

Section 6: Flood Profile and Mitigation Action Plan by Jurisdiction

Mercer County:

Participating municipalities in Mercer County include Ewing, Hamilton, Hopewell, Lawrence, Pennington and Trenton.



The entire western portion of Mercer County lies along the Delaware River. Mercer County was affected by the June 2006, April 2005, September 2004, and September 1999 flooding events. Impacted infrastructure has included the wells and pumps that provide water to the workhouse. These were flooded by the back up of Moore’s Creek secondary to the Delaware River rising. This flooding has required removal and overhaul of the pumps, flushing and testing of the wells to insure water quality. In addition, the County lost several sections of dock from the Waterfront Park over two of the floods.

Flood Response:

To help prepare the citizenry for flood events, the county has developed an Emergency Notification System that can be used to notify residents of impending floods. Prior to a flood event, the county shares information with local OEMs and County departments, prepares EOC for Operations, and issues notifications as requested by local OEMs. During a flood event, the county is responsible for coordinating response efforts of the locals, requesting resources from the State EOC, and collecting data for the Public Damage Assessments. After a flood event, Mercer County helps with the recovery work, completing financial paperwork to track expenses during and after the event, assists FEMA and state liaisons, and, if needed, distribution of supplies to local municipalities.

During past flooding events, Mercer County has received response assistance from FEMA, NJDEP, and NJOEM. Afterwards, the county has received clean-up and recovery help from FEMA, NJDEP, NJOEM, Red Cross, the Salvation Army, Fire, and EMS services. Mercer County has benefited from FEMA's Public Assistance Grant Program.

Mercer County does have a community emergency notification system to help disseminate information during an event.

County Mitigation Statement:

Mercer County pledges to support the mitigation goals and actions of their municipalities to the best of their ability.

County Mitigation Actions:**1. ACTION: Develop data for a hydro-network for Mercer County**

Description/Background: This would be used to model/predict flooding at county roadway intersections and segments. There are county roadway intersections and segments that could benefit from flood mitigation measures although no specific measures at specific locations have yet been identified. Before specific mitigation measures are identified, a planning analysis that uses an updated hydro-network to predict specific flood locations is needed to substantiate and then estimate project scope, measures, and costs.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: County jurisdiction over county roads

Responsible Organization: County

Target Completion Date: 2008/2009

Estimated Cost: \$50,000

Potential Funding Sources: None

Priority: High

2. ACTION: Open Space Acquisition

Description/Background: The County has an open space acquisition program that

follows the goals and objectives of the Mercer County Open Space and Recreation Plan. Generally, the acquisition goals look to preserve contiguous lands to protect ecologically sensitive areas and stream corridors.

Hazard: Flooding

Existing or new assets: New/Existing

Existing mechanism through which action will be implemented: County Open Space Acquisition Program

Responsible Organization: County

Target Completion Date: Ongoing

Estimated Cost: To be determined

Potential Funding Sources: Open Space Preservation Trust Fund

Priority: High

5. ACTION: Removal of the abandoned piers directly upstream of the Yardley-West Trenton Railroad Bridge across the Delaware River,

Description/Background: Debris builds up during high water events at the upstream face of the piers at the Yardley-West Trenton Railroad Bridge across the Delaware River, and at abandoned upstream piers at the site. The bridge is owned by CSX. The existing bridge was constructed between 1911 and 1913 by the F.W. Talbot Construction Company for the Philadelphia and Reading Railroad. This replaced the original bridge, built by the North Pennsylvania Railroad in 1874. The brownstone piers of the original bridge remain in place. The removal of the debris and abandoned piers could reduce backwater and offer an upstream flood mitigation benefit.

Hazard: Flooding

Existing or new assets: New/Existing

Existing mechanism through which action will be implemented: To be determined

Responsible Organization: DRBC/ CSX

Target Completion Date: Dependant on feasibility study and funding

Estimated Cost: To be determined

Potential Funding Sources: To be determined

Priority: Medium

**Mitigation Action Plan
of Participating Jurisdictions
for Mercer County**

Jurisdiction	Page Number	Status
Mercer County	119	3 actions submitted
Ewing Township	125	3 actions submitted
Hamilton Township	128	7 actions submitted
Hopewell Township	134	4 actions submitted
Lawrence Township	137	5 actions submitted
Pennington Borough	140	1 action submitted
City of Trenton	141	12 actions submitted

Mercer County: Municipal Mitigation Actions by Action Category

1. Prevention (Policy/Ordinances/Studies/Enforcement)				
Municipality	Mitigation Action	Responsible Party	Estimated Cost	Priority
Hamilton Township	Flood Damage Prevention	Engineering, Planning, Inspections & Land Use	Staff time	High
Trenton City	Get into FEMA's Community Rating System	Trenton Department of Inspections	Staff time	High
Trenton City	Ongoing coordination and involvement with other agencies to maximize mitigation efforts and use of funds	Trenton Office of Emergency Management	Staff time	Medium
2. Property Protection (Acquisition, Elevation, Flood proofing)				
Municipality	Mitigation Action	Responsible Party	Estimated Cost	Priority
Hamilton Township	Property Acquisition	Engineering, Planning, and Inspections, administration	\$500,000	High
Hopewell Township	Elevate utilities	Homeowners	\$20,000 per home	Medium
Hopewell Township	Elevate properties	Homeowners	\$100,000 per home	Medium
Trenton City	Selective acquisition and demolition of highly flood prone residential or commercial properties	Trenton Department of Housing and Economic Development	Dependant on funding	Medium
Trenton City	Acquire and demolish flood prone property on Taylor Street	Trenton Department of Housing and Economic Development or Inspections Department	Acquisition per structure: \$700,000; demolition \$800,000; remediation \$600,000	High
Trenton City	Acquire and demolish flood prone property on Amtico Square	Trenton Department of Housing and Economic Development	Acquisition per structure: \$700,000; demolition \$800,000; remediation \$600,000	High
Trenton City	Elevate mechanical and electrical equipment in flood prone residential structures	Trenton Department of Inspections	Estimated \$5,000 to \$10,000 per residential structure	High
Trenton City	Assess FEMA RLPs and SRLPs throughout the city to identify mitigation candidates	Trenton Department of Inspections	\$25,000 - \$50,000	High
Trenton City	Purchase and/or flood detention at the Freight Yards	Trenton Department of Housing and Economic Development	Acquisition remaining: \$45,000; detention: \$500,000-\$1,000,000; demolition: \$600,000; site remediation: \$5M	High
3. Public Information and Awareness				
Municipality	Mitigation Action	Responsible Party	Estimated Cost	Priority
Hamilton Township	Public education and outreach	OEM, Engineering, Planning, and Inspections	\$10,000	High

