



TABLE OF CONTENTS

VOLUME I

SECTION 1 INTRODUCTION 1-1

- 1.1 Background 1-1
 - 1.1.1 DMA 2000 Origins -The Robert T. Stafford Disaster Relief and Emergency Assistance Act..... 1-1
 - 1.1.2 Benefits of Mitigation Planning..... 1-2
 - 1.1.3 Organizations Involved in the Mitigation Planning Effort 1-2
 - 1.1.4 Implementation of the 2011 Hazard Mitigation Plan..... 1-6
 - 1.1.5 Implementation of the Planning Process 1-6
 - 1.1.6 Organization of this Mitigation Plan 1-7

SECTION 2 PLAN ADOPTION..... 2-1

- 2.1 Overview 2-1
 - 2.1.1 Plan Adoption by Local Governing Bodies.....2-1

SECTION 3 PLANNING PROCESS..... 3-1

- 2016 Plan Update Changes..... 3-1
- 3.1 Introduction 3-1
- 3.2 Planning Partnership - Organization and Activity..... 3-2
 - 3.2.1 Organization of Planning Partnership..... 3-2
 - 3.2.2 Planning Partnership Activities 3-5
- 3.3 Stakeholder Outreach and Involvement 3-7
- 3.4 Public Participation - Citizen Involvement 3-9
- 3.5 Incorporation of Existing Plans, Studies, Reports and Technical Information..... 3-12
- 3.6 Integration with Existing Planning Mechanisms and Programs 3-14
- 3.7 Continued Public Involvement..... 3-15

SECTION 4 COUNTY PROFILE 4-1

- 2016 HMP Update Changes 4-1
- 4.1 General Information 4-1
 - 4.1.1 Physical Setting 4-3
- 4.2 Economy of Cape May County 4-10
- 4.3 Population and Demographics..... 4-10
 - 4.3.1 Population Characteristics 4-10
 - 4.3.2 Vulnerable Populations..... 4-13
 - 4.3.3 Population Trends..... 4-18
- 4.4 General Building Stock 4-21
 - 4.4.1 Development Trends and New Development 4-27
- 4.5 Critical Facilities 4-29
 - 4.5.1 Essential Facilities 4-29
 - 4.5.2 Transportation Systems 4-30
 - 4.5.3 Lifeline Utility Systems..... 4-31
 - 4.5.4 High-Potential Loss Facilities..... 4-35
 - 4.5.5 Other Facilities 4-35

SECTION 5 RISK ASSESSMENT

- 5.1 Methodology and Tools..... 5.1-1
 - 5.1.1 Methodology..... 5.1-1
 - 5.1.2 Tools..... 5.1-1
- 5.2 Identification of Hazards of Concern 5.2-1





- 5.1.1 Methodology..... 5-1
- 5.3 Hazard Ranking..... 5.3-1
 - 5.3.1 Hazard Ranking Methodology..... 5.3-1
 - 5.3.2 Hazard Ranking Results 5.3-2
- 5.4 Hazard Profiles and Vulnerability Assessments
 - 5.4.1 Climate Change and Sea Level Rise..... 5.4.1-1
 - 5.4.2 Coastal Erosion..... 5.4.2-1
 - 5.4.3 Flood..... 5.4.3-1
 - 5.4.4 Hurricane and Tropical Storm 5.4.4-1
 - 5.4.5 Nor’Easter..... 5.4.5-1
 - 5.4.6 Severe Weather..... 5.4.6-1
 - 5.4.7 Severe Winter Weather..... 5.4.7-1
 - 5.4.8 Tsunami 5.4.8-1
 - 5.4.9 Wildfire..... 5.4.9-1

