

~ 9. Flood Protection and Recovery ~

As protection is a principal function of government, and floods and the potential resulting loss of life and property are a serious threat to those living along the East Branch Delaware River, it is the role of all levels of government to assist the public in securing itself from the threats associated with flooding. Policy for protecting the public from flooding and programs for assisting the public in the event of a flood, flow from the federal level to the state and local levels of government. FEMA, within the Department of Homeland Security, establishes flood programs enabling communities to plan and respond to flood events, minimize or mitigate against flood hazards, and recover from flood disasters. The State Emergency Management Office (SEMO) generally mirrors FEMA policies and programs and helps to administer flood planning, mitigation and coordinate state resources for recovery efforts. Within Delaware County, the Director of Emergency Services coordinates emergency response and recovery, while efforts to plan for mitigating against flood hazards is shared across county agencies such as the Department of Public Works, Planning Department and other Delaware County Action Plan (DCAP) partners under the supervision of the County Hazard Mitigation Coordinator. As a tool for individuals and communities living along the river, this Stream Corridor Management Plan provides a general background on the programs and policies that will enable the community to avoid, mitigate against, or recover from a flood. This section is written for home owners, local leaders and the general public to help increase their knowledge of steps they can take to reduce flood losses and facilitate disaster recovery.

Avoiding Flood Losses

Flood waters are very destructive and while losses in terms of property or life cannot be totally avoided, with good information and wise decisions, individuals and communities can reduce their losses. Information is the most important tool available. Local knowledge, timely communications and accurate maps of where flood waters are likely to have their greatest impact are only some of the information that can help the community with decisions as they seek to avoid flood losses.

Communicating with local experts is critical to avoiding flood losses. A very important and often overlooked individual is the local *floodplain administrator* or floodplain regulation enforcement officer. Many municipalities employ a person in this position to inform the public about floodplain regulations and help landowners make wise decisions about their development projects. The floodplain administrator develops an understanding of the regulations, the best practices and the location of flood-prone areas for their community. Making use of their knowledge can save time and money by avoiding red tape and otherwise avoidable flood damages. Often, the floodplain administrator is also the building/code enforcement officer, so it is likely to meet this person in more than one capacity when a construction project be undertaken in or around a floodplain. Training courses are available through NYSDEC and FEMA to keep the local floodplain administrator current with the latest best management practices and regulations.

Flood Insurance Rate Maps (FIRMs) are available for most communities in the United States and provide a guide to where flood waters of larger floods are likely to inundate the lands surrounding a water body. Before buying or building a house or buying property near a body of water, whether stream, river, lake or wetland³¹, an individual should consult their floodplain map or FIRM “community panel” to find out where the waters will be likely to rise during a major storm event. FIRMs are produced and maintained as part of the National Flood Insurance Program, which provides flood insurance to home owners and businesses living in a participating community. Because properties located outside of Special Flood Hazard Areas are assumed to have a lower risk, they benefit by qualifying for lower insurance premiums. The most recently updated FIRMs for Delaware County were created through engineering studies which based the estimated extent of the floodplain on local topography, channel shape and slope, hydrology and hydraulic conditions for a range of flood return probabilities. Typically, the maps show the one percent annual chance flood (also called the base flood or 100 year flood) extent or the Special Flood Hazard Area. An example of this generation of maps includes the Village of Margaretville. These maps are of reasonable accuracy but could be improved with current mapping technologies. Older maps, such as the FIRM map for the Town of Andes, created in the early 1970’s at the start of the NFIP, only show the “flood hazard boundary” based on approximate studies of the floodprone area for the 100 year flood event. Care should be exercised in using these maps if one is considering a development anywhere near this map zone. When an area is suspected as being within the floodplain, but the limits and depth of the base flood are not known for a location, a flood study should be required of the applicant by the local code officer or planning board. Not all areas at risk of flooding have been mapped by FEMA, so at a minimum, each property owner should evaluate the flood risk for themselves and decide whether they need to purchase flood insurance.

