City of Merced

LOCAL HAZARD MITIGATION PLAN

EFFECTIVE DATE: MARCH 19, 2015

CITY OF MERCED
"Gateway to Yosemite"

CITY CLERK'S CERTIFICATE

I, JOHN M. BRAMBLE, City Clerk of the City of Merced, California, do hereby certify that the attached document, entitled:

RESOLUTION 2015-09

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MERCED, CALIFORNIA, ADOPTING THE *2015 MERCED HAZARD MITIGATION PLAN* AND ACCEPTING A NOTICE OF EXEMPTION PREPARED UNDER ENVIRONMENTAL REVIEW #10-37, AND APPROVING GENERAL PLAN AMENDMENT #14-03

is a true and correct copy of the original on file in the Office of the Merced City Clerk, Merced, California.

DATED: March 17, 2015

JOHN M. BRAMBLE, CITY CLERK

BY: ______________________

JOHN TRESIDDER
Deputy City Clerk

CITY OF MERCED INCORPORATED APRIL 1, A.D. 1889

RESOLUTION NO. 2015-09

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MERCED, CALIFORNIA, ADOPTING THE *2015 MERCED HAZARD MITIGATION PLAN* AND ACCEPTING A NOTICE OF EXEMPTION PREPARED UNDER ENVIRONMENTAL REVIEW #10-37, AND APPROVING GENERAL PLAN AMENDMENT #14-03

WHEREAS, the City of Merced recognizes the threat that natural hazards pose to people and property within our community, and undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

WHEREAS, to be eligible for Federal Emergency Management Agency pre- and post-disaster mitigation funds, the Disaster Mitigation Act of 2000 requires jurisdictions to be covered by a Hazard Mitigation Plan; and

WHEREAS, the Federal Emergency Management Agency and California Emergency Management Agency have developed a hazard mitigation program that assists jurisdictions in their efforts to become Disaster-Resistant entities that focus, not just on disaster response and recovery, but also on preparedness and hazard mitigation, which enhances economic sustainability, environmental stability and social well-being; and

WHEREAS, the City's Disaster Council, in coordination with City Staff and community engagement, have developed a draft Local Hazard Mitigation Plan (LHMP); and

WHEREAS, the LHMP supports and is consistent with the goals and policies established in the Safety Element of the *Merced Vision 2030 General Plan*; and

WHEREAS, the California Office of Emergency Services and Federal Emergency Management Agency officials have reviewed the draft LHMP and have approved it contingent upon adoption of the plan by the City of Merced; and

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WHEREAS, a Notice of Exemption, detailed in Environmental Review #10-37, has been prepared for the LHMP, as well as General Plan Amendment #14-03 to include said plan by reference.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF MERCED DOES HEREBY RESOLVE, DETERMINE, FIND, AND ORDER AS FOLLOWS:

SECTION 1. CALIFORNIA ENVIRONMENTAL QUALITY ACT. Based upon the evidence and testimony in the record at the City Council public hearing, the City Council, exercising its independent judgment and review, hereby accepts Notice of Exemption prepared under Environmental Review #10-37, pursuant to the provisions of the California Environmental Quality Act.

SECTION 2. ADOPTION OF THE 2015 MERCED HAZARD MITIGATION PLAN. The *2015 Merced Hazard Mitigation Plan* is hereby adopted, as recommended by the City's Disaster Council on April 19, 2013 and subsequently recommended by the City of Merced Planning Commission on February 18, 2015.

SECTION 3. GENERAL PLAN AMENDMENT APPROVAL. The General Plan of the City of Merced is hereby amended by approving General Plan Amendment #14-03, incorporating the *2015 Merced Hazard Mitigation Plan* into the General Plan by reference, and making changes as shown in Exhibit 1 to provide consistency between the *Merced Vision 2030 General Plan* and the *2015 Merced Hazard Mitigation Plan*.

SECTION 4. TRANSMITTAL OF 2015 MERCED HAZARD MITIGATION PLAN. The City of Merced Planning Department is directed to submit this Adoption Resolution to the California Emergency Management Agency and Federal Emergency Management Agency officials to enable the Plan's final approval.

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[illegible]

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PASSED AND ADOPTED by the City Council of the City of Merced at a regular meeting held on the 16th day of March 2015, by the following vote:

AYES: 7 Council Members: BELLUOMINI, BLAKE, DOSSETTI, LOR, MURPHY, PEDROZO, THURSTON

NOES: 0 Council Members: NONE

ABSENT: 0 Council Members: NONE

ABSTAIN: 0 Council Members: NONE

APPROVED:

Mayor

ATTEST:
JOHN M. BRAMBLE, CITY CLERK

BY:
Assistant/Deputy City Clerk

(SEAL)

APPROVED AS TO FORM:

2/9/15
City Attorney Date

[illegible]

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GPA #14-03/PROPOSED AMENDMENTS TO THE SAFETY ELEMENT OF THE ***MERCED VISION 2030 GENERAL PLAN***:

11.1.1 Scope of the Safety Element

The Safety Element provides a systematic approach for responding to hazards relevant to the City of Merced through a set of goals, policies, and actions designed to deal with those hazards. This report recognizes that hazards are an unavoidable aspect of society and that, therefore, some degree of risk is inherent in everyday life.

The proposed Merced growth boundary (or SUDP/SOI) has no known history of, or known geographical conditions for, surface rupture, tsunamis, or hydro-compaction. All other hazards relevant to Merced, however, are addressed in more detail in other sections of this Element. This introduction includes an overview of the City's Emergency Response/Disaster Plan and Hazard Mitigation Plan. Section 11.2 presents an analysis of the relevant issues as well as hazard response. Section 11.2 includes the goals, policies, and implementing actions. Section 11.4 contains technical information and support data of the hazards analysis. The Safety Element is one of the seven required elements of the General Plan per State law.

11.1.2 City of Merced Emergency Response/Disaster Plan

In 2011, the City of Merced updated its Emergency Operations Plan. The plan is updated on a regular basis to meet the evolving emergency response needs and to address new hazards. The Plan addresses mitigation, planning, response, and recovery activities for various emergency situations. ~~The Plan consists of: a) Purpose, scope, situations, and assumptions; b) concept of operations; c) organization and assignment of responsibility; d) direction, control, and coordination; e) information collection and dissemination; f) communications; g) administration, logistics, and finance; h) preparedness, training and exercises; i) plan development and maintenance; j) authorities; and k) supporting documents and annexes. The purpose of the plan is to provide emergency planning, organization, response, mitigation, and recovery guidance.~~ The Plan is compliant with the emergency management requirements of the Standardized Emergency Management System (SEMS), the Incident Command System (ICS), and the National Incident Management System (NIMS). ~~Further, the Plan supports law enforcement, access control, fire, medical, rescue, hazardous materials, care and shelter, support, and resources.~~ The plan is designed to prepare the community for responding to an emergency situation in a highly organized and efficient manner.

11.1.3 City of Merced Hazard Mitigation Plan

The *Merced Hazard Mitigation Plan* presents a comprehensive risk assessment of natural hazards that have the potential to affect the City of Merced. The Local Hazard Mitigation Plan recommends possible mitigation measures for reducing the effects of the potential hazards. It is incorporated by this reference into the Safety Element, and should be consulted when addressing known hazards to ensure the general health and safety of people within the City of Merced. The goals and policies within this Safety Elements support and are consistent with the recommended mitigation strategy within the Local Hazard Mitigation Plan.

Deleted characters and spaces: 692
Added characters and spaces: 683

EXHIBIT 1

ORIGINAL POLICY LANGUAGE: **(TO BE DELETED)**

1.1.g **~~Complete preparation and implementation (and updates as needed) of a Local Hazard Mitigation Plan for the City per the requirements of the Federal Emergency Management Agency (FEMA)."~~**

~~The City Fire Department has headed up efforts to make sure that the City of Merced is prepared for emergencies and disasters by preparing a City Emergency Plan and training City management staff and all First Responders in the Incident Command System (ICS)/National Incident Management System (NIMS). The City has a designated Emergency Operations Center in the Central Fire Station on 16th Street. City staff has on-going training and training exercises or drills are conducted on an ongoing basis throughout the year. The above Implementing Actions will be employed to make sure that the City's Emergency Plans are kept up-to-date and the City is prepared for disasters of all types.~~

PROPOSED REPLACEMENT POLICY LANGUAGE: **(TO BE ADDED)**

1.1.g **Adopt and update the *Merced Hazard Mitigation Plan* as needed, and consult it when addressing known hazards to ensure the general health and safety of people within the City of Merced.**

The City of Merced Local Hazard Mitigation Plan presents a comprehensive risk assessment of natural hazards that have the potential to affect the City of Merced. The Local Mitigation Plan was developed by the City in accordance with the Federal Disaster Mitigation Act of 2000, adopted in 2015 by the City of Merced, and approved by the Federal Emergency Management Agency. The Local Hazard Mitigation Plan suggests possible mitigation measures for reducing the effects of the potential hazards. The goals and policies within this Safety Elements support and are consistent with the recommended mitigation strategy within the Local Hazard Mitigation Plan.

NOTICE OF EXEMPTION

To: ___ Office of Planning and Research
P.O. Box 3044
Sacramento, CA 95812-3044

_X_ County Clerk
County of Merced
2222 M Street
Merced, CA 95340

From: City of Merced
678 West 18th St.
Merced, CA 95340

Project Title: City of Merced Local Hazard Mitigation Plan (MHMP), and General Plan Amendment #14-03. Env. Rev. #10-37

Project Applicant: City of Merced

Project Location (Specific): City wide

Project Location - City: Merced **Project Location - County:** Merced

Description of Nature, Purpose, and Beneficiaries of Project: The Hazard Mitigation Plan (MHMP) is a dynamic process built on realistic assessments of past and present information used by the City to anticipate future hazards and provides meaningful strategies to address possible impacts and identified needs. The project follows four phases, organizing resources, assessing risks, developing the mitigation plan, and determining how to implement the plan and monitor progress. The MHMP would be included by reference in the City's General Plan.

Name of Public Agency Approving Project: City of Merced

Name of Person or Agency Carrying Out Project: City of Merced

Exempt Status:

___ Ministerial (Sec. 21080(b)(1); 15268);
___ Declared Emergency (Sec. 21080(b)(3); 15269(a));
___ Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
_X_ Categorical Exemption. State Type and Section Number: 15306, "Class 6"
_X_ Statutory Exemptions. State Code Number: 15262.
___ General Rule (Sec. 15061 (b)(3))

Reasons why Project is Exempt: As defined under the above referenced Sections, the project is exempt because the plan leads to an action which a public agency has not yet approved, adopted, or funded, and the plan is a planning study for possible future actions. The implementation of mitigation actions of future projects of the MHMP may trigger the need for assessment of environmental impacts under CEQA, however.

Lead Agency: City of Merced
Contact Person: Bill King, Principal Planner **Area Code/Telephone:** (209) 385-6858

Signature: Bill King **Date:** 1-26-15 **Title:** Principal Planner

_X_ Signed by Lead Agency

U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

March 19, 2015

Bill King
Principal Planner
City of Merced Planning Department
Merced Civic Center, Planning Department
678 W. 18th Street
Merced, California 95340

Dear Mr. King:

We have completed our final review of the *City of Merced Local Hazard Mitigation Plan*, officially adopted by the City of Merced, CA on March 16, 2015 and found the plan to be in conformance with Title 44 Code of Federal Regulations (CFR) Part 201.6 *Local Mitigation Plans*.

The approval of this plan ensures the City of Merced's continued eligibility for project grants under FEMA's hazard mitigation assistance programs, including Hazard Mitigation Grant Program, Pre-Disaster Mitigation and Flood Mitigation Assistance grant programs. All requests for funding, however, will be evaluated individually according to the specific eligibility, and other requirements of the particular program under which applications are submitted. Approved mitigation plans may be eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at *www.fema.gov/business/nfip/crs.shtm* or through your local floodplain manager.

FEMA's approval of the *City of Merced Local Hazard Mitigation Plan* is for a period of five years, effective starting the date of this letter. Prior to March 19, 2020, the City of Merced is required to review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval in order to continue to be eligible for mitigation project grant funding. The enclosed plan review tool provides additional recommendations to incorporate into the plan when the City of Merced undertakes its identified plan maintenance process.

If you have any questions regarding the planning or review processes, please contact Phillip Wang, Hazard Mitigation Planner at (510) 627-7753, or by email at phillip.wang@fema.dhs.gov.

Sincerely,

Jeffrey D. Lusk
Division Director
Mitigation Division
FEMA Region IX

Enclosures

cc: Marcia Sully, State Hazard Mitigation Officer
Jose Lara, Chief, Hazard Mitigation Planning

www.fema.gov

Benjamin Franklin once said that "By failing to prepare, you are preparing to fail". Many lessons have been learned about disaster preparedness in recent years; most of which have proved this Founding Father to be wise beyond his years.

Michael W. McLaughlin, Fire Chief

The City of Merced has engaged in emergency preparedness planning since 1984 when it developed and adopted its first Emergency Operations Plan (EOP). The Plan was revised in 1995, 2003, and the current Plan was revised and adopted by the City Council in 2011.

The City of Merced is fortunate to not have experienced a major disaster in many years; the optimist would see the City as the safest community to live in; whereas the pessimist would see Merced as being due for a disaster. Planning is the key to proving the optimist correct and the pessimist wrong: "Planning is bringing the future into the present so that you can do something about it now" (Alan Lakein).

Outside of the EOP there have not been any City documents that elaborated on the risks that threaten the community's viability. The EOP identifies many risks to the community; however, the brevity and generalized nature of the hazards and risks identified in the EOP did not provide quantifiable data that the City could use to effectively plan for and prevent the disasters from occurring.

The City of Merced Local Hazard Mitigation Plan (LHMP) has been developed through a participative and collaborative effort that was championed by the City Planning Staff. The purpose of the plan is to identify all potential risks, analyze the likelihood of occurrence, and by planning accordingly, the vulnerability for harm will be greatly diminished. The LHMP will enable the City to effectively plan to prevent and prepare for major events that pose real risks to our City.

This Plan would not be possible without the commitment and contributions of the City of Merced Disaster Council and City Staff. The continued support, comments, and input by the stakeholder organizations and the citizens of our City were invaluable in helping to make the Local Hazard Mitigation Plan an effective, relevant planning tool.

The City of Merced's Local Hazard Mitigation Plan is Online.

In an effort to conserve resources and to protect our natural resources, this document is available online at:

http://www.cityofmerced.org/depts/cd/planning/local hazard mitigation plan/default.asp

CD's of the Plan are also available for purchase at the City of Merced Planning Department.

When printing, please print on recycled paper. We also hope that you will help us continue to be sustainable by sharing printed plans with friends and recycling when it is needed.

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ACKNOWLEDGMENTS

CITY OF MERCED DISASTER COUNCIL

Disaster Control in the City of Merced is guided by Chapter 8.20 of the Merced Municipal Code, which declares its purposes are to provide for: 1) the preparation and carrying out of plans for the protection of persons and property within the City in the event of an emergency; 2) the direction of the emergency organization; and, 3) the coordination of the emergency functions of the City with all other public agencies and affected private persons, corporations, and organizations. To accomplish these purposes, the chapter establishes a "Disaster Council," and describes its powers and duties:

- It shall be the duty of the City of Merced Disaster Council, and it is empowered, to develop and recommend for adoption by the City Council, emergency and mutual-aid plans and agreements and such ordinances and resolutions and rules and regulations as are necessary to implement such plans and agreements; and.
- The City of Merced Disaster Council shall be responsible for the development of the City of Merced emergency operations plan.

Disaster Council Members:

- Chair: **John Bramble**, City Manager (Director of Emergency Services)
- Vice-Chair: **Mike McLaughlin**, Fire Chief (Deputy Director of Emergency Services)
- Police: **Norm Andrade**, Police Chief
- Public Works: **Mike Wegley**, Director
- Public Works: **Stan Murdock**, Director
- Development Services: **David Gonzalves**, Director
- Finance: **Brad Grant**, Director
- Civic Representative: **Dr. Laurie Dickinson**
- The Appraisal Group: **John Sundgren**
- American Red Cross: **Sherry Pitchford**
- Merced Irrigation District: **Dan Aguilar**
- Pacific Gas & Electric: **Richard Dye**
- Merced City School District: **RoseMary Parga Duran**
- Merced Union High School District: **Kelly Bentz**

PLAN LEADERSHIP TEAM

In 2009, the City Manager's Office directed the Development Services Department to spearhead the effort to secure planning funds to prepare a LHMP. The Planning Division of the Development Services Department led this effort, and upon award of a planning grant from FEMA in 2010, formed a Plan Leadership Team (PLT).

- **Bill King** — City of Merced Planning Division (Development Services Department)
- **Mike McLaughlin** — City of Merced Fire Chief
- **Ken Elwin** — City of Merced Engineering Division (Development Services Department)

SKILLS AND KNOWLEDGE STAFF TEAM

Members of the *Skills and Knowledge Staff Team* consisted of City Staff who are currently involved in duties that provide skills and knowledge that were utilized to craft the Plan. The team was established during the initial stages of drafting of the Plan and continued throughout the planning process, providing the following tasks:

- **Joe Angulo** – Environmental Project Manager / Hazardous Waste
- **Dan Arnold** –Public Works Manager - Operations / Mitigation Strategies
- **Stuart England** -- Building Plans Examiner, NFIP Coordinator
- **Kim Espinosa** — Planning Manager / Plan Integrations and Maintenance
- **John Franck** — Senior Engineer / Risk Assessment
- **Mark Hamilton** -- Planner / Asset Inventory and Loss Estimates
- **Ruthanne Harbison** -- GIS Specialist / Mapping and HAZUS
- **Shawn Henry** — City of Merced Fire Battalion Chief / Capability Assessment
- **Nancy Lee** -- Secretary II / Plan Format and Design
- **Julie Nelson** -- Planner / Public Outreach Coordinator
- **Kim Nutt** – Planning Technician II / Hazard Identification
- **Julie Sterling** -- Planner / Public Outreach Coordinator
- **Don Wolcott** -- Building Plans Examiner / Risk Assessment

AGENCIES AND COMMUNITY PARTNERS

Prior to formal presentation and action by the City of Merced Disaster Council and the City Council, many local agencies and partners were invited to review and comment on the Merced Hazard Mitigation Plan to offer technical and professional guidance, and include:

Local and Regional Agencies and Neighboring Communities

Merced County Fire Department
Merced County Public Works - Roads Division
Merced County Sheriff's Office
Merced County Operations of Emergency Services (OES)
Merced County Courthouse Museum
Weaver Union Elementary School District
Merced College
UC Merced
City of Merced Economic Development
City of Merced Information Technology Department
US Army Corp of Engineers
Caltrans District 10
Merced County Local Agency Formation Commission
Merced County Planning Department
Merced County Environmental Health Department
Merced County Public Health Department
Merced County Farm Bureau
City of Atwater

Businesses, Academia, and Other Private and Non-Profits

Merced Ahead
The Greater Merced Chamber of Commerce
The Hispanic Chamber of Commerce
Local Developers and Builders (BIACC)
Mercy Medical Center
Golden Valley Health Center

Riggs Ambulance
Merced County Fair
League of Women Voters
Merced Lao Family Community
National Association for the Advancement of Colored People
Neighborhood Watch Representatives
Environmental and Conservation Groups
Railroad Contacts
Merced Sun Star
Merced County Times
Merced County Historical Society
United Way of Merced
Building Healthy Communities

INTERNSHIP TEAM

The City of Merced extends its gratitude and appreciation to several student interns who contributed greatly to the preparation of the Merced Hazard Mitigation Plan.