SECTION 6 MITIGATION STRATEGY 6-1

- 2016 Plan Update Changes 6-1
- 6.1 Background and Past Mitigation Accomplishments..... 6-1
- 6.2 General Mitigation Planning Approach..... 6-2
- 6.3 Review and Update of Mitigation Goals and Objectives 6-2
 - 6.3.1 Goals and Objectives 6-2
- 6.4 Capability Assessment 6-9
 - 6.4.1 Planning and Regulatory Capability 6-9
 - 6.4.1.1 Planning and Regulatory Capability – Federal and State 6-9
 - 6.4.1.2 Planning and Regulatory Capability – County and Local 6-12
 - 6.4.2 Administrative and Technical Capabilities 6-16
 - 6.4.2.1 Administrative and Technical Capabilities – Federal and State 6-17
 - 6.4.2.2 Administrative and Technical Capabilities – County and Local 6-20
 - 6.4.3 Fiscal Capabilities..... 6-22
 - 6.4.3.1 Fiscal Capabilities – Federal and State..... 6-22
 - 6.4.3.2 Fiscal Capabilities – County and Local..... 6-26
- 6.5 Mitigation Strategy Development and Update 6-27
 - 6.5.1 Update of Municipal Mitigation Strategies 6-27
 - 6.5.2 Update of County Mitigation Strategies 6-31
 - 6.5.3 Mitigation Strategy Evaluation and Prioritization 6-31
 - 6.5.4 Benefit/Cost Review..... 6-32

SECTION 7 PLAN MAINTENANCE

- 2016 Plan Update Changes 7-1
- 7.1 Monitoring, Evaluating, and Updating the Plan 7-1
 - 7.1.1 Monitoring..... 7-2
 - 7.1.2 Evaluating..... 7-3
 - 7.1.2 Updating 7-5
- 7.2 Implementation of Mitigation Plan Through Existing Programs 7-5
- 7.3 Continued Public Involvement..... 7-6





VOLUME II

SECTION 8 PLANNING PARTNERSHIP

8.1	Background	8-1
8.1.1	Initial Solicitation and Letters of Intent	8-1
8.1.2	Planning Partner Expectations	8-1
8.1.3	Jurisdictional Annex Templates	8-2

SECTION 9 ANNEXES 9-1

9.1	Cape May County	9.1-1
9.2	Avalon Borough.....	9.2-1
9.3	City of Cape May.....	9.3-1
9.4	Cape May Point Borough	9.4-1
9.5	Dennis Township	9.5-1
9.6	Lower Township.....	9.6-1
9.7	Middle Township.....	9.7-1
9.8	City of North Wildwood.....	9.8-1
9.9	Ocean City	9.9-1
9.10	Sea Isle City.....	9.10-1
9.11	Borough of Stone Harbor.....	9.11-1
9.12	Upper Township	9.12-1
9.13	Borough of West Cape May	9.13-1
9.14	Borough of West Wildwood	9.14-1
9.15	City of Wildwood	9.15-1
9.16	Borough of Wildwood Crest.....	9.16-1
9.17	Borough of Woodbine	9.17-1

Acronyms and Abbreviations	AC-1
References	R-1

APPENDICES

- Appendix A – Adoption Resolutions
- Appendix B – Meeting Documentation
- Appendix C – Participation
- Appendix D – Public and Stakeholder Outreach Documentation
- Appendix E – Municipal Annex Instructions and Template
- Appendix F – FEMA 386 Worksheets
- Appendix G – Hazard Events and Losses





LIST OF TABLES

Table 1-1 Participating Jurisdictions in Cape May County1-2

Table 1-2 FEMA Local Mitigation Plan Review Crosswalk.....1-4

Table 3-1 Participating Cape May County Jurisdictions3-1

Table 3-2 Cape May County Hazard Mitigation Planning Partnership3-3

Table 3-3 Summary of Mitigation Planning Activities / Efforts3-6

Table 3-4 Record of the Review of Existing Programs, Policies, and Technical Documents for Participating Jurisdictions3-13

