Ashokan Watershed Stream Management Program

STREAM GUIDE

A HOMEOWNER'S GUIDE TO MITIGATING FLOOD RISK

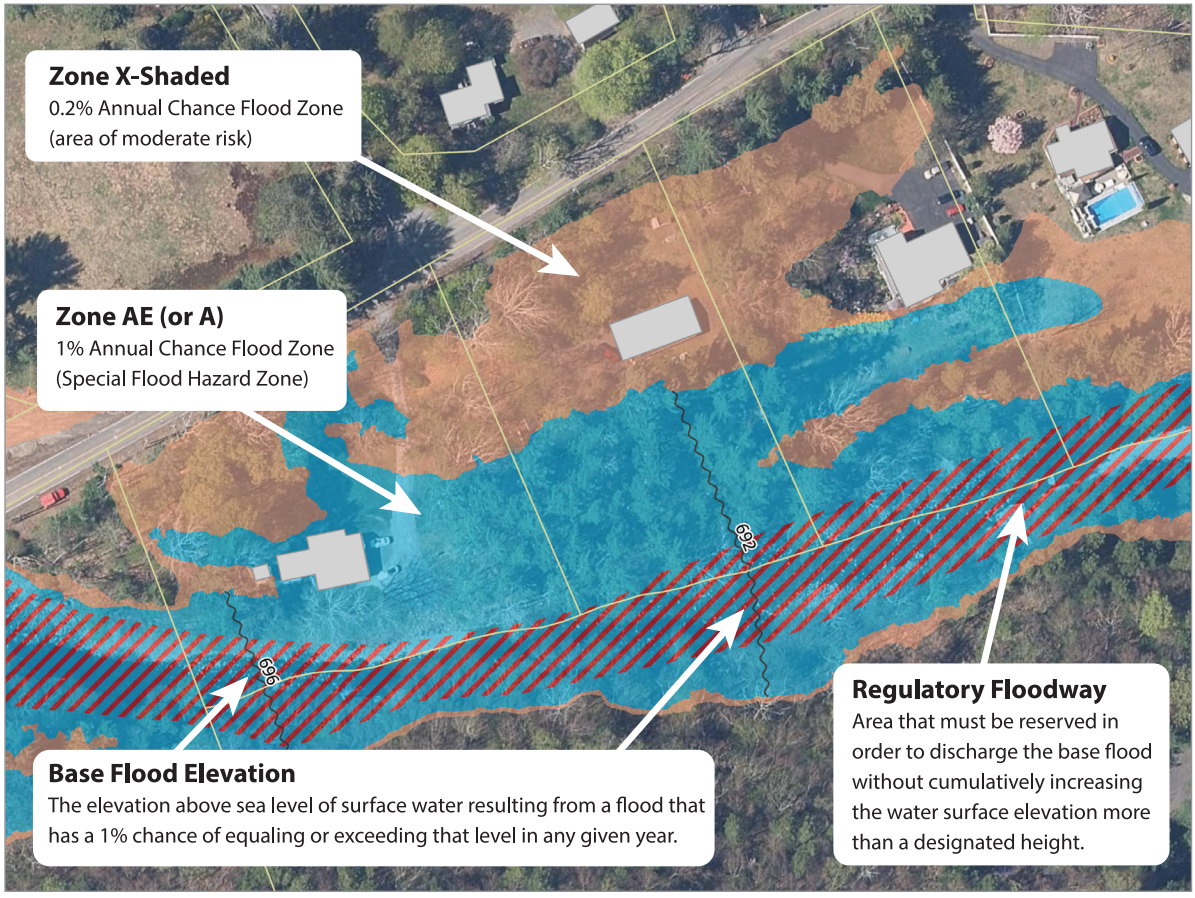
Assessing Your Flood Risk

Do you know your flood risk? The purchase of your home may be the largest and most significant investment you make in your lifetime, but are you considering all the ways you need to protect that investment? Flooding is the most common natural disaster in the United States. Could your home be at risk? We live in an area that experiences frequent, and sometimes significant, flooding and it's important to be prepared. Fortunately, there are tools available that you can use to check your flood risk.