- **Denise Zitnik** – Climate Adaption / Hazardous Materials
- **John Hansen** – Hazard Risk Assessments
- **Rick Navares** – Benefits of Hazard Mitigation Planning

Acknowledgment of Financial Support

Preparation of the *Merced Local Hazard Mitigation Plan* was financially supported by the Federal Emergency Management Agency (FEMA) under Award/Disaster Number LPDM09 (CalEMA# 0005) to the City of Merced, California.

Local Hazard Mitigation Planning Program

This report was prepared as an account of work sponsored by an agency of the United States Government, the *Federal Emergency Management Agency* (FEMA), in coordination with the *California Emergency Management Agency* (Cal EMA). Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.


Chapter 1: Executive Summary

CHAPTER 1: EXECUTIVE SUMMARY

OVERVIEW OF THE“EXECUTIVE SUMMARY” CHAPTER

1.1 LOCAL HAZARD MITIGATION PLANNING

1.2 VISION AND GOALS OF THE LOCAL HAZARD MITIGATION PLAN

1.3 HOW THE LOCAL HAZARD MITIGATION PLAN WAS DEVELOPED

1.4 ORGANIZATION OF THE HAZARD MITIGATION PLAN

1.5 RECOMMENDED HAZARD MITIGATION STRATEGIES

1.1 Local Hazard Mitigation Planning

1.1.1 Purpose of Benefits of the Plan

Plan Purpose

At times, natural hazards are unpredictable, and the reality is they can cause significant damage to a community. More often than not, communities are faced with having to deal with the aftermath of an unwanted hazard that devastates areas of public infrastructure, businesses, and the environment. Each year, natural disasters in the United States take the lives of hundreds of people and injure thousands more, and taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from these events. While we cannot completely prevent disasters from happening, their effects can be reduced or eliminated through well-organized public education and awareness efforts, preparedness and mitigation. For those hazards which cannot be fully mitigated, the community must be prepared to provide efficient and effective response and recovery.

It is impossible to predict exactly when and where disasters will occur or the extent to which they will impact the City. However, with careful planning and collaboration among public agencies, stakeholders, and citizens, it is possible to minimize losses that can occur from disasters. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the community and its property owners by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruption.

The Disaster Mitigation Act (DMA; Public Law 106-390) is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective.

Plan Benefits

The City of Merced developed this Merced Hazard Mitigation Plan (MHMP) in an effort to reduce future loss of life and property resulting from disasters. The MHMP is a tool for decision-makers to direct mitigation activities and resources. This MHMP was also developed to allow the City to be eligible for federal disaster assistance funds, as well as earning points from the National Flood Insurance Program's Community Rating System to lower flood insurance premiums communitywide.

Through the implementation of the Plan's nine recommended strategies, the City of Merced can strive to become disaster-resistant through hazard mitigation.

1.2 Vision and Goals of the Hazard Mitigation Plan

1.2.1 Plan Goals and Objectives

Hazard Mitigation Plan Goals

At their July 13, 2012, Disaster Council meeting, the Disaster Council reviewed and confirmed the Plan Leadership Team's (PLT) draft selection of the Plan's vision and goal statements.

Plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from hazards. They represent a long-term vision for hazard reduction or enhancement of mitigation capabilities.

The PLT conducted a review of existing Plans to assess whether or not the goals listed in these plans conflicted with the draft LHMP goals to reduce the effects of hazards. These plans include:

- 2010 State of California Hazard Mitigation Plan
- Merced Vision 2030 General Plan
- City of Merced Emergency Operations Plan
- Merced County Hazardous Waste Management Plan

Listed below are the goals of the Merced Hazard Mitigation Plan to reduce or avoid long-term vulnerabilities and effects of the profiled hazards addressed in this plan's risk assessment.

Goal 1: Provide protection for people's lives from hazards.

Goal 2: Minimize or reduce damage to property.

Goal 3: Minimize disruption of essential services, facilities, and infrastructure.

Goal 4: Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of disasters.

Goal 5: Promote hazard mitigation as an integrated policy.

Goal 6 Increase public awareness.

Plan Objectives

The Plan Leadership Team's (PLT) set out to develop a plan that would meet these objectives:

- The plan would meet state and federal requirements specified under DMA;
- Utilize Community Rating System (CRS) guidelines so that the City of Merced could potentially reduce insurance costs for local residents living in the designated floodplains;
- The plan would coordinate existing ongoing plans and programs so that high-priority initiatives and projects to mitigate possible disaster impacts would be funded and implemented; and,
- The plan would create a linkage between the MHMP and established plans such as the City's general, specific, and master plans so that they can work together in achieving successful mitigation for the City.

1.3 How the Local Hazard Mitigation Plan was Developed

1.3.1 Planning Process

Six-Step Process

Hazard mitigation planning is the process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented.

The writing effort began with drafting the Planning Process section, and then sequentially through a six-step process of preparing a Mitigation Hazard Plan.

- Where are the hazards?
- What are the risks?
- What is being done?
- Where are the gaps?
- What actions can be taken?
- What are our priorities?

Guiding Documents and Community Members

The order of the plan and activities was strongly influenced by the FEMA "How-to" Guides, the July 2008 Program Guidance, and the October 2011 Local Mitigation Plan Review Guide. The draft plan was reviewed by the Project Leadership Team, Disaster Council, and affected and interested public agencies. The public was also provided opportunities to review and comment (See Section 2.3, Chapter 2). An administrative draft was prepared incorporating these comments, and completed in March 2013. In May 2013, the Disaster Council's recommended MHMP was provided to the State Hazard Mitigation Officer and FEMA staff for review. A final draft was prepared and completed in the summer of 2013 (pending response from Cal-EMA and FEMA), and then provided to the City Council of the City of Merced for final adoption on March 16, 2015 and FEMA Plan Approval on March 19, 2015 (See certifications on the inside cover of this plan).

This plan documents the City of Merced's hazard mitigation planning process, identifies relevant hazards and risks, and identifies the strategy the City will use to decrease vulnerability and increase resiliency and sustainability. The MHMP is a single-jurisdictional plan that geographically covers everything within the City's 2012 Specific Urban Development Plan (SUDP) and Sphere of Influence (SOI) boundaries (hereinafter referred to as the MHMP planning area). This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390). Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act (DMA).

1.3.2 Disaster Council

Authority

A hazard mitigation plan is one of the best ways to enhance collaboration and gain support among the parties whose interests might be affected by hazard losses. By working together, a broad range of stakeholders can identify and create partnerships that pool resources to achieve a common vision for the community. The scope of work established for this process was built around this concept by the formation of a *Disaster Council* (DC).

The powers and duties of the Disaster Council are codified in Title 8, Chapter 20 of the Merced Municipal Code; they are empowered to develop and recommend for adoption by the City Council, emergency and mutual-aid plans.

Local Hazard Mitigation Plan Meetings

The *Disaster Council* met 8 times during the planning period. The purposes of those meetings are outlined in Table 2-1 and the agendas and minutes of their meetings are contained in Appendix A.

Disaster Council Membership

1. Chair: **John Bramble**, City Manager
(Director of Emergency Services)

2. Vice-Chair: **Mike McLaughlin**, Fire Chief
(Deputy Director of Emergency Services)

3. Police: **Norm Andrade**, Police Chief

4. Public Works: **Mike Wegley**, Director

5. Public Works: **Stan Murdock**, Director

6. Development Services: **David Gonzalves**, Director

7. Finance: **Brad Grant**, Director

8. Civic Representative: **Dr. Laurie Dickinson**

9. The Appraisal Group: **John Sundgren**

10. American Red Cross: **Sherry Pitchford**

11. Merced Irrigation District: **Dan Aguilar**

12. Pacific Gas & Electric: **Richard Dye**

13. Merced City School District: **RoseMary Parga Duran**

14. Merced Union High School District: **Kelly Bentz**

1.4 Organization of the Local Hazard Mitigation Plan

1.4.1 Plan Chapters

The Plan Leadership Team opted to create a plan that would be easy to read, taking into consideration length, format, and language style, while satisfying the content requirement of the Disaster Mitigation Act (DMA) 2000. For ease of use, special attention was given to place detailed technical information in the appendices, and to front-load summary findings and conclusions in the body of the report. The MHMP is organized into five Chapters plus an appendix that coincides with the phases of the plan's development.

Chapter 1 - Executive Summary

Chapter 2 – The Planning Process

This chapter contains a detailed description of the planning process, including purposes for planning, the scope of work, organization of resources, public involvement, and a chronology of plan development and milestones.

Chapter 3 - Risk Assessment

This chapter contains the risk assessment for the plan, which includes a profile of the City, identification of hazards, inventory of assets, a vulnerability assessment, and a ranking of risk.

Chapter 4 - Mitigation Strategies

This chapter contains the mitigation strategies for the MHMP, including goals and objectives, a review of alternatives, and an action plan.

Chapter 5 -- Plan Maintenance

This chapter contains a strategy for plan implementation and maintenance, including coordination with other planning mechanisms within the City.

Appendices

The appendix contains numerous background and support documents for the Merced Hazard Mitigation Plan (MHMP). Appendix D contains updated Risk Assessment information concerning drought.

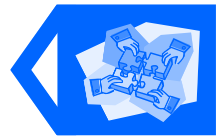
1.4.2 Essential Plan Activities and Elements

Overview

Integrated throughout the Hazard Mitigation Plan are symbols that mark four essential activities of the plan, and enliven and enhance the reading enjoyment and implementation value of the plan, including:

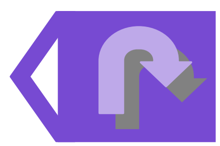
- public involvement;
- integration of Disaster Council input and actions into the MHMP;
- feedback loop describing where existing plans and studies are incorporated into the Merced Hazard Mitigation Plan (MHMP), as well as interjection of MHMP initiatives and information back into related and existing planning mechanisms; and,
- the identification of minimum FEMA content requirements of Local Hazard Mitigation Planning.

This information is marked with icons, which are displayed throughout the document, and include:



The **"Public Involvement"** icon describes public outreach methods and activities that provided an opportunity for the general public to be engaged in preparing the plan. Among other information, these icons describe: *who was involved in the process*, *how they were involved*, and *the methods of public participation that were employed*. The composition of these groups, the specific events and outreach methods are summarized in the ***Community Participation*** section of *Plan Organization* (Chapter 2) of the MHMP.

The **"Disaster Council Input and Actions"** icon describes how an engaged public and steering committee, under the guidance of the *Plan Leadership Team*, culminated into discernable components of the plan.



The **"Feedback"** icon identifies when the MHMP draws from existing plans and studies, as well as when the MHMP will be incorporated into existing planning documents and mechanisms.

The **"Content Requirement"** icon alerts state and federal plan reviewers of where the plan complies with Disaster Mitigation Act (DMA) minimum content elements, and provides an easy to use reference link to the numbering system found in Section 4, "Regulation Checklist," of the *Local Mitigation Plan Review Guide*, October 1, 2011.

1.5 Recommended Hazard Mitigation Strategies

1.5.1 Strategy Selection and Prioritization

Selection Process

For each hazard, City Staff created a comprehensive catalog of sample mitigation strategies that were applicable to the City of Merced. The hazards for which sample mitigation catalogs were created are those in which the City is most vulnerable to, based on the MHMP Risk Assessment. The specific strategies themselves were based upon the MHMP vulnerability assessment. The catalogs were not meant to be exhaustive or site-specific, but rather to inspire discussion. The sample mitigation strategies in the catalogs derived from numerous sources, including: 1) the City's "Community Risk Assessment; and, 2) hazard mitigation plans, notably from Central Valley California communities.

Based on a variety of factors listed below, the Plan Leadership Team narrowed the potential mitigation strategies from 54 actions to 10 strategies.

Factors:

- Scoring of comprehensive list of potential mitigation strategies
- FEMA funding eligibility
- Risk from hazards
- New ideas and approaches
- Meetings with technical City Staff.

Prioritization

After the focused set of ten mitigation strategies was assembled, the *Disaster Council* utilized several decision-making tools to rank the importance and effectiveness of the strategies. These tools included: 1) Benefit-Cost Review "economic" criteria; 2) FEMA's recommended prioritization criteria, STAPLEE (social, technical, administrative, political, legal, economical, and environmental); and, 3) community input gathered from the City's *Natural Hazard Community Awareness Survey* (Appendix C). The results of the prioritization process are presented in the table below.

Prioritized Strategies	
Score	**Recommended Action**
171	(1) Prepare *Energy Assurance Plan*
140	(2) Enhance Storm-Water Drainage Improvements
129	(3) Develop *Disaster Preparedness Program*
120	(4) Support the Haystack Alternative
108	(5) Update City's Storm-water Drainage Master Plan
105	(6) Prepare a *Shelter and Emergency-Provision Plan*
102	(7) Prepare Natural Area Fire Prevention Plan
94	(8) Seismic Vulnerability Assessments of City-owned Critical Facilities, and upgrades
67	(9) Retrofit Unreinforced Masonry Building Program

1.5.2 Action Plan

Recommended Strategies

Action Item #1: Prepare an *Energy Assurance Plan* that includes: 1) the identification and assessment of power-backup capabilities for all the City's critical infrastructure (for example, pumps, data centers, dispatch) and buildings utilized for essential services (such as health-safety, water, sewer, waste, and transportation); 2) coordination of energy resources among public and private partners; 3) establishment of a program and schedule to implement recommended power upgrades and coordination programs; and, 4) an examination of a program of conversion of overhead utilities to underground service that serve critical facilities or other sensitive sites to reduce exposure to hazards, where possible.

Action Item #2: Develop and enhance storm-water drainage improvements to reduce frequent flooding. Projects may involve canals, storm-water drains, basins, trunk lines, auxiliary pipes, and interconnections. For example, increase the current stormwater diversion (at Fahrens Creek, south of Yosemite Avenue) of 50 cubic feet per second (cfs) to 200 cfs, so that storage capacity is not wasted during larger flooding events.

Action Item #3: Create a *Disaster Preparedness Program* that educates populations (residents, property owners, and businesses) that are vulnerable to Merced's natural hazards about: 1) shelter sites; 2) disaster advisory and warning systems; and, 3) "before, during and after" resources from community entities (e.g. hospitals, schools, public works), to prepare for natural disasters. Develop and deploy methods that assure access to this information and to these resources.

Action Item #4: Support Merced County efforts to construct the Haystack Alternative of Black Rascal Creek.

Action Item #5: Update the City's Storm-water Drainage Master Plan.

Action Item #6: Prepare a *Shelter and Emergency-Provision Plan* resulting in identification of existing and future sites and buildings, as well as improvements for their establishment or enhancement.

Action Item #7: Prepare a *Natural Area Fire Prevention Plan* for those areas of Merced to be developed adjacent to natural open space areas (as opposed to agricultural fields or private property) in order to determine the best approach to address and provide a coordinated plan for conflicting needs (for example, air quality, natural resource protection, and property rights). Methods would include acceptable site designs, building designs, and weed abatement.

Action Item #8: Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities (buildings and infrastructure) constructed prior to 1980, and take actions to upgrade or retrofit as needed.

Action Item #9: Create a program to retrofit or upgrade unreinforced masonry buildings in Downtown Merced, or other buildings in the Plan area.

Merced's Implementation Approach – An Action Plan

The Merced Hazard Mitigation Plan (MHMP), through implementation of the hazard mitigation action plan, is a tool for the City of Merced to become a disaster-resistant community. This action plan identifies the following:

- Strategy
- Goals addressed
- Lead implementer and support agencies
- Estimated costs
- Timeline for implementation
- Funding sources

The MHMP Action Plan is provided in Table 4.7 in Section 4.3.3 of Chapter 4.

Chapter 2: The Planning Process

CHAPTER 2: THE PLANNING PROCESS

OVERVIEW OF “THE PLANNING PROCESS” CHAPTER

The “The Planning Process” Chapter of Merced’s Local Hazard Mitigation Plan, describes the purpose, process, community involvement and related documents of the planning effort. It contains the following sections:

2.1 PURPOSES AND BENEFITS OF HAZARD MITIGATION PLANNING

2.2 THE PLANNING PROCESS NARRATIVE

2.3 COMMUNITY PARTICIPATION

2.4 EXISTING PLANS, REPORTS, STUDIES, AND TECHNICAL INFORMATION

2.1 Purposes and Benefits of Hazard Mitigation Planning

Introduction

More often than not, communities are faced with having to deal with the aftermath of an unwanted hazard that can devastate areas of a community. While we cannot prevent disasters from happening, their effects can be reduced or eliminated through hazard mitigation planning, but only if a local government has the foresight to assess likely hazards and craft preventative measures before the next hazard event occurs. This Chapter describes the background of hazard planning and why citizens and governments are becoming better prepared.

2.1.1 Purpose

In the past, federal legislation provided funding for disaster relief, recovery, and for some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. DMA 2000 shifts federal emergency management away from a reactive "response and recovery" emphasis to "preparedness." The Act also facilitates cooperation between state and local authorities, prompting them to work together. It encourages and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

Under the Disaster Mitigation Act of 2000, States and local communities must have an approved mitigation plan prior to receiving post-disaster funds. Local hazard mitigation plans must demonstrate that their proposed mitigation measures are based on sound planning process that account for the risk to and the capabilities of the individual communities. FEMA-approved LHMP's meet the requirements of the DMA 2000, which calls for communities to have a multi-hazard mitigation plan in place in order to qualify for future funding under the Federal Emergency Management Agency's (FEMA) and Hazard Mitigation Grant Program (HMGP). In addition, these plans can assist a community in applying for other hazard mitigation project funding, such as FEMA's pre-disaster mitigation program, the Flood Mitigation Assistance (FMA) program, as well as other federal and state funding. If state and local government meet these criteria and get their plan approved by FEMA, then they are eligible to receive increased funding under the HMGP, which is implemented under Section 404 of the Stafford Act.

In order to continue to be eligible for mitigation project grant funding, a local jurisdiction is required by 44 CFR 201.6(d)(3) to review and revise its plan, and resubmit it for approval within 5 years of FEMA approval of the prior plan.

2.1.2 Benefits

As the costs of damage from natural disasters continue to increase, communities realize the importance of identifying effective ways to reduce vulnerability to disasters. Natural hazard mitigation plans assist communities in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction, while helping to guide and coordinate mitigation activities throughout the City. Preparing a plan to lessen the impact of a disaster before it happens will provide the following benefits to a community:

- Reduce public and private damage costs;
- Reduce social, emotional, and economic disruption;
- Increase access to funding sources for hazards mitigation projects; and,
- Improve the ability to implement post-disaster recovery projects.