4. Emergency Services				
Municipality	Mitigation Action	Responsible Party	Estimated Cost	Priority
Ewing Township	Power Grid Separation	PSE&G	\$150,000	High
Ewing Township	Individual location shut off	PSE&G	N/A	High
Hamilton Township	Flood Threat Recognition System	NJOEM, Hamilton Township Dept. of Engineering, Planning & Inspections and Dept. of Public Works	\$250,000	High
Hamilton Township	Advanced Flood Warning System	NJOEM, Hamilton Township Engineering and Dept. of Public Works	\$400,000	High
5. Natural Resource Protection (Floodplain protection, Stream Corridor Restoration, Open space)				
Municipality	Mitigation Action	Responsible Party	Estimated Cost	Priority
Lawrence Township	Stream cleaning/clearing of Five Mile Run	Lawrence Township	\$75,000	Medium
Lawrence Township	Stream stabilization behind Lawrence Shopping Center	Private property owner	Not known at this time	Medium
Pennington Borough	Land purchase	Borough Council	\$300,000	High
6. Structural Projects				
Municipality	Mitigation Action	Responsible Party	Estimated Cost	Priority
Ewing Township	Backflow prevention valves	NJDOT	unknown	High
Hamilton Township	Retrofit of Greenwood Avenue	NJDOT Region 3 Maintenance Office	\$25,000	Medium
Hopewell Township	Inspection of canal banks	New Jersey Water Supply Authority	N/A	High
Hopewell Township	Raise canal bank	New Jersey Water Supply Authority, NJDEP, D&R Canal Commission	\$250,000	High
Lawrence Township	Analysis of Route 206 at Notre Dame	NJDOT	\$50,000	High
Lawrence Township	Analysis of Bakers Basin Road at Route 1	NJDOT	\$50,000	High
Lawrence Township	Analysis of Princeton Pike culvert near Fairfield Avenue	NJDOT	\$50,000	High
Trenton City	Daylighting the Assunpink from South Broad Street to Warren Street	Trenton Department of Housing and Economic Development/Department of Inspections	To be determined	Medium
Trenton City	Portable Flood Barrier Study and Implementation	Department of Inspections/Fire Department/Civic Associations	To be determined	Medium
Trenton City	Detailed flood vulnerability study of the Trenton Water Filtration Plant	City of Trenton Department of Public Works	\$100,000-\$150,000	Medium
Trenton City	Flood protection at Trenton Water Filtration Plant	City of Trenton Department of Public Works	To be determined, likely over \$1M	Medium

Ewing Township, Mercer County:

Location:

Ewing Township is located along the eastern border of Mercer County immediately north of Trenton City. As of 2000, the township reported 35,707 people, 15.60 square miles of land, and 12,924 housing units. It is bordered by Lawrence Township to the east, Hopewell Township to the north, Upper Makefield (PA) and Lower Makefield (PA) Townships to the west, and the City of Trenton to the south.



Geology:

The township lies in the Piedmont Plateau, which is part of the Appalachian Province. This area is characterized by rolling hills with elevations ranging from 20 feet near the Delaware River to 200 feet near the northwestern boundary of the township.

Hydrology:

The *Delaware River* flows along the western border of Ewing Township.

The *Jacobs Creek* flows southwestward from Hopewell Township to its confluence, the Delaware River. It drains the northwest part of Ewing Township.

The *Ewing Creek* flows westward and originates in the southern part of Hopewell Township and drains the northern part of Ewing Township. Its confluence is the Jacobs Creek.

The *Shabakunk Creek* and *West Branch of the Shabakunk* are located in the eastern part of Ewing Township and is a tributary for the Assunpink Creek. It drains the eastern part of Ewing Township.

Recent Flood History:

Major roadways are located within the floodplain which can cause transportation difficulties during major flooding events. Approximately 25 homes plus apartment buildings near River Road flood during storm events. Only one home receives first floor damage and has since installed pumps. Most flooding is the result of backed up storm sewers. Ewing wants to install uni-direction flap gates on the storm sewer outlet pipes to help prevent stormwater back-ups. When Ewing is affected by flooding, the waters flow downhill into Trenton City.

Ewing is forced to shut off power to the entire township during flood events even if flooding is localized. The municipality is currently working with Public Service Electric and Gas Company (PSE&G) to change the electrical grid system so the township can limit the amount of houses that go without electricity.

Ewing was affected by the June 2006, April 2005, September 2004, and June 1996 floods. During June 2006, the Delaware River flooded River Road from Afton Avenue to Wilburtha Road, and the Delaware's waters backed into the Ewing storm drains. Nine basements were flooded and power was lost to the entire township. The Ewing Sewage Pump Station and the

Villa Victoria Academy were also affected by flood waters. The Trenton Water Works Filtration plant flooded, contaminating water supply in Ewing and causing low water pressure for fire department use. Public utilities were preventatively shut down. During the April 2005 flood, 15 houses sustained basement damage and during the September 2004 flooding event, 9 houses sustained basement damage.

The June 1996 flood was particularly costly for Ewing. The Delaware River and Shabakunk Creek flooded Olden Ave., Lower Ferry Road, and River Road between Afton Avenue to Wilburtha Road. Twenty-six basements flooded and eight buildings sustained structural damage. Two homes sustained first floor damage. Roads, bridges, and lift stations were affected as well.

Ewing wants to add a river gage upstream so that the township can better anticipate flooding events. The township currently utilizes stormwater basins to help detain flood waters and has ongoing acquisitions.

Unique Flood Risk to Municipality:

Primary concern is the river backing up into storm drainage collection system during high water events.

Local Flood Mitigation Planning Committee:

Jack Ball	Mayor
Dave Thompson	Township Administrator
Bert Steinmann	Council Vice President
Kathy Wollert	Council Woman
Chief Robert Coulton	Emergency Management Coordinator
Capt. Dave Morgan	Deputy EMC
William Erney Jr.	Local Floodplain Admin.
Ted Forst	Stormwater Management Coordinator
Angelo Capuano	Public Works Supervisor
Sam Hedrick	Building Code Official
Bob Mannix	Township Engineer
Jamie Sunyak	Township Planner
Richard Owens	Planning Board
Richard Dey	Zoning Board
Kate Tuttle	Flooded Property Owner
Diane Capriglione	Flooded Property Owner
Sue Sabarro	Business Owner

Ordinances/Plans Reviewed:

Flood Damage Prevention Ordinance; Ewing Township Flood Mitigation Plan; Delaware River Basin Flood Mitigation Task Force Report January 20, 2007; history of past flood problems in Ewing Township; concerns, ideas, and suggestions of residents and flood mitigation members.

Outreach: New Jersey Department of Transportation, Public Service Electric and Gas, City of Trenton, Delaware River Basin Commission, County of Mercer

First Public Meeting: 6/13/2007**Advertisement for Meeting:** *Trenton Times Newspaper* 5/31/2007**Questionnaire Distribution:**

Code Enforcement staff hand-delivered questionnaires in areas impacted by past flooding.

Public Response:

1. General comments received noted that primary flooding is caused by water backup through drainage pipes. Suggestions were given as to installing gates, valves, or backflow preventers to eliminate the initial flooding. The committee has reviewed the ideas and is researching.
2. The following additional comments or suggestions were made:
 - a. Stop development along the river
 - b. Dredge river
 - c. Maintain waterways and control flood gates
 - d. Divide utility grid in flood areas

Flood Mitigation Goals:

1. Flood damage prevention through township codes and ordinances
2. Property acquisition and open space conservation along stream corridors and flood prone areas
3. Public education and outreach – provide information on flood insurance, flood protection, flood map information, and early warning programs
4. Hold an annual event to highlight flood mitigation and identify flood hazard areas to the public
5. Regularly update emergency action plans and review list of essential facilities
6. Enforce higher building code standards for any developments in flood hazard areas
7. Split the electric power grid, separate by those that are directly impact by flooding and those that are not. Until item 7 is addressed, during early stages of flood alert, pull electric meters by PSE&G personnel
8. Install valves or back flow preventors on drainage lines along Route 29.
9. Review and improve evacuation procedures

Ewing Mitigation Actions:**1. ACTION: Installation of backflow prevention valves on stormwater outfalls to Delaware River**

Description/Background: During storm events, water from the river backs up through the outfall pipes and the stormwater collection system. This results in roadway and property flooding, requires the shutdown of utilities, and the evacuation of residents. The outfalls are under state jurisdiction and it is the township's understanding that NJDOT is currently studying all the outfalls, and will then install the backflow prevention valves.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Work with NJDOT on study, implementation, and installation of the backflow valves

Responsible Organization: NJDOT

Target Completion Date: Immediately

Estimated Cost: unknown

Potential Funding Sources: State of New Jersey
Priority: High

2. ACTION: Power Grid Separation

Description/Background: Prior to projected storms with predicted flooding, the township immediately shuts off the power to the areas that have a history of flooding. This method impacts many residents who do not have flooding problems. The idea is to isolate the areas directly impacted by the flooding and minimize disruption of power.

