

Flood Preparedness & Response: A Guide for Municipalities



Lower Hudson Coalition of
Conservation Districts
2014

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Hudson Estuary Watershed Resiliency Project
www.hudsonestuaryresilience.net



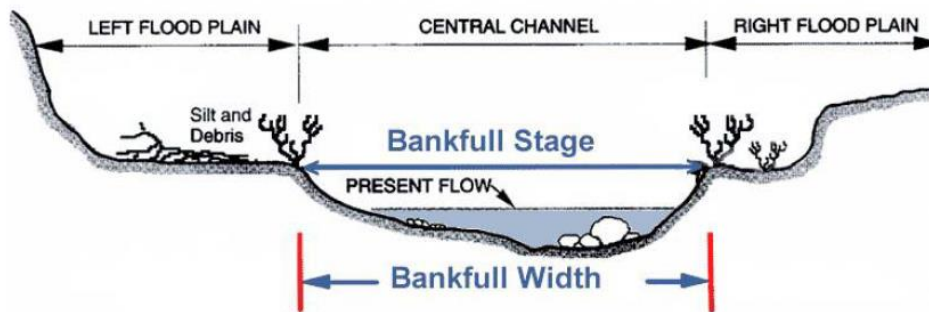
Cornell University
Cooperative Extension



Introduction

The purpose of this guide is specifically to address the flooding of streams and creeks that affects bridges, roadways and other public infrastructure.

Flooding is a natural process. Streams and creeks form their banks based on normal flow patterns, including higher levels during snow melt and light rain. However, streams also naturally have a floodplain that they will occupy during high flow periods. Overflowing into the floodplain allows a stream to spread out and slow down. This is normal and healthy – but it can be a problem if there are roads or structures that are affected.



*Typical stream cross-section.
(From Post-Flood Emergency
Stream Intervention Manual
by Delaware County SWCD)*

Floods are one of the most common hazards in our region and can result in significant damage. Some floods develop slowly, while others can develop in just a few minutes. Floods can be local, impacting a neighborhood or community, or very large, affecting entire river basins. The largest single source of flood losses in the United States, both in terms of cost and number of people affected, is damage to transportation infrastructure. Infrastructure damage also represents the greatest public safety hazard.

Damage can be caused when streams overflow onto floodplains and affect buildings, roads, bridges, septic systems and other structures. Fast moving water can also cause erosion, move large materials and damage structures.

Sometimes stream flooding can be worsened by factors upstream or downstream. Upstream changes to the landscape can cause water to fill streams more quickly. Downstream constrictions or blockages can cause streams to back up. Failure of structures like culverts and dams can also cause damage.

The following sections cover strategies municipalities can use to reduce flooding risks, actions that can be taken immediately before and during a storm, and recovery from flood damage.

What about other types of “flooding”?

Sometimes localized flooding is caused by backed-up storm drain systems or drainage swales in neighborhoods. If the storm drain or swale system is managed by the municipality, the highway or public works department is responsible for maintenance and repair. Regular inspection and maintenance can reduce the risk of failure. Note that many drainage swales are on private property and are the homeowners’ responsibility to maintain.

Please note that this guide is intended to provide ideas and strategies for municipalities. It is not intended to be a thorough guide to proper floodplain management. The NYSDEC Bureau of Flood Protection and Dam Safety should be consulted with respect to dams, flood control projects, coastal erosion, and floodplain management.

Flood-smart strategies

Municipalities are encouraged to take proactive steps to understand and reduce flooding risks by planning emergency response procedures and addressing the causes of flooding and flood risk.

Create an Emergency Action Plan (EAP)

This plan outlines procedures and chains of command during any disaster, including flooding, to allow effective, efficient response. Municipalities can work with county agencies, local fire departments, school districts and other entities to develop a plan.

Normal governmental operations require the integrated daily efforts of all managers as well as coordination from administrators and policy makers for efficient municipal operations to occur. During emergency situations, the need for coordination, cooperation, and efficient resource allocation becomes paramount to a successful outcome. Key personnel need to be able to gather information, assess options, and effectively apply resources in order to mitigate disaster situations. A central location and policies need to be provided to give guidance and support during disaster management operations. Creating specific plans for each dam or waterbody may be helpful.