Communities are the first to feel the effects of disasters; therefore, local government should do everything possible to protect their citizens from hazards' risks and ensure that their community complies with federal and other regulations designed to reduce cost. Business and private organizations also have much to gain by reducing their risk to hazards, in terms of their own well-being, as well as contributing to reducing the risk in the community as a whole. Unfortunately, businesses at times can suffer severe damage from natural disasters and, as a result, they are unable to reopen after the disaster. Even if the business is not physically damaged during the disaster, it cannot operate if its employees cannot get to work, if water and electricity are unavailable, or if customers fear safety hazards. Thus, to ensure that businesses and private organizations reduce their risk to natural hazards, local communities must set forth an effective and comprehensive plan that addresses hazard threats in addition to identifying and selecting the best solutions to handling such potential risk.

A Local Hazard Mitigation Plan (LHMP) provides a set of action items, if deployed, will reduce risk from natural hazards through: 1) education and outreach programs that foster the development of partnerships; and 2) implementation of preventative activities, such as a land use program that restricts and controls development in areas subject to damage from natural hazards. The resources and information within the Merced Mitigation Plan:

- Establish a basis for coordination and collaboration among agencies and the public;
- Identify and prioritize future mitigation projects; and,
- Assist in meeting the requirements of federal assistance programs.

Multiple Benefits, Multiple Approaches

After a disaster, repairs and reconstruction are often completed in such a way as to simply restore to pre-disaster conditions. Such efforts expedite a return to normalcy; however, the replication of pre-disaster conditions results in a cycle of damage, reconstruction, and repeated damage. Local hazard mitigation ensures that such cycles are broken and that post-disaster repairs and reconstruction result in reduction in hazard vulnerability.

The goal of mitigation is to save lives and reduce property damages. Mitigation can accomplish this, and should be cost-effective and environmentally sound. This, in turn, can reduce the cost of a disaster to property owners and all levels of government. In addition, mitigation can protect critical community facilities, reduce exposure to liability, and minimize community disruption. Examples of mitigation include land use planning, adoption of building codes, and elevations of homes, or acquisition and relocation of homes away from floodplains.

Partnership, Programs and Funding Opportunities

Communities and states have a range of “local” tools to finance projects. Use of fees, taxes, bonds, and loans to finance projects are options if there is proper state enabling legislation, local authority, and enough political will. Once the plan has been adopted, there is a legitimate basis for initiating the process required to use these financial tools. However, most local hazard mitigation plans cannot be implemented using only local funding sources. Furthermore, it may take some time to work through the legal and administrative process to use proceeds from bond issues and similar finance tools. To supplement local funds, communities can apply for grants from federal and state government, nonprofit organizations, and foundations, as well as seek funding from other private sources. The advantage of applying for grants is that they do not have to be paid back or generate long-term debt; however, most federal grants require state and/or local government to provide some degree of matching funds.

PARTNERSHIPS

Private Partnership agreements between local governments and business or organizations can be advantageous for all parties involved. Private organizations and businesses routinely offer discounted or free goods and services to local governments in exchange for publicity or other benefits. In the end, the governments, organizations, businesses, and the public can all benefit from working together. For example, in Houston, Texas, FEMA and two prominent home improvement stores teamed up to provide information and advice on cleaning up and rebuilding after flooding caused by Tropical Storm Allison. FEMA Hazard Mitigation Teams staffed booths at both stores for three days, providing information on mitigation methods and techniques and the importance of flood insurance. By providing space, the stores played an important role in promoting community awareness of flooding hazards and helped foster public involvement in recovery.

STATE PROGRAMS

State Partnerships are excellent sources of funding, support, and technical assistance. State geological surveys, water resource agencies, and departments of planning or natural resources often have useful data related to hazard identification and risk assessments. States can further help publicize awareness and generate interest by declaring a Hazard Awareness Week and promoting related local events on their website.

The State of California has numerous agencies that are involved in hazard identification and hazard mitigation, including:

- **California Emergency Management Agency** (Cal EMA) is an entity that is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration.

- **The California Department of Forestry and Fire Protection** (CAL FIRE) is in charge of all aspects of wildland fire protection on private and state properties, and administers forest practice regulation.

- **The California Division of Water Resource** (DWR) plans, designs, constructs, operates, and maintains the State's Water Projects; regulates dams, provides flood protection, and assists in emergency management. It also educates the public and serves local water needs by providing technical assistance.

FEDERAL PROGRAMS

The Federal Emergency Management Agency (FEMA) has developed several programs that provide funding to state and local governments to assist and support state, regional, and local communities in an effort to reduce, respond, and recover from a natural disaster. Under 44 CFR Sec 201.6, local governments must have a FEMA-approved Local Mitigation Plan in order to apply for and/or receive ***project*** grants under the following hazard mitigation assistance programs:

- Hazard Mitigation Grant Program (HMGP);
- Pre-Disaster Mitigation (PDM);
- Flood Mitigation Assistance (FMA); and,
- Severe Repetitive Loss (SRL).

Pre-Disaster Programs

- The **Pre-Disaster Mitigation Program** (PDM), authorized under DMA 2000, provides pre-disaster funding on a competitive basis to states, communities, and tribes for cost-effective hazard mitigation planning activities that complement a comprehensive mitigation program and reduces injuries, loss of life, and damage and destruction of property before it strikes. However, an approved mitigation plan is required to receive funding since it is graded and awarded on a competitive basis.

- The **Flood Mitigation Assistance Program** (FMA) provides funding to assist states and communities in implementing measures to reduces or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other insurable structures. Three types of grants available through the FMA program include "Planning," "Project," and "Technical Assistance." Only communities that participate in the National Flood Insurance Program (NFIP), and have a FEMA-approved LHMP that addresses flood hazards can apply for FMA "Project" grant. "Planning" and "Technical Assistance" grants only require participation in the National Flood Insurance Program (NFIP). Planning grants are to be used by states and communities to prepare flood mitigation plans, with a focus on repetitive loss properties. The NFIP is a governmental entity that helps local communities by offering government insurance to property owners for structures that otherwise would be uninsurable because of their susceptibility to flooding.

- The **Severe Repetitive Loss Program** (SRL) provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) residential structures in order to reduce or eliminate claims under the National Flood Insurance Program (NFIP).

Active-Disaster Programs

- The **Fire Management Assistance Grant Program** (FMAG), made available by FEMA through the President's Disaster Relief Fund, assists in fighting fires that threaten to cause a major disaster. Eligible costs covered by the aid can include expenses for field camps, equipment use, repair and replacement; tools, materials, and supplies; and mobilization and demobilization activities. Such funds can be used for both wildland and urban fires.

Post-Disaster Programs / Federal Disaster Aid and Relief Funds

- The **Hazard Mitigation Grant Program** (HMGP), authorized by Section 404 of the Stafford Act, provides grants to state and local government to implement long-term hazard mitigation actions after a major disaster declaration. An approved mitigation plan is required to receive project funding. Additionally, the Stafford Act also authorizes up to 7 percent of available HMGP funds for mitigation planning purposes.

- The **Public Assistance Program** (PA) is authorized under section 406 of the Stafford Act. The program provides funding to state and local governments, Indian Tribes, and certain private non-profits (such as rural electric cooperatives -RECs), following a disaster declaration, for the repair, restoration, or replacement of damaged facilities, and for other associated expenses, including emergency protective measures and debris removal. Under the program, FEMA reimburses successful applicants for 75 percent of their total eligible expenses. In California, Cal EMA pays 18.75 percent of the eligible costs incurred by city and county agencies and special districts, with local agencies picking up the remaining 6.25 percent. This program does not require an approved mitigation plan from FEMA.

- The **Assistance to Individuals and Households Grant Program** is authorized by Section 411 of the Stafford Act and authorizes grants to be used for mitigation measures to cover serious unmet, disaster-related real property losses.

Federal Disaster Assistance

A United States Department of Agriculture (USDA) declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas and those that are contiguous to declared counties, including those that are across state lines. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. These loans are referred to as Economic Injury Disaster Loans.

2.2 The Planning Process Narrative

Introduction

This section provides a systematic account of how Merced's hazard mitigation plan was developed - from the moment the planning team was created and the public participated, to how each section of the plan was developed. This description serves as a permanent record that explains how decisions were reached on a strategy to reduce losses, and demonstrates that it was developed with stakeholder input in a methodical and reasonable way.

2.2.1 Project Initiation

The planning effort began on July 1, 2010, after award of a planning grant from Cal EMA in spring 2010. The planning effort was led by the City's Planning Division. Considerable effort was made training and researching to assure that the planning approach was comprehensive and consistent with state and federal guidelines and requirements. To achieve this goal, the Project Leadership Team created three key guidance documents that would set the foundation for the project's Planning Process, these being: (1) a detailed *scope-of-work* checklist describing the phases, steps and tasks necessary to craft an acceptable plan: (2) a *public outreach strategy* ensuring that the public would be engaged in the planning process; and, (3) an *agenda outline of committee activities* to occur throughout the planning period. The plan development process was set forth in "The Planning Process Narrative" and "Community Involvement" sections and edited throughout the planning process, as necessary, to account for adjustments. These sections laid the foundation upon which the remainder of the plan was constructed.

2.2.2 Planning Process Narrative

Hazard Mitigation Planning (HMP) is a dynamic process built on realistic assessments of past and present information used by the City to anticipate future hazards and provides meaningful strategies to address possible impacts and identified needs.

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The City of Merced utilized the HMP process described in FEMA's "State and Local Mitigation Planning How-to-Guides." There are four general planning phases. The first phase, ***Organize Resources***, consists of mobilizing the community and getting started with the Planning Process. The second phase, ***Assess Risks***, identifies hazards and estimates the losses associated with these hazards. The third phase, ***Develop the Mitigation Plan***, consists of identifying mitigation actions and implementation strategies. The fourth phase, ***Implement the Plan and Monitor Progress***, discusses how to implement, monitor, and evaluate mitigation actions, and to keep the mitigation plan current.

Into this four-phase process, the City of Merced integrated a more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. Thus, the combined 4-phase HMP and 10-step CRS process used for this plan meets the requirements of six major funding programs:

- FEMA's Hazard Mitigation Grant Program
- Pre-Disaster Mitigation program
- Community Rating System
- Flood Mitigation Assistance Program
- Severe Repetitive Loss program
- New Flood Control Projects Authorized by the U.S. Army Corps of Engineers

FEMA's 4-Phase Process and the 10-Step CRS Process used to Develop the City of Merced Local Hazard Mitigation Plan:

Phase 1: Organize Resources

Step 1: Organize the Planning Effort
Step 2: Involve the Public
Step 3: Coordinate with Other Departments and Agencies

Phase 2: Assess Risks

Step 4: Identify the Hazards
Step 5: Assess the Risks

Phase 3: Develop the Mitigation Plan

Step 6: Set Goals
Step 7: Review Possible Activities
Step 8: Draft an Action Plan

Phase 4: Implement the Plan and Monitor Progress

Step 9: Adopt the Plan

Step 10: Implement, Evaluate, and Revise the Plan

The following "Phase" and "Step" descriptions provide a detailed narrative of the overall project progression. Supplementing this Planning Process Narrative are agendas and minutes (see Appendix A). Meetings are also listed in the "Opportunties for Public Comments," Table 2-1.

Phase 1: Organize Resources

The first phase of the mitigation planning process includes assessing readiness to plan, establishing a planning team, securing political support, and engaging the community. As a single-jurisdiction plan, the City of Merced is the sole jurisdiction seeking approval of the Merced Hazard Mitigation Plan (MHMP).

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Step 1.1: Organize the Planning Effort

The initial step in organizing resources was the establishment of the Plan Leadership Team (PLT), consisting of key City Staff responsible for preparing the MHMP (maps, tables, text, images, and formatting), and for providing the overall guidance of the project. Using FEMA's program guidance documents and how-to-guides, the PLT gained an understanding of HMP and the phases, steps, and tasks necessary to craft an acceptable plan. This work resulted in the creation of a detailed *scope-of-work*.

Next, a *Skills and Knowledge Team* was formed and consisted of representatives from the City's Engineering, Building, and Fire Departments, who brought specialized knowledge of flooding, earthquakes, and fire hazards, respectively. This team conducted initial assessment of hazards and began to draft profiles for Merced's most prevalent hazards. After conclusion of Steps 1.2 and 1.3 below, a citizens advisory committee was formed. (See Section 2.3, "Community Participation," for a full description of the membership and roles of the PLT and the Disaster Council).

Step 1.2: Involve the Public

The PLT crafted a project "Public Outreach Strategy" (please refer to Section 2.3, "Community Involvement," for details). The strategy was crafted to assure that the public and private sectors were engaged in the development process of the plan. The strategy also ensured that the activities of the PLT, the Disaster Council, and stakeholders were coordinated throughout the planning process. Public meetings were held during development of the draft plan and prior to finalizing the plan. These meetings are outlined in Table 2-1 and detailed in the "Community Involvement" section of this Plan. All notices to the public, including press releases, website postings, and newsletters, are on file with the City of Merced Planning Division.

Step 1.3: Coordinate with Other Departments and Agencies

Section 201.6.b.2 of 44 CFR requires that opportunities for involvement in the planning process be provided to neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, businesses, academia, and other private and nonprofit interests. This task was accomplished by the MHMP planning team as summarized below.

- *Agency Notification*—A diligent effort was made to keep key agencies apprised of the planning process. These key agencies are denoted in the list of stakeholders provided in the "Community Participation" section. These key agencies were invited to participate in the HMP process from the beginning and were kept apprised of plan development milestones. All of these

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agencies received meeting announcements, meeting agendas, and given access to meeting minutes throughout the plan development process. This approach proved to be beneficial when these agencies supported the effort by attending meetings or providing feedback on issues. All of these agencies were also informed about the MHMP web page to see up-to-date information.

- *Disaster Council Involvement*—Members of the public and stakeholder agencies sit on the City's Disaster Council, which is assisting the Planning Leadership Team (PLT) to craft the MHMP (See Section 2.3 for details).
- *Coordination with Merced County*—Although the MHMP is a single-jurisdiction multi-hazard mitigation plan, the City engaged Merced County in the City's effort in order to gain insight on shared concerns and goals of responding and preparing for hazards that affect both jurisdictions.
- *Pre-adoption Review*—Community Stakeholders were provided an opportunity to review and comment on the draft MHMP throughout its development. The predominant means for this review was through the MHMP webpage on the City website. When updates were posted, agencies and interested members of the public were sent an e-mail message informing them that draft portions of the MHMP were available for review. In addition to Disaster Council meetings, which were open to the public, a public meeting with the Planning Commission was held on July 18, 2012, to receive public input on the draft plan.

Capitalizing on the resources available from other City departments and agencies, the PLT identified and integrated existing planning documents into MHMP during this phase. A listing of all such documents is provided in Section 2.4, and their use in developing the MHMP is marked in the plan.

Phase 2: Assess Risks

The second phase of the HMP process involved the identification and evaluation of natural and man-made hazards, and the preparation of damage loss estimates. Knowing where hazards can affect Merced's built environment and the likely outcome of damages and losses resulting from a hazard event helps to focus protection efforts on the City's most important assets first. The Risk Assessment also builds the scientific and technical foundations for the mitigation strategy. The Geographic Information System (GIS)-based HAZUS program was used to display, analyze, and quantify hazards and vulnerabilities.

Step 2.1: Identify the Hazards

In this task, all natural and man-made hazards that *might* affect the City of Merced were listed, as well as those that are most likely to occur. The hazards included natural, technical, and human-caused events. The PLT, Disaster Council, and the public all contributed to the identification of hazards in the planning area. The PLT met early in the planning process and identified the most apparent hazards which allowed for the preparation of preliminary Risk Assessments to be drafted by the *Skills and Knowledge Team*. After formation of the Disaster Council and with public input, a final review of the hazard list was prepared. The Disaster Council ranked the list of hazards at their March 9, 2012, public meeting.

Step 2.2: Assess the Risk

This step has three components: (a) preparation of "Risk Assessments," (b) review of community assets, with an emphasis on the effect of natural disasters on the City's critical facilities, including the Civic Center, Police Stations, Fire Stations, and Utility Systems; and, (c) prepare an estimate of losses. Conclusions about the nature of risk and vulnerability formed the foundation for selection and prioritization of mitigation actions.

Risk Assessments: The Disaster Council reviewed the "Risk Assessments" for the identified hazards; both the hazard profile and vulnerability assessment were put together in a combined report. The flood-related hazard profile also includes a description of the role of the National Flood Insurance Program (NFIP). The Profiles include a description of the location, extent, and prior events. Upon completion of describing these factors, the Disaster Council helped to determine the probability of recurrence.

Asset Inventory: An inventory of community assets was performed in order to determine the quantity of buildings, people, and asset values that lie in the different hazard areas and what proportion of the City this represents. The baseline data contained in HAZUS was supplemented with recently constructed assets, (for example, the new Merced Medical Center on "G" Street). This inventory enabled the City to estimate losses resulting from flood and earthquake hazard events and to determine where resources should be allocated to address mitigation issues.

Loss Estimate: The City of Merced utilized HAZUS, a PC-based software, which implements the FEMA-developed "loss estimate methodology" to map and display hazard data, as well as the results of earthquake damage and economic loss estimates for buildings and infrastructure within the City. This task helped the City determine which assets would be subject to the greatest potential damages and which hazard event is likely to produce the greatest potential losses.

Phase 3: Develop the Mitigation Plan

The third phase of the HMP process combined the "Risk Assessment" and loss estimates to develop the mitigation goals, and identified mitigation actions to achieve these goals to reduce future disaster-related losses.

Step 3.1: Mitigation Goals

The first step of this phase was for the Disaster Council to establish a set of goals for hazard mitigation. Goals of the MHMP were selected to be consistent with community and state goals, and applicable to the hazards and vulnerability thereof experienced in the City of Merced.

Step 3.2: Select Mitigation Activities

This step included three activities: (a) draft a capabilities assessment; (b) analyze mitigation actions; and, (c) prioritize selected mitigation measures.

- *Capabilities Assessment*: This assessment provides a comprehensive examination of the City's capacity to implement meaningful mitigation initiatives, and identifies existing opportunities for program enhancement. Capabilities include staff and organizational capability, technical capability, policy and program capability, infrastructure capability, and fiscal capability. The purpose of this assessment is to identify any existing gaps, weaknesses, or conflicts in local programs/activities that may hinder mitigation efforts, or to identify those local activities that can be built upon in establishing a successful community hazard mitigation program.

- *Analyze Mitigation Actions*: Mitigation strategies are intended to reduce the vulnerability to the identified hazards. It was imperative to have engineers and vital City employees involved in this phase of the plan in order to develop strategies and projects that will mitigate the hazard and solve the problem cost-effectively, as well as ensure consistency with the City's long-term mitigation goals and capital improvements. A team-based approach was utilized to brainstorm mitigation projects based on risk assessments, capabilities assessment, and loss estimates.

- *Prioritize Mitigation Initiatives*: The Disaster Council prioritized the mitigation measures, using the "STAPLEE Prioritization" tool, emphasizing benefits vs. costs, where appropriate.