Table 4-1 Municipality Classification7

Table 4-2 Land Use Summary for Cape May County, 2007 & 20128

Table 4-3 Cape May County Population Statistics11

Table 4-4 Cape May County Population Trends, 1920 to 201518

Table 4-5 Ten Largest Municipalities in Cape May County18

Table 4-6 Population Trends in Cape May County by Municipality.....19

Table 4-7 Number of Buildings and Replacement Cost Value by Occupancy Class22

Table 4-8 Water Suppliers in Cape May County.....31

Table 4-9 Wastewater Service Regions in Cape May County.....32

Table 5.2 1. Identification of Natural Hazards of Concern for Cape May County5.2-2

Table 5.3-1 Probability of Occurrence Ranking Factors5.3-1

Table 5.3-2 Numerical Values and Definitions for Impacts on Population, Property and Economy5.3-2

Table 5.3-3 Probability of Occurrence Ranking for Hazards of Concern for Cape May County5.3-3

Table 5.3-4 Impact Ranking for Hazards of Concern for Cape May County5.3-4

Table 5.3-5 Total Risk Ranking Value for Hazards of Concern for Cape May County5.3-5

Table 5.3-6 Hazard Ranking Results for Hazards of Concern for Cape May County5.3-5

Table 5.4.1-1 Total Land Area Affected by Sea-Level Rise by Municipality5.4.1-4

Table 5.4.1-2 Linear MSL Trends and 95% Confidence Intervals.....5.4.1-8

Table 5.4.1-3 Update Mean Sea Level Trends5.4.1-9

Table 5.4.1-4 Total Sea Level Rise Projections for New Jersey5.4.1-9

Table 5.4.1-5 Estimated Population Located in the Projected Sea-Level Rise Inundation Areas5.4.1-13

Table 5.4.1-6 Estimated Number of Buildings Located in Projected Sea Level Rise Inundation Areas5.4.1-14

Table 5.4.1-7 Building Replacement Cost Value Exposed to Projected Sea Level Rise.....5.4.1-16

Table 5.4.1-8 Critical Facilities Located in the MHHW +1 Foot Inundation Area5.4.1-17

Table 5.4.1-9 Critical Facilities Located in the MHHW +2 Feet Inundation Area5.4.1-18

Table 5.4.1-10 Critical Facilities Located in the MHHW +3 Feet Inundation Area5.4.1-18

Table 5.4.1-11 Critical Facilities Located in the MHHW +6 Feet Inundation Area5.4.1-19

Table 5.4.1-12 Acreage of Wetlands Located within the Sea-Level Rise Inundation Areas.....5.4.1-20

Table 5.4.2-1 Coastal Erosion-Related FEMA DR and EM Declarations for Cape May County5.4.2-5

Table 5.4.2-3 Estimated Population Exposed to the Coastal Erosion Hazard5.4.2-11

Table 5.4.2-4 Estimated Buildings Exposed to the Coastal Erosion Hazard5.4.2-12

Table 5.4.2-5 Critical Facilities Located in the Estimated Coastal Erosion Hazard Area5.4.2-12

Table 5.4.2-6 Location of Coastal Erosion Vulnerability for Hurricane Evacuation Routes5.4.2-13

Table 5.4.3-1 Historic Tide References for Flooding in Cape May County5.4.3-6

Table 5.4.3-2 Acreage of Wetlands by Municipality5.4.3-7

Table 5.4.3-3 Natural and Beneficial Land in Cape May County5.4.3-8

Table 5.4.3-4 Hurricane and Tropical Storm-Related FEMA DR and EM Declarations for Cape May





County5.4.3-12

Table 5.4.3-5 Probability of Future Occurrences5.4.3-13

Table 5.4.3-6 Total Land Area in the 1-Percent and 0.2-Percent Annual Chance Flood Zones (Acres).....5.4.3-18

Table 5.4.3-7 Estimated Population Exposed to the Flood Hazard5.4.3-19

Table 5.4.3-8 Estimated Population Displaced or Seeking Short-Term Shelter from the 1-Percent Annual Chance Flood Event.....5.4.3-20

Table 5.4.3-9 Estimated General Building Stock Exposure to the 1- Percent Annual Chance Flood Event – All Occupancies5.4.3-22