Flood Maps

Each community in our watershed participates in the National Flood Insurance Program (NFIP). You can view NFIP Flood Insurance Rate Maps (FIRMs) for your area to determine if you are in a federally regulated flood zone. All FIRMs can be browsed and downloaded for free by visiting the FEMA Map Service Center online at: https://msc.fema.gov/portal.

If you need assistance reading a FIRM and understanding the flood map symbols, FEMA offers a helpful how-to guide. Visit https://www.fema.gov/sites/default/files/documents/how-to-read-flood-insurance-rate-map-tutorial.pdf to learn



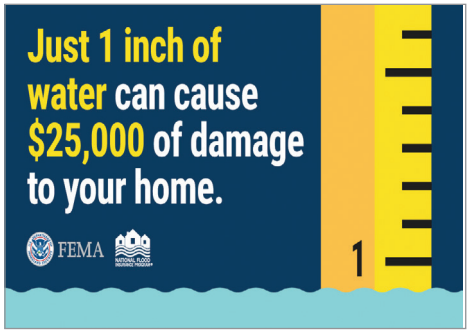
Flood Insurance Rate Maps (FIRMs) and high-resolution GIS mapping tools like the National Flood Hazard Layer (shown here) identify different "flood zones." These zones identify areas that will be inundated by a flood event having a 1% annual chance (blue shaded area) or a 0.2% annual chance (orange shaded area) of being equaled or exceeded in any given year. FIRMs developed for streams in the NYC Drinking Water Supply Watershed portion of the Catskills are based on surveys conducted from 2010-2012.The maps provide a fairly accurate assessment of flood probability. As the climate changes, the probability of floods occurring may also change over time requiring the maps to be updated.

more. Or you can seek assistance from a local code official or Certified Floodplain Manager. The Ashokan Watershed Stream Management Program also offers a video tutorial "How to Read a FIRM Map." Visit https://www.youtube.com/@AshokanWatershed/videos.

Flood Insurance Rate Maps (FIRMs) identify different "flood zones" that indicate the probability a flood will occur within the zone in any given year. FIRMs developed for streams in the NYC Drinking Water Supply Watershed portion of the Catskills were produced from 2010-2012 and provide a fairly accurate assessment of flood probability. As the climate changes, the probability of a flood occurring may also change over time requiring maps to be updated.

One important flood zone identified on the FIRM is the "Special Flood Hazard Area," also called the '100-year flood zone.' Because all FIRMs are based on probability, you should think of this area as having at least a 1% chance of being inundated by floodwaters in any given year. While that may not sound like much risk within any given year, this rarer and deep 'base' flood has a **26% chance of occurring over the life of your 30-year mortgage**.

Structures within this zone may also be at risk during shallower and more frequent floods. To give a sense of how often smaller floods can occur in our region, there have been 13 storm events larger than the 10-year flood recorded since 1932 at a stream gage on the Esopus Creek near Coldbrook (Boiceville commercial area). Of these, nine exceeded the 25-year flood event and two were greater than a 50-year event. According to FEMA and the NFIP, even **just 1 inch of water can cause up to $25,000 of damage to your home**.



Information on the flood frequency and inundation depths may be less readily available for small streams and those with intermittent flows (streams you can easily walk across). However, be aware that seemingly small streams can rapidly enlarge and cause flood damage.

Elevation Certificates

If you'd like to know the precise details surrounding your home's possible flood risk, consider contacting a professional land surveyor for an Elevation Certificate. This certificate will provide information on your exact base flood elevation and the height of your lowest floor, first floor and adjacent ground above sea level. This information can help you determine if action is needed. An Elevation Certificate may also help an insurance agent determine a policy rate for you.

Flood Insurance

Traditional homeowners' insurance does not cover damages due to flooding. If you have a federally backed mortgage, and you live within the Special Flood Hazard Area, you're already required to carry a flood insurance policy. However, if you own your home outright or rent, and live within or very near a mapped flood zone (zones A, AE, X-shaded), you are likely at risk and should consider obtaining a flood insurance policy.

Be aware that Flood Insurance Rate Maps are created for rating purposes. These maps focus on riverine and coastal flooding and don't identify all areas subject to localized flooding, like storm water runoff, or other conceivable risks. FEMA officials recently reported that approximately 40% of flood insurance claims are made from *outside* the mapped flood areas, meaning that locations outside a designated flood zone are not necessarily safe from flooding. Ask your neighbors, local Building Inspector or Floodplain Administrator about any historic flooding in your neighborhood. While a flood insurance policy can be expensive, it is often the only disaster assistance that individuals will receive after a flood.

