



STORMWATER TECHNICAL ASSISTANCE FOR TOWNS

VML CONFERENCE

AGENDA

- **Who is the Alliance for the Chesapeake Bay?**
- **Stormwater Technical Assistance for Towns Program Overview**
- **Green Infrastructure Action Plan Walkthrough**
- **Other Resource for Local Governments**
- **Questions**



VISION

We envision clean water and resilient landscapes, cared for by all the people who live, work, and play in the Chesapeake Bay watershed.

MISSION

The Alliance restores 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.

VALUES

- Adaptive - We design tactics to achieve common goals.
- Collaborative - We partner across sectors and regions.
- Result-Oriented - We deliver efficient, measurable, and holistic programming.
- Equitable - We prioritize inclusivity in directing our impact.



AGRICULTURE



FORESTS



**GREEN
INFRASTRUCTURE**



**STEWARDSHIP
& ENGAGEMENT**



STORMWATER TECHNICAL ASSISTANCE FOR TOWNS (STAT)

STAT OVERVIEW - GOAL

- Provide recommendations to VA Towns to utilize green stormwater infrastructure (GSI) to address erosion, flooding, and stormwater issues.

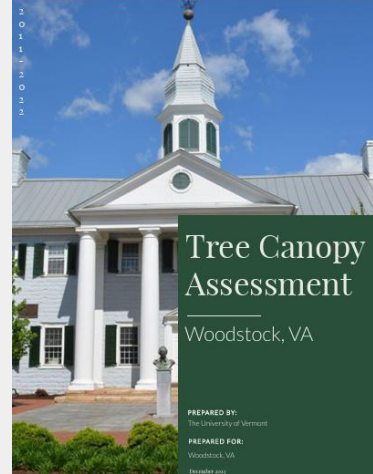


STAT OVERVIEW - PROCESS

Site Visits



Desktop Analysis



STAT OVERVIEW - COLLABORATION



STAT OVERVIEW – PRODUCT



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.



GREEN STORMWATER INFRASTRUCTURE ACTION PLAN

GREEN INFRASTRUCTURE ACTION PLAN

- Recommendations

1

SWALE

A swale is a broad ditch or depression, often vegetated, designed to manage runoff and encourage water infiltration. A swale constructed below the outflow of the level spreader will direct and filter stormwater flowing from the slope into the wooded area adjacent to the trail. The swale will slow down runoff and allow for some of it to soak into the ground. Plantings can be incorporated in the swale and along the edges. A weir, or small wall, can be incorporated to create a series of "step downs" to help reduce high velocity water.

MAINTENANCE

Sediment and debris like leaves and trash will need to be periodically removed from the swale to prevent blocking the flow of water. Undesired vegetation growing inside and along the banks of the swale will also need to be removed. The swale will need to be monitored for water pooling. Water should not pool inside the swale channel for more than 2 or 3 days after a storm event.

COST

A vegetated swale will cost approximately \$20-\$40 per square foot. It would be prudent to include this update to the trail in the larger park improvement project happening adjacent to the site. That would allow the contractor to build this swale while already on site, thus reducing mobilization costs.

Explanation of the practice

Maintenance requirements

Estimated costs

Photo of the practice

GREEN INFRASTRUCTURE ACTION PLAN

• Recommendations

2 SWALE CONTINUED

POTENTIAL FUNDING SOURCES

Central Shenandoah Planning District Commission Watershed Wellness Grant

- The CSPDC Watershed Wellness Grant is a reimbursement grant that provides up to \$100,000 in non-match funding for planning, design, and construction of practical, cost-effective, and ready-to-go best management practice (BMP) stormwater projects that improve water quality and reduce runoff in the Chesapeake Bay watershed. Funding is available for localities and non-profits within the five-county CSPDC region. Applications will be accepted on a rolling basis throughout 2025 until all grant program funds are expended. All projects must be completed by December 19, 2025.

