City of Trenton, New Jersey
Natural Hazard Mitigation Plan

Adopted by the
Trenton City Council
June 19, 2008

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Section 2
Executive Summary

On October 30, 2000, the President signed into law the Disaster Mitigation Act of 2000, also known as DMA2K. Among its other features, DMA2K established a requirement that in order to remain eligible for Federal disaster assistance and grant funds, local and State governments must develop and adopt hazard mitigation plans. On February 26, 2002, the Federal Emergency Management Agency published an Interim Final Rule (IFR) that set forth the guidance and regulations under which such plans are supposed to be developed. The IFR provides detailed descriptions of both the planning process, that states and localities are required to observe, and the contents of the plan that emerges. This Plan responds to those requirements.

Hazard mitigation is often defined as actions taken to reduce the effects of natural hazards on a place and its population. The City of Trenton decided to develop this Hazard Mitigation Plan because of increasing awareness that natural hazards, especially flood and wind, have the potential to affect people, physical assets, and operations in the City.

Contact information for the City of Trenton official submitting this Hazard Mitigation Plan is:

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Email: mbharrison@trentonnj.org

2.1 Organization of the Plan

The City of Trenton Hazard Mitigation Plan is organized to parallel the structure provided in the Interim Final Rule [IFR]. The Plan has ten sections.

Section 1 **Table of Contents**
Section 2 **Executive Summary**
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Section 8 **Mitigation Goals, Objectives Strategies and Actions**
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Section 10 **Capabilities Assessment**

Appendices

There are references to the IFR throughout the Plan. Where possible, these provide specific section and subsection notations to aid the review process. The Plan also includes references to the FEMA crosswalk document, which is used in reviewing mitigation plans.

2.2 Background

The purpose of a mitigation plan is to rationalize the process of determining appropriate hazard mitigation actions. The document includes a detailed characterization of natural hazards in the mid-Atlantic region, New Jersey, and the City of Trenton; a risk assessment that describes potential losses to physical assets, people and operations; a set of goals, objectives, strategies and actions that will guide Trenton's mitigation activities, and a detailed plan for implementing and monitoring the Plan. This Plan focuses on three hazards with the highest potential for damaging physical assets, people and operations in the City. These hazards are floods, high winds (the latter includes hurricanes, tropical storms and tornadoes) and winter storms. Both the risk assessment section and goals sections reflect this emphasis, which was the result of careful consideration and a numerical ranking process carried out by the Hazard Mitigation Committee.

2.3 Hazards and Risks

Hazards

Sections 6 and 7 of this Plan include a detailed description of the process that was used to assess and prioritize Trenton's risks from natural hazards, and quantitative risk assessments for the City as a whole, and more detailed assessments for certain asset classes. Ten hazards were initially identified and profiled by the Hazard Mitigation Committee. These are:

1. Floods
2. High winds (including those related to hurricanes, tropical storms and tornadoes)
3. Earthquake
4. Lightning
5. Wildfire
6. Hail
7. Extreme temperatures
8. Winter storms
9. Drought
10. Sinkholes and land subsidence

For each of these hazards, the profiles in Section 6 include:

- Description
- Geographical Extent
- Severity
- Impact on Life and Property
- Occurrence (probability)

Risks

A risk calculation is a FEMA requirement. Risk is a numerical indication of potential future damages. Although the range of events from lightning to sinkholes all have some potential to affect the City, floods and high winds are clearly the most significant hazards, based on the ranking criteria and experience, followed by winter storms. These three hazards were selected for much more detailed assessments and estimations of future damages. Section 7 includes details about calculation methodologies and results of the risk assessment, which are summarized in Table 2-2.

Table 2-2
Summary of City of Trenton Natural Hazard Risks
by Asset and Hazard Type (100-year horizon)

Asset	Hazard	Risk (100-year horizon)
Repetitive loss properties (residential)	Floods	**$4,644,891**
Repetitive loss properties (non-residential)	Floods	**$3,815,439**
City of Trenton Water Filtration Plant	Floods	**$6,820,361**
Commercial services	Wind	**$30,969,736**
Industrial	Wind	**$9,950,719**
Residential	Wind	**$30,842,886**
All assets, direct damages	Winter Storms	**$5,088,896**
Deaths	Winter Storms	**$589,236**
Injuries	Winter Storms	**$110,478**

2.4 Summary of Goals, Objectives, Strategies and Actions

Section 8 of this Plan describes Trenton's priorities for mitigation actions. The section divides the actions by priority, and describes the funding required, sources of funding, the level of support, and the timing of the action. The section also includes the City's hazard mitigation goals and objectives.

Trenton's Hazard Mitigation Goal

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

Objectives

Objectives are well-defined intermediate points in the process of achieving goals. City of Trenton mitigation planning objectives include:

- Reduce the exposure of residential areas to flooding from the Delaware River and Assunpink Creek.
- Find and develop opportunities to work with other agencies to leverage mitigation funds, and to share information about the risks of natural hazards.
- Promote partnerships among federal state, county, interstate commissions, and local governments to identify, prioritize and implement mitigation actions.
- Maintain the viability of Trenton businesses by preventing damages from hazards.
- Ensure that the City maximizes its opportunities for access to grants and other kinds of assistance.
- Provide effective implementation of existing floodplain regulations and building codes.
- Ensure that Trenton continues to be represented in the determination of region-wide mitigation actions.
- Stay involved with citizen and technical groups.

Strategies

Strategies are specific course of action to achieve the objectives. City of Trenton mitigation planning strategies include:

- Maintain awareness of the potential effects of natural hazards on City of Trenton assets. Use new information from damaging events to increase local knowledge of risks.
- Undertake vulnerability and risk studies to better understand the potential for future damages.
- Implement cost-effective projects and actions to reduce risk from natural hazards, both for the City of Trenton assets and operations, as well as for residents and businesses in the planning area.
- Monitor mitigation measures to ensure they are functioning efficiently.
- Continuously monitor and update this Plan to ensure that it remains current with regard to risks, strategies, priorities and mitigation actions.
- Promote public understanding, support and demand for hazard mitigation
- Seek grants to fund mitigation activities.

- Encourage and facilitate the development or updating of General Plans, Land and Zoning, Building Construction, Fire Protection and Floodplain Management Ordinances to limit development in hazard areas.
- Implement elements of the plan and monitor results.

Actions

High Priority Actions

- Elevate mechanical and electrical equipment in floodprone residential structures
- Assess FEMA repetitive loss and severe repetitive loss properties to identify mitigation candidates
- Purchase and/or flood detention at the Freight yards
- Acquire and demolish floodprone properties on Taylor Street.
- Acquire and demolish floodprone property on Amtico Square
- Enter the City of Trenton into FEMA's Community Rating System

Second Priority Actions

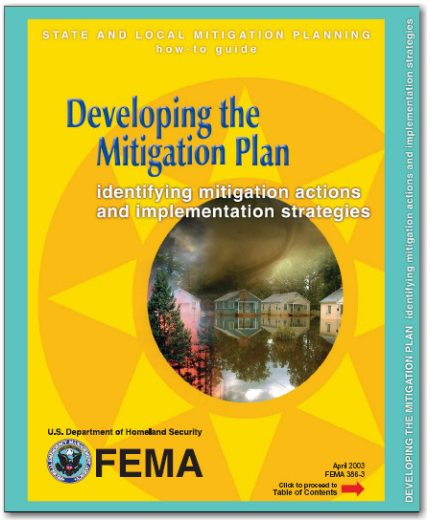
- Coordination and involvement with other agencies to maximize mitigation efforts
- Study the feasibility, cost and practicality of Portable Flood Devices
- Selective acquisition and demolition of highly floodprone residential or commercial properties
- Detailed flood vulnerability study of the Trenton Water Filtration Plant
- Flood protection at Trenton Water Filtration Plant
- Wind vulnerability survey for essential public facilities
- Wind retrofits for essential public facilities
- Selective tree pruning to limit damage from ice and wind storms
- Study daylighting the Assunpink from South Broad Street to Warren Street (identify projects)
- Determine Earthquake Risk to the City, Identify Mitigation Alternatives
- Implement Specific Earthquake Mitigation Actions

The section includes information about the parties responsible for implementing the actions, and about potential sources of funding for mitigation activities. There are also two subsections outlining Trenton's mitigation objectives and strategies.

2.5 The Planning Process

Section 5 provides details about the process that was used to develop this Plan. The process closely followed the guidance in the FEMA "386" series of planning guidance, which recommend a four-stage process for developing mitigation plans.

Step 1 Organize resources
Step 2 Assess risks
Step 3 Develop a mitigation plan
Step 4 Implement the plan and monitor progress



Step 1 included identification of a Hazard Mitigation Committee (HMC) that was responsible for most aspects of Plan development; and a stakeholder group, comprised of individuals from the City and surrounding jurisdictions, who were informed of the planning decisions and provided interim versions of the Plan for review and comment. The Trenton City Council is the approving authority for the Plan.

Step 2, the risk assessment, was completed by the HMC. The risk assessment is included as Section 7 of the Plan.

Step 3, development of the Mitigation Plan is described in Section 5 (Planning Process). The section includes details about who was involved, the processes that were used, and the products that were developed.

Step 4, implementing the Plan, is described in the Mitigation Strategy section, which includes details about who is responsible for implementation of specific strategies and actions; and in Section 9, the Plan Monitoring and Maintenance section, which describes long-term implementation through periodic updates and reviews.

2.6 Approval and Adoption Processes

The Trenton City Council was responsible for approving and adopting this Hazard Mitigation Plan. The Council reviewed and approved the Plan at its June 19, 2008 meeting.

2.7 Implementation Process

The implementation process is described in the Mitigation Strategy section.

2.8 Monitoring and Updating Processes

Section 9 (Plan Monitoring and Maintenance) describes the schedule and procedures for ensuring that the Plan stays current. The section identifies when the Plan must be updated, who is responsible for monitoring the Plan and ensuring that the update procedures are implemented. This section provides a combination of cyclical dates (oriented toward FEMA requirements) and triggering events that will initiate amendments and updates to the Plan. The Trenton Department of Inspections is responsible for monitoring the Plan and initiating the cyclical update process. The point of contact at the City for this is Ms. Monifa Banks-Harrison.

2.9 Capabilities Assessment

Section 10 (Capabilities Assessment) describes the local, state and federal laws and regulations that affect hazard mitigation and provides and inventory of Trenton's programs and policies.

Section 3
Background

Contents of this Section

3.1 Introduction

The City of Trenton undertook the development of this Hazard Mitigation Plan because of increasing awareness that natural and man-made hazards, especially floods, may affect many people and property in the City. The Plan is a requirement associated with a receipt of certain federal mitigation grant program funds administered by the New Jersey Office of Emergency Management (NJOEM), Mitigation Division. In addition, the Plan is a pre-qualification of eligibility for other mitigation grants.

3.2 Authority

44 CFR Part 201, Hazard Mitigation Planning, establishes criteria for State and local hazard mitigation planning authorized by Section 322 of the Stafford Act, as amended by Section 104 of the Disaster Mitigation Act. After November 1, 2004, local governments applying for Pre-Disaster Mitigation (PDM) funds through the States must have an approved local mitigation plan prior to the approval of local mitigation project grants. States are also required to have an approved Standard State mitigation plan in order to receive PDM funds for State or local mitigation projects after November 1, 2004. Therefore, the development of State and local multi-hazard mitigation plans is key to maintaining eligibility for future PDM funding. It is also a precondition for receiving funds under other FEMA mitigation grant programs. In 2006, the City of Trenton received a grant from FEMA, through NJOEM, to develop this natural hazard mitigation plan.

3.3 Organization, Objectives and Mission of the City of Trenton

This section of the Plan describes the purpose, structure and operations of the City of Trenton. Trenton is governed under the Faulkner Act (Mayor-Council) system of municipal government. Citizens in the Mayor-Council system enjoy the right of initiative and referendum, meaning that proposed ordinances can be introduced directly by the people without action by the local governing body. This right is exercised by preparing a conforming petition signed by ten percent of the registered voters who turned out in the last general election in an odd-numbered year. Once the petition is submitted, the local governing body can vote to pass the requested ordinance, and if it refuses, it is then submitted directly to the voters.

The City of Trenton also shares emergency operations responsibilities with several organizations including the State, the surrounding jurisdictions, and National coordination with FEMA. The City of Trenton also works with flood control and other hazards responsibilities with several surrounding organizations and jurisdictions, including the Delaware River Basin Commission, Mercer County, Department of Emergency Management, Joint Toll Bridge Commission, among others. The City of Trenton operations and facilities have a direct bearing not only on the Assunpink Creek, but the Delaware River and Raritan Canal as well.

3.4 Geography, Climate, and Population and Growth of the Planning Area

3.4.1 Geography

The City of Trenton lies on the central-western edge of Mercer County in central New Jersey. Trenton is approximately 45 miles from New York City and 35 miles from Philadelphia. It is bordered to the north by the Townships of Ewing and Lawrence, and to the east and south by the Township of Hamilton. The western border, formed by the Delaware River, is shared with Bucks County Pennsylvania, Townships of Falls and Lower Makefield and the Borough of Morrisville. A total are of 7.5 square miles is contained within the municipal boundaries.

Trenton is a highly developed urban area. Assunpink Creek, US Route 1 and the Amtrak and Conrail tracks pass through the center of the City from northeast to southwest. Industrial and commercial development nearly parallels this water supply and transportation artery through the city. The industries lie to the northeast, while the commercial center and state capitol are situated in the southwest, near the Delaware River. Medium to high density residential areas dominate the remainder of the city.

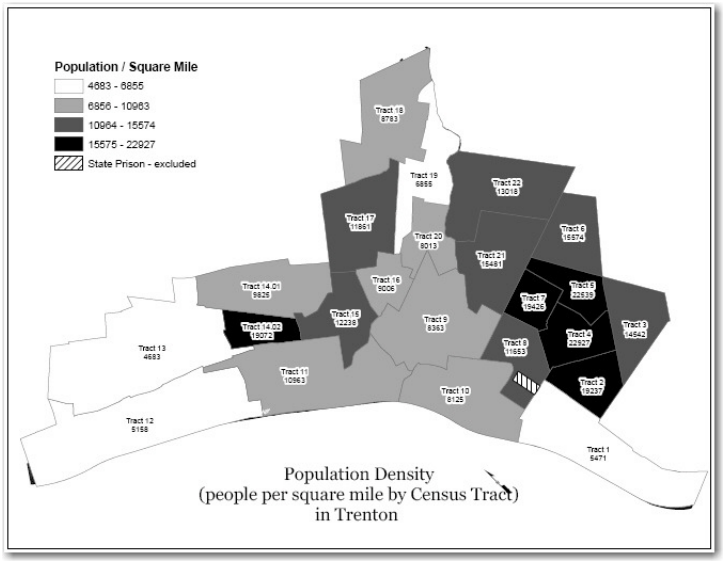


Figure 3-1
Population density in Trenton. Note that most of the areas with lowest densities are near the

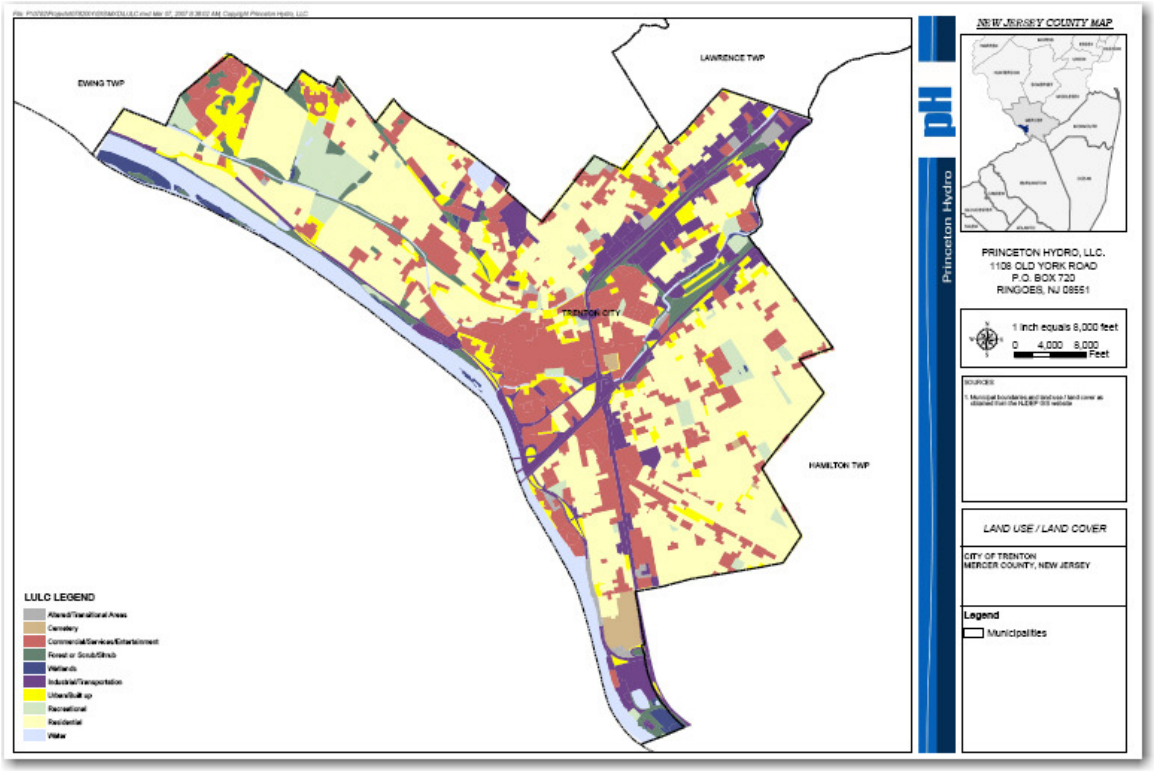


Figure 3-2 Land Use in Trenton

Trenton lies within the Piedmont and Coastal Plain physiographic provinces. As the Assunpink Creek passes through Trenton, its channel etches the "fall line", the boundary between the Piedmont to the north and the Coastal Plain to the south. Elevations range from 15 feet in the southernmost area along the Delaware River to 110 feet along the northern border in west Trenton.

Trenton is situated on a plateau at the Delaware's navigable head. The city itself is bisected by Assunpink Creek. Trenton's climate is largely continental and subject to winds from the interior of the country. To the west are the Appalachian Mountains, which temper storm activity. Annual snowfall is about 23 inches.

3.4.2 Climate

Trenton enjoys a humid continental temperate climate with some marine influence due to the nearby Atlantic Ocean. The four seasons are of approximately equal length, with precipitation fairly evenly distributed through the year. The temperature is rarely below zero or above 100 °F.

During the winter months, temperatures routinely fall below freezing, but rarely fall below 0 °F. The coldest temperature ever recorded in Trenton was -14 °F (-25.6 °C) on February 9, 1934. The average January low is 24 °F (-4.4 °C) and the average January high is 38 °F (3.3 °C). The summers are usually very warm, with temperatures often reaching into the 90 °F's, but rarely reaching into the 100 °F's. The average July low is

67 °F (19.4 °C) and the average July high is 85 °F (29.4 °C). The temperature reaches or exceeds 90 °F on 18 days each year, on average. The hottest temperature ever recorded in Trenton was 106 °F (41.1 °C) on July 9, 1936.

The average precipitation is 45.77 inches per year, which is fairly evenly distributed through the year. The driest month on average is February, with only 2.87 inches of rainfall on average, while the wettest month is July, with 4.82 inches of rainfall on average. Rainfall extremes can occur, however. The all-time single-day rainfall record is 7.25 inches on September 16, 1999, during the passage of Hurricane Floyd. The all-time monthly rainfall record is 14.55 inches in August 1955, due to the passage of Hurricane Connie and Hurricane Diane. The wettest year on record was 1996, when 67.90 inches of rain fell. The driest month on record was October 1963, when only 0.05 inches of rain was recorded. The driest year on record was 1957, when only 28.79 inches of rain was recorded.

Snowfall can vary even more year-to-year. The average snowfall is 24.9 inches, but has ranged from as low as 2 inches (in the winter of 1918-19) to as high as 76.5 inches (in 1995-96). The heaviest snowstorm on record was the Blizzard of 1996 on January 7-8, 1996, when 24.2 inches buried the city. Snowstorms with accumulations of 12 inches or greater occur on average about once every 3-4 years.

3.4.3 Population and Growth

The City of Trenton, as of the 2005 U.S. Census estimates, has a population of roughly 85,000 people. The population density was 11,153.6 people per square mile. There were 33,843 housing units at an average density of 4,419.9 per square mile. Trenton is bordered by two major highway systems, Route 1 and 95 and is on the North East Corridor rail line. Trenton is state capital and county seat. These factors contribute to the population swell at rush hour and during the work day of greater than 110,000.

Table 3-1
United States Census - Trenton, New Jersey Population

	1990	2000	2005
Population	88,675	85,403	84,675

Source: U.S. Census Bureau, 2005 Population Estimates, Census 2000, 1990 Census

A further breakdown of the population of Trenton as collected by the US Census is and compiled in the following table:

Table 3-2 United States Census
Population Characteristics for Trenton, New Jersey

General Characteristics	Estimate	Percent	U.S.
Total population	77,471	--	--
Male	37,102	47.9	49.0%
Female	40,369	52.1	51.0%
Median age	32.6	--	36.4
Under 5 years	6,761	8.7	7.0%
18 years and over	54,920	70.9	74.6%
65 years and over	7,222	9.3	12.1%
One race	75,944	98.0	98.1%

General Characteristics	Estimate	Percent	U.S.
White	24,377	31.5	74.7%
Black or African American	36,809	47.5	12.1%
American Indian/Alaska Native	502	0.6	0.8%
Asian	764	1.0	4.3%
Hawaiian/Pacific Islander	142	0.2	0.1%
Some other race	13,350	17.2	6.0%
Two or more races	1,527	2.0	1.9%
Hispanic or Latino (of any race)	25,672	33.1	14.5%
Total housing units	33,187	--	--
Occupied housing units	27,075	81.6	89.2
Owner-occupied housing units	11,372	42.0	66.9
Renter-occupied housing units	15,703	58.0	33.1
Vacant housing units	6,112	18.4	10.8
Social Characteristics	**Estimate**	**Percent**	**U.S.**
Population 25 years and over	47,348		
High school graduate or higher	--	60.1	84.2%
Bachelor's degree or higher	--	9.2	27.2%
Disability status	10,644	15.1	14.9%
Foreign born	16,160	20.9	12.4%
Economic Characteristics	**Estimate**	**Percent**	**U.S.**
In labor force	39,524	68.5	65.9%
Median household income	$34,356	--	$46,242

Source: U.S. Census Bureau, 2005 American Community Survey

3.5 Maps of the Planning Area

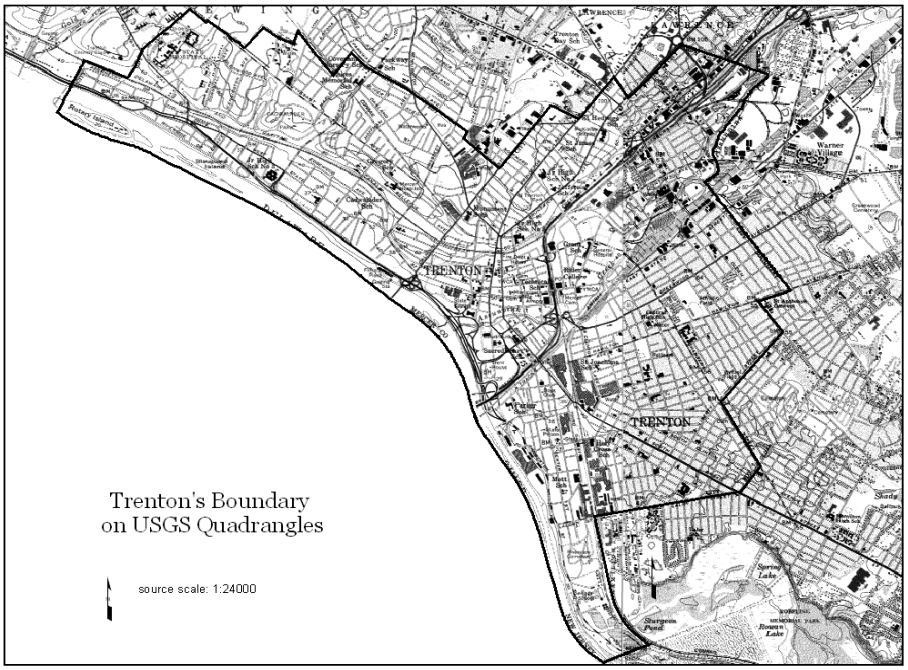


Figure 3-4 City of Trenton Location Map

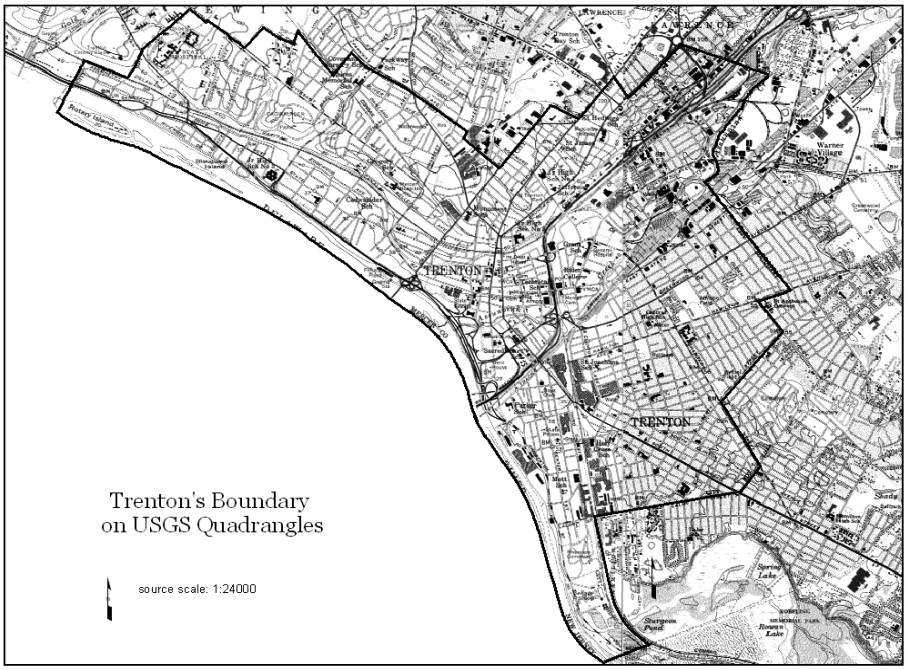


Figure 3-5
USGS Quad map, showing the boundaries of Trenton. The Delaware River forms the western boundary of the City.