The purpose of the Emergency Action Plan:

- Establishes procedures to protect life and property
- Identifies routine monitoring
- Identifies officials, organizations, and agencies
- Identifies responsibilities
- Identifies areas affected

The Emergency Action Plan should contain as a minimum:

- Emergency Notification Flowchart:
 - Include an Incident Report Form
- Site Description:
 - Name & Location
 - ID#
 - Type of Waterbody
 - Outlet/Spillway
 - Maximum capacity
 - Classifications
 - Conditions
 - Identify potential impacts
 - Map
 - Directions
- Emergency Detection, Evaluation and Classification:

The goal of emergency planning is to protect lives and property. Timely identification of emergency conditions by trained personnel becomes paramount to achieving this goal. Procedures to identify emergency conditions have been established by the Federal Emergency Management Agency (FEMA) and adopted by the NYSDEC.

- **Inundation Maps:**
In order to analyze the impacts of a stream breach or dam failure, inundation mapping is one of the most critical components of the EAP. Inundation maps can be found through FEMA or your county Bureau of Emergency Services. Municipalities can also have an engineer develop these maps using ACOE software. The inundation mapping is to be reviewed and updated annually, and more frequently as necessary to reflect changes in the waterbody.

Detailed guidance on developing a plan is provided by the New York State Office of Emergency Management: <http://www.dhSES.ny.gov/planning/>

Take Stock of Infrastructure

Assess dams: Dams are catalogued by New York State and classified according to risk. Learn about dams in your community at: <http://www.dec.ny.gov/lands/4991.html>

Consider culvert upgrades: Culverts and other small stream crossings can present a risk if they are undersized or in disrepair. Culverts can be examined proactively to determine if they need replacement or upgrade. The preferred crossing method is to install open-bottom culverts and crossings that are at least 1.25 times the width of the natural streambank. NYSDEC best management practices can be found at: <http://www.dec.ny.gov/permits/49066.html>. Your county conservation district or municipal engineer may be able to assist with advice on properly sizing culverts for predicted flows and selecting structures that will be less prone to damage.

Create a Multi-Hazard Mitigation Plan

This long-range plan catalogues steps to be taken to reduce the risk of future damage from flooding and other hazards. Developing a Multi-Hazard Mitigation Plan that is approved by FEMA is a prerequisite to obtaining FEMA mitigation funding. Guidance is provided by the New York State Office of Emergency Management: <http://www.dhSES.ny.gov/oem/mitigation/>

Attend Post-Flood Emergency Stream Intervention Training

This training is being offered by some conservation districts to prepare local highway or public works staff to respond to stream damage from storms. Having highway staff trained in advance will provide smooth response when flooding strikes. See <http://www.dec.ny.gov/lands/89755.html>

Slow the Flow off the Land

If a stream is flooding frequently, consider whether development in the surrounding area might be a cause. Hard surfaces like roads, parking lots and roofs can speed water flow into a stream. A community can “re-plumb” upstream land areas to help water slow down and soak in, rather than surging into streams.

- **Road Drainage:** Look at road drainage systems, including ditches and storm drains, to see if they can be disconnected from streams. Outletting drainage systems into an area where

water can infiltrate or pond can slow the flow and recharge groundwater, instead of shunting water directly into streams.

- Catching water on the land: Encourage the use of green infrastructure practices, such as rain gardens and porous pavement, in the surrounding watershed (drainage area). Ensure the planning board and other officials are carefully reviewing stormwater plans for new development to minimize runoff that could affect those downstream.

Reconsider Land Use Within Floodplains

One way to reduce future flood damage is to avoid constructing new private property and public infrastructure in floodplains, and to make sure that any development that does take place complies with floodplain development standards.

Flood Insurance Rate Maps provide the legal designations of regulated flood hazard areas, and can be found at www.msc.fema.gov. Most municipalities have already adopted recommended basic Flood Damage Prevention regulations to stay in compliance with the National Flood Insurance Program so that their residents can maintain access to federally guaranteed flood insurance from the National Flood Insurance Program. Municipalities are responsible for keeping these regulations up to date and enforced, and must legally adopt new maps when FEMA issues an updated Flood Insurance Rate Map. Municipalities and residents can learn more about the National Flood Insurance Program at <http://www.floodsmart.gov/floodsmart/>. Specific information on New York State's program is at: <http://www.dec.ny.gov/lands/39341.html>

