



# State of New Jersey

## 2011 Hazard Mitigation Plan

**Section 1 – Table of Contents**

**Section 2 – Executive Summary**

**Section 3 – Planning Process**

**Section 4 – Risk Assessment**

**Section 5 – Mitigation Strategy**

**Section 6 – Coordinating Local Planning**

**Section 7 - Plan Maintenance**

**Section 8 – Approval and Adoption**

**Appendix**



The New Jersey State Hazard Mitigation Plan represents, among other things, an opportunity to generate active discussions among all levels of government, business and commerce communities and individuals; to identify risks; and to recognize mitigate actions that can be taken by the state, its counties and municipalities and individuals.

Previously approved New Jersey State Plans are:

Plan 1 – Effective April 2005 to April 2008

Plan 2 – Effective April 2008 to April 2011

Current – Effective April 2011

Date	Section/Reference	Subject
XXXXXXXX	Full Plan	Posted on the Internet with the following address



## Section 1 Table of Contents

<b>Section 2 Executive Summary</b>	<b>Page</b>
2.1: Purpose and Scope	Error!
<b>Bookmark not defined.</b>	
2.2: Requirement for the Plan	Error!
<b>Bookmark not defined.</b>	
2.3: Background	Error!
<b>Bookmark not defined.</b>	
2.3.1 Coordination with Federal Requirements:	Error!
<b>Bookmark not defined.</b>	
2.3.2: Specifics on FEMA Programs	Error!
<b>Bookmark not defined.</b>	
2.4: Organization of the Plan	Error!
<b>Bookmark not defined.</b>	
2.4.1: Table of Contents (without discussion)	Error!
<b>Bookmark not defined.</b>	
2.4.2: Executive Summary (without discussion)	Error!
<b>Bookmark not defined.</b>	
2.4.3: Summary of Section 3 Planning Process	Error!
<b>Bookmark not defined.</b>	
2.4.4: Summary of Section 4 Risk Assessment	Error!
<b>Bookmark not defined.</b>	
2.4.5: Summary of Section 5 Mitigation Strategy	Error!
<b>Bookmark not defined.</b>	
2.4.6: Summary of Section 6 Coordinating Local Planning	Error!
<b>Bookmark not defined.</b>	
2.4.7: Summary of Section 7 Plan Maintenance	Error!
<b>Bookmark not defined.</b>	
2.4.8: Summary of Section 8 Approval and Adoption	Error!
<b>Bookmark not defined.</b>	
 <b>Section 3 Planning Process</b>	 <b>Page</b>
Section 3: Planning Process	Error!
<b>Bookmark not defined.</b>	
3.1: Interim Final Rule for the Planning Process	Error!
<b>Bookmark not defined.</b>	
3.2: Description of the Planning Process	Error!
<b>Bookmark not defined.</b>	
3.2.1: Plan Development Committee	Error!



<b>Bookmark not defined.</b>	
3.2.2: The Mitigation Core Team	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.2.3: The State Hazard Mitigation Team (SHMT)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3: Coordination with Federal and State Agencies, and Interested Groups	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3.1: Coordination with FEMA Region II and Other Federal Agencies	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3.2: Coordination with State Agencies	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3.3: Coordination with Other Specifically Interested Groups	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3.3.1: New Jersey Office of Smart Growth	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3.3.2: Floodplain Management Committee	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.3.3.3: NJ Department of Transportation Capital Project Planning	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4: Integration into other Ongoing State Planning Efforts	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.1: State Facilities Risk Management Program	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.2: Coastal Land Use Regulation Program	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.3: Open Space Acquisition Programs	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.3.1: Coastal Blue Acres	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.3.2: Blue Acres and Green Acres Programs	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.4: Statewide Building Codes	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.5: Hurricane Programs	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.6: State Transportation Improvement Plan Flood Mitigation Projects	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.7: Reserved for Future Use	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.8: Tidal Gauge Monitoring	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.9: State of New Jersey Water Emergency Plan	<b>Error!</b>
<b>Bookmark not defined.</b>	



3.4.10: NJDEP Dam Safety Program	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.4.11: Other State Agency Plans Guiding Mitigation Actions	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5: Integration into other FEMA Mitigation Programs and Initiatives	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.1: Public Assistance	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.2: National <b>Flood Insurance Program</b> & Community Rating System	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.3: Flood Mitigation Assistance Program (FMA)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.4: Hazard Mitigation Grant Program (HMGP)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.5: Pre-Disaster Mitigation Program (Competitive) (PDM-C)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.6: Severe Repetitive Loss Grant Program (SRL)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.7: Repetitive Flood Claims Program (RFC)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.8: Fire Management Assistance Grants (FMAG)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.9: Emergency Management Performance Grant (EMPG)	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.5.10: Other Federal Funding Assistance	<b>Error!</b>
<b>Bookmark not defined.</b>	
3.6: Incorporation of Local Plans	<b>Error!</b>
<b>Bookmark not defined.</b>	