Should an older map be of questionable accuracy, the individual should obtain an engineer’s estimate of the floodprone area or the Base Flood Elevation (BFE) for the development site prior to any construction. Before securing financing to purchase or build a home within a known floodprone area with an established Base Flood Elevation (BFE) a lender will require the purchase of flood insurance and have a surveyor define the elevation of the structure’s first floor for use in estimating your flood insurance premium. Building in a floodplain can result in thousands of dollars of losses, especially if the construction is not compliant with the NYS Building Code and NFIP requirements (per DEC). Not only does the individual risk personal losses, but building within the floodplain or floodway can seriously impact the neighboring property owners by causing flood elevations to rise or flood routes and velocities to change. The local Floodplain Administrator can inform individual of the requirements before they begin planning a project. Individuals that are buying land with the intent to build should avoid floodprone areas. FIRM maps are available for inspection at each of the Town or Village Halls. Copies of the maps can also be purchased from FEMA through their website or by mail.

³¹ The National Wetland Inventory (NWI) maps produced by the U.S. Fish and Wildlife Service provide a good reference for the location of wetlands. These maps are available for inspection through the local planning board, the Delaware County Planning Department or the DCSWCD.

Recent advances in remote sensing, hydraulic modeling and computer mapping technology have greatly improved the ability of engineers to accurately estimate the flood extent and elevation for a range of floods. FEMA, together with the NYSDEC have established procedures for revising the current flood studies around New York State. NYSDEC and Schoharie County have completed a new flood study and set of revised paper floodplain maps and Digital FIRMs (DFIRMs) for the entire county. Similar efforts in Delaware County should improve the information available to landowners about the development potential of their property, their risk of flood losses, and help prevent future threats to life and property throughout the area. This information should also improve the community's rating and minimize the need for individuals to bear the expense of site specific flood studies.

NFIP was established by Congress in 1968 to reduce the cost of taxpayer funded disaster relief. The Mitigation Division, within FEMA, manages the NFIP, and oversees the floodplain management and mapping components of the Program.

Nearly 20,000 communities across the United States, (including all municipalities within Delaware County), participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes Federally backed flood insurance available to homeowners, renters, and business owners in these communities. Flood insurance can be purchased through a local insurance agent and covers the cost of structural damage to a home. If an insurance agent is unable to write a flood policy, call 1-800-638-6620 for information. The contents of a home, such as appliances, furniture and clothing are typically insured at additional cost. There is a 30 day waiting period for new policies.

Flood damage is reduced by nearly \$1 billion a year through partnerships with communities and the insurance and lending industries. Further, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance. And, every \$3 paid in flood insurance claims saves \$1 in disaster assistance payments (FEMA, 2004). Flood Insurance rates for individual policyholders of a community can be reduced if the community improves its "*community rating*" by participating in flood disaster planning efforts and takes action to reduce or avoid flood losses. The NYSDEC Flood Bureau within the Division of Water, together with SEMO can help the community identify ways to improve the community's rating under the Community Rating System (CRS). Additional information is available at: <http://www.fema.gov/business/nfip/> (Verified September 27, 2007) and http://www.fema.gov/pdf/nfip/alt_elevations/elevations_appt.pdf (Verified September 27 2007).

Flood Recovery

Following a flood that has been an officially declared disaster, several forms of assistance become available to individuals and communities. There can be both Public Assistance and Individual Assistance programs depending upon the severity of the flood event. Declarations are made on a county by county basis. Less severe events may only trigger

a declaration enacting Public Assistance programs to assist with infrastructure recovery, such as the repair of roads and public facilities. If a disaster is declared for Individual Assistance, then programs are deployed to address the property losses of individuals, farmers and other businesses.

Public Assistance is managed by the state through the Emergency Services Coordinator and local government representatives. A SEMO team will organize initial contact meetings to inform local government representatives of the assistance process and initiate project identification. It is important to document all actions taken to repair damages to a flood and carefully track the use of materials, equipment and labor for later reimbursement. Attendance at these meetings is critical especially if local leadership has changed and the new leadership has not experienced a flood event. Documents regarding flood recovery efforts should be held and shared with those considering flood hazard mitigation planning. The SEMO website is an excellent resource for obtaining the latest information on the status of a disaster recovery effort or finding out who to contact for more information: <http://www.semo.state.ny.us/> (Verified September 27, 2007).

