



Draft Hazard Mitigation Plan

Eastern Municipal Water District
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ES EXECUTIVE SUMMARY

Table of Contents

ES.1	Plan Requirements and Objectives.....	ES-1
ES.2	Mitigation Definition	ES-4
ES.3	Planning Process Summary	ES-5
ES.4	Hazard Analysis	ES-6
ES.5	Mitigation Strategies and Implementation Plan.....	ES-8
ES.6	Monitoring, Evaluating, and Updating the Plan	ES-12

List of Tables

Table ES.1: District Hazard Ranking Summary	ES-6
Table ES.2: Loss Estimate Summary	ES-7
Table ES.3: Mitigation Action Summary.....	ES-10

ES.1 Plan Requirements and Objectives

The Eastern Municipal Water District (District) Hazard Mitigation Plan is a living document that reflects ongoing hazard mitigation activities. Hazard mitigation involves strategies to reduce short and long-term vulnerability to identified hazards. This document serves as the framework for the ongoing identification and implementation of hazard mitigation strategies developed for the District Service Area.

The District adopted its previous Hazard Mitigation Plan in 2011. This document serves as an update to that Plan.

Background Information

In 2000, the United States Congress determined that disasters and, more importantly, lack of preparedness for disasters, were significant causes of loss of life, human suffering, loss of income, and property damage. Furthermore, because disasters often disrupt the normal functioning of governments and communities and adversely affect individuals and families with great severity, special measures designed to assist the efforts of the affected States in expediting the rendering of aid, assistance, and emergency services, and the reconstruction and rehabilitation of devastated areas, were necessary. As a result, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000), or Public Law 106-390, to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. This provides an opportunity for States, Tribal governments, and local jurisdictions to apply for assistance from the Federal government in carrying out their responsibilities to alleviate the suffering and damage which results from such disasters by:

- a. revising and broadening the scope of existing disaster relief programs;
- b. encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by the States, local governments, and special districts;
- c. achieving greater coordination and responsiveness of disaster preparedness and relief programs;
- d. encouraging hazard mitigation measures to reduce losses from disasters, including development of land use and construction regulations; and
- e. providing Federal assistance programs for both public and private losses sustained in disasters.

DMA 2000 allows State, Tribal, and local jurisdictions to obtain Federal assistance through pre-disaster hazard mitigation planning. As part of the requirements for receiving Federal grants for improving a locality's resistance to disasters, each locality must determine their existing vulnerabilities and develop a plan to reduce or eliminate these vulnerabilities and must have this plan approved by the appropriate State and Federal officials. Upon approval of this plan, each locality is eligible to receive various types of disaster-related assistance through the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) Program. This includes the Pre-Disaster Mitigation (PDM) program and Hazard Mitigation Grant Program (HMGP) which releases grant funds before and after a hazard event as well as the Flood Mitigation Assistance Grant (FMA) Program which appropriates funds for projects and planning that will reduce long-term risk of flood damage to structures insured under the National Flood Insurance Program (NFIP). Although the District is not the NFIP Flood Plain Manager, District personnel can work with local Flood Plain Managers/cities to improve flood control.

The PDM program provides funds for hazard mitigation planning and the implementation of mitigation actions prior to a disaster event. These grants are funded and approved through FEMA on a competitive basis. The HMGP provides grants to implement long-term hazard mitigation measures after a major disaster declaration. These grants are funded by FEMA, but are distributed by the State. In California, that agency is the Governor's Office of Emergency Services (Cal OES).

FEMA has developed guidance to assist communities in developing both the vulnerability assessments and plans to reduce or eliminate their vulnerabilities to disasters. These tools, coupled with techniques from the safety and security industries were used to update the District's Hazard Mitigation Plan. Additional information regarding the HMGP and PDM programs can be found in FEMA's "Hazard Mitigation Assistance Unified Guidance" document, located in FEMA's Hazard Mitigation Assistance portal (<http://www.fema.gov/hazard-mitigation-assistance>). Additional information including guidance and regulations can be found at the Cal OES's Local Hazard Mitigation Planning Program portal (http://hazardmitigation.calema.ca.gov/plan/local_hazard_mitigation_plan_lhmp).

In order to be eligible for certain Federal disaster assistance and mitigation funding, the District is required to have a Cal OES- and FEMA-approved Hazard Mitigation Plan in place. As a result, the District began an effort to update this document in order to fulfill Cal OES and FEMA requirements and provide direction and guidance on implementing hazard mitigation actions on a hazard-level, probability, and cost-priority basis. The overall goal

of the Hazard Mitigation Plan is to reduce the potential for damage to critical assets from natural and man-made hazards. In addition, the plan describes past and current hazard mitigation activities and philosophies, and outlines future mitigation goals and strategies.

FEMA Requirements

FEMA requires that the Hazard Mitigation Plan meet certain requirements. First, the planning process must be open and public, and must allow the public to have an opportunity to comment during the drafting stage and prior to plan approval. Second, the process must allow other local jurisdictions to be involved in the planning process. Third, the Plan must incorporate, if appropriate, existing plans, studies, reports, and technical information.

FEMA expects that each Hazard Mitigation Plan have the following information:

1. Documentation of the **planning process** used to develop the plan
2. A **risk assessment** that provides a factual basis for upgrades and recommendations
3. A **description of the natural hazards** that can affect the jurisdiction
4. A **description of the jurisdiction's vulnerability** to these hazards
5. A **description of land usage**, and an **estimate of losses** should a disaster occur
6. A **mitigation strategy**
7. A plan **maintenance process**
8. **Documentation** that the plan has been adopted by the jurisdiction's governing body
9. **Review** by the State Hazard Mitigation Officer

ES.2 Mitigation Definition

Mitigation is the ongoing effort to prevent or lessen future emergency or disaster incidents, and the impacts they might have on people, property, and the environment. Examples of mitigation activities include the following:

- Policies and procedures;
- Variances;
- Engineering and building policies;
- Hazard mitigation plans & teams;
- Technical guidance & assistance;
- Financial assistance;
- Hazard Identification;
- Risk Analysis;
- Evaluation;
- Research; and
- Education.

Mitigation decreases the demand for emergency response resources, reduces the principal causes of injuries and deaths, enables a quicker lifesaving response and economic recovery because the community infrastructure remains intact, and reduces the societal impacts of the emergency because it results in less disruption to the social environment. In essence, mitigation is the foundation of sustainable community development.

ES.3 Planning Process Summary

Hazard mitigation planning is a dynamic process built on realistic assessments of past and present information that enables District personnel to anticipate future hazards and provide mitigation strategies to address possible impacts and identified needs. The overall approach to the Hazard Mitigation Plan included developing a baseline understanding of natural and man-made hazards, determining ways to reduce those risks, and prioritizing mitigation recommendations for implementation.

To complete these objectives, District staff compiled a qualified team with various expertise, including Engineering, Safety; Risk & Environmental, Board of Directors Administration, Local City Personnel, and Riverside County representatives to participate on a Steering Committee to guide the update of the District's comprehensive Hazard Mitigation Plan. In addition, the Steering Committee solicited public involvement throughout the planning process, including the release of a public survey through the District website, allowing the public to comment during the drafting stage, and making the draft Plan available to allow the public to comment on its content. Chapter 1: Planning Process, contains descriptions of the Planning process, including information on the Steering Committee and public involvement.

ES.4 Hazard Analysis

The District's Service Area is vulnerable to a wide range of natural and man-made hazards that threaten life and property. In order to identify the hazards that the District perceives as the largest threat, each member of the Steering Committee participated in the Hazard Identification Workshop during the first Steering Committee Meeting. The Steering Committee brainstormed potential hazards based on past incidents that have impacted the Service Area and information incorporated from other studies. Each identified hazard was then qualitatively ranked based upon hazard probability/frequency, consequence/severity, and the District's overall vulnerability using an interactive model. Section 3.2 Hazard Identification, contains detailed information regarding the hazard ranking. Table ES.1 provides a summary of the hazard ranking.

Table ES.1: District Hazard Ranking Summary

Hazard Rank
High
Earthquake
Moderately High
Extreme Weather
Flood & Dam/Reservoir Failure
Infrastructure Failure
Wildfire
Hazardous Materials Release
Terrorism
Moderate
Power Failure
Moderately Low
Drought
Low

Asset Inventory and Loss Estimates

In addition to the hazard profiles, the Risk Assessment contains a detailed asset inventory that lists the District's assets, such as operations facilities, administration buildings, and pipelines. This asset inventory was used in the vulnerability assessment to estimate potential losses for each hazard. The Steering Committee reviewed each hazard and assigned a potential percentage of damage expected. This also included loss of function values for water service. Section 3.14 Loss Estimates, includes a detailed breakdown of the vulnerability assessment calculations.

Table ES.2: Loss Estimate Summary

Hazard	Estimated Losses
Earthquake	\$616,802,000
Terrorism	\$207,414,000
Hazardous Material Release	\$161,112,000
Infrastructure Failure	\$124,625,000
Flood/Dam Release	\$108,735,000
Wildfire	\$23,289,000
Power Failure	\$21,921,000
Extreme Weather	\$12,183,000
Drought	\$4,779,000

Note: A total value is not included since it is not expected for all hazards to occur simultaneously.

Note: Values are rounded to the nearest thousand.

ES.5 Mitigation Strategies and Implementation Plan

Plan Goals and Objectives

As part of the development process, Plan goals and objectives were revalidated to provide a framework for mitigating hazards and proposing potential mitigation actions. The goals were developed by the Steering Committee and are consistent with the California State Hazard Mitigation Plan and the Riverside County Multi-Jurisdictional Local Hazard Mitigation Plans. The District's overall Plan goals are to:

- Save Lives and Reduce Injuries
- Avoid Damages to Property
- Protect the Environment
- Promote Hazard Mitigation as an Integrated Policy

In addition to the overall Plan goals, individual objectives were developed which support the overall Plan goals and translate more easily into mitigation actions. Section 4.1 Mitigation Goals and Objectives contains the full list of the Plan goals and objectives.

Mitigation Strategies

Mitigation strategies are administrative and/or engineering project recommendations to reduce the vulnerability to the identified hazards. The Steering Committee identified specific mitigation actions to reduce the impact or likelihood of the hazards that reflected the Plan goals and objectives.

Implementation Plan

Following the identification of mitigation actions, a simplified Benefit-Cost Review was applied in order to prioritize the mitigation actions for implementation. The priority for implementing mitigation actions depended upon the overall cost effectiveness of the action, when taking into account monetary and non-monetary costs and benefits associated with each action. Additionally, the following questions were considered when developing the Benefit-Cost Review:

- How many people will benefit from the action?
- How large of an area is impacted?
- How critical are the assets that benefit from the action?
- Environmentally, does it make sense?

The Benefit-Cost Review yielded a relative priority ranking (High, Medium, or Low) for each mitigation action. Each ranking is defined as follows.

- High: Benefits are perceived to exceed costs without further study or evaluations; or the action is critical.
- Medium: Benefits are perceived to exceed costs, but may require further study or evaluation prior to implementation.
- Low: Benefits and costs require evaluation prior to implementation.

Mitigation actions identified as high-priority are typically implemented before lower ranked actions. Results from the Benefit-Cost Review are located in Chapter 4.4 Prioritization of Mitigation Recommendations. The Steering Committee considered responsible departments, funding resources, and estimated implementation timeframe when developing the implementation plan.

Chapter 4 Mitigation Strategies contains additional information regarding the mitigation strategies and implementation plan. Table ES.3 on the following pages provides a summary of each mitigation action, including the hazard(s) mitigated, responsible agency/department, and relative priority rank taken from the Benefit-Cost Review.

Table ES.3: Mitigation Action Summary

Action ID	Mitigation Action	Hazards Mitigated	Responsible Agency/Department	Priority
2017.HMP.01	Review emergency materials inventory, identify potential gaps, and procure new items to improve continuity of operations. Include redundant structural materials to minimize emergency repair time.	All Hazard	Warehouse	Medium
2017.HMP.02	Review and refresh mutual aid agreements. Identify potential gaps and enter in new agreements as appropriate	All Hazard	SREM/ Purchasing	High
2017.HMP.03	Update radio system to enhance communications during a disaster.	All Hazard	SREM	Medium
2017.HMP.04	Purchase an additional satellite to improve emergency communications	All Hazard	SREM	High
2017.HMP.05	Enhance public and student outreach programs to include education on how to prepare for the impacts of hazards on water and wastewater operations.	All Hazard	Public and Government Affairs	Medium
2017.HMP.06	Identify repetitive pipeline break areas and incorporate pipeline replacement in the Capital Improvement Plan.	Earthquake/ Flood & Dam/Reservoir Failure	Water Operations/ Maintenance Services	Medium
2017.HMP.07	Conduct an analysis of critical facilities to determine level of imperviousness to extreme weather events and utilize the maintenance schedule to make upgrades to improve resiliency	Extreme Weather	Water Operations/ Maintenance Services	Medium
2017.HMP.08	Include considerations for extreme weather (i.e. wind, high heat, excessive rain, etc.) events into new building planning documents	Extreme Weather	Water Operations/ Maintenance Services	High
2017.HMP.09	Enhance the District's Emergency 24/7 webpage to include tips for the public regarding extreme weather as they pertain to water service	Extreme Weather	SREM	High

Action ID	Mitigation Action	Hazards Mitigated	Responsible Agency/Department	Priority
2017.HMP.10	Elevate at-risk subterranean facilities to above grade locations A list of facilities requiring elevation can be found in the Engineering Department	Flood & Dam/Reservoir Failure	Operations/ Engineering	Low
2017.HMP.11	Identify facilities located within the updated dam inundation zones currently under development by Riverside County and implement mitigation projects as appropriate.	Flood & Dam/Reservoir Failure	SREM/ Engineering Services	Low
2017.HMP.12	Review and enhance infrastructure maintenance and monitoring schedules to increase the opportunity to identify and repair equipment prior to failure.	Infrastructure Failure/ Power Failure	Operations and Maintenance	High
2017.HMP.13	Review brush clearance standards, particularly for facilities in fringe areas, and identify ways to expand clearance areas. Prioritize those facilities identified as being vulnerable to wildfire.	Wildfire	Maintenance Services	Medium
2017.HMP.14	Purchase emergency water tenders for use during wildfire/ seismic incidents	Wildfire/ Earthquake	SREM	Medium
2017.HMP.15	Identify opportunities to enhance training for the Hazardous Materials Emergency Response Team and implement improvements as appropriate.	Hazardous Material Release/ Earthquake	SREM	High
2017.HMP.16	Implementation of proposed Capital Improvement Projects to augment water supply (Perris II Desalination and San Jacinto Valley enhanced recharge and Recovery Program)	Drought	Water Operations	Medium

ES.6 Monitoring, Evaluating, and Updating the Plan

The Hazard Mitigation Plan is a living document that reflects ongoing hazard mitigation activities and requires monitoring, evaluating, and updating to ensure mitigation actions are implemented. To facilitate the Hazard Mitigation Planning process and adhere to regulatory requirements, the Plan will be reviewed annually and any major revisions will be incorporated into the five-year update. In addition, public involvement will be requested when applicable. Chapter 5: Plan Maintenance outlines the update requirements and planning mechanisms the District has in place for ongoing hazard mitigation.

1 PLANNING PROCESS

Table of Contents

1.1	Narrative Description of the Planning Process	1-1
1.2	Steering Committee & Public Involvement	1-7
1.2.1	Steering Committee Participant Solicitation	1-7
1.2.2	Steering Committee Participants	1-8
1.2.2	Steering Committee Meeting Descriptions	1-10
1.2.3	Public Meetings & Outreach	1-13
1.3	Review and Incorporation of Existing Plans.....	1-14

Figures

Figure 1.1:	Hazard Mitigation Planning Cycle	1-1
Figure 1.2:	Example Hazard Identification Worksheet	1-10
Figure 1.3:	Example FEMA Benefit-Cost Analysis	1-13

Tables

Table 1.1:	Steering Committee Participants	1-9
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1.1 Narrative Description of the Planning Process

§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.

§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.

Hazard mitigation planning is a dynamic process built on realistic assessments of past and present information that engages the Eastern Municipal Water District (District) to anticipate future hazards and provide meaningful strategies to address possible impacts and identified needs. The hazard mitigation planning process involves the following tasks:

- Organizing resources
- Assessing risks
- Developing mitigation strategies, goals, and priorities
- Adopting the plan
- Implementing the plan
- Monitoring progress
- Revising the plan as necessary



Figure 1.1: Hazard Mitigation Planning Cycle

The overall approach to updating the Hazard Mitigation Plan (HMP) includes building off the baseline understanding of hazards defined in the 2011 Hazard Mitigation Plan, determining ways to continue reducing those risks, and prioritizing those recommendations for implementation. The following task descriptions provide a detailed narrative of the overall project progression.

Organize Resources

Identify Stakeholders and Compile Advisory Committee

Susan Barnes, Safety & Emergency Management Officer for the District, and Risk Management Professionals invited and coordinated participation for a Steering Committee from local law enforcement, local government representatives, and District personnel. The Steering Committee was responsible for providing essential insight into the past hazard events, current hazard vulnerability (including specific locations), critical assets, and possible mitigation projects. Although participation was limited due to personnel availability and varying levels of interest from outside agencies, the following groups were invited to participate in the plan development.

- Key District Personnel (Engineering, Safety; Risk & Environmental, and Board of Directors Administration)
- Local City Personnel
- Local Fire Departments
- Riverside County

Public Process

The Disaster Mitigation Act of 2000 requires an “Open and Public Process” for developing the HMP. This process requires, at a minimum, the public be allowed to comment on the HMP during the draft phase and prior to adoption. To meet this requirement, the District published a survey to allow for public comment during the drafting stage of the HMP prior to the creation of a draft for submittal to the California Governor’s Office of Emergency Services (Cal OES) and Federal Emergency Management Agency (FEMA) for review. The public survey was made available through the District website on April 3, 2017. Documentation of public outreach is included in Appendix D.

Identify Hazards

This task was designed to identify all the natural and man-made hazards that *might* affect the District and then narrow the list to the hazards that are most likely to occur. The hazards included natural, technical, and human-caused events, with an emphasis on the effect each disaster would have on the District's critical assets. To compile the list, the Steering Committee built upon the list of hazards identified in the 2011 HMP and then continued to research newspapers, historical records, and websites to determine any additional hazards. In addition, the Steering Committee reviewed the list of hazards that have affected the District in the past with specific information regarding frequency, magnitude, and associated consequences. A hazard identification exercise was conducted during the first Steering Committee meeting to identify and evaluate each selected hazard. The following hazards were included in the HMP update.

- Earthquake
- Extreme Weather
- Flood & Dam/Reservoir Failure
- Infrastructure Failure
- Wildfire
- Hazardous Material Release
- Terrorism
- Power Failure
- Drought

This list does not include all the hazards discussed during the Hazard identification exercise. Hazards which were no longer thought to pose significant risk to the District were removed from the Plan update. In addition, some items were captured as sub-items of the hazards listed above. For example, climate change is discussed with hazards where the impact of changes in weather patterns could act as a catalyst for those scenarios (i.e. Flooding, Wildfire, and Drought).

Profile Hazard Events

The hazard event profiles consist of either a map indicating the area impacted by each hazard or an important piece of data regarding the characteristics of hazard events within the District or surrounding area. To update each detailed hazard profile, the Steering Committee researched and reviewed relevant open-source hazard studies and mapping

projects. In addition, the District supplied any hazard studies that had been developed specifically for the District. This task determined the hazard magnitude, frequency, and location characteristics (e.g. predicted ground acceleration values, fault locations, flood plains, etc.) that were used as the design-basis for the loss estimates and hazard ranking.

Asset Inventory

The purpose of this task was to determine the quantity of assets that lie in the different hazard areas and what portion of the service area this represents. The asset inventory was completed by reviewing a list of District assets from the 2011 HMP and included any new or missing facilities.

The completed asset inventory enabled the Steering Committee to estimate losses resulting from hazard events and to determine where resources should be allocated to address mitigation issues.

Loss Estimates

FEMA developed a standardized natural hazard loss estimation methodology containing models for estimating potential losses from earthquake, wind (hurricanes, thunderstorms, tornadoes, and extra-tropical cyclones), and flood (river basin and coastal) hazards. The District used HAZUS-MH, a PC-based software, which implements the FEMA-developed methodology and runs on a Geographic Information System (GIS) platform, to map and display earthquake hazard data, as well as the results of earthquake damage and economic loss estimates for buildings and infrastructure within the District's service area.



HAZUS-MH contains baseline data such as:

- Demographic data (population, age, ethnicity, and income);
- General building stock (square footage of occupancy classes for each census tract);
- Medical care facilities;
- Emergency response facilities (fire, police, emergency operations centers);
- Schools;

- Dams;
- Hazardous materials facilities;
- Roads, airports, and other transportation facilities; and
- Electric power, oil, and gas lines and other utility facilities.

In estimating losses, HAZUS-MH takes into account various impacts of a hazard events such as:

- Physical damage: damage to residential and commercial buildings, schools, critical facilities, and infrastructure;
- Economic loss: lost jobs, business interruptions, repair and reconstruction costs; and
- Social impacts: impacts to people, including potential loss of potable water and sanitation services.

In addition to the earthquake HAZUS-MH assessment, the Steering Committee developed loss assessment tables for each specific hazard that identifies potential damages within the District's service area, including population at risk, critical infrastructure, and buildings. This task is critical in determining which assets are subject to the greatest potential damages and which hazard event is likely to produce the greatest potential losses. The conclusion of this step precipitated a comprehensive loss estimate (vulnerability assessment) for each identified hazard. The assessment included estimates for all District assets in terms of damages, economic loss, and the associated consequences.

Mitigation Strategy Development

Development of Mitigation Goals and Objectives

The Steering Committee discussed mitigation features and resources the District currently has in place. These mitigation features provided a framework to determine where practical improvements could be made and where sufficient improvement would be prohibitive due to cost, schedule, or impracticality of implementation.

For each of the hazard events, mitigation goals and objectives were created with the intention of reducing or eliminating the potential hazard impacts. The mitigation goals and objectives from the 2011 HMP were reevaluated and, where necessary, rewritten at a Steering Committee Meeting to provide the basis for determining the associated mitigation projects.

Identify and Prioritize Mitigation Actions

Mitigation strategies are administrative and engineering project recommendations to reduce the vulnerability to the identified hazards. It was imperative to have critical District staff as well as representatives from Riverside County and local emergency preparedness planners involved in this phase of the plan to develop strategies and projects that will mitigate hazards cost-effectively, as well as ensure consistency with the District's long-term mitigation goals and capital improvements. At a Steering Committee meeting, a team-based approach was used to review existing and brainstorm new mitigation projects based on the identified hazards and associated loss estimates. The evaluation and prioritization of the mitigation actions produced a list of recommended mitigation actions to incorporate into the HMP. The Steering Committee also conducted a Benefit-Cost Review for each proposed mitigation action to determine the relative priority level of the recommendation.

Implementation & Monitoring

Prepare an Implementation Strategy

The Steering Committee developed an action plan to detail how the mitigation recommendations will be prioritized, implemented, and administered by the District. During the HMP creation process, the Steering Committee discussed mitigation project implementation strategy which included identifying responsible departments, allocating funding resources, and estimating timeframes.

1.2 Steering Committee & Public Involvement

While the District and Risk Management Professionals had lead responsibility for the update of the HMP, neighboring communities, agencies, and other interested parties were invited to participate on the Steering Committee to review the HMP during each phase of document development. Each participating member of the Steering Committee had the opportunity to impact all aspects of the planning process. In addition, the District and Risk Management Professionals personnel

assessed community support for proposed plan revisions through active community involvement; engaging the public through the use of a public survey.



§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

§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.

1.2.1 Steering Committee Participant Solicitation

The District solicited participation in the HMP Steering Committee by contacting both internal and external stakeholders. Internal stakeholders included members of various departments. External stakeholders were comprised of representatives from local agencies and the County of Riverside.

1.2.2 Steering Committee Participants

The District brought together personnel from Engineering, Safety; Risk; and Emergency Management (SREM), and District Board Member Administration along with members of the Riverside County Emergency Management Division to ensure the Steering Committee included members with a variety of backgrounds. Additionally, the District compiled historical data, provided relevant planning documents for incorporation into the HMP, and coordinated participation with the public through a survey. Each draft chapter was reviewed by the Steering Committee and specific comments and input were incorporated into the Plan. The multidisciplinary Steering Committee enabled the District to work together and incorporate each individual's expertise which provided for a more comprehensive HMP.

The HMP was developed with assistance and advice from participants from the District and neighboring cities/agencies. Table 1.1 provide a list of the Steering Committee participants. Individuals are listed in alphabetical order by last name.

Table 1.1: Steering Committee Participants

Name	Affiliation	Title	SCM1	SCM2	SCM3
Barnes, Susan	Eastern Municipal Water District	Safety & Emergency Management Officer	X	X	X
Bray, Ryan	Risk Management Professionals	Technical Consultant	X	X	X
Bruns, Sarah	Riverside County Emergency Management Division	Emergency Services Coordinator	X		X
Day, Dennis	Riverside County Emergency Management Division	Emergency Services Coordinator			X
Gonzalez, Melanie	Riverside County Emergency Management Division	Health Education Assistant II	X		
Hefley, Douglas	Eastern Municipal Water District	Director of the Safety, Risk, and Emergency Management Department	X	X	X
Joyce, Jay	Eastern Municipal Water District	Safety & Risk Emergency Management Officer	X	X	
Martinez, David	City of Perris	Building Officer & Fire Marshall	X		
Wallace, Corey	Eastern Municipal Water District	Civil Engineer II	X	X	X
Zelaya, Sheila	Eastern Municipal Water District	Board Secretary	X	X	X

The Steering Committee met three times during the course of the update to discuss project progress and obtain valuable input and information to include in the HMP update. The scope of these meetings is detailed over the next subsequent pages. Also, Appendix D – Public Participation contains copies of the presentation used at each meeting, specific meeting handouts, and attendance records.

1.2.2 Steering Committee Meeting Descriptions

Steering Committee Meeting #1 – Project Initiation, Hazard Identification, Mitigation

Date: March 14, 2017

During the Project Initiation, Hazard Identification, and Mitigation Goal & Objectives meeting, Risk Management Professionals gave an overview presentation that detailed the objectives and scope of the project. After a review of the project schedule and key tasks, the Steering Committee participant’s areas of expertise, resultant member responsibilities, and community meeting process was discussed.

Figure 1.2: Example Hazard Identification Worksheet

HAZARD IDENTIFICATION AND RISK RANKING		
Hazard Rank Factors	Hazard Factor Description	Rank
Probability/Frequency	Probability/Frequency	0
Consequence/Severity	Consequence/Severity	0
Vulnerability	Not applicable due to geographic location characteristics	0
Risk Rank	Not a hazard - occurs less than once every 10 years	0
Comments	Major event - occurs between once a year and once every 10 years (occurs) Frequent event - occurs more than once every 10 years	0
Wildfire		
Hazard Rank Factors	Hazard Factor Description	Rank
Probability/Frequency	Probability/Frequency	0
Consequence/Severity	Consequence/Severity	0
Vulnerability	Not applicable due to geographic location characteristics	0
Risk Rank	Not a hazard	0
Comments	Not a hazard	0
Flood		
Hazard Rank Factors	Hazard Factor Description	Rank
Probability/Frequency	Probability/Frequency	0
Consequence/Severity	Consequence/Severity	0
Vulnerability	Not applicable due to geographic location characteristics	0
Risk Rank	Not a hazard	0
Comments	Not a hazard	0

The Steering Committee meeting also served as a mechanism to determine the hazards the Plan would profile in detail. To effectively characterize the District’s risk and vulnerability, Risk Management Professionals facilitated a discussion of the historical hazards with the Steering Committee members. This meeting also served as a forum to discuss any background information and obtain asset inventory specifics.

The Steering Committee determined the initial hazard profile ranking through a facilitated exercise using an automated interactive spreadsheet that asks specific questions regarding potential hazards and then assigns a relative value to each potential hazard accordingly, including numerical rankings (1-5) of the following criteria:

- **Consequence/Severity** – How wide spread is the impact area?
- **Secondary Effects** – Could the event trigger another event and separate response?
- **Probability/Frequency** – Historical view of how often this type of event occurs locally and projected recurrence intervals.
- **Warning/Onset** – Advance warning of the event, or none.
- **Duration** – Length of elapsed time where response resources are active.
- **Recovery** – Length of time until lives and property return to normal.

Chapter 3: Risk Assessment outlines the methodology used for hazard rankings. All Steering Committee members were requested to provide existing plans and technical studies, GIS data, and identify existent mitigation features as part of a detailed information request.

Additionally, the Plan's goals and objectives were updated with the intention of reducing or eliminating the potential hazard impacts, which also provided the basis for determining the associated mitigation projects. The Steering Committee reviewed the goals and objective from the 2011 HMP, the California State Multi-Hazard Mitigation plans, and the Riverside County Multi-Jurisdictional Hazard Mitigation Plan as a baseline for determining the District's mitigation goals and objectives.

Following this first meeting, the asset inventory was developed to determine the quantity of building, facilities, and other assets that lie in the different hazard areas and what portion of the service area they represent. The asset inventory included locations and specific information for administration buildings, pipelines, storage tanks, booster stations, lift stations, wells, water treatment, and water reclamation facilities. The asset inventory was reviewed with the Steering Committee to ensure completeness and assignments were given to those who could retrieve missing information.

Advisory Committee Meeting #2 – Asset Inventory and Vulnerability Assessment

Date: April 10, 2017

As part of the second Steering Committee meeting, the completed asset inventory was used to develop loss estimates for all identified hazard scenarios. The hazard probabilities and recurrence intervals were applied to the District's assets to determine which assets were subject to the greatest potential damages and which hazard events were likely to produce the greatest potential losses.

Additionally, each Steering Committee participant was given a Mitigation Activity Identification worksheet to document potential projects to be discussed during Steering Committee Meeting #3.

Advisory Committee Meeting #3 – Mitigation Action Identification and Benefit-Cost Review

Date April 26, 2017

The purpose of the third meeting was to identify potential mitigation action and projects that will reduce the impact of identified hazards. First, the mitigation goals and objectives from Steering Committee #1 were reviewed and validated. Then, the Steering Committee participants brainstormed possible projects and action to mitigate the effects of the identified hazards. This was done using the hazard profiles and asset-specific loss estimates as starting points.

As the mitigation projects were identified, the Steering Committee discussed the implementation plan in terms of the following characteristics:

- Mitigation Action Category – Prevention, Property Protection, Public Education and Awareness, Natural Resources Protection, Emergency Services, and Structural Projects
- Corresponding Goals and Objectives
- Responsible Department – Operations, Safety; Risk; and Engineering, Administration, Flood Control, Integrated Planning, etc.
- Resources – Operating Budget, Grant Programs, Staff Time, Capital Improvements Fund, etc.
- Implementation Timeframe – Ongoing, Short-term (within two years), Medium-term (between three and ten years), and Long-term (greater than ten years)
- Whether the project protects new or future facilities

The Steering Committee then performed a high-level Benefit-Cost review on each of the identified mitigation actions. The review consisted of identifying all perceived benefits and costs associated with implementation of each mitigation action. Typical benefits include:

- Avoided physical damages (e.g. to buildings, infrastructure, and equipment)
- Avoided loss of function costs (e.g. loss of utilities and lifelines)
- Avoided casualties

- Avoided emergency management costs (e.g. emergency operations center costs, evacuation/rescue costs, and other management costs)

Figure 1.3: Example FEMA Benefit-Cost Analysis

Actions	Benefits (Pros)	Costs (Cons)	Priority
Floodproof 10 businesses in the downtown area	<ul style="list-style-type: none"> - Avoidance of 1 loss of life every 20 years (casualties reduced by half) - Saving of \$90,000 in private damages and \$5,000 in public cost - Loss of use of 10 downtown businesses completely eliminated - Community's problem of business interruption solved - Federal grants like FMA and PDM can be applied for to implement the proposed floodproofing - Will help improve CRS rating in the long term (so entire community's flood insurance premium will be reduced) - More than half the members of the City Council are opposed to buy-outs; it might be easier to get their support for an alternative to buy-outs 	<ul style="list-style-type: none"> - Floodproofing cost = \$10,000 X 10 = \$100,000 - Need at least 3 people to administer (after obtaining technical assistance from the State) - Need a year to implement 	High (Priority no. 1)
Build safe rooms for a neighborhood of 50 homes without basements	<ul style="list-style-type: none"> - Avoidance of 5 lives lost every 20 years (casualties reduced by half) - Public and political support for mitigating this hazard exists (due to regular recurrence of tornadoes) 	<ul style="list-style-type: none"> - City will share 50% of the cost per existing home = \$2,000 X 50 = \$100,000 - Administrative cost per home = \$1,000 X 50 = \$50,000 - Need 3 years to complete - Tornadoes are unpredictable; they may never strike this exact area again 	Medium (Priority no. 2)
Broadcast educational video on local channel on hazard mitigation	<ul style="list-style-type: none"> - Local channel might be willing to broadcast free of cost - Publicity would spread awareness about mitigation methods as well as what to do in an emergency 	<ul style="list-style-type: none"> - Cost of preparing video = \$5,000 - Only 5% of population might notice the broadcast - Only 5% of that 5% might actually consider acting on individual mitigation methods 	Low (Priority no. 3)

Once the benefits and costs were estimated, a relative priority was assigned for each action based upon the evaluation.

1.2.3 Public Meetings & Outreach

On April 3, 2017, the District posted an advertisement on the District's website inviting the public to participate in a survey. The survey assessed the community's level of concern with various hazards and the steps each respondent had taken to prepare for a disaster.

On September 15, 2017, the District posted the final draft Plan on the District website allowing members of the public to provide input for HMP development during the drafting stage. Additional documentation regarding public involvement is provided in Appendix D.

1.3 Review and Incorporation of Existing Plans

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

- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

While developing the District's HMP, the Steering Committee reviewed the existing plans detailed below and incorporated relevant information into the planning efforts.

2016 State of California Multi-Hazard Mitigation Plan

The Multi-Hazard Mitigation Plan was reviewed to ensure consistency between the State and District Plan, with respect to identified hazards, vulnerability, goals & objectives, and mitigation actions. The State goals served as the basis for goal development at the District level. Plan goals and objectives are outlined in Chapter 4.

2012 Riverside County Multi-Jurisdictional Local Hazard Mitigation Plan

Like the California Multi-Hazard Mitigation Plan, the Riverside County Multi-Jurisdictional Hazard Mitigation Plan was reviewed to ensure consistency between the County and District Plan. In addition to serving as a basis for goal development (along with the State Plan), the County Plan provided insight into local historical hazards and perceived vulnerability for the region.

Separately, Riverside County and the District were updating their respective plan concurrently. As members of the Riverside County Planning Team were on the Steering Committee, the District was able to take advantage of the County's efforts and information during the HMP update.

2011 Hazard Mitigation Plan

The District's 2011 HMP was crucial in comparing the previous mitigation ideas and attitudes to the District's current needs and concerns. The Steering Committee referred to this Plan constantly throughout the updating process. The Plan provided insight into hazard ranking, hazard history, previously proposal mitigation projects, etc.

2015 Urban Water Management Plan

The 2015 Urban Water Management Plan is updated every five years to monitor water supply issues and mitigation drought situations. Since the Urban Water Management Plan

was recently updated, the District was able to pull information regarding current trends in population, weather patterns, and existing conservation efforts.

Asset Management Program

The District's Asset Management Plan, which was in the process of being updated at the time the HMP was revised, was used in the development of a complete asset inventory. In addition to contributing to a complete list of assets, the program provided realistic estimates for replacement values for critical assets. Less estimates were based, in part, on information provided in the asset Management Program. For more details, please see the Loss Estimates section in Chapter 3.

California Adaptation Planning Guide 2012

FEMA, Cal OES, and the California Natural Resources Agency developed the California Adaptation Planning Guide to assist municipalities in recognizing local climate change and to provide guidance addressing potential vulnerabilities. The information was used to develop potential hazards and to provide background information that allowed the Steering Committee to make educated decisions regarding mitigation actions designed to alleviate the effects of climate change.

2 PLANNING AREA PROFILE

Table of Contents

2.1	Service Area Description.....	2-1
2.2	Development Trends.....	2-2
2.3	Population.....	2-5
2.4	Climate	2-6

Figures

Figure 2.1: District Service Area Overview	2-4
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Tables

Table 2.1: Retail Water Use by Type	2-2
Table 2.2: District Service Area Population Projections.....	2-6
Table 2.3: District Service Area Climate	2-6

2.1 Service Area Description

The Eastern Municipal Water District (District) is a public water agency formed in 1950 by popular vote. In 1951, it was annexed into the Metropolitan Water District of Southern California (MWD) and gained a supply of imported water from the Colorado River Aqueduct (CRA) and the State Water Project (SWP).

The District's initial mission was to deliver imported water to supplement local groundwater for the, mostly agricultural, community. Over time, the District has evolved to include groundwater production, desalination, water filtration, wastewater collection, treatment, and regional water recycling in the list of products and services it offers to more than 546,000 in retail and 215,000 in wholesale customers. Located in one of the most rapidly growing regions in the Nation, the District has a mission "to provide safe and reliable water and wastewater management services to our community in an economical, efficient, and responsible manner, now and in the future."

A five-member Board of Directors governs the District. Each Director serves an area of equivalent population size within the District's boundaries and is elected to office every four years. As a member agency of MWD, the District also has a board member appointed to the MWD Board of Directors.

The District Service Area is located in western Riverside County, approximately 75 miles east of Los Angeles. The 555-square mile service area includes six incorporated cities in addition to several unincorporated areas of the County of Riverside. Figure 2.1, found later in his chapter, provides an overview of the service area boundaries

2.2 Development Trends

§201.6(c)(2)(ii)(C): [The plan **should** describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Since the District is not responsible for overall land use for most of the land within its service area, it relies on the General Plans adopted by local Cities and Riverside County to anticipate future development. However, as mentioned above, the District provides water and wastewater services. Development trends for both service types are outlined in the subsections below.

Water Service

Retail Customers: The District provides potable water service to retail customers within the Cities of Moreno Valley, Menifee, and Temecula as well as the unincorporated communities of Good Hope, Homeland, Lakeview, Nuevo, Mead Valley, Murrieta Hot Springs, San Jacinto, Quail Valley, Romoland, Valle Vista, and Winchester. Residential use makes up the greatest percentage of the demand with single-family residences making up over 65% of the demand. As discussed in Section 2.3, the population is expected to increase rapidly within the service area, over 60%, by 2040. As a result, residential use will likely remain the greatest allocation of water within the District. Landscape irrigation, at just under 10%, makes up the second largest category of retail water use. Table 2.1 below demonstrated the percentage for each water use category served by the District.

Table 2.1: Retail Water Use by Type

Water Use Type	Percentage
Single-Family	57.9%
Multi-Family	7.4%
Commercial	5.8
Industrial	.3
Institutional/ Governmental	3%
Landscape	9.8%
Agriculture irrigation (Potable Water)	2.4%
Agricultural irrigation (Raw Water)	1.1%

Other (temporary construction meters, unbilled consumption)	7%
Losses	5.3%
Total Retail Use:	100%

Note: Percentages are based on current retail demand for portable and raw water figures recorded in the 2015 Urban Water Management Plan

As noted above, the District has little impact of development trends within the Cities and unincorporated areas it serves. However, the District will work with local communities to identify potential hazards and look for ways to improve resiliency for new developments.

Wholesale Customers: In addition, the District also supplies water and wastewater services on a wholesale basis to the Cities of Hemet, San Jacinto, and Perris as well as Lake Hemet Municipal Water District, Nuevo Water Company, Elsinore Valley Municipal Water District, Western Municipal Water District, and Rancho California Water District.

Additionally, the map on the following page depicts the District's service area boundary, relative to the communities and major roads within the boundary.

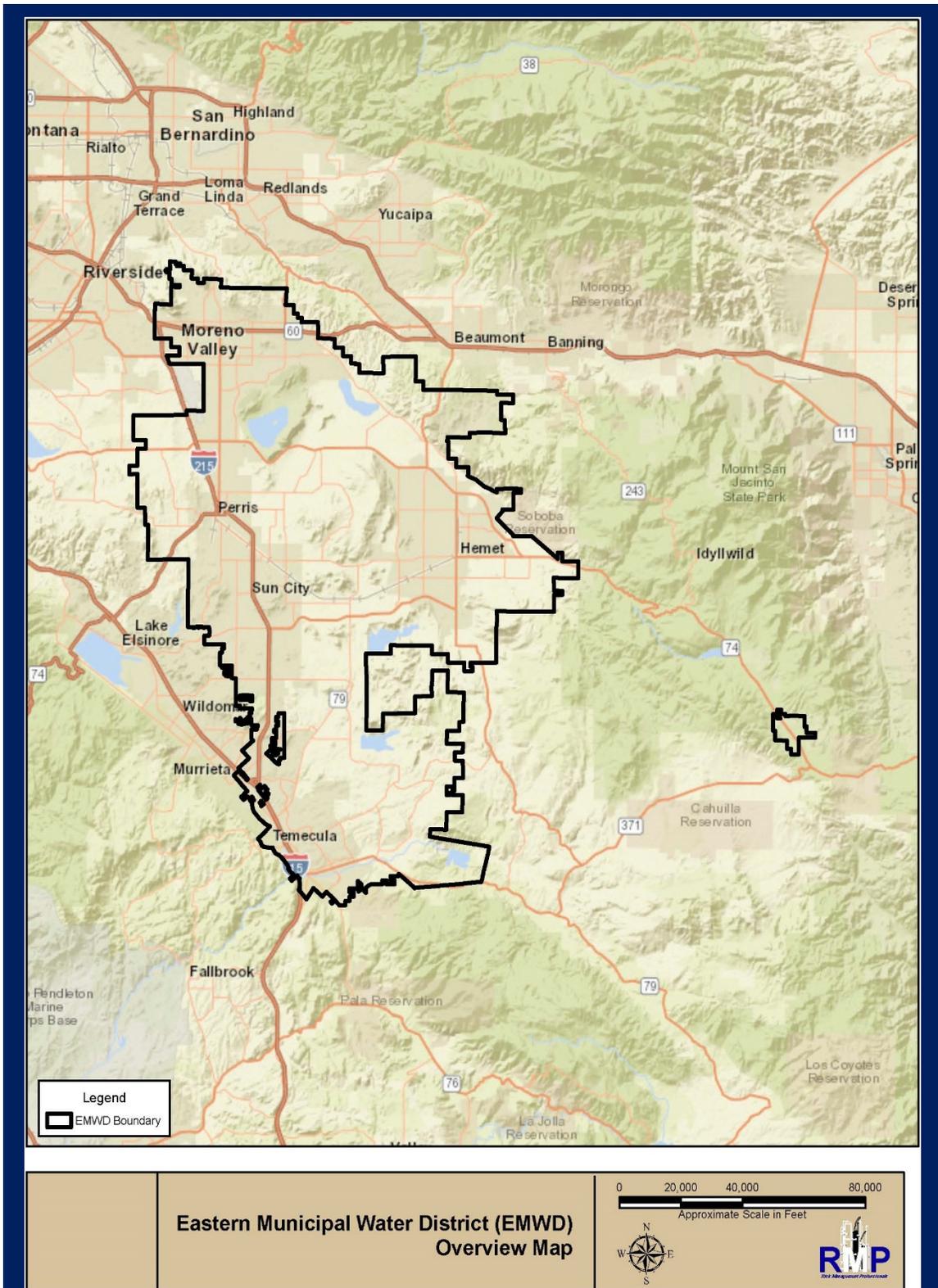


Figure 2.1: District Service Area Overview

Wastewater Service

The District provides wastewater services to approximately 239,000 customers within its service area and currently treats approximately 46 million gallons of wastewater every day at its four active regional water reclamation facilities through 1,813 miles of sewer pipelines. While only a portion of the District's service area receives wastewater services, these areas are spread across the region. As a result, hazard considerations for wastewater should be the same as for water service.

New Developments

Since the update of the 2011 Hazard Mitigation Plan, six (6) new, albeit small, assets have been added to the District. The locations are not listed here as a security measure, but the assets, which include mostly storage tanks and lift stations, have been captured as part of the risk assessment in Section 3.13 Asset Inventory. For each of these assets, the District implemented certain mitigation elements in the design and construction stage to lessen the impacts of potential hazard events. For example, back-up generators were included for electric systems to reduce the impact of a power outage and tanks were built above ground to minimize the impacts of flooding and earthquakes. The Steering Committee discussed the impact these new assets might have on the District's vulnerability and found them to be minimal.

2.3 Population

According to its 2015 Urban Water Management Plan, the District is located in one of the most rapidly growing regions of the United States. Since 1990, nearly 350,000 people have been added to the District's service area, doubling the population. The following table illustrates the estimated retail and wholesale populations within the District's service area through 2040. The information is taken from the 2015 Urban Water Management Plan and was developed using Geographical Information System data, 2010 census tract records, information from State Water Resource Control Board reporting, and the Department of Water Resources' population projection methodology

Table 2.2: District Service Area Population Projections

Population Served	2015	2020	2025	2030	2035	2040
Retail Population	546,146	617,100	699,800	784,100	864,200	939,100
Wholesale Population	215,075	239,400	267,300	291,100	314,400	335,000
Total:	761,221	856,500	967,100	1,075,200	1,178,600	1,274,100

As the population within the District continues to grow, the characteristics of the service area are expected to change. Tract homes, commercial centers and new industrial warehouses are replacing acres of agriculture and open spaces. Over the next 25 years, the District's population is projected to grow by over 500,000 people, a 67% increase over the current population. The impact of the rapid growth on the District is limited to the associated increase in demand. In order to meet this demand, the District will likely consider constructing new facilities to expand the current water system. No specific hazard vulnerabilities were identified for future infrastructure during the plan update; however, locations where future facilities may be exposed to natural hazards, including floodplains and fire history maps, are included in Chapter 3 of this Plan.

2.4 Climate

The District has a semi-arid climate characterized by hot, dry summers and cooler winters. The average rainfall is approximately 7.6 inches occurring mostly from December through March. The region experiences a wide variation in rainfall and periodic local drought. The following tables, taken from the 2015 Urban Water Management Plan, summarize the temperature and precipitation for the District's service area.

Table 2.3: District Service Area Climate

	Average Rainfall (inches)	Average Maximum Temperature (Fahrenheit)	Average Minimum Temperature (Fahrenheit)
January	1.16	67.12	33.96
February	1.78	66.67	35.42
March	.83	70.22	38.89
April	.51	72.79	42.18
May	.24	77.48	47.75
June	.01	84.93	52.84

July	.30	92.26	59.48
August	.1	93.33	58.70
September	.2	91.33	56.23
October	.41	80.40	47.89
November	.57	72.70	39.51
December	1.51	64.16	33.71
Total/Average	7.60	77.78	45.55

3 RISK ASSESSMENT

Table of Contents

3.1	Risk Assessment.....	3-1
3.2	Hazard Identification	3-3
	3.2.1 Hazard Profiling.....	3-6
	3.2.2 Trends in Perceived Hazard Vulnerability	3-7
3.3	Earthquake Hazard Profile.....	3-9
	3.3.1 Earthquake Hazard Information and Background	3-9
	3.3.2 Earthquake Hazard History	3-13
	3.3.3 Earthquake Probability, Frequency, and Magnitude	3-18
3.4	Extreme Weather Hazard Profile.....	3-26
	3.4.1 Extreme Weather Hazard Information and Background	3-26
	3.4.2 Extreme Weather Hazard History	3-31
	3.4.3 Extreme Weather Hazard Frequency and Magnitude.....	3-35
3.5	Flood & Dam Release Hazard Profile	3-39
	3.5.1 Flood & Dam Release Hazard Information and Background	3-39
	3.5.2 Flood & Dam Release Hazard History	3-44
	3.5.3 Flood & Dam/Reservoir Failure Hazard Frequency and Magnitude ...	3-47
3.6	Infrastructure Failure Hazard Profile	3-50
	3.6.1 Infrastructure Failure Hazard Information and Background	3-50
	3.6.2 Infrastructure Failure Hazard History	3-52
	3.6.3 Infrastructure Failure Hazard Frequency and Magnitude	3-53
3.7	Wildfire Hazard Profile	3-54

3.7.1	Wildfire Hazard Information and Background	3-54
3.7.2	Wildfire Hazard History	3-56
3.7.3	Wildfire Failure Hazard Frequency and Magnitude.....	3-57
3.8	Hazardous Materials Release Hazard Profile.....	3-59
3.8.1	Hazardous Materials Release Hazard Information and Background ..	3-59
3.8.2	Hazardous Materials Release Hazard History	3-62
3.8.3	Hazardous Materials Release Hazard Frequency and Magnitude	3-63
3.9	Terrorism Hazard Profile	3-65
3.9.1	Terrorism Hazard Information and Background.....	3-65
3.9.2	Terrorism Hazard History.....	3-67
3.9.3	Terrorism Hazard Magnitude and Frequency	3-68
3.10	Power Failure Hazard Profile.....	3-69
3.10.1	Power Failure Hazard Information and Background	3-69
3.10.2	Power Failure Hazard History	3-70
3.10.3	Power Failure Hazard Frequency and Magnitude.....	3-71
3.11	Drought Hazard Profile	3-72
3.11.1	Drought Hazard Information and Background.....	3-72
3.11.2	Drought Hazard History	3-73
3.11.3	Drought Hazard frequency and Magnitude	3-75
3.12	Climate Change.....	3-77
3.13	Asset Inventory	3-78
3.14	Loss Estimates	3-92
3.15	Information Sources	3-123

Tables

Table 3.1	Risk Factors for Hazard Identification	3-4
Table 3.2	Risk Rank Matrix	3-5

Table 3.3: Risk Rank Categorization.....	3-6
Table 3.4: Hazard Ranking Summary	3-6
Table 3.5: Removed and Modified Hazards.....	3-7
Table 3.6: Modified Mercalli Intensity Scale.....	3-10
Table 3.7: Southern California Historical Earthquakes	3-13
Table 3.8: San Andreas Fault Information	3-20
Table 3.9: Elsinore Fault Information	3-21
Table 3.10: San Jacinto Fault Information	3-21
Table 3.11: Mercalli Intensity and Corresponding Peak Ground Acceleration.....	3-25
Table 3.12: Extreme Heat Damage in Riverside County	3-31
Table 3.13: Historical Severe Weather Damage in Riverside County.....	3-32
Table 3.14: Major Windstorms in the Inland Area	3-33
Table 3.15: Weather Historic Averages for the City of Temecula	3-36
Table 3.16: Weather Historic Averages for the City of Hemet	3-37
Table 3.17: Weather Historic Averages for the City of Moreno Valley	3-38
Table 3.18: Historical Flooding damage in Riverside County	3-45
Table 3.19: Dam Failure Events in California.....	3-46
Table 3.20: Wildfire Damage in Riverside County	3-56
Table 3.21: Types of Hazardous Materials Incidents.....	3-60
Table 3.22: ERNS Spills and Accidents in California in 2010	3-62
Table 3.23: Economic Impacts of Electric Power.....	3-71
Table 3.24: Structural Replacement Values.....	3-78
Table 3.25: Asset Inventory Summary	3-79
Table 3.26: Loss estimate/Vulnerability Assessment – Earthquake, Infrastructure Failure, Power Failure, Terrorism.....	3-93

Table 3.27: Loss Estimate/Vulnerability Assessment – Extreme Weather, Flood/Dam Reservoir Failure, hazardous materials Release, Drought, Wildfire	3-108
---	-------

Figures

Figure 3.1: Southern California Historic Earthquakes Map	3-18
Figure 3.2: District Earthquake Fault Map.....	3-19
Figure 3.3: 2011 District Peak Ground Acceleration	3-23
Figure 3.4: 2014 District Peak Ground Acceleration	3-24
Figure 3.5: Heat Stress Index	3-28
Figure 3.6: Extreme Heat Threat Map.....	3-35
Figure 3.7: City of Temecula Average Wind Speeds	3-36
Figure 3.8: City of Hemet Average Wind Speeds	3-37
Figure 3.9: City of Moreno Valley Average Wind Speeds	3-38
Figure 3.10: Causes of Dam Failure	3-43
Figure 3.11: FEMA Flood Insurance Rate (FIRM) Map	3-48
Figure 3.12: 2011 Riverside County Inundation Map.....	3-49
Figure 3.13: District Fire Threat Map	3-58
Figure 3.14: California Drought Monitor Map.....	3-74

3.1 Risk Assessment

The Risk Assessment consists of four steps: Hazard Identification, Hazard Profiling, Asset Inventory, and Loss Estimates. This chapter includes the Hazard Identification and Hazard Profiling steps to evaluate the hazards of primary concern to local decision-makers in order to provide a basis for loss estimates which is also included within this chapter. Additionally, the Risk Assessment provides a foundation for the evaluation of mitigation measures that can help reduce the impacts of a potential hazard event.

Step 1: Identify Hazards

This step identified all the natural and man-made hazards that might affect the Eastern Municipal Water District (District) and then narrowed the list to the hazards that are most likely to occur. These hazards included natural, technical, and human-caused events with an emphasis on the effect of disasters on critical facilities and services (e.g., treatment plants, reclamation facilities, well sites, lift stations, and booster stations). The Steering Committee participated in a hazard identification exercise during the first Steering Committee meeting to identify and rank the potential hazards within the District's service area.

Step 2: Profile Hazard Events

Hazard event profiles were updated from the 2011 Hazard Mitigation Plan and consist of either a map indicating the area impacted by each hazard or key information regarding the characteristics of hazard events within the service area. To develop detailed hazard profiles, relevant open-source hazard studies, the County Multi-Jurisdictional Hazard Mitigation Plan and mapping projects were reviewed and documented within this report. In addition, the District supplied local account of hazard events that included specific hazard and emergency information. This planning step also determined the magnitude, frequency, and location characteristics of relevant natural hazards (wildfire, fault locations, flood plains, etc.) that were utilized as the design-basis for the loss estimates where possible.

Step 3: Inventory Assets

The purpose of this step is to determine the quantity of buildings and assets in the District's service area that lie in the different hazard areas and what proportion of the District this represents. The



development of the comprehensive inventory facilitated the development of loss estimates for all hazard scenarios

Step 4: Loss Estimates

The Loss Estimate step relied on detailed information regarding the hazard probability and maps of asset locations that were not included in the Plan for security reasons. This information was utilized to apply the hazard probabilities and recurrence intervals to the District's assets and inventory (buildings and infrastructure). This step was critical in determining which assets were subject to the greatest potential damages and which hazard events were likely to produce the greatest potential losses.

The HAZUS-MH software package, which implements the Federal Emergency Management Agency's (FEMA) developed methodology and runs on a GIS platform, was utilized by the County to map and display earthquake hazard data, as well as the results of damage and economic loss estimates for buildings and infrastructure within the County. The Steering Committee refers to the County's map as an indicator of the extent of damage an earthquake event might generate. To estimate potential losses for the remaining hazards, detailed spreadsheets, including asset inventory and potential hazards, were used to find the monetary impact of each hazard to the District.

In estimating losses, HAZUS-MH and the spreadsheets take into account various impacts of a hazard event such as:

- Physical damage: damage to public buildings, critical facilities, and infrastructure;
- Economic loss: lost jobs, business interruptions, repair and reconstruction costs; and
- Social impacts: impacts to people, including requirements for shelters and medical aid.

While many of the damages to local infrastructure and the economy included in the HAZUS-MH model do not directly impact the District, District emergency planners can use the report to examine the "bigger-picture" with regard to the impacts of an earthquake hazard scenario. It should be noted, any regional disaster would affect, and possibly overwhelm, local emergency responders potentially inhibiting the District's ability to manage its own response. Therefore, it is prudent for District personnel to look at the large-scale impacts of a disaster scenario.

The conclusion of this step precipitated a comprehensive loss estimate (vulnerability assessment) for each identified hazard for each specific asset in terms of damages, economic loss, and the associated consequences for the District.

3.2 Hazard Identification

§201.6(c)(2)(i): [The risk assessment **shall** include a] description of the type, 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.

§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.

§201.6(c)(2)(ii): [The risk assessment] **must** also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.

§201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment **must** assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The hazard identification and ranking was obtained from the Hazard Identification Exercise. Each hazard profile includes a summary of the Hazard Identification Exercise's identified risk factors and overall rank for each hazard in addition to the detailed hazard description, historical occurrences, and projected future probability, magnitude, and frequency.

The Hazard Identification Exercise was conducted by the Steering Committee to identify the potential hazards within the District's service area. The Hazard Identification Exercise was facilitated utilizing an interactive spreadsheet program that asks specific questions on potential hazards and then rates them accordingly. These questions guide the team in the correct facilitation and application of the program. Table 3.1 summarizes the Hazard Identification Exercise risk factors, lists the descriptions of each factor, provides the specific descriptor choices for each risk factor and description, and summarizes the risk ranking associated with each hazard.

Table 3.1 Risk Factors for Hazard Identification

Risk Factor	Description	Descriptors	Value
Probability / Frequency	Prediction of how often a hazard will occur in the future	Infeasible event - not applicable due to geographic location characteristics	0
		Rare event - occurs less than once every 50 years	1
		Infrequent event - occurs between once every 8 years and once every 50 years (inclusive)	2
		Regular event - occurs between once a year and once every 7 years	3
Consequence / Severity	Physical Damage - structures and lifelines Economic Impact – loss of function for power, water, sanitation, roads, etc.	Frequent event - occurs more than once a year	4
		No damage	1
		Minor/slight damage to buildings and structures, no loss of lifelines	2
		Moderate building damage, minor loss of lifelines (less than 12 hours)	3
		Moderate building damage, lifeline loss (less than 24 hours)	4
Vulnerability	Impact Area - area impacted by a hazard event Secondary Impacts - Capability of triggering additional hazards Onset - Period of time between initial recognition of an approaching hazard and when the hazard begins to impact the community	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	5
		No physical damage, no secondary impacts	1
		Localized damage area	2
		Localized damage area, minor secondary impacts, delayed hazard onset	3
		Moderate damage area, moderate secondary impacts, moderate warning time	4
	Widespread damage area, significant secondary impacts, no warning time	5	

Each profile also includes a profile ranking of the hazard (ranging from low hazard to high hazard). Table 3.2 illustrates the matrix for how each hazard was ranked according to all of the previously mentioned factors. Table 3.3 provides the value determinations for each ranking. The Steering Committee created this profile ranking based on references to the 2011 Hazard Mitigation Plan, up-to-date hazard identification, profile research, group discussion and evaluation of available data.

Table 3.2 Risk Rank Matrix

Probability/Frequency Description		Risk Ranking Matrix					
Rare Event: Occurs less than once every 50 years	Probability/Frequency	Consequence/Severity					
	Value	1	1	2	3	4	5
	Vulnerability	1	1	2	3	4	5
		2	2	4	6	8	10
		3	3	6	9	12	15
		4	4	8	12	16	20
5		5	10	15	20	25	
Infrequent Event: Occurs between once every 8 years and once every 50 years (inclusive)	Probability/Frequency	Consequence/Severity					
	Value	2	1	2	3	4	5
	Vulnerability	1	2	4	6	8	10
		2	4	8	12	16	20
		3	6	12	18	24	30
		4	8	16	24	32	40
5		10	20	30	40	50	
Regular Event: Occurs between once a year and once every 7 years	Probability/Frequency	Consequence/Severity					
	Value	3	1	2	3	4	5
	Vulnerability	1	3	6	9	12	15
		2	6	12	18	24	30
		3	9	18	27	36	45
		4	12	24	36	48	60
5		15	30	45	60	75	
Frequent Event: Occurs more than once a year	Probability/Frequency	Consequence/Severity					
	Value	4	1	2	3	4	5
	Vulnerability	1	4	8	12	16	20
		2	8	16	24	32	40
		3	12	24	36	48	60
		4	16	32	48	64	80
5		20	40	60	80	100	

Table 3.3: Risk Rank Categorization

High Hazard	50 to 100
Moderately High Hazard	25 to 49
Moderate Hazard	15 to 24
Moderately Low Hazard	5 to 14
Low Hazard	1 to 4

3.2.1 Hazard Profiling

This Section presents additional information regarding the hazards of concern (details below) within the hazard profiles. Hazard profiles are designed to assist agencies in evaluation and comparing the hazards that can impact their community by comparing a number of hazard factors. Each type of hazard has unique characteristics and the impact associated with a specific hazard can vary depending on the magnitude and location of each event. For the purposes of this plan, a hazard event can be defined as a specific, uninterrupted occurrence of a particular type of hazard. Furthermore, the probability of occurrence for a hazard in a given location impacts the priority assigned to that hazard. Finally, each hazard will impact different communities in different ways, based on geography, local development, population distribution, age of buildings, and mitigation measures already implemented. Table 3.4 provides the hazard ranking summary for the District.

Table 3.4: Hazard Ranking Summary

Hazard Rank	Score
High	
Earthquake	75
Moderately High	
Extreme Weather	36
Flood & Dam/Reservoir Failure	32
Infrastructure Failure	32
Wildfire	27
Hazardous Material Release	25
Terrorism	25
Moderate	
Power Failure	24
Moderately Low	
Drought	9
Low	

3.2.2 Trends in Perceived Hazard Vulnerability

As illustrated above, the Steering Committee reviewed its perceived vulnerability to determine the potential impact of each hazard on the District. The Steering Committee began with the hazards identified in 2011 Hazard Mitigation Plan and used the list as a springboard in determining current perceived vulnerability. In some cases, it was determined that a change in labeling made more sense and in some cases the hazard was removed all together. Table 3.5 below documents the modified or removed hazards.

Table 3.5: Removed and Modified Hazards

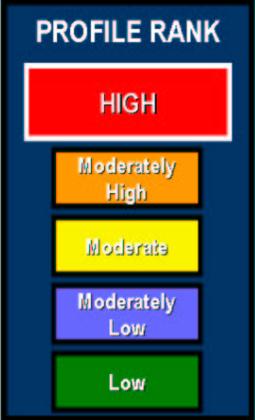
2011 Identified Hazard	Comments
Earth Movement/ Landslide	The Steering Committee felt it made sense to remove landslide as a major component of this hazard. As stated in the 2011 Hazard Mitigation Plan, the District has never incurred any damage as the result of a landslide. Furthermore, the topography of the area is relatively flat and, if a landslide were to occur, it would be likely be the result of an earthquake or flood (through erosion), both of which are captured as identified hazards in the updated Plan. For the current Plan, this hazard was reclassified as earthquake.
Pipeline Failure	The Pipeline Failure hazard focused on gas lines which are outside the District's jurisdiction and rarely impact its assets. The Steering Committee discussed the impact of water pipeline failure and then expanded the scope to include other types of system failures to create a new Infrastructure Failure hazard in the Plan update.
Extreme Heat	Extreme heat, severe storm and Tornado were combined into Extreme Weather in the plan update to simplify the discussion and to allow for expansion of the scope of the hazard in the future.
Flood	Understanding that the impact of a flood due to heavy rain or dam release produced similar

2011 Identified Hazard	Comments
	perceived impacts in the District's case, Flood and Dam Release were combined into a single hazard in the updated Plan.
Dam Failure	Understanding that the impact of a flood due to heavy rain or dam release produced similar perceived impacts in the District's case, Flood and Dam Release were combined into a single hazard in the updated Plan.
San Onofre Nuclear Plant Failure	The San Onofre Nuclear Plant has been decommissioned and is no longer a threat to the region. As a result, this hazard was removed during the update process.
Severe Storm	Extreme heat, severe storm and Tornado were combined into Extreme Weather in the plan update to simplify the discussion and to allow for expansion of the scope of the hazard in the future.
Tornado/Wind	Extreme heat, severe storm and Tornado were combined into Extreme Weather in the plan update to simplify the discussion and to allow for expansion of the scope of the hazard in the future.
Pandemic	Public health, except as it applies to water source reliability, is not under the District's jurisdiction. The District is not expected not is it established to prevent the spread of contagious disease. As a result, this hazard was removed during the update process.
Transportation Accident	The District has no jurisdiction over the roadways that traverse the District. Local communities are responsible for traffic-related hazards. As a result, this hazard was removed during the update process.

3.3 Earthquake Hazard Profile

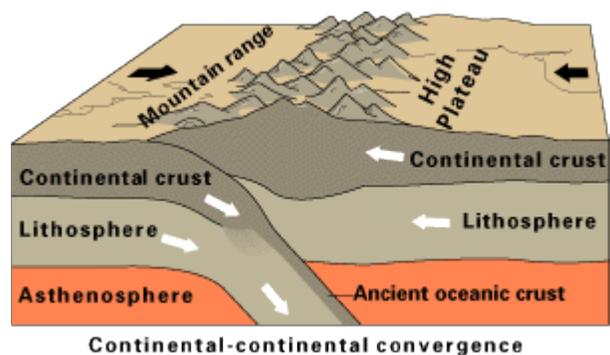
Earthquake Risk Assessment Summary

Risk Rank Category: High

Probability/Frequency:	Regular event - occurs between once a year and once every 7 years	
Consequence/Severity:	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	
Vulnerability:	Widespread damage area, significant secondary impacts, no warning time	
Location:	Earthquake events have the potential to impact all areas throughout the District.	
Hazard Risk Rank Score	75	
Steering Committee Comments:	None	

3.3.1 Earthquake Hazard Information and Background

Plate tectonics is a starting point for understanding the forces within the Earth that cause earthquakes. Plates are thick slabs of rock that make up the outermost 60 miles of the Earth. The term "tectonics" describes the deformation of the Earth's crust, the forces producing such deformation, and the geologic and structural features that result. The constant motion of the plates causes stress in the brittle upper crust of the earth. These tectonic stresses build as the rocks are gradually deformed. The rock deformation, or strain, is stored in the rocks as elastic strain energy. When the strength of the rock is exceeded, rupture occurs along a fault. The rocks on opposite sides of the fault slide past each other as they spring back into a relaxed position.



The strain energy is released partly as heat and partly as elastic waves called seismic waves. The passage of these seismic waves produces the ground shaking in earthquakes.

Faults are more likely to produce future earthquakes if they have rapid rates of movement, have had recent earthquakes along them, experience greater total displacements, or are aligned so that movement can relieve the accumulating tectonic stresses. Geologists classify faults by their relative hazards. “Active” faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). In contrast, “potentially active” faults are those that displaced layers of rock from the Quaternary period (the last 1.8 million years). Determining if a fault is “active” or “potentially active” depends on geologic evidence which may not be available for every fault.

Shaking

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake’s magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales. One of the first was the Richter Scale, developed in 1932 by Dr. Charles F. Richter of the California Institute of Technology. The most commonly used scale today is the Moment Magnitude (M_w) Scale. Moment magnitude is related to the total area of the fault that ruptured and the amount of offset (displacement) across the fault. It is a more uniform measure of the energy released during an earthquake.

The other commonly used measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. In general, it decreases with distance from the source of an earthquake, but it may be increased or decreased by several factors.

The Modified Mercalli Intensity Scale and Corresponding Richter Scale Magnitudes

Shaking intensity is often described using the Modified Mercalli Intensity Scale, which rates an earthquake’s effects based on human observation. While an earthquake has only one magnitude it may have many intensity values, which will generally decrease with distance from the epicenter. Table 3.6 below lists the Mercalli Scale’s various intensity levels.

Table 3.6: Modified Mercalli Intensity Scale

Mercalli Intensity		Description
I	Instrumental	Detected only by a seismograph
II	Feeble	Noticed by sensitive people

Mercalli Intensity		Description
III	Slight	Like the vibrations due to a passing truck
IV	Moderate	Felt by people while walking; rocking of loose objects, including standing vehicles
V	Rather Strong	Felt generally; most sleepers are awakened and bells ring
VI	Strong	Trees sway and all suspended objects swing; damage by over-turning and falling of loose objects
VII	Very Strong	General alarm; walls crack; plaster falls
VIII	Destructive	Car drivers seriously disturbed; masonry fissured; chimneys fall; poor constructed buildings damaged
IX	Ruinous	Some houses collapse where ground begins to crack, and pipes break
X	Disastrous	Ground cracks badly; many buildings destroyed and railway lines bent; landslides on steep slopes
XI	Very disastrous	Few buildings remain standing; bridges destroyed; all services (railway, pipes, and cables) out of action; great landslides and floods
XII	Catastrophic	Total Destruction; objects thrown into air; ground rises and falls in waves

Amplification of Seismic Shaking

Although seismic waves radiate from their source like ripples on a pond, the radiation is not uniform due to the complex nature of an earthquake rupture, the different paths the waves follow through the earth, and the different rock and soil layers near the earth’s surface. Large earthquakes begin to rupture at their hypocenter deep in the earth and the fault ruptures outward from that point. Because the speed of an earthquake rupture on a fault is similar to the speed of seismic waves, waves closer to the epicenter can be compounded by waves from farther along the rupture, creating a pulse of very strong seismic waves that moves along the fault in the direction of the fault rupture. Seismic waves may also be modified as they travel through the earth’s crust.

As seismic waves approach the ground surface, they commonly enter areas of loose soils where the waves travel more slowly. As the waves slow down, their amplitude increases, resulting in larger waves with frequencies that are more likely to damage structures. Waves can also be trapped within soft sediments between the ground surface and deep, hard basement rocks, their

destructive energy multiplying as they bounce back and forth, producing much greater shaking at the ground surface.

Ground Failure

Fissuring, settlement, and permanent horizontal and vertical shifting of the ground often accompany large earthquakes. Although not as pervasive or as costly as the shaking itself, these ground failures can significantly increase damage and under certain circumstances can be the dominant cause of damage.

Fault Rupture

The sudden sliding of one part of the earth's crust past another releases the vast store of elastic energy in the rocks as an earthquake. The resulting fracture is known as a fault, while the sliding movement of earth on either side of a fault is called fault rupture. Fault rupture begins below the ground surface at the earthquake hypocenter, typically between three and ten miles below the ground surface in California. If an earthquake is large enough, the fault rupture will actually travel all the way to the ground surface, severely damaging structures built across its path.

Liquefaction

In addition to the primary fault rupture that occurs right along a fault during an earthquake, the ground many miles away can also fail during the intense shaking. One common type of failure occurs when soft, water-saturated soil settles, causing the water to eject sediment particles as it works its way to the ground surface. This phenomenon, known as liquefaction, turns the soil into a fluid, causing it to lose the ability to support buildings and other structures. Areas susceptible to liquefaction include places where sandy sediments have been deposited by rivers along their course or by wave action along beaches.

Landslides

Landslides typically occur as mass land movement along mountainous regions where a weakened layer of earth separates itself from stable underlying material. Oftentimes, landslides are triggered by ground shaking which cause mass movement of soil. Landslides can include mudflows, mudslides, debris flows, rock falls, rock slides, debris avalanches, debris slides, and slump-earth flows. The two major types of slides are rotational and translational slides. In a rotational slide, a weakened layer ruptures concavely upward and the slide movement is downward and outward. In a translational slide, the weakened material moves along a planar surface with no rotation. Other forms of landslides include falls, block slides, and toppling. Falls are defined as abrupt detachment and movement of rocks or boulders which result in free-falling, bouncing or rolling debris. Block slides are a type of translational slide where a weakened layer consists of a single or multiple units that move as a coherent mass. Toppling failures are seen as

a forward motion of earth along a pivotal point due either to gravity or by water or ice in cracks of the mass.

3.3.2 Earthquake Hazard History

To indicate the potential for an earthquake event, Table 3.7 lists all significant recorded earthquakes in Southern California and the associated magnitudes (excerpted from the Southern California Earthquake Data Center):

Table 3.7: Southern California Historical Earthquakes

■ Under Magnitude 4.5 ■ Magnitude 4.5 - 5.4 ■ Magnitude 5.5 - 6.4 ■ Magnitude 6.5 to 7.4 ■ Magnitude > 7.5		
Magnitude	Year	Earthquake Name
■ Magnitude 5.5 - 6.4	1796	LA Basin Earthquake
■ Magnitude 6.5 to 7.4	1800	San Diego Earthquake
■ Magnitude 6.5 to 7.4	1812	Wrightwood (or San Juan Capistrano) Earthquake
■ Magnitude 6.5 to 7.4	1812	Santa Barbara Earthquake
■ Magnitude 6.5 to 7.4	1852	Volcano Lake Earthquake
■ Magnitude 5.5 - 6.4	1855	Los Angeles Region Earthquake
■ Magnitude > 7.5	1857	Fort Tejon Earthquake
■ Magnitude 5.5 - 6.4	1858	San Bernardino Earthquake
■ Magnitude 5.5 - 6.4	1862	San Diego Earthquake
■ Magnitude > 7.5	1872	Owens Valley Earthquake
■ Magnitude 5.5 - 6.4	1881	Parkfield Earthquake
■ Magnitude 5.5 - 6.4	1883	Santa Barbara Channel Earthquake
■ Magnitude 6.5 to 7.4	1890	San Jacinto or Elsinore Fault Region Earthquake
■ Magnitude 6.5 to 7.4	1892	San Jacinto or Elsinore Fault Region Earthquake
■ Magnitude 6.5 to 7.4	1892	Laguna Salada Earthquake
■ Magnitude > 7.5	1892	Imperial Valley Earthquake
■ Magnitude 5.5 - 6.4	1899	Cajon Pass Earthquake

■ Under Magnitude 4.5 ■ Magnitude 4.5 - 5.4 ■ Magnitude 5.5 - 6.4 ■ Magnitude 6.5 to 7.4 ■ Magnitude > 7.5		
Magnitude	Year	Earthquake Name
■ Magnitude 6.5 to 7.4	1899	San Jacinto Earthquake
■ Magnitude 5.5 - 6.4	1901	Parkfield Earthquake
■ Magnitude 5.5 - 6.4	1906	Imperial Valley Earthquake
■ Magnitude 5.5 - 6.4	1908	Death Valley Region Earthquake
■ Magnitude 5.5 - 6.4	1910	Elsinore Earthquake
■ Magnitude 5.5 - 6.4	1915	Imperial Valley Earthquake
■ Magnitude 5.5 - 6.4	1916	South of Death Valley Earthquake
■ Magnitude 6.5 to 7.4	1918	San Jacinto Earthquake
■ Magnitude 5.5 - 6.4	1922	Parkfield Earthquake
■ Magnitude 5.5 - 6.4	1923	North San Jacinto Fault Earthquake
■ Magnitude 5.5 - 6.4	1925	Santa Barbara Earthquake
■ Magnitude 6.5 to 7.4	1927	Lompoc Earthquake
■ Magnitude 5.5 - 6.4	1933	Long Beach Earthquake
■ Magnitude 5.5 - 6.4	1934	Parkfield Earthquake
■ Magnitude 5.5 - 6.4	1937	San Jacinto Fault ("Terwilliger Valley") Earthquake
■ Magnitude 6.5 to 7.4	1940	Imperial Valley Earthquake
■ Magnitude 5.5 - 6.4	1941	Santa Barbara Earthquake
■ Magnitude 4.5 - 5.4	1941	Torrance-Gardena Earthquakes
■ Magnitude 6.5 to 7.4	1942	Fish Creek Mountains Earthquake
■ Magnitude 5.5 - 6.4	1946	Walker Pass Earthquake
■ Magnitude 6.5 to 7.4	1947	Manix Earthquake
■ Magnitude 5.5 - 6.4	1948	Desert Hot Springs Earthquake
■ Magnitude > 7.5	1952	Kern County Earthquake

■ Under Magnitude 4.5 ■ Magnitude 4.5 - 5.4 ■ Magnitude 5.5 - 6.4 ■ Magnitude 6.5 to 7.4 ■ Magnitude > 7.5		
Magnitude	Year	Earthquake Name
■ Magnitude 5.5 - 6.4	1952	Bakersfield Earthquake
■ Magnitude 5.5 - 6.4	1954	San Jacinto Fault Earthquake
■ Under magnitude 4.5	1966	Imperial Fault Earthquake
■ Magnitude 5.5 - 6.4	1966	Parkfield Earthquake
■ Magnitude 6.5 to 7.4	1968	Borrego Mountain Earthquake
■ Magnitude 4.5 - 5.4	1970	Lytle Creek Earthquake
■ Magnitude 6.5 to 7.4	1971	San Fernando (Sylmar) Earthquake
■ Magnitude 4.5 - 5.4	1973	Point Mugu Earthquake
■ Magnitude 4.5 - 5.4	1975	Galway Lake Earthquake
■ Magnitude 4.5 - 5.4	1978	Santa Barbara Earthquake
■ Magnitude 4.5 - 5.4	1979	Malibu Earthquake
■ Magnitude 5.5 - 6.4	1979	Imperial Valley Earthquake
■ Magnitude 5.5 - 6.4	1980	White Wash Earthquake
■ Magnitude 4.5 - 5.4	1982	"Anza Gap" Earthquake
■ Magnitude 5.5 - 6.4	1986	North Palm Springs Earthquake
■ Magnitude 4.5 - 5.4	1986	Oceanside Earthquake
■ Magnitude 6.5 to 7.4	1987	Elmore Ranch/Superstition Hills Earthquakes
■ Magnitude 5.5 - 6.4	1987	Whittier Narrows Earthquake
■ Magnitude 4.5 - 5.4	1988	Tejon Ranch Earthquake
■ Magnitude 4.5 - 5.4	1988	Upland Earthquake
■ Magnitude 4.5 - 5.4	1988	Pasadena Earthquake
■ Magnitude 4.5 - 5.4	1989	Malibu Earthquake
■ Magnitude 4.5 - 5.4	1989	Newport Beach Earthquake

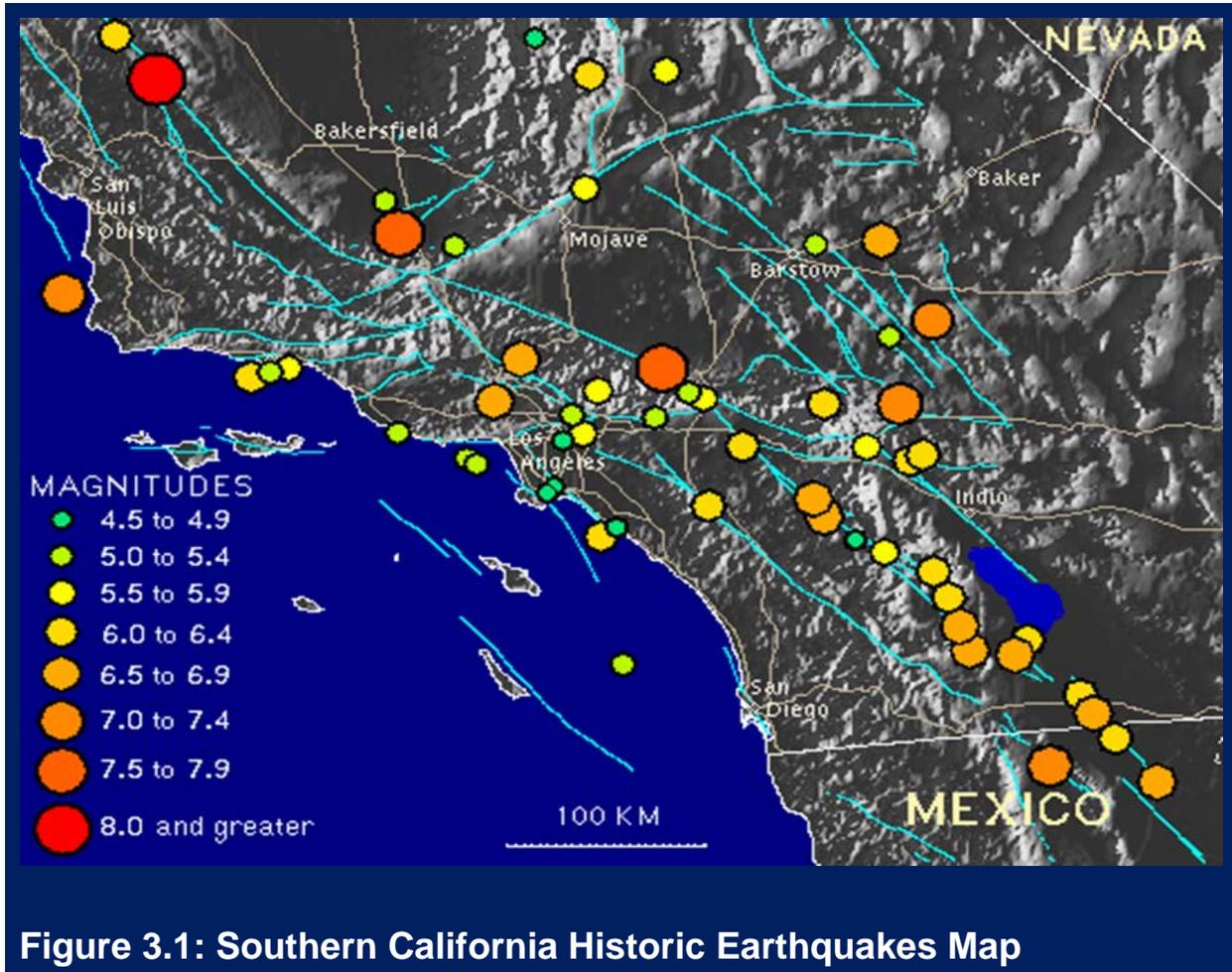
■ Under Magnitude 4.5 ■ Magnitude 4.5 - 5.4 ■ Magnitude 5.5 - 6.4 ■ Magnitude 6.5 to 7.4 ■ Magnitude > 7.5		
Magnitude	Year	Earthquake Name
■ Magnitude 4.5 - 5.4	1989	Montebello Earthquake
■ Magnitude 4.5 - 5.4	1990	Upland Earthquake
■ Magnitude 5.5 - 6.4	1991	Sierra Madre Earthquake
■ Magnitude 5.5 - 6.4	1992	Joshua Tree Earthquake
■ Magnitude 6.5 to 7.4	1992	Landers Earthquake
■ Magnitude 5.5 - 6.4	1992	Big Bear Earthquake
■ Magnitude 5.5 - 6.4	1992	Mojave (Garlock) Earthquake
■ Magnitude 4.5 - 5.4	1993	Wheeler Ridge Earthquake
■ Magnitude 6.5 to 7.4	1994	Northridge Earthquake
■ Magnitude 5.5 - 6.4	1995	Ridgecrest Earthquakes
■ Magnitude 4.5 - 5.4	1996	Coso Earthquake
■ Magnitude 4.5 - 5.4	1997	Calico Earthquake
■ Magnitude 4.5 - 5.4	1998	Coso Earthquakes
■ Magnitude 4.5 - 5.4	1998	Crafton Hills (Redlands) Earthquake
■ Magnitude 4.5 - 5.4	1998	San Bernardino Earthquake
■ Magnitude 4.5 - 5.4	1998	Whiskey Springs (Big Bear City) Earthquake
■ Magnitude 6.5 to 7.4	1999	Hector Mine Earthquake
■ Under magnitude 4.5	2001	West Hollywood Earthquake
■ Magnitude 4.5 - 5.4	2001	Anza Earthquake
■ Magnitude 5.5 - 6.4	2002	Laguna Salad Earthquake
■ Magnitude 6.5 to 7.4	2003	San Simeon Earthquake
■ Magnitude 4.5 - 5.4	2005	Mettler Earthquake
■ Magnitude 4.5 - 5.4	2008	Chino Hills Earthquake

Magnitude	Year	Earthquake Name
■ Magnitude 4.5 - 5.4	2009	Inglewood Earthquake
■ Magnitude 5.5 - 6.4	2009	Baja California Earthquake
■ Magnitude 6.5 to 7.4	2010	Sierra El Mayor Earthquake
■ Magnitude 4.5 - 5.4	2011	Calexico Earthquake
■ Magnitude 4.5 - 5.4	2012	Brawley Earthquake
■ Magnitude 4.5 - 5.4	2012	Westmoreland Earthquake
■ Magnitude 4.5 - 5.4	2013	Isla Vista Earthquake
■ Magnitude 4.5 - 5.4	2014	Brea Earthquake
■ Magnitude 4.5 - 5.4	2015	Stovepipe Wells Earthquake
■ Magnitude 4.5 - 5.4	2016	San Jacinto Earthquake

Southern California Historic Earthquakes

Even if the epicenter of a major earthquake is not located directly within the District's service area, the aftershock associated with that earthquake can cause significant damage. The hazards associated with aftershock earthquakes are the same as mainshock earthquakes and may cause significant damage and disruption. The primary difference between these two types of earthquakes is that aftershock earthquakes are categorized by the following two guidelines. First, it must occur within one rupture length of the mainshock rupture surface, or alternatively, within an "aftershock zone" based upon early aftershock activity and defined by seismologists. Second, it must occur within that designated area before the seismicity rate in that area returns to its "background", meaning pre-mainshock, level. Figure 3.1 from the Southern California Earthquake Data Center details the locations and magnitudes for historic Southern California earthquakes.

In addition to significant earthquakes, the relative seismicity of the region indicates the potential for future significant and catastrophic earthquakes.



3.3.3 Earthquake Probability, Frequency, and Magnitude

The Steering Committee ranked earthquake as the greatest threat to the District due to its proximity to the San Andreas Fault, Elsinore Fault and San Jacinto Fault Zones. All three are classified as right-lateral strike-slip faults capable of producing 6.5 to 8.0 magnitude earthquakes, with lengths of 1,200 km, 180 km and 210 km, respectively. Figure 3.2 on the following page illustrates the faults located in and around the District service area.

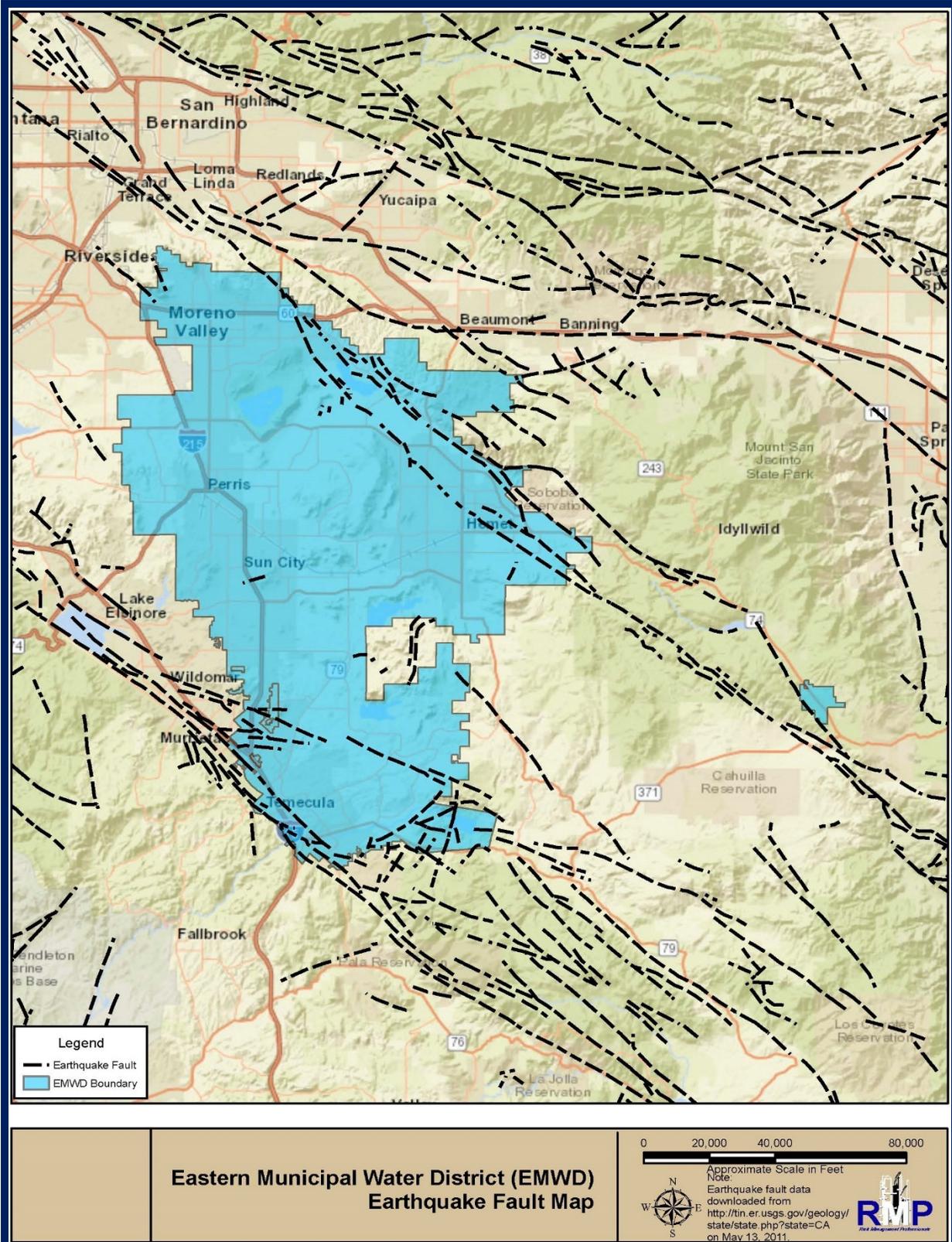


Figure 3.2: District Earthquake Fault Map

Fault Zones

As stated above, there are several faults and fault zones throughout Riverside County, some traversing the District's service area. After reviewing maps of the Riverside County area, it was determined the three faults mentioned about, the San Andreas; Elsinore; San Jacinto Faults, were perceived as the most likely to impact the service area. A major earthquake along any of these faults could result in substantial casualties and damage resulting from collapsed buildings, damaged roads and bridges, fires, flooding, and other threats to life and property. There may still be unmapped faults throughout the Inland Area that could also affect the District. Figure 3.2 shows the local earthquake faults in and around the District's service area. In addition, Tables 3.8 through 3.10 give fault specific information for local faults that could significantly affect the District.

The San Andreas Fault

Table 3.8: San Andreas Fault Information

Type of fault:	Right-lateral strike-slip
Length:	1,200 kilometers (km)
Nearby Communities:	San Jose, San Mateo, Palo Alto, South San Francisco, and Sunnyvale
Last Major Rupture:	June, 1838 (Northern segment), January 9, 1857 (Mojave segment); April 18, 1906 (Northern segment), October 17, 1989 (Northern segment)
Slip rate:	2-2.5 inches/year
Interval Between Major Ruptures:	Recurrence intervals vary greatly from under 20 years (at Parkfield only) to over 300 years
Probable Magnitudes:	6.8 to 8.0
Distance and Direction from the District:	Approximately 13 miles northeast

This fault marks the boundary between the North American and Pacific tectonic plates and is capable of producing earthquakes in the magnitude 8+ range. It has been scientifically determined through a carbon dating process, over the past 1,400 to 1,500 years, a major earthquake on this fault has occurred approximately every 140 to 150 years. In the northern section of the San Andreas, there is a slightly lower potential for a great earthquake within the next few decades as compared to the southern San Andreas section. This is because less than 100 years have passed since the great 1906 San Francisco Earthquake. However, moderately-sized, potentially damaging earthquakes could occur on this fault at any time near the District.

The Elsinore Fault

Table 3.9: Elsinore Fault Information

Type of fault:	Right-lateral strike-slip
Length:	180 kilometers (km)
Nearby Communities:	Temecula, Lake Elsinore, Julian
Last Major Rupture:	May 15, 1910; Magnitude 6 – no surface rupture found
Slip rate:	4.0 mm/year
Interval Between Major Ruptures:	Roughly 250 years
Probable Magnitudes:	6.5 - 7.5
Distance and Direction from the District:	Runs through the southern point of the District service area near Temecula

The Elsinore Fault Zone is one of the largest in southern California but historically has been one of the quietest according to the Southern California Earthquake Data Center. The southeastern extension of the Elsinore fault zone, the Laguna Salada fault, ruptured in 1892 in a magnitude 7 earthquake, but the main trace of the Elsinore fault zone has only seen one historical event greater than magnitude 5.2 -- the earthquake of 1910, a magnitude 6 shock near Temescal Valley, which produced no known surface rupture and did little damage. Still, should a large rupture occur on this fault, the impacts on the District could be substantial.

The San Jacinto Fault

Table 3.10: San Jacinto Fault Information

Type of fault:	Right-lateral strike-slip, minor right-reverse
Length:	210 kilometers (km)
Nearby Communities:	Lytle Creek, San Bernardino, Loma Linda, San Jacinto, Hemet, Anza, Borrego Springs, and Ocotillo Wells
Last Major Rupture:	April 9, 1968 M6.5 on the Coyote Creek Segment
Slip rate:	Between 7 and 17 mm/year
Interval Between Major Ruptures:	Between 100 and 300 years, per segment
Probable Magnitudes:	6.5 to 7.5

Distance and Direction from the District:

Traverses the District from Hemet to Moreno Valley parallel the northeast border of the service area.

The San Jacinto fault zone is large and, like other large fault zones, breaks off into many individual fault strands which have their own identities. The Glen Helen Fault, Lytle Creek Fault, Casa Loma Fault, and the Clark Fault are all strands of the San Jacinto Fault. In 1954, a magnitude 6.4 ruptured of the Clark Fault segment 30 miles south of Indio, California, southwest of the District's service area. Shaking was felt as far as Ventura County and Baja California and damage was reported in Los Angeles, San Bernardino, and San Diego. Based on the interval between major ruptures, the probability of a large earthquake along the San Jacinto Fault in the next 50 years is relatively low.

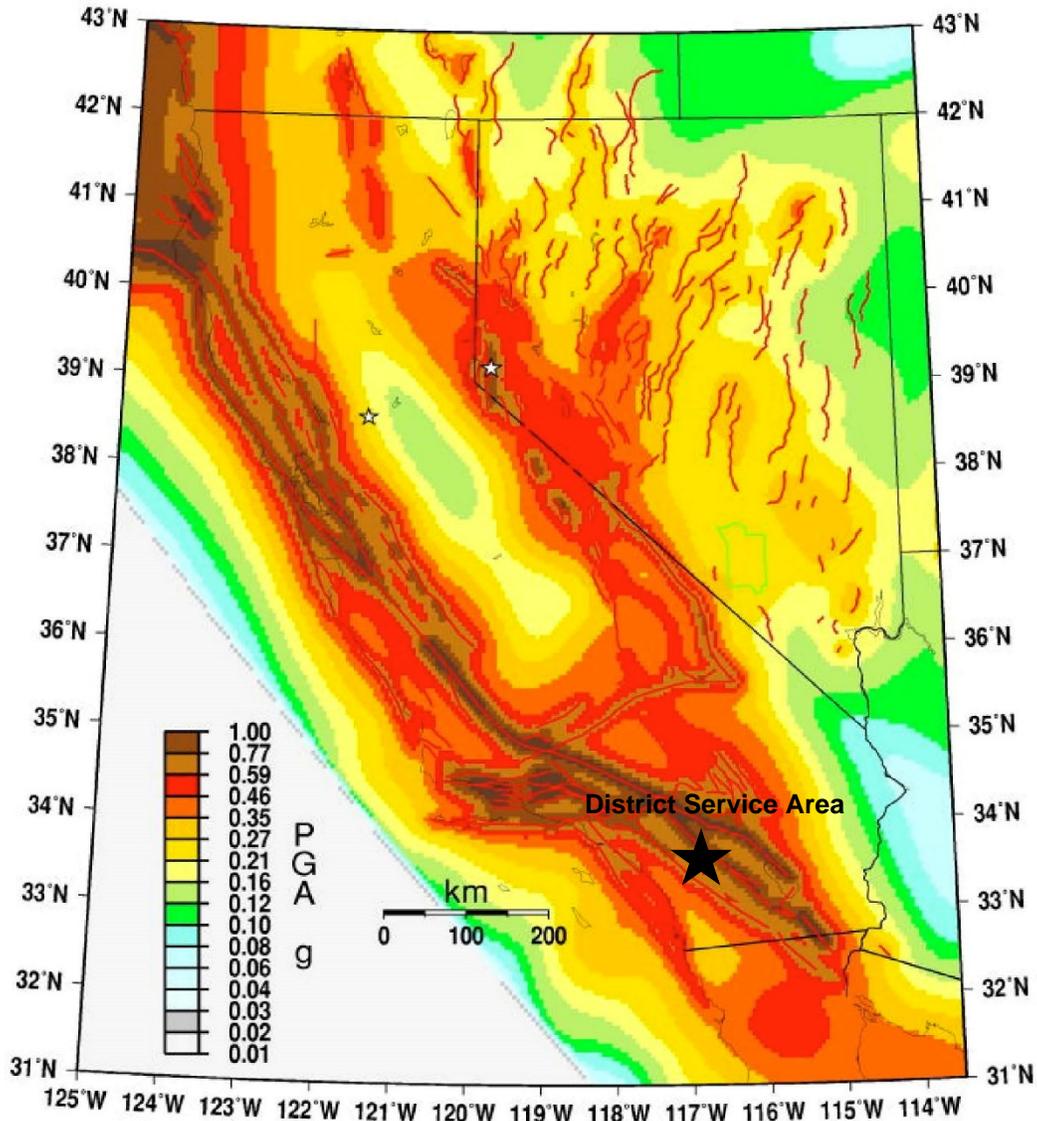
Peak Ground Acceleration

The Peak Ground Acceleration (PGA) mapping represents peak horizontal acceleration of the ground on firm-rock conditions. The approach of representing peak horizontal ground acceleration on firm-rock is a common and widely used method of showing ground accelerations. The development of probabilistic acceleration maps is a result of three types of basic input parameters:

- Attenuation of ground shaking with distance from the earthquake source;
- Frequency of earthquakes within an area or region, termed recurrence; and
- The character and extent of regions and faults that generate earthquakes.

According to the following Probabilistic Seismic Hazard Map, the District is located in an area that will experience a PGA ranging from 0.46g to 1.0g with 2% exceedance in 50 years (0.0004 annual probability).

Calif NV, PGA w/2%PE50yr. 760 m/s Rock



GMT May 22 09:19 PGA NSHMP 2008. Red lines are Qfaults. Site Vs30 760 m/s. 2% in 50 yr PE. UCERF fault models.

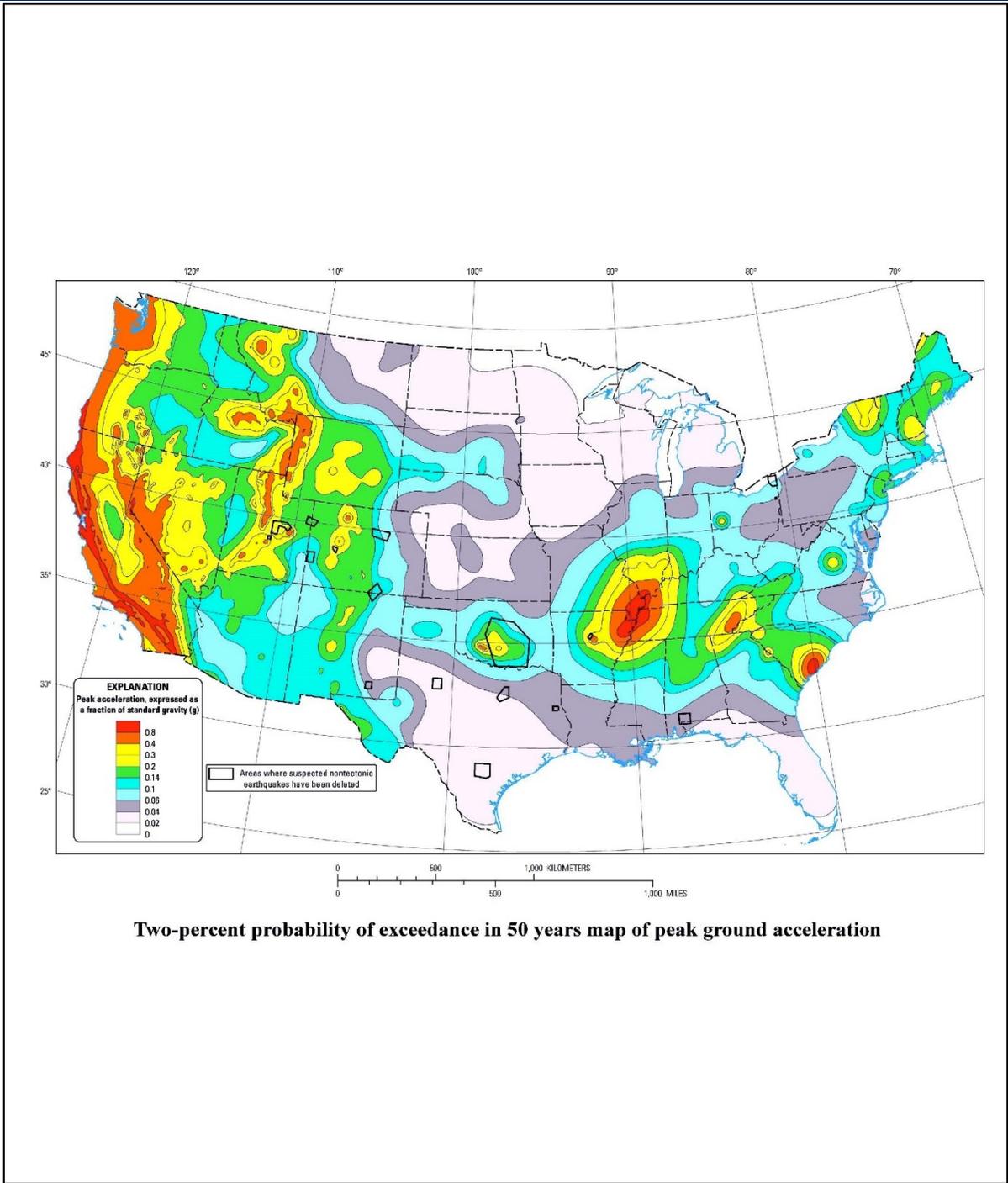
Note:
Peak Ground Acceleration (PGA) image downloaded from <http://earthquake.usgs.gov/hazards/products/continuous/2008/maps/> on June 4, 2011.

**Eastern Municipal Water District (EMWD)
Earthquake Hazard
Peak Ground Acceleration Map**



Figure 3.3: 2011 District Peak Ground Acceleration

Note: Although a later Peak ground Acceleration Map has been released, the 2011 version was used for this report as it provides a much closer look at the District's service area and does seem to be drastically different from the more recent map shown below.



Note:
Peak Ground Acceleration (PGA) image downloaded from <http://earthquake.usgs.gov/hazards/products/continuous/2014/2014pga2pct.pdf> on June 13, 2016.

**Eastern Municipal Water District (EMWD)
Earthquake Hazard
Peak Ground Acceleration Map**

RMP
Risk Management Professionals

Figure 3.4: 2014 District Peak Ground Acceleration

According to table 3.11 provided by the United States Geographic Survey (USGS), this PGA value is typically associated with an approximate 6.2 – 6.9 magnitude earthquake. Thus, there is a 0.0004% annual possibility of a 6.2 – 7.0 magnitude earthquake affecting the District.

Table 3.11: Mercalli Intensity and Corresponding Peak Ground Acceleration

Mercalli Intensity	Richter Intensity	Acceleration (%g)	Velocity (cm/s)	Perceived Shaking	Potential Damage
I	3.5	< 0.17	< 0.1	Not Felt	None
II-III	4.2 – 4.3	0.17 - 1.4	0.1 - 1.1	Weak	None
IV	4.8		1.1 - 3.4	Light	None
V	4.9 – 5.4	3.9 - 9.2	3.4 - 8.1	Moderate	Very light
VI	5.5 – 6.0	9.2 - 18	8.1 - 16	Strong	Light
VII	6.1	18 - 34	16 - 31	Very Strong	Moderate
VIII	6.2	34 - 65	31 - 60	Severe	Moderate to Heavy
IX	6.9	65 - 124	60 - 116	Violent	Heavy
X+	> 7.0	> 124	> 116	Extreme	Very Heavy

3.4 Extreme Weather Hazard Profile

Extreme Weather Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Frequent event - occurs more than once a year	
Consequence/Severity:	Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	
Vulnerability:	Localized damage area, minor secondary impacts, delayed hazard onset	
Location:	The Steering Committee did not note any specific locations more prone to different forms of extreme weather. It was assumed all areas of the District service area were equally vulnerable.	
Hazard Risk Rank Score:	36	
Team Comments:	The Steering Committee combined previously separated hazard including extreme heat, severe storm, windstorm and tornado to form the extreme weather hazard	

3.4.1 Extreme Weather Hazard Information and Background

Extreme weather can be defined as unexpected, unusual, unpredictable severe or unseasonable weather at the extremes of what has been recorded for the region. Extreme weather can take many forms, but the following subsections will attempt to describe the scenarios the Steering Committee perceived as most capable of impacting the District.

Extreme Heat

A heat wave is a prolonged period of abnormally hot weather which may be accompanied by excessive humidity. The term is relative to the normal weather patterns experienced in a given area. Therefore, temperatures from a relatively hotter climate which are considered normal can be called a heat wave in a cooler area if they are outside the normal pattern for that region. The term is applied both to routine weather variations and to extraordinary heat spells which might

occur only once a century. In the U.S., a heat wave is generally defined as at least three consecutive days with temperatures of 90 degrees Fahrenheit (32 Celsius) or more.

Some of the major risks extreme heat poses to public health are as follows:

- Heatstroke - Considered a medical emergency, heatstroke can often be fatal. It occurs when the body's response to heat stress are insufficient to prevent a substantial rise in the body's core temperature. While no standard diagnosis exists, a medical heatstroke condition is usually diagnosed when the body's temperature exceeds 105°F due to environmental temperatures. Rapid cooling is necessary to prevent death, with an average fatality rate of 15 percent, even with treatment.
- Heat Exhaustion - While much less serious than heatstroke, heat exhaustion victims may complain of dizziness, weakness, or fatigue. Body temperatures may be normal or slightly/moderately elevated.
- Heat Syncope - This refers to sudden loss of consciousness and is typically associated with people exercising who are not acclimated to warm temperatures.
- Heat Cramps – These may occur in people unaccustomed to exercising in the heat and generally ceases to be a problem after acclimatization.

In addition to affecting people, severe heat places significant stress on plants and animals. The effects of severe heat on landscaping and local growth can lead to increased vulnerability for fire.

The heat index, also known as the apparent temperature, is a way to describe what the temperature feels like to the human body. The heat index combines the effects of heat and humidity to use as a guide to potential determining danger. Figure 3.5 below is the heat stress index based on the apparent temperature:

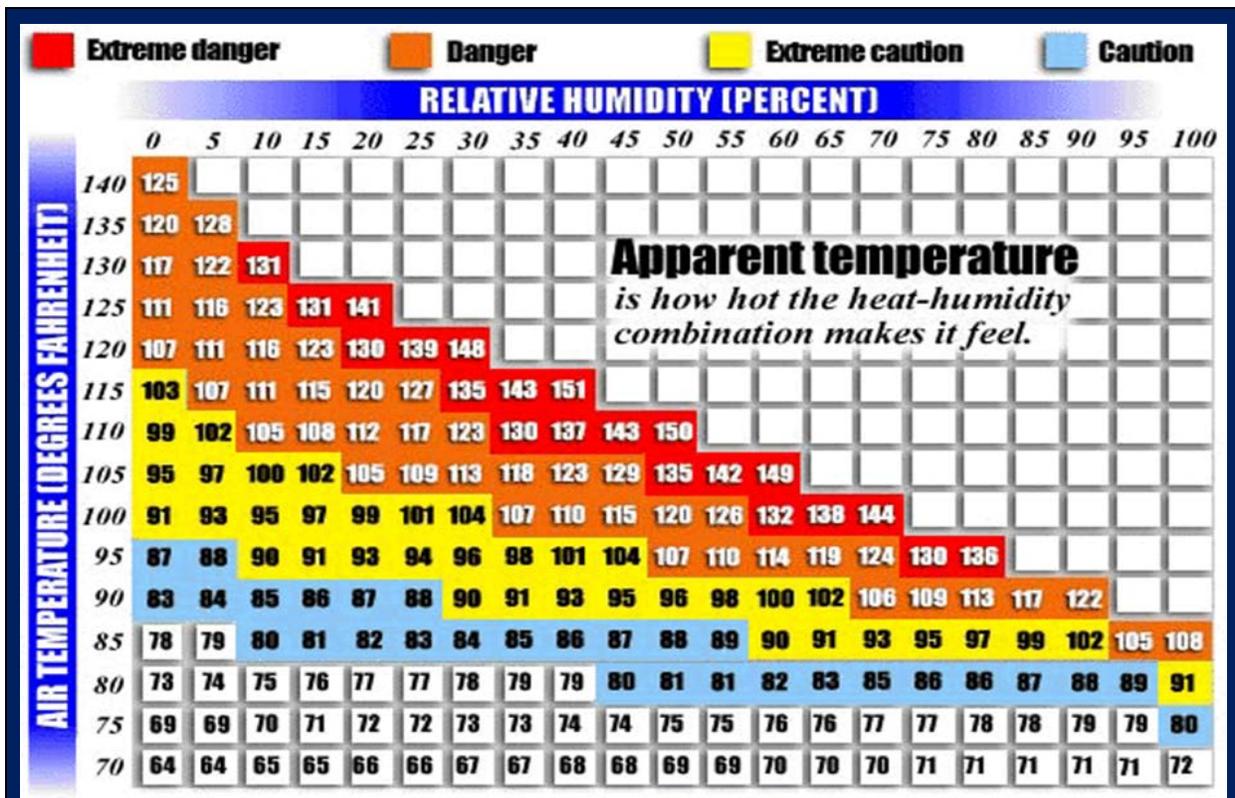


Figure 3.5: Heat Stress Index

Note: Figure was sourced from New Paltz Central School District - <http://www.newpaltz.k12.ny.us/cms/lib/NY01000611/Centricity/Domain/122/AP/HeatIndex.html>

There is a theory claiming increased usage of fossil fuels for transportation and electricity, along with increased deforestation has led to overloading of the atmosphere with greenhouse gases such as carbon dioxide (CO2) along with the destruction of the protective ozone layer above Earth’s atmosphere. According to this theory, these heat trapping emissions act as a blanket and increase the overall atmospheric temperature, thus warming the planet and resulting in heat waves.

Lightning/Thunderstorms

Lightning is a powerful natural electrostatic discharge produced during a thunderstorm. This abrupt electric discharge is accompanied by the emission of visible light. The electric current passing through the discharge channels rapidly heats and expands the air, producing acoustic shock waves (thunder) in the atmosphere.

All lightning originates around 15,000 to 25,000 feet above sea level when raindrops are carried upward until some drops convert to ice. A cloud-to-ground lightning flash originates in this region, moving downward in 50-yard sections called step ladders. Eventually, the charge encounters something on the ground that conducts electricity. At this point the circuit is complete and the

charge is lowered from the cloud to the ground. The return stroke is a flow of charge, which produces visible light.

Lightning causes thunder. The bright light of the lightning flash caused by the return stroke represents a great deal of energy. This energy heats the air in the channel to above 50,000 degrees Fahrenheit in only a few millionths of a second. The air that is now heated to such a high temperature has no time to expand, resulting in very high pressure. The high-pressure air then expands outward into the surrounding air, compressing it and causing a disturbance that propagates in all directions away from the stroke. The disturbance is a shock wave for the first 10 yards, after which it becomes an ordinary sound wave, or thunder.



According to statistics from the National Oceanic and Atmospheric Administration (NOAA), approximately 330 people in the U.S. are struck by lightning annually with 10% of strikes resulting in a fatality. Lightning injuries result from three factors: electrical damage, intense heat, and the associated mechanical energy. The following list provides the lightning hazards to the general population:

- Direct strike
- 'Splash' from nearby objects struck
- Ground strikes near victims which are capable of generating potential differences up to several thousand volts-per-foot, depending upon the ground composition at the strike location.
- Electromagnetic pulse (EMP) produced from strikes - especially during positive lightning discharges

Windstorm

Wind can be described as the flow of air caused by a difference in air pressure within the Earth's atmosphere. Differences in atmospheric pressure causes air to move from high pressure areas to lower. The greater the difference between the two pressure areas, the greater the speed at which the air moves from one pressure area to the other. Strong winds have been known to cause minor property damage and in extreme cases destroy large structures in its path.

The Beaufort Scale is widely used to describe wind speeds based on observed ocean conditions. Since its most recent modification in the 1940's, the scale utilizes a seventeen level system ranging from no air flow to winds that exceed 140 miles per hour (mph) (120 knots) and describe

wind speeds in empirical terms. According to this scale, air speeds during a windstorm usually fall between 65 mph (56 knots) and 72 mph (63 knots). Winds of this speed and greater have been known to cause tornado-like property damage and inhibit utility, telecommunications, and transportation systems in and around the District.

Severe wind storms represent a significant risk to life and property in the region by creating conditions that disrupt essential systems such as public utilities, telecommunications, and transportation routes. High winds can and do occasionally cause tornado-like damage to local homes and businesses. High winds can have destructive impacts, especially to trees, power lines, and utility services.

Based on local history, most incidents of high wind in the District are the result of the Santa Ana wind conditions. While high impact wind incidents are not frequent in the area, significant Santa Ana Wind events and sporadic tornado activity have been known to negatively impact the region.

Tornado:

A tornado is a violent rotating column of air that reaches to the ground from a storm cloud in the shape of a condensation funnel created and maintained by strong inflowing winds. The spinning winds can attain extremely high speeds which provide great risk to property and life at the ground and in the air. When the humidity is high enough, the tornado funnel is made visible by the



circulation of condensed water vapor in its outer sheath, but although the flow of air is inward and upward, the cloud within the low-pressure funnel actually extends downward from the cloud base.

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction, such as a house, in the path of the wind causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

Life and Property:

Based on the history of the region, windstorm events can be expected, perhaps annually, across widespread areas of the region which can be adversely impacted during a windstorm event. Structures with weak reinforcement are susceptible to damage. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift suction forces that pull building components and surfaces outward. With extreme wind forces, the roof or entire building can fail causing considerable damage.

Debris carried by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelopes, siding, or walls. When severe windstorms strike a community, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery.

3.4.2 Extreme Weather Hazard History

Extreme Heat

To indicate the potential for an extreme temperature incident, Table 3.12 below, excerpted from the NOAA, lists recent extreme heat events that have resulted in damage in Riverside County:

Table 3.12: Extreme Heat Damage in Riverside County

Date	Injuries	Fatalities	Property Damage
8/2/1997	0	5	-
6/22/2001	2	1	-
7/23/2002	0	1	-
7/10/2005	0	1	-
7/21/2006	27	16	-
9/1/2007	2	4	-
6/20/2008	0	0	-
5/12/2012	-	1	-
6/20/2016	2	-	-

Heat-Wave of 2006

In mid-July 2006, a severe heat wave hit the U.S, southern California in particular. Temperatures soared to 115 degrees Fahrenheit and by the end of July there were over 160 heat-related deaths in California. The death-toll was so great, several County coroners were back logged. A report from the California Climate Change Center published in 2009 determined that the heat caused two to three time the number of deaths estimated by coroner in at least seven counties. It was documented as one of the worst heat waves on record in the previous 57 years.

Severe Storm

To indicate the potential for a severe storm event, Table 3.13 lists an excerpt of large-scale severe storms extracted from the NOAA's National Climatic Data Center. The table includes lightning, thunderstorms, hail, fog, winter weather, and wind scenarios with some of these storms resulting in extensive regional damage. This list is not comprehensive since severe storms are an annual event regularly causing minor damages and economic disruption (e.g. closed roads, fallen power lines, etc.). The table includes lightning, thunderstorms, hail, fog, winter weather, and wind that have resulted in extensive regional damage.

