

An aerial photograph of a marina in Irvington, VA. The marina is filled with numerous sailboats docked at piers. The surrounding area is lush with green trees and grass, with some residential buildings visible. The water is a calm, light blue color. The overall scene is peaceful and scenic.

GREEN INFRASTRUCTURE ACTION PLAN

Irvington, VA

PROJECT PURPOSE

This Green Infrastructure Action Plan is a guiding document that provides a list of recommendations to address stormwater runoff and reduce erosion in your community. In order to help town leadership make informed decisions when planning and pursuing funding for projects, the green infrastructure practices recommended in this plan come with a range of price and maintenance commitments. Each recommended green infrastructure practice also includes potential funding sources and implementation partners. By implementing these recommendations, your community can improve its climate resilience and contribute to the larger effort to improve the health of local waterways and the Chesapeake Bay.

WHAT IS GREEN INFRASTRUCTURE?

Green infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle. By using plants, permeable surfaces, rainwater harvesting, or landscaping, rain water will be stored on site, allowing it to infiltrate back into groundwater, which will reduce erosion of town property and reduce pollution entering local waterways. Green infrastructure can improve water quality, reduce flooding, increase wildlife habitat, and improve air quality.



Rain Garden, example
of green infrastructure



Site visit to Irvington. Pictured from left to right: Christina Bonini (Alliance), Steve Kimmeth (Village Improvement Association), Heather Sheehan (Farmers Market Manager), Justin Nelson (Town Manager), Julie Harris (Mayor), Cay Bradley (Town Council) Neal Friedman (Alliance), Jeremy Taylor (Planning Commission), and Samantha Van Saun (Town Council).

ABOUT THE ALLIANCE FOR THE CHESAPEAKE BAY

The Alliance for the Chesapeake Bay (the Alliance) is a regional nonprofit organization focused on restoring the lands and waters of the Chesapeake Bay watershed. Our collaborative and action-oriented approach delivers on-the-ground solutions, technical assistance, and builds capacity to achieve healthier lands and cleaner water. We envision clean water and resilient landscapes, cared for by all the people who live, work, and play in the Chesapeake Bay watershed. Visit allianceforthebay.org to learn more.

ABOUT THE VIRGINIA MUNICIPAL LEAGUE

Since it was founded in 1905, the Virginia Municipal League's (VML) history has been linked inextricably to the fortunes of its member local governments. The league and its member cities, towns and counties have worked together to improve the quality of life in communities across Virginia.

VML is a non-profit, non-partisan association. The membership has grown from 16 in 1921, when VML hired its first staff members, to 217 today. That number includes 38 cities, 170 towns and nine counties.