## Section 4 Risk Assessment

	Page
4.1 Interim Final Rule Requirements for Risk Assessments	1
4.2 Background and General Discussion of Risk Assessment	1
4.3 Methodology for Identifying Statewide Hazards of Concern	3
4.4 Statewide Hazard Profiles	3
4.4.1 Floods	5
4.4.1.1 Nature of the Flood Hazard	5
4.4.1.2 Other Previous Flood Occurrences	6



4.4.1.3	Coastal Flood and Storm Surge Occurrences in New Jersey	8
4.4.1.4	Tsunami-Related Flood Occurrences in New Jersey	9
4.4.1.5	Probability of Flood Occurrences	9
4.4.1.6	Flood Loss Estimation	9
4.4.1.6.1	Flood Loss Estimation Method 1 - Extrapolation of NFIP Flood Claims Data	9
4.4.1.6.2	Flood Loss Estimation Method 2 - Extrapolation of NFIP Repetitive Loss Claims Data	11
4.4.1.6.3	Flood Loss Estimation Method 3 – Estimated Annual Damages fo 1% Probability Floods	14
4.4-2	Hurricanes and Tropical Storms	15
4.4.2.1	Nature of the Hurricane and Tropical Storm Hazards	15
4.4.2.2	Previous Hurricane Occurrences in New Jersey	18
4.4.2.3	Probability of Hurricanes and Tropical Storms	19
4.4.2.4	Hurricane Wind Loss Estimation	20
4.4.3	Nor'easters	25
4.4.3.1	Nature of the Nor'easter Hazard	25
4.4.3.2	Previous Nor'easter Occurrences	25
4.4.3.3	Probability of Nor'easters	27
4.4.4	Winter Storms	29
4.4.4.1	Nature of the Winter Storm Hazard	29
4.4.4.2	Snow	29
4.4.4.3	Ice Storms	31
4.4.4.4	Cold Waves and Wind Chill	32
4.4.4.5	Winter Storm Occurrences	32
4.4.4.6	Probability of Winter Storms	35
4.4.5	Tornadoes and High Winds	37
4.4.5.1	Nature of the Tornado and High Wind Hazard	37
4.5.5.2	Tornadoes	37
4.4.5.3	Thunderstorms	38
4.4.5.4	Previous Tornado and High Wind Occurrences	39
4.4.5.5	Probability of Future Occurrences	41
4.4.6	Earthquakes	43
4.4.6.1	Nature of the Earthquake Hazard	43
4.4.6.2	Previous Earthquake Occurrences in New Jersey	46
4.4.6.3	Probability of Earthquakes	49
4.4.6.4	HAZUS Earthquake Loss Estimates for Seven Northeastern New Jersey Counties	50
4.4.6.5	Limitations of the HAZUS Results	51
4.4.6.6	Statewide Earthquake Loss Estimates for New Jersey	52
4.4.6.7	Extrapolation of HAZUS Loss Estimates to All Counties in New Jersey	53
4.4.7	Drought	55
4.4.7.1	Nature of the Drought Hazard in New Jersey	55
4.4.7.2	Previous Drought Occurrences in New Jersey	57
4.4.7.3	Probability of Drought	60
4.4.8	Wildfires	61
4.4.8.1	Nature of the Wildfire Hazard in New Jersey	61



4.4.8.2	Previous Wildfire Occurrences in New Jersey	63
4.4.8.3	Severity of Wildfires	67
4.4.8.3	Probability of Wildfires	71
4.4.9	Geologic Hazards of Landslides, Subsidence and Sinkholes	73
4.4.9.1	Nature of Landslide,	73
4.4.9.2	Nature of Subsidence and Sinkholes	73
4.4.9.3	Previous Landslide Occurrences	75
4.4.9.4	Previous Sinkholes and Subsidence	74
4.4.9.5	Probability of Landslide, Sinkhole and Subsidence Occurrences	78
4.4.10	Hail	83
4.4.10.1	Nature of the Hail Hazard	83
4.4.10.2	Characteristics of Hail	83
4.4.10.3	Location and Extent of the Hail Hazard	84
4.4.10.4	Probability of Hail	84
4.4.11	Extreme Heat	87
4.4.11.1	Nature of the Extreme Heat Hazard	87
4.4.11.2	Previous Extreme Heat Occurrences	88
4.4.11.3	Probability of Extreme Heat Occurrences	88
4.4.12	Coastal Erosion	89
4.4.12.1	Nature of the Coastal Erosion Hazard	89
4.4.12.2	Preparing for Coastal Hazards & Climate Change	90
4.4.12.2	Previous Coastal Erosion Occurrences	93
4.4.12.3	Probability of Coastal Erosion	94
4.4-13	Eliminated Hazards	95
4.4.13.1	Avalanche	95
4.4.13.1.1	Nature of Avalanche	95
4.4.13.1.2	Location and Extent of an Avalanche	95
4.4.13.1.3	Probability of an Avalance	95
4.4-13.2	Volcano	95
4.4.13.2.1	Nature of Volcano	95
4.4.13.2.2	Location and Extent of a Volcano	95
4.4.13.2.3	Probability of a Volcano	95
4.4-13	Other Hazards	97
4.4.14.1	Animal Diseases	97
4.4.14.2	Civil Unrest	98
4.4.14.3	Crop Failure	98
4.4.14.4	Fishing Failure	98
4.4.14.5	Hazardous Waste – Fixed Site	99
4.4.14.6	Hazardous Waste – Transportation	99
4.4.14.7	Hazardous Waste – Off Shore	99
4.4.14.8	Nuclear Hazards Issues	100
4.4.14.9	Pandemic	100
4.4.14.10	Power Outages	100
4.4.14.11	Terrorism	101