Hazard: Flooding/Power Shutoff

Existing or new assets: Existing

Existing mechanism through which action will be implemented:

Work with PSE&G on the study and the implementation of power grid alignment

Responsible Organization: PSE&G

Target Completion Date: June 2008

Estimated Cost: \$150,000

Potential Funding Sources: PSE&G, Ewing Township, State funding

Priority: High

3. ACTION: Individual location shut off

Description/Background: During the most recent flood event, Ewing had public service pull the meters on only the houses and commercial buildings which were directly impacted by flooding. This was the best method at the time to shut down power only to those affected.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Continue working with PSE&G for individual disconnection of meter pulls

Responsible Organization: PSE&G

Target Completion Date: Immediately

Estimated Cost: no fee

Potential Funding Sources: n/a

Priority: High

Hamilton Township, Mercer County:

Location:

Hamilton Township is located in the southwest corner of Mercer County. It is home to over 90,000 people in 40.37 square miles. It is bordered by the City of Bordentown and Townships of Bordentown, Chesterfield, and North Hanover to the south; Upper Freehold Township to the southeast, Washington and West Windsor Townships to the east and northeast, Lawrence Township to the north, and the City of Trenton to the west.



Geology:

Hamilton Township is located on the Atlantic Coastal Plain. Its topography is gently rolling. Marsh areas in the township are confined to the Great Bear Swamp, which covers the northernmost portion, including the Assunpink Creek and Miry Run Flood Plains. Pleistocene sands and gravels overlie all of the older formations except in deeper stream valleys where there may be silt, sand and gravel.

Hydrology:

The *Assunpink Creek* flows through the northern portion of Hamilton Township. The creek flows westward and turns southwest as it approaches the City of Trenton with its confluence at the Delaware River. The Assunpink drains the northern half of the township. Along the creek are ponds and small lakes. Two tributaries to the Assunpink in the Township are *Miry Run* and *Pond Run*.

The *Delaware River* is located in the southwestern part of this township.

The *Crosswicks Creek* drains the southern portion of Hamilton Township. The creek forms the southern township and county border and drains into the Delaware River at the southwestern township limit. *Pleasant Run*, *Doctors Creek* and *Back Creek* are tributaries to Crosswicks Creek.

The *Shady Brook* drains a few square miles of the west central portion of the township. This waterway enters drainage systems in the township and is discharged into the Delaware River.

Recent Flood History:

Hamilton Township has been historically affected by the events of June 2006, September 1999, July 1975 and August 1971. Many transportation routes in the Township cross waterways, which slows discharge and causes pooling behind transportation structures. To help mitigate flooding, there are 10 floodwater retarding structures and a 2.4 mile flood control channel. In addition, culverts under the D&R canal have been reconstructed to increase flow capacity. There is also a storm water diversion dam at Shady Brook.

During the June 2006 flood, Duck Island and the Lamberton Road area were flooded by the Delaware River. No structures were affected. During September 1999, the Assunpink flooded the Whitehead and Cornell Heights areas. About 12 residential structures incurred basement flooding and 8 structures incurred first floor flooding. In July 1975, the Assunpink, Miry Run, Pond Run, North Branch, and Shady Brook all flooded from a tropical storm. Over 800 residences incurred both basement and first floor flooding. Transportation networks and schools were affected as well. Since the event in 1975, Hamilton has installed flood control structures such as dams and stream channel improvements. In August 1971, the Assunpink, Miry Run, Pond Run, North Branch, and Shady Brook flooded and over 650 residential structures incurred basement and first floor flooding damage. Roads, schools, businesses, and transportation networks were temporarily closed.

Unique Flood Risk to Municipality:

Impassable roads and flooding basements are the major risks and impacts. There are also minor impacts such as nuisances and inconvenience.

Local Flood Mitigation Planning Committee:

Lloyd J. Jacobs	Director, EP & I
Richard Balgowan	Director, DPW
Allen Schectel	Township Planner
Haig Kasabach	Planning Board Member
Ata Bonna	Senior Engineer-Hydraulics/Flood Plain Coord.
Walt Bronek	OEM
Ray Lumio	Township Construction Official
Lt. Richard Herrick	OEM Coordinator
Thomas E. Dunn	Township Engineer

Ordinances/Plans Reviewed:

Flood Damage Prevention Ordinance, Stormwater Control Ordinance, Stream Buffer Conservation Zone Ordinance, flood insurance studies, Emergency Action Plan & Operations and Maintenance Manual Dam Site #8, Damage Assessment History from past storm events, Flood Boundary Maps

Outreach: Planned: City of Trenton, Ewing Township, West Windsor, East Windsor, Washington Township, Lawrence, County of Mercer, Friends of the Marsh, Delaware Riverkeepers

First Public Meeting: 10/23/2007

Advertisement for Meeting: 10/17/2007 *Trentonian*

Questionnaire Distribution:

Letters signed by the Mayor with questionnaire were sent to twelve hundred (1200) residents in the documented flood prone areas of the township 10/12/2007. The residents were also notified of the public meeting in the letter. Forty eight (48) responses from residents were received. Of these, 26 have flood insurance, 24 responded that they have sustained flood damages that warranted insurance claims, but none of those that responded were either designated as Repetitive Loss (RL) or Severe Repetitive Loss (SRL) properties.

Public Response:

1. Residents expressed concern about the high cost of flood insurance. They hoped that the new mitigation plan in concert with the township's participation in the Community Rating System (CRS) could be translated into cost reduction and savings.
2. Regular stream channel and storm drain maintenance through cleaning, trees and debris removal, and bank stabilization. At least three complaints were made against overgrown stream channels and blocked drains.
3. Stream channel improvements and widening culvert openings at street and road crossings.
4. Dredging of ponds and streams in densely built residential neighborhoods.
5. Retrofitting storm drain inlets on streets and highways. There was one particular complaint in the neighborhood of Greenwood Avenue (State Highway # 33) between

Norway and Greenwood Avenues. The complainant asserted that there are no curbs in this section, and the roadway is high enough to dump runoff from Norway to Greenwood Avenue over the sidewalk.