Individual Assistance is typically made available following a flood where there has been widespread damage to homes and businesses. The American Red Cross is a first responder helping flood victims with their immediate needs for food, shelter, medical attention and cleanup provisions. Within 12-36 hours of an event, FEMA deploys its staff of inspectors to assess the damage and meet with state and local officials. Once the declaration is made, FEMA will announce an 800 telephone number for individuals to seek assistance and file claims. One of the primary forms of individual assistance is the Assistance for Individuals and Households Program which can help with lodging or temporary housing, home repair grants, and other personal needs. The Small Business Administration (SBA) offers low interest loans to eligible individuals, farmers and businesses to repair or replace damaged property and belongings not covered by insurance. Other assistance is available as tax rebates, veterans benefits and unemployment benefits. Following a flood, individuals should take special care to document their damages and losses. Receipts for repairs and materials as well as photographs of damages should all be kept by home and business owners. If individuals have flood insurance they should initiate a claim immediately.

Flood Hazard Mitigation

Hazard Mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. Examples of hazard mitigation are the acquisition and removal of hazard prone property, retrofitting of existing buildings and facilities, elevation of floodprone structures, and infrastructure protection measures. The federal government provides funding for hazard mitigation following disasters through two programs; the 404 Hazard Mitigation Program and the 406 Hazard Mitigation Program.

FEMA provides funding to States under section 404 of the Stafford Act for the Hazard Mitigation Grant Program (HMGP). The funds are to provide state and local

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government, certain private non-profit organizations and Native American tribes with the incentive and capacity to take critical mitigation measures during the flood recovery and reconstruction process to protect life and property from future disasters (FEMA, 2001). The eligibility of a community requires a community to have prepared and filed with the SEMO, a Hazard Mitigation Plan which describes the local priorities for mitigation. Funding is competitive with other communities around the State, and will be ranked by the results of a benefit-cost analysis with others possible projects for having the greatest potential to reduce future losses. Delaware County received significant levels of funding through this program following the January 1996 flood disaster for the Flood Property Buyout Program and other mitigation projects.

The Delaware County Planning Department has prepared an All-Hazards Mitigation Plan for the county and all 28 municipalities to enable any community within the county to apply for funding under this program. The Plan was completed in 2006 and Delaware County and each of the municipalities adopted the Plan and filed it with New York State in early 2007. The Plan reflects all potential hazards that could affect the county and ranked each for their potential. Flooding was by far the most significant threat to the county and both public and private property. The Plan also requires all hazard mitigation efforts must be coordinated through the Delaware County Planning Department as the Hazard Mitigation Coordinator is the County Planning Director. HMGP funds require a 25 percent local commitment in cash or in kind for total project costs. For more information about this program contact the Delaware County Planning Department or the Hazard Mitigation Program Director within SEMO. The website for the state program is: <http://www.semo.state.ny.us/programs/mitigation/> (Verified September 27, 2007).

The Section 406 Hazard Mitigation Program is available for public assistance projects (those dedicated to the recovery and reconstruction efforts of local government) for the reduction or elimination of future damages to a facility damaged during a disaster. Hazard mitigation funding can be sought for infrastructure damage where the funds would enable the applicant to upgrade the structure to a standard that will avoid future flood damages. Undamaged structures would not be eligible under this program. 406 Hazard mitigation funds are added to the reconstruction costs normally used to return a structure to its pre-flood condition. Typically, there is a 25% local cost share for the mitigation activity. This program is not cost competitive and can be very useful in preventing future flood damages, especially where recurrent flood losses are avoidable through a retrofit. Questions about this and other flood recovery programs should be directed to:

New York State Emergency Management Office
1220 Washington Avenue
Suite 101, Building 22
Albany, New York 12226-2251
Region II Office: Telephone: (845) 454-0430
Fax: (845) 454-4620

E-mail: SEMORegion2@semo.state.ny.us
24 Hour Emergency Coordination Center
Telephone: (518) 292-2200

Citizen Flood Response

Floods are an act of nature and, unfortunately, they can at times create immense damage to our homes and infrastructure. There are well documented events in 1942, 1955 (when the Pepacton Reservoir filled up for the first time), 1987, 1996, 2005, and 2007 to name a few. When floods occur, flow exceeds the “normal” rate, stream banks overtop, and water flows onto the floodplain. It is important to remember “*The floodplain is defined as the flat area bordering a stream, constructed by the river in the present climate and inundated during periods of high flow*” (Leopold, 1997). Flood flows over floodplains accomplish three natural functions: energy reduction, deposition of finer sediments (which enhances plant growth), and deposition of woody debris.