Step 3.3: Draft an Action Plan

The PLT developed a draft action plan to detail how the mitigation recommendations will be implemented and administered by the City, including: responsible departments, funding resources, and estimated timeframe. At their public meeting of January 25, 2013, the Disaster Council reviewed and commented on the draft Action Plan.

The PLT produced a complete first draft of the MHMP, including the *Plan Maintenance* Chapter. This complete draft was posted on the project website for community stakeholders and the Disaster Council's review and comment, and was presented at Community Meeting #2 on April 19, 2013 to provide an opportunity for the public to review and comment on the Plan.

Phase 4: Implement the Plan and Monitor Progress

The fourth phase of the mitigation planning process included: (a) approval and adoption process of the MHMP; and (b) establishing a *Plan Maintenance Program*, to ensure that the MHMP will remain an active and relevant document. The Disaster Council reviewed and approved the Plan Maintenance Chapter of the plan in April 2013. ASectionPeriodic review of the plan helps keep the plan current, reflecting the changing needs of the community or state.

Step 4.1: Adopt the Plan

After the Disaster Council formally voted to approve the draft MHMP at Community Meeting #2, the following actions occurred:

- *State and Federal Plan Approval*—In May 2013, the draft plan was submitted to the State Emergency Management Agency (Cal EMA), who forwarded their comments and MHMP to FEMA, who in turn reviewed, commented and provided one combined review and letter to the City. The MHMP was revised to address these comments, and then sent directly to FEMA for review and approval. On August 6, 2014, FEMA determined the plan is eligible for final approval pending its adoption by the City of Merced.

- *Local Adoption*—Within one calendar year of receipt of an "approval, pending adoption" from FEMA, upon recommendation by the Disaster Council, the Merced City Council adopted the MHMP through Resolution 2015-09 at their hearing of March 16, 2015. The City forwarded this resolution to FEMA, who "officially approved" it on March 19, 2015, the plan's effective date (see inside cover of this plan).

RC#E1

- *General Plan Consistency*— Under AB 2140, adopting the FEMA "Approved" LHMP into the Safety Element of the General Plan is optional. However, doing so entitles compliant communities to additional available recovery reimbursements after a major disaster declaration. It also entitles compliant communities to receive priority consideration for hazard mitigation grant funding. The Local Adoption noted above included the action to include the MHMP as part of the *Merced Vision 2030 General Plan*.

Step 4.2: ***Implement, Evaluate, and Revise the Plan***

The true worth of any mitigation plan is in the effectiveness of its implementation. In the Action Plan, each recommended mitigation strategy includes key implementation factors, such as a lead manager, possible funding sources, and schedule. Implementation of the MHMP will be accomplished through existing planning mechanisms such as the general plan related activities, the capital improvement plan, building code, and development design guidelines. The MHMP *Action Plan* is presented in Chapter 4 (Mitigation Strategy) of the MHMP. A plan update and maintenance schedule and a strategy for evaluation and continued public involvement are included in Chapter 5 (Plan Maintenance) of the MHMP.

2.2.3 Environmental Review

In general, in accordance with CEQA Guideline 15061(b)(3), a project is exempt from CEQA if the activity is covered by the general rule that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA.

In addition to this general exemption, the MHMP is also considered exempt through Statutory Exemption 15262 and Categorical Exemption 15306.

Statutory Exemption

Statutory Exemption 15262, *Feasibility and Planning Studies*, applies to a project involving only feasibility or planning studies for possible future actions which the agency, board, or commission has not approved, adopted, or funded does not require the preparation of an EIR or negative declaration, but does require consideration of environmental factors. This section does not apply to the adoption of a plan that will have a legally binding effect on later activities. The MHMP is consistent with these criteria and is a type of Feasibility and Planning Study.

Categorical Exemptions

Categorical Exemption 15306, *Information Collection*, otherwise known as "Class 6," consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. The MHMP is consistent with these criteria and is a "Class 6" Categorical Exemption.

CEQA Review for the MHMP

The PLT and Disaster Council crafted the MHMP to be consistent with the definitions of Statutory Exemption 15262, *Feasibility and Planning Studies,* and Categorical Exemption 15306, *Information Collection.* No mitigation action is recommended that triggered the need for environmental analysis. A Notice of Exemption citing the aforementioned exemptions was prepared for the MHMP, and is included with plan Adoption Resolution 2015-09 at the inside cover of this plan.

Future CEQA Review

The implementation of mitigation actions of future projects of the MHMP may trigger the need for assessment of environmental impacts under the California Environmental Quality Act (CEQA), and would occur after adoption of the MHMP.

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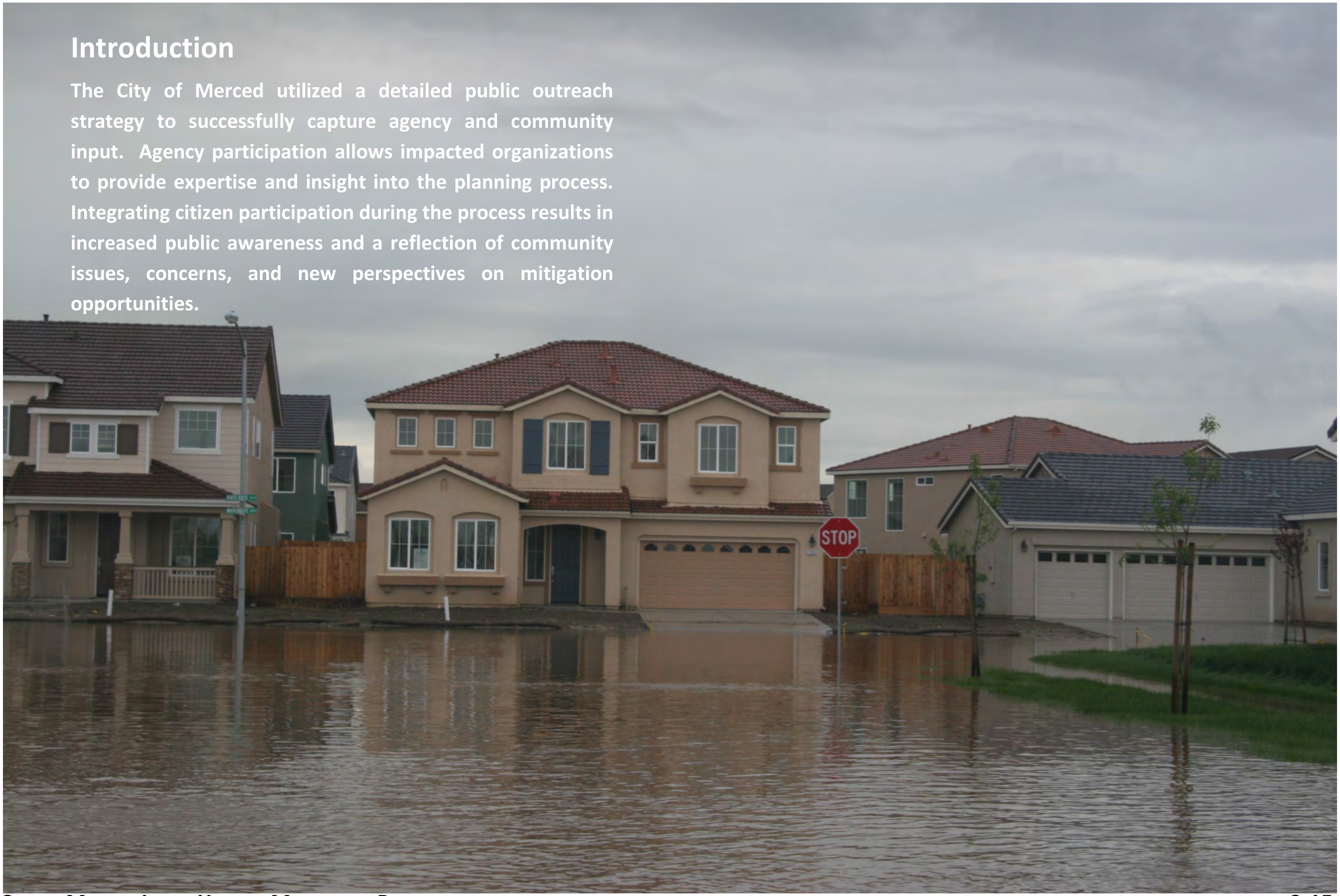
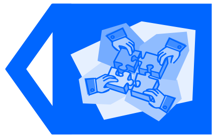
2.3 Community Participation

Introduction

The City of Merced utilized a detailed public outreach strategy to successfully capture agency and community input. Agency participation allows impacted organizations to provide expertise and insight into the planning process. Integrating citizen participation during the process results in increased public awareness and a reflection of community issues, concerns, and new perspectives on mitigation opportunities.



Public Outreach Strategy



This Public Outreach Strategy was developed to provide opportunities for the public to be involved in the development of Merced's LHMP. The objectives of the Public Outreach Strategy are:

- Identify the *participants* in the planning process, who include: the Planning Leadership Team, the Disaster Council, the Skills and Knowledge Team, and the general public, including stakeholders;
- Satisfy the Disaster Mitigation Act of 2000 "public outreach" requirements during the drafting of the plan and prior to its adoption;
- Utilize a variety of *public outreach methods*, for example, a questionnaire to gauge the public's perception of risk and support of hazard mitigation;
- Provide multiple *public outreach events* to collect meaningful input into each aspect of the plan; and,
- Attempt to reach a diverse mix of the public and as many citizens in the planning area as possible.

This chapter is structured to describe three key elements of the public outreach strategy, including: (1) Plan Participants; (2) Public Outreach Methods; and, (3) Public Outreach Events and Activities. The section concludes with Table 2-1, "Opportunities for Public Comments," which provides a summary of the Project's community participation in the development of the plan.

2.3.1 Plan Leadership

RC#A1c&d

The City of Merced Local Hazard Mitigation Plan was crafted by the Plan Leadership Team, guided by technical support staff and actions of the Disaster Council, with input from the comments of an engaged community.

THE PLAN LEADERSHIP TEAM

In 2009, the City Manager's Office directed the Development Services Department to spearhead the effort to secure planning funds to prepare a LHMP. The Planning Division of the Development Services Department led this effort, and upon award of a planning grant from FEMA in 2010, formed a Plan Leadership Team (PLT).

Plan Leadership Team

Bill King, Merced Planning Division

Mike McLaughlin, City of Merced Fire Chief

Ken Elwin, Merced Engineering Division

The PLT duties included:

- Establish a Disaster Council;
- Ensure plan compliance with Disaster Mitigation Act (DMA) requirements;
- Facilitate the Planning Process including Public Participation;
- Produce the draft and final plan documents; and,
- Coordinate the Cal EMA and FEMA Region IX plan reviews.

The PLT engaged other City Staff members having specialized skills and or knowledge to craft specific components of the plan.

Skills and Knowledge Staff Team

Ruthanne Harbison, GIS Specialist / Mapping and HAZUS

Mark Hamilton, Planner / Asset Inventory and Loss Estimates

John Franck, retired Senior Engineer / Risk Assessment

Shawn Henry, City of Merced Fire Battalion Chief / Capability Assessment

Julie Sterling, Associate Planner / Public Outreach Coordinator

Don Wolcott, Building Plans Examiner / Risk Assessment

Stuart England / NFIP Coordinator

Nancy Lee, Secretary II / Plan Format and Design

DISASTER COUNCIL

A hazard mitigation plan is one of the best ways to enhance collaboration and gain support among the parties whose interests might be affected by hazard losses. By working together, a broad range of stakeholders can identify and create partnerships that pool resources to achieve a common vision for the community. The scope of work established for this process was built around this concept by the formation of a *Disaster Council* (DC). The members of this committee included key City personnel, citizens, knowledgeable individuals representative of the community, and stakeholders from within the planning area. After a thorough review, assessment and understanding of Hazard Mitigation Planning, the PLT began the process to establish the membership of the *Disaster Council*.

The City Manager appointed the members and on December 5, 2011, the Merced City Council was presented with its roster and overview of the jurisdiction and purpose of the Disaster Council. The powers and duties of the Disaster Council are codified in Title 8 Chapter 20 of the Merced Municipal Code, and are empowered to develop and recommend for adoption by the City Council, emergency and mutual-aid plans.

Disaster Council

RC#A2.b

1. Chair: **John Bramble**, City Manager

(Director of Emergency Services)

2. Vice-Chair: **Mike McLaughlin**, Fire Chief

(Deputy Director of Emergency Services)

3. Police: **Norm Andrade**, Police Chief

4. Public Works: **Mike Wegley**, Director

5. Public Works: **Stan Murdock**, Director

6. Development Services: **David Gonzalves**, Director

7. Finance: **Brad Grant**, Director

8. Civic Representative: **Dr. Laurie Dickinson**

9. The Appraisal Group: **John Sundgren**

10. American Red Cross: **Sherry Pitchford**

11. Merced Irrigation District: **Dan Aguilar**

12. Pacific Gas & Electric: **Richard Dye**

13. Merced City School District: **RoseMary Parga Duran**

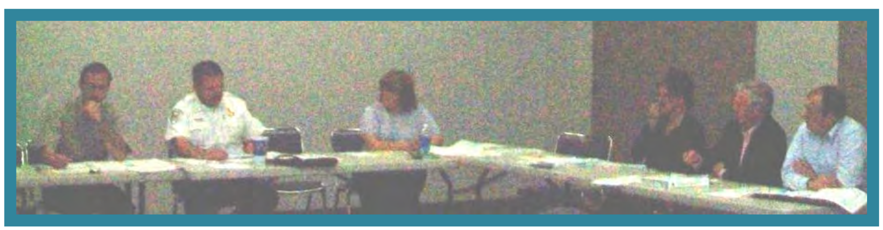
14. Merced Union High School District: **Kelly Bentz**

The *Disaster Council* was responsible for providing essential insight into several facets of the plan, including:

- Identified past natural hazard events and ranking thereof;
- Commented on current natural hazard vulnerability (including specific locations);
- Assisted in developing plan goals;
- Identified critical City assets;
- Identified current mitigation efforts and potential mitigation actions;
- Reviewed chapters of the plan throughout the development process; and,
- Provided a final recommendation to the City Council.

The *Disaster Council* met 8 times during the planning period. The purposes of those meetings are outlined in Table 2-1 and agendas and minutes of the meetings are contained in Appendix A.

RC#A1a



2.3.2 STAKEHOLDER INVOLVEMENT

Stakeholders are individuals or groups that could be affected by the MHMP and/or who can provide specialized knowledge or be individuals working with populations or areas at risk from natural hazards. Key stakeholders were invited to attend *Disaster Council* meetings and provided comment on the draft chapters of the MHMP. Interested stakeholders were granted one-on-one interviews to learn more about their ideas and concerns about hazard mitigation planning for consideration in drafting the draft plan. Stakeholders were notified when draft Chapters of the MHMP were posted on the Project website for review and comment.

Stakeholders represented the following groups. Key stakeholders, denoted by (**) were represented on the Disaster Council.

Neighboring Communities

City of Atwater
Chief of Police
Fire Battalion Chief
Public Works

Local and Regional Agencies

RC#A2.a, b, & c

** Merced Irrigation District
** City Public Works Department
Merced County Fire Department
Merced County Public Works - Roads Division
Merced County Sheriff's Office
Merced County Operations of Emergency Services (OES)
** Pacific Gas and Electric
** Merced Union High School District
** Merced City School District

Weaver Union Elementary School District
Merced College
UC Merced
City of Merced Economic Development
** City of Merced Police Department
** City of Merced Fire Department
City of Merced Information Technology Department
** City of Merced Finance Department
US Army Corp of Engineers
Caltrans District 10

Agencies having Authority to Regulate Development

Merced County Local Agency Formation Commission
**City of Merced Development Services Department
Merced County Planning Department
Merced County Environmental Health Department
Merced County Public Health Department
Merced County Farm Bureau

Businesses, Academia, and Other Private and Non-Profits

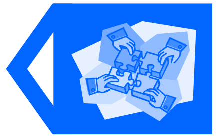
Merced Ahead
The Greater Merced Chamber of Commerce
The Hispanic Chamber of Commerce
Local Developers and Builders (BIACC)
Mercy Medical Center
Golden Valley Health Center
Riggs Ambulance
Merced County Fair
League of Women Voters
Merced Lao Family Community
National Association for the Advancement of Colored People
Neighborhood Watch Representatives
Environmental and Conservation Groups
Railroad Contacts
** Local Chapter of the American Red Cross
Merced Sun Star
Merced County Times
Merced County Historical Society
United Way of Merced
Building Healthy Communities
** The Appraisal Group

GENERAL PUBLIC

Golden Valley Neighborhood Association
Sierra Club
San Joaquin Raptor Wildlife Rescue Center

CONSIDERATION AND INCORPORATION OF PUBLIC COMMENTS AND CONCERNS

The *Disaster Council* considered input received from the public through the various outreach methods, and where appropriate, comments were incorporated into various sections of the plan.



Public Outreach Methods

Multiple public outreach and noticing methods were utilized to inform the community of the preparation of the LHMP, including:

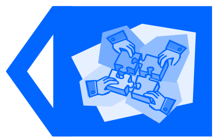
- Information about meeting dates, draft versions of the report, and links to provide public comments were provided via the City's website.
- Meeting notices were posted to the Civic Center Notice Cabinet.
- Notices of community meetings were posted in the City's Employee Newsletter "***City Scene***."
- Newsprint Press Releases on the Project were provided to the Merced Sun Star and *Merced County Times* for various public outreach events.
- Public Service Announcements (PSA), for example a local radio program "***Community Conversations***," was utilized to advertise public outreach events.
- South Merced Community Newsletter: A monthly newsletter from the *Golden Valley Health Centers.*
- Notices of community meetings were posted in the City's newsletter "***Your City Connection***" that is delivered with monthly utility bills.
- Flyers in English and Spanish
- Community Cable TV covered all project-related meetings with the Merced City Council.

Public Outreach Events and Activities

OPPORTUNITIES FOR PUBLIC COMMENTS

RC#A3a & b

A key objective in the public outreach strategy was to give the public as many opportunities to participate during the drafting of the plan and prior to its adoption. This objective was achieved and the events and activities utilized are detailed here. The full listing of public outreach events are summarized in Table 2-1.



Public Survey

A *Natural Hazard Community Awareness Survey* was developed for Merced and asked 30 questions to gauge household hazard preparedness and the level of knowledge of methods available to reduce the impacts of hazards. The survey also asked several demographic questions to help analyze trends. Survey results were used by the *Disaster Council* as a guide when establishing goals and mitigation strategies for the MHMP. The PLT widely advertised this survey, including but not limited to project stakeholders, City employees, members of City committees and commissions, and community groups. The survey was completed and returned by 138 recipients. The data collected was then analyzed and converted into a readable format. Appendix C provides a complete summary of the survey and survey findings.

Informational Webpage

An informational website was created to keep the public posted on plan development milestones and to solicit information pertinent to the development of the plan. The webpage address www.cityofmerced.org was publicized in all press releases, mailings, questionnaires, and public meetings. Information on the Disaster Council, public meetings, key elements of the plan, and drafts of the MHMP were available throughout this process. The City intends to keep the MHMP website active after the plan's completion to keep the public informed about successful mitigation projects and future plan updates.