The basic Flood Damage Prevention regulations govern construction in floodplains with the goal of making sure new structures can withstand flooding with minimal damage. However, some communities may wish to further restrict construction in floodplains to lessen risk and maintain the natural functions of the floodplain to slow and store water. In New York, municipalities have the ability to enact stronger controls on construction in floodplains, including zoning changes and overlay districts. For more detail, the LHCCD recommends Westchester County's guide, "Flooding and Land Use Planning: A Guidance Document for Municipal Officials and Planners" (see resources). Pace Land Use Law Center's Gaining Ground database can also provide examples for overlay zones and other floodplain protection techniques: <http://www.landuse.law.pace.edu/>

The Community Rating System is a FEMA financial incentive program to promote adoption of stronger policies to reduce flood damage. If communities document that they have policies and programs that reduce flood damage risk, they can be rewarded with a reduced flood insurance rate for all landowners within the municipality. More information on this FEMA program is at: <http://www.fema.gov/national-flood-insurance-program-community-rating-system>

Regulate Runoff that Could Worsen Flooding

On sites that are not within floodplains, attention to stormwater management can reduce the potential to create future flooding problems. When a new subdivision or site plan is being considered, municipalities can encourage the use of green infrastructure practices that manage and absorb stormwater on site to reduce additional flow to flood prone areas.

Preparing for a storm

The best way to prepare for flooding is to develop a proactive plan for storm response so that emergency personnel and citizens know where to look for coordination and assistance (see section on Flood-smart Strategies). Advance planning will make preparation for an imminent storm easier and more effective.

If a major storm is in the forecast, it is time to prepare to implement your Emergency Action Plan. If you don't have a plan, there are a few basic steps that can minimize damage:

Inspect Culverts and Bridges where Roads Cross Streams

If there is debris or woody material within or immediately upstream of a culvert or bridge that could result in blockage of the structure, it may be helpful to remove the material. While permits are needed when equipment must be brought into a stream, removing debris by hand or with heavy equipment staged above the stream bank is allowed (provided there is no disturbance to the stream bed or banks). It is not typically recommended to remove woody debris from streams because it can help to calm water and provide habitat, but woody debris (i.e., branches, logs, etc.) in a culvert should be removed so they don't catch moving material and cause a blockage. If you have questions, contact your NYSDEC Regional Permit Administrator or SWCD (see contacts directory).



Culverts clogged with branches can cause upstream flooding during heavy flow.

Check any Existing Streambank Protection Measures

Inspect rock riprap, in-stream rock structures or other practices to ensure they are still functioning properly. Determine if emergency protection measures can be taken in areas particularly sensitive to flooding and erosion.

Make Contact with Emergency Response Personnel

To ensure a coordinated response, learn ahead of time about your county's emergency plans, warning signals, evacuation routes, and locations of emergency shelters. Determine the most appropriate method to inform your residents of any flood watches or warnings and how the public should prepare. Ensure that your residents are prepared for an emergency – example recommendations include keeping an emergency supply kit, knowing the municipality's emergency evacuation plan, keeping a list of valuables prone to flooding, and elevating furnace, water heater and other utilities on basement or ground floors.

During a flood

During an emergency, the goals are to keep residents safe and maintain efficient, orderly communication. If you have an Action Plan (see Flood-smart Strategies), now is the time to deploy it.

Communication with Emergency Services and Residents

Coordinate with county emergency service agencies and local fire departments on a system for keeping the public informed. Keeping the public informed of road closures and detours can be a challenge – press releases to the media can help, as well as use of email or social media alert systems. If you receive information about the possibility of flooding, be prepared to advise residents to move to higher ground immediately.

Emergency Repairs to Bridges and Infrastructure

Sometimes quick work to rebuild/repair a road or bridge may be necessary to protect residents' safety. Remember that disturbance within the bed or banks of a stream, including rebuilding of infrastructure, requires permits from the U.S. Army Corps of Engineers (USACE) and the NYSDEC.

While private landowners always need to provide prior notification for projects carried out in response to an emergency, government entities are allowed to undertake emergency actions if a true emergency exists and notification is not possible. NYSDEC must be notified within 24 hours to provide an Emergency Authorization. An example would be a bridge failing on a weekend, isolating residents on a dead-end road. The local DPW could install a temporary crossing and notify NYSDEC on Monday in accordance with the Emergency Authorization procedures in 6NYCRR Part 621.12.

For questions related to emergency authorizations and notification requirements, contact your regional NYSDEC permits office and the USACE using the contacts directory.



Recovery

After the emergency response to the storm event, municipalities and private land owners need to address damage caused by the storm. Often this means removal of debris and repair of infrastructure.

Working with FEMA

If you are anticipating FEMA reimbursement for repair or reconstruction, it is wise to contact FEMA representatives before beginning work. Contact information is in the contacts directory.