Section 4
Approval and Adoption

Contents of this Section

4.1 IFR Requirement for Approval and Adoption

Requirement §201.6(c)(5): *[The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).*

4.2 Authority

The Trenton City Council has the authority to approve and adopt the Hazard Mitigation Plan.

4.3 Approval and Adoption Procedure

After consideration and approval by the Hazard Mitigation Committee, the plan will be forwarded to the City Council for review and approval. Section 5 provides details about the dates of public presentations and City Council consideration and approval of the plan.

4.4 Adoption Resolution

The Trenton City Council adopted this hazard mitigation plan on June 19, 2008. A copy of the Adoption Resolution is included as Appendix E.

Section 5
Planning Process

Contents of this Section

5.1 IFR Requirement for the Planning Process

Requirement §201.6(c) (1): *[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

5.2 Description of the Planning Process

How the Plan was Prepared

The City of Trenton Hazard Mitigation Plan was prepared in accordance with the process established in the How-To Guides produced by the Federal Emergency Management Agency [FEMA], and the requirements of the February 26, 2002 Interim Final Rule (IFR). The process established in the How-To guides has several steps.

Step 1 Organize resources
Step 2 Assess risks
Step 3 Develop a mitigation plan
Step 4 Implement the plan and monitor progress

These guides provided the structure for the process that was used to develop the Plan. Other sections of this Plan include details about how the IFR requirements were met, the process used to obtain and interpret data and eventually make decisions in such areas as mitigation goals, and project and action priorities. These are discussed only generally in this section.

Step 1 Organize Resources

The City of Trenton used a fairly standard organization to develop its Hazard Mitigation Plan. The organization has three tiers:

- Hazard Mitigation Committee (HMC)
- Stakeholders Group
- Trenton Mayor and City Council

As noted elsewhere, the Trenton Plan was partly funded through a grant from the Federal Emergency Management Agency. Early in the process, Trenton secured the services of a professional planning consultant to facilitate the process.

Composition of the Trenton Hazard Mitigation Committee

The Trenton Hazard Mitigation Committee (HMC) is comprised of the following individuals:

- Mr. Leonard Pucciatti City of Trenton
- Mr. Andrew Carten City of Trenton
- Ms. Monifa Banks-Harrison City of Trenton
- Mr. Eric Jackson City of Trenton
- Mr. Dennis Keenan City of Trenton
- Ms. Trish Long City of Trenton

Hazard Mitigation Committee Meeting Schedule

The Hazard Mitigation Committee and the consultant hired by the City were responsible for developing the Plan and all of its component sections. The HMC met four times during the development of the plan. All the meetings took place at Trenton City Hall. Appendix C includes minutes of all the meetings.

- Meeting 1 December 19, 2006
- Meeting 2 February 8, 2007
- Meeting 3 March 15, 2007
- Meeting 4 May 17, 2007
- Meeting 5 June 26, 2007

Composition of the Stakeholders Group

Early in the planning process the City determined that a group of interested organizations and individuals with an interest in the Trenton Plan should be identified, and that the group would be given regular updates on the planning process and its products. The group was identified by the HMC and Mayor's Office. At several points in the planning process, additional organizations and individuals were added to the stakeholders list.

As drafts of the Plan were prepared, the City used email to distribute them to Stakeholders, and requested that they provide comments. Stakeholders were requested to provide feedback through email or by telephoning the City POC (Ms. Banks-Harrison) or a member of the consultant team. The consultant was responsible for archiving the comments and including them in edited versions of the Plan.

Table 5-1
City of Trenton Hazard Mitigation Plan, Stakeholders Group

Organization	Contact
Delaware River Basin Commission	Ms.Laura Tessieri
Ewing Township (Police)	Captain Dave Morgan
Hamilton Township (Police)	Lieutenant Richard Herrick
Red Cross	Mr.Kurt Weirich
Board of Education	Mr. Everett Collins
Mercer County	Mr. Dean Raymond
Capital Health Systems	Mr. James Boozan
St Francis Hospital	Mr. Joe Flamini
Trenton EMS	Mr. Ralph Gumbert
Trenton Police Department	Mr. David Armitage
NOAA	Mr. Walt Nicklesburg
D&R Commission	Mr. Ernest Hahn
Army Corp of Engineers	Ms. Kathleen Mulvenna
NJ State Police	Sergeant Paul Miller
Trenton Council Civic Associations	Ms. Alysia Welch Chester
Joint Toll Bridge Commission	Mr. John Redos
Trenton Communication	Mr. Steve Ponella
PSE&G	Mr. Don Tretola
Verizon	Ms. Alexa Millas
Trigen	Mr. Mike Smedley
NJ Transit	Mr. Thomas Edward Clark
Glen Afton Civic Association	Ms. Nancy McKeen
Island Civic Association	Mr. William Kearney

Step 2 Assess Risks

In accordance with general mitigation planning practice, as well as the process FEMA established in its Planning "How-To" series of guides, the risk assessment forms the basis for this hazard mitigation plan by quantifying and rationalizing information about how natural hazards affect the City. The processes used to complete the hazard identification and risk assessments, and the results of these activities, are described in detail in Sections 6 and 7 of this Plan. The assessment determined several aspects of the risks of natural hazard faced by the jurisdiction and its constituents:

- The natural hazards that are most likely to affect the City
- How often hazards are expected to impact the City
- The expected severity of the hazards
- What areas of Trenton are likely to be affected by hazards
- How City assets, operations, people and infrastructure may be impacted by hazards
- How private and commercial assets, operations, infrastructure may be impacted by hazards
- The expected future losses if the risk is not mitigated

Through a rating system (explained in detail in Section 6), the HMC reduced the initial hazard list to three. These are predominant risks to the area: floods, high winds (hurricanes and tornadoes, and winter storms. For each of these hazards the planning team performed detailed risk assessments, i.e. calculations of future expected damages, expressed in dollars. These findings were presented to the HMC, discussed by the group, and approved by the Committee as the basis for later phases of the planning process. The results of the risk assessment were also made available to the public during the public presentations noted elsewhere in this Plan. As noted above, a fuller description of this process and its results are presented in Section 7.

Step 3 Develop the Mitigation Plan

As noted elsewhere in this section and others, the process employed to develop this Plan was based entirely on the FEMA 386-series of guides describing hazard mitigation planning procedures. Throughout the document there are cross references to Interim Final Rule and FEMA crosswalk criteria.

Step 4 Implement the Plan and Monitor Progress

The City Department of Inspections is responsible for implementing the plan after it is adopted by the City Council. The Department of Inspections will evaluate the plan approximately annually by assembling the Hazard Mitigation Committee to review key sections of the document. The group will determine if the plan continues to correctly characterize the City's exposure and vulnerability to natural hazards, and if the goal, objectives, strategies and actions adequately address the City's priorities for addressing natural hazards. The HMC will prepare a report that will be forwarded to the Mayor and City Council for review and approval. The Department of Inspections will maintain a written record of these procedures, and will incorporate written records of the Mayor's and Council's review, comment and approval of progress reports.

5.3 How the Public and Other Jurisdictions were Involved

During the development of this Plan, the public was involved by requesting their participation in two public presentations/meetings, providing drafts of the Plan for review, and inviting comments on the contents of the Plan. Minutes of meetings (and attendee lists) are included in Appendix C. The public presentations and meetings were held on the following dates:

Presentation/meeting 1	May 17, 2007	Trenton High School, West Campus
Presentation/meeting 2	June 26, 2007	Trenton Fire Headquarters

5.4 Review and Incorporation of Plans, Studies, Reports and other Information

Overview of the New Jersey State Hazard Mitigation Plan

The State of New Jersey has long been aware that it is exposed to a variety of natural hazards. Of particular concern are flood hazards associated with thunderstorms, snowstorms, hurricane, tropical storms and Nor'easters. The State of New Jersey Hazard Mitigation Plan (April, 2005; accessible online at http://www.njmit.net/njshmp/) was reviewed, approved by FEMA, and is summarized below.

The State of New Jersey's Hazard Mitigation Plan was prepared in compliance with Federal requirements for Standard State Mitigation Plans in the *Stafford Act*, as amended by the *Disaster Mitigation Act of 2000* (42 U.S.C. 5165). The State's plan acknowledges "Hazard mitigation plans, which include a hazard and vulnerability analysis, long term hazard reduction strategies and hazard minimization activities, are part of series of major plans and reports associated with the emergency management cycle" and is the "demonstration of New Jersey's commitment to reduce risk from natural hazards and serves as a guide for both State and local decision makers as they commit resources to reducing the effects of natural hazards on lives and property". (State Hazard Mitigation Plan, 2)

The State Hazard Mitigation plan was prepared by State Hazard Mitigation Team which was comprised of the NJ Office of Emergency Management, the NJ Department of Environmental Protection, the NJ Department of Community Affairs, the NJ Department of Treasury, the NJ Department of Transportation, the NJ Department of Banking and Insurance, the NJ Board of Public Utilities, the NJ Office of Information and Technology, the NJ State Climatologist, and the Office of the Attorney General.

The State's Hazard Mitigation Plan contains attachments outlining specific strategies for dealing with hazards related to floods, hurricanes, Nor'easters, snowstorms, and wildfires. Goals, objectives and action items are described below:

Goal 1 – To Protect Life. In order to meet that goal, NJSHMP set forth the following objectives: (i) to improve the warning and emergency communications systems, (ii) to effectively address laws and regulations that address hazard mitigation issues; (iii) Reduce impacts of hazards on vulnerable populations; (iv) Strengthen State and local building code enforcement; and (v) train emergency responders. In order to meet those objectives, the plan outlines the following actions:

- Expand reverse 911 implementation
- Expand Flood warning system (preparedness unit)

- Encourage enforcement of floodplain management as it relates to new and existing construction
- Encourage participation in existing programs – FMA, PDM, HMGP
- Integrate NFIP standards into the uniform construction codes utilized by the State
- Promote Community Emergency Response Team (CERT) training
- Utilize the NJOEM Training Unit to train emergency responders
- Encourage educational programs (Rutgers, UMDNJ)

Goal 2 – To Protect Property. In order to meet this goal, NJSHMP set forth the following objectives: (i) Protect critical State facility assets; (ii) Protect critical non-state owned facility assets; and (Iii) Reduce repetitive losses. In order to meet these objectives, NJSHMP established the following actions:

- Generate preliminary State critical facilities information for the NJ State Hazard Mitigation Plan (SHMP);
- Establish comprehensive GIS-based repository for data on critical State facilities;
- Prioritize structural and nonstructural retrofits for critical State owned facilities based on their vulnerability to natural hazards;
- Expand State facilities risk management program;
- Provide training seminars in identifying potential hazards to State bureaus responsible for rental/leasing of properties for State offices;
- Inventory non-state owned critical assets that are vulnerable to natural hazards;
- Encourage training of owners and operators of non-state owned critical facilities for hazard mitigation.
- Inventory damaged structures;
- Conduct yearly FMA workshops;
- Promote acquisition and elevation of repetitive loss structures;
- Conduct community outreach, workshops and training to increase NFIP participation;
- Regulate development to reduce flood losses in vulnerable coastal areas;
- Replenish NJDEP acquisition fund to promote more acquisition of repetitive loss structures;

Goal 3 – To Promote a Sustainable Economy. In order to meet this goal, NJSHMP set forth the following objectives: (i) provide incentives for mitigation planning and actions; (ii) form partnerships to leverage and share resources for mitigation; and (iii) Ensure continuity of critical business operations. In order to meet these objectives, NJSMP established the following action items:

- Provide grants, planning tools, training and technical assistance to increase the number of public and private sector hazard mitigation plans and initiatives, especially for multi-jurisdiction districts;
- Ensure the coordination of growth management plans and policies with hazard mitigation and response planning. Coordinate with the State Planning Commission to integrate the State Development and Redevelopment Plan within the SHMP (State Hazard Mitigation Plan);
- Coordinate with the Casino Reinvestment Development Authority on mitigation projects;
- Identify and describe existing plans addressing hazard mitigation issues for review and integration into the SHMP; and
- Update and maintain continuity of government - continuity of operations plans to enable the state government to provide critical services during an interruption of business.

Goal 4 – To Protect the Environment. In order to meet this goal, NJSHMP set forth the following objective: to implement hazard mitigation policies to protect the environment. They put forth the following actions necessary to meet this objective:

- Develop and implement effective strategies that improve the health of forests and reduce the amount of fuels available for wildland fires from dead and dying trees;
- Limit the number of wildfires to fewer than 2,000 annually and the acreage burned to less than ½ of 1% of the state forest; and
- Analyze municipalities' dune systems to identify weaknesses from such aspects as lack of vegetation, storm surge overtopping and over-wash, and walk-through vulnerabilities.

Goal 5 – To Increase Public Preparedness. In order to meet this goal, NJSHMP set forth the following objectives: (i) Improve public awareness and preparedness for natural hazards and the risks they pose; (ii) Improve hazard Information data bases and maps; (iii) Enhance community outreach (iv) Increase development of local mitigation planning. In order to meet these objectives, NJSHMP established the following action items:

- Educate the public through NJOEM outreach programs and hazard mitigation workshops;
- Participate in the Emergency Preparedness Conference with workshops;
- Promote continuing education of state and local officials through Rutgers programs; Incorporate existing HAZUS /NYCEM earthquake studies into the SHMP and indicate completion schedule for other counties; Incorporate additional profiling and vulnerability information recommended by FEMA into the SHMP;
- Develop a hazard event GIS database to help State and local emergency managers with hazard mitigation and other planning initiatives;
- Expand and enhance GIS/HAZUS hazard mitigation databases and use for analysis and mapping in the SHMP;
- Develop State hazard profiles for manmade and technological hazards;
- Develop a cadre of supplemental staff to assist NJOEM with education of affected communities, project assessment and development of mitigation projects. This staff may be comprised of volunteers, temporary reservists, and permanent personnel;
- Conduct community outreach, workshops and training opportunities to promote development of PDM plans;
- Increase NJOEM staffing in areas of planning, engineering and management;
- Revise the SHMP and post it on the web so it is more useable to the public and to local governments developing local mitigation plans;
- Develop and maintain local government mitigation planning assistance/coordination web page; and
- Ensure that each municipality and county develops a wildfire preparedness plan for incorporation into their local and county emergency management plans.

In an effort to address widespread flooding in the Delaware River watershed, the Delaware River Basin Commission (DRBC) has formed a partnership with other environmental planning agencies to develop a Flood Mitigation Plan. Along with the New Jersey Department of Environmental Protection (NJDEP), New jersey Office of Emergency Management (NJOEM), and county emergency management and planning departments, DRBC is enabling municipalities in the plan area, including Trenton, to more effectively compete for funding to implement local mitigation actions. DRBC's planning initiative also strives to assist communities to sustain fewer flood-related losses and recover more quickly by providing local and regional mitigation measures for improving resiliency to flooding. The municipal Master Plan in New Jersey is not

required to have a hazards element. This may explain why DRBC's Flood Mitigation Plan is the only natural hazard mitigation planning currently underway in Mercer County.

5.5 Federal Mitigation Planning Requirements

Requirements for mitigation planning are set forth in four programs administered by the Federal Emergency Management Agency. These are described below. Although slightly different, all programs outline the same basic planning process (described in Section 2.1). The City of Trenton intends to satisfy the basic requirements each of the four programs:

Flood Mitigation Assistance Program. To qualify to receive grant funds to implement projects such as acquisition or elevation of flood-prone homes, local jurisdictions must prepare a mitigation plan. The plan must include specific elements and be prepared following the process outlined in the NFIP's Community Rating System.

Hazard Mitigation Grant Program. To qualify for post-disaster mitigation funds, local jurisdictions must have adopted a mitigation plan that is approved by FEMA.

Pre-Disaster Mitigation Grant Program. To qualify for pre-disaster mitigation funds, local jurisdictions must adopt a mitigation plan that is approved by FEMA.

NFIP's Community Rating System (CRS). The CRS offers recognition to communities that exceed minimum requirements of the National Flood Insurance Program. Recognition comes in the form of discounts on flood insurance policies purchased by citizens. The CRS offers credit for mitigation plans that are prepared according to a multi-step process.

Section 6
Hazard Identification, Profiling and Ranking

Contents of this Section

6.1 IFR Requirement for Hazard Identification and Profiling

> ***Requirement IFR §201.6(c) (2) (i):*** *The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*

Note that Appendix A includes general descriptions of all the hazards that can affect the City of Trenton. The present section addresses the specific requirements of the IFR with regard to hazards in the planning area.

6.2 Hazard Identification

In accordance with IFR requirements, and as part of its efforts to support and encourage hazard mitigation initiatives, Trenton's Hazard Mitigation Committee (HMC) prepared this general assessment of the hazards that have potential to impact the City. The following subsections provide an overview of past hazard events in the City and brief descriptions of the potential for future losses. Section 7 (Risk Assessment) includes much more detailed information about past and potential losses (risk) from a subset of the most significant hazards in Trenton.

The term "planning area" is used frequently in this section. This term refers to the geographic limits of the City of Trenton. Most hazard data that is available from open sources, such as government web sites, is compiled on a county or state level, so there are numerous references in this section to Mercer County. Although information about the County will be different from the City of Trenton, it is provided here to give a general idea as to the magnitude of natural hazard effects in the area. The Risk Assessment section addresses the effects of hazards on Trenton and its citizens.

Overview of Trenton's Natural Hazards History

According to the National Oceanic Atmospheric Administration (NOAA) database, between 1950 and 2006, Mercer County has experienced 89 severe thunderstorms, nine tornadoes (two F0s, four F1s, and three F2s), 27 hail storms (7 of which had greater than 1" diameter hail), 24 significant lightning events, one wildfire, and 37 floods/flash floods. A number of these events caused property damage and injuries. (Reference: NOAA database, www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms).

Numerous federal agencies maintain a variety of records regarding losses associated with natural hazards. Unfortunately, no single source is considered to offer a definitive accounting of all losses. The Federal Emergency Management Agency maintains records on federal expenditures associated with declared major disasters. The U.S. Army Corps of Engineers and the Natural Resources Conservation Service collect data on losses during the course of some of their ongoing projects and studies. Additionally, the National Oceanographic & Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) collects and maintains data about natural hazards in summary format. The data includes occurrences, dates, injuries, deaths, and costs.

In the absence of definitive data on some of the natural hazards that may occur in the City, illustrative examples are useful. Table 6-1 provides brief descriptions of particularly significant natural hazard events occurring in Trenton's recent history. This list is not meant to capture every event that has affected the area, rather lists one or two examples of the types of events that have occurred here in the past.

In 1965, the federal government began to maintain records of events deemed significant enough to warrant declaration of a major disaster by the U.S. President. Presidential Disaster Declarations are made at the county level and are not specific to any one city or sub-area, such as Trenton. Considering the planning area, it is likely that disaster declarations for Mercer County affected the City in some way, and, conversely, that some of the hazards and loss history from open sources like NCDC give information that is not specific

to Trenton. Nevertheless, such data provides a fairly clear indication of hazard and loss history, and can form part of the basis of a risk assessment.

Mercer County has received five Presidential Disaster Declarations since 1950 (1999 – Hurricane Floyd; 2004 – Tropical Depression Ivan; 1996, 2005, and 2006 – Severe Storms and Flooding). Between 1955 and 2006, 5 such disasters have been declared in Mercer County and are identified in Table 6-1. All of the major disasters declared in Mercer County have been the result of significant flooding since 1996. Two of those floods resulted from a downgraded hurricane and tropical storm. According to the National Oceanic Atmospheric Administration (NOAA) database, between 1950 and 2006, Mercer County has experienced 89 severe thunderstorms, nine tornadoes (two F0s, four F1s, and three F2s), 27 hail storms (seven of which had greater than 1" diameter hail), 24 significant lightning events, one wildfire, and 37 floods and/or flash floods. A number of these events caused property damage and injuries. (Reference: NOAA database, www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms). These figures are discussed in more detail in the hazard-specific subsections that follow.

Table 6-1
Recent Natural Hazards and Declared Major Disasters in Mercer County, New Jersey
(1996 to 2007)

Date & Disaster (DR)	Nature of Event
11/19/96 (DR 1145)	SEVERE STORMS AND FLOODING – This Nor'easter stalled for 8 hours over central New Jersey, causing heavy rainfall and street flooding in Trenton.
9/16/99 (DR 1295)	HURRICANE FLOYD – This downgraded fall hurricane put the entire Eastern Seaboard on flood watch, including every county in New Jersey. The storm lasted approximately 18 hours, causing flash flooding throughout Mercer County.
6/17/01	FLOODING – The remainder of Tropical Storm Allison resulted in heavy rainfall over a 24-hour period in Mercer County. In the basin area, most rain fell in Bucks and Montgomery Counties in Pennsylvania.
9/23/03	TORNADO AND THUNDERSTORM WIND – An F1 category tornado touched down in parts of Mercer County causing $1M in damage.
10/1/04 (DR 1563)	TROPICAL DEPRESSION IVAN – This downgraded tropical depression lasted a day and a half and caused flash flooding in Mercer County and three other New Jersey counties. Flooding forced closure of government offices in Trenton, including the State Capitol building.
4/19/05 (DR 1588)	SEVERE STORMS AND FLOODING – Parts of Pennsylvania, New Jersey, New York and areas of New England were affected by this two-day storm. Evacuations, bridge and road closures, and extensive damage were reported in the basin area. The State Capitol building in Trenton closed for two days from flooding issues. Flood crests exceeded those of 2004 storm (T.D. Ivan).
7/7/06 (DR 1653)	SEVERE STORMS AND FLOODING – This 5-day storm had record to near-record flood crests along streams and rivers throughout the basin area. Areas most affected included Eastern Pennsylvania, Eastern New York, and Mercer County.
4/26/07 (DR 1694)	SEVERE STORMS AND INLAND AND COASTAL FLOODING – A 7-day Nor'easter deluged New Jersey with over 9 inches of rain, causing millions of dollars of damage and killing three residents.

Weather-Related Deaths and Injuries

According to the National Climatic Data Center, Mercer County has experienced no deaths and 17 injuries from natural hazards in the period from 1950 to 2006 (Reference: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms).