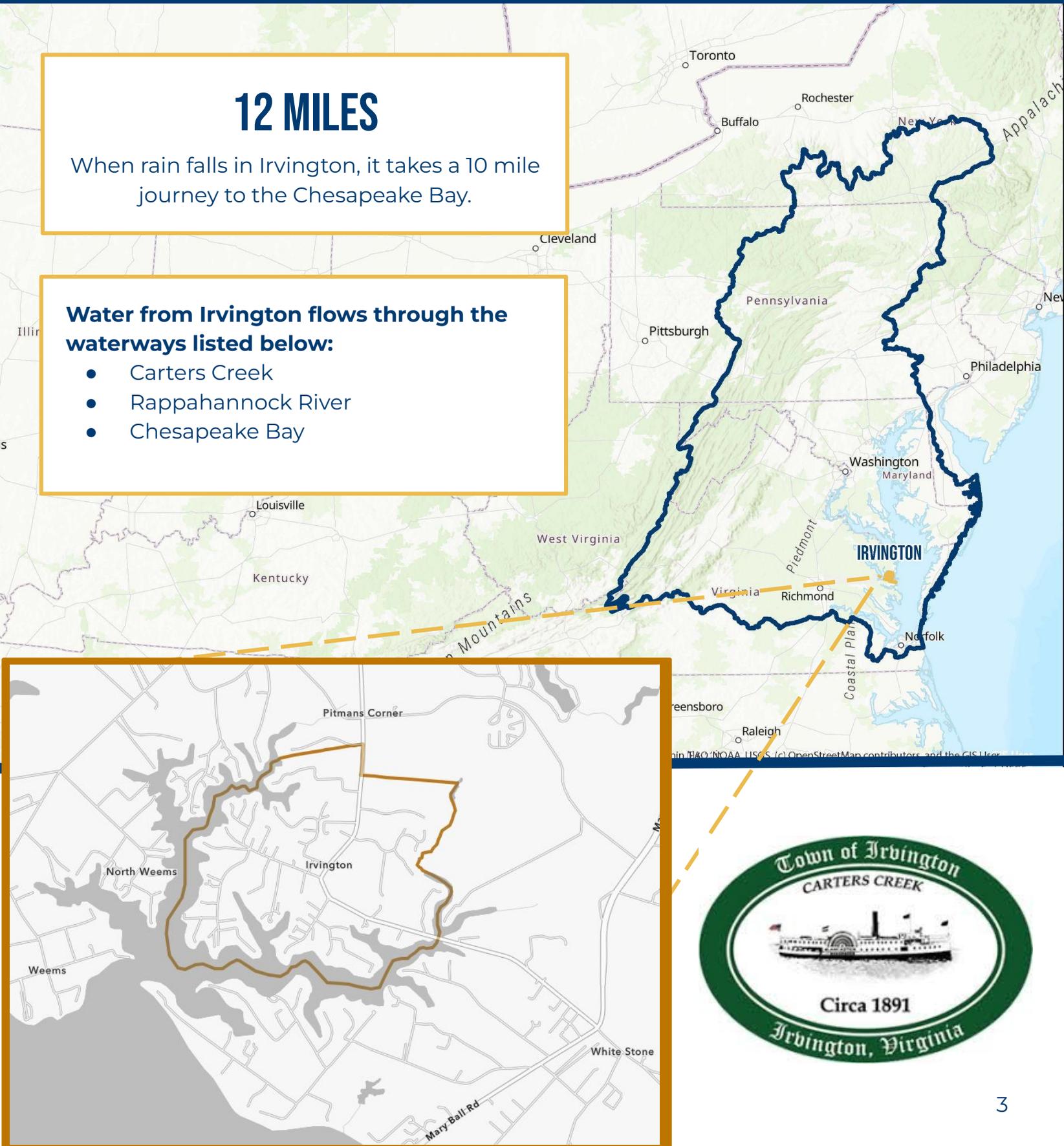
SITE INFORMATION FOR IRVINGTON, VA

12 MILES

When rain falls in Irvington, it takes a 10 mile journey to the Chesapeake Bay.

Water from Irvington flows through the waterways listed below:

- Carters Creek
- Rappahannock River
- Chesapeake Bay



AREA OF FOCUS

This Green Infrastructure Action Plan focuses on the Town Commons and North Commons, which includes 3 town-owned parcels and covers 6.4 acres.

This area is flat and predominantly open space turf grass.

Much of the project area has a soil type of Woodstown fine sandy loam, according to the [USDA Web Soil Survey](#), which is considered to have moderate permeability creating slow to medium runoff.

This space is frequently used for community events, like the Irvington Village Improvement Association Farmer's Market.

Recommendations are aimed to maintain the historic characteristics of the community while working to address flooding, increase education around green infrastructure practices, and ensure the space can continue to be an economic and cultural asset to the community.

Reducing flooding and stormwater runoff on site will help reach Irvington's Goal A, C, and G, outlined in the 2025 Comprehensive Plan.

Figure A: Aerial image with Town Commons and North Commons outlined in yellow.
 Figure B: - Concept plan for Town Commons and North Commons.