6. Property acquisition and creation of more open spaces and halting any future developments within flood hazard areas.

Flood Mitigation Goals:

1. Flood damage prevention enforcement through township codes and ordinances
2. Property acquisitions and open space conservation along stream corridors and flood prone areas
3. Public education and outreach- providing information on flood insurance, flood protection, flood map information and early warning programs
4. Annual event to highlight flood mitigation and identify flood hazard areas to the public
5. Regularly update emergency action plans and review list of essential facilities
6. Enforce higher building code standards for any developments in flood hazard areas
7. Continue and expand Hamilton's participation in the Community Rating System
8. Reduce the number of repetitive loss properties to zero and minimize the number of flood prone structures and facilities
9. Enhance the quality of life, promote public safety awareness, and preserve open space in the floodplain

Hamilton Mitigation Actions:

1. ACTION: Flood Damage Prevention

Description/Background: The flood prone areas are in the older sections of the township that lie along the lower reaches of Pond Run, Miry Run, Assunpink Creek, and Shady Brook. The newer sections of the township are almost entirely without incidence. These areas are benefiting from enforcement of the township's codes and ordinances. Hamilton participates in the Community Rating System (CRS) and vigorously enforces the Phase II Stormwater Regulations. These actions along with structural changes to the stream channels have contributed to better floodplain management in the township.

Hazard: Flooding

Existing or new assets: Existing/New

Existing mechanism through which action will be implemented: Enforcement of township codes and ordinances

Responsible Organization: Engineering, Planning, Inspections & Land Use

Target Completion Date: Upon adoption of plan

Estimated Cost: Staff time

Potential Funding Sources: Department budget

Priority: High

2. ACTION: Public education and outreach

Description/Background: An educated and informed public is an integral part of any successful mitigation plan. The township has an enviable public education and outreach program through the participation in the CRS program and compliance with the Phase II Stormwater Regulation Municipal Stormwater Permit program.

Hazard: All hazards

Existing or new assets: Existing/New

Existing mechanism through which action will be implemented: Emergency Management

Responsible Organization: OEM, Engineering, Planning, and Inspections

Target Completion Date: Upon adoption of plan

Estimated Cost: \$10,000

Potential Funding Sources: Hazard Mitigation Grant Program

Priority: High

3. ACTION: Property Acquisition

Description/Background: The township lists 5 repetitive loss properties and 2 severe repetitive loss properties. The actual number could be higher if every person who has experienced flooding and flood damage on more than one occasion had filed a claim. Flood proofing is an attractive alternative to acquisition, but the township is convinced that acquisition would also satisfy an open space program and would definitely eliminate the repetitive loss and severe damages.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Floodplain management

Responsible Organization: Engineering, Planning, and Inspections, administration

Target Completion Date: 1 year from adoption of plan

Estimated Cost: \$500,000

Potential Funding Sources: Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program Grant, Repetitive Flood Claims Grant, State, etc.

Priority: High

4. ACTION: Retrofit of Greenwood Avenue

Description/Background: In the neighborhood of Greenwood Avenue (State Highway # 33) between Norway and Johnston Avenues, there are no curbs in this section and the roadway is high enough to dump runoff from Norway to Greenwood Avenue over the sidewalk. This causes flooding hazards to properties fronting the Greenwood Avenue section.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: NJDOT Maintenance Program

Responsible Organization: NJDOT Region 3 Maintenance Office

Target Completion Date: To be determined upon plan approval

Estimated Cost: \$25,000

Potential Funding Sources: Flood Mitigation Assistance, NJDOT, Pre-Disaster Mitigation Program Grant

Priority: Medium

5. ACTION: Stream channel improvements

Description/Background: Stream channel and storm drain improvements are needed in the areas of Shady Brook. Permitting needs to be addressed with NJDEP.

Hazard: Flooding
Existing or new assets: Existing
Existing mechanism through which action will be implemented: Township of Hamilton Stream Maintenance Program
Responsible Organization: NJDEP, Township of Hamilton Engineering & Public Works
Target Completion Date: To be determined upon plan approval
Estimated Cost: Unknown at this time
Potential Funding Sources: FEMA, USCOE, Pre-Disaster Mitigation Program Grant, NJDEP
Priority: High

6. ACTION: Flood Threat Recognition System

Description/Background: The identification of flood hazards and the related factors and parameters is paramount for flood hazards mitigation and management. Up to date flood maps, zoning maps, and topographic maps are all necessities. The Township of Hamilton will update these maps and prepare an inventory of road crossings and culvert openings within the township.

Hazard: Flooding
Existing or new assets: Existing and new developments
Existing mechanism through which action will be implemented: Office of Emergency Management and Public Works Inspections and maintenance programs.
Responsible Organization: OEM, EP&I and DPW
Target Completion Date: To be determined upon plan approval.
Estimated Cost: \$250,000
Potential Funding Sources: Pre-Disaster Mitigation Program Grant, USACOE, FMA
Priority: High

7. ACTION: Advance Flood Warning System

Description/Background: The OEM, Engineering and Public Works have always delivered the goods during flooding situations. An elaborate and up to date Advance Flood Warning System is required for effective flooding forecast, education, and outreach programs.

Hazard: Flooding
Existing or new assets: Existing
Existing mechanism through which action will be implemented: OEM
Responsible Organization: OEM, Engineering, Public Works.
Target Completion Date: To be determined upon plan approval
Estimated Cost: \$400,000
Potential Funding Sources: FMA, USACOE, Pre-Disaster Mitigation Program Grant, State of New Jersey
Priority: High

Hopewell Township, Mercer County:

Location:

Hopewell Township is located in the northwestern corner of Mercer County. It is home to 16,105 people living in 5,629 housing units in 58.66 square miles. It is bordered by Ewing and Lawrence Townships to the south, Montgomery Township to the east, East Amwell Township to the north, and Upper Makefield Township (PA) to the west.



Geology:

The township lies in the Piedmont Plateau, which is part of the Appalachian Province. This area is characterized by nearly level lowlands, occasional ridges and low hills, and is underlain by shale. The relatively flat topography of the river terrace is found right along the Delaware River.

Hydrology:

The *Delaware River* flows along the western border of Hopewell Township.

Moore's Creek and *Fiddlers Creek* are both tributaries to the Delaware in the northern part of the township.

The *Jacobs Creek* flows southwestward in western Hopewell Township to its confluence, the Delaware River. The *Woolsey Creek* flows westward and is located in the southern part of Hopewell Township. It is a tributary to Jacobs Creek.

Approximately 50% of Hopewell Township is located in the Raritan River Watershed. Both *Beden Brook* and the *Stony Brook* are tributaries to the Millstone River. *Beden Brook* is located in the northwestern part of the township. The *Stony Brook* originates in East Amwell to the north and flows through Hopewell into Lawrence Township. Tributaries to the *Stony Brook* in Hopewell include *Woodsville Creek*, *Baldwins Creek*, *Lewis Brook* and the *Honey Branch*.

Recent Flood History:

This municipality is affected by waters from the D&R Canal spilling over its banks along a 100' – 150' length of the D&R Canal onto Rt. 29. The flooding inundates the pump station that services the Mercer County Correction Center with well water. The Mercer County Correction Center is a short-term jail facility that confines both men and women and has bed space for 880 inmates with Minimum, Medium and Maximum-security classifications. During flood events that cause overflow from the canal, emergency services are unable to reach the facility and water supply (including fire suppression) to the facility must be suspended.

During flooding events, the Delaware River, the D&R Canal, Jacobs Creek, and Moore's Creek flood River Drive, Route 29 (River Road), and Pleasant Valley Road. Approximately 6 – 10 houses flood along River Drive in Titusville, with the water rising to about 3" – 4" in the first floor. Repetitive flooding occurs in approximately 6 of those houses, especially where the road elevation drops. The average assessed value of the structures is \$400,000.

Historic Roller Mill becomes inundated when Jacobs Creek backs up.