Table 3.13: Historical Severe Weather Damage in Riverside County

Date	Injuries	Fatalities	Property Damage	Description
9/5/1991	0	0	-	Hail
8/13/1994	0	0	\$10,000	Lightning
11/29/1997	20	0	-	Fog
9/21/1999	0	0	-	Hail/Heavy Wind
1/12/2000	1	0	\$20,000	Fog
3/3/2000	3	0	-	Lightning
3/4/2000	13	3	\$50,000	Winter Storm
2/1/2001	31	0	\$150,000	Winter Storm
9/30/2001	0	0	\$50,000	Hail/Heavy Wind
2/25/2003	24	0	\$250,000	Heavy Rain
7/30/2003	0	1	-	Lightning
11/21/2004	0	0	\$250,000	Heavy Snow
1/7/2005	0	0	\$20,000,000	Heavy Rain
3/10/2006	7	1	\$160,000	Winter Storm
8/30/2008	2	0	-	Hail
6/3/2009	0	0	\$105,000	Lightning

Date	Injuries	Fatalities	Property Damage	Description
1/21/2010	1	0	\$100,000	Heavy Rain
10/19/2010	0	0	\$8,000	Lightning
9/3/2013	0	0	\$1,000	Hail
12/30/2014	0	0	\$3,000	Heavy Snow
9/15/2015	0	0	\$10,000	Heavy Rain
11/3/2016	0	0	\$25,000	Thunderstorm Wind

Note: Property Damage may not have been reported for each incident

El Nino

El Nino is a recurring weather pattern associated with a band of warm ocean water that develops in the central and east-central equatorial Pacific. It occurs every two to five years and brings significant precipitation to California in the form of rain and strong winds which increase vulnerability to flooding and mudslides, particularly for areas affected by wildfires. Additionally, after several years of drought, many of the trees throughout the State have been weakened as a result of limited water supply. Coupled with strong winds resulting from an El Nino phenomenon, these trees can pose danger to people and property. The District service area has many trees which may have been impacted by the recent reduction in precipitation and have the potential of being impacted by an El Nino event.

Windstorm

To indicate the potential for a destructive windstorms, Table 3.14 lists an excerpt of large-scale severe windstorms in the vicinity of the District extracted from the NOAA National Climatic Data Center.

Table 3.14: Major Windstorms in the Inland Area

Date	Location and Damage
November 25, 1996	Strong surface high pressure over the Great Basin produced strong Santa Ana winds across Southern California. Gusts up to 98 mph were felt and numerous trees and power lines were blown down.
December 15, 1996	Strong Santa Ana winds toppled trees and electric poles, smashed windows, blew out signs, and knocked out power to tens of thousands across scattered areas of Southern California. Gusts

Date	Location and Damage
	were reported up to 111 mph in some areas. Two fatalities were reported in San Bernardino County.
December 21, 1999	Strong Santa Ana winds caused widespread power outages, toppled trees, and knocked down powerlines. \$15,000 in property damage were reported to local communities. Gusts were recorded between 35 and 53 mph.
January 5, 2003	High winds were recorded with speeds up to 90 mph. Falling trees and power poles were reported and at least 60 communities were affected. \$100,000 dollars were reported in conjunction with this event.
November 11, 2004	A cold low pressure system called an inside slider hit Southern California from the north with gusts up to 85 mph bringing heavy snow and thunderstorms. Snow was reported in areas as low at 1000 feet in Temecula, Elsinore, and Murrieta.
March 2, 2008	An upper trough of low pressure caused gusts of winds between 60 and 80 mph. The wind overturned big rigs and broke tree branches in the Inland Empire.
January, 21, 2012	Gusts between 75 and 100 mph blew through the Inland Empire knocking down trees and costing Riverside County \$600,000 in damages.
December 21, 2016	Reports of multiple northeast wind gusts in excess of 58 mph with a peak of 67 mph over the region bringing with it moderate rainfall. Minor flooding was reported in some areas.

Santa Ana Winds

The Santa Ana Winds are a seasonal phenomenon in Southern California occurring between October and March. According to the California Climate Change Center, these dry winds occur when cold air moves southward into the Great Basin between the Sierra Nevada Mountain Range and the Southern California Coastal Range. The cold air mass is characterized by unusually high pressure near the land surface. As the wind moves through canyons and passes, the wind accelerates to speeds of 40 mph (35 knots) with gusts up to about 70 mph (60 knots). This

phenomenon has occurred with regularity since at least the mid-1800s. While generally overlooked, Santa Ana winds have been reported to have caused property damage, power outages, road blockages from fallen trees, increased fire threats, and even loss of life from the result of a secondary impact.

3.4.3 Extreme Weather Hazard Frequency and Magnitude

Given the severe weather history in the District, severe weather events, including extreme heat, rain, thunderstorms, and windstorms are very likely to continue to occur. There are no known tendencies for any area within the District to experience more severe weather scenarios than other areas, so the Steering Committee assumed equal vulnerability for all portions of the service area.

Overall, the probability and frequency of heat hazards in the service area are characterized by a heat index using temperature and humidity readings. According to the heat index, the District has a relatively high probability of experiencing extremely high apparent temperatures. Figure 3.6 illustrates mean departures from national average temperatures for June – August 2016. As seen below, most of the service area tended to be about six degrees above the average for the area. While 2016 was an especially hot year, this map serves as a case in point that the District experiences periods of higher-than-normal temperatures.

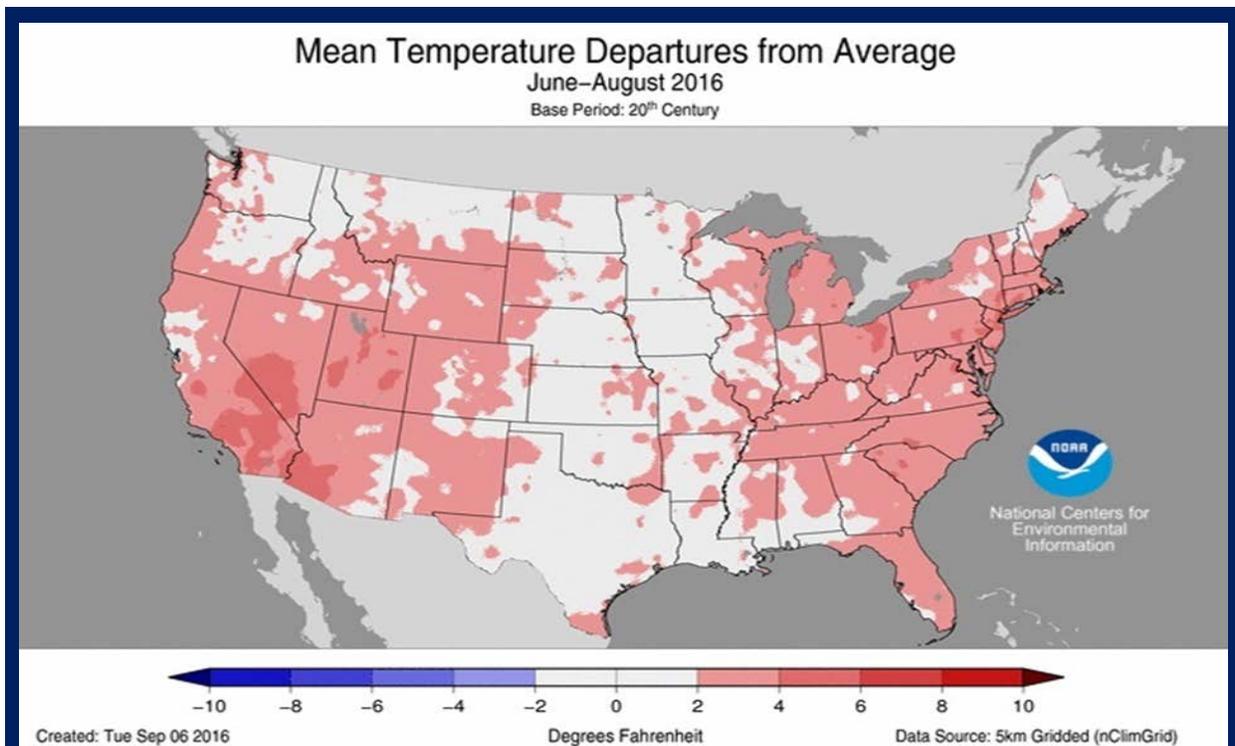


Figure 3.6: Extreme Heat Threat Map

Weather Tables 3.15 through 3.17 and Figures 3.7 through 3.9 portray the averages for several areas within the District’s service area based on information obtained from NOAA. The cities included are Temecula, Moreno Valley, and Hemet. These areas are clear examples of the weather extremes within the service area.

Table 3.15: Weather Historic Averages for the City of Temecula

Month	Average Low	Average High	Average Precipitation	Average Snow
January	25°F	88°F	2.8"	0"
February	34°F	89°F	3.0"	0"
March	34°F	85°F	0.8"	0"
April	38°F	97°F	0.6"	0"
May	45°F	89°F	0.2"	0"
June	49°F	93°F	0.0"	0"
July	53°F	94°F	0.0"	0"
August	50°F	92°F	0.1"	0"
September	45°F	93°F	0.1"	0"
October	34°F	95°F	0.4"	0"
November	30°F	94°F	0.8"	0"
December	29°F	82°F	1.8"	0"

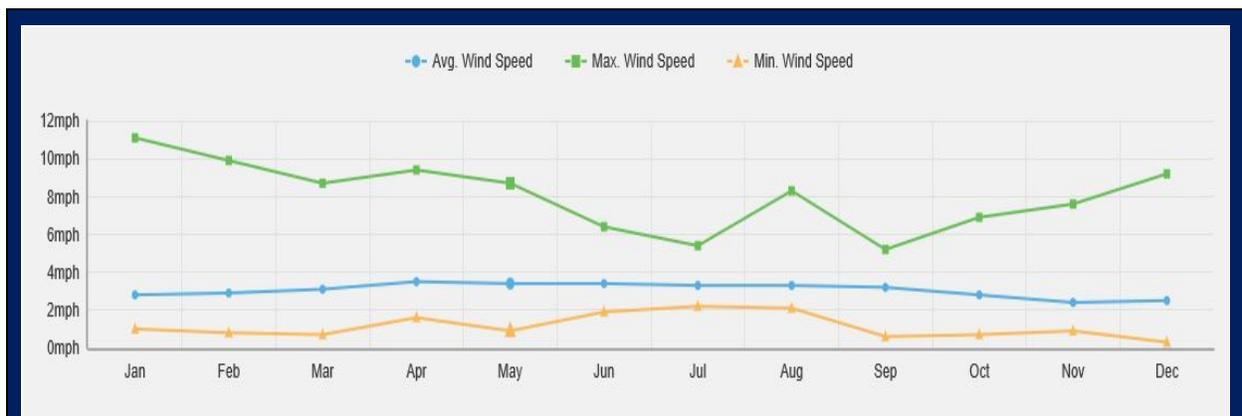


Figure 3.7: City of Temecula Average Wind Speeds

Table 3.16: Weather Historic Averages for the City of Hemet

Month	Average Low	Average High	Average Precipitation	Average Snow
January	19°F	82°F	2.1"	0"
February	27°F	86°F	1.9"	0"
March	26°F	91°F	0.7"	0"
April	30°F	98°F	0.4"	0"
May	39°F	102°F	0.2"	0"
June	46°F	108°F	0.0"	0"
July	50°F	113°F	0.0"	0"
August	53°F	109°F	0.0"	0"
September	45°F	108°F	0.1"	0"
October	37°F	100°F	0.2"	0"
November	30°F	92°F	0.3"	0"
December	25°F	84°F	1.5"	0"



Figure 3.8: City of Hemet Average Wind Speeds

Table 3.17: Weather Historic Averages for the City of Moreno Valley

Month	Average Low	Average High	Average Precipitation	Average Snow
January	19°F	82°F	2.1"	0
February	27°F	86°F	1.9"	0
March	26°F	91°F	0.7"	0
April	30°F	98°F	0.4"	0
May	29°F	102°F	0.2"	0
June	46°F	108°F	0.0"	0
July	50°F	113°F	0.0"	0
August	53°F	109°F	0.0"	0
September	45°F	108°F	0.1"	0
October	37°F	100°F	0.2"	0
November	30°F	92°F	0.3"	0
December	25°F	84°F	1.5"	0

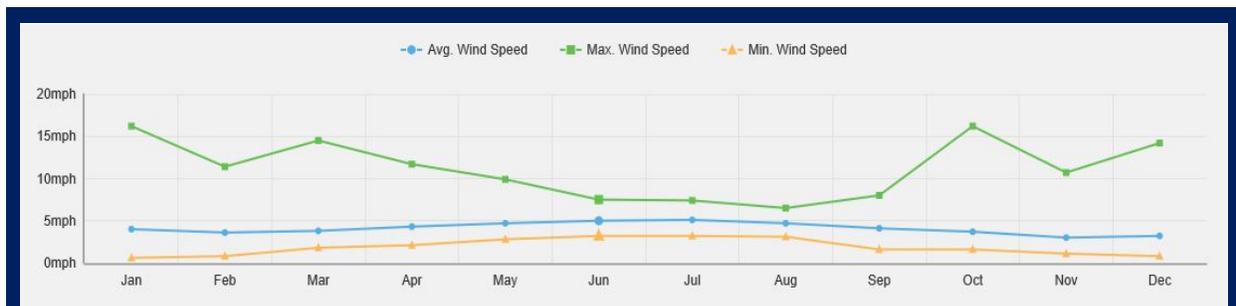
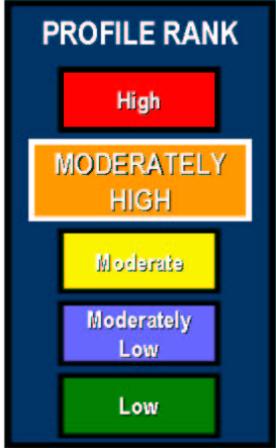


Figure 3.9: City of Moreno Valley Average Wind Speeds

3.5 Flood & Dam Release Hazard Profile

Flood & Dam Release Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Infrequent event - occurs between once every 8 years and once every 50 years (inclusive)	
Consequence/Severity:	Moderate building damage, lifeline loss (less than 24 hours), severe injury or disability	
Vulnerability:	Moderate damage area, moderate secondary impacts, moderate warning time	
Location:	Areas most vulnerable to flooding would be in dam inundation zones and any low-lying plain area. FEMA NFIP maps are included later in this section to demonstrate locations which are more susceptible to flood.	
Hazard Risk Rank Score:	32	
Team Comments:	The Steering Committee combined flood and dam/reservoir failure hazards from the 2011 Plan as the potential impacts are similar for the District.	

3.5.1 Flood & Dam Release Hazard Information and Background

According to the FEMA's National Flood Insurance Program, flood is the most common type of disaster including both man-made and naturally occurring incidents in the U.S. Land along rivers, streams, lakeshores, and coastlines are particularly susceptible to flooding.

The primary responsibility of the local governments during widespread flooding is to protect public safety. The second responsibility is protection of the environment followed by property such as highways, streets, bridges, and structure protection.

The types and causes of flooding that can occur within the District are the result of:

- Heavy rains,
- Flood control channel overflow,
- High water table,
- Coastal, tropical, and/or hurricane storms, and
- Accidents such as reservoir leaks and water main breaks.

What are Floods?

A flood occurs any time a body of water rises to cover what is usually dry land. Floods have many causes, including heavy rains, spring snowmelt, coastal storms, and dam or levee failure. When flooding occurs, affected areas may sustain damage to structures and personal property, as well as severe damage to the environment in the form of soil erosion and deforestation and damage to utilities and transportation systems.

Floods can take several hours to days to develop; the following flood characterization designates the amount of time for response:

- **Flood Watch** – a flood is possible in the area.
- **Flood Warning** – flooding is already occurring or will occur soon in the area.
- **Flash Flood Watch** – a flash flood is possible in the area. Seek immediate shelter or higher ground.
- **Flash Flood Warning** – flooding is already occurring or will occur soon in the area. Flash floods can occur without warning, during heavy rain in mountainous regions ensure that precautions and flash flood warnings are adhered to.

Alluvial Fan Flooding

Alluvial fan flooding occurs in the steep arid or semiarid mountains found throughout California. Alluvial fans are fan-shaped deposits of eroded rock and soil carried out of mountains and into valley floors by landslides, mudslides, mudflows, and surface runoff. At the beginning of the valley, alluvial fans are steep and narrow with boulders and other coarse material. The deposited material becomes increasingly fine as the gradient decreases and the material, mainly gravels, sand and mud, spreads.

When rain falls, runoff from the canyon walls flows as a high-velocity sheet that channels into rivulets, and then to natural drainage courses. The rapidly moving water often carries large boulders and other material from the watershed depositing them into runoff channels, blocking the flow of water. Floodwater then spills out onto the fan, with each event finding a new channel

that soon fills up with deposits and overflows. Flooding in alluvial fans often can cause greater damage than clear-water flooding.

Flash Flooding

A flash flood is a rapid flooding of low-lying areas, rivers, and streams that is caused by the intense rainfall associated with a thunderstorm, or multiple thunderstorms. Flash floods also occur when a man-made structure, such as a dam, collapses. Flash flooding occurs when the ground under a storm becomes saturated with water so quickly that it cannot be absorbed. The runoff collects in low-lying areas and flows rapidly downhill. As a result, anything in its path is suddenly in rising water. A typical flash flood begins with a slow moving thunderstorm. This usually takes longer to move out of the affected areas and causes the area to endure a greater amount of rainfall for a longer period of time. In addition, a thunderstorm may pass over an affected area repeatedly, dumping even more rainfall.

The heavy rainfall associated with these storm systems contributes to urban flooding in a number of ways. Primarily, heavy rainfall will often overwhelm the capacity of the conventional drainage system made up of storm drains, catch basins, sewers, and additional natural mechanisms for storm-water management. These systems typically cannot handle more than one or two inches of rainfall per hour before they begin to backup and overflow. This amount is further diminished if the storm drains, and other components of the storm-water management system, have not been adequately maintained, are clogged with debris such as trash or natural waste, or are old and in a state of disrepair. Heavy rainfall, combined with storm-water runoff, can cause local waterways to rise and overflow their banks.

Dam Release

Dams are an important part of the infrastructure in the U.S.; providing avenues for water supply, flood control, irrigation, hydroelectric power, and recreation. According to FloodSmart.gov (The official website of the National Flood Insurance Program [NFIP]), there are more than 84,000 dams in the National Inventory. It should be noted only one-third of them are owned by the government with the remainder being under private ownership. While it is the dam owner's sole responsibility for safety and liability, the States have regulatory responsibility for about 90% of the dams. With more than a third of our nation's dams being more than 50 years old, 14,000 of them pose a "high" or significant" hazard to life and property if failure occurs.

According to the FEMA website, dam failures are generally caused by one or a combination of the following reasons.

Overtopping

The Association of State Dam Safety Officials (ASDSO) reports 34% of all U.S. dam failures are due to overtopping as a result of inadequate spillway design, debris blockage of spillways, or settlement of the dam crest. Overtopping occurs when primary and emergency spillways are not sufficient to pass floodwaters and the excess runs over the top of the dam. The overflow can erode the embankment, weakening the dam wall and potentially cause a full dam failure. While the City has not experienced the repercussions of a major dam release, the Sweetwater Dam failure that occurred on January 27, 1916 is an example of a release in Southern California that was the result of overtopping. After experiencing a long



period of drought, the area received more than thirty-nine inches of rain. As a result, more than 200 bridges were washed out, entire communities were swept away, levees collapsed, and valleys were inundated. Should the Whittier-Narrows dam fail due to overtopping, this is likely the type of impact the City would encounter.

Acts of sabotage

Sabotage, or deliberate actions aimed at disrupting normal dam operations, can occur for many reasons. Like an act of terrorism or public demonstration, acts of sabotage can be motivated by a number of factors; political, socio-economic, and religious are a just a few. Often they occur suddenly, and without warning. However, according to the Stanford University National Performance of Dams Program (NPDP), sabotage and vandalism have been the cause of the fewest dam failures between the years 1975 and 2001. Therefore, while the City is vulnerable to acts of sabotage, it is unlikely to occur.

Structural failure of materials used in dam construction

According to the NPDP, dam failure due to structural deficiencies are only marginally more common than acts of sabotage. Due to state regulations for dam construction and maintenance, failures due to inadequate structural integrity are rare.

According to FEMA, causes of dam failure in this category may include:

- Movement and/or failure of the foundation supporting the dam,
- Settlement and cracking of concrete or embankment dams,

- Piping and internal erosion of the soil in embankment dams, and
- Inadequate maintenance and upkeep.

One of the most notable dam incidents in California history involved the Baldwin Hills Dam. The dam was constructed in Baldwin Hills, Los Angeles between 1947 and 1951 to provide drinking water for West Los Angeles residents. The dam was constructed on an active fault line which many of the geologists involved in its planning considered unstable for a reservoir. On December 14, 1963, a small crack developed in the embankment which widened to a 75-foot gash resulting in the release of 292 million gallons of water. Five people were killed, sixty five homes were destroyed, and 210 home and apartments were damaged.

As mentioned previously, causes in this category are considered minor as they comprise a minute fraction of historic dam failures in the U.S. Figure 3.10 shows the causes of recorded dam failures between the years 1975 and 2001.

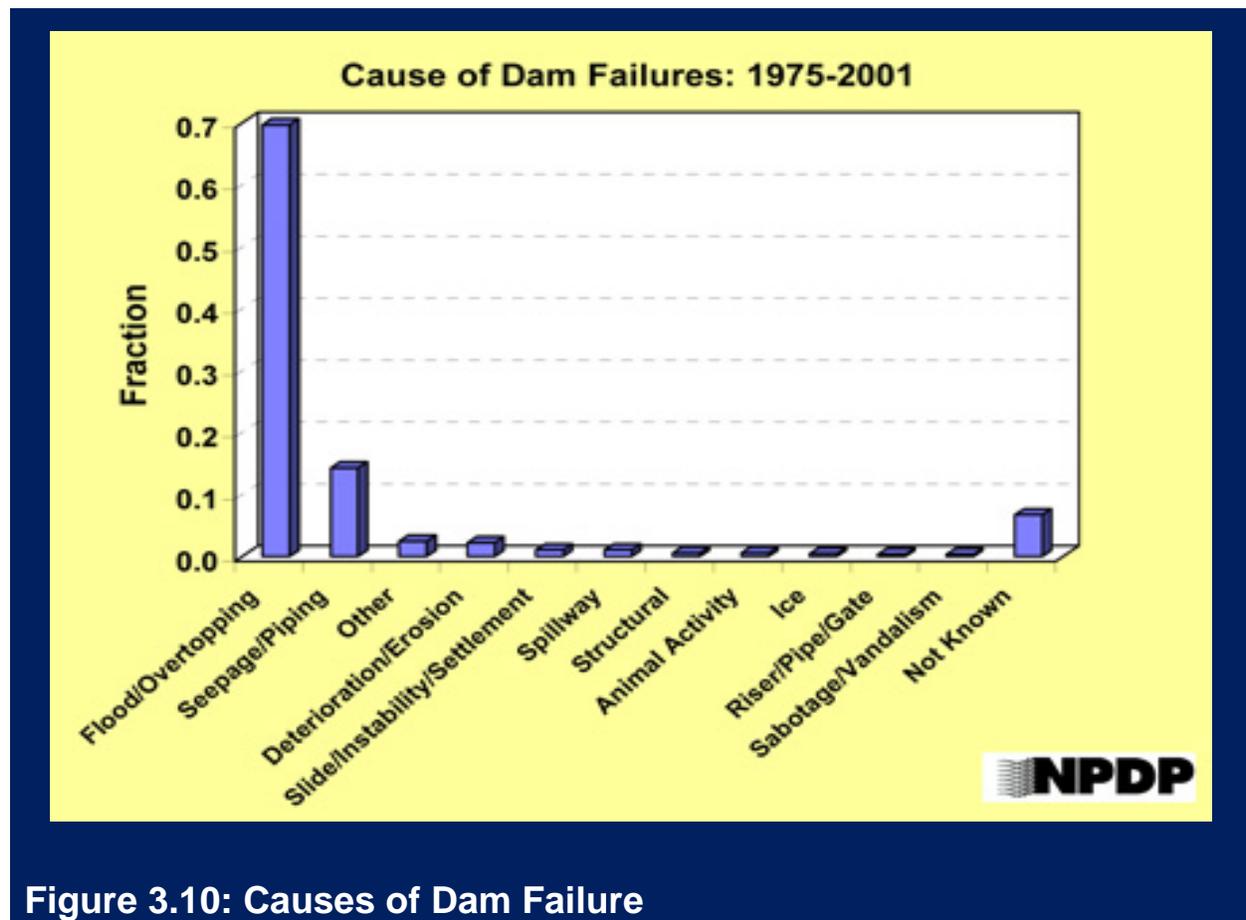


Figure 3.10: Causes of Dam Failure

3.5.2 Flood & Dam Release Hazard History

Riverside County and the District has experienced several large flood events. The subsections below illustrate a few of these occurrences to serve as a case in point of the extent of the District vulnerability to flood as reported by the USGS and NOAA.

1993 Flood Event

From January 6 to February 28, 1993, a series of storms produced 20 to 40 inches of rain over the southern California coastal and mountain regions and over 52 inches at some precipitation gages in the San Bernardino Mountains according to NOAA. These storms were driven by a regional atmospheric low-pressure system off the coast of northern California and Oregon.

The most severe flood event of the January – February 1993 storms occurred on January 16th in the Murrieta Creek floodplain in Temecula. Flood flows at the USGS Murrieta Creek stream flow gaging station (near Temecula) overtopped the gage house and the recorded stage was the maximum for the 68 years of record, exceeding the previous (February 21, 1980) record by more than 3 feet.

Maximums of record were also recorded on the Santa Margarita River near Temecula and on other smaller streams within the Santa Margarita River watershed. Extensive flooding occurred along the Santa Margarita River where it passes through Camp Pendleton, the U.S. Marine Corps base near the mouth of the river. The floodwaters spread over the broad, flat floodplain on the base and deposited large quantities of sediment and debris. The Santa Margarita River stream flow gaging station at Ysidora was damaged as the debris-laden river washed out the bridge. The estimated discharge of 44,000 cubic feet per second (cfs) exceeded the maximum discharge for the 68 years of record (33,600 cfs on February 16, 1927) by 34 percent.

December 2010 Storms and Flooding

In the span of one week, a series of mid–December storms in rapid succession produced record-setting rain and snowfall. The first rains and snow hit California on December 16th and subsequent periods of heavy rains continued almost unabated for a week with heavy snowfall in the Sierra Nevada Mountains according to NOAA. The storm areas of the heavier precipitation gradually shifted from northern California southward with each successive wave, punctuated by a final day of heavy rains, thunderstorms, and snow at the higher elevations of southern California and Nevada on December 22, 2010 when a cold upper trough shifted inland from the Pacific and brought an abrupt and welcome end to the wet pattern.

The Riverside County Flood Control Storm Center and Storm Patrols were activated December 21st - 22nd to monitor facilities, receive complaints and respond to problem areas as necessary.

The Riverside County Flood Control Hydrologic Data Collection Section created a summary chart for the maximum precipitation gauges reported and the corresponding return frequencies for the different durations. The Temecula gauge reading showed a one day max of 5” and the 8-day total rain for the storms ranged from 3.79” to 13.14” at various locations across the county. The frequencies corresponding to six of these gages reached or exceeded the 100-year flood. Two regional flood control facilities were damaged during the storms with costs estimated at \$2 million for restoration repairs. Several other regional facilities reached their capacity and one dam in the City of Riverside had a few inches of water flowing over the spillway.

Table 3.18: Historical Flooding damage in Riverside County

Date	Injuries	Fatalities	Property Damage	Crop Damage	Type
8/9/1994	0	0	\$3,000	-	Flash Flood
3/5/1995	0	0	-	\$1,000,000	Flash Flood
3/6/1995	0	2	-	-	Flash Flood
2/23/1998	0	0	\$8,200,000	\$4,200,000	Flood
7/11/1999	0	0	\$500,000	-	Flood
7/12/1999	4	1	\$50,000	-	Urban Flood
3/8/2000	4	2	\$60,000	-	Urban Flood
7/6/2001	0	0	\$1,200,000	-	Flash Flood
9/4/2003	0	0	\$100,000	-	Flash Flood
1/9/2005	0	0	\$5,000,000	-	Flash Flood
1/14/2005	0	0	\$10,000,000	-	Flood
9/4/2006	0	0	\$100,000	-	Flash Flood
7/20/2008	1	0	\$500,000	-	Flash Flood
12/13/2009	0	0	\$100,000	-	Flash Flood
12/22/2010	0	1	-	-	Flash Flood

Date	Injuries	Fatalities	Property Damage	Crop Damage	Type
7/6/2011	0	0	\$9,000	-	Flood

Historical Dam Failure Events

The District has never been impacted by a dam failure. However, there have been a total of 45 dam failures in California’s history. Failures have occurred for a variety of reasons. According to the United States Bureau of Reclamation, overtopping accounts for 30 percent of all dam failures in the United States in the last 75 years. Other dams have failed due to specific shortcomings in the dam itself or an inadequate assessment of the surrounding geomorphologic characteristics. The first notable dam failure occurred in 1883 in Sierra County, while the most recent failure occurred in 1965. The greatest catastrophe relating to California dam failures was William Mulholland’s infamous St. Francis Dam, which failed in 1928 and resulted in a major disaster. Because of this failure and the exposure to potential risk to the general populace from a number of water storage dams in California, the Legislature in 1929 enacted legislation providing for supervision over non-federal dams in the State. Before the enactment of this legislation, either the State Engineer or the State Railroad Commission exercised State supervision over dams. This supervision was limited in scope and extended to less than half of the dams in the State.

The statute enacted in 1929 provided for:

- examination and approval or repair of dams completed prior to the effective date of the statute, August 14, 1929,
- approval of plans and specifications, and supervision of construction of new dams, and of the enlargement, alteration, repair, or removal of existing dams, and
- supervision over maintenance and operation of all dams of jurisdictional size.

Overall, there have been at least 460 deaths from dam failures in California. These failures are outlined in Table 3.19.

Table 3:19: Dam Failure Events in California

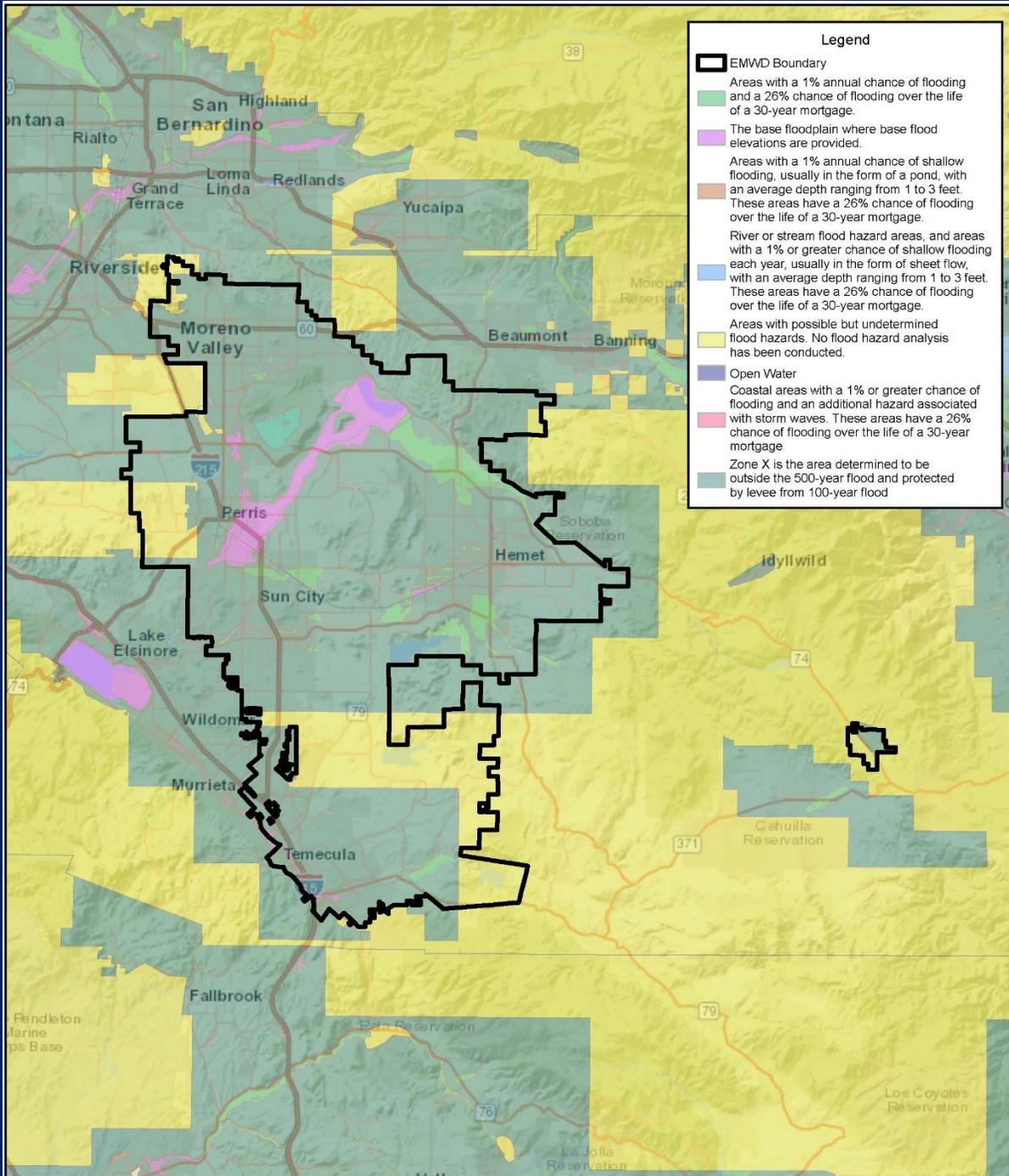
Year Failed	Dam	Location	Cause of Failure/Deaths
1883	English	Sierra County	Dam crumbles to foundations, decay of timber used
1892	Long Valley Creek	San Jacinto	Heavy rains, dam carried away by flood
1895	The Angels	Calaveras County	Undetermined during flood, poor foundation/ 1 death reported
1896	Vernon Heights	Oakland	Shallow foundation

Year Failed	Dam	Location	Cause of Failure/Deaths
1898	Snake Ravine	Stanislaus County	Poor compaction
1905	Piedmont No.1	Oakland	Outlet pipe sheared off at core wall
1906	San Andreas	San Mateo County	Crack along axis
1912	Morena	San Diego	Overtopping
1916	Lower Otay	San Diego	Leakage and overtopping due to inadequate spillway
1918	Lake Hodges	San Diego	Cracks in pier
1963	Baldwin Hills	Los Angeles	Leak through embankment turned into washout/ 3 Deaths
1964	Hell Hole	Rubicon River	Failed during construction due to unprecedented rains
1965	Matilija	Ventura	Bad foundation and concrete disintegrating

Note: Information was taken from UC Davis Civil & Environmental Engineering Department

3.5.3 Flood & Dam/Reservoir Failure Hazard Frequency and Magnitude

According to the FEMA Flood Insurance Rate Map (FIRM) Data illustrated in the map on the following page, minor portions of the District service area are located in 100- and 500-year flood plains. The 100- and 500-year recurrence intervals indicate a 0.01 and 0.002 annual probability of a flooding event, respectively. However, most of the service area is located with an area either outside the designated flood zones, or in an area of undetermined.



Note:
 FEMA Flood zone areas
 downloaded from
<https://data.fema.gov/data>
 FIMA/Risk_MAP/NFHL/
 NFHL_08082016.gdb.zip
 October, 2016.

**Eastern Municipal Water District (EMWD)
 FEMA Flood Insurance Rate Map (FIRM)**

0 20,000 40,000 80,000
 Approximate Scale in Feet

Figure 3.11: FEMA Flood Insurance Rate (FIRM) Map

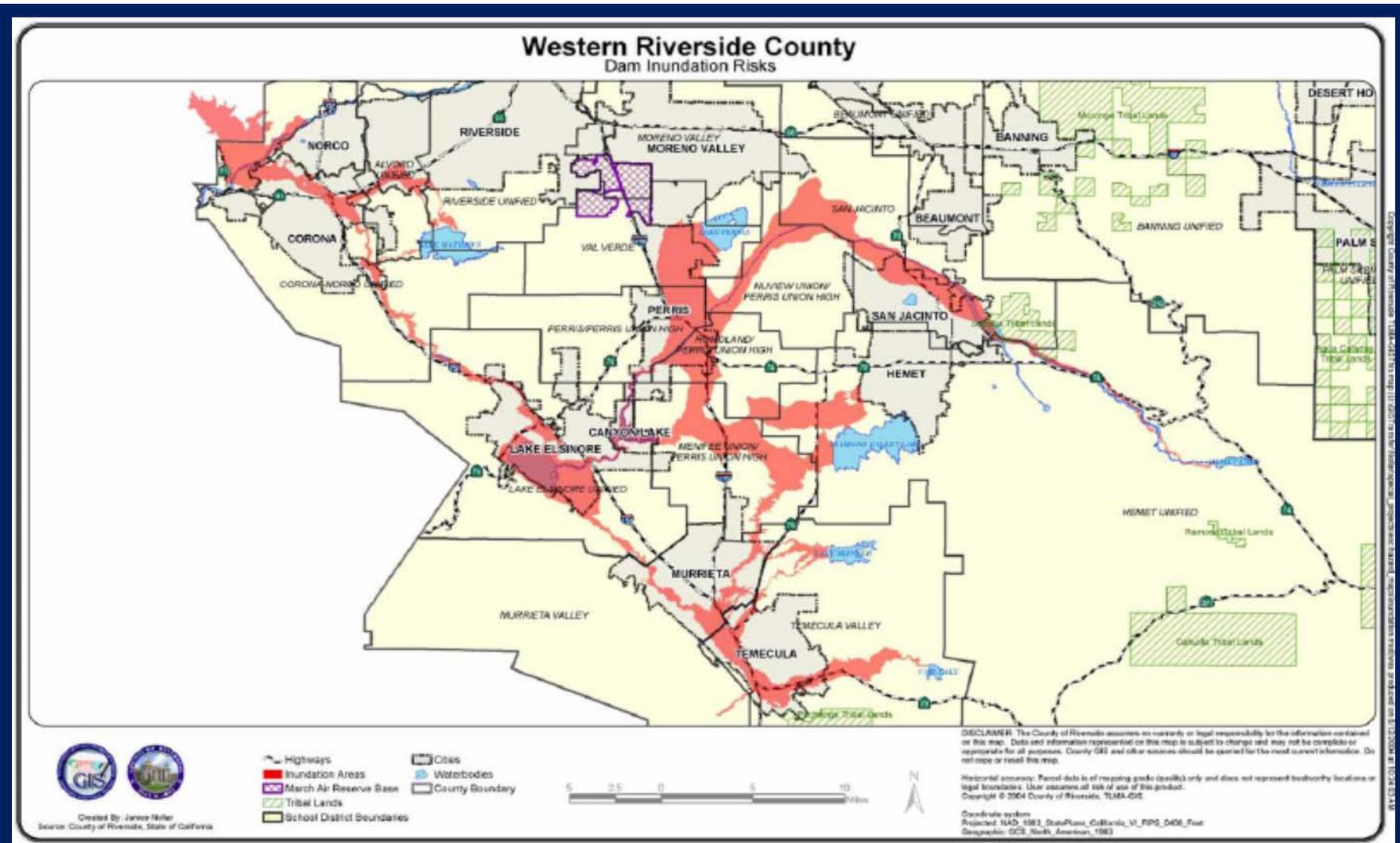
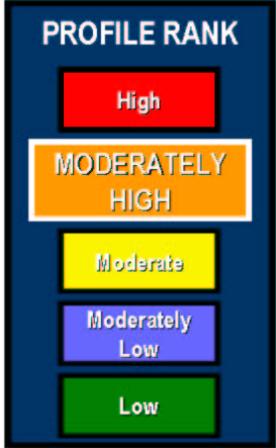


Figure 3.12: 2011 Riverside County Inundation Map

3.6 Infrastructure Failure Hazard Profile

Infrastructure Failure Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Frequent event - occurs more than once a year	
Consequence/Severity:	Moderate building damage, lifeline loss (less than 24 hours), severe injury or disability	
Vulnerability:	Localized damage area	
Location:	District Assets which, if damaged, have the ability to interrupt water service can be found throughout the entire Service Area	
Hazard Risk Rank Score:	32	
Team Comments:	The Steering Committee noted that small deviances from normal operations (i.e. pipeline failures) are a regular occurrence. However, when addressing Infrastructure failure, the team focused on large-scale scenarios such as a main break.	

3.6.1 Infrastructure Failure Hazard Information and Background

Water from dams and reservoirs are supplied to Riverside County through distribution pipelines. Typical infrastructure of water supply system consists of:

- Water supply extraction and storage facilities including pump, dams and reservoirs
- Water conveyance facilities including aqueducts, canals and associated pumps
- Water treatment facilities
- Water distribution pipelines

According to the Centers of Disease Control and Prevention (CDC), the drinking water supplied to homes in the U.S. is some of the safest in the world. Water supply agencies use various methods of water treatment to ensure the drinking water provided to the public is safe for

consumption. Common steps for water treatment used by water agencies are defined below. Failure of components in any of these steps can disrupt reliable supply of water to the public.

Sedimentation: In this step, larger and heavier dirt and contaminants settle to the bottom to be easily separated from water.

Filtration: This step removes the remaining contaminants left over from sedimentation process. This step can include process such as microfiltration, ultrafiltration, nanofiltration or reverse osmosis. These systems have proven very effective in removing bacteria, viruses, chemicals and other harmful contaminants.

Water softening system: This step is often used for drinking water supply systems. This involves ion exchange technology that removes calcium and magnesium ions in the water and replaces them with sodium ions. This process not only removes the hardness of the water, but can also remove heavy metals, radioactivity, nitrates, etc.

Distillation system: This step is also seen in the drinking water supply systems. This involves boiling and condensing water, which in turn removes many of the soluble and insoluble contaminants such as bacteria, viruses, heavy metals and chemical contaminants.

Disinfection: This is a crucial step in the water treatment system. Water that is treated, filtered and distilled may contain microorganisms that can affect humans. Water also needs to be protected from increased microorganism growth during distribution in the piping and distribution systems.

Causes of infrastructure failure:

With increasing population and the need for reliable water supply, infrastructure failure is a critical hazard that is commonly overlooked. One of the main causes of infrastructure failure in the water supply systems is aging in equipment such as pipelines, tunnels, dams, pumps, tanks and buried equipment. Protecting the pump and filtration systems from inlet sand and gravel is vital in extending the life of filter membranes and pump internals. Lack of regular maintenance, improper operation and corrosion over time can add to the loss of mechanical integrity. This can also lead to water quality issues and contaminated water supply to the public.

Infrastructure failure can also occur as a secondary impact during natural disasters such as earthquakes, landslides and flooding. Ground shaking and support damage can cause failure of piping and aqueducts which may result in disrupted water flow to the public. Failure history, probability, frequency and magnitude of hazards such as earthquakes, landslides and flooding are discussed in other sections.

3.6.2 Infrastructure Failure Hazard History

The most common infrastructure failure seen in California's water systems is water main failure. These failures have been known to result in property damage, disruption of traffic, loss of water, and high repair costs. Below are a few recent examples of main breaks in Riverside County to serve as a case in point of the kind of scenarios the District might face if it experiences an infrastructure failure event.

2014 Trey Avenue Water Main Break

On Saturday, December 20, 2014 around 2:30 AM, emergency responders arrived at the 8300 block of Trey Avenue in the City of Riverside to find a water main break had caused a large sinkhole and left 40 homes without water service. Later, a separate leak was found which added to the extent of the repair. Once the water was shut off, it took local City workers ten (10) hours to restore water service. Additional time and resources were needed to



clear away mud from the street and nearby homes. Local authorities attributed the accident to the age of the pipes and increased vulnerability due to cold weather. Local reports did not release information about the cost of the repairs, but it is estimated the incident accrued tens of thousands in damage and repairs.

2015 Menifee Water Main Break



On Tuesday, April 28, 2015 a water main break flooded a Rite Aid Pharmacy on Newport and Murrieta roads in the City of Menifee, a retail customer within the District Service Area. Just after 1:00 PM, City emergency responders found "several hundreds, if not thousands of gallons of water flowing," according to Station 5 Engineer Paramedic Jeff Stout who participated in the response effort. Minor to moderate damage was reported to the pharmacy, but no other nearby

properties were damaged. The blast from the break caused a 20-foot-wide sinkhole and a disruption in water service to several of the surrounding businesses and residences. Local business owners made recorded statements about the loss of business due to water service outages adding to overall cost of the event. Overall, the City reported a cost of \$250,000 to repair the 24 inches of broken pipeline and 300 feet of warped asphalt.

3.6.3 Infrastructure Failure Hazard Frequency and Magnitude

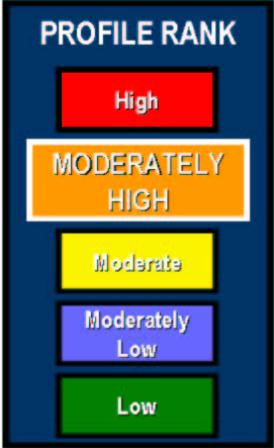
Nationally, several organizations have been trying to raise awareness of the growing need for water infrastructure repairs and the growing cost of systems failures. The U.S. Environmental Protection Agency (EPA) reports that there are an estimated 240,000 water main breaks per year. Many of these breaks require millions of dollars for the replacement of worn piping and to repair residual damage to municipal and private property. According to the American Water Works Association, an estimated \$1 trillion dollars is necessary to maintain and expand water service to meet demands over the next 25 years nationally.

The District has an extensive network of pipes throughout its service area that are susceptible to failure and can cause localized flooding of homes, disrupt traffic and businesses and at times create sinkholes. Other infrastructure failures such as pump failures and water filtration system failures can also disrupt water supply to public. However, these systems are designed with redundancy and are generally not expected to cause any major disruption to the public as the result of normal wear. Other infrastructure failures resulting from earthquakes, flooding and drought can compound to the hazards and are discussed in other sections

3.7 Wildfire Hazard Profile

Wildfire Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Regular event - occurs between once a year and once every 7 years	
Consequence/Severity:	Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	
Vulnerability:	Localized damage area, minor secondary impacts, delayed hazard onset	
Location:		
Hazard Risk Rank Score:	27	
Team Comments:	None	

3.7.1 Wildfire Hazard Information and Background

A wildland fire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires can be human-caused through acts such as arson or campfires, or can be caused by natural events such as lightning. Fires are typically classified according to the following categories:

- **Urban fires** are primarily those associated with structures and the activities in and around them.
- **Wildland fires** occur in forests or other generally uninhabited areas and are fueled primarily by natural vegetation.
- **Urban Interface fires** occur where development and forest interface, with both vegetation and structures providing fuel (may also be referred to as urban-wildland interface fires).



Wildland fire behavior and propagation of the fire has three mechanisms:

- **Crawling fire:** the fire spreads via low level vegetation (e.g., bushes)
- **Crown fire:** a fire that "crowns" (spreads to the top branches of trees) can spread at an incredible pace through the top of a forest. Running crown fires can be extremely dangerous to all inhabitants underneath, since all the oxygen is sucked out to feed the fire above, increasing potential for asphyxiation.
- **Jumping or Spotting fire:** burning branches and leaves are carried by the wind and start distant fires; the fire can thus "jump" over a road, river, or even a firebreak.

The following factors contribute significantly to aforementioned wildland fire behavior:

- **Slope/Topography:** As slope increases, the rate of wildland fire spread increases. South facing slopes are also subject to greater solar radiation, making them drier and thereby intensifying wildland fire behavior.
- **Vegetation/Fuel:** Weight and volume are the two methods of classifying fuel, with volume also referred to as fuel loading (measured in tons of vegetative material per acre). Each fuel is assigned a burn index (the estimated amount of potential energy released during a fire), an estimate of the effort required to contain a wildland fire, and an expected flame length.
- **Weather:** Variations in weather conditions have a significant effect on the occurrence and behavior of wildfires.

Firestorms that occur during extreme weather (e.g., high temperatures, low humidity, and high winds) have high intensity making fire suppression is virtually impossible. These events typically burn until the conditions change or the fuel is exhausted. Even small fires can threaten lives and resources, and destroy improved properties. It is also important to note that in addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require the emergency watering/feeding, shelter, evacuation, and even burying of animals.

Wildfire Secondary Events

The aftermath of a wildfire can be as disastrous if not more so than the fire. A particularly destructive fire burns away plants and trees that prevent erosion. If heavy rains occur after such a fire, landslides, ash flows, and flash floods can occur. This can result in property damage outside the immediate fire area, and can affect the water quality of streams, rivers and lakes.

Wildfire as a Secondary Event

In addition to typical ignition sources for wildfires, earthquakes or floods have the potential to rupture buried gas lines, and high winds or accidents could cause overhead electric lines to break, creating ignition sources for wildland fires. Catastrophic earthquakes could cause widespread urban fires, as multiple gas and electrical lines could be broken or disrupted.

3.7.2 Wildfire Hazard History

To indicate the potential for a fire event, the following table excerpts recent fires in Riverside County, and is taken from the National Climatic Data Center.

Table 3.20: Wildfire Damage in Riverside County

Date	Injuries	Fatalities	Property Damage	Crop Damage
8/31/1998	0	0	\$4,500,000	-
9/30/1999	0	0	\$500,000	\$500,000
8/01/2000	9	0	\$40,000	-
6/23/2001	2	0	\$50,000	-
6/29/2001	0	1	-	-
8/18/2003	3	0	\$1,000,000	\$250,000
5/02/2004	18	0	\$8,100,000	-
7/22/2004	3	0	-	\$300,000
9/28/2005	0	0	\$869,000	-
7/23/2006	3	0	-	-
10/22/2007	0	0	\$100,000	\$100,000
11/15/2008	0	0	\$150,000,000	-
8/27/2009	0	0	\$50,000	-
7/15/2010	1	0	\$18,000	-
8/3/2010	2	0	-	-

Additionally, Figure 3.13 depicts the fire history throughout the Eastern Municipal Water District service area.

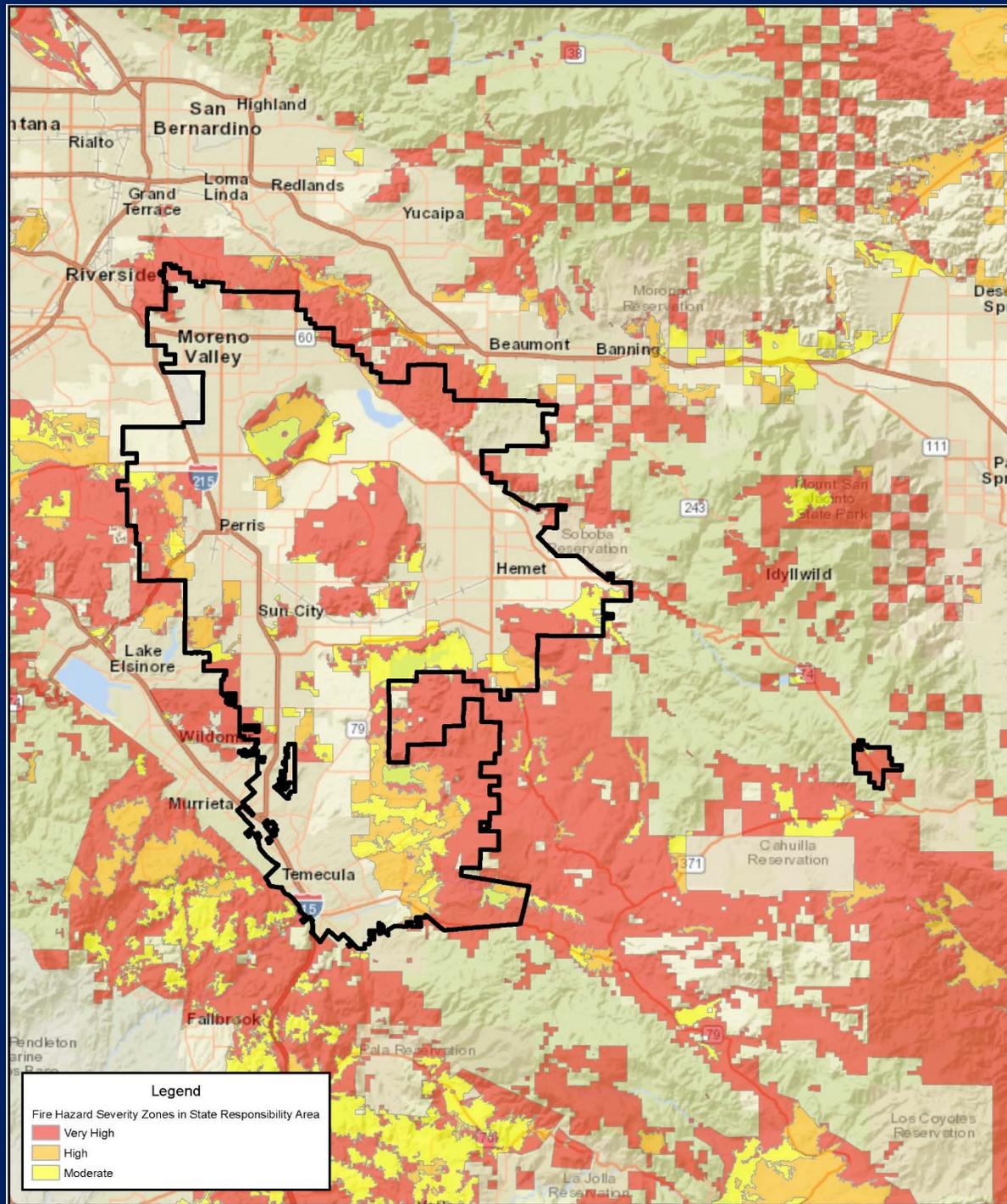
3.7.3 Wildfire Failure Hazard Frequency and Magnitude

Wildfires are a major environmental hazard that have historically cost California more than 800 million dollars each year and contribute to "bad air days" throughout the state. Heat and smoke from fires can be more dangerous than the flames. Inhaling the smoke can sear the lungs and fire also produces poisonous gases that cause disorientation and drowsiness which eventually lead to asphyxiation. As a result, asphyxiation is the leading cause of fire deaths, exceeding burns by a three-to-one ratio.

Figure 3.13 on the following page illustrates the fire threat to the Districts' service area. As shown in the figure, the expected fire hazard is low.

Wildfires and climate change

Increased usage of fossil fuels for transportation and electricity, along with increased deforestation has led to the overloading of the atmosphere with greenhouse gases such as carbon dioxide (CO₂). These heat trapping emissions act as a blanket and increase the overall atmospheric temperature, thus warming the planet. As summers get hotter and longer, the conditions for wildfires increase exponentially. Wildfires in the U.S. have been on an increasing trend and the effects of climate change has shown to aggravate the frequency and duration of wildfires.



Note:
 Fire hazard severity zones
 downloaded from
http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_statewide
 on
 October 11, 2016.

**Eastern Municipal Water District (EMWD)
 Fire Hazard Severity Zones**

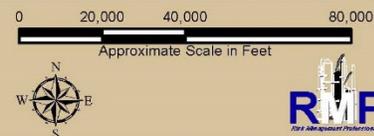
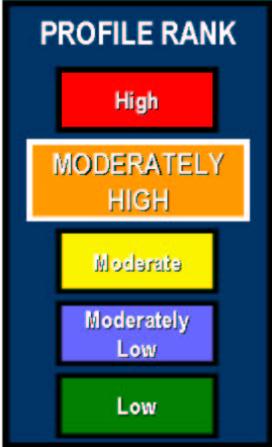


Figure 3.13: District Fire Threat Map

3.8 Hazardous Materials Release Hazard Profile

Hazardous Materials Release Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Rare event - occurs less than once every 50 years	
Consequence/Severity:	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	
Vulnerability:	Widespread damage area, significant secondary impacts, no warning time	
Location:	Currently, this hazard applies to water treatment and reclamation facilities as well as assets which are near freeways where hazardous materials are being transported. Locations of these assets have not been included in this plan for security reasons, but were considered by the Steering Committee when completing the Risk Assessment	
Hazard Risk Rank Score:	25	
Team Comments:	As the San Onofre Nuclear Plant is no longer operational, it was removed from the list of identified hazards. However, as the plant is still storing hazardous materials which are transported through the District Service Area, the Steering Committee expanded the range of the Hazard Material Release hazard to include the release of any hazardous material during transport throughout the Service Area	

3.8.1 Hazardous Materials Release Hazard Information and Background

Hazardous materials include hundreds of substances that can potentially pose a significant risk to the general population if released. These substances may be highly toxic, reactive, corrosive, flammable, radioactive or infectious. They are present in nearly every community in the United States, where they may be manufactured, used, stored, transported, or disposed. Because of

their nearly ubiquitous presence, there are hundreds of hazardous material release events annually that contaminate air, soil, and groundwater resources, potentially triggering millions of dollars in clean-up costs, human and wildlife injuries, and occasionally cause human deaths.

Accidents, which result in chemical clouds or release of hazardous materials into public water or sewer systems, may affect outlying neighborhoods or the community at large. Depending upon the scale of the release, large segments of the residential and the business populations may need to be evacuated quickly for extended periods of time. Effective emergency planning with regard to hazardous materials, therefore, requires the concentrated efforts of the Fire and Police Departments as well as other public safety officials and private organizations, such as the Red Cross. Hazardous material releases may occur from any of the following:

Table 3.21: Types of Hazardous Materials Incidents

Fixed-Site	Includes all releases involving the production and manufacturing, handling, and storage of a hazardous product at a single facility as well as any releases that may occur at a designated hazardous waste disposal site.
Transportation	Includes all releases that occur while the product is in transit from one facility to another or en-route to be disposed of at a designated hazardous waste disposal site.
Intentional Spills and Releases	Includes all criminal acts and acts of terrorism in which a hazardous material is used to intentionally cause injuries and/or fatalities, damage the environment and/or property, or advance a political or social agenda. Weapons of Mass Destruction (WMD) are discussed in further detail in the Terrorism section of this document.

In response to concerns over the environmental and safety hazards posed by the storage and handling of toxic chemicals, Congress passed the Emergency Planning and Community Right to Know Act (EPCRA) in 1986. To reduce the likelihood of hazardous material releases, EPCRA established specific requirements on federal, state and local governments, Indian tribes, and industry to plan for hazardous materials emergencies. EPCRA's Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities working with facilities can use the information to improve chemical safety and protect public health and the environment. Under EPCRA, hazardous materials must be reported to the EPA, even if they do not result in human exposure. Hazardous material releases may include the following:

- Air emissions (e.g., pressure relief valves, smokestacks, broken pipes, water or ground emissions with vapors)
- Discharges into bodies of water (e.g., outflows to sewers, spills on land, water runoff, contaminated groundwater)
- Discharges onto land
- Solid waste disposals in onsite landfills
- Transfer of wastewater to public sewage plants
- Transfers of waste to offsite facilities for treatment or storage

In addition to accidental human-caused hazardous material events, natural hazards may cause the release of hazardous materials and complicate response activities. The impact of earthquakes on fixed facilities may be particularly damaging due to the impairment of the physical integrity or even failure of containment facilities. The threat of any hazardous material event may be magnified due to restricted access, reduced fire suppression and spill containment, and even complete cut-off of response personnel and equipment. In addition, the risk of terrorism involving hazardous materials is considered a major threat due to the location of hazardous material facilities and transport routes throughout communities and the frequently limited anti-terrorism security at these facilities.

In recognition of the dangers associated with keeping hazardous substances, the California State legislature has enacted several laws regulating the use and transport of identified hazardous materials. In particular, Chapter 6.95 of the Health and Safety Code requires all businesses using these materials to inform local government agencies of the types and quantities of materials stored on site. This disclosure enables emergency response agencies to respond quickly and appropriately to accidents involving dangerous substances. Chapter 6.95 of the California Health and Safety Code, and Title 19 of the California Code of Regulation, describes the requirements for chemical disclosure, business emergency plans, and community right to know programs. According to these state requirements, a business that uses or handles hazardous materials in amounts equal to or greater than 55 gallons, 500 pounds or 200 cubic feet at any one time must prepare a business emergency plan and chemical inventory. The inventory must be updated annually and the business plan every two years. The chapter also has incorporated certain requirements from Federal SARA Title III for chemicals designated as acutely hazardous.

The Eastern Municipal Water District is located within close proximity to Interstates 10, 15, and 215 and Highways 60, 74, 79, and 91. Due to the volume of traffic and the nature of the materials transported, there is a heightened risk of a hazardous material leak or spill within the service area. The ongoing use, production, and transportation of hazardous materials in and through the District

pose constant and real threats to the safety of the community. An accidental release of a hazardous substance into the environment has the potential to cause localized or widespread upset.

3.8.2 Hazardous Materials Release Hazard History

According to the Emergency Response Notifications System (ERNS), there have been a total of 2,683 spills and accidents in California during 2015. As illustrated in the table below, many of these incidents were caused by mobile vehicles, which represent a substantial threat to the District.

Table 3.22: ERNS Spills and Accidents in California in 2010

Type of Incident	Number of Incidents
Fixed site (e.g., incident at a building)	577
Continuous release	1
Storage tank, drilling platform, or pipeline	176
Unknown sheen on water	522
Mobile vehicle (plane, truck, train, ship, etc.)	971
Other or unknown	0
Total	2,247

2012 Richmond Refinery Fire

On August 6, 2012, a piping segment at the Number 4 Crude Unit at a Chevron refinery in Richmond, California, failed, resulting in the release of hydrocarbons. The hydrocarbon vapor cloud then ignited, resulting in a large, uncontrolled fire. The fire burned for several hours before being contained later that night. The picture below illustrates the smoke plume from the fire.



Photo taken from a Cal/OSHA presentation on 2/26/2014

Although no fatalities resulted from the fire, according to the final investigation report completed by the U. S. Chemical Safety Board (CSB), over 15,000 residents in the vicinity of the refinery sought medical treatment for respiratory irritation. The incident inundated local emergency response agencies and interrupted local operation of the Bay Area Rapid Transit (BART). Although the 2012 Richmond Refinery Fire did not impact the District, the incident illustrated the potential major impacts that a similar release could have on the Service Area. Fortunately, no hazardous material events of this magnitude have ever occurred with the District's service area.

3.8.3 Hazardous Materials Release Hazard Frequency and Magnitude

Since the District utilizes chlorine gas for disinfection in the water distribution system, there is an increased risk for hazardous materials releases impacting the service area. In order to decrease the probability of an accidental release, the District has developed a California Accidental Release Prevention Program, Risk Management Plan, and Process Safety Management Plan. These plans include dispersion modeling, process hazard analyses (including identification of consequences of deviation from normal operation and safeguards), seismic assessments of chlorine process equipment, and operating and maintenance procedures. In addition, to lessen the magnitude of such an event, the District has developed emergency response and notification procedures and conducts periodic training exercises.

District assets that house hazardous materials were not included in this Plan for security reasons. However, the Steering Committee determined that areas in and around Perris, Hemet and

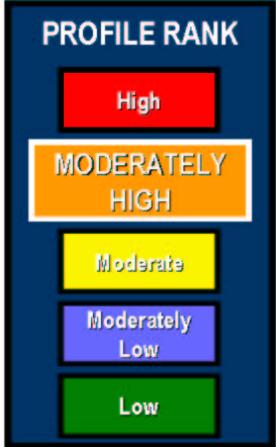
Temecula were likely to be more vulnerable due to a higher concentration of hazardous materials facilities in those areas.

Additionally, it is important to note that hazardous material emergencies also occur during transportation and all major highways are susceptible to releases of toxic and flammable chemicals. While there is currently no mechanism to assign a probability of a fixed-site or transportation hazardous material emergency, it is important to consider a relatively high likelihood of occurrence and conduct planning and training accordingly.

3.9 Terrorism Hazard Profile

Terrorism Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Rare event - occurs less than once every 50 years	
Consequence/Severity:	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	
Vulnerability:	Widespread damage area, significant secondary impacts, no warning time	
Location:	Water treatment and reclamation facility locations are perceived to be more likely targeted due to the presence of hazardous chemicals and access to the water system	
Hazard Risk Rank Score:	27	
Team Comments:	The Steering Committee noted assumed water contamination or an intentional release of hazardous chemicals was the most likely terrorism scenario for the District. Hazard ranking estimates were based on these types of scenarios.	

3.9.1 Terrorism Hazard Information and Background

Terrorism is the unlawful use of force or violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of a political or social objective. The Federal Bureau of Investigation (FBI) has categorized two types of terrorism in the United States.

International Terrorism involves terrorist activity committed by groups or individuals who are foreign-based and/or directed by countries or groups outside the United States, or whose activities transcend national boundaries.

Domestic Terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction.

Well-known international terrorist groups include Islamic Fundamentalist groups, such as Islamic State in Iraq and Syria (ISIS); European terrorists, including the Red Brigade in Italy, Spain's Euskadi Ta Askatasuna (ETA), and the Japanese Red Army; separatist groups, such as Sierra Luminoso, and the "Shining Path" in Peru. Add to these a host of narco-terrorists, such as the Medellin and Cali drug cartels.

In the U.S., a number of animal rights activists; environmentalist groups; white supremacists, such as the League of Aryan nations; and groups including the Covenant, Sword and Arm of the Lord, New World Order, and skinheads have been responsible for acts of terrorism on U.S. soil. Added to these are groups like the Klu Klux Klan; survivalists, such as the Freemen in Montana; and doomsday cults, such as David Koresh in Waco, Texas, and Jim Jones in Guyana.

There are a number of methods a terrorist may use to carry out their objective, including attacks of a chemical, biological, radiological, nuclear, explosive, and cyber nature. In addition, terrorists conduct hijackings, assassinations, armed assaults, kidnappings/hostage taking, arson fires, sabotage of critical infrastructures such as utilities and transportation, and the dissemination of confidential or otherwise sensitive information for the planning of terrorist attacks.

Chemical

Chemical agents involve the use of chemical compounds to kill or seriously injure its victims. There are numerous kinds of chemical weapons and their effectiveness is determined by a number of factors including age, purity, weather conditions, wind direction, and means of dissemination.

Biological

Biological agents include microbes, such as bacteria or viruses, and toxins derived from plants or animals that can produce illness or death. Illegal facilities that manufacture these substances are difficult to detect because they employ fermentation technology commonly used in the production of legitimate products such as antibiotics, vaccines, wine, and beer.

Radiological and Nuclear

Radiological or nuclear terrorism is the use of radioactive materials and/or nuclear explosives, as well as any terrorist actions against nuclear facilities by individuals or groups, to inflict harm on a population and advance political or social objectives. Sources of radiological material include nuclear fuel cycle waste, medical and dental equipment, military weaponry, and machines used in private industry.

Explosive

The impact of a bombing depends largely on the type, size, and placement of the device used. Additionally, a WMD in combination with an explosive device expands the lethality, physical damage, and economic disruption. The use of an explosive device can also inflict significant disruption of society through destruction of critical infrastructure and widespread fear amongst the target population.

Cyber

Cyber terrorism is a premeditated, politically motivated attack against information, computer systems, computer programs, and data which result in violence against noncombatant targets by sub-national groups or clandestine agents. Cyber terrorists can be domestic or international. Classification of being a cyber terrorist depends on if the terrorist relies on cyber terrorism to further their cause, or use it in addition to conventional terrorism.

Additional Terrorism Methods

Additional terrorism methods include hijackings, kidnappings, and the taking of hostages, armed assaults and mass shootings, assassinations of public figures, sabotage of transportation systems and utility infrastructure, the dissemination of confidential information that would aid terrorist organizations when planning an attack, arson fires, and many other means of disrupting normal society or endangering lives and property.

3.9.2 Terrorism Hazard History

The U.S. has proven to be a high priority target for both domestic and international adversarial/human-caused events. Acts of terror have become increasingly alarming in their magnitude in recent years. Examples of this include the bombing of the Alfred P. Murrah Federal Building in Oklahoma City and the attacks of September 11, 2001 on the World Trade Center complex and the Pentagon. Not all attacks, however, are at this level of intensity. The U.S. has also been subject to small scale attacks in the past such as the bombing at the Boston Marathon in 2013.

Specifically, the District has not been directly impacted by terrorism events in the past. However, a recent attack near the District occurred on December 2, 2015. As the result of a mass shooting and attempted bombing at the Inland Regional Center in San Bernardino, 14 people were killed and 22 were seriously injured. 12 of those who died were County employees, 10 of which were environmental health specialists. Those 10 made up 2 percent of the County's health inspectors.

The shooting lasted for only a few minutes, but two masked shooters fired more than 100 bullets before fleeing the scene. Local authorities pursued the attackers for 1.7 miles before they stopped in a residential sector to open fire on law enforcement. Residents were instructed to stay in their homes while over 500 rounds of ammunition were exchanged in the street. Both



attackers were shot and killed before peace was restored. While this event didn't impact the District, the Steering Committee recognizes the potential for a similar terrorism event to impact its assets and personnel.

3.9.3 Terrorism Hazard Magnitude and Frequency

As stated above, the District recognizes the potential for a terrorism event to impact the service area. Given current escalating terrorism trends, the threat of a terrorist event within the U.S. is a credible possibility and the Steering Committee ranked the probability of terrorism accordingly during the Hazard Identification Exercise. Although the District does not have any identified hard targets within the service area, the potential threat exists due to its proximity to the City of Riverside, nearby international airports, and other identified targets. However, the Steering Committee discussed that administration buildings and sites housing hazardous materials were perceived as more likely to be vulnerable to an act of terrorism.

Additionally, the District completed a Vulnerability Assessment to comply with the Bioterrorism Act of 2002. The Vulnerability Assessment evaluated the District's vulnerability to malevolent attacks, including terrorism and contamination, and developed recommendations to protect against the malevolent attacks. However, because of the sensitive nature of the information, the terrorism risk assessment results are not repeated as part of the Hazard Mitigation Plan

3.10 Power Failure Hazard Profile

Power Failure Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Frequent event - occurs more than once a year	
Consequence/Severity:	Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	
Vulnerability:	Localized damage area	
Location:	Assets that rely on electricity are spread throughout the Service Area.	
Hazard Risk Rank Score:	24	
Team Comments:	None	

3.10.1 Power Failure Hazard Information and Background

While electric power, water, telecommunications, highway transportation, wastewater systems, and natural gas are all examples of lifeline utilities necessary for a local community to thrive, loss of power is the utility that has the most potential for disrupting District operations. Loss of any power may occur as a secondary impact of earthquakes, landslides, or failure of pipes or as a result of human error, among other factors.

Power Failure

A power outage is the loss of the electricity supply to an area. In addition to natural hazards, power failure can result from a defect in a power station, damage to a power line or other part of the distribution system, a short circuit, or the overloading of electricity mains.

A power outage may be referred to as a blackout if power is lost completely, or as a brownout if some power supply is retained, but the voltage level is below the minimum level specified for the system, and a short circuit indicates a loss of power for a short amount of time (usually seconds). Some brownouts, called voltage reductions, are made intentionally to prevent a full power outage.

As discussed in the Earthquake Risk Assessment, the absence of electrical power at EMWD facilities for extended periods can, in some areas, preclude water deliveries where pumping is necessary.

3.10.2 Power Failure Hazard History

The Inland Area has experienced a number of power outages; either as the result of human error or as a secondary impact of natural hazard events. Power outages can also occur as a result of weather cycles and increase fluctuation in energy demand. Some of the significant power outages in California history are discussed below.

2000-2001 California Energy Crisis

In 2000 and 2001, California experienced a shortage of electricity supply as a result of capped prices, market manipulations, and illegal pipeline shutdowns by Texas energy company, Enron. The shortage resulted in multiple large-scale blackouts due to losses in transmission, generation, and/or extremely severe temperatures that lead to heavy electric power consumption. This crisis brought to light many critical issues surrounding the state's power generation and distribution system, including its dependency on out-of-state resources.

2011 Southwest Blackout

September 2011, a system disturbance led to cascading outages and left about 2.7 million people without power. The outages affected parts of Arizona, southern California and Baja California, Mexico. All of about 1.5 million people in San Diego lost power for about 12 hours. This affected schools, businesses, traffic, flights, public transportation and even water and sewage pumping stations.

In order to mitigate severe consequences and protect local communities from power outages, California has implemented several energy conservation programs, energy efficiency and alternative energy programs. Rolling blackouts during heat waves are an indication of the higher demand for power and the need for appropriate planning for alternate power sources.

2014 Riverside County Storm Outages

In the afternoon on September 9, 2014, a fast-moving storm triggered a severe-weather advisory for both San Bernardino and Riverside Counties and contributed to a blackout that left a least 3,830 homes and businesses without power. Affected areas stretched from San Jacinto to Murrieta. Most power outages were reported between 2:00PM and 3:00PM that day as many areas were impacted by heavy rains. By 5:00PM, the downpour had all but ceased in most areas leaving only the impacts of the residual power outages behind.

3.10.3 Power Failure Hazard Frequency and Magnitude

Currently, there is no mechanism to calculate the probability of a power failure, without evaluating the failure as a cascade effect from natural hazards (i.e., earthquakes). However, based on historical events, minor power failure occurs at least annually and has the ability to impact any part of the service area. To help mitigate the severity in an extreme power outage, the District has back-up generators to provide power for water treatment and reclamation facilities. Furthermore, to evaluate the damage inflicted by a power outage, FEMA has assigned economic values to the loss of electric power. Table 3.23 summarizes the loss estimates per capita per day.

Table 3.23: Economic Impacts of Electric Power

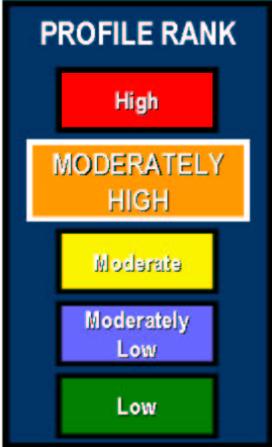
Category	Estimated Economic Impact
Reduced regional economic activity ¹	\$87
<i>Impacts on Residential Customers</i>	
<ul style="list-style-type: none"> • Direct economic losses • Disruption economic impact • Total Best estimate 	<p>\$30 to \$35</p> <p>\$63 to 85</p> <p>\$101</p>
<i>Total economic impacts</i>	\$188

Note: Values are per capita per day

3.11 Drought Hazard Profile

Drought Risk Assessment Summary

Risk Rank Category: Moderately High

Probability/Frequency:	Regular event - occurs between once a year and once every 7 years	
Consequence/Severity:	Localized damage area	
Vulnerability:	Localized damage area, minor secondary impacts, delayed hazard onset	
Location:	Drought has the ability to impact the entire service area	
Hazard Risk Rank Score:	9	
Team Comments:	The team noted that the most critical impact of drought was economic loss rather than asset damage or personal injury. Recent droughts have proven that conservation efforts typically allow the public to receive a water supply sufficient to support overall public health.	

3.11.1 Drought Hazard Information and Background

A drought or an extreme dry periodic climate is an extended period where water availability falls below the statistical requirements for a region. Drought is not a purely physical phenomenon, but rather an interplay between natural water availability and human demands for water supply. The precise definition of drought is made complex owing to political considerations, but there are generally four types of conditions that are referred to as drought:

- **Meteorological drought** is brought about when there is a prolonged period with less than average precipitation.
- **Agricultural drought** is brought about when there is insufficient moisture for average crop or range production. This condition can arise, even in times of average precipitation, owing to soil conditions or agricultural techniques.

- **Hydrologic drought** is brought about when the water reserves available in sources such as aquifers, lakes, and reservoirs falls below the statistical average. This condition can arise, even in times of average (or above average) precipitation, when increased usage of water diminishes the reserves.
- **Socioeconomic drought** associates the supply and demand of water services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall.

Due to the extensive nature of water supply infrastructure – reservoirs, groundwater basins, and inter-regional conveyance facilities – mitigation for the effect of short-term dry periods is implicit for most systems. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or wildland fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multiyear period. There is no universal definition of when a drought begins or ends. Impacts of drought are typically felt first by those most reliant on annual rainfall – ranchers engaged in dryland grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable source. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline.

Droughts may cause a shortage of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may also decline and the number and severity of wildland fires may increase. Severe droughts may result in the loss of agricultural crops and forest products, undernourished wildlife and livestock, lower land values, and raise unemployment.

3.11.2 Drought Hazard History

According to the U.S. Drought Monitor Map released on June 1, 2017 for California, the District Service area is in an Abnormally Dry Drought Zone. This point is illustrated in Figure 3.14. It should be noted this map demonstrates an improvement in the region’s drought conditions. On

the June 7, 2016 release of the same map, the area was designated as an Extreme Drought Zone.

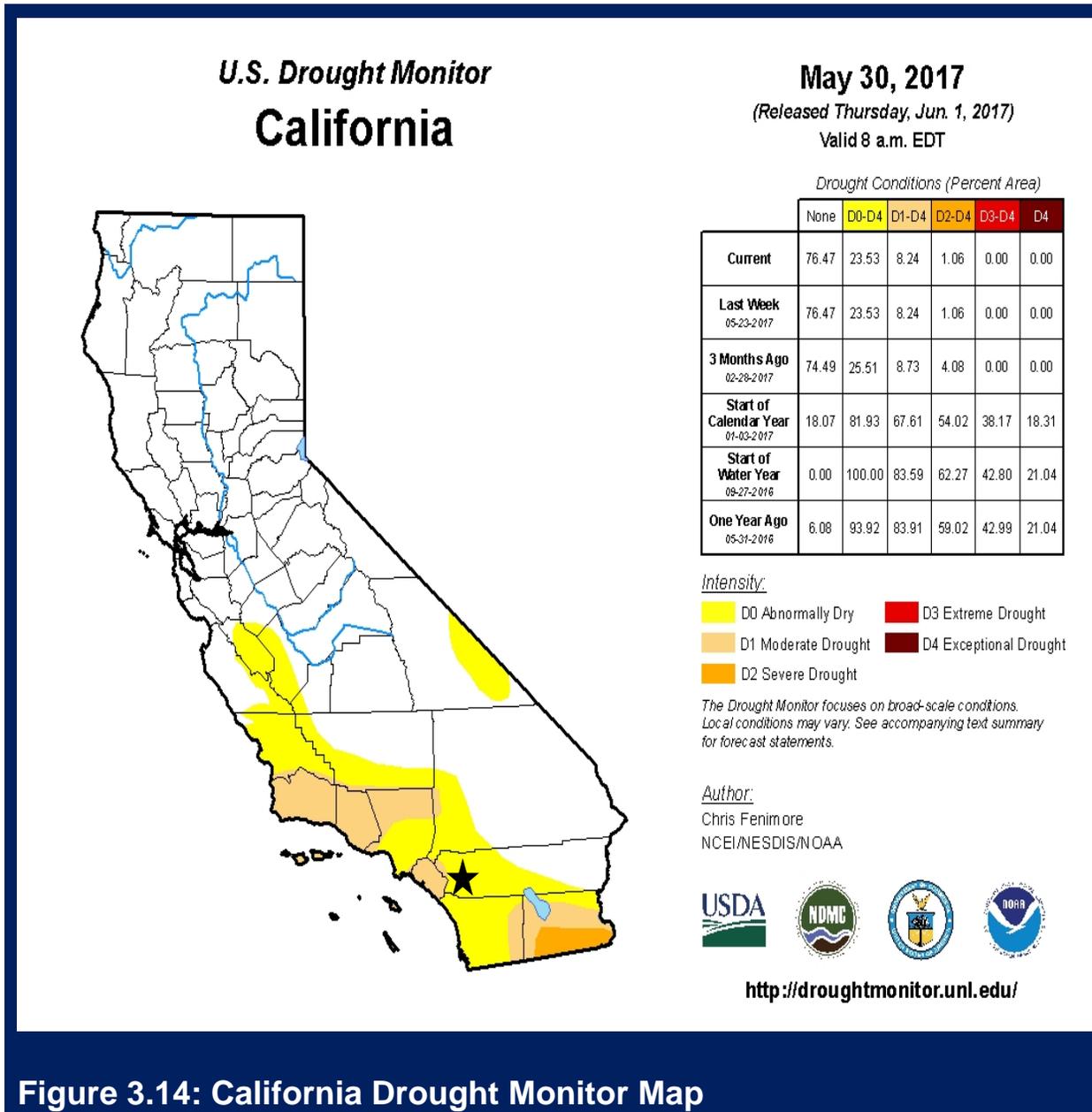


Figure 3.14: California Drought Monitor Map

Over the past century, many of the droughts experienced in the U.S. affected vegetation, food supply and livelihood for tens of thousands of families. This, in turn, created the need for water conservation and water management efforts across the country including California. For example, the Dust Bowl was an extended period of severe drought in the 1930s which affected Oklahoma and parts of Texas, New Mexico, Colorado, and Kansas. Over the course of a decade, the region experienced four of the driest calendar years since 1895. Top soil erosion and strong winds resulted in the large dust storms. Reduced vegetation severely impacted the farming-reliant

economy forcing tens of thousands of families to relocate in search of better economic condition. Various dam and reservoir projects to allow for a more reliable water supply for the public were constructed as a result of this historic drought.

The California drought of 1976 to 1977 is another is example of severe drought conditions. By the end of the “wet season” in 1976, California reservoirs were depleted and melting snow from the Sierra snowpack was minimal. The following year was marked as one of the driest years on record. Out of the 58 counties in California, 47 of them declared a local drought emergency, making them eligible for relief money at both State and Federal levels. The drought hit farmers especially hard, with many experiencing economic losses in every stage of food production and supply. This drought marked the beginning of an extensive water conservation movement across California that has continued even through times of abundance. As a result, farmers have switched to water efficient crops and reduced the aggressive pumping of groundwater.

3.11.3 Drought Hazard frequency and Magnitude

Until recent years, the District has enjoyed an abundant supply of high-quality water. However, as water demand continues to increase statewide and supply fluctuates through the service area under current drought conditions, the District must be even more conscientious of the water supply and maximize efficient use of its natural resources. The District works to evaluate new and innovative water management and supply development programs, including water reuse and recycling, rebate incentives and water use efficiency programs. These efforts are helping to enhance long-term water reliability and water quality throughout the Service Area as droughts are likely to impact the entire region.

Drought and Climate Change

It is hypothesized that through increased population and exploitation of fossil fuels during the past century has led to longer and more prevalent droughts in many parts of the U.S. The global warming phenomenon has led to increased rainfall instead of snowfall in many regions, resulting in increased flooding. The, combined with earlier and rapid melting snow, has led to fluctuation in water availability and resulting increased floods in wet regions and drought in dry regions. As inland area temperatures rise and water sources are depleted, the potential for drought in California, including the District service area, are expected to continue to increase.

As mentioned in the next section, Section 3.12, District personnel would likely recognize decreased water supply and decreased precipitation, common impacts of climate change, as a drought scenario. As mitigation activities focused on water supply reliability are indifferent to the root cause of water shortage, the district has chosen to blend applicable impacts of climate

change with its drought mitigation efforts. All mitigation actions for drought described in Chapter 4 also consider the impacts of certain impacts of climate change.

3.12 Climate Change

With the release of the California Adaptation Planning Guide (APG) in March 2015, the District aimed to include the effects of climate change into the Hazard Mitigation Plan update. As identified in the “Understanding Regional Characteristics” portion of the APG, The District is located in the Desert Region of California. As a result, the Steering Committee considered the following climate change impacts as recommended by the APG:

- Reduced Water Supply
- Increased Temperatures
- Reduced Precipitation
- Diminished Snowpack
- Wildfire Risk
- Public Health and Social Vulnerability
- Stress on Special-Status Species

The Steering Committee engaged in a discussion to determine which impacts posed a viable threat to the District. While some impacts clearly applied, others required additional research. Studies were conducted to look at recorded trends for reduced water supply, wildfire, and regional temperature increases. The result of the study was the following list of perceived, feasible impacts that might affect the District over the next 5 to 10 years:

- Reduced Water Supply
- Increased Temperatures
- Reduced Precipitation
- Wildfire Risk

After reviewing the results of each of these impacts, the Steering Committee decided to include hazards in the Plan update that represented how the impacts would be felt by the District. For example, increased temperatures, reduced water supply, and reduced precipitation would be recognized as a drought. Additionally, increased temperatures and reduced precipitation might result in a wildfire. Therefore, the Steering Committee identified Drought and Wildfire as perceived hazards. Any information regarding the effects of these impacts on the District will be found under the hazard profiles listed above. Additionally, mitigation strategies that apply to these impacts will be classified under Drought and Wildfire in the mitigation actions identified in Chapter 4

3.13 Asset Inventory

§201.6(c)(2)(ii)(A): [The plan **should** describe vulnerability in terms of] the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area

A critical step required to complete the Risk Assessment is to develop a detailed asset inventory and document potential asset damages due to each identified hazard. The calculated loss estimates will be based on the values determined during the initial asset inventory. In order to produce accurate loss estimates, the Steering Committee developed a comprehensive inventory of all assets, including asset locations.

In order to develop loss estimates, specific values were assigned to critical District facilities in the asset inventory. Replacement value estimates were developed utilizing internal sources which included the most recent version of the Asset Value Report.

Loss of Function Values

To provide a mechanism for evaluating the importance of lifelines and critical services, the table on the following page was used to identify per capita values for loss of potable water service. Based upon the population in the District's service area, the following values were assigned.

Table 3.24: Structural Replacement Values

Loss of Potable Water Service	Cost of Complete Loss of Service	Cost of Water Unsafe for Drinking
Reduced Regional Economic Activity 1	\$35	\$8.75
Impacts on Residential Customers	\$68	\$34
Total Economic Impact (all hazards)	\$103	\$43

Note: The values listed in this table were obtained from FEMA's guidance document entitled "What is a Benefit? – Guidance on Benefit-Cost Analysis on Hazard Mitigation Projects, Draft Revision 2.0"

Future Developments

Currently, the District is in the process of adding facilities through its Capital Improvement Plan. Although the facilities are not complete, they were added to the asset inventory summary and the team considered their impact on future vulnerability. As none of the new facilities will be manned and they will be built with consideration for hazard mitigation, the Steering Committee determined the overall impact to District vulnerability would be negligible. The Asset Inventory Summary for the District is presented in the following tables.

Table 3:25: Asset Inventory Summary

Type	Name	TOTAL
Pipeline	Aggregate Brine Water Distribution Pipeline	\$45,422,994
Pipeline	Aggregate Potable Water Distribution Pipeline	\$1,197,903,405
Pipeline	Aggregate Raw Water Distribution Pipeline	\$140,660,694
Pipeline	Aggregate Recycled Water Distribution Pipeline	\$368,625,884
Pipeline	Aggregate Wastewater Collection Pipeline	\$1,038,195,836
Potable Water Storage Tank	S4102	\$3,383,067
Potable Water Storage Tank	S4103	\$1,284,783
Potable Water Storage Tank	S4104	\$886,471
Potable Water Storage Tank	S4105	\$2,982,509
Potable Water Storage Tank	S4106	\$1,242,121
Potable Water Storage Tank	S4107	\$4,590,426
Potable Water Storage Tank	S4108	\$1,701,169
Potable Water Storage Tank	S4109	\$4,590,426
Potable Water Storage Tank	S4110	\$3,688,721
Potable Water Storage Tank	S4111	\$985,850
Potable Water Storage Tank	S4112	\$1,284,783
Potable Water Storage Tank	S4113	\$1,701,169

Type	Name	TOTAL
Potable Water Storage Tank	S4114	\$1,569,791
Potable Water Storage Tank	S4115	\$2,982,509
Potable Water Storage Tank	S4116	\$1,793,881
Potable Water Storage Tank	S4117	\$2,982,509
Potable Water Storage Tank	S4118	\$2,465,546
Potable Water Storage Tank	S4119	\$2,252,500
Potable Water Storage Tank	S4120	\$2,252,500
Potable Water Storage Tank	S4122	\$3,949,108
Potable Water Storage Tank	S4123	\$3,949,108
Potable Water Storage Tank	S4124	\$2,252,500
Potable Water Storage Tank	S4125	\$2,982,509
Potable Water Storage Tank	S4126	\$2,252,500
Potable Water Storage Tank	S4127	\$1,701,169
Potable Water Storage Tank	S4128	\$3,367,960
Potable Water Storage Tank	S4129	\$1,044,675
Potable Water Storage Tank	S4130	\$1,197,189
Potable Water Storage Tank	S4131	\$1,197,189
Potable Water Storage Tank	S4132	\$3,949,108
Potable Water Storage Tank	S4133	\$1,701,169
Potable Water Storage Tank	S4134	\$1,701,169
Potable Water Storage Tank	S4135	\$1,173,766
Potable Water Storage Tank	S4136	\$4,322,624
Potable Water Storage Tank	S4138	\$2,982,509

Type	Name	TOTAL
Potable Water Storage Tank	S4139	\$1,701,169
Potable Water Storage Tank	S4140	\$3,367,960
Potable Water Storage Tank	S4141	\$2,921,189
Potable Water Storage Tank	S4142	\$2,057,860
Potable Water Storage Tank	S4143	\$4,459,479
Potable Water Storage Tank	S4144	\$4,653,888
Potable Water Storage Tank	S4145	\$1,673,275
Potable Water Storage Tank	S4146	\$3,949,108
Potable Water Storage Tank	S4147	\$4,746,763
Potable Water Storage Tank	S4148	\$4,653,888
Potable Water Storage Tank	S4149	\$4,653,888
Potable Water Storage Tank	S4151	\$5,066,448
Potable Water Storage Tank	S4152	\$2,505,022
Potable Water Storage Tank	S4153	\$1,284,783
Potable Water Storage Tank	S4154	\$1,701,169
Potable Water Storage Tank	S4155	\$5,333,321
Potable Water Storage Tank	S4156	\$3,367,960
Potable Water Storage Tank	S4157	\$3,607,866
Potable Water Storage Tank	S4158	\$3,607,866
Potable Water Storage Tank	S4159	\$4,895,880
Potable Water Storage Tank	S4160	\$3,088,443
Potable Water Storage Tank	S4161	\$2,654,492
Potable Water Storage Tank	S4164	\$2,982,509

Type	Name	TOTAL
Potable Water Storage Tank	S4165	\$4,653,888
Potable Water Storage Tank	S4203	\$2,473,516
Potable Water Storage Tank	S4205	\$985,850
Potable Water Storage Tank	S4207	\$886,471
Potable Water Storage Tank	S4208	\$886,471
Potable Water Storage Tank	S4211	\$1,600,366
Potable Water Storage Tank	S4212	\$4,590,426
Potable Water Storage Tank	S4213	\$3,949,108
Potable Water Storage Tank	S4214	\$5,121,464
Potable Water Storage Tank	S4215	\$5,121,464
Potable Water Storage Tank	S4216	\$3,607,866
Potable Water Storage Tank	S4303	\$2,982,509
Potable Water Storage Tank	S4304	\$2,982,509
Potable Water Storage Tank	S4305	\$2,982,509
Potable Water Storage Tank	S4306	\$2,982,509
Potable Water Storage Tank	S4307	\$3,949,108
Potable Water Storage Tank	S4308	\$4,895,880
Potable Water Storage Tank	S4310	\$3,367,960
Potable Water Storage Tank	S4311	\$3,367,960
Potable Water Storage Tank	S4312	\$809,871
Potable Water Storage Tank	S4313	\$1,505,866
Recycled Water Storage Tank	S4209	\$2,252,500
Recycled Water Storage Tank	S9817	\$3,949,108

Type	Name	TOTAL
Recycled Water Storage Tank	S9819	\$4,142,053
Recycled Water Storage Tank	S9820	\$4,322,624
Recycled Water Storage Tank	S9822	\$2,982,509
Potable Water Filtration	Hemet Water Filtration Plant	\$60,000,000
Potable Water Filtration	Iron And Manganese Removal Plant	\$22,000,000
Potable Water Filtration	Menifee Desalter Facility	\$4,800,000
Potable Water Filtration	Perris Desalter Facility	\$7,000,000
Potable Water Filtration	Perris Water Filtration Plant	\$60,000,000
Potable Water Booster Stations	B0002	\$2,783,582
Potable Water Booster Stations	B0003	\$2,069,545
Potable Water Booster Stations	B0004	\$3,915,986
Potable Water Booster Stations	B0010	\$4,969,755
Potable Water Booster Stations	B0011	\$4,142,040
Potable Water Booster Stations	B0012	\$3,031,452
Potable Water Booster Stations	B0013	\$3,031,452
Potable Water Booster Stations	B0015	\$4,881,079
Potable Water Booster Stations	B0022	\$2,228,521
Potable Water Booster Stations	B0023	\$2,618,986
Potable Water Booster Stations	B0024	\$2,284,345
Potable Water Booster Stations	B0025	\$2,135,100
Potable Water Booster Stations	B0026	\$3,596,952
Potable Water Booster Stations	B0027	\$1,757,282
Potable Water Booster Stations	B0031	\$2,330,240

Type	Name	TOTAL
Potable Water Booster Stations	B0032	\$2,003,841
Potable Water Booster Stations	B0040	\$5,824,388
Potable Water Booster Stations	B0041	\$4,290,357
Potable Water Booster Stations	B0042	\$3,542,929
Potable Water Booster Stations	B0044	\$3,675,243
Potable Water Booster Stations	B0045	\$3,180,441
Potable Water Booster Stations	B0046	\$2,472,169
Potable Water Booster Stations	B0048	\$5,500,068
Potable Water Booster Stations	B0050	\$4,984,247
Potable Water Booster Stations	B0051	\$5,386,718
Potable Water Booster Stations	B4102	\$1,526,023
Potable Water Booster Stations	B4103	\$1,757,282
Potable Water Booster Stations	B4104	\$2,981,136
Potable Water Booster Stations	B4105	\$1,867,400
Potable Water Booster Stations	B4107	\$1,295,768
Potable Water Booster Stations	B4109	\$1,084,737
Potable Water Booster Stations	B4111	\$1,295,768
Potable Water Booster Stations	B4112	\$1,380,646
Potable Water Booster Stations	B4113	\$1,899,179
Potable Water Booster Stations	B4116	\$2,472,169
Potable Water Booster Stations	B4117	\$1,589,873
Potable Water Booster Stations	B4118	\$1,649,248
Potable Water Booster Stations	B4119	\$1,526,023

Type	Name	TOTAL
Potable Water Booster Stations	B4120	\$1,865,579
Potable Water Booster Stations	B4127	\$1,731,445
Potable Water Booster Stations	B4130	\$1,249,119
Potable Water Booster Stations	B4131	\$1,162,459
Potable Water Booster Stations	B4132	\$1,526,023
Potable Water Booster Stations	B4133	\$1,084,737
Potable Water Booster Stations	B4134	\$1,084,737
Potable Water Booster Stations	B4135	\$1,785,396
Potable Water Booster Stations	B4136	\$1,339,467
Potable Water Booster Stations	B4138	\$1,782,423
Potable Water Booster Stations	B4139	\$1,419,645
Potable Water Booster Stations	B4140	\$1,380,646
Potable Water Booster Stations	B4141	\$1,330,942
Potable Water Booster Stations	B4145	\$2,671,795
Potable Water Booster Stations	B4146	\$2,624,525
Potable Water Booster Stations	B4150	\$2,042,968
Potable Water Booster Stations	B4151	\$2,186,984
Potable Water Booster Stations	B4152	\$1,649,248
Potable Water Booster Stations	B4153	\$2,099,155
Potable Water Booster Stations	B4154	\$2,783,582
Potable Water Booster Stations	B4155	\$1,649,248
Potable Water Booster Stations	B4156	\$1,492,135
Potable Water Booster Stations	B4157	\$1,478,163

Type	Name	TOTAL
Potable Water Booster Stations	B4158	\$1,144,516
Potable Water Booster Stations	B4159	\$3,375,321
Potable Water Booster Stations	B4160	\$1,830,805
Potable Water Booster Stations	B4161	\$3,076,683
Potable Water Booster Stations	B4162	\$920,211
Potable Water Booster Stations	B4163	\$3,166,464
Potable Water Booster Stations	B4165	\$2,417,264
Potable Water Booster Stations	B4166	\$1,649,248
Potable Water Booster Stations	B4167	\$1,249,119
Potable Water Booster Stations	B4168	\$2,887,740
Potable Water Booster Stations	B4169	\$1,854,123
Potable Water Booster Stations	B4170	\$3,400,645
Potable Water Booster Stations	B4209	\$1,492,135
Potable Water Booster Stations	B4210	\$941,986
Potable Water Booster Stations	B4212	\$852,248
Potable Water Booster Stations	B4213	\$941,986
Potable Water Booster Stations	B4214	\$723,521
Potable Water Booster Stations	B4218	\$1,303,840
Potable Water Booster Stations	B4221	\$1,097,184
Potable Water Booster Stations	B4222	\$2,575,605
Potable Water Booster Stations	B4303	\$2,042,968
Potable Water Booster Stations	B4308	\$740,095
Potable Water Booster Stations	B4309	\$1,380,646

Type	Name	TOTAL
Potable Water Booster Stations	B4313	\$1,018,052
Recycled Water Pump Stations	B9800	\$2,099,155
Recycled Water Pump Stations	B9802	\$2,099,155
Recycled Water Pump Stations	B9803	\$2,671,795
Recycled Water Pump Stations	B9820	\$2,023,583
Recycled Water Pump Stations	B9821	\$4,826,007
Recycled Water Pump Stations	B9841	\$3,557,940
Recycled Water Pump Stations	B9850	\$5,258,926
Recycled Water Pump Stations	B9860	\$3,033,284
Recycled Water Pump Stations	B9861	\$1,200,159
Recycled Water Pump Stations	B9862	\$2,887,538
Recycled Water Pump Stations	B9881	\$3,623,037
Recycled Water Pump Stations	B9884	\$2,887,538
Wastewater Lift Station	L3121	\$3,926,404
Wastewater Lift Station	L3126	\$1,935,023
Wastewater Lift Station	L3128	\$2,235,655
Wastewater Lift Station	L3131	\$4,921,055
Wastewater Lift Station	L3132	\$11,469,754
Wastewater Lift Station	L3133	\$3,329,035
Wastewater Lift Station	L3135	\$3,271,877
Wastewater Lift Station	L3136	\$2,031,472
Wastewater Lift Station	L3137	\$2,827,612
Wastewater Lift Station	L3213	\$3,187,841

Type	Name	TOTAL
Wastewater Lift Station	L3221	\$4,292,385
Wastewater Lift Station	L3224	\$2,136,806
Wastewater Lift Station	L3228	\$6,136,945
Wastewater Lift Station	L3230	\$2,241,127
Wastewater Lift Station	L3325	\$8,878,345
Wastewater Lift Station	L3327	\$9,178,188
Wastewater Lift Station	L3328	\$1,984,027
Wastewater Lift Station	L3329	\$1,758,299
Wastewater Lift Station	L3330	\$1,606,255
Wastewater Lift Station	L3331	\$1,984,027
Wastewater Lift Station	L3332	\$2,344,512
Wastewater Lift Station	L3333	\$1,412,132
Wastewater Lift Station	L3334	\$2,000,008
Wastewater Lift Station	L3423	\$3,477,961
Wastewater Lift Station	L3426	\$5,621,741
Wastewater Lift Station	L3432	\$1,935,023
Wastewater Lift Station	L3435	\$8,087,355
Wastewater Lift Station	L3436	\$1,167,272
Wastewater Lift Station	L3437	\$8,878,345
Wastewater Lift Station	L3441	\$4,053,300
Wastewater Lift Station	L3443	\$1,618,955
Wastewater Lift Station	L3444	\$1,412,132
Wastewater Lift Station	L3447	\$2,991,745

Type	Name	TOTAL
Wastewater Lift Station	L3448	\$4,175,118
Wastewater Lift Station	L3450	\$1,186,579
Wastewater Lift Station	L3451	\$1,610,502
Wastewater Lift Station	L3524	\$1,980,452
Wastewater Lift Station	L3525	\$2,262,849
Wastewater Lift Station	L3526	\$1,967,873
Wastewater Lift Station	L3528	\$1,117,044
Wastewater Lift Station	L3529	\$2,302,845
Wastewater Lift Station	L3530	\$1,517,933
Wastewater Lift Station	L3531	\$2,589,889
Well	W0014	\$3,200,000
Well	W0017	\$3,200,000
Well	W0025	\$3,200,000
Well	W0026	\$3,200,000
Well	W0027	\$3,200,000
Well	W0028	\$3,200,000
Well	W0029	\$3,200,000
Well	W0033	\$3,200,000
Well	W0034	\$3,200,000
Well	W0035	\$3,200,000
Well	W0036	\$3,200,000
Well	W0044	\$3,200,000
Well	W0049	\$3,200,000

Type	Name	TOTAL
Well	W0055	\$3,200,000
Well	W0056	\$3,200,000
Well	W0057	\$3,200,000
Well	W0059	\$3,200,000
Well	W0075	\$3,200,000
Well	W0076	\$3,200,000
Well	W0077	\$3,200,000
Well	W0080	\$3,200,000
Well	W0081	\$3,200,000
Well	W0082	\$3,200,000
Well	W0083	\$3,200,000
Well	W0084	\$3,200,000
Well	W0085	\$3,200,000
Well	W0086	\$3,200,000
Well	W0087	\$3,200,000
Well	W0088	\$3,200,000
Well	W0089	\$3,200,000
Well	W0090	\$3,200,000
Well	W0091	\$3,200,000
Well	W0092	\$3,200,000
Well	W0093	\$3,200,000
Water Reclamation	Moreno Valley Region WRF	\$370,000,000
Water Reclamation	Perris Valley Regional WRF	\$440,000,000

Type	Name	TOTAL
Water Reclamation	San Jacinto Regional WRF	\$280,000,000
Water Reclamation	Temecula Valley Regional WRF	\$360,000,000
Administration	Customer Service Call Center	\$2,000,000
Administration	OPS Maintenance & Administration Centers	\$32,600,000
Subtotal		\$5,154,316,997

Note: Addresses and location descriptions were not included in this list for security purposes. However, the Steering Committee considered the location these assets when developing the loss estimates in the next section and in the overall Risk Assessment.