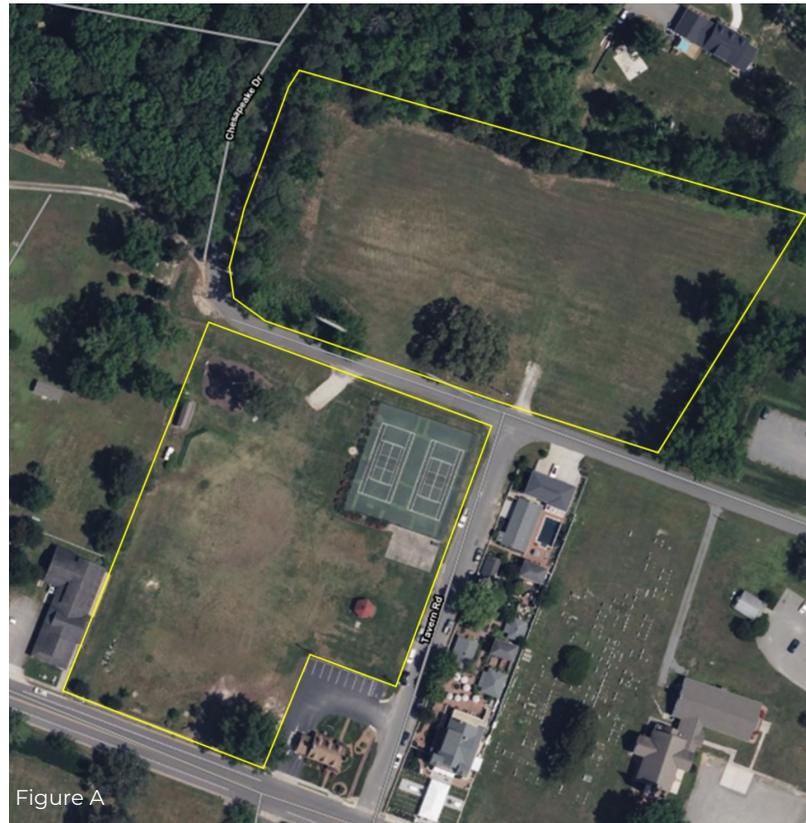


Figure A



Figure B

KEY ISSUES IDENTIFIED

Flooding and erosion due to stormwater runoff is occurring in the southeastern corner of the Town Commons, adjacent to Chesapeake Bank. While minimal, the slope off the bank parking lot is focusing the flow of stormwater into the space. During heavy rain events, flooding occurs throughout the entire project area.

Erosion and soil compaction were identified at the vehicle entrances on the north side of Town Commons and south side of North Commons, along Chesapeake Drive. Soil compaction reduces permeability and erosion can increase sediment and nutrients entering nearby waterways.

Drainage inlets and piping exist along the western boundary of the Commons and move stormwater towards the ditch along Chesapeake Drive. During heavy rain events, water moving through the ditch can spill over onto Chesapeake Drive impacting travel. Flooding has also been seen along Tavern Drive.



Drone photogage documenting flooding courtesy of Town of Irvington.



Erosion near bank parking lot.



Erosion and compaction near playground.



Stormwater inlets and ditch.

GREEN INFRASTRUCTURE RECOMMENDATIONS

Recommendations are aimed to maintain the historic characteristics of the community while working to address flooding, increase education around green infrastructure practices, and ensure the space can continue to be an economic and cultural asset to the community. Reducing flooding and stormwater runoff on site will also help Irvington to reach the following goals outlined in the 2024 Comprehensive Plan:

- Goal A: Preserve and enrich the charm and attractiveness of the Town of Irvington.
- Goal C: Foster the development of the Town’s infrastructure for full- and part-time residents and tourists
- Goal G: Continue to protect the Town’s environmental resources.

With “general support for minor, inexpensive improvements to landscaping, beautification, etc.” (2024 Comprehensive Plan), the plan focuses on a single green infrastructure practice, permeable pavement, to address issues identified. A general recommendations section is included which provides additional, inexpensive recommendations that could also be utilized.

The table below lists the recommendation, cost, maintenance level, and page reference number. Additional information on the recommendation can be found on the subsequent pages.

IRVINGTON RECOMMENDATIONS				
ISSUES	GREEN INFRASTRUCTURE PRACTICE	COST	MAINTENANCE	PAGE #
Runoff, Flooding, Erosion	Permeable Pavement	\$ - \$\$\$		7
Runoff, Flooding, Erosion	General recommendations	\$ - \$\$	 -  	12

The Alliance contracted Four Winds, LC to modify the existing commons master plan, previously approved by the town, to reflect our recommendations, as well as additional recommendations, for potential green infrastructure practices. This updated plan can be found in Appendix B, page 16.