Disaster Council Meetings

All Disaster Council (DC) meetings were advertised as public meetings on the City website, emails, and through press releases prior to scheduled meeting dates.

Public Community Meetings

In addition to the public Disaster Council meetings, several public community meetings occurred throughout the development of the MHMP to identify common concerns and ideas regarding hazard mitigation and to discuss specific goals and actions of the mitigation plan. On July 18, 2012, the PLT held a public meeting concerning the draft MHMP at a Planning Commission meeting to receive input from the public. The following outreach for this meeting occurred: 1) a June 28, 2012, legal notice in the Merced County Times; 2) a July 5, 2012 article in the Merced County Times; 3) notices to 93 local Neighborhood Watch block captains; 4) notices to all 50 stakeholders representing public agencies and community interest groups; 5) article in the City of Merced Employee Newsletter, "City Scene;" and, 6) a radio interview/advertisement on Capital Public Radio.

Market on Main Street Event

Planning Staff provided opportunities for community input at the *Market on Main Street* event in August' 2012. Input was sought through the use of: 1) *Natural Hazard Community Awareness Surveys*; and 2) participants ranked the potential mitigation actions, and were encouraged to provide ideas for mitigation strategies for the MHMP.

There were a total of 22 people who completed the Community Awareness Surveys and 18 people who participated in ranking the potential mitigation strategies.

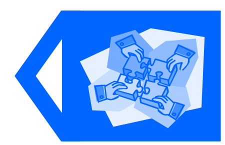
The public input gathered from these events was shared with the *Disaster Council* at their December 2012 meeting to help them prioritize the final set of potential mitigation actions. The 9 recommended Mitigation Strategies were subsequently ranked and tallied by the PLT.

The Planning Leadership Team, guided by FEMA plan development requirements determined which of the six Plan Goals were met for each strategy; when implementation is to occur within the 5-year Plan timeline; which organization/department would be responsible for overseeing the strategy; provide potential funding sources; and estimate the project costs. At their January 25, 2013 Meeting, the Disaster Council reviewed and discussed the Mitigation Action Plan for the MHMP.

Community Stakeholder Interviews

The PLT offered interviews to all Community Stakeholders. The meetings were held at the Merced Civic Center or at the Merced City Fire Department Station #51 throughout the development process of the MHMP.

On April 19, 2013, prior to plan approval, the complete draft plan was presented to the Disaster Council, Stakeholders, and the general public at Community Meeting #2.




Objectives
• Increase awareness of the Merced County Emergency Notification System.
• Describe the Emergency Notification System and its capabilities.
• Describe how citizens can enroll in the system.
• Outline a public education plan.

Table 2-1: Opportunities for Public Comments			
Date	**Event Title**	**Plan Participants**	**Outreach Methods**
2/10/11	Plan Leadership Orientation Meeting with Skills and Knowledge Team	PLT, SKT	Internal
Ongoing	Skills and Knowledge Team Meetings	PLT, SKT	Internal
9/2011 - 11/2012	Community Survey using Survey Monkey	All	W, F, CN. PR, SMN
11/14 -11/18/11	Geographic Information System (GIS) Day and Map Gallery	All	W, CN, PR, F
1/13/2012	Disaster Council Meeting #1: Project Orientation	PLT,DC,CS,GP	PHN,W
2/10/2012	Disaster Council Meeting #2: Hazard Identification	PLT,DC,CS,GP	PHN,W
3/6/2012	Public Outreach at Golden Valley Heath Center Roundtable Discussion	PLT,DC,SKT	F,CM
3/7/2012	Article in the Merced Sun Star	GP	PR
3/9/2012	Disaster Council Meeting #3: Risk Assessment and Hazard Ranking	PLT,DC,CS,GP	PHN,W,PR
4/2012	Article in City of Merced Utility Billing - "Your City Connection"	GP	UB
4/2012	Golden Valley Health Center Newsletter sent to 250 residents (English/Spanish)	GP	SMN
7/2/12	Article in City Scene – City Employees & City Council	PLT,DC,SKT	CN
7/3/12	South Merced Roundtable Discussion – Public Outreach (Update on grant)	GP/CS	F,CM
7/5/12	Article in Merced County Times	GP/CS	PR
7/9/12	Radio Interview w/ Robert Hensley, Capital Public Radio, Sacramento	GP	RI
7/9/12	Outreach e-mail blast to Neighborhood Watch Captains	GP/CS	CN
7/13/12	Disaster Council Meeting #4: Capability Assessment, Mitigation Goals, and Actions	PLT,DC,CS,GP	PHN,W
7/18/12	Community Meeting #1 "Planning Commission Orientation and Public Input"	PLT,CS,GP	PHN,W,PR, CN, RI,
8/9/12	Public Outreach Booth at "Market on Main Street" event	PLT, GP	W, RI , F
10/6/12	Fire Safety Week	PLT, GP	CN, F
11/13-11/27/12	Geographic Information System (GIS) Day and Map Gallery	PLT,DC,CS,GP	W, CN, PR, F
12/4/12	South Merced Roundtable Discussion – Public Outreach (Update on grant)	GP/CS	F,CM
12/7/12	Disaster Council Meeting #5: Prioritize and Project Implementation Action Plan	PLT,DC,CS,GP	PHN,W
1/25/13	Disaster Council Meeting #6: LHMP Action Strategy Matrix	PLT,DC,CS,GP	PHN,W
4/19/13	Community Meeting #2 and Disaster Council Meeting #7 - "Public Review of Draft Plan" and Formal Recommendation of Draft Plan	PLT,DC,CS,GP	PHN,W,PR
2/18/2015	Planning Commission Public Hearing	PLT,CS,GP	PHN,W
3/16/2015	City Council Public Hearing	PLT,CS,GP	PHN,W

Community Participation Table Key

Code	Outreach Method Description
W	Website
PHN	Civic Center Notice Cabinet
TV	Community Cable TV
CN	City Employee Newsletter
F	Flyers
UB	Utility Bill Notice
PR	Press Release
RI	Radio Interviews
SMN	Community Newsletter
CM	Community Meeting

Code	Participants
PLT	Plan Leadership Team
DC	Disaster Council
SKT	Skills and Knowledge Team
CS	Community Stakeholders
GP	General Public

2.4 Existing Plans, Reports, Studies, and Technical Information

Introduction

Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability from natural hazards. Integrating plans, studies, programs, and ordinances that guide growth and development into the MHMP establishes a credible and comprehensive plan that links with and supports other community programs.

2.4.1 Plan Coordination with Exisiting Documents

While developing the City of Merced Hazard Mitigation Plan (MHMP), the Project Leadership Team reviewed existing planning resources, such as plans, reports, studies, technical information, programs and policies, and codes. As appropriate, relevant information from these resources were incorporated into the hazard mitigation planning effort.

RC#A4.a & b

INFLUENCE OF MHMP ON OTHER PLANNING RESOURCES

Following completion and approval of the Hazard Mitigation Plan, these existing planning resources will be reviewed to ensure their information is consistent with the MHMP and updated as appropriate. For example, the City of Merced's General Plan Safety Element will be amended to include the FEMA "Approved" Local Hazard Mitigation Plan. Additionally, the next update to the City of Merced Emergency Operations Plan (EOP) will incorporate the hazard risk assessment from the MHMP. These are a few examples of how the MHMP will be integrated into existing planning resources.

SUMMARY TABLE OF EXISTING PLANNING RESOURCES

Listed in Tables 2-1.a and 2-1.b are existing studies, reports, technical information, programs, codes, and policies that have either been incorporated into the Merced Hazard Mitigation Plan (MHMP), or have been or may be amended with information found in the MHMP.

Table 2-1.a: Existing Plans, Reports, Studies and Technical Information

Existing Plans, Reports, Studies and Technical Information	Information From:	Potential Information To:
Merced Vision 2030 General Plan	×	×
City of Merced Capital Improvement Plan	×	×
City of Merced Emergency Operations Plan (2011 Revision)	×	×
State of California Multi-Hazard Mitigation Plan	×	
Merced Integrated Regional Water Management Plan (under preparation)	×	×
2010 Urban Water Management Plan	×	×
City of Merced Stormwater Management Plan	×	×
Merced County - Feasibility Study Black Rascal Creek Flood Control Project June 2008/Addendum 1 February 2009	×	
Yosemite Lake Dam Failure Analysis for Bellevue High School – NAVD 88 (subsequent name change to El Capitan High School)	×	
Possibilities versus Probabilities: Analysis of Community Risk within the City of Merced	×	
Final Environmental Impact Report, Merced Union High School District Bellevue Road Area High School	×	
Merced County Courthouse Museum Archives	×	×
ACS Firehouse Software (number of occurrences of the hazard as recorded by the Merced Fire Department)	×	
GIS Data: Assessor parcel data including use codes, assessed categories and values, geographic placement of critical facilities, base theme data including parcels, water features, roads, topography, city limits	×	

Additionally, during the development of the MHMP, many data sources were utilized to gather historical hazard frequencies and probabilities, and detailed hazard descriptions. These are listed in the "References and Works Cited" – Appendix E.

Table 2-1.b: Existing Plans, Reports, Studies and Technical Information		
Existing, Programs, and Policies and Codes	**Information From:**	**Potential Information To:**
Programs		
Functional Access and Needs Plan	×	×
Continuity of Operations Plan	×	×
Merced County Hazardous Waste Management Plan (The Merced County Environmental Health Division, which oversees the enforcement of the *Merced County Hazardous Waste Management Plan* maintains an up-to-date list of known hazardous waste sites within the County)	×	×
The City of Merced Hazardous Materials Area Plan has been developed and is utilized as the response guidelines to hazardous materials incidents. [2]	×	×
2011 Area Plan for Emergency Response to Hazardous Material Incidents	×	×
CalSIEC Central Planning Area / Merced Operational Area Governance Charter	×	
Fire Department Master Plan and Strategic Plan	×	×
National Flood Improvement Program	×	×
Policies and Codes		
Zoning and Subdivision Ordinances	×	×
Floodplain Ordinance	×	×
Building Code		×

CHAPTER 3: RISK ASSESSMENT

CHAPTER 3: RISK ASSESSMENT

OVERVIEW OF “RISK ASSESSMENT” (Chapter 3)

Chapter 3, “Risk Assessment” of Merced’s Local Hazard Mitigation Plan, profiles and describes Merced’s vulnerability to natural and manmade hazards most likely to impact the community.

3.1 PLANNING AREA AND COMMUNITY PROFILE

3.2 HAZARD IDENTIFICATION

3.3 HAZARD PROFILES

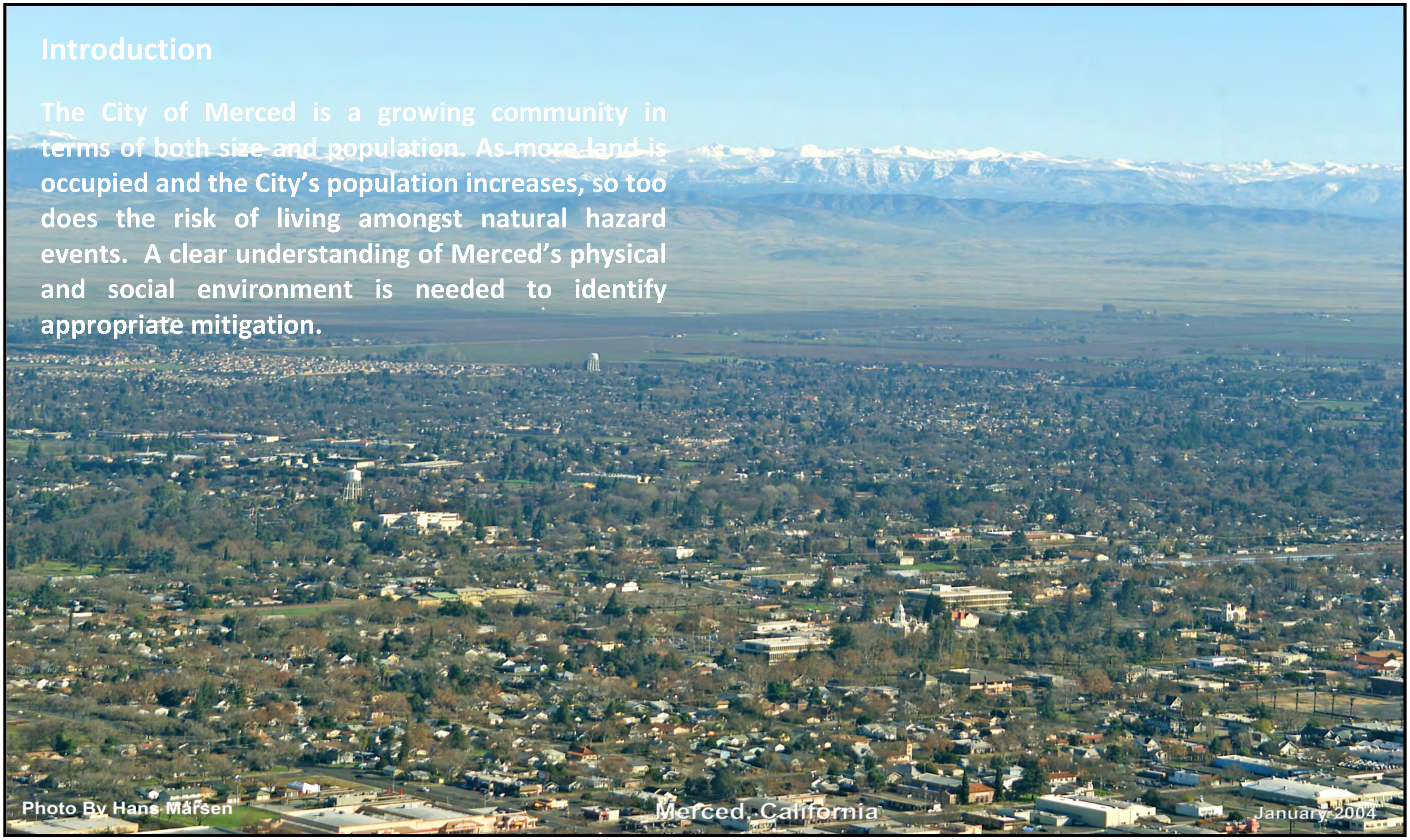
3.4 VULNERABILITY

At their public meetings of March 9, 2012, and December 7, 2012, the *Technical and Plan Preparation Team* provided the City of Merced *Disaster Council* and attending stakeholders and members of the public an overview of the draft “Risk Assessment” Chapter of the draft Merced Hazard Mitigation Plan (MHMP). Comments were received and the draft was amended to reflect the concerns of the Disaster Council and public.

3.1 Planning Area and Community Profile

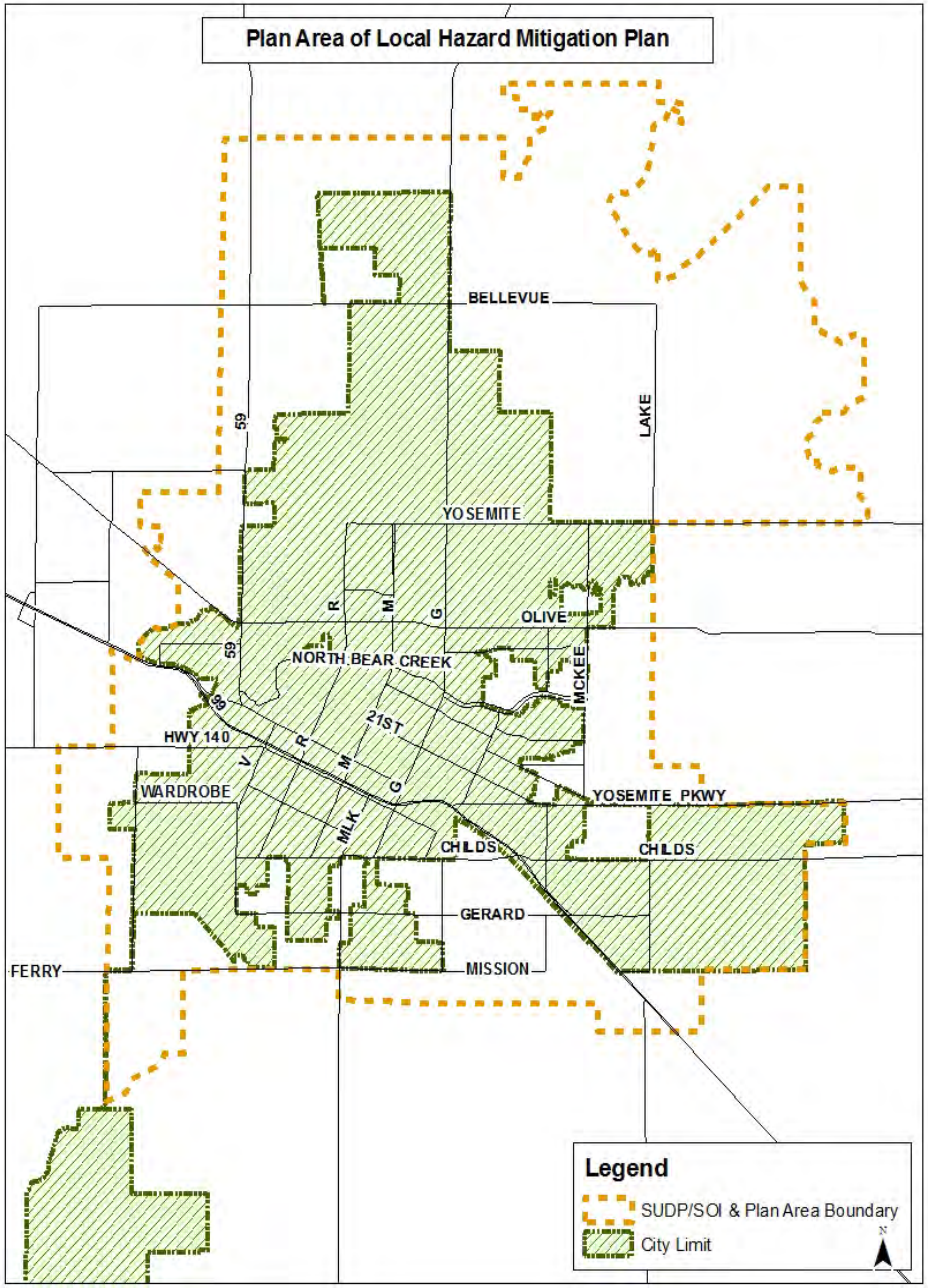
Introduction

The City of Merced is a growing community in terms of both size and population. As more land is occupied and the City's population increases, so too does the risk of living amongst natural hazard events. A clear understanding of Merced's physical and social environment is needed to identify appropriate mitigation.



3.1.1 Scope of Plan and Planning Area

The Merced Hazard Mitigation Plan (MHMP) includes the territory located within the City's planned growth area, which is delineated by the Specific Urban Development Plan / Sphere of Influence (SUDP/SOI) boundary as shown in the City's *Merced Vision 2030 General Plan*. The hazard assessments, goals and objectives, and mitigation measures of the Merced Hazard Mitigation Plan (MHMP) apply to City-owned facilities and properties. As the City grows, the application of the LHMP will expand to the larger geographic area located within the City Limits.