3.14 Loss Estimates

Loss Assessment Calculations

The Steering Committee reviewed each asset category and assigned a potential percentage of damage expected due to each identified hazard. In addition, if there were identified lifeline or emergency service interruptions, the loss of function values were also included. The tables on the following pages identify each asset category, name, total value and the percent damage/damage value for each asset. The damages for each asset are totaled for each hazard to obtain the overall loss estimate for each hazard

Table 3:26: Loss estimate/Vulnerability Assessment – Earthquake, Infrastructure Failure, Power Failure, Terrorism

Vulnerability Assessment Calculations			Earthquake		Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Pipeline	Aggregate Brine Water Distribution Pipeline	\$45,422,994	1%	\$454,230	0.1%	\$45,423	0%	\$0	0%	\$0
Pipeline	Aggregate Potable Water Distribution Pipeline	\$1,197,903,405	1%	\$11,979,034	0.1%	\$1,197,903	0%	\$0	0%	\$0
Pipeline	Aggregate Raw Water Distribution Pipeline	\$140,660,694	1%	\$1,406,607	0.1%	\$140,661	0%	\$0	0%	\$0
Pipeline	Aggregate Recycled Water Distribution Pipeline	\$368,625,884	1%	\$3,686,259	0.1%	\$368,626	0%	\$0	0%	\$0
Pipeline	Aggregate Wastewater Collection Pipeline	\$1,038,195,836	1%	\$10,381,958	0.1%	\$1,038,196	0%	\$0	0%	\$0
Potable Water Storage Tank	S4102	\$3,383,067	50%	\$1,691,534	5%	\$169,153	0%	\$0	5%	\$169,153
Potable Water Storage Tank	S4103	\$1,284,783	50%	\$642,392	5%	\$64,239	0%	\$0	5%	\$64,239
Potable Water Storage Tank	S4104	\$886,471	50%	\$443,236	5%	\$44,324	0%	\$0	5%	\$44,324
Potable Water Storage Tank	S4105	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4106	\$1,242,121	50%	\$621,061	5%	\$62,106	0%	\$0	5%	\$62,106
Potable Water Storage Tank	S4107	\$4,590,426	50%	\$2,295,213	5%	\$229,521	0%	\$0	5%	\$229,521
Potable Water Storage Tank	S4108	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058
Potable Water Storage Tank	S4109	\$4,590,426	50%	\$2,295,213	5%	\$229,521	0%	\$0	5%	\$229,521
Potable Water Storage Tank	S4110	\$3,688,721	50%	\$1,844,361	5%	\$184,436	0%	\$0	5%	\$184,436
Potable Water Storage Tank	S4111	\$985,850	50%	\$492,925	5%	\$49,293	0%	\$0	5%	\$49,293
Potable Water Storage Tank	S4112	\$1,284,783	50%	\$642,392	5%	\$64,239	0%	\$0	5%	\$64,239
Potable Water Storage Tank	S4113	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058
Potable Water Storage Tank	S4114	\$1,569,791	50%	\$784,896	5%	\$78,490	0%	\$0	5%	\$78,490

Vulnerability Assessment Calculations										
		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4115	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4116	\$1,793,881	50%	\$896,941	5%	\$89,694	0%	\$0	5%	\$89,694
Potable Water Storage Tank	S4117	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4118	\$2,465,546	50%	\$1,232,773	5%	\$123,277	0%	\$0	5%	\$123,277
Potable Water Storage Tank	S4119	\$2,252,500	50%	\$1,126,250	5%	\$112,625	0%	\$0	5%	\$112,625
Potable Water Storage Tank	S4120	\$2,252,500	50%	\$1,126,250	5%	\$112,625	0%	\$0	5%	\$112,625
Potable Water Storage Tank	S4122	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Potable Water Storage Tank	S4123	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Potable Water Storage Tank	S4124	\$2,252,500	50%	\$1,126,250	5%	\$112,625	0%	\$0	5%	\$112,625
Potable Water Storage Tank	S4125	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4126	\$2,252,500	50%	\$1,126,250	5%	\$112,625	0%	\$0	5%	\$112,625
Potable Water Storage Tank	S4127	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058
Potable Water Storage Tank	S4128	\$3,367,960	50%	\$1,683,980	5%	\$168,398	0%	\$0	5%	\$168,398
Potable Water Storage Tank	S4129	\$1,044,675	50%	\$522,338	5%	\$52,234	0%	\$0	5%	\$52,234
Potable Water Storage Tank	S4130	\$1,197,189	50%	\$598,595	5%	\$59,859	0%	\$0	5%	\$59,859
Potable Water Storage Tank	S4131	\$1,197,189	50%	\$598,595	5%	\$59,859	0%	\$0	5%	\$59,859
Potable Water Storage Tank	S4132	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Potable Water Storage Tank	S4133	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058
Potable Water Storage Tank	S4134	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4135	\$1,173,766	50%	\$586,883	5%	\$58,688	0%	\$0	5%	\$58,688
Potable Water Storage Tank	S4136	\$4,322,624	50%	\$2,161,312	5%	\$216,131	0%	\$0	5%	\$216,131
Potable Water Storage Tank	S4138	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4139	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058
Potable Water Storage Tank	S4140	\$3,367,960	50%	\$1,683,980	5%	\$168,398	0%	\$0	5%	\$168,398
Potable Water Storage Tank	S4141	\$2,921,189	50%	\$1,460,595	5%	\$146,059	0%	\$0	5%	\$146,059
Potable Water Storage Tank	S4142	\$2,057,860	50%	\$1,028,930	5%	\$102,893	0%	\$0	5%	\$102,893
Potable Water Storage Tank	S4143	\$4,459,479	50%	\$2,229,740	5%	\$222,974	0%	\$0	5%	\$222,974
Potable Water Storage Tank	S4144	\$4,653,888	50%	\$2,326,944	5%	\$232,694	0%	\$0	5%	\$232,694
Potable Water Storage Tank	S4145	\$1,673,275	50%	\$836,638	5%	\$83,664	0%	\$0	5%	\$83,664
Potable Water Storage Tank	S4146	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Potable Water Storage Tank	S4147	\$4,746,763	50%	\$2,373,382	5%	\$237,338	0%	\$0	5%	\$237,338
Potable Water Storage Tank	S4148	\$4,653,888	50%	\$2,326,944	5%	\$232,694	0%	\$0	5%	\$232,694
Potable Water Storage Tank	S4149	\$4,653,888	50%	\$2,326,944	5%	\$232,694	0%	\$0	5%	\$232,694
Potable Water Storage Tank	S4151	\$5,066,448	50%	\$2,533,224	5%	\$253,322	0%	\$0	5%	\$253,322
Potable Water Storage Tank	S4152	\$2,505,022	50%	\$1,252,511	5%	\$125,251	0%	\$0	5%	\$125,251
Potable Water Storage Tank	S4153	\$1,284,783	50%	\$642,392	5%	\$64,239	0%	\$0	5%	\$64,239
Potable Water Storage Tank	S4154	\$1,701,169	50%	\$850,585	5%	\$85,058	0%	\$0	5%	\$85,058
Potable Water Storage Tank	S4155	\$5,333,321	50%	\$2,666,661	5%	\$266,666	0%	\$0	5%	\$266,666

Vulnerability Assessment Calculations										
		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4156	\$3,367,960	50%	\$1,683,980	5%	\$168,398	0%	\$0	5%	\$168,398
Potable Water Storage Tank	S4157	\$3,607,866	50%	\$1,803,933	5%	\$180,393	0%	\$0	5%	\$180,393
Potable Water Storage Tank	S4158	\$3,607,866	50%	\$1,803,933	5%	\$180,393	0%	\$0	5%	\$180,393
Potable Water Storage Tank	S4159	\$4,895,880	50%	\$2,447,940	5%	\$244,794	0%	\$0	5%	\$244,794
Potable Water Storage Tank	S4160	\$3,088,443	50%	\$1,544,222	5%	\$154,422	0%	\$0	5%	\$154,422
Potable Water Storage Tank	S4161	\$2,654,492	50%	\$1,327,246	5%	\$132,725	0%	\$0	5%	\$132,725
Potable Water Storage Tank	S4164	\$2,982,509	35%	\$1,043,878	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4165	\$4,653,888	35%	\$1,628,861	5%	\$232,694	0%	\$0	5%	\$232,694
Potable Water Storage Tank	S4203	\$2,473,516	50%	\$1,236,758	5%	\$123,676	0%	\$0	5%	\$123,676
Potable Water Storage Tank	S4205	\$985,850	50%	\$492,925	5%	\$49,293	0%	\$0	5%	\$49,293
Potable Water Storage Tank	S4207	\$886,471	50%	\$443,236	5%	\$44,324	0%	\$0	5%	\$44,324
Potable Water Storage Tank	S4208	\$886,471	50%	\$443,236	5%	\$44,324	0%	\$0	5%	\$44,324
Potable Water Storage Tank	S4211	\$1,600,366	50%	\$800,183	5%	\$80,018	0%	\$0	5%	\$80,018
Potable Water Storage Tank	S4212	\$4,590,426	50%	\$2,295,213	5%	\$229,521	0%	\$0	5%	\$229,521
Potable Water Storage Tank	S4213	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Potable Water Storage Tank	S4214	\$5,121,464	50%	\$2,560,732	5%	\$256,073	0%	\$0	5%	\$256,073
Potable Water Storage Tank	S4215	\$5,121,464	50%	\$2,560,732	5%	\$256,073	0%	\$0	5%	\$256,073
Potable Water Storage Tank	S4216	\$3,607,866	50%	\$1,803,933	5%	\$180,393	0%	\$0	5%	\$180,393
Potable Water Storage Tank	S4303	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125

Vulnerability Assessment Calculations										
		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4304	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4305	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4306	\$2,982,509	50%	\$1,491,255	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Storage Tank	S4307	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Potable Water Storage Tank	S4308	\$4,895,880	50%	\$2,447,940	5%	\$244,794	0%	\$0	5%	\$244,794
Potable Water Storage Tank	S4310	\$3,367,960	50%	\$1,683,980	5%	\$168,398	0%	\$0	5%	\$168,398
Potable Water Storage Tank	S4311	\$3,367,960	50%	\$1,683,980	5%	\$168,398	0%	\$0	5%	\$168,398
Potable Water Storage Tank	S4312	\$809,871	50%	\$404,936	5%	\$40,494	0%	\$0	5%	\$40,494
Potable Water Storage Tank	S4313	\$1,505,866	50%	\$752,933	5%	\$75,293	0%	\$0	5%	\$75,293
Recycled Water Storage Tank	S4209	\$2,252,500	50%	\$1,126,250	5%	\$112,625	0%	\$0	5%	\$112,625
Recycled Water Storage Tank	S9817	\$3,949,108	50%	\$1,974,554	5%	\$197,455	0%	\$0	5%	\$197,455
Recycled Water Storage Tank	S9819	\$4,142,053	50%	\$2,071,027	5%	\$207,103	0%	\$0	5%	\$207,103
Recycled Water Storage Tank	S9820	\$4,322,624	35%	\$1,512,918	5%	\$216,131	0%	\$0	5%	\$216,131
Recycled Water Storage Tank	S9822	\$2,982,509	35%	\$1,043,878	5%	\$149,125	0%	\$0	5%	\$149,125
Potable Water Filtration	Hemet Water Filtration Plant	\$60,000,000	15%	\$9,000,000	5%	\$3,000,000	1%	\$600,000	10%	\$6,000,000
Potable Water Filtration	Iron and Manganese Removal Plant	\$22,000,000	15%	\$3,300,000	5%	\$1,100,000	1%	\$220,000	10%	\$2,200,000
Potable Water Filtration	Menifee Desalter Facility	\$4,800,000	15%	\$720,000	5%	\$240,000	1%	\$48,000	10%	\$480,000
Potable Water Filtration	Perris Desalter Facility	\$7,000,000	15%	\$1,050,000	5%	\$350,000	1%	\$70,000	10%	\$700,000
Potable Water Filtration	Perris Water Filtration Plant	\$60,000,000	15%	\$9,000,000	5%	\$3,000,000	1%	\$600,000	10%	\$6,000,000

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B0002	\$2,783,582	10%	\$278,358	5%	\$139,179	1%	\$27,836	5%	\$139,179
Potable Water Booster Stations	B0003	\$2,069,545	10%	\$206,955	5%	\$103,477	1%	\$20,695	5%	\$103,477
Potable Water Booster Stations	B0004	\$3,915,986	10%	\$391,599	5%	\$195,799	1%	\$39,160	5%	\$195,799
Potable Water Booster Stations	B0010	\$4,969,755	10%	\$496,976	5%	\$248,488	1%	\$49,698	5%	\$248,488
Potable Water Booster Stations	B0011	\$4,142,040	10%	\$414,204	5%	\$207,102	1%	\$41,420	5%	\$207,102
Potable Water Booster Stations	B0012	\$3,031,452	10%	\$303,145	5%	\$151,573	1%	\$30,315	5%	\$151,573
Potable Water Booster Stations	B0013	\$3,031,452	10%	\$303,145	5%	\$151,573	1%	\$30,315	5%	\$151,573
Potable Water Booster Stations	B0015	\$4,881,079	10%	\$488,108	5%	\$244,054	1%	\$48,811	5%	\$244,054
Potable Water Booster Stations	B0022	\$2,228,521	10%	\$222,852	5%	\$111,426	1%	\$22,285	5%	\$111,426
Potable Water Booster Stations	B0023	\$2,618,986	10%	\$261,899	5%	\$130,949	1%	\$26,190	5%	\$130,949
Potable Water Booster Stations	B0024	\$2,284,345	10%	\$228,435	5%	\$114,217	1%	\$22,843	5%	\$114,217
Potable Water Booster Stations	B0025	\$2,135,100	10%	\$213,510	5%	\$106,755	1%	\$21,351	5%	\$106,755
Potable Water Booster Stations	B0026	\$3,596,952	10%	\$359,695	5%	\$179,848	1%	\$35,970	5%	\$179,848
Potable Water Booster Stations	B0027	\$1,757,282	10%	\$175,728	5%	\$87,864	1%	\$17,573	5%	\$87,864
Potable Water Booster Stations	B0031	\$2,330,240	10%	\$233,024	5%	\$116,512	1%	\$23,302	5%	\$116,512
Potable Water Booster Stations	B0032	\$2,003,841	10%	\$200,384	5%	\$100,192	1%	\$20,038	5%	\$100,192
Potable Water Booster Stations	B0040	\$5,824,388	10%	\$582,439	5%	\$291,219	1%	\$58,244	5%	\$291,219
Potable Water Booster Stations	B0041	\$4,290,357	10%	\$429,036	5%	\$214,518	1%	\$42,904	5%	\$214,518
Potable Water Booster Stations	B0042	\$3,542,929	10%	\$354,293	5%	\$177,146	1%	\$35,429	5%	\$177,146

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B0044	\$3,675,243	10%	\$367,524	5%	\$183,762	1%	\$36,752	5%	\$183,762
Potable Water Booster Stations	B0045	\$3,180,441	10%	\$318,044	5%	\$159,022	1%	\$31,804	5%	\$159,022
Potable Water Booster Stations	B0046	\$2,472,169	10%	\$247,217	5%	\$123,608	1%	\$24,722	5%	\$123,608
Potable Water Booster Stations	B0048	\$5,500,068	10%	\$550,007	5%	\$275,003	1%	\$55,001	5%	\$275,003
Potable Water Booster Stations	B0050	\$4,984,247	10%	\$498,425	5%	\$249,212	1%	\$49,842	5%	\$249,212
Potable Water Booster Stations	B0051	\$5,386,718	10%	\$538,672	5%	\$269,336	1%	\$53,867	5%	\$269,336
Potable Water Booster Stations	B4102	\$1,526,023	10%	\$152,602	5%	\$76,301	1%	\$15,260	5%	\$76,301
Potable Water Booster Stations	B4103	\$1,757,282	10%	\$175,728	5%	\$87,864	1%	\$17,573	5%	\$87,864
Potable Water Booster Stations	B4104	\$2,981,136	10%	\$298,114	5%	\$149,057	1%	\$29,811	5%	\$149,057
Potable Water Booster Stations	B4105	\$1,867,400	10%	\$186,740	5%	\$93,370	1%	\$18,674	5%	\$93,370
Potable Water Booster Stations	B4107	\$1,295,768	10%	\$129,577	5%	\$64,788	1%	\$12,958	5%	\$64,788
Potable Water Booster Stations	B4109	\$1,084,737	10%	\$108,474	5%	\$54,237	1%	\$10,847	5%	\$54,237
Potable Water Booster Stations	B4111	\$1,295,768	10%	\$129,577	5%	\$64,788	1%	\$12,958	5%	\$64,788
Potable Water Booster Stations	B4112	\$1,380,646	10%	\$138,065	5%	\$69,032	1%	\$13,806	5%	\$69,032
Potable Water Booster Stations	B4113	\$1,899,179	10%	\$189,918	5%	\$94,959	1%	\$18,992	5%	\$94,959
Potable Water Booster Stations	B4116	\$2,472,169	10%	\$247,217	5%	\$123,608	1%	\$24,722	5%	\$123,608
Potable Water Booster Stations	B4117	\$1,589,873	10%	\$158,987	5%	\$79,494	1%	\$15,899	5%	\$79,494
Potable Water Booster Stations	B4118	\$1,649,248	10%	\$164,925	5%	\$82,462	1%	\$16,492	5%	\$82,462
Potable Water Booster Stations	B4119	\$1,526,023	10%	\$152,602	5%	\$76,301	1%	\$15,260	5%	\$76,301

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B4120	\$1,865,579	10%	\$186,558	5%	\$93,279	1%	\$18,656	5%	\$93,279
Potable Water Booster Stations	B4127	\$1,731,445	10%	\$173,145	5%	\$86,572	1%	\$17,314	5%	\$86,572
Potable Water Booster Stations	B4130	\$1,249,119	10%	\$124,912	5%	\$62,456	1%	\$12,491	5%	\$62,456
Potable Water Booster Stations	B4131	\$1,162,459	10%	\$116,246	5%	\$58,123	1%	\$11,625	5%	\$58,123
Potable Water Booster Stations	B4132	\$1,526,023	10%	\$152,602	5%	\$76,301	1%	\$15,260	5%	\$76,301
Potable Water Booster Stations	B4133	\$1,084,737	10%	\$108,474	5%	\$54,237	1%	\$10,847	5%	\$54,237
Potable Water Booster Stations	B4134	\$1,084,737	10%	\$108,474	5%	\$54,237	1%	\$10,847	5%	\$54,237
Potable Water Booster Stations	B4135	\$1,785,396	10%	\$178,540	5%	\$89,270	1%	\$17,854	5%	\$89,270
Potable Water Booster Stations	B4136	\$1,339,467	10%	\$133,947	5%	\$66,973	1%	\$13,395	5%	\$66,973
Potable Water Booster Stations	B4138	\$1,782,423	10%	\$178,242	5%	\$89,121	1%	\$17,824	5%	\$89,121
Potable Water Booster Stations	B4139	\$1,419,645	10%	\$141,965	5%	\$70,982	1%	\$14,196	5%	\$70,982
Potable Water Booster Stations	B4140	\$1,380,646	10%	\$138,065	5%	\$69,032	1%	\$13,806	5%	\$69,032
Potable Water Booster Stations	B4141	\$1,330,942	10%	\$133,094	5%	\$66,547	1%	\$13,309	5%	\$66,547
Potable Water Booster Stations	B4145	\$2,671,795	10%	\$267,180	5%	\$133,590	1%	\$26,718	5%	\$133,590
Potable Water Booster Stations	B4146	\$2,624,525	10%	\$262,453	5%	\$131,226	1%	\$26,245	5%	\$131,226
Potable Water Booster Stations	B4150	\$2,042,968	10%	\$204,297	5%	\$102,148	1%	\$20,430	5%	\$102,148
Potable Water Booster Stations	B4151	\$2,186,984	10%	\$218,698	5%	\$109,349	1%	\$21,870	5%	\$109,349
Potable Water Booster Stations	B4152	\$1,649,248	10%	\$164,925	5%	\$82,462	1%	\$16,492	5%	\$82,462
Potable Water Booster Stations	B4153	\$2,099,155	10%	\$209,916	5%	\$104,958	1%	\$20,992	5%	\$104,958

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B4154	\$2,783,582	10%	\$278,358	5%	\$139,179	1%	\$27,836	5%	\$139,179
Potable Water Booster Stations	B4155	\$1,649,248	10%	\$164,925	5%	\$82,462	1%	\$16,492	5%	\$82,462
Potable Water Booster Stations	B4156	\$1,492,135	10%	\$149,214	5%	\$74,607	1%	\$14,921	5%	\$74,607
Potable Water Booster Stations	B4157	\$1,478,163	10%	\$147,816	5%	\$73,908	1%	\$14,782	5%	\$73,908
Potable Water Booster Stations	B4158	\$1,144,516	10%	\$114,452	5%	\$57,226	1%	\$11,445	5%	\$57,226
Potable Water Booster Stations	B4159	\$3,375,321	10%	\$337,532	5%	\$168,766	1%	\$33,753	5%	\$168,766
Potable Water Booster Stations	B4160	\$1,830,805	10%	\$183,081	5%	\$91,540	1%	\$18,308	5%	\$91,540
Potable Water Booster Stations	B4161	\$3,076,683	10%	\$307,668	5%	\$153,834	1%	\$30,767	5%	\$153,834
Potable Water Booster Stations	B4162	\$920,211	10%	\$92,021	5%	\$46,011	1%	\$9,202	5%	\$46,011
Potable Water Booster Stations	B4163	\$3,166,464	10%	\$316,646	5%	\$158,323	1%	\$31,665	5%	\$158,323
Potable Water Booster Stations	B4165	\$2,417,264	10%	\$241,726	5%	\$120,863	1%	\$24,173	5%	\$120,863
Potable Water Booster Stations	B4166	\$1,649,248	10%	\$164,925	5%	\$82,462	1%	\$16,492	5%	\$82,462
Potable Water Booster Stations	B4167	\$1,249,119	10%	\$124,912	5%	\$62,456	1%	\$12,491	5%	\$62,456
Potable Water Booster Stations	B4168	\$2,887,740	10%	\$288,774	5%	\$144,387	1%	\$28,877	5%	\$144,387
Potable Water Booster Stations	B4169	\$1,854,123	10%	\$185,412	5%	\$92,706	1%	\$18,541	5%	\$92,706
Potable Water Booster Stations	B4170	\$3,400,645	10%	\$340,065	5%	\$170,032	1%	\$34,006	5%	\$170,032
Potable Water Booster Stations	B4209	\$1,492,135	10%	\$149,214	5%	\$74,607	1%	\$14,921	5%	\$74,607
Potable Water Booster Stations	B4210	\$941,986	10%	\$94,199	5%	\$47,099	1%	\$9,420	5%	\$47,099
Potable Water Booster Stations	B4212	\$852,248	10%	\$85,225	5%	\$42,612	1%	\$8,522	5%	\$42,612

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B4213	\$941,986	10%	\$94,199	5%	\$47,099	1%	\$9,420	5%	\$47,099
Potable Water Booster Stations	B4214	\$723,521	10%	\$72,352	5%	\$36,176	1%	\$7,235	5%	\$36,176
Potable Water Booster Stations	B4218	\$1,303,840	10%	\$130,384	5%	\$65,192	1%	\$13,038	5%	\$65,192
Potable Water Booster Stations	B4221	\$1,097,184	10%	\$109,718	5%	\$54,859	1%	\$10,972	5%	\$54,859
Potable Water Booster Stations	B4222	\$2,575,605	10%	\$257,561	5%	\$128,780	1%	\$25,756	5%	\$128,780
Potable Water Booster Stations	B4303	\$2,042,968	10%	\$204,297	5%	\$102,148	1%	\$20,430	5%	\$102,148
Potable Water Booster Stations	B4308	\$740,095	10%	\$74,010	5%	\$37,005	1%	\$7,401	5%	\$37,005
Potable Water Booster Stations	B4309	\$1,380,646	10%	\$138,065	5%	\$69,032	1%	\$13,806	5%	\$69,032
Potable Water Booster Stations	B4313	\$1,018,052	10%	\$101,805	5%	\$50,903	1%	\$10,181	5%	\$50,903
Recycled Water Pump Stations	B9800	\$2,099,155	10%	\$209,916	5%	\$104,958	1%	\$20,992	5%	\$104,958
Recycled Water Pump Stations	B9802	\$2,099,155	10%	\$209,916	5%	\$104,958	1%	\$20,992	5%	\$104,958
Recycled Water Pump Stations	B9803	\$2,671,795	10%	\$267,180	5%	\$133,590	1%	\$26,718	5%	\$133,590
Recycled Water Pump Stations	B9820	\$2,023,583	10%	\$202,358	5%	\$101,179	1%	\$20,236	5%	\$101,179
Recycled Water Pump Stations	B9821	\$4,826,007	10%	\$482,601	5%	\$241,300	1%	\$48,260	5%	\$241,300
Recycled Water Pump Stations	B9841	\$3,557,940	10%	\$355,794	5%	\$177,897	1%	\$35,579	5%	\$177,897
Recycled Water Pump Stations	B9850	\$5,258,926	10%	\$525,893	5%	\$262,946	1%	\$52,589	5%	\$262,946
Recycled Water Pump Stations	B9860	\$3,033,284	10%	\$303,328	5%	\$151,664	1%	\$30,333	5%	\$151,664
Recycled Water Pump Stations	B9861	\$1,200,159	10%	\$120,016	5%	\$60,008	1%	\$12,002	5%	\$60,008
Recycled Water Pump Stations	B9862	\$2,887,538	10%	\$288,754	5%	\$144,377	1%	\$28,875	5%	\$144,377

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Recycled Water Pump Stations	B9881	\$3,623,037	10%	\$362,304	5%	\$181,152	1%	\$36,230	5%	\$181,152
Recycled Water Pump Stations	B9884	\$2,887,538	10%	\$288,754	5%	\$144,377	1%	\$28,875	5%	\$144,377
Wastewater Lift Station	L3121	\$3,926,404	5%	\$196,320	5%	\$196,320	1%	\$39,264	5%	\$196,320
Wastewater Lift Station	L3126	\$1,935,023	5%	\$96,751	5%	\$96,751	1%	\$19,350	5%	\$96,751
Wastewater Lift Station	L3128	\$2,235,655	5%	\$111,783	5%	\$111,783	1%	\$22,357	5%	\$111,783
Wastewater Lift Station	L3131	\$4,921,055	5%	\$246,053	5%	\$246,053	1%	\$49,211	5%	\$246,053
Wastewater Lift Station	L3132	\$11,469,754	5%	\$573,488	5%	\$573,488	1%	\$114,698	5%	\$573,488
Wastewater Lift Station	L3133	\$3,329,035	5%	\$166,452	5%	\$166,452	1%	\$33,290	5%	\$166,452
Wastewater Lift Station	L3135	\$3,271,877	5%	\$163,594	5%	\$163,594	1%	\$32,719	5%	\$163,594
Wastewater Lift Station	L3136	\$2,031,472	5%	\$101,574	5%	\$101,574	1%	\$20,315	5%	\$101,574
Wastewater Lift Station	L3137	\$2,827,612	5%	\$141,381	5%	\$141,381	1%	\$28,276	5%	\$141,381
Wastewater Lift Station	L3213	\$3,187,841	5%	\$159,392	5%	\$159,392	1%	\$31,878	5%	\$159,392
Wastewater Lift Station	L3221	\$4,292,385	5%	\$214,619	5%	\$214,619	1%	\$42,924	5%	\$214,619
Wastewater Lift Station	L3224	\$2,136,806	5%	\$106,840	5%	\$106,840	1%	\$21,368	5%	\$106,840
Wastewater Lift Station	L3228	\$6,136,945	5%	\$306,847	5%	\$306,847	1%	\$61,369	5%	\$306,847
Wastewater Lift Station	L3230	\$2,241,127	5%	\$112,056	5%	\$112,056	1%	\$22,411	5%	\$112,056
Wastewater Lift Station	L3325	\$8,878,345	5%	\$443,917	5%	\$443,917	1%	\$88,783	5%	\$443,917
Wastewater Lift Station	L3327	\$9,178,188	5%	\$458,909	5%	\$458,909	1%	\$91,782	5%	\$458,909
Wastewater Lift Station	L3328	\$1,984,027	5%	\$99,201	5%	\$99,201	1%	\$19,840	5%	\$99,201

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Wastewater Lift Station	L3329	\$1,758,299	5%	\$87,915	5%	\$87,915	1%	\$17,583	5%	\$87,915
Wastewater Lift Station	L3330	\$1,606,255	5%	\$80,313	5%	\$80,313	1%	\$16,063	5%	\$80,313
Wastewater Lift Station	L3331	\$1,984,027	5%	\$99,201	5%	\$99,201	1%	\$19,840	5%	\$99,201
Wastewater Lift Station	L3332	\$2,344,512	5%	\$117,226	5%	\$117,226	1%	\$23,445	5%	\$117,226
Wastewater Lift Station	L3333	\$1,412,132	5%	\$70,607	5%	\$70,607	1%	\$14,121	5%	\$70,607
Wastewater Lift Station	L3334	\$2,000,008	5%	\$100,000	5%	\$100,000	1%	\$20,000	5%	\$100,000
Wastewater Lift Station	L3423	\$3,477,961	5%	\$173,898	5%	\$173,898	1%	\$34,780	5%	\$173,898
Wastewater Lift Station	L3426	\$5,621,741	5%	\$281,087	5%	\$281,087	1%	\$56,217	5%	\$281,087
Wastewater Lift Station	L3432	\$1,935,023	5%	\$96,751	5%	\$96,751	1%	\$19,350	5%	\$96,751
Wastewater Lift Station	L3435	\$8,087,355	5%	\$404,368	5%	\$404,368	1%	\$80,874	5%	\$404,368
Wastewater Lift Station	L3436	\$1,167,272	5%	\$58,364	5%	\$58,364	1%	\$11,673	5%	\$58,364
Wastewater Lift Station	L3437	\$8,878,345	5%	\$443,917	5%	\$443,917	1%	\$88,783	5%	\$443,917
Wastewater Lift Station	L3441	\$4,053,300	5%	\$202,665	5%	\$202,665	1%	\$40,533	5%	\$202,665
Wastewater Lift Station	L3443	\$1,618,955	5%	\$80,948	5%	\$80,948	1%	\$16,190	5%	\$80,948
Wastewater Lift Station	L3444	\$1,412,132	5%	\$70,607	5%	\$70,607	1%	\$14,121	5%	\$70,607
Wastewater Lift Station	L3447	\$2,991,745	5%	\$149,587	5%	\$149,587	1%	\$29,917	5%	\$149,587
Wastewater Lift Station	L3448	\$4,175,118	5%	\$208,756	5%	\$208,756	1%	\$41,751	5%	\$208,756
Wastewater Lift Station	L3450	\$1,186,579	5%	\$59,329	5%	\$59,329	1%	\$11,866	5%	\$59,329
Wastewater Lift Station	L3451	\$1,610,502	5%	\$80,525	5%	\$80,525	1%	\$16,105	5%	\$80,525

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Wastewater Lift Station	L3524	\$1,980,452	5%	\$99,023	5%	\$99,023	1%	\$19,805	5%	\$99,023
Wastewater Lift Station	L3525	\$2,262,849	5%	\$113,142	5%	\$113,142	1%	\$22,628	5%	\$113,142
Wastewater Lift Station	L3526	\$1,967,873	5%	\$98,394	5%	\$98,394	1%	\$19,679	5%	\$98,394
Wastewater Lift Station	L3528	\$1,117,044	5%	\$55,852	5%	\$55,852	1%	\$11,170	5%	\$55,852
Wastewater Lift Station	L3529	\$2,302,845	5%	\$115,142	5%	\$115,142	1%	\$23,028	5%	\$115,142
Wastewater Lift Station	L3530	\$1,517,933	5%	\$75,897	5%	\$75,897	1%	\$15,179	5%	\$75,897
Wastewater Lift Station	L3531	\$2,589,889	5%	\$129,494	5%	\$129,494	1%	\$25,899	5%	\$129,494
Well	W0014	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0017	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0025	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0026	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0027	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0028	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0029	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0033	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0034	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0035	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0036	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0044	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000

Vulnerability Assessment Calculations										
		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Well	W0049	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0055	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0056	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0057	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0059	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0075	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0076	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0077	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0080	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0081	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0082	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0083	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0084	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0085	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0086	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0087	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0088	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0089	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0090	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000

Vulnerability Assessment Calculations		Earthquake			Infrastructure Failure		Power Failure		Terrorism	
Type	Name	TOTAL	% Damage	Loss Estimate	%	Loss Estimate	%	Loss Estimate	% Damage	Loss Estimate
Well	W0091	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0092	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Well	W0093	\$3,200,000	5%	\$160,000	5%	\$160,000	1%	\$32,000	5%	\$160,000
Water Reclamation	Moreno Valley Region WRF	\$370,000,000	25%	\$92,500,000	5%	\$18,500,000	1%	\$3,700,000	10%	\$37,000,000
Water Reclamation	Perris Valley Regional WRF	\$440,000,000	25%	\$110,000,000	5%	\$22,000,000	1%	\$4,400,000	10%	\$44,000,000
Water Reclamation	San Jacinto Regional WRF	\$280,000,000	25%	\$70,000,000	5%	\$14,000,000	1%	\$2,800,000	10%	\$28,000,000
Water Reclamation	Temecula Valley Regional WRF	\$360,000,000	30%	\$108,000,000	5%	\$18,000,000	1%	\$3,600,000	10%	\$36,000,000
General Buildings	Customer Service Call Center	\$2,000,000	10%	\$200,000	5%	\$100,000	1%	\$20,000	10%	\$200,000
General Buildings	OPS Maintenance & Administration Centers	\$32,600,000	10%	\$3,260,000	5%	\$1,630,000	1%	\$326,000	10%	\$3,260,000
Water Service		\$50,791,578	30%	\$15,237,473	5%	\$2,539,579	1%	\$507,916	10%	\$5,079,158
Wastewater		\$22,391,986	50%	\$11,195,993	5%	\$1,119,599	1%	\$223,920	10%	\$2,239,199
			Earthquake	\$616,801,588	Infrastructure Failure	\$124,625,396	Power Failure	\$21,920,602	Terrorism	\$207,413,766

Table 3.27: Loss Estimate/Vulnerability Assessment – Extreme Weather, Flood/Dam Reservoir Failure, hazardous materials Release, Drought, Wildfire

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Pipeline	Aggregate Brine Water Distribution Pipeline	\$45,422,994	0%	\$0	0.1%	\$45,423	0%	\$0	0%	\$0	0%	\$0
Pipeline	Aggregate Potable Water Distribution Pipeline	\$1,197,903,405	0%	\$0	0.1%	\$1,197,903	0%	\$0	0%	\$0	0%	\$0
Pipeline	Aggregate Raw Water Distribution Pipeline	\$140,660,694	0%	\$0	0.1%	\$140,661	0%	\$0	0%	\$0	0%	\$0
Pipeline	Aggregate Recycled Water Distribution Pipeline	\$368,625,884	0%	\$0	0.1%	\$368,626	0%	\$0	0%	\$0	0%	\$0
Pipeline	Aggregate Wastewater Collection Pipeline	\$1,038,195,836	0%	\$0	0.1%	\$1,038,196	0%	\$0	0%	\$0	0%	\$0
Potable Water Storage Tank	S4102	\$3,383,067	0.5%	\$16,915	0%	\$0	0%	\$0	0%	\$0	1%	\$33,831
Potable Water Storage Tank	S4103	\$1,284,783	0.5%	\$6,424	0%	\$0	0%	\$0	0%	\$0	1%	\$12,848
Potable Water Storage Tank	S4104	\$886,471	0.5%	\$4,432	0%	\$0	0%	\$0	0%	\$0	1%	\$8,865
Potable Water Storage Tank	S4105	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4106	\$1,242,121	0.5%	\$6,211	0%	\$0	0%	\$0	0%	\$0	1%	\$12,421
Potable Water Storage Tank	S4107	\$4,590,426	0.5%	\$22,952	0%	\$0	0%	\$0	0%	\$0	1%	\$45,904
Potable Water Storage Tank	S4108	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012
Potable Water Storage Tank	S4109	\$4,590,426	0.5%	\$22,952	0%	\$0	0%	\$0	0%	\$0	1%	\$45,904
Potable Water Storage Tank	S4110	\$3,688,721	0.5%	\$18,444	0%	\$0	0%	\$0	0%	\$0	1%	\$36,887
Potable Water Storage Tank	S4111	\$985,850	0.5%	\$4,929	0%	\$0	0%	\$0	0%	\$0	1%	\$9,859
Potable Water Storage Tank	S4112	\$1,284,783	0.5%	\$6,424	0%	\$0	0%	\$0	0%	\$0	1%	\$12,848
Potable Water Storage Tank	S4113	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012
Potable Water Storage Tank	S4114	\$1,569,791	0.5%	\$7,849	0%	\$0	0%	\$0	0%	\$0	1%	\$15,698

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4115	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4116	\$1,793,881	0.5%	\$8,969	0%	\$0	0%	\$0	0%	\$0	1%	\$17,939
Potable Water Storage Tank	S4117	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4118	\$2,465,546	0.5%	\$12,328	0%	\$0	0%	\$0	0%	\$0	1%	\$24,655
Potable Water Storage Tank	S4119	\$2,252,500	0.5%	\$11,263	0%	\$0	0%	\$0	0%	\$0	1%	\$22,525
Potable Water Storage Tank	S4120	\$2,252,500	0.5%	\$11,263	0%	\$0	0%	\$0	0%	\$0	1%	\$22,525
Potable Water Storage Tank	S4122	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Potable Water Storage Tank	S4123	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Potable Water Storage Tank	S4124	\$2,252,500	0.5%	\$11,263	0%	\$0	0%	\$0	0%	\$0	1%	\$22,525
Potable Water Storage Tank	S4125	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4126	\$2,252,500	0.5%	\$11,263	0%	\$0	0%	\$0	0%	\$0	1%	\$22,525
Potable Water Storage Tank	S4127	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012
Potable Water Storage Tank	S4128	\$3,367,960	0.5%	\$16,840	0%	\$0	0%	\$0	0%	\$0	1%	\$33,680
Potable Water Storage Tank	S4129	\$1,044,675	0.5%	\$5,223	0%	\$0	0%	\$0	0%	\$0	1%	\$10,447
Potable Water Storage Tank	S4130	\$1,197,189	0.5%	\$5,986	0%	\$0	0%	\$0	0%	\$0	1%	\$11,972
Potable Water Storage Tank	S4131	\$1,197,189	0.5%	\$5,986	0%	\$0	0%	\$0	0%	\$0	1%	\$11,972
Potable Water Storage Tank	S4132	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Potable Water Storage Tank	S4133	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012
Potable Water Storage Tank	S4134	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4135	\$1,173,766	0.5%	\$5,869	0%	\$0	0%	\$0	0%	\$0	1%	\$11,738
Potable Water Storage Tank	S4136	\$4,322,624	0.5%	\$21,613	0%	\$0	0%	\$0	0%	\$0	1%	\$43,226
Potable Water Storage Tank	S4138	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4139	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012
Potable Water Storage Tank	S4140	\$3,367,960	0.5%	\$16,840	0%	\$0	0%	\$0	0%	\$0	1%	\$33,680
Potable Water Storage Tank	S4141	\$2,921,189	0.5%	\$14,606	0%	\$0	0%	\$0	0%	\$0	1%	\$29,212
Potable Water Storage Tank	S4142	\$2,057,860	0.5%	\$10,289	0%	\$0	0%	\$0	0%	\$0	1%	\$20,579
Potable Water Storage Tank	S4143	\$4,459,479	0.5%	\$22,297	0%	\$0	0%	\$0	0%	\$0	1%	\$44,595
Potable Water Storage Tank	S4144	\$4,653,888	0.5%	\$23,269	0%	\$0	0%	\$0	0%	\$0	1%	\$46,539
Potable Water Storage Tank	S4145	\$1,673,275	0.5%	\$8,366	0%	\$0	0%	\$0	0%	\$0	1%	\$16,733
Potable Water Storage Tank	S4146	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Potable Water Storage Tank	S4147	\$4,746,763	0.5%	\$23,734	0%	\$0	0%	\$0	0%	\$0	1%	\$47,468
Potable Water Storage Tank	S4148	\$4,653,888	0.5%	\$23,269	0%	\$0	0%	\$0	0%	\$0	1%	\$46,539
Potable Water Storage Tank	S4149	\$4,653,888	0.5%	\$23,269	0%	\$0	0%	\$0	0%	\$0	1%	\$46,539
Potable Water Storage Tank	S4151	\$5,066,448	0.5%	\$25,332	0%	\$0	0%	\$0	0%	\$0	1%	\$50,664
Potable Water Storage Tank	S4152	\$2,505,022	0.5%	\$12,525	0%	\$0	0%	\$0	0%	\$0	1%	\$25,050
Potable Water Storage Tank	S4153	\$1,284,783	0.5%	\$6,424	0%	\$0	0%	\$0	0%	\$0	1%	\$12,848
Potable Water Storage Tank	S4154	\$1,701,169	0.5%	\$8,506	0%	\$0	0%	\$0	0%	\$0	1%	\$17,012
Potable Water Storage Tank	S4155	\$5,333,321	0.5%	\$26,667	0%	\$0	0%	\$0	0%	\$0	1%	\$53,333

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4156	\$3,367,960	0.5%	\$16,840	0%	\$0	0%	\$0	0%	\$0	1%	\$33,680
Potable Water Storage Tank	S4157	\$3,607,866	0.5%	\$18,039	0%	\$0	0%	\$0	0%	\$0	1%	\$36,079
Potable Water Storage Tank	S4158	\$3,607,866	0.5%	\$18,039	0%	\$0	0%	\$0	0%	\$0	1%	\$36,079
Potable Water Storage Tank	S4159	\$4,895,880	0.5%	\$24,479	0%	\$0	0%	\$0	0%	\$0	1%	\$48,959
Potable Water Storage Tank	S4160	\$3,088,443	0.5%	\$15,442	0%	\$0	0%	\$0	0%	\$0	1%	\$30,884
Potable Water Storage Tank	S4161	\$2,654,492	0.5%	\$13,272	0%	\$0	0%	\$0	0%	\$0	1%	\$26,545
Potable Water Storage Tank	S4164	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4165	\$4,653,888	0.5%	\$23,269	0%	\$0	0%	\$0	0%	\$0	1%	\$46,539
Potable Water Storage Tank	S4203	\$2,473,516	0.5%	\$12,368	0%	\$0	0%	\$0	0%	\$0	1%	\$24,735
Potable Water Storage Tank	S4205	\$985,850	0.5%	\$4,929	0%	\$0	0%	\$0	0%	\$0	1%	\$9,859
Potable Water Storage Tank	S4207	\$886,471	0.5%	\$4,432	0%	\$0	0%	\$0	0%	\$0	1%	\$8,865
Potable Water Storage Tank	S4208	\$886,471	0.5%	\$4,432	0%	\$0	0%	\$0	0%	\$0	1%	\$8,865
Potable Water Storage Tank	S4211	\$1,600,366	0.5%	\$8,002	0%	\$0	0%	\$0	0%	\$0	1%	\$16,004
Potable Water Storage Tank	S4212	\$4,590,426	0.5%	\$22,952	0%	\$0	0%	\$0	0%	\$0	1%	\$45,904
Potable Water Storage Tank	S4213	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Potable Water Storage Tank	S4214	\$5,121,464	0.5%	\$25,607	0%	\$0	0%	\$0	0%	\$0	1%	\$51,215
Potable Water Storage Tank	S4215	\$5,121,464	0.5%	\$25,607	0%	\$0	0%	\$0	0%	\$0	1%	\$51,215
Potable Water Storage Tank	S4216	\$3,607,866	0.5%	\$18,039	0%	\$0	0%	\$0	0%	\$0	1%	\$36,079
Potable Water Storage Tank	S4303	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825

Vulnerability Assessment Calculations			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Storage Tank	S4304	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4305	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4306	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Storage Tank	S4307	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Potable Water Storage Tank	S4308	\$4,895,880	0.5%	\$24,479	0%	\$0	0%	\$0	0%	\$0	1%	\$48,959
Potable Water Storage Tank	S4310	\$3,367,960	0.5%	\$16,840	0%	\$0	0%	\$0	0%	\$0	1%	\$33,680
Potable Water Storage Tank	S4311	\$3,367,960	0.5%	\$16,840	0%	\$0	0%	\$0	0%	\$0	1%	\$33,680
Potable Water Storage Tank	S4312	\$809,871	0.5%	\$4,049	0%	\$0	0%	\$0	0%	\$0	1%	\$8,099
Potable Water Storage Tank	S4313	\$1,505,866	0.5%	\$7,529	0%	\$0	0%	\$0	0%	\$0	1%	\$15,059
Recycled Water Storage Tank	S4209	\$2,252,500	0.5%	\$11,263	0%	\$0	0%	\$0	0%	\$0	1%	\$22,525
Recycled Water Storage Tank	S9817	\$3,949,108	0.5%	\$19,746	0%	\$0	0%	\$0	0%	\$0	1%	\$39,491
Recycled Water Storage Tank	S9819	\$4,142,053	0.5%	\$20,710	0%	\$0	0%	\$0	0%	\$0	1%	\$41,421
Recycled Water Storage Tank	S9820	\$4,322,624	0.5%	\$21,613	0%	\$0	0%	\$0	0%	\$0	1%	\$43,226
Recycled Water Storage Tank	S9822	\$2,982,509	0.5%	\$14,913	0%	\$0	0%	\$0	0%	\$0	1%	\$29,825
Potable Water Filtration	Hemet Water Filtration Plant	\$60,000,000	0.5%	\$300,000	5%	\$3,000,000	10%	\$6,000,000	0%	\$0	1%	\$600,000
Potable Water Filtration	Iron and Manganese Removal Plant	\$22,000,000	0.5%	\$110,000	5%	\$1,100,000	10%	\$2,200,000	0%	\$0	1%	\$220,000
Potable Water Filtration	Menifee Desalter Facility	\$4,800,000	0.5%	\$24,000	5%	\$240,000	10%	\$480,000	0%	\$0	1%	\$48,000
Potable Water Filtration	Perris Desalter Facility	\$7,000,000	0.5%	\$35,000	5%	\$350,000	10%	\$700,000	0%	\$0	1%	\$70,000
Potable Water Filtration	Perris Water Filtration Plant	\$60,000,000	0.5%	\$300,000	5%	\$3,000,000	10%	\$6,000,000	0%	\$0	1%	\$600,000

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B0002	\$2,783,582	0.5%	\$13,918	5%	\$139,179	0%	\$0	0%	\$0	1%	\$27,836
Potable Water Booster Stations	B0003	\$2,069,545	0.5%	\$10,348	5%	\$103,477	0%	\$0	0%	\$0	1%	\$20,695
Potable Water Booster Stations	B0004	\$3,915,986	0.5%	\$19,580	5%	\$195,799	0%	\$0	0%	\$0	1%	\$39,160
Potable Water Booster Stations	B0010	\$4,969,755	0.5%	\$24,849	5%	\$248,488	0%	\$0	0%	\$0	1%	\$49,698
Potable Water Booster Stations	B0011	\$4,142,040	0.5%	\$20,710	5%	\$207,102	0%	\$0	0%	\$0	1%	\$41,420
Potable Water Booster Stations	B0012	\$3,031,452	0.5%	\$15,157	5%	\$151,573	0%	\$0	0%	\$0	1%	\$30,315
Potable Water Booster Stations	B0013	\$3,031,452	0.5%	\$15,157	5%	\$151,573	0%	\$0	0%	\$0	1%	\$30,315
Potable Water Booster Stations	B0015	\$4,881,079	0.5%	\$24,405	5%	\$244,054	0%	\$0	0%	\$0	1%	\$48,811
Potable Water Booster Stations	B0022	\$2,228,521	0.5%	\$11,143	5%	\$111,426	0%	\$0	0%	\$0	1%	\$22,285
Potable Water Booster Stations	B0023	\$2,618,986	0.5%	\$13,095	5%	\$130,949	0%	\$0	0%	\$0	1%	\$26,190
Potable Water Booster Stations	B0024	\$2,284,345	0.5%	\$11,422	5%	\$114,217	0%	\$0	0%	\$0	1%	\$22,843
Potable Water Booster Stations	B0025	\$2,135,100	0.5%	\$10,676	5%	\$106,755	0%	\$0	0%	\$0	1%	\$21,351
Potable Water Booster Stations	B0026	\$3,596,952	0.5%	\$17,985	5%	\$179,848	0%	\$0	0%	\$0	1%	\$35,970
Potable Water Booster Stations	B0027	\$1,757,282	0.5%	\$8,786	5%	\$87,864	0%	\$0	0%	\$0	1%	\$17,573
Potable Water Booster Stations	B0031	\$2,330,240	0.5%	\$11,651	5%	\$116,512	0%	\$0	0%	\$0	1%	\$23,302
Potable Water Booster Stations	B0032	\$2,003,841	0.5%	\$10,019	5%	\$100,192	0%	\$0	0%	\$0	1%	\$20,038
Potable Water Booster Stations	B0040	\$5,824,388	0.5%	\$29,122	5%	\$291,219	0%	\$0	0%	\$0	1%	\$58,244
Potable Water Booster Stations	B0041	\$4,290,357	0.5%	\$21,452	5%	\$214,518	0%	\$0	0%	\$0	1%	\$42,904
Potable Water Booster Stations	B0042	\$3,542,929	0.5%	\$17,715	5%	\$177,146	0%	\$0	0%	\$0	1%	\$35,429

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B0044	\$3,675,243	0.5%	\$18,376	5%	\$183,762	0%	\$0	0%	\$0	1%	\$36,752
Potable Water Booster Stations	B0045	\$3,180,441	0.5%	\$15,902	5%	\$159,022	0%	\$0	0%	\$0	1%	\$31,804
Potable Water Booster Stations	B0046	\$2,472,169	0.5%	\$12,361	5%	\$123,608	0%	\$0	0%	\$0	1%	\$24,722
Potable Water Booster Stations	B0048	\$5,500,068	0.5%	\$27,500	5%	\$275,003	0%	\$0	0%	\$0	1%	\$55,001
Potable Water Booster Stations	B0050	\$4,984,247	0.5%	\$24,921	5%	\$249,212	0%	\$0	0%	\$0	1%	\$49,842
Potable Water Booster Stations	B0051	\$5,386,718	0.5%	\$26,934	5%	\$269,336	0%	\$0	0%	\$0	1%	\$53,867
Potable Water Booster Stations	B4102	\$1,526,023	0.5%	\$7,630	5%	\$76,301	0%	\$0	0%	\$0	1%	\$15,260
Potable Water Booster Stations	B4103	\$1,757,282	0.5%	\$8,786	5%	\$87,864	0%	\$0	0%	\$0	1%	\$17,573
Potable Water Booster Stations	B4104	\$2,981,136	0.5%	\$14,906	5%	\$149,057	0%	\$0	0%	\$0	1%	\$29,811
Potable Water Booster Stations	B4105	\$1,867,400	0.5%	\$9,337	5%	\$93,370	0%	\$0	0%	\$0	1%	\$18,674
Potable Water Booster Stations	B4107	\$1,295,768	0.5%	\$6,479	5%	\$64,788	0%	\$0	0%	\$0	1%	\$12,958
Potable Water Booster Stations	B4109	\$1,084,737	0.5%	\$5,424	5%	\$54,237	0%	\$0	0%	\$0	1%	\$10,847
Potable Water Booster Stations	B4111	\$1,295,768	0.5%	\$6,479	5%	\$64,788	0%	\$0	0%	\$0	1%	\$12,958
Potable Water Booster Stations	B4112	\$1,380,646	0.5%	\$6,903	5%	\$69,032	0%	\$0	0%	\$0	1%	\$13,806
Potable Water Booster Stations	B4113	\$1,899,179	0.5%	\$9,496	5%	\$94,959	0%	\$0	0%	\$0	1%	\$18,992
Potable Water Booster Stations	B4116	\$2,472,169	0.5%	\$12,361	5%	\$123,608	0%	\$0	0%	\$0	1%	\$24,722
Potable Water Booster Stations	B4117	\$1,589,873	0.5%	\$7,949	5%	\$79,494	0%	\$0	0%	\$0	1%	\$15,899
Potable Water Booster Stations	B4118	\$1,649,248	0.5%	\$8,246	5%	\$82,462	0%	\$0	0%	\$0	1%	\$16,492
Potable Water Booster Stations	B4119	\$1,526,023	0.5%	\$7,630	5%	\$76,301	0%	\$0	0%	\$0	1%	\$15,260

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B4120	\$1,865,579	0.5%	\$9,328	5%	\$93,279	0%	\$0	0%	\$0	1%	\$18,656
Potable Water Booster Stations	B4127	\$1,731,445	0.5%	\$8,657	5%	\$86,572	0%	\$0	0%	\$0	1%	\$17,314
Potable Water Booster Stations	B4130	\$1,249,119	0.5%	\$6,246	5%	\$62,456	0%	\$0	0%	\$0	1%	\$12,491
Potable Water Booster Stations	B4131	\$1,162,459	0.5%	\$5,812	5%	\$58,123	0%	\$0	0%	\$0	1%	\$11,625
Potable Water Booster Stations	B4132	\$1,526,023	0.5%	\$7,630	5%	\$76,301	0%	\$0	0%	\$0	1%	\$15,260
Potable Water Booster Stations	B4133	\$1,084,737	0.5%	\$5,424	5%	\$54,237	0%	\$0	0%	\$0	1%	\$10,847
Potable Water Booster Stations	B4134	\$1,084,737	0.5%	\$5,424	5%	\$54,237	0%	\$0	0%	\$0	1%	\$10,847
Potable Water Booster Stations	B4135	\$1,785,396	0.5%	\$8,927	5%	\$89,270	0%	\$0	0%	\$0	1%	\$17,854
Potable Water Booster Stations	B4136	\$1,339,467	0.5%	\$6,697	5%	\$66,973	0%	\$0	0%	\$0	1%	\$13,395
Potable Water Booster Stations	B4138	\$1,782,423	0.5%	\$8,912	5%	\$89,121	0%	\$0	0%	\$0	1%	\$17,824
Potable Water Booster Stations	B4139	\$1,419,645	0.5%	\$7,098	5%	\$70,982	0%	\$0	0%	\$0	1%	\$14,196
Potable Water Booster Stations	B4140	\$1,380,646	0.5%	\$6,903	5%	\$69,032	0%	\$0	0%	\$0	1%	\$13,806
Potable Water Booster Stations	B4141	\$1,330,942	0.5%	\$6,655	5%	\$66,547	0%	\$0	0%	\$0	1%	\$13,309
Potable Water Booster Stations	B4145	\$2,671,795	0.5%	\$13,359	5%	\$133,590	0%	\$0	0%	\$0	1%	\$26,718
Potable Water Booster Stations	B4146	\$2,624,525	0.5%	\$13,123	5%	\$131,226	0%	\$0	0%	\$0	1%	\$26,245
Potable Water Booster Stations	B4150	\$2,042,968	0.5%	\$10,215	5%	\$102,148	0%	\$0	0%	\$0	1%	\$20,430
Potable Water Booster Stations	B4151	\$2,186,984	0.5%	\$10,935	5%	\$109,349	0%	\$0	0%	\$0	1%	\$21,870
Potable Water Booster Stations	B4152	\$1,649,248	0.5%	\$8,246	5%	\$82,462	0%	\$0	0%	\$0	1%	\$16,492
Potable Water Booster Stations	B4153	\$2,099,155	0.5%	\$10,496	5%	\$104,958	0%	\$0	0%	\$0	1%	\$20,992

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B4154	\$2,783,582	0.5%	\$13,918	5%	\$139,179	0%	\$0	0%	\$0	1%	\$27,836
Potable Water Booster Stations	B4155	\$1,649,248	0.5%	\$8,246	5%	\$82,462	0%	\$0	0%	\$0	1%	\$16,492
Potable Water Booster Stations	B4156	\$1,492,135	0.5%	\$7,461	5%	\$74,607	0%	\$0	0%	\$0	1%	\$14,921
Potable Water Booster Stations	B4157	\$1,478,163	0.5%	\$7,391	5%	\$73,908	0%	\$0	0%	\$0	1%	\$14,782
Potable Water Booster Stations	B4158	\$1,144,516	0.5%	\$5,723	5%	\$57,226	0%	\$0	0%	\$0	1%	\$11,445
Potable Water Booster Stations	B4159	\$3,375,321	0.5%	\$16,877	5%	\$168,766	0%	\$0	0%	\$0	1%	\$33,753
Potable Water Booster Stations	B4160	\$1,830,805	0.5%	\$9,154	5%	\$91,540	0%	\$0	0%	\$0	1%	\$18,308
Potable Water Booster Stations	B4161	\$3,076,683	0.5%	\$15,383	5%	\$153,834	0%	\$0	0%	\$0	1%	\$30,767
Potable Water Booster Stations	B4162	\$920,211	0.5%	\$4,601	5%	\$46,011	0%	\$0	0%	\$0	1%	\$9,202
Potable Water Booster Stations	B4163	\$3,166,464	0.5%	\$15,832	5%	\$158,323	0%	\$0	0%	\$0	1%	\$31,665
Potable Water Booster Stations	B4165	\$2,417,264	0.5%	\$12,086	5%	\$120,863	0%	\$0	0%	\$0	1%	\$24,173
Potable Water Booster Stations	B4166	\$1,649,248	0.5%	\$8,246	5%	\$82,462	0%	\$0	0%	\$0	1%	\$16,492
Potable Water Booster Stations	B4167	\$1,249,119	0.5%	\$6,246	5%	\$62,456	0%	\$0	0%	\$0	1%	\$12,491
Potable Water Booster Stations	B4168	\$2,887,740	0.5%	\$14,439	5%	\$144,387	0%	\$0	0%	\$0	1%	\$28,877
Potable Water Booster Stations	B4169	\$1,854,123	0.5%	\$9,271	5%	\$92,706	0%	\$0	0%	\$0	1%	\$18,541
Potable Water Booster Stations	B4170	\$3,400,645	0.5%	\$17,003	5%	\$170,032	0%	\$0	0%	\$0	1%	\$34,006
Potable Water Booster Stations	B4209	\$1,492,135	0.5%	\$7,461	5%	\$74,607	0%	\$0	0%	\$0	1%	\$14,921
Potable Water Booster Stations	B4210	\$941,986	0.5%	\$4,710	5%	\$47,099	0%	\$0	0%	\$0	1%	\$9,420
Potable Water Booster Stations	B4212	\$852,248	0.5%	\$4,261	5%	\$42,612	0%	\$0	0%	\$0	1%	\$8,522

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Potable Water Booster Stations	B4213	\$941,986	0.5%	\$4,710	5%	\$47,099	0%	\$0	0%	\$0	1%	\$9,420
Potable Water Booster Stations	B4214	\$723,521	0.5%	\$3,618	5%	\$36,176	0%	\$0	0%	\$0	1%	\$7,235
Potable Water Booster Stations	B4218	\$1,303,840	0.5%	\$6,519	5%	\$65,192	0%	\$0	0%	\$0	1%	\$13,038
Potable Water Booster Stations	B4221	\$1,097,184	0.5%	\$5,486	5%	\$54,859	0%	\$0	0%	\$0	1%	\$10,972
Potable Water Booster Stations	B4222	\$2,575,605	0.5%	\$12,878	5%	\$128,780	0%	\$0	0%	\$0	1%	\$25,756
Potable Water Booster Stations	B4303	\$2,042,968	0.5%	\$10,215	5%	\$102,148	0%	\$0	0%	\$0	1%	\$20,430
Potable Water Booster Stations	B4308	\$740,095	0.5%	\$3,700	5%	\$37,005	0%	\$0	0%	\$0	1%	\$7,401
Potable Water Booster Stations	B4309	\$1,380,646	0.5%	\$6,903	5%	\$69,032	0%	\$0	0%	\$0	1%	\$13,806
Potable Water Booster Stations	B4313	\$1,018,052	0.5%	\$5,090	5%	\$50,903	0%	\$0	0%	\$0	1%	\$10,181
Recycled Water Pump Stations	B9800	\$2,099,155	0.5%	\$10,496	5%	\$104,958	0%	\$0	0%	\$0	1%	\$20,992
Recycled Water Pump Stations	B9802	\$2,099,155	0.5%	\$10,496	5%	\$104,958	0%	\$0	0%	\$0	1%	\$20,992
Recycled Water Pump Stations	B9803	\$2,671,795	0.5%	\$13,359	5%	\$133,590	0%	\$0	0%	\$0	1%	\$26,718
Recycled Water Pump Stations	B9820	\$2,023,583	0.5%	\$10,118	5%	\$101,179	0%	\$0	0%	\$0	1%	\$20,236
Recycled Water Pump Stations	B9821	\$4,826,007	0.5%	\$24,130	5%	\$241,300	0%	\$0	0%	\$0	1%	\$48,260
Recycled Water Pump Stations	B9841	\$3,557,940	0.5%	\$17,790	5%	\$177,897	0%	\$0	0%	\$0	1%	\$35,579
Recycled Water Pump Stations	B9850	\$5,258,926	0.5%	\$26,295	5%	\$262,946	0%	\$0	0%	\$0	1%	\$52,589
Recycled Water Pump Stations	B9860	\$3,033,284	0.5%	\$15,166	5%	\$151,664	0%	\$0	0%	\$0	1%	\$30,333
Recycled Water Pump Stations	B9861	\$1,200,159	0.5%	\$6,001	5%	\$60,008	0%	\$0	0%	\$0	1%	\$12,002
Recycled Water Pump Stations	B9862	\$2,887,538	0.5%	\$14,438	5%	\$144,377	0%	\$0	0%	\$0	1%	\$28,875

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Recycled Water Pump Stations	B9881	\$3,623,037	0.5%	\$18,115	5%	\$181,152	0%	\$0	0%	\$0	1%	\$36,230
Recycled Water Pump Stations	B9884	\$2,887,538	0.5%	\$14,438	5%	\$144,377	0%	\$0	0%	\$0	1%	\$28,875
Wastewater Lift Station	L3121	\$3,926,404	0.5%	\$19,632	5%	\$196,320	0%	\$0	0%	\$0	1%	\$39,264
Wastewater Lift Station	L3126	\$1,935,023	0.5%	\$9,675	5%	\$96,751	0%	\$0	0%	\$0	1%	\$19,350
Wastewater Lift Station	L3128	\$2,235,655	0.5%	\$11,178	5%	\$111,783	0%	\$0	0%	\$0	1%	\$22,357
Wastewater Lift Station	L3131	\$4,921,055	0.5%	\$24,605	5%	\$246,053	0%	\$0	0%	\$0	1%	\$49,211
Wastewater Lift Station	L3132	\$11,469,754	0.5%	\$57,349	5%	\$573,488	0%	\$0	0%	\$0	1%	\$114,698
Wastewater Lift Station	L3133	\$3,329,035	0.5%	\$16,645	5%	\$166,452	0%	\$0	0%	\$0	1%	\$33,290
Wastewater Lift Station	L3135	\$3,271,877	0.5%	\$16,359	5%	\$163,594	0%	\$0	0%	\$0	1%	\$32,719
Wastewater Lift Station	L3136	\$2,031,472	0.5%	\$10,157	5%	\$101,574	0%	\$0	0%	\$0	1%	\$20,315
Wastewater Lift Station	L3137	\$2,827,612	0.5%	\$14,138	5%	\$141,381	0%	\$0	0%	\$0	1%	\$28,276
Wastewater Lift Station	L3213	\$3,187,841	0.5%	\$15,939	5%	\$159,392	0%	\$0	0%	\$0	1%	\$31,878
Wastewater Lift Station	L3221	\$4,292,385	0.5%	\$21,462	5%	\$214,619	0%	\$0	0%	\$0	1%	\$42,924
Wastewater Lift Station	L3224	\$2,136,806	0.5%	\$10,684	5%	\$106,840	0%	\$0	0%	\$0	1%	\$21,368
Wastewater Lift Station	L3228	\$6,136,945	0.5%	\$30,685	5%	\$306,847	0%	\$0	0%	\$0	1%	\$61,369
Wastewater Lift Station	L3230	\$2,241,127	0.5%	\$11,206	5%	\$112,056	0%	\$0	0%	\$0	1%	\$22,411
Wastewater Lift Station	L3325	\$8,878,345	0.5%	\$44,392	5%	\$443,917	0%	\$0	0%	\$0	1%	\$88,783
Wastewater Lift Station	L3327	\$9,178,188	0.5%	\$45,891	5%	\$458,909	0%	\$0	0%	\$0	1%	\$91,782
Wastewater Lift Station	L3328	\$1,984,027	0.5%	\$9,920	5%	\$99,201	0%	\$0	0%	\$0	1%	\$19,840

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Wastewater Lift Station	L3329	\$1,758,299	0.5%	\$8,791	5%	\$87,915	0%	\$0	0%	\$0	1%	\$17,583
Wastewater Lift Station	L3330	\$1,606,255	0.5%	\$8,031	5%	\$80,313	0%	\$0	0%	\$0	1%	\$16,063
Wastewater Lift Station	L3331	\$1,984,027	0.5%	\$9,920	5%	\$99,201	0%	\$0	0%	\$0	1%	\$19,840
Wastewater Lift Station	L3332	\$2,344,512	0.5%	\$11,723	5%	\$117,226	0%	\$0	0%	\$0	1%	\$23,445
Wastewater Lift Station	L3333	\$1,412,132	0.5%	\$7,061	5%	\$70,607	0%	\$0	0%	\$0	1%	\$14,121
Wastewater Lift Station	L3334	\$2,000,008	0.5%	\$10,000	5%	\$100,000	0%	\$0	0%	\$0	1%	\$20,000
Wastewater Lift Station	L3423	\$3,477,961	0.5%	\$17,390	5%	\$173,898	0%	\$0	0%	\$0	1%	\$34,780
Wastewater Lift Station	L3426	\$5,621,741	0.5%	\$28,109	5%	\$281,087	0%	\$0	0%	\$0	1%	\$56,217
Wastewater Lift Station	L3432	\$1,935,023	0.5%	\$9,675	5%	\$96,751	0%	\$0	0%	\$0	1%	\$19,350
Wastewater Lift Station	L3435	\$8,087,355	0.5%	\$40,437	5%	\$404,368	0%	\$0	0%	\$0	1%	\$80,874
Wastewater Lift Station	L3436	\$1,167,272	0.5%	\$5,836	5%	\$58,364	0%	\$0	0%	\$0	1%	\$11,673
Wastewater Lift Station	L3437	\$8,878,345	0.5%	\$44,392	5%	\$443,917	0%	\$0	0%	\$0	1%	\$88,783
Wastewater Lift Station	L3441	\$4,053,300	0.5%	\$20,267	5%	\$202,665	0%	\$0	0%	\$0	1%	\$40,533
Wastewater Lift Station	L3443	\$1,618,955	0.5%	\$8,095	5%	\$80,948	0%	\$0	0%	\$0	1%	\$16,190
Wastewater Lift Station	L3444	\$1,412,132	0.5%	\$7,061	5%	\$70,607	0%	\$0	0%	\$0	1%	\$14,121
Wastewater Lift Station	L3447	\$2,991,745	0.5%	\$14,959	5%	\$149,587	0%	\$0	0%	\$0	1%	\$29,917
Wastewater Lift Station	L3448	\$4,175,118	0.5%	\$20,876	5%	\$208,756	0%	\$0	0%	\$0	1%	\$41,751
Wastewater Lift Station	L3450	\$1,186,579	0.5%	\$5,933	5%	\$59,329	0%	\$0	0%	\$0	1%	\$11,866
Wastewater Lift Station	L3451	\$1,610,502	0.5%	\$8,053	5%	\$80,525	0%	\$0	0%	\$0	1%	\$16,105

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Wastewater Lift Station	L3524	\$1,980,452	0.5%	\$9,902	5%	\$99,023	0%	\$0	0%	\$0	1%	\$19,805
Wastewater Lift Station	L3525	\$2,262,849	0.5%	\$11,314	5%	\$113,142	0%	\$0	0%	\$0	1%	\$22,628
Wastewater Lift Station	L3526	\$1,967,873	0.5%	\$9,839	5%	\$98,394	0%	\$0	0%	\$0	1%	\$19,679
Wastewater Lift Station	L3528	\$1,117,044	0.5%	\$5,585	5%	\$55,852	0%	\$0	0%	\$0	1%	\$11,170
Wastewater Lift Station	L3529	\$2,302,845	0.5%	\$11,514	5%	\$115,142	0%	\$0	0%	\$0	1%	\$23,028
Wastewater Lift Station	L3530	\$1,517,933	0.5%	\$7,590	5%	\$75,897	0%	\$0	0%	\$0	1%	\$15,179
Wastewater Lift Station	L3531	\$2,589,889	0.5%	\$12,949	5%	\$129,494	0%	\$0	0%	\$0	1%	\$25,899
Well	W0014	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0017	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0025	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0026	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0027	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0028	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0029	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0033	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0034	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0035	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0036	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0044	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000

Vulnerability Assessment Calculations												
			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Well	W0049	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0055	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0056	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0057	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0059	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0075	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0076	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0077	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0080	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0081	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0082	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0083	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0084	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0085	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0086	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0087	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0088	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0089	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0090	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000

Vulnerability Assessment Calculations			Extreme Weather		Flood & Dam Reservoir Failure		Hazardous Material Release		Drought		Wildfire	
Type	Name	TOTAL	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate	% Damage	Loss Estimate
Well	W0091	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0092	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Well	W0093	\$3,200,000	0.5%	\$16,000	5%	\$160,000	0%	\$0	0%	\$0	1%	\$32,000
Water Reclamation	Moreno Valley Region WRF	\$370,000,000	0.5%	\$1,850,000	5%	\$18,500,000	10%	\$37,000,000	0%	\$0	1%	\$3,700,000
Water Reclamation	Perris Valley Regional WRF	\$440,000,000	0.5%	\$2,200,000	5%	\$22,000,000	10%	\$44,000,000	0%	\$0	1%	\$4,400,000
Water Reclamation	San Jacinto Regional WRF	\$280,000,000	0.5%	\$1,400,000	5%	\$14,000,000	10%	\$28,000,000	0%	\$0	1%	\$2,800,000
Water Reclamation	Temecula Valley Regional WRF	\$360,000,000	0.5%	\$1,800,000	5%	\$18,000,000	10%	\$36,000,000	0%	\$0	1%	\$3,600,000
General Buildings	Customer Service Call Center	\$2,000,000	0.5%	\$10,000	5%	\$100,000	0%	\$0	0%	\$0	0%	\$0
General Buildings	OPS Maintenance & Administration Centers	\$32,600,000	0.5%	\$163,000	5%	\$1,630,000	0%	\$0	0%	\$0	0%	\$0
Water Service		\$50,791,578	0.5%	\$253,958	0%	\$0	1%	\$507,916	5%	\$2,539,579	0%	\$0
Wastewater		\$22,391,986	0.5%	\$111,960	0%	\$0	1%	\$223,920	10%	\$2,239,199	0%	\$0
			Extreme Weather	\$12,183,459	Flood & Dam Reservoir Failure	\$108,734,639	Hazardous Material Release	\$161,111,836	Drought	\$4,778,778	Wildfire	\$23,289,082

3.15 Information Sources

University of South Carolina – Spatial Hazard Events and Losses Database for the United States (http://go2.cla.sc.edu/sheldus/db_registration)

Natural Resources Conservation Service (<http://www.wcc.nrcs.usda.gov/climate/windrose.html>)

National Climactic Data Center (<http://www.ncdc.noaa.gov/oa/ncdc.html>)

National Lightning Safety Institute (<http://www.lightningsafety.com/>)

Wind Hazard Reduction Coalition (<http://www.windhazards.org/coalition.cfm>)

California Department of Forestry and Fire Protection (<http://www.fire.ca.gov/php/index.php>)

California Fire Alliance (<http://www.cafirealliance.org/>)

California Geological Survey (<http://www.consrv.ca.gov/cgs/>)

Southern California Earthquake Data Center (<http://www.data.scec.org/>)

California Department of Water Resources (<http://www.water.ca.gov/>)

Earthquake Hazards Program (<http://earthquake.usgs.gov/research/hazmaps/>)

4 MITIGATION STRATEGIES

Table of Contents

4.1	Mitigation Goals and Objectives.....	4-1
4.2	Identification of Mitigation Recommendations	4-3
4.3	National Flood Insurance Program Compliance	4-7
4.4	Prioritization of Mitigation Recommendations.....	4-8
4.5	Implementation Strategy	4-16

Tables

Table 4.1:	Overall Plan Goals and Objectives	4-2
Table 4.2:	Mitigation Action Identification.....	4-5
Table 4.3:	District Service Area NFIP Participation.....	4-7
Table 4.4:	Mitigation Action Prioritization Benefit-Cost Review	4-10
Table 4.5:	Completed Actions from the 2011 Hazard Mitigation Plan.....	4-16
Table 4.6:	2011 Mitigation Actions Removed from the Current Update	4-17
Table 4.7:	2011/2017 Corresponding Mitigation Actions	4-20

4.1 Mitigation Goals and Objectives

In order to structure goals and objectives that produce appropriate mitigation actions, the hazard profiles and loss estimates were thoroughly reviewed to identify patterns in the location of potential hazard events and the vulnerability of the infrastructure identified within those locations. This information was used to develop clear goals to mitigate the effects of natural hazard events.

Mitigation goals provide guidelines for developing mitigation projects which, in turn, provide prioritized hazard reduction. The mitigation goals are based on previous goals from the 2011 Hazard Mitigation Plan, findings of

the risk assessment, and input from the Steering Committee for the purpose of characterizing long-term hazard reduction targets as well as the enhancement of current mitigation capabilities. In addition, the goals and objectives were developed to be consistent with the District's overall mission statement:

“The mission of Eastern Municipal Water District is to provide safe and reliable water and wastewater services to our community in an economical, efficient and responsible manner, now and in the future.”

§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.

Table 4.1 below includes the Plan goals and corresponding mitigation objectives. These objectives were taken from the 2011 Hazard Mitigation Plan and reviewed by the Steering Committee utilizing

- knowledge of the service area (including high-hazard area and sensitive populations),
- review of past efforts,
- findings of the risk assessment, and
- identification of mitigation projects.



It should be noted that little changed from the original goals and objectives. While some minor edits were made, the spirit of the original goals and objects, as well as the priorities, were maintained in the Plan update.

Table 4.1: Overall Plan Goals and Objectives

Goal 1: Save Lives and Reduce Injuries
<ul style="list-style-type: none"> • Objective 1a: Initiate mitigation projects which promote resilience for key water/wastewater operations, water supply for critical facilities, integrity of hazardous chemical containment, and reduction of wastewater spillage which could contaminate potable water supplies • Objective 1b: Identify and Improve emergency response/operations capabilities
Goal 2: Avoid Damages to Property
<ul style="list-style-type: none"> • Objective 2a: Review and upgrade current safety mechanisms to encourage early detection and isolation of damaged facilities • Objective 2b: Identify repetitive damage facilities and implement project to mitigate future damages • Objective 2c: Consider existing facility hazards and mitigate vulnerability through improved design for new facilities • Objective 2d: Research, develop, and adopt cost-effective codes and standards to make properties more resistant to damage in addition to improving life safety
Goal 3: Protect the Environment
<ul style="list-style-type: none"> • Objective 3a: Review proposed projects and evaluate any environmental impacts, in accordance with the District’s adopted code of ethics, before initiation • Objective 3b: Initiate mitigation projects that improve environmental sustainability
Goal 4: Promote Hazard Mitigation as an Integrated Policy
<ul style="list-style-type: none"> • Objective 4a: Integrate hazard mitigation policies into the District’s master planning efforts

- Objective 4b: Improve and maintain partnerships with cities within the Service Area and Riverside County Emergency Services
- Objective 4c: Enhance public awareness of the importance, and perceived benefits, of hazard mitigation through continued outreach

4.2 Identification of Mitigation Recommendations

§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.

§201.6(c)(3)(iv): For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Mitigation actions are administrative and/or engineering project recommendations to reduce the District's vulnerability to the identified hazards. Safety, Risk, and Emergency Management along with Engineering staff involvement were required in the development of actions and projects that are designed to mitigate the impact of identified hazards and solve problems effectively within the District's long-term mitigation goals and capital improvements. During the third Steering Committee meeting, a team-based approach was utilized to brainstorm mitigation projects based on the identified hazards and associated loss estimates. In addition, the Federal Emergency Management Agency's (FEMA) Local Mitigation Action Planning Handbook and the California Adaptation Planning Guide were used to identify actions to mitigate the effects of climate change.

The evaluation and prioritization of the mitigation actions was used as an aid to produce a list of recommended mitigation actions to incorporate into the mitigation plan. Each of the mitigation recommendations will fall into one or more of the following categories:

- Prevention – planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management
- Property Protection – acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass

- Personnel Education and Awareness – outreach projects, real estate disclosure, hazard information centers, and education programs
- Natural Resource Protection – sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation
- Emergency Services – warning systems, emergency response services, and protection of critical facilities
- Structural Projects – dams, levees, floodwalls, seawalls, retaining walls, and safe rooms

Table 4.3 provides an overview of the mitigation action and other relevant information, in no specific order. Following the identification of mitigation actions, a Cost-Benefit Review was conducted in order to determine a prioritization of the items. Section 4.4 contains more information on the Cost-Benefit review and the prioritization of the projects.

Table 4.2: Mitigation Action Identification

Mitigation Activity	Hazards Mitigated	Mitigation Action Category	Corresponding Goals & Objectives	Responsible Department	Resources	Estimated Project Cost	Timeframe	Protects New Buildings	Protects Existing Buildings
2017.HMP.01 - Review emergency materials inventory, identify potential gaps, and procure new items to improve continuity of operations. Include redundant structural materials to minimize emergency repair time.	All Hazards	Emergency Services	1B	Warehouse	General Funding	\$150k/year	Short	N	Y
2017.HMP.02 - Review and refresh mutual aid agreements. Identify potential gaps and enter in new agreements as appropriate	All Hazards	Prevention/ Emergency Services	4B	SREM/ Purchasing	Staff Time	Staff Time	Short	Y	Y
2017.HMP.03 - Update radio system to enhance communications during a disaster.	All Hazards	Emergency Services	1B	SREM	Grants/ General Funding	\$2,500,000	Short	Y	Y
2017.HMP.04 - Purchase an additional satellite to improve emergency communications	All Hazards	Emergency Services	1B	SREM	Grants/ General Fund	\$25,000	Short	Y	Y
2017.HMP.05 – Enhance public and student outreach programs to include education on how to prepare for the impacts of hazards on water and wastewater operations.	All Hazards	Personnel Education and Awareness	4C	Public and Government Affairs	Staff Time/ General Funding	\$50k/year	Short	N	N
2017.HMP.06 - Identify repetitive pipeline break areas and incorporate pipeline replacement in the Capital Improvement Plan.	Earthquake/ Flood & Dam/Reservoir Failure	Property Protection/ Structural Project	3A, 2B	Water Operations/ Maintenance Services	Capital Improvements General Fund	Staff Time	Long	N	Y
2017.HMP.07 - Conduct an analysis of critical facilities to determine level of imperviousness to extreme weather events and utilize the maintenance schedule to make upgrades to improve resiliency	Extreme Weather	Property Protection	2A	Water Operations/ Maintenance Services	General Fund	Staff Time	Long	Y	N
2017.HMP.08 - Include considerations for extreme weather (i.e. wind, high heat, excessive rain, etc.) events into new building planning documents	Extreme Weather	Property Protection	2D, 4A	Water Operations/ Maintenance Services	General Fund/ Staff Time	Staff Time	Medium	Y	N
2017.HMP.09 - Enhance the District’s Emergency 24/7 webpage to include tips for the public for extreme weather as they pertain to water service	Extreme Weather	Personnel Education and Awareness	4A,4C	SREM	Staff Time	Staff Time	Short	N	N
2017.HMP.10 - Elevate at-risk subterranean facilities to above grade locations A list of facilities requiring elevation can be found (add location - Corey to look for list)	Flood & Dam/Reservoir Failure	Structural Project	2C	Operations/ Engineering	Capital Improvements	\$10mil/ project	Ongoing	N	Y
2017.HMP.11 - Identify facilities located within the updated dam inundation zones currently under development by Riverside County and implement mitigation projects as appropriate.	Flood & Dam/Reservoir Failure	Property Protection	1A	SREM/ Engineering Services	General Fund/ Staff Time	Staff Time	Short	Y	Y
2017.HMP.12 – Review and enhance infrastructure maintenance and monitoring schedules to increase the opportunity to identify and repair equipment prior to failure.	Infrastructure Failure/ Power Failure	Prevention	2D	Operations and Maintenance	Staff Time/ General Fund	Staff Time	Long	Y	Y

2017.HMP.13 – Review brush clearance standards, particularly for facilities in fringe areas, and identify ways to expand clearance areas. Prioritize those facilities in areas identified as being vulnerable to wildfire.	Wildfire	Property Protection	2A	Maintenance Services	General Fund	Staff Time	Medium	N	Y
2017.HMP.14 - Purchase emergency water tenders for use during wildfire/ seismic incidents	Wildfire/ Earthquake	Property Protection	1A	SREM	General Fund	\$1,500,000	Short	Y	Y
2017.HMP.15 – Identify opportunities to enhance training for the Hazardous Materials Emergency Response Team and implement improvements as appropriate.	Hazardous Material Release/ Earthquake	Personnel Education and Awareness	4A	SREM	General Fund	\$90k/year	Short	Y	Y
2017.HMP.16 – Implementation of proposed Capital Improvement Projects to augment water supply (Perris II Desalination and San Jacinto Valley enhanced recharge and Recovery Program Phase 1)	Drought	Structural Projects	3B	Water Operations	Capital Improvements	\$30,000,000-\$25,000,000	Long	Y	N

4.3 National Flood Insurance Program Compliance

§201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.

The National Flood Insurance Program (NFIP) is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

The District is not a floodplain manager and relies on local cities and Riverside County's floodplain manager. Table 4.3 represents the participation of the cities on the District's service area and Riverside County.

Table 4.3: District Service Area NFIP Participation

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date	Tribal
060253	Hemet, City of	Riverside	05/24/74	09/29/78	08/28/08	09/29/78	No
065074	Moreno Valley, City of	Riverside		06/18/87	08/28/08	06/18/87	No
060751	Murrieta, City of	Riverside		04/15/80	08/28/08	06/09/93	No
060258	Perris, City of	Riverside	09/06/74	04/16/79	08/28/08	04/16/79	No
065056	San Jacinto, City of	Riverside		09/28/73	08/28/08	09/28/73	No
060742	Temecula, City of	Riverside		09/02/93	08/28/08	08/28/91	No
060245	Riverside County	Riverside		04/15/80	08/28/08	04/15/80	No

Flood Recommendations/Repetitive Loss Properties

There were no properties identified as having repetitive losses or assets impacted by regular flooding. District facilities are robust and damage is expected to be minimal. Still, the District identified several recommendations to mitigate flood hazards in Table 4.2: Mitigation Action Identification. Specifically, actions 2017.HMP.06, 2017.HMP.07, and 2017.HMP.08 are designed to minimize losses to critical District facilities from flooding.

4.4 Prioritization of Mitigation Recommendations

§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.

A simplified Benefit-Cost Review was applied in order to prioritize the mitigation recommendations for implementation. The priority for implementing mitigation recommendations depends upon the overall cost effectiveness of the recommendation, when taking into account monetary and non-monetary costs and benefits associated with each action. Additionally, the following questions were considered when developing the Benefit-Cost Review:

- How many people will benefit from the action?
- How large an area is impacted?
- How critical are the facilities that benefit from the action?
- Environmentally, does it make sense to do this project for the overall community?

Table 4.5 on the following pages provides a detailed benefit-cost review for each mitigation recommendation, as well as a relative priority rank (High, Medium, Low) based upon the judgement of the Steering Committee. The general category guidelines are listed below.

- High – Benefits are perceived to exceed costs without further study or evaluation
- Medium – Benefits are perceived to exceed costs, but may require further study or evaluation prior to implementation
- Low – Benefits and cost evaluations requires additional evaluation prior to implementation

It should be noted that values for costs (cons) are estimates only.

Table 4.4: Mitigation Action Prioritization Benefit-Cost Review

Mitigation Project	Benefit (Pros)	Costs (Cons)	Priority
<p>2017.HMP.01 - Review emergency materials inventory, identify potential gaps, and procure new items to improve continuity of operations. Include redundant structural materials to minimize emergency repair time.</p>	<ul style="list-style-type: none"> • Avoided Loss-of-Function Costs • Avoided Emergency Management Costs • Increased ability to share resources and improve regional emergency response (Cal WARN) 	<ul style="list-style-type: none"> • Staff Time to review inventory and source equipment • Equipment Costs (\$150,000/year) 	<p>Medium</p>
<p>2017.HMP.02 - Review and refresh mutual aid agreements. Identify potential gaps and enter in new agreements as appropriate</p>	<ul style="list-style-type: none"> • Avoided Loss-of-Function Costs • Avoided Emergency Management Costs • Improved Emergency Response Capabilities 	<ul style="list-style-type: none"> • Staff Time for coordination 	<p>High</p>
<p>2017.HMP.03 - Update radio system to enhance communications during a disaster.</p>	<ul style="list-style-type: none"> • Improved Emergency Communications Capabilities • Avoided Emergency Management Costs • Avoided Casualties 	<ul style="list-style-type: none"> • Equipment Costs (\$2,500,000 for system update) • Staff Time 	<p>Medium</p>

Mitigation Project	Benefit (Pros)	Costs (Cons)	Priority
2017.HMP.04 - Purchase an additional satellite to improve emergency communications	<ul style="list-style-type: none"> • Avoided Loss-of-Function Costs • Avoided Emergency Management Costs • Improved Emergency Response Capabilities • Avoided Casualties 	<ul style="list-style-type: none"> • Equipment Costs (\$25,000 for satellite) • Staff time 	High
2017.HMP.05 – Enhance public and student outreach programs to include education on how to prepare for the impacts of hazards on water and wastewater operations.	<ul style="list-style-type: none"> • Avoided Casualties • Enhanced presence within the community 	<ul style="list-style-type: none"> • Educational Materials Costs (\$50,000/year) • Staff Time 	Medium
2017.HMP.06 - Identify repetitive pipeline break areas and incorporate pipeline replacement in the Capital Improvement Plan.	<ul style="list-style-type: none"> • Avoided Loss-of-Function Costs • Improved Resiliency • Avoided Physical Damages 	<ul style="list-style-type: none"> • Material Costs • Construction Costs • Staff Time 	Medium

Mitigation Project	Benefit (Pros)	Costs (Cons)	Priority
2017.HMP.07 - Conduct an analysis of critical facilities to determine level of imperviousness to extreme weather events and utilize the maintenance schedule to make upgrades to improve resiliency	<ul style="list-style-type: none"> • Avoided Physical Damages • Improved vulnerability awareness • Avoided Loss-of-Function Costs • Avoided Emergency Management Costs 	<ul style="list-style-type: none"> • Evaluation Costs • Maintenance Costs (???) • Administration/Management Costs • Staff Time 	Medium
2017.HMP.08 - Include considerations for extreme weather (i.e. wind, high heat, excessive rain, etc.) events into new building planning documents	<ul style="list-style-type: none"> • Avoided Physical Damages • Avoided Loss-of-Function Costs • Improved building design for new facilities 	<ul style="list-style-type: none"> • Staff Time 	High
2017.HMP.09 - Enhance the District's Emergency 24/7 webpage to include tips for the public regarding extreme weather as they pertain to water service	<ul style="list-style-type: none"> • Avoided Casualties • Enhanced Presence within the Community 	<ul style="list-style-type: none"> • Staff Time 	High

Mitigation Project	Benefit (Pros)	Costs (Cons)	Priority
2017.HMP.10 - Elevate at-risk subterranean facilities to above grade locations A list of facilities requiring elevation can be found in the Engineering Department	<ul style="list-style-type: none"> • Avoided Physical Damages • Avoided Loss-of-Function • Improved Resiliency • Avoided Emergency Management Costs 	<ul style="list-style-type: none"> • Construction Costs (\$10,000,000/ Project) 	Low
2017.HMP.11 - Identify facilities located within the updated dam inundation zones currently under development by Riverside County and implement mitigation projects as appropriate.	<ul style="list-style-type: none"> • Avoided Physical Damages • Avoided Loss-of-Function • Improved Vulnerability Awareness • Avoided Emergency Management Costs 	<ul style="list-style-type: none"> • Staff Time • Project Costs (potential project value unknown) 	Low
2017.HMP.12 – Review and enhance infrastructure maintenance and monitoring schedules to increase the opportunity to identify and repair equipment prior to failure.	<ul style="list-style-type: none"> • Avoided Physical Damages • Avoided Loss-of-Function Costs • Improved Resiliency • Avoided Emergency Management Costs 	<ul style="list-style-type: none"> • Staff Time 	High

Mitigation Project	Benefit (Pros)	Costs (Cons)	Priority
2017.HMP.13 – Review brush clearance standards, particularly for facilities in fringe areas, and identify ways to expand clearance areas. Prioritize those facilities identified as being vulnerable to wildfire.	<ul style="list-style-type: none"> • Reduced vulnerability to wildfire • Avoided Physical Damages • Improved standards for brush clearance 	<ul style="list-style-type: none"> • Staff Time 	Medium
2017.HMP.14 - Purchase emergency water tenders for use during wildfire/ seismic incidents	<ul style="list-style-type: none"> • Avoided Physical Damages • Improved Emergency Management Capabilities • Avoided Loss-of-Function Costs • Avoided Emergency Management Costs • Avoided Casualties 	<ul style="list-style-type: none"> • Equipment Costs (\$1,500,000/ unit) 	Medium
2017.HMP.15 – Identify opportunities to enhance training for the Hazardous Materials Emergency Response Team and implement improvements as appropriate.	<ul style="list-style-type: none"> • Avoided Casualties • Avoided Emergency Management Costs • Avoided Physical Damages 	<ul style="list-style-type: none"> • Training Costs (\$90,000/year) 	High

Mitigation Project	Benefit (Pros)	Costs (Cons)	Priority
2017.HMP.16 – Implementation of proposed Capital Improvement Projects to augment water supply (Perris II Desalination and San Jacinto Valley enhanced recharge and Recovery Program)	<ul style="list-style-type: none"> • Improve Water Supply Reliability • Avoided Loss-of-Function • Improved Resiliency 	<ul style="list-style-type: none"> • Project Costs (\$30,000,000 - \$25,000,000) 	Medium

4.5 Implementation Strategy

Mitigation actions classified as high-priority provide the most signification perceived vulnerability reduction, as related to cost and probability, and are typically implemented before lower ranked improvements. The District may, however, find that under some circumstances a recommendation classified as a lower-priority mitigation action may need to be implemented before a higher priority recommendation. The priority levels associated with each improvement are indicated in Table 4.5 “Mitigation Action Prioritization: Benefit-Cost Review” in the previous section.

Mitigation Strategy Evolution

The Steering Committee reviewed the mitigation actions in the 2011 Hazard Mitigation Plan and used them as a springboard for mitigation action development for the current Plan update. The term “development” is used in this context, rather than “update”, because the team felt some dramatic changes were required to focus the Plan on more viable actions that would propel the District to greater resiliency.

First, it was important for the Committee to judge progress through the identification of completed mitigation actions. The 2011 mitigation actions were reviewed and completed actions were removed. Below is a list of completed actions from the previous Plan.

Table 4.5: Completed Actions from the 2011 Hazard Mitigation Plan

Completed Mitigation Action	Notes:
Recommendation 1.6: Continue to include back-up power generation as part of critical facility design	Back-up generators have been purchased for existing facilities and the District has made the inclusion of back-up generators for new facilities standard protocol
Recommendation 1.9: Purchase dedicated Emergency Operations center laptops with WebEOC software.	The District has purchased laptops and has secured a WebEOC license through Riverside County
Recommendation 1.13: Consider developing a memorandum for the use of the Emergency Alert System.	Directives for using the Emergency Alert Systems were included in the latest Emergency Response Plan revision

Recommendation 1.26: Continue to institute water shortage contingency measures during extreme drought periods.	Through the recent drought, water shortage contingency measures were implemented. These measures will continue to be implemented during any future water shortage as they are part of the District's normal operations.
Recommendation 1.32: Consider developing an operations procedure for freezing temperatures.	A procedure was developed and implemented
Recommendation 1.34: Considers wildfire clearance in the design of future facilities within wildfire zones.	Considerations for locations in identified fire zones has been included in the District's policy for new facility development

Second, the Steering Committee identified those actions that no longer made sense. In many cases, mitigation actions from the 2011 Hazard Mitigation Plan called out for activities that are ongoing parts of the District's normal operations. While prevention efforts oftentimes contribute to successful mitigation, the Steering Committee felt the update should only include actions that enhanced or added to existing efforts. Anything deemed as being part of "normal operations" was removed. Table 4.6 below identifies actions from the previous plan that were removed from the current update.

Table 4.6: 2011 Mitigation Actions Removed from the Current Update

Removed Mitigation Action	Notes:
Recommendation 1.5: Continue to incorporate scrubber and containment systems into treatment plant design where hazardous materials are utilized	Normal Operations
Recommendation 1.10: Continue to conduct Emergency Operations Center training and exercises.	Normal Operations
Recommendation 1.12: Consider developing a reverse 911 priority list for	The District is in the process of removing chlorine from its operations diminishing the

customers residing within the chlorine release circle of concern	need for a special reverse 911 service. Should a release of another hazardous material occur, the District is connected with local communities which already have emergency alert systems in place.
Recommendation 1.14: Continue training employees in the policies and procedures associated with natural and man-made hazards.	Normal Operations
Recommendation 1.15: Continue to identify and ensure that pipe specifications are compatible with engineering and earthquake specifications.	Normal Operations
Recommendation 1.17: Identify the location of hydrocarbon pipelines prior to excavation and construction	Normal Operations
Recommendation 1.18: Continue to provide employee education and resources for extreme heat hazards.	Normal Operations
Recommendation 1.20: Continue to ensure facility designs include considerations for flooding especially at water crossings	Normal Operations. Objective captured through other actions.
Recommendation 1.21: Continue to identify and inspect public facilities and businesses that maintain chemicals that can contaminate the wastewater	Normal Operations
Recommendation 1.24: In the event of displaced population from a disaster event crowding primary transportation routes, consider developing alternate transportation routes to critical District facilities.	This action is outside the District's jurisdiction. The District discussed modifying this action in order to keep it, but ultimately determined this idea could not be salvaged.

Recommendation 1.25: Continue to monitor groundwater levels for drought conditions.	Normal Operations
Recommendation 1.27: Continue development and implementation of the pandemic/influenza emergency response plan module.	Pandemic was removed from the list of identified hazards because public resistance to contagious disease is outside the District's jurisdiction. As a result, this action is no longer applicable.
Recommendation 1.28: Consider training employees in the pandemic/influenza procedures.	Pandemic was removed from the list of identified hazards because public resistance to contagious disease is outside the District's jurisdiction. As a result, this action is no longer applicable.
Recommendation 1.29: Maintain and train employees in the use of necessary pandemic/influenza personal protective equipment.	Pandemic was removed from the list of identified hazards because public resistance to contagious disease is outside the District's jurisdiction. As a result, this action is no longer applicable.
Recommendation 1.30: Continue to provide first-aid and CPR training for employees	Normal Operations
Recommendation 1.31: Consider including freeze protection for above ground facility designs	Normal Operations
Recommendation 1.35: Continue training field personnel in the importance of fire safety.	Normal Operations
Recommendation 1.36: Provide employees with appropriate fire safety personal protective equipment.	Normal Operations
Recommendation 1.37: Continue wildfire detection and reporting training for field personnel.	Normal Operations
Recommendation 1.38: Continue providing a "drivers education course" to reduce the impact of transportation accidents on District operations.	Normal Operations

Recommendation 1.39: Consider posting a copy of the Eastern Municipal Water District Hazard Mitigation Plan on the website to provide public education on potential District hazards.	Normal Operations
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Once completed and irrelevant actions were removed, the Steering Committee considered the remaining actions and determined in what form they would be present in the current update. In some cases, similar items were grouped together for ease. In others, the task was changed in order to capture current trends in the District. The remaining actions are listed in Table 4.7 below along with their corresponding action in the 2017 Mitigation Action List.

Table 4.7: 2011/2017 Corresponding Mitigation Actions

2011 Mitigation Action	2017 Mitigation Action:
Recommendation 1.1: Review emergency inventory materials and enhance with new items to improve continuity of operations	2017.HMP.01 - Review emergency materials inventory, identify potential gaps, and procure new items to improve continuity of operations. Include redundant structural materials to minimize emergency repair time.
Recommendation 1.7: Update District Radio system to enhance communications during a disaster	2017.HMP.03 - Update radio system to enhance communications during a disaster.
Recommendation 1.8: Purchase additional satellite	2017.HMP.04 - Purchase an additional satellite to improve emergency communications
Recommendation 1.16: Identify repetitive pipeline break areas and incorporate pipeline replacement within the Capital Improvement Plan.	2017.HMP.06 - Identify repetitive pipeline break areas and incorporate pipeline replacement in the Capital Improvement Plan.
Recommendation 1.19: Elevate at-risk subterranean facilities to above grade locations	2017.HMP.07 - Elevate at-risk subterranean facilities to above grade locations A list of facilities requiring elevation can be found in the Engineering Department

2011 Mitigation Action	2017 Mitigation Action:
Recommendation 1.22: Enhance training for the Hazardous Materials Emergency Response Team.	2017.HMP.12 – Identify opportunities to enhance training for the Hazardous Materials Emergency Response Team and implement improvements as appropriate.
Recommendation 1.23: Identify District facilities located within the updated Dam inundation zones currently under development by Riverside County.	2017.HMP.08 - Identify facilities located within the updated dam inundation zones currently under development by Riverside County and implement mitigation projects as appropriate.
Recommendation 1.33: Identify ways to improve appropriate clearance areas around facilities within wildfire areas.	2017.HMP.10 – Review brush clearance standards, particularly for facilities in fringe areas, and identify ways to expand clearance areas. Prioritize those facilities in areas identified as being vulnerable to wildfire.
Recommendation 1.40: Enhance public education campaign about how to prepare for the impacts of hazards on water and wastewater operations.	2017.HMP.05 – Enhance public and student outreach programs to include education on how to prepare for the impacts of hazards on water and wastewater operations.
Recommendation 1.41: Continue student outreach and interaction program, with the inclusion of a natural hazard education module.	Combined Recommendation 1.40, 1.41, and 1.42 in 2017.HMP.05. See above.
Recommendation 1.42: Consider including hazard education (e.g., earthquake kits and preparedness) through District water bill inserts.	Combined Recommendation 1.40, 1.41, and 1.42 in 2017.HMP.05. See above.

The full list of mitigation actions, including re-envisioned 2011 mitigation actions and new ideas brainstormed by the Steering Committee can be found in Table 4:2 Mitigation Action Identification. As mentioned above, the Steering Committee was committed to,

- Removing hazards and actions that are outside of the jurisdiction of the District
- Removing actions that are part of normal operations and designing new actions that improve upon current efforts
- Improving action tracking by designing actions that are trackable and have definitive end points, where possible
- Including fewer, but more focused, actions that are realistic tasks which could be accomplished within the planning timeline.

These shifts in priorities were made in an effort to make the Plan more relevant and better positioned to be incorporated in future policy, facility, and outreach campaign development.

5

PLAN MAINTENANCE

Table of Contents

5.1	Mitigation Progress Monitoring	5-1
5.2	Capability Assessment	5-2
5.2.1	Available Planning Mechanisms to Incorporate Mitigation Requirements	5-7
5.4	Periodic Assessment Requirements	5-10
5.5	Update Requirements	5-11

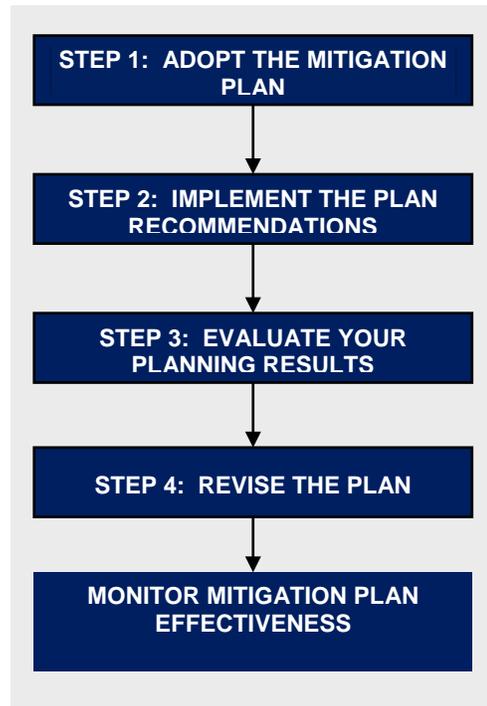
Tables

Table 5.1:	Regulatory Tools Table	5-3
Table 5.2:	Administrative/Technical Tools Table	5-3
Table 5.3:	Fiscal Tools table	5-4
Table 5.4:	Grant Funding Tools	5-5
Table 5.5:	Outreach and Partnership Tools	5-6
Table 5.6:	Action item Implementation.....	5-12

5.1 Mitigation Progress Monitoring

The Mitigation Strategy section in the Hazard Mitigation Plan (HMP) identifies mitigation actions that have been prioritized based on the loss estimates and the probability of each hazard, which will typically be implemented according to the priority rank. To thoroughly track hazard mitigation status, the Eastern Municipal Water District (District) must continuously monitor and document the progress of the implementation of mitigation actions. Though mitigation actions may be delegated to different departments within the District, the Safety, Risk, & Emergency Management (SREM) Department will have the responsibility of monitoring overall progress. SREM personnel meet regularly to discuss District hazard vulnerability and to plan training events.

As part of these meetings, mitigation action implementation will be discussed, monitored, and propelled.



§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.

To facilitate the monitoring process, Table 5-6: “HMP Action Item Implementation” was developed to provide a mechanism for monitoring the overall implementation progress. The table is designed to monitor mitigation actions according to department assignments, project status, and project milestones. It is located at the end of this chapter.

5.2 Capability Assessment

§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.

A capability assessment is an integral part of mitigation planning because through identification and review of existing authorities, policies, programs, and resources, the Steering Committee can determine its capacity to carry out mitigation goals and objectives. In addition, the assessment can illuminate alternative mitigation actions, propelling the Steering Committee to utilize potentially overlooked resources.

The following subsections attempt to document the Regulatory, Administrative/Technical, Fiscal, Grant funding, and Outreach/Partnership resources available to the District.

Regulatory Resources

Table 5.1: Regulatory Tools Table

Regulatory Tool	Updated	Comments
Strategic Plan 2016-2018	2016	The Plan organizes decisions and actions to better direct the District to accomplish organizational missions. Includes considerations for the environment, public health, maintenance, water recycling, and service reliability.
Water Shortage Contingency Plan	10/28/2015	Plan outlines legality and framework for imposing water use restrictions and fines in times of water shortage
Urban Water Management Plan	June 2016	Plan outlines forecasts for drought probability and magnitude while expanding upon awareness of drought hazard vulnerability.

Administrative/Technical Resources

Table 5.2: Administrative/Technical Tools Table

Administrative/Technical Tool	Personnel/Resources
Safety, Risk, and Emergency Management Department (SREM)	SREM Director, SREM Officers, EOC Responders

Board of Directors	President, Vice-President, Treasurer, Division Directors, Metropolitan Water District of Southern California Chairman, Santa Ana River Watershed Project Authority Commissioner. This group has the authority to pass legislation to implement mitigation objectives
Operations & Engineering Department	This department employs a multi-faceted groups will an array of technical backgrounds. In review of maintenance, upgrade, and construction protocols, this groups has the ability to ensure mitigation objectives are implemented at the design level.
Legislative Review Committee	Committee members review proposed legislation and are able to make suggested improvements to include hazard mitigation objectives.
Plan Review Committee	Committee members review planning documents and are able to make suggested improvements to include hazard mitigation objectives.

Fiscal Resources

Table 5.3: Fiscal Tools table

Fiscal Tool	Notes
General Funding	Although subject to council approval, the general fund can be utilized to support a wide range of mitigation efforts.

Capital Improvement Program	This program is reviewed annually and allocated funds for facility construction and facility improvement projects.
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Grant Funding

Table 5.4: Grant Funding Tools

Grant Funding Tool	Agency	Purpose	Contact
Pre-Disaster Mitigation Program (PDM)	U.S. Department of Homeland Security, Federal Emergency Management Agency	To provide funding for States, and communities for cost-effective hazard mitigation activities which complement a comprehensive hazard mitigation program and reduce injuries, loss of life, and damage and deconstruction of property.	FEMA 500 C. Street, SW Washington, DC 20472 Phone: (202) 646-4621 www.fema.gov
Hazard Mitigation Grant Program	U.S. Department of Homeland Security, Federal Emergency Management Agency	To prevent future losses of lives property due to disasters; to implement State of local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.	FEMA 500 C Street S.W. Washington, DC 20472 Phone (202) 646-4621 www.fema.gov

For a more comprehensive list of grant funding resources, please refer to the County of Riverside Multi-Jurisdictional Local Hazard Mitigation Plan.

Outreach and Partnership Resources

Table 5.5: Outreach and Partnership Tools

Outreach/Partnership Tools	Notes
District Website	Updated regularly, the website can be utilized to provide hazard-related information continuously and formatted to highlight relevant information should the threat of a hazard event arise.
Cal WARN	Through mutual partnership with local water districts, the District can
Public Outreach	The district holds several training opportunities throughout the year. Public safety training will be able to be expended to include hazard-specific information to improve hazard awareness.

5.2.1 Available Planning Mechanisms to Incorporate Mitigation Requirements

The District maintains the following processes to incorporate mitigation strategies of the HMP in planning mechanisms. While many of these are listed in the tables above, the following subsection provide additional details.

Website

The HMP will be posted on the District website to enable members of the public to review and provide feedback regarding mitigation objectives and strategies continuously going forward. Feedback from the public can be incorporated during the Plan's annual review or five-year update. In addition, the website will serve as a vehicle to maintain an ongoing conversation with the public about upcoming mitigation projects and provide an avenue for hazard education. Currently, the basic 2011 Plan is available through the website, but the District can expand it's 24/7 Emergency Info page to include links to emergency resources as well as tips for dealing with a water/wastewater service interruption.

SREM Department

The District assembled the SREM department to manage emergency preparedness planning and promote environmentally-friendly policies within the District. The Team meets regularly to discuss planning updates, training schedules, mitigation projects, and policy review. SREM Team members will be an active, driving force for encouraging the implementation of mitigation actions. Since the team is responsible for planning and emergency preparedness training, they will be responsible for expanding emergency services capabilities and including hazard awareness in training exercises.

Legislative Review Committee

The District's Legislative Review Committee is dedicated to closely following regulations that impact District operations. As part of this effort, the Legislative Review Committee meets every three weeks and is tasked with receiving and reviewing all bills, including hazard legislation, for District applicability. Encouraged by SREM personnel, the Committee will review the HMP and make recommendations to the Board of Directors to update current policies to include considerations to mitigate identified hazards.

Operations and Engineering Meeting

Operations and Engineering meetings are held every two weeks to conduct facility design reviews. These meetings are a mechanism for incorporating mitigation elements into future facility designs (e.g., flexible couplings, earthquake valves, back-up power

generation, etc.). Through these meetings, Steering Committee members from the Engineering Department will have the opportunity to suggest hazard mitigation objectives to be included in the design of new facilities and through maintenance for existing ones.

Materials Approval Committee

The District's Materials Approval Committee reviews and provides approval for materials (e.g., valves, piping, etc.), while following industry standards and best practices to ensure proper mitigation strategies are employed. Encouraged by members of the SREM department, the Materials Approval Committee can recommend that the inventory be expanded to include redundant materials to minimize repair time as suggested in Table 4.2: Mitigation Actions Identification.

Plan Review Committee

The District Plan Review Committee meets bi-weekly to review plans for upcoming projects. These meetings provide a mechanism for incorporating mitigation elements into future facility designs. Encouraged by SREM staff, this committee will determine how mitigation goals and objective can be include for future projects.

Local Area Planning Committee

The District is located within the California Governor's Office of Emergency Services (Cal OES) LEPC Region VI, and regularly sends a representative to attend the Local Area Planning Committee meetings where emergency planning and mitigation efforts are discussed at a regional planning level. While not necessarily an objective of the HMP, District representatives will have an opportunity through this forum to share mitigation strategies and regional data to assist local communities in improving their mitigation efforts.

Southwest Committee

The Southwest Committee is a subsidiary of the Office of Emergency Services Local Area Planning Committee dedicated to discussing hazards at a local level. The District typically has a representative present at all Committee meetings. Participation in Committee meetings will allow the District to promote mitigation objective within the local community and encourage coordination with local communities to work together to improve resiliency.

Safety Council

District senior management periodically meet to discuss employee health and safety, including training needs, safety audits, and regulatory inspections, providing a forum for management to discuss the vulnerability of District employees to hazards. With

encouragement from the SREM department, this council can improve on the education and resources provide to District personnel on preparing for and dealing with hazard events.

Metropolitan Member Agency Response System (MARS)

As a member agency to the Metropolitan Water District of Southern California, the District has access to communicate with adjacent water agencies through MARS, share mitigation ideas, and work in tandem to improve preparedness throughout the region. Additionally, this program facilitates mutual aid response during an emergency event.

California Water Agency Response Network (Cal WARN)

The District participates in Cal WARN, which provides members with emergency planning, response, and recovery information before, during, and after an emergency. In order to facilitate a timely emergency response and promote mutual aid, the WARN website maintains an emergency equipment database that matches utility resources with a member's needs during an emergency. A member can locate emergency equipment (pumps, generators, chlorinators, evacuators, etc.) and trained personnel (e.g., treatment plant operators) that may be needed in an emergency. Through Cal WARN coordination, the District can estimate the amount of redundant inventory to maintain in order to improve resiliency for the District and neighboring water agencies.

5.4 Periodic Assessment Requirements

§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.

Planning is an ongoing process and, as such, the HMP should be treated as a living document that must grow and adapt in order to keep pace with changes within the District. An annual assessment will be completed to document any changes in site hazards (e.g., updated FIRM maps, contemporary seismic studies, etc.) or the purchase and installation of new equipment (e.g., back-up generators, emergency response equipment, etc.) to ensure they do not have any effect on District hazard vulnerabilities that would impact the conclusions or actions associated with the HMP. Prior to the fifth year of the revision cycle, these annual observations will be reviewed to determine what changes should be implemented in the HMP update. The results of the annual evaluations should be folded back into each phase of the planning process and should yield decisions on how to update each section of the plan.

The SREM department will have the responsibility of implementing these annual and five-year requirements. During the annual review, if any updates are deemed minor, then the SREM department will perform the updates. If more significant updates are required, the Steering Committee will be reconvened to discuss the effects on the Plan. For the fifth-year revision, the entire Steering Committee will reconvene in order to use their expertise to update the Plan in its entirety.

In addition to these periodic requirements, any significant modification to District facilities should be considered with respect to a possible impact on the HMP. All Steering Committee members are responsible for providing update for the Plan to the SREM department as necessary. As noted in the following section, the completed HMP will be available on the District's website to allow the public to continue to be involved during these periodic reviews.

5.5 Update Requirements

§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.

§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.

The Emergency Management and Assistance regulations (44 CFR Part 201) state that it is the responsibility of local agencies to “at a minimum, review and, if necessary, update the local mitigation plan every five years from date of plan approval to continue program eligibility.” As stated in Section 5.4, this responsibility lies with the SREM Director. The evaluation procedures listed below will provide insight into the major changes that need to be included in the five-year update and resubmission to FEMA.

- Annual HMP review with respect to changes in hazard vulnerability (e.g., additional hazards identified, natural hazard events, etc.)
- Annual HMP review with respect to development of new facilities
- Five-year comprehensive update to address the findings of the annual reviews
- Re-submittal of the updated HMP to (Cal OES) and FEMA

Additionally, the risk assessment portion of the plan will be reviewed to determine if the information should be updated or modified. Each division/department responsible for the various implementation actions will report on:

- Status of their projects,
- Implementation processes,
- Any difficulties encountered,
- How coordination efforts are proceeding, and
- Which strategies should be revised.

Table 5.6: Action item Implementation

Recommendation Description	Responsible Department	Implementation Timeframe	Status	Details/Status Summary
2017.HMP.01 - Review emergency materials inventory, identify potential gaps, and procure new items to improve continuity of operations. Include redundant structural materials to minimize emergency repair time.	<ul style="list-style-type: none"> Warehouse 	Short	Open	
2017.HMP.02 - Review and refresh mutual aid agreements. Identify potential gaps and enter in new agreements as appropriate	<ul style="list-style-type: none"> SREM/ Purchasing 	Short	Open	
2017.HMP.03 - Update radio system to enhance communications during a disaster.	<ul style="list-style-type: none"> SREM 	Short	Open	
2017.HMP.04 - Purchase an additional satellite to improve emergency communications	<ul style="list-style-type: none"> SREM 	Short	Open	
2017.HMP.05 – Enhance public and student outreach programs to include education on how to prepare for the impacts of hazards on water and wastewater operations.	<ul style="list-style-type: none"> Public and Government Affairs 	Short	Open	
2017.HMP.06 - Identify repetitive pipeline break areas and incorporate pipeline replacement in the Capital Improvement Plan.	<ul style="list-style-type: none"> Water Operations/ Maintenance Services 	Long	Open	
2017.HMP.07 - Conduct an analysis of critical facilities to determine level of imperviousness to extreme weather events and utilize the maintenance schedule to make upgrades to improve resiliency	<ul style="list-style-type: none"> Water Operations/ Maintenance Services 	Long	Open	

Recommendation Description	Responsible Department	Implementation Timeframe	Status	Details/Status Summary
2017.HMP.08 - Include considerations for extreme weather (i.e. wind, high heat, excessive rain, etc.) events into new building planning documents	<ul style="list-style-type: none"> Water Operations/ Maintenance Services 	Medium	Open	
2017.HMP.09 - Enhance the District's Emergency 24/7 webpage to include tips for the public for extreme weather as they pertain to water service	<ul style="list-style-type: none"> SREM 	Short	Open	
2017.HMP.10 - Elevate at-risk subterranean facilities to above grade locations A list of facilities requiring elevation can be found (add location - Corey to look for list)	<ul style="list-style-type: none"> Operations/ Engineering 	Ongoing	Open	
2017.HMP.11 - Identify facilities located within the updated dam inundation zones currently under development by Riverside County and implement mitigation projects as appropriate.	<ul style="list-style-type: none"> SREM/ Engineering Services 	Short	Open	
2017.HMP.12 – Review and enhance infrastructure maintenance and monitoring schedules to increase the opportunity to identify and repair equipment prior to failure.	<ul style="list-style-type: none"> Operations and Maintenance 	Long	Open	
2017.HMP.13 – Review brush clearance standards, particularly for facilities in fringe areas, and identify ways to expand clearance areas. Prioritize those facilities in areas identified as being vulnerable to wildfire.	<ul style="list-style-type: none"> Maintenance Services 	Medium	Open	
2017.HMP.14 - Purchase emergency water tenders for use during wildfire/ seismic incidents	<ul style="list-style-type: none"> SREM 	Short	Open	

Recommendation Description	Responsible Department	Implementation Timeframe	Status	Details/Status Summary
2017.HMP.15 – Identify opportunities to enhance training for the Hazardous Materials Emergency Response Team and implement improvements as appropriate.	<ul style="list-style-type: none"> SREM 	Short	Open	
2017.HMP.16 – Implementation of proposed Capital Improvement Projects to augment water supply (Perris II Desalination and San Jacinto Valley enhanced recharge and Recovery Program Phase 1)	<ul style="list-style-type: none"> Water Operations 	Long	Open	

A GLOSSARY

Active fault - For implementation of Alquist-Priolo Earthquake Fault Zoning Act (APEFZA) requirements, an active fault is one that shows evidence of, or is suspected of having experienced surface displacement within the last 11,000 years. APEFZA classification is designed for land use management of surface rupture hazards. A more general definition (National Academy of Science, 1988), states "a fault that on the basis of historical, seismological, or geological evidence has the finite probability of producing an earthquake" (see potentially active fault).

Aftershocks - Minor earthquakes following a greater one and originating at or near the same place.

Asset - Any man-made or natural feature that has value, including, but not limited to people, buildings, infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

A zone - Under the National Flood Insurance Program, area subject to inundation by the 100-year flood where wave action does not occur or where waves are less than 3 feet high, designated Zone A, AE, A1-A30, A0, AH, or AR on a Flood Insurance Rate Map (FIRM).

Base flood - Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.

Bedrock - The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Contour - A line of equal ground elevation on a topographic (contour) map.

Critical facility - Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.

Debris - (Seismic) the scattered remains of something broken or destroyed; ruins; rubble; fragments. (Flooding, Coastal) Solid objects or masses carried by or floating on the surface of moving water.

Debris flow - A saturated, rapidly moving saturated earth flow with 50 percent rock fragments coarser than 2 mm in size which can occur on natural and graded slopes.

Duration - How long a hazard event lasts.

Earthquake - Vibratory motion propagating within the Earth or along its surface caused by the abrupt release of strain from elastically deformed rock by displacement along a fault.

Epicenter - The point at the Earth's surface directly above where an earthquake originated.

Erosion - Under the National Flood Insurance Program, the process of the gradual wearing away of landmasses. In general, erosion involves the detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.

Essential facility - Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.

Extent - The size of an area affected by a hazard or hazard event.

Fault - A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.

Fault slip rate - The average long-term movement of a fault (measured in cm/year or mm/year) as determined from geologic evidence.

Federal Emergency Management Agency (FEMA) - Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.

Flash flood - A flood event occurring with little or no warning where water levels rise at an extremely fast rate.

Flood - A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Floodplain - Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Frequency - A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Geographic Information Systems (GIS) - A computer software application that relates physical features on the Earth to a database to be used for mapping and analysis.

Ground motion - The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Ground rupture - Displacement of the earth's surface as a result of fault movement associated with an earthquake.

Hailstorm – Storm associated with spherical balls of ice. Hail is a product of thunderstorms or intense showers. It is generally white and translucent, consisting of liquid or snow particles encased with layers of ice. Hail is formed within the higher reaches of a well-developed thunderstorm. When hailstones become too heavy to be caught in an updraft back into the clouds of the thunderstorm (hailstones can be caught in numerous updrafts adding a coating of ice to the original frozen droplet of rain each time), they fall as hail and a hailstorm ensues.

Hazard - A source of potential danger or adverse condition. Hazards in this how to series will include naturally occurring events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.

Hazard event - A specific occurrence of a particular type of hazard.

Hazard identification - The process of identifying hazards that threaten an area.

Hazard mitigation - Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Mitigation Grant Program (HMGP) – Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to

reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazard Mitigation Plan – A collaborative document in which hazards affecting the community are identified, vulnerability to hazards assessed, and consensus reached on how to minimize or eliminate the effects of these hazards.

Hazard profile - A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

Hazardous Material Facilities – Facilities housing industrial and hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins.

HAZUS (Hazards U.S.) - A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.

Hurricane - An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74-miles-per-hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the North Atlantic Ocean, northeast Pacific Ocean, or the South Pacific Ocean east of 160°E longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Hydrology - The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.

Infrastructure - Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers and regional dams.

Landslide - A general term covering a wide variety of mass-movement landforms and processes involving the downslope transport, under gravitational influence, of soil and rock material en masse.

Liquefaction - Changing of soils (unconsolidated alluvium) from a solid state to weaker state unable to support structures; where the material behaves similar to a liquid as a

consequence of earthquake shaking. The transformation of cohesionless soils from a solid or liquid state as a result of increased pore pressure and reduced effective stress.

Magnitude - A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.

Mitigation plan - A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the state and includes a description of actions to minimize future vulnerability to hazards.

Nor'easter - An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.

Peak Ground Acceleration (PGA) - The greatest amplitude of acceleration measured for a single frequency on an earthquake accelerogram. The maximum horizontal ground motion generated by an earthquake. The measure of this motion is the acceleration of gravity (equal to 32 feet per second squared, or 980 centimeter per second squared), and generally expressed as a percentage of gravity.

Potentially active fault - A fault showing evidence of movement within the last 1.6 million years (750,000 years according to the U.S. Geological Survey) but before about 11,000 years ago, and that is capable of generating damaging earthquakes.

Probability - A statistical measure of the likelihood that a hazard event will occur.

Replacement value - The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality.

Retrofit - Any change made to an existing structure to reduce or eliminate damage to that structure from flooding, erosion, high winds, earthquakes, or other hazards

Richter scale - A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935. Seismologists no longer use this magnitude scale because of limitations in how it measures large earthquakes, and prefer instead to use moment magnitude as a measure of the energy released during an earthquake.

Risk - The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Seismicity - Describes the likelihood of an area being subject to earthquakes.

Tectonic plate - Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.

Topographic - Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.

Tornado - A violently rotating column of air extending from a thunderstorm to the ground.

Tsunami - Great sea wave produced by a submarine earthquake, landslide, or volcanic eruption.

Vulnerability - Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability assessment - The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Wildfire - An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Zone - A geographical area shown on a Flood Insurance Rate Map.

100-year flood – A flood that has a 1-percent chance of being equaled or exceeded in any given year. This flood event is also referred to as the base flood. The term "100-year flood" can be misleading; it is not the flood that will occur once every 100 years. Rather, it is the flood elevation that has a 1- percent chance of being equaled or exceeded each year. Therefore, the 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management to determine the need for flood insurance.

500-year flood – A flood that has a 0.2-percent chance of being equaled or exceeded in any one year.

B REGULATIONS

The Disaster Mitigation Act of 2000 (P.L. 106-390) facilitates a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance 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 following pages provide a description of the Disaster Mitigation Act of 2000, as well as the Interim Final Rule for mitigation planning.

PUBLIC LAW 106-390—OCT. 30, 2000

DISASTER MITIGATION ACT OF 2000

Public Law 106–390
106th Congress

An Act

Oct. 30, 2000
[H.R. 707]

To amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act to authorize a program for predisaster mitigation, to streamline the administration of disaster relief, to control the Federal costs of disaster assistance, and for other purposes.

Disaster
Mitigation Act of
2000.
42 USC 5121
note.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) **SHORT TITLE.**—This Act may be cited as the “Disaster Mitigation Act of 2000”.

(b) **TABLE OF CONTENTS.**—The table of contents of this Act is as follows:

Sec. 1. Short title; table of contents.

TITLE I—PREDISASTER HAZARD MITIGATION

Sec. 101. Findings and purpose.
Sec. 102. Predisaster hazard mitigation.
Sec. 103. Interagency task force.
Sec. 104. Mitigation planning; minimum standards for public and private structures.

TITLE II—STREAMLINING AND COST REDUCTION

Sec. 201. Technical amendments.
Sec. 202. Management costs.
Sec. 203. Public notice, comment, and consultation requirements.
Sec. 204. State administration of hazard mitigation grant program.
Sec. 205. Assistance to repair, restore, reconstruct, or replace damaged facilities.
Sec. 206. Federal assistance to individuals and households.
Sec. 207. Community disaster loans.
Sec. 208. Report on State management of small disasters initiative.
Sec. 209. Study regarding cost reduction.

TITLE III—MISCELLANEOUS

Sec. 301. Technical correction of short title.
Sec. 302. Definitions.
Sec. 303. Fire management assistance.
Sec. 304. Disaster grant closeout procedures.
Sec. 305. Public safety officer benefits for certain Federal and State employees.
Sec. 306. Buy American.
Sec. 307. Treatment of certain real property.
Sec. 308. Study of participation by Indian tribes in emergency management.

**TITLE I—PREDISASTER HAZARD
MITIGATION**

42 USC 5133
note.

SEC. 101. FINDINGS AND PURPOSE.

(a) **FINDINGS.**—Congress finds that—

(1) natural disasters, including earthquakes, tsunamis, tornadoes, hurricanes, flooding, and wildfires, pose great danger to human life and to property throughout the United States;

(2) greater emphasis needs to be placed on—

(A) identifying and assessing the risks to States and local governments (including Indian tribes) from natural disasters;

(B) implementing adequate measures to reduce losses from natural disasters; and

(C) ensuring that the critical services and facilities of communities will continue to function after a natural disaster;

(3) expenditures for postdisaster assistance are increasing without commensurate reductions in the likelihood of future losses from natural disasters;

(4) in the expenditure of Federal funds under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq.), high priority should be given to mitigation of hazards at the local level; and

(5) with a unified effort of economic incentives, awareness and education, technical assistance, and demonstrated Federal support, States and local governments (including Indian tribes) will be able to—

(A) form effective community-based partnerships for hazard mitigation purposes;

(B) implement effective hazard mitigation measures that reduce the potential damage from natural disasters;

(C) ensure continued functionality of critical services;

(D) leverage additional non-Federal resources in meeting natural disaster resistance goals; and

(E) make commitments to long-term hazard mitigation efforts to be applied to new and existing structures.

(b) **PURPOSE.**—The purpose of this title is to establish a national disaster hazard mitigation program—

(1) to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters; and

(2) to provide a source of predisaster hazard mitigation funding that will assist States and local governments (including Indian tribes) in implementing effective hazard mitigation measures that are designed to ensure the continued functionality of critical services and facilities after a natural disaster.

SEC. 102. PREDISASTER HAZARD MITIGATION.

(a) **IN GENERAL.**—Title II of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5131 et seq.) is amended by adding at the end the following:

“SEC. 203. PREDISASTER HAZARD MITIGATION.

“(a) **DEFINITION OF SMALL IMPOVERISHED COMMUNITY.**—In this section, the term ‘small impoverished community’ means a community of 3,000 or fewer individuals that is economically disadvantaged, as determined by the State in which the community is located and based on criteria established by the President.

“(b) **ESTABLISHMENT OF PROGRAM.**—The President may establish a program to provide technical and financial assistance to States and local governments to assist in the implementation of

President.
42 USC 5133.

predisaster hazard mitigation measures that are cost-effective and are designed to reduce injuries, loss of life, and damage and destruction of property, including damage to critical services and facilities under the jurisdiction of the States or local governments.

“(c) APPROVAL BY PRESIDENT.—If the President determines that a State or local government has identified natural disaster hazards in areas under its jurisdiction and has demonstrated the ability to form effective public-private natural disaster hazard mitigation partnerships, the President, using amounts in the National Predisaster Mitigation Fund established under subsection (i) (referred to in this section as the ‘Fund’), may provide technical and financial assistance to the State or local government to be used in accordance with subsection (e).

“(d) STATE RECOMMENDATIONS.—

“(1) IN GENERAL.—

“(A) RECOMMENDATIONS.—The Governor of each State may recommend to the President not fewer than five local governments to receive assistance under this section.

“(B) DEADLINE FOR SUBMISSION.—The recommendations under subparagraph (A) shall be submitted to the President not later than October 1, 2001, and each October 1st thereafter or such later date in the year as the President may establish.

“(C) CRITERIA.—In making recommendations under subparagraph (A), a Governor shall consider the criteria specified in subsection (g).

“(2) USE.—

President.

“(A) IN GENERAL.—Except as provided in subparagraph (B), in providing assistance to local governments under this section, the President shall select from local governments recommended by the Governors under this subsection.

“(B) EXTRAORDINARY CIRCUMSTANCES.—In providing assistance to local governments under this section, the President may select a local government that has not been recommended by a Governor under this subsection if the President determines that extraordinary circumstances justify the selection and that making the selection will further the purpose of this section.

“(3) EFFECT OF FAILURE TO NOMINATE.—If a Governor of a State fails to submit recommendations under this subsection in a timely manner, the President may select, subject to the criteria specified in subsection (g), any local governments of the State to receive assistance under this section.

“(e) USES OF TECHNICAL AND FINANCIAL ASSISTANCE.—

“(1) IN GENERAL.—Technical and financial assistance provided under this section—

“(A) shall be used by States and local governments principally to implement predisaster hazard mitigation measures that are cost-effective and are described in proposals approved by the President under this section; and

“(B) may be used—

“(i) to support effective public-private natural disaster hazard mitigation partnerships;

“(ii) to improve the assessment of a community’s vulnerability to natural hazards; or

“(iii) to establish hazard mitigation priorities, and an appropriate hazard mitigation plan, for a community.

“(2) DISSEMINATION.—A State or local government may use not more than 10 percent of the financial assistance received by the State or local government under this section for a fiscal year to fund activities to disseminate information regarding cost-effective mitigation technologies.

“(f) ALLOCATION OF FUNDS.—The amount of financial assistance made available to a State (including amounts made available to local governments of the State) under this section for a fiscal year—

“(1) shall be not less than the lesser of—

“(A) \$500,000; or

“(B) the amount that is equal to 1.0 percent of the total funds appropriated to carry out this section for the fiscal year;

“(2) shall not exceed 15 percent of the total funds described in paragraph (1)(B); and

“(3) shall be subject to the criteria specified in subsection

(g).

“(g) CRITERIA FOR ASSISTANCE AWARDS.—In determining whether to provide technical and financial assistance to a State or local government under this section, the President shall take into account—

“(1) the extent and nature of the hazards to be mitigated;

“(2) the degree of commitment of the State or local government to reduce damages from future natural disasters;

“(3) the degree of commitment by the State or local government to support ongoing non-Federal support for the hazard mitigation measures to be carried out using the technical and financial assistance;

“(4) the extent to which the hazard mitigation measures to be carried out using the technical and financial assistance contribute to the mitigation goals and priorities established by the State;

“(5) the extent to which the technical and financial assistance is consistent with other assistance provided under this Act;

“(6) the extent to which prioritized, cost-effective mitigation activities that produce meaningful and definable outcomes are clearly identified;

“(7) if the State or local government has submitted a mitigation plan under section 322, the extent to which the activities identified under paragraph (6) are consistent with the mitigation plan;

“(8) the opportunity to fund activities that maximize net benefits to society;

“(9) the extent to which assistance will fund mitigation activities in small impoverished communities; and

“(10) such other criteria as the President establishes in consultation with State and local governments.