Working In and Near Streams

When planning work in or near streams, the first rule is: Don't do more than necessary. Streams exist in a delicate balance, and when people make changes, often the stream will compensate with unexpected reactions. Dredging out a section of stream may cause the stream to erode upstream or downstream to regain equilibrium. Changing the curve of a stream may cause it to form a new curve in an unpredicted location. Those who have worked in streams for many years often learn to use a light touch and only do what is necessary.

If a stream has become clogged or damaged during a storm, contact your county conservation district or other professional for guidance on planning your response. The Post-Flood Emergency Stream Intervention manual has a wealth of information as well (see resources). Consult the "Permits" section below for more on permitting requirements.

Rebuilding Infrastructure

When bridges or culverts wash out or roads alongside streams are damaged, it's tempting to quickly rebuild the same infrastructure to get traffic flowing again. However, sometimes it's better to upgrade to improve resilience and prevent problems in the future.

Where roads cross streams, crossings that accommodate the stream's natural characteristics are preferred. Culverts that are too small or poorly placed can cause problems down the line. Putting two culverts side-by-side rather than installing a larger crossing can cause debris to snag and water to back up. NYSDEC has developed best practices for stream crossings, which you can view here: <http://www.dec.ny.gov/permits/49066.html>

Before designing new infrastructure, check with your regional NYSDEC permits office and the USACE for guidance. Your county conservation district may be able to assist as well.



Open-bottom structures that span the width of the stream are best for accommodating large flows and maintaining wildlife habitat.

Permits

If you need to work in or near a stream, it's likely you'll need a permit. The purpose of permitting is to ensure that actions undertaken with good intentions don't unintentionally cause other problems. The following is an overview of the types of permits that may be needed.

U.S. Army Corps of Engineers Permits

Permits are required from the U.S. Army Corps of Engineers for projects involving the discharge of dredged or fill material into waters of the U.S. including culvert or bridge repair and stream stabilization projects. The USACE has general permits known as Nationwide Permits and Regional General Permits which authorize certain activities which have a minimal environmental impact such as repair or replacement of existing structures. Nationwide permits and Regional General Permits provide an expedited permit review process for routine actions or actions undertaken in response to a storm event.

NYSDEC Permits

The following provides a brief overview of NYSDEC permits that may be needed for work in or near a stream or wetland. More specific information can be found at the following link:

<http://www.dec.ny.gov/63.html>

Article 15 Protection of Waters Permits: These permits are necessary if projects will disturb the bed or banks of protected streams (Class C(t) or higher – see explanation below), or if the project will involve excavation or fill in a navigable waters of the state (i.e., streambank stabilization, repairs or replacement of bridges or culverts, etc.). It is important to note that for some protected streams, the actual regulated stream bank may extend 50 feet or more from the stream bed (refer to <http://www.dec.ny.gov/permits/70947.html> for a Stream Bank Illustration and Definition).

Article 24 Freshwater Wetlands Permits: Wetlands that are 12.4 acres or greater, or have been determined by the NYSDEC to have unusual local importance, are protected under the Freshwater

Wetlands Act and require a permit for most disturbances within the wetland and 100 ft. of the wetland.

Article 25 Tidal Wetlands Permits: Tidal Wetlands are protected under the Tidal Wetlands Act and the NYSDEC requires a permit for most activities within the wetlands or up to 300 feet adjacent to the wetlands.

Section 401 Water Quality Certification: If work will occur within a federally regulated waters of the U.S. (including wetlands and streams), and a USACE permit is required, the NYSDEC may need to make a determination that discharges from the proposed activities will comply with the applicable effluent limitations, water quality standards, and any other applicable conditions of the State Law. A Water Quality Certification, pursuant to Section 401 of the Federal Clean Water Act, may be required from the NYSDEC for impacts to federally regulated waters of the U.S. For routine repairs and replacements of existing structures and for some stream bank stabilization projects, work may be authorized under a Blanket 401 Water Quality Certification; more details on this can be found at: <http://www.dec.ny.gov/permits/81010.html>.

Stormwater Permit for Construction Activities: Before commencing construction activities, applicants need to obtain coverage under the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activities that will disturb more than 1 acre. The Permit requires the preparation of a Stormwater Pollution Prevention Plan and submission of a Notice of Intent. Please see the following link for more information: <http://www.dec.ny.gov/chemical/43133.html>.