Mitigating Your Flood Risk

Protecting Your Home from Flood Damages

Each year millions (and sometimes billions) of dollars are spent on repairing or rebuilding structures following a flood. There are actions homeowners can take to protect their most valuable investment. Structures that are properly elevated or floodproofed typically receive little or no flood damage. Owners of these structures also have the benefit of paying reduced premiums on flood insurance, making the structures more affordable overall. Whether you're looking at building new construction or retrofitting an existing structure, it makes sense both from a safety and a financial standpoint to elevate or floodproof. In fact, according to FEMA, estimates indicate that on average, for every $1 spent on mitigation, $4 are saved from future losses.

A flooded home pushed off its foundation by floodwaters, Oliverea, NY. This home was not elevated or wet floodproofed. Photo: A Bennett

A home in Phoenicia, NY undergoing an elevation. Photo: AWSMP

Elevation

Elevating a structure is one of the most common and effective ways to reduce a building's susceptibility to flood damage. To elevate a structure properly, New York State regulations require that new construction be built at least two feet above the Base Flood Elevation (BFE). The BFE is the water surface elevation during a 1% annual chance flood. Elevation of an existing structure is also possible. Special lifting equipment, such as hydraulic and other jacks, are used to gently lift the structure, inch by inch. Timber cribbing is placed under the structure as it is elevated, and the jacks need to be reset or moved until the final elevation is reached. The foundation, such as an extended foundation wall and crawlspace, piles, posts, piers, or columns will then be built, and ultimately the home will be lowered and fastened to the foundation.

Elevating on Extended Foundation Walls

For areas with shallower flooding, elevating a structure on extended foundation walls is an appropriate technique to use. Structures are either constructed or lifted to allow a higher foundation wall to be built above the BFE. If the structure has a basement or crawlspace, it needs to be filled to the level of the adjacent grade outside.

It is also important to create openings in the new foundation walls to allow floodwaters to pass through, as this equalizes hydrostatic forces of water. The foundations can crack and buckle if forces are not equalized. See the section below on Wet Floodproofing for more details.

Elevating on an Open Foundation (piers, posts, columns, or piles)

For areas with deeper flooding, such as those exposed to tidal flooding or wave

A home near Phoenicia, NY elevated on extended foundation walls. Photo: AWSMP

A home elevated on piers; reconstructed after Hurricane Sandy to meet current NFIP standards. Piermont, NY. Photo: AWSMP

action, elevating on an open foundation is usually the only effective method to adequately protect a structure. Each of these methods (piers, posts, columns, or piles) are similar, only with some variation.

When elevating on **piers**, basements are usually covered over and graded with fill. The basement slab is often left in place, though it should be broken up to allow water to seep through and reduce buoyancy forces. Piers can be constructed of cast-in place concrete as well as fully grouted masonry blocks. They are designed primarily for vertical loading and must be reinforced with properly sized and placed steel bars. The connections between the piers and the original foundation and elevated structure must also resist both horizontal and vertical loads so the structure does not shift off the foundation.

Posts and **columns** are similar to piers, however the existing foundation (if there is one) usually has to be removed so that concrete encasements or pads can be installed.

Elevating on **piles** is a more involved process than the others mentioned. Piles are driven into the ground and are not supported by concrete footings or pads. Piles are often used when the footings must be driven in deeper than what posts, columns, or piers can achieve.

Consult with a professional engineer or architect prior to utilizing any of the techniques above. While most of the methods can be used in many flooding scenarios, there are times when some methods are superior to others. Also keep in mind that all utilities need to be elevated above the BFE as well. Any remaining space or enclosed area below the structure can be used only for parking, building access, and storage. Local permitting officials will often ask the owner to sign a Non-Conversion Agreement, promising to keep the enclosure used for only the above three items.