President.

“(h) FEDERAL SHARE.—

“(1) IN GENERAL.—Financial assistance provided under this section may contribute up to 75 percent of the total cost of mitigation activities approved by the President.

“(2) SMALL IMPOVERISHED COMMUNITIES.—Notwithstanding paragraph (1), the President may contribute up to 90 percent of the total cost of a mitigation activity carried out in a small impoverished community.

“(i) NATIONAL PREDISASTER MITIGATION FUND.—

“(1) ESTABLISHMENT.—The President may establish in the Treasury of the United States a fund to be known as the ‘National Predisaster Mitigation Fund’, to be used in carrying out this section.

“(2) TRANSFERS TO FUND.—There shall be deposited in the Fund—

“(A) amounts appropriated to carry out this section, which shall remain available until expended; and

“(B) sums available from gifts, bequests, or donations of services or property received by the President for the purpose of predisaster hazard mitigation.

“(3) EXPENDITURES FROM FUND.—Upon request by the President, the Secretary of the Treasury shall transfer from the Fund to the President such amounts as the President determines are necessary to provide technical and financial assistance under this section.

“(4) INVESTMENT OF AMOUNTS.—

“(A) IN GENERAL.—The Secretary of the Treasury shall invest such portion of the Fund as is not, in the judgment of the Secretary of the Treasury, required to meet current withdrawals. Investments may be made only in interest-bearing obligations of the United States.

“(B) ACQUISITION OF OBLIGATIONS.—For the purpose of investments under subparagraph (A), obligations may be acquired—

“(i) on original issue at the issue price; or

“(ii) by purchase of outstanding obligations at the market price.

“(C) SALE OF OBLIGATIONS.—Any obligation acquired by the Fund may be sold by the Secretary of the Treasury at the market price.

“(D) CREDITS TO FUND.—The interest on, and the proceeds from the sale or redemption of, any obligations held in the Fund shall be credited to and form a part of the Fund.

“(E) TRANSFERS OF AMOUNTS.—

“(i) IN GENERAL.—The amounts required to be transferred to the Fund under this subsection shall be transferred at least monthly from the general fund of the Treasury to the Fund on the basis of estimates made by the Secretary of the Treasury.

“(ii) ADJUSTMENTS.—Proper adjustment shall be made in amounts subsequently transferred to the extent prior estimates were in excess of or less than the amounts required to be transferred.

“(j) LIMITATION ON TOTAL AMOUNT OF FINANCIAL ASSISTANCE.—The President shall not provide financial assistance under this section in an amount greater than the amount available in the Fund.

“(k) MULTHAZARD ADVISORY MAPS.—

“(1) DEFINITION OF MULTHAZARD ADVISORY MAP.—In this subsection, the term ‘multihazard advisory map’ means a map

on which hazard data concerning each type of natural disaster is identified simultaneously for the purpose of showing areas of hazard overlap.

“(2) DEVELOPMENT OF MAPS.—In consultation with States, local governments, and appropriate Federal agencies, the President shall develop multihazard advisory maps for areas, in not fewer than five States, that are subject to commonly recurring natural hazards (including flooding, hurricanes and severe winds, and seismic events).

President.

“(3) USE OF TECHNOLOGY.—In developing multihazard advisory maps under this subsection, the President shall use, to the maximum extent practicable, the most cost-effective and efficient technology available.

“(4) USE OF MAPS.—

“(A) ADVISORY NATURE.—The multihazard advisory maps shall be considered to be advisory and shall not require the development of any new policy by, or impose any new policy on, any government or private entity.

“(B) AVAILABILITY OF MAPS.—The multihazard advisory maps shall be made available to the appropriate State and local governments for the purposes of—

“(i) informing the general public about the risks of natural hazards in the areas described in paragraph (2);

“(ii) supporting the activities described in subsection (e); and

“(iii) other public uses.

“(1) REPORT ON FEDERAL AND STATE ADMINISTRATION.—Not later than 18 months after the date of the enactment of this section, the President, in consultation with State and local governments, shall submit to Congress a report evaluating efforts to implement this section and recommending a process for transferring greater authority and responsibility for administering the assistance program established under this section to capable States.

Deadline.

“(m) TERMINATION OF AUTHORITY.—The authority provided by this section terminates December 31, 2003.”

(b) CONFORMING AMENDMENT.—Title II of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5131 et seq.) is amended by striking the title heading and inserting the following:

**“TITLE II—DISASTER PREPAREDNESS
AND MITIGATION ASSISTANCE”.**

SEC. 103. INTERAGENCY TASK FORCE.

Title II of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5131 et seq.) (as amended by section 102(a)) is amended by adding at the end the following:

“SEC. 204. INTERAGENCY TASK FORCE.

42 USC 5134.

“(a) IN GENERAL.—The President shall establish a Federal interagency task force for the purpose of coordinating the implementation of predisaster hazard mitigation programs administered by the Federal Government.

“(b) CHAIRPERSON.—The Director of the Federal Emergency Management Agency shall serve as the chairperson of the task force.

“(c) MEMBERSHIP.—The membership of the task force shall include representatives of—

“(1) relevant Federal agencies;

“(2) State and local government organizations (including Indian tribes); and

“(3) the American Red Cross.”.

SEC. 104. MITIGATION PLANNING; MINIMUM STANDARDS FOR PUBLIC AND PRIVATE STRUCTURES.

(a) IN GENERAL.—Title III of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5141 et seq.) is amended by adding at the end the following:

42 USC 5165.

“SEC. 322. MITIGATION PLANNING.

“(a) REQUIREMENT OF MITIGATION PLAN.—As a condition of receipt of an increased Federal share for hazard mitigation measures under subsection (e), a State, local, or tribal government shall develop and submit for approval to the President a mitigation plan that outlines processes for identifying the natural hazards, risks, and vulnerabilities of the area under the jurisdiction of the government.

“(b) LOCAL AND TRIBAL PLANS.—Each mitigation plan developed by a local or tribal government shall—

“(1) describe actions to mitigate hazards, risks, and vulnerabilities identified under the plan; and

“(2) establish a strategy to implement those actions.

“(c) STATE PLANS.—The State process of development of a mitigation plan under this section shall—

“(1) identify the natural hazards, risks, and vulnerabilities of areas in the State;

“(2) support development of local mitigation plans;

“(3) provide for technical assistance to local and tribal governments for mitigation planning; and

“(4) identify and prioritize mitigation actions that the State will support, as resources become available.

“(d) FUNDING.—

“(1) IN GENERAL.—Federal contributions under section 404 may be used to fund the development and updating of mitigation plans under this section.

“(2) MAXIMUM FEDERAL CONTRIBUTION.—With respect to any mitigation plan, a State, local, or tribal government may use an amount of Federal contributions under section 404 not to exceed 7 percent of the amount of such contributions available to the government as of a date determined by the government.

“(e) INCREASED FEDERAL SHARE FOR HAZARD MITIGATION MEASURES.—

“(1) IN GENERAL.—If, at the time of the declaration of a major disaster, a State has in effect an approved mitigation plan under this section, the President may increase to 20 percent, with respect to the major disaster, the maximum percentage specified in the last sentence of section 404(a).

President.

“(2) FACTORS FOR CONSIDERATION.—In determining whether to increase the maximum percentage under paragraph (1), the President shall consider whether the State has established—

“(A) eligibility criteria for property acquisition and other types of mitigation measures;

“(B) requirements for cost effectiveness that are related to the eligibility criteria;

“(C) a system of priorities that is related to the eligibility criteria; and

“(D) a process by which an assessment of the effectiveness of a mitigation action may be carried out after the mitigation action is complete.

“SEC. 323. MINIMUM STANDARDS FOR PUBLIC AND PRIVATE STRUCTURES.

42 USC 5165a.

“(a) IN GENERAL.—As a condition of receipt of a disaster loan or grant under this Act—

“(1) the recipient shall carry out any repair or construction to be financed with the loan or grant in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications, and standards; and

“(2) the President may require safe land use and construction practices, after adequate consultation with appropriate State and local government officials.

“(b) EVIDENCE OF COMPLIANCE.—A recipient of a disaster loan or grant under this Act shall provide such evidence of compliance with this section as the President may require by regulation.”.

(b) LOSSES FROM STRAIGHT LINE WINDS.—The President shall increase the maximum percentage specified in the last sentence of section 404(a) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5170c(a)) from 15 percent to 20 percent with respect to any major disaster that is in the State of Minnesota and for which assistance is being provided as of the date of the enactment of this Act, except that additional assistance provided under this subsection shall not exceed \$6,000,000. The mitigation measures assisted under this subsection shall be related to losses in the State of Minnesota from straight line winds.

President.

(c) CONFORMING AMENDMENTS.—

(1) Section 404(a) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5170c(a)) is amended—

(A) in the second sentence, by striking “section 409” and inserting “section 322”; and

(B) in the third sentence, by striking “The total” and inserting “Subject to section 322, the total”.

(2) Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5176) is repealed.

TITLE II—STREAMLINING AND COST REDUCTION

SEC. 201. TECHNICAL AMENDMENTS.

Section 311 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5154) is amended in subsections (a)(1), (b), and (c) by striking “section 803 of the Public Works and Economic Development Act of 1965” each place it appears

and inserting “section 209(c)(2) of the Public Works and Economic Development Act of 1965 (42 U.S.C. 3149(c)(2))”.

SEC. 202. MANAGEMENT COSTS.

(a) IN GENERAL.—Title III of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5141 et seq.) (as amended by section 104(a)) is amended by adding at the end the following:

42 USC 5165b.

“SEC. 324. MANAGEMENT COSTS.

“(a) DEFINITION OF MANAGEMENT COST.—In this section, the term ‘management cost’ includes any indirect cost, any administrative expense, and any other expense not directly chargeable to a specific project under a major disaster, emergency, or disaster preparedness or mitigation activity or measure.

Regulations.

“(b) ESTABLISHMENT OF MANAGEMENT COST RATES.—Notwithstanding any other provision of law (including any administrative rule or guidance), the President shall by regulation establish management cost rates, for grantees and subgrantees, that shall be used to determine contributions under this Act for management costs.

Deadline.

“(c) REVIEW.—The President shall review the management cost rates established under subsection (b) not later than 3 years after the date of establishment of the rates and periodically thereafter.”.

42 USC 5165b
note.

(b) APPLICABILITY.—

(1) IN GENERAL.—Subject to paragraph (2), subsections (a) and (b) of section 324 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (as added by subsection (a)) shall apply to major disasters declared under that Act on or after the date of the enactment of this Act.

(2) INTERIM AUTHORITY.—Until the date on which the President establishes the management cost rates under section 324 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (as added by subsection (a)), section 406(f) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172(f)) (as in effect on the day before the date of the enactment of this Act) shall be used to establish management cost rates.

SEC. 203. PUBLIC NOTICE, COMMENT, AND CONSULTATION REQUIREMENTS.

Title III of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5141 et seq.) (as amended by section 202(a)) is amended by adding at the end the following:

42 USC 5165c.

“SEC. 325. PUBLIC NOTICE, COMMENT, AND CONSULTATION REQUIREMENTS.

“(a) PUBLIC NOTICE AND COMMENT CONCERNING NEW OR MODIFIED POLICIES.—

President.

“(1) IN GENERAL.—The President shall provide for public notice and opportunity for comment before adopting any new or modified policy that—

“(A) governs implementation of the public assistance program administered by the Federal Emergency Management Agency under this Act; and

“(B) could result in a significant reduction of assistance under the program.

“(2) APPLICATION.—Any policy adopted under paragraph (1) shall apply only to a major disaster or emergency declared on or after the date on which the policy is adopted.

“(b) CONSULTATION CONCERNING INTERIM POLICIES.—

“(1) IN GENERAL.—Before adopting any interim policy under the public assistance program to address specific conditions that relate to a major disaster or emergency that has been declared under this Act, the President, to the maximum extent practicable, shall solicit the views and recommendations of grantees and subgrantees with respect to the major disaster or emergency concerning the potential interim policy, if the interim policy is likely—

“(A) to result in a significant reduction of assistance to applicants for the assistance with respect to the major disaster or emergency; or

“(B) to change the terms of a written agreement to which the Federal Government is a party concerning the declaration of the major disaster or emergency.

“(2) NO LEGAL RIGHT OF ACTION.—Nothing in this subsection confers a legal right of action on any party.

“(c) PUBLIC ACCESS.—The President shall promote public access to policies governing the implementation of the public assistance program.”.

President.

SEC. 204. STATE ADMINISTRATION OF HAZARD MITIGATION GRANT PROGRAM.

Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5170c) is amended by adding at the end the following:

“(c) PROGRAM ADMINISTRATION BY STATES.—

“(1) IN GENERAL.—A State desiring to administer the hazard mitigation grant program established by this section with respect to hazard mitigation assistance in the State may submit to the President an application for the delegation of the authority to administer the program.

“(2) CRITERIA.—The President, in consultation and coordination with States and local governments, shall establish criteria for the approval of applications submitted under paragraph (1). The criteria shall include, at a minimum—

“(A) the demonstrated ability of the State to manage the grant program under this section;

“(B) there being in effect an approved mitigation plan under section 322; and

“(C) a demonstrated commitment to mitigation activities.

“(3) APPROVAL.—The President shall approve an application submitted under paragraph (1) that meets the criteria established under paragraph (2).

President.

“(4) WITHDRAWAL OF APPROVAL.—If, after approving an application of a State submitted under paragraph (1), the President determines that the State is not administering the hazard mitigation grant program established by this section in a manner satisfactory to the President, the President shall withdraw the approval.

“(5) AUDITS.—The President shall provide for periodic audits of the hazard mitigation grant programs administered by States under this subsection.”.

President.

SEC. 205. ASSISTANCE TO REPAIR, RESTORE, RECONSTRUCT, OR REPLACE DAMAGED FACILITIES.

(a) CONTRIBUTIONS.—Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172) is amended by striking subsection (a) and inserting the following:

“(a) CONTRIBUTIONS.—

“(1) IN GENERAL.—The President may make contributions—

“(A) to a State or local government for the repair, restoration, reconstruction, or replacement of a public facility damaged or destroyed by a major disaster and for associated expenses incurred by the government; and

“(B) subject to paragraph (3), to a person that owns or operates a private nonprofit facility damaged or destroyed by a major disaster for the repair, restoration, reconstruction, or replacement of the facility and for associated expenses incurred by the person.

“(2) ASSOCIATED EXPENSES.—For the purposes of this section, associated expenses shall include—

“(A) the costs of mobilizing and employing the National Guard for performance of eligible work;

“(B) the costs of using prison labor to perform eligible work, including wages actually paid, transportation to a worksite, and extraordinary costs of guards, food, and lodging; and

“(C) base and overtime wages for the employees and extra hires of a State, local government, or person described in paragraph (1) that perform eligible work, plus fringe benefits on such wages to the extent that such benefits were being paid before the major disaster.

“(3) CONDITIONS FOR ASSISTANCE TO PRIVATE NONPROFIT FACILITIES.—

“(A) IN GENERAL.—The President may make contributions to a private nonprofit facility under paragraph (1)(B) only if—

“(i) the facility provides critical services (as defined by the President) in the event of a major disaster; or

“(ii) the owner or operator of the facility—

“(I) has applied for a disaster loan under section 7(b) of the Small Business Act (15 U.S.C. 636(b)); and

“(II)(aa) has been determined to be ineligible for such a loan; or

“(bb) has obtained such a loan in the maximum amount for which the Small Business Administration determines the facility is eligible.

“(B) DEFINITION OF CRITICAL SERVICES.—In this paragraph, the term ‘critical services’ includes power, water (including water provided by an irrigation organization or facility), sewer, wastewater treatment, communications, and emergency medical care.

“(4) NOTIFICATION TO CONGRESS.—Before making any contribution under this section in an amount greater than \$20,000,000, the President shall notify—

“(A) the Committee on Environment and Public Works of the Senate;

“(B) the Committee on Transportation and Infrastructure of the House of Representatives;

“(C) the Committee on Appropriations of the Senate; and

“(D) the Committee on Appropriations of the House of Representatives.”

(b) FEDERAL SHARE.—Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172) is amended by striking subsection (b) and inserting the following:

“(b) FEDERAL SHARE.—

“(1) MINIMUM FEDERAL SHARE.—Except as provided in paragraph (2), the Federal share of assistance under this section shall be not less than 75 percent of the eligible cost of repair, restoration, reconstruction, or replacement carried out under this section.

“(2) REDUCED FEDERAL SHARE.—The President shall promulgate regulations to reduce the Federal share of assistance under this section to not less than 25 percent in the case of the repair, restoration, reconstruction, or replacement of any eligible public facility or private nonprofit facility following an event associated with a major disaster—

President.
Regulations.

“(A) that has been damaged, on more than one occasion within the preceding 10-year period, by the same type of event; and

“(B) the owner of which has failed to implement appropriate mitigation measures to address the hazard that caused the damage to the facility.”

(c) LARGE IN-LIEU CONTRIBUTIONS.—Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172) is amended by striking subsection (c) and inserting the following:

“(c) LARGE IN-LIEU CONTRIBUTIONS.—

“(1) FOR PUBLIC FACILITIES.—

“(A) IN GENERAL.—In any case in which a State or local government determines that the public welfare would not best be served by repairing, restoring, reconstructing, or replacing any public facility owned or controlled by the State or local government, the State or local government may elect to receive, in lieu of a contribution under subsection (a)(1)(A), a contribution in an amount equal to 75 percent of the Federal share of the Federal estimate of the cost of repairing, restoring, reconstructing, or replacing the facility and of management expenses.

“(B) AREAS WITH UNSTABLE SOIL.—In any case in which a State or local government determines that the public welfare would not best be served by repairing, restoring, reconstructing, or replacing any public facility owned or controlled by the State or local government because soil instability in the disaster area makes repair, restoration, reconstruction, or replacement infeasible, the State or local government may elect to receive, in lieu of a contribution under subsection (a)(1)(A), a contribution in an amount equal to 90 percent of the Federal share of the Federal estimate of the cost of repairing, restoring, reconstructing, or replacing the facility and of management expenses.

“(C) USE OF FUNDS.—Funds contributed to a State or local government under this paragraph may be used—

“(i) to repair, restore, or expand other selected public facilities;

“(ii) to construct new facilities; or

“(iii) to fund hazard mitigation measures that the State or local government determines to be necessary to meet a need for governmental services and functions in the area affected by the major disaster.

“(D) LIMITATIONS.—Funds made available to a State or local government under this paragraph may not be used for—

“(i) any public facility located in a regulatory floodway (as defined in section 59.1 of title 44, Code of Federal Regulations (or a successor regulation)); or

“(ii) any uninsured public facility located in a special flood hazard area identified by the Director of the Federal Emergency Management Agency under the National Flood Insurance Act of 1968 (42 U.S.C. 4001 et seq.).

“(2) FOR PRIVATE NONPROFIT FACILITIES.—

“(A) IN GENERAL.—In any case in which a person that owns or operates a private nonprofit facility determines that the public welfare would not best be served by repairing, restoring, reconstructing, or replacing the facility, the person may elect to receive, in lieu of a contribution under subsection (a)(1)(B), a contribution in an amount equal to 75 percent of the Federal share of the Federal estimate of the cost of repairing, restoring, reconstructing, or replacing the facility and of management expenses.

“(B) USE OF FUNDS.—Funds contributed to a person under this paragraph may be used—

“(i) to repair, restore, or expand other selected private nonprofit facilities owned or operated by the person;

“(ii) to construct new private nonprofit facilities to be owned or operated by the person; or

“(iii) to fund hazard mitigation measures that the person determines to be necessary to meet a need for the person’s services and functions in the area affected by the major disaster.

“(C) LIMITATIONS.—Funds made available to a person under this paragraph may not be used for—

“(i) any private nonprofit facility located in a regulatory floodway (as defined in section 59.1 of title 44, Code of Federal Regulations (or a successor regulation)); or

“(ii) any uninsured private nonprofit facility located in a special flood hazard area identified by the Director of the Federal Emergency Management Agency under the National Flood Insurance Act of 1968 (42 U.S.C. 4001 et seq.).”

(d) ELIGIBLE COST.—

(1) IN GENERAL.—Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172) is amended by striking subsection (e) and inserting the following:

“(e) ELIGIBLE COST.—

“(1) DETERMINATION.—

“(A) IN GENERAL.—For the purposes of this section, the President shall estimate the eligible cost of repairing, restoring, reconstructing, or replacing a public facility or private nonprofit facility—

“(i) on the basis of the design of the facility as the facility existed immediately before the major disaster; and

“(ii) in conformity with codes, specifications, and standards (including floodplain management and hazard mitigation criteria required by the President or under the Coastal Barrier Resources Act (16 U.S.C. 3501 et seq.)) applicable at the time at which the disaster occurred.

“(B) COST ESTIMATION PROCEDURES.—

“(i) IN GENERAL.—Subject to paragraph (2), the President shall use the cost estimation procedures established under paragraph (3) to determine the eligible cost under this subsection.

“(ii) APPLICABILITY.—The procedures specified in this paragraph and paragraph (2) shall apply only to projects the eligible cost of which is equal to or greater than the amount specified in section 422.

“(2) MODIFICATION OF ELIGIBLE COST.—

“(A) ACTUAL COST GREATER THAN CEILING PERCENTAGE OF ESTIMATED COST.—In any case in which the actual cost of repairing, restoring, reconstructing, or replacing a facility under this section is greater than the ceiling percentage established under paragraph (3) of the cost estimated under paragraph (1), the President may determine that the eligible cost includes a portion of the actual cost of the repair, restoration, reconstruction, or replacement that exceeds the cost estimated under paragraph (1).

“(B) ACTUAL COST LESS THAN ESTIMATED COST.—

“(i) GREATER THAN OR EQUAL TO FLOOR PERCENTAGE OF ESTIMATED COST.—In any case in which the actual cost of repairing, restoring, reconstructing, or replacing a facility under this section is less than 100 percent of the cost estimated under paragraph (1), but is greater than or equal to the floor percentage established under paragraph (3) of the cost estimated under paragraph (1), the State or local government or person receiving funds under this section shall use the excess funds to carry out cost-effective activities that reduce the risk of future damage, hardship, or suffering from a major disaster.

“(ii) LESS THAN FLOOR PERCENTAGE OF ESTIMATED COST.—In any case in which the actual cost of repairing, restoring, reconstructing, or replacing a facility under this section is less than the floor percentage established under paragraph (3) of the cost estimated under paragraph (1), the State or local government or person receiving assistance under this section shall reimburse the President in the amount of the difference.

“(C) NO EFFECT ON APPEALS PROCESS.—Nothing in this paragraph affects any right of appeal under section 423.

“(3) EXPERT PANEL.—

“(A) ESTABLISHMENT.—Not later than 18 months after the date of the enactment of this paragraph, the President, acting through the Director of the Federal Emergency Management Agency, shall establish an expert panel, which shall include representatives from the construction industry and State and local government.

“(B) DUTIES.—The expert panel shall develop recommendations concerning—

“(i) procedures for estimating the cost of repairing, restoring, reconstructing, or replacing a facility consistent with industry practices; and

“(ii) the ceiling and floor percentages referred to in paragraph (2).

President.

“(C) REGULATIONS.—Taking into account the recommendations of the expert panel under subparagraph (B), the President shall promulgate regulations that establish—

“(i) cost estimation procedures described in subparagraph (B)(i); and

“(ii) the ceiling and floor percentages referred to in paragraph (2).

Deadline.

“(D) REVIEW BY PRESIDENT.—Not later than 2 years after the date of promulgation of regulations under subparagraph (C) and periodically thereafter, the President shall review the cost estimation procedures and the ceiling and floor percentages established under this paragraph.

Deadline.

“(E) REPORT TO CONGRESS.—Not later than 1 year after the date of promulgation of regulations under subparagraph (C), 3 years after that date, and at the end of each 2-year period thereafter, the expert panel shall submit to Congress a report on the appropriateness of the cost estimation procedures.

“(4) SPECIAL RULE.—In any case in which the facility being repaired, restored, reconstructed, or replaced under this section was under construction on the date of the major disaster, the cost of repairing, restoring, reconstructing, or replacing the facility shall include, for the purposes of this section, only those costs that, under the contract for the construction, are the owner’s responsibility and not the contractor’s responsibility.”

42 USC 5172
note.

(2) EFFECTIVE DATE.—The amendment made by paragraph (1) takes effect on the date of the enactment of this Act and applies to funds appropriated after the date of the enactment of this Act, except that paragraph (1) of section 406(e) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (as amended by paragraph (1)) takes effect on the date on which the cost estimation procedures established under paragraph (3) of that section take effect.

(e) CONFORMING AMENDMENT.—Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172) is amended by striking subsection (f).

SEC. 206. FEDERAL ASSISTANCE TO INDIVIDUALS AND HOUSEHOLDS.

(a) IN GENERAL.—Section 408 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5174) is amended to read as follows:

“SEC. 408. FEDERAL ASSISTANCE TO INDIVIDUALS AND HOUSEHOLDS.

“(a) IN GENERAL.—

“(1) PROVISION OF ASSISTANCE.—In accordance with this section, the President, in consultation with the Governor of a State, may provide financial assistance, and, if necessary, direct services, to individuals and households in the State who, as a direct result of a major disaster, have necessary expenses and serious needs in cases in which the individuals and households are unable to meet such expenses or needs through other means.

“(2) RELATIONSHIP TO OTHER ASSISTANCE.—Under paragraph (1), an individual or household shall not be denied assistance under paragraph (1), (3), or (4) of subsection (c) solely on the basis that the individual or household has not applied for or received any loan or other financial assistance from the Small Business Administration or any other Federal agency.

“(b) HOUSING ASSISTANCE.—

“(1) ELIGIBILITY.—The President may provide financial or other assistance under this section to individuals and households to respond to the disaster-related housing needs of individuals and households who are displaced from their predisaster primary residences or whose predisaster primary residences are rendered uninhabitable as a result of damage caused by a major disaster.

“(2) DETERMINATION OF APPROPRIATE TYPES OF ASSISTANCE.—

“(A) IN GENERAL.—The President shall determine appropriate types of housing assistance to be provided under this section to individuals and households described in subsection (a)(1) based on considerations of cost effectiveness, convenience to the individuals and households, and such other factors as the President may consider appropriate.

President.

“(B) MULTIPLE TYPES OF ASSISTANCE.—One or more types of housing assistance may be made available under this section, based on the suitability and availability of the types of assistance, to meet the needs of individuals and households in the particular disaster situation.

“(c) TYPES OF HOUSING ASSISTANCE.—

“(1) TEMPORARY HOUSING.—

“(A) FINANCIAL ASSISTANCE.—

“(i) IN GENERAL.—The President may provide financial assistance to individuals or households to rent alternate housing accommodations, existing rental units, manufactured housing, recreational vehicles, or other readily fabricated dwellings.

“(ii) AMOUNT.—The amount of assistance under clause (i) shall be based on the fair market rent for the accommodation provided plus the cost of any transportation, utility hookups, or unit installation not provided directly by the President.

“(B) DIRECT ASSISTANCE.—

“(i) IN GENERAL.—The President may provide temporary housing units, acquired by purchase or lease, directly to individuals or households who, because of a lack of available housing resources, would be unable

to make use of the assistance provided under subparagraph (A).

“(ii) PERIOD OF ASSISTANCE.—The President may not provide direct assistance under clause (i) with respect to a major disaster after the end of the 18-month period beginning on the date of the declaration of the major disaster by the President, except that the President may extend that period if the President determines that due to extraordinary circumstances an extension would be in the public interest.

“(iii) COLLECTION OF RENTAL CHARGES.—After the end of the 18-month period referred to in clause (ii), the President may charge fair market rent for each temporary housing unit provided.

“(2) REPAIRS.—

“(A) IN GENERAL.—The President may provide financial assistance for—

“(i) the repair of owner-occupied private residences, utilities, and residential infrastructure (such as a private access route) damaged by a major disaster to a safe and sanitary living or functioning condition; and

“(ii) eligible hazard mitigation measures that reduce the likelihood of future damage to such residences, utilities, or infrastructure.

“(B) RELATIONSHIP TO OTHER ASSISTANCE.—A recipient of assistance provided under this paragraph shall not be required to show that the assistance can be met through other means, except insurance proceeds.

“(C) MAXIMUM AMOUNT OF ASSISTANCE.—The amount of assistance provided to a household under this paragraph shall not exceed \$5,000, as adjusted annually to reflect changes in the Consumer Price Index for All Urban Consumers published by the Department of Labor.

“(3) REPLACEMENT.—

“(A) IN GENERAL.—The President may provide financial assistance for the replacement of owner-occupied private residences damaged by a major disaster.

“(B) MAXIMUM AMOUNT OF ASSISTANCE.—The amount of assistance provided to a household under this paragraph shall not exceed \$10,000, as adjusted annually to reflect changes in the Consumer Price Index for All Urban Consumers published by the Department of Labor.

“(C) APPLICABILITY OF FLOOD INSURANCE REQUIREMENT.—With respect to assistance provided under this paragraph, the President may not waive any provision of Federal law requiring the purchase of flood insurance as a condition of the receipt of Federal disaster assistance.

“(4) PERMANENT HOUSING CONSTRUCTION.—The President may provide financial assistance or direct assistance to individuals or households to construct permanent housing in insular areas outside the continental United States and in other remote locations in cases in which—

“(A) no alternative housing resources are available; and

“(B) the types of temporary housing assistance described in paragraph (1) are unavailable, infeasible, or not cost-effective.

“(d) TERMS AND CONDITIONS RELATING TO HOUSING ASSISTANCE.—

“(1) SITES.—

“(A) IN GENERAL.—Any readily fabricated dwelling provided under this section shall, whenever practicable, be located on a site that—

“(i) is complete with utilities; and

“(ii) is provided by the State or local government, by the owner of the site, or by the occupant who was displaced by the major disaster.

“(B) SITES PROVIDED BY THE PRESIDENT.—A readily fabricated dwelling may be located on a site provided by the President if the President determines that such a site would be more economical or accessible.

“(2) DISPOSAL OF UNITS.—

“(A) SALE TO OCCUPANTS.—

“(i) IN GENERAL.—Notwithstanding any other provision of law, a temporary housing unit purchased under this section by the President for the purpose of housing disaster victims may be sold directly to the individual or household who is occupying the unit if the individual or household lacks permanent housing.

“(ii) SALE PRICE.—A sale of a temporary housing unit under clause (i) shall be at a price that is fair and equitable.

“(iii) DEPOSIT OF PROCEEDS.—Notwithstanding any other provision of law, the proceeds of a sale under clause (i) shall be deposited in the appropriate Disaster Relief Fund account.

“(iv) HAZARD AND FLOOD INSURANCE.—A sale of a temporary housing unit under clause (i) shall be made on the condition that the individual or household purchasing the housing unit agrees to obtain and maintain hazard and flood insurance on the housing unit.

“(v) USE OF GSA SERVICES.—The President may use the services of the General Services Administration to accomplish a sale under clause (i).

“(B) OTHER METHODS OF DISPOSAL.—If not disposed of under subparagraph (A), a temporary housing unit purchased under this section by the President for the purpose of housing disaster victims—

“(i) may be sold to any person; or

“(ii) may be sold, transferred, donated, or otherwise made available directly to a State or other governmental entity or to a voluntary organization for the sole purpose of providing temporary housing to disaster victims in major disasters and emergencies if, as a condition of the sale, transfer, or donation, the State, other governmental agency, or voluntary organization agrees—

“(I) to comply with the nondiscrimination provisions of section 308; and

“(II) to obtain and maintain hazard and flood insurance on the housing unit.

“(e) FINANCIAL ASSISTANCE TO ADDRESS OTHER NEEDS.—

“(1) MEDICAL, DENTAL, AND FUNERAL EXPENSES.—The President, in consultation with the Governor of a State, may provide financial assistance under this section to an individual or household in the State who is adversely affected by a major disaster to meet disaster-related medical, dental, and funeral expenses.

“(2) PERSONAL PROPERTY, TRANSPORTATION, AND OTHER EXPENSES.—The President, in consultation with the Governor of a State, may provide financial assistance under this section to an individual or household described in paragraph (1) to address personal property, transportation, and other necessary expenses or serious needs resulting from the major disaster.

“(f) STATE ROLE.—

“(1) FINANCIAL ASSISTANCE TO ADDRESS OTHER NEEDS.—

“(A) GRANT TO STATE.—Subject to subsection (g), a Governor may request a grant from the President to provide financial assistance to individuals and households in the State under subsection (e).

“(B) ADMINISTRATIVE COSTS.—A State that receives a grant under subparagraph (A) may expend not more than 5 percent of the amount of the grant for the administrative costs of providing financial assistance to individuals and households in the State under subsection (e).

“(2) ACCESS TO RECORDS.—In providing assistance to individuals and households under this section, the President shall provide for the substantial and ongoing involvement of the States in which the individuals and households are located, including by providing to the States access to the electronic records of individuals and households receiving assistance under this section in order for the States to make available any additional State and local assistance to the individuals and households.

“(g) COST SHARING.—

“(1) FEDERAL SHARE.—Except as provided in paragraph (2), the Federal share of the costs eligible to be paid using assistance provided under this section shall be 100 percent.

“(2) FINANCIAL ASSISTANCE TO ADDRESS OTHER NEEDS.—In the case of financial assistance provided under subsection (e)—

“(A) the Federal share shall be 75 percent; and

“(B) the non-Federal share shall be paid from funds made available by the State.

“(h) MAXIMUM AMOUNT OF ASSISTANCE.—

“(1) IN GENERAL.—No individual or household shall receive financial assistance greater than \$25,000 under this section with respect to a single major disaster.

“(2) ADJUSTMENT OF LIMIT.—The limit established under paragraph (1) shall be adjusted annually to reflect changes in the Consumer Price Index for All Urban Consumers published by the Department of Labor.

President.

“(i) RULES AND REGULATIONS.—The President shall prescribe rules and regulations to carry out this section, including criteria, standards, and procedures for determining eligibility for assistance.”

(b) CONFORMING AMENDMENT.—Section 502(a)(6) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5192(a)(6)) is amended by striking “temporary housing”.

(c) **ELIMINATION OF INDIVIDUAL AND FAMILY GRANT PROGRAMS.**—Section 411 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5178) is repealed.

(d) **EFFECTIVE DATE.**—The amendments made by this section take effect 18 months after the date of the enactment of this Act.

42 USC 5174
note.

SEC. 207. COMMUNITY DISASTER LOANS.

Section 417 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5184) is amended—

(1) by striking “(a) The President” and inserting the following:

“(a) **IN GENERAL.**—The President”;

(2) by striking “The amount” and inserting the following:

“(b) **AMOUNT.**—The amount”;

(3) by striking “Repayment” and inserting the following:

“(c) **REPAYMENT.**—

“(1) **CANCELLATION.**—Repayment”;

(4) by striking “(b) Any loans” and inserting the following:

“(d) **EFFECT ON OTHER ASSISTANCE.**—Any loans”;

(5) in subsection (b) (as designated by paragraph (2))—

(A) by striking “and shall” and inserting “shall”; and

(B) by inserting before the period at the end the following: “, and shall not exceed \$5,000,000”; and

(6) in subsection (c) (as designated by paragraph (3)), by

adding at the end the following:

“(2) **CONDITION ON CONTINUING ELIGIBILITY.**—A local government shall not be eligible for further assistance under this section during any period in which the local government is in arrears with respect to a required repayment of a loan under this section.”.

SEC. 208. REPORT ON STATE MANAGEMENT OF SMALL DISASTERS INITIATIVE.

42 USC 5121
note.

Not later than 3 years after the date of the enactment of this Act, the President shall submit to Congress a report describing the results of the State Management of Small Disasters Initiative, including—

Deadline.

(1) identification of any administrative or financial benefits of the initiative; and

(2) recommendations concerning the conditions, if any, under which States should be allowed the option to administer parts of the assistance program under section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5172).

SEC. 209. STUDY REGARDING COST REDUCTION.

42 USC 5121
note.
Deadline.

Not later than 3 years after the date of the enactment of this Act, the Director of the Congressional Budget Office shall complete a study estimating the reduction in Federal disaster assistance that has resulted and is likely to result from the enactment of this Act.

TITLE III—MISCELLANEOUS

SEC. 301. TECHNICAL CORRECTION OF SHORT TITLE.

The first section of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 note) is amended to read as follows:

“SECTION 1. SHORT TITLE.

“This Act may be cited as the ‘Robert T. Stafford Disaster Relief and Emergency Assistance Act’.”

SEC. 302. DEFINITIONS.

Section 102 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5122) is amended—

(1) in each of paragraphs (3) and (4), by striking “the Northern” and all that follows through “Pacific Islands” and inserting “and the Commonwealth of the Northern Mariana Islands”;

(2) by striking paragraph (6) and inserting the following:
“(6) LOCAL GOVERNMENT.—The term ‘local government’ means—

“(A) a county, municipality, city, town, township, local public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government;

“(B) an Indian tribe or authorized tribal organization, or Alaska Native village or organization; and

“(C) a rural community, unincorporated town or village, or other public entity, for which an application for assistance is made by a State or political subdivision of a State.”; and

(3) in paragraph (9), by inserting “irrigation,” after “utility,”.

SEC. 303. FIRE MANAGEMENT ASSISTANCE.

(a) IN GENERAL.—Section 420 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5187) is amended to read as follows:

“SEC. 420. FIRE MANAGEMENT ASSISTANCE.

“(a) IN GENERAL.—The President is authorized to provide assistance, including grants, equipment, supplies, and personnel, to any State or local government for the mitigation, management, and control of any fire on public or private forest land or grassland that threatens such destruction as would constitute a major disaster.

President.

“(b) COORDINATION WITH STATE AND TRIBAL DEPARTMENTS OF FORESTRY.—In providing assistance under this section, the President shall coordinate with State and tribal departments of forestry.

“(c) ESSENTIAL ASSISTANCE.—In providing assistance under this section, the President may use the authority provided under section 403.

“(d) RULES AND REGULATIONS.—The President shall prescribe such rules and regulations as are necessary to carry out this section.” President.

(b) EFFECTIVE DATE.—The amendment made by subsection (a) takes effect 1 year after the date of the enactment of this Act. 42 USC 5187 note.

SEC. 304. DISASTER GRANT CLOSEOUT PROCEDURES. 42 USC 5205.

Title VII of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5101 et seq.) is amended by adding at the end the following:

“SEC. 705. DISASTER GRANT CLOSEOUT PROCEDURES.

“(a) STATUTE OF LIMITATIONS.—

“(1) IN GENERAL.—Except as provided in paragraph (2), no administrative action to recover any payment made to a State or local government for disaster or emergency assistance under this Act shall be initiated in any forum after the date that is 3 years after the date of transmission of the final expenditure report for the disaster or emergency.

“(2) FRAUD EXCEPTION.—The limitation under paragraph (1) shall apply unless there is evidence of civil or criminal fraud.

“(b) REBUTTAL OF PRESUMPTION OF RECORD MAINTENANCE.—

“(1) IN GENERAL.—In any dispute arising under this section after the date that is 3 years after the date of transmission of the final expenditure report for the disaster or emergency, there shall be a presumption that accounting records were maintained that adequately identify the source and application of funds provided for financially assisted activities.

“(2) AFFIRMATIVE EVIDENCE.—The presumption described in paragraph (1) may be rebutted only on production of affirmative evidence that the State or local government did not maintain documentation described in that paragraph.

“(3) INABILITY TO PRODUCE DOCUMENTATION.—The inability of the Federal, State, or local government to produce source documentation supporting expenditure reports later than 3 years after the date of transmission of the final expenditure report shall not constitute evidence to rebut the presumption described in paragraph (1).

“(4) RIGHT OF ACCESS.—The period during which the Federal, State, or local government has the right to access source documentation shall not be limited to the required 3-year retention period referred to in paragraph (3), but shall last as long as the records are maintained.

“(c) BINDING NATURE OF GRANT REQUIREMENTS.—A State or local government shall not be liable for reimbursement or any other penalty for any payment made under this Act if—

“(1) the payment was authorized by an approved agreement specifying the costs;

“(2) the costs were reasonable; and

“(3) the purpose of the grant was accomplished.”.

SEC. 305. PUBLIC SAFETY OFFICER BENEFITS FOR CERTAIN FEDERAL AND STATE EMPLOYEES.

(a) IN GENERAL.—Section 1204 of the Omnibus Crime Control and Safe Streets Act of 1968 (42 U.S.C. 3796b) is amended by striking paragraph (7) and inserting the following:

“(7) ‘public safety officer’ means—

“(A) an individual serving a public agency in an official capacity, with or without compensation, as a law enforcement officer, as a firefighter, or as a member of a rescue squad or ambulance crew;

“(B) an employee of the Federal Emergency Management Agency who is performing official duties of the Agency in an area, if those official duties—

“(i) are related to a major disaster or emergency that has been, or is later, declared to exist with respect to the area under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq.); and

“(ii) are determined by the Director of the Federal Emergency Management Agency to be hazardous duties; or

“(C) an employee of a State, local, or tribal emergency management or civil defense agency who is performing official duties in cooperation with the Federal Emergency Management Agency in an area, if those official duties—

“(i) are related to a major disaster or emergency that has been, or is later, declared to exist with respect to the area under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq.); and

“(ii) are determined by the head of the agency to be hazardous duties.”.

42 USC 3796b
note.

(b) **EFFECTIVE DATE.**—The amendment made by subsection (a) applies only to employees described in subparagraphs (B) and (C) of section 1204(7) of the Omnibus Crime Control and Safe Streets Act of 1968 (as amended by subsection (a)) who are injured or who die in the line of duty on or after the date of the enactment of this Act.

42 USC 5206.

SEC. 306. BUY AMERICAN.

(a) **COMPLIANCE WITH BUY AMERICAN ACT.**—No funds authorized to be appropriated under this Act or any amendment made by this Act may be expended by an entity unless the entity, in expending the funds, complies with the Buy American Act (41 U.S.C. 10a et seq.).

(b) **DEBARMENT OF PERSONS CONVICTED OF FRAUDULENT USE OF “MADE IN AMERICA” LABELS.**—

Deadline.

(1) **IN GENERAL.**—If the Director of the Federal Emergency Management Agency determines that a person has been convicted of intentionally affixing a label bearing a “Made in America” inscription to any product sold in or shipped to the United States that is not made in America, the Director shall determine, not later than 90 days after determining that the person has been so convicted, whether the person should be debarred from contracting under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5121 et seq.).

(2) **DEFINITION OF DEBAR.**—In this subsection, the term “debar” has the meaning given the term in section 2393(c) of title 10, United States Code.

SEC. 307. TREATMENT OF CERTAIN REAL PROPERTY.

(a) **IN GENERAL.**—Notwithstanding the National Flood Insurance Act of 1968 (42 U.S.C. 4001 et seq.), the Flood Disaster

Protection Act of 1973 (42 U.S.C. 4002 et seq.), or any other provision of law, or any flood risk zone identified, delineated, or established under any such law (by flood insurance rate map or otherwise), the real property described in subsection (b) shall not be considered to be, or to have been, located in any area having special flood hazards (including any floodway or floodplain).

(b) REAL PROPERTY.—The real property described in this subsection is all land and improvements on the land located in the Maple Terrace Subdivisions in the City of Sycamore, DeKalb County, Illinois, including—

- (1) Maple Terrace Phase I;
- (2) Maple Terrace Phase II;
- (3) Maple Terrace Phase III Unit 1;
- (4) Maple Terrace Phase III Unit 2;
- (5) Maple Terrace Phase III Unit 3;
- (6) Maple Terrace Phase IV Unit 1;
- (7) Maple Terrace Phase IV Unit 2; and
- (8) Maple Terrace Phase IV Unit 3.

(c) REVISION OF FLOOD INSURANCE RATE LOT MAPS.—As soon as practicable after the date of the enactment of this Act, the Director of the Federal Emergency Management Agency shall revise the appropriate flood insurance rate lot maps of the agency to reflect the treatment under subsection (a) of the real property described in subsection (b).

SEC. 308. STUDY OF PARTICIPATION BY INDIAN TRIBES IN EMERGENCY MANAGEMENT.

42 USC 5121
note.

(a) DEFINITION OF INDIAN TRIBE.—In this section, the term “Indian tribe” has the meaning given the term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450b).

(b) STUDY.—

(1) IN GENERAL.—The Director of the Federal Emergency Management Agency shall conduct a study of participation by Indian tribes in emergency management.

(2) REQUIRED ELEMENTS.—The study shall—

(A) survey participation by Indian tribes in training, predisaster and postdisaster mitigation, disaster preparedness, and disaster recovery programs at the Federal and State levels; and

(B) review and assess the capacity of Indian tribes to participate in cost-shared emergency management programs and to participate in the management of the programs.

(3) CONSULTATION.—In conducting the study, the Director shall consult with Indian tribes.

(c) REPORT.—Not later than 1 year after the date of the enactment of this Act, the Director shall submit a report on the study under subsection (b) to—

Deadline.

(1) the Committee on Environment and Public Works of the Senate;

(2) the Committee on Transportation and Infrastructure of the House of Representatives;

(3) the Committee on Appropriations of the Senate; and

(4) the Committee on Appropriations of the House of Representatives.

Approved October 30, 2000.

LEGISLATIVE HISTORY—H.R. 707 (S. 1691):

HOUSE REPORTS: No. 106-40 (Comm. on Transportation and Infrastructure).

SENATE REPORTS: No. 106-295 accompanying S. 1691 (Comm. on Environment and Public Works).

CONGRESSIONAL RECORD:

Vol. 145 (1999): Mar. 4, considered and passed House.

Vol. 146 (2000): July 19, considered and passed Senate, amended.

Oct. 3, House concurred in Senate amendment with an amendment.

Oct. 5, Senate concurred in House amendment with an amendment.

Oct. 10, House concurred in Senate amendment.





Federal Register

**Tuesday,
February 26, 2002**

Part III

**Federal Emergency
Management Agency**

44 CFR Parts 201 and 206

**Hazard Mitigation Planning and Hazard
Mitigation Grant Program; Interim Final
Rule**

**FEDERAL EMERGENCY
MANAGEMENT AGENCY**
44 CFR Parts 201 and 206
RIN 3067-AD22
**Hazard Mitigation Planning and Hazard
Mitigation Grant Program**
AGENCY: Federal Emergency
Management Agency.

ACTION: Interim final rule.

SUMMARY: This rule addresses State mitigation planning, identifies new local mitigation planning requirements, authorizes Hazard Mitigation Grant Program (HMGP) funds for planning activities, and increases the amount of HMGP funds available to States that develop a comprehensive, enhanced mitigation plan. This rule also requires that repairs or construction funded by a disaster loan or grant must be carried out in accordance with applicable standards and says that FEMA may require safe land use and construction practices as a condition of grantees receiving disaster assistance under the Stafford Act.

DATES: *Effective Date:* February 26, 2002.

Comment Date: We will accept written comments through April 29, 2002.

ADDRESSES: Please send written comments to the Rules Docket Clerk, Office of the General Counsel, Federal Emergency Management Agency, 500 C Street, SW., room 840, Washington, DC 20472, (facsimile) 202-646-4536, or (email) rules@fema.gov.

FOR FURTHER INFORMATION CONTACT: Margaret E. Lawless, Federal Insurance and Mitigation Administration, Federal Emergency Management Agency, 500 C Street, SW., Washington, DC, 20472, 202-646-3027, (facsimile) 202-646-3104, or (email) margaret.lawless@fema.gov.

SUPPLEMENTARY INFORMATION:
Introduction

Throughout the preamble and the rule the terms “we”, “our” and “us” refer to FEMA.

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under § 104 the Disaster Mitigation Act of 2000, (DMA 2000) P.L. 106-390, provides new and revitalized approaches to mitigation planning. This section: (1) Continues the requirement for a Standard State Mitigation plan as a condition of disaster assistance; (2) provides for States to receive an increased

percentage of HMGP funds (from 15 to 20 percent of the total estimated eligible Federal assistance) if, at the time of the declaration of a major disaster, they have in effect a FEMA-approved Enhanced State Mitigation Plan that meets the factors listed in this rule; (3) establishes a new requirement for local mitigation plans; and (4) authorizes up to 7 percent of the HMGP funds available to a State to be used for development of State, tribal, and local mitigation plans. We will give Indian tribal governments the opportunity to fulfill the requirements of § 322 either as a grantee or a subgrantee. An Indian tribal government may choose to apply for HMGP funding directly to us and would then serve as a grantee, meeting the State level responsibilities, or it may apply through the State, meeting the local government or subgrantee responsibilities.

Section 322, in concert with other sections of the Act, provides a significant opportunity to reduce the Nation’s disaster losses through mitigation planning. In addition, implementation of planned, pre-identified, cost-effective mitigation measures will streamline the disaster recovery process. The Act provides a framework for linking pre- and post-disaster mitigation planning and initiatives with public and private interests to ensure an integrated, comprehensive approach to disaster loss reduction. The language in the Act, taken as a whole, emphasizes the importance of strong State and local planning processes and comprehensive program management at the State level. The new planning criteria also support State administration of the HMGP, and contemplate a significant State commitment to mitigation activities, comprehensive State mitigation planning, and strong program management.

The planning process also provides a link between State and local mitigation programs. Both State level and local plans should address strategies for incorporating post-disaster early mitigation implementation strategies and sustainable recovery actions. We also recognize that governments are involved in a range of planning activities and that mitigation plans may be linked to or reference hazardous materials and other non-natural hazard plans. Improved mitigation planning will result in a better understanding of risks and vulnerabilities, as well as to expedite implementation of measures and activities to reduce those risks, both pre- and post-disaster.

Section 409 of the Stafford Act, 42 U.S.C. 5176, which required mitigation

plans and the use of minimum codes and standards, was repealed by the DMA 2000. These issues are now addressed in two separate sections of the law: mitigation planning is in section 322 of the Act, and minimum codes and standards are in section 323 of the Act. We previously implemented section 409 through 44 CFR Part 206, Subpart M. Since current law now distinguishes the planning from the codes and standards in separate sections, we will address them in different sections of the CFR. We address the new planning regulations in Part 201 to reflect the broader relevance of planning to all FEMA mitigation programs, while the minimum standards remain in Part 206, Federal Disaster Assistance, Subpart M. The regulations implementing the Hazard Mitigation Grant Program are in Part 206, Subpart N. This rule also contains changes to Subpart N, to reflect the new planning criteria identified in section 322 of the Act.

The administration is considering changes to FEMA’s mitigation programs in the President’s Budget for FY 2003. However, States and localities still would be required to have plans in effect, which meet the minimum requirements under this rule, as a condition of receiving mitigation assistance after November 1, 2003.

Implementation Strategy. States must have an approved hazard mitigation plan in order to receive Stafford Act assistance, excluding assistance provided pursuant to emergency provisions. These regulations provide criteria for the new two-tiered State mitigation plan process: Standard State Mitigation Plans, which allow a State to receive HMGP funding based on 15 percent of the total estimated eligible Stafford Act disaster assistance, and Enhanced State Mitigation Plans, which allow a State to receive HMGP funds based on 20 percent of the total estimated eligible Stafford Act disaster assistance. Enhanced State Mitigation Plans must demonstrate that the State has developed a comprehensive mitigation program, that it effectively uses available mitigation funding, and that it is capable of managing the increased funding. All State Mitigation Plans must be reviewed, revised, and re-approved by FEMA every three years. An important requirement of the legislation is that we must approve a completed enhanced plan *before* a disaster declaration, in order for the State to be eligible for the increased funding.

We will no longer require States to revise their mitigation plan after every disaster declaration, as under former

section 409 of the Act, 42 U.S.C. 5176. We recommend, however, that States consider revising their plan if a disaster or other circumstances significantly affect its mitigation priorities. States with existing mitigation plans, approved under former section 409, will continue to be eligible for the 15 percent HMGP funding until November 1, 2003, when all State mitigation plans must meet the requirements of these regulations. If State plans are not revised and approved to meet the Standard State Mitigation Plan requirements by that time, they will be ineligible for Stafford Act assistance, excluding emergency assistance.

Indian tribal governments may choose to apply directly to us for HMGP funding, and would therefore be responsible for having an approved State level mitigation plan, and would act as the grantee. If an Indian tribal government chooses to apply for HMGP grants through the State, they would be responsible for having an approved local level mitigation plan, and would serve as a subgrantee accountable to the State as grantee.

This rule also establishes local planning criteria so that these jurisdictions can actively begin the hazard mitigation planning process. This requirement is to encourage the development of comprehensive mitigation plans before disaster events. Section 322 requires local governments to have an approved local mitigation plan to be eligible to receive an HMGP project grant; however, this requirement will not fully take effect until November 1, 2003. FEMA Regional Directors may grant an exception to this requirement in extenuating circumstances. Until November 1, 2003, local governments will be able to receive HMGP project grant funds and may prepare a mitigation plan concurrently with implementation of their project grant. We anticipate that the Predisaster Mitigation program authorized by section 203 of the Act, 42 U.S.C. 5133, will also support this local mitigation planning by making funds available for the development of comprehensive local mitigation plans. Managing States that we approve under new criteria established under section 404 of the Act, 42 U.S.C. 5170c(c), as amended by section 204 of DMA 2000 will have approval authority for local mitigation plans. This provision does not apply to States that we approved under the Managing State program in effect before enactment of DMA 2000.

Our goal is for State and local governments to develop comprehensive and integrated plans that are coordinated through appropriate State,

local, and regional agencies, as well as non-governmental interest groups. To the extent feasible and practicable, we would also like to consolidate the planning requirements for different FEMA mitigation programs. This will ensure that one local plan will meet the minimum requirements for all of the different FEMA mitigation programs, such as the Flood Mitigation Assistance Program (authorized by sections 553 and 554 of the National Flood Insurance Reform Act of 1994, 42 U.S.C. 4104c and 42 U.S.C. 4104d), the Community Rating System (authorized by section 541 of the National Flood Insurance Reform Act of 1994, 42 U.S.C. 4022), the Pre-Disaster Mitigation Program (authorized by section 203 of the Stafford Act), the Hazard Mitigation Grant Program (authorized by section 404 of the Stafford Act), and the mitigation activities that are based upon the provisions of section 323 and subsections 406(b) and (e) of the Stafford Act. The mitigation plans may also serve to integrate documents and plans produced under other emergency management programs. State level plans should identify overall goals and priorities, incorporating the more specific local risk assessments, when available, and including projects identified through the local planning process.

Under section 322(d), up to 7 percent of the available HMGP funds may now be used for planning, and we encourage States to use these funds for local plan development. In a memorandum to FEMA Regional Directors dated December 21, 2000, we announced that this provision of section 322 was effective for disasters declared on or after October 30, 2000, the date on which the Disaster Mitigation Act of 2000 became law. Regional Directors are encouraging States to make these funds immediately available to local and Indian tribal governments, although the funds can be used for plan development and review at the State level as well.

As discussed earlier in this Supplementary Information, subsection 323(a) of the Stafford Act, 42 U.S.C. 5166(a), requires as a precondition to receiving disaster assistance under the Act that State and local governments, as well as eligible private nonprofit entities, must agree to carry out repair and reconstruction activities "in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications, and standards." In addition, that subsection authorizes the President (FEMA, by virtue of Executive Order 12148, as amended) to "require safe land use and construction practices,

after adequate consultation with appropriate State and local officials" in the course of the use of Federal disaster assistance by eligible applicants to repair and restore disaster-damaged facilities.

At the same time that we implement the planning mandates of section 322 of the Stafford Act, we are also implementing the Minimum Standards for Public and Private Structures provision of section 323 of the Act. This rule appears at Subpart M of Part 206 of Title 44 of the Code of Federal Regulations. As mentioned earlier, the section 322 planning regulations are in Part 201, while Part 206, Subpart M includes only the minimum codes and standards regulations mandated in § 323. The rule to implement § 323 of the Act reinforces the link between pre-disaster planning, building and construction standards, and post-disaster reconstruction efforts.

We encourage comments on this interim final rule, and we will make every effort to involve all interested parties prior to the development of the Final Rule.

Justification for Interim Final Rule

In general, FEMA publishes a rule for public comment before issuing a final rule, under the Administrative Procedure Act, 5 U.S.C. 533 and 44 CFR 1.12. The Administrative Procedure Act, however, provides an exception from that general rule where the agency for good cause finds the procedures for comment and response contrary to public interest. Section 322 of the Stafford Act allows States to receive increased post-disaster grant funding for projects designed to reduce future disaster losses. States will only be eligible for these increased funds if they have a FEMA-approved Enhanced State Mitigation Plan.

This interim final rule provides the criteria for development and approval of these plans, as well as criteria for local mitigation plans required by this legislation. In order for State and local governments to be positioned to receive these mitigation funds as soon as possible, these regulations must be in effect. The public benefit of this rule will be to assist States and communities assess their risks and identify activities to strengthen the larger community and the built environment in order to become less susceptible to disasters. Planning serves as the vital foundation to saving lives and protecting properties, having integrated plans in place can serve to both streamline recovery efforts and lessen potential future damages. Therefore, we believe it is contrary to the public interest to delay

the benefits of this rule. In accordance with the Administrative Procedure Act, 5 U.S.C. 553(d)(3), we find that there is good cause for the interim final rule to take effect immediately upon publication in the **Federal Register** in order to meet the needs of States and communities by identifying criteria for mitigation plans in order to reduce risks nationwide, establish criteria for minimum codes and standards in post-disaster reconstruction, and to allow States to adjust their mitigation plans to receive the increase in mitigation funding.

In addition, we believe that, under the circumstances, delaying the effective date of this rule until after the comment period would not further the public interest. Prior to this rulemaking, FEMA hosted a meeting where interested parties provided comments and suggestions on how we could implement these planning requirements. Participants in this meeting included representatives from the National Emergency Management Association, the Association of State Floodplain Managers, the National Governors' Association, the International Association of Emergency Managers, the National Association of Development Organizations, the American Public Works Association, the National League of Cities, the National Association of Counties, the National Conference of State Legislatures, the International City/County Management Association, and the Bureau of Indian Affairs. We took comments and suggestions provided at this meeting into account in developing this interim final rule. Therefore, we find that prior notice and comment on this rule would not further the public interest. We actively encourage and solicit comments on this interim final rule from interested parties, and we will consider them in preparing the final rule. For these reasons, we believe we have good cause to publish an interim final rule.

National Environmental Policy Act

44 CFR 10.8(d)(2)(ii) excludes this rule from the preparation of an environmental assessment or environmental impact statement, where the rule relates to actions that qualify for categorical exclusion under 44 CFR 10.8(d)(2)(iii), such as the development of plans under this section.

Executive Order 12866, Regulatory Planning and Review

We have prepared and reviewed this rule under the provisions of E.O. 12866, Regulatory Planning and Review. Under Executive Order 12866, 58 FR 51735, October 4, 1993, a significant regulatory

action is subject to OMB review and the requirements of the Executive Order. The Executive Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The purpose of this rule is to implement section 322 of the Stafford Act which addresses mitigation planning at the State, tribal, and local levels, identifies new local planning requirements, allows Hazard Mitigation Grant Program (HMGP) funds for planning activities, and increases the amount of HMGP funds available to States that develop a comprehensive, enhanced mitigation plan. The rule identifies local mitigation planning requirements before approval of project grants, and requires our approval of an Enhanced State Mitigation plan as a condition for increased mitigation funding. The rule also implements section 323 of the Stafford Act, which requires that repairs or construction funded by disaster loans or grants must comply with applicable standards and safe land use and construction practices. As such the rule itself will not have an effect on the economy of more than \$100,000,000.

Therefore, this rule is a significant regulatory action and is not an economically significant rule under Executive Order 12866. The Office of Management and Budget (OMB) has reviewed this rule under Executive Order 12866.

Executive Order 12898, Environmental Justice

Under Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, February 16, 1994, we incorporate environmental justice into our policies and programs. The Executive Order requires each Federal agency to conduct its programs, policies, and activities that substantially affect human health or the

environment, in a manner that ensures that those programs, policies, and activities do not have the effect of excluding persons from participation in our programs, denying persons the benefits of our programs, or subjecting persons to discrimination because of their race, color, or national origin.

No action that we can anticipate under the final rule will have a disproportionately high or adverse human health and environmental effect on any segment of the population. Section 322 focuses specifically on mitigation planning to: Identify the natural hazards, risks, and vulnerabilities of areas in States, localities, and tribal areas; support development of local mitigation plans; provide for technical assistance to local and tribal governments for mitigation planning; and identify and prioritize mitigation actions that the State will support, as resources become available. Section 323 requires compliance with applicable codes and standards in repair and construction, and use of safe land use and construction standards. Accordingly, the requirements of Executive Order 12898 do not apply to this interim final rule.

Paperwork Reduction Act of 1995

As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) and concurrent with the publication of this interim final rule, we have submitted a request for review and approval of a new collection of information, which is contained in this interim final rule. Under the Paperwork Reduction Act of 1995, a person may not be penalized for failing to comply with an information collection that does not display a currently valid Office of Management and Budget (OMB) control number. The request was submitted to OMB for approval under the emergency processing procedures in OMB regulation 5 CFR 1320.1. OMB has approved this collection of information for use through August 31, 2002, under OMB Number 3067-0297.

We expect to follow this emergency request with a request for OMB approval to continue the use of the collection of information for a term of three years. The request will be processed under OMB's normal clearance procedures in accordance with provisions of OMB regulation 5 CFR 1320.10. To help us with the timely processing of the emergency and normal clearance submissions to OMB, we invite the general public to comment on the collection of information. This notice and request for comments complies with the provisions of the Paperwork

Reduction Act of 1995 (44 U.S.C. 3506(c)(2)(A)).

Collection of Information

Title: State/Local/Tribal Hazard Mitigation Plans under Section 322 of the Disaster Mitigation Act of 2000.

Abstract: Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Section 104 of the Disaster Mitigation Act of 2000, provides new and revitalized approaches to mitigation planning. To obtain Federal assistance, new planning provisions require that each state, local, and tribal government prepare a hazard mitigation plan to include sections that describe the planning process, an assessment of the risks, a mitigation strategy, and identification of the plan maintenance and updating process. The Act provides a framework for linking pre- and post-disaster mitigation planning and initiatives with public and

private interests to ensure an integrated, comprehensive approach to disaster loss reduction. Under Section 322 there is a two-tiered State mitigation plan process. State mitigation plans must be reviewed, revised, and submitted to us every 3 years.

(1) A *Standard State Mitigation Plan* must be approved by us in order for States to be eligible to receive Hazard Mitigation Grant Program (HGMP) funding based on 15 percent of the total estimated eligible Federal disaster assistance. This plan demonstrates the State's goals, priorities, and commitment to reduce risks from natural hazards and serves as a guide for State and local decision makers as they commit resources to reducing the effects of natural hazards.

(2) An *Enhanced State Mitigation Plan* must be approved by us for a State to be eligible to receive HMGP funds based on 20 percent of the total

estimated eligible Federal disaster assistance. This plan must be approved by us within the 3 years prior to the current major disaster declaration. It must demonstrate that a State has developed a comprehensive mitigation program, is effectively using available mitigation funding, and is capable of managing the increased funding.

To be eligible to receive HMGP project grants, *local governments* must develop Local Mitigation Plans that include a risk assessment and mitigation strategy to reduce potential losses and target resources. Plans must be reviewed, revised, and submitted to us for approval every 5 years.

To receive HMGP project grants, *tribal governments* may apply as a grantee or subgrantee, and will be required to meet the planning requirements of a State or local government.

Estimated Total Annual Burden:

Type of collection/forms	No. of respondents	Hours per response	Annual burden hours
Update state or tribal mitigation plans (standard state mitigation plans)	18	320	5,760
State review of local plans	500 local plans	8	4,000
States develop Enhanced State Mitigation Plans	7	100	700
Local or tribal governments develop mitigation plans	500 local plans	300	150,000
Total burden	160,460

Comments: We are soliciting written comments to: (a) Evaluate whether the proposed data collection is necessary for the proper performance of the agency, including whether the information shall have practical utility; (b) evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information; (c) obtain recommendations to enhance the quality, utility, and clarity of the information to be collected; and (d) evaluate the extent to which automated, electronic, mechanical, or other technological collection techniques may further reduce the respondents' burden. FEMA will accept comments through April 29, 2002.

Addressee: Interested persons should submit written comments to Muriel B. Anderson, Chief, Records Management Section, Program Services and Systems Branch, Facilities Management and Services Division, Administration and Resource Planning Directorate, Federal Emergency Management Agency, 500 C Street, Street, SW., Washington, DC 20472.

FOR FURTHER INFORMATION CONTACT: You may obtain copies of the OMB paperwork clearance package by

contacting Ms. Anderson at (202) 646-2625 (voice), (202) 646-3347 (facsimile), or by e-mail at muriel.anderson@fema.gov.

Executive Order 13132, Federalism

Executive Order 13132, Federalism, dated August 4, 1999, sets forth principles and criteria that agencies must adhere to in formulating and implementing policies that have federalism implications, that is, regulations that have substantial direct effects on the States, or on the distribution of power and responsibilities among the various levels of government. Federal agencies must closely examine the statutory authority supporting any action that would limit the policymaking discretion of the States, and to the extent practicable, must consult with State and local officials before implementing any such action.

We have reviewed this rule under E.O.13132 and have concluded that the rule does not have federalism implications as defined by the Executive Order. We have determined that the rule does not significantly affect the rights, roles, and responsibilities of States, and involves no preemption of State law nor

does it limit State policymaking discretion.

However, we have consulted with State and local officials. In order to assist us in the development of this rule, we hosted a meeting to allow interested parties an opportunity to provide their perspectives on the legislation and options for implementation of § 322. Stakeholders who attended the meeting included representatives from the National Emergency Management Association, the Association of State Floodplain Managers, the National Governors' Association, the International Association of Emergency Managers, the National Association of Development Organizations, the American Public Works Association, the National League of Cities, the National Association of Counties, the National Conference of State Legislatures, the International City/County Management Association, and the Bureau of Indian Affairs. We received valuable input from all parties at the meeting, which we took into account in the development of this rule. Additionally, we actively encourage and solicit comments on this interim final rule from interested parties, and we will

consider them in preparing the final rule.

Executive Order 13175, Consultation and Coordination With Indian Tribal Governments

We have reviewed this interim final rule under Executive Order 13175, which became effective on February 6, 2001. Under the Hazard Mitigation Grant Program (HMGP), Indian tribal governments will have the option to apply for grants directly to us and to serve as “grantee”, carrying out “State” roles. If they choose this option, tribal governments may submit either a State-level Standard Mitigation Plan for the 15 percent HMGP funding or a State-level Enhanced Mitigation Plan for 20 percent HMGP funding. In either case, Indian tribal governments would be able to spend up to 7 percent of those funds on planning. Before developing this rule, we met with representatives from State and local governments and the Bureau of Indian Affairs, to discuss the new planning opportunities and requirements of § 322 of the Stafford Act. We received valuable input from all parties, which helped us to develop this interim final rule.

In reviewing the interim final rule, we find that it does not have “tribal implications” as defined in Executive Order 13175 because it will not have a substantial direct effect on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes. Moreover, the interim final rule does not impose substantial direct compliance costs on tribal governments, nor does it preempt tribal law, impair treaty rights or limit the self-governing powers of tribal governments.

Congressional Review of Agency Rulemaking

We have sent this interim final rule to the Congress and to the General Accounting Office under the Congressional Review of Agency Rulemaking Act, Public Law 104–121. The rule is a not “major rule” within the meaning of that Act. It is an administrative action in support of normal day-to-day mitigation planning activities required by section 322 and compliance under section 323 of the Stafford Act, as enacted in DMA 2000.

The rule will not result in a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions. It will not have “significant adverse effects” on competition, employment, investment,

productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises. This final rule is subject to the information collection requirements of the Paperwork Reduction Act, and OMB has assigned Control No. 3067–0297. The rule is not an unfunded Federal mandate within the meaning of the Unfunded Mandates Reform Act of 1995, Public Law 104–4, and any enforceable duties that we impose are a condition of Federal assistance or a duty arising from participation in a voluntary Federal program.

List of Subjects in 44 CFR Part 201 and Part 206

Administrative practice and procedure, Disaster assistance, Grant programs, Mitigation planning, Reporting and recordkeeping requirements.

Accordingly, Amend 44 CFR, Subchapter D—Disaster Assistance, as follows:

1. Add Part 201 to read as follows:

PART 201—MITIGATION PLANNING

Sec.

- 201.1 Purpose.
- 201.2 Definitions.
- 201.3 Responsibilities.
- 201.4 Standard State Mitigation Plans.
- 201.5 Enhanced State Mitigation Plans.
- 201.6 Local Mitigation Plans.

Authority: Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121–5206; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127, 44 FR 19367, 3 CFR, 1979 Comp., p. 376; E.O. 12148, 44 FR 43239, 3 CFR, 1979 Comp., p. 412; and E.O. 12673, 54 FR 12571, 3 CFR, 1989 Comp., p. 214.

§ 201.1 Purpose.

(a) The purpose of this part is to provide information on the policies and procedures for mitigation planning as required by the provisions of section 322 of the Stafford Act, 42 U.S.C. 5165.

(b) The purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources.

§ 201.2 Definitions.

Grantee means the government to which a grant is awarded, which is accountable for the use of the funds provided. The grantee is the entire legal entity even if only a particular component of the entity is designated in the grant award document. Generally,

the State is the grantee. However, after a declaration, an Indian tribal government may choose to be a grantee, or may act as a subgrantee under the State. An Indian tribal government acting as grantee will assume the responsibilities of a “state”, as described in this part, for the purposes of administering the grant.

Hazard mitigation means any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

Hazard Mitigation Grant Program means the program authorized under section 404 of the Stafford Act, 42 U.S.C. 5170c and implemented at 44 CFR Part 206, Subpart N, which authorizes funding for certain mitigation measures identified through the evaluation of natural hazards conducted under section 322 of the Stafford Act 42 U.S.C. 5165.

Indian tribal government means any Federally recognized governing body of an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

Local government is any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Managing State means a State to which FEMA has delegated the authority to administer and manage the HMGP under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c). FEMA may also delegate authority to tribal governments to administer and manage the HMGP as a Managing State.

Regional Director is a director of a regional office of FEMA, or his/her designated representative.

Small and impoverished communities means a community of 3,000 or fewer individuals that is identified by the State as a rural community, and is not a remote area within the corporate boundaries of a larger city; is economically disadvantaged, by having an average per capita annual income of residents not exceeding 80 percent of national, per capita income, based on

best available data; the local unemployment rate exceeds by one percentage point or more, the most recently reported, average yearly national unemployment rate; and any other factors identified in the State Plan in which the community is located.

The Stafford Act refers to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended (42 U.S.C. 5121-5206).

State is any State of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

State Hazard Mitigation Officer is the official representative of State government who is the primary point of contact with FEMA, other Federal agencies, and local governments in mitigation planning and implementation of mitigation programs and activities required under the Stafford Act.

Subgrantee means the government or other legal entity to which a subgrant is awarded and which is accountable to the grantee for the use of the funds provided. Subgrantees can be a State agency, local government, private non-profit organizations, or Indian tribal government. Indian tribal governments acting as a subgrantee are accountable to the State grantee.

§ 201.3 Responsibilities.

(a) *General*. This section identifies the key responsibilities of FEMA, States, and local/tribal governments in carrying out section 322 of the Stafford Act, 42 U.S.C. 5165.

(b) *FEMA*. The key responsibilities of the Regional Director are to:

(1) Oversee all FEMA related pre- and post-disaster hazard mitigation programs and activities;

(2) Provide technical assistance and training to State, local, and Indian tribal governments regarding the mitigation planning process;

(3) Review and approve all Standard and Enhanced State Mitigation Plans;

(4) Review and approve all local mitigation plans, unless that authority has been delegated to the State in accordance with § 201.6(d);

(5) Conduct reviews, at least once every three years, of State mitigation activities, plans, and programs to ensure that mitigation commitments are fulfilled, and when necessary, take action, including recovery of funds or denial of future funds, if mitigation commitments are not fulfilled.

(c) *State*. The key responsibilities of the State are to coordinate all State and

local activities relating to hazard evaluation and mitigation and to:

(1) Prepare and submit to FEMA a Standard State Mitigation Plan following the criteria established in § 201.4 as a condition of receiving Stafford Act assistance (except emergency assistance).

(2) In order to be considered for the 20 percent HMGP funding, prepare and submit an Enhanced State Mitigation Plan in accordance with § 201.5, which must be reviewed and updated, if necessary, every three years from the date of the approval of the previous plan.

(3) At a minimum, review and, if necessary, update the Standard State Mitigation Plan by November 1, 2003 and every three years from the date of the approval of the previous plan in order to continue program eligibility.

(4) Make available the use of up to the 7 percent of HMGP funding for planning in accordance with § 206.434.

(5) Provide technical assistance and training to local governments to assist them in applying for HMGP planning grants, and in developing local mitigation plans.

(6) For Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c), review and approve local mitigation plans in accordance with § 201.6(d).

(d) *Local governments*. The key responsibilities of local governments are to:

(1) Prepare and adopt a jurisdiction-wide natural hazard mitigation plan as a condition of receiving project grant funds under the HMGP, in accordance with § 201.6.

(2) At a minimum, review and, if necessary, update the local mitigation plan every five years from date of plan approval to continue program eligibility.

(e) *Indian tribal governments*. Indian tribal governments will be given the option of applying directly to us for Hazard Mitigation Grant Program funding, or they may choose to apply through the State. If they apply directly to us, they will assume the responsibilities of the State, or grantee, and if they apply through the State, they will assume the responsibilities of the local government, or subgrantee.

§ 201.4 Standard State Mitigation Plans.

(a) *Plan requirement*. By November 1, 2003, States must have an approved Standard State Mitigation plan meeting the requirements of this section, in order to receive assistance under the Stafford Act, although assistance authorized under disasters declared prior to November 1, 2003 will continue

to be made available. In any case, emergency assistance provided under 42 U.S.C. 5170a, 5170b, 5173, 5174, 5177, 5179, 5180, 5182, 5183, 5184, 5192 will not be affected. The mitigation plan is the demonstration of the State's commitment to reduce risks from natural hazards and serves as a guide for State decision makers as they commit resources to reducing the effects of natural hazards. States may choose to include the requirements of the HMGP Administrative Plan in their mitigation plan.

(b) *Planning process*. An effective planning process is essential in developing and maintaining a good plan. The mitigation planning process should include coordination with other State agencies, appropriate Federal agencies, interested groups, and be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives.

(c) *Plan content*. To be effective the plan must include the following elements:

(1) Description of the *planning process* used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.

(2) *Risk assessments* that provide the factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the State to compare potential losses throughout the State and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments. The risk assessment shall include the following:

(i) An overview of the type and location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate;

(ii) An overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the State risk assessment. The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. State owned critical or operated facilities located in the

identified hazard areas shall also be addressed;

(iii) An overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment. The State shall estimate the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.

(3) A *Mitigation Strategy* that provides the State's blueprint for reducing the losses identified in the risk assessment. This section shall include:

(i) A description of State goals to guide the selection of activities to mitigate and reduce potential losses.

(ii) A discussion of the State's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas; a discussion of State funding capabilities for hazard mitigation projects; and a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.

(iii) An identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy. This section should be linked to local plans, where specific local actions and projects are identified.

(iv) Identification of current and potential sources of Federal, State, local, or private funding to implement mitigation activities.

(4) A section on the *Coordination of Local Mitigation Planning* that includes the following:

(i) A description of the State process to support, through funding and technical assistance, the development of local mitigation plans.

(ii) A description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan.

(iii) Criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which should include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures. Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according

to a cost benefit review of proposed projects and their associated costs.

(5) A *Plan Maintenance Process* that includes:

(i) An established method and schedule for monitoring, evaluating, and updating the plan.

(ii) A system for monitoring implementation of mitigation measures and project closeouts.

(iii) A system for reviewing progress on achieving goals as well as activities and projects identified in the Mitigation Strategy.

(6) A *Plan Adoption Process*. The plan must be formally adopted by the State prior to submittal to us for final review and approval.

(7) *Assurances*. The plan must include assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

(d) *Review and updates*. Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities and resubmitted for approval to the appropriate Regional Director every three years. The Regional review will be completed within 45 days after receipt from the State, whenever possible. We also encourage a State to review its plan in the post-disaster timeframe to reflect changing priorities, but it is not required.

§ 201.5 Enhanced State Mitigation Plans.

(a) A State with a FEMA approved Enhanced State Mitigation Plan at the time of a disaster declaration is eligible to receive increased funds under the HMGP, based on twenty percent of the total estimated eligible Stafford Act disaster assistance. The Enhanced State Mitigation Plan must demonstrate that a State has developed a comprehensive mitigation program, that the State effectively uses available mitigation funding, and that it is capable of managing the increased funding. In order for the State to be eligible for the 20 percent HMGP funding, FEMA must have approved the plan within three years prior to the disaster declaration.

(b) Enhanced State Mitigation Plans must include all elements of the Standard State Mitigation Plan identified in § 201.4, as well as document the following:

(1) Demonstration that the plan is integrated to the extent practicable with other State and/or regional planning

initiatives (comprehensive, growth management, economic development, capital improvement, land development, and/or emergency management plans) and FEMA mitigation programs and initiatives that provide guidance to State and regional agencies.

(2) Documentation of the State's project implementation capability, identifying and demonstrating the ability to implement the plan, including:

(i) Established eligibility criteria for multi-hazard mitigation measures.

(ii) A system to determine the cost effectiveness of mitigation measures, consistent with OMB Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, and to rank the measures according to the State's eligibility criteria.

(iii) Demonstration that the State has the capability to effectively manage the HMGP as well as other mitigation grant programs, including a record of the following:

(A) Meeting HMGP and other mitigation grant application timeframes and submitting complete, technically feasible, and eligible project applications with appropriate supporting documentation;

(B) Preparing and submitting accurate environmental reviews and benefit-cost analyses;

(C) Submitting complete and accurate quarterly progress and financial reports on time; and

(D) Completing HMGP and other mitigation grant projects within established performance periods, including financial reconciliation.

(iv) A system and strategy by which the State will conduct an assessment of the completed mitigation actions and include a record of the effectiveness (actual cost avoidance) of each mitigation action.

(3) Demonstration that the State effectively uses existing mitigation programs to achieve its mitigation goals.

(4) Demonstration that the State is committed to a comprehensive state mitigation program, which might include any of the following:

(i) A commitment to support local mitigation planning by providing workshops and training, State planning grants, or coordinated capability development of local officials, including Emergency Management and Floodplain Management certifications.

(ii) A statewide program of hazard mitigation through the development of legislative initiatives, mitigation councils, formation of public/private

partnerships, and/or other executive actions that promote hazard mitigation.

(iii) The State provides a portion of the non-Federal match for HMGP and/or other mitigation projects.

(iv) To the extent allowed by State law, the State requires or encourages local governments to use a current version of a nationally applicable model building code or standard that addresses natural hazards as a basis for design and construction of State sponsored mitigation projects.

(v) A comprehensive, multi-year plan to mitigate the risks posed to existing buildings that have been identified as necessary for post-disaster response and recovery operations.

(vi) A comprehensive description of how the State integrates mitigation into its post-disaster recovery operations.

(c) *Review and updates.* (1) A State must review and revise its plan to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities, and resubmit it for approval to the appropriate Regional Director every three years. The Regional review will be completed within 45 days after receipt from the State, whenever possible.

(2) In order for a State to be eligible for the 20 percent HMGP funding, the Enhanced State Mitigation plan must be approved by FEMA within the three years prior to the current major disaster declaration.

§ 201.6 Local Mitigation Plans.

The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

(a) *Plan requirement.* (1) For disasters declared after November 1, 2003, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants. Until November 1, 2003, local mitigation plans may be developed concurrent with the implementation of the project grant.

(2) Regional Directors may grant an exception to the plan requirement in extraordinary circumstances, such as in a small and impoverished community, when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after

notice of grant's termination will not be reimbursed by FEMA.

(3) Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan. State-wide plans will not be accepted as multi-jurisdictional plans.

(b) *Planning process.* An open public involvement process is essential to the development of an effective plan. 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.

(c) *Plan content.* The plan shall include the following:

(1) Documentation of 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.

(2) 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. The risk assessment shall include:

(i) A description of the type, 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.

(ii) 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. The plan should describe vulnerability in terms of:

(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section

and a description of the methodology used to prepare the estimate;

(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

(3) 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. This section shall include:

(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

(ii) 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.

(iii) An action plan describing how the actions identified in paragraph (c)(2)(ii) of this section 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.

(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

(4) A *plan maintenance process* that includes:

(i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

(ii) 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.

(iii) Discussion on how the community will continue public participation in the plan maintenance process.

(5) *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). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

(d) *Plan review.* (1) Plans must be submitted to the State Hazard Mitigation Officer for initial review and coordination. The State will then send the plan to the appropriate FEMA Regional Office for formal review and approval.

(2) The Regional review will be completed within 45 days after receipt from the State, whenever possible.

(3) Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years in order to continue to be eligible for HMGP project grant funding.

(4) Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c) will be delegated approval authority for local mitigation plans, and the review will be based on the criteria in this part. Managing States will review the plans within 45 days of receipt of the plans, whenever possible, and provide a copy of the approved plans to the Regional Office.

PART 206—FEDERAL DISASTER ASSISTANCE FOR DISASTERS DECLARED ON OR AFTER NOVEMBER 23, 1988

2. The authority citation for part 206 is revised to read as follows:

Authority: Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121–5206; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127, 44 FR 19367, 3 CFR, 1979 Comp., p. 376; E.O. 12148, 44 FR 43239, 3 CFR, 1979 Comp., p. 412; and E.O. 12673, 54 FR 12571, 3 CFR, 1989 Comp., p. 214.

2a. Revise Part 206, Subpart M to read as follows:

Subpart M—Minimum Standards

Sec.
206.400 General.
206.401 Local standards.
206.402 Compliance.

§ 206.400 General.

(a) As a condition of the receipt of any disaster assistance under the Stafford Act, the applicant shall carry out any repair or construction to be financed with the disaster assistance in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications and standards.

(b) Applicable codes, specifications, and standards shall include any disaster resistant building code that meets the minimum requirements of the National Flood Insurance Program (NFIP) as well as being substantially equivalent to the recommended provisions of the National Earthquake Hazards Reduction

Program (NEHRP). In addition, the applicant shall comply with any requirements necessary in regards to Executive Order 11988, Floodplain Management, Executive Order 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, and any other applicable Executive orders.

(c) In situations where there are no locally applicable standards of safety, decency and sanitation, or where there are no applicable local codes, specifications and standards governing repair or construction activities, or where the Regional Director determines that otherwise applicable codes, specifications, and standards are inadequate, then the Regional Director may, after consultation with appropriate State and local officials, require the use of nationally applicable codes, specifications, and standards, as well as safe land use and construction practices in the course of repair or construction activities.

(d) The mitigation planning process that is mandated by section 322 of the Stafford Act and 44 CFR part 201 can assist State and local governments in determining where codes, specifications, and standards are inadequate, and may need to be upgraded.

§ 206.401 Local standards.

The cost of repairing or constructing a facility in conformity with minimum codes, specifications and standards may be eligible for reimbursement under section 406 of the Stafford Act, as long as such codes, specifications and standards meet the criteria that are listed at 44 CFR 206.226(b).

§ 206.402 Compliance.

A recipient of disaster assistance under the Stafford Act must document for the Regional Director its compliance with this subpart following the completion of any repair or construction activities.

Subpart N—Hazard Mitigation Grant Program

3. Revise § 206.431 to read as follows:

§ 206.431 Definitions.

Activity means any mitigation measure, project, or action proposed to reduce risk of future damage, hardship, loss or suffering from disasters.

Applicant means a State agency, local government, Indian tribal government, or eligible private nonprofit organization, submitting an application to the grantee for assistance under the HMGP.

Enhanced State Mitigation Plan is the hazard mitigation plan approved under 44 CFR part 201 as a condition of receiving increased funding under the HMGP.

Grant application means the request to FEMA for HMGP funding, as outlined in § 206.436, by a State or tribal government that will act as grantee.

Grant award means total of Federal and non-Federal contributions to complete the approved scope of work.

Grantee means the government to which a grant is awarded and which is accountable for the use of the funds provided. The grantee is the entire legal entity even if only a particular component of the entity is designated in the grant award document. Generally, the State is the grantee. However, an Indian tribal government may choose to be a grantee, or it may act as a subgrantee under the State. An Indian tribal government acting as a grantee will assume the responsibilities of a “state”, under this subpart, for the purposes of administering the grant.

Indian tribal government means any Federally recognized governing body of an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

Local Mitigation Plan is the hazard mitigation plan required of a local or Indian tribal government acting as a subgrantee as a condition of receiving a project subgrant under the HMGP as outlined in 44 CFR 201.6.

Standard State Mitigation Plan is the hazard mitigation plan approved under 44 CFR part 201, as a condition of receiving Stafford Act assistance as outlined in § 201.4.

State Administrative Plan for the Hazard Mitigation Grant Program means the plan developed by the State to describe the procedures for administration of the HMGP.

Subgrant means an award of financial assistance under a grant by a grantee to an eligible subgrantee.

Subgrant application means the request to the grantee for HMGP funding by the eligible subgrantee, as outlined in § 206.436.

Subgrantee means the government or other legal entity to which a subgrant is awarded and which is accountable to the grantee for the use of the funds provided. Subgrantees can be a State agency, local government, private nonprofit organizations, or Indian tribal government as outlined in § 206.433.

Indian tribal governments acting as a subgrantee are accountable to the State grantee.

4. Revise § 206.432(b) to read as follows:

§ 206.432 Federal grant assistance.

* * * * *

(b) *Amounts of assistance.* The total of Federal assistance under this subpart shall not exceed either 15 or 20 percent of the total estimated Federal assistance (excluding administrative costs) provided for a major disaster under 42 U.S.C. 5170b, 5172, 5173, 5174, 5177, 5178, 5183, and 5201 as follows:

(1) *Fifteen (15) percent.* Effective November 1, 2003, a State with an approved Standard State Mitigation Plan, which meets the requirements outlined in 44 CFR 201.4, shall be eligible for assistance under the HMGP not to exceed 15 percent of the total estimated Federal assistance described in this paragraph. Until that date, existing, approved State Mitigation Plans will be accepted.

(2) *Twenty (20) percent.* A State with an approved Enhanced State Mitigation Plan, in effect prior to the disaster declaration, which meets the requirements outlined in 44 CFR 201.5 shall be eligible for assistance under the HMGP not to exceed 20 percent of the total estimated Federal assistance described in this paragraph.

(3) The estimates of Federal assistance under this paragraph (b) shall be based on the Regional Director's estimate of all eligible costs, actual grants, and appropriate mission assignments.

* * * * *

5. Section 206.434 is amended by redesignating paragraphs (b) through (g) as paragraphs (c) through (h), respectively; adding a new paragraph (b); revising redesignated paragraphs (c) introductory text and (c)(1); and revising redesignated paragraph (d) to read as follows:

§ 206.434 Eligibility.

* * * * *

(b) *Plan requirement.* (1) For all disasters declared on or after November 1, 2003, local and tribal government applicants for subgrants, must have an approved local mitigation plan in accordance with 44 CFR 201.6 prior to receipt of HMGP subgrant funding. Until November 1, 2003, local mitigation plans may be developed concurrent with the implementation of subgrants.

(2) Regional Directors may grant an exception to this requirement in extraordinary circumstances, such as in a small and impoverished community

when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after notice of grant's termination will not be reimbursed by FEMA.

(c) *Minimum project criteria.* To be eligible for the Hazard Mitigation Grant Program, a project must:

(1) Be in conformance with the State Mitigation Plan and Local Mitigation Plan approved under 44 CFR part 201;

* * * * *

(d) *Eligible activities.* (1) *Planning.* Up to 7% of the State's HMGP grant may be used to develop State, tribal and/or local mitigation plans to meet the planning criteria outlined in 44 CFR part 201.

(2) *Types of projects.* Projects may be of any nature that will result in protection to public or private property. Eligible projects include, but are not limited to:

- (i) Structural hazard control or protection projects;
- (ii) Construction activities that will result in protection from hazards;
- (iii) Retrofitting of facilities;
- (iv) Property acquisition or relocation, as defined in paragraph (e) of this section;
- (v) Development of State or local mitigation standards;
- (vi) Development of comprehensive mitigation programs with implementation as an essential component;
- (vii) Development or improvement of warning systems.

* * * * *

6. Revise § 206.435(a) to read as follows:

§ 206.435 Project identification and selection criteria.

(a) *Identification.* It is the State's responsibility to identify and select eligible hazard mitigation projects. All funded projects must be consistent with the State Mitigation Plan. Hazard Mitigation projects shall be identified and prioritized through the State, Indian tribal, and local planning process.

* * * * *

7. Revise § 206.436 to read as follows:

§ 206.436 Application procedures.

(a) *General.* This section describes the procedures to be used by the grantee in submitting an application for HMGP funding. Under the HMGP, the State or Indian tribal government is the grantee and is responsible for processing subgrants to applicants in accordance with 44 CFR part 13 and this part 206. Subgrantees are accountable to the grantee.

(b) *Governor's Authorized Representative.* The Governor's Authorized Representative serves as the grant administrator for all funds provided under the Hazard Mitigation Grant Program. The Governor's Authorized Representative's responsibilities as they pertain to procedures outlined in this section include providing technical advice and assistance to eligible subgrantees, and ensuring that all potential applicants are aware of assistance available and submission of those documents necessary for grant award.

(c) *Hazard mitigation application.* Upon identification of mitigation measures, the State (Governor's Authorized Representative) will submit its Hazard Mitigation Grant Program application to the FEMA Regional Director. The application will identify one or more mitigation measures for which funding is requested. The application must include a Standard Form (SF) 424, Application for Federal Assistance, SF 424D, Assurances for Construction Programs, if appropriate, and a narrative statement. The narrative statement will contain any pertinent project management information not included in the State's administrative plan for Hazard Mitigation. The narrative statement will also serve to identify the specific mitigation measures for which funding is requested. Information required for each mitigation measure shall include the following:

- (1) Name of the subgrantee, if any;
- (2) State or local contact for the measure;
- (3) Location of the project;
- (4) Description of the measure;
- (5) Cost estimate for the measure;
- (6) Analysis of the measure's cost-effectiveness and substantial risk reduction, consistent with § 206.434(c);
- (7) Work schedule;
- (8) Justification for selection;
- (9) Alternatives considered;
- (10) Environmental information consistent with 44 CFR part 9, Floodplain Management and Protection of Wetlands, and 44 CFR part 10, Environmental Considerations.

(d) *Application submission time limit.* The State's application may be amended as the State identifies and selects local project applications to be funded. The State must submit all local HMGP applications and funding requests for the purpose of identifying new projects to the Regional Director within 12 months of the date of disaster declaration.

(e) *Extensions.* The State may request the Regional Director to extend the application time limit by 30 to 90 day

increments, not to exceed a total of 180 days. The grantee must include a justification in its request.

(f) *FEMA approval.* The application and supplement(s) will be submitted to the FEMA Regional Director for approval. FEMA has final approval authority for funding of all projects.

(g) *Indian tribal grantees.* Indian tribal governments may submit a SF 424 directly to the Regional Director.

Subpart H—Public Assistance Eligibility

* * * * *

8. Revise § 206.220 to read as follows:

§ 206.220 General.

This subpart provides policies and procedures for determinations of eligibility of applicants for public assistance, eligibility of work, and eligibility of costs for assistance under sections 402, 403, 406, 407, 418, 419,

421(d), 502, and 503 of the Stafford Act. Assistance under this subpart must also conform to requirements of 44 CFR part 201, Mitigation Planning, and 44 CFR part 206, subparts G—Public Assistance Project Administration, I—Public Assistance Insurance Requirements, J—Coastal Barrier Resources Act, and M—Minimum Standards. Regulations under 44 CFR part 9—Floodplain Management and 44 CFR part 10—Environmental Considerations, also apply to this assistance.

9. Section 206.226 is amended by redesignating paragraphs

(b) through (j) as paragraphs (c) through (k), respectively; adding a new paragraph (b); and revising redesignated paragraph (g)(5) to read as follows:

§ 206.226 Restoration of damaged facilities.

* * * * *

(b) *Mitigation planning.* In order to receive assistance under this section, as

of November 1, 2003, the State must have in place a FEMA approved State Mitigation Plan in accordance with 44 CFR part 201.

* * * * *

(g) * * *

(5) If relocation of a facility is not feasible or cost effective, the Regional Director shall disapprove Federal funding for the original location when he/she determines in accordance with 44 CFR parts 9, 10, 201, or subpart M of this part 206, that restoration in the original location is not allowed. In such cases, an alternative project may be applied for.

* * * * *

Dated: February 19, 2002.

Michael D. Brown,
General Counsel.

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Hazard Mitigation Assistance Unified Guidance

Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program,
and Flood Mitigation Assistance Program

July 12, 2013



FEMA

Federal Emergency Management Agency
Department of Homeland Security
500 C Street, S.W.
Washington, DC 20472

Titles of Opportunities:

- ◆ Hazard Mitigation Grant Program (HMGP)
- ◆ Pre-Disaster Mitigation (PDM) Program
- ◆ Flood Mitigation Assistance (FMA)

Funding Opportunity Numbers:

The Catalog of Federal Domestic Assistance (CFDA) numbers for the three Hazard Mitigation Assistance (HMA) programs are:

- ◆ 97.039 Hazard Mitigation Grant Program (HMGP)
- ◆ 97.047 Pre-Disaster Mitigation (PDM) Program
- ◆ 97.029 Flood Mitigation Assistance (FMA)

Federal Agency Name:

U.S. Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)

Announcement Type:

Initial

CONTENTS

Part I. Funding Opportunity Description.....	1
A. Authorization and Appropriation.....	2
B. Additional Program Information.....	3
B.1 Programmatic Changes	4
Part II. Frontloading HMA Program Eligibility Requirements	9
A. Mitigation Planning	11
B. Technical Feasibility and Effectiveness.....	11
C. Floodplain Management and Protection of Wetlands.....	11
D. Environmental Planning and Historic Preservation Review and Compliance.....	12
E. Cost-effectiveness	12
F. Cost Review	12
G. Project Development.....	14
H. Advance Assistance	14
I. Strategic Funds Management.....	14
J. Project Monitoring	15
K. Closeout	15
Part III. Award Information.....	16
Part IV. Eligibility Information.....	17
A. Eligible Applicants.....	17
A.1 Eligible Subapplicants.....	17
B. Cost Sharing.....	18
B.1 Federal Funds Allowed to Be Used as Non-Federal Cost Share.....	20
B.2 Increased Cost of Compliance as Non-Federal Cost Share.....	20
C. Restrictions	20
C.1 Non-Discrimination Compliance	20
C.2 Conflict of Interest	21
C.3 Duplication of Programs	21
C.4 Duplication of Benefits	21
D. General Program Requirements.....	22
D.1 Eligible Activities.....	22
D.1.1 Mitigation Projects	23
D.1.2 Hazard Mitigation Planning	27
D.1.3 Management Costs	29

D.2	Ineligible Activities	30
D.3	Cost-effectiveness	31
D.4	Feasibility and Effectiveness.....	32
D.5	Hazard Mitigation Plan Requirement.....	32
D.5.1	Indian Tribal Government Hazard Mitigation Plan Requirement.....	34
D.5.2	Conformance with Hazard Mitigation Plans.....	34
D.6	Environmental Planning and Historic Preservation Requirement.....	34
D.6.1	Floodplain Management and Protection of Wetlands	35
D.7	National Flood Insurance Program Eligibility Requirements	35
D.7.1	Special Flood Hazard Area Requirements	36
D.8	Statutory, Regulatory, and Other Requirements	36
Part V.	Application and Submission Information	38
A.	Address to Request Application Package	38
B.	Content and Form of Application	38
C.	Submission Dates and Times	39
D.	Intergovernmental Review	39
E.	Funding Restrictions	39
E.1	HMGP Funding Restrictions.....	39
E.2	PDM Program Funding Restrictions.....	40
E.3	FMA Funding Restrictions.....	40
E.4	Management Costs Funding Restrictions.....	40
F.	Other Submission Requirements.....	41
F.1	Application Consideration under Multiple HMA Programs	41
F.2	Pre-Award Costs	41
G.	Applicant Guidance	41
G.1	General Applicant Guidance	41
G.2	Minimum Eligibility and Completeness Criteria	42
H.	Scope of Work	43
H.1	Project Scope of Work	43
H.2	Hazard Mitigation Planning Scope of Work.....	44
H.3	Management Costs Scope of Work.....	46
H.4	Schedule	46
H.5	Cost Estimate.....	46
H.5.1	Project Cost Estimate	47
H.5.2	Hazard Mitigation Planning Cost Estimate.....	47
H.5.3	Management Cost Estimate.....	48
I.	Cost-effectiveness	48

I.1	Substantial Damage Waiver	48
I.2	Aggregation.....	49
I.3	5 Percent Initiative	49
I.4	Pre-calculated Benefits (Safe rooms).....	49
I.5	Greatest Savings to the Fund.....	49
I.6	Environmental Benefits.....	49
I.7	Benefit-Cost Analysis Resources	50
J.	Feasibility and Effectiveness Documentation.....	50
K.	Environmental Planning and Historic Preservation Documentation	51
Part VI.	Application Review Information	54
A.	Review Criteria	54
A.1	Application Review	54
A.2	Cost-effectiveness Review	54
A.3	Feasibility and Effectiveness Review	54
A.4	Environmental Planning and Historic Preservation Review	55
A.5	HMA Efficiencies	55
A.5.1	Safe Room Projects	55
A.5.2	Wind Retrofit Projects.....	56
A.5.3	Certain Flood Mitigation Projects.....	56
B.	Review and Selection Process	56
B.1	Technical Review	56
B.2	Requests for Information.....	56
B.2.1	Request for Information Timelines	57
B.3	Selection	59
B.4	Notification.....	59
B.5	Reconsideration Process.....	59
B.5.1	Consideration of Additional Information.....	60
Part VII.	Award Administration Information	61
A.	Notice of Award.....	61
B.	Administrative and National Policy Requirements.....	61
B.1	Cost-Share Documentation	61
B.2	Scope of Work Changes.....	62
B.3	Budget Changes.....	62
B.3.1	Non-construction Projects.....	62
B.3.2	Construction Projects	62
B.3.3	Cost Overruns and Underruns	62

B.4	Program Period of Performance	63
B.4.1	Extensions	63
B.5	Requests for Advances and Reimbursements	63
B.5.1	Strategic Funds Management	64
B.6	Program Income	64
B.7	Federal Income Tax on Mitigation Project Funds	64
B.8	Noncompliance	65
C.	Reporting Requirements	65
C.1	Federal Financial Reports	65
C.2	Performance Reports	66
C.3	Final Reports	67
D.	Closeout	67
D.1	Subgrant Closeout	67
D.2	Grant Closeout	68
D.2.1	Update of Repetitive Loss Database	69
Part VIII. FEMA Contacts.....		71
Part IX. Additional Program Guidance.....		72
A.	Hazard Mitigation Grant Program	72
A.1	Grantee Request for HMGP Funds	72
A.2	State Administrative Plan	72
A.2.1	Designation of Grantee and SHMO	73
A.2.2	Staffing Requirements and the Mitigation Team	73
A.2.3	Procedures to Guide Implementation Activities	74
A.2.4	Sliding Scale	74
A.2.5	Management Costs	75
A.2.6	Submission and Approval Deadlines	75
A.3	HMGP Funding	75
A.4	HMGP Management Costs	76
A.5	Eligible Subapplicants	77
A.6	Submission of HMGP Subapplications	78
A.7	Grant Cost-share Requirements	78
A.8	Post-Disaster Code Enforcement Projects	79
A.9	Advance Assistance	80
A.10	Phased Projects	82
A.10.1	Pre-Screening Process	83
A.10.2	Phase I Conditional Approval	83

A.10.3 Phase II Approval-Construction Process.....	84
A.11 The 5 Percent Initiative	84
A.11.1 Availability of Additional Funds for Tornado Mitigation.....	85
A.12 Appeal Process	85
B. Pre-Disaster Mitigation Program	87
B.1 Allocation	87
B.2 Small Impoverished Communities	87
B.3 Information Dissemination.....	87
B.4 Applicant Ranking of Subapplications.....	88
B.5 Selection	88
C. Flood Mitigation Assistance Program	89
C.1 Eligible Properties	89
C.2 Repetitive Loss Strategy.....	89
C.3 Cost Sharing	90
C.4 Applicant Ranking of Subapplications.....	90
C.5 Selection	90
Part X. Appendices	92
A. Acronyms.....	92
B. Glossary	95
C. Additional Resources	103
D. Referenced Regulations, Statutes, Directives, and Guidance	107
E. Eligibility and Completeness Review Checklist for Project Subapplications	117
F. Safe Room Application Using Pre-Calculated Benefits	120
G. Generator FAQ.....	125
H. Eligibility and Completeness Review Checklist for Planning Subapplications	133
I. EHP Checklist.....	135
J. 8-Step Decision Making Process for Floodplain Management Considerations	137
K. Section 106 Process under the National Historic Preservation Act.....	138
L. Application for Advance Assistance.....	140

List of Figures

Figure 1: Overall Project Lifecycle.....9
Figure 2: General Steps in Project Scoping Process.....10
Figure 3: Frontloading EHP Considerations and the NEPA Process13
Figure 4: RFI Flowchart.....58

List of Tables

Table 1: Eligible Subapplicants18
Table 2: Cost-Share Requirements19
Table 3: Eligible Activities by Program23
Table 4: Green Open Space and Riparian Benefits50
Table 5: RFI Timelines57
Table 6: FEMA Regions71

PART I. FUNDING OPPORTUNITY DESCRIPTION

Part I of the Hazard Mitigation Assistance (HMA) Unified Guidance introduces the three HMA programs and outlines the organization of the document.

The U.S. Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA) HMA programs present a critical opportunity to reduce the risk to individuals and property from natural hazards while simultaneously reducing reliance on Federal disaster funds. On March 30, 2011, the President signed Presidential Policy Directive 8: National Preparedness (PPD-8), and the National Mitigation Framework was finalized in May 2013. The National Mitigation Framework comprises seven core capabilities, including Threats and Hazard Identification, Risk and Disaster Resilience Assessment, Planning, Community Resilience, Public Information and Warning, Long-term Vulnerability Reduction, and Operational Coordination. HMA programs provide funding for eligible activities that are consistent with the National Mitigation Framework's Long-term Vulnerability Reduction capability. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.

Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. Accordingly, States, Territories, Indian Tribal governments, and communities are encouraged to take advantage of funding that HMA programs provide in both the pre- and post-disaster timelines.

Together, these programs provide significant opportunities to reduce or eliminate potential losses to State, Indian Tribal government, and local assets through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent.

The Hazard Mitigation Grant Program (HMGP) provides funds to States, Territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Presidential major disaster declaration. The Pre-Disaster Mitigation (PDM) Program and Flood Mitigation Assistance (FMA) programs provide funds annually to States, Territories, Indian Tribal governments, and local governments. Although the statutory origins of the programs

differ, both share the common goal of reducing the risk of loss of life and property due to natural hazards.

This guidance applies to HMGP funds available for disasters declared on or after the date of publication. The guidance in this document is subject to change based on new laws or regulations enacted after publication. This guidance is applicable to the PDM and FMA programs; the application cycles are announced via <http://www.grants.gov/>. For additional information, please contact FEMA.

State, Territory, or Indian Tribal governments are eligible Applicants for HMA programs. The Applicant is responsible for soliciting subapplications from eligible subapplicants, assisting in the preparation of them, and submitting eligible, complete applications to FEMA in priority order. HMA grant funds are awarded to Applicants. When funding is awarded, the Applicant then becomes the “Grantee” and is accountable for the use of the funds, responsible for administering the grant, and responsible for complying with program requirements and other applicable Federal, State, Territorial, and Indian Tribal laws and regulations. As the Grantee, the Applicant is also responsible for financial management of the program and overseeing all approved projects. In general, the “subapplicant” is a State-level agency, Indian Tribal government, local government, or other eligible entity that submits a subapplication for FEMA assistance to the Applicant. If HMA funding is awarded, the subapplicant becomes the “subgrantee” and is responsible for managing the subgrant and complying with program requirements and other applicable Federal, State, Territorial, Indian Tribal, and local laws and regulations. An Indian Tribal government may participate as either the Applicant/Grantee or the subapplicant/subgrantee (see [Part IV, A](#)). For **HMGP**, “subapplicant” has the same meaning given to the term “Applicant” in the HMGP regulations at Title 44 of the Code of Federal Regulations (CFR) Part 206.431.

A. Authorization and Appropriation

HMGP is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, U.S. Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Indian Tribal governments may also submit a request for a major disaster declaration within their impacted area. The amount of HMGP funding available to the Applicant is based upon the estimated total of Federal assistance, subject to the sliding scale formula outlined in 44 CFR Section 206.432(b) that FEMA provides for disaster recovery under the Presidential major disaster declaration. The formula provides for up to 15 percent of the first \$2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between \$2 billion and \$10 billion, and up to 7.5 percent for amounts between \$10 billion and \$35.333 billion. For States with enhanced

plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed \$35.333 billion.

The **PDM** Program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The PDM Program is designed to assist States, Territories, Indian Tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters.

The **FMA** program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

The National Flood Insurance Fund (NFIF) provides the funding for the FMA program. The PDM and FMA programs are subject to the availability of appropriation funding, as well as any program-specific directive or restriction made with respect to such funds.

More information about each program can be found on the FEMA HMA Web site at <https://www.fema.gov/hazard-mitigation-assistance>.

B. Additional Program Information

This guidance consolidates the common requirements for all HMA programs and explains the unique elements of the programs in individual sections. Additionally, it provides information for Federal, State, Indian Tribal, and local officials on how to apply for HMA funding for a proposed mitigation activity.

The organization of this HMA Unified Guidance provides clarity and ease of use by presenting information common to all programs in general order of the grant life cycle. As a result, closely related topics may be presented in different sections of the guidance. This guidance is organized in the following manner:

- ◆ [Part I](#), Funding Opportunity Description, introduces the HMA programs;
- ◆ [Part II](#), Frontloading HMA Program Eligibility Requirements, provides general information to facilitate project scoping and the overall decision-making process;
- ◆ [Part III](#), Award Information, provides information about available funding and application deadlines;
- ◆ [Part IV](#), Eligibility Information, provides information about eligible Applicants and subapplicants, cost-sharing requirements, and other program requirements;
- ◆ [Part V](#), Application and Submission Information, provides information regarding application development including funding restrictions;

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- ◆ [Part VI](#), Application Review Information, summarizes the FEMA review and selection process;
 - ◆ [Part VII](#), Award Administration Information, highlights grants management requirements from the time an award is made through closeout;
 - ◆ [Part VIII](#), FEMA Contacts, provides Regional and State contact information;
 - ◆ [Part IX](#), Additional Program Guidance, provides information that is unique to each program; and
 - ◆ [Part X](#), Appendices, includes acronyms, a glossary, additional resources, and referenced regulations and statutes.
 - ◆ Additional guidance for particular activity types is provided as an Addendum to this guidance. This additional guidance provides information specific to property acquisition and structure demolition or relocation, wildfire mitigation, safe room construction, mitigation reconstruction, and structure elevation projects.

B.1 Programmatic Changes

Although many of the specific requirements of each program remain the same, significant revisions to programmatic requirements included in this HMA Unified Guidance are:

- ◆ Per the Sandy Recovery Improvement Act of 2013 (SRIA), Indian Tribal governments can submit a request for a major disaster declaration within their impacted areas;
- ◆ A new [Part II](#) has been created to outline the importance of “frontloading” HMA program requirements in the project scoping and development process;
- ◆ The Biggert-Waters Flood Insurance Reform Act of 2012 eliminated the Repetitive Flood Claims and Severe Repetitive Loss programs and made the following significant changes to the FMA program:
 - The definitions of repetitive loss and severe repetitive loss properties have been modified ([Part IX, C.1](#));
 - There is no longer a State cap of \$10 million or a community cap of \$3.3 million for any 5-year period;
 - There is no longer a limit on in-kind contributions for the non-Federal cost share (previously limited to one-half of the non-Federal share);
 - Mitigation reconstruction is an eligible activity;
 - Cost-share requirements have changed to allow more Federal funds for properties with repetitive flood claims and severe repetitive loss properties ([Part IV, B](#));

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- The development or update of mitigation plans shall not exceed \$50,000 Federal share to any Applicant or \$25,000 Federal share to any subapplicant ([Part V, E.3](#)); and
 - There is no longer a restriction that a planning grant can only be awarded not more than once every 5 years to a State or community.
- ◆ For Duplication of Benefits (DOB), HMA does not require that property owners seek assistance from other sources (with the exception of insurance);
 - ◆ However, other assistance anticipated or received must be reported ([Part IV, C.4](#)). A Privacy Act notice is required to be provided to homeowners participating in mitigation projects;
 - ◆ For **HMGP**, the purchase and installation of stand-alone generators are eligible under regular HMGP funding if they protect a critical facility and meet all other program eligibility criteria ([Part IV, D.1.1](#));
 - ◆ For **HMGP** and the **PDM Program**, generators and/or related equipment purchases (e.g., generator hook-ups) that are not stand-alone are considered eligible when the generator and related equipment directly relates to the hazard being mitigated and is part of a more comprehensive project ([Part IV, D.1.1](#));
 - ◆ For non-structural retrofits, the elevation of utilities is an eligible activity ([Part IV, D.1.1](#));
 - ◆ FEMA Policy 104-008-01, “Hazard Mitigation Assistance for Wind Retrofit Projects for Existing Residential Buildings” dated November 16, 2012, has been incorporated ([Part IV, D.1.1](#)). With the release of this HMA Unified Guidance, the policy has been superseded;
 - ◆ A mitigation planning subgrant award can result in a mitigation plan adopted by the jurisdiction(s) and approved by FEMA or it can also include planning-related activities as outlined in 44 CFR Parts 201 and 206 ([Part IV, D.1.2](#));
 - ◆ FEMA Mitigation Planning Memorandum (MT-PL) #2 “Guidance For FEMA Regional Directors Regarding “Extraordinary Circumstances” under which an HMGP Project Grant may be awarded to Local Jurisdictions without an Approved Local Mitigation Plan” dated October 28, 2005, has been incorporated. With the release of this HMA Unified Guidance, the memo has been superseded;
 - ◆ For **PDM** and **FMA** project subgrants, the Region may apply extraordinary circumstances, when justification is provided, with concurrence received from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) prior to granting an exception ([Part IV, D.5](#));
 - ◆ For the PDM Program, the Federal share to update a hazard mitigation plan has been reduced to \$300,000 ([Part V, E.2](#));
 - ◆ Applications must contain minimal information in order for FEMA to be able to make a general eligibility determination ([Part V, G.2](#));

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- ◆ Applications or subapplications submitted to FEMA that do not contain the minimal eligibility criteria are subject to immediate denial ([Part V, G.2](#));
 - ◆ Greatest Savings to the Fund (GSTF) extends to properties under HMA ([Part V, I](#));
 - ◆ An expedited cost-effectiveness methodology (substantial damage waiver) is available for property acquisition projects when certain conditions are met under all HMA programs; this was previously limited to HMGP ([Part V, I](#));
 - ◆ FEMA Policy 108-024-01, “Consideration of Environmental Benefits in the Evaluation of Acquisition Projects under the Hazard Mitigation Assistance (HMA) Programs” dated June 18, 2013, has been incorporated ([Part V, I](#)). With the release of this HMA Unified Guidance, this policy has been incorporated;
 - ◆ Green open space and riparian area benefits can now be included in the project benefit cost ratio (BCR) once the project BCR reaches 0.75 or greater. The inclusion of environmental benefits in the project BCR is limited to acquisition-related activities;
 - ◆ FEMA recommends several HMA efficiencies to facilitate FEMA review and approval ([Part VI, A.5](#));
 - ◆ FEMA provides timelines for Applicants to comply with requests for information (RFI) ([Part VI, B.2.1](#));
 - ◆ FEMA clarifies the consideration of additional information in support of a subapplication ([Part VI, B.5](#));
 - ◆ FEMA clarifies that requests for Scope of Work Changes must address the need for the change through a revised scope, schedule, and budget ([Part VII, B.2](#));
 - ◆ FEMA clarifies when prior FEMA approval is needed for a budget change ([Part VII, B.3](#));
 - ◆ With the publication of this HMA Unified Guidance, the Period of Performance (POP) for the programs begins with the opening of the application period and ends no later than 36 months from the close of the application period. All requests to extend the grant POP beyond 12 months from the original grant POP termination date must be approved by FEMA Headquarters ([Part VII, B.4](#));
 - ◆ FEMA may elect to provide funding for certain projects in incremental amounts (Strategic Funds Management [SFM]) ([Part VII, B.5.1](#));
 - ◆ The Grantee must notify FEMA of each property for which settlement was completed in that quarter ([Part VII, C.2](#));
 - ◆ The HMGP final lock-in will be established 12 months after date of declaration. The final lock-in amount may be greater than or less than the previous calculations. Because the lock-in estimate is subject to change, FEMA will not obligate more than 75 percent of any estimate prior to the calculation of the final lock-in without concurrence of the Regional Administrator or Federal Coordinating Officer with Disaster Recovery Manager

Authority and the Office of Chief Financial Officer ([Part IX, A.3](#));

- ◆ With the release of this guidance, Section 1104 of the SRIA is incorporated as Advance Assistance in ([Part IX, A.9](#));
- ◆ Advance Assistance can be used to accelerate the implementation of the HMGP. Applicants may use Advance Assistance to develop mitigation strategies and obtain data to prioritize, select, and develop complete HMGP applications in a timely manner ([Part IX, A.9](#));
- ◆ For acquisition projects, clarifications were made regarding the purchase of vacant land, land already owned by an eligible entity, and outstanding tax liens (Addendum, Part A);
- ◆ FEMA will make a determination on the open space compatibility of access to a subsurface resource (e.g., mineral rights) on a case-by-case basis (Addendum, Part A);
- ◆ Acquisitions in Coastal Barrier Resource System (CBRS) units and Other Protected Areas (OPAs) are eligible under all HMA programs if the projects are otherwise eligible under the requirements in the 44 CFR and this guidance (Addendum, Part A);
- ◆ FEMA clarifies that the relevant event may vary under the HMA programs; however, pre-market value or current market value can be used at the Applicant’s discretion for all HMA programs (Addendum, Part A);
- ◆ In accordance with Section 203(a)(1) of the Uniform Relocation Assistance and Real Property Acquisition Policies Act, the replacement housing allowance for homeowners may increase from \$22,500 to \$31,000 on October 1, 2014 (Addendum, Part A);
- ◆ With the release of this HMA Unified Guidance, certified clean is defined as a letter from the appropriate local, State, Indian Tribal, or Federal entity determining that no further remedial action is required to protect human health or the environment (Addendum, Part A);
- ◆ FEMA Policy MRR-2-08-1, “Wildfire Mitigation Policy for the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) Program,” dated September 8, 2008, has been incorporated. With the release of this HMA Unified Guidance, this policy has now been superseded (Addendum, Part B);
- ◆ FEMA urges communities to implement wildfire projects using the materials and technologies that are in accordance with the International Code Council, FEMA, U.S. Fire Administration, and the National Fire Protection Association (NFPA) Firewise recommendations, whenever applicable (Addendum, Part B);
- ◆ For wildfire projects, the application will include a narrative statement acknowledging the information required in the final operations and maintenance plan. The final operations and maintenance plans must be submitted to FEMA prior to project closeout (Addendum, Part B);

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- ◆ FEMA Interim Policy MRR-2-09-1, “Hazard Mitigation Assistance for Safe Rooms,” dated April 30, 2009, and FEMA Memorandum, subject “Waiver of Two Provisions of Mitigation Interim Policy MRR-2-09-1, “Hazard Mitigation Assistance for Safe Rooms,” dated February 07, 2012, have been incorporated. With the release of this HMA Unified Guidance both policies are now superseded (Addendum, Part C);
 - ◆ For safe room projects, costs associated with the acquisition of land for a community safe room are eligible costs (Addendum, Part C);
 - ◆ For safe room projects, FEMA will review final operations and maintenance plans during project closeout (Addendum, Part C); and
 - ◆ For safe room projects, costs associated with fire suppression sprinklers and heating, ventilation, and air-conditioning (HVAC) systems are an eligible cost (Addendum, Part C).