4.4.15	Consequences and Implementation	106
4.4.15.1	Floods	106
4.4.15.2	Hurricanes, Tropical Storms and Nor-Easters	110
4.4.15.3	Winter Storms	114
4.4.15.4	Tornadoes, and High Winds	119
4.4.15.5	Drought	124
4.4.15.6	Wildfires	127
4.4.15.7	Geological Land Disturbances	131
4.4.15.8	Extreme Heat	136
4.5	Vulnerability Assessment and Loss Estimation	139
4.5.1	Introduction to Vulnerability Assessment and Loss Estimation	139
4.5.2	Definitions of Vulnerability and Loss Estimation	139
4.5.2.1	Vulnerability	139
4.5.2.2	Loss Estimation (Risk Assessment)	140
4.5.3	General Indicators of Vulnerability	140
4.5.3.1	Population Demographics and Location	141
4.5.3.2	Value and Exposure of Assets (Structures) and Contents Statewide	146
4.5.3.3	FEMA Public Assistance Program Project Worksheets	146
4.5.4	Flood Vulnerabilities	150
4.5.4.1	Flood Vulnerability Measure 1	150
4.5.4.1	Flood Vulnerability Measure 2	152
4.5.4.1	Flood Vulnerability Measure 3	154
4.5.4.1	Flood Vulnerability Measure 4	166
4.6	Jurisdictions most Threatened, and most Vulnerable to Damage and Loss	157
4.7	Vulnerabilities of State Owned and Operated Facilities	159
4.8	Incorporation of Risk and Vulnerability Data from Local and Regional Hazard Mitigation Plans	162

## Section 5 Mitigation Strategy

## Page

5.1	Interim Final Rule Requirements for Mitigation Strategy	1
5.2	State Hazard Mitigation Strategy	3
5.2.1	Overview of the State Strategy	3
5.2.2	State Hazard Mitigation Goals and Objectives	3
5.2.3	State Hazard Mitigation Program Repetitive Loss Strategy	4
5.3	Ongoing Mitigation Programs	5
5.3.1	Identification and Continuity of Mitigation Program Status	5
5.3.2	Ongoing Mitigation Programs and Evaluation of Progress	6
5.3.2.1	Department of Community Affairs	7
5.3.2.2	Department of the Treasury	8
5.3.2.3	Department of Environmental Protection	9



5.3.2.4	Department of Law and Public Safety,	14
5.4	Continuing and New Mitigation Actions	19
5.4.1	Identifying Continuing Actions	19
5.4.2	Description of Dew Mitigation Actions	19
5.4.3	Mitigation Strategies	19
5.5	Evaluating Alternative Mitigation Actions	35
5.6	Progress on Other State Mitigation Actions	39
5.6.1	NJDEP Flood Update – Delaware River	39
5.6.1.1	Updated Flood Hazard Area Control Rules	39
5.6.1.2	Updated Floodplain Study and Mapping Delineation	39
5.6.1.3	Flood Mitigation Feasibility Study	40
5.6.1.4	Upgrades to the USGS Streamgaging Program	40
5.6.1.5	Multi-Jurisdictional Flood Mitigation Plan	40
5.6.1.6	Updated State Hazard Mitigation Plan	41
5.6.1.7	Develop a Flood Analysis Modeling Tool	41
5.6.2	Blue Acres Program for New Jersey	41
5.6.3	Shore Protection Program Projects	
5.7	Pre- and Post-Disaster Hazard Management Policies, Programs and Capabilities	43
5.7.1	Organization of the Office of Emergence Management	43
5.7.2	Evaluation of New Jersey State Hazard Mitigation Division	47
5.8	Evaluation of State Laws, Regulations, Policies and Programs related to Hazard Mitigation and Development in Hazard Prone Areas	49
5.8.1	Laws and Regulations	49
5.8	State Funding Capabilities for Hazard Mitigation Projects	65
5.10	General Description and Analysis of the Effectiveness of Local Mitigation Policies, Programs and Capabilities	69
5.10.1	Project Awards and Implementation	71