1

PERMEABLE PAVERS

A permeable paver system allows stormwater to pass through the surface and into an underlying stone reservoir, rather than running off traditional impervious pavement. By reducing runoff volume and slowing the flow of water, permeable pavers help prevent erosion, minimize flooding, and promote natural groundwater recharge. The stored water can then infiltrate into the soil over time, supporting healthier soils and reducing stress on local drainage systems.

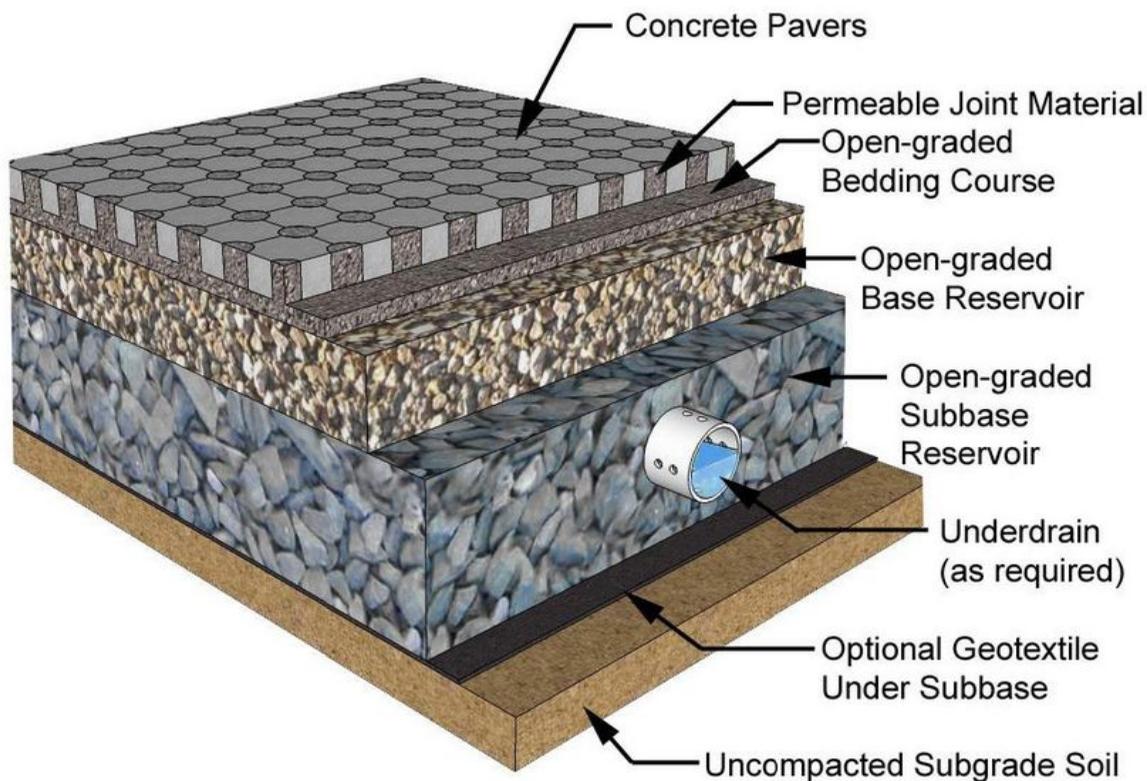
MAINTENANCE

Permeable pavers require relatively simple but consistent maintenance to keep them functioning well. Routine inspections are needed to remove leaves, sediment, and debris from the paver joints, as well as vacuuming or cleaning to prevent clogging one to two times a year. Weeds should be removed and damaged pavers replaced as needed.



COST

Average cost per square foot is: \$20-35. While installing permeable pavers is generally more expensive than conventional paving, they have a longer life expectancy and savings are recognized through lowered maintenance and stormwater management costs.