Virginia Soil and Water Conservation District's Virginia Conservation Assistance Program (VCAP):

- VCAP is a cost-share program that provides financial incentives and technical and educational assistance to property owners installing eligible green infrastructure practices in Virginia's participating Soil and Water Conservation Districts. These practices can be installed in areas where problems like erosion, poor drainage, or poor vegetation occur.

SUGGESTED IMPLEMENTATION PARTNERS

- Valley Engineering
- Shenandoah Valley Soil and Water Conservation District - District office at 540-534-3105

DESIGN

It is best to work with an engineer or a landscaper for this practice.

PERMITTING

It is recommended to confirm with your contractor or engineer on whether or not this practice will require permits. If bundling this improvement project with the adjacent community park improvements, these could all fall under one permit.

COMMUNITY ENGAGEMENT

Community engagement will need to occur around construction on the trail that could lead to disrupted access for the public. A temporary sign could be placed on site explaining that the disruption is necessary to reduce erosion and ensure the future of the trail. Additionally, information could be included in Town Council communications or through social media.

7

Potential funding sources

Suggested implementation partners

Design considerations

Permitting requirements

Community engagement strategies

GREEN INFRASTRUCTURE ACTION PLAN

• What else is in the plan?

SITE INFORMATION FOR MT. CRAWFORD, VA

343 MILES

When rain falls in Mt. Crawford, it takes a 343 mile journey to the Chesapeake Bay.

Water from Mt. Crawford flows through the waterways listed below:

- North River
- South Fork Shenandoah River
- Shenandoah River
- Potomac River
- Chesapeake Bay

AREA OF FOCUS

This Green Infrastructure Action Plan focuses on the town-owned property behind Mt. Crawford's Town Municipal Building.

This area is sloped, and the majority of water runs downhill to the west, entering the floodplain and the North River below. To the west of the building, a paved accessible trail and boat launch for canoes and kayaks have been built to provide public river access to the North River.

Due to the steep slope of the site, stormwater runs off the parking lot at the top of the site and has begun to cause erosion along parts of the trail. A new town park is being constructed adjacent to the Town Municipal Building and will provide additional amenities to the public visiting the area.

With increased public access to the area, it is important to manage erosion along the boat ramp trail so that it can continue to be an asset to the community.



KEY ISSUES IDENTIFIED

Erosion is occurring at several points along the newly constructed river access trail behind the Town Municipal Building. The table on the following page outlines green infrastructure practices that can help reduce or prevent this erosion, protecting the trail's structural integrity and minimizing pollution entering the North River. Additional details for each practice are provided in the pages that follow.

It is also recommended that Mt. Crawford consult the original engineer or designer of the level spreader installed at the upper portion of the trail. Level spreaders help diffuse stormwater and reduce erosion; however, given the current erosion issues, a reevaluation of its effectiveness is advised.

GREEN INFRASTRUCTURE RECOMMENDATIONS

ISSUES	GREEN INFRASTRUCTURE PRACTICE	COST	MAINTENANCE	PAGE
Erosion, runoff	Swale	\$ \$	✓	6
Erosion	Tree and shrub planting	\$	✓	8
Erosion, runoff	Erosion mat and conservation landscaping	\$	✓	11
Erosion, runoff	Channel drain	\$ \$	✓	13
Invasive Species	Invasive species management	\$	✓	15