Unique Flood Risk to Municipality: The D&R feeder canal spills over flooding portions of Route 29.

Local Flood Mitigation Planning Committee:

Judy Niederer	Committee Member
Robert Miller	Zoning Officer
Herbert Hinkle	Flooded Property Owner
George Meyer	EMC
Paul Pogorzelski	Administrator/Engineer
Vincent Piacente	Resident

Ordinances/Plans Reviewed: Flood Damage Prevention, Floodplain

Outreach:

First Public Meeting: 05/21/2007

Advertisement for Meeting: Hopewell Valley News, local cable channel, and web site during the month of May

Questionnaire Distribution: Police officers distributed to residents of Titusville, questionnaires also available at library and municipal building.

Public Response:

1. Questions about NYC reservoirs
2. Residents want to know the real cause of the flooding
3. Wanted more information about elevating utilities, elevating properties, and acquiring properties
4. Concern was expressed regarding the integrity of D&R Feeder Canal banks and about the possibility of raising the banks to prevent flooding near Pleasant Valley Road.

Flood Mitigation Goals:

1. Provide assistance to residents desiring to elevate utilities
2. Provide assistance to residents desiring to elevate properties
3. Request appropriate authorities to ensure integrity of canal bank
4. Request appropriate authorities to raise canal bank in low spot

Hopewell Mitigation Actions:

1. ACTION: Inspection of canal banks

Description/Background:

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: New Jersey Water Supply Authority engineers

Responsible Organization: New Jersey Water Supply Authority

Target Completion Date: 6 months

Estimated Cost: No cost unless deficiencies are identified

Potential Funding Sources: N/A

Priority: High

2. ACTION: Raise canal bank

Description/Background: It is desired to raise the berm on the canal for the distance that it floods Route 29. Benefits such as uninterrupted water supply, fire suppression and emergency access would be realized at the Mercer County Correction Center.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: New Jersey Water Supply Authority

Responsible Organization: New Jersey Water Supply Authority, NJDEP, D&R Canal Commission

Target Completion Date: 1 year

Estimated Cost: \$250,000

Potential Funding Sources: New Jersey Water Supply Authority, NJDEP, D&R Canal Commission

Priority: High

3. ACTION: Elevate utilities

Description/Background: Especially in the area of Titusville

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Homeowner action with local assistance

Responsible Organization: Homeowners

Target Completion Date: 1 year

Estimated Cost: \$20,000 per home

Potential Funding Sources: Private funding, possible federal assistance

Priority: Medium

4. ACTION: Elevate properties

Description/Background: Especially in the area of Titusville

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Homeowner action with local assistance

Responsible Organization: Homeowners

Target Completion Date: 5 years

Estimated Cost: \$100,000 per home

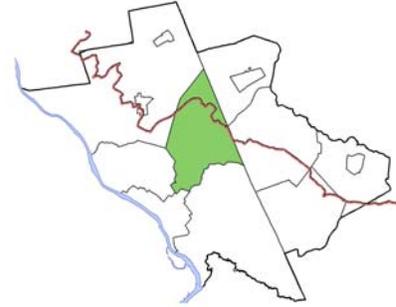
Potential Funding Sources: Private funding, possible federal assistance

Priority: Medium

Lawrence Township, Mercer County:

Location:

Lawrence Township is located in central New Jersey's Mercer County. It is bordered by Hopewell Township to the north, Ewing Township and the City of Trenton to the west, Princeton and West Windsor Township to the east, and Hamilton Township to the south. Lawrence Township is home to 29,159 people within 22.18 square miles.



Geology:

The northern and western parts of the township lie within the Piedmont region. This area consists of gently undulating and moderately sloping uplands with relatively narrow floodplains. The eastern portion of the township is located on the coastal plain. This area is fairly flat with wide flood plains. The dividing line between these two regions lies near and along Princeton Pike.

Hydrology:

The *Shipetaukin Creek* originates in the west-central portion of Lawrence Township and merges with several small tributaries as it flows northeast and then southeast to its confluence, the Assunpink Creek.

The *Shabakunk Creek* is located in the western part of Lawrence Township and is a tributary for the Assunpink Creek. The creek flows in an easterly direction and drains much of Lawrence Township.

The *Assunpink Creek* forms much of the southern corporate limits of Lawrence Township. The creek flows westward and turns southwest as it approaches the City of Trenton.

Recent Flood History:

Lawrence Township was affected by Hurricane Floyd in September 1999. Five Mile Run flooded Pine Knoll Drive and the Shabakunk flooded Meriline Avenue, Altamawr Avenue, Zoar Street, and Fairfield Avenue at Princeton Pike. Bakers Basin Road at Route 1 also flooded. It is unknown how many properties were affected, but all of them sustained basement damage.

Baskers Basin Road at Route 1, Princeton Pike north of Lewisville Road, Princeton Pike south of Fairfield Avenue, and Route 206 at Notre Dame High School routinely flood. Nineteen properties have been acquired since 2005 with funding from the New Jersey Department of Environmental Protection Flood Control Program. The township would be interested in the community telephone notification system if funding becomes available.

Unique Flood Risk to Municipality: The 3 significant areas of flooding over roads involve state roads (Route 206, Route 1) and county structures (culvert on Princeton Pike). Lawrence is also impacted by flow and sediment from Ewing Township, which contributes to decreased capacity in local tributaries and in Colonial Lake.

Local Flood Mitigation Planning Committee:

Bob Ireland	Public Works
Jack Oakley	Deputy EMC
Brenda Kraemer	Assistant Municipal Engineer
Richard Krawczun	Municipal Manager
Dale Robbins	Director Emergency Management
Christine Altomari	Environmental Resource Committee

Ordinances/Plans Reviewed: Land Development Ordinance, available police reports regarding road closures

Outreach: Lawrence Township Council, Environmental Resource Committee

First Public Meeting: 05/16/2007

Advertisement for Meeting: *Lawrence Ledger* (05/3/2007), *Trenton Times* (05/5/2007), *Lawrence Ledger* article (05/10/2007)

Questionnaire Distribution: Mailed to flood-prone residents, available on web site, available through engineering department

Public response:

1. Two residents were interested in acquisition; however, Lawrence Township already received funding for acquisition so the inquiries were handled under the current program.
2. One resident expressed concern about Colonial Lake; however, Lawrence Township maintains a dredging maintenance program and no further projects are planned for this area.
3. Two other residents were interested in future stream cleaning projects.