It is important to recognize that much of the property damage suffered during floods is directly related to development on the floodplain. For those who live in a flood-prone area, several practical steps can be taken to protect a home or business in preparation for future floods. Irreplaceable valuables should not be stored in the cellar and first floor. If an oil tank exists in the basement, it should be securely anchored according to code to prevent it from floating and spilling during a flood. Electrical components, including the washer and dryer, within the house should be raised above the level of potential flood waters. Consideration should be given whether to raise the furnace and water heater above the level of potential flood waters. These suggested actions could help avoid the common repairs homeowners may have to undertake after a flood. Propane tanks should also be secured in a manner that they will not float downstream in the event of a flood.

In the event of a flood, FEMA recommends the following actions to make sure a family stays safe until the water levels recede:

- ◆ **Fill bathtubs, sinks, and jugs with clean water in case water becomes contaminated.**
- ◆ **Listen to a battery-operated radio for the latest storm information.**
- ◆ **If local authorities instruct the community to do so, turn off all utilities at the main power switch and close the main gas valve.**
- ◆ **If told to evacuate your home, do so immediately.**
- ◆ **If the waters start to rise inside a house before evacuation, retreat to the second floor, the attic, and if necessary, the roof.**
- ◆ **Floodwaters may carry raw sewage, chemical waste and other disease-spreading substances; wash hands with soap and disinfected water.**
- ◆ **Avoid walking through floodwaters. As little as six inches of moving water can knock a person off their feet.**
- ◆ **Don't drive through a flooded area. If you come upon a flooded road, turn around and go another way. A car can be carried away by just 2 feet of flood water, the depth of which can be very hard to judge.**
- ◆ **Electric current passes easily through water, so stay away from downed power lines and electrical wires.**

Following a flood, individuals should take special care to document their damages and losses. Receipts for repairs and materials as well as photographs of damages should all be kept by home and business owners.

June 2007 Flood Event

A very localized and devastating flood occurred on June 19, 2007. An intense storm dropped over eight inches of rain in two hours, causing severe flash flooding in a few small tributaries that discharge directly into the Pepacton Reservoir. Holliday Brook and Beech Hill were hardest hit (see **Map 9.1** below).

Holliday Brook

Along Holliday Brook, one house was completely washed away, one private bridge was obliterated, another bridge disabled, and several vehicles were washed downstream. Approximately three quarters of one mile of road – both Town of Colchester and New York City jurisdictions – was completely washed out, making both unrecognizable and impassable. An entire mile of stream upstream from the reservoir was significantly altered. Damage included channel avulsion (re-location), severe down-cutting, and debris deposition, all of which were most significant at the demolished private bridge. The impacts to water quality and aquatic habitat were severe.

Since the Holliday Brook Road is a connector road to a New York State Scenic Highway Corridor, the New York State Department of Transportation (NYSDOT) assisted the Town of Colchester and City of New York with flood response and recovery efforts. The Army National Guard was also made available to assist. At the request of NYSDOT, DCSWCD staff was dispatched to guide the National Guard with emergency stream restoration. DCSWCD staff's flood response protocol involved assessment of the stream reach, removal of large woody debris from the channel, and where necessary returning the stream to its original channel as well as re-establishing an adequate channel cross-sectional area. Approximate cross-sectional area was calculated from the DCSWCD Regional Hydraulic Relationship Curves (see **Volume 2, Section 3**). DCSWCD



Figure 9.1 Flood aftermath on Holliday Brook on City Property



Figure 9.2 NYS DOT Post Flood Recovery of Holliday Brook

staff provided channel alignment, stream grade, and cross-section stakeout to guide National Guard operators. **Figure 9.1** shows flood damage on Holliday Brook on the NYC DEP property. **Figure 9.2** NYS DOT post flood recovery triage on Holliday Brook - note that the floodplain elevation is near pre-flood state