LOCAL RESOURCES

- ALLIANCE FOR THE CHESAPEAKE BAY**
Name: Rick Mittler, Local Government Projects Coordinator
Email: rmittler@allianceforthebay.org
Phone: (804) 775-0953
Address: 1221 Hull Street, Suite 101C, Richmond, VA 23224
- CENTRAL SHENANDOAH PLANNING DISTRICT COMMISSION**
Name: Zac Beard, Program Manager
Email: zach@csdpc.org
Phone: (540) 885-5774
Address: 112 MacTany Place, Staunton, VA 24401
- SHENANDOAH VALLEY SOIL AND WATER CONSERVATION DISTRICT**
Name: Megan Dalton, District Manager
Email: info@svswcd.org
Phone: (540) 534-3105
Address: 1934 Deyler Avenue, Suite B, Harrisonburg, Virginia 22801
- VIRGINIA DEPARTMENT OF FORESTRY**
Name: Stuart Baker, Area Forester
Email: stuart.baker@DOF.virginia.gov
Phone: (434) 987-6336
Address: 90 Forestry Center Lane, Crimora, VA 24431
- VIRGINIA MUNICIPAL LEAGUE**
Name: Mitchell Smiley, Policy Manager, Transportation and Natural Resources
Email: msmiley@vml.org
Phone: (804) 401-7425
Mailing Address: P.O. Box 12664, Richmond, VA 23246
Office Address: 13 E. Franklin St., Richmond, VA 23279

LINKS

1. **Watershed Wellness Grant:** www.cspdc.org/programs-services/wip-ii/
2. **Central Shenandoah Valley Master Gardener:** www.csvmg.org
3. **The Eight Essential Elements of Conservation Landscaping:** www.chesapeakebaylandscape.org/resources/the-eight-essential-elements
4. **Native Plant Center:** nativeplantcenter.net or www.allianceforthebay.org/native-plant-center/
5. **Plant Ridge & Valley Native:** [A Guide for Gardeners](https://storage.googleapis.com/virginia-public-plant-ridge-2016/valleyNativeDigitalmail-C.pdf) <https://storage.googleapis.com/virginia-public-plant-ridge-2016/valleyNativeDigitalmail-C.pdf>
6. **Japanese Knotweed:** extension.psu.edu/japanese-knotweed
7. **Blue Ridge Prism:** www.blueridgeprism.org
8. **Virginia Invasive Plant Coalition:** www.virginiainvasives.org/resources
9. **Virginia Invasive Plant ID & Control Tool:** www.blueridgeprism.org/plants
10. **Headwaters Master Naturalist:** www.headwatersnm.org

ADDITIONAL RESOURCES

- Native Plants or Wildlife Habitat and Conservation Landscaping:** www.rnriandgwtc.com/documents/nativeplants.pdf
- Developing Green Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed:** www.virginia.gov/pubs/other/developing-green-strategies-improve-operations-and-maintenance.pdf
- Sustainable Landscaping Maintenance Manual for the Chesapeake Bay Watershed:** 2030.org/download/CLM-PH/landscapingmanual.pdf
- Vegetation in Stormwater Best Management Practices:** web.maryland.gov/gwp/docs/StormwaterBestManagementProgram/Documents/bt08/bt08stormwaterbt08vegetationbt08stormwaterbt08.pdf

WHO WE ARE WORKING WITH



WHO WE ARE WORKING WITH

Is your
town
interested?



THANKS

- **Key Partner**
 - Virginia Municipal League

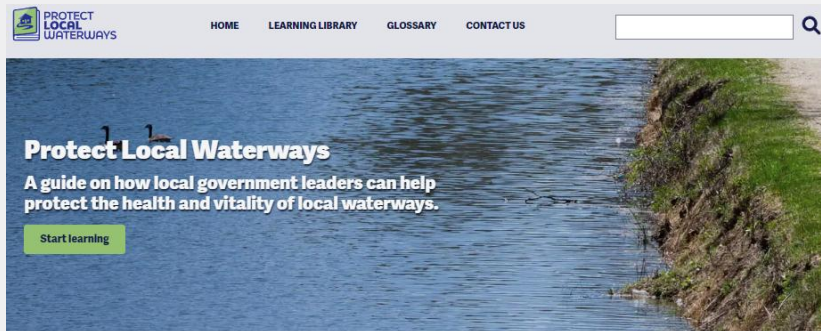


- **Funding**
 - National Fish and Wildlife Foundation



OTHER RESOURCES

PROTECT LOCAL WATERWAYS



Set the Course for Your Community

Local government leaders are key decision makers in creating healthy, vibrant communities. When you take action to protect local landscapes and waterways, you're taking action to help your communities thrive.