Flood Mitigation Goals:

1. Analysis of Route 206 at Notre Dame (flooding over road)
2. Analysis of Bakers Basin Road at Route 1 (flooding over road)
3. Analysis of Princeton Pike, south of Fairfield Avenue (flooding over road)
4. Stream cleaning/clearing of 5 Mile Run
5. Stream stabilization behind Lawrence Shopping Center

Lawrence Mitigation Actions:**1. ACTION: Analysis of Route 206 at Notre Dame****Description/Background:**

Hazard: Flooding over road

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Various agency coordination

Responsible Organization: NJDOT

Target Completion Date: 5 years

Estimated Cost: \$50,000

Potential Funding Sources: NJDOT

Priority: High

- 2. ACTION: Analysis of Bakers Basin Road at Route 1**
Description/Background:
Hazard: Flooding over road
Existing or new assets: Existing
Existing mechanism through which action will be implemented: Various agency coordination
Responsible Organization: NJDOT
Target Completion Date: 5 years
Estimated Cost: \$50,000
Potential Funding Sources: NJDOT
Priority: High
- 3. ACTION: Analysis of Princeton Pike culvert near Fairfield Avenue**
Description/Background:
Hazard: Flooding over road
Existing or new assets: Existing
Existing mechanism through which action will be implemented: Various agency coordination
Responsible Organization: NJDOT
Target Completion Date: 5 years
Estimated Cost: \$50,000
Potential Funding Sources: Mercer County
Priority: High
- 4. ACTION: Stream cleaning/clearing of Five Mile Run**
Description/Background:
Hazard: Debris, silt in stream
Existing or new assets: Existing
Existing mechanism through which action will be implemented: Not known at this time
Responsible Organization: Lawrence Township
Target Completion Date: 3 years
Estimated Cost: \$75,000
Potential Funding Sources: Not known at this time
Priority: Medium
- 5. ACTION: Stream stabilization behind Lawrence Shopping Center**
Description/Background:
Hazard: Downstream erosion
Existing or new assets: Existing
Existing mechanism through which action will be implemented: Not known at this time
Responsible Organization: Private property owner
Target Completion Date: Not known at this time
Estimated Cost: Not known at this time
Potential Funding Sources: Not known at this time
Priority: Medium

Pennington Borough, Mercer County:

Location:

Pennington Borough is located in the northwestern portion of Mercer County and is home to 2,696 people within .96 square miles.



Geology:

The township lies in the Piedmont Plateau, which is part of the Appalachian Province. This area is characterized by nearly level lowlands, occasional ridges and low hills, and is underlain by shale.

Hydrology:

Only one-third of the municipality drains into the Delaware River, the other two-thirds are located within the Raritan River watershed. Rainwater is the primary cause of flooding within the borough.

Recent Flood History:

Flood events caused by the overtopping of streams are rare in Pennington. Pennington was affected in 1999 flooding when rainwater flooded King George Road and inundated both sewage lift stations and the generator at Sked Street. In addition, rains washed out the head wall at the Department Public Works office.

Unique Flood Risk to Municipality: None

Local Flood Mitigation Planning Committee:

Mark Blackwell	Planning Board Member
Don Fetzer	Engineer
Gene Dunworth	Administrator

Ordinances/Plans Reviewed: Stormwater regulations from the state

Outreach:

First Public Meeting: 09/10/2007

Advertisement for Meeting: Hopewell Valley News 08/2007

Questionnaire Distribution:

Public Response:

Flood Mitigation Goals:

1. Prevent basement flooding

Pennington Mitigation Actions:

1. ACTION: Land purchase

Description/Background:

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: Borough Council/Open Space

Responsible Organization: Borough Council

Target Completion Date: Early 2008

Estimated Cost: \$300,000

Potential Funding Sources: Borough Open Space, green acres

Priority: High

City of Trenton, Mercer County:

Location:

The City of Trenton is located in the southwestern portion of Mercer County. It is the capitol of New Jersey and is home to 85,403 people within an area of 8.15 square miles. It is bordered to the north by Ewing and Lawrence Townships, Hamilton Township to the east, the Townships of Lower Makefield (PA), Falls (PA) and Borough of Morrisville to the west.



Geology:

Trenton lies within the Piedmont and Coastal Plain regions. The division of these two regions occurs along the Assunpink Creek. Elevations range from 15 feet at the Delaware River to 110 feet along the northern border with West Trenton.

Hydrology:

The *Assunpink Creek* flows right through the center of Trenton. The creek flows through a rock bottom channel with a top width of 70 feet. There are several closed culverts going under streets, parking lots, buildings and long railroads. From Stockton Street to Pond Run, there is a natural channel that is 50 feet wide, except where bridges and buildings form a side wall.

The *Delaware and Raritan Canal* also passes through Trenton. From the northwest part of the city the canal flows southeast, paralleling the Delaware River. It then makes a 90 degree turn and heads northeast paralleling the Assunpink Creek. The canal was designed with spillways to discharge excess flows

The *Delaware River* creates the western border of Trenton.

Recent Flood History:

Trenton has had many major floods caused by tropical storms, thunderstorms and high runoff. The major areas that flood occur along the Assunpink Creek and Delaware River. The Trenton stormwater infrastructure flowed directly to the Delaware River before Route 29 was constructed. When Route 29 was constructed, the municipal system was bisected and junctioned into the stormwater system associated with the roadway (owned by NJDOT). When the river overflows its banks, the water runs along Route 29 and compounds the flooding problem.

The April 2005 and June 2006 are the only times that the Delaware River has overflowed its banks in Trenton since the flood of 1955.

During the June 2006 event, the Delaware River overflowed its banks and backed into the storm sewers. Gold Run Creek also overflowed and sent water throughout Trenton. During the June 2006 event, Clearfield Avenue, Riverside Drive, Columbia Avenue, Mt. Vernon Avenue, Bloomfield, Lee, Newell, LeClede, Lipton, and Westminster flooded in the Island section. In Glen Afton, Sanhican Drive, Morningside Drive, Aberfeldy, Afton, LaBarre, River Drive, and Riverside Avenue flooded. Two hundred and seventy one homes incurred basement damage. In addition, the New Jersey State House Parking Garage was flooded and the River's Edge Nursing home was evacuated. There was substantial damage to electrical and heating systems and the pumps in the sewer lift station were damaged.

In April of 2005, the Delaware River overflowed its banks and backed into Trenton's sewer system. Two hundred homes sustained basement damage. The same roads were flooded as in June of 2006.

In September 2004, Assunpink Creek flooded, but the Delaware River did not overtop its banks in Trenton. There was stormwater backflow. In addition to the previously mentioned flooding areas, Mulberry Street, Webster, Fillmore, Ferry Street, Taylor, Bridge Street, Artisan Street, Prospect Street, and Parkside Avenue also sustained flood damage. 200 homes incurred basement damage.

September 1999 brought Hurricane Floyd and heavy rains that caused the Assunpink to flood. 184 private dwellings sustained basement damage and 30 sustained first floor damage. After the event, several properties were acquired and demolished decreasing Trenton's tax base. There was also road damage.

Flood Mitigation History:

The Assunpink Creek Watershed Work Plan was created in 1964 to help mitigate flooding problems along the creek. This included the construction of 10 flood water retarding structures and 2.4 miles of flood control channel. Also the culverts under the Delaware and Raritan Canal have been reconstructed to increase flow capacities and lower flood stages west of the canal.

There are 176 repetitive loss properties and 6 severe repetitive loss properties in Trenton. Since 2001, there have been 34 property acquisitions funded by FEMA and NJ hazard mitigation grants. Due to the closeness of buildings and use of varied building materials including stone masonry, it would be difficult and expensive to elevate properties in Trenton. There are several people interested in acquisition.

The Island section of Trenton contains about 170 structures that are prone to basement flooding. Many residents do not want to move and are against the installation of a flood wall that would negatively affect the riverside view. According to municipal representatives, residents may be amenable to having houses elevated, although there were several homes constructed of stone/masonry and these would be very costly to elevate. In general, elevation of houses in this area appears to be problematic. The houses are of varying types and styles of

construction and they are close together which would cause construction difficulties. The Army Corps of Engineers recommends looking into the installation of a berm. The city has encouraged residents to raise their utilities.