Section 6.3 Overview of the Type and Location of Natural Hazards that can affect the City of Trenton

In the initial phase of the planning process, Trenton's Hazard Mitigation Committee (HMC) considered 10 natural hazards and the risks they create for the City of Trenton and its material assets, operations, and staff. These hazards were selected for inclusion in the plan by the HMC. The hazards initially considered were:

1. Floods
2. Wind
3. Winter Storms
4. Earthquakes
5. Lightning
6. Drought
7. Wildfires/Urban Interface
8. Hail
9. Extreme Temperatures
10. Sinkholes and Subsidence

In the initial identification process, the HMC catalogued potential hazards to identify those with the most chance to significantly affect the City. The hazards include those that have occurred in the past and may occur in the future. A variety of sources were used in the investigation. These included national, regional, and local sources such as websites, published documents, databases, and maps, as well as discussion with the HMC staff.

See Appendix A for detailed descriptions and characterizations of the natural hazards profiled in this plan.

6.3.1 Floods

Location and Extent of the Flood Hazard

Trenton is bordered on the southwest by the Delaware River, and is roughly bisected southwest to northeast by the Assunpink Creek, a tributary to the Delaware. Although there are isolated places in the City that are subject to flooding via overland flow or ponding, most flood issues in the City are related to these two sources. Over the years there have been many flood studies conducted by various public and quasi-public agencies and by the City itself. These studies characterize flooding in Trenton and surrounds, describe its causes, and identify potential solutions. As described below, there have been several fairly severe floods in recent years, and the City and New Jersey State agencies have implemented public works and mitigation projects to reduce the future effects of flooding. The specific causes and effects of flooding from the Delaware and Assunpink are discussed in more detail in Section 7 (Risk Assessment).

Figure 6-1
Assunpink Creek Drains Into the Delaware River

Source: DRBC. http://www.state.nj.us/drbc/04-05report/Map.pdf.

Delaware River Flooding

Not surprisingly, the Delaware has been a major cause of flood problems in Trenton. As is typical for such a large river, there are many influences on water levels, including rainfall amount and rate, development in the watershed, the speed of snow and ice melt, and upstream releases from reservoirs and impoundments, among others. In the past, various combinations of these factors have occasionally caused increased volume in the Delaware and flooding in adjacent areas. 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, 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. There is a more extensive discussion of this in Section 7. High water surface elevations on the Delaware also limit the discharge potential from the Assunpink and other tributaries, sometimes contributing to upstream (backwater) flooding. These effects are also discussed the Risk Assessment section of the plan.

Assunpink Creek Flooding

As noted earlier, the Assunpink Creek crosses Trenton northeast to southwest, draining to the Delaware River. Many areas around the creek are relatively flat and there are numerous weirs, so overbank flooding is common, even during relatively ordinary rainfalls. Flooding from this source has occurred in a very typical pattern, with most losses clustered very near the creek itself, particularly in areas where there are bridges or culverts, or other physical elements that can block the free flow of water. This pattern is evident nearly the entire length of the creek as it passes through Trenton, although many areas are not populated and therefore no manmade structures are damaged by floods.

Figure 6-2
FIRMette of Assunpink Creek
area of Trenton

Figure 6-3
Assunpink Creek in the area of Olden Street following the April, 2007 event.

Severity of the Flood Hazard

Floods have been and continue to be the most frequent, destructive, and costly natural hazard facing Trenton. 90.6 percent of the County's damage reported for major disasters is associated with floods. Records indicate that the streams and rivers draining the City have flooded throughout the area's history. Most recently, the City has been impacted by five significant flood events: in 1996, 1999, 2004, 2005, and 2006. There was yet another event in April 2007, in which several industrial areas around the Assunpink were again flooded.

Flood severity is measured in several ways, including frequency, depth, velocity, duration and contamination, among others. In Trenton, characterizing the severity of the flood hazard depends on what part of the City is being considered, but generally speaking the issues relate to how often floods occur. Except for a few industrial areas along the Assunpink, flooding tends to be relatively shallow, inundating basements and streets. However, this has happened so often recently that the problem has gone past the level of a nuisance.

Impact on Life and Property

The National Climatic Data Center (NCDC) database indicates that there have been 60 floods in Mercer County in the period from 1950 to 2005, with damages of over $66 million. Figures maintained by NCDC indicate that Mercer County has experienced no deaths and 7 injuries due to floods. Of those 7 injuries, NCDC reported 5 injuries related to flooding from Hurricane Floyd in 1999 (References: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms). Section 7 of this plan includes a much more detailed discussion of flood impacts on the City, in particular the history of National Flood Insurance Program claims, and the number of FEMA "repetitive loss" properties.

Occurrences of Flood Hazard

Table 6-2
Flood Events Resulting in Property Damage, Mercer County, 1950 – 2006

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 NJZ001 - 007>010 - 015 - 018	01/19/1996	07:00 PM	Flood	N/A	0	1	10.7M	0
2 Western	06/12/1996	06:00 PM	Flash Flood	N/A	0	0	8.0M	0
3 Countywide	09/16/1999	08:00 AM	Flash Flood	N/A	0	5	32.0M	0
4 NJZ015	09/19/2004	12:48 AM	Flood	N/A	0	0	2.4M	0
5 NJZ015	04/02/2005	05:00 PM	Flood	N/A	0	0	5.0M	0
6 Countywide	06/28/2006	06:11 AM	Flood	N/A	0	0	8.5M	0
				TOTALS:	0	6	66.620M	0

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

Tropical Depression Ivan was downgraded to heavy rainfall when it hit Trenton in 2004, yet the slow moving storm brought the most devastating flood crests since the Flood of 1955. In 2005 snow melt and another slow-moving storm outpaced the 2004 flood levels. A 5-day storm in 2006 caused flood levels to rise to record and near-record levels. Flooding of various kinds occurs frequently in Trenton and in most of Mercer County. Although the HMC has no authority or jurisdiction related to anything other than its own facilities, National Flood Insurance Program (NFIP) information provides an indication of the potential for flooding in Trenton, and the amount of damage it has caused in the past.

In recent years, FEMA has focused considerable attention on these insured, repetitive loss properties. By NFIP standards, these properties had to have received two or more claim payments of at least $1,000 each over a ten-year period. In the City of Trenton, 178 properties have been identified as repetitive loss properties, and more will appear on this list after the April 2007 event, although this was not as severe as some others in recent history. Collectively, claim holders have received payments of over $9.5 million (includes claim payments for building damage and contents damage).

Based on past and recent history, certain parts of Trenton clearly have a high probability of flooding repeatedly in the future. Many areas adjacent to the Assunpink Creek flood almost annually, and the Island and Glen Afton sections of the City have flooded several times in the past few years alone, although the Delaware has not experienced any overbank flooding in or around Trenton. Severe flooding in Trenton five out of the last ten years and each of the past three years suggests that the repeated flooding in certain areas may continue.

Figure 6-4 Overbank Flooding in Trenton from the Delaware River

6.3.2 Wind

(Includes Hurricanes, Nor'easters, Tropical Storms, and Tornadoes)

Location and Extent of the Wind Hazard

The entire planning area is subject to the wind effects and flooding of hurricanes, nor'easters, tropical storms, tornadoes, and thunderstorms. The northeast United States has one of the lowest historical concentrations of tornadoes. New Jersey is included in this geographical area, and is located in one of the lowest-probability zones. Nevertheless, the entire planning area is subject to tornadoes and other high-wind storms at most times of the year, with the highest potential in the spring and summer months. Wind hazards are discussed in much more detail in Section 7 of this hazard mitigation plan (Risk Assessment).

Severity of the Wind Hazard

The severity of the wind hazard is measured primarily by velocity, although effects are clearly exacerbated by duration and the presence of debris that can create missiles. As discussed in Section 7, inland New Jersey is not particularly prone to high wind hazards, but occasionally tropical storms or thunderstorms are severe enough to cause moderate damage in the area.

Impact on Life and Property

The information in the NCDC database (Table 6-3), reflect a significant part of the costs of recovery from strong winds. However, there are also very significant costs associated with interrupted business, lost wages, lost tax base, etc. that are very difficult to quantify but are nevertheless important metrics for determining the severity of the risk. As shown in the table below, Mercer County has experienced eight events exceeding 50-mph since 1999, with one death, 21 injuries and more than $15M in property damage.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 NJZ015	01/18/1999	04:55 PM	High Wind	61 kts.	0	0	750K	0
2 NJZ001 - 007>010 - 012>013 - 015>023	09/16/1999	01:00 PM	High Wind	54 kts.	0	2	4.0M	0
3 Lawrenceville	10/04/2000	06:39 PM	Tstm Wind	69 kts.	0	3	250K	100K
4 NJZ001 - 007>010 - 012>026	12/12/2000	08:00 AM	High Wind	62 kts.	0	11	875K	0
5 NJZ001 - 007>010 - 012>013 - 015>020 - 022 - 027	09/18/2003	04:00 PM	High Wind	50 kts.	1	0	1.9M	0
6 NJZ001 - 007>010 - 012>027	11/13/2003	07:00 AM	High Wind	58 kts.	0	5	2.0M	0
7 NJZ008 - 012>013 - 015>023 - 025 - 027	01/18/2006	04:30 AM	High Wind	60 kts.	0	0	5.3M	0
8 Princeton Jct	07/28/2006	02:35 PM	Tstm Wind	50 kts.	0	0	5K	0
				TOTALS:	1	21	15.080M	100K

Table 6-3
High Wind Events Over 50 Knots, Excluding Tornado Winds, Mercer County, 1950 – 2006

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~sto

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MERCER	06/13/1958	1520	Tornado	F2	0	0	250K	0
2 MERCER	06/24/1960	1700	Tornado	F	0	0	25K	0
3 MERCER	05/24/1962	1334	Tornado	F2	0	1	250K	0
4 MERCER	10/18/1967	1740	Tornado	F1	0	0	25K	0
5 MERCER	08/17/1988	1630	Tornado	F2	0	0	2.5M	0
6 MERCER	11/16/1989	1017	Tornado	F1	0	0	250K	0
7 MERCER	07/31/1992	1355	Tornado	F1	0	0	250K	0
8 Trenton	09/23/2003	07:15 AM	Tornado	F1	0	0	1.0M	0
				TOTALS:	0	1	4.550M	0

Table 6-4 Tornado Winds, Mercer County, 1950 – 2006

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

For Mercer County from 1950 to 2006, there were 10 deaths, 39 injuries, and $16.8 million of property damage reported in the NCDC database for thunderstorm and high wind events. In addition, there was one injury and over $4.5 million in property damage attributed to tornado events. Hurricane Floyd was downgraded by the time it reached Trenton. It is categorized as a Flash Flood in Mercer County, with 5 related injuries. (Reference: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms) To protect life and property from wind events, the building code administered within the incorporated areas of Mercer County require all new construction to be designed and constructed for 95 mile per hour wind loads.

Occurrences of the Wind Hazard

Between 1950 and 2006, there have been numerous severe storms causing significant effects in Mercer County. Nine tornados have touched down in the County, with all but one occurring prior to 1997. In 1999, what began as Hurricane Floyd resulted in Federal Disaster declarations across the State of New Jersey. There exists a possibility of increasing probabilities for wind events because of the effects of global warming and other weather phenomena. However, without additional information that would allow accurate predictions, it is reasonable to assume that the probabilities of these wind events will remain about the same in the future.

6.3.3 Winter Storms

Description

Winter storms bring various forms of precipitation that occur only at cold temperatures, such as snow, sleet, or a rainstorm where ground temperatures are cold enough to allow icy conditions. These cold weather storms can also take the form of freezing rain or a wintry mix.

Location and Extent of the Winter Storm Hazard

The potential for winter storms is uniform for the entire planning area. All people and assets are considered to have the same degree of exposure.

Severity of Winter Storm Hazard

Although the NCDC database has not categorized any previous storms in Mercer County as blizzards, this is perhaps the most severe type of winter storm, characterized by low temperatures, strong winds, and heavy blowing snow.

Impact on Life and Property

In Mercer County since 1950, NCDC reports there have been 33 injuries and one death due to snow and ice conditions. Approximately $19 million has been reported in property damages related to winter storms.

Table 6-5
Winter Storm Events Resulting in Property Damage, Mercer County, 1950 – 2006

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 NJZ001 - 007>010 - 012>015	02/16/2003	03:00 PM	Heavy Snow	N/A	1	8	8.0M	0
2 NJZ001 - 007>008 - 010 - 012>015	01/22/2005	11:00 AM	Heavy Snow	N/A	0	0	11.0M	0
				TOTALS:	1	8	19.000M	0

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

Table 6-6
Injury-Related Winter Storm Events, Mercer County, 1950 – 2006

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 NJZ001 - 007>010 - 012 - 015 - 019	01/13/1999	03:00 PM	Winter Storm	N/A	0	25	0	0
2 NJZ001 - 007>010 - 012>015	02/16/2003	03:00 PM	Heavy Snow	N/A	1	8	8.0M	0
				TOTALS:	1	33	8.000M	0

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

Occurrences

Winter storms occur frequently enough in Trenton to be a threat to people and property. Generally, the winter storm season in New Jersey runs from December to March. The NCDC database reveals there have been 85 recorded winter storms in Mercer County from 1995 to 2006. The probability of winter storms occurring is relatively high, based on previous data. On average, seven winter storms occur every year in Mercer County.

6.3.4 Earthquakes

Description

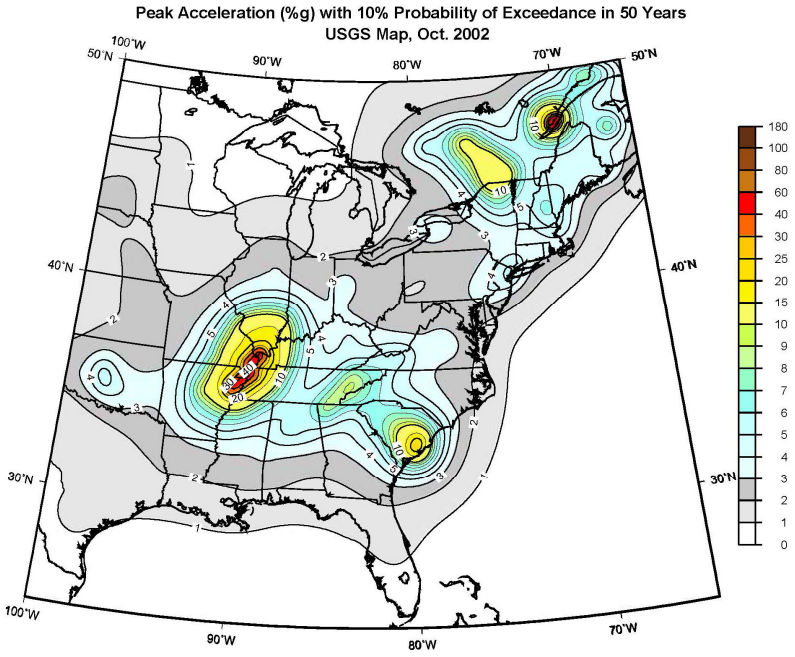
An earthquake is a sudden release of energy from the earth's crust that creates seismic waves. Tectonic plates become stuck, putting a strain on the ground. When the strain becomes so great that rocks give way, fault lines occur. At the Earth's surface, earthquakes may manifest themselves by a shaking or displacement of the ground, which may lead to loss of life and destruction of property. Size of an earthquake is expressed quantitatively as magnitude and local strength of shaking as intensity. The inherent size of an earthquake is commonly expressed using a magnitude.

Location and Extent of the Earthquake Hazard

The entire New Jersey planning area is susceptible to the effects of earthquakes. However, as depicted in Figure 6-5, New Jersey has relatively low seismicity compared to other areas in the eastern part of the U.S. The level of seismic hazard in New Jersey – the probability and severity of earthquakes – varies markedly with location with the State. It is not possible to predict exactly when and where future earthquakes will occur. Thus, seismic hazard is expressed in probabilistic terms.

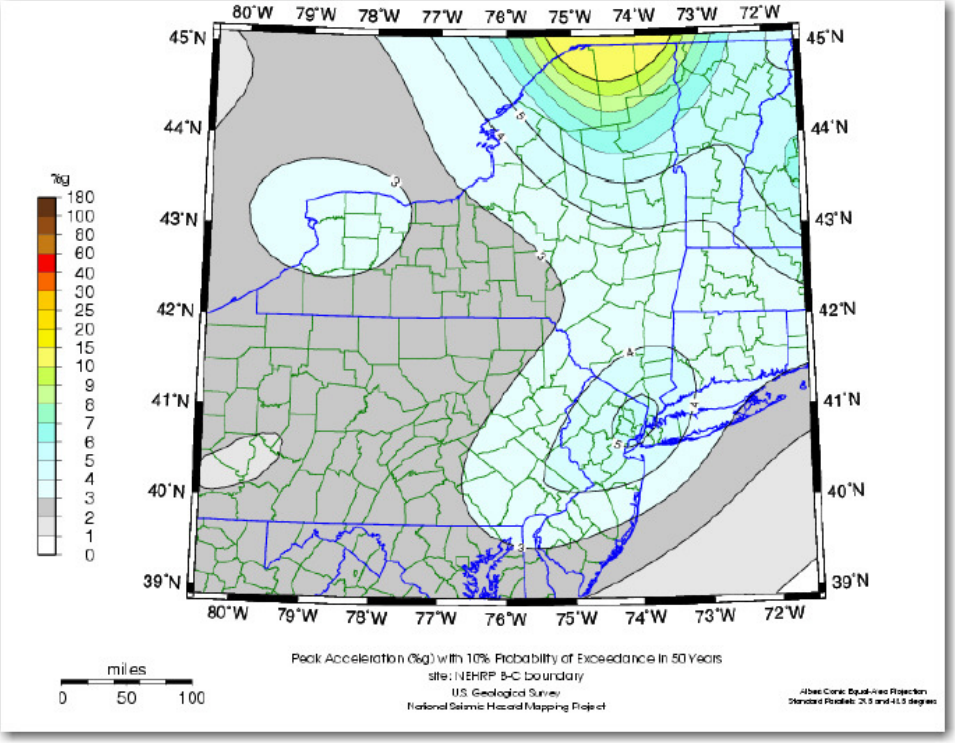
The following series of figures show the levels of ground shaking (PGA, peak ground acceleration, in percent of G, the acceleration of gravity) with 10% and 2% probabilities of being exceeded in any 50-year time period. These maps are national consensus, United States Geological Survey estimates, which are used in building codes (along with other maps showing spectral acceleration values) and for seismic risk assessments.

Figure 6-5
USGS 10% in 50-Year Earthquake Ground Motions (PGA)



Nevertheless, there is some elevated seismicity related to minor faults in the State itself (see below), as well as more significant faults found north of the border of New York State (see Figure 6-6). The figure shows the 10% in 50-year earthquake ground motion contours for the central and eastern United States.

Figure 6-6
USGS 10% in 50-Year Earthquake Ground Motions for Northeast U.S. (PGA)



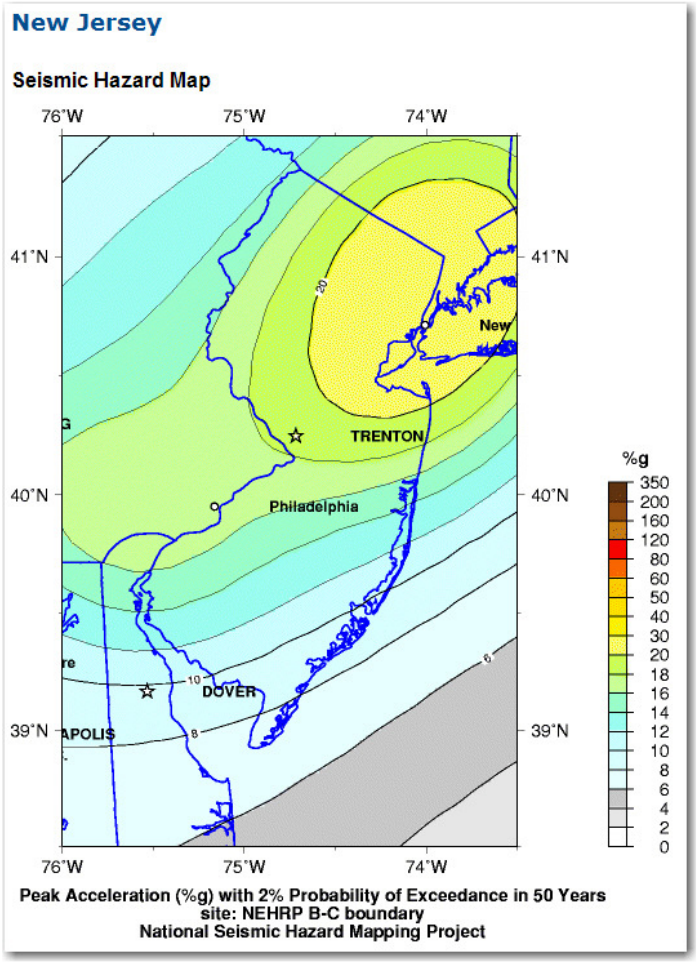
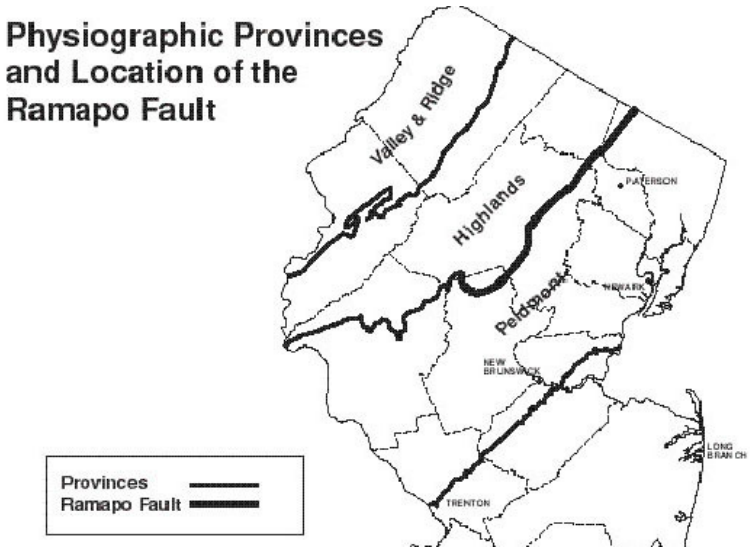


Figure 6-7

New Jersey Seismic Hazard Map, showing Peak Ground Acceleration in Percent of *G,* with two percent

The longest and most active fault in New Jersey is the Border Fault. The fault, which divides the Highlands and Piedmont Physiographic Provinces – which are geologically unique regions – extends south from Stony Point, New York to Reading, Pennsylvania (see Figure 6-5). In the north, it passes into New Jersey about half a mile west of State Route 202 in Bergen County, and passes out of northwestern New Jersey north of Stockton in Hunterdon County. The Ramapo section of this fault, known as the Ramapo Fault, which extends south from the New Jersey-New York border along two thirds of the New Jersey portion of the Border fault, has been the most active section of the Border Fault. Over 25 percent of the earthquakes experienced in New Jersey over the past 200 years had their epicenters within 30 miles of the fault.

Figure 6-8
Ramapo Fault



Severity

Past earthquakes in New Jersey earthquakes have been comparatively low in terms of magnitude and intensity. Trenton has experienced few and minor earthquakes over the past 75-plus years (Source: USGS). As shown in the figures above, the probability of any severe earthquake in the area is minimal. However, as discussed in Appendix A, the severity of earthquakes is influenced by several factors, including the depth of the quake, the geology in the area, and the soils.

Impact on Life and Property

There are no known deaths, injuries, or property damage from earthquakes in Mercer County. The effects on life and property in the area could be significant if a large earthquake were to occur, because of the nature of the built environment and the high population. The New Jersey State Geologic Survey has completed HAZUS risk calculations for seven of the most earthquake-prone Counties in the State (those in the northern part of New Jersey), and plans to perform similar assessments for the remainder of the Counties over the next few years. A comprehensive, risk-based calculation such as this is clearly the best way to estimate risk, particularly when an area has a large inventory of assets that may be vulnerable to shaking). As part of the hazard mitigation planning process, the City used land use inventory data and some general assumptions to estimate potential damages and injuries from a series of earthquakes in Mercer County. This information should be regarded as a ***very general estimate only***, and not used for developing or prioritizing mitigation activities.

This methodology is based on the NJGS HAZUS calculations, and uses a proportional methodology to associate potential losses in Middlesex County to those in Mercer County. Again, this methodology is

intended only to provide a very general sense of potential losses based on relative populations and building stock. Both soils and seismicity in Mercer County differ from those in Middlesex County, and these factors could have a significant influence on the results. The NJGS HAZUS calculation will provide a much more reliable prediction of potential losses.