Cross Section of Permeable Pavers with Underdrain
Photo Credit: David Smith, ICPI

PERMEABLE PAVERS CONTINUED

DESIGN

Working with a licensed engineer on the design and sizing of the permeable area is highly recommended. Different types of permeable pavers are recommended for different locations in the project area. [See Potential Locations - Ranked - pg 11.](#)

- Locations 1, 3, 4: Due to vehicle traffic, these locations require pavers that are structurally designed to support the sustained weight of vehicles. The cost of these typically ranges from \$20-35 a square foot.
 - Option 1: Precast porous concrete panels which are modular, removable, reusable, ready-to-install units. Consideration: Higher cost.
 - Option 2: Stormcrete or Powerblock Pavers.
- Locations 2, 5, 6: Due to these locations only being used by foot traffic, more options exist for suitable permeable pavers. The aesthetics of the brick pavers can also help preserve Irvington's historic appeal.
 - Option 1: Brick Pavers
 - Option 2: Permeable interlocking concrete pavers (PICP)
 - Option 3: Grass or gravel fill pavers



Example:
Brick pavers



Example:
PICP



Example:
Grass fill pavers



Example:
Gravel fill pavers

Photos: Alliance for the Chesapeake Bay, Resilient East, Archweb.com, TrueGrid Pavers

Sediment pre-treatment areas installed around and near the permeable pavement can reduce sand and debris clogging the system. Examples of this are gravel filter strips or vegetated swales. Stamped pattern permeable pavers can also act as sediment catchment. It's not required, but including will help reduce the need for vacuuming and maintenance as they are easier to clean and reduce clogging of systems.



Pre-treatment example. "Sediment Pad" shown at the curb cutout into bioretention area to capture sediment, trash, and debris before entering BMP. Photo: City of Toronto, Canada

PERMEABLE PAVERS CONTINUED

DESIGN CONTINUE

At location 2, enhanced capacity underground retention basins could be used. This could help offset the impact of future capital improvement projects that may increase impervious surface and the volume of stormwater runoff. It's recommended to work with the engineer to plan for underground storage to accommodate this potential future load. Adding a stormwater retention area/rain garden adjacent to the parking lot would capture additional stormwater, create a space for native plants to filter water, and create an aesthetically enhanced space in the project area.

PERMITTING

Permits may be required depending on the size of the project and level of land disturbance. The town should work with their engineer to determine if the project size requires permits.

COMMUNITY ENGAGEMENT

This project serves as a unique opportunity for a public private partnership with Chesapeake Bank. Much of the stormwater runoff appears to be coming from the bank parking lot adjacent to the project area. Coordinating with the bank could provide match-funding for the grants while protecting their recent septic infrastructure investment.

REGIONAL EXAMPLE

To address flooding, pollution, and community aesthetics, the Hampton Roads Planning District Commission (HRPDC) retrofitted its regional building visitor lot with permeable concrete panels, bioretention basins, EV charging stations, and native landscaping. The project demonstrates how parking areas can serve as stormwater management tools, benefiting visitors and protecting local waterways. [Learn more.](#)

SUGGESTED IMPLEMENTATION PARTNERS

- Alliance for the Chesapeake Bay
- Chesapeake Bank (adjacent property owner)
- Friends of the Rappahannock
- Northern Neck Soil and Water Conservation District

PERMEABLE PAVERS CONTINUED

POTENTIAL FUNDING SOURCES

Virginia Soil and Water Conservation District's Virginia Conservation Assistance Program (VCAP): Permeable Pavement will be reimbursed at a rate of up to \$14.00 per square foot with a maximum payment of \$20,000.00. The cost-share program also provides financial incentives and technical and educational assistance to property owners installing eligible green infrastructure in areas where problems like erosion and poor drainage occur.

Stormwater Local Assistance Fund (SLAF): Matching grants to local governments for the planning, design, and implementation of stormwater best management practices (BMPs) that address cost efficiency and commitments related to reducing water quality pollutant loads.

National Fish and Wildlife Foundation's Small Watershed Implementation Grant (SWG): Program that supports efforts to achieve water quality improvement, restoration, and protection of key Chesapeake Bay species and their habitats, and the fostering of an engaged and diverse citizen and stakeholder presence that will build upon and sustain measurable natural resource improvements.

Green Streets, Green Jobs, Green Towns Grant Program (G3): Grant program supporting design and implementation of green streets, community greening, and urban tree canopy projects that enhance livability in cities and communities, in addition to white papers that address these topics. The goal of this grant program is to help communities develop and implement plans that reduce stormwater runoff, increase the number and amount of green spaces in urban areas, improve the health of local waters and the Chesapeake Bay, and enhance quality of life and community livability.