Table 5.4.3-10 Estimated General Building Stock Exposure to the 0.2-Percent Annual Chance Flood Event – All Occupancies5.4.3-23

Table 5.4.3-11 Estimated General Building Stock Potential Loss to the 1-Percent Annual Chance Flood Event5.4.3-24

Table 5.4.3-12 Occupancy Class of Repetitive Loss Structures in Cape May County.....5.4.3-25

Table 5.4.3-13 Occupancy Class of Repetitive Loss Structures in Cape May County, by Municipality5.4.3-26

Table 5.4.3-14 NFIP Policies, Claims and Repetitive Loss Statistics5.4.3-27

Table 5.4.3-15 Number of Critical Facilities Located in the 1-Percent Annual Chance Flood Zone.....5.4.3-29

Table 5.4.3-16 Number of Critical Facilities Located in the 0.2-Percent Annual Chance Flood Zone5.4.3-30

Table 5.4.3-17 Estimated Debris Generated from the 1-Percent Flood Event.....5.4.3-31

Table 5.4.4-1 The Saffir-Simpson Hurricane Scale.....5.4.4-4

Table 5.4.4-2 Hurricane and Tropical Storm-Related FEMA DR and EM Declarations for Cape May County5.4.4-8

Table 5.4.4-3 Probability of Future Occurrences of Hurricane and Tropical Storm Events.....5.4.4-9

Table 5.4.4-4 Approximate Population Located in the Hurricane Inundation Zones5.4.4-11

Table 5.4.4-5 Estimated Sheltering Needs for the 100- and 500-year MRP Hurricane Event5.4.4-12

Table 5.4.4-6 Description of Damage Categories5.4.4-13

Table 5.4.4-7 Estimated Building Value (Structure Only) Damaged by the 100-Year and 500-Year MRP Hurricane-Related Winds.....5.4.4-14

Table 5.4.4-8 Estimated Building Value (Structure Only) Damaged by the 100-Year and 500-Year MRP Hurricane-Related Winds.....5.4.4-15

Table 5.4.4-9 Number of Buildings in the Hurricane Inundation Zones5.4.4-19

Table 5.4.4-10 Building Replacement Cost Value in the Hurricane Inundation Zones5.4.4-20

Table 5.4.4-11 Estimated Impacts to Critical Facilities for the 100- Year Mean Return Period Hurricane-Related Winds5.4.4-21

Table 5.4.4-12 Estimated Impacts to Critical Facilities for the 500-Year Mean Return Period Hurricane-Related Winds5.4.4-21

Table 5.4.4-13 Critical Facilities and Utilities Located in the Category 1 SLOSH Inundation Zone5.4.4-22

Table 5.4.4-14 Critical Facilities and Utilities Located in the Category 2 SLOSH Inundation Zone5.4.4-23

Table 5.4.4-15 Critical Facilities and Utilities Located in the Category 3 SLOSH Inundation Zone5.4.4-24

Table 5.4.4-16 Critical Facilities and Utilities Located in the Category 4 SLOSH Inundation Zone5.4.4-25

Table 5.4.4-17 Debris Production for 100- and 500-Year Mean Return Period Hurricane-Related Winds...5.4.4-27

Table 5.4.5-1 RSI Ranking Categories5.4.5-2

Table 5.4.5-2 FEMA Declarations for Nor'Easter Events in Cape May County5.4.5-2

Table 5.4.5-3 Probability of Future Occurrences of Nor'Easter Events5.4.5-3

Table 5.4.6-1 NWS Wind Descriptions.....5.4.6-5

Table 5.4.6-2 Fujita Damage Scale5.4.6-6

Table 5.4.6-3 Enhanced Fujita Damage Scale.....5.4.6-6

Table 5.4.6-4 Hail Size.....5.4.6-8

Table 5.4.6-5 MRCC Temperature Extremes.....5.4.6-11

Table 5.4.6-6 FEMA DR and EM Declarations since 2010 for Severe Weather Events in Cape May