Elevating Machinery and Equipment

The National Flood Insurance Program (NFIP) requires that all mechanical equipment in new or substantially improved structures be elevated to above the BFE or designed so that floodwaters cannot infiltrate or accumulate within any component of the system. This would include electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities. Under the latest rating method, NFIP policyholders may receive a mitigation discount if the covered machinery and equipment servicing the building, whether inside or outside, are elevated to at least the elevation of the floor *above* the building's first floor.

Floodproofing

There are two types of floodproofing: wet and dry. Wet floodproofing allows for floodwater to enter the building (effectively abandoning the lowest floor) to equalize pressure on the structure. Dry floodproofing, which is only allowed for commercial and non-residential structures, utilizes waterproof materials to make the building watertight. Non-residential buildings need to be dry floodproofed to at least one foot above the BFE to receive any reduction on flood insurance premiums. Elevation, wet, or dry floodproofing all require design by a licensed engineer or architect.

Wet Floodproofing

Just three feet of water against a foundation can cause a structural collapse. Wet floodproofing alleviates that pressure by allowing floodwater to enter the lower portion of a structure and then leave via vents or openings without human intervention. Residential wet floodproofing is generally suitable for non-living areas such as basements (including walk-out on grade basements), crawlspaces, or attached garages. The benefits of wet floodproofing are that the procedure is relatively inexpensive and greatly reduces the threat of hydrostatic forces that can cause significant damage. However, since floodwater is automatically allowed to flow through the lowest level of the structure, for most purposes, that level is uninhabitable living space.

Like elevation, to comply with federal regulations, areas of a structure that are wet floodproofed are used only for parking, building access, and/or storage. The lowest elevation (floor) of the space must

Smart Vent Engineered Flood Vent shown. Photo: Smart Vent Products Inc.

One of several types of flood vents available, an engineered flood vent is a passive vent with maximized flow capacity that protects your home by preventing hydrostatic pressure buildup that can collapse foundation walls.

be made equal to the lowest adjacent outside grade and be constructed of flood damage-resistant materials.

Openings should be installed no higher than one foot above grade and must be installed on at least two sides of the building. Regulations dictate that either: 1) there are a minimum of two openings having a net total area of not less than one square inch for every square foot of enclosed area subject to flooding; or 2) the openings can be engineered openings, such as flood vents, to maximize efficiency. Openings that are not engineered are less expensive but often less effective, as they can clog, and require that more total openings be installed.

Since floodwater can enter the structure, damage to any contents kept in this area can still occur. Landowners must consider post-flood cleanup since floodwaters often carry debris or contaminants. Damp areas can also increase the likelihood of mold growth, and damage can occur to any utilities that are not elevated. Furthermore, if the structure is subject to rapidly rising, high-velocity floodwaters, then this method may be unsuitable. For these reasons, wet floodproofing may not be recommended as a first order flood protection measure and should only be used in select circumstances.

Dry Floodproofing

Dry Floodproofing may be a suitable option for non-residential or non-residential portions of mixed-use structures only. The practice involves completely sealing a building's exterior and installing backflow valves in water and sewer lines to prevent the entry of all floodwaters. Special sealants are applied to exterior walls that help keep the building watertight. Specially designed shields can be put in front of doors to prevent water from seeping in. All these methods are designed to keep water from entering a structure. Dry floodproofing also has the advantage of not changing the functionality of the building and usually maintains its outward appearance.

A staff member at Townsend Elementary School in Walton, NY practices installation of a removable flood barrier at one of the building entrances. Photo: CWC.

One of many dry floodproofing mechanisms, these flood barriers for doors are ready-to-deploy and require bracket hardware to be permanently affixed to the structure outside the door. Gasketed, locking panels are manually placed within the brackets ahead of a flooding event.

While this may sound good, dry floodproofing is not without disadvantages. First, it can only be applied to structures constructed with block or masonry. Second, even the best sealants will leak, and pumping systems will have to be installed to remove any water that may enter. Third, dry floodproofing is only appropriate in areas with shallow flooding and low velocities. If floodwaters are expected to reach three feet or more on a structure, then dry floodproofing is not recommended as it is not likely to withstand the load placed by water. Dry floodproofing also does not protect adequately against floods that have long durations because the seals generally last only 24 hours, or less in some cases.