Often after a storm event, the NYSDEC will provide for an expedited permitting process to address storm related repairs such as issuance of General Permits. The following link provides additional information on Storm Recovery Permits: <http://www.dec.ny.gov/permits/89343.html>. Additionally, there are some activities that are exempt from permitting including the removal of debris and woody material from streams that may be compromising existing infrastructure, provided that removal does not result in the disturbance of the bed or banks of the stream (i.e., using chainsaws to cut up woody material in the stream, hand removal of woody material, or picking up woody material using heavy equipment provided that the equipment itself does not enter the water).

County/Town Permits

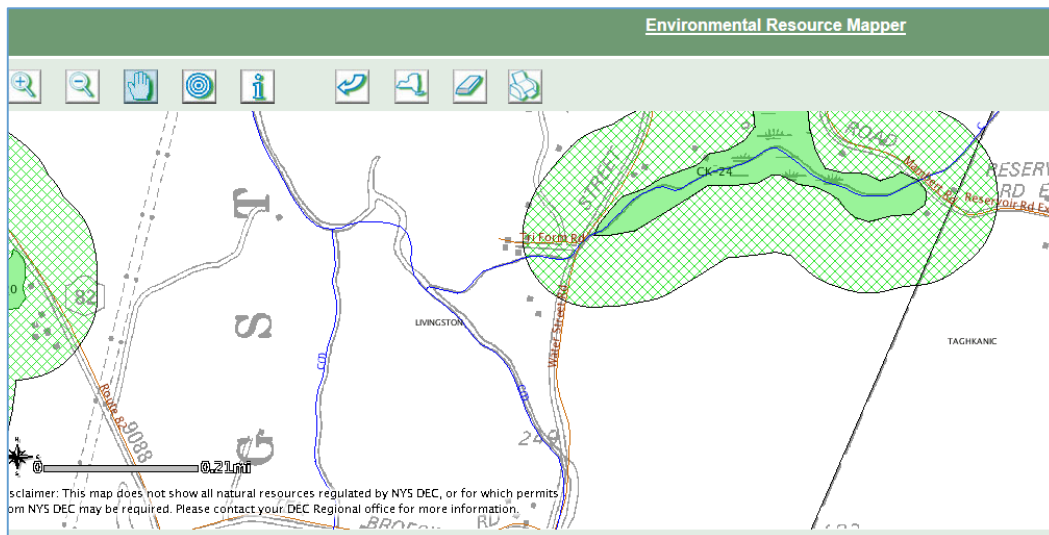
Floodplain Development Permit: Generally, local governments regulate construction and development in floodplains, based on the National Flood Insurance Program. This involves regulations not only in streams, but also in adjacent floodplains.

Local Land Use Laws: These regulations include any other legislation or ordinances your local government may have for stream, wetlands, and floodplain development.

Which streams and wetlands are regulated/protected by NYSDEC?

Certain waters of the state are protected on the basis of their classification. NYSDEC classifies streams with a letter that designates best intended use. Sometimes a "T" is added to signify trout habitat. Streams and small water bodies located in the course of a stream with a classification of AA, A, or B, or with a classification of C with a standard of (T) or (TS) are collectively referred to as "protected streams," and are subject to the stream protection provisions of the Protection of Waters (Disturbance of the Bed or Banks of a Protected Stream or Other Watercourse) regulations. It is also important to note that some streams are considered navigable waters (regardless of their classification and standard) and may also require a Protection of Waters Permit for Placement of Fill in Navigable Waters.

You can easily determine the classification of your stream or whether there are mapped Freshwater or Tidal Wetlands in the area by using the Environmental Resource Mapper on NYSDEC's website. Go to: <http://www.dec.ny.gov/imsmaps/ERM/viewer.htm>. Use the search tools on the left to find your site, and then zoom in to the location. Then use the "Layers & Legend" tab to turn on the stream and wetlands layers to view regulated features in the selected area.



It is important to note that even if NYSDEC and/or USACE approvals are not required for a project, work shall not result in the degradation or contravening of water quality standards of streams or waterbodies. Care shall be taken to stabilize any disturbed areas promptly after construction, and all necessary precautions shall be taken to prevent contamination of the stream or waterbody.