County5.4.6-11

Table 5.4.6-7 Probability of Future Occurrences of Severe Weather Events5.4.6-12

Table 5.4.7-1 RSI Ranking Categories5.4.7-3

Table 5.4.7-2 FEMA Declarations for Severe Winter Weather Events in Cape May County5.4.7-4

Table 5.4.7-3 Probability of Future Occurrence of Severe Winter Weather Events5.4.7-5

Table 5.4.7-4 General Building Stock Exposure and Estimated Losses from Severe Winter Storm Events ..5.4.7-7

Table 5.4.8-1 Probability of Future Occurrences of Tsunamis.....5.4.8-3

Table 5.4.9-1 Approximate Area in the Wildfire Fuel Hazard Areas in Cape May County5.4.9-4

Table 5.4.9-2 Approximate Area in Wildfire Fuel Hazard Areas in Cape May County5.4.9-4

Table 5.4.9-3 Fire Danger Rating and Color Code.....5.4.9-8

Table 5.4.9-4 Probability of Future Occurrence of Wildfire Events5.4.9-9

Table 5.4.9-5 Estimated Vulnerable Population.....5.4.9-12

Table 5.4.9-6 Building Stock Replacement Cost Value Located in Wildfire Fuel Hazard Ranking Zones .5.4.9-13

Table 5.4.9-7 Number of Buildings Located in Wildfire Fuel Hazard Ranking Zones5.4.9-13

Table 5.4.9-8 Facilities in Extreme, Very High, or High Wildfire Fuel Hazard Ranking Zones in Cape May County.....5.4.9-14

Table 5.4.9-9 Facilities in Moderate and Low Wildfire Fuel Hazard Ranking Zones in Cape May County5.4.9-15

Table 6-1 Cape May County Hazard Mitigation Plan Goals and Objectives 6-3

Table 6-2 Cape May County Hazard Mitigation Plan Objectives meeting multiple Goals 6-5

Table 6-3 Comprehensive Range of Mitigation Actions 6-30

Table 6-4 Qualitative Cost and Benefit Ratings 6-33

Table 7-1 Cape May County Hazard Mitigation Planning Partnership7-1

Table 8-1 Participating Jurisdictions in Cape May County8-1

LIST OF FIGURES

Figure 1-1 Cape May County, New Jersey Mitigation Plan Area3

Figure 1-2 Cape May County Hazard Mitigation Planning Process7

Figure 3-1 Screenshot of the Cape May County Hazard Mitigation Plan Website Home Page 3-11

Figure 3-2 Screenshot of the Cape May County Hazard Mitigation Website Public Survey 3-11

Figure 3-3 Screenshot of the Enhanced RL/SRL Initiative page on project website 3-12

Figure 4-1 Overview Map of Cape May County, New Jersey 4-2

Figure 4-2 Bodies of Water in Cape May County 4-4

Figure 4-3 Watersheds of New Jersey. 4-5

Figure 4-4 2012 Land Use Land Cover for Cape May County..... 4-9

Figure 4-5 Distribution of General Population for Cape May County, New Jersey 4-12

Figure 4-6 Distribution of Persons over the Age of 65 in Cape May County, New Jersey 4-15

Figure 4-7 Distribution of Low-Income Population in Cape May County, New Jersey..... 4-16

Figure 4-8 Distribution of Children Under Age of 16 in Cape May County, New Jersey..... 4-17

Figure 4-9 Cape May County Population Projections, 2017 to 2032 4-20

Figure 4-10 Distribution of Residential Building Stock and Value Density in Cape May County 4-24

Figure 4-11 Distribution of Commercial Building Stock and Exposure Density in Cape May County 4-25

Figure 4-12 Distribution of Industrial Building Stock and Value Density in Cape May County 4-26