Most forms of dry floodproofing require human intervention. This could mean the physical installation of barriers or panels, or the activation of a pump, where a person needs to be present. Without a responsible person onsite, damage is likely to occur. Also, only non-residential structures can receive an insurance premium discount for dry floodproofing and a floodproofing certificate must be filled out by a licensed professional engineer to ensure that the structure has been designed to meet all floodproofing standards.

Other Protection Measures Outside the Home

Anchoring Fuel Tanks

Unanchored fuel tanks can be easily moved by floodwaters, posing an elevated risk of environmental damage and water contamination. An unanchored tank could also be driven in to your structure, or downstream into another home. Property owners can anchor fuel tanks to the wall or floor with noncorrosive metal strapping and lag bolts. Watershed residents within the 500-year flood zone (zones A, AE, zone X-shaded) are eligible to apply for full funding of tank anchoring projects from the Catskill Watershed Corporation (CWC). For more information online, visit: www.cwconline.org or call 845-586-1400.

An anchored fuel tank near Halcottsville, NY. Photo: CWC.

Direct Water Away from Structures

FEMA recommends improving your yard so that it slopes away from your home. Determine how water flows or accumulates around your home to identify potential trouble spots (often easy to see during an average rainstorm). Stormwater should always drain away from the building; if necessary, change your landscaping to improve runoff (being careful not to divert waters onto adjoining properties). Make sure to also routinely clean and maintain your gutters or collect water in rain barrels.

Regulations

When elevating or floodproofing a structure, you must adhere to certain state and federal regulations. New York State requires that new or substantially improved structures (defined as improvements that cost more than 50% of market value) have two feet of freeboard. Freeboard is a factor of safety usually expressed in feet above the Base Flood Elevation (BFE). In short, New York State requires all new construction or elevated structures within the Special Flood Hazard Area (with a 1% annual chance of flooding) to be built two feet above the BFE.

Any development within the FEMA-designated Special Flood Hazard Area requires a Floodplain Development Permit Application be submitted to your Local Floodplain Administrator.

Which Methods Are Right for Your Home?

Mitigation measures need to be tailored to your property. The appropriate protection methods for your home may depend on several factors. In a "Homeowner's Guide to Retrofitting," FEMA recommends the following four steps when making that decision. They include:

1. Determine the Hazards to Your Home

Use the map tools mentioned in this guide to determine your flood zone and proximity to the flooding source; ask your neighbors about the severity of past storms. You may also visit your town government office or AWSMP and speak with a Certified Floodplain Manager for more assistance.

2. Inspect Your Home — Make note of four key characteristics of your home:

- ✔ Construction type (e.g., wood frame or masonry)
- ✔ Foundation type (e.g., concrete slab, cinderblock crawlspace)
- ✔ Lowest floor elevation (not necessarily your first floor; a licensed surveyor can determine this)
- ✔ Condition (prepare a record of any past or current damage)

3. Check with Your Local Officials

Examples include your local Floodplain Administrator, Building Inspector, and Code Enforcement Officer. They can help you determine the base flood elevation at your structure, look up velocities, and identify code requirements and permits.

4. Consult with a Design Professional and Retrofitting Contractor

Professional engineers and architects will be able to technically evaluate your options and design a solution. A retrofitting contractor can estimate the cost to complete the project.

Need further assistance? If you live in the Catskills, you may qualify for a grant from the Catskill Watershed Corporation (CWC) to conduct a Property Protection Measures Feasibility Study and protect your home or business. CWC's Flood Hazard Mitigation Implementation Program may cover up to 100% of the cost of both a feasibility study and design, and up to 75% of the cost of construction for eligible projects. Contact the CWC to learn if you qualify for funding through one of their programs. Visit online at www.cwconline.org or call the CWC at 845-586-1400.

Final Thoughts

Flooding and other natural disasters are not going away. With climate change they will likely only become more common and destructive. Mitigating structures through elevation and floodproofing are good steps to protect our structures and make our homes, businesses, and communities more resilient.