Table 6-7
NJGS/HAZUS Estimates of Potential Earthquake Damages for *Middlesex County*, New Jersey
(for comparison to Mercer County)

Magnitude	Damaged Buildings	Heavily Damaged Buildings	Property Damage $M	Business Interruption $M	Minor Injuries	Major Injuries	Deaths	Displaced Households	# Needing Shelter
5.0	12,500	500	$1,160	$50	245	30	<20	320	190
6.0	110,000	12,500	$5,950	$1,250	4,300	1,075	250	12,000	7,500
7.0	130,000	50,000	$15,500	$3,650	17,500	5,750	1,300	42,500	27,000

Table 6-8
Proportion of Buildings, Infrastructure and Populations:
Middlesex and Mercer Counties, New Jersey

County	Population	Residential Structures (#)	Other Land Uses (s.f.)
Middlesex	367,605	786,971	675,756,687
Mercer	139,887	285,518	495,910,364

The population and residential structures ratios are then used to extrapolate estimates of potential earthquake damages in Mercer County based on the HAZUS estimates for Middlesex County. The residential structures ratio is used to estimate damages to buildings, property damage, and business interruption. The population ratio is used for injuries, deaths, displaced households and the numbers of people needing shelter. It should be noted that injuries, deaths and displaced households and sheltering can be assigned monetary values if this is eventually required for a more formal risk assessment. The present assessment is intended *only* as comparative estimate of potential damages. Furthermore, although the City of Trenton obviously comprises a significant percentage of the population of Mercer County (and a large proportion of the building stock and other assets as well), the figures in Table 6-19 represent the entire County. When the City and NJGS complete the HAZUS calculations for Mercer County, and perform a basic inventory of structures in Trenton, it will be possible to develop a more accurate estimate of potential losses.

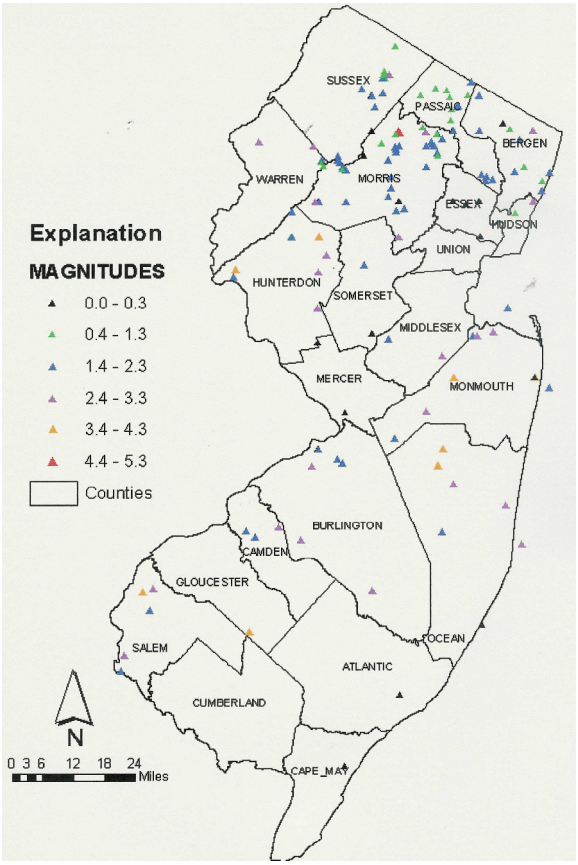
Table 6-9
Estimated Potential Earthquake Damages in *Mercer County*,
by Derivation from Middlesex County HAZUS Calculations

Magnitude	Damaged Buildings	Heavily Damaged Buildings	Property Damage $M	Business Interruption $M	Minor Injuries	Major Injuries	Deaths	Displaced Households	# Needing Shelter
5.0	$4,525	$181	$420	$18	93	11	7.6	122	72
6.0	$39,820	$4,525	$2,154	$453	1,634	409	95	4,560	2,850
7.0	$47,060	$18,100	$5,611	$1,321	6,650	2,185	494	16,150	10,260

Occurrences

On January 24, 1933, a sharp jolt was felt over central New Jersey from Lakehurst to Trenton. Residents of Salem County were startled by earthquake tremors on November 14, 1939, which caused little damage. The disturbance was reportedly felt from Trenton to Baltimore, Maryland, and from Cape May to Philadelphia and its adjoining counties. Reports indicated in northeastern Philadelphia and adjoining portions of New Jersey and Pennsylvania, residents were alarmed by loud rumbling sounds on December 27, 1961. In New Jersey, the tremor was felt by many in Bordentown and Trenton, where houses shook (intensity V) and windows and dishes rattled. A similar disturbance affected much of the same area about seven years later when on December 10, 1968, an earthquake measured at magnitude 2.5 occurred in Burlington County. Most of New Jersey and adjoining portions of Delaware, Maryland, and Pennsylvania experienced a moderately strong earthquake on February 28, 1973. The magnitude 3.8 tremor was centered in northwestern Salem County, near the Delaware River border with the State of Delaware (Source: USGS).

Figure 6.9
Epicenters of Earthquakes in New Jersey



There is clearly a high probability of future earthquakes in New Jersey, although generally speaking the magnitudes of typical events are low. Note that Mercer County is among the lowest figures for earthquake epicenters, reflecting the local geology. This should not be considered a direct predictor of risk, however, since earthquakes with remote epicenters can affect Mercer County and Trenton, particularly in areas where soil characteristics may amplify their effects.

6.3.5 Lightning

Description

Lightning is a discharge of electricity in the atmosphere. Usually, but not always, lightning occurs during rain storms.

Location and Extent of the Lightning Hazard

Lightning occurs over the entire planning area, particularly during warm months when thunderstorms typically occur.

Severity of Lightning Hazard

Severe lightning events can occur in the planning area. Even during common events, the lightning current can branch off to strike a person from a tree, fence, pole, or other tall object. In addition, electrical current may be conducted through the ground to a person after lightning strikes a nearby tree, antenna, or other tall object. The current also may travel through power lines, telephone lines, or plumbing pipes to a person who is in contact with an electric appliance, telephone, or plumbing fixture. Lightning may use similar processes to damage property or cause fires.

Impact on Life and Property

There were no deaths, six injuries, and approximately $187,000 in property damages related to lightning in Mercer County. There have been no reports of injuries, deaths, or property damage in the City of Trenton, according to the NCDC database, although clearly there have been occasional incidents that simply have not been reported to or by NOAA. About 100 deaths and 500 injuries are reported annually across the U.S. from this hazard. The low dollar impact and low injury/death rate from previous lightning events points to a relatively low vulnerability for lightning hazards in the planning area. Based on previous occurrences, the probability of future lightning events in Mercer County is slightly fewer than 2 events per year. For Trenton itself, that number decreases to approximately 1 event every four years. (Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms).

Table 6-10
Property Damage from Lightning, Mercer County, 1950 – 2006

	Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1	Robbinsville	08/07/2000	05:18 PM	Lightning	N/A	0	0	10K	0
2	Princeton	12/17/2000	08:20 AM	Lightning	N/A	0	0	1K	0
3	Hamilton Square	12/17/2000	12:00 PM	Lightning	N/A	0	0	50K	0
4	Hamilton Square	08/04/2001	05:30 PM	Lightning	N/A	0	0	25K	0
5	Windsor	08/27/2001	03:30 PM	Lightning	N/A	0	0	1K	0
6	Lawrenceville	07/01/2005	04:15 PM	Lightning	N/A	0	0	100K	0
					TOTALS:	0	0	187K	0

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

Table 6-11
Reported Injuries from Lightning, Mercer County, 1950 – 2006

	Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1	Princeton	07/01/2001	02:30 PM	Lightning	N/A	0	2	0	0
2	Etra	06/14/2003	04:49 PM	Lightning	N/A	0	2	0	0
3	Clarksville	05/24/2004	06:00 PM	Lightning	N/A	0	2	0	0
					TOTALS:	0	6	0	0

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

Occurrences of the Lightning Hazard

There were 24 instances of lightning reported in the NCDC database for Mercer County from 1994 to mid-2006. Three of those events, or 12.5%, occurred solely in the planning area. The probability of lightning impacting the City of Trenton and Mercer County is presumed to be about the same as it has been in the past.

6.3.6 Drought

Description

A drought is an extended dry climate condition when there is not enough water to support urban, agricultural, human, or environmental water needs. It usually refers to a period of below-normal rainfall, but can also be caused by drying bores or lakes, or anything that reduces the amount of liquid water available. Drought is a recurring feature of nearly all the world's climatic regions.

Location and Extent of the Drought Hazard

Drought is possible throughout the planning area, but the data has revealed no significant drought history since 1950.

Severity of the Drought Hazard

There have been no incidences of drought in the planning area since 1950 (Reference: http://www.ncdc.noaa.gov/oa/climate/severeweather/extremes).

Impact on Life and Property

There are no known deaths or injuries from droughts in the planning area.

Occurrences of the Drought Hazard

According to the NCDC database, Mercer County has experienced no drought events in the period from 1950 to 2006. Although there always exists the possibility that this trend will change, it is reasonable to assume that the City has a relatively low probability of future drought occurrences.

6.3.7 Wildfires and Urban Interface Fires

Description

Wildfires are uncontrolled fires often occurring in wildland areas, which can consume houses or agricultural resources if not contained. Urban interface fires are defined as those that occur in areas where structures and other human development blend with undeveloped wildland.

Location and Extent of the Fire Hazard

The potential for wildfires exists over the entire planning area, although the probability is relatively low because of the urban nature of the planning area, as well as the detection and suppression capabilities that exist in the City.

Severity of Wildfires and Urban Interface Fires

The frequency and severity of wildfires is dependent on weather and on human activity. In the planning area, severity has historically been very low, and duration a matter of hours to a day.

Impact on Life and Property

There are no records of deaths or injuries and no recorded loss of property from wildfires/urban interface fires in the planning area.

Occurrences of Wildfires

There has been one reported wildfire in Mercer County since 1950. Although records do not indicate where, in Mercer County, the fire occurred, it is likely to have occurred outside the City limits (Reference: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms). The risk is increased and compounded by increasing development within the zone commonly referred to as the "urban-wildland interface." Within this zone of natural landscape, buildings become additional fuel for fires when fires do occur. Most wildland fires are man-caused and occur in the interface of developed lands and forest and range lands. In particular, the dry conditions, high temperatures, and low humidity that characterize drought periods set the stage for wildfires. The probability of wildfires occurring in the planning area is relatively low based on past records.

6.3.8 Hail

Description

Hail is a form of precipitation comprised of spherical lumps of ice. Known as hailstones, these ice balls typically range from 5 mm–50 mm in diameter on average, with much larger hailstones forming in severe thunderstorms.

Location and Extent of the Hail Hazard

The potential for hail exists over the entire planning area, although the probability is relatively low compared to other parts of the U.S. There are at least a few incidences of hail almost every year in the planning area, although for the most part they are minor. .

Severity of the Hail Hazard

The severity of hailstorms is measured by duration, size of the hail itself, and geographic extent. All of these factors are directly related to the weather phenomena that create the hail, thunderstorms. There is wide potential variation in these severity components. The planning area has a relatively low potential for significant hail events, based on previous records.

Impact on Life and Property

There are no known instances of injuries or death from hail events in Mercer County. The National Climatic Data Center (NCDC) database does not show any significant damage from hail events in the period of record. Presumably there are

damages, but most of these are likely addressed by citizens or insurance companies, and therefore there is no readily accessible record of damages. Damages that do occur are presumably orders of magnitude less than other hazards such as floods or hurricane winds.

Occurrences of the Hail Hazard

The National Climatic Data Center reported 27 hail events from the period 1950 through 2006 in Mercer County. Table 6-9 shows Mercer County hail events that produced hail an inch or more in diameter.

Table 6-12
Large-Sized Hail Events, Mercer County, 1950 – 2006

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MERCER	07/10/1974	1330	Hail	1.00 in.	0	0	0	0
2 MERCER	11/17/1977	1500	Hail	1.50 in.	0	0	0	0
3 MERCER	06/03/1980	1400	Hail	1.75 in.	0	0	0	0
4 MERCER	06/24/1985	1415	Hail	1.75 in.	0	0	0	0
5 MERCER	06/24/1985	1445	Hail	1.75 in.	0	0	0	0
6 MERCER	05/22/1986	1627	Hail	1.00 in.	0	0	0	0
7 MERCER	06/13/1987	1840	Hail	1.75 in.	0	0	0	0
8 MERCER	07/30/1987	1535	Hail	1.00 in.	0	0	0	0
9 Ewing Township	06/12/1996	04:28 PM	Hail	1.00 in.	0	0	0	0
10 Ewing Township	06/22/1996	05:20 PM	Hail	1.00 in.	0	0	0	0
11 Nottingham	06/22/1996	05:28 PM	Hail	1.00 in.	0	0	0	0
12 Princeton	10/04/2000	06:45 PM	Hail	1.75 in.	0	0	0	0
13 Dutch Neck	05/27/2001	06:10 PM	Hail	1.50 in.	0	0	0	0
14 Ewing Township	03/21/2003	04:36 PM	Hail	1.00 in.	0	0	0	0
15 Princeton	06/17/2004	06:50 PM	Hail	1.00 in.	0	0	0	0
16 Lawrenceville	08/11/2004	05:52 PM	Hail	1.00 in.	0	0	0	0
				TOTALS:	0	0	0	0

Source: NOAA's National Climatic Data Center. http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

6.3.9 Extreme Temperatures

Description

Temperatures that range far above or below normal are considered extreme temperatures. Heat stress can be indexed by combining the effects of temperature and humidity.

Geographical Vulnerability

The entire planning area is subject to extreme temperature hazards.

Severity Extreme Temperatures

The severity of extreme temperature events is measured by temperature, duration and humidity. Most events are of less than a week in duration.

Impact on Life and Property

The NCDC database shows no incidence of injuries or deaths from extreme temperatures in the period 1950 – 2006 in Mercer County. Damages from the extreme temperature hazard are generally confined to effects on humans, although occasionally there may be relatively minor effects on infrastructure such as electric grids.

Occurrences of Extreme Temperatures

There have been no recorded extreme temperature events in Mercer County in the period between 1950 – 2006. The probability of extreme temperatures is relatively low, based on past data.

6.3.10 Sinkholes and Land Subsidence

Description

A sinkhole is a natural depression or hole in the surface topography caused from the removal of soil or bedrock by water. They can vary in size, form either gradually or suddenly, and are found worldwide. Subsidence is the motion of the Earth's surface as it shifts downward, relative to sea-level. When sinkholes occur in urban areas, it is usually due to water main breaks or sewer collapses when old pipes give way.

Location and Extent of the Sinkhole Hazard

Sinkholes do occur in urban areas, so the planning area is vulnerable hazard, although it is not common. Land subsidence is generally found in areas of very distinct geography, such as places where there is extensive gas or groundwater (that has been extracted), or in areas of karst topography or mines. However, in 2006, the City experienced a significant sinkhole in front of the State Department of Human Services Building.

Figure 6-6
Sinkhole in front of the New Jersey State Department of Human Services in Trenton

Severity of Land Subsidence

The severity of land subsidence has no generally established measure, except that it can be described in terms of change in ground elevation relative to sea level. Subsidence is generally permanent, although it

can be abated with proper management methods. Sinkholes are generally of short duration, although if not repaired they can become permanent features of the landscape.

Impact on Life and Property

There have been no reported instances of sinkholes or land subsidence in the planning area, and thus no injuries, deaths, or damages.

Occurrences of Sinkholes and Land Subsidence

The planning area is generally not subject to sinkholes or land subsidence, and there have been few reports of such effects in Mercer County. The probability of sinkholes and subsidence occurring in the planning area in the future is relatively low, based on past data.

Section 7
Risk Assessment

The Interim Final Rule [IFR] published in the February 26, 2002 Federal Register requires risk assessments as part of a State hazard mitigation plan. This section of the plan addresses that requirement.

Contents of this Section

7.1 IFR Requirement for Risk Assessments

Requirement §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

Requirement §201.6(c)(2)(ii): *[The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

7.2 Overview and Analysis of City of Trenton Vulnerability to Hazards

As discussed in Section 6 of this Plan (Hazard Identification), the City of Trenton has at least some exposure to as many as ten natural hazards, but most of them have such low probability that there is little or no serious risk to the City.

This section addresses vulnerabilities to these three predominant risks, and provides projected future losses from them, in accordance with FEMA requirements. The most significant natural hazard to which the City of Trenton is exposed is clearly flooding. The City has a well-established history of floods, mainly along the Delaware River and Assunpink Creek. As discussed in much more detail below (and in Section 6 of this Plan), the floodprone areas near the Delaware River are generally residential in nature, while those that flood from the Assunpink Creek tend to be commercial or industrial, although in the past some residential areas have flooded occasionally. In some areas north of the Assunpink the City has conducted limited acquisition/demolition activities to reduce flood risk. The City's risk from wind and winter storms is not especially significant given the inland location and long history of preparing for and addressing winter hazards. Nevertheless, this section does address those hazards, though in somewhat less detail than the flood risks.

Figure 7-1
Area Map of Trenton, showing the Delaware River and Assunpink Creek

7.3 Estimate of Potential Losses (Risk)

This section describes the risks to City of Trenton, including its citizens, residential, government and commercial assets, and City operations, from a set of pre-identified hazards. These include flooding, wind, and to a much lesser degree, winter storms. .As noted above, risk is an expression of expected future monetary losses resulting from the impacts of natural hazards. The risk assessment process is based on several sequential steps:

- Assign values to the assets
- Develop damage, injury and mortality functions for the assets (quantify the vulnerabilities)
- Determine annual probabilities and severity of natural hazard events impacting the assets
- Calculate the annual damages from the impacts of the hazards
- Perform a present-value calculation to bring future risks to current dollars

Table 7-1 provides the estimated total square footage of Trenton's predominant asset classes in designated flood zones A and X.

Table 7-1
City of Trenton: Square Footages of Predominant Asset Classes in Designated Flood Zones A through X-500

Land Use/Flood Zone	A	AE	X	X500	Total
Commercial Services	55,582	324,468	11,030,818	529,180	11,940,047
Industrial	0	428,186	3,316,654	144,089	3,888,929
Major Roadway	0	1,103	622	0	1,725
Residential, High-Density or Multiple Dwelling	139,332	372,200	20,515,889	607,735	21,635,156
Residential, Rural, Single Unit	0	4,535	8,036	199	12,770
Residential, Single Unit Low Density	0	15,559	19,185	4,711	39,454
Residential, Single Unit, Medium Density	0	145,167	1,589,627	63,390	1,798,185
Stadiums, Theaters, Cultural Centers, Zoos	0	70,581	104,438	17,624	192,643
Transportation, Communications, Utilities	175	157,467	193,988	165,165	516,795
Total	**195,088**	**1,519,268**	**36,779,257**	**1,532,091**	**40,025,704**

Table 7-2 shows values for various land uses in Trenton. The values of the various assets and contents were estimated using the RS Means on-line square foot cost guides. The figures are not intended to be an exact determination of value. Note that the roadway value calculation is left out of the table because these cannot be identified through open-source methods, and because it is assumed they are not particularly susceptible to the effects of low-level floods.

Table 7-2
Areas and Values for Various Trenton Asset Classes in Flood Zones A, AE and X

Land Use	Area A/AE	Value A/AE	Area X	Value X
Commercial Services	380,050	$71,657,895	11,030,818	$2,079,845,291
Industrial	428,186	$66,963,109	3,316,654	$518,684,554
Major Roadway	1,103	[1]	622	[1]
Residential, High-Density or Multiple Dwelling	511,532	$73,561,371	20,515,889	$2,950,307,934
Residential, Rural, Single Unit	4,535	$530,595	8,036	$940,212
Residential, Single Unit Low Density	15,559	$1,820,403	19,185	$2,244,645
Residential, Single Unit, Medium Density	145,167	$16,984,539	1,589,627	$185,986,359
Stadiums, Theaters, Cultural Centers, Zoos	70,581	$12,351,675	104,438	$18,276,650
Transportation, Communications, Utilities	157,642	$39,410,500	193,988	$48,497,000
Total	**1,714,355**	**$283,280,088**	**36,779,257**	**$5,804,782,644**

Note 1. Valuation not provided in data set.

7.3.1 Flood Risk in Trenton

This subsection of the Plan provides estimates of future flood losses, i.e. risk. Each of the loss calculations is based on best available data, but they must be considered estimates because highly detailed engineering were not performed as part of this planning process.

Method 1
Risk Estimate based on Area of Asset Classes in Various Flood Zones

The first method used to estimate the flood risk in Trenton is to use the estimates of total square footage and value of structures that are in FEMA-identified flood zones, as shown above. As shown in Table 7-2 above, the City has about 1.75 million square feet of built space in FEMA A and AE flood zones and 5.2 million square feet in X and X-500 zones. A and AE zones are designated 100-year flood areas; i.e. they have at least a one percent annual chance of flooding. The X zone designation indicates an approximate 500-year flood zone (a 1/5 of one percent annual chance of flooding. The X-500 designation indicates that a particular place is determined outside the 500-year floodplain. In order to estimate the risk to these assets, the total value of the asset classes in each flood zone is multiplied by the probability. For example,

$2,244,645 (residential/single-unit/low density) X 0.002 (X-zone probability) = $4,489 (risk)

It is recognized that this method has some uncertainty because it does not contemplate that many structures in various flood zones will be constructed in relatively safe areas based on past experience. However, it does offer a good proxy calculation to show the overall relative flood risk in the City. Table 7-3 shows the estimated annual flood risk to these various asset classes in the City. It should also be noted that flood zones (in particular A zones in this example), depict the outer boundary of statistical flood risk, so higher-risk areas are captured within them. This means that (generally speaking) flood exposure increases moving from the 100-year floodplain boundary (for example) towards the source of flooding, so by definition a simple percentage calculation such as this underestimates flood risk because many of the assets included in the sample are in fact at more risk than the 1% flood calculation suggests. A site-by-site determination of elevations and vulnerabilities would be required to more accurately characterize the flood risk.

Table 7-3
Estimated Annual Flood Risk for Various Trenton Asset Classes in Flood Zones A, AE and X

Land Use	Value A/AE	Risk A/AE	Value X	Risk X
Commercial Services	$71,657,895	$716,578.95	$2,079,845,291	$4,159,691
Industrial	$66,963,109	$669,631.09	$518,684,554	$1,037,369
Major Roadway	[1]			
Residential, High-Density or Multiple Dwelling	$73,561,371	$735,613.71	$2,950,307,934	$5,900,616
Residential, Rural, Single Unit	$530,595	$5,305.95	$940,212	$1,880
Residential, Single Unit Low Density	$1,820,403	$18,204.03	$2,244,645	$4,489
Residential, Single Unit, Medium Density	$16,984,539	$169,845.39	$185,986,359	$371,973
Stadiums, Theaters, Cultural Centers, Zoos	$12,351,675	$123,516.75	$18,276,650	$36,553
Transportation, Communications, Utilities	$39,410,500	$394,105.00	$48,497,000	$96,994
Total	**$283,280,088**	**$2,832,800.88**	**$5,804,782,644**	**$11,609,565**

Note 1. Valuation not provided in data set.

Method 2
Analysis of NFIP Repetitive Loss Data

The second risk assessment method is based on an analysis of National Flood Insurance Program (NFIP) data on repetitive flood loss properties. The NFIP defines repetitive loss properties as those that have submitted at least two insurance claims of more than $1,000 in a ten-year period. As of December, 2006, the City of Trenton had 178 such properties, based on a query of the FEMA Bureaunet NFIP interface. Of these, 162 properties were residential and 15 non-residential.

Residential Repetitive Loss Properties

Table 7-4 provides a summary of residential repetitive loss claims for building and contents damages, the number of properties on the various streets, the total number of claims on specific streets, and the average claim amounts. Note that these figures will change following the April, 2007 floods, but the data had not entered the system at the time the initial version of the plan was developed.