## Section 6 Coordinating Local Planning

Section 6: Coordinating Local Planning

**Bookmark not defined.**

6.1: Interim Final Rule Requirement for Coordinating Local Planning

**Bookmark not defined.**

6.2: State Process for Developing Local Plans, Projects and Continued Planning

**Page**

**Error!**

**Error!**

**Error!**



<b>Bookmark not defined.</b>	<b>Error!</b>
6.2.1: Planning Awareness And Education	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.2.2: Funding Support	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.2.3: Available Informational Resources	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3: Local Plan Review, Coordination and Linkages	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3.1: Coordination	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3.2: Additional State Requirements to the Crosswalk	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3.2.1: Plan's Web Address	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3.2.2 Identification of Mitigation projects	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3.2.3: Identification of Local Jurisdiction Mitigation Contacts	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.3.2.4: Reserved for future NJOEM Crosswalk requirements.	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.4 : Criteria for Prioritizing Mitigation Planning and Project Grants	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.4.1: Prioritizing Mitigation Planning Funds	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>
6.4.2: Prioritizing Mitigation Project Funds	<b>Error!</b>
<b>Bookmark not defined.</b>	<b>Error!</b>



## Section 7 Plan Maintenance

Section 7: Plan Maintenance

**Bookmark not defined.**

7.1: Interim Final Rule for Plan Maintenance

**Bookmark not defined.**

7.2: Method for Monitoring, Evaluating and Updating the Plan

**Bookmark not defined.**

7.3: Monitoring Mitigation Measures and Project Closeouts

**Bookmark not defined.**

7.4: Reviewing Progress on Achieving Goals, Activities and Projects in the State  
Mitigation Strategy

**Bookmark not defined.**

7.5: Discussion of Successes and Challenges in Project Implementation and  
Closeout

**Error! Bookmark not defined.**

7.5.1: Mitigation Success and Challenges

**Bookmark not defined.**

7.5.2: Mitigation Success

**Bookmark not defined.**

7.5.3: Mitigation Challenges

**Bookmark not defined.**

Page

Error!

Error!

Error!

Error!

Error!

Error!

Error!

Error!

## Section 8 Approval and Adoption

8.1: Interim Final Rule Requirement for Plan Adoption

**Bookmark not defined.**

8.2: Plan Adoption by the State of New Jersey

**Bookmark not defined.**

8.3: Authorities and References

**Bookmark not defined.**

8.3.1: Authorities

**Bookmark not defined.**

8.3.2: References

**Bookmark not defined.**

8.4: Assurances

**Bookmark not defined.**

8.5: Adoption Documents

**Bookmark not defined.**

Page

Error!

Error!

Error!

Error!

Error!

Error!

Error!





## List of Figures

## Page

Figure 4.4-1-1	Floodplain Definition (Source: FEMA, August 2001)	5
Figure 4.4-1-2	New Jersey Watershed Management Areas (NJDEP)	6
Figure 4.4.1.6.1-1	New Jersey Annualized NFIP Flood Insurance Claims and Projected Losses (Risk for 100 year Horizon)	11
Figure 4.4.2.1-1	Hurricanes and Tropical Storms that have Crossed New Jersey 1950-2007	16
Figure 4.4.2.3-1	What is my chance of being struck by a tropical storm or hurricane	20
Figure 4.4.2.4-1	Wind Hazard Profile for Southern Inland New Jersey Counties	21
Figure 4.4.2.4-2	Wind Hazard Profile for Coastal New Jersey Counties	21
Figure 4.4.2.4-3	Wind Hazard Profile for Northern Inland New Jersey Counties	21
Figure 4.4.3.1-1	The Dolan-Davis Nor'easter Intensity Scale	25
Figure 4.4.3.2-1	The "Super Storm" of March 1993 (NOAA)	27
Figure 4.4.4.2-1	Average Annual Snowfall in New Jersey	30
Figure 4.4.4.2-2	Ground Snow Loads for Northeastern United States	31
Figure 4.4.5.2-1	United States Wind Zones	38
Figure 4.4.5.4-1	Historic Tornado Distribution and Intensity in the State of New Jersey	39
Figure 4.4.5.4-2	Distribution of Thunderstorms Days in New Jersey	41
Figure 4.4.5.5-1	Tornado Days per Year (1980-1999)	42
Figure 4.4.5.2-1	Earthquakes Epicentered in New Jersey	46
Figure 4.4.6.2-2	Epicenters of Earthquakes in the Northeastern United States 1737-1986	47
Figure 4.4.6.2-3	USGS 10% in 50-year Earthquake Ground Motions for Northeast U. S.	48
Figure 4.4.6.2-4	Rock-Soil Class Map for Northeastern New Jersey	49
Figure 4.4.7.1-1	Figure New Jersey Drought Regions	56
Figure 4.4.8.1-1	Wildfire Hazard Assessments	62
Figure 4.4.8.2-1	Historic Large Fires	65
Figure 4.4.8.2-2	Points of Forest Fire Origin	67
Figure 4.4.8.3-4	Wildfire Incidents in New Jersey, 1996-2006	70
Figure 4.4.8.3-5	Acres Burned in Wildfires in New Jersey 1996-2006	71
Figure 4.4.9.1-1	Small landslide in an unidentified residential area in New Jersey	73
Figure 4.4.9.3-1	Landslides in New Jersey, 1951 to 2006 (NJGS)	75
Figure 4.4.9.4-1	Sinkhole in front of the New Jersey State Department of Human Services in Trenton	76
Figure 4.4.9.4-2	State Open Space and known Abandoned Mines in Northern New Jersey (2009)	77
Figure 4.4.9.4-3	Collapse in road above school bus stop, Rockaway Township	78
Figure 4.4.9.5-1	Landslide Susceptibility and Population Density in New Jersey	79
Figure 4.4.9.5-2	New Jersey Geology with Sinkhole Potential	80
Figure 4.4.9.5-3	New Jersey Geology with Sinkhole Potential and Population Density	81
Figure 4.4.9.5-4	Carbonate Rock and Limestone Regions of New Jersey	82
Figure 4.4.10.2-1	How Hail is Formed	83
Figure 4.4.10.2-2	Large Hailstone	84