3.1.2 Community Profile

This section includes an overview of characteristics that have influenced the composition and form of Merced, including: 1) geography and climate; 2) areas of historic significance; 3) history and impact of natural hazards; 4) major economic, industrial, and agricultural activities; 5) demographics; and 6) land use patterns and trends. When necessary, greater detail of some of these topics can be found in the hazard profile and vulnerability sections. For example, more information about the community's weather patterns can be found in the hazard profiles for extreme temperatures, fog, tornadoes, and storm-related hazards.

Geography and Climate

GEOGRAPHY

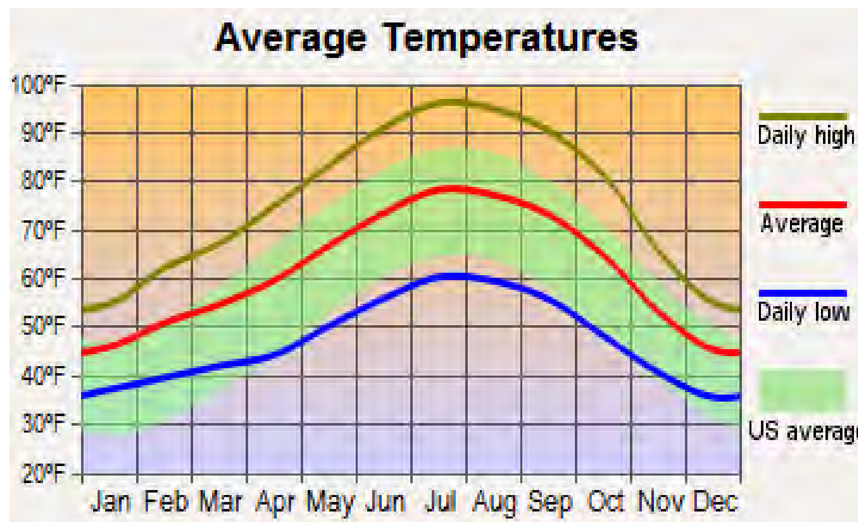
The City of Merced is located near the geographic center of the County of Merced, which is located in California's San Joaquin Valley along the western slope of the Sierra Nevada Mountain range. Merced is located approximately 100 miles southeast of Sacramento, and is one of a chain of cities located along State Highway 99. The northern portion of the City is characterized by gently rolling terrain, while the southerly portion is relatively flat. The northern, western, and eastern portions of the City contain a number of creeks, including Bear Creek, Black Rascal Creek, Fahrens Creek, and Cottonwood Creek which drain the local foothill country located northeast of the City.

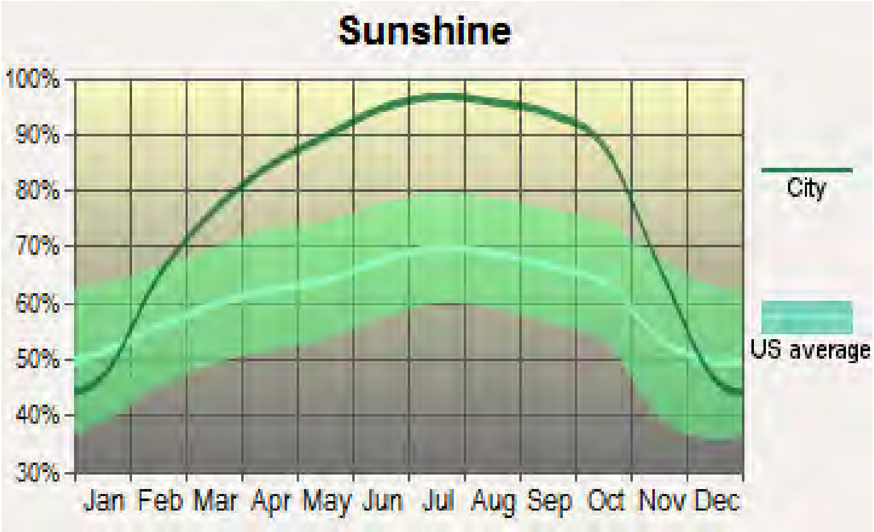
CLIMATE

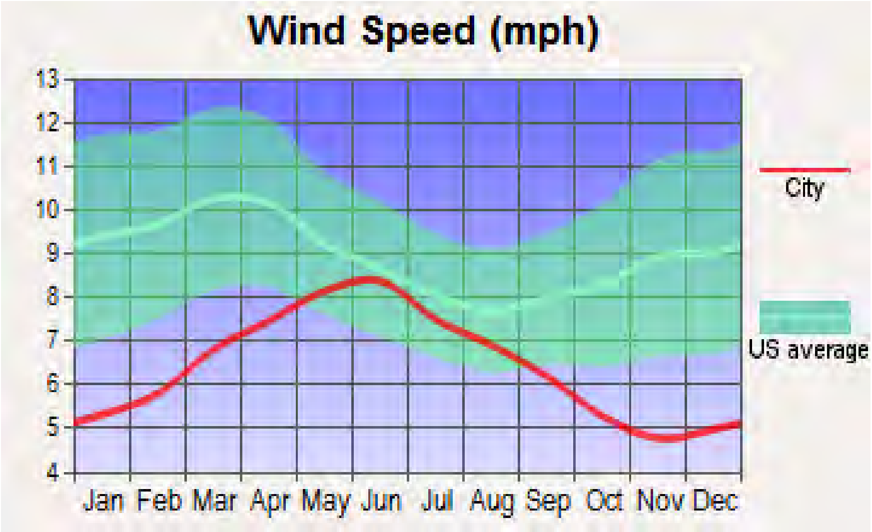
These geographic features strongly influence Merced's climate. The inland low-elevation valley and general southern latitude ensures hot and dry summers, while its relative proximity to the ocean and position west of the Sierra Nevada Mountain range boosts rainfall events during the winter. The diagrams of average temperatures, sunshine and precipitation were obtained from: http://www.city-data.com/city/Merced-California.html [4]

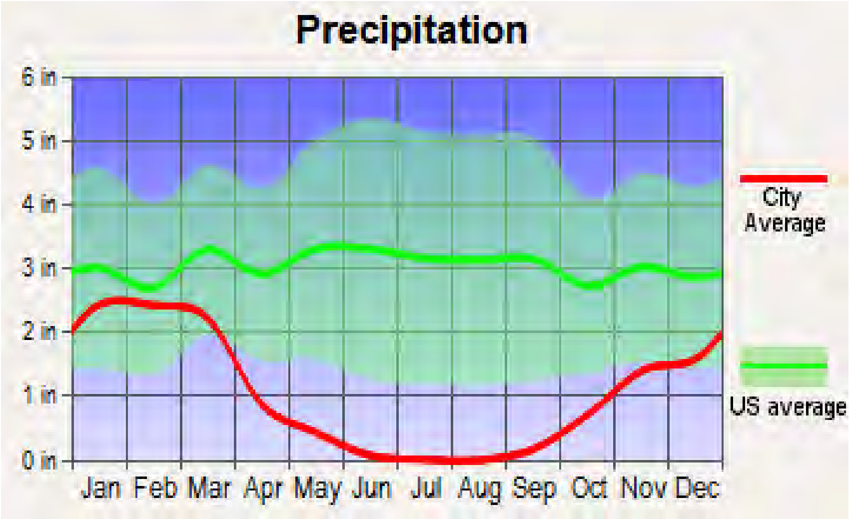
Precipitation in the San Joaquin Valley is strongly influenced by the position of the semi-permanent subtropical high pressure belt located off the Pacific coast (Pacific High). Between winter storms, high pressure and light winds allow cold moist air to pool on the valley floor. This creates strong low level temperature inversions and very stable air conditions. This situation leads to the Valley's famous "Tule Fog."

The topography of the San Joaquin Valley has a dominating effect on wind flow patterns. Winds tend to blow somewhat parallel to the valley and mountain range orientation. Seasonal weather patterns and the region's topography produce the high incidence of relatively strong northwesterly winds in the spring and early summer.




Sunshine
100%
90%
80%
70%
60%
50%
40%
30%
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
City
US average


Wind Speed (mph)
13
12
11
10
9
8
7
6
5
4
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
City
US average


Precipitation
6 in
5 in
4 in
3 in
2 in
1 in
0 in
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
City Average
US average

ENVIRONMENTALLY SIGNIFICANT SITES

Environmentally significant sites within the Plan area include riparian corridors along Fahrens Creek, Cottonwood Creek, Black Rascal Creek, Bear Creek, Miles Creek, Owens Creek, Canal Creek, and the Hartley Slough.

The City also contains land designated as Critical Habitat. Critical Habitat is a term defined and used in the Endangered Species Act (Act). It is a specific geographic area that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery. The SUDP/SOI currently contains critical habitat areas near Lake Yosemite and UC Merced Campus (in northeast Merced). The species that have critical habitat areas include:

- San Joaquin Valley Orcutt Grass
- Green Tuctoria
- Conservancy Fairy Shrimp
- Vernal Pool Fairy Shrimp
- California Tiger Salamander

NOTE: A critical habitat designation does not necessarily restrict further development. It is a reminder to federal agencies that they must make special efforts to protect the important characteristics of these areas.

Areas of Historic Significance

Early development in the San Joaquin Valley was driven by the development of the Central Pacific Railroad. Today, most of the major cities in the Valley are located along this historic rail line. Transportation corridors were a major influence in the growth and development of San Joaquin Valley communities and Merced is no exception.

In 1871, Charles H. Huffman was locating town sites along the new railroad line. Grid type street system were laid out by Huffman, and are oriented along the alignment of the railroad line. As a result, the older parts of Merced between Bear Creek and the Central Pacific Railroad line are along a southeast/northwest trending angle.

In the 1870's, the City served as an entry point to the gold mining industry of the region. Later, as Yosemite Valley became world renowned, Merced became an important gateway to Yosemite National Park.

The new courthouse, dedicated in 1875, was oriented towards the railroad line and connected to the railroad by Courthouse Avenue (now "N" Street) lined with palm trees. Early planners envisioned Courthouse Avenue and Huffman Avenue ("M" Street) as the main business section of the new city, but development occurred on the less expensive lots near the tracks along Main and Front (16th) Streets.

Merced's commercial and industrial districts were well established by 1875. Commercial establishments located on the north side of Front Street with hotels, stables, and small stores situated on Main Street behind the Front Street business district. The railroad depot, warehouses, and other industrial buildings were located along the tracks. Water was supplied to this area by a large elevated water tank near Main and "M" Streets.

Merced had three distinctive residential districts after only three years of existence. Most of Merced's residences were located on 18th and 19th Streets between J (now Martin Luther King Jr. Way) and M Streets and on the eastern end of Main Street. The first prestigious neighborhood in Merced was "Little Snelling," settled by former residents of the old county seat. Little Snelling was located south of the tracks across from the El Capitan Hotel, between "N" and "O" on 14th and 15th Streets and included elaborate homes.

Chinatown, a compact self-sustaining community, was located one block to the east of Little Snelling, but was built at a higher density and included a mix of homes and businesses and a Buddhist Temple (or Joss House). Early churches and school facilities were developed in the vicinity of the new courthouse. The new city grew rapidly in the ensuing years, reaching a population of 1,525 by 1880 and 2,009 by 1890.

By 1888, the City had a street light system, and Lake Yosemite was constructed and supplied the City with water by 1889. By 1896, electrical power was being supplied to domestic and commercial customers by the Merced Falls Gas and Electric Company. The community's educational system was enhanced by the construction of Merced's first public high school in Courthouse Park in 1897.

Santa Fe Railroad Station (1892)

In the late 1890's, transportation again had a major impact on the urban design of Merced. The San Francisco and San Joaquin Valley Railroad was granted a right-of-way through Merced. The railroad was given the use of 24th Street in the hope that the competition would force the Southern Pacific to lower its exorbitant freight rates. A station was built along the newly laid tracks near "K" Street in 1896. The elevated road bed may have retarded growth in northern Merced by greatly reducing access to this area, which remained rural in character until the 1920's. The railroad later became part of the Atchison, Topeka, and Santa Fe in 1900.

Another significant transportation feature changed the growth characteristics of the City with the construction of the Yosemite Valley Railroad (1905-1907). The station was located off the end of Main Street in the present day Westgate Shopping Center while the roundhouse and support facilities were situated where Fremont School stands today. The tracks, laid down the middle of "R" Street, may have impeded growth in the west end of Merced, which did not develop until after the removal of the tracks in 1946.

Another major change that would alter Merced's growth pattern also took place in the 1960's. In 1960, the elevated Highway 99 was constructed along 13th Street, effectively dividing South Merced from the downtown and creating three distinct sub-areas of Merced--1) North Merced, north of Bear Creek; 2) Central Merced, between Bear Creek and Highway 99; and 3) South Merced, south of Highway 99.

Major Economic, Industrial and Agricultural Activities

Employment and Industry

Merced has experienced large growth over the last several years and has seen an increase in industry and retail businesses. Between 2000 and 2007, the City added over 550,000 square feet of retail space, over 280,000 square feet of office space, nearly 374,000 square feet of industrial buildings, approximately 55,000 square feet of building space in a business park, and 259 hotel/motel rooms. In 2005, the University of California opened its 10th campus, UC Merced, just beyond the current city limits. In 2009 the City welcomed the opening of the new Mercy Hospital in North Merced.

Unfortunately, the current economy has left its mark on Merced. As with most of California and the nation, the current economic climate has taken a toll on businesses in Merced. Over the last year, several businesses and industrial users have closed their doors, which are reflected in the high unemployment rates in Merced County (17.4%, August 2010). As the economy improves, Merced hopes to see a renewal in the number of businesses coming to Merced.

Unlike many communities of Merced's size, Merced has several fully-serviced industrial parks "ready-to-go" to offer industries an opportunity for quick development.

Merced has many strengths and opportunities to offer businesses. Merced has excellent access to higher education resources, not only through the UC, but also through the Merced Community College. In addition, Merced is within driving distance to CSU Stanislaus and CSU Fresno.

Merced is also close to major markets. Being centrally located in the state, Merced has easy access to both the Bay Area and Southern California. In addition, Merced is located on major transportation routes. Highway 99 and Highway 140 run through Merced and I-5 is close by. Rail access is also available to both Union Pacific and Burlington North Santa Fe Railroads with both railroads having main lines running through Merced.

Although there are currently a large number of unemployed residents in Merced, in the event of an emergency, businesses and industries should have a plan in place to ensure the safety and welfare of workers and limit damage to industrial infrastructure. The majority of workers rely on local roads and Highway 99 for commuting to and from work. This creates a need for mitigation plans to ensure access to these roads or alternate routes for commuting and a plan for emergency communication. Before a natural hazard event, large and small businesses should develop strategies to prepare for natural hazards, respond efficiently, and prevent loss of life and property.

Demographics

It is important for hazard-related plans to consider the demographics of the communities they seek to protect. Some populations experience greater risk from hazard events not because of their geographic proximity to the hazard, but because of decreased resources and/or physical capabilities. Elderly people, for example, may be more likely to be injured in a disaster and are also more likely to require additional assistance after a disaster. Research has shown that people living near or below the poverty line, the elderly and especially older single men, the disabled, women, children, ethnic minorities, and renters all experience, to some degree, more severe effects from disasters than the general population.

Vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, their capabilities during a hazard, and access to resources for post-disaster recovery. Despite the fact that they often disproportionately experience the effects of a disaster, vulnerable populations are rarely accounted for in the current hazard planning process.

POPULATION

The City of Merced is home to approximately 80,985 residents according to the California Department of Finance 2010 estimates. Merced is comprised of 23.17 square miles of land. From 1980 to 2000, the City population increased from 36,499 to 63,893, a 75 percent increase over 20 years. However, in 2012, Merced experienced a decrease in population to 79,328. Projections from the City's *Draft Merced Vision 2030 General Plan* indicate that by the year 2015, the population will have grown to 99,463 and by 2030 it will have grown to 154,951. The table below shows the population projections for the City from 1980 to 2030. Based on these projections, the city's population is expected to increase by 91 percent over the next 20 years.

City of Merced Population Projections (2000 to 2030)

Year	*Population*
1980	36,499
1990	56,216
2000	63,893
2005	74,010
2010	80,985
2015	99,463
2020	115,305
2030	154,961

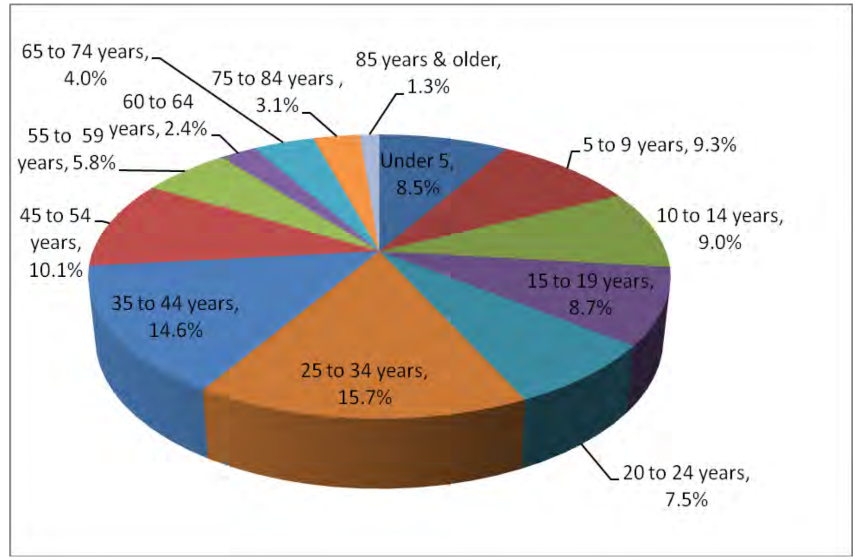
Average Household Size for Merced in 2000 was 3.06 persons. The 2008 American Community Survey estimates indicate that number has grown to an average of 3.13 persons per household. As the number of students increase at UC Merced, this number is expected to continue to increase.

Age Characteristics

According to the 2008 American Community Survey, the City's population in 2008 was estimated to be 79,266. That population was made up primarily of residents 20 to 44 years old. This age group made up 40.4 percent of the City's population.

The vulnerability of the elderly population can vary significantly based on health, age, and economic security. As a group, the elderly are more apt to lack the physical and economic resources necessary for response and are more likely to suffer health-related consequences and be slower to recover.