PART II. FRONTLOADING HMA PROGRAM ELIGIBILITY REQUIREMENTS

Part II provides general information on the importance of “frontloading” HMA Program eligibility requirements in the project scoping and the overall decision-making process. Project scoping and project development are two of the earliest steps in the overall project lifecycle (see [Figure 1](#)) and can have a significant impact on the course an application or subapplication takes through the HMA grant process.

Project scoping (as shown in [Figure 2](#)) is the process by which subapplicants develop effective mitigation alternatives based on a defined set of requirements that meet the stated purpose and need of the proposed project. Applicants are encouraged to include representatives of the whole community in planning and scoping the project to gain broad community participation and support.

The scoping process includes the identification and evaluation of technical feasibility, cost review, cost-effectiveness, and environmental and cultural resource considerations. Based on potential impacts to environmental and cultural resources, there may be a legal requirement to alter the project. The process results in the development of a preferred project alternative that is then documented through the preparation of the application or subapplication. Applicants and subapplicants should consider the whole range of program requirements at the beginning stages of project development. The incorporation of these considerations into the scoping process can increase the efficiency of program review and ensure that all HMA program requirements are addressed.

Figure 1: Overall Project Lifecycle

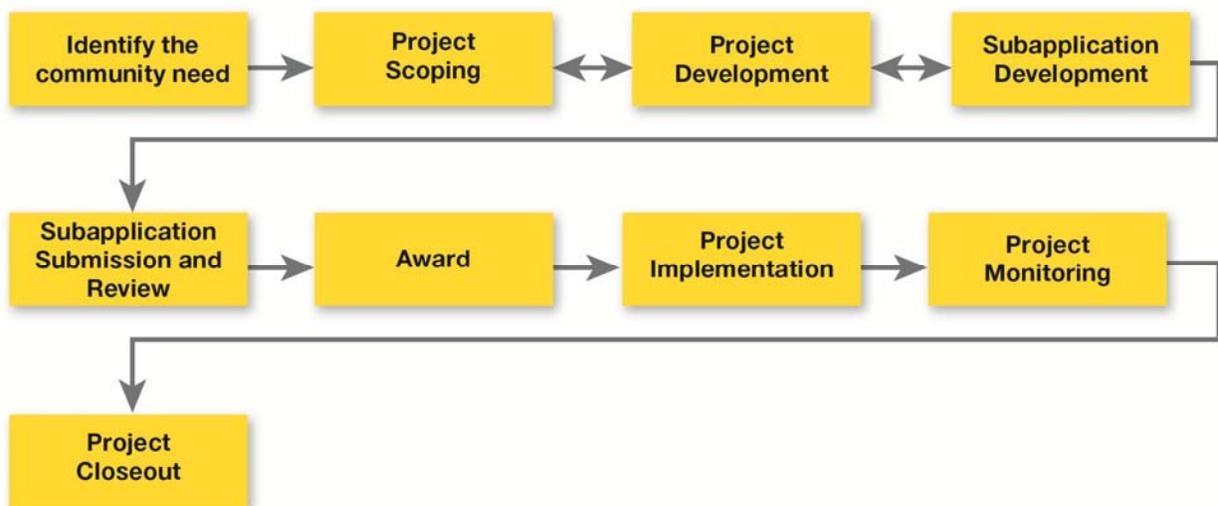
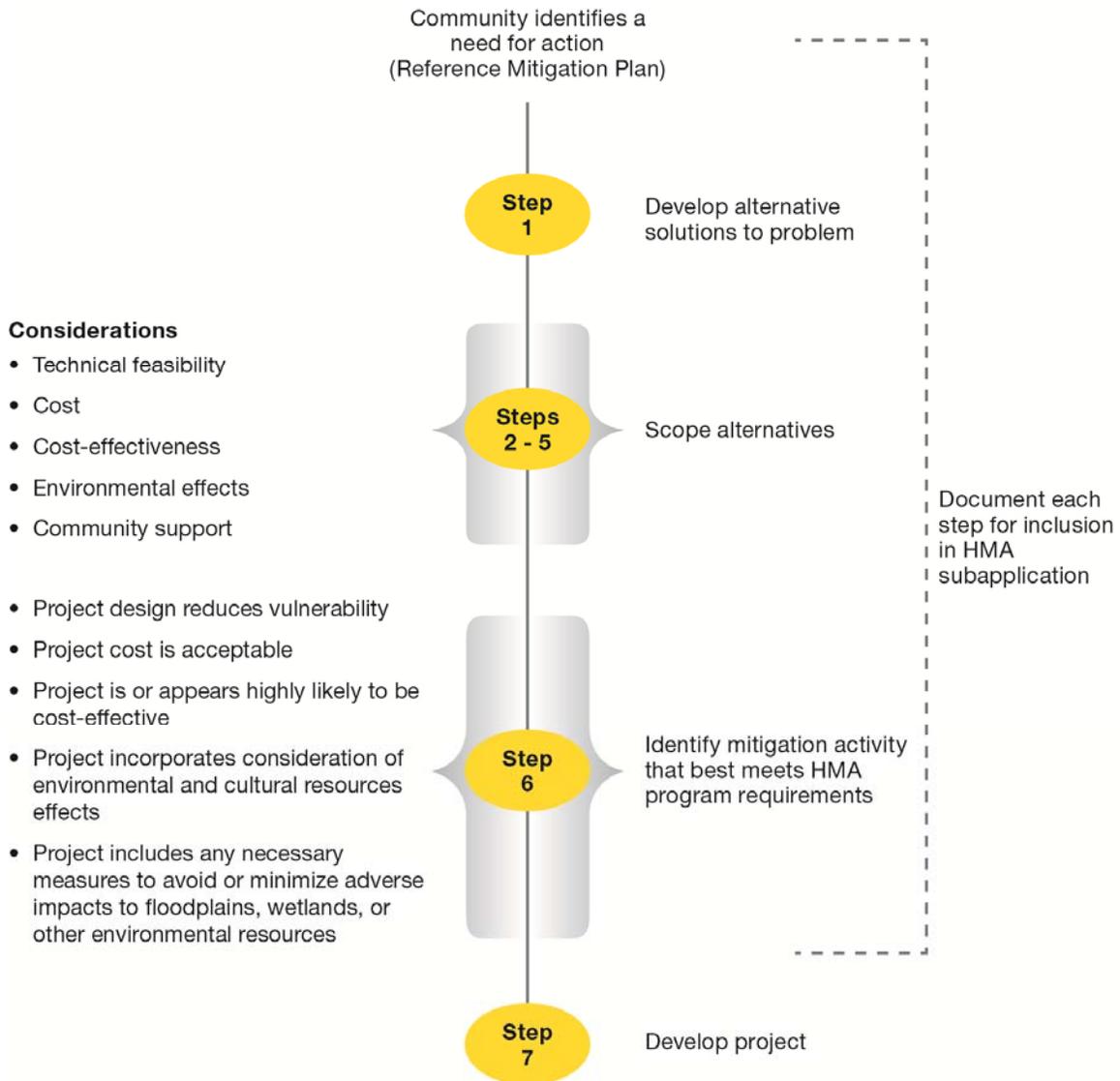


Figure 2: General Steps in Project Scoping Process



Addressing the following HMA program requirements at the earliest stage possible in the decision-making process is important because it can lead to enhanced project scoping as well as development and prevent delays later:

- ◆ Mitigation Planning;
- ◆ Technical Feasibility and Effectiveness;
- ◆ Floodplain Management and Protection of Wetlands;
- ◆ Environmental Planning and Historic Preservation Review and Compliance;
- ◆ Cost-Effectiveness; and
- ◆ Cost Review.

“Frontloading” of these requirements at the earliest point in the decision-making process increases the efficacy of the overall HMA Program. It also reduces the need for RFIs, which may result in quicker selections of projects for further review or approval. Additionally, early consideration of Advance Assistance, SFM, project monitoring, and project closeout in the decision-making process can facilitate the scoping and development of viable projects.

A. Mitigation Planning

Reviewing and incorporating information from the State, Indian Tribal, or local mitigation plan can help an Applicant or subapplicant facilitate the development of mitigation project alternatives. Linking the existing mitigation plan to project scoping can support the Applicant and the subapplicant in selecting the most appropriate mitigation activity that best addresses the identified hazard(s) while taking into account community priorities. In particular, the mitigation strategy section of the plan identifies a range of specific mitigation activities that can reduce vulnerability and includes information on the process that was used to identify, prioritize, and implement the range of mitigation actions considered. Another resource that may be useful in developing mitigation alternatives is the “Mitigation Ideas” guide available from the FEMA Library (see <http://www.fema.gov/library/viewRecord.do?id=6938>). It is important to reference the mitigation plan as potential project alternatives may have been considered during the planning process. If these alternatives were not considered during the mitigation planning process, please include this information in the next mitigation plan update. For more information on hazard mitigation planning, see [Part IV, D.1.2](#) (eligible activities), [Part V, H.2](#) (scope of work), [Part V, H.5.2](#) (cost estimate), or [Part X, C](#) (additional resources).

B. Technical Feasibility and Effectiveness

Mitigation projects submitted for the HMA grants must be both feasible and effective at mitigating the risks of the hazard for which the project was designed. The feasibility of the project is demonstrated through conformance with accepted engineering practices, established codes, standards, modeling techniques, or best practices. Effective mitigation measures funded under HMA should provide a long-term or permanent solution. Consideration of technical feasibility and effectiveness during the project scoping process facilitates project development. For more information on technical feasibility and effectiveness, see [Part VI, A.3](#) (application review criteria), [Part IV, D.4](#) (eligibility program requirements), or [Part V, J](#) (documentation).

C. Floodplain Management and Protection of Wetlands

HMA programs and grants must conform to 44 CFR Part 9, which incorporates the requirements of Executive Order (EO) 11988 (*Floodplain Management*) and EO 11990 (*Protection of Wetlands*). All proposed actions should be reviewed to determine if they are in the floodplain or a wetland. Any actions located in the 100-year floodplain (500-year for critical actions), or adversely increasing the base flood or adversely affecting a wetland, trigger the requirement to

complete the 8-step decision-making process outlined in 44 CFR Section 9.6, see [Part X, Appendix J](#). As part of that process, FEMA must consider alternative locations to determine whether the floodplain or wetland is the only practicable location for that action. If the floodplain or wetland is the only practicable location, FEMA must avoid or must minimize adverse impacts to the floodplain or wetland. For more information on floodplain management and the protection of wetlands, see [Part IV, D.6.1](#) (general program requirements) and [Part X, Appendix J](#) (8-Step Decision Making Process for Floodplain Management Considerations).

D. Environmental Planning and Historic Preservation Review and Compliance

HMA programs and grants must comply with all environmental and historic preservation (EHP) laws and with 44 CFR Part 10, which may include identifying alternate locations and, as necessary, modifying the project. See the EHP Checklist in [Part X, Appendix I](#). Completion of this list is not a substitute for environmental compliance. The front-loading of EHP into the decision-making process allows for development of mitigation measures that reduce or eliminate the proposed project's impact to the human environment; see [Figure 3](#) for an overview of frontloading the EHP and National Environmental Policy Act (NEPA) process. Moreover, compliance with all environmental laws and regulations is a condition of the grant. Two key considerations are whether the proposed project is located in an area that has endangered or threatened species or critical habitat and whether the proposed project might impact historic or cultural resources. If the project could result in adverse impacts to those resources, it might be necessary to change the scope of the project to avoid those impacts or incorporate mitigation measures to minimize the impacts to those resources. To determine whether any EHP issues may be associated with the proposed project, Applicants should review FEMA's HMA EHP Resources At-a-Glance Guide, located at <http://www.fema.gov/library/viewRecord.do?id=6976>. For more information on EHP, see [Part IV, D.6](#) (general program requirements), [Part V, K](#) (documentation), and [Part VI, A.4](#) (application review).

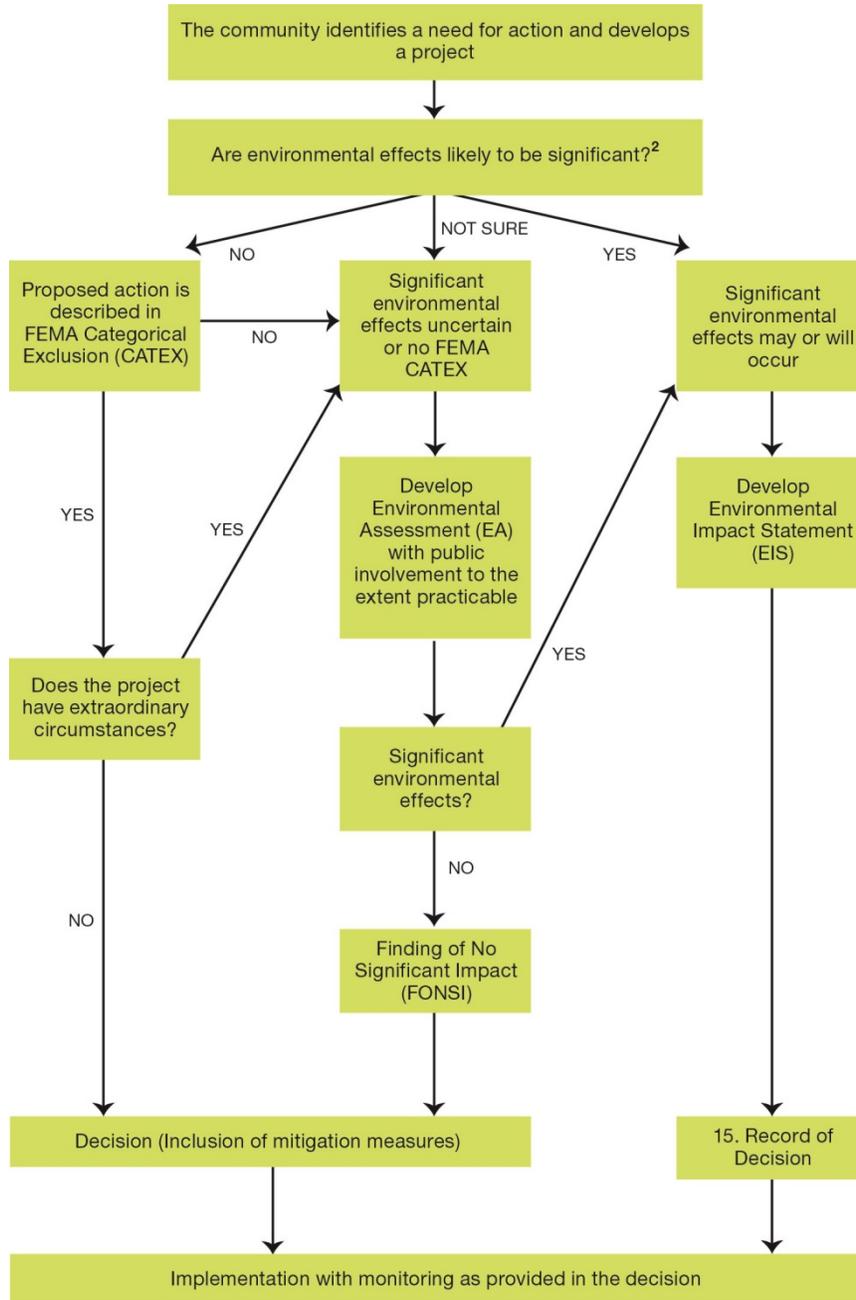
E. Cost-effectiveness

Mitigation activities are required by statute and regulation to be cost-effective or be in the interest of the NFIF. Consideration of the cost-effectiveness requirement at the earliest possible stage of the decision-making process can facilitate project scoping and improve project design. For more information on cost-effectiveness, see [Part IV, D.3](#) (general program requirements) and [Part V, I](#) (documentation).

F. Cost Review

All costs included in the subapplication should be reviewed to ensure that they are necessary, reasonable, and allocable consistent with the provisions of Office of Management and Budget (OMB) Circular A-87 and 2 CFR Part 225, Cost Principles for State, Local, and Indian Tribal

Figure 3: Frontloading EHP Considerations and the NEPA Process



- Note: 1. Significant new circumstances or information relevant to environmental concerns or substantial changes in the proposed action that are relevant to environmental concerns may necessitate preparation of a supplemental EIS following either the draft or final EIS or the Record of Decision (CEQ NEPA Regulations, 40 C.F.R. § 1502.9(c).
2. Are other environmental and historical preservation laws/EOs triggered by this action? (e.g., ESA, MTBA, EO 11988, EO 1990, CAA, RCRA, CBRA, etc.) If so, coordinate with appropriate agencies as necessary.
3. Figure adapted from "A Citizen's Guide to the NEPA" by the Council on Environmental Quality

Governments. Conducting this cost review at the earliest possible stage allows for improved project scoping and facilitates project development, which facilitates FEMA project review.

G. Project Development

Project scoping is not a separate, stand-alone process from project development. It can be considered the initial stage of project development, during which the details of mitigation activities are evaluated and developed. State, Local, and Indian Tribal governments that actively participate in and document their project scoping process put themselves in a greater position for success during project development. The information gathered in the scoping process serves as the basis for the development of a more detailed and robust technical design, cost, and environmental compliance components of the mitigation activity.

During the project development process, the subapplicant may encounter project considerations such as technical feasibility, cost-effectiveness, and EHP that necessitate the refinement or adjustment of the mitigation activity. When these situations are encountered, the reason for the refinement or re-scoping should be fully documented and included with the subapplication.

H. Advance Assistance

Section 1104 of the SRIA authorizes the use of Advance Assistance to accelerate the implementation of the HMGP. Applicants may use Advance Assistance to develop mitigation strategies and obtain data to prioritize, select, and develop complete HMGP applications in a timely manner. Using Advance Assistance can help Applicants develop eligible and complete applications that include a feasible project budget and an appropriate project milestone. See [Part IX, A.9](#) for additional information on Advance Assistance.

ADVANCE ASSISTANCE

Advance Assistance can be used to develop mitigation strategies and obtain data to prioritize, select, and develop complete HMGP applications. Consideration of Advance Assistance early in the decision-making process can help facilitate the development of a viable project, as well as project administration.

I. Strategic Funds Management

FEMA has implemented SFM. SFM, or incremental funding, is the concept of fiscal program management designed to provide funds as they are needed to implement approved HMGP activities. Through SFM, Applicant recovery and preparedness, communication and partnership, and the overall fiscal accuracy are expected to be improved. Considering SFM early in the decision-making process can help facilitate the development of a feasible project budget and

STRATEGIC FUNDS MANAGEMENT

SFM is a fiscal management approach designed to provide funds to the Grantee as needed to implement approved HMGP activities.

appropriate project milestones. At the beginning of an SFM project, FEMA and the State will work together to develop a work schedule.

See [Part VII, B.5.1](#) for additional information on SFM.

J. Project Monitoring

After a grant or subgrant is awarded, the Grantee and subgrantee are required to monitor and evaluate the progress of the mitigation activity in accordance with the:

- ◆ Approved original scope of work (SOW) and budget;
- ◆ Administrative requirements of 44 CFR Part 13; and
- ◆ Any applicable State requirements.

Sound project monitoring improves the efficiency of the project implementation process and the obligation of funds process. The satisfactory use of quarterly reporting facilitates project management and allows the Grantee, subgrantee, and FEMA to monitor obligations and any unliquidated funds. For additional information on project monitoring (reporting requirements) see [Part VII, C](#).

K. Closeout

Upon project completion, the Grantee and subgrantee are required to closeout the subgrant or grant in accordance 44 CFR Section 13.50 (Closeout). The project file should document that the:

- ◆ Approved SOW was fully implemented;
- ◆ All obligated funds were liquidated and in a manner consistent with the approved SOW;
- ◆ All environmental compliance measures or mitigations were implemented;
- ◆ The project was implemented in a manner consistent with the grant or subgrant agreement;
- ◆ Grantees submitted the required quarterly financial and performance reports; and
- ◆ The grant and subgrant were closed out in accordance with the provisions outlined in [Part VII, C](#) and [D](#) (subgrant and grant closeout).

For more information on closeout, see [Part VII, D](#).

PART III. AWARD INFORMATION

Funding under HMA programs is subject to the availability of appropriations (as well as any directive or restriction made with respect to such funds in the law) and, for HMGP, to the amount of FEMA disaster recovery assistance under the Presidential major disaster declaration.

For additional information about available funding for HMGP, see [Part IX, A.3](#); for the PDM Program, see [Part IX, B.1](#); and for FMA, see [Part IX, C](#).

PART IV. ELIGIBILITY INFORMATION

Part IV identifies common eligibility requirements for all HMA programs, such as eligible Applicants and subapplicants, cost-sharing requirements, restrictions on the use of HMA funds, activities that are eligible for HMA funding, and other program requirements. Additional program-specific requirements are found in [Part IX](#) of this guidance. Additional project-specific requirements can be found in the Addendum to this guidance. To be eligible for funding, Applicants and subapplicants must apply for funds as described in this guidance.

A. Eligible Applicants

Entities eligible to apply for HMA grants include the emergency management agency or a similar office of the 50 States (e.g., the office that has primary emergency management or floodplain management responsibility), the District of Columbia, American Samoa, Guam, the U.S. Virgin Islands, Puerto Rico, the Northern Mariana Islands, and Indian Tribal governments. Each State, Territory, Commonwealth, or Indian Tribal government shall designate one agency to serve as the Applicant for each HMA program. For the definition of the term Indian Tribal government refer to 44 CFR Section 206.431.

An Indian Tribal government may have the option to apply for HMA grants through the State as a subapplicant or directly to FEMA as an Applicant. The option for an Indian Tribal government to apply directly to FEMA reflects FEMA recognition that Indian Tribal governments are sovereign nations and share a government-to-government relationship with the United States. This choice is independent of a designation under other FEMA grants and programs, but is not available on a project-by-project basis within a single grant program. If an Indian Tribal government chooses to apply directly to FEMA and is awarded the grant, it bears the full responsibility of a Grantee for the purposes of administering the grant. For plan requirements relevant to the options to apply as a subapplicant or an Applicant, see [Part IV, D.5.1](#).

A.1 Eligible Subapplicants

All interested subapplicants must apply to the Applicant. [Table 1](#) identifies, in general, eligible subapplicants. For specific details regarding eligible subapplicants, refer to 44 CFR Section 206.434(a) for HMGP and 44 CFR Section 79.6(a) for FMA. For HMGP and the PDM Program, see 44 CFR Section 206.2(a)(16) for a definition of local governments.

Individuals and businesses are not eligible to apply for HMA funds; however, an eligible Applicant or subapplicant may apply for funding on behalf of individuals and businesses. For additional information about the eligibility of PNPs for HMGP, see [Part IX, A.5](#).

Table 1: Eligible Subapplicants

Entity	HMGP	PDM	FMA
State agencies	√	√	√
Indian Tribal governments	√	√	√
Local governments/communities	√	√	√
Private non-profit organizations (PNPs)	√		

B. Cost Sharing

Under the HMA programs, the total cost to implement approved mitigation activities is generally funded by a combination of Federal and non-Federal sources. Both the Federal and the non-Federal cost shares must be for eligible costs used in direct support of the approved activities under this guidance and the grant award. Contributions of cash, third-party in-kind services, materials, or any combination thereof, may be accepted as part of the non-Federal cost share.

FEMA administers cost-sharing requirements consistent with 44 CFR Section 13.24 and 2 CFR Section 215.23. To meet cost-sharing requirements, the non-Federal contributions must be reasonable, allowable, allocable, and necessary under the grant program and must comply with all Federal requirements and regulations.

In general, HMA funds may be used to pay up to 75 percent of the eligible activity costs. The remaining 25 percent of eligible activity costs are derived from non-Federal sources. Exceptions to the 75 percent Federal and 25 percent non-Federal share (see [Table 2](#)) are as follows:

- ◆ **PDM Program** – Small impoverished communities may be eligible for up to a 90 percent Federal cost share. For information about small impoverished communities, see [Part IX, B.2](#).
- ◆ **FMA**
 - FEMA may contribute up to 100 percent Federal cost share for severe repetitive loss properties or the expected savings to the NFIF for acquisition or relocation activities (the GSTF value for property acquisition may be offered to the property owner if the project is not cost-effective using pre-event or current market value);
 - FEMA may contribute up to 90 percent Federal cost share for repetitive loss properties; and
 - FEMA may contribute up to 75 percent Federal cost share for NFIP-insured properties.
- ◆ **Insular areas, including American Samoa, Guam, the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands** – FEMA automatically waives the non-Federal cost share when the non-Federal cost share for the entire grant is under \$200,000, not an individual subgrant. If the non-Federal cost share for the entire grant is \$200,000 or

greater, FEMA may waive all or part of the cost share, such a waiver is usually consistent with that provided for Public Assistance under the disaster declaration. If FEMA does not waive the cost share, the insular area must pay the entire cost-share amount, not only the amount over \$200,000.

Cost-share requirements also extend to management costs with the following exceptions:

- ◆ For **HMGP**, available HMGP management costs are calculated as a percentage of the Federal funds provided. There is no additional cost-share requirement for management costs.
- ◆ Under the **PDM Program**, only Indian Tribal Grantees meeting the definition of a small impoverished community are eligible for a non-Federal cost share of 10 percent for management costs.

See [Part IX, A.7](#) for further information about HMGP cost-share requirements and [Part V, E.4](#) for further information on funding restrictions for management costs.

HMA Federal funds, or funds used to meet HMA cost-share requirements, may not be used as a cost share for other Federal funds, for lobbying, or intervention in Federal regulatory or adjudicatory proceedings.

Table 2: Cost-Share Requirements

Programs	Mitigation Activity	Grantee Management Costs	Subgrantee Management Costs
	(Percent of Federal / Non-Federal Share)	(Percent of Federal / Non-Federal Share)	(Percent of Federal / Non-Federal Share)
HMGP	75/25	100/0	-/- ⁽¹⁾
PDM	75/25	75/25	75/25
PDM – subgrantee is small impoverished community	90/10	75/25	90/10
PDM – Tribal Grantee is small impoverished community	90/10	90/10	90/10
FMA – insured properties and planning grants	75/25	75/25	75/25
FMA – repetitive loss property ⁽²⁾	90/10	90/10	90/10
FMA – severe repetitive loss property ⁽²⁾	100/0	100/0	100/0

(1) Subapplicants should consult their State Hazard Mitigation Officer (SHMO) for the amount or percentage of HMGP subgrantee management cost funding their State has determined to be passed through to subgrantees.

(2) To be eligible for an increased Federal cost share a FEMA-approved State or Tribal (Standard or Enhanced) Mitigation Plan that addresses repetitive loss properties must be in effect at the time of grant award, and the property that is being submitted for consideration must be a repetitive loss property.

B.1 Federal Funds Allowed to Be Used as Non-Federal Cost Share

In general, the non-Federal cost-share requirement may not be met with funds from other Federal agencies; however, authorizing statutes explicitly allow some Federal funds to be used as a cost share for other Federal grants. Federal funds that are used to meet a non-Federal cost-share requirement must meet the purpose and eligibility requirements of both the Federal source program and the HMA grant program.

B.2 Increased Cost of Compliance as Non-Federal Cost Share

The NFIP Increased Cost of Compliance (ICC) claim payment from a flood event may be used to contribute to the non-Federal cost-share requirements so long as the claim is made within the timelines allowed by the NFIP. ICC payments can only be used for costs that are eligible for ICC benefits; for example, ICC cannot pay for property acquisition, but can pay for structure demolition or relocation. In addition, Federal funds cannot be provided where ICC funds are available; if the ICC payment exceeds the required non-Federal share, the Federal funding award will be reduced to the difference between the cost of the activity and the ICC payment.

If an ICC payment is being used as a subapplicant's non-Federal cost share, the NFIP policyholder must assign the claim to the subapplicant. However, only that part of the ICC benefit that pertains to the property can be assigned to the subapplicant. The NFIP policyholder can only assign the ICC benefit to the subapplicant; in no case can the policyholder assign the ICC benefit to another individual. Steps for the assignment of ICC coverage are available at <http://www.fema.gov/national-flood-insurance-program/steps-assignment-coverage-d-increased-cost-compliance-coverage>.

C. Restrictions

C.1 Non-Discrimination Compliance

In accordance with Section 308 of the Stafford Act and Title VI of the 1964 Civil Rights Act, all HMA programs are administered in an equitable and impartial manner, without discrimination on the grounds of race, color, religion, nationality, sex, age, disability, English proficiency, or economic status. In addition, Federal assistance distributed by State and local governments is to be implemented in compliance with all applicable laws.

Applicants and subapplicants must ensure that no discrimination is practiced. Applicants and subapplicants must consider fairness, equity, and equal access when prioritizing and selecting project subapplications to submit with their grant application. Subapplicants also must ensure fairness and equal access to property owners and individuals that benefit from mitigation activities.

C.2 Conflict of Interest

Applicants and subapplicants must avoid conflicts of interest. Subapplicants must comply with the procurement guidelines at 44 CFR Section 13.36, which require subapplicants to avoid situations in which local officials with oversight authority might benefit financially from the grant disbursement. Applicants must comply with guidelines for awarding and administering subgrants as stated in 44 CFR Section 13.37.

C.3 Duplication of Programs

FEMA will not provide assistance for activities for which it determines the primary or more specific authority lies with another Federal agency or program. Other programs and authorities should be examined before applying for HMA funding. HMA funds are not intended to be used as a substitute for other available program authorities. Available program authorities include other FEMA programs (e.g., Individual Assistance and Public Assistance) and programs under other Federal agencies, such as the U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, and the Natural Resources Conservation Service. FEMA may disallow or recoup amounts that duplicate other authorities.

For additional information about Duplication of Programs for wildfire mitigation projects, see Addendum, Part B.2.

C.4 Duplication of Benefits

HMA funds cannot duplicate funds received by or available to Applicants or subapplicants from other sources for the same purpose. Examples of other sources include insurance claims, other assistance programs (including previous project or planning grants and subgrants from HMA programs), legal awards, or other benefits associated with properties or damage that are subject of litigation.

Because the availability of other sources of mitigation grant or loan assistance is subject to available information and the means of each individual Applicant, HMA does not require that property owners seek assistance from other sources (with the exception of insurance). However, it is the responsibility of the property owner to report other benefits received, any applications for other assistance, the availability of insurance proceeds, or the potential for other compensation, such as from pending legal claims for damages, relating to the property.

DUPLICATION OF BENEFITS

DOB is used to describe assistance that is from more than one source and that is used for the same purpose or activity. The purpose may apply to the entire project or only part of it.

DOB may apply when assistance for the same purpose:

- Has been received
- Will be received
- Is reasonably available from another source, such as insurance or legal settlements due to the property owners

Where the property owner has an insurance policy covering any loss to the property that relates to the proposed HMA project, the means are available for receiving compensation for a loss or, in the case of ICC, assistance toward a mitigation project. FEMA will generally require that the property owner file a claim prior to the receipt of HMA funds.

Information regarding other assistance received by properties in HMA projects may be shared under 5 U.S.C. 552a (b) of the Privacy Act of 1974. Uses may include sharing with custodians of property records, such as other Federal or other governmental agencies, insurance companies, or any public or private entity, for the purposes of ensuring that the property has not received money that is duplicative of any possible HMA grants received. When obtaining information from property owners about other sources of assistance, a Privacy Act statement must be distributed to each owner. For more information about the process of verifying potential duplication, access the HMA Tool for Identifying Duplication of Benefits at <http://www.fema.gov/library/viewRecord.do?id=6815> and for a copy of the Privacy Act statement (see Appendix F of that document).

For additional information on DOB for property acquisition and structure demolition or relocation projects, see Addendum Part A.11.4.

D. General Program Requirements

D.1 Eligible Activities

To be eligible, activities must meet all requirements referenced in this guidance. Eligible activities for HMA fall into the following categories:

- ◆ Mitigation projects (all HMA programs);
- ◆ Hazard mitigation planning (all HMA programs); and
- ◆ Management costs (all HMA programs).

[Table 3](#) summarizes eligible activities that may be funded by the HMA programs. Detailed descriptions of these activities follow the table in [Part IV, D.1.1](#), [D.1.2](#), and [D.1.3](#).

The following activities are not eligible as stand-alone activities but are eligible when included as a functional component of eligible mitigation activities:

- ◆ For the **PDM Program**, generators and/or related equipment purchases (e.g., generator hook-ups), when the generator directly relates to the hazards being mitigated and is part of a larger project;
- ◆ Real property or easements purchases required for the completion of an eligible mitigation project; and
- ◆ Studies that are integral to the development and implementation of mitigation project, including hydrologic and hydraulic, engineering, or drainage studies.

Table 3: Eligible Activities by Program

Eligible Activities	HMGP	PDM	FMA
1. Mitigation Projects	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction			√
Dry Floodproofing of Historic Residential Structures	√	√	√
Dry Floodproofing of Non-residential Structures	√	√	√
Minor Localized Flood Reduction Projects	√	√	√
Structural Retrofitting of Existing Buildings	√	√	
Non-structural Retrofitting of Existing Buildings and Facilities	√	√	√
Safe Room Construction	√	√	
Wind Retrofit for One- and Two-Family Residences	√	√	
Infrastructure Retrofit	√	√	√
Soil Stabilization	√	√	√
Wildfire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
Generators	√	√	
5 Percent Initiative Projects	√		
Advance Assistance	√		
2. Hazard Mitigation Planning	√	√	√
3. Management Costs	√	√	√

Additional information regarding eligible projects for HMGP is included in [Part IX, A.8](#) and [A.9](#); and for FMA, see [Part IX, C.1](#).

Costs for eligible activities must be reasonable, allowable, allocable, and necessary as required by 2 CFR Part 225, Cost Principles for State, Local, and Indian Tribal Governments, 44 CFR Section 13.22, applicable program regulations, and this guidance.

D.1.1 Mitigation Projects

This section briefly describes the mitigation projects eligible under one or more of the three HMA programs. [Table 3](#) summarizes the eligibility of the following project types for each program:

- ◆ **Property Acquisition and Structure Demolition** – The voluntary acquisition of an existing at-risk structure and, typically, the underlying land, and conversion of the land to

open space through the demolition of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure demolition projects, see Addendum, Part A.

- ◆ **Property Acquisition and Structure Relocation** – The voluntary physical relocation of an existing structure to an area outside of a hazard-prone area, such as the Special Flood Hazard Area (SFHA) or a regulatory erosion zone and, typically, the acquisition of the underlying land. Relocation must conform to all applicable State and local regulations. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions. For property acquisition and structure relocation projects, see Addendum, Part A.
- ◆ **Structure Elevation** – Physically raising and/or retrofitting an existing structure to the Base Flood Elevation (BFE) or higher if required by FEMA or local ordinance. Elevation may be achieved through a variety of methods, including elevating on continuous foundation walls; elevating on open foundations, such as piles, piers, posts, or columns; and elevating on fill. Foundations must be designed to properly address all loads and be appropriately connected to the floor structure above, and utilities must be properly elevated as well. FEMA encourages Applicants and subapplicants to design all structure elevation projects in accordance with the American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) 24-05, *Flood Resistant Design and Construction*. For additional information about structure elevation projects, see Addendum, Part E.
- ◆ **Mitigation Reconstruction** – The construction of an improved, elevated building on the same site where an existing building and/or foundation has been partially or completely demolished or destroyed. Mitigation reconstruction is only permitted for structures outside of the regulatory floodway or coastal high hazard area (Zone V) as identified by the existing best available flood hazard data. Activities that result in the construction of new living space at or above the BFE will only be considered when consistent with the mitigation reconstruction requirements.
- ◆ **Dry Floodproofing** – Techniques applied to keep structures dry by sealing the structure to keep floodwaters out. For all dry floodproofing activities, FEMA encourages Applicants and subapplicants to design all dry floodproofing projects in accordance with ASCE/SEI 24-05.
 - **Dry Floodproofing of Historic Residential Structures** is permissible only when other techniques that would mitigate to the BFE would cause the structure to lose its status as a Historic Structure, as defined in 44 CFR Section 59.1.
 - **Dry Floodproofing of Non-residential Structures** must be performed in accordance with NFIP Technical Bulletin (TB) 3-93, *Non-Residential Floodproofing*—

Requirements and Certification, and the requirements pertaining to dry floodproofing of non-residential structures found in 44 CFR Sections 60.3(b)(5) and (c)(4).

◆ **Generators** – Generators are emergency equipment that provide a secondary source of power. Generators and related equipment (e.g., hook-ups) are eligible provided that they are cost-effective, contribute to a long-term solution to the problem they are intended to address, and meet other program eligibility criteria.

- **PDM Program:** Generators and/or related equipment purchases (e.g., generator hook-ups) are eligible when the generator directly relates to the hazards being mitigated and is part of a larger project.
- **HMGP:** A permanently installed generator that is a stand-alone project can be considered under regular HMGP funding if the generator protects a critical facility. Critical facilities may include police and fire stations, hospitals, and water and sewer treatment facilities. A generator that is a component of a larger project (e.g., elevation of a lift station) can also be funded under regular HMGP funding and the use of aggregation is permitted. Portable generators are eligible provided that they meet all HMGP requirements as described in 44 CFR Section 206.434. Stand-alone generator projects that cannot be determined cost-effective via standard HMA benefit-cost methodology may be eligible under the 5 Percent Initiative. See [Part IX, A.10](#) for additional information about the 5 Percent Initiative.

GENERATORS

- Stand-alone generators and related equipment (e.g., generator hook-ups) are eligible under the 5 Percent Initiative.
- Stand-alone generators (including related equipment) are eligible for regular HMGP funding if the generator protects a critical facility and meets all other program eligibility criteria.
- Generators (including related equipment) that constitute a functional portion of an otherwise eligible mitigation measure are eligible for HMGP and PDM Program funding.
- Portable generators are eligible for HMGP regular funding and the 5 Percent Initiative if they meet all HMGP requirements as described in 44 CFR Section 206.434.

For additional information on generators please see the Frequently Asked Questions for Generators in [Part X, Appendix G](#).

HMA funds are not available as a substitute for emergency, temporary, or partial solutions under the Stafford Act Section 403, Essential Assistance (42 U.S.C. 5170b) and/or the Stafford Act, Title VI Emergency Preparedness (42 U.S.C. 5195).

◆ **Minor Localized Flood Reduction Projects** – Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or modification of culverts, and stormwater management activities, such as creating retention and detention basins. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.

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- Under the FMA program, minor localized flood reduction projects should benefit NFIP-insured properties. Projects will be prioritized based on the number of NFIP insured properties included in the project. Projects that do not include NFIP-insured properties will not be considered for funding. Documentation must be provided in the subapplication to verify the NFIP insurance requirement, which includes flood insurance policy and property locator numbers as appropriate.
 - ◆ **Structural Retrofitting of Existing Buildings** – Modifications to the structural elements of a building to reduce or eliminate the risk of future damage and to protect inhabitants. The structural elements of a building that are essential to protect to prevent damage include foundations, load-bearing walls, beams, columns, building envelope, structural floors and roofs, and the connections between these elements.
 - ◆ **Non-structural Retrofitting of Existing Buildings and Facilities** – Modifications to the non-structural elements of a building or facility to reduce or eliminate the risk of future damage and to protect inhabitants. Non-structural retrofits may include bracing of building contents to prevent earthquake damage or the elevation of utilities.
 - ◆ **Safe Room Construction** – Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events, including hurricanes. For HMA, the term “safe room” only applies to extreme wind (combined tornado and hurricane) residential, non-residential, and community safe rooms; tornado community safe rooms; and hurricane community safe rooms. This type of project includes retrofits of existing facilities or new safe room construction projects, and applies to both single and dual-use facilities. For additional information, see Addendum, Part C.
 - ◆ **Wind retrofit projects** – Wind retrofit projects of one and two-family residential buildings must be designed in conformance with the design criteria found in the *Wind Retrofit Guide for Residential Buildings* (FEMA P-804) published December 2010. This document is available in the FEMA Library at <http://www.fema.gov/library/viewRecord.do?id=4569>.
 - ◆ **Infrastructure Retrofit** – Measures to reduce risk to existing utility systems, roads, and bridges.
 - ◆ **Soil Stabilization** – Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geotextiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies.
 - ◆ **Wildfire Mitigation** – Projects to mitigate at-risk structures and associated loss of life from the threat of future wildfire through:

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- **Defensible Space for Wildfire** – Projects creating perimeters around homes, structures, and critical facilities through the removal or reduction of flammable vegetation. For additional information, see Addendum, Part B.3.1.
 - **Application of Ignition-resistant Construction** – Projects that apply ignition-resistant techniques and/or non-combustible materials on new and existing homes, structures, and critical facilities. For additional information, see Addendum, Part B.3.2.
 - **Hazardous Fuels Reduction** – Projects that remove vegetative fuels proximate to at-risk structures that, if ignited, pose significant threat to human life and property, especially critical facilities. For additional information, see Addendum, Part B.3.3.
 - ◆ **Post-Disaster Code Enforcement** – Projects designed to support the post-disaster rebuilding effort by ensuring that sufficient expertise is on hand to ensure appropriate codes and standards, including NFIP local ordinance requirements, are used and enforced. For additional information, see [Part IX, A.8](#).
 - ◆ **Advance Assistance** – Section 1104 of the SRIA authorizes the use of Advance Assistance to accelerate the implementation of the Hazard Mitigation Grant Program (HMGP). Applicants may use Advance Assistance to develop mitigation strategies and obtain data to prioritize, select and develop complete HMGP applications in a timely manner. See [Part IX, A.9](#) for additional information on Advance Assistance.
 - ◆ **5 Percent Initiative Projects** – These projects, which are only available pursuant to an HMGP disaster, provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of the State or Indian Tribal (Standard or Enhanced) and local mitigation plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard Benefit-Cost Analysis (BCA) to prove cost-effectiveness. For additional information, see [Part IX, A.10](#).

D.1.2 Hazard Mitigation Planning

Mitigation plans are the foundation for effective hazard mitigation. A mitigation plan is a demonstration of the commitment to reduce risks from natural hazards and serves as a strategic guide for decision-makers as they commit resources.

The mitigation planning process includes hazard identification and risk assessment leading to the development of a comprehensive mitigation strategy for reducing risks to life and property. The mitigation strategy section of the plan identifies a range of specific mitigation actions and projects being considered to reduce risks to new and existing buildings and infrastructure. This section includes an action plan describing how identified mitigation activities will be prioritized, implemented, and administered.

MITIGATION PLANNING-RELATED ACTIVITIES

Planning activities can include assessing risk and updating the mitigation strategy to reflect current disaster recovery goals.

Planning activities funded under HMA are designed to develop State, Indian Tribal, and local mitigation plans that meet the planning requirements outlined in 44 CFR Part 201. A mitigation planning subgrant award must result in a mitigation plan adopted by the jurisdiction(s) and approved by FEMA or it must result in a planning related activity approved by FEMA (e.g., incorporating new data into the Risk Assessment, or updating the Mitigation Strategy to reflect current disaster recovery goals) consistent with the requirements in 44 CFR Parts 201 and 206.

For **FMA**, funds shall only be used to support the flood hazard portion of State, Indian Tribal, or local mitigation plans to meet the criteria specified in 44 CFR Part 201. Funds are only available to support these activities in communities participating in the NFIP.

For links to mitigation planning and risk assessment resources, see [Part X, C.2](#).

D.1.2.1 Eligible Hazard Mitigation Planning-Related Activities

Eligible activities include but are not limited to:

- ◆ Update or enhance sections of the current FEMA-approved mitigation plan, such as:
 - Risk and vulnerability assessment based on new information, including supporting studies, such as economic analyses;
 - Mitigation strategy, specifically strengthening the linkage to mitigation action implementation, with emphasis on available HMA project grant funding; or
 - Incorporate climate adaptation, green building, or smart growth principles into the risk assessment and/or mitigation strategy.
- ◆ Integrate information from mitigation plans, specifically risk assessment or mitigation strategies, with other planning efforts, such as:
 - Disaster recovery strategy (pre- or post), preparedness, or response plans;
 - Comprehensive (e.g., land use, master) plans;
 - Capital improvement or economic development plans;
 - Resource management / conservation plans (i.e., storm water, open space); or
 - Other long-term community planning initiatives (i.e., transportation or housing).
- ◆ Building capability through delivery of technical assistance and training.
- ◆ Evaluation of adoption and/or implementation of ordinances that reduce risk and/or increase resilience.

D.1.2.2 Ineligible Hazard Mitigation Planning-Related Activities

The following is a list of activities considered ineligible as “stand alone” planning-related activities:

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- ◆ Hazard identification or mapping and related equipment for the implementation of mitigation activities (eligible under 5 Percent Initiative);
 - ◆ Geographic Information System (GIS) software, hardware, and data acquisition whose primary aim is mitigation (eligible under 5 Percent Initiative);
 - ◆ Public awareness or education campaigns about mitigation (eligible under 5 Percent Initiative);
 - ◆ Project scoping or development (also referred to as “project planning”), such as BCA, engineering feasibility studies, application development, construction design, or EHP data collection; and
 - ◆ Activities not resulting in a clearly defined product or product(s).

D.1.3 Management Costs

Management costs are any indirect costs and administrative expenses that are reasonably incurred by a Grantee or subgrantee in administering a grant or subgrant award.

Eligible Applicant or subapplicant management cost activities may include:

- ◆ Solicitation, review, and processing of subapplications and subgrant awards;
- ◆ Subapplication development and technical assistance to subapplicants regarding feasibility and effectiveness, BCA, and EHP documentation;
- ◆ Geocoding mitigation projects identified for further review by FEMA;
- ◆ Delivery of technical assistance (e.g., plan reviews, planning workshops, training) to support the implementation of mitigation activities;
- ◆ Managing grants (e.g., quarterly reporting, closeout);
- ◆ Technical monitoring (e.g., site visits, technical meetings);
- ◆ Purchase of equipment, per diem and travel expenses, and professional development that is directly related to the implementation of HMA programs; and
- ◆ Staff salary costs directly related to performing the activities listed above.

Management costs are only awarded in conjunction with project or planning grants and subgrants. For more information regarding management costs for HMGP, see [Part IX, A.4](#). For the **PDM Program and FMA**, FEMA may provide up to 25 percent of the Applicant’s anticipated management costs, upon the award and final approval of the first subgrant. The remaining management costs will be obligated as additional subgrants are awarded.

D.2 Ineligible Activities

The following list provides examples of activities that are not eligible for HMA funding:

- ◆ Projects that do not reduce the risk to people, structures, or infrastructure;
- ◆ Projects that are dependent on a contingent action in order to be effective and/or feasible (i.e., not a stand-alone mitigation project that solves a problem independently or constitutes a functional portion of a solution);
- ◆ Projects with the sole purpose of open space acquisition of unimproved land;
- ◆ Projects for which actual physical work such as groundbreaking, demolition, or construction of a raised foundation has occurred prior to award or final approval. Projects for which demolition and debris removal related to structures proposed for acquisition or mitigation reconstruction has already occurred may be eligible when such activities were initiated or completed under the FEMA Public Assistance program to alleviate a health or safety hazard as a result of a disaster;
- ◆ Projects that involve land that is contaminated with hazardous waste;
- ◆ Projects for preparedness activities or temporary measures (e.g., sandbags, bladders, geotubes);
- ◆ Projects that create revolving loan funds;
- ◆ Activities required as a result of negligence or intentional actions, or those intended to remedy a code violation, or the reimbursement of legal obligations such as those imposed by a legal settlement, court order, or State law;
- ◆ FEMA may, at its discretion, choose not to fund projects subject to ongoing litigation if such litigation may affect eligibility of the project or may substantially delay implementation of the project;
- ◆ All projects located in a CBRS Unit or in OPAs, other than property acquisition and structure demolition or relocation projects for open space under HMA. For details on property acquisition and structure demolition or relocation projects for open space within a CBRS Unit or OPAs see Addendum, Part A.2;
- ◆ Activities on Federal lands or associated with facilities owned by another Federal entity;
- ◆ Major flood control projects related to the construction, demolition, or repair of dams, dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and erosion projects related to beach nourishment or re-nourishment;
- ◆ Projects for hazardous fuels reduction in excess of 2 miles from structures;
- ◆ Projects that address unmet needs from a disaster that are not related to mitigation;

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- ◆ Retrofitting facilities primarily used for religious purposes, such as places of worship (or other projects that solely benefit religious organizations). However, a place of worship may be included in a property acquisition and structure demolition or relocation project provided that the project benefits the entire community, such as when the whole neighborhood or community is being removed from the hazard area;
 - ◆ Activities that only address manmade hazards;
 - ◆ Projects that address, without an increase in the level of protection, operation, deferred or future maintenance, repairs, or replacement of existing structures, facilities, or infrastructure (e.g., dredging, debris removal, replacement of obsolete utility systems, bridges, and facility repair/rehabilitation);
 - ◆ Projects for the purpose of:
 - Landscaping for ornamentation (e.g., trees, shrubs);
 - Site remediation of hazardous materials (with the exception eligible activities, such as the abatement of asbestos and/or lead-based paint and the removal of household hazardous wastes to an approved landfill);
 - Water quality infrastructure;
 - Projects that primarily address ecological or agricultural issues;
 - Forest management;
 - Prescribed burning or clear-cutting;
 - Creation and maintenance of fire breaks, access roads, or staging areas;
 - Irrigation systems;
 - ◆ Studies not directly related to the design and implementation of a proposed mitigation project; and
 - ◆ Preparedness measures and response equipment (e.g., response training, electronic evacuation road signs, interoperable communications equipment).

All projects must also comply with any additional project-specific guidance provided in the Addendum.

D.3 Cost-effectiveness

Mitigation program authorizing statutes (Flood Mitigation Assistance at 42 U.S.C. 4104c, Pre-Disaster Hazard Mitigation at 42 U.S.C. 5133, and Hazard Mitigation at 42 U.S.C. 5170c) require that FEMA provide funding for mitigation measures that are cost-effective or are in the interest of the NFIF. FEMA has specified minimum project criteria via regulation (44 CFR Part 79 and 44 CFR Section 206.434), including that Applicants must demonstrate mitigation projects are cost-effective. The determination of cost-effectiveness is performed in a variety of ways. It

is typically demonstrated by the calculation of a BCR, dividing total annualized project benefits by total annualized project cost. Projects where benefits exceed costs are generally considered cost-effective (see [Part V, I](#) and [Part VI, A.2](#) for additional information).

D.4 Feasibility and Effectiveness

Mitigation projects funded by HMA must be both feasible and effective at mitigating the risks of the hazard(s) for which the project was designed. A project's feasibility is demonstrated through conformance with accepted engineering practices, established codes, standards, modeling techniques, or best practices. Effective mitigation measures funded under HMA provide a long-term or permanent solution to a risk from a natural hazard.

For additional information about the feasibility and effectiveness requirement for mitigation reconstruction projects, see the Addendum, Part D.3; for additional feasibility and effectiveness resources, see [Part X, C.5](#).

D.5 Hazard Mitigation Plan Requirement

In accordance with 44 CFR Part 201, all Applicants for the **PDM Program** and **FMA** must have a FEMA-approved State or Tribal (Standard or Enhanced) Mitigation Plan by the application deadline and at the time of obligation of the grant funds. The only exception is for a subapplication for a State or Indian Tribal (Standard or Enhanced) Mitigation Plan. In addition, all subapplicants for the **PDM Program** and **FMA** mitigation projects must have a FEMA-approved local or Indian Tribal mitigation plan by the application deadline and at the time of obligation of grant funds. There is no local or Indian Tribal mitigation plan requirement for any HMA program for a planning subgrant.

EXTRAORDINARY CIRCUMSTANCES EXCEPTION

- **For HMGP** project subgrants, the Regional Administrator may grant an exception to a local or Indian Tribal mitigation plan requirement in extraordinary circumstances when justification is provided.
- **For the PDM Program and FMA** project subgrants, the Region may apply extraordinary circumstances when justification is provided and with concurrence from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) before granting an exception.

Applicants for **HMGP** funding must have a FEMA-approved State or Indian Tribal (Standard or Enhanced) Mitigation Plan at the time of the disaster declaration and at the time HMGP funding is obligated to the Grantee to receive an HMGP award. For **HMGP** project subgrants, the Regional Administrator may grant an exception to the local or Indian Tribal mitigation plan requirement in extraordinary circumstances, when justification is provided. If this exception is granted, a local or Indian Tribal mitigation plan must be approved by FEMA within 12 months of the award of the project subgrant to that community.

For **PDM** and **FMA** project subgrants, the Region may apply extraordinary circumstances when justification is provided and with concurrence from FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) prior to granting an exception. If this exception is granted, a local or Indian Tribal mitigation plan must be approved by FEMA within 12 months of the award of the project subgrant to that community.

For **HMGP**, the **PDM Program**, and **FMA**, extraordinary circumstances exist when a determination is made by the Applicant and FEMA that the proposed project is consistent with the priorities and strategies identified in the State or Indian Tribal (Standard or Enhanced) Mitigation Plan and that the jurisdiction meets at least one of the criteria below. If the jurisdiction does not meet at least one of the following criteria, the Region must coordinate with FEMA Headquarters (Risk Reduction and Risk Analysis Divisions) for **HMGP** and coordinate and seek concurrence prior to granting an exception for the **PDM Program** and **FMA**:

- ◆ The jurisdiction meets the small impoverished community criteria (see [Part IX, B.2](#));
- ◆ The jurisdiction has been determined to have had insufficient capacity due to lack of available funding, staffing, or other necessary expertise to satisfy the mitigation planning requirement prior to the current disaster or application deadline;
- ◆ The jurisdiction has been determined to have been at low risk from hazards due to low frequency of occurrence or minimal damages from previous occurrences due to sparse development;
- ◆ The jurisdiction experienced significant disruption from a declared disaster or another event that impacts its ability to complete the mitigation planning process prior to award or final approval of a project grant; and
- ◆ The jurisdiction does not have a mitigation plan for reasons beyond the control of the State, Indian Tribal or local community, such as Disaster Relief Fund (DRF) restrictions that delay FEMA from awarding project grants prior to the expiration of the local or Indian Tribal mitigation plan.

For **HMGP**, the **PDM Program**, and **FMA**, the Applicant must provide written justification that identifies the specific criteria from above or circumstance, explain why there is no longer an impediment to satisfying the mitigation planning requirement, and identify the specific actions or circumstances that eliminated the deficiency.

In determining whether to grant the exception, FEMA takes into consideration factors including whether an Applicant has prioritized its authorized HMA project assistance for use in those communities with an approved local or Indian Tribal mitigation plan, whether there are additional project funds available for award to a jurisdiction that does not have an approved local or Indian Tribal mitigation plan, and whether an Applicant has placed higher priority for grant funding on communities with higher risks. In all cases, a local or Indian Tribal mitigation plan must be completed and approved by FEMA within 12 months of the award. If a local or Indian

Tribal mitigation plan is not approved by FEMA within this timeline, the project subgrant will be terminated and any costs incurred after the notice of the subgrant's termination will not be reimbursed by FEMA.

When an HMGP project subgrant is awarded under extraordinary circumstances, the Grantee shall acknowledge in writing to the Regional Administrator that a plan will be completed within 12 months of the award of the project grant. The Grantee must provide a work plan for completing the local or tribal mitigation plan, including milestones and a timetable, to ensure that the jurisdiction will complete the plan in the required time. This requirement shall be incorporated into the grant award (both the planning and project subgrant agreements, if a planning subgrant is also awarded).

D.5.1 Indian Tribal Government Hazard Mitigation Plan Requirement

Indian Tribal governments with an approved Indian Tribal mitigation plan in accordance with 44 CFR Section 201.7 may apply for assistance from FEMA as a Grantee. In addition, if an Indian Tribal government with an approved Indian Tribal mitigation plan in accordance with 44 CFR Section 201.7 coordinates the review of their Indian Tribal mitigation plan with the State or another Indian Tribal government, it has the option to apply as a subapplicant through that State or Indian Tribal government, except as prohibited by State law.

D.5.2 Conformance with Hazard Mitigation Plans

Projects submitted for consideration for HMA funding must be consistent with the goals and objectives identified in the current, FEMA-approved State or Indian Tribal (Standard or Enhanced) Mitigation Plan and local or Indian Tribal mitigation plan for the jurisdiction in which the activity is located.

D.6 Environmental Planning and Historic Preservation Requirement

HMA programs, and grants awarded pursuant to these programs, must conform to 44 CFR Parts 9 and 10, and with all applicable EHP laws, implementing regulations, and EOs, such as the NEPA, the National Historic Preservation Act (NHPA), the Endangered Species Act (ESA), EO 11988 (*Floodplain Management*), EO 11990 (*Protection of Wetlands*), and EO 12898 (*Environmental Justice*). EHP requirements ensure appropriate consideration of reasonable alternatives, taking the project's impacts to the human environment into account in the decision-making process. The project, when completed, must comply with all applicable environmental laws and regulations as a condition of grant eligibility.

FEMA reviews the completeness of the responses to the questions in the EHP review section of the project subapplication and supporting documentation. For HMA project subapplications that do not include the required information for each property identified in the subapplication, there

may be a delay in identifying outstanding EHP compliance measures. Lack of the required information by the application deadline may prohibit FEMA from awarding a grant or subgrant.

FEMA has developed guidance to assist in completing the EHP information section of a project subapplication, including an eLearning Tool, online training, and information about historic preservation. For links to these EHP resources, see [Part X, C.5](#).

D.6.1 Floodplain Management and Protection of Wetlands

As noted in [Part IV D.6](#), all activities funded by HMA programs must conform to 44 CFR Part 9. Activities involving development will only be eligible for a grant if the Applicant demonstrates that there is no practicable alternative to such development in accordance with 44 CFR Section 9.9. In addition, **HMGP** funds cannot be used to fund new construction or Substantial Improvement in a floodway or new construction in a coastal high hazard zone. However, the costs to elevate or floodproof a damaged structure or facility are not included in determining whether the Substantial Improvement threshold is triggered.

For additional information see 44 CFR Section 9.11(d).

D.7 National Flood Insurance Program Eligibility Requirements

HMA eligibility is related to the NFIP as follows:

- ◆ **Subapplicant eligibility:** All subapplicants for **FMA** must currently be participating in the NFIP, and not withdrawn or suspended, to be eligible to apply for grant funds. Certain non-participating political subdivisions (i.e., regional flood control districts or county governments) may apply and act as subgrantees on behalf of the NFIP-participating community in areas where the political subdivision provides zoning and building code enforcement or planning and community development professional services for that community;
- ◆ **Project eligibility: HMGP and PDM** mitigation project subapplications for projects sited within an SFHA are eligible only if the jurisdiction in which the project is located is participating in the NFIP. There is no NFIP participation requirement for HMGP and PDM project subapplications for projects located outside of the SFHA;
- ◆ **Hazard mitigation planning eligibility:** There are no NFIP participation requirements for **HMGP** and **PDM** hazard mitigation planning subapplications; and
- ◆ **Property eligibility:** Properties included in a project subapplication for **FMA** funding must be NFIP insured at the time of the application submittal. Flood insurance must be maintained for the life of the structure.

D.7.1 Special Flood Hazard Area Requirements

For structures that remain in the SFHA after the implementation of the mitigation project, flood insurance must be maintained for the life of the structure to an amount at least equal to the project cost or to the maximum limit of coverage made available with respect to the particular property, whichever is less. The maximum limit of coverage made available is defined as the replacement cost value of the structure up to \$250,000 for residential and \$500,000 for non-residential. Insurance coverage on the property must be maintained during the life of the property regardless of transfer of ownership of such property.

The subgrantee (or property owner) must legally record, with the county or appropriate jurisdiction's land records, a notice that includes the name of the current property owner (including book/page reference to record of current title, if readily available), a legal description of the property, and the following notice of flood insurance requirements:

This property has received Federal hazard mitigation assistance. Federal law requires that flood insurance coverage on this property must be maintained during the life of the property regardless of transfer of ownership of such property. Pursuant to 42 U.S.C. 5154a, failure to maintain flood insurance on this property may prohibit the owner from receiving Federal disaster assistance with respect to this property in the event of a flood disaster. The Property Owner is also required to maintain this property in accordance with the floodplain management criteria of 44 CFR Part 60.3 and City/County Ordinance.

Applicants/subapplicants receiving assistance for projects sited in an SFHA must ensure that these requirements are met by requesting that the participating property owner(s) sign an *Acknowledgement of Conditions for Mitigation of Property in an SFHA with FEMA Grant Funds* form and providing the form to FEMA prior to award or final approval. This form is available on the FEMA Web site at <http://www.fema.gov/library/viewRecord.do?id=3592>, or from the appropriate FEMA Regional Office (for Regional Office information, see [Part VIII](#)). Properties that do not meet these requirements will not be eligible to receive assistance under the HMA programs.

If an approved HMA project affects the accuracy of the applicable Flood Insurance Rate Map (FIRM), the subgrantee is responsible for ensuring that appropriate map amendments or revisions are made. Costs associated with map amendments may be identified in the cost estimate section of a subgrant application.

D.8 Statutory, Regulatory, and Other Requirements

Mitigation activities must adhere to all relevant statutes, regulations, and requirements, including:

- ◆ Sections 203 (PDM Program) and 404 (HMGP) of the Stafford Act;

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- ◆ Section 1366 (FMA) of the NFIA;
 - ◆ Section 322 of the Stafford Act (Mitigation Planning);
 - ◆ Section 324 of the Stafford Act (Management Costs);
 - ◆ NHPA;
 - ◆ NEPA;
 - ◆ Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970;
 - ◆ Floodplain Management and Protection of Wetlands (44 CFR Part 9);
 - ◆ Environmental Considerations (44 CFR Part 10, NEPA, and ESA);
 - ◆ Coastal Barriers Resources Act (CBRA; 44 CFR Part 206, Subpart J);
 - ◆ Uniform Administrative Requirements for Grants and Cooperative Agreements to States and Local Governments (44 CFR Part 13);
 - ◆ Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and other Non-Profit Organizations (2 CFR Part 215);
 - ◆ Floodplain Management (44 CFR Part 60);
 - ◆ Flood Mitigation Grants (44 CFR Part 79);
 - ◆ Property Acquisition and Relocation for Open Space (44 CFR Part 80);
 - ◆ Hazard Mitigation Planning (44 CFR Part 201);
 - ◆ Hazard Mitigation Grant Program (44 CFR Part 206, Subpart N);
 - ◆ Management Costs (44 CFR Part 207);
 - ◆ Cost Principles for Educational Institutions (2 CFR Part 220, OMB Circular A-21); Cost Principles for State, Local, and Indian Tribal Governments (2 CFR Part 225, OMB Circular A-87); Cost Principles for Nonprofit Organizations (2 CFR Part 230, OMB Circular A-122);
 - ◆ OMB Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*;
 - ◆ OMB Circular A-133, *Audits of States, Local Governments, and Non-Profit Organizations*;
 - ◆ Federal Acquisition Regulations (FAR) Subpart 31.2, Contracts with Commercial Organizations; and
 - ◆ Other applicable Federal, State, Indian Tribal, and local laws, implementing regulations, and EOs (e.g., EO 11988, EO 11990).

PART V. APPLICATION AND SUBMISSION INFORMATION

Part V provides guidance on developing HMA applications or subapplications, and on related funding restrictions.

A. Address to Request Application Package

Applications for **HMGP** are processed through the National Emergency Management Information System (NEMIS). Applicants may use the Application Development Module of NEMIS to create project applications and submit them to the appropriate FEMA Region in digital format for the relevant disaster. For NEMIS Helpdesk resources, see [Part X C.6](#).

Applications for the **PDM Program** and **FMA** are processed through the *eGrants* system. The *eGrants* system encompasses the entire grant application process and provides the means to electronically create, review, and submit a grant application to FEMA via the Internet.

Applicants and subapplicants can access *eGrants* at <https://portal.fema.gov/famsVuWeb/home>.

The FEMA Technical Service desk phone number is 1 (877) 611-4700. For additional *eGrants* resources, see [Part X C.6](#).

For more information about using NEMIS or *eGrants*, contact the appropriate FEMA Regional Office (see [Part VIII](#)).

B. Content and Form of Application

For **HMGP**, subapplication packages are available from eligible Applicants following Presidential major disaster declarations. The Applicant selects and prioritizes subapplications and submits them to FEMA. Applicants must submit an SF-424, Application for Federal Assistance, before HMGP funding can be obligated. The Applicant submits the subapplications both in digital format via NEMIS and in hard copy format.

Applications and subapplications for the **PDM Program** and **FMA** are submitted via the *eGrants* system. If a subapplicant does not use the *eGrants* system, the Applicant must enter the paper subapplication(s) into the *eGrants* system on the subapplicant's behalf. Blank applications that conform to the *eGrants* format are available for printing from the *eGrants* system and the FEMA Web site. Supporting documentation that cannot be electronically attached to the *eGrants* application (e.g., engineering drawings, photographs, and maps) must be submitted to the appropriate FEMA Regional Office. The entire application, including all paper documentation, must be received by the appropriate FEMA Regional Office no later than the application deadline.

C. Submission Dates and Times

HMGP submittal deadlines for applications are established based on the disaster declaration date. For submission of an application for HMGP, see [Part IX, A.1](#) and [A.6](#).

Completed applications for the **PDM Program** and **FMA** must be submitted to FEMA through eGrants. Application submission due dates and times are posted to the HMA Web site at <https://www.fema.gov/hazard-mitigation-assistance>. Subapplicants should consult the official designated point of contact (POC) for their Applicant for more information regarding the application process. For more information on FEMA and Applicant contacts, see [Part VIII](#). For additional information on HMA application cycles either contact FEMA or go to <http://www.grants.gov/>.

D. Intergovernmental Review

It may be necessary to allow sufficient time for an intergovernmental review of an application as established by EOs 12372 and 12416 (*Intergovernmental Review of Federal Programs*). If an Applicant has chosen not to participate in the intergovernmental review process, the application may be sent directly to FEMA. Guidance on the intergovernmental review process, including the names and addresses of the single POCs as listed by OMB, is available at http://www.whitehouse.gov/omb/grants_spoc.

E. Funding Restrictions

HMA programs allow the funding of eligible costs for mitigation activities as outlined in [Part IV, D.1](#). Subapplications that propose a Federal expenditure in excess of the Federal funding limit will not be considered for an award. For each program, additional funding restrictions apply as described below.

E.1 HMGP Funding Restrictions

- ◆ Up to 7 percent of the Grantee's HMGP ceiling may be used for mitigation planning activities in compliance with 44 CFR Section 201.3(c)(4).
- ◆ Up to 5 percent of the Grantee's HMGP ceiling may be used for mitigation measures that are difficult to evaluate against traditional program cost-effectiveness criteria (i.e., the 5 Percent Initiative).
- ◆ For Presidential major disaster declarations for tornadoes and high winds, an additional 5 percent of the Grantee's HMGP ceiling may be used to fund hazard mitigation measures (e.g., warning systems) to address the unique hazards posed by tornadoes.

For more information on the 5 Percent Initiative and the additional 5 percent for tornadoes, see [Part IX, A.10](#).

E.2 PDM Program Funding Restrictions

- ◆ Up to \$800,000 Federal share may be requested in a subapplication for a planning grant to develop a new hazard mitigation plan.
- ◆ Up to \$300,000 Federal share may be requested in a subapplication for a planning grant to update a hazard mitigation plan.
- ◆ Up to \$3 million Federal share may be requested in a subapplication to implement a mitigation project.
- ◆ The cumulative Federal award for subapplications awarded during a single application cycle to any one Applicant shall not exceed 15 percent of the total appropriated PDM Program funds for that application cycle.

MAXIMUM AMOUNTS OF MITIGATION PLANNING GRANTS

Under the PDM Program, the maximum mitigation planning grant is \$800,000 for a new plan and \$300,000 for an update.

Under FMA, the maximum individual planning grant is \$50,000 for any Applicant and \$25,000 for any subapplicant.

E.3 FMA Funding Restrictions

- ◆ Individual planning grants using FMA funds shall not exceed \$50,000 to any Applicant or \$25,000 to any subapplicant. FMA funds can only be used for the flood hazard component of a hazard mitigation plan that meets the planning criteria outlined in 44 CFR Part 201.

E.4 Management Costs Funding Restrictions

For **all HMA** programs, indirect costs may be included as a part of the management cost estimate shown in the application or subapplication.

For **HMGP** only: The Grantee may request a flat percentage rate (4.89 percent) of the projected eligible program costs for management costs. The Grantee is responsible for determining the amount, if any, of funds that will be passed through to the subgrantee(s) for their management costs. For further information on HMGP management costs, see [Part IX, A.2.5](#) and [A.4](#).

Applicants for the **PDM Program** and **FMA** may apply for a maximum of 10 percent of the total funds requested in their grant application budget (Federal and non-Federal shares) for management costs to support the project and planning subapplications included as part of their grant application. Applicants requesting Applicant management costs must submit a separate Management Costs subapplication in eGrants. This subapplication must be included in the overall grant application or the request will not be considered. Applicants who are not awarded grants funds for project or planning activities will not receive reimbursement for the corresponding costs incurred in developing and submitting applications.

Subapplicants for the **PDM Program** and **FMA** may apply for a maximum of 5 percent of the total funds requested in a subapplication for management costs. Subapplicants requesting management costs must include them in the project or planning subapplication for consideration as separate activities in the Mitigation Activity section of eGrants. Subapplicants who are not awarded subgrants for project or planning activities will not receive reimbursement for the corresponding costs incurred in developing and submitting subapplications.

F. Other Submission Requirements

F.1 Application Consideration under Multiple HMA Programs

FEMA will only consider applications and subapplications submitted to a specific HMA program. If an applicant would like to have a subapplication considered under multiple HMA programs, the applicant must submit that subapplication to each HMA program separately.

F.2 Pre-Award Costs

Costs incurred after the HMA application period has opened, but prior to the date of the grant award or final approval, are identified as pre-award costs. For **HMGP**, the opening of the application period is the date when HMGP is authorized, which is generally the date of declaration. The opening of the application period for the **PDM Program** and **FMA** is established annually by FEMA.

Pre-award costs directly related to developing the application or subapplication may be funded through HMA as funds are available. Such costs may have been incurred, for example, to develop a BCA, to gather EHP data, for preparing design specifications, or for workshops or meetings related to development and submission of HMA applications and subapplications. Costs associated with implementation of the activity but incurred prior to grant award or final approval are not eligible (projects initiated or completed prior to grant award or full approval of the project are not eligible). To be eligible for HMA funding, pre-award costs must be identified as separate line items in the cost estimate of the subapplication. Applicants and subapplicants may identify such pre-award costs as their non-Federal cost share. Applicants and subapplicants who are not awarded grants or subgrants will not receive reimbursement for the corresponding pre-award costs.

G. Applicant Guidance

G.1 General Applicant Guidance

FEMA will not direct the Applicant on how to submit its applications. The Applicant may submit a single application representing all subapplications or they may submit multiple applications. When submitting multiple subapplications, they should be ranked in priority order.

Before forwarding subapplications to FEMA, Applicants also should review subapplications to document that:

- ◆ The subapplicant has documented its capacity to manage the subgrant funds;
- ◆ The subapplicant has documented its capacity to complete the mitigation activity in the time specified;
- ◆ Non-Federal cost-share funds are or will be available for the project;
- ◆ The maintenance requirements have been sufficiently identified, and the subapplicant or another authorized entity has accepted the maintenance responsibility;
- ◆ The underlying cost-effectiveness data are accurate and complete; and
- ◆ All program- and project-specific requirements have been met and are documented as appropriate.

If the subapplication is considered to be deficient, the Applicant may revise or augment the subapplication in consultation with the subapplicant. Applicants must certify that they have evaluated the activities included in each subapplication and that activities will be implemented in accordance with 44 CFR Part 13 and other applicable program or activity type requirements.

G.2 Minimum Eligibility and Completeness Criteria

FEMA will no longer accept incomplete and placeholder project applications. Incomplete applications or subapplications delay project approval because they do not contain sufficient information for FEMA to make program eligibility determinations. Applications and subapplications submitted to FEMA must meet the minimal eligibility and completeness criteria as there is no method to determine eligibility without these data.

These minimal eligibility criteria are required for all submittals including over-submittals and placeholder applications. Additional information may be requested during FEMA review. The following list is not all inclusive. For a more detailed checklist please see [Part X, Appendix E](#) for projects and [Part X, Appendix H for plans](#).

MINIMUM ELIGIBILITY AND COMPLETENESS REQUIREMENTS

Applications and subapplications submitted to FEMA must meet the minimal eligibility and completeness criteria, as there is no method to determine eligibility without these data. For a detailed Eligibility and Completeness checklist please see [Part X, Appendix E](#) for projects and [Part X, Appendix H](#) for plans.

Unless otherwise noted, the following criteria apply to plans, management costs, and project subapplications and applications:

- ◆ Eligible Applicant;
- ◆ Meets all plan requirements per 44 CFR Parts 201 and 206;
- ◆ Provides a detailed SOW as described in [Part V, H](#);

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- ◆ Provides a work schedule of 3 years or less;
 - ◆ If project is suitable for phased or incremental funding, the schedule reflects activities and timelines for each funding increment (**projects**);
 - ◆ Budget/Match Source;
 - A detailed cost estimate/budget is provided that supports the SOW;
 - ◆ Cost-effectiveness and Feasibility (**projects**);
 - Project includes a FEMA-approved BCA or FEMA-approved alternate cost-effectiveness documentation (see [Part V, I](#) for additional information);
 - The proposed activity is feasible and effective as demonstrated through conformance with accepted engineering practices, established codes, standards, modeling techniques, or best practices (see [Part V, J](#) for additional information);
 - ◆ EHP;
 - Project includes information and documentation to demonstrate conformance with all applicable laws and regulations (e.g., NEPA and State Historic Preservation Act);
 - Project demonstrates that it minimizes harm to the environment and is the best alternative from a range of options considered (see [Part V, K](#) for additional information); and
 - ◆ Assurances.

H. Scope of Work

The SOW identifies the eligible mitigation activity, as described in [Part IV, D.1](#); describes what will be accomplished; and explains how the mitigation activity will be implemented. The mitigation activity must be described in sufficient detail to verify the cost estimate. All activities for which funding is requested must be identified in the SOW prior to the close of the application period.

H.1 Project Scope of Work

The project subapplication SOW provides detailed information about the project, as well as applicable references and supporting documentation. The SOW includes:

- ◆ **Purpose of the project** – The intended outcome or objectives of the project;
- ◆ **Clear, concise description of the proposed project** – Proposed conceptual design, means of implementation of the project, and responsible party for implementation;
- ◆ **Identification of properties to be mitigated** – All properties to be mitigated must be identified, including additional, alternate properties that may be substituted should one or

more of the other properties be withdrawn for eligibility or other reasons. In order for alternate properties to be properly considered in the event of a substitution, the same level of information for the alternate properties is required as is provided for the proposed properties;

- ◆ **Outcomes** – Proposed project accomplishments, problem(s) that the project will solve, parties that will directly or indirectly benefit from the project, and ways that the risks of damage or harm will be reduced;
- ◆ **Special project components** – New technologies that will be used during project implementation and how they are expected to provide the necessary results, and necessary laboratory tests or field-testing;
- ◆ **Other projects** – Other projects that are currently being implemented or expected to be implemented that will affect the proposed project;
- ◆ **Extraordinary Circumstances** – If this exception is used, a plan must be completed within 12 months of the award of the project grant, per [Part IV, D.5](#) (Hazard Mitigation Plan Requirement); and
- ◆ **Latitude/Longitude and site photographs** – Subapplicants must identify the proposed project location on a map and provide the latitude/longitude and any relevant photographs including, but not limited to sides of the building, foundation, roof, both sides of the culvert, and the surrounding project area.

The required documentation depends upon the nature of the proposed project and may include: proposed schematics, drawings or sketches, photographs, maps, sections of hazard maps, a Flood Insurance Study, or a FIRM. Whenever possible, data used to document existing conditions must be obtained from recognized sources, such as Federal agencies, State agencies, and academic organizations. The references and/or supporting documentation from qualified and credible sources such as Professional Engineers or local government records should be included when using locally developed data. Deviations from standard procedures, methods, techniques, technical provisions of the applicable codes, or best practices must be thoroughly explained and documented. Subapplicants must identify the proposed project location on a map and provide any relevant photographs including, but not limited to, sides of the building, foundation, and roof (as appropriate).

H.2 Hazard Mitigation Planning Scope of Work

The hazard mitigation planning subapplication SOW must describe the development of a hazard mitigation plan or planning-related activity that is consistent with the requirements identified in 44 CFR Part 201.

For a hazard mitigation plan, the SOW must:

- ◆ Describe the proposed planning activity, including whether it will:

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- Result in a new or updated hazard mitigation plan that complies with the requirements identified in 44 CFR Part 201; or
 - Enhance an existing mitigation plan through a planning related activity that is consistent with 44 CFR Part 201.
- ◆ Identify the jurisdiction(s) or tribe(s) that will participate in developing the plan or the planning-related activity and describe the jurisdictions;
 - ◆ Provide a statement on how the overall planning effort will be coordinated;
 - ◆ Describe the process for plan development or the planning-related activity, clearly demonstrating what applicable regulatory requirements will be met. Document in detail the activities the jurisdiction(s) will complete to develop the plan or the planning related activity, including public involvement, identification of hazards, development of a comprehensive risk/vulnerability assessment, identification of mitigation goals and strategies, and plan implementation, and describe how these activities relate to the cost estimate; and
 - ◆ For new or updated hazard mitigation plans, describe the plan adoption process for the jurisdiction(s) or tribe(s) to ensure sufficient time to complete the plan, as well as time for State and FEMA review and, if necessary, time to complete any required revisions and to formally adopt the plan.

Additionally, for an update to a hazard mitigation plan, the SOW must include the reasons for the update and describe the process for plan update, clearly demonstrating that applicable regulatory requirements will be met. Also, provide a statement on how the overall planning effort will be coordinated.

If available, the subapplication also should include a copy of the plan review document (i.e., review tool or crosswalk) from the FEMA approval of the previous plan.

For planning related activities, the SOW should describe the:

- ◆ Final product(s);
- ◆ Process and level of effort to develop the final product(s), including key milestones (such as meetings; data research, collection, and analysis; drafts; and outreach); and
- ◆ Process to incorporate the product(s) or results into the update of the next mitigation plan.

Applicants/subapplicants are advised to make use of already developed materials and to seek available resources when developing a new mitigation plan or updating a mitigation plan. For links to mitigation planning and risk assessment resources, see [Part X, C.2](#).

H.3 Management Costs Scope of Work

For the Applicant management cost subapplication, the SOW must describe the activities and specific tasks related to developing subapplications, and implementing as well as closing subgrants. The SOW should state whether the work will be conducted by the Applicant's staff or by contractor staff.

H.4 Schedule

Subapplications should include a work schedule for all project tasks identified in the SOW, such as data collection, site survey, permitting and inspections, site preparation, and construction. The schedule should identify timelines for accomplishing significant milestones, including anticipated quarterly usage of Federal funds. Proposed schedules for individual subapplications should not exceed 36 months (see [Part VII, B.4](#)).

For planning subapplications, the work schedule must allow sufficient time for State and FEMA reviews; preparation of required revisions, if needed; formal adoption by the jurisdiction(s); and FEMA approval.

H.5 Cost Estimate

The cost estimate describes all of the subapplicant's anticipated costs associated with the SOW for the proposed mitigation activity. Cost estimates must include detailed estimates of various cost item categories, such as labor, materials, equipment, and subcontractor costs. No lump-sum estimates will be accepted. The cost estimate must identify the cost categories and value for which anticipated cash and third-party in-kind contributions will be used to meet the non-Federal cost share.

COST ESTIMATES

FEMA will accept cost estimates used to support budgets and BCAs if the Applicant or subapplicant certifies that the estimates are based on nationally published or local cost-estimating guides.

FEMA will accept cost estimates that the Applicant or subapplicant certifies were established using nationally published or local cost estimating guides to support the budget and BCA. The Applicant or subapplicant must include appropriate documentation in the application or subapplication that demonstrates a national published standard or local cost estimating guide was used. If a cost estimate is based on a contractor's bid or historic costs from another activity, detailed documentation must be provided. The applicant must document actual costs for eligible activities at closeout. Separate cost line items in a subapplication are required to ensure that cost thresholds are not exceeded. As applicable, the following line items must be listed separately in the budget:

- ◆ Pre-award costs;
- ◆ Subapplicant management costs for the PDM Program and FMA, and HMGP if the Grantee has agreed to pass through funds to the subgrantee; and

-
- ◆ Information dissemination costs (for the PDM Program).

Additionally, the cost estimate should indicate items for which the cost may change, such as a price quoted by a contractor that is only valid for 1 year. Neither contingency nor escalation costs are permitted as individual line items in the cost estimate.

H.5.1 Project Cost Estimate

In addition to the items described in [Part V, H.5](#), the project cost estimate must include a line-item breakdown of all anticipated costs including, as applicable:

- ◆ Costs for anticipated environmental resource impact treatment or historic property treatment measures;
- ◆ Costs for engineering designs/specifications, including hydrologic and hydraulic studies/analyses required as an integral part of designing the project;
- ◆ Construction/demolition/relocation costs, such as survey, permitting, site preparation, and material/debris disposal costs; and
- ◆ All other costs required to implement the mitigation project, including any applicable project-type specific costs identified in the Addendum of this guidance.

For additional information about cost estimates for property acquisition and structure demolition or relocation projects, see Addendum, Parts A.5 and A.6; for wildfire mitigation projects, see Addendum, Part B.3; for safe room construction projects, see Addendum, Part C.3.4; for mitigation reconstruction see projects Addendum, Parts D.2 and D.5; and for structure elevation projects, see Addendum, Part E.3.

H.5.2 Hazard Mitigation Planning Cost Estimate

In addition to the items described in [Part V, H.5](#), the hazard mitigation planning cost estimate must include a line-item breakdown of costs associated with all elements described in the SOW, such as:

- ◆ Meetings and public outreach, including the costs associated with what is necessary and reasonable;
- ◆ Data research and collection, including eligible mapping activities or risk assessment;
- ◆ Plan drafting, review, and final production;
- ◆ Information dissemination activities, including printing and advertising; and
- ◆ Professional development training, tuition, and travel for the purpose of carrying out the planning SOW.

H.5.3 Management Cost Estimate

Applicants and subapplicants requesting management costs should provide supporting documentation and include these costs as separate line items in the cost estimate portion of the application or subapplication.

A narrative must accompany a request for management costs. The narrative should describe the activities, personnel requirements, and other costs for which the Grantee and/or subgrantee will use management cost funding. It should provide information on how the funds will be expended and monitored and show that sufficient funds will be available for closeout.

For more information on HMGP management costs, see [Part IX, A.4](#).

I. Cost-effectiveness

FEMA will only consider applications that use a FEMA-approved methodology to demonstrate cost-effectiveness. This is typically demonstrated by the calculation of a BCR. Projects for which benefits exceed costs are generally considered cost-effective. Benefits may include avoided damages, loss of function, and displacement.

FEMA provides BCA software that allows Applicants to calculate a project BCR. Written materials and training are also available. The FEMA BCA software utilizes the OMB Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. FEMA requires using approved BCA software (version 4.5.5 or greater) to help ensure that calculations are consistent with OMB Circular A-94. The current software is available at the FEMA Regional Office or from the BCA Technical Assistance Helpline.

If FEMA standard values are used, then no additional documentation is required. If non-standard values are used, then documentation is required. Documentation must be accurate and sufficiently detailed for the analysis to be validated. FEMA recommends that supporting documentation be obtained from credible sources, such as a Flood Insurance Study.

Data associated with the various methodologies for analyzing cost-effectiveness are available from the appropriate FEMA Regional Office (see [Part VIII](#)) or the BCA Technical Assistance Helpline.

I.1 Substantial Damage Waiver

An expedited cost-effectiveness methodology is available for property acquisition projects when certain conditions are met. Structures that are declared Substantially Damaged as a result of flooding and located in a riverine SFHA on a

**SUBSTANTIAL DAMAGE
WAIVER EXTENDED
TO ALL HMA PROGRAMS**

An expedited cost-effectiveness analysis methodology is available for property acquisition projects when certain conditions are met.

preliminary or effective FIRM are considered cost-effective for acquisition projects. If this methodology is used, the project application should include a certification that the structures meet these conditions.

I.2 Aggregation

An evaluation of the cost-effectiveness of a project should include all activities included within the SOW. This may include activities in multiple jurisdictions. It may also include combining benefits from multiple activities and multiple hazards, such as wind and flood, if it is a part of the same project.

AGGREGATION

It is appropriate to aggregate benefits from multiple activities and multiple jurisdictions if part of the same project.

I.3 5 Percent Initiative

For **5 Percent Initiative** subapplications for HMGP funding, a narrative description of the project's cost-effectiveness must be provided. For more information on the 5 Percent Initiative, see [Part IX, A.10](#).

I.4 Pre-calculated Benefits (Safe rooms)

For **Safe Room Construction** projects, an expedited cost-effectiveness methodology is available that identifies the benefits associated with certain types of safe rooms (see Appendix F). If this methodology is used, the submitted project application should include a copy of the data relevant to the project location.

I.5 Greatest Savings to the Fund

FEMA also allows for the use of the GSTF data and methodology to demonstrate cost-effectiveness for properties included in mitigation projects under HMA. Subapplicants are not required to use this methodology when submitting projects for funding and may utilize the current applicable BCA version (4.5.5 or greater) methodology.

GREATEST SAVINGS TO THE FUND METHODOLOGY

GSTF can be used to demonstrate cost-effectiveness of a project under all HMA programs.

I.6 Environmental Benefits

FEMA has identified and quantified environmental benefits for mitigation activities. Incorporating environmental benefits into the overall quantification of benefits for acquisition-related activities supports

INCLUSION OF ENVIRONMENTAL BENEFITS INTO THE BCA TOOLKIT

Green open space and riparian benefits have been identified and quantified for acquisition projects. The BCR for an acquisition project must be 0.75 before the environmental benefit can be incorporated.

FIMA’s mission of risk reduction, environmental compliance, and preservation of the natural and beneficial functions of the floodplain.

Specifically, FEMA developed economic values for green open space and riparian areas. FEMA will be incorporating the environmental benefits for green open space and riparian areas into the BCA toolkit for acquisition projects.

The economic value for green open space is \$7,853 per acre per year. For riparian areas, the economic value is \$37,493 per acre per year. When incorporating these values into FEMA’s BCA, the yearly benefits accrue over the 100-year project useful life and are discounted at 7 percent per year to meet OMB requirements. [Table 4](#) provides the green open space and riparian benefits per acre per year and per square foot.

Table 4: Green Open Space and Riparian Benefits

Land Use	Total Estimated Benefits (per acre per year)	Total Estimated Benefits ⁽¹⁾ (per square foot)
Green Open Space	\$7,853	\$2.57
Riparian	\$37,493	\$12.29

⁽¹⁾ Projected for 100 years with 7 percent discount rate

For an acquisition project, the BCR for a project must be 0.75 before incorporating the environmental benefit. This ensures projects funded by HMA are primarily associated with risk reduction activities. Once a project’s BCR reaches 0.75, the appropriate environmental benefit can be included for the individual properties.

I.7 Benefit-Cost Analysis Resources

Other methods to demonstrate cost-effectiveness may be used when they address a non-correctable flaw in the FEMA-approved methodologies or propose a new approach that is unavailable using current tools. New methodologies may be used only if FEMA approves the methodology before application submission. For more information on resources, see [Part X, C.3](#).

BCA Helpline

Telephone: (855) 540-6744

Email: bchelp@fema.dhs.gov

BCA Policies, Overview, and Software

<http://www.fema.gov/benefit-cost-analysis>

J. Feasibility and Effectiveness Documentation

FEMA will use the information provided in the subapplication, including the SOW, the cost estimate, and supporting documentation to determine the feasibility and effectiveness of the

proposed mitigation activity. FEMA accepts the engineering design for a project if a registered Professional Engineer (or other design professional) certifies that the design meets the appropriate code or industry design and construction standards. FEMA will accept the certified engineering design in lieu of a comprehensive technical feasibility review. If accepted codes/standards are used, no additional documentation is required. See [Part X, Appendix D](#) (Referenced Regulations, Statutes, Directives, and Guidance) for examples of codes and standards used for various projects types.

If an alternative design is proposed the application/subapplication should contain:

- ◆ Applicable building code/edition or engineering standard used;
- ◆ Level of protection provided by the proposed project and description of how the proposed activity will mitigate future losses;
- ◆ For the retrofit of existing buildings or infrastructure protection projects, an assessment of the vulnerabilities of the existing building;
- ◆ Any remaining risk to the structure after project implementation; and
- ◆ Proposed schematic drawings or designs (as applicable).

Project subapplications that do not include appropriate documentation to support the determination of feasibility and effectiveness may be removed from consideration. Upon request, FEMA will provide technical assistance regarding engineering documentation.

For structure elevation and dry floodproofing activities, a statement certifying that the project will be designed in conformance with ASCE/SEI 24-05 will assist in satisfying the feasibility and effectiveness requirement.

K. Environmental Planning and Historic Preservation Documentation

The Applicant and subapplicant should ensure that the project SOW takes into account all potential EHP compliance issues. When completing the subapplication, the Applicant/subapplicant must answer a series of EHP review questions and provide information about potential impacts on environmental resources and cultural resources (if applicable) in the project area. For additional information, see [Part X, Appendix I](#) (EHP Checklist) and [Part X, Appendix J](#) (8-Step Decision Making Process for Floodplain Considerations), and [Part X, Appendix K](#) (Section 106 Process under the National Historic Preservation Act).

If potential impacts are identified through the responses to these EHP review questions, the Applicant/subapplicant must provide additional information, (as applicable), such as:

- ◆ The property address, original date of construction, and two color photographs for any buildings, structures, objects, or manmade sites/landscapes features that are 50 years or

more in age. At least one of the two photographs provided of a building should be the front or primary façade showing the elevation;

- ◆ Any identified federally listed threatened or endangered species and/or designated critical habitat in the project area;
- ◆ Vegetation, including amount (area), type, and extent to be removed or affected;
- ◆ Identification of all surface waters in the project area regardless of drainage area, size, or perceived hazard level. Information about surface waters should include dimensions, proximity of the project activity to the water, and the expected and possible impacts of the project upon surface waters, if any; and
- ◆ A description of any adverse effects on low income or minority populations in the project area.

Applicants seeking to determine whether there are any EHP issues associated with the proposed project should consult the HMA EHP Resources At-a-Glance Guide, located at <http://www.fema.gov/library/viewRecord.do?id=6976> and the HMA EHP at a Glance at <http://www.fema.gov/library/viewRecord.do?id=5904>. This Guide also provides key contacts, Web sites, and search engines to assist in early identification of EHP issues and to facilitate coordination with the appropriate State and Federal agencies.

If EHP issues are identified, the Applicant/subapplicant should initiate coordination with the relevant State and Federal agencies as early in the project planning stages as possible to address any potential EHP compliance issues associated with proposed projects. This coordination does not substitute, and shall not be interpreted to mean, that formal consultation has occurred between FEMA and the applicable resource agency.

Additional EHP compliance review activities may be necessary to facilitate project approval, such as environmental impact statements, environmental assessments, Phase I environmental site assessments, biological assessments, archeological or standing structures surveys and documentation, wetlands delineations, and air quality conformity analysis or determinations.

If FEMA or the Applicant/subapplicant identifies any potential impacts through the EHP review process described above, the following requirements must be completed before a grant award may be made:

- ◆ Evaluate any potential effects to environmental and historic resources and provide the required information and documentation to identify the impact on these resources;
- ◆ Complete an evaluation of alternatives to the proposed action that will avoid or minimize these impacts, including consideration of the environmental impact of taking no action;
- ◆ Complete any required consultation and/or coordination with the appropriate parties (e.g., the State Historic Preservation Officer, the U.S. Fish and Wildlife Service, the National

Marine Fisheries Service) to evaluate potential effects of the proposed project and to identify any measures necessary to avoid or minimize these effects;

- ◆ Demonstrate that the project will comply with all environmental laws and regulations; and
- ◆ Make certain that the costs of any measures to treat adverse effects are realistically reflected in the project budget estimate.

Applicants/Grantees may incur costs for significant EHP compliance review activities and/or EHP mitigation measures. FEMA will consider the following factors to determine whether to reimburse costs:

- ◆ Nature of the analysis or study required (e.g., environmental impact statement);
- ◆ Costs of EHP activities compared to project costs;
- ◆ Complexity of the proposed project; and
- ◆ Nature and extent of potential adverse impacts to environmental and/or historic resources.

Applicants should consider potential EHP costs during application development and submission and should seek to avoid activities that may negatively impact EHP resources.

FEMA may remove projects from consideration for full approval and/or funding when EHP compliance review activities are not progressing and the Applicant/Grantee has not dedicated resources and/or provided required documentation in a timely manner.

For additional information on required EHP documentation, see [Part X, C.5](#).

PART VI. APPLICATION REVIEW INFORMATION

Part VI provides information about the review process so that Applicants and subapplicants can prepare applications that meet FEMA review criteria. During an application review, FEMA may request additional information or documentation from Applicants.

A. Review Criteria

While review processes vary somewhat among HMA programs, FEMA reviews all applications for:

- ◆ Application eligibility;
- ◆ Cost-effectiveness;
- ◆ Feasibility and effectiveness; and
- ◆ EHP compliance.

A.1 Application Review

FEMA will review all applications and subapplications for eligibility and completeness. Applications and subapplications that do not satisfy the eligibility and completeness requirements will not be funded. The eligibility and completeness requirements are outlined in [Parts IV](#) and [V](#).

A.2 Cost-effectiveness Review

FEMA will review the documentation provided in support of the subapplication cost-effectiveness to validate the accuracy and credibility of data and ensure the appropriate use of the cost-effectiveness methodologies. Only subapplications meeting HMA cost-effectiveness requirements will be considered eligible.

A.3 Feasibility and Effectiveness Review

FEMA will use the information provided in the subapplication, including the SOW and project cost estimate sections, as well as any supporting documentation to determine the feasibility and effectiveness of the mitigation activity.

For project subapplications, FEMA will consider the following criteria in reviewing feasibility and effectiveness:

- ◆ Conformance to accepted engineering practices, established codes, standards, modeling techniques, or best practices, as well as work schedule;

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- ◆ Effectiveness in mitigating the risks of the hazard(s); and
 - ◆ Reasonableness of the cost estimate.

A.4 Environmental Planning and Historic Preservation Review

Applicants and subapplicants are required to provide information to support the FEMA EHP compliance review. FEMA, in consultation with appropriate Federal and State resource agencies, will use the information provided in the application/subapplication, including the SOW, project cost estimate, as well as any supporting documentation, to ensure compliance with EHP requirements.

As part of the EHP review process, FEMA will assess compliance with applicable requirements including NEPA, NHPA, ESA, CBRA, EO 11988 (*Floodplain Management*), EO 11990 (*Protection of Wetlands*), and EO 12898 (*Environmental Justice*). Funds will not be awarded, and the Applicant/subapplicant may not initiate the project, other than planning or preparatory work not involving construction or alteration of the land, until FEMA has completed this review and it is demonstrated that the project, when completed, will comply with all environmental laws and regulations.

A.5 HMA Efficiencies

FEMA accepts the engineering design for a project if a registered Professional Engineer (or other design professional) certifies that the design meets the appropriate code, or industry design and construction standards. FEMA will accept the certified engineering design in lieu of the FEMA comprehensive technical feasibility review. For example, if a registered Professional Engineer certifies that design of a community safe room project meets or exceeds FEMA P-361 standards for design and construction, FEMA will not perform a detailed design review to ensure compliance with the standard.

HMA EFFICIENCIES

FEMA provides opportunities to streamline application requirements by allowing Applicants to use:

- FEMA technical publications
- National standards and codes
- Design criteria such as ASCE criteria
- Pre-calculated benefits

Additionally, in the development of applications and subapplications, the following resources and approaches should be considered as they will promote efficiencies in FEMA review and approval.

A.5.1 Safe Room Projects

Applicants must document that the proposed safe room project is consistent with the requirements of FEMA P-320 or FEMA P-361. Applicants must use the expedited HMGP application for

PRE-CALCULATED BENEFITS FOR SAFE ROOMS UNDER HMGP

If the Applicant submits a residential safe room project with costs that are less than the pre-calculated benefit, then FEMA will consider the project to be cost effective.

Residential Safe Rooms to apply pre-calculated benefits under HMGP (see [Part X, Appendix F](#)). This pre-calculated benefit provides standardized benefits associated with residential safe rooms so that individual BCAs are not required as long as the project costs do not exceed the benefits.

A.5.2 Wind Retrofit Projects

FEMA P-804 provides design guidance for wind-retrofit projects on existing one- and two-family dwellings in coastal areas. Mitigation projects funded under HMGP and the PDM Program are required to be implemented in conformance with FEMA-804. If a subapplication complies with FEMA P-804, no additional technical information is required in the subapplication.

A.5.3 Certain Flood Mitigation Projects

FEMA recommends HMA flood mitigation projects be designed and constructed in conformance with the design criteria of ASCE/SEI 24-05 as a minimum standard. FEMA will consider a project application utilizing ASCE/SEI 24-05 as being consistent with HMA engineering feasibility and effectiveness requirements. Project applications that do not use ASCE/SEI 24-05 must submit documentation to demonstrate the project meets the engineering feasibility and effectiveness requirement.

B. Review and Selection Process

B.1 Technical Review

FEMA will conduct a technical review for all project subapplications that are forwarded from the initial FEMA review, for the following:

- ◆ Cost-effectiveness;
- ◆ Feasibility and effectiveness; and
- ◆ EHP compliance.

B.2 Requests for Information

FEMA may request additional information or documentation from Applicants to resolve outstanding administrative or procedural requirements. RFIs can take various forms, including email requests, documented telephone calls, or formal letters. Failure to provide requested information by the deadline identified in the request may result in denial, because eligibility cannot be determined. Technical assistance is available, if requested.

Comments may be provided by FEMA on subapplications determined ineligible so that subapplicants can modify their subapplication for resubmission in future grant cycles.

B.2.1 Request for Information Timelines

[Table 5](#) provides timelines for stepwise information requests and assistance offers. [Figure 4](#) outlines the RFI process and assigned responsible party. The RFI process involves an eligibility review to determine if the subapplication and subapplicant are eligible, then a completeness review is conducted to determine if a complete subapplication was submitted. If the subapplication is determined to be incomplete, there are three steps FEMA will take to request further information from the subapplicant. At each step throughout the RFI process, FEMA will work with the Applicant and subapplicant to determine available options to develop a viable project. Some options include technical assistance from FEMA or implementing a phased project. If the requested information is not received by the Regional Administrator before the deadline, the project will be denied as FEMA will have no basis to make an eligibility determination. Upon receipt of the requested information and confirmation it adequately addresses the RFI, FEMA will proceed with making a determination of project eligibility.

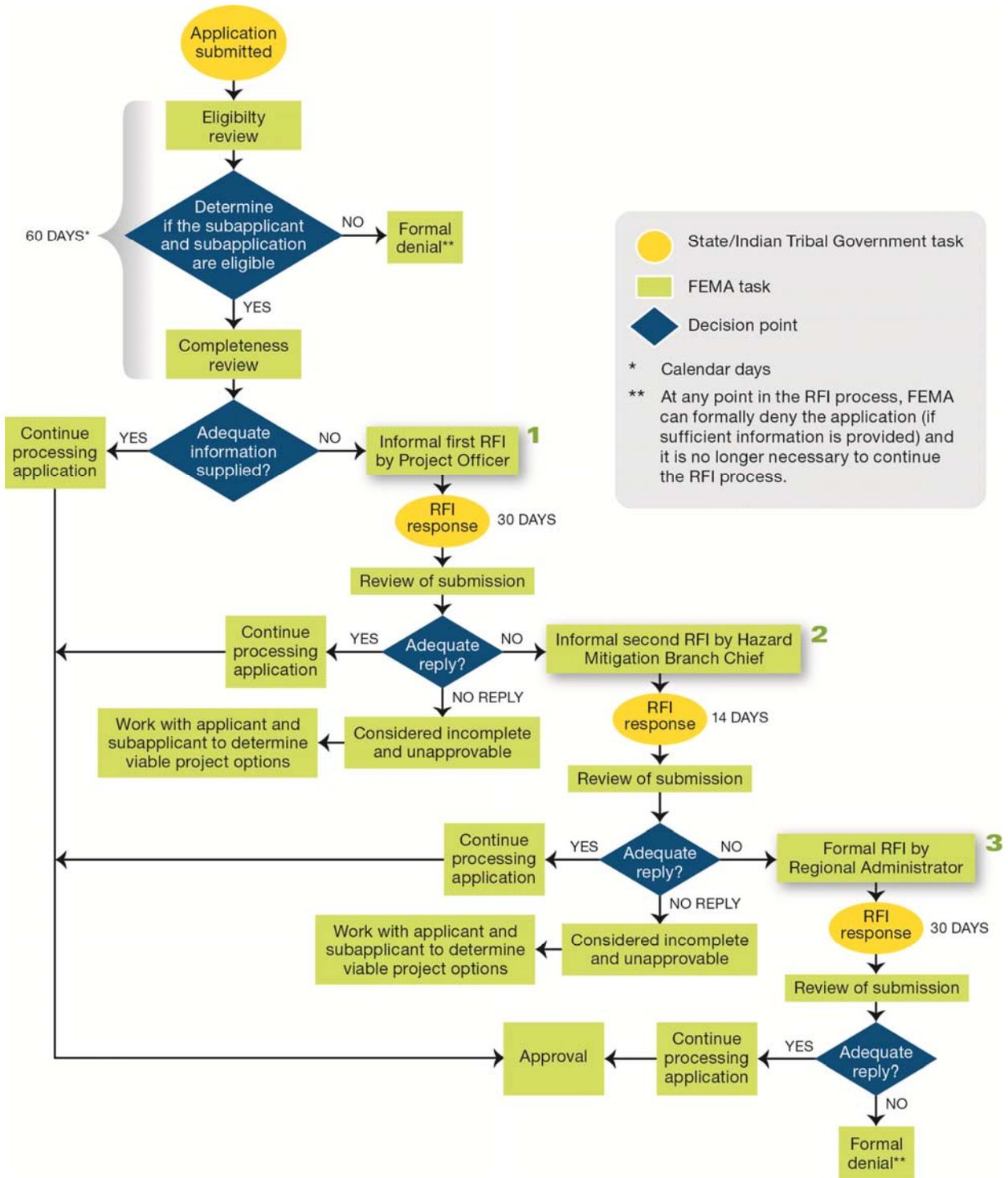
REQUEST FOR INFORMATION

If a subapplication does not meet the administrative or procedural information requirements, FEMA may request additional information in the form of an RFI. If the Regional Administrator does not receive the requested information by the final deadline, the project will be denied.

Table 5: RFI Timelines

Request Format	Timeline
Informal – First Request	The Project Officer requests additional information. If the requested information is not received within 30 calendar days from the date of the request, FEMA will consider the application to be incomplete and not approvable. FEMA may provide technical assistance if requested, unless the HMA program is competitive. The Applicant may consider phasing the project if it is feasible to do so.
Informal – Second Request	The Hazard Mitigation Branch Chief requests additional information. If the requested information is not received within 14 calendar days from the date of the request, FEMA will consider the application to be incomplete and not approvable. FEMA may provide technical assistance if requested, unless the HMA program is competitive. FEMA, Grantee, and Applicant staff should meet to resolve any open items within the allotted timeframe, if necessary.
Formal	The Regional Administrator requests additional information and will document previous requests. If the requested information is not received within 30 calendar days from the date of the request, FEMA will consider the application to be incomplete and not approvable.
Formal	If the Regional Administrator does not receive the requested information within 30 calendar days, he or she will determine the requested project application be ineligible for funding under HMGP. The second formal letter is a denial.

Figure 4: RFI Flowchart



The Regional Administrator may choose to allow more time, with justification. FEMA encourages Applicants to coordinate early with the State or eligible Indian Tribal government to identify potential technical assistance. If technical data is not readily available, the subapplicant should coordinate with Grantee to determine whether the project should be phased in order to develop required data. States or Indian Tribal governments with Grantee status could contact the FEMA regional office to request technical assistance, relevant training or other needed support.

B.3 Selection

FEMA selects eligible subapplications based on priorities set by the Applicant or program priorities, if applicable. For more information for the PDM Program, see [Part IX, B.5](#), for FMA, see [Part IX, C.4](#).

B.4 Notification

For the **PDM Program** and **FMA**, during the review and selection process FEMA will notify Applicants as to whether subapplications have been identified for further review, determined eligible but will not be funded, or determined ineligible for funding. A determination of “identified for further review” is not notification or guarantee of an award.

FEMA will work with Applicants on subapplications identified for further review. Applicants will be notified of activities required, such as an EHP review; verification of subapplicant commitments; verification of hazard mitigation plan status; and of the date by which all required activities must be completed.

Comments may be provided by FEMA on subapplications determined ineligible so that subapplicants can modify their subapplication for resubmission in future grant cycles.

The PDM Program and FMA have specific ranking criteria in addition to those described in this part. For information about ranking criteria and on the review and selection process for the PDM Program, see [Part IX, B.4](#); and FMA, see [Part IX, C.4](#).

B.5 Reconsideration Process

For the FMA and PDM programs, FEMA will reconsider its determination of a subapplication evaluated on a competitive basis only when there is an indication of a substantive technical or procedural error by FEMA. Only information provided in the submitted subapplication is considered supporting documentation for the request for reconsideration. The amount of funding available for Applicant management costs will not be reconsidered.

FEMA may evaluate subapplications on a competitive basis when:

- ◆ Submitted subapplications exceed available funds;
- ◆ Law or regulation requires the administration of a competitive program; or

-
- ◆ Circumstances merit the administration of funds in a competitive manner.

Applicants must send requests for reconsideration based upon technical or procedural error to FEMA within the time specified in the notification letter to the Applicant. A FEMA decision to uphold or overturn a decision regarding a subapplication evaluated on a competitive basis is final.

B.5.1 Consideration of Additional Information

FEMA may, at its discretion, notify Applicants that it will consider additional information in support of a subapplication.

FEMA will accept supplemental or corrected data in support of a subapplication when:

- ◆ Submitted subapplications do not exhaust available program funds;
- ◆ Law or regulation do not require the administration of a competitive program; or
- ◆ When determined appropriate by the program office.

Instructions for submitting supplemental data will be provided within the FEMA notification letter, if applicable.

For information on appeal and administration of HMGP subapplications, see [Part IX, A.11](#).

PART VII. AWARD ADMINISTRATION INFORMATION

Part VII describes how successful Applicants will receive award information. Additionally, this part describes administrative requirements from the time an award is made through closeout and the maintenance actions that must occur after an activity is complete.

A. Notice of Award

FEMA will provide an award package to the Applicant for successful subapplications. Subapplicants will receive notice of award from the Applicant.

Award packages for the **PDM Program** and **FMA** include an award letter, FEMA Form 76-10A, *Obligating Document for Awards/Amendments*, and Articles of Agreement, EHP, and/or other conditions that must be signed by the Applicant in *eGrants* and returned to FEMA for approval before funds can be obligated.

For **HMGP**, award packages for subgrants include an approval letter, an obligation document, and EHP and/or other conditions.

When the Applicant or subapplicant accepts an award, they are denoted as Grantee and subgrantee, respectively. The Grantee and subgrantee agree to abide by the grant award terms and conditions as set forth in the Articles of Agreement or the FEMA-State Agreement.

B. Administrative and National Policy Requirements

B.1 Cost-Share Documentation

Requirements for cash and third-party in-kind contributions can be found in 44 CFR Section 13.24. Third-party in-kind and cash contributions are only allowable for eligible program costs. The following documentation is required for cash and third-party in-kind contributions:

- ◆ Record of donor;
- ◆ Dates of donation;
- ◆ Rates for staffing, equipment or usage, supplies, etc.;
- ◆ Amounts of donation or value of donation; and
- ◆ Deposit slips for cash contributions.

Such documentation must be kept on file by the Grantee and subgrantee.

B.2 Scope of Work Changes

In accordance with 44 CFR Section 13.30, Grantees must obtain FEMA's prior approval whenever there is a proposed SOW change. Requests for changes to the SOW after award are permissible as long as they are consistent with the intent of the program. Requests must be made in writing and demonstrate the need for the scope change. The request also should include a revised scope, schedule, and budget. Any SOW changes are subject to all programmatic requirements. All approvals will be at FEMA's discretion.

SCOPE CHANGE

Grantees and subgrantees must request FEMA's approval for a change in scope after the grant has been awarded. The change must be consistent with the intent of the program. Requests must be made in writing and demonstrate the need for a change.

B.3 Budget Changes

Grantees and subgrantees are permitted to rebudget within the approved direct cost budget to meet unanticipated requirements and may make limited program changes to the approved budget. For more information on direct cost categories, please see OMB Circular A-87 and 2 CFR Part 225, *Cost Principles for State, Local, and Indian Tribal Governments*. Unless expressly waived by FEMA, the following types of post-award changes to budgets will require the prior written approval of FEMA:

BUDGET CHANGE

In limited cases, Grantees and subgrantees are permitted to make adjustments within the approved direct cost category to meet unanticipated requirements.

B.3.1 Non-construction Projects

- ◆ Non-construction subgrant adjustments of more than 10 percent in any direct cost categories; and
- ◆ Any changes that would result in additional funding to the grant.

B.3.2 Construction Projects

- ◆ All construction cost adjustments that lead to the need for additional funds.

When budget changes are made, all programmatic requirements continue to apply. Additional information regarding budget adjustments and revisions can be found in 44 CFR Section 13.30.

B.3.3 Cost Overruns and Underruns

A cost overrun or underrun can result from a scope, schedule, or budget change.

Grantees must notify FEMA prior to redirecting funds from an underrun to other approved subgrants for which an overrun has been requested. The subgrant must continue to meet programmatic eligibility requirements including cost share.

B.4 Program Period of Performance

The POP is the period during which the Grantee is expected to complete all grant activities and to incur costs. The POP for the Program begins with the opening of the application period and ends no later than 36 months from the close of the application period.

PERIOD OF PERFORMANCE

With the publication of this HMA Unified Guidance, the POP for the Program begins with opening of the application period and ends no later than 36 months from the close of the application period.

FEMA will not establish activity completion timelines for individual subgrants. Grantees are responsible for ensuring that all approved activities are completed by the end of the grant POP.

B.4.1 Extensions

Requests for extensions to a grant POP will be evaluated by FEMA but will not be approved automatically. The Regional Administrator can extend the POP for up to 12 months with justification. All requests to extend the grant POP beyond 12 months from the original grant POP end date must be approved by FEMA Headquarters.

All extension requests must be submitted to FEMA at least 60 days prior to the expiration of the grant POP and justifications must be submitted in writing. The justification must include:

- ◆ Verification that progress has been made as described in quarterly reports;
- ◆ Reason(s) for delay;
- ◆ Current status of the activity/activities;
- ◆ Current POP termination date and new projected completion date;
- ◆ Remaining available funds, both Federal and non-Federal;
- ◆ Budget outlining how remaining Federal and non-Federal funds will be expended; and
- ◆ Plan for completion, including updated schedule.

B.5 Requests for Advances and Reimbursements

The Grantee's responsibility of an HMA grant is to process requests for advances and reimbursements of funds. The Grantee should establish accounting procedures to disburse money to subgrantees in a timely manner and should provide to subgrantees a POC for information on requesting and receiving the funds, records that must be maintained, forms to be used, and timelines for requesting the funds.

For the **PDM Program** and **FMA**, Payment and Reporting System (PARS) is used to transfer funds between FEMA and Grantees. Grantees shall submit to FEMA a copy of the Standard Form (SF-425).

For **HMGP**, the Department of Health and Human Services, Division of Payment Management, Payment Management System, SMARTLINK, is used to transfer funds between FEMA and Grantees. Grantees shall submit to FEMA a copy of the SF-425.

B.5.1 Strategic Funds Management

In accordance with the needs of the Disaster Relief Fund as well as Grantee priorities and ability to execute the project in a timely manner, FEMA may elect to provide funding for certain projects in incremental amounts, including advance payments (Strategic Funds Management or SFM). SFM allows FEMA to schedule obligations to be available when the State is ready to execute an HMGP subgrant or components of the subgrant. SFM also allows for incremental obligations as needed within the 3-year POP requirements to support project activities as described in the project work schedule.

SFM does not allow funds to be advanced for an HMGP project that is not approved and eligible.

DIFFERENCE BETWEEN STRATEGIC FUNDS MANAGEMENT, PHASED PROJECTS, PRE-AWARD COSTS, AND ADVANCE ASSISTANCE

SFM is designed to provide incremental funding for eligible activities when the funds are required.

Phased projects are those that receive funding for only certain complex activities that are approved to allow the Applicant to develop a full work scope/data package to support the full project description.

Pre-award costs are eligible costs incurred by the Applicant in advance of receiving funds. These activities are reimbursed when the project is approved and funded.

Advance Assistance provides States and Indian Tribal governments with resources to develop mitigation strategies and obtain data to prioritize, select, and develop complete HMGP applications in a timely manner.

B.6 Program Income

FEMA encourages Grantees and subgrantees to generate program income to help defray program costs. Program income is gross income received by the Grantee or subgrantee directly generated by a grant-supported activity or earned only as a result of the grant during the grant POP. Program income may be derived from use or rental of real or personal property acquired with grant funds, and sale of commodities or items fabricated under the grant award. Subgrantees deduct this income from total project costs as specified in 44 CFR Section 13.25(g)(1). This income may not count towards the non-Federal cost share.

B.7 Federal Income Tax on Mitigation Project Funds

FEMA mitigation payments that benefit property owners through the mitigation of their structures are not subject to Federal income taxation. FEMA mitigation payments to acquire a property will be treated as an involuntary conversion for tax purposes. These tax relief measures

are effective for such payments made in all prior years. For more information, property owners should consult the Internal Revenue Service (IRS) office or a tax advisor.

B.8 Noncompliance

If a Grantee or subgrantee materially fails to comply with any term of an award, whether stated in a Federal statute or regulation, an assurance, a State Administrative Plan or application, a notice of award, or elsewhere, including in this guidance, FEMA may take one or more of the following actions, as appropriate:

- ◆ Temporarily withhold cash payments pending correction of the deficiency by the Grantee or subgrantee;
- ◆ Disallow (that is, deny both use of funds and matching credit for) all or part of the cost of the activity or action not in compliance;
- ◆ Wholly or partly suspend or terminate the current award for the Grantee's or subgrantee's HMA grant program(s);
- ◆ Withhold further awards for HMA grant program(s); or
- ◆ Take other remedies that may be legally available.

Additional details can be found in 44 CFR Section 13.43.

C. Reporting Requirements

Grantees and subgrantees must maintain records of work and expenditures. Grantees submit quarterly financial and performance reports to FEMA on January 30, April 30, July 30, and October 30. The first quarterly reports are due within 30 days of the end of the first Federal quarter following the initial grant award. FEMA may waive the initial reports. The Grantee shall submit quarterly financial status and performance reports thereafter until the grant ends. Failure to submit financial and performance reports to FEMA in a timely manner may result in an inability to access grant funds until proper reports are received by FEMA. Grantees are encouraged to contact FEMA should this occur.