Table 7-4
Summary of Residential NFIP Repetitive Loss Statistics, City of Trenton

Street	Properties	Building	Contents	Total	Claims	Average
Aberfeldy Drive	1	$14,922	$448	$15,370	3	$5,123
Bloomfield Avenue	1	$24,703	$0	$24,703	3	$8,234
Clearfield Avenue	11	$319,086	$2,961	$322,046	29	$11,105
Columbia Avenue	43	$986,377	$46,571	$1,032,948	115	$8,982
Laclede Avenue	5	$155,771	$7,029	$162,800	14	$11,629
Lee Avenue	6	$162,423	$2,502	$164,925	22	$7,497
Lipton Avenue	3	$76,845	$7,806	$84,651	8	$10,581
Morningside Drive	6	$278,126	$36,596	$314,722	16	$19,670
Mulberry Street	6	$146,182	$7,178	$153,360	15	$10,224
Newell Avenue	7	$145,054	$8,599	$153,652	20	$7,683
NW Feld Avenue	1	$3,217	$4,924	$8,141	4	$2,035
Riverside Drive	55	$1,560,270	$50,423	$1,610,693	142	$11,343
Sanhican Drive	25	$505,438	$67,968	$573,406	37	$15,497
W Minister Avenue	1	$70,877	$11,586	$82,463	3	$27,488
Stokes Avenue	1	$63,051	$115,576	$178,627	5	$35,725
Totals/Averages	**172**	**$4,512,342**	**$370,165**	**$4,882,507**	**436**	**$11,198**

As expected, this data suggests relatively strong spatial patterns in flood risk in Trenton. Most of the flood risk in the City appears to be concentrated on Columbia Avenue, Riverside Drive and Sanhican Drive. Flood risk appears to be concentrated in the areas of the City known as The Island and Glen Afton. The Island neighborhood is located in the West Ward of the City, and is bounded by the Delaware River on the west, Route 29 on the east, and by Stacy Park on the north and south. Glen Afton is also in the West Ward, and consists of about 230 homes. The boundary of the neighborhood is approximately formed Shelburne

Avenue, School Lane, Mill Drive, the 100 through 600 blocks of Sanhican Drive, River Drive, Abernethy Drive, Morningside Drive and Afton Avenue.

There are several patterns in this data that provide insight into residential flood risk in Trenton. First, there is a relatively large ratio between the amounts of the claims for building damages versus contents damages. To a degree this may be an artifact of the flood insurance policies, but it more likely suggests that in these areas basements are being flooded, and that over time the owners have limited the amount of contents stored below grade because they are aware of the flood risk. Although this is partly a supposition, it is borne out by interviews with homeowners and a number of reports about flooding in these areas. A secondary point that is illustrated by the data is that the flooding is primarily below grade, based on the relatively low amount of the claims averages. Note that the overall average claim is slightly over $11,000, suggesting that the flood damages have typically been confined to parts of the residences that do not have highly vulnerable building components such as drywall, trim, etc.

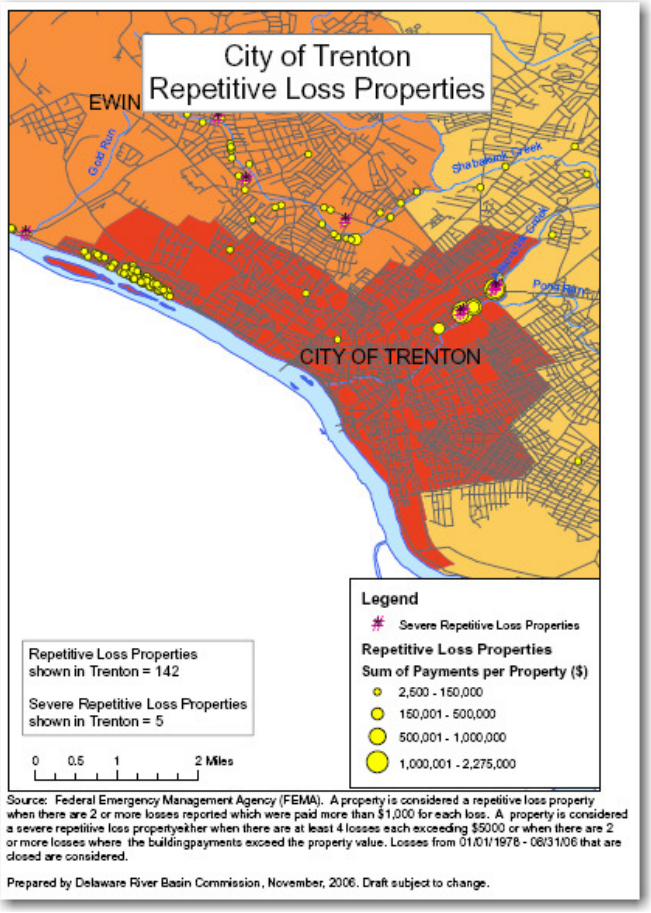


Figure 7-2 Repetitive Loss

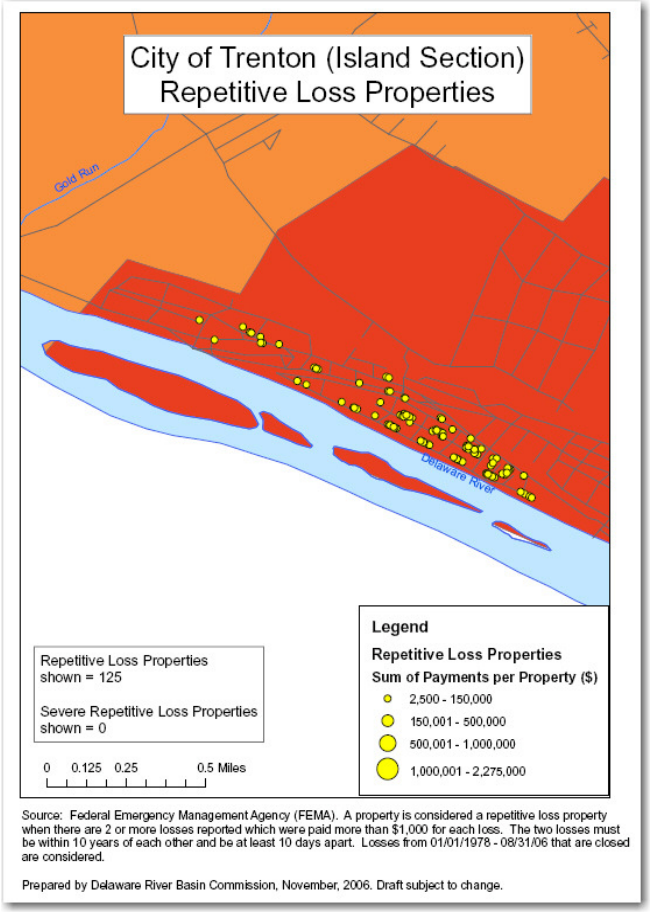


Figure 7-3 Repetitive Loss in the Island

Graphics from Delaware River Basin Commission

Flood Risk to Residential Properties

Residential flood risk is calculated by a simple methodology that uses the FEMA default present-value coefficients from the benefit-cost analysis software modules. To perform this calculation, the repetitive loss data was reviewed to determine an approximate period over which the claims occurred. There is not an exact method of doing this, because there are numerous properties in the database, and insurance policies come into force at different times, and are cancelled and reinstated periodically; these variables are not part of the query output. Most of the flood claims in the most recent query occurred between the early 1990s and the present, a period of about 15 years.

As shown in Table 7-5, there have been 436 claims in the 15-year period, for an average number of claims per year of 29.1. Based on a 100-year horizon and a present value coefficient of 14.27 (the coefficient for 100 years using the mandatory OMB discount rate of 7.0 percent), the projected flood risk to these properties is shown at the bottom of the table. It must be understood that individuals can obtain and cancel flood insurance policies, and the flood hazard depends on many variables, including the weather, so this projection is simply an estimate of potential damages. Nevertheless, it offers a useful metric that can be used in assessing the potential cost effectiveness of mitigation actions.

Table 7-5
Projected 100-year Flood Risk in Trenton Repetitive Loss Areas

Data	Value
Period in years	15
Number of claims	436
Average claims per year	29.1
Total value of claims	$4,882,507
Average value of claims per year	$325,501
Projected risk, 100-year horizon	**$4,644,891**

The next table (7-6) shows risk projections for the three streets that appear to have the most risk, based on NFIP repetitive loss records. These projections are done in the same manner as the overall projection that is described above. Note that the projected 100-year risk per policy for all three streets is very similar. This risk figure is a good basis for determining the total amount that can be spent (either overall, or per typical property) on mitigation actions, although the ultimate cost effectiveness is also a function of the effectiveness and useful life of the project itself.

Table 7-6
Projected 100-year Flood Risk, Select Trenton Streets with Highest Number of Repetitive Flood Loss Claims in NFIP Database

Columbia Avenue	
Total claims	115
Average claims per year	7.67
Total value of claims	$1,032,948
Average value of claims per year	$68,863
Projected risk, 100-year horizon	$982,678
Number of claimants	43
Projected risk per policy, 100-year horizon	**$22,853**
Riverside Drive	
Total claims	142
Average claims per year	9.47
Total value of claims	$1,610,693
Average value of claims per year	$107,380
Projected risk, 100-year horizon	$1,532,306
Number of claimants	55
Projected risk per policy, 100-year horizon	**$27,860**
Sanhican Drive	
Total claims	37
Average claims per year	2.46
Total value of claims	$573,406
Average value of claims per year	$38,227
Projected risk, 100-year horizon	$545,500
Number of claimants	25
Projected risk per policy, 100-year horizon	**$21,820**

Flood Risk to Non-Residential Properties

As noted earlier, as of December, 2006, the City of Trenton had 15 non-residential repetitive loss properties in the NFIP database. Damages to a number of these properties have been very significant over the years; one of the properties has had 17 flood insurance claims. Table 7-6 below shows select data about flood losses on these sites. Address data about individual sites is omitted for reasons of confidentiality.

Table 7-6
Summary of Non-Residential Repetitive Loss Claims in Trenton (ordered by total amount of claims)

Street	ID	Building	Contents	Claims	Total	Average
Taylor Street	1	$217,959	$2,043,532	17	$2,261,491	$133,029
Nottingham Way	2	$358,413	$795,472	14	$1,153,886	$82,420
North Olden Avenue	3	$0	$815,239	2	$815,239	$407,620
Taylor Street	4	$430,000	$265,441	3	$695,441	$231,814
Nottingham Way	5	$142,891	$440,091	17	$582,982	$34,293
Olden Avenue	6	$311,122	$73,967	3	$385,090	$128,363
Amtico Square	7	$47,029	$295,415	3	$342,445	$114,148
Nottingham Way	8	$34,947	$265,570	4	$300,517	$75,129
Sanhican Drive	9	$219,318	$0	2	$219,318	$109,659
Mulberry Street	10	$69,872	$5,528	8	$75,400	$9,425
Mulberry Street	11	$65,667	$0	8	$65,667	$8,208
Sanhican Drive	12	$46,121	$0	3	$46,121	$15,374
Prospect Street	13	$5,126	$5,525	2	$10,651	$5,326
North Clinton Avenue	14	$0	$8,000	2	$8,000	$4,000
North Willow Street	15	$645	$5,546	2	$6,191	$3,095
Totals/Averages		**$1,949,112**	**$5,019,327**	**90**	**$6,968,440**	**$77,427**

As with the residential flood loss history, the past claims information can be used to project future flood losses, as shown in Table 7-7 below. The methodology is the same as what is described in the residential section. By definition these results can be considered more reliable because the underlying data is more robust.

Table 7-7
Projected 100-year Flood Risk,
Select Non-Residential Repetitive Loss Properties
in the City of Trenton (order by 100-year risk estimate)

Street	ID	Average	Claims	Claim Freq	100-year risk
Taylor Street	1	$133,029	17	0.88	**$1,898,323**
Nottingham Way	2	$82,420	14	1.07	**$1,176,133**
North Olden Avenue	3	$407,620	2	7.50	**note 1**
Taylor Street	4	$231,814	3	5.00	**note 1**
Nottingham Way	5	$34,293	17	0.88	**$489,361**
Olden Avenue	6	$128,363	3	5.00	**note 1**
Amtico Square	7	$114,148	3	5.00	**note 1**
Nottingham Way	8	$75,129	4	3.75	**note 1**

Street	ID	Average	Claims	Claim Freq	100-year risk
Sanhican Drive	9	$109,659	2	7.50	**note 1**
Mulberry Street	10	$9,425	8	1.88	**$134,494**
Mulberry Street	11	$8,208	8	1.88	**$117,128**
Sanhican Drive	12	$15,374	3	5.00	**note 1**
Prospect Street	13	$5,326	2	7.50	**note 1**
North Clinton Avenue	14	$4,000	2	7.50	**note 1**
North Willow Street	15	$3,095	2	7.50	**note 1**
Totals/Averages		**$77,427**	**90**		**$3,815,439**

Note 1. These properties have insufficient claims history for this calculation methodology to be valid.

It should be noted that some of the non-residential properties on this list may be at far greater flood risk that indicated, because there may be have been periods where the owner(s) did not carry flood insurance, with the result that they may have been damaged but there is no damage record. This type of analysis is not totally conclusive, but for certain of the properties (IDs 1, 2, 5, 10, and 11) there is clearly significant future flood risk based on the NFIP claims history. It would be possible to perform relatively simple engineering studies to better assess risks in those properties with just a few claims.

Flood Risk to City of Trenton Public Assets

As part of the process of developing this plan, the HMC representative interviewed various City departments to determine flood risks to City-owned property. There appears to be little or no flood history in City facilities, which is not especially surprising considering that the City does not have a large number of assets, and most of them appear to be in relatively safe locations with respect to flooding. There are several public facilities that abut potential flood sources – these include the Trenton Sewage Treatment and Water Treatment Plants, both of which are very close to the Delaware River. According to the Department of Public Works, the Sewage Treatment Plant is not at any particular risk from flooding, but the Water Treatment Plant is at risk of catastrophic damage from low-probability (i.e. 500-year+) floods, which could cause damage to equipment and extended periods of interrupted service. Absent a detailed engineering study that is outside the scope of this Plan, it is only possible to estimate the potential effects based on a combination of assumptions about the flood frequency that would inundate the facility, plus the time of lost function and the direct damages to equipment.

Figure 7-4
City of Trenton Water Filtration Plant, dry (Route 29) side.

For the purpose of a risk projection the planning team used the FEMA Limited Data software module to calculate damages in a 500-year flood event, using an estimated population served of 250,000, direct physical damages of $500,000 and a time of lost function of two weeks. The FEMA *What is a Benefit* guidance provides a useful basic metric for calculating the value of loss of water service, as shown in Figure 7-4. A value of $68 per capita per day was used in this risk assessment. This figure is slightly low because the guidance was written several years ago.

Figure 7-5 FEMA *What is a Benefit?* Guidance related to Economic Impacts of Loss of Potable Water Service

Table 6.3
Economic Impacts of Loss of Potable Water Service
Per Capita Per Day

Category	Complete Loss of Water Service	Water Unsafe for Drinking
Reduced regional economic activity[1]	$35	$8.75
Impacts on Residential Customers ▪ Direct economic losses ▪ Disruption economic impact ▪ Total Best estimate	 $15 $42 to 63 $68	 $7.50 $21 to 42 $34
Total economic impacts (all hazards)	$103	$43
Fire following earthquake losses ▪ Dry climates ▪ Moderate climates ▪ Wet climates	 $35 $17.50 $8.75	 None None None

[1] This value of reduced regional economic activity is based on national economic data. If desired, more detailed estimates could be made for specific metropolitan areas using NAICS data in the economic census referenced above.

With these basic figures to perform the calculation, the FEMA LD BCA module was used to estimate risk, as shown in Figure 7.-6. Using these assumptions, the future expected flood damages are $6,820,361.

Figure 7-6 Estimated Future Flood Damages to Trenton Water Filtration Plant, Using FEMA LD BCA Module

SUMMARY OF BENEFITS AND COSTS	Expected Annual	Present Value
Expected Annual Damages Before Mitigation	$477,976	$6,820,361
Expected Annual Damages After Mitigation	$0	$0
Expected Avoided Damages After Mitigation (BENEFITS)	$477,976	$6,820,361
PROJECT COSTS	$1	
PROJECT BENEFITS	$6,820,361	
BENEFITS MINUS COSTS	$6,820,360	
BENEFIT-COST RATIO	$6,820,361	

7.3.2 Wind Risk in Trenton

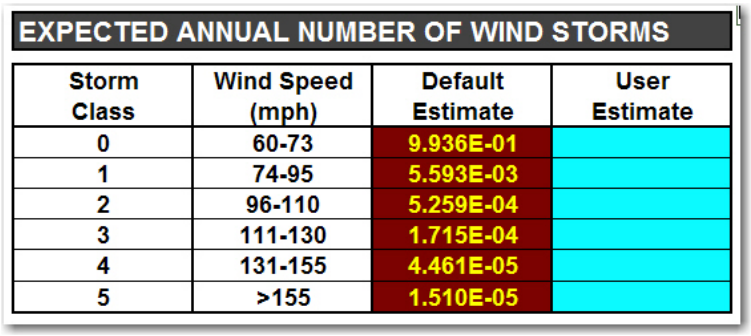
The figures in these tables are estimates based on best available data. Information sources are provided in the notes below the tables, where applicable. The speed and probability data in this table is extracted from the FEMA wind database on Version 3.0 of the BCA Toolkit.

Table 7-8 Hurricane Wind Probabilities in Trenton

Wind Speed (mph)	Return Interval (years)
30	10
46	25
60	50
70	100
101	2000

The wind risk assessment for the City was conducted using the FEMA Hurricane Wind BCA software and the FEMA wind database on the BCA Toolkit Version 3.0. All figures are based on 100-year time horizon and a 7% discount rate to determine net present value of the risk. Table 7-9 shows the expected annual number of hurricane wind storms in Trenton, by class.

Figure 7-7
Expected Annual Number of Wind Storms by Class, City of Trenton



EXPECTED ANNUAL NUMBER OF WIND STORMS			
Storm Class	Wind Speed (mph)	Default Estimate	User Estimate
0	60-73	9.936E-01	
1	74-95	5.593E-03	
2	96-110	5.259E-04	
3	111-130	1.715E-04	
4	131-155	4.461E-05	
5	>155	1.510E-05	

Damage functions for all structure types are verbatim from the FEMA software; the assumed structure and roof type used in the analysis are noted in Table 7-10. Note that these assumptions are intended only to provide a general estimate of potential wind risk. Specific proposed mitigation projects will require more detailed engineering assessments. The major roadways and transportation/communications/utilities classes were not assessed as part of this plan because most of these are unique and would require detailed engineering studies to be accurate.

Table 7-9
Area and Structure Type for Trenton Asset Classes

Land Use/Flood Zone	Total Area	Building Type in Risk Calculation
Commercial Services	11,940,047	Masonry engineered commercial, flat roof
Industrial	3,888,929	Steel frame engineered commercial, flat roof
Major Roadway	1,725	Not assessed
Residential, High-Density or Multiple Dwelling	21,635,156	Wood, non-engineered, hip roof
Residential, Rural, Single Unit	12,770	Wood, non-engineered, hip roof
Residential, Single Unit Low Density	39,454	Wood, non-engineered, hip roof
Residential, Single Unit, Medium Density	1,798,185	Wood, non-engineered, hip roof
Stadiums, Theaters, Cultural Centers, Zoos	192,643	Steel frame engineered commercial, flat roof
Transportation, Communications, Utilities	516,795	Not assessed
Total	**40,025,704**	

Wind risk for the six primary asset classes in Trenton was calculated using the FEMA Full-Data Hurricane Wind BCA module. The calculations were made for a standard 1,000 square foot structure for each asset class, then extrapolated to the full square footage of the class City-wide. The assessment uses a 100-year time horizon. Table 7-10 shows the wind risk by specific asset class, and the total wind risk for the City from hurricanes. Although these figures seem relatively high, it should be noted that this hazard (hurricane wind) affects all the assets in Trenton about equally, whereas flooding generally affects only those assets or operations that are close to flood sources. It should also be remembered that mitigation measures for the more localized flood risk are much more feasible (generally) than any wind mitigation measures that would apply to these asset classes in general.

Table 7-10
Wind Risk to Six Primary Asset Classes, City of Trenton

Asset Class	Risk/1000 s.f.	Total Risk
Commercial Services	$2,593.77	$30,969,736
Industrial	$2,558.73	$9,950,719
Residential, High-Density or Multiple Dwelling	$1,313.27	$28,412,801
Residential, Rural, Single Unit	$1,313.27	$16,770
Residential, Single Unit Low Density	$1,313.27	$51,813
Residential, Single Unit, Medium Density	$1,313.27	$2,361,502
Total	**---**	**$71,763,342**

7.3.3 Winter Storm Risk in Trenton

The NOAA/NCDC database lists 85 winter storm/snow/ice events from 1995 to 2007. The web site does not indicate why the data does not extend to 1950. However, the amount of data that is presently on the site is sufficient for a basic risk assessment for Trenton. Table 7-11 shows the basic data required for the assessment; all information is from open sources. Some of the information may be slightly out of date because it has not been updated since the 2000 census, but it is sufficient for the risk estimates.

Table 7-11
Data Parameters for Trenton Winter Storm Risk Assessment; Data for Mercer County, New Jersey (except as noted), from the NOAA/NCDC Database (1995-2007)

Data	Value
Winter storm events	85
Average annual number of winter storm events, Mercer County	6.54
Total reported damages	$19,000,000
Annual damages	$1,461,538
Reported deaths	1
Annual deaths	0.076
Value of single death (FEMA, approximately 1998 value)	$2,200,000
Estimated annual cost of deaths from winter storms	$167,200
Reported injuries	33
Annual injuries	2.54
Value of single injury (FEMA, approximately 1998 value)	$12,500
Estimated annual cost of injuries from winter storms	$31,750
Population of Mercer County	350,761
Population of the City of Trenton	85,403
Population of Trenton as a percentage of population of Mercer County	24.4

The information in Table 7-11 is used to infer winter storm damages to the City of Trenton, as shown below. As noted, Trenton accounts for about 24 percent of the population of Mercer County. For the purpose of this assessment, it is assumed that damages are proportional, thus damages for Trenton are estimated as follows:

Table 7-12
Estimated Winter Storm Damages to the City of Trenton

Data	Value
Estimated damages to City of Trenton since 1995	$4,630,000
Estimated annual damages to City of Trenton	$356,615
Inferred total number of deaths	0.244
Inferred total cost of deaths	$536,800
Inferred annual number of deaths	0.019
Inferred annual cost of deaths	$41,292
Inferred total number of injuries	8.052
Inferred total cost of injuries	$100,650
Inferred annual number of injuries	0.619
Inferred annual cost of injuries	$7,742

After estimating the annual figures for damages, deaths and injuries for the City, the risk assessment comprises a simple projection of future expected damages based on a standard present value coefficient of 14.27. This represents a 100-year time horizon and a 7 percent discount rate (the latter required by OMB).

Table 7-13
Estimate of Risk to the City of Trenton from Winter Storms

Data	Value
Estimated annual damages to City of Trenton	$356,615
Projected risk from direct winter storm damages	$5,088,896
Inferred annual cost of deaths	$41,292
Projected risk from winter storm-related deaths	$589,236
Inferred annual cost of injuries	$7,742
Projected risk from winter storm-related injuries	$110,478
Estimated total risk from winter storms (100-year horizon)	**$5,788,610**

7.4 Summary of Trenton's Risks

Table 7-14 shows the results of the risk assessments for floods, wind and winter storms for the City of Trenton.

Table 7-14
Summary of City of Trenton Natural Hazard Risks
By Asset and Hazard Type (100-year horizon)

Asset	Hazard	Risk (100-year horizon)
Repetitive loss properties (residential)	Floods	**$4,644,891**
Repetitive loss properties (non-residential)	Floods	**$3,815,439**
City of Trenton Water Filtration Plant	Floods	**$6,820,361**
Commercial services	Wind	**$30,969,736**
Industrial	Wind	**$9,950,719**
Residential	Wind	**$30,842,886**
All assets, direct damages	Winter Storms	**$5,088,896**
Deaths	Winter Storms	**$589,236**
Injuries	Winter Storms	**$110,478**

Section 8
Mitigation Strategy

The Interim Final Rule (IFR) published in the February 26, 2002 Federal Register requires risk assessments as part of a hazard mitigation plan. This section of the plan addresses that requirement.

Contents of this Section

8.1 IFR Requirement for Mitigation Strategy

Requirement §201.6(c)(3): *The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Requirement §201.6(c)(3)(ii): *[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Requirement: §201.6(c)(3) (iii): *[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

8.2 City of Trenton Mitigation Goal

Goals are general descriptions of desired long-term outcomes. State and federal guidance and regulations pertaining to mitigation planning require the development of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards. Mitigation goals have been established by the Federal Emergency Management Agency, the State of New Jersey, and the City of Trenton.