Figure 4.4.11.1-1 Heat-related Hospitalizations vs. Average Temperature in New Jersey	88
Figure 4.4.12.2-1 Beach Nourishment Project in Sea Girt, New Jersey	91
Figure 4.4.12.2-2 New Jersey Coastal Boundary Map	92
Figure 4.5.3.1-1 Graphical Depiction of County Population, State of New Jersey	106
Figure 4.5.3.2-1 Total Value of Assets in New Jersey Counties	108
Figure 4.5.3.3-1 Total Dollar Value of Losses Reported through FEMA Public Assistance Program Records for Six most Recent Declared Disasters	110
Figure 4.5.4.1-1 Land Area and Percentage of Counties in New Jersey In FEMA-designated "A" Flood Zones,	112
Figure 4.5.4.1-2 Land Area and Percentage of Counties in New Jersey In FEMA-designated "V" and "VE" Flood Zones	113
Figure 4.5.4.3-1 Historic flood claims in the State of New Jersey, 1979-2007, ordered by Dollar Amount of Total Historical Claims	116
Figure 5.3.1-1 Identification of Ongoing Mitigation Programs in 2011 NJ All Hazards Plan	5
Figure 5.3.1-2 Identification of Ongoing Mitigation Programs in future NJ All Hazards Plan	5
Figure 5.3.1.3 Identification of New Mitigation Programs in future NJ All Hazards Plan	6
Figure 6.2.4-1 Anticipated Years for DFIRM Adoption in New Jersey	7
Figure 6.3.2.1-1 Crosswalk Addition identifying Plan Web Site Location	11
Figure 6.3.2.1-2 Crosswalk Addition identifying Mitigation Projects	11
Figure 6.3.2.3-3 Crosswalk Addition identifying Local Participants in the Plan Development	12
Figure 6.4-2 Sample New Jersey State Mitigation Project Priority Score Sheet	14



## List of Tables

Table 2.4-1	County Hazard Mitigation Plan Web Sites	10
Table 3.2.2-1	Membership of the New Jersey State Hazard Mitigation Core Team	2
Table 3.2.3-1	Membership of the New Jersey State Hazard Mitigation Plan Update State Hazard Mitigation Team (SHMT)	4
Table 3.2.2-2	Meeting Dates and Subject Matter for State Hazard Mitigation Team during the 2009-10 NJ State Mitigation Plan Update	6
Table 3.3.1-1	Public Outreach Efforts during the 2008 Plan Update Process	10
Table 3.3.3-1	New Jersey Organizations with ongoing involvement with NJOEM on Hazard Mitigation and Mitigation Planning	12
Table 3.4-1	Natural Hazards/Building Codes	22
Table 4.4-1	State of New Jersey Natural Hazards	3
Table 4.4.1.2-1	Summary of Recent Presidentially-declared Disasters in New Jersey – (Ten recent disasters for which data was provided by FEMA Region II)	8
Table 4.4.1.3-1	Recent Presidentially Declared Coastal Flood Disasters in New Jersey	8
Table 4.4.1.6.1-1	Annualized NFIP Flood Insurance Claims and Projected 50- and 100-year Losses (Risk), - Ordered by Annual Claims Value	10
Table 4.4.1.6.1-2	FEMA NFIP Actuarial Calculation of Potential Maximum Benefits -for Mitigating SRL Properties, ordered alphabetically by New Jersey County	10
Table 4.4.1.6.2-1	Estimated Future Flood Losses to FEMA Repetitive Loss Properties, based on NFIP claims records, - With 50- and 100-year Loss Projections on Countywide and Individual Policy Basis	12
Table 4.4.1.6.3-1	Estimated Annual Damages in New Jersey Counties for 1% Floods, sorted by Total Potential Damages	14
Table 4.4.2.1-1	Saffir/Simpson Hurricane Intensity Categories	16
Table 4.4.2.2-1	Hurricanes and Tropical Storms affecting New Jersey from 1950 to 2007	16
Table 4.4.2.2-2	Hurricane-related Presidential Disaster Declarations in New Jersey	18
Table 4.4.2.2-2	Hurricanes and Tropical Storms affecting New Jersey from 2001-2008	19
Table 4.4.2.4-1	Hurricane Wind Risk for Coastal New Jersey Counties (ZIP 08752)	22
Table 4.4.2.4-2	Hurricane Wind Risk for Northern Inland New Jersey Counties (ZIP 08101)	22
Table 4.4.2.4-3	Hurricane Wind Risk for Southern Inland New Jersey Counties (ZIP 07005)	22
Table 4.4.2.2-3	100-year New Jersey Wind Risk, Ordered by County	23
Table 4.4.3.1-1	The Dolan-Davis Nor'easter Intensity Scale	25
Table 4.4.3.2-1	New Jersey Presidential Disaster Declarations for Nor'easter Storms	26
Table 4.4.4.5-1	New Jersey Snow and Ice Storm Events by County, 1950-2010	33
Table 4.4.4.5-2	Summary of Notable Winter Storm Events in New Jersey	34