The **PDM Program** and **FMA** quarterly reports can be submitted via *eGrants*. For **HMGP**, quarterly performance reports can be submitted via NEMIS or a hard copy to the Region. PDM Program and FMA quarterly financial reports must be submitted via PARS.

C.1 Federal Financial Reports

Grantees shall submit a quarterly Federal Financial Report (FFR). Obligations and expenditures must be reported on a quarterly basis through the FFR (SF-425), which is due to FEMA within 30 days of the end of each calendar quarter (e.g., for the quarter ending March 31, the FFR is due no later than April 30). A report must be submitted for every quarter of the POP, including

partial calendar quarters, as well as for periods where no grant activity occurs. Future awards and fund drawdowns may be withheld if these reports are delinquent. The final FFR is due 90 days after the end date of the POP.

OMB has directed that the FFR (SF-425) replace the use of the SF-269, SF-269A, SF-272, and SF-272A. The SF-425 consolidates the Federal Status Report and the Federal Cash Transaction Report into a single report. The SF-425 is intended to provide Federal agencies and grant recipients with a standard format and consistent reporting requirements.

Reporting periods and due dates:

- ◆ October 1 – December 31; Due January 30
- ◆ January 1 – March 31; Due April 30
- ◆ April 1 – June 30; Due July 30
- ◆ July 1 – September 30; Due October 30

FEMA may suspend drawdowns from SMARTLINK or PARS if quarterly financial reports are not submitted on time.

C.2 Performance Reports

The Grantee shall submit a quarterly performance report for each grant award. Performance reports should include:

- ◆ Reporting period, date of report, and Grantee POC name and contact information;
- ◆ Project identification information, including FEMA project number (including disaster number and declaration date for the HMGP), subgrantee, and project type using standard eGrants/NEMIS project type codes;
- ◆ Significant activities and developments that have occurred or have shown progress during the quarter, including a comparison of actual accomplishments to the work schedule objectives established in the subgrant;
- ◆ Percent completion and whether completion of work is on schedule; a discussion of any problems, delays, or adverse conditions that will impair the ability to meet the timelines stated in the subgrant; and anticipated completion date;
- ◆ Status of costs, including whether the costs are: (1) unchanged, (2) overrun, or (3) underrun. If there is a change in cost status, the report should include a narrative describing the change. Also, include amount dispersed to subgrantee by activity;
- ◆ A statement of whether a request to extend the grant POP is anticipated;
- ◆ Incremental funding amounts (SFM) and progress completed;

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- ◆ For acquisition projects, the Grantee must notify FEMA on the current status of each property for which settlement was completed in that quarter; and
 - ◆ FEMA may require additional information as needed to assess the progress of a grant.

FEMA may suspend drawdowns from SMARTLINK or PARS if quarterly performance reports are not submitted on time.

C.3 Final Reports

The Grantee shall submit a Final SF-425 and Performance Report no later than 90 days after the end date of the POP, per 44 CFR Section 13.50.

D. Closeout

D.1 Subgrant Closeout

Upon subgrant completion, the Grantee must ensure that:

- ◆ Each subgrant has been completed in compliance with the approved SOW. The Grantee must conduct a site visit or collect photographs for a project subgrant to ensure the approved SOW was completed;
- ◆ Each subgrant has been completed in compliance with all environmental mitigation conditions attached to it;
- ◆ Actual expenditures have been documented and are consistent with the SF-424A or SF-424C;
- ◆ All program income has been deducted from total project costs as specified in 44 CFR Section 13.25(g)(1);
- ◆ All project work was performed in accordance with all required permits and applicable building codes as modified or protected by the approved project;
- ◆ For projects involving an insurable facility, the required hazard insurance (e.g., NFIP) has been secured;
- ◆ Geospatial coordinates, in the form of latitude and longitude with an accuracy of +/- 20 meters (64 feet), have been provided for the project. For minor localized flood reduction, hazardous fuels reduction, and soil stabilization projects, an accurate recording of the official acreage, using open file formats geospatial files (i.e., shapefiles), has been submitted;
- ◆ For new or updated hazard mitigation plans, a final copy of the FEMA-approved and community-adopted plan has been submitted; and
- ◆ For planning related activities, the activity is consistent with 44 CFR Parts 201 or 206 (HMGP).

For project-specific requirements, see the Appendices and the Addendum to this HMA Unified Guidance. Grantees should close out subgrants as activities are completed. In addition, as cost underruns are identified, the Grantee should submit de-obligation requests to FEMA.

The subgrantee is required to keep records for at least 3 years from the date when the Grantee submits to FEMA the single or final expenditure report for the subgrantee in accordance with 42 U.S.C. 705 and 44 CFR Section 13.42.

For additional information about closeout for property acquisition and structure demolition or relocation projects, see Addendum, Parts A.13 and A.15. For additional information about closeout for mitigation reconstruction projects, see Addendum, Part D.9.

D.2 Grant Closeout

The Grantee has up to 90 days following the expiration of the grant POP to liquidate valid expenditures incurred during the POP. Cost underruns remaining after the post-POP liquidation period date must be reported to FEMA for de-obligation. The closeout process for the Grantee involves the following steps:

- ◆ The Grantee ensures all subgrants have been closed out as identified in [Part VII, D.1](#);
- ◆ The Grantee reconciles/adjusts subgrant costs, ensures that non-Federal share costs are documented, and ensures that all costs submitted are eligible according to the FEMA-approved SOW;
- ◆ The Grantee receives and processes cost adjustments or returns unobligated funds to FEMA via SMARTLINK or PARS. Final payment is made to the Grantee;
- ◆ The Grantee submits a closeout letter to FEMA with supporting documentation, including:
 - Statement that SOW(s) has been completed as approved and all EHP requirements have been satisfied;
 - SF-425 (for PARS, the final SF-425 is also submitted via PARS);
 - SF-270, *Request for Advance or Reimbursement*, if applicable, or request for de-obligation of unused funds, if applicable;
 - FEMA Form 20-18, *Report on Government Property*, if applicable; and
- ◆ The Grantee notifies FEMA that the grant is ready for final closeout.

The Grantee must maintain the complete grant closeout records file for at least 3 years from the submission date of its single or last expenditure report in accordance with 44 CFR Section 13.42.

For **HMGP**, FEMA can track closeouts using the Project Closeout module in NEMIS.

D.2.1 Update of Repetitive Loss Database

Grantees with projects that mitigate a repetitive loss property, as identified by the NFIP, must update the NFIP Repetitive Loss Database as project activities are completed.

- ◆ For acquisition and demolition or relocation projects, Grantees must provide this update when there is no longer an insurable structure on the property; and
- ◆ For elevation, reconstruction, floodproofing, and minor flood control projects, Grantees must provide this update when the approved activity is complete or otherwise effective.

The NFIP defines a repetitive loss property as any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period since 1978. At least two of the claims must be more than 10 days apart but within 10 years of each other. A repetitive loss property may or may not be currently insured by the NFIP.

Please note this definition of repetitive loss property is different from the FMA definition of repetitive loss property located in [Part IX, C.1](#).

To gain access to sensitive NFIP data, government officials are required to obtain a User Name and Password for access to Data Exchange, the Repetitive Loss Database that is managed by the NFIP Legacy Systems Contractor. Currently, only two access accounts are permitted per State and are reserved for the State Hazard Mitigation Officer (SHMO) and the State NFIP Coordinator or their designee. To obtain a User Name and Password for access to Data Exchange, send an email with your name, title, contact information, and the reason that access to Data Exchange is needed to FEMA. Once FEMA authorizes you for NFIP Legacy Systems access to Data Exchange, you will be notified via email.

To maintain accurate, up-to-date records for all repetitive loss properties mitigated as a result of HMA grant funds, FEMA requires that the Grantee submit FEMA Form AW-501, *NFIP Repetitive Loss Update Worksheet* (OMB 1660-0022). Form AW-501 must be submitted along with documentation supporting the change in the mitigated status of a structure (e.g., elevation certificate). This form must be submitted for each property mitigated with HMA grant funds prior to closeout. The AW-501 form and instructions for completing and submitting it can be found on the FEMA Web site: <http://www.fema.gov/library/viewRecord.do?id=3244>. Detailed AW-501 forms for individual repetitive loss properties can be obtained by accessing Data Exchange and selecting the link to AW-501 data after selecting to look up property by property locator or repetitive loss number.

States accessing NFIP data via the electronic systems (Data Exchange) are advised of, and must acknowledge, the sensitive nature of the information and the need to prevent the release of the data to unauthorized users. When the data is released to a local government by either the State or the appropriate FEMA Regional Office, the local government must be notified in writing that the records relating to individuals and individual properties are:

being made available through the FEMA routine use policy for the specific purposes of mitigation planning, research, analysis, and feasibility studies consistent with the NFIP and for uses that further the floodplain management and hazard mitigation goals of the States and FEMA.

PART VIII. FEMA CONTACTS

Part VIII identifies resources that may help Applicants and subapplicants request HMA funds.

If requested, FEMA will provide technical assistance to both Applicants and subapplicants regarding:

- ◆ General questions about the HMA programs;
- ◆ Specific questions about subapplications after the application period opens;
- ◆ Feasibility and effectiveness, cost-effectiveness, and EHP compliance during the application period; and
- ◆ The *eGrants* application processes.

For additional technical assistance resources, including HMA application and award resources, see [Part X, C.7](#).

FEMA encourages Applicants and subapplicants to seek technical assistance early in the application period by contacting their appropriate FEMA Regional Office. [Table 6](#) shows which States are served by each FEMA Region.

Contact information for FEMA Regional Offices is provided at <http://www.fema.gov/regional-operations>.

Contact information for each SHMO is provided at <http://www.fema.gov/state-hazard-mitigation-officers>.

Table 6: FEMA Regions

FEMA Region	Serving
I	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
II	New Jersey, New York, Puerto Rico, U.S. Virgin Islands
III	Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia
IV	Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee
V	Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin
VI	Arkansas, Louisiana, New Mexico, Oklahoma, Texas
VII	Iowa, Kansas, Missouri, Nebraska
VIII	Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming
IX	Arizona, California, Hawaii, Nevada, American Samoa, Guam, the Northern Mariana Islands
X	Alaska, Idaho, Oregon, Washington

PART IX. ADDITIONAL PROGRAM GUIDANCE

Part IX provides additional information applicable to assistance available under each particular HMA grant program. This section supplements the information provided in Parts I through VIII, and the unique project type guidance included in the Addendum. Part IX does not provide all of the information necessary to apply for funding through an HMA program and must be read in conjunction with other relevant sections of this guidance.

A. Hazard Mitigation Grant Program

Most of the information that an Applicant or subapplicant needs to apply for an HMGP award or that a Grantee or subgrantee needs to manage a HMGP award is provided in Parts I through VIII, and Part X. This section contains supplemental guidance specific to HMGP.

A.1 Grantee Request for HMGP Funds

HMGP is authorized through a Presidential major disaster declaration for activities that provide a beneficial impact to the disaster area. A Governor may request that HMGP funding be available throughout the State or only in specific jurisdictions. For information regarding the declaration process and authorization of HMGP, see 44 CFR Part 206, Subpart B, and seek assistance from the appropriate FEMA Regional Office.

The Governor's Authorized Representative (GAR) serves as the grant administrator for all funds provided under HMGP 44 CFR Section 206.438 (d). The GAR responsibilities include providing technical advice and assistance to eligible subapplicants and/or subgrantees and ensuring that all potential subapplicants are aware of available assistance for the submission of all documents necessary for grant award.

A.2 State Administrative Plan

The State Administrative Plan is a procedural guide that details how the Grantee will administer HMGP. Grantees must have a current Administrative Plan approved by FEMA before receiving HMGP funds. The State Administrative Plan may become an annex or chapter of the State's overall emergency response and operations plan or comprehensive mitigation program strategy. At a minimum, the State Administrative Plan must:

- ◆ Designate the State agency that will act as Grantee;
- ◆ Identify the SHMO;
- ◆ Identify staffing requirements and resources, including a procedure for expanding staff temporarily following a disaster, if necessary;

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- ◆ Establish procedures to guide implementation activities, including Grantee management costs and distribution of subgrantee management costs; and
 - ◆ Comply with 44 CFR Section 206.437.

A.2.1 Designation of Grantee and SHMO

Typically, the agency designated to act as Grantee manages the State responsibilities for Federal and State disaster assistance and is responsible for meeting the mitigation planning requirement. Although a single agency may administer the funding, the Governor may establish an interagency mitigation team to manage the State mitigation program.

The SHMO is typically responsible for managing the State's mitigation program, coordinating the mitigation team, and developing as well as implementing the hazard mitigation plan. States often rely on staff from the emergency management agency or other State agencies to augment the staff of the SHMO following a disaster.

A.2.2 Staffing Requirements and the Mitigation Team

The State Administrative Plan should identify the positions and minimum number of personnel needed to implement HMGP. Key positions may include clerical, administrative, and financial management staff; program specialists to support mitigation planning and the implementation of mitigation activities and to conduct BCAs; and environmental planners. However, the organizational structure of the staff should remain flexible as it may be augmented as needed with emergency management agency staff, staff from other State agencies, or temporary staff or contractors hired to administer HMGP effectively. The State Administrative Plan should include a procedure for expanding staff resources and using HMGP management costs.

The mitigation team may include representatives of agencies involved with emergency management, natural resources, floodplain management, environmental issues and historic and archeological preservation, soil conservation, transportation, planning and zoning, housing and economic development, building regulations, infrastructure regulations or construction, public information, insurance, regional and local government, academia, business, and non-profit organizations. With the varied backgrounds and specialized expertise of members, the team creates interagency, interdisciplinary insight regarding risks and potential solutions. The interagency aspect of the team can diffuse political pressure on the Grantee agency and increase the availability of resources. The mitigation team may support the Grantee agency by:

- ◆ Developing a comprehensive mitigation strategy;
- ◆ Supporting development and implementation of the State Mitigation Plan;
- ◆ Communicating with local governments regarding State mitigation priorities;
- ◆ Building public and business/industry support for mitigation initiatives;

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- ◆ Reviewing, assigning priority, and recommending mitigation actions for implementation; and
 - ◆ Seeking funding for implementation of mitigation measures.

A.2.3 Procedures to Guide Implementation Activities

The State Administrative Plan must establish procedures to:

- ◆ Identify and notify potential subapplicants of the availability of HMGP funding;
- ◆ Provide potential subapplicants information on the application process, program eligibility, and deadlines;
- ◆ Determine subapplicant eligibility;
- ◆ Provide information for environmental and floodplain management reviews in conformance with 44 CFR Parts 9 and 10;
- ◆ Process requests for advances of funds and reimbursements;
- ◆ Monitor and evaluate the progress and completion of funded mitigation activities;
- ◆ Review and approve cost overruns;
- ◆ Process appeals;
- ◆ Provide technical assistance as required to subgrantees;
- ◆ Comply with the administrative requirements of 44 CFR Parts 13 and 206;
- ◆ Comply with audit requirements of 44 CFR Section 13.26 and OMB Circular A-133; and
- ◆ Provide quarterly progress reports to FEMA on funded mitigation activities.

A.2.4 Sliding Scale

The maximum amount of HMGP funding available is calculated using a “sliding scale” formula based on a percentage of the estimated total Federal assistance under the Stafford Act, excluding administrative costs for each Presidential major disaster declaration. Applicants with a FEMA-approved State or Tribal Standard Mitigation Plan may receive:

- ◆ Up to 15 percent of the first \$2 billion of the estimated aggregate amount of disaster assistance;
- ◆ Up to 10 percent for the next portion of the estimated aggregate amount more than \$2 billion and up to \$10 billion; and
- ◆ Up to 7.5 percent for the next portion of the estimated aggregate amount more than \$10 billion and up to \$35.333 billion.

Applicants with a FEMA-approved State or Indian Tribal Enhanced Mitigation Plan are eligible for HMGP funding not to exceed 20 percent of the estimated total Federal assistance under the Stafford Act, up to \$35.333 billion of such assistance, excluding administrative costs authorized for the disaster.

A.2.5 Management Costs

The Grantee must amend its State Administrative Plan to include procedures for determining the reasonable amount or percentage of management costs that it will pass through to the subgrantee, as well as closeout and audit procedures before FEMA will obligate any management costs (see 44 CFR Sections 207.4(c) and 207.7(b)). The State will determine the amount, if any, of management costs it will pass through to the subgrantee. FEMA has not established any minimum for what constitutes a reasonable amount.

A.2.6 Submission and Approval Deadlines

A State may forward a new or updated State Administrative Plan to FEMA for approval at any time. A State should review and update their plan annually and must review and update it following a Presidential major disaster declaration if required to meet current policy guidance or changes to the administration of the program. If a review indicates that there will be no changes to the current State Administrative Plan, the Grantee should notify FEMA of this within 90 days of the disaster declaration.

A.3 HMGP Funding

FEMA will determine the funding it will make available for the HMGP by a lock-in, which will act as a ceiling for funds available to a Grantee, including its subgrantees. The level of HMGP funding available for a given disaster is based on a percentage of the estimated total Federal assistance under the Stafford Act, excluding administrative costs for each Presidential major disaster declaration, as described in 44 CFR Section 206.432(b) and [Part III, A](#) of this guidance.

An initial estimate will be provided within 35 days of the disaster declaration or soon thereafter, in conjunction with calculation of the preliminary lock-in amount(s) for management costs.

The 6-month estimate is no longer the floor or a guaranteed minimum funding for HMGP. The 12-month lock-in is the maximum amount available. Prior to 12 months, total obligations are

THE HMGP FINAL LOCK-IN

Because lock-in estimates are subject to change, FEMA will not obligate more than 75 percent of any estimate before the final lock-in is calculated.

Total State Management Cost (SMC)
(4.89% of Total Available HMGP):



Prior to 12 Months:

FEMA obligates up to 75 percent of total HMGP funding separate from SMC



At 12 Months:

FEMA establishes the full HMGP ceiling amount



At 18 Months:

For a catastrophic disaster, the final lock-in amount is adjusted upon

limited to not more than **75 percent** of any current estimate, without the concurrence of the Regional Administrator or Federal Coordinating Officer (FCO) with Disaster Recovery Manager authority and the Office of the Chief Financial Officer (OCFO).

FEMA will establish the HMGP funding ceiling for each disaster at 12 months after the disaster declaration. This amount, also known as the “lock-in” value for HMGP, is the maximum that FEMA can obligate for eligible HMGP activities. The OCFO will continue to provide HMGP estimates prior to 12 months; however, these estimates will not represent a minimum or floor amount.

In rare circumstances, when a catastrophic disaster has resulted in major fluctuations of projected disaster costs, FEMA may, at the request of the Grantee, conduct an additional review 18 months after the disaster declaration. If the resulting review shows that the amount of funds available for HMGP is different than previously calculated, the final lock-in amount will be adjusted accordingly.

The Grantee must justify in writing to the Regional Administrator any requests to change the amount of the lock-in or perform subsequent reviews. The Regional Administrator will recommend to the Chief Financial Officer whether to approve the change. Changes to the lock-in will not be made without the approval of the Chief Financial Officer. The Chief Financial Officer may change the amount of the lock-in if it is determined that the projections used to determine the lock-in were inaccurate to such a degree that the change to the lock-in would be material, or for other reasons in his or her discretion that may reasonably warrant such changes. The Chief Financial Officer will not make such changes without consultation with the Grantee and the Regional Administrator.

A.4 HMGP Management Costs

The amounts, allowable uses, and procedures for HMGP management costs are established in 44 CFR Part 207. Examples of allowable management costs are listed in [Part IV, D.1.3](#). HMGP management costs will be provided at a rate of 4.89 percent of the HMGP ceiling. The Grantee, in its State Administrative Plan, will determine the amount, if any, of management costs it will pass through to the subgrantee (see [Part IX, A.2.5](#)). Management costs are provided outside of and separate from the HMGP ceiling amount. There is no additional cost-share requirement for HMGP management costs.

FEMA will establish the amount of funds that it will make available for management costs by a lock-in, which will act as a ceiling for management cost funds available to a Grantee, including its subgrantees. FEMA will determine, and provide to the Grantee, management cost lock-ins at 30 days (or soon thereafter), at 6 months, and at 12 months from the date of declaration, or upon the calculation of the final HMGP lock-in ceiling, whichever is later.

Upon receipt of the initial 30-day lock-in, Grantees may request that FEMA obligate 25 percent of the estimated lock-in amount(s) to the Grantee. No later than 120 days after the date of declaration, the Grantee must submit documentation to support costs and activities for which the projected lock-in for management cost funding will be used. In extraordinary circumstances, FEMA may approve a request by a Grantee to submit supporting documentation after 120 days.

FEMA will work with the Grantee to approve or reject the documentation submitted within 30 days of receipt. If the documentation is rejected, the Grantee will have 30 days to resubmit it for reconsideration and approval. FEMA will not obligate any additional management costs unless the Grantee's documentation is approved.

The documentation for management costs must include:

- ◆ A description of activities, personnel requirements, and other costs for which the Grantee will use the management cost funding provided under this part;
- ◆ The Grantee's plan for expending and monitoring the funds provided under this part and ensuring sufficient funds are budgeted for grant closeout; and
- ◆ An estimate of the percentage or amount of pass-through funds for management costs provided under this part that the Grantee will make available to subgrantees, and the basis, criteria, or formula for determining the subgrantee percentage or amount (e.g., number of projects, complexity of projects, etc.).

Upon receipt of the 6-month management costs lock-in, and if the Grantee can justify a bona fide need for additional management costs, the Grantee may submit a request to the Regional Administrator for an interim obligation. Any interim obligation must be approved by the Chief Financial Officer and will not exceed an amount equal to 10 percent of the 6-month lock-in amount, except in extraordinary circumstances.

The Grantee must justify in writing to the Regional Administrator any requests to change the amount of the lock-in or the cap, extend the time period before lock-in, or request an interim obligation of funding at the time of the 6-month lock-in adjustment. The Regional Administrator will recommend to the Chief Financial Officer whether to approve the extension, change, or interim obligation. Extensions, changes to the lock-in, or interim obligations will not be made without the approval of the Chief Financial Officer.

For additional information on HMGP management costs see 44 CFR Part 207.

A.5 Eligible Subapplicants

In addition to the eligible subapplicants described in [Part IV, A.1](#), PNP organizations may act as the subapplicant for HMGP. PNP organizations or institutions that own or operate a PNP facility are defined in 44 CFR Section 206.221(e). Each subapplication from a PNP must include either:

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- ◆ An effective ruling letter from the IRS granting tax exemption under Section 501(c), (d), or (e) of the Internal Revenue Code of 1954, as amended; or
 - ◆ State certification, under State law, of non-profit status.

A qualified conservation organization, as defined at 44 CFR Section 80.3(h), is the only PNP organization eligible to apply for property acquisition and demolition or relocation projects.

A.6 Submission of HMGP Subapplications

The Grantee must submit all HMGP subapplications to FEMA within 12 months of the date of the disaster declaration. Upon written request and justification from the Grantee, FEMA may extend the application submission timeline in 30- to 90-day increments not to exceed a total extension of 180 days, in the event of extraordinary conditions. For additional information see 44 CFR Section 206.436. Additional time may be available based on meeting the criteria of the Stafford Act, Section 301. To qualify, the requestor must justify how the event for which the additional time is needed created the situation in which the Grantee cannot meet the regulatory administrative deadline.

Extensions beyond regulatory time limits will be considered on a case-by-case basis. Stafford Act Section 301 provides relief for the rare circumstance when the magnitude of the event for which the extension is requested prevents the Grantee from meeting program administrative requirements. The Grantee must make the request to the Flood Insurance and Mitigation Administration Associate Administrator by submitting through the Regional Administrator, or if there is a Joint Field Office submit through the FCO. The Regional Administrator or FCO will provide his or her comments or concurrence and forward the request. The maximum time available is 90 days. The request must describe the conditions that preclude the Grantee from meeting the administrative requirements and must include a summary of current status, planned actions to meet the extension, and any resources that may be required. FEMA will consider the request and will provide a decision within 30 days.

A.7 Grant Cost-share Requirements

HMGP grants are required to have at least a 25 percent non-Federal cost share.

The Grantee may choose to meet the cost-share requirement by ensuring a minimum 25 percent non-Federal share for the overall HMGP grant award, rather than on an individual activity basis. Grantees choosing this option should develop a cost-share strategy as part of their Administrative Plan for review and approval by FEMA.

If an Applicant chooses to fund individual projects with non-Federal cost shares below 25 percent, the Applicant must notify FEMA. If an Applicant intends to implement this approach, the State Administrative Plan must explain how the Applicant will:

- ◆ Apply this approach in a fair and impartial manner to all subapplications;

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- ◆ Monitor the cost share for the overall grant throughout the POP; and
 - ◆ Address any cost-share shortfalls that may occur during the POP and at closeout.

If, at closeout, the non-Federal cost share of the grant is less than 25 percent of the total amount, FEMA will recoup the amount of Federal funds needed to bring the cost share into compliance.

A.8 Post-Disaster Code Enforcement Projects

HMGP will fund extraordinary post-disaster code enforcement costs. Extraordinary needs associated with enforcing local building codes during post-disaster reconstruction may include the performance of building department functions, such as building inspections, and the performance of Substantial Damage determinations under the NFIP.

A post-disaster code enforcement project may be funded through HMGP if:

- ◆ The Grantee assesses existing building code and/or zoning and land use management regulations and determines that they adequately address the identified natural hazard risks. The Grantee determines that the local community has adopted a building code consistent with a recent edition of the International Code Series, conforms to State-model or State-mandated building codes, and, if the local community participates in the NFIP, has local floodplain management measures in place that meet the minimum requirements for participation in the NFIP;
- ◆ The Grantee evaluates the building department and determines that its organization, funding, and enforcement and inspection processes are sufficient to ensure proper enforcement of all applicable laws and ordinances during normal operations; and
- ◆ The Grantee evaluates the building department and identifies deficiencies, and the local community agrees to address any deficiencies identified in this evaluation as a condition of receiving the subgrant. This agreement can be a simple statement attached to the evaluation and should include an implementation schedule that is mutually satisfactory to the Grantee, the subgrantee, and FEMA. The agreement should include an acknowledgment by the subgrantee that failure to meet the agreed upon implementation schedule can result in the loss of all current and/or future building department assistance used to support post-disaster operations.

The State's assessment can be accomplished through various mechanisms. Any assessment should include a discussion of the community's compliance with the NFIP. Suggested approaches include (but are not limited to):

- ◆ Employing a mutual-aid agreement among communities to use other local building officials;
- ◆ Entering into a contractual agreement with a State or regional government entity that is well versed in building codes and proper administration of a building department;

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- ◆ Entering into a contractual agreement with one of the model building code organizations;
 - ◆ Employing building code experts temporarily;
 - ◆ Deploying FEMA mitigation staff knowledgeable of building codes and proper building department administration. Former local building officials can often provide the requisite knowledge; or
 - ◆ Requesting the Hazard Mitigation Technical Assistance Program.

HMGP funds only extraordinary post-disaster code enforcement costs. Extraordinary post-disaster code enforcement costs are the costs to ensure disaster-resistant codes are implemented during disaster reconstruction after normal costs of the building department are deducted. Costs might include staffing, equipment purchases, office rental, transportation, supplies, and similar expenses. Extraordinary costs equal disaster costs minus normal costs and cost of fees or fee waivers.

- ◆ Disaster costs can be determined by the payroll and office expenses during the period of assistance. If the subapplicant must purchase new equipment, only the equivalent rental cost of this equipment for the period of assistance is considered a disaster cost. The revenues generated by fees for inspections or permits, whether collected or not, must be deducted;
- ◆ Normal costs can be determined from a monthly average of payroll and office expenses during the most recent 12-month period that does not include Federal, State, or local disaster declarations; and
- ◆ If a community has already received Federal assistance for meeting emergency building inspection needs (such as determining habitability), these costs must be deducted in determining extraordinary costs.

A.9 Advance Assistance

Advance Assistance is authorized by the SRIA, which allows advancing up to 25 percent of the HMGP ceiling or \$10 million to Applicants, whichever is less. The purpose of Advance Assistance is to provide States and Tribes resources to develop mitigation strategies and obtain data to prioritize, select, and develop complete HMGP applications in a timely manner. FEMA expects States and Tribes that receive Advance Assistance to submit complete project applications up to or over the HMGP ceiling by the application deadline.

ADVANCE ASSISTANCE

FEMA may provide up to 25 percent (with a limit of \$10 million) of the amount of estimated HMGP costs to States and Indian Tribal governments in advance of incurring eligible costs.

FEMA expects States that receive Advance Assistance to submit complete project applications up to or over the available HMGP ceiling by the final HMGP project application deadline.

FEMA will continue to implement Advance Assistance on a pilot basis for any State or Indian Tribal government having a declaration with an open application period. Advance Assistance is not automatic. States and Tribes may request Advance Assistance by submitting an HMGP application form to the Regional Mitigation Division Director. The application must identify the proposed use of the funds, including costs in sufficient detail for each proposed activity and milestones for submitting completed HMGP applications to FEMA. Advance Assistance is subject to the HMGP cost-share requirements and SFM (i.e., FEMA will not obligate funds until the State has an immediate need for the funds). Advance Assistance is part of the HMGP ceiling amount.

States may use Advance Assistance for the following activities:

- ◆ Obtain staff or resources to develop a cost-share strategy and identify potential match funding;
- ◆ Evaluate facilities or areas to determine appropriate mitigation actions;
- ◆ Incorporate environmental considerations early into program decisions;
- ◆ Collect data for BCAs, environmental compliance and other program requirements;
- ◆ Scope and prioritize hazard mitigation projects (including State coordination of local projects) to incorporate sustainability, resilience, and renewable building concepts;
- ◆ Develop hazard mitigation projects, including engineering design and feasibility actions;
- ◆ Incorporate SFM principles into mitigation project work schedules and budgets that will facilitate compliance with the legislative requirement to expend obligated funds within 24 months;
- ◆ Conduct meetings, outreach, and coordination with potential subapplicants and community residents to identify potential participants for property acquisition and demolition or relocation projects;
- ◆ Conduct engineering design and feasibility studies for larger or complex community drainage projects or critical facility retrofits (such as for phased projects);
- ◆ Conduct hydrologic and hydraulic studies for unmapped flood zones or Approximate A Zone areas where communities propose to submit hazard mitigation projects;
- ◆ Perform professional cost estimation services to aid consistency in project budgeting across subapplications;
- ◆ Rectify data consistency needs for other project application categories, such as EHP, cost sharing mechanisms, and work schedules; and
- ◆ Complete necessary documents for deed restricting properties such as acknowledgement of voluntary participation, or Model Acknowledgement of Conditions for Mitigation of Property in a Special Flood Hazard Area with FEMA Grant Funds for property acquisition projects.

Requirements and Deliverables Associated with Advance Assistance and Resulting HMGP Applications may include:

- ◆ Documentation of Advance Assistance Accomplishments: Applicants must submit documentation to FEMA to support that they accomplished all activities listed in their Advance Assistance application.
- ◆ Submission of Projects up to the HMGP Ceiling: FEMA expects States that receive Advance Assistance to submit complete project applications up to or over the available HMGP ceiling by the final HMGP project application deadline.
- ◆ Accounting for Use of Advance Assistance Funds: For accounting and audit purposes, the State must submit sufficient financial detail to demonstrate that no costs claimed under Advance Assistance are duplicated in subsequent HMGP project applications or in State Management Cost budgets.
- ◆ Documentation of Environmental Considerations: The Applicant must document that effects to environmental and historic resources were considered early in the planning and project scoping processes. This requirement is in addition to ensuring environmental compliance.

For additional information on Advance Assistance, please see [Appendix L](#), Advance Assistance Optional Application.

A.10 Phased Projects

In general, sufficient technical information is provided by the Applicant or subapplicant to allow FEMA to make an eligibility determination on a subapplication. The costs to obtain this information are generally eligible as pre-award costs (See [Part V, F.2](#) for more information). However, in rare circumstances it is beyond the subapplicant's technical and financial resources to provide the complete technical information required for a full eligibility or environmental review of a complex project. The Applicant and FEMA may provide technical assistance to the subapplicant to develop this complete body of technical data by approving a subapplication to complete a Phase I design, engineering, environmental, or feasibility study. The Phase I study provides FEMA with a technical body of information mutually concurred on by the subapplicant, the Applicant, and FEMA to determine project eligibility. If the results of the Phase I review indicate that the project meets HMGP requirements, the project would then be eligible for funding for construction under a Phase II approval. Phase I study funding is part of the project's total estimated cost, and is subject to HMGP cost-share requirements.

The use of a Phase I study should be limited to complex projects that require technical or environmental data beyond the scope of that generally required for a typical HMGP project. The following provides guidelines and outlines the process for selecting projects for Phase I/Phase II project approval.

A.10.1 Pre-Screening Process

The project must meet the following pre-screening criteria for a conditional Phase I approval in the following sequence:

- ◆ State or Indian Tribal (Standard or Enhanced) Mitigation Plan – The proposed project must be in conformance with the State or Tribal (Standard or Enhanced) Mitigation Plan;
- ◆ Justification for Selection of the Proposed Project – Justification must be provided for the selection of the proposed solution after consideration of a range of options;
- ◆ Potential Cost-effectiveness – The project demonstrates potential cost-effectiveness based on a preliminary assessment of anticipated project benefits and cost. The subapplicant must be aware that this preliminary assessment is solely for the purpose of the Phase I pre-screening process and is not the final cost-effectiveness determination;
- ◆ EHP Review – Initial environmental review to identify major EHP compliance issues. The Phase I study is categorically excluded from NEPA review; and
- ◆ Hydrologic and Hydraulic or Other Relevant Technical Data – The subapplicant provides available hydrologic and hydraulic data based on existing models and other relevant technical data, as appropriate.

A.10.2 Phase I Conditional Approval

The Applicant and FEMA may approve projects meeting the above pre-screening requirements for technical assistance under a Phase I conditional approval. FEMA and the Applicant will coordinate closely to ensure mutual concurrence on all data and technical information as the Phase I technical review process proceeds. The sequence for the process is as follows:

- ◆ Hydrologic and Hydraulic or Other Relevant Technical Data – If appropriate, the Applicant and FEMA will review the hydrologic and hydraulic or other technical data provided by the subapplicant;
- ◆ Preliminary Engineering Design – Based upon the technical data, the subapplicant develops a preliminary engineering design and layout and cost estimates with ad-hoc technical assistance from the Applicant and FEMA;
- ◆ EO 11988 – If applicable, based upon the technical data and revised engineering design, the project must demonstrate compliance with floodplain management requirements under this EO. If a FIRM amendment or revision will be necessary, the Applicant and FEMA will provide the subapplicant with technical assistance to meet this requirement;
- ◆ Refinement of the Cost-Effectiveness Assessment – Based upon the revised design and cost estimates, the Applicant and FEMA will refine the preliminary assessment of cost-effectiveness conducted in the Phase I pre-screening process. This will result in a final

BCR to evaluate the project's cost-effectiveness, which will include all the project costs including Phase I; and

- ◆ EHP Review – The Applicant and FEMA will conduct a review of the revised project design to ensure EHP compliance. The project will meet EHP requirements before Phase II approval.

A.10.3 Phase II Approval-Construction Process

If the project is determined to be eligible, technically feasible, cost-effective, and compliant with EHP requirements under the Phase I technical review, the project may then be approved for construction under Phase II.

A.11 The 5 Percent Initiative

Some mitigation activities are difficult to evaluate using FEMA-approved cost-effectiveness methodologies. Up to 5 percent of the total HMGP funds may be set aside by the Grantee to pay for such activities. These funds are not eligible to be used in situations where the mitigation activities can be evaluated under FEMA-approved cost-effectiveness methodologies but do not meet the required BCA threshold.

To be eligible for the 5 Percent Initiative, activities must:

- ◆ Be difficult to evaluate against traditional program cost-effectiveness criteria;
- ◆ Comply with all applicable HMGP eligibility criteria as well as with Federal, State, and local laws and ordinances;
- ◆ Be consistent with the goals and objectives of the State or Indian Tribal (Standard or Enhanced) and local or Tribal mitigation plans; and
- ◆ Be submitted for review with a narrative that indicates that there is a reasonable expectation that future damage or loss of life or injury will be reduced or prevented by the activity.

Activities that might be funded under the 5 Percent Initiative include:

- ◆ The use, evaluation, and application of new, unproven mitigation techniques, technologies, methods, procedures, or products;
- ◆ Equipment and systems for the purpose of warning citizens of impending hazards;
- ◆ Purchase of generators or related equipment, such as generator hook-ups;
- ◆ Hazard identification or mapping and related equipment for the implementation of mitigation activities;
- ◆ GIS software, hardware, and data acquisition whose primary aim is mitigation;

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- ◆ Public awareness or education campaigns about mitigation; and
 - ◆ Evaluation of model building codes in support of future adoption and/or implementation.

A.11.1 Availability of Additional Funds for Tornado Mitigation

FEMA allows increasing the 5 Percent Initiative amount up to 10 percent for a Presidential major disaster declaration for tornadoes and high winds at the discretion of the Grantee. The increased initiative funding can be used for activities that address the unique hazards posed by tornadoes. To qualify for this funding, the Grantee must, in its State or Indian Tribal (Standard or Enhanced) Mitigation Plan, or other comprehensive plan, address warning of citizens (ensuring 90 percent coverage), further the safe room concept in construction or rehabilitation of residences or commercial structures, and address sheltering in mobile home parks. The plan, also, must explain how the Grantee will implement an ongoing public education program so that citizens are aware of warning systems and their meaning and the availability of in-home shelter designs. Similar information should be included in the subgrantee's local or Indian Tribal mitigation plan.

A.12 Appeal Process

An eligible subapplicant, subgrantee, or Grantee may appeal any FEMA determination regarding subapplications or applications submitted for funding under HMGP. FEMA will only consider appeals in writing that contain documentation that justifies the request for reconsideration. The appeal should specify the monetary figure in dispute and the provisions in Federal law, regulation, or policy with which the appellant believes the initial action was inconsistent.

Whether the appeal is originated by the Grantee or by a subapplicant/subgrantee, the appeal must be submitted in writing to the Regional Administrator by the Grantee. The Regional Administrator is the decision-maker on first appeals. If there is an appeal of the Regional Administrator's decision on any first appeal, the Assistant Administrator for Mitigation is the decision-maker for the second appeal. In some cases the appeal may involve highly technical issues. In these cases, FEMA may consult independent scientific or technical experts on the subject under appeal.

Appellants must make appeals within 60 days after receipt of a notice of the action that is being appealed. The Grantee must forward any appeal from a subapplicant/subgrantee with a written recommendation to the Regional Administrator within 60 days of receipt. Within 90 days following the receipt of an appeal, FEMA will notify the Grantee in writing of the disposition of the appeal or of the need for additional information.

If additional information is needed, FEMA will determine a date by which the information must be provided. Within 90 days following the receipt of the requested additional information (or 90 days after the information was due), FEMA will notify the Grantee in writing of the disposition of the appeal.

FEMA will provide its decision to the Grantee in writing. If the decision is to grant the appeal, the Regional Administrator will take the appropriate action.

Additional information regarding appeals can be found at 44 CFR Section 206.440.

B. Pre-Disaster Mitigation Program

Most of the information that an Applicant or subapplicant needs to apply for a PDM award or that a Grantee or subgrantee needs to manage a PDM award is provided in Parts I through VIII, and Part X. This section contains supplemental guidance specific to the PDM Program.

B.1 Allocation

FEMA will allocate funds for eligible projects to States and Territories consistent with applicable, statutory base and/or maximum allocations in the authorizing and appropriation laws. FEMA will administer the program as directed by Congress.

B.2 Small Impoverished Communities

Grants awarded to small impoverished communities may receive a Federal cost share of up to 90 percent of the total amount approved under the grant award to implement eligible approved activities in accordance with the Stafford Act. A small impoverished community must:

- ◆ Be a community of 3,000 or fewer individuals identified by the State as a rural community that is not a remote area within the corporate boundaries of a larger city;
- ◆ Be economically disadvantaged, with residents having an average per capita annual income not exceeding 80 percent of the national per capita income, based on best available data. For the most current information, go to <http://www.bea.gov>;
- ◆ Have a local unemployment rate that exceeds by 1 percentage point or more the most recently reported, average yearly national unemployment rate. For the most current information, go to <http://www.bls.gov/eag/eag.us.htm>; and
- ◆ Meet other criteria required by the Applicant in which the community is located.

Applicants must certify and provide documentation of the community status with the appropriate subapplication to justify the 90 percent cost share. If documentation is not submitted with the subapplication, FEMA will provide no more than the standard 75 percent of the total eligible costs.

B.3 Information Dissemination

Under the PDM Program, subapplicants may include eligible information dissemination activities in their project or planning subapplication. Eligible information dissemination activities include public awareness and education (brochures, workshops, videos, etc.) that directly relate to the eligible mitigation activity proposed in the subapplication. Information dissemination activities are limited to a maximum of 10 percent of the total cost of a subapplication.

B.4 Applicant Ranking of Subapplications

Applicants must rank each subapplication included in their grant application in order of their priority for funding. Each subapplication must be assigned a unique rank in *eGrants*. Applicants must provide an explanation for the rank given to each subapplication and demonstrate how it is consistent with their State or Tribal (Standard or Enhanced) Mitigation Plan.

B.5 Selection

FEMA will identify subapplications for further review based on Applicant rank. FEMA may identify a subapplication for further review out of rank order based on considerations such as program priorities, available funds, and policy factors.

FEMA will notify Applicants whose subapplications are identified for further review; however, this notification and conducting FEMA-requested pre-award activities are not considered notification or guarantee of a grant award.

C. Flood Mitigation Assistance Program

Most of the information that an Applicant or subapplicant needs to apply for an FMA award or that a Grantee or subgrantee needs to manage an FMA award is provided in Parts I through VII, and Part IX. This section contains supplemental guidance specific to FMA.

C.1 Eligible Properties

Properties included in a project subapplication for FMA funding must be NFIP-insured at the time of the application submittal. Flood insurance must be maintained through completion of the mitigation activity and for the life of the structure.

Residential or non-residential properties currently insured with the NFIP are eligible to receive FMA funds. In order to receive an increased Federal cost share, properties must meet one of the definitions below (consistent with the legislative changes made in the Biggert-Waters Flood Insurance Reform Act of 2012):

- ◆ **A severe repetitive loss property** is a structure that:
 - (a) Is covered under a contract for flood insurance made available under the NFIP; and
 - (b) Has incurred flood related damage –
 - (i) For which 4 or more separate claims payments have been made under flood insurance coverage with the amount of each such claim exceeding \$5,000, and with the cumulative amount of such claims payments exceeding \$20,000; or
 - (ii) For which at least 2 separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.
- ◆ **A repetitive loss property** is a structure covered by a contract for flood insurance made available under the NFIP that:
 - (a) Has incurred flood-related damage on 2 occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and
 - (b) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage.

C.2 Repetitive Loss Strategy

To be eligible for an increased Federal cost share, a FEMA-approved State or Tribal (Standard or Enhanced) Mitigation Plan that addresses repetitive loss properties must be in effect at the time of grant award and the property that is being submitted for consideration must be a repetitive loss property. Guidance on addressing repetitive loss properties can be found in the *State Multi-Hazard Mitigation Planning Guidance* and in 44 CFR Section 201.4(c)(3)(v). The Repetitive

Loss Strategy must identify the specific actions the State has taken to reduce the number of repetitive loss properties, which must include severe repetitive loss properties, and specify how the State intends to reduce the number of such repetitive loss properties. In addition, the hazard mitigation plan must describe the State's strategy to ensure that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including the development of local or Tribal mitigation plans. For information about the Repetitive Loss Database, see [Part VII, D.2.1](#).

C.3 Cost Sharing

Consistent with the legislative changes made in the Biggert-Waters Flood Insurance Reform Act of 2012, cost-share availability under the FMA program depends on the type of properties included in the grant. For example, severe repetitive loss properties may receive up to 100 percent Federal funding and repetitive loss properties may receive up to 90 percent.

- ◆ In the case of mitigation activities to severe repetitive loss structures:
 - FEMA may contribute up to 100 percent Federal funding of all eligible costs, if the activities are technically feasible and cost-effective; or
 - The expected savings to the NFIF from expected avoided damages through acquisition or relocation activities, if the activities will eliminate future payments from the NFIF for severe repetitive loss structures through an acquisition or relocation activity.
- ◆ In the case of mitigation activities to repetitive loss structures, FEMA may contribute up to 90 percent Federal funding of all eligible costs.
- ◆ In the case of all other mitigation activities, FEMA may contribute up to 75 percent Federal funding of all eligible costs.

Structures with varying cost-share requirements can be submitted in one application. Applicants must provide documentation in the project application showing how the final cost share was derived. The final cost share will be entered into the *eGrants* system and documentation showing how the final cost share was derived must be attached to the application.

C.4 Applicant Ranking of Subapplications

Applicants must rank each subapplication included in their grant application in order of priority for funding. Each subapplication must be assigned a unique rank in *eGrants*. Applicants must provide an explanation for the rank given to each subapplication and demonstrate how it is consistent with their State or Tribal (Standard or Enhanced) Mitigation Plan.

C.5 Selection

FEMA will identify subapplications for further review based on a number of criteria, including but not limited to: savings to the NFIF, applicant rank, and property status (e.g., repetitive loss

property, severe repetitive loss property). FEMA also may identify a subapplication for further review out of rank order based on considerations such as program priorities, available funds, and other factors.

FEMA will notify Applicants whose subapplications are identified for further review; however, this notification and conducting FEMA-requested pre-award activities are not considered notification or guarantee of a grant award.

PART X. APPENDICES

A. Acronyms

ABFE	Advisory Base Flood Elevation
ADA	Americans with Disabilities Act
ADR	Alternative Dispute Resolution
ASCE	American Society of Civil Engineers
BCA	Benefit-Cost Analysis
BCR	Benefit-Cost Ratio
BFE	Base Flood Elevation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CBRA	Coastal Barrier Resource Act
CBRS	Coastal Barrier Resource System
CDBG	Community Development Block Grant
CFDA	Catalog of Federal Domestic Assistance
CFR	Code of Federal Regulations
CRS	Community Rating System
DHS	Department of Homeland Security
DOB	Duplication of Benefits
DOI	Department of the Interior
DOP	Duplication of Programs
DOT	Department of Transportation
eGrants	Electronic Grants
EHP	Environmental Planning and Historic Preservation
EO	Executive Order
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FCO	Federal Coordinating Officer
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration

FIMA	Flood Insurance and Mitigation Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FY	Fiscal Year
GAR	Governor’s Authorized Representative
GIS	Geographic Information System
GSTF	Greatest Savings to the Fund
Hazus	Hazards United States
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IBC	International Building Code
ICC	Increased Cost of Compliance
IRS	Internal Revenue Service
ITP	Independent Third Party
NAP	Non-Insured Crop Disaster Assistance Program
NEMIS	National Emergency Management Information System
NEPA	National Environmental Policy Act
NFIA	National Flood Insurance Act
NFIF	National Flood Insurance Fund
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
OMB	Office of Management and Budget
OPA	Otherwise Protected Area
PARS	Payment and Reporting System

PDM	Pre-Disaster Mitigation
PNP	Private Non-profit
POC	Point of Contact
POP	Period of Performance
SBA	Small Business Administration
SEI	Structural Engineering Institute
SF	Standard Form
SFHA	Special Flood Hazard Area
SFM	Strategic Funds Management
SHMO	State Hazard Mitigation Officer
SOW	Scope of Work
SRIA	Sandy Recovery Improvement Act of 2013
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
TB	Technical Bulletin
URA	Uniform Relocation Assistance and Real Property Acquisition Act of 1970
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFA	U.S. Fire Administration
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WUI	Wildland-Urban Interface Area

B. Glossary

Applicant: The entity, such as a State, Territory, or Indian Tribal government, applying to FEMA for a grant that will be accountable for the use of the funds. Once grant funds are awarded, the Applicant becomes the “Grantee.”

Base Flood: A flood having a 1 percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE): The elevation shown on the Flood Insurance Rate Map (FIRM) for Zones AE, AH, A1–A30, AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO, V1–V30, and VE that indicates the water surface elevation resulting from a flood that has a 1 percent chance of equaling or exceeding that level in any given year.

Benefit-Cost Analysis (BCA): A quantitative procedure that assesses the cost-effectiveness of a hazard mitigation measure by taking a long-term view of avoided future damages as compared to the cost of a project.

Benefit-Cost Ratio (BCR): A numerical expression of the cost-effectiveness of a project calculated as the net present value of total project benefits divided by the net present value of total project costs.

Biomass: Biological material derived from living, or recently living organisms.

Building: A structure with two or more outside rigid walls and a fully secured roof that is affixed to a permanent site; a manufactured home or a mobile home without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community’s floodplain management and building ordinances or laws. “Building” does not mean a gas or liquid storage tank or a recreational vehicle, park trailer, or other similar vehicle.

Clean-site certification: A letter from the appropriate local, State, Indian Tribal, or Federal entity determining that no further remedial action is required to protect human health or the environment.

Coastal Barrier Resource System (CBRS): A geographic unit designated to serve as a protective barrier against forces of wind and tidal action caused by coastal storms and serving as habitat for aquatic species. Congress restricted Federal spending and assistance for development-related activities within CBRS units to protect them from further development. Federal flood insurance is unavailable in these areas. CBRS units are identified on FEMA FIRMs.

Coastal High Hazard Area: An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

Combustible material: Any material that, in the form in which it is used and under the conditions anticipated, will ignite and burn or will add appreciable heat to an ambient fire.

Community Rating System (CRS): A program developed by FEMA to provide incentives for those communities in the NFIP that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding.

Cost-effectiveness: Determined by a systematic quantitative method for comparing the costs of alternative means of achieving the same stream of benefits for a given objective. The benefits in the context of hazard mitigation are avoided future damages and losses. Cost-effectiveness is determined by performing a BCA.

Cost share: The portion of the costs of a federally assisted project or program not borne by the Federal Government.

Defensible space: An area that is either natural or manmade, where material capable of allowing a fire to spread unchecked has been treated, cleared, or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire-suppression operations to occur.

Dwelling: A building designed for use as a residence for no more than four families or a single-family unit in a building under a condominium form of ownership.

Elevated Building: A building that has no basement and a lowest floor that is elevated to or above the BFE by foundation walls, shear walls, posts, piers, pilings, or columns. Solid perimeter foundations walls are not an acceptable means of elevating buildings in Zones V and VE.

Environmental Benefits: Environmental benefits are direct or indirect contributions that ecosystems make to the environment and human populations. For FEMA BCA, certain types of environmental benefits may be realized when homes are removed and land is returned to open space uses. Benefits may include flood hazard reduction; an increase in recreation and tourism; enhanced aesthetic value; and improved erosion control, air quality, and water filtration.

Equipment: Tangible, nonexpendable, personal property having a useful life of more than 1 year and an acquisition cost of \$5,000 or more per unit. A Grantee may use its own definition of equipment provided such definition would at least include all equipment defined above.

Federal Agency: Any department, independent establishment, Government corporation, or other agency of the executive branch of the Federal Government, including the U.S. Postal Service, but not the American National Red Cross.

Federal Cognizant Agency: The Federal agency responsible for reviewing, negotiating, and approving cost allocation plans or indirect cost proposals developed on behalf of all Federal agencies. The OMB publishes a list of Federal Cognizant Agencies.

Firebreak: a strip of cleared land that provides a gap in vegetation or other combustible material that is expected to slow or stop the progress of a wildfire.

Fire-proofing: Removal or treatment of fuels to reduce the danger of fires igniting or spreading. (e.g., fire-proofing roadsides, campsites, structural timber).

Fire-resistant material: Material that has a property that prevents or retards the passage of excessive heat, hot gases, or flames under conditions of use.

Fire retardant: A chemical applied to lumber or other wood products to slow combustion and flame spread.

Fire Severity Zone: Three concentric zones around a building used to determine the most effective design for defensible space.

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels.

Flood Insurance Rate Map (FIRM): Official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community.

Floodplain: Any land area that FEMA has determined has at least a 1 percent chance in any given year of being inundated by floodwaters from any source.

Floodplain Management: The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to, emergency preparedness plans, flood control works, and floodplain management regulations.

Floodway: The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities regulate development in these floodways to ensure that there are no increases in upstream flood elevations.

Freeboard: Freeboard is a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. “Freeboard” tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Fuel break: A natural or manmade change in fuel characteristics that affects fire behavior so that fires burning into them can be more readily controlled.

Fuel condition: Relative flammability of fuel as determined by fuel type and environmental conditions.

Governor’s Authorized Representative (GAR): The individual, designated by the Governor, who serves as the grant administrator for all funds provided under HMGP; the person empowered by the Governor to execute, on behalf of the State, all necessary documents for disaster assistance.

Grant: An award of financial assistance for a specified purpose by the Federal government to an eligible Grantee.

Grantee: The entity, such as a State, Territory, or Indian Tribal government to which a grant is awarded and that is accountable for the use of the funds provided. The Grantee is the entire legal entity even if only a particular component of the entity is designated in the grant award document.

Green Open Space: Green open space is land that does not directly touch a natural body of water, such as a river, lake, stream, creek, or coastal body of water.

Hazardous fuels reduction: An area strategically located in relation to predicted fire hazard and occurrence where the vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled (e.g., vegetation management activities).

Hazard mitigation planning: A process used by governments to identify risks, assess vulnerabilities, and develop long-term strategies for protecting people and property from the effects of future natural hazard events.

HMGP Lock-In Ceiling: The level of HMGP funding available to a Grantee for a particular Presidential major disaster declaration.

Identified for Further Review: Subapplications identified for further review contain sufficient information for a preliminary determination of cost-effectiveness and feasibility. In certain instances, FEMA may work with Applicants to confirm cost-effectiveness and feasibility. Identification for further review is not a notification of award.

Ignition-resistant construction: Construction standards based on use of fire-resistant materials, non-combustible materials, and 1-hour fire-rated assemblies.

Increased Cost of Compliance: Coverage for expenses a property owner must incur, above and beyond the cost to repair the physical damage the structure actually sustained from a flooding event, to comply with mitigation requirements of State or local floodplain management ordinances or laws; acceptable mitigation measures are structure elevation, dry floodproofing, structure relocation, structure demolition, or any combination thereof.

Indian Tribal Government: A federally recognized governing body of an Indian or Alaska Native Tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian Tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

Indirect cost: Cost that is incurred by a Grantee for a common or joint purpose benefitting more than one cost objective that is not readily assignable to the cost objectives specifically benefited.

Indirect cost rate: Percentage established by a Federal department or agency for a Grantee to use in computing the dollar amount it charges to the grant to reimburse itself for indirect costs incurred in doing the work of the grant activity.

Management costs: Any indirect costs, administrative expenses, and any other expenses not directly chargeable to a specific project that are reasonably incurred by a Grantee or subgrantee in administering and managing a grant or subgrant award. For HMGP, management cost funding is provided outside of Federal assistance limits defined at 44 CFR Section 206.432(b).

Manufactured (Mobile) home: A structure, transportable in one or more sections that is built on a permanent chassis and designed for use with or without a permanent foundation when attached to the required utilities.

Mitigation: Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

Mitigation activity: A mitigation measure, project, plan, or action proposed to reduce risk of future damage, hardship, loss, or suffering from disasters. The term “measure” is used interchangeably with the term “project” in this program.

National Flood Insurance Program (NFIP): Provides the availability of flood insurance in exchange for the adoption of a minimum local floodplain management ordinance that regulates new and Substantially Improved development in identified flood hazard areas.

Non-combustible material: Material of which no part will ignite and burn when subjected to fire, such as any material conforming to ASTM E 136.

Nonflammable: Material unlikely to burn when exposed to flame under most conditions.

Non-Federal funds: Financial resources provided by sources other than the Federal Government. The term does not include funds provided to a State or local government through a Federal grant unless the authorizing statute for that grant explicitly allows the funds to be used as cost share for other Federal grants.

Non-Residential structure: Includes, but is not limited to small business concerns, places of worship, schools, farm buildings (including grain bins and silos), pool houses, clubhouses, recreational buildings, mercantile structures, agricultural and industrial structures, warehouses, hotels and motels with normal room rentals for less than 6 months' duration, and nursing homes.

Office of Environmental Planning and Historic Preservation: Integrates the protection and enhancement of environmental, historic, and cultural resources into the FEMA mission and FEMA programs and activities; ensures that FEMA activities and programs related to disaster response and recovery, hazard mitigation, and emergency preparedness comply with Federal environmental and historic preservation (EHP) laws and Executive orders; and provides EHP technical assistance to FEMA staff, local, State, and Federal partners, and Grantees and subgrantees.

Otherwise Protected Areas (OPAs): Designation created by the Coastal Barrier Improvement Act. Flood insurance is restricted in OPAs even though they are not in the CBRS and may receive other forms of Federal assistance. OPAs are identified on FEMA FIRMs.

Period of Performance (POP): The period of time during which the Grantee is expected to complete the grant activities and to incur and expend approved funds.

Pile burning: Piling removed vegetation into manageable piles and burning the individual piles during safe and approved burning conditions.

Post-FIRM Building: A building for which construction or Substantial Improvement occurred after December 31, 1974, or on or after the effective date of an initial FIRM, whichever is later.

Practicable: An action that is capable of being done within existing constraints. The test of what is practicable depends upon the situation and includes consideration of all pertinent factors, such as environment, cost, and technology.

Pre-FIRM Building: A building for which construction or Substantial Improvement occurred on or before December 31, 1974, or before the effective date of an initial FIRM.

Prescribed burning: The deliberate and managed use of fire ignited by management actions to meet specific fuels management objectives.

Presidential Major Disaster: Any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

Private non-profit (PNP): Any non-governmental agency or entity that currently has: (i) an effective ruling letter from the Internal Revenue Service granting tax exemption under section 501(c), (d), or (e) of the Internal Revenue Code of 1954; or (ii) satisfactory evidence from the State that the organization or entity is a non-profit one organized or doing business under State law.

Project: Any mitigation measure or action proposed to reduce risk of future damage, hardship, loss, or suffering from disasters.

Public Assistance: Supplementary Federal assistance provided under the Stafford Act to State and local governments or certain PNP organizations other than assistance for the direct benefit of individuals and families. For further information, see 44 CFR Part 206, Subparts G and H. Fire Management Assistance Grants under section 420 of the Stafford Act are also considered Public Assistance.

Replacement cost value: The cost to replace property with materials of like kind and quality, without any deduction for depreciation.

Riparian Area: The land that directly abuts a natural body of water, such as a river, lake, stream, creek, or coastal body of water.

Slash: The accumulation of vegetative materials such as tops, limbs, branches, brush, and miscellaneous residue results from forest management activities such as thinning, pruning, timber harvesting, and wildfire hazard mitigation.

Special Flood Hazard Area (SFHA): The land in the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. An area having special flood, mudflow, or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or a FIRM as Zone A, AO, A1–A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1–A30, V1–V30, VE, or V.

State Hazard Mitigation Officer (SHMO): The representative of a State government who is the primary point of contact with FEMA, other Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Structural fire protection: The protection of homes or other buildings from wildland fire.

Subapplicant: The entity, such as a community/local government, Tribal government, or PNP, that submits a subapplication for FEMA assistance to the Applicant. Once funding is awarded, the subapplicant becomes the “subgrantee.”

Subgrant: An award of financial assistance under a grant by a Grantee to an eligible subgrantee.

Subgrantee: The entity, such as a community/local government, Tribal government, or PNP to which a subgrant is awarded and who is accountable to the Grantee for the use of the funds provided.

Substantial Damage: Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damaged condition would equal or exceed 50 percent of the market value of the building before the damage occurred.

Wildfire: An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Wildland-Urban Interface Area: That geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

All terms not listed above are used consistent with the term definitions used in 44 CFR unless otherwise specified.

C. Additional Resources

Description	Web Link or Contact Information
1. NFIP Resources	
National Flood Insurance Program	http://www.floodsmart.gov
Floodplain Management	http://www.fema.gov/national-flood-insurance-program
Map Service Center	http://msc.fema.gov Telephone: (877) FEMA-MAP (336-2627)
FIRMs	http://www.fema.gov/national-flood-insurance-program-1/flood-insurance-rate-map-firm
ABFEs	Mississippi: http://www.fema.gov/news-release/abfes-are-best-resources-mississippians-rebuilding-now Louisiana: http://www.fema.gov/news-release/2006/02/06/post-katrina-policy-building-elevations
Flood Insurance Studies	http://www.fema.gov/national-flood-insurance-program-2/flood-insurance-study-fis
FEMA Form AW-501	http://www.fema.gov/national-flood-insurance-program-1/mitigated-properties-updates
2. Mitigation Planning and Risk Assessment Resources	
Hazard Mitigation Planning Overview	http://www.fema.gov/hazard-mitigation-planning-overview
Local Mitigation Planning Handbook (FR302-094-1)	http://www.fema.gov/library/viewRecord.do?id=7209
Local Mitigation Plan Review Guide	http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=4859
Mitigation Planning Guidance	http://www.fema.gov/mitigation-planning-laws-regulations-guidance
Mitigation Planning Policies	http://www.fema.gov/mitigation-planning-laws-regulations-guidance
Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards	http://www.fema.gov/library/viewRecord.do?id=6938
Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials	http://www.fema.gov/library/viewRecord.do?id=7130
Mitigation Planning How-To Guides (FEMA)	http://www.fema.gov/hazard-mitigation-planning-resources
Hazard Mitigation Planning Risk Assessment	http://www.fema.gov/hazard-mitigation-planning-risk-assessment
IS-318: Mitigation Planning for Local and Tribal Communities	http://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=is-318
IS-328: Plan Review for Local Mitigation Plans	http://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=IS-328
Hazus	http://www.fema.gov/hazus
USGS National Map	http://nationalmap.gov/
USGS Natural Hazards Gateway	http://www.usgs.gov/natural_hazards/

Description	Web Link or Contact Information
3. Benefit-Cost Analysis Resources	
BCA Software and Helpline	Telephone: (866) 222-3580 Email: bchelpine@dhs.gov
BCA Overview	http://www.fema.gov/benefit-cost-analysis
BCA Policies	http://www.fema.gov/benefit-cost-analysis
4. Feasibility and Effectiveness Resources	
Engineering Helpline	Telephone: (866) 222-3580 Email: enghelpline@dhs.gov
Engineering Case Studies	http://www.fema.gov/grant-applicant-resources
Property Acquisition Projects	http://www.fema.gov/library/viewRecord.do?id=1861
Structure Elevation Projects	http://www.fema.gov/library/viewRecord.do?id=1862
Minor Localized Flood Reduction Projects	http://www.fema.gov/library/viewRecord.do?id=1863
Non-Structural Seismic Retrofit	http://www.fema.gov/library/viewRecord.do?id=1865
Structural Seismic Retrofit	http://www.fema.gov/library/viewRecord.do?id=1866
Wind Shutters	http://www.fema.gov/library/viewRecord.do?id=1864
5. EHP Resources	
EHP Program	http://www.fema.gov/environmental-planning-and-historic-preservation-program
EHP Helpline	Telephone: (866) 222-3580 Email: ehhelpline@dhs.gov
EHP Guidance	http://www.fema.gov/environmental-planning-and-historic-preservation-program/environmental-historic-preservation-1
EHP eLearning Tool	http://www.fema.gov/environmental-planning-and-historic-preservation-program/elearning-tool-fema-grant-applicants-45
EHP Policies	http://www.fema.gov/hazard-mitigation-assistance-policy
EHP Training	http://training.fema.gov/EMIWeb/IS/IS253a.asp
National Register of Historic Places	http://www.nps.gov/history/nr/
6. eGrants and NEMIS (HMGP) Resources	
FEMA Enterprise Service Desk – for HMGP (NEMIS-MT) issues	Telephone: (888) HLP-FEMA (1-888-457-3362) Email: fema-enterprise-service-desk@fema.dhs.gov
FEMA Enterprise Service Desk – eGrants issues	Telephone: (877) 611-4700
eGrants Resources Web site	http://www.fema.gov/mitigation-egrants-system
eGrants Applicant Quick Reference Guide	http://www.fema.gov/library/viewRecord.do?id=3266
eGrants Subapplicant Quick Reference Guide	http://www.fema.gov/library/viewRecord.do?id=3267
eGrants System for Grant Applicants online course (IS-31)	http://training.fema.gov/EMIWeb/IS/is31a.asp
eGrants System for Subgrant Applicants online course (IS-30)	http://training.fema.gov/EMIWeb/IS/is30a.asp

Description	Web Link or Contact Information
eGrants Internal System online course (IS-32)	http://training.fema.gov/EMIWeb/IS/courseOverview.aspx?code=is-32
MT eGrants Internal Quick Reference Guide	http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=5885
NEMIS-MT Frequently Asked Questions:	http://www.fema.gov/hazard-mitigation-grant-program/national-emergency-management-information-system-mitigation-module http://www.fema.gov/library/viewRecord.do?id=4913
NEMIS-MT User Manual	http://www.fema.gov/library/viewRecord.do?id=4909
7. HMA Application and Award Resources	
HMA Overview	http://www.fema.gov/hazard-mitigation-assistance
HMA Helpline	Telephone: (866) 222-3580 Email: hmagrantshelpline@dhs.gov
HMA Policies	http://www.fema.gov/hazard-mitigation-assistance-policy
8. Acquisition Project Resources	
Model Deed Restriction	http://www.fema.gov/library/viewRecord.do?id=6327
Model Acknowledgement of Conditions for Mitigation in Special Flood Hazard Area	http://www.fema.gov/library/viewRecord.do?id=3592
Model Statement of Assurances	http://www.fema.gov/library/viewRecord.do?id=6365
Notice of Voluntary Interest	http://www.fema.gov/library/viewRecord.do?id=3595 http://www.fema.gov/library/viewRecord.do?id=3596
Statement of Voluntary Participation	http://www.fema.gov/library/viewRecord.do?id=3333
9. Mitigation Reconstruction References	
<ul style="list-style-type: none"> • ASCE/SEI 24-05, <i>Flood Resistant Design and Construction</i>, January 2006 • ASCE/SEI 7-05, <i>Minimum Design Loads for Buildings and Other Structures</i>, 2005 • <i>International Building Code (IBC)</i>, 2006 edition • International Code Council, <i>Reducing Flood Losses Through the International Codes</i>, 3rd Edition, 2008 • FEMA P-55, <i>Coastal Construction Manual</i>, 4th Edition, August 2011 • FEMA P-424, <i>Design Guide for Improving School Safety in Earthquakes, Floods and High Winds</i>, December 2010 • FEMA 489, <i>Mitigation Assessment Team Report: Hurricane Ivan in Alabama and Florida</i>, August 2005 • FEMA P-499, <i>Home Builder's Guide to Coastal Construction Technical Fact Sheet Series</i>, December 2010 • FEMA 543, <i>Design Guide for Improving Critical Facility Safety from Flooding and High Winds</i>, January 2007 • FEMA 549, <i>Mitigation Assessment Team Report: Hurricane Katrina in the Gulf Coast</i>, July 2006 • FEMA 550, <i>Recommended Residential Construction for Coastal Areas: Building on Strong and Safe Foundations</i>, 2nd Edition, December 2009 • FEMA 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i>, March 2007 • FEMA 577, <i>Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings</i>, June 2007 	

Description	Web Link or Contact Information
10. Structure Elevation References	
<ul style="list-style-type: none"> • ASCE/SEI 24-05, <i>Flood Resistant Design and Construction</i>, January 2006 • FEMA P-55, <i>Coastal Construction Manual</i>, 4th Edition, August 2011 • FEMA P-259, <i>Engineering Principles and Practices of Retrofitting Floodprone Residential Structures</i>, 3rd Edition, January 2012 • FEMA P-312, <i>Homeowners Guide to Retrofitting</i>, 2nd Edition, December 2009 • FEMA 347, <i>Above the Flood: Elevating Your Flood Prone House</i>, May 2000 • FEMA P-499, <i>Home Builder's Guide to Coastal Construction Technical Fact Sheet Series</i>, December 2010 • FEMA Technical Bulletin TB-1, <i>Openings in Foundation Walls and Walls of Enclosures</i>, 2008 • FEMA Technical Bulletin TB-5, <i>Free-of-Obstruction Requirements</i>, 2008 • FEMA Technical Bulletin TB-9, <i>Design and Construction Guidance for Breakaway Walls</i>, 2008 • FEMA Form 81-31, <i>NFIP Elevation Certificate</i>, February 2013 	

D. Referenced Regulations, Statutes, Directives, and Guidance

Reference	Description	Web Link
REGULATIONS		
2 CFR Part 215, Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations (OMB Circular A-110)	This part contains Office of Management and Budget (OMB) guidance to Federal agencies on the administration of grants to and agreements with institutions of higher education, hospitals, and other non-profit organizations. The guidance sets forth standards for obtaining consistency and uniformity in the agencies' administration of those grants and agreements.	http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title02/2cfr215_main_02.tpl
2 CFR Part 220, Cost Principles For Educational Institutions (OMB Circular A-21)	Establishes principles for determining costs applicable to grants, contracts, and other agreements with educational institutions.	http://www.whitehouse.gov/omb/circulars_a021_2004
2 CFR Part 225, Cost Principles for State, Local, and Indian Tribal Governments (OMB Circular A-87)	Establishes principles and standards for determining costs for Federal awards carried out through grants, cost reimbursement contracts, and other agreements with State and local governments and federally recognized Indian Tribal governments.	http://ecfr.gpoaccess.gov/cgi/t/text-idx?c=ecfr&tpl=/ecfrbrowse/Title02/2cfr225_main_02.tpl
2 CFR Part 230, Cost Principles for Non-Profit Organizations (OMB Circular A-122)	Establishes principles for determining costs of grants, contracts and other agreements with non-profit organizations.	http://www.whitehouse.gov/omb/circulars_a122_2004
26 CFR Section 1.170A-14, Qualified Conservation Contributions	Discusses deductions allowable for charitable contributions of interests in properties.	http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=13&SID=7e3a7c14f52556f38d469032c58a4507&ty=HTML&h=L&r=SECTI ON&n=26y3.0.1.1.0.2.19
40 CFR Part 312, Innocent Landowners, Standards for Conducting All Appropriate Inquiries	Provide standards and practices for "all appropriate inquiries" for the purposes of the Comprehensive Environmental Response, Compensation, and Liability Act sections 101(35)(B)(i)(I) and 101(35)(B)(ii) and (iii).	http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr312_main_02.tpl
44 CFR Part 9, Floodplain Management and Protection of Wetlands	Sets forth policy, procedure, and responsibilities to implement and enforce Executive Order (EO) 11988, <i>Floodplain Management</i> , and EO 11990, <i>Protection of Wetlands</i> .	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part9.xml
44 CFR Part 10, Environmental Considerations	FEMA procedures for implementing the National Environmental Policy Act (NEPA). Provides policy and procedures to enable FEMA officials to account for environmental considerations when authorizing/approving major actions that have a significant impact on the environment.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part10.xml
44 CFR Part 13, Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments	Establishes uniform administrative rules for Federal grants and cooperative agreements and subgrants to State, local, and Indian Tribal governments.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part13.xml

Reference	Description	Web Link
44 CFR Section 59.1, General Provisions, Definitions	Defines terms used in the Emergency Management and Assistance Federal Regulations	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part59.xml
44 CFR Part 60, Criteria for Land Management and Use	Contains regulations for sale of flood insurance; criteria to determine the adequacy of a community's floodplain management regulations; and the minimum standards for the adoption of floodplain management regulations in flood-prone areas.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part60.xml
44 CFR Sections 60.3(b)(5) and (c)(4), Criteria for Land Management and Use and Floodplain Management Criteria for Floodprone Areas	Regulations regarding obtaining the elevation of residential and non-residential structures.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part60.xml#seqnum60.3
44 CFR Part 79, Flood Mitigation Grants	Prescribes actions, procedures, and requirements for the administration the Flood Mitigation Assistance grant programs.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part79.xml
44 CFR Part 80, Property Acquisition and Relocation for Open Space	Provides actions, procedures, and requirements for the administration of FEMA mitigation assistance for projects to acquire property for open space purposes under all Hazard Mitigation Assistance programs.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part80.xml
44 CFR Part 201, Mitigation Planning	Provides information on requirements and procedures for mitigation planning as required by the Stafford Act.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part201.xml
44 CFR Part 206, Federal Disaster Assistance for Disasters Declared On or After November 23, 1988	Prescribes policies and procedures for implementing the sections of Public Law 93-288 (the Stafford Act) that are delegated to the director of FEMA, including the administration of the Hazard Mitigation Grant Program (HMGP).	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part206.xml
44 CFR Part 207, Management Costs	Implements section 324, Management Costs, of the Stafford Act, providing actions, procedures, and policies for HMGP management costs.	http://www.gpo.gov/fdsys/pkg/CFR-2008-title44-vol1/xml/CFR-2008-title44-vol1-part207.xml
49 CFR Part 24, Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs	Promulgates rules to ensure that owners of real property displaced or acquired by Federal or federally assisted programs are treated fairly, consistently, and equitably, and that agencies who implement these regulations do so efficiently and cost effectively.	http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;rgn=div5;view=text;node=49%3A1.0.1.1.18;idno=49;sid=4c3367f93b8162bf6daaf0a88fe20a0e;cc=ecfr
49 CFR Part 29, Governmentwide Debarment and Suspension (Nonprocurement)	This part adopts a government-wide system of debarment and suspension for nonprocurement activities.	http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title49/49cfr29_main_02.tpl
Federal Acquisition Regulations (FAR) Subpart 31.2	The FAR codifies and publishes uniform policies and procedures for acquisition by all executive agencies. Subpart 31.2 refers to Contracts with Commercial Organizations.	http://www.acquisition.gov/far/
Internal Revenue Code of 1954, as amended, Sections 170(h) (3) and (4)	Provides definitions for qualified conservation organizations and conservation purpose, including specific information regarding historic structure certification.	http://www.law.cornell.edu/uscode/text/26/170

Reference	Description	Web Link
Internal Revenue Code of 1954, as amended, Sections 501(c), (d), and (e)	Provides criteria for tax-exempt organizations.	http://www.law.cornell.edu/uscode/text/26/501
National Flood Insurance Program (NFIP) Technical Bulletin 3-93, <i>Non-Residential Floodproofing – Requirements and Certification</i>	Provides guidance on the NFIP regulations concerning watertight construction and the required certification for floodproofed non-residential buildings in Zones A, AE, A1–A30, AR, AO, and AH whose lowest floors are below the Base Flood Elevation.	http://www.fema.gov/library/viewRecord.do?id=1716
STATUTES		
Immigration and Nationality Act	Provides a definition for the term “national of the United States.”	http://www.uscis.gov/portal/site/uscis/menuitem.eb1d4c2a3e5b9ac89243c6a7543f6d1a/?vgnextoid=f3829c7755cb9010VgnVCM10000045f3d6a1RCRD&vgnnextchannel=f3829c7755cb9010VgnVCM10000045f3d6a1RCRD
Appalachian Regional Commission Funds, 40 U.S.C. 14321(a)(3), Grants and other assistance	Provides information on the authority of the Appalachian Regional Commission to make grants for administrative expenses and lists what those expenses may and may not include. Also provides information on what the local development district’s contributions should be.	http://www.arc.gov/about/USCodeTitle40SubtitleIV.asp#14321
Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (Public Law 108-264), Part 102	A bill to amend the National Flood Insurance Act of 1968 to reduce losses to properties for which repetitive flood insurance claim payments have been made.	http://www.gpo.gov/fdsys/pkg/PLAW-108publ264/pdf/PLAW-108publ264.pdf
Biggert-Waters Flood Insurance Reform Act. P.L. 112-141 July 6, 2012	Flood Insurance Reform and Modernization Act that proposed changes to Mitigation Assistance Grants related to Flood Mitigation.	http://www.gpo.gov/fdsys/pkg/PLAW-112publ141/pdf/PLAW-112publ141.pdf
Civil Rights Act of 1964, 42 U.S.C. 2000d et seq., Title VI of the Civil Rights Act	Prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving Federal financial assistance.	http://www.justice.gov/crt/about/cor/coord/titlevi.php
Coastal Barrier Resources Act (Public Law 97-348; 16 U.S.C. 3501 et seq.)	Designated various undeveloped coastal barrier islands, depicted by specific maps, for inclusion in the Coastal Barrier Resource System. Areas so designated were made ineligible for direct or indirect Federal financial assistance that might support development, including flood insurance, except for emergency life-saving activities.	http://uscode.house.gov/download/pls/16c55.txt
Endangered Species Act (Public Law 93-205; 16 U.S.C. 1531–1544)	Prohibits Federal agencies from funding actions that would jeopardize the continued existence of endangered or threatened species or adversely modify critical habitat.	http://epw.senate.gov/esa73.pdf
Federal Crop Insurance Act, as amended, 7 U.S.C. 1501 et seq.	Promotes the national welfare by improving the economic stability of agriculture through a sound system of crop insurance.	http://www.agriculturelaw.com/links/cropins/statute.htm

Reference	Description	Web Link
National Environmental Policy Act (NEPA) (Public Law 91-190; 42 U.S.C. 4321 and 4331-4335)	Declares a national policy that encourages productive and enjoyable harmony between man and his environment; promotes efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enriches the understanding of the ecological systems and natural resources important to the Nation; and establishes a Council on Environmental Quality.	http://www.nps.gov/history/local-law/FHPL_NtlEnvirnPolcy.pdf
National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq.	The National Flood Insurance Act of 1968 created the Federal Insurance Administration and made flood insurance available for the first time. The Flood Disaster Protection Act of 1973 made the purchase of flood insurance mandatory for the protection of property located in the Special Flood Hazard Area.	http://www.fema.gov/library/viewRecord.do?id=2216
National Flood Insurance Reform Act of 1994 (Public Law 103-325)	Amended the Flood Disaster Protection Act of 1973, providing 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.	http://www.fema.gov/library/viewRecord.do?id=2217
National Historic Preservation Act (Public Law 89-665; 16 U.S.C. 470 et seq.)	Establishes a program for the preservation of historic and prehistoric resources deemed important to our understanding of prehistory and U.S. history and created the National Register of Historic Places.	http://www.achp.gov/docs/nhpa%202008-final.pdf
National Register of Historic Places	The official list of the Nation's historic places worthy of preservation. It is part of a national program to support public and private efforts to identify, evaluate, and protect our historic and archeological resources.	http://www.nps.gov/history/nr/
Non-Insured Crop Disaster Assistance Program, 7 U.S.C. 7333	Provides financial assistance to producers of non-insurable crops when low yields, loss of inventory, or prevented planting occur due to natural disasters.	http://www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20110830_distr_en_nap.html
Privacy Act of 1974 (5 U.S.C. 552a)	Regulates the collection, maintenance, use, and dissemination of personal information by Federal executive branch agencies.	http://www.justice.gov/opcl/privstat.htm
Public Health and Welfare, 42 U.S.C. 5133, Pre-Disaster Hazard Mitigation	Authorizes the Pre-Disaster Mitigation program.	http://www.law.cornell.edu/uscode/uscode42/uscode42.usc.sec.42.00005133---000-.html
Public Health and Welfare, 42 U.S.C. 5154 (a), Insurance	Contains information on compliance with certain regulations and maintaining insurance in regard to Applicants and subapplicants requesting assistance to repair, restore, or replace damaged facilities under this code.	http://www.law.cornell.edu/uscode/uscode42/uscode42.usc.sec.42.00005154---000-.html
Refugee Education Assistance Act of 1980, (Public Law 96-422) Part 501(e)	Allows the President to exercise authorities over Cuban and Haitian immigrants identical to the authorities exercised in the Immigration and Nationality Act, 8 U.S.C. 1158.	http://www.ssa.gov/OP_Home/comp2/F096-422.html

Reference	Description	Web Link
Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 et seq.	Constitutes the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and FEMA programs.	http://www.fema.gov/pdf/about/stafford_act.pdf
Secure Rural Schools and Community Self-Determination Act of 2000, 16 U.S.C. 500	Contains information regarding payment and evaluation of receipts to State or Territory for schools and roads, moneys received, projections of revenues, and estimated payments.	http://www.govtrack.us/data/us/bills/text/106/h/h2389.pdf
Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646)	Ensures that people whose real property is acquired, or who move as a result of projects receiving Federal funds, will be treated fairly and equitably and will receive assistance in moving from the property they occupy.	http://uscode.house.gov/download/pls/42c61.txt
DIRECTIVES		
EO 11988, <i>Floodplain Management</i>	Requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.	http://www.fema.gov/plan/ehp/ehplaws/eo11988.shtm
EO 11990, <i>Protection of Wetlands</i>	Requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided.	http://www.fema.gov/environmental-planning-and-historic-preservation-program/executive-order-11990-protection-wetlands
EO 12898, <i>Environmental Justice for Low-Income and Minority Populations</i>	Directs Federal agencies “to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations in the United States.”	http://www.fema.gov/environmental-planning-and-historic-preservation-program/executive-order-12898-environmental-justice
EO 12372, July 14, 1982, <i>Intergovernmental Review of Federal Programs</i>	Fosters an intergovernmental partnership and strengthens federalism by relying on State and local processes for State and local coordination and review of proposed Federal financial assistance.	http://www.archives.gov/federal-register/codification/executive-order/12372.html
EO 12416, April 8, 1983, <i>Intergovernmental Review of Federal Programs</i>	Amends Section 8 of EO 12372 regarding the content of the Director of the Office of Management and Budget’s report and to whom the report is submitted.	http://www.archives.gov/federal-register/codification/executive-order/12372.html
EO 12699, January 5, 1990, <i>Seismic Safety of Federal and Federally assisted or Regulated New Building Construction</i>	Requires that each Federal agency responsible for the design and construction of each new Federal building shall ensure that the building is designed and constructed in accord with appropriate seismic design and construction standards.	http://www.wbdg.org/ccb/FED/FMEO/eo12699.pdf
GUIDANCE		
FEMA P-85, <i>Protecting Manufactured Homes from Floods and Other Hazards</i> (2nd Edition, November 2009)	Provides a best practices approach in reducing damages from natural hazards to assist in protecting manufactured homes from floods and other hazards.	http://www.fema.gov/library/viewRecord.do?id=1577

Reference	Description	Web Link
FEMA 317, <i>Property Acquisition Handbook for Local Communities</i> (October 1998)	A “how to” guide to help communities work through one specific hazard mitigation alternative known as property acquisition (also referred to as “buyout”).	http://www.fema.gov/library/viewRecord.do?id=1654
FEMA P-320, <i>Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business</i> (3rd Edition, August 2008)	Guide to help homeowners decide if they should build a shelter in their house; provides various shelter designs that can be given to a contractor/builder.	http://www.fema.gov/plan/prevent/saferoom/fema320.shtm
FEMA P-361, <i>Design and Construction Guidance for Community Safe Rooms</i> (2nd Edition, August 2008)	A guidance manual for engineers, architects, building officials, and prospective shelter owners that presents important information about the design and construction of residential and community safe rooms that protect people during tornado and hurricane events.	http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=1657
FEMA P-424, <i>Design Guide for Improving School Safety in Earthquakes, Floods, and High Winds</i> (December 2010)	This manual is intended to provide guidance for the protection of school buildings from natural disasters. This volume concentrates on grade schools, K-12. FEMA P-424 covers earthquakes, floods, and high winds. Its intended audience is design professionals and school officials involved in the technical and financial decisions of school construction, repair, and renovations.	http://www.fema.gov/library/viewRecord.do?id=1986
FEMA 489, <i>Mitigation Assessment Team Report: Hurricane Ivan in Alabama and Florida</i> (August 2005)	Summarizes the observations, conclusions, and recommendations that resulted from post-disaster assessments sponsored by FEMA in response to Florida’s 2004 hurricane season.	http://www.fema.gov/library/viewRecord.do?id=1569
FEMA P-499, <i>Home Builder’s Guide to Coastal Construction Technical Fact Sheet Series</i> (December 2010)	Presents information aimed at improving the performance of buildings subject to flood and wind forces in coastal environments.	http://www.fema.gov/technology-transfer/home-builders-guide-coastal-construction-technical-fact-sheet-series-fema-p-499
FEMA 543, <i>Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection for People and Buildings</i> (January 2007)	Provides building professionals and decision-makers with information and guidelines for implementing a variety of mitigation measures to reduce the vulnerability to damage and disruption of operations during severe flooding and high-wind events. It concentrates on critical facilities (hospitals, schools, fire and police stations, and emergency operation centers).	http://www.fema.gov/library/viewRecord.do?id=2441
FEMA 549, <i>Mitigation Assessment Team Report: Hurricane Katrina in the Gulf Coast</i> (July 2006)	Evaluates and assesses damage from the hurricane and provides observations, conclusions, and recommendations on the performance of buildings and other structures impacted by wind and flood forces.	http://www.fema.gov/library/viewRecord.do?id=1857
FEMA P-55, <i>Coastal Construction Manual</i> , (4th Edition, August 2011)	Provides a comprehensive approach to sensible development in coastal areas based on guidance from over 200 experts in building science, coastal hazard mitigation, and building codes and regulatory requirements.	http://www.fema.gov/library/viewRecord.do?id=1671

Reference	Description	Web Link
FEMA P-550, <i>Recommended Residential Construction for Coastal Areas: Building on Strong and Safe Foundations</i> (2nd Edition, December 2009)	Provides recommended designs and guidance for rebuilding homes destroyed by hurricanes in the Gulf Coast. The manual also provides guidance in designing and building less vulnerable new homes that reduce the risk to life and property.	http://www.fema.gov/library/viewRecord.do?id=1853
FEMA 551, <i>Selecting Appropriate Mitigation Measures for Floodprone Structures</i> (March 2007)	This manual is intended to provide guidance to community officials for developing mitigation projects that reduce or eliminate identified risks for floodprone structures.	http://www.fema.gov/library/viewRecord.do?id=2737
FEMA 577, <i>Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings</i> (June 2007)	The intent of the Design Guide is to provide its audience with state-of-the-art knowledge on the variety of vulnerabilities faced by hospitals exposed to earthquakes, flooding, and high-winds risks, as well as the best ways to mitigate the risk of damage and disruption of hospital operations caused by these events.	http://www.fema.gov/library/viewRecord.do?id=2739
FEMA P-804, <i>Wind Retrofit Guide for Residential Buildings</i> (December 2010)	The purpose of this Guide is to provide guidance on how to improve the wind resistance of existing residential buildings. The content of this document should serve as guidance on retrofitting existing buildings for improved performance during high-wind events in all coastal regions.	http://www.fema.gov/library/viewRecord.do?id=4569
Mitigation Planning Guidance	This guidance provides information on preparing and updating mitigation plans in compliance with the mitigation planning regulations found at 44 CFR Part 201.	http://www.fema.gov/mitigation-planning-laws-regulations-guidance
Mitigation Planning How-To Guides (FEMA)	The guides focus on initiating and maintaining a planning process that will result in safer communities and are applicable to jurisdictions of all sizes and all resource and capability levels.	http://www.fema.gov/hazard-mitigation-planning-resources
<i>Uniform Standards of Professional Appraisal Practice</i> (2012–2013)	The generally accepted standards for professional appraisal practice in North America. Standards are included for real estate, personal property, business, and mass appraisal.	http://www.USPAP.org
<i>Hazard Mitigation Assistance Tool for Identifying Duplication of Benefits</i> (January 2013)	This guide provides instruction on what constitutes Duplication of Benefits in the use of Hazard Mitigation Assistance funds for property mitigation. It gives direction regarding verification processes and actions that can be taken to ensure that Duplication of Benefits does not occur.	http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=6815
OTHER RESOURCES		
Government-to-Government Relations with American Indian and Alaska Native Tribal Governments. January 12, 1999 (<i>Federal Register</i> vol. 64 no. 7)	Guides FEMA interactions with American Indian and Alaska Native Tribal governments.	http://www.gpo.gov/fdsys/pkg/FR-1999-01-12/html/99-642.htm

Reference	Description	Web Link
OMB Circular A-94, <i>Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs</i> (October 29, 1992)	Specifies certain discount rates that will be updated annually when the interest rate and inflation assumptions in the budget are changed.	http://www.whitehouse.gov/omb/circulars/a094/a094.html
OMB Circular A-133, <i>Audits of States, Local Governments, and Non-Profit Organizations</i> (revised June 27, 2003 and June 26, 2007)	Sets forth standards for obtaining consistency and uniformity among Federal agencies for the audit of States, local governments, and non-profit organizations expending Federal awards.	http://www.whitehouse.gov/sites/default/files/omb/assets/a133/a133_revised_2007.pdf
ASCE/SEI 24-05, <i>Flood Resistant Design and Construction</i> (2006)	Provides minimum requirements for flood-resistant design and construction of structures located in flood hazard areas.	https://secure.asce.org/files/estore/5419/40818_40818.pdf
ASCE/SEI 7-05, <i>Minimum Design Loads for Buildings and Other Structures</i> (2005)	Provides requirements for general structural design and includes means for determining dead, live, soil, flood, wind, snow, rain, atmospheric ice, and earthquake loads, and their combinations that are suitable for inclusion in building codes and other documents.	https://secure.asce.org/files/estore/896/40809_40809.pdf
ASTM International Standard E1527-05, <i>Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process</i> (2005)	Defines good commercial and customary practices for conducting an environmental site assessment of a parcel of commercial real estate.	http://www.astm.org/Standards/E1527.htm
ASTM International Standard E2247-08, <i>Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property</i> (2008)	This practice is intended for use on a voluntary basis by parties who wish to assess the environmental condition of forestland or rural property of 120 acres or greater taking into account commonly known and reasonably ascertainable information.	http://www.astm.org/Standards/E2247.htm
<i>International Building Code</i> (International Code Council)	The scope of this code covers all buildings except three-story, and one- and two-family dwellings and townhomes. This comprehensive code features time-tested safety concepts, structural, and fire and life-safety provisions covering means of egress, interior finish requirements, comprehensive roof provisions, seismic engineering provisions, innovative construction technology, occupancy classifications, and the latest industry standards in material design.	http://publicecodes.cyberregs.com/icod/ibc/index.htm
International Code Council, <i>International Wildland-Urban Interface Code</i> (2012)	Contains provisions addressing fire spread, accessibility, defensible space, water supply, and more for buildings constructed near wildland areas.	http://publicecodes.cyberregs.com/icod/iwuic/2012/index.htm

Reference	Description	Web Link
International Code Council, <i>Reducing Flood Losses through the International Codes</i> (3rd Edition, 2008)	This guide is intended to help community officials decide how to integrate the 2006 edition of the International Codes (I-Codes) into their current floodplain development and regulatory processes in order to meet the requirements to participate in the NFIP.	http://www.fema.gov/library/viewRecord.do?id=2094
<i>International Residential Code for One- and Two-Family Dwellings</i> (International Code Council)	A comprehensive code for homebuilding that brings together all building, plumbing, mechanical and electrical provisions for one- and two-family residences.	http://publicecodes.cyberregs.com/icod/irc/index.htm
National Fire Protection Association (NFPA) 225, <i>Model Manufactured Home Installation Standard</i> (2009 Edition)	Includes updated criteria covering the anchoring of the home and protection against seismic events, floods, and wind. Rules apply to single- and multi-section units.	http://www.nfpa.org/catalog/product.asp?pid=22509
NFPA 703, <i>Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials</i>	Provides enforcers, engineers, and architects with the industry's most advanced criteria for defining and identifying fire retardant-treated wood and fire-retardant coatings for building materials.	http://www.nfpa.org/catalog/product.asp?pid=70312
NFPA 914, <i>Code for Fire Protection of Historic Structures</i>	Intended to improve or upgrade the fire protection features in a wide range of historic buildings, and address ongoing operations as well as renovation and restoration projects.	http://www.nfpa.org/catalog/product.asp?pid=91410
NFPA 1141, <i>Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas</i>	Provides recommendations for planning and installing fire protection infrastructure for new developments in a community.	http://www.nfpa.org/catalog/product.asp?pid=114112
NFPA 1144, <i>Standard for Reducing Structure Ignition Hazards for Land Development in Suburban and Rural Areas</i>	Covers minimum design, construction, and landscaping elements for structures in the wildland/urban interface.	http://www.nfpa.org/cataloghttp://dnrc.mt.gov/forestry/Fire/Prevention/documents/WUIrewrite/NFP A1144.pdf/
NFPA 5000 Code, <i>Building Construction and Safety Code</i> (2012 Edition)	Combines regulations controlling design, construction, quality of materials, use and occupancy, location, and maintenance of buildings and structures, with fire and life-safety requirements found in NFPA codes and standards.	http://www.nfpa.org/catalog/product.asp?pid=500012
Firewise Communities	A multi-agency effort designed to reach beyond the fire service by involving homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire—before a fire starts.	http://www.firewise.org/
U.S. Department of Commerce, Bureau of Economic Analysis	Produces economic account statistics that enable government and business decision-makers, researchers, and the American public to follow and understand the performance of the Nation's economy.	http://www.bea.gov

Reference	Description	Web Link
U.S. Bureau of Labor and Statistics	An independent national statistical agency that collects, processes, analyzes, and disseminates essential statistical data to the American public, the U.S. Congress, other Federal agencies, State and local governments, business, and labor.	http://stats.bls.gov

E. Eligibility and Completeness Review Checklist for Project Subapplications

Applications submitted to FEMA that do not contain at least the basic components listed below may be immediately denied because there is no method to determine eligibility without this data. Additional information may be requested during FEMA review. This information is required for all submittals, including potential substitutions.

Application Component	Yes	No	Comment
General			
Documentation included in the subapplication?			
Is this a phased project?			
Technical Assistance Needed? Subapplicant is encouraged to contact the State (Applicant) to request application development assistance. FEMA resources may be available but will only be provided if requested by the Applicant.			
Applicants			
Eligible Applicant is identified (State or local government; eligible Private, non-profit organization; or Indian Tribal government)			
Applicant participates in the National Flood Insurance Program			
Plan Requirement			
Project conforms with State Mitigation Plan per 44 CFR Part 201			
Project conforms with Local Mitigation Plan per 44 CFR Part 201			
Project conforms with Indian Tribal Mitigation Plan per 44 CFR Part 201			
Scope of Work			
SOW describes the proposed solution			
Alternatives considered as part of the decision-making process			
Project includes photographs of each structure and general project area			
Project includes appropriate maps that orient the reviewer to the entire project area			
Latitude and longitude are provided for each structure			
SOW justifies the proposed solution as the best option over a range of alternatives			
Project site is clearly identified using maps, GPS coordinates, or other means			
Project addresses a repetitive problem or a significant risk to public health			

Application Component	Yes	No	Comment
Project solves a problem independently or constitutes a functional portion of a solution			
Schedule			
A work schedule of 3 years or less is provided			
Budget/Match Source			
A cost estimate/budget is provided that supports the SOW			
If project requires phased or incremental funding, the budget reflects amounts estimated for each funding increment			
Non-Federal cost shares and match sources are identified			
Project should identify potential Duplication of Benefits such as Insurance, Small Business Administration loans if information is available during project development			
Cost-effectiveness and Feasibility			
Project includes a benefit-cost analysis, or alternate cost-effectiveness documentation, such as Substantial Damage verification, and located in a riverine floodplain; or a narrative supporting cost-effectiveness and request for consideration under 5 percent HMGP discretionary funding			
Project includes technical information to support proposed action. For example, level of protection for drainage projects, engineering data to support proposed seismic retrofits, and population data to support safe room placement and size. Elevations are technically feasible.			
Environmental and Historic Preservation			
Project includes information and documentation to demonstrate conformance with 44 CFR Part 9.6 and Part 10			
Project demonstrates that it minimizes harm to the environment			
Project includes construction date for each structure			
Project includes all available information relating to known historic, archaeological, or environmentally sensitive areas (e.g., critical Coastal Barrier Resources Act or Otherwise Protected Area)			
All appropriate Federal, State, and local agencies have been consulted			
Project includes environmental coordination letters or contact information to obtain required coordination information			
Assurances			
FEMA Form 20-16A, Assurances Non-Construction Programs			
FEMA Form 20-16B, Assurances Construction Programs			
FEMA Form 20-16C, Certifications Regarding Lobbying, etc.			

Application Component	Yes	No	Comment
SF-LLL, Disclosure of Lobbying Activities			
Considers long-term changes to the area it proposes to protect and has manageable future maintenance and modification requirements			
Acquisition Demolition / Relocation Information			
Project confirms compliance with timelines and all other criteria set forth in 44 CFR Part 80 requirements			
Project includes Voluntary Participation Documentation for each property			
Documentation (if needed) that the property owner is National of United States or qualified alien			
For properties that are to be relocated, will the structure be relocated outside of the Special Flood Hazard Area?			
Elevation Information			
Project identifies the Base Flood Elevation or Advisory Base Flood Elevation			
Project includes finished floor elevation (Elevation certificate is preferred)			
Project includes proposed elevation height of the structure			
Designed and Implemented consistent with ASCE/SEI 24-05			
Safe Room Information			
Project includes population size and basis			
Designed and implemented consistent with FEMA P-320 or FEMA P-361			
Wind Retrofit Information			
Project includes proposed level of protection			
Designed and implemented consistent with P-804			
Drainage Information			
Project includes initial technical information to support size, costs and local permitting requirements			

F. Safe Room Application Using Pre-Calculated Benefits

Expedited HMGP Application for Residential Safe Rooms

- ◆ The State must have an approved State Administrative Plan and State Hazard Mitigation Plan prior to grant award.
- ◆ If a local jurisdiction is the subapplicant, they must have an approved local mitigation plan in place (or receive an Extraordinary Circumstances exception) prior to grant award.
- ◆ Each safe room included in this project must meet the criteria of FEMA P-320, *Taking Shelter From the Storm, Building a Safe Room For your Home or Small Business*, or FEMA P-361, *Design and Construction Guidance for Community Safe Rooms*.
- ◆ Safe rooms cannot be placed in floodways, velocity zones, Coastal A Zones, or areas subject to coastal storm surge inundation associated with a Category 5 hurricane.
- ◆ If a residential safe room is sited in a Special Flood Hazard Area, the structure must be insured for Flood Damage, and a deed notice must be conveyed to retain this requirement.
- ◆ This project conforms with applicable Hazard Mitigation Grant Program eligibility criteria for all projects.
- ◆ Applicant may request approval for pre-award costs. Implementation costs incurred prior to grant award are not eligible for reimbursement.

State (Grantee) Information

Disaster number: _____

Eligible subapplicant: _____ State or local government _____ Private non-profit entity

Does the project conform to the State/local mitigation plan? _____ Yes _____ No

Applicant Information

Project Title: Residential Safe Room Construction/Installation

Applicant _____

Federal Information Processing Standard (FIPS) Code _____

Federal Tax ID Number (if required) _____

Data Universal Numbering System (DUNS) Number _____

Community NFIP Status: Participating Community ID # _____

 In Good Standing _____ Non-participating _____ CRS _____

Legislative District(s) _____

Application prepared by:

Name _____

Title _____

Address _____

City/State/Zip _____

Telephone _____ Email _____

Applicant Agent* _____

Title _____

Address _____

City/State/Zip _____

Telephone _____ Email _____

* Individual authorized to sign financial and legal documents on behalf of the Applicant

Project Information

1. History of hazards and description of the vulnerability to be mitigated

Sample language:

This project is being submitted in response to the recent, severe weather and tornado activity nationwide. It is the intent of the State and affected local jurisdictions to support the placement and availability of safe rooms as a means of providing life-safety level protection for our citizens.

2. Scope/description: Project includes population size and basis

Sample language:

This project proposes to fund the purchase, construction/installation, and verification of 150 residential safe rooms. These safe rooms will be constructed and installed to meet FEMA P-320 or FEMA P-361 design and construction criteria, prior to reimbursement by the Applicant to the property owner; the safe rooms will be verified by a qualified professional to meet FEMA P-320 standards. Prior to closeout, all property-specific data will be provided for entry into NEMIS in order to capture full information for each mitigated property.

3. Project Useful Life: (30 years).

4. Property and Structure Information

- ◆ Address, including geo-location
- ◆ Floodplain map and flood zone information
- ◆ Structure age
- ◆ Photographs

-
- ◆ Proposed action:
 - Safe room placed inside structure (no ground disturbance)
 - Safe room placed above/below ground outside the structure (ground disturbance)
 - ◆ Additional information if identified by FEMA/State/Applicant

Environmental and Historic Preservation Compliance

Each site must be reviewed to determine compliance with environmental and historic preservation compliance requirements and to prepare necessary documentation. FEMA's *Programmatic Environmental Assessment for Hazard Mitigation Safe Room Construction* (June 2011) provides efficiencies for completing the environmental review for this project.

NOTE: FEMA may enter into agreements or other negotiated arrangements with the respective State Historic Preservation Officers and Indian Tribes to allow for expedited review in accordance with Section 106 of the National Historic Preservation Act.

Describe alternatives considered for this project:

Sample language:

Alternative 1 – Do nothing. This alternative will not result in substantial risk reduction and will leave many citizens exposed to future tornado and high-wind damages, including loss of life.

Alternative 2 – Community safe room or evacuation. Tornadoes do not allow for sufficient time to relocate household members to an off-site facility, and evacuation is not viable as travel in severe weather exposes evacuees to another set of risks and hazards with little certainty that they can reach safe haven.

Project Implementation Narrative

Briefly describe the Applicant's process for selecting and prioritizing participants; describe any limits to funding, the proposed project management actions to be taken during implementation and any variations from standard quarterly reporting; and provide a list (or form) to be submitted by property owners to validate eligible costs.

Sample language:

- ◆ *This project limits the amount reimbursable to property owner to up to 50 percent of the cost of the safe room, not to exceed \$3,500 **OR** This project limits the amount of each safe room to \$7,000 (or other value).*
- ◆ *Participants were prioritized based on damaged areas and dates costs were incurred.*
- ◆ *Participants will be accepted as long as funds are available. Over submittals will be considered if additional funds become available.*
- ◆ *Quarterly reports will include current totals of completed, verified sites and associated costs for each completed site.*

- ◆ Applicant reserves the right to expand this project as long as the application period is open.
- ◆ Site verification form will be provided for each site location (Attachment 2).

Project Work Schedule (not to exceed 3 years)

Sample:

0–6 months: Initiate outreach-marketing; identify participants

3–12 months: Verify FEMA P-320 or FEMA P-361 criteria and all program eligibility requirements have been met for known sites.

12 months (prior to application period closing): Revise project if necessary to include more participants.

12–30 months: Provide quarterly progress reports indicating volume of completed verified actions; complete project implementation.

30–36 months: Collect all closeout data and complete data dissemination to local emergency medical services.

Cost-effectiveness Review

Sample language:

A cost-effectiveness evaluation has been performed for residential safe rooms in the (State of _____ / County of _____) and produced benefits as reflected on Table 1. These benefits are based on general sampling statewide and are based on 3 persons per household served by each safe room.

Options for capturing additional benefits: If the benefits listed in Table 1 are not sufficient to produce a ratio greater than 1:1 for this project, additional benefits may be obtained by increasing household population, where appropriate, verifying the structure type (manufactured housing produces more benefits than standard construction), and/or using a more specific local valuation that may include higher benefits based on specific risk. Technical support is available if needed.

Budget/Funding Information

Sample budget:

Cost Item	Quantity	Est. Cost Each	Total Est. Cost	Est. Fed Share	Estimated Match Share
Data Collection	150	\$100	\$15,000	\$15,000	—
Material/Construction	150	\$5,000	\$750,000	\$525,000 ⁽¹⁾	\$225,000
Project Management	150	\$200	\$30,000	\$30,000	—
Inspection Certification	150	\$200	\$30,000	\$30,000	—
Design/Engineering Review	150	\$200	\$30,000	30,000	—

Cost Item	Quantity	Est. Cost Each	Total Est. Cost	Est. Fed Share	Estimated Match Share
Verification/Closeout	150	\$100	\$15,000	\$15,000	—
Outreach	—	—	\$15,000	\$15,000	—
Data Dissemination ⁽²⁾	—	—	\$15,000	\$15,000	—
Grand Total	NA	NA	\$900,000	\$675,000	\$225,000

NOTES:

Line items for Data Collection, Project Management, Design, and Outreach could be phased. This would allow limited fund release to identify participants and collect data to complete required environmental and historic preservation reviews.

General-cost line items are samples, not all costs may be required; amounts are variable. Additional line items may be included as necessary. These values are based on historical submittals and averages.

(1) This example limits reimbursement to property owner to \$3,500.

(2) With property owner authorization, provide safe room geo-data to local emergency medical services in usable format.

**All Federal Share Obligations of \$1,000,000 or More
Must Complete the Large Project Notification Process Prior to Approval**

Aggregate Benefits By State (Abridged List)			
Alabama	\$13,336.96	Nebraska	\$9,921.78
Arkansas	\$16,717.85	North Carolina	\$5,723.26
Georgia	\$5,290.98	Ohio	\$11,469.38
Illinois	\$13,685.72	Oklahoma	\$18,366.36
Iowa	\$14,962.87	Pennsylvania	\$4,065.90
Indiana	\$18,126.34	South Carolina	\$6,139.38
Kansas	\$14,005.75	South Dakota	\$5,230.17
Kentucky	\$13,554.96	Tennessee	\$13,579.58
Louisiana	\$9,921.94	Texas	\$5,421.32
Michigan	\$6,522.49	Virginia	\$3,936.05
Missouri	\$15,654.96	West Virginia	\$4,973.50
Mississippi	\$20,067.64	Wisconsin	\$9,025.48
Minnesota	\$7,092.39		

**Final Documentation and Certification Variable by State/Region
(FEMA/State/Applicant may include additional items)**

- Property Owner Name
- Property Address, including geo-location for Safe Room
- Verification of FEMA P-320 or FEMA P-361 criteria
- Installation Inspection
- Conforms to Categorical Exclusion or Environmental Assessment
- Conforms to Local Floodplain Ordinance (if applicable)
- Flood Insurance Deed Tag (if applicable)
- Final Cost list
- Property owner permission to distribute GEO-location to local emergency medical services (optional)

G. Generator FAQ

Eligibility of Generators under the Hazard Mitigation Grant Program

General Eligibility and Application Development

1. How does the information in this guidance differ from current practice?

This Hazard Mitigation Assistance (HMA) Guidance establishes that the purchase and installation of generators for the protection of critical facilities is an eligible, stand-alone project type under the Hazard Mitigation Grant Program (HMGP) and is no longer limited only to the 5 Percent Initiative. Generators that constitute a functional portion of an otherwise eligible mitigation solution (critical or not) remain eligible.

2. Are generators still eligible under the 5 Percent Initiative?

Yes. If there is insufficient data to evaluate a generator project using a standard, HMA-approved Benefit-Cost Analysis (BCA) method, the project may be eligible under the 5 Percent Initiative, as described in current HMA Unified Guidance. To perform this evaluation, a narrative description of the project's cost-effectiveness must be provided in lieu of a BCA. However, when data is available to perform a standard, HMA-approved BCA, the standard method must be used.

3. Are eligible critical facilities limited to those listed in this guidance?

No. The critical facilities listed in this guidance are not exhaustive. Eligible critical facilities are generally meant to include, but not be limited to, facilities such as hospitals, fire stations, police stations, and water and waste water treatment plants.

4. Must the generator be permanently installed in, or anchored to, the critical facility, or can it be portable?

Generators for a single facility or building should be permanently installed on site. Portable generators are eligible provided that they meet all HMGP requirements as described in **44 CFR Section 206.434, Eligibility**. The Applicant must ensure that the generator will be in place to protect the facility functions specified in the project application. The Application should describe relevant transport, hook up, and fuel supply and storage requirements at multiple facilities and how these will be executed if the generator is portable.

5. Is the purchase of generators for residential structures an eligible activity?

No. The purchase of a generator for the singular purpose of maintaining power for a single residential structure is not an eligible activity.

6. If a generator is required by code, is the purchase of a generator for these facilities eligible?

Yes, provided that the generator project meets all HMGP requirements as described in **44 CFR Section 206.434, Eligibility**.

7. What size generator is appropriate for a facility?

This will vary by facility and usage. It is not always necessary for the generator to support facility operations to their full capacity, but it should be sized appropriately to ensure the facility is able to provide uninterrupted critical functions in the event of future power outages.

8. Is there a National Emergency Management Information System (NEMIS) code for generators as a stand-alone project type?

Yes. The new NEMIS code for stand-alone generator projects is **601.2 – Generator Regular**. The NEMIS code for generator projects as part of the 5 percent discretionary allowance is **601.1 – Generator**.

Cost-effectiveness

9. Will FEMA develop a separate BCA module for generators?

No. A separate module is not necessary to perform the analysis. The Damage Frequency Assessment (DFA) module is able to perform this analysis for multiple hazards and project types. If you experience problems using the DFA module, contact the BC helpline at bchelp@fema.dhs.gov.

10. What are the key elements of a BCA for generator projects?

Key inputs required are:

- a. Project Useful Life:** According to **OMB Circular A-76, Performance of Commercial Activities**, the useful life for generators or generator sets is 19 years. This value can be used as the default useful life value when performing the BCA. It may be altered based on manufacturer warranty or other documentation that can demonstrate that the generator may be able to provide service for longer than 19 years. Analysts should use the 19-year project useful life first.
- b. Project Costs:** The cost of generators varies by size, installation, and purpose. The generator's size and specifications should be reasonable, appropriate, and necessary to continuing critical functions of the facility. The exact costs for generators, installation, and components should be provided by the subapplicant and included in the costs when performing the BCA.
- c. Facility and Value of Service:** Analysis for facilities for potable water, waste water, police stations, fire stations, and hospitals can be quickly performed using FEMA's BCA toolkit and the DFA module, which provides service values for these facilities. To use these values, the analyst will need some information regarding the population served by the facility. For example, if a generator is to be installed at a waste water treatment plant, the analyst will need to know how many customers are served by the facility, as well as how many days the facility was not able to operate because of power failure. These values can typically be obtained from the facility manager and can be provided on official letterhead for documentation purposes.

-
- d. **Recurrence Determination:** Recurrence information used in the analysis may vary by location or by cause of power failure, such as wind or flood. See FAQ #17 for additional information.
 - e. **Other Benefits:** Other benefits (or costs avoided) may be included if they are addressed by the generator project.

11. What information is needed to perform a BCA for generator projects?

Information needed for performing the BCA will vary by facility. However, the following inputs are **required** to run the BCA module:

11.1 For **all BCAs** performed, the subapplicant must provide the following:

- a. The total project cost
- b. Useful life (19 years for generators)
- c. Estimated yearly maintenance costs
- d. The frequency of the event used in analysis that would cause a power failure demonstrating the need for a backup power source (generator)
- e. The number of days that service was affected (without power)

To calculate the value of services (benefits to society), the following inputs **must** be included for each specified facility type:

11.2 For Water or Waste Water Services:

- a. The number of customers affected by the power outage at the treatment plants

11.3 For Hospitals

- a. The number of people served by the hospital
- b. The distance in miles between the hospital being analyzed and the hospital that would treat these people in the event the hospital was inoperative
- c. The number of people normally served by the alternate hospital

11.4 For Police Stations

- a. The type of station (metropolitan, city, or rural)
- b. The number of people served by the police station
- c. The number of officers that work at the station and would serve the same area if the station were shut down as a result of a disaster

11.5 For Fire Stations

- a. The number of people served by the station
- b. The type of area served by the fire station (urban, suburban, rural, wilderness)
- c. The distance in miles to the nearest fire station that would provide protection for the area normally served by the fire station affected

d. Does the fire station provide emergency medical services?

Value of service for hospitals, police, and fire stations are in the DFA module by selecting Non Residential Buildings for the Facility Type for Loss of Function in the DFA modules as shown in the screen shots below.

The image contains two screenshots of a software application interface. The left screenshot shows a window titled 'PROJECT: Test Generator, STRUCTURE: test generator' and 'MITIGATION TYPE: Damage-Frequency Assessment - TBD'. It has a 'Save and Go Back' button and a section titled 'TYPE OF SERVICES'. Under 'Facility Type For Loss of Function *', there are four checkboxes: 'Utilities', 'Roads/Bridges', 'Non Residential Buildings' (which is checked), and 'Not Applicable'. The right screenshot shows the same window with the 'BUILDINGS' section expanded. It has a 'Save and Go Back' button and a 'Facility Type *' dropdown menu with 'Fire Station' selected. Below this are several input fields: 'How many people are served by this fire station?' (0), 'Indicate the type of area served by this fire station' (== SELECT ==), 'What is the distance in miles between this fire station and the fire station that would provide fire protection for the geographical area normally served by this fire station?' (0.0), 'Does the fire station provide Emergency Medical Services (EMS)?' (Yes/No radio buttons, with 'No' selected), 'Fire Station with EMS *', and 'What is the distance in miles between this fire station and the fire station that would provide EMS for the geographical area normally served by this fire station?' (0.0). At the bottom right, there is a 'Show Total (\$/day)' button and a value of 0.00.

12. Are the benefits limited to damages avoided to the facility?

No, benefits are not limited to just damages avoided. The value of service for critical facilities can be used to demonstrate cost-effectiveness. The value of services for critical infrastructure and facilities are included in the BCA toolkit, which is available at <http://www.fema.gov/benefit-cost-analysis>. All costs associated with power failure that would be mitigated by a generator should be considered.

Additional losses can be included in the BCA if those losses are a direct result of interrupted power service that a generator would have mitigated. For waste water treatment plants, additional costs are sometimes required to bring the facility back to operating status after an extended power failure. This may include removal of sludge in equipment or additional man hours needed to bring the facility back to operational status. Those additional costs can be included above and beyond the value of service costs if a generator would have prevented those additional costs.

13. Can an Applicant consider multiple hazards in the BCA?

Yes. Multiple hazards may disrupt power supply. The Applicant will need to provide the frequency of each hazard used in its analysis.

14. How does an Applicant develop the return interval for an event requiring the use of a generator?

The recurrence interval used in the analysis will depend on the hazard that caused or will cause the facility to lose power. For example, in the New York City metropolitan area, winds of 85 miles per hour could equate to a 25-year recurrence interval. For other hazards, such as extreme snow fall, information about prior snow fall totals could be validated to estimate the recurrence interval. Recurrence interval data can be obtained from a number of sources, such as the National Weather Service for rainfall and ice storms and the U.S. Geological Survey for floods. If three or more past

events resulted in power failure, the DFA module can calculate the recurrence interval based on the years of the events. Question #17 provides some useful tools to assist in frequency determination.

Generally, two events are required to perform the analysis. Applicants/subapplicants are encouraged to provide as much historical damage information as they can. Projects submitted with one frequency will be considered acceptable.

15. In the case of a water treatment plant, is the cost of providing temporary water or other emergency protective measures considered a future cost avoided?

Yes. If the generator will negate the need for temporary water in the future, then those costs should be included in the analysis.

16. Are environmental benefits included in the BCA?

To the extent they can be captured and justified, environmental costs associated with raw sewage discharge can be included in the BCA for waste water treatment plants. FEMA does not have a default value for these associated costs, and these costs will vary by location. The Applicant/subapplicant should include all reasonable costs that will be mitigated by having a backup generator installed at a facility.

17. What resources are available to determine recurrence interval values?

Recurrence intervals may be determined by using some of the tools provided below:

- ◆ If the facility lost power as a result of wind damage to power lines feeding the facility, the analyst can utilize the Advanced Technology Council Wind Speed tool available at <http://www.atcouncil.org/windspeed/index.php> to determine the frequency of the coastal wind event.
- ◆ If power outages are attributed to flooding, recurrence information for the flooding event should be used in the analysis. The National Weather Services provides the Precipitation Frequency Data Server at <http://hdsc.nws.noaa.gov/hdsc/pfds/>, which can be utilized to establish a frequency for various precipitation events.
- ◆ U.S. Geological Survey stream gauge data can also be used to extrapolate frequency information for flood events, details of which can be found in the *Supplement to the Benefit-Cost Analysis Reference Guide* in the FEMA library at <http://www.fema.gov/library/viewRecord.do?id=4830>.
- ◆ National Snow and Ice Data Center (National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, National Science Foundation) at <http://nsidc.org/data/search/data-search.html>.
- ◆ Insurance claims, BureauNet information, damage repair records, data from the State/local agency, or local government Newspaper accounts citing credible sources (other than homeowner accounts) could be used in conjunction with the DFA module's unknown frequency calculator. Using this method may require more time as three events are required for analysis.