As required by the planning process, the Mitigation Planning Committee developed a goal statement. To do so, the Committee reviewed FEMA's national mitigation goals, several examples of goal statements from other states and communities, and the State of New Jersey's Mitigation goal. The committee also considered information about natural hazards that may occur in the area and their potential consequences and losses.

The City of Trenton's Hazard Mitigation Goal

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

8.3 City of Trenton Mitigation Objectives and Strategies

Mitigation Objectives

Objectives are well-defined intermediate points in the process of achieving goals. City of Trenton mitigation planning objectives include:

- Reduce the exposure of residential areas to flooding from the Delaware River and Assunpink Creek.
- Develop and maintain an understanding of risks from the full range of natural hazards that can affect the City, and initiate mitigation activities to address the potential effects of those hazards.
- Find and develop opportunities to work with other agencies to leverage mitigation funds, and to share information about the risks of natural hazards.
- Promote partnerships among federal, state, county, interstate commissions, and local governments to identify, prioritize and implement mitigation actions.
- Maintain the viability of Trenton businesses by preventing damages from hazards.
- Ensure that the City maximizes its opportunities for access to grants and other kinds of assistance.
- Provide effective implementation of existing floodplain regulations and building codes.

- Ensure that Trenton continues to be represented in the determination of region-wide mitigation actions.

- Stay involved with citizen and technical groups.

Mitigation Strategies

- Strategies are specific course of action to achieve the objectives. City of Trenton mitigation planning strategies include:

- Maintain awareness of the potential effects of natural hazards on City of Trenton assets. Use new information from damaging events to increase local knowledge of risks.

- Undertake vulnerability and risk studies to better understand the potential for future damages.

- Implement cost-effective projects and actions to reduce risk from natural hazards, both for the City of Trenton assets and operations, as well as for residents and businesses in the planning area.

- Monitor mitigation measures to ensure they are functioning efficiently.

- Continuously monitor and update this Plan to ensure that it remains current with regard to risks, strategies, priorities and mitigation actions.

- Promote public understanding, support and demand for hazard mitigation.

- Seek grants to fund mitigation activities.

- Encourage and facilitate the development or updating of General Plans, Land and Zoning, Building Construction, Fire Protection and Floodplain Management Ordinances to limit development in hazard areas.

- Implement elements of the plan and monitor results.

8.4 City of Trenton Mitigation Priorities

The actions noted in Section 8.5 below were prioritized by the HMC based on their potential effects in reducing risk to the City, including its citizens, operations, and physical assets. The highest priority actions are those that are most effective in reducing risks to multiple assets simultaneously.

As discussed in Section 7 (risk assessment), a key criterion in Trenton's prioritization of actions is the cost-effectiveness of actions and projects. High-priority actions and projects are subjected to feasibility assessments and benefit-cost analyses to determine if they are good candidates for mitigation actions. Cost effectiveness will continue to be central to the City's decision-making processes in identifying and funding mitigation actions.

8.5 City of Trenton Mitigation Actions

The HMC considered a number of related factors in identifying and prioritizing mitigation actions. These factors included the availability of information on flood hazards, other hazards, past hazard events, City of Trenton assets and operations that are exposed to the hazards, and the elements of the development approval process. High priority was placed on actions that are consistent with current City policies, those that are technically feasible and have high political and social acceptance, and those that can be achieved using existing authorities, budget levels, and staff. City of Trenton has virtually no new construction of any kind. The City actively enforces building codes and floodplain regulations, but there is no need for the plan to address actions and projects that reduce hazard effects on new construction.

High Priority Actions

High Priority Action 1

Elevate mechanical and electrical equipment in floodprone residential structures.

Project/Action Description.

This action is to elevate mechanical and electrical utilities in residential structures. As discussed in the Risk Assessment section of this plan, 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.

Lead Office: Trenton Department of Inspections.
Support: Broad support, particularly from residents of the affected areas.
Status: To be determined; depends on availability of matching funds.
Cost: Estimated $5,000 to $10,000 per residential structure, depending on specifics.
Cost Effectiveness: Moderate to high, depending on flood loss history and configuration of house.
Funding Sources: FEMA HMGP, FMA, PDM, or SRL (depending on eligibility criteria).
Timing: To be determined by City, pending availability of match and grant funds.

High Priority Action 2

Assess FEMA repetitive loss and severe repetitive loss properties throughout the City to identify mitigation candidates.

Project/Action Description.

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. As discussed in detail in Section 7, Trenton has numerous properties that are classified as *repetitive loss* and *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.

Lead Office: Trenton Department of Inspections.
Support: Unknown at present, but presumed strong.
Status: To be determined.
Cost: Likely in $25,000 to $50,000 range, depending on whether City staff or consultants do the work.
Cost Effectiveness: Not independently cost-effective, but would identify effective mitigation actions.
Funding Sources: Not yet identified, but would probably be the City, as federal and state funds are limited.
Timing: Unknown, but likely to start within one year of the hazard mitigation plan.

High Priority Action 3

Purchase and/or flood detention at 163 North Olden Avenue (Freightyards).

Project/Action Description.

This 35-acre site in Trenton was formerly occupied by railroad freightyards. 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.

Lead Office: Trenton Department of Economic Development
Support: Unknown.
Status: To be determined.

Cost: Acquisition remaining as of May 2007 is $45,000; detention not yet determined, but could be in the range of $500,000 to $1,000,000. This would be determined as part of an engineering study. Demolition and removal of concrete estimated at $600,000; site remediation estimated at $5M.
Cost Effectiveness: Probably cost-effective, but will require additional study to verify.
Funding Sources: FEMA grant programs, NRCS.
Timing: Overall project has already commenced; additional actions as above would depend on funding.

High Priority Action 4

Acquire and demolish floodprone property at 104 Taylor Street.

Project/Action Description.

This seven acre site is immediately adjacent to the Assunpink, and has repeatedly flooded over the years. The property is on the NFIP's repetitive loss list, and was mostly recently flooded in April, 2007, soon after its current owner moved in. This project is to purchase and demolish the building, 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.

Lead Office: Trenton Department of Economic Development or Inspections Department
Support: Unknown, probably high because the site is already under consideration as part of the City's project to return areas adjacent to the Assunpink to a natural floodplain environment.
Status: To be determined probably fairly high priority.
Cost: Acquisition: estimated $700,000; demolition: estimated $800,000; site remediation: estimated $600,000.
Cost Effectiveness: Probably very cost-effective, but will require additional study to verify.
Funding Sources: FEMA grant programs, NRCS.
Timing: Overall project has already commenced; additional actions as above would depend on funding.

High Priority Action 5

Acquire and demolish floodprone property at 151 Taylor Street.

Project/Action Description.

This site is located on the north side of Taylor Street, near Webster. The building is one of the highest repetitive loss properties in the NFIP database (see Section 7, Risk Assessment). It was most recently flooded in April, 2007. This project is to purchase and demolish the building, 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.

Lead Office: Trenton Department of Economic Development or Inspections Department
Support: Unknown, probably high because the site is already under consideration as part of the City's project to return areas adjacent to the Assunpink to a natural floodplain environment.
Status: To be determined probably fairly high priority.
Cost: Acquisition: estimated $700,000; demolition: estimated $800,000; site remediation: estimated $600,000.
Cost Effectiveness: Probably very cost-effective, but will require additional study to verify.
Funding Sources: FEMA grant programs.
Timing: Unknown.

High Priority Action 6

Acquire and demolish floodprone property at 3 Amtico Square

Project/Action Description.

This 7.5-acre site is located on the west side of the Assunpink Creek. The building comprises 100,758 square feet and has 165 parking spaces. This project is to acquire the building and site, demolish the building and return to site to 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.

Lead Office: Trenton Department of Economic Development or Inspections Department
Support: Unknown, probably high because the site is already under consideration as part of the City's project to return areas adjacent to the Assunpink to a natural floodplain environment.
Status: To be determined, probably fairly high priority.
Cost: Acquisition: estimated $700,000; demolition: estimated $800,000; site remediation: estimated $600,000.
Cost Effectiveness: Probably very cost-effective, but will require additional study to verify.
Funding Sources: FEMA grant programs.
Timing: Unknown.

High Priority Action 7

Get the City of Trenton into FEMA's Community Rating System

Project/Action Description

This action is to perform all the necessary steps to get the City 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.

Lead Office: Trenton Department of Inspections
Support: Broad once it is widely understood that insurance rates may drop.
Status: Not yet determined; likely to be implemented.
Cost: Minimal; mostly staff time.
Cost Effectiveness: Not independently cost effective, but leads to far greater flood mitigation.
Funding Sources: To be determined, but probably City of Trenton.
Timing: Not yet determined.

Second Priority Actions

Second Priority Action 1

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

Project/Action Description

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 maximizing the potential for collaborative actions that might lead to mitigation grants or other assistance from State or Federal agencies.

Lead Office: Trenton Department of Inspections or Department of Economic Development.
Support: Broad.
Status: Already ongoing.
Cost: Some investment of staff time, otherwise negligible.
Cost Effectiveness: Not independently cost-effective, but an essential part of long-term protections.
Funding Sources: City budget to pay staff.
Timing: Already ongoing to some extent, to be continued indefinitely.

Second Priority Action 2

Selective acquisition and demolition of highly floodprone residential or commercial properties.

Project/Action Description

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. As discussed in the Risk Assessment section of this plan, 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.

Lead Office: Trenton Department of Inspections or Department of Economic Development
Support: Unknown; depends on specific property
Status: Unknown.
Cost: Depends on specific property; unknown until properties are identified.
Cost Effectiveness: If part of FEMA grant program, by law must be cost-effective.
Funding Sources: FEMA HMGP, PDM, FMA, SRL programs
Timing: Unknown; depends on availability of funds, identification of appropriate properties.

Second Priority Action 3

Localized Portable Flood Barriers

Project/Action Description

This project is to purchase and implement small portable flood barriers in specific floodprone areas, likely in the Island and Glen Afton neighborhoods, but possibly in other places as well. These devices could be used to block flood water from structures, or to channel water away from areas of low elevation to improve drainage. Prior to implementing such a project, it will be necessary to perform smalls-scale hydrologic study of the areas of potential deployment, to ensure that (1) the methodology is feasible and effective, and (2) that implementation will not cause flood water to be diverted inappropriately with the result of flooding other properties. It will also be necessary to identify issues related to deployment, and ensure that either the neighborhoods or the City have the means (and authority) to set up the barriers when flooding is likely to occur.

Lead Office: Department of Inspections, probably collaborating with the Fire and Public Works Departments.
Support: High in areas that would be protected.
Status: Indeterminate; depends on availability of funding and determination of cost effectiveness.
Cost: To be determined based on site specific conditions (e.g. how many linear feet would be required for devices to be effective at redirecting water and protecting individual homes).
Cost Effectiveness: Likely to be cost-effective, assuming that the measure is feasible, and that the most flood-prone sites are identified.
Funding Sources: City budget.
Timing: To be determined**.**

Second Priority Action 4

Detailed flood vulnerability study of the Trenton Water Filtration Plant.

Project/Action Description

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.

Lead Office: City of Trenton Department of Public Works.
Support: Very broad, very strong.
Status: Indeterminate; depends on availability of funding.
Cost: To be determined based on bids, but expected to be in the $100,000 to $150,000 range.
Cost Effectiveness: Not independently cost effective, but necessary precursor to mitigation project.
Funding Sources: Not yet identified, but possibly City of Trenton or EPA.
Timing: Not yet determined, but likely by 2009.

Second Priority Action 5

Flood protection at Trenton Water Filtration Plant.

Project/Action Description

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 the plan abuts. The specifics of such an effort will be known only after a detailed risk assessment and preliminary scoping exercise (see above). Nevertheless, the plant would clearly be at risk if water surface elevations on the Delaware reach extreme levels. As described in the risk assessment, the potential direct damages to the plant, and lost function would certainly be in the millions of dollars under certain circumstances.

Lead Office: City of Trenton Department of Public Works.
Support: Broad, assumed most of community will support the project because of need for the service.
Status: Indeterminate; depends on availability of funding and results of risk assessment.
Cost: To be determined based on design; likely more than $1 million.
Cost Effectiveness: Not independently cost effective, but necessary precursor to mitigation project.
Funding Sources: Not yet determined; City will seek outside sources.
Timing: To be determined after initial studies are completed and cost is better understood.

Second Priority Action 6

Wind vulnerability survey for essential public facilities.

Project/Action Description

Although wind risk to public facilities in Trenton appears to be relatively low, it would be fairly simple and inexpensive to survey these buildings in detail to determine if there are any obvious vulnerabilities that should be addressed

through mitigation actions, potentially funded through grants. For some critical facilities, potential losses from injuries, deaths and losses of function may far exceed direct damages to the structure or contents, but this will be better understood when a detailed study is completed. This project is to perform a basic

engineering survey to assess the wind vulnerabilities of essential public facilities in Trenton, such as City Hall, the water filtration plant, police and fire headquarters, etc.

Lead Office: Trenton Department of Inspections.
Support: Unknown, will depend on cost and complexity,
Status: Not yet determined, depends on administration priorities.
Cost: Depends on number of facilities and level of detail, but probably less than $200,000.
Cost Effectiveness: Not independently cost effective, but required in order to identify risks.
Funding Sources: To be determined, but probably City of Trenton.
Timing: Not yet determined.

Second Priority Action 7

Wind retrofits for essential public facilities.

Project/Action Description

This project is to undertake wind retrofits for essential public facilities in the City of Trenton. The locations and nature of the projects will be determined as part of the study of wind vulnerabilities. Potential projects could include loadpath improvements, hardening power feeds, improving window performance, shuttering, securing roof ballast, etc. There are often relatively inexpensive but very effective wind mitigation measures. This suggests a high level of cost-effectiveness, particularly for high-value or high-occupancy facilities such as EOCs, fire/police facilities, etc.

Lead Office: Depends on facility, City of Trenton.
Support: Unknown, will depend on cost and complexity.
Status: Not yet determined.
Cost: To be determined, but generally there are inexpensive wind mitigation alternatives.
Cost Effectiveness: Depends on vulnerability and cost, but wind retrofits are generally very cost effective.
Funding Sources: To be determined, but probably City of Trenton.
Timing: Not yet determined.

Second Priority Action 8

Selective tree pruning to limit damage from ice and wind storms.

Project/Action Description

In rare cases, winter storms may result in ice buildup on tree branches, leading to breakage, which in turn can lead to power lines being downed by the falling branches. This action is to survey key areas of the City to determine where such risks are likely, and to undertake selective pruning to reduce the potential for trees to break under ice loads.

Lead Office: Trenton Department of Inspections, local power provider.
Support: Probably widespread, but unknown.
Status: Not yet determined.
Cost: Depends on number of sites addressed.
Cost Effectiveness: Highly cost effective if specific site selections are appropriate.

Funding Sources: To be determined, but probably City of Trenton.
Timing: Not yet determined.

Second Priority Action 9

Daylighting the Assunpink from South Broad Street to Warren Street

Project/Action Description

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.

Lead Office: Trenton Department of Housing and Economic Development
Support: Unknown, will depend on cost and complexity
Status: To be determined; parts are already under consideration by the City
Cost: A study is likely to cost at least $100,000; project costs would depend on the specific action.
Cost Effectiveness: Study would not be independently cost effective; project would be cost effective.
Funding Sources: FEMA and other public agencies.
Timing: To be determined.

Second Priority Action 10

Determine Earthquake Risk to the City, Identify Mitigation Alternatives

Project/Action Description

This project is to calculate earthquake risk to Trenton. Although this area of the U.S. is not particularly seismic, there is the potential for a significant earthquake, and the region is home to numerous buildings and infrastructure assets that were not designed to withstand ground motion, in particular unreinforced masonry structures, which are quite common in the area. The project has four components. First, the City will encourage the New Jersey Geologic Survey to complete the HAZUS calculation, which will provide at least a basic idea of overall risks to the City from earthquakes. Second, the City will develop a list of critical facilities that may be at risk from earthquakes. The qualifying criteria may include both functional and physical aspects, including status as an essential government operation, structure type and use, and occupancy, among other parameters. The City will prioritize the list. Third, the City will undertake more detailed seismic risk studies of high-priority assets and operations, as a precursor to developing mitigation projects (see next action below). Fourth, the City will develop specific actions to mitigate earthquake risk.

Lead Office: Trenton Department of Inspections, with assistance from NJGS

Support: Unknown, will depend on cost and complexity. Likely relatively low until risk is better understood.
Status: To be determined. Action will require a campaign to develop support based on preliminary information.
Cost: NJGS will fund the HAZUS study; costs will depend mainly on staff time required, plus any data collection efforts. Staff time related to developing and prioritizing the list of critical facilities will mostly consist of staff time, and is expected to be relatively inexpensive. Vulnerability and risk studies for individual facilities can range from thousands to tens of thousands of dollars, depending on the size and complexity of the facility, and the need to gather additional information. Developing mitigation actions, even at a relatively cursory level, is likely to be fairly expensive, because of the need for qualified structural engineers to be involved in many cases.
Cost Effectiveness: Study would not be independently cost effective, but the studies are essential antecedents to any mitigation actions.
Funding Sources: Probably FEMA and other public agencies.
Timing: To be determined.

Second Priority Action 11

Implement Specific Earthquake Mitigation Actions

Project/Action Description

The earthquake vulnerability and risk studies described in Action 10 above will identify measures that will reduce earthquake risk to the City. Such measures could range widely, from developing literature and public information, to structural alternatives to reduce vulnerabilities to specific high-priority facilities.

Lead Office: Trenton Department of Inspections; other City departments and operations.
Support: Unknown, will depend on cost and complexity
Status: To be determined.
Cost: Wide range, depending on measure.
Cost Effectiveness: Depends on measure. Public information campaigns are not independently cost effective, whereas some specific engineering solutions may be very cost effective.
Funding Sources: FEMA and other public agencies.
Timing: To be determined.

8.6 Implementation and Evaluation of Mitigation Actions

The specific department or organization that implements the mitigation actions described here will be determined on a case-by-case basis, and will likely be directed by City administration. The actions noted in the sections above provide a general indication of the City's priorities, although the specific order can change depending on the priorities of the administration and the availability of funding.

In selecting and implementing the actions described here, the City will take into account numerous factors, including feasibility, the views of the citizens of Trenton (including civic associations), technical merit, and cost effectiveness. Cost effectiveness will be a particular area of emphasis in many cases, because many of the most significant actions may in part be funded by the Federal Emergency Management Agency, which has a regulatory requirement that all mitigation projects must exceed a 1.0 benefit-cost ratio. As a part of any grant application the City will ensure that this requirement is met through a technically accurate and fully documented benefit-cost analysis.

As part of its normal Plan monitoring, maintenance and update processes (described in detail in Section 9), the City of Trenton will review mitigation actions it has taken, to determine their success and to identify any additional actions that may be required. The City will make a particular effort to evaluate actions and projects with respect to their performance during hazard events, to determine their mitigation effectiveness.

Section 9
Plan Monitoring, Evaluation and Maintenance

Contents of this Section

9.1 IFR Requirement for Plan Monitoring, Evaluation and Maintenance

Requirement §201.6(c)(4)(i): *[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Requirement §201.6(c)(4)(ii): *[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Requirement §201.6(c)(4)(iii): *[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.*

9.2 Method for Monitoring and Evaluating the Plan

This Plan will be monitored and evaluated by the City of Trenton for several related purposes:

- Maintain the currency of hazard and risk information.
- Ensure that mitigation projects and actions reflect the priorities of the City and its constituents.
- To comply with FEMA requirements, and maintain the City's eligibility for federal disaster assistance and mitigation grants.

The Mayor of the City of Trenton or his or her designee is responsible for monitoring and maintaining this Plan. The City will continuously monitor the Plan with respect to the purposes noted above, and with respect to the update triggers noted in Section 9.5 below.

9.3 Schedule for Monitoring and Evaluating the Plan

Informal Plan monitoring and evaluation activities will be ongoing. In addition to the annual review and update, the Mayor or his/her designee will perform an informal review/evaluation of the Plan approximately every year, or more often as circumstances require. In addition to this, the Mayor or designee will convene meetings after natural hazard events that cause damage, in order to review the effects of such events. Based on those effects, adjustments to the mitigation priorities listed in Section 8 may be made or additional event-specific actions identified. The City will use FEMA guidance (in particular the crosswalk document) in performing its plan evaluations.

9.4 Method and Schedule for Updating the Plan

The City will undertake a comprehensive review and revision of this Plan on a five-year cycle, as required by FEMA regulations. This Plan will initially be adopted in 2007, and thus must undergo a formal FEMA-compliant update process by 2012.

Approximately six months before the five year anniversary of the Plan being adopted, the Mayor or his designee will initiate a comprehensive review of the document. The responsible party or department will prepare a report (1) describing the update requirements; (2) summarizing the staff analysis of the Plan, highlighting areas that require modification and explaining the reasons why the modification is needed, and; (3) providing detailed recommendations about how the Plan should be updated, noting any technical work that may be required. The report will be provided to the Mitigation Planning Committee and City Council for consideration. The Stakeholders group will be provided a copy of the report for review and comment.

The City Council and HMC will review the report and make recommendations to the Mayor on how to proceed with the update process. The Mayor will designate an individual or City department to carry out the recommendations and any technical work, and will prepare draft updates to the Plan on a schedule determined by the HMC, City Council and/or the Mayor.

When the draft updates are completed, the HMC will be convened to conduct the comprehensive evaluation and revision. The Committee (with input from the Stakeholders group) will produce a final draft of the updated Plan for consideration by the Mayor and City Council. The Council and Mayor will review the updated Plan, initiate changes, approve and adopt the Plan in sufficient time to meet FEMA requirements.

9.5 Circumstances that will Initiate Plan Review and Updates

This section identifies the circumstances or conditions under which the City will initiate Plan reviews and updates.

1. On the recommendation of the Mayor or the Director of the Department of Inspections, or on its own initiative, the City Council may initiate a Plan review at any time.

2. At approximately the one-year anniversary of the initial Plan adoption, and every year thereafter.

3. After natural hazard events that appear to significantly change the apparent risk to Trenton assets, operations and/or constituents.

4. When activities of the City or surrounding jurisdictions or the State significantly alter the potential effects of natural hazards on Trenton's assets, operations and/or constituents. For example, when the organization itself or one of the other local jurisdictions completes a mitigation project that significantly reduces risk to Trenton, or, conversely, takes action that increases risks to the City.

5. When new mitigation opportunities or sources of funding are identified.

9.6 Other Local Planning Mechanisms

The City of Trenton has several existing mechanisms that offer opportunities to incorporate elements of this mitigation plan. The first of these is the capital budgeting process. After this plan is adopted, the City will seek opportunities to fund appropriate mitigation actions, mainly through provision of the local match requirement for FEMA funding. This may take the form of "in-kind" or cash, but in either scenario, the City capital budget will reflect that resources have been designated to support hazard mitigation activities. The second mechanism is the City's zoning ordinance, which is presently being updated to incorporate elements of sustainable design, as well as measures to minimize runoff in the City. The City also continues to actively enforce subdivision and floodplain management regulations through its Building and Inspections Departments.

The City's Department of Housing and Development will also refer to this document when applying for funds from the New Jersey Department of Transportation or the New Jersey Department of Environmental Protection. Both agencies have historically funded City redevelopment projects which have included measures to improve storm water management, stream restoration and property acquisition in flood prone areas. We anticipate that having an approved Hazard Mitigation plan will enhance the likelihood of the City securing additional monies from these agencies to perform some of the mitigation measures outlined in the report.

9.7 Continued Public Involvement

As noted above, this Plan will be evaluated and updated on an approximately annual basis, and when certain triggering events occur. Regardless of the reason for the evaluation and update, the City will observe its mandated public notification processes by publishing a notice in the local newspaper at least two weeks in advance of all public meetings in which the Plan or elements of the Plan are to be discussed. Additionally, when Plan updates or other revisions are being contemplated, the City will provide paper and electronic copies of these revisions for public review at least two weeks prior to any hearings or meetings at which the Plan or revisions will be discussed. Paper copies will be provided at City Hall, and electronic copies will be made available through the City web site or via requests to the staff person who is designated point of contact. City staff will be available to discuss the plan with the public or interested groups.

Section 10
Capabilities Assessment

Contents of this Section

10.1 Overview of Capabilities Assessment

Although not required by DMA 2000 or the Interim Final Rule, a capability assessment adds context to a mitigation plan by providing an inventory of a jurisdiction's programs and policies, and an analysis of its capacity to carry them out. The capability assessment is a review of the City's resources in order to identify, review, and analyze what the City is currently doing to reduce losses and identify the framework that is in place or should be in place for the implementation of new mitigation activities. A helpful component is to understand the coordination efforts with Mercer County, of which Trenton is one of the municipalities, and with the New Jersey State Office of Emergency Management (NJOEM).

