and increase infiltration.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [ ] tree pits
- [ ] stormwater planters
- [ ] rain barrels
- [ ] buffers
- [ ] cisterns
- [ ] pervious pavement
- [x] bioswales
- [ ] depaving


N


The site is both a church and a daycare center located on a corner lot in Harrison. Downspouts direct roof runoff onto the lawn and sidewalk. The south strip of lawn is an opportunity for a rain garden and downspout disconnection. Near the entrance of the daycare, stormwater runoff is directly connected to the sewer syestem. This area is an opportunity for a raised downspout stormwater planter box. Additionally, the corner of Davis Avenue and Cross Street is sloped away from the site and is a suitable for a curb 'bump out' stormwater planter to intercept runoff and provide traffic calming.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [ ] tree pits
- [x] stormwater planters
- [ ] rain barrels
- [ ] buffers
- [ ] cisterns
- [ ] pervious pavement
- [ ] bioswales
- [ ] depaving

HARRISON SPANISH SEVENTH-DAY ADVENTIST CHURCH

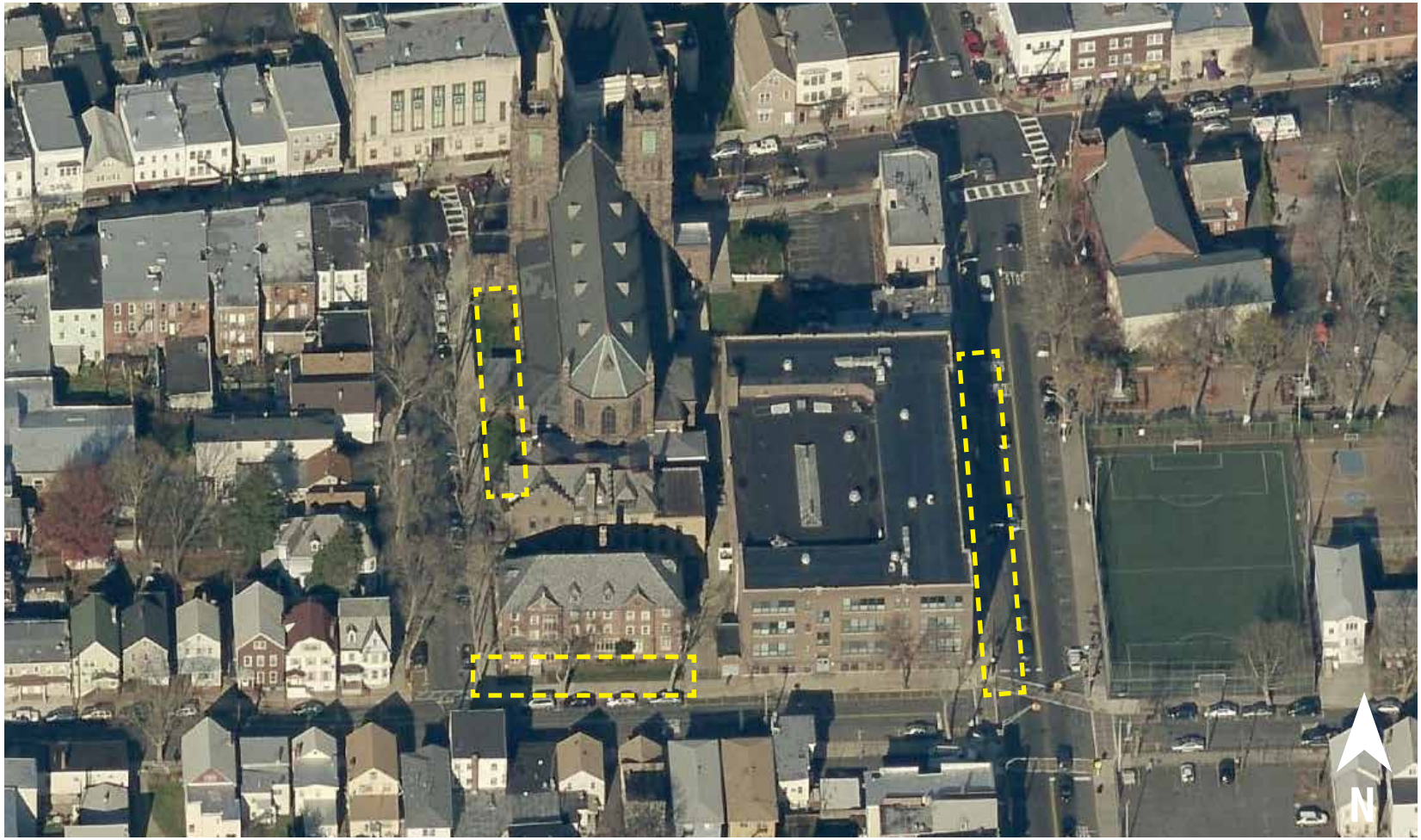
527 Central Avenue
Harrison, NJ 07029



This site is a church with a front lawn and planting beds surrounded by an elevated brick retaining wall. One visible downspout is piped into the ground, while another is directed to overflow on the concrete driveway. The front open space is a suitable location for a rainwater harvesting system or rain garden.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [x] rain barrels
- [ ] pervious pavement
- [ ] tree pits
- [ ] buffers
- [ ] bioswales
- [ ] stormwater planters
- [x] cisterns
- [ ] depaving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The site is a church, school, and several parish buildings located on a single block. Several buildings along Church Square have downspouts directly connected into the sewer system. Rain gardens are suitable for downspout disconnection at several locations on this site. A complete site evaluation is recommended in partnership with property managers.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [ ] rain barrels
- [ ] pervious pavement
- [ ] tree pits
- [ ] buffers
- [ ] bioswales
- [ ] stormwater planters
- [ ] cisterns
- [ ] depaving

HOLY CROSS CHURCH PARKING LOT

100 Frank East Rodgers Boulevard South
Harrison, NJ 07029

This site is a parking lot for the nearby Holy Cross Church. The asphalt is in fair condition with visible cracks and potholes. There is a catch basin on-site, but most of the parking lot drains away from the site onto the adjacent sidewalk and road. It is possible to repave the lot in a one-way parking configuration using porous pavement. A vegetated filter strip/bioswale, porous pavement/sidewalk, or stormwater planter may also be used to intercept parking lot runoff.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☐ rain barrels
- ☑ pervious pavement
- ☐ tree pits
- ☐ buffers
- ☑ bioswales
- ☑ stormwater planters
- ☐ cisterns
- ☐ depaving

HOLY CROSS CHURCH PARKING LOT

100 Frank East Rodgers Boulevard South
Harrison, NJ 07029

Jersey Street & 3rd Street