The Glen Afton section of Trenton, across Route 29 from the Island, contains approximately 225 structures were affected by flooding, including 100 rental units in an apartment complex. Flood waters from Ewing Township come southbound down River Road, turn left on Afton Avenue and take a right onto Morningside Drive, all the while flooding properties. 225 structures flood including about 100 rental properties. These properties are worth \$250,000 to \$400,000.

There is a floodwall in place on that part of the river by the State House. The adjacent parking garage to the State House floods through NJDOT-owned storm drains carrying backflow from the river.

Unique Flood Risk to Municipality:

In recent history, the most significant cause of flooding from the Delaware in Trenton is not from overbank events, but surcharge from storm sewers when the river reaches relatively low elevations compared to the overtop height of the bank. Several neighborhoods that border the river, including the Island and Glen Afton sections, have endured repeated flooding from this source. A few other areas of the City have also experienced surcharge-related flooding, but these two areas are clearly the most frequently affected. High water surface elevations on the Delaware also limit the discharge potential from the Assunpink and other tributaries, sometimes contributing to upstream (backwater) flooding.

NJDOT has cleaned out the stormwater system associated with Route 29 and is evaluating the installation of backflow preventers to about 50 existing outfall structures from the vicinity of Waterfront Park to the Ewing Township line. The NJDOT investigative work is being led by James Purcell, P.E., of Medina Consultants and includes the performance of field investigations, survey of existing conditions, evaluation of the drainage system, and recommended solutions for prevention of backwater flow from the Delaware River into the stormwater systems on Route 29 and the immediate vicinity.

In 2007, a Tideflex valve was installed on the Sanhican outfall located on the north end of the Trenton Island to help prevent future flooding from high river stages up to a point prior to overtopping of the river banks. This backflow preventer will be effective between river flow elevations of approximately 18 feet (equivalent to less than a 2-year storm event) and approximately 32 feet (about a 50-year storm event). The Sanhican outfall and associated system is an urban drainage system bordered by the Delaware River on the south and the Delaware and Raritan Feeder Canal to the north, and extends from Sullivan Way to the east along Route 29 (a.k.a Sanhican Drive) then along Morningside Drive to La Barre Avenue to the west. The Sanhican drainage system services a drainage area of 49 acres.

Local Flood Mitigation Planning Committee:

Leonard Pucciatti	Director, Dept. Public Inspections
Andrew Carten	Director of Planning

Monifa Banks-Harrison	Senior Systems Analyst
Eric Jackson	Director of Public Works
Dennis Keenan	Former Fire Director
Trish Long	Department of Planning
Joseph McIntyre	General Superintendent Water/Sewer
Fran Goeke	Municipal Engineer

Ordinances/plans reviewed: Master Plan, Floodplain Management, Building Construction, Zoning and Land Development

Outreach: DRBC, Ewing Township (police), Hamilton Township (police), Red Cross, Board of Education, Mercer County, Capital Health Systems, St. Francis Hospital, Trenton EMS, Trenton Police Department, NOAA, D&R Commission, Army Corp of Engineers, FEMA region II, NJ State Police, Trenton Council Civic Associations, Joint Toll Bridge Commission, Trenton Communication, PSE&G, Verizon, Trigen, NJ Transit, Glen Afton Civic Association, Island Civic Association

First Public Meeting: 05/18/2007

Advertisement for Meeting: Newspaper

Questionnaire Distribution:

Public Response:

1. There were questions regarding the accuracy of FEMA claims databases and why it was used. (To show the flood prone areas).
2. Will projects in Lambertville affect Trenton? (They will look at downstream affects before doing anything).
3. Should other projects upstream of the city be included in the plan? (No, because they are out of city jurisdiction).
4. Which is a priority for the city, residential or commercial mitigation projects? (Residential.)
5. Can we include portable flood barriers in the plan? (Yes. They didn't know if FEMA would fund it, but that doesn't mean it should be taken out.)

Flood Mitigation Goals:

1. Ensure that Trenton, its citizens, assets and operations, have the best possible protection from the future effects of natural hazards.

Trenton Mitigation Actions:

1. **ACTION: Elevate mechanical and electrical equipment in flood prone residential structures**

Description/Background: Residences in the Island and Glen Afton sections of Trenton are highly susceptible to flooding from storm sewer surcharge when the Delaware River reaches relatively low elevations (well below the overbank elevation). Although the State and City have recently instituted measures that may alleviate these risks, their efficacy is not yet proven. Given the highly repetitive nature of these damages, it is likely that they will continue to some degree even if the structural measures are effective. The cost of moving mechanical and electrical equipment in a standard residence is estimated at between \$5,000 and \$10,000 per house. As discussed earlier, the estimated average flood insurance claim in these areas is in the same cost range.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Inspections

Target Completion Date: TBD pending availability of matching funds

Estimated Cost: Estimated \$5,000 to \$10,000 per residential structure

Potential Funding Sources: FEMA, HMGP, FMA, PDM, or SRL

Priority: High

2. **ACTION: Assess FEMA RLPs and SRLPs throughout the city to identify mitigation candidates**

Description/Background: Assess FEMA repetitive loss and severe repetitive flood loss properties throughout the City to identify specific properties or areas that are at the most risk. FEMA and the National Flood Insurance Program (NFIP) maintain detailed records of flood insurance payments. Trenton has numerous properties that are classified as either repetitive loss or severe repetitive loss. Several kinds of FEMA mitigation grants are available for actions that reduce these risks – such properties are a high priority to FEMA, and as such are likely to be successful candidates for mitigation grants. The purpose of this action is to perform more detailed assessments of these properties than is possible in the context of this plan, in order to determine the range and feasibility of potential mitigation activities. This action will include performing benefit-cost analysis of alternatives once properties and projects have been identified. This action will include contacting homeowners and homeowners' associations to determine the level of interest and cooperation. The Mayor's Flood Committee may offer a good operational model to do this.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Inspections

Target Completion Date: Unknown, likely to start within 1 year

Estimated Cost: Likely between \$25,000 and \$50,000

Potential Funding Sources: Most likely City

Priority: High

3. **ACTION: Purchase and/or flood detention at the Freight Yards**

Description/Background: This 35-acre site in Trenton was formerly occupied by railroad freight yards. It has extensive impermeable surfaces throughout, mostly concrete, and will require extensive environmental remediation before it can be returned to natural landscape. Because of the expanses of impermeable land, there is a fairly high potential for areas south and east of this site to flood from overland flows from this site. At least once in the past, the major rail line on the east coast (which carries large amounts of freight, and is part of the northeast Amtrak corridor) has flooded, causing interrupted rail service, with huge economic impacts. There are several possible mitigation projects related to this site, including purchase of the property (this will not be independently cost-effective because a simple purchase will not eliminate flooding) and providing on-site water impoundment/detention as a means to alleviate flooding on other sites. This would require an engineering study to determine the effectiveness of such a measure.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Housing and Economic Development

Target Completion Date: Ongoing

Estimated Cost: Acquisition remaining: \$45,000; detention: \$500,000-\$1,000,000; demolition: \$600,000; site remediation: \$5 million

Potential Funding Sources: FEMA grant programs, NRCS

Priority: High

4. ACTION: Acquire and demolish flood prone property on Taylor Street

Description/Background: These commercial properties are located on Taylor Street. These buildings have been subjected to severe flooding as recent as the April, 2007 event. This project is to purchase and demolish these buildings, then remediate the site and return it to open space uses. This is a case where FEMA mitigation program funds could potentially be used for the acquisition and demolition, and other sources of funding could be identified to pay for project elements that are not strictly related to mitigation. It may also be feasible for FEMA mitigation funds to be used to pay for the entire project, depending on the cost effectiveness of the action. A detailed risk assessment and benefit cost analysis will be required for the project to be submitted to FEMA for consideration.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Housing and Economic Development or Inspections Department