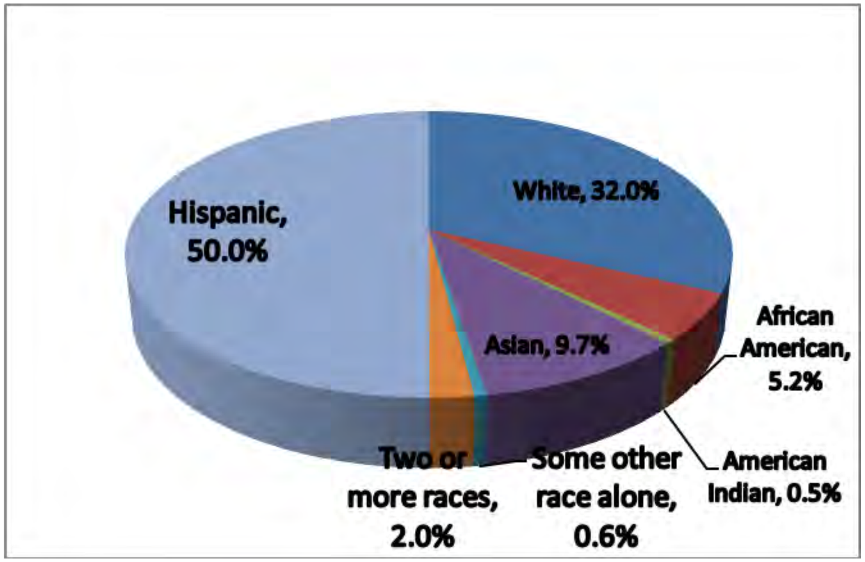
The elderly are also more likely to live in group quarters such as assisted-living facilities, where emergency preparedness occurs at the discretion of the entity operating the facility. While some may be very well prepared, others may not be. This could put a large number of elderly residents at a higher risk if the facility where they reside doesn't take the necessary steps to be prepared for a disaster.



Race and Ethnicity

Merced has a wide, very diverse community. Hispanics make up the majority of the residents in Merced accounting for 50% of the total population (39,660) according to the 2008 American Community Survey estimates and a total estimated population in 2008 of 79,260. The white population comprised 32%, or 25,365 total residents. The Asian population totaled 7,698, or 9.7%, and the African-American population was 4,145, or 5.2% of the total population.

Because of the diversity of residents, not all residents speak English. This has important implications for emergency managers, who must get crucial information out to all members of the population in emergency events.



Disabled Persons

People with disabilities have a special stake in emergency planning because they are more likely to have difficulty responding to a hazard event than the general population. According to the 2000 U.S. Census roughly 1/5 of the U.S. population lives with a disability. These numbers are rising, and disabled populations are increasingly integrated into society. This means that a large segment of the population will require assistance during the 72 hours post-event, the period generally reserved for self-help.

Disabilities can vary greatly in severity and permanence, making populations difficult to define and track. There is no "typical" disabled person, which can complicate disaster-planning processes that attempt to incorporate them. Furthermore, disability is likely to be compounded with other vulnerabilities, such as age, economic disadvantage, and ethnicity, all of which mean that housing is more likely to be substandard.

While the percentage of disabled persons in Merced is relatively small, the overall numbers are significant and warrant special attention from planner and emergency managers.

Disability Status for the Non-Institutionalized Population

Age	Number	Percent
5-17 years	165	0.3%
18-34 years	479	0.7%
35-64 years	1067	1.6%
65+ years	2000	3.0%

INCOME

Median income is the amount that divides the income distribution into two equal groups: one group having incomes above the median, and the other having incomes below. Median family income is different from median household income. Median family income indicates income for those households with two or more related individuals, i.e. families, while median household income indicates the income of all households, including persons living alone or with unrelated individuals. Median family income is, generally speaking, higher than median household income.

The 2008 American Community Survey Estimates reports a total of 24,674 households in Merced and 17,074 families. The median *household* income was estimated to be $36,064 and the median *family* income was $38,246. The number of households with an income less than $10,000 is 3,792, or 15.4% of all households. The number of families with an income less than $10,000 is 1,997, or 11.7% of the total families. The number of households with an income between $10,000 to $19,999 was 3,564 (14.4%) and the number of families with an income in this range was 2,446 (14.3%). Over 60% of all households in Merced earn less than $50,000, 55% of all families earn less than $50,000. Only 24% of all households earn between $50,000 and $99,999 and 17.9% of families fall into this income category. In the higher income category of $100,000 to $200,000 and over, 15% of all households are in this range and 19.1% of families are within this range.

Impoverished people may experience greater harm from disasters than members of the general population. 27.5 percent of all households in Merced are considered to be below poverty level (*source: ACS 2008 estimates).*

In the United States, individual households are expected to use private resources to prepare for, respond to, and recover from disasters to some extent. This expectation means that households living in poverty are automatically disadvantaged when confronting hazards. Additionally, the poor typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in hurricanes, tornadoes, and floods than other types of housing. In urban areas, the poor often live in older houses and apartment complexes, which are more likely to be made of unreinforced masonry, which is particularly susceptible to damage during earthquakes. In general, the poor are more likely to die as a result of a disaster because they tend to live in older or poorly constructed homes in more hazardous areas, such as floodplains, and they are less likely to fully recover after one.

Land Use Patterns and Trends

LAND AND DEVELOPMENT

The City is approximately seven miles long from north to south and six miles at its widest point from east to west. In 2012, the City of Merced has an area of 23.17 square miles.

Much of Merced's recent population growth can and will be attributed to the opening of University of California's 10th Campus, UC Merced. The campus opened its doors in 2005. Since that time, the campus population has grown to more than 2,700 students. The campus is expected to continue to grow at a steady pace, with the addition of approximately 680 students in 2010 and by 2014 the campus will have grown to more than 6,600 full-time enrolled students. The UC's Long Range Development Plan (LRDP) defines a campus that can accommodate a total of 25,000 students: 22,500 undergraduates and 2,500 graduate students, with a faculty and staff of 6,560.

Land Use

The City of Merced is situated within an area containing important soils capable of producing a wide range of agricultural products. Throughout the region, growth patterns of cities have resulted in these soils being converted to urban uses.

The Land Use Element of the General Plan establishes the proposed general distribution and extent of land uses within the City of Merced and its SUDP/SOI. There are a number of underlying principles that form the foundation for the goals and policies of the City's Land Use Plan. The Land Use Element includes a description of the different land use designations within the City's SUDP/SOI. These descriptions also include standards of population density and building intensity. All land uses are depicted on the City's General Plan map.

Housing Units

Over the last 5 years, Merced has experienced significant growth in the number of housing units in the City. With the much-anticipated opening of the 10th University of California Campus in the Merced area, growth began to increase at the beginning of 2000. From 2000 to 2006, 5,389 permits were issued for new single-family dwellings (this is an average of 900 permits per year). An additional 823 new multi-family units were also built during that time frame. In 2007, the surge for housing slowed and the issuance of building permits for residential construction fell dramatically. The number of building permits for single-family dwellings dropped to 164 units. The number of multi-family units constructed fell to only 6 units. For 2008 and 2009, only 34 single-family dwelling permits were issued and 1 permit for a duplex. The drop in the average of 900 permits per year issued from 2000 to 2006 to the total number issued in 2007 represents an 81% decline in building permit activity for single-family dwellings. This drastic decline has continued into 2010 and is not expected to make any dramatic changes in the near future.

On a positive note, In November, 2011, building permits were issued for a 75-unit apartment complex (Woodbridge) in North Merced and in October, 2012 building permits were issued for a 66-unit apartment complex (Gateway Terrace) in South Merced. Both of the permits were made possible with funding assistance from tax credits, HOME, Neighborhood Stabilization and Redevelopment Agency low and moderate income set aside funds.

According to the 2006-2008 American Community Survey, the total number of housing units within the City of Merced is 23,600. Of this number 14,055 are renter-occupied and 9,545 are owner-occupied.

TRANSPORTATION AND COMMUTING PATTERNS

Being centrally located in the state, Merced has easy access to both the Bay Area and Southern California. In addition, Merced is located on major transportation routes. Highway 99 and Highway 140 run through Merced and I-5 is close by. Rail access is also available to both Union Pacific and Burlington North Santa Fe Railroads with both railroads having main lines running through Merced.

In August 2008, the California Transportation Commission awarded the City of Merced a $9,000,000 Grant to construct the G Street Railroad Undercrossing of the Burlington Northern & Santa Fe (BNSF) tracks (Project No. 106076). This was part of the Prop 1B $250 million Highway-Railroad Crossing Safety Account (HRCSA) Program. The total project cost was estimated at $18 million. The conversion of the City's G Street at-grade railroad crossing to an undercrossing had been a long-term goal of the City of Merced for many years.

Prior to completion of the undercrossing, thousands of Merced commuters, emergency responders and school bus drivers experienced delays at railroad tracks bisecting the community at G Street and Santa Fe Avenue. The BNSF Railroad alone has more than 70 trains running through town every day, previously causing significant delays to traffic, and as much as two (2) hours of response time lost to rail traffic delays each day for emergency service providers such as police and fire personnel.

G Street was formally re-opened with a Community Celebration and Dedication on December 3, 2011. The underpass was the largest road project in the City's history. In addition to the reconstruction of the railroad crossing with the installation of 45 pilings to hold the bridge, there was construction of a massive storm water drainage system, rerouting water and sewer lines, along with moving natural gas lines and power poles.

Private automobiles are the dominant means of transportation, but Merced also contains a significant bike path and trail system and provides public transportation through the Merced County Transit ("The Bus") system. "The Bus" operates on 16 fixed routes and also provides demand responsive service. Weekday and Saturday service is provided.

Merced does not have significant numbers of commuters either traveling to the City for work or leaving the City to work elsewhere.
The City has an extensive network of arterial, collector, and local streets throughout the City. This roadway network connects Merced residents to local and regional destinations.

EMERGENCY SERVICES

An overview of the City's Emergency Services is provided in Chapter 4, Section 4.1..

3.2 Hazard Identification

Introduction

Before detailed risk assessments can be prepared, hazards likely to affect Merced need to be identified and ranked. This process involves review of hazard-related data, such as listings of State and Federal disaster declarations. Community-based knowledge from local individuals and groups can also help to identify those hazards that most affect Merced.

3.2.1 Overview

The City of Merced is exposed to a number of man-made and natural hazards that vary in potential intensity and impact on the City. The Merced Hazard Mitigation Plan (MHMP) addresses 10 prevalent hazards. This Chapter describes how the Plan Leadership Team (PLT) and Disaster Council (DC) identified and ranked these hazards. In general, hazards were included in the plan based on the likelihood of occurrence and the potential impact on the City.

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Through an evaluation and screening process, the PLT and DC identified several hazards having the potential to affect the City. These hazards include natural and human-caused occurrences that might affect people and property. The screening process involved two steps:

- Step 1, identifying ***likely hazards*** that may occur in the study area; and
- Step 2, identifying ***prevalent*** hazards by ranking

Screening Methodology

LIKELY HAZARDS

The PLT began with a broad list of natural and man-made occurring hazards that take place in the State of California and that might possibly affect the City of Merced (Table 3-1); these are presented in the first column of the table. Then at their February 10, 2012, meeting, the Disaster Council performed an assessment of which hazards may occur in the study area; these are denoted by a check-mark in the second column of the table.

RISK RANKING - PREVALENT HAZARDS

Additional assessments with the Disaster Council were conducted to identify those hazards which are more prevalent, and could pose significant threats to the community; these are denoted by a "threat level" in the third column of Table 3-1. More information about these "threat levels" is discussed later in this Chapter, and was the topic of the Merced Disaster Council meeting of March 9, 2012.

Items involving sensitive and security matters, such as the location of natural gas transmission lines, are not included in the MHMP; such information is available through other sources. Topics such as terrorism, civil unrest, and crime, which are beyond the scope and purpose of the MHMP, are not included either.

Table 3-1 - Hazard Identification and Screening for the City of Merced / Natural Hazards			
Hazards	**May Occur**	**Threat Level**	**Why or Why not**
Avalanche		----	The City is not located in a mountain area.
Coastal Erosion		----	The City is not located within a coastal area.
Coastal Storm		----	The City is not located within a coastal area.
Debris Flow		----	The topography of Merced is low and not subject to debris flows.
Drought	✓	8	The Central Valley is semiarid, and Merced's sole source of water is groundwater.
Earthquake	✓	12	Echo or secondary waves reach Merced from the coastal range and the Sierra Nevada foothills.
Expansive Soil	✓	----	Some expansive soils exist in Merced, but foundation design and moisture control addresses this concern.
Extreme Heat	✓	24	Most summers bring hot, dry weather, and heat spells historically can be extreme.
Flood	✓	27	Past events have been experienced by the City of Merced
Fog	✓	24	Merced experiences "Tule" and patchy fog yearly, with some periods of zero visibility.
Extreme Cold	✓	----	Merced generally has mild winters, with a few days of freezing temperatures.
Hailstorm	✓	----	Hailstorms in Merced are usually associated with severe storm events.
Hurricane		----	Hurricanes do not occur at Merced's latitude
Land Subsidence		----	No past evidence of this hazard has been recorded.
Landslide		----	Merced does not have any elevated areas that would be susceptible to landslides.
Severe Storm	✓	18	Severe storms may occur in Merced.
Tornado	✓	12	Tornadoes of very low intensity occur.
Tsunami		----	Merced is not located within a coastal area.
Volcano		----	Merced is not located in an active volcanic region.
Wildfire	✓	24	Flatland grassfires are a concern at the urban-agricultural interface.
Windstorm	✓	----	Windstorms in Merced are usually associated with severe storm events.
Aviation	✓	----	The Merced Regional Airport and Atwater's Castle Airport affect the Plan Area.
Agricultural		----	The amount of agricultural resources within the Planning Area is limited
Dam Failure	✓	16	The inundation area from two earthern-type reservoirs occur in Merced
Pipelines	✓	----	Pipelines in Merced are usually associated with hazardous material events.
Hazardous-Mat	✓	36	Trains and commercial freight vehicles travel on Plan Area railways and roadways.
Highway	✓	----	Although the Plan Area includes several state highways, these hazards are not the focus of this Plan.
Power Supply	✓	----	Electrical supply is taxed during times of extreme heat.
Urban Fire	✓	24	The City of Merced is subject to this hazard.

3.2.2 Likely Hazards

General Background

The Plan Leadership Team (PLT) performed an assessment of which hazards may occur in the study area. In addition to the information about state and federal disaster declarations, this initial assessment was based on research of information gathered from newspapers, historical records, existing plans and reports, and local experts.

Existing Plans and Reports Examined:

- Emergency Operations Plan
- City's Merced Vision 2030 General Plan
- State of California's Multi-Hazard Mitigation Plan
- 2009 Analysis of Community Risk within the City of Merced

Local Experts

- Merced City Engineer
- Merced Fire Chief
- Merced Police Chief
- Merced County Historical Society

Other Sources of Hazards Data:

- California Governor's Office of Emergency Services (CA-OES)
- State of California Hazard Mitigation Plan
- The Federal Emergency Management Agency
- The National Oceanic and Atmospheric Administration

City Staff also confirmed the relevance of floods, earthquakes, and tornadoes by researching the suggested websites provided in the State and Local Mitigation Planning "How-to Guide: Understanding Your Risks," provided by CAL EMA. The DC provided local expertise and historical knowledge to this effort. The draft selection prepared by the PLT was confirmed and adjusted by the DC at its January 13, 2012, meeting.

MERCED COUNTY DISASTER DECLARATION HISTORY

One method the PLT used to learn of hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the study area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance. The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations.

Details on federal and state disaster declarations were obtained by the FEMA and CA-OES and compiled in chronological order in Table 3-2. A review of state and federal declared disasters indicates that Merced County received 10 state declarations between 1950 and July 2007, 10 of which also received federal disaster declarations. Of these state declarations, 8 were associated with severe winter storms, heavy rains, or flooding, and 2 were for freezes. This disaster history (combined FEMA and state) suggests that Merced County experiences a major event worthy of a disaster declaration every 5.7 years.

Table 3-2. Merced County Disaster History: State Proclamations, Federal Declarations, and Selected Events (1950 to May 2007)					
Hazard Type	**Disaster Cause**	**State Disaster #**	**Year**	**Federal Declaration**	**Damage* (in millions)**
Flood	Storms	DR-1646	2006	Declared	28.9
	Freeze	GP 98-02, DR-1267	1998	Declared	17.5
Flood	Storms	DR-1203	1998	Declared	385.1
Flood	Storms	DR-1155	1997	Declared	194.3
Flood	Storms	DR-1046	1995	Declared	132
Freeze	Freeze	DR-894	1990	Declared	856.3
Flood	Flood	DR-677	1982	Declared	523.6
Drought	Drought	Not Listed	1976	Not Declared	2,664
Freeze	Freeze	Not Listed	1972	Not Declared	111.5
Flood	Storms	DR-253	1969	Declared	300
Flood	Storms	Not Listed	1958	Declared	24
Flood	Flood	DR-47	1955	Declared	200
Flood	Flood	OCD 50-01	1950	Not Declared	32.2
* Note: damage amount and deaths and injuries reflect totals for all impacted counties.					

Source: 2007 State of California Multi-Hazard Mitigation Plan, Appendix.

NATIONAL CLIMATIC DATA CENTER STORM EVENTS DATABASE

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1950-1992). This database contains 84 severe weather events that occurred in the County of Merced between January 1, 1950, and November 30, 2010.

Table 3-3.
Hazard Event Reports for the County of Merced, 1950-2010*

Type	#	Property Loss ($)	Crop Loss ($)	Deaths	Injuries
Dense Fog	2	50,000	0	0	12
Funnel Clouds	20	0	0	0	0
Gusty Wind	1	0	0	0	0
Hail	4	0	220,000	0	0
Heavy Rain	20	2,033,000	15,660,000	0	0
Lightning	8	0	0	0	1
Severe Thunderstorm/Wind	2	50,000	3,000,000	0	0
Small Hail	3	30,000	913,000	0	0
Thunderstorm/Wind	6	380,000	100,000	0	0
Tornado: F0	13	115,000	50,000	0	0
Tornado: F1	4	695,000	0	0	1
Wind	1	0	0	0	0

*Note: Losses reflect totals for all impacted areas

Source: National Climatic Data Center Storm Events Database [11]

The NCDC table above summarizes severe weather events that occurred in the County of Merced. Only a few of the events actually resulted in state and federal disaster declarations.

2009 CITY OF MERCED ANALYSIS OF COMMUNITY RISK

A Community Risk Assessment for the City of Merced was prepared by Fire Chief Mike McLaughlin, in 2009. The 2009 Community Assessment analyzed various types of risks. Natural and technological hazards identified in that assessment are discussed below and summarized in Table 3-4.

Table 3-4
Threat Levels of the 2009 City of Merced Community Risk Assessment for Natural and Technological Events

Threat Level	Natural	Technological
SEVERE RISK	Flood	Highway
HIGH RISK	Pandemic/Epidemic	Dam
		Pipelines
		Railway
MODERATE	Earthquake	Fire
	Heat/Cold	Utilities
	Thunderstorm	
	Wildland Fire	
LOW	Tornado	Airport/Aircraft
	Tropical Storm	

SAFETY ELEMENT / MERCED VISION 2030 GENERAL PLAN

According to the Safety Element of the Merced Vision 2030 General Plan, seismically induced ground shaking, ground failure, dam failure, flooding, urban and wildland fires, airport safety, crime and policing, and hazardous materials are considered the relevant hazards to the City of Merced.

3.2.3 Risk Ranking

General Background

In this step, additional assessments were conducted to identify those hazards which are more prevalent, and could pose significant threats to the community. The results of this step guided further risk assessment analysis in later chapters of the MHMP. At its March 9, 2012 meeting, the Disaster Council utilized a ranking process to identify priority hazards of the study area. Risk Assessments were completed for these priority hazards, which were the basis for the selected mitigation initiatives of the MHMP.