Public-Private Partnerships (P3): Working with Chesapeake Bank on funding that could be applied to the grants above to offset the cost to the town. Example: **Prince George's County Clean Water Partnership**

National Fish and Wildlife Foundation's Five Star Program: Community-focused grant initiative that builds local stewardship of natural resources by funding partnerships to restore and protect natural areas, and urban waters while addressing water quality issues like stormwater runoff and erosion. It provides funding for on-the-ground conservation, nature-based stormwater management, education, and community outreach, with measurable ecological and educational outcomes. Program is nationwide.

PERMEABLE PAVERS CONTINUED

POTENTIAL LOCATIONS - RANKED

Potential locations for permeable pavers were ranked by amount of impact. The amount of impact was determined by assessing which locations receive the most amount of stormwater in addition to the locations with public outreach opportunity. For example, the Shade Patio was a top request by community members, so permeable pavers with signage at this location could have a large impact.



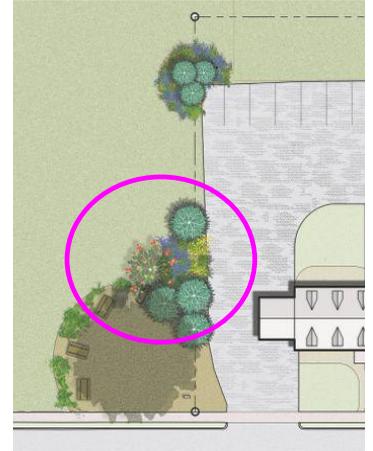
GENERAL RECOMMENDATIONS

PARTNERSHIPS

Continue working and growing Irvington’s relationship with Friends of the Rappahannock and the Northern Neck Soil & Water Conservation District.

RAIN GARDEN/BIORETENTION AREA

A rain garden is a bowl-shaped garden designed to capture and infiltrate stormwater runoff. Using deep-rooted native plants will help soak up the water and provide habitat for pollinators and wildlife. Installing a rain garden with an underdrain adjacent to the bank parking lot would slow stormwater runoff, reduce erosion, and increase beautification. Using native plants adapted to Irvington’s climate would require less maintenance once established.



Potential rain garden location circled in pink

RAINWATER HARVESTING

Installing a rainwater harvesting system on the Gazebo, could slightly reduce stormwater by capturing water running off the roof and storing it for future non potable use. Collected water may then be dispersed at a later time, when the soil is not saturated, to increase water infiltration into the ground and overflow could be directed to adjacent native plant gardens. Minor maintenance is required to empty containers to avoid overflow.

Including educational signage in this highly visible location could educate the public about this practice and inspire them to implement on their property.

CONSERVATION LANDSCAPING

Removing turf and planting native plants, shrubs, and groundcover at key areas throughout the project area that would not impede with the flow of traffic during events. Native vegetation and mulch create habitat, improve aesthetics, and can help with absorbing stormwater runoff. While reduction of turf grass reduces mowing, there are maintenance needs (weeding, watering, mulching, etc) associated with this practice.



BEFORE



AFTER

Before and after photos of conservation landscaping addressing erosion.

SOIL AMENDMENTS

Biochar soil amendments could be added to improve water retention. Biochar’s porous, high-surface-area structure acts like a sponge, increasing soil moisture storage and reducing evaporation. [Learn more about biochar.](#)

GENERAL RECOMMENDATIONS

SOIL AERATION

Vehicle traffic in the project area compacts the soil leading to decreased infiltration during rain events. Aerating the soil will relieve compaction and increase permeability. Working with local landscaper to determine frequency is recommended.

EDUCATIONAL SIGNAGE

With extensive public use of the space during events, educational signage at key areas throughout the space could educate visitors about the importance of green infrastructure and how it works. These signs could magnify the impact of the practice as it could inspire others in the community to adopt similar practices at their homes or businesses. Signs also provide an opportunity to recognize partners and funders through the inclusion of their logos. Key areas for signage include the Gazebo, Arrival Court, Playground, near conservation landscaping, and near permeable pavement additions.

The example permeable paver sign below was created for Blackwell Park in Richmond, VA.