Target Completion Date: TBD

Estimated Cost: Acquisition per structure: \$700,000; demolition \$800,000; remediation \$600,000

Potential Funding Sources: FEMA grant programs

Priority: High

5. ACTION: Acquire and demolish flood prone property on Amtico Square

Description/Background: This site is located on the west side of the Assunpink Creek. This project is to acquire the building and site, demolish the building and return the site to a natural floodplain. This is a case where FEMA mitigation program funds could potentially be used for the acquisition and demolition, and other sources of funding could be identified to pay for project elements that are not strictly related to mitigation. It may also be feasible for FEMA mitigation funds to be used to pay for the entire project, depending on the cost effectiveness of the action. A detailed risk assessment and benefit cost analysis will be required for the project to be submitted to FEMA for consideration.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Housing and Economic Development

Target Completion Date: TBD

Estimated Cost: Acquisition: \$700,000; demolition \$800,000; remediation \$600,000

Potential Funding Sources: FEMA grant programs

Priority: High

6. ACTION: Get into FEMA's Community Rating System

Description/Background: This action is to perform all the necessary steps for the City of Trenton to enter into FEMA's Community Rating System (CRS). The CRS is a program that offers reduced NFIP flood insurance rates for communities that meet certain criteria. These extend from simple activities such as promulgating information about floods and building codes, to more complex requirements related to enforcement of floodplain regulations, and numerous activities between. A CRS Plan is a requirement for entry into the program, and this plan may partly satisfy that criterion, but there are several additional steps needed for qualification.

Hazard: Flooding

Existing or new assets: Existing/New

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Inspections

Target Completion Date: TBD

Estimated Cost: Staff Time

Potential Funding Sources: City of Trenton

Priority: High

7. ACTION: Ongoing coordination and involvement with other agencies to maximize mitigation efforts and use of funds

Description/Background: This action is simply to remain engaged with various organizations (such as the Delaware River Basin Commission, among others) in order to ensure that the City is staying aware of potential mitigation opportunities and is ensuring the maximum use of mitigation funds and projects.

Hazard: Flooding

Existing or new assets: Existing/New

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Office of Emergency Management

Target Completion Date: Ongoing

Estimated Cost: Staff Time

Potential Funding Sources: City of Trenton

Priority: Medium

8. ACTION: Portable Flood Barrier Study and Implementation

Description/Background: A small scale hydrologic study of the Glen Afton and Island communities to assess feasibility of the portable flood barrier devices. If proven that the devices are an effective flood barrier, then the City can proceed with a more detailed assessment of the cost and practicality of using the devices. After the cost and practicality is established, then the cost affecters can be identified and validated.

Hazard: Flooding

Existing or new assets: Existing/New

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Department of Inspections/Fire Department/Civic Associations

so effective training of devices occurs

Target Completion Date: TBD

Estimated Cost: To be determined based on site specific conditions (e.g. how many linear feet would be required for devices to be effective for redirecting water and protecting individual homes).

Potential Funding Sources: City Budget

Priority: Medium

9. ACTION: Selective acquisition and demolition of highly flood prone residential or commercial properties

Description/Background: This project is to identify, acquire and demolish highly floodprone commercial or residential properties in the City. The National Flood Insurance Program has established special designations for very floodprone properties: repetitive loss and severe repetitive loss. Trenton has properties in both categories. Although being so designated does not necessarily mean that specific properties would qualify for purchase/demolition through FEMA grant programs, the fact that they are in this category suggests that they may be good candidates. This project is related to High Priority Project No. 2 (above), because identifying such properties and testing the cost effectiveness of purchasing them is a precursor to determining the kinds of projects and the specific properties that would be eligible. There are also issues of the federal/local match requirements that would have to be addressed, as well as the requirement that any participation in mitigation activity must be voluntary.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Housing and Economic Development

Target Completion Date: Unknown; depends on availability of funds, identification of appropriate properties.

Estimated Cost: Depends on specific property; unknown until properties are identified.

Potential Funding Sources: FEMA, HMGP, PDM, FMA, SRL

Priority: Medium

10. ACTION: Detailed flood vulnerability study of the Trenton Water Filtration Plant

Description/Background: The Trenton Water Filtration Plant is located immediately adjacent to the Delaware River, on the west side of Route 29. The plant is currently vulnerable to flood damage in low-probability events (500-year return interval and higher, estimated) Although it would likely require a flood in excess of a 500-year event on the Delaware to flood the plant, this is clearly a high consequence scenario in which about a quarter million citizens would lose access to clean potable water, fire suppression capabilities would be severely hindered, and losses to businesses extreme. This project is to perform a detailed study of flood risk to the facility, to ascertain the probability of flood damages, the likely outcome, as well as a preliminary conceptual study to develop potential mitigation options.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: City of Trenton Department of Public Works

Target Completion Date: Not yet determined, but likely by 2009

Estimated Cost: Expected \$100,000-\$150,000

Potential Funding Sources: possibly City of Trenton/EPA

Priority: Medium

11. ACTION: Flood protection at Trenton Water Filtration Plant

Description/Background: This project is to construct a flood protection structure at the Trenton Water Filtration Plant to prevent damage and loss of function at the plant that would result from very high flood stages on the Delaware River, which abuts the plant. The specifics of such an effort will be known only after a detailed risk assessment and preliminary scoping exercise. Nevertheless, the plant would clearly be at risk if water surface elevations on the Delaware reach extreme levels. The potential direct damages to the plant and lost function would certainly be in the millions of dollars under certain circumstances.

Hazard: Flooding

Existing or new assets: Existing

Existing mechanism through which action will be implemented: TBD

Responsible Organization: City of Trenton Department of Public Works

Target Completion Date: TBD

Estimated Cost: TBD, likely over \$1 million

Potential Funding Sources: TBD, looking for outside sources

Priority: Medium

12. ACTION: Daylighting the Assunpink from South Broad Street to Warren Street

Description/Background: This project is to open (daylight) the Assunpink Creek from South Broad Street to Warren Street. The project has been under discussion as a flood mitigation measure by the City of Trenton and various state and federal agencies. With respect to the potential for using FEMA grant program funding for all or part of this project, it is necessary to first definitively determine the status of the project, particularly as it relates to what agencies or programs may be used to fund it. The flood mitigation effects of the project will also have to be identified before it can be considered as part of a FEMA application (bearing in mind that there may be other sources of financial support that are not related to FEMA). The first part of this action is to undertake a more detailed examination of the project as it currently stands, to identify what agencies are involved, if the overall project is potentially eligible for FEMA funding support, and if the entire project is not, if there are sub-elements that may qualify. The second part of the project is to perform a preliminary risk assessment to determine if the project or a sub-project is likely to be cost-effective from a flood mitigation standpoint. The third part of the project is to undertake a mitigation project based on the results of these reviews.

Hazard: Flooding

Existing or new assets: Existing/New

Existing mechanism through which action will be implemented: TBD

Responsible Organization: Trenton Department of Housing and Economic Development/Department of Inspections

Target Completion Date: TBD

Estimated Cost: A study is likely to cost at least \$100,000; project costs would depend on the specific action.

Potential Funding Sources: FEMA, other public agencies

Priority: Medium