18. How should emergency operations centers (EOCs) be evaluated for inclusion in the BCA toolkit?

Finding the value (in loss of service terms) of a State Emergency Operation Center to prove cost-effectiveness of a generator project is difficult. FEMA will allow reasonable and justified “loss of service” costs for State and local EOCs that are identified by the Grantee to be entered into the DFA module to evaluate cost-effectiveness of an EOC generator project. Another or additional option is to investigate the costs of remobilizing an EOC to an alternate / continuity of operations location that could be avoided should the EOC be supplied with an uninterruptible power source such as a generator.

Scenarios

Different power failure scenarios at various facilities are outlined below. For analysis purposes, each facility was reviewed using 4 days of loss of service due to power failure at the 25-year recurrence. The 25-year recurrence interval for the test cases is based on observed wind speeds and the frequency was extrapolated using the Advanced Technology Council Wind Speed tool for the New York metropolitan area. Other project locations should use the appropriate recurrence intervals for the hazard being mitigated. Analysis was performed using the DFA module in the BCA Toolkit.

The scenarios are for demonstration purposes only. Dollar amounts and frequency intervals were chosen for comparison purposes only. Analysts should use the appropriate values for the facility being examined. For those performing the analysis, assistance is available through the benefit-cost helpline at bchelp@fema.dhs.gov or at 1-855-540-6744. The helpline is not allowed to perform or review analyses but can provide answers to specific questions regarding methodologies.

When performing the BCA, inputs used in the module should be documented, as with all analysis. Documentation sources may include, but are not limited to, correspondence with facility or site managers, data available from the county or facility Web site, information from other government Web sites, media releases, engineering analysis, and letters from the facility manager. Discussion of data documentation is available in the BCA training materials available on FEMA.gov. There are no special or extraordinary data documentation requirements for this project type.

Scenario 1: The Purchase and Installation of a Generator at an Urban Police Station

Assumptions:

- ◆ The police station has 119 officers who serve up to 27,000 residents
- ◆ The police station loses power and the efficiency of the police station drops to 50 percent (assumes 50 percent of the force are working out of other facilities or within the community)
- ◆ The power is not fully restored for 4 days
- ◆ The project useful life for the generator is 19 years
- ◆ The project cost is \$50,000

Benefit-Cost Ratio:

- ◆ The resulting benefit-cost ratio (BCR) is 1.23

Scenario 2: The Purchase and Installation of a Generator at an Urban Fire Station

Assumptions:

- ◆ The fire station has 119 firefighters who serve up to 27,000 residents
- ◆ The fire station loses power and the efficiency of the fire station drops to 50 percent
- ◆ The power is not fully restored for 4 days
- ◆ The project useful life for the generator is 19 years
- ◆ The project cost is \$50,000

Benefit-Cost Ratio:

- ◆ The resulting BCR is 0.80

Scenario 3: The Purchase and Installation of a Generator at an Urban Hospital

Assumptions:

- ◆ The hospital serves up to 27,000 residents
- ◆ The power is not fully restored for 4 days
- ◆ The project useful life for the generator is 19 years
- ◆ The project cost is \$200,000

Benefit-Cost Ratio:

- ◆ The resulting BCR is 1.0

Scenario 4: The Purchase and Installation of a Generator at a Rural Area Water Treatment Plant (Potable Water)

Assumptions:

- ◆ The water treatment plant serves up to 15,000 customers
- ◆ The plant loses power for 3 days
- ◆ A 100-year recurrence interval is used
- ◆ The project cost is \$200,000

Benefit-Cost Ratio

- ◆ The resulting BCR is 1.05

Scenario 5: The Purchase and Installation of a Generator at an Urban Area Waste Water Treatment Plant

Assumptions:

- ◆ The waste water treatment plant serves up to 500,000 residents
- ◆ The waste water treatment plant loses power and there is no service
- ◆ The power is not fully restored for 4 days
- ◆ The project useful life for the generator is 19 years
- ◆ The project cost is \$1,500,000

Benefit-Cost Ratio:

- ◆ The resulting BCR is 24.8

H. Eligibility and Completeness Review Checklist for Planning Subapplications

Applications submitted to FEMA that do not contain at least the basic components listed below may be immediately denied because there is no method to determine eligibility without this data. Additional information may be requested during FEMA review. This information is required for all submittals, including potential substitutions.

Application Component	Yes	No	Comments
General			
Documentation included in the subapplication?			
Technical Assistance Needed? Subapplicant is encouraged to contact the State (Applicant) to request application development assistance. FEMA resources may be available but will only be provided if requested by the Applicant.			
Applicants			
Applicant included management costs for delivery of technical assistance for mitigation planning (e.g., plan reviews, planning workshops, training)			
Scope of Work (SOW)			
Proposed planning activity is consistent with 44 CFR Part 201			
Proposed planning activity is described, including whether it will result in a new or updated hazard mitigation plan (including public involvement, identification of hazards, development of a comprehensive risk/vulnerability assessment, identification of mitigation goals and strategies, and plan implementation) or enhance an existing mitigation plan through a planning-related activity			
Participating jurisdiction(s) are identified and described			
A statement is provided on how the overall planning effort will be coordinated			
SOW is consistent with work schedule and cost estimate (describes entire planning process)			
For mitigation plan updates, the SOW describes the process that each jurisdiction will complete to review each section of the previous plan and address gaps, as needed; new information (including hazard, land use, and development trends); how the previous plan was implemented; and what process will be used			
Copy of the plan review document (i.e., review tool or crosswalk) from the FEMA approval of the previous plan is included, if available/applicable			

Application Component	Yes	No	Comments
Schedule			
Work schedule of 3 years or less is provided and allows sufficient time for State and FEMA reviews; preparation of required revisions, if needed; formal adoption by the jurisdiction(s); and FEMA approval			
Cost Estimate			
Cost estimate supports the SOW and is reasonable for the jurisdictions participating			
Assurances			
FEMA Form 20-16A, Assurances Non-Construction Programs			
FEMA Form 20-16C, Certifications Regarding Lobbying, etc.			
SF-LLL, Disclosure of Lobbying Activities			

I. EHP Checklist

“Yes” indicates that the environmental regulation or statute may apply to your project.

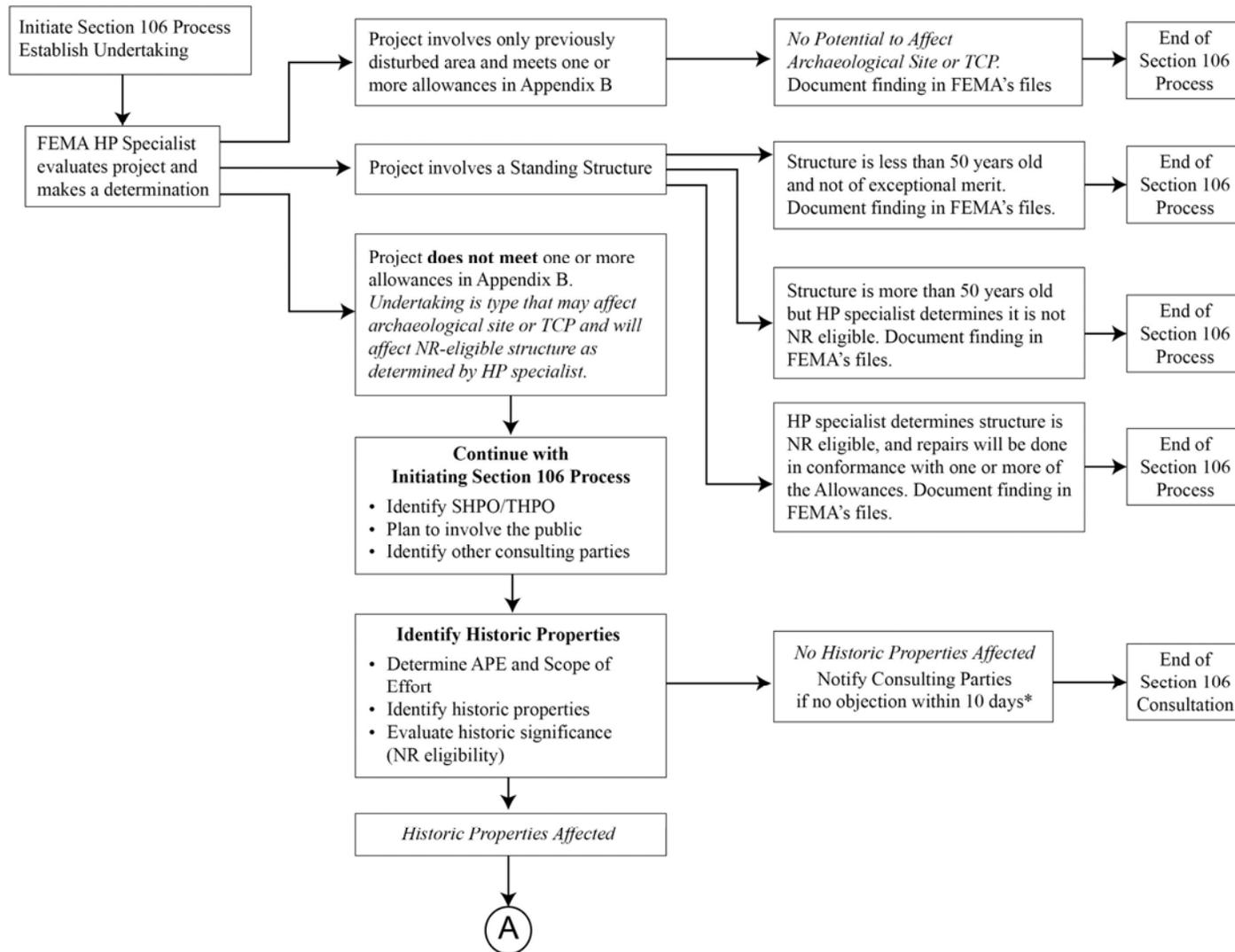
Environmental Regulation or Statute		Yes	No
National Historic Preservation Act			
1.A	Would the proposed project affect, or is the proposed project in close proximity to, any buildings or structures 50 years or more in age?		
1.B	Will the proposed project involve disturbance of ground?		
Endangered Species Act and Wildlife Coordination Act			
2.A	Are federally listed or endangered species, or their critical habitat, present in or near the project area and, if so, which species are present?		
2.B	Will the proposed project remove or affect vegetation?		
2.C	Is the proposed project in or near (within 200 feet), or likely to affect, any type of waterbody or body of water?		
Clean Water Act, Rivers and Harbors Act			
3.A	Will the proposed project involve dredging or disposal of dredged material, excavation, the addition of fill material, or result in any modification to water bodies or wetlands designated as “waters of the United States” as identified by the U.S. Army Corps of Engineers or on the National Wetland Inventory?		
Executive Order 11988 (Protection of Floodplains) and Executive Order 11990 (Protection of Wetlands)			
4.A	Does a Flood Insurance Rate Map, Flood Hazard Boundary Map, hydrological study, or some other source indicate that the project is located in, or will affect, a 100-year floodplain, a 500-year floodplain (if a critical facility), an identified regulatory floodway, or an area prone to flooding?		
4.B	Is the proposed project located in, or will it affect, a wetland as listed in the National Wetland Inventory?		
4.C	Will the proposed project alter a watercourse, water flow patterns, or a drainage way, regardless of its floodplain designation?		
4.D	Is the proposed project located in, or will it affect, a floodplain or wetland? If yes, the 8-step process summarized in Appendix J must be completed.		
Coastal Zone Management Act			
5.A	Is the proposed project located in the State’s designated coastal zone?		
Farmland Protection Policy Act			
6.A	Will the proposed project convert more than 5 acres of “prime or unique” farmland outside city limits to a non-agricultural use?		
Resource Conservation Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act			
7.A	Is there reason to suspect there are contaminants from a current or past use on the property associated with the proposed project?		
7.B	Are there any studies, investigations, or enforcement actions related to the property associated with the proposed project?		
7.C	Will any project construction or operation activities involve the use of hazardous or toxic materials?		

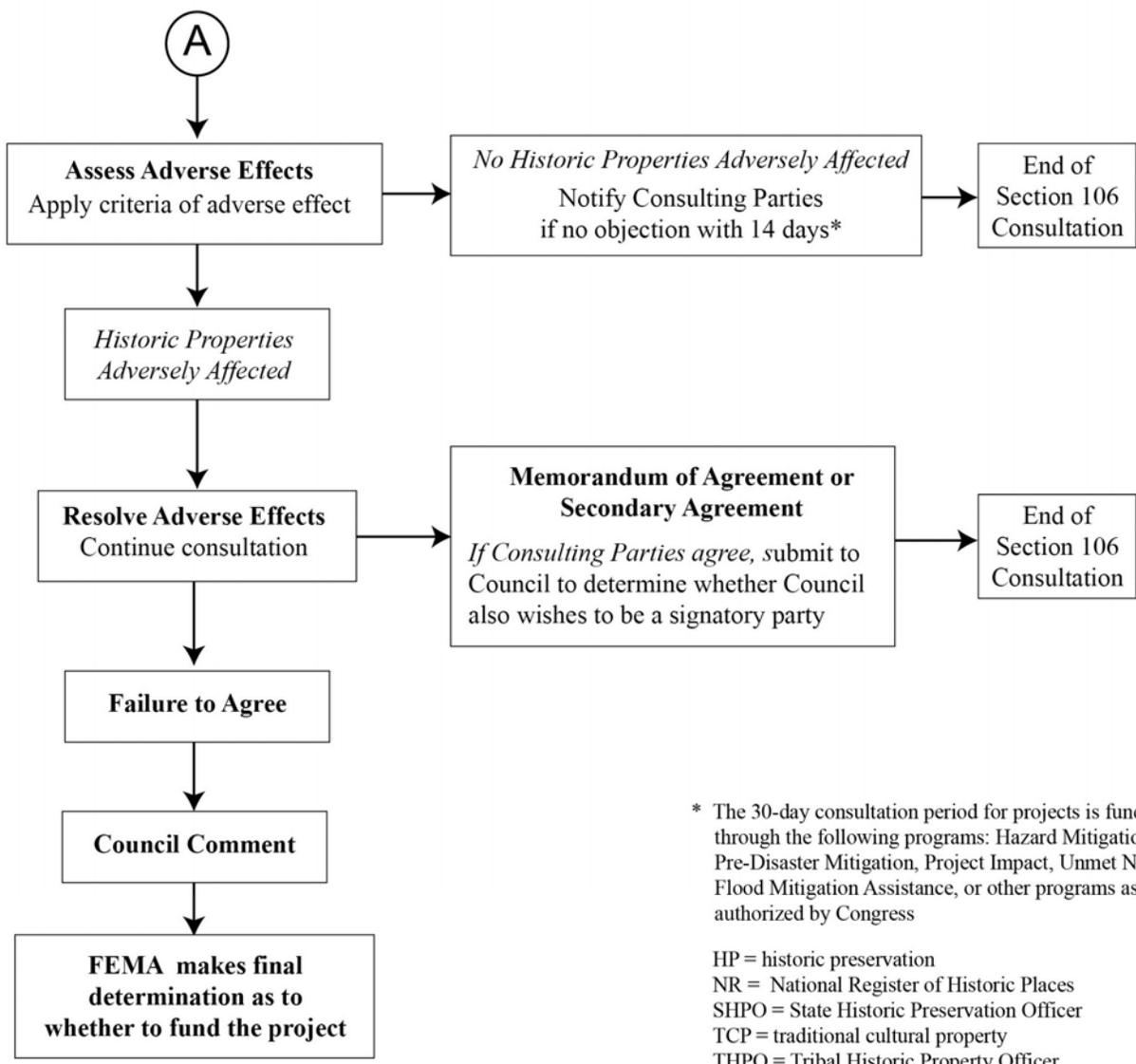
Environmental Regulation or Statute		Yes	No
7.D	Are any of the current or past land uses of the property associated with the proposed project or are any of the adjacent properties associated with hazardous or toxic materials?		
Executive Order 12898 (Environmental Justice for Low Income and Minority Populations)			
8.A	Are there any low-income or minority populations in the project's area of effect or adjacent to the project area?		
Other Environmental/Historic Preservation Laws (including applicable State laws) or Issues			
9.A	Are other environmental/historic preservation requirements associated with this project?		
9.B	Are any controversial issues associated with this project?		
9.C	Have any public meetings been conducted, or public comment solicited, on the proposed project?		

J. 8-Step Decision Making Process for Floodplain Management Considerations

- Step 1.** Determine whether the proposed action is located in a wetland and/or the 100-year floodplain (500-year floodplain for critical actions) and whether it has the potential to affect or be affected by a floodplain or wetland (see 44 CFR Section 9.7).
- Step 2.** Notify the public at the earliest possible time of the intent to carry out an action in a floodplain or wetland, and involve the affected and interested public in the decision-making process (see 44 CFR Section 9.8).
- Step 3.** Identify and evaluate practicable alternatives to locating the proposed action in a floodplain or wetland (including alternative sites, actions, and the “no action” option) (see 44 CFR Section 9.9). If a practicable alternative exists outside the floodplain or wetland, FEMA must locate the action at the alternative site.
- Step 4.** Identify the potential direct and indirect impacts associated with the occupancy or modification of floodplains and wetlands and the potential direct and indirect support of floodplain and wetland development that could result from the proposed action (see 44 CFR Section 9.10).
- Step 5.** Minimize the potential adverse impacts and support to or within floodplains and wetlands to be identified under Step 4, restore and preserve the natural and beneficial values served by floodplains, and preserve and enhance the natural and beneficial values served by wetlands (see 44 CFR Section 9.11).
- Step 6.** Reevaluate the proposed action to determine first, if it is still practicable in light of its exposure to flood hazards, the extent to which it will aggravate the hazards to others, and its potential to disrupt floodplain and wetland values, and second, if alternatives preliminarily rejected at Step 3 are practicable in light of the information gained in Steps 4 and 5. FEMA shall not act in a floodplain or wetland unless it is the only practicable location (see 44 CFR Section 9.9).
- Step 7.** Prepare and provide the public with a finding and public explanation of any final decision that the floodplain or wetland is the only practicable alternative (see 44 CFR Section 9.12).
- Step 8.** Review the implementation and post-implementation phases of the proposed action to ensure that the requirements stated in 44 CFR Section 9.11 are fully implemented. Oversight responsibility shall be integrated into existing processes.

K. Section 106 Process under the National Historic Preservation Act





* The 30-day consultation period for projects is funded through the following programs: Hazard Mitigation Grant, Pre-Disaster Mitigation, Project Impact, Unmet Needs, Flood Mitigation Assistance, or other programs as authorized by Congress

HP = historic preservation
 NR = National Register of Historic Places
 SHPO = State Historic Preservation Officer
 TCP = traditional cultural property
 THPO = Tribal Historic Property Officer

L. Application for Advance Assistance

Hazard Mitigation Grant Program (HMGP) Advance Assistance Pilot Optional Application

The State of _____ requests \$_____ in Advance Assistance¹ for DR_____ pursuant to Section 1104 of the Sandy Recovery and Improvement Act (SRIA) of 2013 to accelerate implementation of the Hazard Mitigation Grant Program (HMGP). The State will use Advance Assistance to develop mitigation strategies and obtain data to prioritize, select and develop complete HMGP applications in a timely manner, as described in the Project Description (Work Scope) below.

Disaster and Project Number _____

Project Title: Advance Funding Request

Applicant _____

Federal Information Processing Standard (FIPS) Code _____

Applicant's Agent and Contact Information _____

Project Description (Work Scope)

List proposed activities, estimated costs and deliverables. (See Advance Assistance Frequently Asked Questions for list of eligible activities).

Activity	Estimated Cost	Deliverable
1.		
2.		
3.		
(Etc.)		

Work Schedule

Following is a schedule of proposed milestones by quarter for all major activities by which the State proposes to monitor progress for Advance Assistance:

¹States may apply for up to 25 percent of the estimated total HMGP grant amount or \$10 million, whichever is less.

Q1 (First Quarter Following Initial Approval)

Activity	Milestone	Deliverables
1.		
2.		
3.		
(Etc.)		

Budget Information

Total Estimated Cost (Federal and non-Federal cost) _____

Total Federal Cost _____

Line Item Budget

The State may request that FEMA obligate Advance Assistance funds incrementally, based on when the State needs the funds. Please list the obligation schedule by activity below.

Activity	Initial Amount Requested	Second Amount Requested	Third Amount Requested	Total Requested
1,				
2,				
3.				
(Etc.)				

Additional Information Section

Provide any relevant information or explanation.

C HAZARD ANALYSIS

The hazard identification and ranking was obtained primarily from the Eastern Municipal Water District (District) Hazard Identification exercise. The Hazard Identification exercise was conducted as a participatory Steering Committee workshop to identify the potential hazards within the District. The Hazard Identification Workshop was facilitated using an interactive spreadsheet that asked specific questions on potential hazards and then rated them accordingly. These questions guide the team in the correct facilitation and application of the program. The following information summarizes the Hazard Identification Workshop risk ranking results, including the descriptions of each hazard factor, and provides the specific descriptor choices for each risk factor and description. Additionally, a risk ranking matrix is provided to designate the overall ranking score and categorization of each hazard.

Hazard Identification and Risk Ranking

Each hazard profile included a profile ranking of the hazard (ranging from low risk to high risk). The Steering Committee determined this initial profile ranking based on all of the hazard identification and profile research, group discussion, and evaluation of all of the data, including numerical rankings (1-5) of the following criteria:

- **Consequence/Severity** – How wide spread is the impact area?
- **Secondary Effects** – Could the event trigger another event and separate response?
- **Probability/Frequency** – Historical view of how often this type of event occurs locally and projected recurrence intervals.
- **Warning/Onset** – Advance warning of the event, or none.
- **Duration** – Length of elapsed time where response resources are active.
- **Recovery** – Length of time until lives and property return to normal.



Risk Factors for Hazard Identification

Risk Factor	Description	Descriptors	Value
Probability/ Frequency	Prediction of how often a hazard will occur in the future	Infeasible event - not applicable due to geographic location characteristics	0
		Rare event - occurs less than once every 50 years	1
		Infrequent event - occurs between once every 8 years and once every 50 years (inclusive)	2
		Regular event - occurs between once a year and once every 7 years	3
		Frequent event - occurs more than once a year	4
Consequence/ Severity	Physical Damage - structures and lifelines Economic Impact – loss of function for power, water, sanitation, roads, etc.	No damage	1
		Minor/slight damage to buildings and structures, no loss of lifelines	2
		Moderate building damage, minor loss of lifelines (less than 12 hours)	3
		Moderate building damage, lifeline loss (less than 24 hours)	4
		Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	5
Vulnerability	Impact Area - area impacted by a hazard event Secondary Impacts - Capability of triggering additional hazards Onset - Period of time between initial recognition of an approaching hazard and when the hazard begins to impact the community	No physical damage, no secondary impacts	1
		Localized damage area	2
		Localized damage area, minor secondary impacts, delayed hazard onset	3
		Moderate damage area, moderate secondary impacts, moderate warning time	4
		Widespread damage area, significant secondary impacts, no warning time	5

Each profile includes a ranking of the hazard. The hazard rankings were determined by assigning each hazard the appropriate risk factors as described above. The risk factors were then used with a hazard ranking matrix to determine the final hazard score. The following table provides the matrix used for determining each hazard's score.

Risk Ranking Matrix							
Probability/Frequency Description	Risk Ranking Matrix						
Rare Event: Occurs less than once every 50 years	Probability/Frequency Value	1	Consequence/Severity				
			1	2	3	4	5
	Vulnerability	1	1	2	3	4	5
		2	2	4	6	8	10
		3	3	6	9	12	15
		4	4	8	12	16	20
5		5	10	15	20	25	
Infrequent Event: Occurs between once every 8 years and once every 50 years (inclusive)	Probability/Frequency Value	2	Consequence/Severity				
			1	2	3	4	5
	Vulnerability	1	2	4	6	8	10
		2	4	8	12	16	20
		3	6	12	18	24	30
		4	8	16	24	32	40
5		10	20	30	40	50	
Regular Event: Occurs between once a year and once every 7 years	Probability/Frequency Value	3	Consequence/Severity				
			1	2	3	4	5
	Vulnerability	1	3	6	9	12	15
		2	6	12	18	24	30
		3	9	18	27	36	45
		4	12	24	36	48	60
5		15	30	45	60	75	
Frequent Event: Occurs more than once a year	Probability/Frequency Value	4	Consequence/Severity				
			1	2	3	4	5
	Vulnerability	1	4	8	12	16	20
		2	8	16	24	32	40
		3	12	24	36	48	60
		4	16	32	48	64	80
5		20	40	60	80	100	

The hazard scores from the Hazard Ranking Matrix were compared to the hazard rank criteria to categorize each hazard with a hazard ranking. The table below provides the value determinations for each hazard ranking.

Risk Rank Categorization	
High Hazard	50 to 100
Moderately High Hazard	25 to 49
Moderate Hazard	15 to 24
Moderately Low Hazard	5 to 14
Low Hazard	1 to 4

The hazard ranking worksheets are provided in the following pages.

HAZARD IDENTIFICATION AND RISK RANKING

Earthquake

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Regular event - occurs between once a year and once every 7 years	3
Consequence	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	5
Vulnerability	Widespread damage area, significant secondary impacts, no warning time	5
Risk	High	75
Comments		

Extreme Weather

Hazard Rank Factors	Hazard Factor Description	Rank
Probability/Frequency	Frequent event - occurs more than once a year	4
Consequence/Severity	Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	3
Vulnerability	Localized damage area, minor secondary impacts, delayed hazard onset	3
Risk	Moderately High	36
Comments	The Steering Committee combined previously separated hazards including extreme heat, severe storm, windstorm and tornado to form the extreme weather hazard.	

Infrastructure Failure

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Frequent event - occurs more than once a year	4
Consequence	Moderate building damage, lifeline loss (less than 24 hours), severe injury or disability	4
Vulnerability	Localized damage area	2
Risk	Moderate	32
Comments	The Steering Committee noted that small deviances from normal operations (i.e. pipeline failures) are a regular occurrence. However, when addressing Infrastructure failure, the team focused on large-scale scenarios such as a main break.	

HAZARD IDENTIFICATION AND RISK RANKING

Flood & Dam/Reservoir Failure

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Infrequent event - occurs between once every 8 years and once every 50 years (inclusive)	2
Vulnerability	Moderate building damage, lifeline loss (less than 24 hours), severe injury or disability	4
Consequence	Moderate damage area, moderate secondary impacts, moderate warning time	4
Risk	Moderately High	32
Comments	The Steering Committee combined flood and dam/reservoir failure hazards as the potential impacts are similar for the District.	

Wildfire

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Regular event - occurs between once a year and once every 7 years	3
Consequence	Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	3
Vulnerability	Localized damage area, minor secondary impacts, delayed hazard onset	3
Risk	Moderately High	27
Comments		

Terrorism

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Rare event - occurs less than once every 50 years	1
Consequence	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	5
Vulnerability	Widespread damage area, significant secondary impacts, no warning time	5
Risk	Moderately High	25
Comments	The Steering Committee noted assumed water contamination or an intentional release of hazardous chemicals was the most likely terrorism scenario for the District. Hazard ranking estimates were based on these types of scenarios.	

HAZARD IDENTIFICATION AND RISK RANKING

Hazardous Material Release

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Rare event - occurs less than once every 50 years	1
Consequence	Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	5
Vulnerability	Widespread damage area, significant secondary impacts, no warning time	5
Risk	Moderately High	25
Comments	As the San Onofre Nuclear Plant is no longer operational, it was removed from the list of identified hazards. However, as the plant is still storing hazardous materials which are transported through the District Service Area, the Steering Committee expanded the range of the Hazard Material Release hazard to include the release of any hazardous material during transport throughout the Service Area	

Power Failure

Hazard Rank Factors	Hazard Factor Description	Rank
Probability	Frequent event - occurs more than once a year	4
Consequence	Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	3
Vulnerability	Localized damage area	2
Risk	Moderate	24
Comments		

HAZARD IDENTIFICATION AND RISK RANKING

Drought

Hazard Rank Factors	Hazard Factor Description	
Probability	Regular event - occurs between once a year and once every 7 years	3
Consequence	Localized damage area	1
Vulnerability	Localized damage area, minor secondary impacts, delayed hazard onset	3
Risk	Moderately High	9
Comments		



PUBLIC PARTICIPATION & PLANNING PROCESS DOCUMENTATION

To include valuable input from the community as part of the development of a Hazard Mitigation Plan (HMP), the Eastern Municipal Water District (District) solicited public participation several times during plan development; including a survey posted on the District's website as well as an open comment period culminating in a public Board Meeting once a draft was completed.

The survey included 10 questions designed to provide insight into the community's opinion on perceived vulnerability for certain hazard events, to clarify which methods the community prefers to receive educational and outreach materials, and to illustrate the participants' overall level of hazard awareness.

Upon completion of the initial draft HMP, the Plan was posted on the District's website initiating a period of public comment. In addition to comments received electronically through the District's website, a public hearing was held during a Board Meeting to allow the public to bring their suggestions directly to the Steering Committee and Board Members. The close of the Board Meeting ended the public comment period. All received recommendations were reviewed and incorporated into the plan as appropriate.

D1. Survey Contents and Responses

This section includes the survey questions. The Survey was release on April 4, 2017 and remained available for three months while the draft was completed. During that time, the District received only one response to the survey. This was not enough responses for the District to make inferences on the community's opinion on the plan update process. The survey will remain active on the District's website in order to maintain in open forum for the public to provide feedback. The survey questions are provided below.

1. In the past five years, have you or someone in your household experienced a disaster such as an earthquake, drought, flood, wildfire, or other type of disaster? Yes or No?

2. If yes, have you, or someone in your household, experienced any of the following disasters?

- Earthquake
- Terrorism
- Flood
- Hazardous Materials Release
- Severe Storm
- Wildfire
- Power Failure
- Extreme Heat
- Dam/ Reservoir Failure
- Drought
- Windstorm
- Other: _____

**3. How concerned are you about the following disasters affecting the community?
(1 through 10)**

- Earthquake
- Drought
- Extreme Weather
- Flood & Dam Failure
- Wildfire
- Hazardous Material Release
- Terrorism
- Infrastructure Failure
- Power Failure

4. Have you ever received, requested, or researched information on ways to make your family and/or home safer from local hazards?

5. How recently did you receive this information?

- In the last 6 months
- 6-12 months ago
- 1-2 years ago
- 2-5 years ago
- 5 years or more
- I don't remember

6. From whom did you last receive this information?

- Water District
- News Media
- Government Agency
- Insurance Agency or Company
- Utility Company
- American Red Cross
- Other Non-profit Organization
- Unsure
- Other: _____

7. What are the best ways for you to receive information about making your family and home safer from local disasters? *(Please check all that apply)*

- **Newspaper stories**
- **Television news**
- **Radio news**
- **District Website**
- **Schools**
- **Books**
- **Fire Department/ Rescue**
- **Fact Sheet or brochure available at local city facility or event**
- **Magazine**
- **Newspaper Ads**
- **Television Ads**
- **Radio Ads**
- **District Newsletter**
- **Outdoor ads (billboards, etc.)**
- **Mail**
- **Internet Search**
- **Public Workshop/ meeting**
- **Other (please explain)**

8. What steps, if any, have you or someone in your household taken to prepare for a disaster? *(Check all that apply)*

- Food
- Flashlight(s)
- Battery-powered radio
- Fire Extinguisher
- Dust mask or cotton t-shirt (for air-filtering)
- Wrench or pliers to shut off utilities
- Sleeping bag or warm blanket for each person
- Important family documents
- Water
- Batteries
- Medical Supplies (first aid kit)
- Moist towelettes, garbage bags and plastic ties for personal sanitation
- Plastic sheeting and duct tape (to shelter in-place)
- Clothing
- Prescription medications
- Other

9. Do you live in the District's Service Area? Yes or No?

10. How many years have you lived in the District's service area?

D2. Inferences

As mentioned above, the District did not receive enough responses from the community to make educated inferences based on participant feedback. However, the survey will remain available through the next planning period in order to allow the public provide comments. When the District receives several completed surveys, the following inferences may be made. As more responses are received, these inferences will be adjusted based on any additional comments received.

Participant Profile

It is important for the Steering Committee to identify certain characteristics of the participating group in order to give proper weight to the feedback received. The survey asked participants to provide their years of residence and whether or not they lived within the service area. With regards to years of residence, the assumption is made that those who had lived in the region over a long period of time should have a better understanding of the hazards that have affected the District historically. Based on this assumption and the responses received for questions 9 and 10 above, the Steering Committee can begin to assess whether the participating group have lived in the service area long enough to have a basic understanding of the hazards that affect the region.

Next, the Steering Committee can begin to assess whether or not the participating group have actively tried to mitigate hazards in their own homes. An assumption is made that those who take a proactive role in mitigating hazards individually will have a better understanding of the District's efforts to mitigate the effects of regional hazards. Based on the responses from question 8 above, the Steering Committee can determine whether the respondents have taken action to mitigation the impacts of disasters in their own home and whether it might be sufficient to suggest a better understanding of regional disaster preparedness.

Methods for Successful Public Outreach

For several of the hazards identified by the Steering Committee, public education and outreach serve as one of the main ways to mitigate future losses. While the District already has outreach campaigns in place, the Steering Committee decided it would be useful for the public to comment on which distribution methods were best for receiving information. The data collected from these surveys will allow the District to maximize its outreach efforts

by utilizing the methods specified by the public to guide future outreach campaign planning.

From response to questions 4-6 the Steering Committee can determine which of participants have received, requested or researched safety information regarding local hazards and how long again they obtained information. From these responses, the Steering Committee can estimate whether respondents are actively seeking information and, with input from question 7, determine which methods those people most prefer to receive information.

Hazard Profiling

The survey asked participants to rank identified hazards based on their level of concern. The Steering Committee can tally the responses, list them from greatest to least, and create a public hazard ranking. The Steering Committee can compare the public's hazard ranking to it's own and decide whether changes are necessary. In addition, inference may be drawn about mitigation activities that will be supported by the public. As assumption is made that any action that decreases the vulnerability of a scenario which had been identified as a hazard of great concern by the public will be positively viewed by the community. The Steering Committee intends for the District to use this information as a way to include the public's opinion as it continues to implement new mitigation measures.

D3. Public Meeting

Once a draft of the HMP was developed, the Plan was uploaded to the District's website on September 15, 2017. This allowed the public time to review the document and provide comments before Plan adoption. Prior to Cal OES submission, no comments were received. However, the Plan will remain on the District's website giving the public an ongoing opportunity to provide feedback on the District's hazard mitigation efforts.

D5. Planning Process

The following sections provide additional information and supporting documentation about the planning process implemented by the Steering Committee to update the HMP. For descriptions of the content of each Steering Committee meeting, please refer to Chapter 1.

Steering Committee Meeting #1

**Eastern Municipal Water District
HAZARD MITIGATION PLAN-
Steering Committee Meeting #1**

March 14, 2017

Name	Company	Position	Email Address	Phone #
DAVID J. MARTINEZ	CITY OF PERRIS	BUILDING OFFICER FIRE MARSHAL	D.MARTINEZ@CITY.PERRIS.ORG	951 743-5063
Melanie Gonzalez	Riverside County EMD	Health Education Assistant	melanie.gonzalez@rinco.org	(951)955-5505
Sarah Bruns	Riverside County EMD	Emergency Services Coord.	sbruns@rinco.org	951 840 0367
JAY JAYCE	EASTERN MUNICIPAL WATER	SAFETY & RISK EMERGENCY MANAGEMENT OFFICER	JayceJ@EMWD.ORG	(951) 928-3777 X 4304
Susan Barne	EMWD	" "	barness@emwd.org	951-300-7560
SHEILA ZAVATA	EMWD	BOARD SECRETARY	ZELUMAS@EMWD.ORG	(951)928-3777 x4235
COREY WALLACE	EMWD	CIVIL ENGINEER II	WALLACE@EMWD.ORG	(951)928-3777 x4550
Doug Hefley (phone in)	EMWD	Director of Safety, Risk, + Emergency Management	hefleyd@emwd.org	(951)928-3777

Eastern Municipal Water District Hazard Mitigation Plan

Steering Committee Meeting #1:

Project Initiation, Hazard Revalidation, Goals & Objectives

March 14, 2017



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MEETING AGENDA

- Project Overview and Background
- Risk Assessment Background
- Hazard Revalidation and Ranking
- HMP Goals and Objectives Revalidation

Project Overview

DISASTER MITIGATION ACT OF 2000

- Revitalized Federal Planning Requirements
 - State and Local Hazard Mitigation Plans
 - Plans must be updated every five years
- Federal Grant Funding Eligibility
 - Hazard Mitigation Grant Program (HMGP)
 - Pre-Disaster Mitigation Program (PDM)
- Disaster Mitigation Act of 2000 is intended to facilitate cooperation between state and local authorities on risk reduction measures and to expedite funding allocation

PUBLIC PROCESS

DMA 2000 Stresses Public Participation:

- An open public involvement process that is comprehensive, continuous and starts early
- Coordination with neighboring communities and various interest groups in Plan development
- Some potential public participation methods include:
 - Steering Committee meeting attendance
 - Public Surveys
 - Public meetings/ workshops/ webinars
 - Public Draft Review

CLIMATE CHANGE

- California Adaptation Planning Guide (APG) released Spring 2015 in response to several Executive Orders encouraging research of and response to climate change
- The District is located in the Desert Region and should consider some of the following hazards:
 - Reduced Water Supply
 - Increased Temperature
 - Reduced Precipitation
 - Diminished Snowpack
 - Wildfire Risk
 - Public Health and Social Vulnerability
 - Stress on special-status species

STEERING COMMITTEE GOALS

- Review existing Plan for implementation
- Review the list of potential hazards and add additional hazards for the revision
- Determine the hazard impacts throughout the District
- Interface with partner agencies to determine existing mitigation measures
- Develop possible approaches to projects which will reduce the impacts
- Prioritize mitigation projects for implementation

Risk Assessment Methodology

RISK ASSESSMENT METHODOLOGY

- Risk Assessment provides the foundation for the mitigation planning process, which is focused on identifying and prioritizing actions to reduce risk to hazards
- FEMA recommended steps for conducting a risk assessment:
 - Describe Hazards
 - Identify Community Assets
 - Analyze Risks
 - Summarize Vulnerability
- Risk Management Professionals incorporates each of these steps into the Plan update process and has acquired Cal OES and FEMA approval using this methodology many times

RISK ASSESSMENT – POTENTIAL HAZARDS

Hazards From Previous Plan

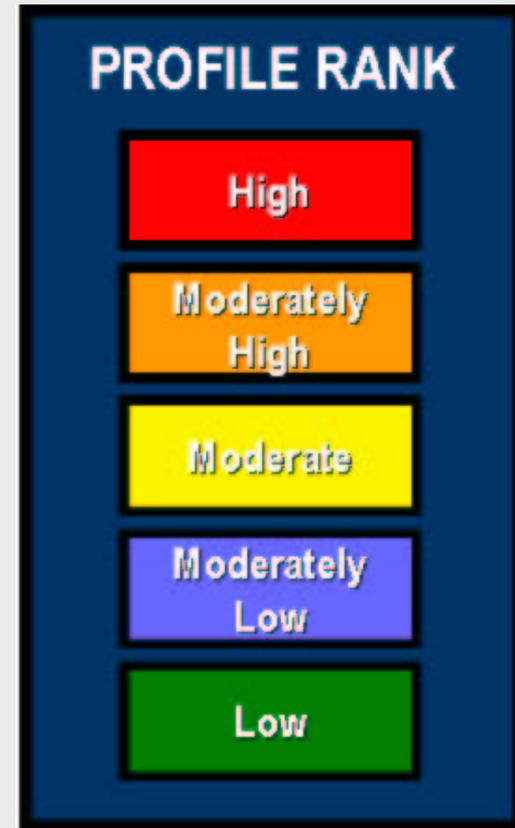
- Earthquake
- Pipeline Failure
- Power Failure
- Terrorism
- Extreme Heat
- Flood
- Dam/Reservoir Failure
- Hazardous Material Release
- San Onofre Nuclear Plant Failure
- Drought
- Pandemic
- Severe Storm
- Tornado/Wind Hazard
- Wildfire
- Transportation Accident

Hazards Resulting From Climate Change

- Reduced Water Supply
- Increased Temperature
- Reduced Precipitation
- Diminished Snowpack
- Wildfire Risk
- Public Health and Social Vulnerability
- Stress on Special-Status Species

HAZARD RANKING METHODOLOGY

- The risk ranking is facilitated using an automated interactive spreadsheet program that asks specific questions on potential hazards and then assigns a relative value to each potential hazard accordingly
- The result of the workshop will be a ranked list of hazards to be studied in detail in the Hazard Mitigation Plan



RISK RANK METHODOLOGY

HAZARD IDENTIFICATION AND RISK RANKING

	Hazard Rank Factors	Hazard Factor Description	Rank
Earthquake	Probability/Frequency		0
	Consequence/Severity		0
	Vulnerability	Probability/Frequency	0
	Risk Rank	Infeasible event - not applicable due to geographic location characteristics Rare event - occurs less than once every 50 years	0
	Comments	Infrequent event - occurs between once every 8 years and once every 50 years (inclusive) Regular event - occurs between once a year and once every 7 years Frequent event - occurs more than once a year	

	Hazard Rank Factors	Hazard Factor Description	Rank
Wildfire	Probability		0
	Vulnerability		0
	Consequence		0
	Risk Rank	Not a Hazard	0
	Comments		

	Hazard Rank Factors	Hazard Factor Description	Rank
Flood	Probability		0
	Vulnerability		0
	Consequence		0
	Risk Rank	Not a Hazard	0
	Comments		

HAZARD RANKING – PROBABILITY/FREQUENCY

Recurrence Interval – Prediction of how often a hazard will occur in the future, including projected return intervals

Probability/ Frequency Rank Descriptors	Rank
Infeasible event - not applicable due to geographic location characteristics	0
Rare event - occurs less than once every 50 years	1
Infrequent event - occurs between once every 8 years and once every 50 years (inclusive)	2
Regular event - occurs between once a year and once every 7 years	3
Frequent event - occurs more than once a year	4

HAZARD RANKING – CONSEQUENCE/SEVERITY

Physical Damage – Structures and lifelines

Economic Impact – Loss of power, water, sanitation, roads, etc.

Consequence/ Severity Rank Descriptors	Rank
No damage	1
Minor/slight damage to buildings and structures, no loss of lifelines, first aid injury and no disability	2
Moderate building damage, minor loss of lifelines (less than 12 hours), lost time injury but no disability	3
Moderate building damage, lifeline loss (less than 24 hours), severe injury or disability	4
Extensive building damage, widespread loss of lifelines (water, gas, electricity, sanitation, roads), loss of life	5

HAZARD RANKING – VULNERABILITY

Impact Area – Area impacted by a hazard event

Secondary Impacts – Capability of triggering additional hazards

Onset - Period between initial recognition of an approaching hazard and when the hazard begins to impact the community

Vulnerability Rank Descriptors	Rank
No Physical damage, no secondary impacts	1
Localized damage area	2
Localized damage area, minor secondary impacts, delayed hazard onset	3
Moderate damage area, moderate secondary impacts, moderate warning time	4
Widespread damage area, significant secondary impacts, no warning time	5

HAZARD RANKING – MATRIX

Probability/Frequency Description		Risk Ranking Matrix					
	Probability/Frequency Value	Consequence/Severity					
		1	2	3	4	5	
Rare Event: Occurs less than once every 50 years	Vulnerability	1	1	2	3	4	5
		2	2	4	6	8	10
		3	3	6	9	12	15
		4	4	8	12	16	20
		5	5	10	15	20	25
		Value	1	2	3	4	5
Infrequent Event: Occurs between once every 8 years and once every 50 years (inclusive)	Vulnerability	1	2	4	6	8	10
		2	4	8	12	16	20
		3	6	12	18	24	30
		4	8	16	24	32	40
		5	10	20	30	40	50
		Value	1	2	3	4	5
Regular Event: Occurs between once a year and once every 7 years	Vulnerability	1	3	6	9	12	15
		2	6	12	18	24	30
		3	9	18	27	36	45
		4	12	24	36	48	60
		5	15	30	45	60	75
		Value	1	2	3	4	5
Frequent Event: Occurs more than once a year	Vulnerability	1	4	8	12	16	20
		2	8	16	24	32	40
		3	12	24	36	48	60
		4	16	32	48	64	80
		5	20	40	60	80	100
		Value	1	2	3	4	5

HAZARD RANK CATEGORIZATION

Risk Rank Equation

$$\text{Risk} = \text{Probability} \times \text{Consequence} \times \text{Vulnerability}$$

Risk Rank Categorization	
High Hazard	50 to 100
Moderately High Hazard	25 to 49
Moderate Hazard	15 to 24
Moderately Low Hazard	5 to 14
Low Hazard	1 to 4

Update Mitigation Goals and Objectives

GOALS AND OBJECTIVES

- Review previous HMP Goals and Objectives
- Engage in discussions to review and update Goals and Objectives in accordance with current District trends

Previous Plan Goal

- Save Lives and Reduce Injuries
- Avoid Damages to Property
- Protect the Environment
- Promote Hazard Mitigation as an Integrated Policy

Next Scheduled Meeting...

Monday, April 10, 2017

1:00 – 3:00 PM

CONTACT INFORMATION

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Steering Committee Meeting #2

Eastern Municipal Water District
 HAZARD MITIGATION PLAN-
 Steering Committee Meeting #2

April 10, 2017

Name	Company	Position	Email Address	Phone #
SHEILA ZELMAN	EMWD	BOARD SECRETARY	ZELMAN.S@EMWD.ORG	(951) 928-5771 EM 4255
JAY JOYCE	EMWD	SREM	Joyce.S@EMWD	(951) 928-3777 X4304
Susan Barnes	EMWD	SREM	barness@emwd.org	951-300-7564
Doug Hefley	EMWD	SREM	hefleyd@emwd.org	951-287-8627
COREY WALLACE	EMWD	CIVIL ENGR.	WALLACE@EMWD.ORG	x 4550
Ryan Bray	RMP	Technical Consultant	Ryan.Bray@KIMCorp.com	949-283-0123 xt 238

Eastern Municipal Water District Hazard Mitigation Plan

Steering Committee Meeting #2:

Asset Inventory and Vulnerability Assessment

April 10, 2017



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Meeting Agenda

- Review Hazard Rankings
- Review Asset Inventory List
- Begin Vulnerability Assessment (Loss Estimate Calculations)
 - Assign **estimated** percent damage to each asset from the identified hazards
 - Assign tasks for completion

Hazard Rankings Review

Hazard Rankings

Rank	Score
High	
Earthquake	75
Moderately High	
Extreme Weather	36
Flood & Dam/Reservoir Failure	32
Infrastructure Failure	32
Wildfire	27
Hazardous Material Release	25
Terrorism	25
Moderate	
Power Failure	24
Moderately Low	14
Drought	9
Low	
None	*

Asset Inventory and Vulnerability Assessment

Asset Inventory & Loss Estimates

- Review Asset Inventory
- Vulnerability Assessment (Loss Estimates)
- Assign Tasks

Asset Inventory

- Asset Inventory
 - Types and number of existing and future buildings
 - Infrastructure
 - Critical Facilities

Asset Inventory Summary – Eastern Municipal Water District

Type	Name	Address	TOTAL
Well	EMWD C1	Near SCRWRF	\$400,000
Well	EMWD C2	Near SCRWRF	\$400,000
Well	EMWD C3	Near SCRWRF	\$400,000
Well	EMWD C4	Near SCRWRF	\$400,000
Well	EMWD C5	Near SCRWRF	\$400,000
Well	EMWD CU MW08	Near San Jacinto/ Meridan Channel	\$400,000

Vulnerability Assessment Estimates

- Review each asset and assign potential percentage of damage expected due to each identified hazard

Eastern Municipal Water District Vulnerability Assessment Calculations				Earthquake		Infrastructure Failure	
Type	Name		TOTAL	% Damage	Loss Estimate	%	Loss Estimate
Storage Tank	Adobe Springs Tank	Murrieta, CA	\$0	0%	\$0	2%	\$0
Storage Tank	Antelope Tank	Sun City, CA	\$1,250,000	0%	\$0	2%	\$25,000
Storage Tank	Bautista Tank	Hemet, CA	\$162,500	0%	\$0	2%	\$3,250
Storage Tank	Benton Rd RW Tank	Winchester, CA	\$2,500,000	0%	\$0	2%	\$50,000
Storage Tank	Box Springs I Tank	Moreno Valley, CA	\$2,500,000	0%	\$0	2%	\$50,000
Storage Tank	Box Springs II Tank	Moreno Valley, CA	\$6,000,000	0%	\$0	2%	\$120,000

Next Steps...

Mitigation Action Worksheet

- Summarize mitigation project specifications
- Identify project goal, objective, and category
- Capital Improvements Plan

Mitigation Activity Identification

Goal: _____

Objective: _____

Circle all that apply:

- Prevention
- Public Education & Awareness
- Emergency Services
- Property Protection
- Natural Resource Protection
- Structural Projects

Mitigation Activity	Comments (problem addressed, information sources, etc.)

Mitigation Action Categories

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection
- Emergency Services
- Structural Projects

Next Scheduled Meeting...

Wednesday, April 26, 2017

9:00 – 11:00 AM

Contact Information

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Steering Committee Meeting #3

**Eastern Municipal Water District
HAZARD MITIGATION PLAN-
Steering Committee Meeting #3**

April 26, 2017

Name	Company	Position	Email Address	Phone #
Sarah Browns	Riv. Co. EMD	Emergency Dir. Coord.	sbrowns@rivco.org	951 358 7194
SHEILA ZELMIA	EMWD	BOARD SECRETARY	ZELMIA@EMWD.ORG	(951) 928-3177 ext 4235
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Eastern Municipal Water District

Hazard Mitigation Plan

Steering Committee Meeting #3:

Mitigation Action Identification and Project Benefit-Cost Review

April 26, 2017



Risk Management Professionals, Inc. – www.RMPCorp.com

MEETING OBJECTIVES

- Review Mitigation Goals and Objectives
- Develop Potential Mitigation Projects
- Conduct a Benefit-Cost Review of Mitigation Projects
- Discuss Schedule for Last Steps of Update Process

Hazard Ranking Review

HAZARD RANKING SUMMARY

Rank	Score
High	
Earthquake	75
Moderately High	
Extreme Weather	36
Flood & Dam/Reservoir Failure	32
Infrastructure Failure	32
Wildfire	27
Hazardous Material Release	25
Terrorism	25
Moderate	
Power Failure	24
Moderately Low	14
Drought	9
Low	
None	*

Mitigation Goals and Objectives Review

OVERALL PLAN GOALS

1. Save Lives and Reduce Injury
2. Avoid Damages to Property
3. Protect the Environment
4. Promote Hazard Mitigation as an Integrated Policy

Identify Potential Mitigation Actions

MITIGATION ACTION CATEGORIES

- Prevention
- Property Protection
- Public Education and Awareness
- Natural Resource Protection
- Emergency Services
- Structural Projects

MITIGATION ACTION WORKSHEET

- Summarize mitigation action specifications
- Identify action goal, objective, & category

Mitigation Activity Identification

Goal: _____

Objective: _____

Circle all that apply:

- Prevention
- Public Education & Awareness
- Emergency Services
- Property Protection
- Natural Resource Protection
- Structural Projects

Mitigation Activity	Comments (problem addressed, information sources, etc.)

EARTHQUAKE EXAMPLE MITIGATION PROJECTS

- Building Retrofits
- Anchor Electrical Transformers
- Install Expansion Joints
- Reinforce Well Shaft or Install Submersible Pump
- Restrain Pipes
- Improve Pipe Materials
- Install Tank Anchors
- Install Friction Dampers on Elevated Tanks

EXTREME WEATHER EXAMPLE MITIGATION PROJECTS

- Retrofits
- Anchoring, Structural Bracing
- Implement Tree Trimming
- Increase Tree Planting to Mitigation High Temperatures
- Install “Green Roofs” to Provide Shade and Remove Heat
- Install Lightning Protection Devices
- Install and Maintain Surge Protectors for Critical eEquipment
- Review Current Building Standards and Upgrade Buildings as Necessary

FLOOD/ DAM FAILURE EXAMPLE MITIGATION PROJECTS

- Acquisition, Relocation, & Elevation Projects
- Dry-Floodproofing (e.g., plastic sheeting)
- Wet-Floodproofing (e.g., water resistant materials)
- Stormwater Management Ordinances or Amendments
- Floodplain Ordinances or Amendments
- Storm Drainage System Improvements
- Structural Flood Control Measures (e.g., levees, dams, floodwalls) Inundation Zone Mapping
- Preparedness and Response Plans
- Notification Systems
- Structural Storage Tank Reservoir Improvements

INFRASTRUCTURE FAILURE EXAMPLE MITIGATION PROJECTS

- Periodic Maintenance and Inspection
- Replacement of Aged-Equipment and Pipelines
- Installation of Redundant Critical Equipment and Pipelines
- Contingency and Emergency Planning

WILDFIRE EXAMPLE MITIGATION PROJECTS

- Community Awareness
- Fire-safe Practices for Structures and Landscaping
- Enhancement of Fire-Suppression Capabilities
- Fire Risk Mapping

HAZARDOUS MATERIALS RELEASE MITIGATION PROJECTS

- Review and Revise Emergency Plans
- Industrial Site Buffering
- Contingency Planning
- Improvement to Maps and Records
- Transportation
- Chemical Storage Location and Design
- Emergency Response Teams

TERRORISM EXAMPLE MITIGATION PROJECTS

- Emergency Plans
- Emergency Response Teams
- Improved Security
- Training (Recognition and Documentation)
- Public Outreach

POWER FAILURE EXAMPLE MITIGATION PROJECTS

- Contingency Planning
- Enhancement of Emergency Response Teams
- Emergency Fuel and Water Distribution and Storage Systems
- Preparedness and Response Plans

DROUGHT EXAMPLE MITIGATION PROJECTS

- Water Use Ordinances
- Contingency Plans
- Emergency Water Distribution and Storage Systems
- Water Conservation Education
- System Retrofits
- Leak Detection Programs

Benefit-Cost Review

PURPOSE OF BENEFIT-COST REVIEW

- FEMA requires the Steering Committee to prioritize actions for implementation
- The process is designed to help the Steering Committee weigh pros and cons for each action
- RMP's method utilizes a qualitative methodology with a High, Medium, and Low range
 - High – Benefits are perceived to exceed costs without further study or evaluations; or the action is critical
 - Medium – Benefits are perceived to exceed costs, but may require further study or evaluation prior to implementation
 - Low – Benefits and costs require evaluation prior to implementation

BENEFIT-COST REVIEW

- Review each identified mitigation project and quantify the benefits and costs of implementing each project
 - Assign a priority based on the benefit-cost review

BENEFIT-COST REVIEW EXAMPLE

- Example from FEMA:

Actions	Benefits (Pros)	Costs (Cons)	Priority
Floodproof 10 businesses in the downtown area	<ul style="list-style-type: none"> - Avoidance of 1 loss of life every 20 years (casualties reduced by half) - Saving of \$90,000 in private damages and \$5,000 in public cost - Loss of use of 10 downtown businesses completely eliminated - Community's problem of business interruption solved - Federal grants like FMA and PDM can be applied for to implement the proposed floodproofing - Will help improve CRS rating in the long term (so entire community's flood insurance premium will be reduced) - More than half the members of the City Council are opposed to buy-outs; it might be easier to get their support for an alternative to buy-outs 	<ul style="list-style-type: none"> - Floodproofing cost = $\\$10,000 \times 10 = \\$100,000$ - Need at least 3 people to administer (after obtaining technical assistance from the State) - Need a year to implement 	High (Priority no. 1)
Build safe rooms for a neighborhood of 50 homes without basements	<ul style="list-style-type: none"> - Avoidance of 5 lives lost every 20 years (casualties reduced by half) - Public and political support for mitigating this hazard exists (due to regular recurrence of tornadoes) 	<ul style="list-style-type: none"> - City will share 50% of the cost per existing home = $\\$2,000 \times 50 = \\$100,000$ - Administrative cost per home = $\\$1,000 \times 50 = \\$50,000$ - Need 3 years to complete - Tornadoes are unpredictable; they may never strike this exact area again 	Medium (Priority no. 2)
Broadcast educational video on local channel on hazard mitigation	<ul style="list-style-type: none"> - Local channel might be willing to broadcast free of cost - Publicity would spread awareness about mitigation methods as well as what to do in an emergency 	<ul style="list-style-type: none"> - Cost of preparing video = \$5,000 - Only 5% of population might notice the broadcast - Only 5% of that 5% might actually consider acting on individual mitigation methods 	Low (Priority no. 3)

Next Steps...

NEXT ADVISORY COMMITTEE MEETING

The Draft Hazard Mitigation Plan will be provided to each member for review. Once comments are implemented, the Public Review Draft Hazard Mitigation Plan will be presented at a Board Meeting:

**Board Meeting:
Date to be Determined**

CONTACT INFORMATION

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Example Benefits

Avoided Physical Damages	<ul style="list-style-type: none"> ▪ Buildings ▪ Contents ▪ Infrastructure ▪ Landscaping ▪ Site Contamination ▪ Vehicles ▪ Equipment
Avoided Loss-of-Function Costs	<ul style="list-style-type: none"> ▪ Displacement costs for temporary quarters ▪ Loss of rental income ▪ Loss of business income ▪ Lost wages ▪ Disruption time for residents ▪ Loss of public services ▪ Economic impact of loss of utility services ▪ Economic impact of road/bridge closures
Avoided Casualties	<ul style="list-style-type: none"> ▪ Deaths ▪ Injuries ▪ Illnesses
Avoided Emergency Management Costs	<ul style="list-style-type: none"> ▪ Emergency operations center costs ▪ Evacuation or rescue costs ▪ Security costs ▪ Temporary protective measure costs ▪ Debris removal and cleanup costs ▪ Other management costs

Example Costs

- Planning Costs
- Construction Cost
- Administration/Management Cost
- Time Needed to Implement
- Social Impacts
- Public/Political Opposition
- Environmental Impacts

Benefit Cost Review Example

Actions	Benefits (Pros)	Costs (Cons)	Priority
Floodproof 10 businesses in the downtown area	<ul style="list-style-type: none"> - Avoidance of 1 loss of life every 20 years (casualties reduced by half) - Saving of \$90,000 in private damages and \$5,000 in public cost - Loss of use of 10 downtown businesses completely eliminated - Community's problem of business interruption solved - Federal grants like FMA and PDM can be applied for to implement the proposed floodproofing - Will help improve CRS rating in the long term (so entire community's flood insurance premium will be reduced) - More than half the members of the City Council are opposed to buy-outs; it might be easier to get their support for an alternative to buy-outs 	<ul style="list-style-type: none"> - Floodproofing cost = $\\$10,000 \times 10 = \\$100,000$ - Need at least 3 people to administer (after obtaining technical assistance from the State) - Need a year to implement 	High (Priority no. 1)
Build safe rooms for a neighborhood of 50 homes without basements	<ul style="list-style-type: none"> - Avoidance of 5 lives lost every 20 years (casualties reduced by half) - Public and political support for mitigating this hazard exists (due to regular recurrence of tornadoes) 	<ul style="list-style-type: none"> - City will share 50% of the cost per existing home = $\\$2,000 \times 50 = \\$100,000$ - Administrative cost per home = $\\$1,000 \times 50 = \\$50,000$ - Need 3 years to complete - Tornadoes are unpredictable; they may never strike this exact area again 	Medium (Priority no. 2)
Broadcast educational video on local channel on hazard mitigation	<ul style="list-style-type: none"> - Local channel might be willing to broadcast free of cost - Publicity would spread awareness about mitigation methods as well as what to do in an emergency 	<ul style="list-style-type: none"> - Cost of preparing video = \$5,000 - Only 5% of population might notice the broadcast - Only 5% of that 5% might actually consider acting on individual mitigation methods 	Low (Priority no. 3)



BENEFIT-COST ANALYSIS

Benefits can be classified as avoided damages and losses. To calculate the benefit of implementing mitigation recommendations, one would first calculate the likely damage without the mitigation action. Next, one would calculate the likely damage after the implementation of the mitigation recommendation. Then, the losses after mitigation are subtracted from the losses without mitigation to calculate net benefits. Finally, the useful life of the building and the time value of money (discount rate) are used to convert those average annual losses to their present value using the following Net Present Value (NPV) equation:

$$NPV = -M + B * [(1 - (1 + i)^{-T}) / i]$$

Where M is the cost of the mitigation measure, B is the net benefit (loss without mitigation - loss with mitigation), T is the useful life of the asset (50 years), and I is the interest rate to calculate the present-day value (7%).

The net benefits of mitigation are compared to the direct costs of implementing the mitigation action. This relationship is expressed as the ratio of benefits to costs.

$$\text{Benefit / Cost} = (\text{NPV of expected benefit}) / (\text{mitigation cost})$$

A ratio of greater than 1.0 is considered a worthwhile mitigation investment.

Since the Benefit-Cost Analysis is an integral part of obtaining grant money from the Federal Emergency Management Agency (FEMA) for mitigation efforts, this appendix includes the requirements for classifying benefits for select mitigation projects, include FEMA's *What is a Benefit* and *Using Benefit-Cost Review in Mitigation Planning*.

WHAT IS A BENEFIT?

GUIDANCE ON BENEFIT-COST ANALYSIS

OF HAZARD MITIGATION PROJECTS

DRAFT

REVISION 2.0

(Supersedes Revision 1.0)



Federal Emergency Management Agency
Flood Insurance and Mitigation Administration
500 C Street, SW
Washington, DC 20472

May 1, 2001

Table of Contents

Section 1	Introduction	1-1
1.1	What Is Mitigation?	1-1
1.2	What Are Benefits?	1-2
1.3	What Benefits Should Be Counted?	1-3
1.4	Categories of Benefits	1-4
1.5	What Benefits Cannot Be Counted?	1-7
1.6	What Is Benefit-Cost Analysis?	1-8
1.7	Why Does Fema Do Benefit-Cost Analysis?	1-11
1.7.1	The Stafford Act	1-11
1.7.2	44 CFR, Emergency Management and Assistance	1-12
Section 2	How to Calculate Benefits	2-1
2.1	Avoided Physical Damages	2-1
2.2	Loss-of-Function Impacts	2-3
2.2.1	Displacement Time and Functional Downtime	2-4
2.2.2	Loss-of-Function Impacts for Buildings	2-5
2.2.3	Economic Impact of Loss of Utility Services	2-9
2.2.4	Economic Impact of Road and Bridge Closures	2-9
2.3	Casualties	2-11
2.4	Emergency Management Costs	2-12
2.5	Summary	2-13
Section 3	Counting Benefits for Ordinary Buildings	3-1
3.1	Single Residential Buildings	3-1
3.2	Groups of Residential Buildings	3-5
3.3	Commercial Buildings	3-6
3.4	Public Buildings	3-9
3.5	Summary	3-11
Section 4	Critical Facilities: Police, Fire and Medical Buildings	4-1
4.1	Physical Damage Estimates for Police, Fire and Medical Buildings	4-2
4.2	Displacement Costs	4-3
4.3	Loss of Public Services	4-4
4.3.1	Continuity Premiums for Police, Fire and Medical Services	4-5
4.3.2	Functional Downtime Estimates for Police, Fire and Medical Services	4-7

Table of Contents

4.4	Casualties.....	4-9
4.5	Summary Guidance	4-10
Section 5	Critical Facilities: Emergency Operations Centers and Emergency Shelters	5-1
5.1	Physical Damage Estimates for EOC and Emergency Shelter Buildings	5-3
5.2	Displacement Costs	5-4
5.3	Loss of Public Services for EOCs	5-4
	5.3.1 Functional Downtime Estimates for EOCs and Shelters	5-4
	5.3.2 Value of Services	5-5
	5.3.4 Continuity Premiums for EOCs and Shelters	5-5
5.4	Casualties.....	5-6
5.5	Summary Guidance	5-7
Section 6	Utilities: Electric Power, Potable Water, Wastewater.....	6-1
6.1	Overview	6-1
6.2	Physical Damage Estimates.....	6-2
6.3	Functional Downtime Estimates.....	6-3
6.4	Economic Impact of Loss of Utility Services.....	6-4
	6.4.1 Economic Impacts of Loss of Electric Power.....	6-4
	6.4.2 Economic Impacts of Loss of Potable Water.....	6-6
	6.4.3 Economic Impacts of Loss of Wastewater Service.....	6-9
6.5	Casualties.....	6-11
6.6	Summary Guidance	6-12
Section 7	Roads and Bridges	7-1
7.1	Overview	7-1
7.2	Physical Damage Estimates.....	7-2
7.3	Functional Downtime Estimates.....	7-2
7.4	Economic Impact of Road and Bridge Closures	7-3
	7.4.1 Functional Downtime (Repair Time) for Roads and Bridges	7-4
	7.4.2 Average Daily Traffic Counts.....	7-4
	7.4.3 Average Delay or Detour Times	7-5
	7.4.4 Economic Impact Per Person Per Hour of Delay or Detour Time	7-6
7.5	Casualties.....	7-8
7.6	Summary Guidance	7-8

Table of Contents

List of Tables

Table 1.1	Categories of Avoided Damages
Table 1.2	Example Showing Principles of Benefit-Cost Analysis Damages Before Mitigation
Table 1.3	Example Showing Principles of Benefit-Cost Analysis Summary Calculation
Table 2.1	Summary Guidance for Physical Damage Estimates
Table 2.2	Loss-of-function Impacts
Table 3.1	Categories of Benefits to be Counted Single Residential Buildings
Table 3.2	Example Showing How to Count Other Physical Damages
Table 3.3	Additional Categories of Benefits to be Counted for Groups of Residential Buildings
Table 3.4	Categories of Benefits to be Counted for Commercial Buildings
Table 3.5	Categories of Benefits to be Counted for Public Buildings
Table 3.6	The Most Important Benefits for Hazard Mitigation Projects for Ordinary Buildings
Table 3.7	Possible Additional Benefits to Count (if project is not cost-effective after counting benefits in Table 3.6)
Table 4.1	Categories of Benefits to be Counted for Critical Facilities: Police, Fire and Medical Buildings
Table 4.2	Continuity Premiums Police, Fire, and Medical Services
Table 4.3	Summary Guidance Benefit-Cost Analysis of Mitigation Projects for Police, Fire, and Medical Facilities
Table 5.1	Categories of Benefits to be Counted Critical Facilities: EOCs and Emergency Shelters
Table 5.2	Special Considerations for Benefit-Cost Analysis of Mitigation Projects for EOCs and Emergency Shelters
Table 6.1	Primary Categories of Benefits Mitigation Projects for Utilities.
Table 6.2	Economic Impacts of Loss of Electric Power Per Capita Per Day
Table 6.3	Economic Impacts of Loss of Potable Water Service Per Capita Per Day
Table 6.4	Economic Impacts of Loss of Wastewater Service Per Capita Per Day
Table 6.5	Economic Impacts of Loss of Utility Services per Person Per Day of Lost Service
Table 7.1	Primary Categories of Benefits Mitigation Projects for Roads and Bridges
Table 7.2	Summary Guidance for Benefit-Cost Analysis of Hazard Mitigation Projects for Roads and Bridges
Table 7.3	Example: Damages and Losses in a 25-year flood Event

There is little doubt that flood-proofing a school, installing hurricane shutters on a beachside home, or seismically retrofitting a heavily-traveled bridge can bring substantial benefits to a community. Reducing the risk of damage from a natural disaster has the potential to save lives, significantly lower cleanup and recovery costs, and minimize the amount of time it takes for a community to return to normal among many other benefits.

While it may seem clear that activities that reduce the damage caused by natural disasters would bring a host of benefits, it is far less obvious how we would actually categorize and quantify these benefits. What kinds of benefits *do* activities like flood-proofing a school or upgrading a drainage channel provide? The purpose of this analysis is to help answer this question by identifying the benefits associated with hazard mitigation projects; demonstrating ways to quantify benefits for use in the benefit-cost analysis (BCA) of hazard mitigation projects; and presenting several applied examples of calculating the benefits of mitigation.

1.1 What is Mitigation?

Mitigation is an action taken specifically to reduce *future* damages and losses from natural disasters. Most Hazard Mitigation Grant Program (HMGP) mitigation projects are construction projects that are designed to avoid or reduce damages to buildings or infrastructure in future disasters. In addition to reducing damages to a facility or building structure, many mitigation projects also reduce the broader negative impacts that disasters have on affected communities, such as the economic effects of regional loss of power.

Examples of common mitigation projects include:

- Acquiring flood-prone structures to remove them from the floodplain,
- Elevating flood-prone structures,
- Improving storm water drainage systems,
- Adding hurricane shutters to improve building wind resistance,
- Strengthening buildings or infrastructure to resist earthquakes, and
- Bracing building contents to resist earthquakes.

Mitigation projects may also include education programs, publications or videos, building code enhancements, and mitigation planning activities, but only if such projects demonstrably result in actions which reduce future damages and losses. These types of “soft” mitigation projects are sometimes excluded by FEMA policies or priorities and are generally more difficult to evaluate than the more common types of “hard” mitigation projects listed above.

Mitigation is conceptually distinct from repair of damaged facilities. After disasters, many damaged facilities are simply repaired to their pre-disaster condition. Such repair actions are not mitigation because they do not reduce the potential for future damages and losses. However, after a disaster some projects may include both repair and mitigation. In this case, the costs of repair and mitigation must be separated. The guidance for benefit-cost analysis in this document applies only to mitigation projects, or only to the mitigation portion of projects that include both repair and mitigation elements.

1.2 What are Benefits?

The benefits of a mitigation project are the elimination and/or reduction of future damages and losses. In other words:

Benefits are simply avoided damages and losses.

For every mitigation project, benefits are calculated by estimating future damages and losses under two circumstances: with and without undertaking the mitigation project. As a simple example, consider a mitigation project to elevate a single flood-prone residential structure. Assume that future damages and losses for this home are estimated as \$5,000 per year for the as-is situation (without mitigation). After elevation, future damages and losses are estimated as \$500 per year. In this example, the benefits of the mitigation project are \$4,500 per year. The \$4,500 in annual benefits is calculated as the difference in estimated future damages and losses before and after mitigation (\$5,000 minus \$500).

For benefit-cost analysis, much of the effort is focused on estimating damages and losses. This focus on damages and losses is sometimes confusing to novices. However, as illustrated by the example above, mitigation project benefits can only be calculated by estimating damages and losses both before and after the mitigation project and then taking the difference between the two.

There are two aspects of counting benefits that are particularly important to keep in mind when conducting benefit-cost analyses of mitigation projects. First, mitigation projects reduce future damages and losses, but generally do not completely eliminate future damages and losses. Acquisition is the only type of mitigation project that completely eliminates future damages and losses. All other mitigation projects reduce future damages and losses but do not completely eliminate them. For example, mitigation projects to elevate structures for floods or to strengthen structures for hurricanes or earthquakes may greatly reduce future damages, but some level of damages will still occur, especially in major disasters. Thus, except for acquisition projects, it will always be necessary to estimate damages and losses after mitigation.

Second, for every mitigation project, the greater the damages and losses are before mitigation, the greater are the potential benefits.

For example, if damages before mitigation are estimated as \$10,000 per year for one house and only \$500 per year for another house, then the maximum possible benefit for the first house is \$10,000 per year and only \$500 per year for the second house. The maximum level of benefit can be achieved only if the estimated damages and losses are completely eliminated by a mitigation project (i.e., by acquiring and demolishing the house). The relationship between damages and losses before mitigation and the maximum possible benefit achieved after mitigation is very important. The best mitigation projects are often those where the damages and losses are greatest before mitigation is undertaken. In other words, the greater the damage and losses are prior to mitigation project, the greater the potential benefits of mitigation. Conversely, when the damages and losses before mitigation are minor, the maximum possible benefits are limited. This relationship is very important for mitigation planning. Mitigation projects providing the highest level of benefit can be identified simply by finding the structures or facilities with the highest risk for future damages and losses.

1.3 What Benefits Should Be Counted?

The goal of FEMA's hazard mitigation program is to reduce the impacts of natural disasters on affected communities. In this context, it is very important to note:

The benefits considered in benefit-cost analysis are the benefits to the community, not just the benefits to FEMA or the federal government. The Office of Management and Budget (OMB) Advisory Circular A-94 (Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs) provides explicit guidance on what benefits to count:

Analyses should include comprehensive estimates of the expected benefits and costs to society based on established definitions and practices for program and policy evaluation. Social net benefits, and not the benefits and costs to the federal government, should be the basis for evaluating Government programs or policies that have effects on private citizens or other levels of Government.

This OMB guidance means that benefits must always be counted from the perspective of the affected community, not from the perspective of FEMA or the federal government. Thus, for benefit-cost analysis of hazard mitigation projects, a broad range of benefits may legitimately be counted, even if Federal programs do not address actually compensate for the damages when they occur.

Some of the benefits to be counted are covered by government programs. Examples of such benefits include avoided damages to public buildings or infrastructure, and emergency management costs (including debris removal) which may be covered under the Public Assistance Program. Other damages and recovery costs may be partially covered by government programs. Examples include avoided damages to private residences and displacement costs for temporary housing, which may be

partially covered under FEMA's Individual and Family Grant Program. Other damages, such as deaths and injuries, do not involve any real exchange of money and are not compensated by any government program. Regardless of whether government agencies actually compensate the damages and losses, the OMB guidance directs Federal agencies such as FEMA to count the full direct benefits of hazard mitigation projects. As an example, consider a city hall building damaged in an earthquake. Federal programs may reimburse the city for damages to the city hall and contents, for cleanup costs, and add something else that FEMA would cover or delete, but the Federal government does not provide life insurance for occupants of public buildings. From a community perspective, however, casualties from the earthquake are obviously a major negative effect of the disaster, and hence it is correct and necessary to count the casualties as damages.

The goal of benefit-cost analysis of hazard mitigation projects is always to count *all* of the benefits of each mitigation project whether or not the categories of benefits are covered by FEMA programs or programs of other federal agencies.

The broad categories of benefits to be counted are summarized in Section 1.4 below.

1.4 Categories of Benefits

Mitigation projects may be undertaken to reduce the extent of damage from natural disaster for a wide variety of facilities. Mitigation projects may apply to private residential and commercial buildings as well as many types of public buildings from city halls and schools, hospitals, to more specialized buildings providing medical, police, or fire services. Mitigation projects may also cover utilities providing electric power, water and other services as well as a wide range of infrastructure from drainage systems, to roads and bridges, to dams and other specialized structures.

The specific benefits to be counted for each mitigation project depend on the type of facility covered by the mitigation project. Different benefits may be counted for different types of projects. However, conceptually, most of the benefits to be counted for any mitigation project can be sorted into four main categories, as summarized below in Table 1.1.

Table 1.1 Categories of Avoided Damages

<p>Avoided Physical Damages</p>	<ul style="list-style-type: none"> ▪ Buildings ▪ Contents ▪ Infrastructure ▪ Landscaping ▪ Site Contamination ▪ Vehicles ▪ Equipment
<p>Avoided Loss-of-Function Costs</p>	<ul style="list-style-type: none"> ▪ Displacement costs for temporary quarters ▪ Loss of rental income ▪ Loss of business income ▪ Lost wages ▪ Disruption time for residents ▪ Loss of public services ▪ Economic impact of loss of utility services ▪ Economic impact of road/bridge closures
<p>Avoided Casualties</p>	<ul style="list-style-type: none"> ▪ Deaths ▪ Injuries ▪ Illnesses
<p>Avoided Emergency Management Costs</p>	<ul style="list-style-type: none"> ▪ Emergency operations center costs ▪ Evacuation or rescue costs ▪ Security costs ▪ Temporary protective measure costs ▪ Debris removal and cleanup costs ▪ Other management costs

These categories are briefly described below and are discussed more fully in Section 2 of this report. Examples, case studies and guidance on how to count each type of benefit are provided in Sections 3 and 4.

Physical damages are probably the easiest category of damages and losses and benefits to understand. Buildings, contents, infrastructure, landscaping, vehicles and equipment are damaged by a flood or other disaster event. The monetary damages are simply the cost to repair or replace the damaged property. For physical damages, benefits are simply the avoided damages; that is, the reduction in future damages attributable to a mitigation project.

Loss of function economic impacts are losses and costs that are incurred when facilities are damaged to the point that the normal function of the facility is disrupted. Many loss-of-function economic impacts are extra costs incurred by occupants of damaged buildings. For example, occupants of residential, commercial or public buildings may incur displacement costs for temporary quarters when damage levels render buildings unoccupiable after a disaster. The loss of function of buildings may also result in other direct economic impacts to occupants such as loss of rental income, loss of business income, or lost wages as well as disruption time (time spent in cleanup, repair, and replacement of damaged property and so on).

In addition, loss of function of some types of facilities may have negative impacts on the community as a whole. For public buildings, loss of function also means loss of the public service provided from the building; such loss of public service has a direct impact on the community. Similarly, loss of utility or transportation services may have large direct economic impacts on affected communities as a whole.

Mitigation projects that reduce physical damages to buildings and other facilities also reduce the loss of function of the facilities, so benefits from mitigation projects often include reducing loss-of-function impacts. The types of reduced loss-of-function benefits to be counted vary, depending on the type of facility, but these benefits can be large and important to count in benefit-cost analysis. For some types of mitigation projects, especially for utilities, roads, bridges, and critical facilities such as hospitals, the benefits of avoiding the loss-of-function impacts are *always* important and may be larger than the benefits of avoiding physical damages. Indeed, many mitigation projects for these types of facilities are undertaken primarily to preserve the critical function of the facility, with reduction of physical damages being an important, but secondary consideration.

For important community operations, loss of function is often the most severe impact of a hazard event, so it is critically important to correctly count the losses and the benefits of avoiding some or all of them.

Casualties include deaths, injuries and illnesses. For some types of mitigation projects, such as seismic retrofit of buildings, reducing casualties is often the main reason a project is undertaken. Whenever a specific mitigation project demonstrably reduces the future potential for casualties, it is proper and necessary to count the benefits of reduced casualties.

Emergency management costs include a range of disaster response and recovery costs that may be incurred by communities during and immediately after a disaster. In many disasters, these costs are much smaller than physical damages or loss-of-function economic impacts. Furthermore, many common mitigation projects have little or no significant impact on a community's emergency management costs. However, in circumstances where a project affects a large part of a community and may significantly reduce future emergency management costs; counting the benefits of reduced emergency management costs is proper. For most projects, however, the benefits in this category are

negligible or very small. Thus, in most cases it may not be necessary to make the effort to estimate the benefits of reduced emergency management costs. In cases where a project has a benefit-cost ratio very close to 1.0 and has significant potential benefits in reducing future emergency management costs, it may be worthwhile to calculate the damages from this source, and the benefits of reducing or eliminating them.

1.5 What Benefits Cannot Be Counted?

As summarized above, the intent of benefit-cost analysis is to count all benefits for each hazard mitigation project, whether or not FEMA or other Federal government programs cover the benefit category. . However, OMB Circular A-94 does place one important limit on the types of benefits than can be counted. In simple terms, the OMB guidance is to NOT count indirect or secondary benefits. The technical language in Circular A-94 is:

Employment or output multipliers that purport to measure the secondary impacts of government expenditures on employment and output should not be included in measured social benefits or costs

In simpler terms, this means that the possible impact of a mitigation project on local or regional employment or on overall economic output or economic activity should not be counted. Therefore, changes in employment levels, economic growth or development, tourism, or future tax revenues should not be considered in benefit-cost analysis.

The focus of OMB guidance on benefit-cost analysis is thus to count direct benefits; that is, to count the damages and losses that would be incurred in the future if the mitigation project were not completed. Such direct benefits include: avoided physical damages, avoided loss-of-function costs incurred by the affected community, avoided casualties, and avoided emergency management costs. Other, more indirect or secondary impacts should not be counted.

This policy guidance from OMB applies to FEMA and to all other federal agencies that do benefit-cost analysis except for the U.S. Army Corps of Engineers (USACE). USACE benefit-cost analysis of projects for navigable waterways is separately mandated by legislation to include a broader range of long-term regional economic impacts, reflecting the large scale and long-term regional economic impact of many Corps projects. Thus, USACE benefit-cost analysis may include benefits that are not countable for most other Federal benefit-cost analysis.

Detailed guidance on what direct benefits to count for particular types of projects, with examples and case studies are given later in this report.

1.6 What is Benefit-Cost Analysis?

Benefit-cost analysis is a standardized, systematic way to count the benefits of a mitigation project and to compare these benefits to the costs of mitigation. A complete benefit-cost analysis counts *all* of the significant direct benefits of a mitigation project.

A benefit-cost analysis always involves looking at damages and losses twice: first, before mitigation (the as-is situation) and second, after mitigation. The benefits of a mitigation project are simply the difference in expected damages and losses before and after the mitigation project are completed.

In more technical detail, a benefit-cost analysis also takes into account:

1. The probabilities of various levels of natural hazard events and damages
2. The useful lifetime of the mitigation project
3. The time value of money (the discount rate)

As a quick review, the underlying principles of benefit-cost analysis are illustrated by one simplified example. Consider a mitigation project to elevate a single flood-prone residential structure. Annualized damages are calculated for each flood depth by estimating each damage category and then taking into account the annual probability of each flood depth. First, annualized damages are estimated before mitigation by combining the probability of each level of flooding with the estimated damages and losses at each flood depth. For a residential structure, the damages considered typically include building damages, damages to contents, and displacement costs for temporary housing (refer to Table 1.2).

Table 1.2
Example Showing Principles of Benefit-Cost Analysis
Damages Before Mitigation

Flood Depth (feet)	Annual Probability of Flooding	Scenario Damages and Losses (per flood event)	Annualized Damages and Losses
0	0.2050	\$6,400	\$1,312
1	0.1234	\$14,300	\$1,765
2	0.0867	\$24,500	\$2,124
3	0.0233	\$28,900	\$673
4	0.0098	\$32,100	\$315
5	0.0034	\$36,300	\$123
Total Annualized Damages and Losses (Before Mitigation)			\$6,312

In the Table 1.2, the scenario damages (damages per flood event) increase with increasing flood depth in the home, as expected. However, the annualized damages, which also take into account the probability of flooding, are lower at high flood depths because such floods are very infrequent at this site.

The total annualized damages and losses, \$6,312 in the above example, indicates the level of risk faced by the property. The greater the frequency and depth of flooding for a given home, the higher the annualized damages and losses. To the extent that a mitigation project reduces or eliminates these damages and losses, the greater the potential benefits of the mitigation project.

For benefit-cost analysis, a similar calculation is done after mitigation, and then benefits are calculated as the difference between annualized damages with and without undertaking the mitigation project (as shown in Table 1.3).

Table 1.3
Example Showing Principles of Benefit-Cost Analysis
Summary Calculation

Flood Depth (feet)	Before Mitigation Annualized Damages (from Table 1.2)	After Mitigation Annualized Damages	Annualized Benefits (Avoided Damages) “Before Mitigation” – “After Mitigation”
0	\$1,312	\$0	\$1,312
1	\$1,765	\$0	\$1,765
2	\$2,124	\$0	\$2,124
3	\$673	\$0	\$673
4	\$315	\$63	\$252
5	\$123	\$49	\$74
Totals	\$6,312	\$112	\$6,200
Present Value Coefficient (7% discount rate, 30 year project lifetime)			12.41
Net Present Value of Future Benefits			\$76,942
Mitigation Project Costs			\$20,000
Benefit-Cost Ratio (Net Present Value of Future Benefits ÷ Project Costs)			3.85

In this example, the annualized benefits are calculated as the difference in the annualized damages before and after mitigation. The benefits of this mitigation project are assumed to occur over a 30-year useful lifetime of the mitigation project. To compare this future stream of statistical (probabilistic) benefits to the present cost of the mitigation projects, a present value calculation is done. The present value calculation depends on the project useful lifetime and on the discount rate that accounts for the time value of money. For FEMA projects, the discount rate is specified by OMB Circular A-94 as 7%. The present value coefficient, which depends on the project useful lifetime and the discount rate, is a multiplier that converts the annualized benefits to net present value.

In this example, the annual benefit of \$6,200 corresponds to a net present value of benefits of \$76,942. The benefit-cost ratio of 3.85 indicates that the benefits are 3.85 times the costs. In other

words, for each dollar spent on mitigation there is an expected return of \$3.85 in reduced damages and losses.

1.7 Why Does FEMA Do Benefit-Cost Analysis?

There are four primary reasons why FEMA does benefit-cost analysis of hazard mitigation projects:

1. To meet the statutory and regulatory requirement eligibility requirement, as specified in the Stafford Act and in 44 CFR. To be eligible for FEMA funding under the HMGP or Flood Mitigation Assistance (FMA) program, each mitigation project must be shown to be cost-effective. As defined in the regulations, cost-effective means that the benefits of each project must exceed the costs (i.e., that the benefit-cost ratio exceeds 1.0).
2. To determine whether or not a mitigation project is worth doing.
3. To provide a common basis with which to compare and prioritize mitigation projects and to help ensure that limited mitigation funds result in the greatest possible reduction in future damages and losses.
4. To demonstrate that mitigation works. Benefit-cost analysis can be a powerful tool to help sell the concept of mitigation and to convince individuals and communities that mitigation investments are in their own self interest. For the HMGP and FMA program overall, benefit-cost analysis helps to demonstrate that the programs and their actions are fiscally sound.

The statutory and regulatory basis of FEMA's benefit-cost analyses is outlined in the Stafford Act and in the program regulations in the Code of Federal Regulations.

1.7.1 The Stafford Act

FEMA's disaster assistance activities, including the HMGP, are enabled by the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The intent and purpose of the Stafford Act is spelled out in Section 102 (2):

to supplement the efforts and available resources of States, local governments and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused by major disasters.

Hazard mitigation activities, which by their nature are designed to alleviate the damage, loss, hardship, and suffering caused by natural disasters, are addressed in Section 404 of the Stafford Act:

The President may contribute up to 50 percent of the cost of hazard mitigation measures which the President has determined are cost-effective and which substantially reduce the risk of future damage, hardship, loss, or suffering in any area affected by a major disaster.

1.7.2 44 CFR, Emergency Management and Assistance

The requirement that each mitigation project must be cost-effective is described in Section 44 206.434 Eligibility (Code of Federal Regulations, 44 Emergency Management and Assistance, Revised as of October 1, 1998). Section 206.434 specifies the eligibility requirements for Hazard Mitigation Program Grants:

“(b) Minimum project criteria. To be eligible for the Hazard Mitigation Grant Program a project must:

(5) Be cost effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project;

(i) Addresses a problem that has been repetitive or a problem that poses a significant risk to public health and safety if left unsolved,

(ii) Will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur. Both costs and benefits will be computed on a net present value basis,

(iii) Has been determined to be the most practical, effective and environmentally sound alternative after consideration of a range of options,

(iv) Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address,

(v) Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

The goal of benefit-cost analysis of hazard mitigation projects is always to count the benefits of each mitigation project whether or not the categories of benefits are covered by FEMA programs or programs of other federal agencies.

The OMB Guidance to count the social net benefits, not only the benefits to the federal government, also applies on the cost side of benefit-cost analysis. Thus, it is always the total cost of the project

that is included in the analysis, not the FEMA share of the cost. For example, consider a mitigation project with a total cost of \$500,000 and calculated benefits of \$300,000 (i.e., a benefit-cost ratio of 0.60). This project fails the cost-effectiveness criterion. From the perspective of the community as a whole, the benefits are less than the cost of the project. This conclusion does not depend on what fraction of the project is FEMA funded, even if FEMA funds less than \$300,000 of the project cost, because the OMB guidance for benefit-cost analysis requires the entire project be cost-effective in order to be eligible for funding.

As discussed in Section 1, the benefits of mitigation projects are future damages and losses avoided by undertaking the mitigation project. Damages and losses become benefits when they are avoided by a mitigation project. This section describes the major categories of damages and losses estimated before and after mitigation; the estimates of damages and losses are then used to calculate the benefits of avoided such damages and losses.

In most cases, FEMA's goal is to count fully all of the benefits of each mitigation project. There are four major categories of benefits:

1. Avoided physical damages
2. Avoided loss-of-function impacts
3. Avoided casualties,
4. Avoided emergency management costs

A brief summary of how to count each of these four categories is provided in this section.

2.1 Avoided Physical Damages

Physical damages are the most direct kind of damages and usually are the easiest to count. Physical damages are simply the costs to repair or replace damaged facilities, including buildings, building contents, and infrastructure. Physical damages may also include repair or replacement costs for landscaping, site contamination restoration, vehicles, and equipment. The most common sub-categories of avoided physical damages are:

- Buildings
- Contents
- Infrastructure
- Landscaping
- Outbuildings
- Site Contamination
- Vehicles
- Equipment

Physical damage estimates (before and after mitigation) are expressed in dollars. For benefit-cost analysis of hazard mitigation projects, damages are often expressed as a percentage of the replacement value of the damaged element (e.g., a building, the contents of a building, a utility component or a bridge). Damage functions are used to express the percentage damage expected as a

function of flood depth for floods, wind speed for hurricanes or level of ground shaking for earthquakes.

For buildings and infrastructure, facilities are generally deemed a complete loss and replaced rather than repaired whenever the damage percentage exceeds a value known as the demolition threshold. For buildings, a 50% demolition threshold is often assumed. For outdated or marginal buildings, much lower demolition thresholds are sometimes appropriate. Similar concepts apply to infrastructure damages.

Guidance for evaluating physical damages is summarized below in Table 2.1. FEMA has developed typical or default damage functions that express the expected percentage damage for buildings and contents. These damage functions are most useful for ordinary residential, commercial or public buildings and may have to be modified for more specialized buildings, using historical damage data, professional judgment, or both.

There are no typical or default damage functions available for estimating the other sub-categories of physical damages. For these categories, historical data and professional judgment are used to make damage estimates.

**Table 2.1
Summary Guidance for Physical Damage Estimates**

Type of Facility	Level of Technical Expertise Required	Typical Data Sources
Residential buildings	Low	Historical damage data Professional judgment
Commercial buildings	Low	Historical damage data Professional judgment
Public buildings	Low	Historical damage data Professional judgment DSRs if available
Specialized buildings for police, fire, and medical facilities	Moderate	Historical damage data Professional judgment Default damage functions may need to be adjusted
Contents, ordinary or specialized buildings	Low to moderate	Historical damage data Professional judgment

Type of Facility	Level of Technical Expertise Required	Typical Data Sources
Infrastructure (including utility and transportation elements)	Moderate to high	Historical damage data Specialized engineering experience with these type of facilities is essential
Landscaping damages and yard cleanup	Low to moderate	Historical data Professional judgment
Site contamination restoration	Moderate to high	Historical data Specialized engineering experience helpful
Vehicles and equipment	Moderate to high	Historical data Professional judgment

2.2 Loss-of-Function Impacts

The negative impacts of a disaster on a community often go far beyond the physical damages alone. Loss-of-function impacts are the losses, costs and direct economic impacts that occur when physical damages are severe enough to interrupt the function of a building or other facility. For a building, loss-of-function impacts may include the costs for temporary quarters while repairs are made, as well as losses in rental income, business income, or public services provided from the building. For utilities, loss of function means a loss of service or a reduction in the level of service. For a road or bridge, loss of function means closures of a road or bridge, or delays arising from a reduction in traffic capacity of a damaged road or bridge.

Loss-of-function impacts are sometimes as important as or even more important than the direct physical damages. For example, the loss of function of a hospital or fire station or other facility critical to the emergency response and recovery during and immediately after a disaster may have a much greater economic impact on the community than simply the repair costs for the physical damages. Similarly, loss of electric power or potable water service has a much larger economic impact on a community than simply the costs to repair damage to the electric power or water systems. Thus, to fully count the benefits of each hazard mitigation project it is very important to count all of the benefits of avoiding loss-of-function impacts.

The type of loss-of-function impacts to be counted varies depending on the type of facility under evaluation. Some of the sub-categories of loss-of-function impacts are somewhat more difficult to understand and to calculate than the more self-evident physical damage sub-categories. As a result, loss-of-function impacts have often been only partially counted or not counted at all when conducting benefit-cost analyses of hazard mitigation projects. Undercounting loss-of-function impacts is a serious error that may result in highly meritorious and highly cost-effective mitigation projects being improperly rejected. The most common sub-categories of loss-of-function impacts are:

- Displacement costs for temporary quarters
 - Loss of rental income
 - Loss of business income
 - Lost wages
 - Disruption time for residents
 - Loss of public services
 - Economic impact of loss of utility services
 - Economic impact of road/bridge closures

2.2.1 Displacement Time and Functional Downtime

Estimating loss-of-function economic impacts for a building or other facility always requires two steps. First, the time duration of the interruption of function must be estimated, and second, the economic value per unit time of interruption of service must be estimated.

For purposes of benefit-cost analysis, displacement time and functional downtime must be considered. **Displacement time** is the time period during which occupants are displaced from a building so repairs can be made. For low levels of damage, displacement time is generally zero; that is, minor repairs can be made without displacing occupants. **Functional downtime** is the time period during which services are lost.

Functional downtime may be much shorter than displacement time. For example, consider a city hall building that is badly damaged in a disaster. The occupants of the building may be displaced to temporary quarters for six months - this is the displacement time. Displacement costs are estimated from the displacement time and the daily or monthly cost of displacement. However, in this simple example, the functional downtime is much less than six months. If the services are re-established in the temporary quarters in two weeks, then the functional downtime is only two weeks, not six months.

Functional downtime can also be fractional. One day of functional downtime can be one day of complete loss of service, or two days of 50% loss of service, or 10 days of 10% loss of service, and so on.

For utility and transportation systems, there are generally no displacement costs because such service generally can't simply be moved to temporary quarters. Thus for these systems the loss-of-function economic impacts are calculated from the estimated functional downtime and the value of the service per day.

2.2.2 Loss-of-Function Impacts for Buildings

For buildings, loss-of-function impacts may include the following categories: displacement costs, loss of rental income, loss of business income, loss of wages, loss of public services, and disruption time.

Displacement costs are the extra costs incurred when occupants of a building are displaced to temporary quarters. Displacement costs may be incurred for residential, commercial, or public buildings. Displacement occurs only when damages to a building are sufficiently severe that the building cannot be repaired with occupants in place. At lower levels of damage, repairs are commonly made with occupants remaining in the building during the repair process.

Displacement costs include the following sub-categories of costs:

1. Rental costs for temporary quarters
2. Other monthly costs of displacement such as furniture rental, other costs of being in temporary space, extra commuting costs, etc.
3. One-time costs such as utility hookup fees, round-trip moving costs, etc.

Displacement costs are the most commonly counted loss-of-function impact. The necessary data is straightforward and relatively easy to obtain. Rental costs for temporary quarters can be obtained from local officials or real estate firms. Estimates for other monthly costs and one-time moving costs can be provided by applicants or estimated using common sense.

Rental income losses are incurred by owners when tenants vacate premises because of damages, resulting in a loss of rental income for the owner. Rental income losses may apply to any building that is rented (residential, commercial, or public).

Analysts should be aware of the potential for double-counting rental income losses. Consider an example where two homes are damaged by floods and the occupants are displaced to temporary quarters for several months while repairs are made. If one home is owner-occupied, the owner is still responsible for mortgage and tax payments on the home in addition to paying rent and other expenses

for temporary quarters. In this case, the full displacement costs for temporary quarters are additional expenses and should be counted. However, for a rented home, the economics are different. If a renter is displaced to temporary quarters, then he/she no longer pays rent for the damaged facility. This loss of rental income is a loss to the owner and may be counted as part of the loss-of-function impacts for the building. However, in this case, the displacement costs for the renter must be adjusted to consider only the possible increase in rent above the previous rent, rather than the total cost of rent at the temporary quarters. Counting the displacement costs for the renter and the full loss of rental income for the owner is double-counting and must be avoided.

The simplest way to avoid potential double-counting is to not count rental income losses. If this is done, then the full displacement costs should be counted for both owners and renters. Counting the full displacement costs for renters, does, in effect, count the lost rental income. This approach has the additional advantage that it is no longer necessary to determine whether occupants of buildings are owners or renters.

Loss of business income may occur for commercial buildings when damage is severe enough to result in temporary loss of function of a building. For benefit-cost analysis, the proper measure of loss of business income is the net income, not the gross income since expenses as well as receipts are lower when a business is closed.

Estimates of net business income losses can generally be obtained from applicants, the owners, or local officials. In making estimates of net business income losses, it is important to remember that some lost business income can be made up. For example, a business that is closed for two weeks because of hurricane damage does not necessarily lose two weeks of net business income. In many cases, some of the lost sales or income will be made up after the business reopens.

FEMA considers relatively few mitigation projects for commercial buildings. In most cases, the loss of business income constitutes only a very small fraction of total damages and losses. Thus, the benefits of avoiding or reducing loss of business income are generally only a small fraction of total damages and losses. For projects that are clearly cost-effective, it may not be necessary to consider business income losses to demonstrate cost-effectiveness. However, to count fully the benefits of hazard mitigation projects for commercial buildings, it is necessary to consider loss of business income.

Loss of wage income may also occur for commercial buildings, when damage is severe enough to result in temporary loss of function of a building. When a business closes temporarily due to damages, loss of wages for employees is analogous to the loss of business income for the owner. Historically, loss of wage income has not been considered in FEMA's benefit-cost analysis. In economic theory, wages are considered fungible, that is, movable or transferable, and it is commonly assumed that wage earners who lose one job find another. However, since loss of wages due to

disaster damage is short-term and not predictable, the assumption of fundability does not appear to apply.

The intent of the Stafford Act is to alleviate the “damage, loss, hardship, and suffering” caused by major disasters. In this context and for consistency with regard to counting losses in net business income, counting loss of wage income is appropriate for benefit-cost analysis of hazard mitigation projects. For purposes of benefit-cost analysis, wage income losses to be counted are only short-term losses due to temporary business closes. The wage losses to be counted are primarily those for hourly workers. Wage losses for salaried workers should not be counted unless these workers are also laid off without pay. Wage losses should be counted as business income losses only to the extent that they are not likely to be made up later after the business reopens.

Situations where a business may leave town with permanent loss of wages (if, for example, some flood protection improvements are not made) should not be counted because such impacts fall under the type of secondary impacts on employment or output that are excluded from consideration under OMB guidance.

Loss of wages for public employees should not be counted for two reasons: 1) most public employees are likely to continue to receive wages during and after disasters, and 2) the value of public sector wages is already included in evaluating the loss of public services.

Loss of hourly wages due to temporary business closures due to disaster damage should include the full value to employees, wages plus benefits. Local data on wages and benefits are generally available from local officials. If not, national average data may be used. As discussed in Section 7 of this report (Roads and Bridges), the current national average for wages and benefits is \$21.16 per hour.

Economic value of disruption time for residents is the value of lost time incurred by residents for pre-disaster preventative measures, evacuation time, cleanup and repair of flood damages, replacement of damaged property, dealing with insurance claims and other disaster-related matters. The key economic concept is that personal time has value, whether or not the time is formally compensated by employment. Outlined below is an approach closely analogous to that adopted by the U.S. Department of Transportation (DOT) in calculating the benefits of reducing travel time delays. The simplest assumption consistent with economic theory is that each hour of time is worth the same amount, whether such time is personal or business, compensated or not. In other words, the last hour of work time and the first hour of leisure time are assumed to have equal value. This is the assumption suggested in Section 7 (Roads and Bridges) for placing a value on delay or detour times due to closures of roads and bridges. The same economic principles apply to personal time lost due to disaster damages to residential structures. Placing an economic value on personal disruption time is consistent with the DOT’s approach and with the intent of the Stafford Act to alleviate the “damage, loss, hardship, and suffering” caused by major disasters.

The economic value of disruption time for residents is estimated at \$21.16 per hour, the national average value for wages and benefits.

Loss of Public Services may occur for public buildings when damage is severe enough to result in temporary loss of function of the building. For purposes of benefit-cost analysis, private non-profit organizations providing what are essentially public services (e.g., the Red Cross, schools, and hospitals) are evaluated in exactly the same manner as public buildings. For commercial buildings, the loss of net business income is a measure of the economic impact of loss of function of the building. For public buildings, the measure of the economic impact of loss of function is the value of the services provided to the community by the agencies operating in the building.

To value public services, FEMA makes the very simple and direct assumption that public services are worth what it costs to provide the services to the public. For example, if a public service costs \$1,000 per day to provide, then the value is assumed to be \$1,000 per day. If the service is lost because of damage to the building, the loss is assumed to be \$1,000 per day. If the loss of service is avoided because of a hazard mitigation project, then the benefit is assumed to be \$1,000 per day.

The daily cost of services is estimated from the annual operating budget for the agencies occupying a building. The annual operating budget includes all of the direct costs necessary to provide the public services, including salaries and benefits, materials, supplies, utilities, equipment costs, and rent or the annual cost of owning the building. The only exclusion is for transfer payments. For example, if a public office distributes pension checks, the value of the service is not the value of the checks distributed, but rather the cost of providing the service.

This method for valuing the loss of public services applies to all public services, including administrative functions, schools, as well as more specialized services such as public works, police, fire and medical services. For ordinary (non-disaster related) public services, the annual operating budget is used directly as a proxy to determine the daily value of services to the community. For services which are essential to immediate disaster response and recovery, a continuity premium is added to reflect the greater impact of losing services when they are most in demand and most critical to the community.

The continuity premium is a multiplier on the normal daily cost of service that is applied only to services, such as police, fire and medical that are directly related to emergency response and recovery. The continuity premium reflects the greater demand for such services during disasters and, in effect, is an estimate of how much more than the normal cost a community would be willing to pay to maintain these services during disasters. Determining an appropriate continuity premium for public services that are critical to disaster response and recovery is difficult and requires a great deal of judgment and experience. Guidance on appropriate continuity premiums for police, fire, and hospital services is given in Section 4 of this report. Guidance on appropriate continuity premiums for emergency operations centers and emergency shelters is given in Section 5 of this report.

2.2.3 Economic Impact of Loss of Utility Services

Utility services such as electric power, potable water, and wastewater are often referred to as “lifelines” because these utility services are so critical to the functioning of modern cities. Mitigation projects for utilities are often motivated primarily by the desire to maintain function of these critical services. The economic impacts of loss of utility services are generally many times larger than the physical damages alone. For example, loss of electric power affects not only the utility itself but impacts economic activity in the entire community.

Since the loss-of-function impacts (economic impact of loss of utility services) for utility systems are almost always much larger than physical damages alone, benefit-cost analysis for utility systems must always include loss-of-function impacts. Because of the complex, technical nature of most utility systems, evaluating mitigation projects for these systems usually requires specialized expertise.

Detailed technical guidance on how to evaluate mitigation projects for electric power, potable water, and wastewater utility systems is given in Section 6 of this report. The economic impacts of loss of utility services are calculated by first estimating the functional downtime (i.e., the time period for which utility service is lost), then the per capita economic impacts per day of lost service are estimated by the summing the impact of lost service on local economic activity and the economic impacts on residents, and finally, the economic impact of loss of utility services is calculated as the product of the functional downtime and the economic impact per day of lost service.

2.2.4 Economic Impact of Road and Bridge Closures

Roads and bridges, like utilities, are commonly considered lifelines for communities because they are so critical to the functioning of modern cities. Mitigation projects for roads and bridges are often motivated primarily by the desire to maintain function of these critical transportation system links. The economic impacts of road and bridge closures are often many times larger than the physical damages alone.

Since the loss-of-function impacts for roads and bridges (economic impact of road and bridge closures) are often larger than physical damages alone, benefit-cost analysis for hazard mitigation projects must always include the loss-of-function impacts.

Detailed technical guidance on how to evaluate mitigation projects for roads and bridges is given in Section 7 of this report. The economic impacts of road and bridge closures are calculated by first estimating the functional downtime (i.e., the duration of road or bridge closures), then, calculating the number of person hours of delay or detour time from the daily traffic volume and the expected

duration of delays or detours, and finally, calculating the economic impact using the number of person hours of delay or detour times the average value of wages and benefits.

This section has reviewed the major types of loss-of-function impacts and how to calculate each one. A summary of loss-of-function impacts is given below in Table 2.2.

**Table 2.2
Loss-of-Function Impacts**

Type of Facility	Loss-of-Function Impact	Data Inputs
Building (residential, commercial, public)	Displacement costs	<ul style="list-style-type: none"> ▪ Displacement time ▪ Rent for temporary quarters ▪ Other monthly costs ▪ One-time costs
Building (residential, commercial)	Rental income losses	<ul style="list-style-type: none"> ▪ Displacement time ▪ Monthly rent
Building (commercial)	Business income losses Wage income losses	<ul style="list-style-type: none"> ▪ Functional downtime ▪ Net business income per month ▪ Wages and benefits per month
Building (residential)	Disruption costs	<ul style="list-style-type: none"> ▪ Disruption time ▪ Economic value per person per hour
Building (public, ordinary services))	Loss of public services	<ul style="list-style-type: none"> ▪ Functional downtime ▪ Operating budget
Building (public, critical services))	Economic Impact of Loss of public services	<ul style="list-style-type: none"> ▪ Functional downtime ▪ Operating budget ▪ Continuity premium (sometimes)
Utilities	Economic Impact of Loss of public services	<ul style="list-style-type: none"> ▪ Functional downtime ▪ Economic impact per capita per day
Roads and Bridges	Economic impact of road and bridge closures	<ul style="list-style-type: none"> ▪ Functional downtime ▪ Delay or detour time ▪ Daily traffic load ▪ Economic value per person per hour

2.3 Casualties

Natural disasters commonly result in casualties, including deaths, injuries, and illnesses. Casualties are the most devastating impact of disasters. Some mitigation projects are designed to reduce casualties in future disasters. Almost all earthquake projects are designed to reduce casualties, as are some hurricanes, wind, and flood mitigation projects.

For some mitigation projects, the benefits of reduced casualties can be a large fraction of the total benefits, or even the largest category of benefits. Thus, for some mitigation projects, it is very important to count the benefits of reduced casualties.

Like other benefits, the benefits of avoided casualties are calculated as the difference in casualties occurring before mitigation and after mitigation. FEMA uses statistical values to place a monetary value on the benefits of avoided casualties. In the most recent FEMA benefit-cost analysis software, statistical values of \$1,250, \$12,500 and \$2,200,000 are assigned to minor injuries, major injuries and deaths, respectively. Minor injuries are defined as those requiring medical treatment, excluding minor bruises or scrapes. Major injuries are defined as those requiring hospitalization for treatment. Minor and major illnesses can be defined similarly, using the same statistical values.

When adjusted to year 2001, these statistical values for casualties are approximately \$1,560, \$15,600, and \$2,710,000 for minor injuries, major injuries, and deaths, respectively. For economic correctness, these adjusted values are suggested for benefit-cost analysis of FEMA hazard mitigation projects.

As reviewed in Section 1.3, OMB guidance for benefit-cost analysis mandates that the benefits to be considered in FEMA's benefit-cost analyses are social net benefits, not the benefits to FEMA or to the federal government. Even though neither FEMA nor any other Federal Agency provides compensation for disaster casualties, the perspective of benefit-cost analysis is always that of the affected community. Thus, it is proper and indeed necessary to count the benefits of avoided casualties, whenever a mitigation project directly and demonstrably will reduce future casualties.

Counting the benefits of avoided casualties is necessary for nearly all earthquake mitigation projects. Reducing casualties is often the primary motivation for earthquake mitigation projects.

For many common types of mitigation projects, life safety benefits are non-existent or negligible. For example, except for situations with flash flooding or dam failures, most flood hazard mitigation projects do not significantly reduce casualties. Similarly, except for shelter projects, most hurricane mitigation projects do not significantly reduce casualties. Assuming that a mitigation project for floods or hurricanes will increase life safety may actually increase casualties by given a potentially false sense of safety and reducing people's motivation to evacuate when necessary.

For some mitigation projects life safety benefits are very important and must be included. Calculation of life safety benefits must always be done carefully, by experienced analysts. Including spurious life safety benefits has the potential to greatly distort benefit-cost results and lead to erroneous decisions about mitigation projects.

2.4 Emergency Management Costs

Disasters commonly result in a range of emergency management costs for affected communities. Emergency management costs include emergency operations center costs, evacuation or rescue costs, security costs, temporary protective measure costs, debris removal, pumping costs and other cleanup costs, and other costs for disaster response and recovery.

If a mitigation project under evaluation significantly reduces these emergency management costs, then the benefits of reduced emergency management costs should be counted. However, many FEMA hazard mitigation projects deal with single structures or a few scattered structures in a larger community. In this case, the reduction in emergency management cost is non-existent or negligible and should not be counted.

For example, elevating or acquiring a single structure or a few scattered structures in a community does not significantly impact a community's overall emergency management costs. However, acquisition of an entire flood prone neighborhood of homes might significantly reduce emergency management costs.

Determining whether or not a specific mitigation project significantly reduces a community's emergency management costs requires considerable judgment and experience. Calculation of such benefits must be done carefully, with full documentation of data and assumptions.

The most common subcategories of emergency management costs are:

- Emergency operations center costs
- Evacuation or rescue costs
- Security costs
- Temporary protective measure costs
- Debris removal and cleanup costs
- Other management costs

2.5 Summary

The above sections provide summary guidance for four main categories of benefits, including avoided physical damages, avoided loss-of-function costs, avoided casualties, and avoided emergency management costs. For every type of benefit to be counted the procedure is the same: damages and losses are estimated both before and after undertaking a mitigation project. Then, benefits are calculated as the difference between damages and losses before and after mitigation, taking into account the time value of money (mitigation project useful lifetime and discount rate).

Within these four major categories of benefits, more than 20 subcategories of benefits were described briefly. However, once the basic procedure for calculating benefits for the major categories is mastered, calculating additional benefits for the subcategories is relatively straightforward.

Counting some of the less commonly used subcategories of benefits requires a little more ingenuity. In some cases, it may be convenient to do a side calculation and then add these benefits to those calculated in the module. For example, the modules for hurricane and flood projects do not include spaces for calculating the benefits of reduced casualties. If counting the benefits of avoided casualties is necessary for a particular mitigation project (e.g., a hurricane shelter, or acquisition of properties subject to flash flooding), then a side calculation is probably the easiest way to include these benefits in the module.

As a caveat, it is important to do note that evaluating some types of projects, for example mitigation projects for utility systems, requires a moderate- to high-level of technical understanding of utility systems and thus should not be attempted by analysts lacking this expertise. Similarly, performing estimates of avoided casualty benefits and estimates of some of the other less commonly calculated benefits requires a considerable amount of experience and expertise and should not be attempted by novice analysts. Throughout the process of counting applicable benefits, care must also be taken to avoid double-counting benefits in more than one place or more than one subcategory.

This section provides examples of how to count benefits for “ordinary” buildings. In the present context, “ordinary” buildings are those that are not critical facilities for emergency response and recovery. Ordinary buildings include residential and commercial buildings, and public buildings used for non-critical functions, such as schools and administrative buildings. Public buildings used to provide services that are critical to disaster response and recovery, such as police, fire and medical facilities, emergency operations centers, and emergency shelters are addressed separately in Section 4.

Mitigation projects for ordinary buildings are the most common type of FEMA mitigation project. Most of the guidance below is applicable to mitigation projects for all types of hazards and for all types of mitigation projects. However, some categories of benefits may be applicable only to certain types of mitigation projects and/or only for some types of hazards. For example, counting the benefits of avoided casualties is almost always very important for seismic hazard mitigation projects, but generally not applicable to most other types of projects.

3.1 Single Residential Buildings

This section describes benefits to be counted for mitigation projects for single residential buildings, small groups of residential buildings, or a group of residential buildings at scattered locations. The benefits to be counted for mitigation projects for an entire neighborhood of residential buildings, which are somewhat different than for single buildings, are addressed in Section 3.2.

The categories of benefits to be counted for mitigation projects for single residential buildings are summarized below in Table 3.1.

For mitigation projects for residential buildings, the suggested benefit-cost analysis strategy is to first count the largest and most easily counted benefits. For this type of project, these benefits include building damages, contents damages, and displacement costs. For seismic projects, casualties should also be counted. If the project is cost-effective, it may not be necessary to count other benefits. If the project is not cost-effective, the categories of other physical damages and disruption costs are generally the most significant additional benefits to count. The other benefit categories generally contribute only minor benefits or aren't applicable.

**Table 3.1
Categories of Benefits to be Counted
Single Residential Buildings¹**

Type of Benefits to Consider	When to Count
1. Physical Damages	
Building damages	Always counted
Contents damages	Always counted
Other physical damages ² - Landscaping - Outbuildings - vehicles, equipment - site contamination	Applicable to acquisition or flood control infrastructure projects only ³ . Consider counting if significant, especially for projects that are close to being cost-effective without counting these categories.
2. Loss-of-Function Impacts	
Displacement costs	Always counted
Rental income losses	Can count if appropriate, but easier to include in displacement costs ⁴
Business income losses	For home business, consider counting, but generally constitutes only a very small fraction of benefits
Disruption time costs ⁵	Consider counting, especially for projects that are close to being cost-effective, can add significantly to benefits
3. Casualties	Always counted for seismic projects, rarely applicable to other projects ⁶
4. Emergency Management Costs	Not applicable to single residential structures ⁷

Notes:

¹ Guidance in table applies to single residential structures, small groups of residential structures, and groups of structures at scattered locations.

² Other physical damages can be counted by adding appropriate damage percentages to the damage function for building or contents. These damages may be significant and thus counting them may add significantly to the total benefits. This type of mitigation project does not reduce damages to off-site utilities or transportation systems and no benefits should be counted for such other physical damages.

³ Other physical damages are applicable only to acquisition projects or flood control

infrastructure projects because mitigation projects to elevate or retrofit the primary structure have no impact on these other categories of damages - thus, there are no additional benefits.

⁴ Rental income losses are not necessary to count if the full costs of temporary quarters are included in displacement costs for both owners and renters. Double-counting must be avoided.

⁵ Disruption costs may be significant and thus counting them may add significantly to the total benefits.

⁶ Casualties may be important for seismic hazard mitigation projects. Counting the benefits of avoided casualties may be a substantial fraction of total benefits and thus they should always be counted. For most other mitigation projects, benefits of casualties avoided are non-existent or negligible and thus should be counted only in special circumstances.

⁷ Acquisition, elevation or retrofit of single residential structures, small groups of structures, or groups at scattered locations does not significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by disaster is not decreased or not decreased significantly.

Counting Other Physical Damage. This simplified example is for floods, but the same principles apply for other hazards as well. Consider a one-story home without basement, with a replacement value of \$100,000. Building damage estimates, before and after mitigation, are calculated as percentages of building replacement value. If other physical damages are to be added to building damages, these damages must also be expressed as percentages of building replacement value (not as percentages of their replacement value). For example, if landscaping damages at -2 feet flood depth are estimated as \$500, then this damage is entered as 0.5% of the building replacement value (refer to Table 3.2).

Table 3.2
Example Showing How to Count Other Physical Damages

Flood Depth (feet)	Building Damage %	Landscaping and Outbuilding Damage %	Vehicle and Equipment Damage %	Adjusted Total Damage %
-2	0.0%	0.5%	0.0%	0.5%
-1	0.0%	1.0%	1.0%	2.0%
0	9.0%	1.5%	2.0%	12.5%
1	14.0%	2.0%	3.0%	19.0%
2	22.0%	2.5%	4.0%	28.5%
3	27.0%	3.0%	5.0%	35.0%

In this example, the building damage percentages are the typical or default values for a one-story structure without basement. Dollar damage estimates were made, using common sense and professional judgment, for the two other categories of physical damages. The dollar estimates were then converted to percentages of building replacement value. The sum of these damage percentages then represents the total damage estimates for the building, for landscaping and outbuildings, vehicles and equipment.