Resources

Training

Cornell Local Roads Program: <http://www.clrp.cornell.edu/>

NYS Division of Homeland Security & Emergency Services: <http://www.dhSES.ny.gov/training/>

Post Flood Emergency Stream Intervention: <http://www.dec.ny.gov/lands/89755.html>

Estuary Watershed Resiliency: <http://blogs.cornell.edu/estuaryresilience/>

Information

Westchester County's guide, "Flooding and Land Use Planning":
<http://planning.westchestergov.com/images/stories/reports/FLOODGUIDE.pdf>

NYSDEC "What to do after a Flood":
<http://www.dec.ny.gov/lands/80429.html>

Post Flood Emergency Stream Intervention Manual:
http://www.dec.ny.gov/docs/administration_pdf/streammnl.pdf

Funding

Following a major flooding event, specific funding sources may become available for recovery. Keep an eye out for announcements from state agencies. You can contact your regional Office of Emergency Management using the contacts directory.

Funding for proactive flood mitigation measures may be available from:

- NYSDEC's Water Quality Improvement Program: <http://www.dec.ny.gov/pubs/4774.html>
- Hudson River Estuary Program: <http://www.dec.ny.gov/lands/5091.html>
- NYS Division of Homeland Security & Emergency Services:
<http://www.dhSES.ny.gov/grants/program.cfm>
- NYS Department of State – Local Waterfront Revitalization Program:
<http://www.dos.ny.gov/opd/programs/lwrp.html>
- Hudson River Valley Greenway – Greenway Communities Grant Program:
<http://hudsongreenway.ny.gov/GrantFunding/CommunityGrants.aspx>

Contacts Directory

New York State Department of Environmental Conservation

<http://www.dec.ny.gov/about/558.html>

NYSDEC Region	Counties covered	Contact info:
Region 2	New York City	Permits: (718) 482-4997 Information: (718) 482-4900 After Hours Emergencies: (800) 847-7332
Region 3	Ulster, Dutchess, Orange, Putnam, Rockland, Westchester	Permits: (845) 256-3054 Information: (845) 256-3000
Region 4	Albany, Rensselaer, Columbia, Greene	Permits: (518) 357-2069 Information: (518) 357-2068

NYSDEC Floodplain Management Section (statewide): 518-402-8185, floodpln@gw.dec.state.ny.us

NYS Office of Emergency Management (DHSES)

<http://www.dhSES.ny.gov/contact/>

DHSES Region	Counties covered	Contact info:
Region I	New York City	(631) 952-6322 OEMRegion1dl@dhSES.ny.gov
Region II	Columbia, Dutchess, Greene, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester	(845) 454-0430 OEMRegion2dl@dhSES.ny.gov
Region III	Albany, Rensselaer	(518) 793-6646 OEMRegion3dl@dhSES.ny.gov

Other NYS Agencies

Department of State – Office of Communities & Waterfronts	(518) 474-6000
Office of Parks, Recreation & Historic Preservation	NYC: (212) 866-2599 Mid-Hudson: (845) 889-3866 Capital Region: (518) 584-2000

Federal Agencies

U.S. Army Corps of Engineers – New York District	(for NYSDEC Regions 2 and 3 area) (917) 790-8007 Cenan-pa@usace.army.mil http://www.nan.usace.army.mil/Contact.aspx Upstate NY Section (for NYSDEC Region 4 area) Cenan.rfo@usace.army.mil (518) 266-6350
FEMA Region II	(212) 680-3600 FEMA-R2-ExternalAffairs@fema.dhs.gov http://www.fema.gov/region-ii-contact-us

Regional

In New York City water supply watersheds, contact NYC Department of Environmental Protection at 212-639-9675. More information at:

http://www.nyc.gov/html/dep/html/watershed_protection/regulatory.shtml

County

Contact your County Soil & Water Conservation District for information on relevant agencies and resources within your county.

Albany County SWCD

PO Box 497, 24 Martin Road
Voorheesville, NY 12186
Phone: (518) 765-7923
Joseph Slezak

Columbia County SWCD

1024 State Route 66
Ghent, NY 12075-3200
Phone: (518) 828-4386 Ext. 3
Laura Sager

Dutchess County SWCD

2715 Route 44, Suite 3
Millbrook, NY 12545
Phone: (845) 677-8011/8199 Ext. 3
Brian Scoralick

Greene County SWCD

907 County Office Building
Cairo, NY 12413-9502
Phone: (518) 622-3620
Jeff Flack

New York City SWCD

121 Sixth Avenue, Suite 501
New York, NY 10013
Phone: (212) 431-9676
Shino Tanikawa

Orange County SWCD

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Kevin Sumner

Putnam County SWCD

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Lauri Taylor

Rensselaer County SWCD

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Rockland County SWCD

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