Table 4.4.5.2-1	Enhanced Fujita Tornado Intensity Scale	37
Table 4.4.5.4-1	Tornadoes affecting New Jersey from 1950 to 2006	40
Table 4.4.5.4-2	Annual Tornado Summary, State of New Jersey	40
Table 4.4.6.1-1	Modified Mercalli Intensity Scale	44
Table 4.4.6.1-2	Damage Levels Experienced in Earthquakes	45
Table 4.4.6.4-1	HAZUS Scenario Earthquake Loss Estimates for Seven New Jersey Counties	50
Table 4.4.6.7-1	Potential Earthquake Losses to New Jersey Counties, as extrapolated from M5.5 HAZUS scenario Loss Calculation	53
Table 4.4.7.1-1	Water Emergency Phases	57
Table 4.4.7.2-1	New Jersey Drought History and Location, 1995 to 2006 Source	57
Table 4.4.8.2-1	Major Historic Wildfires in New Jersey	66
Table 4.4.8.3-1	New Jersey Wildfires of more than 10 acres 1996-2006	68
Table 4.4.8.3-2	Number of Fire Incidents per Year by New Jersey County: 1996 to 2006	68
Table 4.4.8.3-3	State of New Jersey Annual Number of Acres Burned by Wildfires	69
Table 4.4.10.2-1	Estimating Hail Size	84
Table 4.4.10.4-1	Hail Events, NJ 1950-2009	85
Table 4.4.11.1-1	Heat Index and Disorders	87
Table 4.4..12.3-1	Storm-Induced Coastal Erosion Events	93
Table 4.4..14	Other Hazards	97
Table 4.5.3-1	New Jersey Population Projections by County	105
Table 4.5.3-2	Exposure (value) of Assets and Contents in New Jersey by Land Use Type, Sorted by Total Value	107
Table 4.5.3.3-1	Summary of Recent Presidentially-declared Disasters in New Jersey	109
Table 4.5.3.3-2	Losses by New Jersey County from Recent Presidentially-Declared Disasters, all FEMA Public Assistance Categories, ordered by Amount of Loss	109
Table 4.5.4.1-1	Land Area and Percentage of County in FEMA-designated "A" Flood Zones, New Jersey Counties, ordered by Number of Acres in Zone	111
Table 4.5.4.1-2	Land Area and Percentage of County in FEMA-designated "V" and "VE" Flood Zones, New Jersey Counties, ordered by Area in Acres (non-zero Counties only)	112
Table 4.5.4.2-1	Areas of Selected New Jersey Land Uses in FEMA Flood Zones (in acres), ordered alphabetically by Land Use	114
Table 4.5.4.3-1	Selected Data Parameters Related to Flood Insurance Claims in the State of New Jersey, 1979-2007, ordered by Dollar Amount of Total Historical Claims	115
Table 4.5.4.4-1	Selected HAZUS Critical Facilities and FEMA Flood Zone Designations	117