Harrison, NJ 07029



The intersection of Jersey Street and 3rd Street consists of residential and religious community buildings. Stormwater flows from downspouts directly onto adjacent sidewalks and streets, where it then travels into catch basins located at the intersection. Creating curb 'bump-out' stormwater planters at no parking zones will intercept stormwater runoff and provide traffic calming for pedestrians.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☐ rain barrels
- ☐ pervious pavement
- ☐ tree pits
- ☐ buffers
- ☐ bioswales
- ☑ stormwater planters
- ☐ cisterns
- ☐ depaving

KINGSLAND AVENUE STREETSCAPE

Kingsland Avenue & Franklin Avenue
Harrison, NJ 07029



The site is a one-way residential street. Parking is limited and angled to the left side, allowing for thoroughfare and simplified ingress/egress. Homes along the street have downspout outflows enclosed in the curb. When repaving, porous asphalt should be used in the parking sections. Stormwater planters located parallel to the curb could be installed to intercept the residential roof runoff.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- ☐ rain gardens
- ☐ rain barrels
- ☑ pervious pavement
- ☐ tree pits
- ☐ buffers
- ☐ bioswales
- ☑ stormwater planters
- ☐ cisterns
- ☐ depaving

WEST HUDSON PARK

Davis Avenue
Harrison, NJ 07029



This site is a 46 acre recreational park in the Hudson County Park located at the northern boundary of Harrison. At the west entrance to the park there are signs of erosion and steep slopes along the main park road and pump house. Vegetated bioswales can be used to intercept stormwater at the most eroded places along the road and sidewalks. The pump house is in need of gutters to direct roof runoff away from the nearby slope and is a suitable site for a demonstration rain garden.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [ ] tree pits
- [ ] stormwater planters
- [ ] rain barrels
- [ ] buffers
- [ ] cisterns
- [ ] pervious pavement
- [x] bioswales
- [ ] depaving

WEST HUDSON PARK

Davis Avenue
Harrison, NJ 07029



This site consists of the recently completed Red Bull Arena and surrounding waterfront redevelopment area. Green infrastructure, water quality, and sustainable stormwater best management practices should be prioritized in all new development.

Part of the site is the recently developed streetscape of Somerset Street. Curbs along Somerset Street are depressed and provide opportunities to intercept runoff through vegetated bioswales or rain gardens between the sidewalk and the road. The west side and rear of the parking garage is an undeveloped gravel strip and should remain a permeable surface. Enhanced tree pits can be used in new street tree plantings where appropriate.

SUITABLE GREEN INFRASTRUCTURE STRATEGIES:

- [x] rain gardens
- [x] tree pits
- [ ] stormwater planters
- [ ] rain barrels
- [ ] buffers
- [ ] cisterns
- [x] pervious pavement
- [x] bioswales
- [ ] depaving

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PASSAIC VALLEY SEWERAGE COMMISSION

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