The flood event resulted in a sustained discharge of turbidity from Holliday Brook and posed a continuing threat to water quality in the Pepacton Reservoir, even after the NYS DOT/National Guard response efforts. The flood's disturbance to the stream on the City property threatened to continue to destabilize the upstream reaches with future bed and bank erosion. After the Commissioner of the NYCDEP issued an emergency declaration, the NYCDEP dedicated staff, consulting engineering, and funding in order to restore the lower 1300 feet of



Figure 9.3 Holliday Brook After Construction with Cross Vane Structure

channel. The intent of the restoration was to address issues of channel instability and road protection. Beginning within 45 days of the event, a multi-million dollar stream restoration/road reconstruction project was designed, bid and contracted out by the NYCDEP. Construction was initiated in late August, with stream restoration efforts completed by early October. At the direction of the NYCDEP Stream Management Program, the design incorporated natural channel design structures to stabilize the channel slope and alignment and reconnect the stream with its floodplain. These structures were also designed to protect the realigned, reconstructed road way during future storm events. This effort provides an example for future recovery efforts where

long term instability is likely due to flood induced geomorphic changes to the stream system. **Figure 9.3** shows the restored reach on City property (same location as shown in **Figure 9.1**). Note that the cross vanes limit the potential for headward bed degradation (head-cuts) and the floodplain is restored. Additional vegetation will be planted in the Spring of 2008. **Figure 9.4** shows Holliday Brook restored reach and the cross vane (at upstream

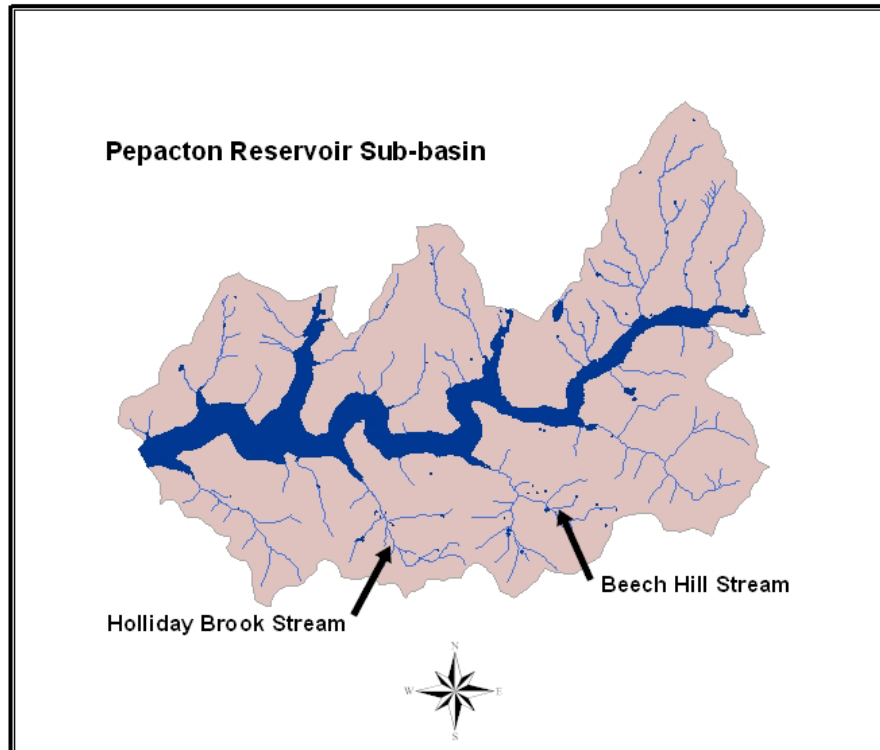


Figure 9.4 Holliday Brook After Construction

plunge pool). The cross vane will prevent future migration of head-cuts and a series of straight vanes protect the base of this stacked rock wall.