Table 4.6-1	Summary of New Jersey Jurisdictions most threatened by Natural Hazards, selected data parameters	118
Table 4.6-2	Summary of Relative Threat to New Jersey Counties from Natural Hazards	119
Table 4.7.1	Summary of FEMA Public Assistance Grant Application Amounts for Six Recent Disasters	121
Table 4.7.2	New Jersey State Government FEMA Public Assistance Grant Applicants from Six Recent Presidentially-declared Disasters	122
Table 5.4.3-1	2011 Mitigation Objectives and Actions	19
Table 5.5-1	STAPLEE Review	36
Table 5.8-1	Federal and State Mitigation Laws and Regulations that Impact the Development in Hazard Prone Areas	49
Table 5.9-1	Funding Sources Available for Mitigation Activities	65
Table 5.10-1	New Jersey Policies that Impact Local Hazard Mitigation Efforts	69
Table 5.10-2	2005-2007 Hazard Mitigation Planning and Project Grants	72
Table 5.10-3	2008-2009 Approved Hazard Mitigation Planning and Project Grants submitted Pending FEMA Approval	73
Table 5.10.4	2008-2009 Hazard Mitigation Project Grants Submitted Pending FEMA Approval	73
Table 5.10.5	2010 Approved FEMA Hazard Mitigation Assistance Applications	73
Table 5.10.6	2010 Pending and/or Submitted FEMA Hazard Mitigation Assistance Applications	73
Table 5.10.7	Hazard Mitigation Planning and Project Grants Submitted pending FEMA Approval	74
Table 6.2-1	Status of New Jersey County Hazard Mitigation Plans, as of March 2010	2
Table 6.2-2	Status of New Jersey Municipal Hazard Mitigation Plans, as of March 2010	3
Table 6.2.3-1	New Jersey Hazard Mitigation Handouts	4
Table 6.2.4-1	Hazard Mitigation Resources	8
Table 6.3.1-1	NJOEM Schedule of Review of Local Hazard Mitigation Plans	9
Table 6.3.2.3-1	Identification of Local Participants in the Plan Development	12



## Section 9 Appendices

- A. Disaster Mitigation Act of 2000 Legislation
- B. FEMA Final Rule Related to Mitigation Planning
- C. New Jersey Executive Order #115
- D. Descriptions of Recent New Jersey Disasters
- E. Background about the State of New Jersey
- F. Reserved
- G. New Jersey State Severe Repetitive Loss Mitigation Strategy
- H. FEMA Mitigation Grant Program Fact Sheet
- I. DFIRM and Q3 Maps for all New Jersey Counties
  - i. Atlantic County FEMA Q3 Floodplains
  - ii. Bergen County DFIRM Floodplains
  - iii. Burlington County FEMA Q3 Floodplains
  - iv. Camden County DFIRM Floodplains
  - v. Cape May FEMA Q3 Floodplains
  - vi. Cumberland FEMA Q3 Floodplains
  - vii. Gloucester FEMA Q3 Floodplains
  - viii. Essex County
  - ix. Hudson County DFIRM Floodplains
  - x. Hunterdon County FEMA Q3 Floodplains
  - xi. Mercer County
  - xii. Middlesex County DFIRM Floodplains
  - xiii. Monmouth County
  - xiv. Morris County
  - xv. Ocean County DFIRM Floodplains
  - xvi. Passaic County
  - xvii. Salem County DFIRM Floodplains
  - xviii. Somerset County DFIRM Floodplains
  - xix. Sussex County
  - xx. Union County
  - xxi. Warren County FEMA Q3 Floodplains
- J. Maps of HAZUS Critical Facilities Statewide
  - i. Statewide Emergency Center Locations
  - ii. Statewide Dam Locations
  - iii. Statewide HAZMAT Locations
  - iv. Statewide Police Stations
  - v. Statewide Fire Station Locations
  - vi. Statewide Care Facilities
- K. Statewide Dollar Exposure by Land Use Type
  - i. HAZUS Estimated Value of Agriculture Assets by County
  - ii. HAZUS Estimated Value of Commercial Assets by County
  - iii. HAZUS Estimated Value of Educational Assets by County
  - iv. HAZUS Estimated Value of Government Assets by County
  - v. HAZUS Estimated Value of Religious Assets by County
  - vi. HAZUS Estimated Value of Residential Assets by County
  - vii. HAZUS Estimated Value of Industrial Assets by County
  - viii. HAZUS Estimated Value of Statewide Total Assets by County
- L. Graphics of New Jersey Census Data