In making estimates of expected dollar damages for landscaping, outbuildings, vehicles, and equipment, historical damage data can be used, along with common sense. Structures with different types of landscaping may have different levels of damage. Not all homes have outbuildings and not all vehicles and equipment will be damaged in floods, because many owners will move such items to higher ground before floods. Whenever adjustments are made as shown above in the simplified example, full documentation of data sources and assumptions are essential.

If adjustments for other physical damages are made, it is very important to make appropriate, consistent adjustments in damage estimates both before and after mitigation. For example, damages to landscaping, outbuildings, vehicles and equipment are eliminated by acquisition. However, elevation or retrofit of the primary structure does not reduce these other types of damages. Thus, estimating these types of damages makes sense only for acquisition projects.

Counting Reduced Disruption Costs. To count the benefits of disruption, disruption time estimates must be made for each damage level (e.g., flood depth or wind speed bin). Then the dollar value of disruption time is calculated by multiplying the number of adults per house by the national average value of wages and benefits (\$21.16) to get a dollar value of disruption time. This

dollar value for disruption time can be converted to a percentage of building replacement value and added to the building damage percentage in the same manner as discussed above for other physical damages. This approach is mathematically correct, and reasonably straightforward, albeit perhaps confusing to the novice. As always, whenever such adjustments are made, full documentation of data sources and assumptions is essential.

3.2 Groups of Residential Buildings

Counting benefits for groups of residential buildings is very similar to counting benefits for single residential buildings. All of the categories of benefits discussed above in Section 3.1 for single residential buildings apply to groups of residential buildings. For groups of buildings, these benefits can be calculated for each building and then summed.

In some cases, groups of very similar buildings can be combined for purposes of benefit-cost analysis. However, this type of aggregation has to be done carefully. Groups of buildings can be combined if and only if they are the same structure type and have very similar frequencies and severities of disaster events. For flood mitigation projects this means that the structures must have very closely similar first floor elevations, and be close enough geographically so that they have very closely similar flood hazard data. For hurricane, wind, or earthquake projects, this means that the structures must be geographically close.

In addition to the benefits countable for single residential structures, mitigation projects for groups of residential may have two additional categories of benefits in some cases: avoided infrastructure damages and avoided emergency management costs. These additional benefits are generally only applicable to certain types of flood hazard mitigation projects.

If a mitigation project, such as improvements in flood control infrastructure, affects an entire town or an entire neighborhood, the damages to infrastructure will generally be reduced along with damages to the structures themselves. For example, there will be reduced damages to roads and utilities as well as to buildings. Similarly, if an acquisition project removes all of the homes from a neighborhood, then much of the infrastructure supporting the homes can be “retired” and is no longer subject to damage.

Likewise, if improvements in flood control infrastructure or acquisition of all homes in a neighborhood significantly reduces the level of flood risk for a community, then there is expected to be a proportional reduction in future emergency management costs.

All of the categories of benefits discussed above in Section 3.1 for single residential structures also apply to groups of residential structures. The additional categories of benefits that may be applicable

for some flood hazard mitigation projects for groups of residential structures are summarized below in Table 3.3.

**Table 3.3
Additional Categories of Benefits to be Counted for
Groups of Residential Buildings^{1,2}**

Additional Types of Benefits to Consider	When to Count
1. Physical Damages	
Other physical damages: - infrastructure	Applicable only to some flood mitigation projects
2. Emergency Management Costs	
Emergency operations center costs Evacuation or rescue costs Security costs Temporary protective measure costs Debris removal and cleanup costs Other emergency management costs	Applicable only to some flood mitigation projects
<p>Notes:</p> <p>¹ These possible additional categories of benefits apply only when a mitigation project such as improvements in flood control infrastructure affects an entire town or entire neighborhood or when an acquisition project affects an entire neighborhood.</p> <p>² These possible additional categories of benefits generally apply only to flood hazard mitigation projects. Mitigation projects for hurricanes and earthquakes generally affect only individual structures and do not reduce a community’s infrastructure damages or emergency management costs.</p>	

3.3 Commercial Buildings

Most of the benefit categories counted for commercial buildings are the same as for residential buildings discussed above. One exception is that disruption costs, which may be counted for residential buildings, are not applicable to commercial buildings. The equivalent of disruption time

for commercial businesses is already implicitly included in estimates of functional downtime and lost business income. To count disruption time for commercial structures would be double-counting.

For mitigation projects for commercial buildings, the suggested benefit-cost analysis strategy is to count first the largest and most easily counted benefits. For this type of project, these benefits include building damages, contents damages, and displacement costs. In addition, for seismic projects, casualties should always be counted. If the project is cost-effective, it may not be necessary to count additional benefits. If not, the categories of other physical damages, business income losses and wage losses are generally the most significant additional benefits to count. The other categories are likely to contribute only minor benefits or to not be applicable.

The categories of benefits to be counted for mitigation projects for single commercial buildings (or small groups of commercial buildings or a group of commercial buildings at scattered locations) are summarized below in Table 3.4.

**Table 3.4
Categories of Benefits to be Counted for Commercial Buildings¹**

Type of Benefits to Consider	When to Count
1. Physical Damages	
Building damages	Always counted
Contents damages	Always counted
Other physical damages ² <ul style="list-style-type: none"> - landscaping - outbuildings - vehicles, equipment - site contamination 	Applicable to acquisition or flood control infrastructure projects only ³ . Consider counting if significant, especially for projects that are close to being cost-effective without counting these categories
2. Loss-of-Function Impacts	
Displacement costs	Always counted
Rental income losses	Can count if appropriate, but easier to include in displacement costs ⁴
Business income losses ⁵	Consider counting, but generally constitutes only a small fraction of benefits
Wage income losses ⁵	Consider counting, especially for projects that are close to being cost-effective, can add significantly to benefits

Type of Benefits to Consider	When to Count
3. Casualties	Always counted for seismic projects, rarely applicable to other projects ⁶
4. Emergency Management Costs	Not applicable to single commercial structures ⁷
<p>Notes:</p> <p>¹ Guidance in table applies to single commercial structures, small groups of commercial structures, and groups of structures at scattered locations.</p> <p>² Other physical damages can be counted by adding appropriate damage percentages to the damage function for building or contents. These damages may be significant and thus counting them may add significantly to the total benefits. This type of mitigation project does <u>not</u> reduce damages to off-site utilities or transportation systems and no benefits should be counted for such other physical damages.</p> <p>³ Other physical damages are applicable <u>only</u> to acquisition or flood control infrastructure projects because mitigation projects to elevate or retrofit the primary structure have no impact on these other categories of damages - thus, there are no additional benefits.</p> <p>⁴ Rental income losses are not necessary to count if the full costs of temporary quarters are included in displacement costs for both owners and renters. Double-counting must be avoided.</p> <p>⁵ Business income losses and especially wage losses may be significant for commercial structures and thus counting them may add significantly to the total benefits.</p> <p>⁶ Casualties may be important for seismic hazard mitigation projects. Counting the benefits of avoided casualties may be a substantial fraction of total benefits and thus they should always be counted. For most other mitigation projects, benefits of casualties avoided are non-existent or negligible and thus should be counted only in special circumstances.</p> <p>⁷ Acquisition, elevation or retrofit of single commercial structures, small groups of structures, or groups at scattered locations does <u>not</u> significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by disaster is not decreased or not decreased significantly.</p>	

For commercial businesses, the appropriate measure of business income losses is net business income not gross business income because loss of function of a commercial building (i.e., functional downtime) generally reduces costs as well as receipts.

Loss of wage income generally applies only to hourly employees, since most salaried employees are likely to continue to be paid during relatively short post-disaster business interruptions. Estimates of lost wages should include wages and benefits. If local data are not available, the national average value of \$21.16 for hourly wages and benefits may be used for benefit-cost analysis.

Only in rare circumstances are FEMA hazard mitigation projects likely to include an entire neighborhood of commercial structures. If, however, a flood infrastructure improvement project or flood acquisition project does affect an entire neighborhood of commercial structures (or a mix of

residential and commercial structures), then the additional benefits discussed above for groups of residential structures also apply to groups of commercial structures. These possible additional benefits, which include avoided infrastructure damages and avoided emergency management costs, are subject to the same caveats and the same calculation methods as for residential structures.

3.4 Public Buildings

Most of the categories of benefits to be counted for public buildings are the same as for commercial buildings discussed above. Two exceptions are that business income losses and wage income losses are generally not applicable to public buildings. For public buildings, the measure of the economic impact of loss of function of a building is the loss of public services.

For ordinary public buildings that do not provide critical services for disaster response and recovery, the measure of the value of loss of service is the cost of providing the public service. To value public services, FEMA makes the very simple and direct assumption that public services are worth what it costs to provide the services to the public. For example, if a public service costs \$1,000 per day to provide, then the value is assumed to be \$1,000 per day. If the service is lost because of damage to the building, the loss is assumed to be \$1,000 per day. If the loss of service is avoided because of a hazard mitigation project, then the benefit is assumed to be \$1,000 per day. This method for valuing the loss of public services applies to all public services.

The daily cost of services is estimated from the annual operating budget for the agencies occupying a building. The annual operating budget includes all of the direct costs necessary to provide the public services, including salaries and benefits, materials, supplies, utilities, equipment costs, and rent or the annual cost of owning the building. The only exclusion is for transfer payments. For example, if a public office distributes pension checks, the value of the service is not the value of the checks distributed, but rather the cost of providing the service.

The equivalent of wage income losses is already explicitly included in estimates of functional downtime and loss of public services, because wages and benefits are a large portion of the costs of providing public services. Thus, to count wage income losses separately for public structures would be double counting.

For ordinary public buildings, a continuity premium is not added to the normal cost of service. A continuity premium is added only for services such as police, fire and medical, that is critical to emergency response and recovery. However, if some fraction of the staff of an ordinary public building does provide emergency services, an appropriate continuity premium could be added to that proportionate fraction of the cost of services.

For mitigation projects for public buildings, the suggested benefit-cost analysis strategy is to count first the most easily identifiable and quantifiable benefits. For this type of project, these benefits include building damages, contents damages, displacement costs, and loss of public services. In addition, casualties should always be counted for seismic projects. If the project is cost-effective, it may not be necessary to count additional benefits. If the project is not cost-effective, the category of other physical damages may add the most significant additional benefits to count. The other benefit categories generally contribute only minor benefits or aren't applicable.

The categories of benefits to be counted for mitigation projects for public buildings are summarized below in Table 3.5.

**Table 3.5
Categories of Benefits to be Counted for Public Buildings**

Types of Benefits to Consider	When to Count
1. Physical Damages	
Building damages	Always counted
Contents damages	Always counted
Other physical damages ¹ <ul style="list-style-type: none"> - landscaping - outbuildings - vehicles, equipment - site contamination 	Applicable to acquisition or flood control infrastructure projects only ² . Consider counting if significant, especially for projects that are close to being cost-effective without counting these categories
2. Loss-of-Function Impacts	
Displacement costs	Always counted
Loss of public services	Always counted No continuity premium for ordinary services
3. Casualties	Always counted for seismic projects, rarely applicable to other projects ³
4. Emergency Management Costs	Not applicable to single public structures ⁴

Notes:

¹ Other physical damages can be counted by adding appropriate damage percentages to the damage function for building or contents. These damages may be significant and thus counting them may add significantly to the total benefits. This type of mitigation project does not reduce damages to off-site utilities or transportation systems and no benefits should be counted for such other physical damages.

² Other physical damages are applicable only to acquisition or flood control infrastructure projects because mitigation projects to elevate or retrofit the primary structure have no impact on these other categories of damages - thus, there are no additional benefits.

³ Casualties may be important for seismic hazard mitigation projects. Counting the benefits of avoided casualties may be a substantial fraction of total benefits and thus they should always be counted. For most other mitigation projects, benefits of casualties avoided are non-existent or negligible and thus should be counted only in special circumstances.

⁴ Acquisition, elevation or retrofit of single public structures, does not significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by disaster is not decreased or not decreased significantly.

3.5 Summary

Benefit-cost analysis of ordinary residential, commercial, or public buildings is straightforward. Many of the same benefits are counted, regardless of the function of the building. For ordinary buildings, the following benefits are always counted and are usually the largest categories of benefits: 1) building damages, 2) contents damages, and 3) displacement costs. In addition, for public buildings, the value of lost public services should always be counted. For seismic hazard mitigation projects, the benefits of avoided casualties are often very important, sometimes the largest single category of benefits, and should always be counted. The most important benefits to count are summarized in Table 3.6 below.

Table 3.6
The Most Important Benefits for Hazard Mitigation Projects for Ordinary Buildings

Types of Benefits to Consider	When to Count
▪ Building damages	Always counted
▪ Contents damages	Always counted
▪ Displacement costs	Always counted
▪ Loss of public services	Always counted for public buildings
▪ Casualties	Always counted for seismic projects

In addition, there are several other categories of benefits that apply in more limited cases or are generally significantly smaller than those identified in Table 3.6. Possible additional benefits to count are summarized below in Table 3.7.

Table 3.7
Possible Additional Benefits to Count
(if project is not cost-effective after counting benefits in Table 3.6)

Types of Benefits to Consider	When to Count
▪ Other physical damages	Applicable for all building types, but only for acquisition or flood control infrastructure mitigation projects; may add significantly to total benefits.
▪ Rental income losses	Applicable to all building types, but not necessary to count; instead, it is easier to include in displacement costs.
▪ Business income losses	Applicable to commercial buildings and to home businesses; this category of benefits is generally small.
▪ Wage income losses	Applicable only to commercial buildings; may add significantly to total benefits.
▪ Disruption costs	Applicable to residential buildings; may add significantly to total benefits.

Types of Benefits to Consider	When to Count
<ul style="list-style-type: none">▪ Emergency management costs	Applicable only to flood control infrastructure projects or acquisition projects that protect entire neighborhoods; this category of benefits is generally small.

SECTIONFOUR

Critical Facilities: Police, Fire and Medical Buildings

This section provides guidance and examples of how to count benefits for mitigation projects for buildings providing police, fire, and medical services. Such buildings are considered critical facilities because the services they provide are critical to disaster response and recovery.

Benefit-cost analysis for critical facilities is generally similar to that for ordinary public buildings. The same categories of benefits are typically counted, as summarized below in Table 4.1

Table 4.1
Categories of Benefits to be Counted for
Critical Facilities: Police, Fire and Medical Buildings

Types of Benefits to Consider	When to Count
1. Physical Damages	
<ul style="list-style-type: none"> ▪ Building damages 	<ul style="list-style-type: none"> ▪ Always counted ▪ Building replacement values may differ from those for ordinary buildings ▪ Specialized damage functions may be needed
<ul style="list-style-type: none"> ▪ Contents damages 	<ul style="list-style-type: none"> ▪ Always counted ▪ Contents replacement values may differ from those for ordinary buildings ▪ Specialized damage functions may be needed
<ul style="list-style-type: none"> ▪ Other physical damages¹ <ul style="list-style-type: none"> - landscaping - outbuildings - vehicles, equipment - site contamination 	<p>Applicable to acquisition or flood control infrastructure projects only². Consider counting if significant, especially for projects that are close to being cost-effective without counting these categories</p>
2. Loss-of-Function Impacts	
<ul style="list-style-type: none"> ▪ Displacement costs 	<ul style="list-style-type: none"> ▪ Generally counted ▪ May not be applicable for some facilities
<ul style="list-style-type: none"> ▪ Loss of public services 	<ul style="list-style-type: none"> ▪ Always counted ▪ A continuity premium must be added to the normal cost of providing service ▪ In many cases, the continuity premium has a large impact on the benefit-cost analysis
3. Casualties	<p>Always counted for seismic projects, rarely applicable to other projects³</p>
4. Emergency Management Costs	<p>Not applicable to single public structures⁴</p>

Notes:

¹ Other physical damages can be counted by adding appropriate damage percentages to the damage function for building or contents. These damages may be significant and thus counting them may add significantly to the total benefits. This type of mitigation project does not reduce damages to off-site utilities or transportation systems and no benefits should be counted for such other physical damages.

² Other physical damages are applicable only to acquisition or flood control infrastructure projects because mitigation projects to elevate or retrofit the primary structure have no impact on these other categories of damages - thus, there are no additional benefits.

³ Casualties may be important for seismic hazard mitigation projects. Counting the benefits of avoided casualties may be a substantial fraction of total benefits and thus they should always be counted. For most other mitigation projects, benefits of casualties avoided are non-existent or negligible and thus should be counted only in special circumstances.

⁴ Acquisition, elevation or retrofit of single public structures, does not significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by disaster is not decreased or not decreased significantly.

There are, however, important differences in benefit-cost analysis of mitigation projects for critical facilities as compared to analysis for ordinary buildings.

4.1 Physical Damage Estimates for Police, Fire and Medical Buildings

Physical damage patterns for these types of buildings are generally similar to those for ordinary buildings. However, in some cases critical facilities are designed to higher codes and standards than ordinary buildings and thus may be somewhat less vulnerable to damages. Building replacement values may also differ because of the specialized nature of these buildings. For example, building replacement values for hospitals can be as high as \$300 per square foot. On the other hand, building replacement values for fire stations can be quite low, because of the simple nature of most fire stations, with much of the space being garage space for fire apparatus. Building replacement values for police, fire, or medical facilities are generally available from the agencies providing such services, from local building officials, or from local building engineers.

Contents damage patterns for these types of buildings are generally similar to those for ordinary buildings. In some cases, professional judgment is necessary to adjust typical or default contents damage functions to reflect the specialized communications or medical equipment in these types of facilities. For hospitals and other medical facilities, the contents replacement value may be very high, in some cases similar to or exceeding the building replacement value. Appropriate contents

replacement values for police, fire, or medical facilities are generally available from the agencies providing such services, from local building officials, or from local building engineers.

For acquisition or flood control infrastructure mitigation projects, one of the benefits may be reductions in other physical damages. As for ordinary buildings discussed in Section 3, other physical damages for critical service buildings include damages to landscaping, outbuildings, vehicles, and equipment and possible site contamination. Such damages can be estimated, but are generally small compared to the other categories of benefits for critical service facilities. Thus, such benefits can generally be ignored except for projects that are very close to being cost-effective without counting this category. For mitigation projects other than acquisition or flood control infrastructure, there are no benefits in this category because elevation, retrofit or strengthening of a building itself does not reduce this category of damages.

4.2 Displacement Costs

When facilities housing police and fire services are damaged to an extent such that the buildings cannot be occupied during repairs, the services are moved to temporary quarters. The displacement costs for such temporary quarters are part of the damages and losses attributed to a disaster and these displacement costs become part of the benefits to the extent that they are avoided or reduced by a mitigation project.

Displacement costs for police and fire facilities are counted in the same manner as for ordinary buildings. Displacement costs include:

- Monthly costs of rent for temporary space

- Other monthly costs such as furniture rental

- One-time costs such as round-trip moving costs, utility connection fees and other such costs

For police and fire facilities, the one-time costs may be higher than for ordinary buildings because of the critical communications equipment that would have to be moved and reinstalled. Other monthly costs could also include extra transportation time and costs if the temporary facility is not as well located as the permanent facility.

For police facilities that include jails, the concept of displacement costs is somewhat more complicated. For security reasons, inmates probably cannot be housed in ordinary temporary quarters. Rather, displacement of jail inmates probably requires moving inmates to another correctional facility. In such cases, displacement costs would include the transportation or moving costs, any extra daily transportation time and costs, plus the monthly cost of housing inmates in the alternative facility.

For hospitals, the concept of displacement to temporary quarters is also somewhat more complicated. Some hospital facilities such as office space, storage space, residential quarter for staff and other ordinary functions can be relocated to temporary quarters. For such space, displacement costs are calculated as summarized above for police and fire services.

Some hospital services, including most patient care facilities cannot readily be located to temporary quarters. For such services, displacement probably requires moving patients and services to another medical facility. In this case, displacement costs would include the transportation or moving costs, any extra daily transportation time and costs, plus the extra monthly cost of housing patients in the alternative facility.

The typical values for displacement time assume that building damages of less than 10% of the building replacement value can be repaired without requiring displacement of occupants. For damages above 10%, a minimum displacement of 30 days is assumed, with the displacement time increasing linearly with damage percentage up to a cap of 365 days (one year) for displacement time. That is, regardless of the level of damages, it is assumed that public services will be back in the original (repaired) building or in a new permanent building within one year of the disaster. Professional judgment, experience, and many years of use confirm that these estimates appear reasonable in most cases, especially for small- to medium-sized facilities.

For major, complex or specialized facilities that suffer major damage or that require replacement with new facilities, or for large, monumental historical buildings, longer displacement times of up to two or three years are sometimes experienced. While such long displacement times are uncommon, they do occur and in such cases it is important to make realistic estimates of displacement time. Displacement time estimates for major complex projects can be based on construction duration estimates, construction bids, or on the professional judgment of the design and construction details of the repairs or of the replacement facility. Longer displacement time estimates are appropriate if and only if there is sound documentation of longer repair or replacement times for a specific facility under evaluation.

4.3 Loss of Public Services

For critical facilities, the first step in evaluating the benefits of reducing the loss of public service is exactly the same as that for ordinary buildings, as discussed in Section 3.4. The base value of public services, including police, fire and medical services, is estimated from the annual operating budget of the facility providing the service. The annual operating budget includes all of the direct costs necessary to provide the public services, including salaries and benefits, materials, supplies, utilities, equipment costs, and rent or the annual cost of owning the building. The only exclusion is for

transfer payments. For example, if a public office distributes pension checks, the value of the service is not the value of the checks distributed, but rather the cost of providing the service.

The equivalent of wage income losses is already explicitly included in estimates of functional downtime and loss of public services, because wages and benefits are a large portion of the costs of providing public services. Thus, to count wage income losses separately for public structures would be double-counting.

4.3.1 Continuity Premiums for Police, Fire and Medical Services

A continuity premium is a measure of the extra importance that some public services have during disasters. In simple terms, a continuity premium is a measure of how much extra a community would be willing to pay to continue to have critical services during a disaster.

In benefit-cost analysis, the effect of a continuity premium is to count more highly those services that are essential for disaster response and recovery, compared to ordinary services that are not more important to a community during disasters. A high continuity premium increases the benefits of a mitigation project by increasing the benefits of avoiding loss of public services.

In assigning continuity premiums for police, fire and hospital services, the following question must be answered:

In a disaster, how much more important are police, fire and hospital services compared to their value to the community in non-disaster circumstances?

Answering the above question and thereby determining an appropriate continuity premium for these services profoundly affects the determination of which hazard mitigation projects are or are not cost-effective.

For police and fire services, the maximum possible continuity premium is limited by the capacity of police and fire departments to respond to emergency calls. For example, police and fire departments cannot respond to 1,000 times more calls than normal during a disaster because of limited staff and apparatus. A more detailed analysis of continuity premiums for police and fire services is given in Chapter 1 of the Supporting Documentation (Technical Appendix: Guidance for Benefit-Cost Analysis of Mitigation Projects for Police, Fire, and Medical Service Facilities). In general, a continuity premium of ten times the normal cost of service is appropriate for police and fire services.

For medical services, similar concepts apply as discussed above for police and fire services, although appropriate continuity premiums for medical services vary with the disaster type as follows:

For earthquakes, the potential for mass casualties means that an appropriate continuity premium will be governed by the capacity to provide emergency medical services. A continuity premium of 10 times the normal cost of service is suggested for medical facilities providing direct patient care.

For floods, there is very little likelihood of significantly more than normal demand for emergency medical services and therefore no continuity premium should be applied.

For hurricanes, the typical number of casualties is low because of the widespread evacuations that are commonly ordered in advance of a hurricane. Thus, there is very little likelihood of significantly more than normal demand for emergency medical services and no continuity premium should be applied.

For tornadoes and fires, some casualties are likely. However, such events typically impact only very small segments of a hospital service area and thus, there is very little likelihood of significantly more than normal demand for emergency medical services and no continuity premium should be applied.

Thus, for hospitals and other patient care medical facilities, a continuity premium is suggested only for seismic hazard mitigation projects. For seismic hazard mitigation projects for hospitals, a continuity premium of 10 is suggested only for facilities providing direct patient care. For a hospital complex as a whole, many facilities are support facilities not directly related to immediate patient care; therefore for hospital complexes as a whole, a continuity premium of 5 is suggested. For non-patient care buildings within a hospital complex, continuity premiums from none to perhaps 5 are suggested, depending on the strength of the linkage between the building's services and patient care. A more detailed analysis of continuity premiums for hospitals and other medical care services is given in Chapter 1 of the Supporting Documentation (Technical Appendix: Guidance for Benefit-Cost Analysis of Mitigation Projects for Police, Fire, and Medical Service Facilities).

Suggested continuity premiums for police, fire and medical services are summarized below in Table 4.2.

Table 4.2
Continuity Premiums
Police, Fire, and Medical Services

Type of Facility	Continuity Premium
Police Services	10
Fire Services	10
Medical Services	<ul style="list-style-type: none"> ▪ 0 for non-seismic mitigation projects ▪ 10 for seismic mitigation projects for patient care facilities ▪ 5 for seismic mitigation projects for whole hospital complex ▪ 0 to 5 for seismic mitigation projects for non-patient care buildings, depending on linkage between services provided and patient care

4.3.2 Functional Downtime Estimates for Police, Fire and Medical Services

Functional downtime is the number of days that a public service is not available because of disaster damage. Functional downtime days may be fractional. For example, one day of functional downtime may be one day with 100% loss of service or two days with 50% loss of service or 10 days with 10% loss of service.

Functional downtime is not the same as displacement time. For example, a building providing a public service is damaged in a flood and occupants are displaced to temporary quarters for 3 months while repairs are made. The public service, however, is restored in two weeks from the temporary quarters. In this simple example, the functional downtime is two weeks, while the displacement time is three months.

Estimates of functional downtime are substantially different for critical services than for ordinary services. For example, if a library suffers damage in a flood or an earthquake, the library may close for several weeks or several months. Loss of library service may be tolerable to a community for an extended period of time. However, if a police or fire station suffers a similar level of damage, the police or fire services cannot be closed down for an extended period of time because these services are simply too important to the community. Thus, in the case of damage to a police or fire station, the essential police or fire services are generally reestablished quickly in temporary quarters. Essential services will be reestablished much more quickly than would less important services.

A general rule of thumb is that the more important a public service is to a community, the shorter the functional downtime will be.

SECTIONFOUR

Critical Facilities: Police, Fire and Medical Buildings

Police and fire services are in large part provided away from the facility housing the staff and apparatus. This aspect of such services is very important because it means that, to a considerable degree, service can be continued even when the facility housing the service has considerable damage. In an emergency, many operations can be run from a parking lot with manual dispatch or cell phone dispatch in the event that a station is heavily damaged in a disaster.

For the reasons cited above, loss of police and fire services is almost always partial. It would be very rare for a police or fire department to provide no service for any significant period of time. Rather, damage to facilities or disruption of communication links commonly result in delays or disruption of normal service. For any given disaster event, days of loss of service are not likely to be complete days with 100% loss of service. More likely there might be, for example, one day with 50% service, several days with 80% service and several days with 90% service. When historical data on service disruption are available, the functional downtime can be calculated by summing up the fractional days of lost service over the service restoration time period after the disaster.

The concepts discussed above and the analysis of functional downtime for police and fire services suggests that functional downtimes for these services are expected to be significantly shorter than for ordinary (non-critical) public services. A common sense rule of thumb, based on professional judgment and experience, is that functional downtimes might average a factor of three less than for ordinary public services.

Functional downtime estimates for hospitals are, in some regards, similar to those for police and fire services. Because hospital services, like police and fire services, are obviously important to a community in a disaster situation, functional downtimes are likely to be shorter for hospitals than for ordinary facilities. That is, repair and restoration of damaged hospital facilities almost always has a very high priority.

However, the shorter functional downtimes expected for hospitals because of their importance to the community is counterbalanced by the fact that many critical hospital services require special, sterile medical conditions and complex modern medical equipment. Thus, while police and fire staff and apparatus can be dispatched from a parking lot, if necessary, few major medical, surgical, or diagnostic procedures requiring specialized equipment and/or sterile conditions can be performed in a parking lot.

Similarly, a few inches of water or even a foot or two of water in a police or fire station will disrupt service, but will not result in complete loss of service. However, a few inches of water in an operating room, a diagnostic room with specialized medical equipment, or a patient care room, would almost certainly result in complete loss of service.

Combining the importance of hospital services to a community and the medical requirements for sterile conditions and other operating constraints for medical facilities suggests that functional downtimes for hospitals are likely to be shorter than those for ordinary buildings but longer than

those for police and fire services. A common sense rule of thumb, based on professional judgment and experience, is that functional downtimes for hospitals might average a factor of two less than for ordinary public services.

4.4 Casualties

In some disaster events, occupants of facilities housing police and fire services and hospitals and other medical facilities are at risk of injury or death. Casualty estimates for such facilities are made in exactly the same manner as for ordinary buildings. Casualties are estimated from the average occupancy (24 hours per day, 365 days per year) of a facility and the estimated casualty rate as a function of severity of disaster.

For these critical facilities, casualty estimates are most important for earthquakes. Major earthquakes may pose a significant life safety risk for occupants of buildings with seismic vulnerabilities. For seismic hazard mitigation projects, the benefits of reduced or avoided casualties may be a major component of total benefits for any of these critical facilities, which usually have 24-hour occupancy. However, the benefits of avoided casualties are particularly important for hospitals because of their typically very high occupancy levels (patients, staff, and visitors). In some cases, especially for hospitals, the benefits of reduced casualties may be the largest single benefit of a mitigation project. For seismic mitigation projects, the benefits of reduced casualties are important and these benefits should always be counted.

For floods and hurricanes, casualties are generally low and many casualties that do occur are a result of individuals ignoring evacuation warnings (in the case of hurricanes) or ignoring road or bridge closures (in the case of floods). For most flood and hurricane hazard mitigation projects the benefits of reduced casualties are generally not significant and are not considered in the benefit-cost analysis. However, critical facilities such as those for police and fire services and hospitals are probably less likely to be evacuated in hurricanes than are ordinary facilities. Especially for mitigation projects that are designed to harden such facilities to withstand hurricane winds or tornadoes, the benefits of reduced casualties may be significant and should be considered in the analysis. In these circumstances, casualty rate estimates should always be made in close consultation with an engineer knowledgeable about the wind design characteristics of the existing building and the capacity of the post-mitigation building.

For benefit-cost analyses where reductions in casualties are included, the benefits of casualties avoided are often a large component of total benefits and thus estimates of casualty rates before and after mitigation become a very important determinant of the overall benefit-cost analysis and results. Making realistic estimates of casualty rates is difficult and requires a substantial understanding of the failure modes of buildings and the likely casualty rates that would result. Estimates of casualty rates

should always be made by an engineer or analyst very knowledgeable about such issues, with a considerable amount of experience.

For seismic mitigation projects, the casualty rate estimates in the FEMA-sponsored HAZUS program (HAZUS, Earthquake Loss Estimation Methodology, National Institute of Building Science and Federal Emergency Management Agency, 1997) provide the best available consensus estimates of casualty rates for different structural types of buildings designed to varying seismic design levels. However, using these estimates is possible if and only if a building's seismic vulnerability is expressed as a fragility curve. A fragility curve is a mathematical representation that states the probability that a building will sustain a given level of damage as a function of the level of ground motion. Fragility curve-based estimates of casualty rates are the best available, but the necessary calculations are mathematically complicated and should not be attempted by analysts not thoroughly familiar with this mathematics.

Damage to critical facilities may also result in a loss of function that may pose a life safety threat to the community served by the facility. This potential casualty risk is separate from casualty risk faced by the occupants of the building. Police, fire and medical services are directly related to life safety in the community as a whole. The high operating budgets of such facilities reflect, in large part, the life safety aspects of these services. However, the life safety impacts of losing service from such facilities are already included in the value of public services calculation discussed above in Section 4.3. The high normal daily cost of service and the high continuity premiums for these critical services include the importance of these facilities in preserving life safety in the community. Thus, separate casualty estimates for the community as a whole should not be done for benefit-cost analysis and to do so would be to incorrectly double-count life safety benefits.

4.5 Summary Guidance

The major categories of benefits to be counted for mitigation projects for public buildings providing police, fire, and medical services are summarized below in Table 4.3.

**Table 4.3
Summary Guidance
Benefit-Cost Analysis of Mitigation Projects for Police, Fire, and Medical Facilities**

Damages/Benefits Categories	Data Sources and Guidance
1. Physical Damages	
<ul style="list-style-type: none"> ▪ Building replacement value and contents value 	Values from local officials.
<ul style="list-style-type: none"> ▪ Building and contents damage functions 	Historical data and professional judgment, as necessary.
<ul style="list-style-type: none"> ▪ Other physical damages 	For acquisition and flood control infrastructure projects only, generally of minor importance, estimates based on historical data and professional judgment.
2a. Economic Impact of Loss of Function (i.e., Displacement Costs)	
<ul style="list-style-type: none"> ▪ Displacement time 	Historical data and professional judgment, as necessary.
<ul style="list-style-type: none"> ▪ Displacement costs 	Estimates of monthly rent, other costs, and one-time costs from local officials. Costs may differ for critical service facilities.
2b. Economic Impact of Loss of Function (i.e., Loss of Public Services)	
<ul style="list-style-type: none"> ▪ Normal cost of service 	Annual operating budgets from local officials
<ul style="list-style-type: none"> ▪ Functional downtime 	<ul style="list-style-type: none"> ▪ Police services: 1/3 of typical values ▪ Fire services: 1/3 of typical values ▪ Medical services: 1/2 of typical values
<ul style="list-style-type: none"> ▪ Continuity Premiums - police and fire services 	10x cost of normal service
<ul style="list-style-type: none"> ▪ Continuity Premiums - medical services, seismic projects 	<ul style="list-style-type: none"> ▪ Patient care facilities: 10x cost of normal services ▪ Whole medical complex: 5x cost of normal services ▪ Non-patient care bldgs: 0 to 5x cost of normal services
<ul style="list-style-type: none"> ▪ Continuity Premiums - medical services, other projects 	None, demand for services is typically not significantly greater than normal

Damages/Benefits Categories	Data Sources and Guidance
3. Casualties	
<ul style="list-style-type: none"> ▪ Average Facility occupancy 	Local officials or applicant
<ul style="list-style-type: none"> ▪ Casualty rates 	HAZUS casualty rates for earthquakes, professional judgement for other hazards
<ul style="list-style-type: none"> ▪ Statistical values of deaths, injuries, and illnesses 	FEMA values, updated to 2001 values, see Section 2.3 <ul style="list-style-type: none"> - deaths: \$2,710,000 - major injuries/illnesses: \$15,600 - minor injuries/illnesses: \$1,560

Mitigation projects for critical facilities are, by definition, important projects to communities. The guidance for benefit-cost analysis presented above makes it more likely that mitigation projects are cost-effective, compared to similar mitigation projects for ordinary facilities. Most importantly, the continuity premium places a greater value on avoiding loss of service, thus substantially increasing benefits. Furthermore, especially for hospitals, the greater building values, contents values, and high occupancy all result in higher benefits when mitigation projects will reduce damages and casualties. Benefit-cost analysis properly and fully recognizes and counts the importance of these critical facilities to a community.

However, regardless of how important these facilities may be to a community, not every mitigation project for a critical facility will be cost-effective. For example, consider a mitigation project for a seismic upgrade or replacement of a fire station built below the current building codes. If the building is located in a high seismic hazard area and is constructed of unreinforced masonry, subject to collapse during an earthquake with resulting casualties and substantial loss of the important services, then the benefits of retrofit or replacement will be very high. In many such cases, even a complete replacement of the building with a new building may be cost-effective. On the other hand, if the existing fire station has only minor seismic deficiencies, with little potential for casualties, and only limited potential for loss of service, then a very expensive seismic retrofit (e.g., \$100 or \$150 per square foot) to bring the entire building up to current code requirements will almost certainly not be cost-effective. In these circumstances a more modest seismic retrofit to address the specific deficiencies has a higher likelihood of being cost-effective.

Mitigation projects for critical facilities, which are reasonable in cost and address specific deficiencies in high hazard areas, have a high likelihood of being cost-effective. On the other hand, expensive mitigation projects that correct only minor deficiencies or located in areas with only minor exposure to hazards are unlikely to be cost-effective, even for critical facilities. It is important to understand that a benefit-cost analysis indicating that a mitigation project for a critical facility is not

SECTIONFOUR

Critical Facilities: Police, Fire and Medical Buildings

cost-effective does not mean that the benefit-cost analysis is flawed but may instead indicate that the mitigation project is poorly conceived and, indeed, not worth doing.

In many regards, benefit-cost analysis of mitigation projects for emergency operations centers (EOCs) and emergency shelters is similar to that for other critical facilities. For EOCs and emergency shelters, however, there are two very important differences: 1) such facilities often occupy only part of a building, and 2) such facilities are in function only immediately before, during or immediately after disaster events. Both of these differences affect benefit-cost analysis of mitigation projects for EOCs and emergency shelters.

Many mitigation projects for EOCs and emergency shelters address only the portion of a building used for the EOC or shelter. In this case, the benefit-cost analysis should consider only the portion of the building used for the EOC or shelter, because such a mitigation project has no effect on the remainder of the building. Estimates of building damages, contents damages, displacement costs, casualties, loss of public services and any other categories of benefits should consider only the portion of the building used as an EOC or shelter.

If a mitigation project affects the entire building housing an EOC or shelter and other non-critical public functions, then the easiest way to approach the benefit-cost analysis is to consider separately the parts of the building providing ordinary services and critical services and then add the benefits together. For benefit-cost analysis, the part of the building providing ordinary services is evaluated in exactly the same manner as “ordinary” public buildings, with guidance as outlined in Section 3.

For benefit-cost analysis, the portion of a building providing EOC or shelter services is treated conceptually as a separate building.

The guidance in this section focuses only on portions of a facility providing EOC or shelter services, or the whole building if the whole building provides EOC or shelter services.

Benefit-cost analysis for these buildings or parts of buildings providing EOC or emergency shelter services is generally similar to that for ordinary public buildings. The same categories of benefits are typically counted, as summarized below in Table 5.1

Table 5.1
Categories of Benefits to be Counted
Critical Facilities: EOCs and Emergency Shelters

Types of Benefits to Consider	When to Count
1. Physical Damages	
<ul style="list-style-type: none"> ▪ Building damages 	<ul style="list-style-type: none"> ▪ Always counted ▪ Building replacement values may differ from those for ordinary buildings ▪ Specialized damage functions may be needed
<ul style="list-style-type: none"> ▪ Contents damages 	<ul style="list-style-type: none"> ▪ Always counted ▪ Contents replacement values may differ from those for ordinary buildings ▪ Specialized damage functions may be needed
<ul style="list-style-type: none"> ▪ Other physical damages¹ <ul style="list-style-type: none"> - landscaping - outbuildings - vehicles, equipment - site contamination 	<ul style="list-style-type: none"> ▪ Applicable to acquisition or flood control infrastructure projects only² ▪ Consider counting if significant, especially for projects that are close to being cost-effective without counting these categories
2. Loss-of-Function Impacts	
<ul style="list-style-type: none"> ▪ Displacement costs 	<ul style="list-style-type: none"> ▪ May be applicable for some facilities, ▪ Displacement time estimates are different than for ordinary buildings: limited to normal duration of use during disasters
<ul style="list-style-type: none"> ▪ Loss of public services 	<ul style="list-style-type: none"> ▪ Always counted ▪ A continuity premium must be added to the normal cost of providing service ▪ In many cases, the continuity premium has a large impact on the benefit-cost analysis ▪ Functional downtime estimates are different than for ordinary buildings: limited to normal duration of use during disasters
3. Casualties	Always counted for seismic projects, may be applicable for hurricane and tornado projects as well ³
4. Emergency Management Costs	Not applicable to single public structures ⁴

Notes:

¹ Other physical damages can be counted by adding appropriate damage percentages to the damage function for building or contents. These damages may be significant and thus counting them may add significantly to the total benefits. This type of mitigation project does not reduce damages to off-site utilities or transportation systems and no benefits should be counted for such other physical damages.

² Other physical damages are applicable only to acquisition or flood control infrastructure projects because mitigation projects to elevate or retrofit the primary structure have no impact on these other categories of damages - thus, there are no additional benefits.

³ Casualties may be important for seismic hazard mitigation projects. Counting the benefits of avoided casualties may be a substantial fraction of total benefits and thus they should always be counted. Benefits of avoided casualties may also be important for hurricane and tornado mitigation projects because EOCs and emergency shelters are intended to be occupied during disaster events.

⁴ Acquisition, elevation or retrofit of single public structures, does not significantly reduce a community's emergency management costs because the area affected by a disaster is not decreased, and the total population affected by disaster is not decreased or not decreased significantly.

5.1 Physical Damage Estimates for EOC and Emergency Shelter Buildings

Physical damage estimates for EOCs and emergency shelters are generally similar to those for ordinary buildings. If the EOC or shelter is designed to higher than normal building code standards, then professional judgement must be used to make appropriate estimates of damages, before and after mitigation.

Contents damage estimates for EOCs and emergency shelters are also generally similar to those for ordinary buildings. For EOCs, the extra value of communications and other EOC equipment must be considered in the analysis.

Acquisition projects are uncommon for EOC or shelters. However, if a mitigation project is acquisition or is a flood control infrastructure project that provides better flood protection for an EOC or shelter, other physical damages (landscaping, outbuildings, etc.) can also be counted. However, for typical mitigation projects for EOCs and shelters, that involve hardening of the building itself, there are no additional benefits in this category and they should not be counted.

5.2 Displacement Costs

In principle, the public services provided by EOCs and emergency shelters are subject to being displaced to temporary quarters due to disaster damages, just like any other public service. In practice, however, the operation of EOCs or emergency shelters is typically only for short periods of time immediately before, during, or after disaster events. Furthermore, because of the specialized, temporary function of EOCs and shelters, displacement to temporary quarters may not be physical possible, during the brief periods that EOCs and shelters would normally operate in a single disaster event. Typically, there is ample time between disasters to allow for repairs between uses of EOCs or shelters.

Because of the operating characteristics of EOCs and emergency shelters, the possible benefits of reduced displacement time are likely to be substantially less than for ordinary buildings. For ordinary buildings, the benefits of reduced displacement time generally constitute only a small fraction of total benefits. Thus, for EOC or emergency shelter mitigation projects the benefits of reduced displacement time are likely to be very minor. Except for mitigation projects that are very close to being cost-effective without counting the benefits of reduced displacement time, it may not be necessary to count displacement benefits for most mitigation projects for EOCs and emergency shelters.

5.3 Loss of Public Services for EOCs

In principle, the benefits of avoiding loss of public services provided by EOCs and emergency shelters are calculated from the daily cost of public services, just like any other public service. In addition, since EOCs and emergency shelters are critical facilities, an appropriate continuity premium must be added to reflect properly the greater importance of EOCs and emergency shelters during disasters.

5.3.1 Functional Downtime Estimates for EOCs and Shelters

Functional downtime estimates for EOCs and shelters are different from those for ordinary buildings because EOCs and shelters are typically used only for short periods of time before, during and/or after disaster events. Functional downtimes for EOCs and shelters cannot be longer than the typical duration of use.

5.3.2 Value of Services

As with any public building, the base value of the service provided by an EOC or shelter is estimated from the daily cost of providing the service. However, unlike other public services, EOCs and shelters are used only for brief periods of time before, during or after disaster events. For ordinary public buildings, the daily cost of service is estimated by dividing the annual operating budget of a facility by 365 days per year.

For EOCs the daily cost of service is estimated by dividing the annual operating budget by the typical or average number of days of use per year.

For example, if an EOC has an annual operating cost of \$36,500 per year and operates an average of only 2 days per year, based on historical data, then the average daily cost of service is \$17,500 per day (when used). In this case, the average value of the EOC services is estimated at \$17,500 per day. As with any public services, the annual operating budget for an EOC includes annual costs for equipment, supplies, utilities, administrative and training costs and other operating costs, as well as the salary and benefit-costs of personnel when the EOC is activated.

Rather than trying to estimate an annual operating budget for emergency shelters, a different approach is suggested for estimating the base value of emergency shelter. For Federal travel, the GSA establishes standard rates for lodging and meals. For the continental U.S., the base CONUS daily rates are \$55 for lodging and \$30 for meals and incidentals. Higher rates are published for counties with higher than these typical values (i.e., many medium- to large- urban areas). The simplest measure of the value of temporary lodging and meals provided by an emergency shelter would be \$85 per day (the base CONUS rate). A more accurate measure could be obtained by using the GSA rate appropriate for the county in which the emergency shelter is located. Current GSA lodging and meals rates are available at several websites, including a DOD site (www.dtic.mil/perdiem).

For emergency shelters, the base daily value of the public service is estimated by multiplying the average number of people given shelter by the \$85 per day CONUS value (or the appropriate local value of lodging and meals from the GSA data).

5.3.4 Continuity Premiums for EOCs and Shelters

Determining an appropriate continuity premium for an EOC is difficult. In many ways, evaluating a mitigation project for an EOC is similar to evaluating a mitigation planning project. An EOC does not, by itself, directly reduce damages, losses, or casualties in a disaster. Rather, by coordinating response efforts, an EOC makes a community's disaster response more efficient and thus is beneficial to the community. Indirectly, an EOC may reduce damages by targeting and

implementing preventative measures more efficiently or reduce casualties by focusing search and rescue operations more efficiently.

Clearly, an EOC is important to a community during disasters. However, because of the indirect connection between an EOC and reductions in damages, losses, and casualties, it is difficult to estimate a suitable continuity premium. For consistency, we suggest assuming that a functioning EOC has the same continuity premium, relative to the cost of service, as police and fire services. This assumption then assigns a common continuity factor of 10 times the daily cost of services to each of the primary emergency response functions: police, fire and EOCs.

In a disaster, there are several reasons why emergency shelter is clearly worth more to residents and to the community than during ordinary times. First, hotels and motels are likely to be filled to capacity, or unavailable due to closures and/or damage. Second, emergency shelter is more important than discretionary temporary shelter. Discretionary travel and shelter can be postponed, but the need for emergency shelter is immediate and cannot be postponed. Third, there is a life safety impact of emergency shelter. Availability of safe emergency shelters in tornadoes and hurricanes reduces casualties because people move from less safe structures to safer emergency shelters. In hurricanes, the availability of shelters undoubtedly reduces the number of people who are at risk because they ignore evacuation warnings. That is, the availability of emergency shelter makes it more likely that people will evacuate when so ordered by local officials.

Estimating the value of emergency shelter to a community and determining an appropriate continuity premium depends primarily on common sense and professional judgement. Clearly, people displaced from their homes or evacuated would be willing to pay more than the normal cost of shelter and food - perhaps twice normal costs, or several times normal costs or even ten times normal costs, but not 100 or 1000 times normal costs. At 100 or 1000 times normal costs, the value per day of temporary shelter would be \$8,500 or \$85,000 per person per day, respectively, and clearly such numbers exceed the bounds of common sense for the typical or average value of emergency shelter in disasters.

For emergency shelters, a continuity premium similar to, but not larger than, those assigned to police and fire services and EOCs appears reasonable. Thus, a continuity premium of 10 times the normal cost of service for emergency shelters should be used.

5.4 Casualties

In some disaster events, occupants of EOCs and shelters may be at risk of injury or death. In estimating casualties, the occupancy characteristics of EOCs and shelters must be carefully considered. Methods for estimating casualties depend on whether or not the facility has alternative

uses during non-disaster times and whether or not the expected types of disasters occur with or without warnings.

For seismic hazard mitigation projects for EOCs and shelters, the appropriate occupancy value is the typical year-round occupancy for the normal function of the facility. In other words, casualty estimates are made in exactly the same manner as for any other building. For seismic mitigation projects, the best available casualty rate estimates are those in the FEMA-sponsored HAZUS program (HAZUS, Earthquake Loss Estimation Methodology, National Institute of Building Sciences and FEMA, 1997). HAZUS has consensus estimates of casualty rates for different structural types of buildings designed to several seismic design levels. However, using these estimates is possible if and only if a building's seismic vulnerability is expressed as a fragility curve. A fragility curve is a mathematical representation of a damage function expressed as the probabilities that a building will sustain a given level of damage as a function of the level of ground motion. Fragility curve-based estimates of casualty rates are the best available, but the necessary calculations are mathematically complex and should not be attempted by analysts not thoroughly familiar with this specialized mathematics and methodology.

For hurricane or tornado mitigation projects for EOCs and shelters, the appropriate occupancy value would be the occupancy during hurricane or tornado warnings, which may differ significantly from the normal occupancy of the facility. For hurricane winds and tornadoes, there are no currently available resources such as the earthquake HAZUS model to assist in casualty rate estimates. Rather, casualty rate estimates must be made for each building, based on the capacity of the specific building to withstand wind forces. In these circumstances, casualty rate estimates should always be made only in close consultation with an engineer very knowledgeable about the wind design characteristics of the existing building and the ability of the post-mitigation building to withstand wind forces.

For flood hazard mitigation projects for EOCs and shelters, life safety is generally not an issue and thus it is not necessary to make casualty estimates.

5.5 Summary Guidance

The major categories of benefits to be counted for mitigation projects for EOCs and emergency shelters are the same as those addressed for ordinary public buildings (Section 3) and for police, fire and medical facilities (Section 4). However, because of the function and occupancy characteristics of EOCs and shelters, there are several significant differences in benefit-cost analysis. These special considerations for EOC and shelter mitigation projects are highlighted in the summary Table 5.2 below.

**Table 5.2
Special Considerations for Benefit-Cost Analysis
of Mitigation Projects for EOCs and Emergency Shelters**

Types of Benefits to Consider	Data Sources and Guidance
1. Economic Impact of Loss of Function (i.e., Displacement Costs)	May not be applicable for EOCs and shelters, because of short period of use of these services.
<ul style="list-style-type: none"> ▪ Displacement time 	Maximum possible displacement times are limited by the typical duration of use of EOCs or shelters.
<ul style="list-style-type: none"> ▪ Displacement costs 	If appropriate, the extra costs of providing service from temporary locations.
2. Economic Impact of Loss of Function (i.e., Loss of Public Services)	
<ul style="list-style-type: none"> ▪ Normal cost of service 	<ul style="list-style-type: none"> ▪ EOCs: daily base cost of service is annual operating budget divided by average number of days of use, plus daily costs during operation. ▪ Shelters: \$85 per day CONUS cost of temporary lodging and meals or local GSA values.
<ul style="list-style-type: none"> ▪ Functional downtime 	Maximum possible displacement times are limited by the typical duration of use of EOCs or shelters
<ul style="list-style-type: none"> ▪ Continuity Premiums 	10 x cost of normal service, calculated as above, differently than for other public services
3. Casualties	
<ul style="list-style-type: none"> ▪ Facility occupancy 	<ul style="list-style-type: none"> ▪ Earthquakes: normal occupancy for all functions ▪ Hurricanes and tornadoes: occupancy during warnings ▪ Floods: not necessary to estimate, minimal life safety benefits
<ul style="list-style-type: none"> ▪ Casualty rates 	HAZUS casualty rates for earthquakes, professional judgement for other hazards
<ul style="list-style-type: none"> ▪ Statistical values of deaths, injuries, and illnesses 	FEMA values, updated to 2001 values, see Section 2.3 <ul style="list-style-type: none"> - deaths: \$2,710,000 - major injuries/illnesses: \$15,600 - minor injuries/illnesses: \$1,560

6.1 Overview

In the context of emergency planning, disaster response, and disaster recovery, utilities are often characterized as lifelines. This characterization reflects the great importance that such systems have on the functioning of modern society. For example, loss of electric power greatly reduces economic activity in a community, as well as having a direct and major impact on affected residents. Similarly, loss of function of water or wastewater systems generally has direct economic impacts on a community that are far larger than the cost of repairs of the physical damages alone.

Electric power, potable water and wastewater systems are subject to physical damages from natural disasters such as earthquakes, hurricanes and floods. More importantly, however, such systems are subject to loss of function; that is, loss of utility service. Such loss-of-function disruptions often have major negative impacts on affected communities.

Hazard mitigation projects for utility systems may eliminate or reduce physical damages in future disasters. However, in many cases, an important motivation or even the primary motivation in undertaking hazard mitigation projects for utility systems is not to reduce the physical damages alone, but rather to reduce the tremendous impacts that the loss of function of such systems may have on the affected communities.

The basic concepts of benefit-cost analysis of mitigation projects for utilities are the same as those for buildings. The general principles and categories of benefits outlined in Section 2 apply to utilities as well as to ordinary buildings (Section 3) and critical facilities (Sections 4 and 5).

Mitigation projects for utility administration buildings are evaluated in the same manner as for an ordinary commercial or public building, as discussed in Section 3. Mitigation projects for utility control or command centers are evaluated in the same manner, except that a continuity premium should be added to reflect the importance of such centers in providing utility services. By analogy to the continuity premiums assigned to EOCs, a continuity premium of 10 times the normal cost of operations appears reasonable for utility control or command centers.

, Most mitigation projects for utilities, however, deal with the complex infrastructure of the utility systems and not with buildings.

The guidance in this section focuses specifically on mitigation projects for utility infrastructure (not on mitigation projects for utility buildings).

Some of the details of benefit-cost analysis differ between mitigation projects for electric power systems, potable water systems, and wastewater systems. These details are discussed below. Benefit-cost analysis for all three of these utilities considers four primary categories of possible benefits, as

summarized below in Table 6.1. These are the same primary categories of benefits that were defined and discussed in Section 2.

Table 6.1
Primary Categories of Benefits
Mitigation Projects for Utilities.

Types of Benefits to Consider	Notes for Utility Mitigation Projects
1. Physical damages	Damage estimates made using professional judgement in consultation with those knowledgeable about utility system components and their vulnerability.
2a. Loss-of-Function Impacts (i.e., Displacement costs)	Not applicable to utility infrastructure mitigation projects; utility system components cannot be displaced to temporary quarters.
2b. Loss-of-Function Impacts (i.e., Economic impacts of loss of service)	<ul style="list-style-type: none"> ▪ Economic impacts of loss of service are generally the largest category of benefits. ▪ See detailed guidance for each of the three utility systems evaluated.
3. Casualties	<ul style="list-style-type: none"> ▪ May be significant for some types of projects, for some utility systems, for some hazards. ▪ See detailed guidance for each of the three utility systems evaluated.
4. Emergency Management Costs	<ul style="list-style-type: none"> ▪ Not generally considered. ▪ Most utility mitigation projects have a negligible impact on a community's overall emergency management costs.

6.2 Physical Damage Estimates

Utility systems contain a wide range of highly specialized components. Electric power systems have generating plants, transmission and distribution lines, high voltage substations and a host of specialized ancillary equipment. Potable water systems have storage reservoirs, storage tanks, wells, treatment plants, aqueducts and transmission pipes, distribution pipes, pumping plants, valves and a host of specialized ancillary equipment. Wastewater systems have treatment plants, systems of collection pipes, pumping plants (lift stations) and a host of specialized ancillary equipment.

Because of the complex, technical, and specialized nature of the components of utility infrastructure systems, damage estimates should always be made in close consultation with qualified individuals familiar with the specific systems under evaluation.

6.3 Functional Downtime Estimates

Functional downtime estimates for utility systems differ fundamentally from functional downtime estimates for buildings because of the network characteristics of utility systems. In order for an electric power or potable water or wastewater system to deliver service and to function as intended, a myriad of interconnected components has to work together as designed. Utility system networks are generally described in terms of links and nodes. Links are the lines or pipes that connect the other elements of the system, defined as nodes. Nodes include generating plants, treatment plants, substations, pumping plants and other facilities that are necessary to provide utility service.

In complex, networked utility systems, some components may be redundant; that is, there is an alternative, functionally equivalent component that can serve the same function if the first component fails. Other components are unique; that is, alternative components are not available if the first component fails. Therefore, the extent of loss of utility service that results from specific levels of damage depends on the detailed network operating characteristics of each specific utility system. For example, damage to one substation or pumping plant might result in little or no loss of function if the component is redundant. However, the same level of damage to another substation or pumping plant might result in loss of service to an entire neighborhood or city.

Because of the networked nature of utility systems, estimating functional downtime requires a thorough understanding of the network operating characteristics of the specific utility system under evaluation. Functional downtime estimates for utility systems should always be made in conjunction with qualified individuals knowledgeable about the specific utility system under evaluation and in close cooperation with local utility staff.

For utility systems, functional downtimes are best expressed as “system days” of lost service. A “system day” of lost service is defined as one day in which the entire system is without service. However, system days are usually fractional. For example, one system day may be one day of complete loss of service, or two days with 50% loss of service, or 10 days with 10% loss of service, and so on. Loss of service is generally defined as the percentage of customers without service. For example, if 20% of a utility’s customers have no service for 2 days, with 5% having no service for a third day, then the functional downtime is 0.45 system days. In this example the system days are calculated as 20% (0.20) times two days plus 5% (0.05) times one day or 0.45 days.

6.4 Economic Impact of Loss of Utility Services

The economic impact of loss of utility services is analogous to estimating the impact on a community of loss of public services provided from a building. The estimated economic impacts of loss of utility services differ for electric power systems, potable water systems, and wastewater systems. Thus, guidance for each of these types of utility systems is presented separately.

6.4.1 Economic Impacts of Loss of Electric Power

The base economic value of electric power is the cost of service. Recent data from the U.S. Department of Energy show a national average price of electricity of 6.74 cents per kilowatt-hour. However, electric power is extremely important for the functioning of a modern community. The economic impacts of loss of electric power are far greater than the simple cost of electric power. The primary motivation for most mitigation projects for electric power is to minimize the loss of electric power service to the community. Reductions in damage to the electric power system are an important objective, but generally secondary to preserving the delivery of electric power to the community.

The direct economic impact of loss of electric power is estimated from nationwide data on economic activity by sector of the economy (1997 Economic Census, North American Industry Classification System, and NAICS). These data were combined with electric power importance factors for each major economic sector. These importance factors reflect the reality that different sectors of the economy have varying degrees of dependence on electric power. Importance factors were taken from the FEMA-sponsored publication ATC-25 (Applied Technology Council, Seismic Vulnerability and Impact of Disruption of Lifelines in the Conterminous United States, 1991). These estimated economic impacts include both wage and business income losses.

For purposes of benefit-cost analysis, the economic impacts calculated as described in the previous paragraph were updated to 2000 values and then adjusted downwards. The downwards adjustments were made because: 1) some facilities have on-site generation or back-up power sources, 2) some lost economic production can and will be made up after restoration of electric power, and 3) there is a high potential for double-counting of reasons for the loss of economic production. With these corrections, the direct economic impact of loss of electric power is estimated to be \$87 per capita per day. Following this approach, the direct regional economic impact of one system day of complete loss of electric service for a community of 100,000 people would be estimated at \$8,700,000 (100,000 times \$87).

In addition to these regional economic impacts, loss of electric power service also has direct economic impacts on residents, separate from the regional economic impacts estimated above. Examples of these impacts include food spoilage during prolonged outages, extra costs for meals or temporary lodging for some people, water damages due to frozen pipes and so on. Rough, common sense estimates outlined in the Supporting Documentation Volume Chapter 3 (to be available in late 2001) suggest that these impacts may total about \$30 to \$35 per capita per day, on average.

In addition, there is an economic value to the major disruption of normal activities that result from loss of electric power. The key point is that people's time has economic value, whether such time is devoted to remunerative work or to personal leisure and recreation.

The estimated economic value per person per hour of disruption from loss of electric power is estimated using an approach similar to that used by the U.S. Department of Transportation (DOT) for highway planning purposes. Technical details of this approach are given in the DOT memo: The Value of Travel Time: Departmental Guidance for Conducting Economic Evaluations (U.S. Department of Transportation, memo from Frank E. Kruesi, Assistant Secretary for Transportation Policy, April 9, 1997).

The simplest assumption consistent with economic theory is that each hour of people's time is worth the same amount, whether such time is personal or business time. In other words, the last hour of work time and the first hour of leisure or recreation time are assumed to have equal value. This is the assumption that should be used when valuing the direct economic impact of the disruption time for residents subjected to electric power outages.

Following the DOT approach, the average hourly compensation rate (wages and benefits) is the best available measure of the economic value of people's time. The latest available data, for March 2000, of average employer cost for employee compensation for civilian workers (private industry and state and local government) is \$21.16 per hour (U.S. Department of Labor, Bureau of Labor Statistics News, USDL: 00-186, June 29, 2000). A value of \$21.16 per person per hour should be used as the value for the economic impact of disruption time for customers subject to loss of electric power service.

Loss of electric power has a major disruptive impact on residential customers. The impacts include loss of lighting and in many cases loss of cooking capability, hot water and heating. Almost all normal daily activities, including preparing food, cleaning, reading, watching television, listening to music, and using computers, are disrupted. As a conservative estimate, such disruptions total at least 3 to 4 hours per person per system day of electric power outage. At slightly more than \$21 per hour, such disruption of normal activities would add \$63 to \$85 per capita per day to the estimated direct economic impacts of \$30 to \$35 for residential customers estimated above. The resulting total estimated economic impacts for residential customers are approximately \$93 to \$110 per capita per day. The midpoint of this range of estimates is \$101 per day per person.

Combining the estimated impact of losing electric power on regional economic activity and the estimated impact on residential customers yields a total estimated impact of \$187 per person per day of lost service. These estimates are summarized below in Table 6.2.

**Table 6.2
Economic Impacts of Loss of Electric Power
Per Capita Per Day**

Category	Estimated Economic Impact
Reduced regional economic activity¹	\$87
Impacts on Residential Customers	
▪ Direct economic losses	\$30 to \$35
▪ Disruption economic impact	<u>\$63 to 85</u>
▪ Total Best estimate	\$101
Total economic impacts	\$188
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.	

As an example, consider a community of 40,000 people that suffers a partial loss of electric power due to flood damage at one substation. If 50% of the customers have no power for 1 day, 15% have no power for an additional day, and 5% have no power for two additional days, then the number of system days of loss of power is calculated as 0.50 times 1 plus 0.15 times 1 plus 0.05 times 2 or 0.75 system days. With 0.75 system days of lost service, total economic impacts of \$188 per person per day and 40,000 customers, the total economic impacts are calculated as 0.75 times 40,000 times \$188 or \$5,640,000.

6.4.2 Economic Impacts of Loss of Potable Water

The economic impacts of loss of potable water service are estimated in the same manner as for electric power service above. For potable water systems, two levels of loss of service are evaluated: 1) complete loss of water service, and 2) water unsafe for drinking.

The impact of loss of water service on regional economic activity is estimated using nationwide economic data by economic sector and water importance factors from the same sources as referenced in Section 6.4.1. The economic impact of loss of water service is large, but smaller than that for electric power. For complete loss of water service, and water unsafe for drinking, the regional economic impacts are estimated at \$35 and \$8.75 per person per day, respectively.

In addition to these regional economic impacts, loss of potable water service also has direct economic impacts on residents, separate from the regional economic impacts estimated above. Examples of these impacts include costs of bottled water for drinking, cleaning and sanitation purposes, increased meal costs for restaurant meals, temporary lodging for some people, increased transportation costs to obtain water, meals, and sanitation facilities and so on. Prolonged outages could also cause landscaping damage in climates where irrigation is necessary. Rough, common sense estimates outlined in the Supporting Documentation Volume (Chapter 4) (to be available in late 2001) suggest that these impacts may total about \$15 per capita per day, on average.

In addition, there is an economic value to the major disruption of normal activities that result from loss of potable water service. As described in Section 6.4.1, people's time has economic value, whether such time is devoted to remunerative work or to personal leisure and recreation. As a conservative (lower bound) estimate, we suggest that such disruptions would total about 2 to 3 hours per person per system day of complete loss of water service. At about \$21 per hour (the average hourly wage, as described in Section 6.4.1), the economic impact of such disruption would add \$42 to \$63 per day to the estimated direct economic impacts of \$15 per day. The resulting total estimated economic impacts of complete loss of water service for residential customers are approximately \$57 to \$78 per day. The midpoint of this range is about \$68 per person per day.

For loss of water quality, such that water is unsafe for drinking, the estimated economic impacts on residential customers are about 50% of the estimates for complete loss of service, or about \$34 per person per day.

The above estimates of the economic impact of loss of potable water service apply to all types of natural hazard events. For earthquakes, there are additional potential losses arising from fire following the earthquake event. Earthquakes commonly cause fire ignitions, due to building damage, downed power lines, and gas line breaks. For earthquake-induced fires, loss of water service reduces fire suppression capability and leads to a statistical expectation of higher fire losses. The extent of fire following earthquake losses arising from loss of water service is possible to model mathematically, with inputs on building stock, building density, climate and wind conditions, and fire suppression capability. As a first level estimate, fires following earthquake losses due to loss of water service are estimated at \$35, \$17.50, and \$8.75 per person for dry, moderate and wet climates, respectively.

Fire following earthquakes occurs predominantly during the first few hours or first day after a major earthquake, although some ignitions may occur later. For example, reconnecting gas lines may lead to fires if leaks are present in the distribution lines.

Loss of water service also reduces fire suppression capability for normal fires, but such fires are relatively infrequent. Thus, the effective number of days of functional downtime to be considered for fire following earthquake should logically be capped at a smaller number than the total system restoration time.

For purposes of benefit-cost analysis, a maximum of one system day should be used for estimating fire following earthquake losses.

**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 activity¹	\$35	\$8.75
Impacts on Residential Customers		
▪ Direct economic losses	\$15	\$7.50
▪ Disruption economic impact	<u>\$42 to 63</u>	<u>\$21 to 42</u>
▪ Total Best estimate	\$68	\$34
Total economic impacts (all hazards)	\$103	\$43
Fire following earthquake losses		
▪ Dry climates	\$35	None
▪ Moderate climates	\$17.50	None
▪ Wet climates	\$8.75	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.		

The estimated economic impacts of loss of water service, as summarized above in Table 6.3 are large, but somewhat lower than those for loss of electric power.

As an example, consider a community of 500,000 people that has a partial loss of potable water service in an earthquake. The loss of service is primarily because of pipe breaks in the distribution system, coupled with minor damage at pumping plants. If 20% of the customers have no power for 1 day and 5% have no power for an average of three additional days, then the number of system days of loss of potable water service is calculated as 0.20 times 1 plus 0.05 times 3 or 0.35 system days. With 0.35 system days of lost service, total economic impacts of \$103 per person per day and 50,000 people affected, the total economic impacts are calculated as 0.35 times 500,000 times \$103 or \$18,025,000.

In this example, there are also earthquake-induced fires resulting from the loss of water service. The community is a moderate climate. The fire losses only occur on the first day (0.20 system day of lost service); therefore the estimated fire losses are 0.20 times 500,000 times \$17.50 or \$1,750,000. In this example, fire losses are slightly less than 10% of the total estimated economic impacts of loss of water service.

6.4.3 Economic Impacts of Loss of Wastewater Service

The economic impacts of loss of wastewater service are estimated in the same manner as for electric power and potable water service above. A detailed examination of the economic impacts of loss of wastewater service is given in the Supporting Documentation Volume (Chapter 5) (to be available in late 2001). A brief summary is presented below.

The impact of loss of wastewater service on regional economic activity is estimated using nationwide economic data by economic sector and water importance factors from the same sources as referenced sections 6.4.1 and 6.4.2. The economic impact of loss of wastewater service is large, similar to that for potable water, but smaller than that for electric power. The regional economic impacts of loss of wastewater service are estimated at \$33.50 and \$8.50 per person per day for complete loss of treatment and partial loss of treatment, respectively.

As discussed above in Sections 6.4.1 and 6.4.2, loss of electric power and potable water services has direct impacts on residential customers, separate from the impacts on regional economic activity. For wastewater services, however, impacts on residential customers are generally non-existent or negligible. Temporary loss of wastewater treatment capability (complete or partial loss of treatment) does not generally interrupt residential customer's ability to dispose of sewage or other wastewater.

The above estimates of the economic impact of loss of potable water service apply to all types of natural hazard events. These estimates are summarized below in Table 6.4

Table 6.4
Economic Impacts of Loss of Wastewater Service
Per Capita Per Day

Category	Complete Loss of Treatment	Partial Loss of Treatment
Reduced regional economic activity ¹	\$33.50	\$8.50
Impacts on Residential Customers		
▪ Direct economic losses	None	None
▪ Disruption economic impact	None	None
▪ Total Best estimate	None	None
Total economic impacts (all hazards)	\$33.50	\$8.50
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.		

The estimated total economic impacts of loss of wastewater service, as summarized above in Table 6.4 are large, but significantly smaller than those for loss of potable water or electric power service.

As an example, consider a community of 27,000 people with flood damage to a wastewater treatment plant. There is complete loss of service for 2.5 days and then partial loss of treatment capability for an additional 5 days. These losses of service affect the entire community. The estimated economic impact of complete loss of service for 2.5 days is 2.5 times 27,000 times \$33.50 or \$2,261,250. The estimated economic impact of partial loss of service for 5 additional days is 5.0 times 27,000 times \$8.50 or \$1,147,500. The total estimated economic impact of loss of wastewater services is \$3,408,750.

The above analysis does not explicitly consider environmental impacts of loss of wastewater treatment services. Discharge of untreated or partially treated wastewater has potential negative environmental impacts. Flooding of wastewater treatment plants is the most common reason for loss of wastewater treatment services. Discharges of untreated or partially treated wastewater most commonly occur during periods of high water flows, when dilution of wastes is maximized and potential environmental impacts (are minimized).

The scope of the present guidance does not include evaluating environmental damages or the benefits of reducing or avoiding such damages. However, in effect, such environmental impacts are partially considered in the present analysis of the economic impacts of loss of function of wastewater treatment facilities, as described below.

The analysis of the regional economic impacts of loss of wastewater services implicitly assumes that business activity will be curtailed during periods of loss of wastewater service. When wastewater services are lost, communities sometimes impose operating restrictions on industrial and large commercial facilities to reduce the inflow of waste. More commonly, however, communities simply discharge partially treated or completely untreated waste.

In making a public policy decision to discharge partially treated or completely untreated waste, rather than to impose drastic restrictions to curb waste inflows, communities are implicitly deciding that possible environmental impacts are less than the economic losses that would arise from imposing more drastic reductions to curb waste inflows. To the extent that communities choose to release completely untreated or partially treated waste instead of curbing economic activity to reduce waste inflow, the estimated regional economic impacts of loss of wastewater service, as outlined above, will be over-estimated.

Following the above analysis, the estimated regional economic impacts of loss of wastewater treatment services probably overestimate the actual economic impacts. However, the estimated regional economic impacts implicitly are deemed equal to or greater than possible environmental damages. In effect, possible environmental impacts are counted indirectly (at least roughly) in the proposed methodology for estimating regional economic impacts.

6.5 Casualties

Loss of function of utilities - electric power, potable water and wastewater - has potential life safety impacts on affected communities. In some cases there may be deaths, injuries or illnesses arising from loss of utility services.

Loss of electric power may result in casualties. However, facilities for which electric power is a critical life safety issue (such as acute care in hospitals) always have redundant backup power supplies (e.g., battery back-ups and emergency generators). An upper bound analysis of potential casualties due to loss of electric power in Chapter 3 of the Supporting Documentation Volume (to be available in late 2001), suggests that the economic value of casualties is likely to be well below \$2.50 per person per day of lost service. This upper bound value is very low compared to the estimated economic impacts of loss of electric power, \$188 per person per day, and thus may be ignored as negligible for benefit-cost analysis. Actual casualties are likely to be less than these upper bound estimates.

Loss of potable water service may also result in casualties, most commonly illness from drinking contaminated water. Deaths from contaminated water are possible, but extremely rare. A rather extreme upper bound analysis of potential casualties due to loss of potable water service in Chapter 4 of the Supporting Documentation Volume (to be available in late 2001), suggests that the economic

value of deaths is likely to be well below \$2.50 per person per day of lost service, with the economic value of illnesses likely to be well below \$1.50 per person per day. These upper bound values is low compared to the estimated economic impacts of loss of potable water service, \$103 per person per day, and thus can probably be ignored as negligible for benefit-cost analysis. Actual casualties are likely to be less than these upper bound estimates.

Loss of wastewater service also has the potential for casualties, most commonly illness from drinking or exposure to contaminated water. However, any such illnesses are likely to be much less than those estimated above for potable water systems, since few people are likely to drink raw untreated water. Casualties arising from loss of function of wastewater treatment plants appear to be negligible for purposes of benefit-cost analysis.

6.6 Summary Guidance

The basic concepts of benefit-cost analysis of mitigation projects for utilities are the same as those for buildings (as discussed in previous sections). Significant differences are as follows:

Physical damage estimates for utility systems must be estimated by qualified individuals thoroughly familiar with the specific utility systems under evaluation, based on historical damage data, professional judgement and engineering calculations.

Displacement costs are not applicable to utility systems, since utility system components cannot be displaced to temporary quarters. Displacement costs should not be counted in benefit-cost analysis of mitigation projects for utility systems.

Loss of function of utility services has a great economic impact on regional economic activity in general and residential customers in particular. In addition, for loss of potable water service in earthquakes, there are additional losses due to fires following earthquakes. These economic impacts are summarized in Table 6.5 below.

Table 6.5
Economic Impacts of Loss of Utility Services
per Person Per Day of Lost Service

Loss of Electric Power	Cost of Complete Loss of Service	
Reduced Regional Economic Activity ¹	\$87	
Impacts on Residential Customers	\$101	
Total Economic Impact	\$188	
Loss of Potable Water Service	Cost of Complete Loss of Service	Cost of Water Unsafe for Drinking
Reduced Regional Economic Activity ¹	\$35	\$8.75
Impacts on Residential Customers	\$68	\$34
Total economic impact (all hazards)	\$103	\$43
Fire Following Earthquake Losses	Cost of Fire Damage	
- Dry Climates	\$35	
- Moderate Climates	\$17.50	
- Wet Climates	\$8.75	
Loss of Wastewater Service	Cost of Complete Loss of Service	Cost of Partial Treatment Only
Reduced Regional Economic Activity ¹	\$33.50	\$8.50
Impacts on Residential Customers	None	None
Total Economic Impact	\$33.50	\$8.50
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.		

7.1 Overview

In the context of emergency planning, disaster response, and disaster recovery, roads and bridges are often characterized as lifelines. This characterization reflects the importance that roads and bridges have on the functioning of modern society. Especially in a disaster, roads and bridges are often critical for disaster response and evacuation.

Roads and bridges are subject to physical damages from natural disasters such as earthquakes, hurricanes and floods. More importantly, however, roads and bridges are subject to loss of function; that is, closure to traffic. Such closures often have significant negative impacts on affected communities.

Hazard mitigation projects for roads and bridges may reduce physical damages in future disasters. However, in many cases, an important motivation or even the primary motivation in undertaking hazard mitigation projects for roads and bridges is not to reduce the physical damages alone, but rather to reduce the negative impacts that the closures of roads and bridges may have on the affected communities. That is, mitigation projects for roads and bridges are often focused primarily on keeping the roads and bridges open during disaster events.

The basic concepts of benefit-cost analysis of mitigation projects for roads and bridges are the same as those for buildings and are summarized in Table 7.1. The general principles and categories of benefits outlined in Section2 apply to roads and bridges as well as to ordinary buildings (Section3), critical facilities (Sections4 and 5), and utilities (Section6).

Table 7.1
Primary Categories of Benefits
Mitigation Projects for Roads and Bridges

Primary Categories of Damages/Benefits	Notes for Utility Mitigation Projects
1. Physical Damages	Damage estimates must be made by engineers knowledgeable about roads and bridges and their vulnerability to each type of hazard.
2a. Loss-of-Function Impacts (i.e., Displacement costs)	Not applicable to road and bridge mitigation projects; roads and bridges cannot be displaced to temporary quarters.
2b. Loss-of-Function Impacts (i.e., Economic impacts of loss of service)	Economic impacts of road or bridge closures are the generally the largest category of benefits; see detailed guidance in this section.
3. Casualties	Not generally significant, except for seismic mitigation projects for bridges.
4. Emergency Management Costs	Not generally considered; most road and bridge mitigation projects have a negligible impact on a communities overall emergency management costs

7.2 Physical Damage Estimates

Roads and bridges vary in their materials and designs. The vulnerability of roads and bridges to flood, wind, or seismic damage varies drastically depending on the type of components, their age, their design and condition. As such, it is necessary to make facility-specific estimates based on historical damage data and professional judgement. Because of the somewhat specialized nature of road and bridge engineering, damage estimates should always be made in close consultation with qualified individuals thoroughly familiar with the specific components under evaluation.

7.3 Functional Downtime Estimates

Functional downtime estimates for roads and bridges are somewhat different than for buildings or utilities. For roads and bridges there are two aspects of functional downtime. The first aspect is the closure time or the time period during which the road or bridge is closed to normal traffic while

repairs are made. Closure times may range from a few hours to several days to several weeks in unusual cases. The second aspect is the delay or detour time. Delay or detour time is the average amount of extra time that motorists spend taking alternative routes because of road or bridge closures. Delay or detour time may be only a few minutes if an alternative route is only a block or two away. Typically delay or detour times are fractions of an hour. In rare cases, delay or detour times may be an hour or more if, for example, a bridge is closed and the nearest alternative bridge is a long distance away.

For road and bridge closures, functional downtime is expressed in two steps:

1. Estimate the number of days for the damaged road or bridge to be repaired and reopened to normal traffic flow
2. Estimate the average delay or detour time for motorists while the bridge is closed.

For example, assume that a culvert fails in a flood and a road is washed out. A county highway department estimates that the repair time is one week and that the average delay or detour time caused by the closure is about 20 minutes. When a disaster event causes numerous road or bridge closures, repairs are almost always made first to the most important roads or bridges. Thus, secondary or rural roads and bridges are generally expected to have longer closure times than primary roads.

Estimates of repair times and delay or detour times are made based on historical data and experience. Local highway department staff is generally very experienced with closures and is the best source of repair time estimates and delay or detour times.

7.4 Economic Impact of Road and Bridge Closures

The economic impact of road and bridge closures is analogous to estimating the impact on a community of loss of public services provided from a building. Closure of a road or bridge represents loss of a public service - the availability of a transportation route.

The economic impact of road and bridge closures is estimated from the number of vehicles per day using the route, the average delay or detour time, and the average value of people's time. The primary economic impact of road and bridge closures is loss of time.

There are four steps in estimating the direct economic impacts of road or bridge closures:

1. Estimate the functional downtime; that is, the repair time to restore normal traffic flow on the road or bridge

2. Determine the average daily traffic count for the closed road or bridge
3. Estimate the average delay or detour time arising because of the closure
4. Place a typical or average dollar value per person hour or per vehicle hour of delay or detour

Each of these steps is discussed in detail below.

7.4.1 Functional Downtime (Repair Time) for Roads and Bridges

For roads and bridges, functional downtime is the time period for which the road or bridge is closed to normal traffic flow. For a given road or bridge that is damaged in a disaster event, the repair time depends on the severity of damage, on the number of other damaged roads or bridges, and, very importantly, on the priority placed on repair and reopening by the local highway department. When there are multiple outages, local highway departments almost always prioritize repairs so that the most important roads or bridges are reopened first. Small residential or rural roads are likely to be repaired much later than major arteries with high traffic flows.

Repair times can range from a few hours if there are only a few outages, to several days to several weeks, depending on the number of damaged roads or bridges. Repair times are very rarely longer than two or three weeks, except for major bridge structures, which might take many months or even a year or two to replace if destroyed.

Estimating repair times requires somewhat specialized knowledge of the local highway transportation system, of the availability of local resources, and of local priorities, and is thus best made in close cooperation with local traffic officials.

7.4.2 Average Daily Traffic Counts

Average daily traffic counts for most roads or bridges are available from local highway officials. Traffic counts are used for road/bridge design purposes and for traffic control, planning and management purposes. Local highway officials generally can provide actual traffic counts for specific segments of roads or bridges, or at least reasonable estimates based on traffic counts for similar nearby roads and bridges.

Traffic counts are usually presented as the number of vehicles per day or per hour. Traffic counts may be presented as total vehicles or separately for different classes of vehicles (e.g., cars, light trucks, heavy trucks). Traffic counts are usually presented as the number of single (one-way) trips,

but are sometimes presented as the number of round trips. The difference between one-way and round-trip counts is important and the unit of measure (one-way or round-trip) must always be noted carefully.

7.4.3 Average Delay or Detour Times

When a given road or bridge is closed because of high water, unsafe conditions, or physical damage, the delay or detour varies markedly, depending on local conditions. Delay or detour times can range from five minutes or less to several hours (in rare cases).

Road and systems are networked systems of interconnected elements. In, networked systems, some elements may be redundant; that is, alternative paths may be available if such elements fail. Other elements may be nearly unique; that is, no practical alternative paths are available. The extent of loss of function that results from specific damage depends on the characteristics of each specific road and bridge system. For example, damage that closes one city street may have very little impact on traffic if the resulting detour is only one city block while repairs are made. However, closure of a rural road or a bridge may result in a substantial detour (duration and mileage) with a correspondingly significant economic impact.

The length of delay or detour that is likely to result from the closure of a particular road or bridge depends entirely on specific local conditions and so no generalizations can be drawn. The length of delay or detour depends on:

- The traffic count for the closed road or bridge

- The layout of the local road and bridge system (what alternative routes are available, how suitable the alternative routes are, how heavy the normal traffic is on these routes, and the distance between the closed road or bridge and the alternative route)

Local highway officials are the best source of delay or detour time estimates. Local highway officials have knowledge of past closures, of what detours or alternative routes are available, and knowledge of the local road and bridge system and local traffic patterns. Estimated delay or detour times will never be exact and will vary depending on the time of the day and on the day of the week. However, knowledgeable local highway officials should be able to make reasonable estimates: Will closure of this bridge result in a 5 minute detour, a 30 minute detour, or a several hour detour?

7.4.4 Economic Impact Per Person Per Hour of Delay or Detour Time

The economic impacts of road or bridge closures are estimated by combining the number of days of road or bridge closure, the average daily number of vehicles using the road, the average delay or detour time per vehicle, and the estimated economic value per person per hour of delay or detour.

The estimated economic value per person hour of delay or detour is estimated using an approach similar to that used by the U.S. Department of Transportation (DOT) for highway planning purposes (The Value of Travel Time: Departmental Guidance for Conducting Economic Evaluations, U.S. Department of Transportation, memo from Frank E. Kruesi, Assistant Secretary for Transportation Policy, April 9, 1997).

The DOT memo referenced above has a detailed analysis of economic theory and references to its approach. For the present purposes, a condensed summary of the analysis is presented. The key point is that time saved from travel has economic value, whether such time is devoted to remunerative work or personal leisure/recreation. Furthermore, if travel is associated with unpleasant conditions of crowding (or delays and detours), exposure to weather, risk, effort or boredom, cutting the time it requires will be beneficial. In simple terms, people would, on average, be willing to pay something to avoid such unpleasant travel conditions.

The simplest assumption consistent with economic theory is that each hour of time lost in travel delays or detours is worth the same amount, whether such time is personal or business time. In other words, the last hour of work time and the first hour of leisure/recreation time are assumed to have equal value. This is the assumption that should be used for valuing the direct economic impact of the time lost by closures of roads and bridges. For benefit-cost analyses of FEMA-funded hazard mitigation projects, 100% of the national average hourly wage (plus benefits) should be the value of travel time lost by road and bridge closures. As described in Section 6.4.1, the average employer cost for employee compensation is \$21.16 per hour according to U.S. Department of Labor.

The U.S. DOT also has data on average vehicle occupancies. For 1996, the total highway passenger miles were 3.962 trillion. A passenger mile is one person traveling one mile by automobile, motorcycle, light truck, heavy truck, or bus. For 1996, the total highway vehicle miles were 2.482 trillion. The ratio of these two numbers, 1.596 is the average vehicle occupancy. Applying this occupancy value and the \$21.16 per person per hour value derived above yields a value of \$33.78 per vehicle hour of lost travel time.

The U.S. Census Bureau population estimate for November 2000 indicates that 74.47% of the population is 18 or over, with 25.53% under 18. If these ratios are applied to the average vehicle occupancy, assuming that drivers are 18 or over, then the average vehicle occupancy is 1.444 adults

and 0.152 children under 18. This estimated proportion of adult and child passengers does not consider that some drivers are under 18 (about 3% of the total population is between 16 and 18) but this is offset by the fact that the proportion of children as passengers is likely lower than in the population as a whole, because there are few children as passengers for commuting or business travel. Combining these data, we estimate that the average vehicle occupancy is about 1.45 adults and 0.15 children.

If lost time for children were assumed to have no economic value (a somewhat extreme assumption), then the estimate of \$33.78 per vehicle hour of lost travel time would be reduced by nearly 10% to \$30.68. More reasonably, lost time for children has an economic value, but less than that for adults. Taking the midpoint of these two extremes (counting children's lost time the same as adults or counting children's lost time at zero) yields an estimate of \$32.23, which appears to be a reasonable estimate. Thus, the average economic value of lost travel time as \$32.23 per vehicle hour of delay or detour due to road and bridge closures.

The above analysis considers all traffic to be of equal economic value. However, there are two other possible economic impacts from closures of roads and bridges that need to be evaluated for possible inclusion in benefit-cost analysis, namely:

1. Economic impacts for commercial traffic
2. The impact of road and bridge closures on emergency vehicles

For commercial travel (including heavy trucks) the analysis presented above includes only the value of the driver's time. As discussed above, typical delay or detour times are short, on the order of a few minutes to perhaps an hour or two. For such short delays there are unlikely to be major economic impacts such as spoilage of perishables goods or interruption of normal economic activity. Therefore, no adjustments for commercial traffic need be made.

For emergency vehicles, the delay or detour times may increase the response time and thus lower the quality of emergency response. However, the fraction of normal traffic that is emergency vehicles is extremely small, a very small fraction of 1% of total traffic. Furthermore, delays and detours may be shorter for emergency vehicles as such vehicles typically have expedited access to the transportation system and some emergency response vehicles have off-road capabilities or higher ground clearances and thus can travel on roads closed to normal traffic. Thus, the impact of road and bridge closures on emergency vehicle response is assumed to be minor.

For purposes of benefit-cost analysis, the economic impact of road or bridge closures is estimated as \$32.23 per vehicle hour of delay.

7.5 Casualties

Failure of a road or bridge may occasionally result in deaths or injuries from vehicular accidents at the failure location. However, such incidents are extremely rare. Closure of a road or bridge, or even a major washout of a section of road or complete washout of a bridge very rarely results in casualties. Historical experience suggests that deaths from such accidents would be many times less than 1 person per 1,000,000 in a community affected by a typical road or bridge closure. Based on the statistical value of human life (deaths and injuries), such rare incidents are generally negligible compared to the economic impact of delay and detour times discussed above.

The statistical value of casualties avoided may be important for one type of hazard mitigation project: seismic retrofit of bridges subject to collapse in earthquakes. For example, if one of the approximately 300-foot long segments of the Bay Bridge between Oakland (CA) and Treasure Island were to fail completely in an earthquake, the expected death rate would be a very high percentage of the average “occupancy” of the bridge segment. For high traffic bridges that could be subject to complete failure in earthquakes, the value of casualties avoided should be evaluated individually for each mitigation project.

Estimating casualty rates from bridge failures from earthquakes requires professional judgement. Such estimates should be made in close consultation with seismic engineers thoroughly familiar with seismic bridge engineering.

7.6 Summary Guidance

The suggested approach for benefit-cost analysis of hazard mitigation projects for roads and bridges has five steps, each of which must be done for both the before and after mitigation states of the road or bridge, as a function of the severity of disaster:

1. Estimate the physical damages to road or bridges in dollar terms
2. Estimate the repair time to restore normal traffic flow,
3. Estimate the average delay or detour time
4. Obtain the average daily traffic count for the road or bridge
5. Calculate the economic impacts of loss of function of the road or bridge, using the above data and the per vehicle per hour value of lost travel time of \$32.23

For floods, these estimates are made as a function of flood depth or flood frequency. For hurricanes or earthquakes, these estimates are made as a function of wind speed or peak ground acceleration

(PGA), respectively. Data sources and guidance for making these estimates calculations are summarized in Table 7.2 below. For earthquakes only, the additional category of casualties losses is also considered for bridge mitigation projects.

**Table 7.2
Summary Guidance for Benefit-Cost Analysis
of Hazard Mitigation Projects for Roads and Bridges**

Parameter	Data Sources
1. Physical damages to road or bridge	Historical data and professional judgement from individuals knowledgeable about roads and bridges
2. Repair time to restore normal traffic flow	Historical data and professional judgement or estimates from local traffic officials
3. Average delay or detour time	Historical data or estimates from local traffic officials
4. Average daily vehicle count	Historical data or estimates from local traffic officials
5. Economic impact of road or bridge closure	\$32.23 per vehicle hour of delay or detour

As an example, consider a situation in which a culvert washout closes a road until repairs are made. For benefit-cost analysis, estimates are made of the physical damage costs and loss-of-function economic impacts for each flood depth or flood frequency, both before and after mitigation. As an example, we show a typical calculation of the damages and losses before mitigation for one flood frequency (a 25-year event).

Example

Physical damages, the actual cost to repair the road and culvert, are estimated from historical sources to be **\$6,500**. Local traffic officials estimate the number of days of closure to be **3 days**, the average delay or detour time to be **30 minutes**, and the average daily vehicle count to be **1,200**.

To determine the economic impact of the road closure, we take the product of the repair time (3 days), average delay or detour time (0.5 hours), average daily vehicle count (1,200 vehicles per day), and the cost per vehicle hour of the delay or detour (\$32.23) (see Table 7.2), or:

$$\begin{aligned}
 & \mathbf{3 \times 0.5 \times 1,200 \times \$32.23 = \$58,014} && \text{for the economic impact of the road closure.} \\
 & \text{Add the physical damage cost:} && \mathbf{+ 6,500} \\
 & \text{for total damages and losses:} && \mathbf{\$64,514}
 \end{aligned}$$

In this example, nearly 90% of the total damages and losses arise from the economic impact of the road closure. Only 10% of the total damages and losses are from the repair costs. For benefit-cost analysis of mitigation projects for roads and bridges, it is always extremely important to count the benefits of avoiding road closures. To not do so would be to grossly undercount the benefits of mitigation projects for roads and bridges.

Using Benefit-Cost Review in Mitigation Planning

State and Local Mitigation Planning

How-To Guide Number Five

FEMA 386-5 *May 2007*



FEMA

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TABLE OF CONTENTS

INTRODUCTION	1
About This Document	2
Purpose	2
Benefit-Cost Review vs. Benefit-Cost Analysis	2
How to Use This How-To Guide	3
PART 1: REVIEW BENEFITS AND COSTS	5
PART 2A: PRIORITIZE ACTIONS - QUALITATIVE METHODS.....	8
Method A: Simple Listing	8
Step 1: List identified actions	8
Step 2: Identify benefits and costs.....	8
Step 3: Assign priority.....	8
Method B: Relative Rating	10
PART 2B: PRIORITIZE ACTIONS - QUANTITATIVE METHODS	11
Method C: Simple Score	11
Method D: Weighted Score	12
PART 3: DOCUMENT THE REVIEW AND PRIORITIZATION PROCESS	13
APPENDIX A: EXHIBITS	
<i>List of Exhibits</i>	
Exhibit 1: Measuring Vulnerability Before and After Mitigation.....	5
Exhibit 2: Benefits	6
Exhibit 3: Costs	6
Exhibit 4: Prioritization by Listing Benefits and Costs	10
Exhibit 5: Prioritization Using STAPLEE and Qualitative Scores	11
Exhibit 6: Prioritization Using STAPLEE and Simple Scores.....	12
Exhibit 7: Prioritization Using STAPLEE and Weighted Scores	13

The **Disaster Mitigation Act of 2000** (DMA 2000) provides an opportunity for States, Tribal governments, and local jurisdictions to significantly reduce their vulnerability to natural hazards. It also allows them to streamline the receipt and use of Federal disaster assistance through pre-disaster hazard mitigation planning. DMA 2000 places new emphasis on State, Tribal, and local mitigation planning by requiring these entities to develop and submit mitigation plans as a condition of receiving various types of pre- and post-disaster assistance (such as the Pre-Disaster Mitigation [PDM] program and the Hazard Mitigation Grant Program [HMGP]) under the Stafford Act.

On February 26, 2002, the Department of Homeland Security's Federal Emergency Management Agency (FEMA) published an **Interim Final Rule** (the Rule) to implement the mitigation planning requirements of DMA 2000. The Rule outlines the requirements for State, Tribal and local mitigation plans.

FEMA has developed a series of guides, called the **Mitigation Planning "How-To" Guides**, to provide State, Tribal, and local governments with easy-to-understand information needed to initiate and maintain a hazard mitigation planning process and meet the requirements of the Rule. The guides can be ordered free of cost by calling 1-800-480-2520, or they can be downloaded from http://www.fema.gov/plan/mitplanning/planning_resources.shtm#1.

The first four How-To Guides are known as the "core four" guides. They provide the basic instructions for preparing a natural hazard mitigation plan. They are:

- *Getting Started: Building Support for Mitigation Planning* (FEMA 386-1)
- *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA 386-2)
- *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies* (FEMA 386-3)
- *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan* (FEMA 386-4)

This How-To Guide, *Using Benefit-Cost Review in Mitigation Planning* (FEMA 386-5), supplements FEMA 386-3 and focuses on guidance for using Benefit-Cost Review when prioritizing mitigation actions in a hazard mitigation plan.

About This Document

Purpose

The purpose of a mitigation plan is to reduce the community's vulnerability to hazards. After assessing its risks, a community may consider many mitigation options. However, due to monetary as well as other limitations, it is often impossible to implement all mitigation actions. Hence, the Planning Team needs to select the most cost-effective actions for implementation first, not only to use resources efficiently, but to make a realistic start toward mitigating risks.

The Rule supports the principle of cost-effectiveness by requiring hazard mitigation plans to have an action plan that includes a prioritization process that demonstrates a special emphasis on maximization of benefits over costs. The requirement states:

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. [§201.6(c)(3)(iii)]

The purpose of this guide is to help local jurisdictions understand how to apply the concepts of Benefit-Cost Review to the prioritization of mitigation actions, and thereby meet the requirement of the Rule.

Benefit-Cost Review vs. Benefit-Cost Analysis

The Benefit-Cost Review for mitigation planning differs from the benefit-cost analysis (BCA) used for specific projects. BCA is a method for determining the potential positive effects of a mitigation action and comparing them to the cost of the action. To assess and demonstrate the cost-effectiveness of mitigation actions, FEMA has developed a suite of BCA software, including hazard-specific modules. The analysis determines whether a mitigation project is technically cost-effective.

The principle behind the BCA is that the benefit of an action is a reduction in future damages. The Benefit-Cost Review method described in this guide is based on the same principle, but this guide does NOT explain how to conduct a BCA. DMA 2000 does not require hazard mitigation plans to include BCAs for specific projects.

A Benefit-Cost Review can satisfy the DMA 2000 requirements even if it is relatively simple. Remember that a Benefit-Cost Review can be broad and need not be complex. It needs to be comprehensive so that it covers

monetary as well as non-monetary costs and benefits associated with each action. Some projects can be extremely cost-effective but not as beneficial for the community at large. The Planning Team should think through a wide variety of questions, such as: How many people will benefit from the action? How large an area is impacted? How critical are the facilities that benefit from the action (e.g., is it more beneficial to protect the fire station than the administrative building, even though it costs more)? Environmentally, does it make sense to do this project for the overall community?

A hazard mitigation plan must demonstrate that a process was employed that emphasized a review of costs and benefits when prioritizing the mitigation actions. This requirement allows the Planning Team flexibility in determining which method to use. Four methods are described in this document, ranging from qualitative to more quantitative. These examples are intended to be illustrative of acceptable processes, but do not cover all possible methods that are approvable under DMA 2000.

How to Use This How-To Guide

The Rule states, “The mitigation strategy shall include a section that identifies and analyzes a comprehensive range of mitigation actions.” However, no specific methodology for the analysis is specified or required. FEMA 386-3 discusses some ways to conduct an analysis. This How-To Guide, Using Benefit-Cost Review in Mitigation Planning (FEMA 386-5), provides methods and examples to review benefits and costs, prioritize actions and document the entire process.

This guide is organized as follows:

Part 1 - Review Benefits and Costs – This section explains how to review benefits and costs for each action.

Part 2 A - Prioritize Actions – Qualitative Methods – This section provides two qualitative methods to prioritize actions (Methods A and B).

Part 2 B - Prioritize Actions – Quantitative Methods – This section provides two quantitative methods to prioritize actions (Methods C and D).

Part 3 - Document the Review and Prioritization Process – This section discusses documentation of the Benefit-Cost Review process in the plan to meet DMA 2000 requirements.

Worksheets (Review Tools) like the ones in Part 1 can be used to summarize the costs and benefits. After the review of benefits and costs for each action, the Planning Team will be able to prioritize the actions.

They can then use one of the four methods (A to D), which range from simple to complex. See Figure 1 for an illustration of how to use this guide. Blank worksheets are included in Appendix A, Exhibits. The worksheets can be duplicated and used to record the progress of prioritizing mitigation actions for the hazard mitigation plan.

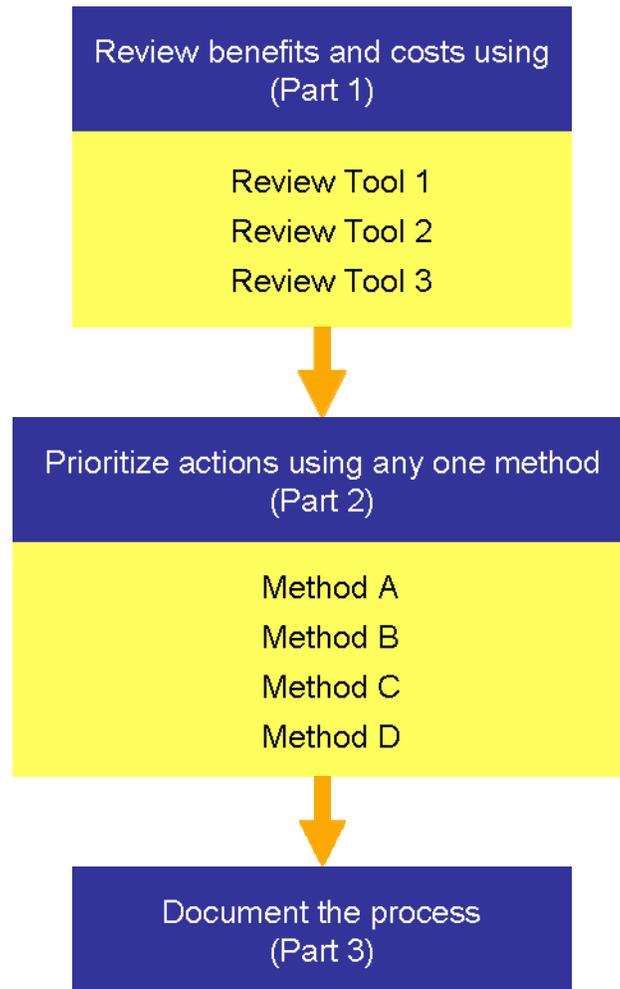


Figure 1. How to Use This How-To Guide

Therefore, a hazard mitigation plan will meet the requirements of the Rule by:

- Using Review Tools 1, 2, and 3 from Part 1,
- Using any one prioritization method from Part 2 (Method A, B, C, or D), and
- Documenting the process (as described in Part 3).

PART 1: REVIEW BENEFITS AND COSTS

To assess the measurable and non-measurable benefits and costs associated with each action, use Review Tools 1, 2, and 3. Then, summarize the analysis of each action's benefits and costs and use this review later when prioritizing the actions.

Review Tool 1: Measuring Vulnerability Before and After Mitigation

Action: _____

Vulnerability	Before the Action is implemented*	After the Action is implemented*	Difference
Number of people affected by the hazard			
Area affected (acreage) by the hazard			
Number of properties affected by the hazard			
Property damage (amount in \$)			
Loss of use (number of properties/physical assets [e.g., bridges] in number of days)			
Loss of life (number of people)			
Injury (number of people)			
**			

*Include measurable items, where possible, based on experience, professional estimate, or judgment.

**Add more categories of risk as appropriate for the specific community's plan.

Sample Exhibit 1: Measuring Vulnerability Before and After Mitigation

(Exhibit 1 shows Review Tool 1 filled out for one action)

Action: Floodproof 10 businesses in the downtown area

Vulnerability	Before the Action is implemented	After the Action is implemented	Difference
Number of people affected by the hazard	<u>Almost entire community (because downtown is affected)</u>	<u>Same as before but they will be less affected if businesses are able to remain open</u>	<u>Less impact</u>
Area affected (acreage) by the hazard	<u>1 acre</u>	<u>1 acre</u>	<u>Area still affected but less impact</u>
Number of properties affected by the hazard	<u>15</u>	<u>5</u>	<u>10</u>
Property damage (amount in \$)	<u>\$100,000 every year</u>	<u>\$10,000 every year</u>	<u>\$90,000 every year</u>
Loss of use (number of properties/physical assets [e.g., bridges] in number of days)	<u>10 properties for 5 days every year</u>	<u>0</u>	<u>Completely eliminated</u>
Loss of life (number of people)	<u>2 every 20 years</u>	<u>1 every 20 years</u>	<u>Reduced by half</u>
Injury (number of people)	<u>0</u>	<u>0</u>	<u>0</u>

PART 1: REVIEW BENEFITS AND COSTS

A simple listing of other costs and benefits (that do not fit into the quantitative format of Review Tool 1) can supplement Review Tool 1, as shown in Review Tools 2 and 3. Fill out as many items as possible.

Review Tool 2: Benefits

Action: _____

<u>Benefits</u>
Risk reduction (short- or long-term)
If other community goals are achieved, explain
If easy to implement, explain
If funding is available, explain
If politically/socially acceptable, explain

Sample Exhibit 2: Benefits

Action: Floodproof 10 businesses in the downtown area

<u>Benefits</u>
City's cost to repair flooded properties reduced by 80%; approximate saving of \$5,000 per year
Flooding problem in downtown area solved for the long-term; community's problem of business interruption solved
Federal grants like Flood Mitigation Assistance (FMA) and PDM can be applied for to implement the proposed floodproofing
Will help improve CRS rating in the long term (so entire community's flood insurance premium will be reduced)
More than half the members of the City Council are opposed to buy-outs; it might be easier to get their support for an alternative to buy-outs

Review Tool 3: Costs

Action: _____

<u>Costs*</u>
Construction cost (amount in \$)
Programming cost (amount in \$, # of people needed to administer)
Time needed to implement
If unfair to a certain social group, explain
If there is public/political opposition, explain
If there are any adverse effects on the environment, explain

*If precise costs are not available, use costs based on experience, professional estimate, or judgment.

Sample Exhibit 3: Costs

Action: Floodproof 10 businesses in the downtown area

<u>Costs</u>
Floodproofing cost = \$10,000 X 10 = \$100,000
Need at least 3 people to administer (after technical assistance from the State)
Need a year to implement

PART 1: REVIEW BENEFITS AND COSTS

After reviewing benefits and costs for all the actions using the Review Tools, go on to prioritize the actions. Note that there are many ways of prioritizing actions; however, DMA 2000 mandates an emphasis on Benefit-Cost Review as part of the prioritization process. Directly linking the prioritization process to the Benefit-Cost Review clearly shows that costs and benefits were emphasized. Therefore, when the review of benefits and costs of actions in Part 1 is used to prioritize the actions using one of the methods from Part 2, the process meets DMA 2000 requirements.

PART 2A: PRIORITIZE ACTIONS - QUALITATIVE METHODS

Based on the review completed in Part 1, use Part 2 to prioritize or rank the actions.

The two qualitative methods described in this section rely on a holistic response or common sense ranking. The two quantitative approaches in Part 2B rely more on comparative analysis that can be translated into mathematical scores. When the number of actions is relatively small, a subjective or qualitative process may be used. The greater the number of actions, the more likely it is that a more quantitative approach will be useful in assigning priority.

Method A: Simple Listing

The qualitative method described below helps the Planning Team judge the priorities of actions based on perceived pros and cons (i.e., benefits and costs).

The method is best used when it is not possible, or appropriate, to identify a quantitative measure of benefits and costs. Each action can have a unique advantage or disadvantage that can subsequently be used for prioritization.

Using this method ensures that special emphasis is given to Benefit-Cost Review by categorizing prioritization criteria (e.g., ease of implementation, technical effectiveness) as either benefits or costs.

Step 1: List identified actions

For each hazard, list the actions identified earlier in the plan.

Step 2: Identify benefits and costs

Identify all expected benefits (i.e., positive effects) and costs (i.e., perceived obstacles) of the actions and write these down in the benefits and costs columns, respectively. Use Review Tools 1, 2, and 3 (see Exhibits 1, 2, and 3) from Part 1.

Step 3: Assign priority

As a result of the Benefit-Cost Review, the Planning Team assigns a priority to each action. Priority can be expressed in many ways, such as:

- High, medium, low, accompanied by an explanation of what each term means.
- Priority 1, Priority 2, etc.
- Immediate, short-term, and long-term, accompanied by an explanation of what each category means (e.g., immediate = within a month, short-term = within 6 months, long-term = within 2 years).

PART 2A: PRIORITIZE ACTIONS - QUALITATIVE METHODS

Sample Exhibit 4: Prioritization by Listing Benefits and Costs

Actions	Benefits (Pros)	Costs (Cons)	Priority
Floodproof 10 businesses in the downtown area	<ul style="list-style-type: none"> - Avoidance of 1 loss of life every 20 years (casualties reduced by half) - Saving of \$90,000 in private damages and \$5,000 in public cost - Loss of use of 10 downtown businesses completely eliminated - Community's problem of business interruption solved - Federal grants like FMA and PDM can be applied for to implement the proposed floodproofing - Will help improve CRS rating in the long term (so entire community's flood insurance premium will be reduced) - More than half the members of the City Council are opposed to buy-outs; it might be easier to get their support for an alternative to buy-outs 	<ul style="list-style-type: none"> - Floodproofing cost = \$10,000 X 10 = \$100,000 - Need at least 3 people to administer (after obtaining technical assistance from the State) - Need a year to implement 	High (Priority no. 1)
Build safe rooms for a neighborhood of 50 homes without basements	<ul style="list-style-type: none"> - Avoidance of 5 lives lost every 20 years (casualties reduced by half) - Public and political support for mitigating this hazard exists (due to regular recurrence of tornadoes) 	<ul style="list-style-type: none"> - City will share 50% of the cost per existing home = \$2,000 X 50 = \$100,000 - Administrative cost per home = \$1,000 X 50 = \$50,000 - Need 3 years to complete - Tornadoes are unpredictable; they may never strike this exact area again 	Medium (Priority no. 2)
Broadcast educational video on local channel on hazard mitigation	<ul style="list-style-type: none"> - Local channel might be willing to broadcast free of cost - Publicity would spread awareness about mitigation methods as well as what to do in an emergency 	<ul style="list-style-type: none"> - Cost of preparing video = \$5,000 - Only 5% of population might notice the broadcast - Only 5% of that 5% might actually consider acting on individual mitigation methods 	Low (Priority no. 3)

PART 2A: PRIORITIZE ACTIONS - QUALITATIVE METHODS

Method B: Relative Rating

A second approach is to assign relative scores to the actions based on qualitative factors. By rating costs and benefits as High, Medium, and Low, this method clearly emphasizes the Benefit-Cost Review. Exhibit 5 uses a set of factors commonly called STAPLEE, which stands for **S**ocial, **T**echnical, **A**ministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental factors. They are typically used for evaluating planning alternatives. For details on using STAPLEE, refer to FEMA 386-3.

Sample Exhibit 5: Prioritization Using STAPLEE and Qualitative Scores

Actions → Criteria ↓	Floodproof 10 properties in the downtown area		Build safe rooms in a neighborhood of 50 homes without basements		Broadcast educational video about hazard mitigation on local channel	
	Cost	Benefit	Cost	Benefit	Cost	Benefit
Social	-	-	L	-	-	-
Technical	M	H	M	M	L	L
Administrative	M	-	M	-	L	-
Political	-	L	-	H	-	-
Legal	-	-	-	-	-	-
Economic	M	H	H	-	-	-
Environmental	-	-	-	-	-	-
Priority	High (priority 1)		Medium (priority 2)		Low (priority 3)	

Definition of rating scale: H=High, M=Medium, L=Low, - None/Not applicable

Use the Review Tools completed in Part 1 to help rate the costs and benefits. For help on how to rank High, Medium, Low, None, or NA, see the explanation about STAPLEE in FEMA 386-3.

PART 2B: PRIORITIZE ACTIONS - QUANTITATIVE METHODS

Quantitative methods typically assign numerical values to concepts like high, medium, and low. The Planning Team needs to review the scores and make sure they make sense.

Method C: Simple Score

A simple way of using scores based on the STAPLEE criteria is shown in Exhibit 6. After the table is completed, the scores can be added to determine priority.

Sample Exhibit 6: Prioritization Using STAPLEE and Simple Scores

Actions → Criteria ↓	Floodproof 10 properties in the downtown area		Build safe rooms in a neighborhood of 50 homes without basements		Broadcast educational video about hazard mitigation on local channel	
	Cost	Benefit	Cost	Benefit	Cost	Benefit
Social	0	1	-1	1	0	0
Technical	-1	2	-1	2	-1	1
Administrative	-1	0	-1	0	-1	0
Political	0	1	0	1	0	0
Legal	0	0	0	0	0	0
Economic	-1	2	-1	0	0	0
Environmental	0	0	0	0	0	0
Sub-total of cost/benefit	-3	6	-4	4	-2	1
Total Score	-3+6 = 3		-4+4 = 0		-2+1 = -1	
Priority	No. 1		No. 2		No. 3	

Definition of rating scale: 2=Very beneficial, 1=Favorable, 0=None/Not applicable, -1=Not Favorable

The Planning Team should be careful when assigning criteria, scores, and weights to avoid the problem inherent in comparing different types of actions. In the example above, the scores allowed the participants to objectively compare the various actions. The weakness of such a simple method is that very different kinds of actions may score similarly, and if not given qualitative consideration (a common-sense check), may yield a questionable ranking. In this example, the safe-room action's total score is very low compared to the floodproofing action, but the Relative Rating method (Method B in Part 2A) showed that for floodproofing and safe rooms, the actions were similar in how their benefits measured up against the costs, and for both actions the benefits exceeded the costs. The Simple Score method shown above, however, results in a greater difference in the final priority scores (3 vs. 0), indicating a large difference

PART 2B: PRIORITIZE ACTIONS - QUANTITATIVE METHODS

in these actions' cost-effectiveness. A formal Benefit-Cost Analysis for each project would verify whether this large difference is accurate, although it is not required for the plan.

Method D: Weighted Score

As noted in the Simple Score method (Method C), a common-sense adjustment may be necessary to adapt the prioritization to the plan. The weighted score method attempts to compensate for the limitations of the Simple Score method by adding emphasis to those factors judged to be more important.

An example of weighted scores using STAPLEE follows.

Sample Exhibit 7: Prioritization Using STAPLEE and Weighted Scores

Actions → Criteria ↓	Floodproof 10 properties in the downtown		Build safe rooms in a neighborhood of 50 homes without basements		Broadcast educational video about hazard mitigation on local channel	
	Cost	Benefit	Cost	Benefit	Cost	Benefit
Social (weight = 1)	0	1	-1	1	0	0
Technical (weight = 2)	-1x2=-2	2x2=4	-1x2=-2	2x2=4	-1x2=-2	1x2=2
Administrative (weight = 1)	-1	0	-1	0	-1	0
Political (weight = 1)	0	1	0	1	0	0
Legal (weight = 1)	0	0	0	0	0	0
Economic (weight = 2)	-1x2=-2	2x2=4	-1x2=-2	0	0	0
Environmental (weight = 1)	0	0	0	0	0	0
Sub-total of cost/benefit	-5	10	-6	6	-3	2
Total Score	-5+10 = 5		-6+6 = 0		-3+2 = -1	
Priority	No. 1		No. 2		No. 3	

Definition of rating scale: 2=Very beneficial, 1=Favorable, 0=None/Not applicable, -1=Not Favorable

Assigning weights to some factors over others can become challenging for the Planning Team. Local knowledge and values should guide the process to achieve the priorities most appropriate for the local situation.

PART 3: DOCUMENT THE REVIEW AND PRIORITIZATION PROCESS

Remember to document in the plan the Benefit-Cost Review process and prioritization method used. Include the Review Tools and prioritization worksheets from this How-To Guide in the plan. Clearly explain how the scores and priorities were assigned.

Be sure to explicitly state that Benefit-Cost Review was **emphasized** in the prioritization process. Using the Review Tools and one of the methods for prioritization from this guide ensures the emphasis on the maximization of benefits over costs. This approach demonstrates that the actions are being evaluated in terms of their pros and cons, which are represented as costs and benefits.

The intention of DMA 2000 is for the hazard mitigation plan to be useful and unique for each community; therefore, an impartial review and ranking of the mitigation actions is key. It is not so important which method is used, but rather that the method chosen is logical and clearly documented.

Remember that the Benefit-Cost Review is an important element of the community's hazard mitigation plan. Keep it simple, and focus on your community's needs and values.

Appendix A

Exhibits

Exhibit 1: Measuring Vulnerability Before and After Mitigation

Action: _____

Vulnerability	Before the Action is implemented*	After the Action is implemented*	Difference
Number of people affected by the hazard			
Area affected (acreage) by the hazard			
Number of properties affected by the hazard			
Property damage (amount in \$)			
Loss of use (number of properties/physical assets [e.g., bridges] in number of days)			
Loss of life (number of people)			
Injury (number of people)			
**			

*Include measurable items, where possible, based on experience, professional estimate, or judgment.

**Add more categories of risk as appropriate for the specific community's plan.

Exhibit 2: Benefits

Action: _____

<u>Benefits</u>
Risk reduction (short- or long-term)
If other community goals are achieved, explain
If easy to implement, explain
If funding is available, explain
If politically/socially acceptable, explain

Exhibit 3: Costs

Action: _____

<u>Costs*</u>
Construction cost (amount in \$)
Programming cost (amount in \$, # of people needed to administer)
Time needed to implement
If unfair to a certain social group, explain
If there is public/political opposition, explain
If there are any adverse effects on the environment, explain

*If precise costs are not available, use costs based on experience, professional estimate, or judgment.

Exhibit 5: Prioritization Using STAPLEE and Qualitative Scores

Criteria ↓ Actions →						
	Cost	Benefit	Cost	Benefit	Cost	Benefit
Social						
Technical						
Administrative						
Political						
Legal						
Economic						
Environmental						
Priority						

Definition of rating scale: _____

Exhibit 6: Prioritization Using STAPLEE and Simple Scores

Criteria ↓ Actions →						
	Cost	Benefit	Cost	Benefit	Cost	Benefit
Social						
Technical						
Administrative						
Political						
Legal						
Economic						
Environmental						
Sub-total of cost/benefit						
Total Score						
Priority						

Definition of rating scale: _____

Exhibit 7: Prioritization Using STAPLEE and Weighted Scores

Actions → Criteria ↓						
	Cost	Benefit	Cost	Benefit	Cost	Benefit
Social (weight = __)						
Technical (weight = __)						
Administrative (weight = __)						
Political (weight = __)						
Legal (weight = __)						
Economic (weight = __)						
Environmental (weight = __)						
Sub-total of cost/benefit						
Total Score						
Priority						

Definition of rating scale: _____