Resource Hub
for Local Officials

Designed by
Local Officials for
Local Officials

PROTECT LOCAL WATERWAYS – LEARNING LIBRARY

HOMELEARNING LIBRARYGLOSSARYCONTACT US

Learning Library

Learn how your actions to protect and restore the environment also support education, economic development, public health and safety, and infrastructure.

How Your Watershed Works

Get to know the Chesapeake Bay: its watershed, its residents and the role of clean water in helping its communities thrive.

[View details](#)[Preview](#)

Foundations of Clean Water

Learn about laws and agreements relevant to Chesapeake Bay health.

[View details](#)[Preview](#)

Clean Water for the Economy

Learn how environmental protections help local economies thrive.

[View details](#)[Preview](#)

Capitalizing on the Benefits of Trees

Learn how to expand tree cover across your community.

[View details](#)[Preview](#)

Preserving Local Character and Landscapes

Access foundational resources and case studies to support your land use decision-making.

[View details](#)[Preview](#)

Protecting Your Infrastructure Through Stormwater Resilience

Learn how to plan for climate conditions and the risks of stormwater runoff.

[View details](#)[Preview](#)

Building the Workforce of Today and Tomorrow

Learn how supporting green jobs can help your community thrive.

Preparing Your Community for Water Extremes

Learn how to prepare for, manage and reduce the impacts of local flooding and drought.

11 Learning Modules

PROTECT LOCAL WATERWAYS – MODULES

Protecting Your Infrastructure Through Stormwater Resilience

Managing stormwater runoff and increasing stormwater resilience can mitigate flooding and flood-related damages to local infrastructure. Stormwater runoff can carry bacteria and other pollutants into waterways used for drinking water, fishing, swimming and other recreational activities. This module explains how to protect your community by planning for climate conditions and the risks of stormwater runoff.

[Read the video transcript →](#)

[Preview](#)



IN THIS TOPIC YOU WILL LEARN

- 1 What is stormwater and how can it be dangerous to my community?
- 2 What can I do to mitigate flood-related damages?
- 3 How will future climate conditions impact infrastructure?

Case Studies You'll Find Inside

Henrico County

Pennsylvania

Claud E. Kitchens Outdoor School

Binghamton

Norfolk

Annapolis

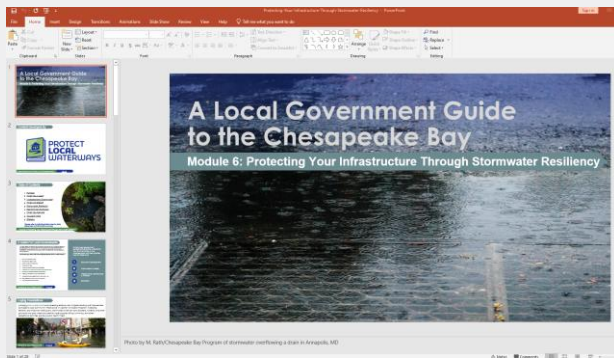


A line of cars drives down a flooded street. (Envato Elements)

Norfolk
NORFOLK, VIRGINIA

Preparing for Weather Extremes

In 2018, Norfolk, Virginia, adopted a [zoning ordinance](#) that directs new and more intense development to be built on higher ground. In an effort to mitigate the impacts of sea level rise, the ordinance established a Coastal Resilience Overlay zone, wherein development must meet new flood resilience requirements, and an Upland Resilience Overlay zone, designed to encourage development in areas of the city at lower risk of flooding.



Highlights



Education

Excess stormwater runoff can cause flooding and other damage to school buildings, leading to extended closures and missed school days. Excess runoff can also disrupt bus routes and impact Internet access that is needed for schoolwork.