- i. Population Density per Square Mile
  - ii. Population Density per Square Mile (averaged by Census Tract)
  - iii. Total Population
  - iv. Total Population by Census Tracts
- M. Area and % of New Jersey Counties in FEMA A, AE, V and VE Flood Zones
  - i. Percentage of County Land Area in FEMA Flood Zones
  - ii. Percentage of County Land Area in FEMA V and VE Flood Zones
- N. Reserved
- O. Reserved
- P. Summary Loss Data on Six Recent New Jersey Disasters
- Q. Plan Adoption Document
- R. Local Emergency Management Coordinators
- S. Guide for Local Hazard Mitigation Initiatives
- T. New Jersey Open Space Program Funding
- U. New Jersey State Mitigation Policies, Programs and Capabilities
- V. Summary of Emergency Management Laws, Executive Orders and Legal Opinions
- W. Landslide Susceptibility Maps for Seven Counties
  - i. Landslide Susceptibility in Bergen County
  - ii. Landslide Susceptibility in Essex County
  - iii. Landslide Susceptibility in Hudson County
  - iv. Landslide Susceptibility in Middlesex County
  - v. Landslide Susceptibility in Monmouth County
  - vi. Landslide Susceptibility in Morris County
  - vii. Landslide Susceptibility in Passaic County
  - viii. Landslide Susceptibility in Somerset County
  - ix. Landslide Susceptibility in Union County
- X. Mitigation Handouts and Fact Sheets
  - NJOEM Handout No. 2: Introduction to Hazards Types includes information on “rating” an occurrence. Also includes a history of NJ disasters
  - NJOEM Handout No. 3: Fact Sheet on FEMA Hazard Mitigation Grant programs administered by NJOEM
  - NJOEM Handout No. 4: Reprint of sections of 44 Code of Federal Regulations dealing with the need for an all hazards plan to be eligible for Federal grants
  - NJOEM Handout No. 5: Available Local Mitigation Planning Tools to help in the preparation of a Pre Disaster Mitigation Plan as required by 44 CFR
  - NJOEM Handout No. 6: Statement of New Jersey’s State Hazard Mitigation Goals, Objectives and Strategy
  - NJOEM Handout No. 7: Summary of the “2005 Multi-Hazard Mitigation Council Study” -- a “Project” Saves Money for every dollar spent \$4 is saved. Also includes listing of past approved FEMA mitigation projects.
  - NJOEM Handout No. 9: Partners in Open Space - Informational sheet on combining FEMA and NJ DEP Green Acres land acquisition grants to achieve 100% funding.
  - NJOEM Handout No. 11: Repetitive Flood Losses - Repetitive flood losses by county including information as to insurance payments made, number of losses and number of properties. Also includes information on non-participating and non-mapped municipalities.
  - NJOEM Handout No. 12: Community Rating System - Information on “how to reduce flood insurance costs - includes list of participating municipalities & policy discounts.



- NJOEM Handout No. 13: Technical Fact Sheets as a Home Builder's Guide to Coastal Construction - text and drawings on a wide variety of subjects.
- NJOEM Handout No. 14: The National Flood Insurance Program (NFIP). Includes information on the flood insurance program, floodplain management and flood hazard mapping. Listing of policy information by county and state-wide distribution.
- NJOEM Handout No. 15: Federal Grants Management – Summary of Post Award Requirements. A guide to administrative elements.
- NJOEM Handout No. 17: Core FEMA Publications. A “short” listing of publication, identified by FEMA, as highly recommended by subject matter experts.
- NJOEM Handout No. 24: EMA Program Comparison of Mitigation Grant Programs - includes information on “The Catalog of Federal Domestic Assistance.
- NJOEM Handout No. 25: Consequences of not having a FEMA Approved All Hazards Mitigation Plan - eligibility for PA and grants.
- NJOEM Handout No. 28: What is Mitigation – definition and examples of mitigation. Making it easier to understand.
- NJOEM Handout No. 29: HAZUS – awareness of the FEMA Geographical Information System (GIS) designed to prepare for earthquake,, wind and flood.
- NJOEM Handout No. 30: The SRL Program – Understanding FEMA's Severe Repetitive Loss program.
- NJOEM Handout No. 31: Participation in the SRL Program – includes information on how it works and what is included
- NJOEM Handout No. 33: Benefit/Cost Analysis information on how to document a flood project.
- NJOEM Handout Identifies as No. 34: The Flood Mitigation Assistance Program – Facts and figures on the FMA program
- NJOEM Handout No. 35: Mitigation Plan Requirements of the SRL Program – eligibility to receive funding.
- NJOEM Handout No. 38: FEMA's Presidential Declaration Process Fact Sheet. How the declaration process works,
- NJOEM Handout No. 39: Hazard Mitigation Grant Program – Describes the funding available after a declared disaster.
- NJOEM Handout No. 40: Allowable Mitigation Projects – “Fundable” projects under the five FEMA grant programs
- NJOEM Handout No. 44: FEMA Grant Program Comparison – Side-by-side comparison of essential items of the five FEMA grant program
- NJOEM Handout No. 47: HMA Decision Matrix – Lists the criteria of project eligibility for FEMA funding program
- **No. 49:** Sample HMA Project Scoring – Describes how applications will be scored and ranked for funding. 52: Map Modernization – Information, justification and schedule of bringing FIRM up to current technology.
- No. 53: Crosswalk – highlights of the FEMA Mitigation Plan Review checklist
- No. 54: FEMA Mitigation Planning Grant Status
- No. 56: Increased Cost of Compliance provisions of the NFIP
- No. 58: Public Assistance and Section 406 Mitigation