Funding for this project was provided in part by National Fish & Wildlife Foundation, Chesapeake Bay Trust, CarMax, Altria, Dominion, Richmond Dept. of Public Utilities, VA Dept. of Forestry, and Luck Ecosystems

La financiación de este proyecto fue proporcionada en parte por la Fundación Nacional para la Vida Silvestre y Acuática, Chesapeake Bay Trust, CarMax, Altria, Dominion, el Departamento de Servicios Públicos de Richmond, el Departamento de Silvicultura de Virginia y Luck Ecosystems

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APPENDIX A

FUNDING



[Virginia Conservation Assistance Program](https://vaswcd.org/vcap/)
<https://vaswcd.org/vcap/>



[DEO Stormwater Local Assistance Fund:](http://deq.virginia.gov/water/clean-water-financing-and-assistance/stormwater-local-assistance-fund-slaf)
deq.virginia.gov/water/clean-water-financing-and-assistance/stormwater-local-assistance-fund-slaf



[National Fish and Wildlife Foundation's Small Watershed Grant:](http://nfwf.org/programs/chesapeake-small-watershed-grants)
nfwf.org/programs/chesapeake-small-watershed-grants



[Chesapeake Bay Trust's Green Streets, Green Jobs, Green Towns Grant:](http://cbtrust.org/grants/green-streets-green-jobs-green-towns/)
cbtrust.org/grants/green-streets-green-jobs-green-towns/



[National Fish and Wildlife Foundation's Five Star Program](https://www.nfwf.org/programs/five-star-program)
<https://www.nfwf.org/programs/five-star-program>

ADDITIONAL RESOURCES



[Basics of Biochar: Understanding Its Definition and Diversity](https://www.scalingupbiochar.com/lessons/basics-of-biochar-understanding-its-definition-and-diversity)
<https://www.scalingupbiochar.com/lessons/basics-of-biochar-understanding-its-definition-and-diversity>



[Beyond Just Parking: New Regional Building Parking Lot Demonstrates Innovative Green Practices:](https://www.hrpdcva.gov/CivicAlerts.aspx?AID=189&ARC=453)
<https://www.hrpdcva.gov/CivicAlerts.aspx?AID=189&ARC=453>



[Prince George's County Clean Water Partnership:](https://thecleanwaterpartnership.com/)
<https://thecleanwaterpartnership.com/>



[Municipal Online Stormwater Training Center:](https://mostcenter.umd.edu/)
<https://mostcenter.umd.edu/>



[Native Plant Center:](http://nativeplantcenter.net)
nativeplantcenter.net or www.allianceforthebay.org/native-plant-center/



[Native Plants or Wildlife Habitat and Conservation Landscaping:](http://dnr.maryland.gov/criticalarea/Documents/chesapeakenatives.pdf)
dnr.maryland.gov/criticalarea/Documents/chesapeakenatives.pdf



[Staying Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed:](http://americanrivers.org/wp-content/uploads/2016/05/staying-green-strategies-improve-operations-and-maintenance.pdf)
americanrivers.org/wp-content/uploads/2016/05/staying-green-strategies-improve-operations-and-maintenance.pdf



[Sustainable Landscape Maintenance Manual for the Chesapeake Bay Watershed:](http://cblpro.org/downloads/CBLPMaintenanceManual.pdf)
cblpro.org/downloads/CBLPMaintenanceManual.pdf



[Vegetation in Stormwater Best Management Practices:](http://mde.maryland.gov/programs/Water/StormwaterManagementProgram/Documents/MDE%20Stormwater%20Vegetation%20Guidance%202011-2019.pdf)
mde.maryland.gov/programs/Water/StormwaterManagementProgram/Documents/MDE%20Stormwater%20Vegetation%20Guidance%202011-2019.pdf

FOUR WINDS, LC

As part of this project, the Alliance contracted Four Winds, LC to make alterations to the existing Commons master plan adopted by town council to reflect potential green infrastructure practices on town property. Labels were adjusted along with the site plan to reflect recommendations in the report.

If Irvington wishes to pursue any of Four Wind, LC’s additional recommendations, the Alliance is available to provide additional guidance and support in moving forward.