Figure 4-13 Potential New Development in Cape May County 4-28

Figure 4-14 Essential Facilities in Cape May County 4-33

Figure 4-15 Transportation Facilities in Cape May County 4-34





Figure 4-16 Utility Lifelines in Cape May County 4-36

Figure 4-17 High-Potential Loss Facilities in Cape May County 4-37

Figure 4-18 Additional Critical Facilities in Cape May County 4-38

Figure 5.4.1-1 The Causes of Sea Level Change 5.4.1-2

Figure 5.4.1-2 Northeast CEI, 1910-2015 5.4.1-6

Figure 5.4.1-3 Mean Sea Level Trends in New Jersey 5.4.1-8

Figure 5.4.1-4 Sea Level Rise Scenarios for Cape May County 5.4.1-12

Figure 5.4.1-5 Hurricane Evacuation Routes and Sea-Level Rise Scenarios 5.4.1-21

Figure 5.4.1-6 Potential New Development and Sea Level Rise 5.4.1-23

Figure 5.4.2-1 Coastline of Cape May County 5.4.2-3

Figure 5.4.2-2 NJDEP Shoreline Classification for Cape May County 5.4.2-9

Figure 5.4.2-3 Estimated Coastal Erosion Hazard Area for Cape May County 5.4.2-10

Figure 5.4.2-4 Potential New Development in Cape May County, FEMA Flood Hazard Area, NFIP Repetitive Loss Areas 5.4.2-15

Figure 5.4.3-1 FEMA Flood Hazard Areas in Cape May County 5.4.3-5

Figure 5.4.3-2 Wetlands in Cape May County 5.4.3-10

Figure 5.4.3-3 Coastal Flood Exposure in Cape May County 5.4.3-15

Figure 5.4.3-4 Coastal Vulnerability Index in Cape May County 5.4.3-16

Figure 5.4.3-5 NFIP Repetitive and Severe Repetitive Loss Areas in Cape May County 5.4.3-28

Figure 5.4.3-6 Potential New Development in Cape May County, FEMA Flood Hazard Area, NFIP Repetitive Loss Areas 5.4.3-34

Figure 5.4.4-1 Coastal Evacuation Routes in Cape May County 5.4.4-3

Figure 5.4.4-2 Historical Tropical Storm and Hurricane Tracks 2008 to 2015 5.4.4-4

Figure 5.4.4-3 Wind Speeds for the 100-Year Mean Return Period Event 5.4.4-6

Figure 5.4.4-4 Wind Speeds for the 500-Year Mean Return Period Event 5.4.4-7

Figure 5.4.4-5 Density of Losses for Structures (All Occupancies) for the County 100-Year MRP Hurricane (Wind-Only) Event 5.4.4-16

Figure 5.4.4-6 Density of Losses for Structures (All Occupancies) for the County 500-Year MRP Hurricane (Wind-Only) Event 5.4.4-17

Figure 5.4.4-7 Hurricane Evacuation Routes and SLOSH in Cape May County 5.4.4-28

Figure 5.4.4-8 Potential New Development in Cape May County and SLOSH 5.4.4-30

Figure 5.4.6-1 NWS Heat Index Chart 5.4.6-8

Figure 5.4.6-2 Adverse Effects of Prolonged Exposures to Heat on Individuals 5.4.6-9

Figure 5.4.6-3 NWS Wind Chill Index 5.4.6-10

Figure 5.4.6-4 Annual Days Suitable for Thunderstorms/Damaging Winds 5.4.6-13

Figure 5.4.8-1 Tsunami Inundation Map for Cape May 5.4.8-6

Figure 5.4.8-2 Tsunami Inundation Map for Avalon Borough 5.4.8-7

Figure 5.4.8-3 Tsunami Inundation Map for Ocean City 5.4.8-8

Figure 5.4.9-1 Municipalities of the New Jersey Pine Barrens 5.4.9-3

Figure 5.4.9-2 Wildfire Fuel Hazard for Cape May County 5.4.9-6

Figure 5.4.9-3 Wildfire Risk for Cape May County 5.4.9-7