Economic Development

Flooding harms businesses, damages private property and threatens the health of local waterways, which often support tourism and outdoor recreation.



Public Health and Safety

Stormwater runoff picks up litter, toxic contaminants, nutrients, sediment and other pollutants as it passes over the land. These pollutants are typically discharged directly into local waterways, without having been treated.



Infrastructure Maintenance and Finance

Flooding endangers critical community infrastructure, including roads, bridges, power lines, cellular phone service and access to drinking water.



A Local Government Guide to the Chesapeake Bay
PROTECTING YOUR INFRASTRUCTURE THROUGH STORMWATER RESILIENCY

A Local Government Guide to the Chesapeake Bay is a seven-module series created to support decision making by local officials. As a local leader, your decisions set the course for your community. Your actions determine the health and vitality of your jurisdiction, as well as that of local waterways and the Chesapeake Bay. You can achieve win-win outcomes by prioritizing local economic development, infrastructure resiliency, public health, and education while also protecting your environment. This fact sheet accompanies a module focused on stormwater and flooding.

WHAT IS STORMWATER?

Stormwater, or runoff, is precipitation that does not evaporate or soak into the ground but instead runs across the land and into the nearest waterway. Along its path, it picks up pollutants (like litter, nutrients, and bacteria) and erodes the land, carrying sediments and pollutants directly to local waterways and the Chesapeake Bay. The amount of stormwater that your community experiences is likely to increase due to projected increases in precipitation.

THE WATER CYCLE



IMPACT ON YOUR COMMUNITY

Flooding can disrupt education through extended building closures, responsible bus routes, lack of internet access, and more.

Pollution carried in runoff can make local waterways unsafe. Recreation and eating local fish and shellfish may become unsafe. Stormwater runoff can also threaten drinking water in your community or downstream.

Flooding in the United States disproportionately harms African American neighborhoods. [Read the 2022 book Scientific American](#)

Diversity Equity Inclusion Justice

One inch of rain

730 gallons of runoff

Natural landscapes reduce runoff in your community. Adding more parking lots, roofs, and roads changes landscapes and can have negative impact on stormwater resiliency.

Every \$1 invested in natural hazard mitigation pays back \$7 in emergency response and recovery costs in the long run. [Read the 2022 report from National Oceanic and Atmospheric Administration](#)

Please visit the [Chesapeake Bay Program website](#) for more information.

March 2021

Glossary

A

Agricultural byproducts

Provides fertilizers, herbicides and other products that can harm the health of humans and wildlife. For example, herbicides used to treat unwanted weeds in farmland can be carried into local waterways.

This term can be found in: [Consulting on the Benefits of Trees](#)

Agrotourism

Travel that involves a recreational or educational experience, such as a harvest or grow your own fruits. This term can be found in: [Chesapeake Local Character and Landscapes: Understanding and Supporting Your Agricultural Identity](#)

Altitude

The area of land over which offshore populations can travel to reach a particular shore, lake, bay or other body of water. The Chesapeake Bay cannot be accessed by ships, including those in Canada, west to the west and south to the south coast.

This term can be found in: [Your Health and the Environment](#)

JUMP TO LETTER

A B C D E F G
H I J K L M N O
P Q R S T U V W
X Y Z +TOP

PROTECT LOCAL WATERWAYS



Online resource library designed by local government leaders for local government leaders. Download resources, review case studies, and explore how your actions to protect and restore the environment also support local education, economic development, public health and safety, and infrastructure

Visit protectlocalwaterways.com
or scan the QR code!



WATERSHED CURRENTS NEWSLETTER



Bi-monthly curated newsletter that highlights local case studies and provides inspirational and informative resources for local governments and interested parties within the Chesapeake Bay watershed. Each newsletter is themed-focused and organized by local priorities impacting local government communities today.

Scan the QR code to sign up
for our newsletter!



QUESTIONS?

THANK YOU!

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FOR OUR FORESTS. FOR OUR STREAMS. FOR OUR FUTURE.