New Jersey is comprised of 21 counties and 566 municipalities and follows a "Home Rule" philosophy. That philosophy dictates that each municipality must choose who is responsible for their local emergency management duties and that person is responsible for coordinating emergency response with the county, state and federal officials.

State Emergency Management Plans

As stated in the New Jersey State Mitigation Plan, "Emergency management in New Jersey is under the direct control of the Governor. The State Constitution gives the Governor specific emergency powers. The Governor can direct the National Guard to provide support to localities, and can direct the State Director of Emergency Management to implement a State Emergency Operations Plan and direct the activation of county and municipal emergency operations plans as necessary" (New Jersey State Hazard Mitigation Plan, p. 83). The New Jersey Office of Emergency Management is the lead agency to implement the state emergency operations plan.

The NJ Office of Emergency Management (NJOEM) is a division within the New Jersey Department of Law and Public Safety. The NJOEM responds to resource requests of the counties when they are overwhelmed and in need of assistance whether it is a statewide disaster or one of a more local (county) level (New Jersey State Hazard Mitigation Plan, p. 89). The NJOEM has a Regional Emergency Management Coordinator who is the primary liaison for the counties. Mercer County is located within the Central Region for coordination purposes.

County Emergency Management Plans

Each county has a county emergency management coordinator and the NJOEM Regional Coordinator works closely with them. For Mercer County (which includes Trenton) the Coordinator is:

Dean Raymond
350 Lawrenceville Station Road
Lawrenceville, NJ 08646
609-799-8868
Deputy Coordinator: William Duffy

The County Coordinator provides support in any disaster that exceeds the capabilities of the municipality to properly respond. The County Office of Emergency Management (OEM) is often activated whenever there are weather emergencies or hazardous materials events. OEM coordinates the activities of the thirteen municipalities within Mercer County, and requests NJOEM assistance if needed (Source: Mercer County website).

City Emergency Management Plan

The City of Trenton Office of Emergency Management works closely with the State of New Jersey and Mercer County in the event of a natural or manmade disaster. The City of Trenton Emergency Management plans were updated and certified by the State Office of Emergency Management through October 2007. New Jersey State Law requires each municipality update its emergency operations plan every four years. Trenton is currently updating this plan in preparation for re-certification in the Fall 2007. The Trenton OEM Coordinator is Dennis M. Keenan and the Deputy Coordinator is Richard J. Laird.

State Municipal Land Use Statute and Its Incorporation into Local Laws

In addition to emergency planning, the State of New Jersey helps to mitigate damages from future disaster by updating and enforcing laws, regulations and ordinances to help protect life and property. New Jersey mandates compliance with the Municipal Land Use Law, which requires all jurisdictions to have current land use master plans (reexamined every six years), zoning, floodplain management, and other land development ordinances. For example, municipalities that are members of the National Flood Insurance Program have the required aspects of the NFIP codified within their zoning, floodplain and land development ordinances. Trenton is currently operating under the City's Land Use Plan that was written in 1999. Under State law, each municipality is required to update or reexamine its Master Plan every six years. In 2005, the City of Trenton prepared The *2005 Re-examination Report* which describes the major problems and objectives relating to land development in Trenton and the extent to which such problems and objectives have been reduced or have increased since the 1999 Land Use Plan was produced. Trenton had its Master Plan re-certified in 2006.

State Building Codes Enforcement

The State of New Jersey adopted a Uniform Construction Code and Enforcement (UCC), which each municipality is required to adopt within its local ordinances. The State UCC master plan and zoning ordinance provisions address construction in flood zones and apply to new construction and any construction in which 50% or more of the structure is rebuilt or remodeled.

The City of Trenton has adopted local ordinances to regulate and enforce these State statues on the local level and to help mitigate future damage to life and property. The next section reviews the City 's ordinances that impact hazard mitigation for the City.

10 Review and Incorporation of Existing Plans, Studies, Reports and Technical Information

The Trenton planning team obtained and reviewed a range of other plans, studies and technical information as part of the process of developing the City's hazard mitigation plan. Not surprisingly, most of the technical studies and plans related to natural hazards are related to floods. There are also various planning and regulatory documents common to most cities that were also reviewed as part of the planning process, and incorporated where applicable. Table 10-1 provides a brief summary of plans and other documents that were reviewed as part of this process, and

Table 10-1
Summary of Plans, Studies, Reports and Technical Information
Considered in the Planning Process

Report or Study Name	Date	Description and how used in Trenton's HMP
FEMA Project Impact baseline report	Circa 1994	Included lists of critical facilities and hazard rankings Hazard rankings. Used as a starting point to identify hazards in the current plan, provided general idea of nature of facilities in and around Trenton.
Delaware River Basin Commission Resolution 2006-19.	September 2006	Background information only.
FEMA Project Impact, Project Recommendations report	Undated	Basic information about projects the City was considering as part of the FEMA Project Impact Initiative. Provided ideas about mitigation projects for hazards other than floods, such as ice and snow storms, excessive heat, etc.
City of Trenton Land Use Plan	1999	Background and review for issues related to land use controls in hazard areas.
City of Trenton's Periodic Review of the City's Land Use Plan and Regulations.	2005	Background; updated information on land use planning in the City. Incorporated new information about the Assunpink Creek brownfields redevelopment project. In the future, this period review may offer a good mechanism to introduce more mitigation principles and activities into the City's land use decisions.
New Jersey State Hazard Mitigation Plan	2005	Review and background. To the extent possible the Trenton HMP tries to incorporate some of the principles and goals that the State HMP established. The State HMP is currently undergoing a comprehensive update. When the Trenton Plan is updated, the City will again refer to the State plan.
Delaware River Basin Commission Comprehensive Plan.	July 2001	The New Jersey section of this Plan was reviewed for background information, but offered only very limited information for use in the Trenton HMP.
Delaware River Basin Commission, Flood Mitigation Task Force; Preliminary Action Plan (public review draft)	January 2007	Provided background
New Jersey Flood Mitigation Task Force; Report on Delaware River Flood Mitigation	August 2006	This document offers very current information about the state of various programs, regulations, etc. relative to the river watershed. While the report is generally at the level of the State and Counties rather than local jurisdictions, it was reviewed in detail to get a sense of

Report or Study Name	Date	Description and how used in Trenton's HMP
		where the Task Force wishes to focus efforts and resources.
FEMA Flood Insurance Study, City of Trenton, New Jersey: Mercer County. April 15, 1981.	1981	Background data about flood hazards in the area. Flood profiles for various reaches of the Delaware River and Assunpink Creek.
City of Trenton FIRM		Flood boundaries.
USACE Delaware River Basin Study; Survey Report	1984	Mostly background information; details about flood characteristics in the watershed.
Final EIS, Mercer and Monmouth Counties, New Jersey. USDA, Soil Conservation Service.	1974	Background information only.
City of Trenton Zoning Map	1989	General review.
City of Trenton Comprehensive Economic Development Strategy	2004	General review.
Geology of the Ground Water Resources of Mercer County. New Jersey Geologic Survey, Department of Conservation and Economic Development.	1965	Background information only.
City of Trenton Sustainable Design Guidelines	2005	General review. In the future this document may offer a good vehicle for introducing mitigation into the City's building codes and guidelines.
Delaware and Raritan Canal State Park Development Guide. Delaware and Raritan Canal Commission, August, 1985.	1985	Background information only.
Floods of July, 1975, Assunpink Creek Watershed, Mercer and Monmouth Counties, New Jersey. USDA.	1975	Background information only
Flood Control Data Analysis 26, Comprehensive Planning Program. Mercer County Planning Board, Mercer County, New Jersey, Department of Planning and Economic Development; Thomas Tyler Moore Associates, Inc ., September, 1973.	1973	Background information only.
Geology of Mercer County in Brief, New Jersey Geological Survey.	1977	Background information for earthquake hazard.
Flood Hazard Analyses, Assunpink Creek Watershed, Mercer and Monmouth Counties, New Jersey. USDA/SCS.	1977	Background and technical information about flooding on the Assunpink.
Assunpink Creek Watershed Work Plan, Mercer and Monmouth Counties, New Jersey. State of New Jersey and US Department of Agriculture, Soil Conservation Service, 1964 to 1973 (various individual reports).	1964-1973	Background information only.
Flood Control Data Analysis 26, Comprehensive Planning Program. Mercer County Planning Board, Mercer County, New Jersey,	1973	Background information only.

10.2 Local Ordinances and Enforcement

This section of the capabilities assessment describes how the City of Trenton regulates and enforces regulations in its efforts to mitigate damage from potential hazards. The City of Trenton regulates by the use of ordinances, which are local laws found in the City's Code. While there are over 100 ordinances adopted by the City Council, there are three that focus on mitigating potential hazards – floodplain management; building construction; and zoning and land development.

Floodplain Management in Trenton

Trenton regulates the flood hazard areas of the City to help prevent loss of life, property damage, damage to transportation and utility systems or unwise development in unprotected floodplains. The City uses the Composite Flood Map and the Flood Insurance Study developed by FEMA to illustrate the flood hazard areas in the City. The following requirements have been imposed on the area defined as the flood hazard area (FHA), the SFHA, floodplains and floodways:

- The City requires a permit for any proposed construction or other development (e.g. placing of a mobile home) in a special flood hazard area (SHFA);
- Encroachment in floodways, including fill, new construction, substantial improvements and other developments shall be prohibited unless there is a technical evaluation that determines that such encroachment will not result in any increase in flood levels;
- All new construction and substantial improvements shall comply with all applicable flood hazard reduction provision of the Federal Insurance Program (NFIP);
- Placement of a mobile home in a floodway is prohibited;
- Base flood elevation data must be provided for subdivision proposals and other proposed development which contain at least 50 lots or five acres;
- If a proposed building site is in a flood-prone area, all new construction and substantial improvements must be designed or modified and anchored to prevent movement of the structure;
- All subdivision proposal or new development must be reviewed by the Inspections Department to determine whether the proposal is safe from flooding;
- New and replacement water supply systems in a flood hazard area (FHA) must be designed to minimize or eliminate infiltration of floodwaters into the systems;
- New and replacement sewer supply systems in a FHA must be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges and onsite waste disposal systems must be located to avoid contamination during flooding;
- There must be an evacuation plan for mobile home parks with a Zone A;
- New or substantially improved construction within a FHA or federal insurance rate map (FIRM) must be elevated at or above base flood level;
- If flood proofing is used a professional engineer or architect must certify that the methods are adequate and must be filed with the Building Inspector;
- All mobile homes in Zone A of the City's flood hazard boundary maps (FHBM) shall be anchored and with specific anchoring requirements;
- No new construction or substantial improvement is allowed within the FHA or FIRM unless applicant can demonstrate that the cumulative effect of the proposed development when combined

with all or other existing and anticipated development will not increase the water surface elevation of the base flood more than 0.2 foot at any point in the City;

- Applicant must apply to the Building Inspector for approval of development plans. The Building Inspector must send the application to the State Division of Water Resources and Supply for report and recommendation. No action can be taken until the report is received. The Building Inspector must send the application to Zoning and Land Development or Planning depending on the application. No permit can be issued without review and concurrence; and
- Fines or other penalties may be assessed for noncompliance.

Enforcement of Trenton's floodplain ordinance is under the Inspections Department and The Project Application Review Committee (PARC). Failure to comply with these regulations may result in any or all of the following: a fine up to $2,000; imprisonment in the county jail for up to 90 days; or community service up to 90 days. There are additional fines for repeat offenders and each day in which a violation occurs is considered a separate violation.

Building Construction Ordinance

The City of Trenton adopted the Uniform Construction Code (UCC) to regulate structures within Trenton. A permit is required to construct or alter a structure, construct an addition, demolish or move a structure, make a change of occupancy, install or alter any equipment regulated by the building code, or move a lot line which affects an existing structure. Non-compliance is subject to monetary fines, community service or imprisonment.

The City of Trenton's Inspections Department has two divisions – Housing and Technical Services. The Technical Services Division is responsible for enforcement of the Uniform Construction Code of the State of New Jersey and the Uniform Fire Code of the State of New Jersey, which governs all construction, alteration, repair or demolition of property. Permits for all building, plumbing, electrical and fire protection work are issued from this office. The Division reviews all plans for new construction or alterations to existing structures.

Zoning and Land Development Ordinance

The zoning and land ordinance sets forth the regulations and conditions necessary prior to building or altering structures or land development in Trenton. The Zoning Officer administers and enforces the ordinance. The City Zoning Officer inspects the structures and land in the City and orders the owner, in writing, to remedy any condition found to exist in violation of any provision /or any site plan approved by the Planning Board or the Zoning Board of Adjustment .

The Zoning Officer shall notify the owner of any structure or land found to exist in violation of any provision of this ordinance and/or any approved site plan of such violation(s), in writing by certified mail. Such notice shall specify that the owner will have 15 days thereafter to respond to the Zoning Officer as to such violation(s) and the remedies to be taken. A copy of the notice and response shall be immediately filed in the Office of Inspections. In addition to the Zoning Officer, the City has a Planning Board and a Project Application Review Committee (PARC) to review zoning and land issues.

The (PARC) was created by the City of Trenton to assist individuals interested in developing property in Trenton. The committee is made up of staff members from the following City departments: Inspections-building, fire, plumbing, electrical, and zoning; Public Works-water and sewer utilities; Housing and Economic Development-planning; and Health and Human Services-health. The committee meets on a biweekly basis to review and provide comments on proposed projects in the City of Trenton that are in the conceptual or schematic stages of development.

The purpose of PARC is to help those who are interested in developing property in the evaluation of their project and to advise them of the requirements and approvals needed in the areas of zoning, planning, utilities, health and inspections. At the PARC meeting, applicants have the opportunity to describe, in as much detail as possible, their proposed plans for the property. The various City review agencies will then have an opportunity to give applicants an evaluation of how the project will be impacted by City codes and ordinances and advise applicants on how to comply with these requirements.

The objective of the PARC meeting is to provide applicants with a review of their proposed development in order that they may be able to determine if their project, as proposed, is feasible. Applicants will also be apprised if formal submittals of plans will be required and to which appropriate City boards or other offices they should be submitted.

Table 1 describes the local ordinances in Trenton which affect or promote hazard mitigation which affect or promote disaster mitigation, preparedness, response or recovery in Trenton. It also provides how the City enforces these ordinances. The second part of Table 10-1 provides other relevant ordinances and enforcement practices and provides a list of key plans that impact the City's mitigation efforts and the certification or re-certification date.

Table 10-2
City of Trenton Local Ordinances That Promote or Affect Hazard Mitigation

CITY OF TRENTON ORDINANCES		
Ordinance	**Description**	**Enforcement**
Flood Control Ordinance(§ 109:1-26)	The City of Trenton flood losses are caused by he cumulative effect of obstructions in areas of special flood hazards which increases flood heights and velocities, and when inadequately anchored, damage uses in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss. Therefore, the most appropriate method of alleviating such conditions is through regulation of such developments and encroachments. It is, therefore, determined that the special and paramount public interest in the floodplain justifies the regulation of property located therein, as provided in this §, which is in the exercise of police power of the City for the protection of the persons and property of its inhabitants and for the preservation of public health safety and general welfare.	The City of Trenton has a Floodplain Manager in the Inspections Department. There are three processes necessary before any construction is allowed to begin. The applicant can request a review by the PARC which helps to determine the feasibility of the request. If feasible, the applicant must file with the Planning Board to review what can be built and where. If the planning Board approves the plan, the Architectural review must be completed by the Inspections Department. When all is completed, then a permit may be issued for construction. If there is any noncompliance during the building phase, the Inspections Department, Technical Services Division has the authority to enforce the ordinance with a fine, community services or possible imprisonment.

CITY OF TRENTON ORDINANCES

Ordinance	Description	Enforcement
Building Construction (§ 41: 1-12	The City of Trenton adopted the Uniform Construction Code and established an agency and Administrator to enforce the code.	The City of Trenton has an Inspections Department that enforces the building code and issues fines, community service or possible imprisonment for non-compliance.
Zoning and Land Development (§315:1-211)	The City of Trenton adopted a zoning and land development ordinance that regulates and limits the uses of land and the uses and locations of buildings and structures; regulates and restricts the height and bulk of buildings and structures and determines the area of yards and other open spaces; regulates and restricts the density of population; divides the City of Trenton into districts for such purposes; adopts a map of the City showing boundaries and the classification of such districts; establishes rules, regulations and standards governing the subdivision and development of land within the City; establishes a Planning Board and a Zoning Board of Adjustment; and prescribes penalties for the violation of its provisions.	The City of Trenton has a Zoning Officer who enforces the zoning and land development ordinances and issues fines, community service or possible imprisonment for non-compliance.
OTHER CITY OF TRENTON ORDINANCES		
Fire Prevention § 97	The Uniform Fire Safety Act authorizes municipalities to provide for local enforcement of these standards and to establish local enforcement agencies for that purpose; and whereas, it is in the best interest of the City of Trenton to have the Uniform Fire Code enforced locally; and whereas, the local fire service has agreed to the plan, which is set forth herein, for the administration and enforcement of the Uniform Fire Code.	The Inspections and Fire Departments enforce this ordinance and issues fines, community service or possible imprisonment for non- compliance.
§ 132: Housing Standards	There is hereby adopted for the City of Trenton a Housing Code to establish minimum standards governing supplied utilities and facilities and other physical things and conditions essential to make dwellings safe, sanitary and fit for human habitation; to establish minimum standards governing the condition and maintenance of dwellings and dwelling units; to fix certain responsibilities and duties of owners and occupants of dwellings; and to provide for administration, enforcement and penalties for violations.	The Inspections Department enforces this ordinance and issues fines, community service or possible imprisonment for non-compliance.
§ 56: Commercial Structures	The purpose of this ordinance is to protect public health, safely, morals and welfare by establishing minimum standards governing the maintenance, appearance, condition and occupancy of nonresidential premises; establish minimum standards governing utilities, facilities and other physical components and conditions essential to make the aforesaid facilities fit for human habitation, occupancy and use; fix certain responsibilities and duties upon owners and operators, and distinct and separate responsibilities and duties upon occupants; authorize and establish procedures for the inspection of premises; and provide for the repair, demolition or vacation of premises unfit for human habitation or occupancy or use.	The Inspections Department enforces this ordinance and issues fines, community service or possible imprisonment for non-compliance.
§ 254: Stormwater Management	It is the purpose of this ordinance to establish minimum stormwater management requirements and controls for "major development. This ordinance shall be applicable to all site plans and subdivisions for the following major developments that require preliminary or final site plan or subdivision review.	The Planning Department enforces this ordinance and issues fines, community service or possible imprisonment for non-compliance.
§ 309: Water and Sewers	The provisions of this ordinance and all other rules and regulations relating to the water supply system of the City of Trenton shall be enforced by the Division of Water and Sewer of the Department of Public Works. The officers, agents and employees of the Division of Water and Sewer shall	The Department of Public Works enforces this ordinance and issues fines, community service or possible imprisonment for non-compliance.

CITY OF TRENTON ORDINANCES		
Ordinance	**Description**	**Enforcement**
	have free access at all reasonable times, and in the event of an emergency at any time, to any premises for the purpose of examining the water service. They shall have the power to reject all pipes and fixtures considered unsuitable for that purpose.	
§ 38: Brush, Grass, and Weeds	The owner or tenant of lands lying within the City of Trenton shall be required to keep all brush, hedges and other plant life growing within 10 feet of any roadway and within 25 feet of the intersection of two roadways cut to a height of not more than 2 1/2 feet, as deemed necessary and expedient for the preservation of public safety after a determination by the Director of the Division of Inspections or the Police Director, or any subordinates acting under their direction.	The Inspections Department enforces this ordinance and issues fines, community service or possible imprisonment for non-compliance.
Master Plan	The City of Trenton's Master Plan was adopted in 1998 and was recertified in 2006.	Housing and Economic Development Department
Emergency Operations Plan	The City of Trenton is required by State Statute to update its Emergency Operations Plan every four years. The Current plan used is the 2003 Updated Plan. The City is in the process of updating its plan by the Fall, 2007.	Office of Emergency Management , Fire Department
Economic Development Plan	The City has and Comprehensive Economic Development Strategy (CEDS) that is updated annually.	Housing and Economic Development Department

10.4 Local Administrative and Technical Capacity

This section provides a review of the administrative and technical resources within the City's Departments to determine if all of the necessary resources are available to Trenton to engage in mitigation planning processes. Table 2 indicates the potential resources needed and if Trenton has an employee on staff with that expertise or if the City uses outside contractors to help in the needed area.

Table 10-3
Trenton Administrative and Technical Capacity

Staff/Personnel Resources	On Staff	Department/Agency
Planner(s) or engineer with knowledge of land development and Land management practices	Yes	Planning Division of Housing and Economic Development Department
Engineer(s) or professional(s) trained in construction practice related to buildings and/or infrastructure	Yes	Inspections Department
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	No	When need, the City obtains specialists by contract.
Floodplain Manager	Yes	Inspections Department
Surveyors	Yes	Public Works Department, Streets Division
Staff with education or expertise to assess the community's vulnerability to hazards	Yes	OEM, Fire Department
Personnel skilled in GIS and/or HAZUS	Yes	Planning Division and OEM
Scientists familiar with the hazards of the community	No	When needed, the City obtains specialists. For example, there was an underground water issue on Pennington Avenue that required as assessment of groundwater conditions and a hydrologist was contract to perform various surveys and studies on behalf of the City.
Emergency Manager	Yes	OEM, Fire Department

10.5 Fiscal Capability

This section, as illustrated in Table 3, provides a list of local funding sources within the City and determines if that funding source can be used to affect or promote mitigation within Trenton. Understanding where potential funding sources are available to the City is a helpful component to mitigation activities.

Table 10-4
Trenton Fiscal Capability Chart

Financial Resources	Accessible or Eligible to Use
General Fund	Yes
Development Fees	No
Community Development Block Grant (CDBG)	Yes
Capital Improvements Project Funding	Yes
Authority to Levy taxes for Specific Purposes	No
Fees for Water, Sewer, Gas or Electric Service	Yes
Green Acres Fund	Yes
Impact Fees for Homebuyers or Developers for New Developments/Homes	No
Federal Hazard Mitigation Grant Program	Yes, once the plan is approved by FEMA and adopted by the City the City will be eligible for HMGP grants.

10.5 Current and Completed Hazard Mitigation Programs and Projects

This section provides a review of the completed hazard mitigation projects or programs and provides a description of the potential or in process projects or programs and the agency or agencies that the City worked with or is working with to complete the projects.

Table 10-5
Trenton Current and Completed Hazard Mitigation Programs and Projects

Current and Completed Hazard Mitigation Programs and Projects		
Program or Project	**Description**	**Agency**
Voluntary Buyout Program for Mulberry Street	The City of Trenton received funding from FEMA through NJOEM under the Hazard Mitigation Grant Program (HMGP) for the purpose of acquiring properties in the SFHA. The City purchased 34 homes which totaled $1.2 million (	FEMA and NJOEM
NJ DOT Backflow Prevention Device	In April 2007, NJ DOT installed a new backflow prevention system which should provide significant flood protection on the area referred to as the “Island” and in Glen Afton unless the river actually overflows its banks	NJ DOT
Trenton Connect-CTY	A free, voluntary and confidential notification system that Trenton uses in the event of an emergency or important communication is needed	NJOEM, Fire Department

10.5 Federal Laws and Regulations

This section describes federal laws and regulations that provide the guidance and requirements necessary for the City to follow in order to be in compliance with federal law and to receive federal support in the planning stages of mitigation as well as during and after a disaster occurs in the City.