Resources:

Homeowner's Guide to Retrofitting; Six Ways to Protect your Home from Flooding

FEMA P-312, Third Edition, June 2014

The Federal Emergency Management Agency (FEMA) has prepared this guide specifically for homeowners who want to know how to protect their homes from flooding. As a homeowner, you need clear information about the options available to you and straightforward guidance that will help you make decisions. This guide gives you both, in a form designed for readers who have little or no experience with flood protection methods or building construction techniques.

https://www.fema.gov/sites/default/files/2020-08/FEMA_P-312.pdf

Ashokan Watershed Stream Management Program – Floodplain Management

The Ashokan Watershed Stream Management Program (AWSMP) offers a variety of educational resources and services to help individuals and communities manage and reduce the risk of flooding and erosion. With funding from New York City, AWSMP has administered multiple Local Flood Analyses (LFA) in hamlets throughout the watershed and work is on-going to implement LFA-recommended flood reduction actions. AWSMP also aids municipalities with flood recovery and response following major flood events.

https://ashokanstreams.org/our-areas-of-focus/floodplain-management/

Flood Hazard Mitigation Implementation Program

Administered by the Catskill Watershed Corporation, the program funds projects that are expected to have measurable impacts on the hazards caused by flooding. Projects funded by the program must (with limited exceptions) be identified through a Local Flood Analysis (LFA) and designed to remedy situations where an imminent and substantial danger to persons or properties exists, or improve community flood resilience while providing a water quality benefit. Eligible projects may include relocation assistance, feasibility studies for property protection measures, and tank anchoring.

https://cwconline.org/programs/flood-hazard-mitigation/

Historic Homeownership Rehabilitation Credit Program

Rehabilitation of listed historic residential buildings or buildings contributing to a Historic District may qualify for a state income tax credit. The program covers a portion of qualified rehabilitation expenses up to a credit value of $50,000 per year. Additional rules apply.

https://parks.ny.gov/shpo/tax-credit-programs/

New York State Office of Resilient Homes & Communities, Governor's Office of Storm Recovery

Spearheading the state's efforts to assist storm-affected homeowners, the Governor's Office of Storm Recovery operates a Housing Recovery Program to facilitate home repairs, rehabilitation, mitigation, and elevation for the owners of single-family homes. Additional programs are available for the owners of multi-family rental properties, and for individual owners of co-ops and condos, as well as owners' associations.

https://stormrecovery.ny.gov/housing

The National Flood Insurance Program (NFIP)

Whether you're a homeowner, business owner, or renter, the NFIP offers flood insurance coverage to help you protect the life you've built. Work with your insurance agent to learn more about coverage amounts, deductibles, and policy costs.

https://www.floodsmart.gov/

Key Terms:

Base Flood Elevation (BFE)

The elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that elevation level in any given year.

Federal Emergency Management Agency (FEMA)

Government agency that supports citizens and emergency personnel to build, sustain, and improve the nation's capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.

Flood Insurance Rate Map (FIRM)

Official map of a community on which FEMA has delineated the Special Flood Hazard Areas (SFHAs), the Base Flood Elevations (BFEs), and the risk premium zones applicable to the community.

The National Flood Insurance Program (NFIP)

A program managed by FEMA and delivered to the public by a network of more than 50 insurance companies, the NFIP provides flood insurance to property owners, renters, and businesses. Having this coverage helps policyholders recover faster when floodwaters recede. The NFIP works with communities required to adopt and enforce floodplain management regulations that help mitigate flooding effects.

Flood insurance is available to anyone living in one of the 23,000 participating NFIP communities. Homes and businesses in high-risk flood areas with mortgages from government-backed lenders are required to have flood insurance.

Special Flood Hazard Area (SFHA)

An area having special flood, mudflow or flood-related erosion hazards and shown on a Flood Insurance Rate Map (FIRM) locally as Zones A and AE (most commonly). The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

Substantially Improved Building

A building that has undergone reconstruction, rehabilitation, addition, or other improvement, the cost of which equals or exceeds 50% of the market value of the building before the "start of construction" of the improvement.

Zone A

Area delineated on Flood Insurance Rate Maps (FIRMs) with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses have not been performed for such areas; no depths or base flood elevations are shown within these zones.

Zone AE

The base floodplain delineated on Flood Insurance Rate Maps (FIRMs) for which base flood elevations are provided.

Zone X-Shaded

Area delineated on Flood Insurance Rate Maps (FIRMs) with a 0.2% annual chance of flooding or areas of 1% annual chance of flooding with an average depth of less than one foot.

Ashokan Watershed
Stream Management Program

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