Beech Hill

Impacts to the Beech Hill and Mary Smith Hill tributary were less significant, but still resulted in damage to public infrastructure in the form of failed highway embankments, temporary road closures, and impacts to water quality and aquatic habitat. DCSWCD staff assisted the USDA Natural Resources Conservation Service Emergency Watershed Protection Program with designs at two locations to repair approximately 1200 feet of stream channel and embankments.



Map 9.1 Location of Holliday Brook and Beech Hill

Delaware County's System for Flood Response

On July 21, 2004, the Delaware County Comprehensive Emergency Management Plan (CEMP) was adopted by the Delaware County Board of Supervisors. The CEMP resulted from recognition on the part of local government and state officials that a comprehensive plan was needed to enhance the county's ability to manage emergency/disaster situations. It was prepared by county officials working as a team in a planning effort recommended by the State Emergency Management Office (SEMO). The CEMP constitutes an integral part of a statewide emergency program and contributes to its effectiveness. It describes in detail the centralized direction of requests for assistance and the understanding that the governmental jurisdiction most affected by an emergency is required to involve itself prior to requesting assistance. The development of the CEMP included an analysis of potential hazards that could affect the county and an assessment

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of the capabilities existing in the county to deal with potential problems. Authority to undertake this effort was provided by both Article 2-B of the State Executive Law and New York State Defense Emergency Act.

Dealing with disasters is an ongoing and complex undertaking. However, lives can be saved and property damage minimized by reducing risk before a disaster occurs. Timely and effective response from appropriate officials and volunteers during an event helps provide both short and long term recovery assistance.

This process is called Comprehensive Emergency Management (CEM). CEM emphasizes the interrelationship of activities, functions, and expertise of local, county, state and federal departments and agencies necessary to deal with emergencies. The CEMP contains three sections to deal separately with each part of this ongoing process. The emergency management responsibilities of various county officials, departments and agencies are outlined in the CEMP. Assignments are made within the framework of the present county capability and existing organizational responsibilities. The Department of Emergency Services is designated to coordinate all emergency management activities of the county during the event and assist with coordination of all local efforts to respond.

Once the immediate response to an event is over and recovery efforts are under way the Delaware County Hazard Mitigation Coordinator becomes responsible for all county and local efforts to clean up and prepare long term mitigation programs. The designated Hazard Mitigation Coordinator is the Delaware County Planning Director to ensure all mitigation and recovery efforts are properly coordinated with all agencies and local entities.

County responsibilities are closely related to the responsibilities of the local officials within the county (cities, towns and villages). The county emergency management coordinator must officially open the county's Emergency Operations Center (EOC) and contact all partners involved in management phases of an emergency. Once the EOC is operating the municipalities have a location to send information and request additional support. The EOC is manned by all members of the emergency response team including emergency personnel, police, public works representatives, planning staff and administrative staff as well as any other essential personnel called upon. The county has the responsibility to assist the local governments in the event that they have fully committed their resources and are still unable to cope with disaster. Similarly, New York State is obligated to provide assistance to the county after resources have been exhausted and the county is unable to cope with the disaster.

Delaware County uses the Incident Command System (ICS) to respond to emergencies. The ICS is a management tool for the command, control and coordination of resources and personnel in an emergency. Specific emergency management guidance for situations requiring special knowledge, technical expertise, and resources may be addressed in separate annexes attached to the CEMP. Examples of this type of situation are emergencies resulting from floods, hazardous chemical releases, dam failure, and power outage. The CEMP provides general all-hazards management guidance—using existing

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organizations—to allow the county to meet its responsibilities before, during and after an emergency.³²

Although the CEMP addresses all emergency/disaster situations, flooding has been the most prevalent in the East Branch watershed. During major flood events and other disasters that can cause road and bridge closures, the Delaware County Department of Emergency Services (DCDES) activates its emergency operations center and ICS. All emergency response agencies including Federal Emergency Management Agency (FEMA), SEMO, the NYS Office of Fire Prevention Control, law enforcement agencies, and fire departments are contacted and put on alert. The Department of Emergency Services monitors all emergency situations and provides for emergency evacuations, if necessary.

³² Delaware County, *Delaware County Comprehensive Emergency Management Plan*, July 2004, pages i-ii, paraphrased.