Table 10-6
Federal Laws that Impact Hazard Mitigation

Laws and Regulations	Description	Comments
Federal Laws and Regulations		
Bunning-Bereuter-Blumenaurer Flood Insurance Reform Act of 2004	The Flood Insurance Reform Act of 2004 amended the 1994 National Flood Insurance Reform Act of 1968 to reduce losses to properties for which repetitive flood insurance claim payments have been made. The Act established the pilot program for mitigation of severe repetitive loss properties. It gave FEMA the authority to fund mitigation activities for individual repetitive loss claims properties. The Act provides additional coverage for compliance with land use and control measures	The City of Trenton entered into the NFIP program on December 23, 1971. The initial FIRM for the City is July 1, 1974 and the most current FIRM was done in February 2000.
Disaster Mitigation Act of 2000	The Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) provides an opportunity for states, Tribes and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Act) by repealing the previous mitigation planning provisions (Section 409) and replacing them with a new set of mitigation plan requirements (Section 322). This new section emphasizes the need for state, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. The requirement for a State mitigation plan is continued as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the State level through the establishment of requirements for two different levels of state plans: "Standard" and "Enhanced." States that demonstrate an increased commitment to comprehensive mitigation planning and implementation through the development of an approved Enhanced State Plan can increase the amount of funding available through the Hazard Mitigation Grant Program (HMGP). DMA 2000 also established a new requirement for local mitigation plans and authorized up to 7% of HMGP funds available to a state to be used for development of state, Tribal, and local mitigation plans.	In order to be eligible for FEMA funded HMGP, PDM, and FMA grants to support mitigation efforts, the State of NJ must have an approved Hazard Mitigation Plan that has been adopted by the State. Once the State has completed those efforts (April, 2005), the City of Trenton must have an approved Hazard Mitigation Plan that has been adopted by the City Council. The City is working on their HMGP to adopt in 2007. The City has solicited support and input with various stakeholders.
National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101)	This act resulted in major changes to the National Flood Insurance Program (NFIP). The law amended the Flood Disaster Protection Act of 1973. It provides tools to make the NFIP more effective in achieving its goals of reducing the risk of flood damage to properties and reducing Federal expenditures for uninsured properties that are damaged by floods.	The City has incorporated NFIP guidelines in its Flood Control, Building, and Zoning Ordinances.
Robert T. Stafford	The Act provides an orderly and continuing means of assistance by the	This Law impacts how the

Laws and Regulations	Description	Comments
Federal Laws and Regulations		
Bunning-Bereuter-Blumenaurer Flood Insurance Reform Act of 2004	The Flood Insurance Reform Act of 2004 amended the 1994 National Flood Insurance Reform Act of 1968 to reduce losses to properties for which repetitive flood insurance claim payments have been made. The Act established the pilot program for mitigation of severe repetitive loss properties. It gave FEMA the authority to fund mitigation activities for individual repetitive loss claims properties. The Act provides additional coverage for compliance with land use and control measures	The City of Trenton entered into the NFIP program on December 23, 1971. The initial FIRM for the City is July 1, 1974 and the most current FIRM was done in February 2000.
Disaster Relief and Emergency Assistance Act	Federal Government to State and local governments in carrying out their responsibilities to alleviate the suffering and damage which result from such disasters by-- 1. revising and broadening the scope of existing disaster relief programs; 2. encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by the States and by local governments; 3. achieving greater coordination and responsiveness of disaster preparedness and relief programs; 4. encouraging individuals, States, and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance; 5. encouraging hazard mitigation measures to reduce losses from disasters, including development of land use and construction regulations; and 6. providing Federal assistance programs for both public and private losses sustained in disasters.	Federal Government helps state and local communities before, during and after a disaster.
Federal Civil Defense Act of 1950	Establishes the Federal framework for providing fiscal assistance to the state's emergency management activities.	This Act sets forth the funding support the Federal Government provides to the State Governments.
PL-99-400 Superfund Reauthorization Act	Requires chemical handling facilities to prepare annual chemical inventories and maintain emergency response plans. It also requires an emergency planning structure be instituted for the state and local emergency planning committees.	The City uses these guidelines and State Guidelines with its Hazardous Materials plan.
Federal Property Administration Services Act	Establishes the procedures for the transfer of excess and surplus federal property to the States	In the event there is Federal land within the City limits, the Act provides guidelines in the event the Federal Government is not using the land.

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10.6 State Laws and Regulations

Table 10.6 describes state laws and regulations that provide guidance and requirements necessary for the City to follow in order to be compliant with state statutes and regulations and to receive support in the planning stages of mitigation as well as during and after a disaster occurs in the City.

Table 10-7
State Laws and Regulations that Impact Hazard Mitigation

Laws and Regulations	Description	Integration Efforts with Trenton
	State Laws and Regulations	
Freshwater Wetland Protection Act (N.J.S.A. 13 B:1)	NJ enacted this law to support development and enhancement of state, local, and tribal wetland protection programs. Projects must clearly demonstrate a direct link to increasing a state's ability to protect wetland resources. Grants are federally funded and administered by the NJ DEP.	The City works closely with the NJ DEP to ensure compliance.
Flood Hazard Area Control Act (N.J.S.A. 58:16A-52)	NJ enacted this law in the interest of the safety, health, and general welfare of the people of the State that legislative action be taken to empower the Department of environmental Protection to delineate and mark flood hazard areas, to authorize the Department of Environmental Protection to adopt land use regulations for the flood hazard area, to control stream encroachments, to coordinate effectively the development, dissemination, and use of information on floods and flood damages that may be available, to authorize the delegation of certain administrative and enforcement functions to county governing bodies and to integrate the flood control activities of the municipal, county, State and Federal Governments.	The City adopted a flood management ordinance and works closely with NJ DEP on flood issues associated with the Act and compliance.
Waterfront Development Statutes (N.S.A. 12:5-1)	NJ enacted this law to ensure that all plans for the development of any waterfront upon any navigable water or stream of this State or bounding thereon, which is contemplated by any person or municipality, in the nature of individual improvement or development or as a part of a general plan which involves the construction or alteration of a dock, wharf, pier, bulkhead, bridge, pipeline, cable, or any other similar or dissimilar waterfront development shall be first submitted to the Department of Environmental Protection. No such development or improvement shall be commenced or executed without the approval of the Department of Environmental Protection first had and received, or as hereinafter in this § provided.	The City works closely with the NJ DEP to ensure compliance.
Freshwater Wetland Protection Act (N.J.A.C. 7:71)	Regulations to support the New Jersey freshwater wetlands program which protects freshwater wetlands, and upland areas within 150 feet of wetlands (sometimes called "buffers"), from development which will impair the wetlands.	The NJ DEPT has the authority from the Statute to proscribe detailed guidelines to ensure compliance and the City works closely with NJ DEP to ensure compliance.
Flood Hazard Area Control Act (N.J.A.C. 7:13)	The specific intent of the regulations is minimize potential on and off site damage to public or private property caused by development which, at times of flood, subject structures to	The City passed a flood management ordinance to enforce these regulations and the City

Laws and Regulations	Description	Integration Efforts with Trenton
	flooding and increase flood heights and/or velocities both upstream and downstream. These rules are also intended to safeguard the public from the dangers and damages caused by materials being swept onto nearby or downstream lands, to protect and enhance the public's health and welfare by minimizing the degradation of water quality from point and non point pollution sources and to protect wildlife and fisheries by preserving and enhancing water quality and the environment associated with the floodplain and the watercourses that create them. Without proper controls, development in the floodplain and the watercourses that create them may adversely affect the flood carrying capacity of these areas, subject new facilities to flooding, reduce natural flood storage that the floodplain provides, increase the volume of storm water runoff, degrade the water quality of the receiving water body, and result in increased sedimentation, erosion or other environmental damage. Any development in areas regulated by this § must conform to criteria which, as outlined in this §, depend upon the characteristics of the area and the type of activity involved.	works closely with NJ DEP to ensure compliance.
N.J.S.A. 2A:53A-13.1	No volunteer fire company, volunteer first aid, rescue or emergency squad, civil defense unit, which provides services for the control and extinguishment of fires or emergency public first aid and rescue services shall be liable in any civil action to respond in damages as a result of any commission arising out of the rendition in good faith of any such services.	This Law protects the emergency operations within Trenton from liability from a rescue done in good faith.
N.J.S.A. 2A:62A-7	No individual, partnership, corporation, association, or other entity shall be liable for civil damages as a result of acts taken in the course of rendering care, assistance, or advise with respect to an incident creating a danger to persons or property	This Law protects the emergency personnel within Trenton from liability from a rescue done in good faith.
N.J.S.A. 2C:17-2	A person who purposely or knowingly, unlawfully causes an explosion, flood, collapse of a building, release or abandonment of poison gas, radioactive materials or any other harmful substance will be charged with a crime in the second degree.	This Law provides municipalities and the States the right to prosecute any person who has unwillingly caused damage within the State.
N.J.S.A. 13:1E-80 .	All major hazardous waste facilities shall, for the purpose of local property taxation, be assessed and taxed in the same manner as other property.	This Law gives Trenton the right to assess taxes on hazardous waste facilities.
N.J.S.A. 13:IK-17	When the Department of Environmental Protection obtains information which leads it to suspect. that hazardous discharge has occurred, they shall immediately notify the governing body and local Board of Health of the municipality in which the hazardous discharge has occurred and shall take appropriate act verify that discharge has occurred.	This Law sets forth NJ DEP roles in working with the local community, in this case Trenton, in the event of a potential hazardous discharge. Trenton has a HAZMAT team to handle these issues.
N.J.S.A. 26:2D-37-et seq	The Division of State Police and the Department of Environmental Protection shall prepare or cause to be prepared and adopt a State Radiation Emergency Response Plan. This statute covers local response plans, county response plans, the powers and duties of DEEP and the powers and duties of the Division of State Police. The statute also provides guidelines for	The City of Trenton OEM works closely with the State Police OEM and NJ DEP with local emergency response plans and HAZMAT plans.

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	other relevant agencies needed for radiation response.	
N.J.S.A. 38A: 2-3 et seq.	Whenever the militia, or any part thereof, is employed in aid of civil authority, the Governor, if in his/her judgment the maintenance of law and order will thereby be promoted, may by proclamation, declare any county or municipality, or part thereof, which the troops are serving to be subject to martial law.	The City works with the State in the event National Guards are needed within the City.
N.J.S.A. 38A: 3-6.1	The Governor shall have the authority to order to active duty, with or without pay, in State service, such members of the New Jersey National Guard that in their judgment are necessary to provide aid in circumstances which threaten or are a danger to the public health, safety or welfare	This Statute is used in the event of manmade or natural disasters or emergencies.
N.J.S.A. 38A: 20-3	The purpose of this law is to provide mutual aid among the states in meeting any emergency or disaster from enemy attack or other cause (natural or otherwise) including sabotage and subversive acts and direct attacks by bombs, shellfire, and atomic, radiological, chemical, bacteriological means, and other weapons. The prompt, full and effective utilization of the resources of respective states, including such resources as may be available from the United States Government or any other source, are essential to the safety, care and welfare of the people.	This Statute is used in the event of manmade or natural disasters or emergencies
N.J.S.A. 39:4-213	The Attorney General is authorized to erect directional signals or signs, and assign such police personnel as may be necessary for the manual direction of traffic during an emergency.	This Statute is used in the event of manmade or natural disasters or emergencies
N.J.S.A. 40A: 14-156.4	The county emergency management coordinator may by express order suspend operation of the provisions upon declaration of a State of Emergency.	The Mercer County OEM coordinates closely with the City of Trenton.
N.J.S.A. 52:27D-222	This law directs certain entities which store, manufacture, distribute or warehouse unusually hazardous substances to develop an emergency response plan along with the county or municipal fire officials.	The City of Trenton closely coordinates with businesses located in Trenton with regard to emergency management planning.
N.J.S.A. 55:13C-1	Need for emergency shelters for victims of fire, natural disasters, domestic violence and other causes of homelessness. Directs the Department of Community Affairs and Human Services to develop regulations for implementation of the Rooming and Boarding Housing Act of 1979.	The City's Department of Housing and Economic Development and the Community Affairs works closely with the State in the event of emergency shelter needs.
N.J.S.A. 58:16A-66 et seq	The Commissioner of the Department of Environmental Protection shall in consultation with the United States Army Corps, of Engineers and in coordination with the Off ice of Emergency Management in the Division of State Police, develop a flood early warning system.	The City closely coordinates with the County and State OEM on an Early Warning System and has instituted a City free, voluntary and confidential notification system called Connect - CTY
N.J.S.A. 58:16a-101	The office of Emergency Management shall notify the emergency management organization in the counties, which shall then notify the local police departments in the event of a flood situation.	Law that establishes the coordination and communication of the various agencies involved in an emergency.
N.J.A.C. § 17	The Governor is authorized to enter into agreements with the governors of any of the states bordering on New Jersey for the	This Statute is used in the event of manmade or natural disasters or

Laws and Regulations	Description	Integration Efforts with Trenton
	protection in the event of emergency of any or all interstate bridges, tunnels, ferries and other communications facilities.	emergencies.

10.7 Inventory of Organizations and how they work with Trenton on Mitigation Efforts

This section provides a list of the federal, state and local organizations and private institutions and if there is a process to work with them or a protocol to communicate with them.

Table 10-8
Organizations that Work With Trenton on Hazard Mitigation Issues

Organization	Description	Are there Coordination effort or Processes?
Federal Agencies/Organizations		
FEMA	On March 1, 2003, the Federal Emergency Management Agency (FEMA) became part of the U.S. Department of Homeland Security (DHS). FEMA's continuing mission within the new department is to lead the effort to prepare the nation for all hazards and effectively manage federal response and recovery efforts following any national incident. FEMA also initiates proactive mitigation activities, trains first responders, and manages the National Flood Insurance Program.	Yes
US Army Corp of Engineers	The USACE provide quality, responsive engineering services to the nation including: Planning, designing, building and operating water resources and other civil works projects (Navigation, Flood Control, Environmental Protection, Disaster Response, etc.)	Yes
American Red Cross	The American Red Cross, a humanitarian organization led by volunteers, guided by its Congressional Charter and the Fundamental Principles of the International Red Cross Movement, provides relief to victims of disasters and help people prevent, prepare for, and respond to emergencies. It functions independently of the government but works closely with government agencies, such as the Federal Emergency Management Agency (FEMA), during times of major crises. The organization is neither led nor funded by governmental agencies. It is responsible for giving aid to members of the U.S. Armed Forces and to disaster victims at home and abroad. It does this through services that are consistent with its Congressional Charter and the Fundamental Principles of	Yes

Organization	Description	Are there Coordination effort or Processes?
	the International Red Cross and Red Crescent Movement allowing the Red Cross to stay neutral and impartial.	
State Agencies		
NJ Office of Emergency Management	OEM is responsible for the oversight and management of state and local hazard mitigation plan preparation process; identification and evaluation of mitigation planning programs and opportunities; coordination of mitigation planning with preparedness, response and recovery planning and event management; and coordination of natural hazard mitigation with mitigation of manmade hazards, including terrorism.	Yes
NJ Department of Health and Senior Services	NJ Department of Health and Senior Services is responsible to foster accessible and high-quality health and senior services to help all people in New Jersey achieve optimal health, dignity and independence. We work to prevent disease, promote and protect well-being at all life stages and encourage informed choices that enrich quality of life for individuals and communities. The EMS is an office within the Department's Division of Health Infrastructure Preparedness and Emergency Response.	Yes
NJ Emergency Management Services	OEMS is part of the department's Division of Health Infrastructure Preparedness and Emergency Response. OEMS maintains the certification of more than 22,000 Emergency Medical Technician-Basics (EMT-B's) and 1,500 Emergency Medical Technician-Paramedics (EMT-P's) as well as the provider licensure of mobility assistant vehicles, ambulances, mobile intensive care units, specialty care transport units and air medical units totaling more than 4,500 vehicles.	Yes
NJ Emergency Management Services Task Force	The EMS TF will support first responders with an advanced on-call EMS response capability that provides specialized equipment, EMS management support and specialized medical response to mass casualty incidents and chemical, biological, nuclear, radiological and explosive events. Under the overall supervision of the Department of Health and Senior Services, and in direct support of the State's Office of Emergency Management (OEM), EMS TFs will provide 24/7/365 medical first responder support to immediate response EMS units and to those EMS units called up during large mobilization efforts.	Yes
NJ Department of Environmental Protection	Provision and analysis of digital data and research publications and memoranda; assessment of natural hazards, identification of management programs; direct participation of the State Coordinator for the National Flood Insurance Program, the Office of Land Use Regulation, Forest Fire Service, Geologic Survey and other experienced personnel; and coordination with state and federal programs affecting natural hazard mitigation including open space conservation, historic preservation, water resources	Yes

Organization	Description	Are there Coordination effort or Processes?
	management, dam safety and shore protection.	
NJ Department of Community Affairs	Assessment of building codes and their development, oversight and enforcement affecting hazard mitigation; coordination of state and local planning policies and initiatives affecting land use and infrastructure investments through State Development and Redevelopment Plan and needs for hazard mitigation; oversight of local government fiscal management; and technical support for local redevelopment and revitalization initiatives that provide opportunities for hazard mitigation.	Yes
NJ Department of Treasury	Identification of resources available for program implementation through oversight of state agency budgets; and identification and management of state property and state owned and leased facilities potentially vulnerable to natural hazards.	Yes
NJ Department of Transportation	Planning, management and integration of all transportation facilities to ensure the safe, efficient and effective movement of people and goods; planning and project implementation to reduce vulnerabilities to natural hazards and to mitigate potential impacts of natural hazards on critical transportation infrastructure; and identify and reduce vulnerabilities of people and materials to natural hazards through emergency evacuation or other needs and initiatives.	Yes
NJ Department of Banking and Insurance	Identification of opportunities to improve the collection of data regarding property losses associated with natural hazard events; and identification of opportunities to ensure that hazard mitigation is given proper consideration in private sector banking, insurance and real estate transactions.	Yes
Board of Public Utilities	Provision and analysis of natural hazard information affecting the provision of electric power, telecommunications, public water, sewage collection and treatment, and other regulated public utilities.	Yes
Office of Information Technology	Provision of digital data and identification of opportunities for establishing, organizing and enhancing data necessary to improve identification and mitigation of natural hazards.	Yes
Office of Attorney General	Define policies and procedures for hazard mitigation planning and project implementation consistent with appropriate precedent and practice.	Yes
State Climatologist	Collection and management of weather, hydrologic and associated meteorological data; and identification of opportunities to analyze and present data in ways that facilitate hazard mitigation planning and decision making.	Yes
County and Local Departments		
Mercer County Emergency	The mission is to protect life and property in emergencies. The Emergency Management Coordinator prepares detailed	Yes

Organization	Description	Are there Coordination effort or Processes?
Coordinator	plans for response to natural and man-made disasters. The OEM also provides for the training of volunteers to be relied upon in fire and medical emergencies. The County OEM gets involved in any disaster that gets beyond the capabilities of the municipality to properly respond. The OEM is often activated whenever there are severe blizzards, floods, hurricanes, fires and chemical spills by coordinating the activities of the thirteen municipalities of the County. Assistance may also be obtained from the State OEM	
Trenton Department of Inspections	The Department of Inspection is charged with the enforcement of all rules and regulations governing the use, occupancy, construction, alteration and maintenance of all property within the City.	Yes
Trenton Fire Department	The Fire Department is responsible for fire suppression, fire prevention, control of hazardous materials emergencies, response to natural disasters and rescue of trapped or injured persons within the City. The Department takes a subordinate roll in emergency medical service, evacuation of civilians, clean-up of hazardous materials emergencies, response to terrorist or acts of civil disturbance and mutual aid assistance to those agencies and communities in need.	Yes
Trenton Emergency Medical Services	TEMS is currently the sole provider of basic life support services in the city of Trenton. TEMS works in cooperation with the Trenton Fire Department, Trenton Police Department, Trenton schools, and many private business and civic groups providing care, support and education for the residents and visitors of the city of Trenton.	Yes
Trenton Public Works Department	The goal of the Department is to ensure that all municipal owned buildings and properties under the jurisdiction of this Department are properly maintained, secured and safe for the general public and municipal employee use.	Yes
Trenton Police Department	The Trenton Police Department works in a true partnership with citizens from all segments of the community to reduce crime and fear, and to keep streets free from the threats of violence and narcotics trafficking. By subscribing to the highest standards of professionalism, the Department raises the level of public safety through effective crime prevention and problem solving. Provides the citizens of Trenton security for property, order and civility in public places and an environment where families and businesses can prosper.	Yes
Trenton Department of Health and Human Services, Division of Health	The City of Trenton's Division of Health is the official public health agency for the City, providing a full range of preventive health and educational services to the community. A licensed Health Officer, pursuant to the New Jersey State Sanitary Code, Chapter 1, manages the City of Trenton's Division of Health. The Health Officer is the executive officer of the Board of Health who enforces the	Yes

Organization	Description	Are there Coordination effort or Processes?
	laws of New Jersey relating to public health, the provisions of the State Sanitary Code, and ordinances adopted by the local board.	
Trenton Department of Housing and Economic Development	The City's Department of Housing & Economic Development manages the planning and development activities of the City government and is divided into four operating divisions. They are the Divisions of Economic Development, Planning, Housing Production, and Real Estate.	Yes
Lawrence Township	Lawrence Township is a neighboring township of the City of Trenton.	Yes
Ewing Township	Ewing Township is a neighboring township of the City of Trenton.	Yes
Hamilton Township	Hamilton Township is a neighboring township of the City of Trenton.	Yes
Task Forces and Commissions		
Delaware Basin River Commission (DRBC)	The Delaware River Basin Commission was formed in 1954 with a consent decree signed between New York, New Jersey, Pennsylvania and Delaware. The Commission plans, regulates and analyses the 330 miles of the Delaware River that winds through these states. The DRBC is comprised of 5 Commissioners – a federally appointed Commissioner, and a Commissioner representing New York, New Jersey, Pennsylvania and Delaware. Each commissioner has one vote of equal power with a majority vote needed to decide most issues. Unanimity is required for votes on the annual budget and drought declarations. The Commission holds business meetings and hearings on policy matters and water resource projects under regulatory review. These sessions, along with meetings of the commission's various advisory committees, are open to the public.	Yes
DRBC Flood Task Force	The Delaware River Basin Interstate Flood Mitigation Task Force was assembled in October 2006. It is comprised of 32 members from a geographically diverse array of government agencies (legislative, executive, federal, state and local), private businesses and not-for-profit Organizations. The group has identified a total of 44 consensus recommendations for a proactive, sustainable, and systematic approach to flood damage reduction. The recommendations are based upon a set of six guiding principles concerning floodplain restoration, floodplain protection, institutional and individual preparedness, local stormwater management and engineering standards, and the use of structural and non-structural measures.	Yes
NJ Flood Task Force	After two devastating floods from September 2004 through April 2005, then Acting Governor Codey established the New Jersey Flood Mitigation Task Force to study flooding issues in New Jersey. In addition to meeting with the public, the Task Force formed a committee to study the technical;	Yes. The City of Trenton played an active role in the statewide recommendations and through this participation

Organization	Description	Are there Coordination effort or Processes?
	funding, public education and planning issues that faced flood mitigation efforts. The Task Force was comprised on 17 key flood stakeholders, including, but not limited to, the Mayor of Trenton, the Executive Director of the DRBC, Trenton Resident and CEO of Isles, the State Hazard Mitigation Officer, and a Representative from FEMA II. After careful examination and public input, the Task Force provided statewide recommendations to improve and strengthen regulatory protections of floodplains and homes; to aggressively pursue mitigation and control measures through improved studies, forecasting and flood warning systems; to request funding for planning and additional resources dedicated to reduce flood risk in NJ; and to improve assistance for New Jersey residents before and after a flooding event takes place.	recognized that as an NFIP participating community, Trenton needed to prepare a flood mitigation plan to be eligible to apply for FEMA flood mitigation grants.
Delaware Joint Toll Bridge Commission	The mission of the Delaware River Joint Toll Bridge Commission is to provide safe and efficient river crossings over 139 miles of river within its jurisdiction. Stretching from northern Burlington County, New Jersey and Bucks County, Pennsylvania northward to the New York State Line, the Commission's jurisdiction encompasses a diverse geographic region featuring bustling cities, quaint river villages, and scenic portions of the Delaware River where nature's beauty abounds.	Yes
Civic and Private Organizations		
Isles, Inc.	A Non Profit organization within The City of Trenton affected by flooding Issues	Yes
Board of Education	The City Public School System Administration	Yes
Capital Health Systems	A local hospital within the City of Trenton	Yes
St Francis Hospital	A local hospital within the City of Trenton	Yes
Trenton Council Civic Associations (Including two civic associations directly impacted by the flooding – Glen Afton and Island Associations)	An organization that represents all of the community associations with the City of Trenton.	Yes
PSE&G	An electric and gas provider for the City of Trenton.	Yes
Verizon	A communications provider for the City of Trenton.	Yes
Trigen	A private company that provides centrally produced hot water and chilled water to approximately 35 commercial, governmental, institutional and hospitality customers in the central business district of Trenton and also co-generates electricity.	Yes