RISK FACTOR SCORING

To determine whether or not a hazard was prevalent and could pose significant threats to the community, all hazards that could occur in the study area were ranked according to three broad "risk factors," namely:

Probability and Frequency - Prediction of how often a hazard will occur in the future.

Consequence and Severity - Describes extent of physical damage to structures and lifelines (power, water, sanitation, roads, etc.)

Vulnerability - Describes three inter-related factors: 1) area impacted by a hazard event; 2) the events capability of triggering additional hazards; and 3) onset, the period of time between initial recognition of an approaching hazard and when the hazard begins to impact the community.

"Descriptors," applicable to each risk factor, are used to determine "threat scores;" the higher the score, the higher the threat will be.

Probability and Frequency:

Score	Descriptors
0	Infeasible event – not applicable due to geographic location characteristics.
1	Rare Event – occurs less than once every 50 years
2	Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
3	Regular Event – Occurs between once a year and once every 7 years
4	Frequent Event – occurs more than once a year.

Consequence and Severity:

Score	Descriptors
1	No damage
2	Minor/slight damage to buildings and structures, no loss of lifelines
3	Moderate building damage, minor loss of lifelines
4	Moderate building damage, moderate loss of lifelines
5	Extensive building damage, widespread loss of lifelines

Vulnerability:

Score	Descriptors
1	No physical damage, no secondary impacts
2	Localized damage area
3	Localized damage area, minor secondary impacts, delayed hazard onset
4	Moderate damage area, moderate secondary impacts, moderate warning time
5	Widespread damage area; significant secondary impacts, no warning time

RISK RANKING MATRIX

To determine each hazard's "Threat Level", the *Risk Factor Scores* were entered into the applicable "Risk Ranking Matrix" (see below).

Probability/Frequency Value: (1)						
		Consequence/Severity Scores				
		1	**2**	**3**	**4**	**5**
Vulnerability Scores	**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

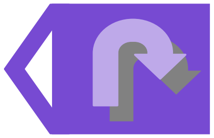
Probability/Frequency Value: (2)						
		Consequence/Severity Scores				
		1	**2**	**3**	**4**	**5**
Vulnerability Scores	**1**	2	4	6	8	10
	2	4	8	12	16	20
	3	6	12	18	24	30
	4	8	16	24	32	40
	5	10	20	30	40	50

Probability/Frequency Value: (3)						
		Consequence/Severity Scores				
		1	**2**	**3**	**4**	**5**
Vulnerability Scores	**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

Probability/Frequency Value: (4)						
		Consequence/Severity Scores				
		1	**2**	**3**	**4**	**5**
Vulnerability Scores	**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

HAZARD SCORES

At their March 9, 2012 meeting, the Disaster Council and attending stakeholders assigned risk factor scores for each identified likely hazard. This occurred after the Disaster Council had an opportunity to review the draft hazard profiles and held a group discussion on the topic.



Some adjustments were made to the qualitative "probability" scoring based on the City's *ACS Firehouse Software* that includes a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23). The following adjustments to the "probability" scores were made:

Fire	increased to 4 from 3
Hazardous Materials:	increased to 4 from 2
Storm-Related:	decreased from 3 to 2

Based on information gathered in the Risk Hazard Assessment, the following adjustments were made:

Drought	decreased from 3 to 2

The "Consequence/Severity" and 'Vulnerability' scores for Dam failure were increased from 3 to 4 to reflect anticipated impacts.

The average scores, after adjustments, are presented below:

Flooding	
Risk Factors	***Scores***
- Probability /Frequency	3
- Consequence / Severity	3
- Vulnerability	3
Threat Level	**27**

Fire	
Risk Factors	***Scores***
- Probability /Frequency	4
- Consequence / Severity	3
- Vulnerability	2
Threat Level	**24**

Drought	
Risk Factors	***Scores***
- Probability /Frequency	2
- Consequence / Severity	2
- Vulnerability	2
Threat Level	**8**

Hazardous Materials	
Risk Factors	***Scores***
- Probability /Frequency	4
- Consequence / Severity	3
- Vulnerability	3
Threat Level	**36**

Earthquakes	
Risk Factors	***Scores***
- Probability /Frequency	2
- Consequence / Severity	2
- Vulnerability	3
Threat Level	**12**

Dam Failure	
Risk Factors	***Scores***
- Probability /Frequency	1
- Consequence / Severity	4
- Vulnerability	4
Threat Level	**16**

Extreme Temperatures	
Risk Factors	***Scores***
- Probability /Frequency	4
- Consequence / Severity	2
- Vulnerability	3
Threat Level	**24**

Tornadoes	
Risk Factors	***Scores***
- Probability /Frequency	2
- Consequence / Severity	2
- Vulnerability	3
Threat Level	**12**

Fog	
Risk Factors	***Scores***
- Probability /Frequency	4
- Consequence / Severity	2
- Vulnerability	3
Threat Level	**24**

Storm-Related Hazards	
Risk Factors	***Scores***
- Probability /Frequency	2
- Consequence / Severity	3
- Vulnerability	3
Threat Level	**18**

PRIORITY HAZARDS

The Disaster Council decided that hazards with Threat Levels 18 and above would be identified as "Priority Hazards." Priority Hazards have a broader, more detailed hazard profile & vulnerability assessment. Thus, the hazards evaluated as part of this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future. Tables 3-5 and 3-6 display the hazard threat levels and scores.

Table 3-5 - Hazard Threat Levels

Level	Threat Score Range
High Hazard	50-100
Moderately-High Hazard	25-49
Moderate Hazard	15-24
Moderately-Low Hazard	5-14
Low Hazard	1-4

Table 3-6 - Hazard Threat Level Scores

Hazard Threat Levels	Hazard Threat Scores
Moderately-High Hazard	
• *Hazardous Materials*	**36**
• *Flooding*	27
Moderate Hazard	
• *Fire*	**24**
• *Extreme Temperatures*	24
• *Fog*	24
• *Storm-Related Hazards*	**18**
• *Dam Failure*	**16**
Moderately-Low Hazard	
• *Earthquake*	12
• *Tornadoes*	12
• *Drought*	8

Although the ranking did not place any hazards in the "High" or "Low" categories, the relative ordering of hazards is similar to those identified in the Community Risk Assessment for the City of Merced.

NON-PRIORITY HAZARDS

Hazards that were not identified as "Priority Hazards" were eliminated from further consideration in the MHMP Risk Assessment. These hazards either occur rarely or not at all in the City of Merced, and when they do occur, they are very limited in magnitude—no or very limited damage is sustained. These include:

- Volcanoes

RC#B1.b.

City of Merced
Hazard Frequency Table
01/01/03 - 01/01/12

Year	Fire			
	Total	Structure	Wildland	Other[1]
2003	377	97	85	195
2004	369	112	77	180
2005	409	119	84	206
2006	426	109	94	223
2007	440	138	89	213
2008	407	101	91	215
2009	380	100	85	195
2010	330	111	57	162
2011	373	104	67	202
Total	**3511**	**991**	**729**	**1791**
Avg. Incidents Per Year	390.11	110.11	81.00	199.00
% of Incidents	100.00%	28.23%	20.76%	51.01%
Probability and Frequency Score		4	4	4

Year	Hazardous Condition			
	Total	Gas Leak	Chemical Spill/Biological Hazard	Other[2]
2003	224	41	2	181
2004	189	29	4	156
2005	197	29	3	165
2006	223	29	3	191
2007	144	23	0	121
2008	163	31	5	127
2009	143	29	5	109
2010	145	23	1	121
2011	118	26	2	90
Total	**1546**	**260**	**25**	**1261**
Avg. Incidents Per Year	171.78	28.89	2.78	140.11
% of Incidents	100.00%	16.82%	1.62%	81.57%
Probability and Frequency Score		4	4	4

Year	Severe Weather and Natural Disaster					
	Total	Earthquake	Lighting Strike	Windstorm, tornado/hurricane assessment	Flood Assessment	Severe Weather
2003	3	1	2	0		0
2004	3			3		0
2005	0					
2006	6				6	
2007	3			2	1	0
2008	3			2		1
2009	1					1
2010	2			2		0
2011	0					
Total	**21**	**1**	**2**	**9**	**7**	**2**
Avg. Incidents Per Year	2.33	0.11	0.22	1.00	0.78	0.22
% of Incidents	100.00%	4.76%	9.52%	42.86%	33.33%	9.52%
Probability and Frequency Score		2	1	3	3	2

Source: ACS Firehouse Software
Time Period: 01/01/03 to 01/01/12
Hazard Frequency Table reflects the number of occurrences of the hazard as recorded by the Merced Fire Department.

[1] Fuel burner/boiler malfunction; trash or rubbish fire, contained; mobile property (vehicle) fire, other; passenger vehicle fire; road freight or transport vehicle fire; camper or recreational vehicle (RV) fire; off-road vehicle or heavy equipment fire; outside rubbish fire, other; outside rubbish, trash or waste fire; dumpster or other outside trash receptacle; special outside fire, other; ouside equipment fire; cultivated grain or crop fire; culativated trees or nurery stock fire.

[2] Hazardous condition, other; combustible,flammable gas/liquid condition; gasoline or other flammable liquid spill; oil or other combustible liquid spill; carbon monoxide incident; electrical wiring/equipment problem, other; heat from short circuit (wiring); overheated motor; breakdown of light ballast; power line down; arcing, shorted electrical equipment; accident, potential accident, other; building or structure weakened or collapsed; vehicle accident, general cleanup; attempted burning, illegal action, other; attempt to burn.

Methodology:
The probability was determined by comparing historial data from the Hazard Frequency Table and categorizing the data based on the Probably and Frequency Scoring Table.

Probability and Frequency Scoring	
Score	Descriptors
0	Infeasible Event - Not applicable due to geographic location characteristics.
1	Rare Event - Occurs less than once every 50 years.
2	Infrequent Event - Occurs between once every 8 years and once every 50 years (inclusive).
3	Regular Event - Occurs between once a year and once every 7 years.
4	Frequent Event - Occurs more than once a year.

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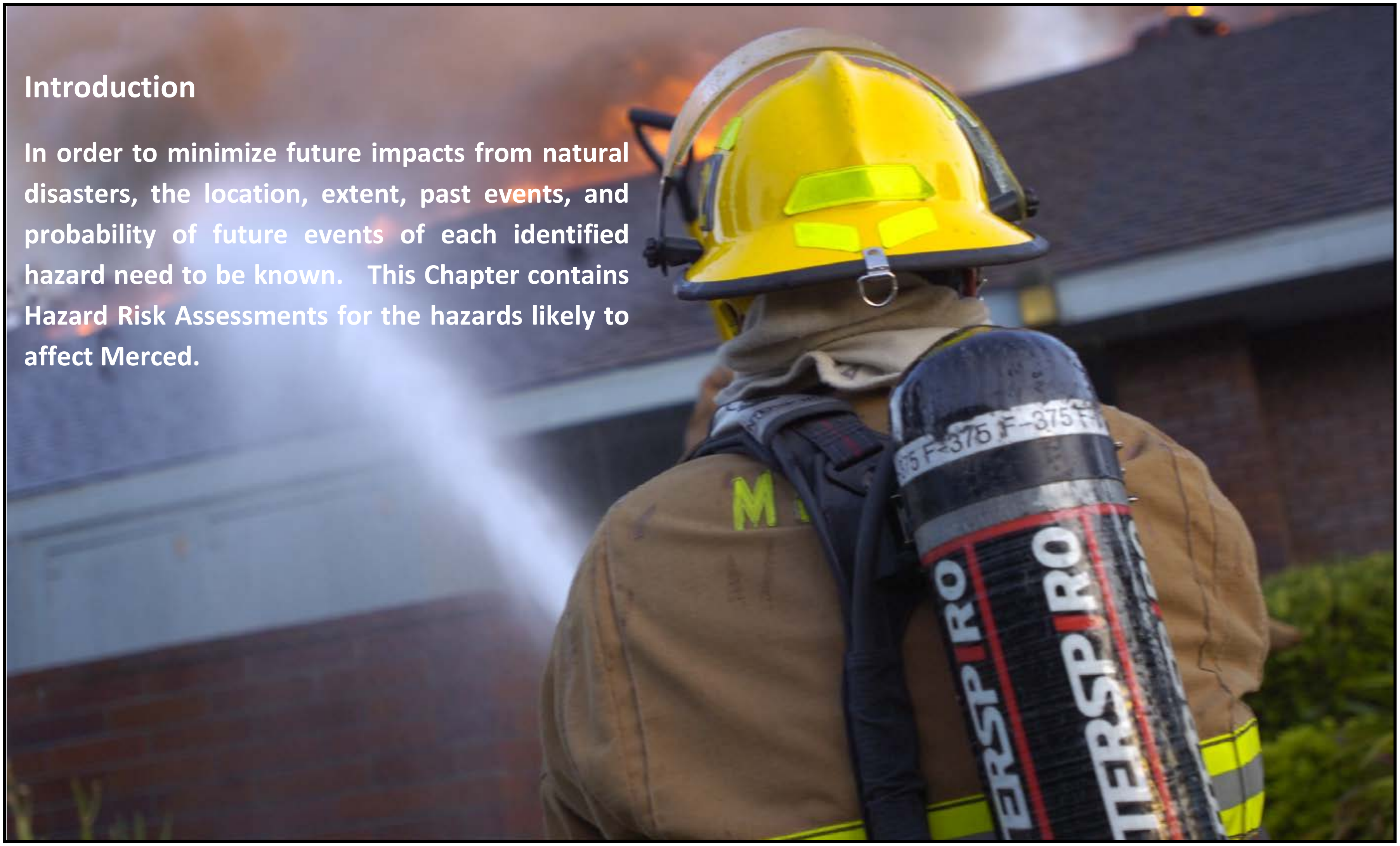
3.3 Hazard Profiles



Introduction

In order to minimize future impacts from natural disasters, the location, extent, past events, and probability of future events of each identified hazard need to be known. This Chapter contains Hazard Risk Assessments for the hazards likely to affect Merced.

Overview - Hazard Risk Assessments

Under 44 CFR, Section 201.6(c)(2)(i) of the Disaster Mitigation Act (DMA), risk assessments are required to include a description of the location and extent of hazards that can affect the jurisdiction.

Under 44 CFR, Section 201(6)(c)(2)(ii) of the DMA, risk assessments are also required to include a description of the jurisdiction's vulnerability to specified hazards and their potential impact on the community. This description should also describe the community's vulnerability (see Section 3.4) in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazardous materials incident hazard area; estimated potential dollar losses to vulnerable structures; and an analysis of development trends.

The Disaster Committee identified 10 hazards as likely to impact the City of Merced. For each of these hazards, this Chapter includes a Hazard Risk Assessment, focused on location, extent, previous occurrences, and future probability, and include the following hazards:

3.3.1 Flooding
3.3.2 Fire
3.3.3 Drought
3.3.4 Hazardous Materials
3.3.5 Earthquakes
3.3.6 Dam Failure
3.3.7 Extreme Temperatures
3.3.8 Tornadoes
3.3.9 Fog
3.3.10 Storm-Related Hazards

RC#B1c/B2

3.3.1 Flooding

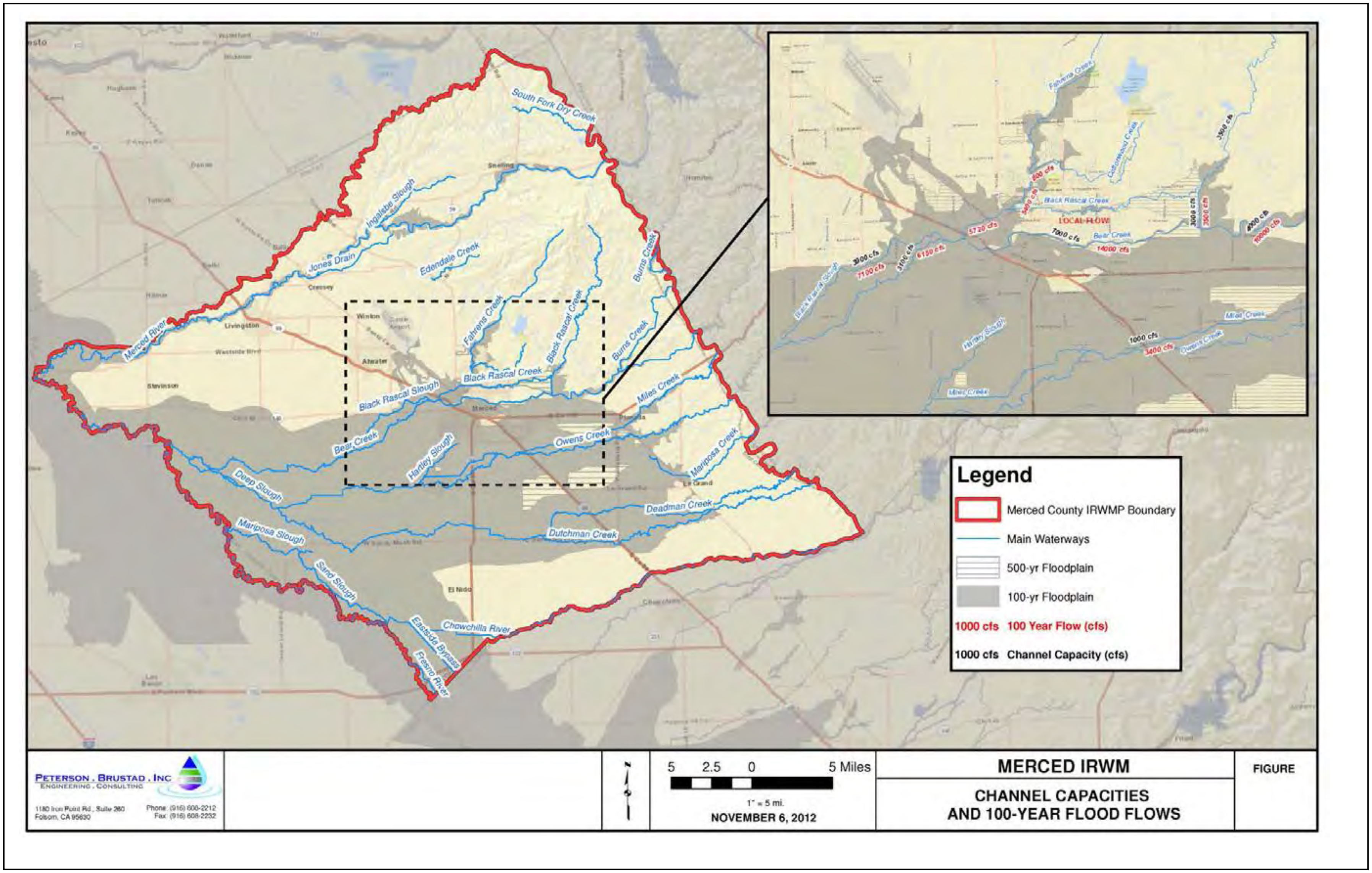
California flood of 1861-61, K Street, Sacramento. (USGS)

General Background

A flood is defined as an overflowing of water onto an area of land that is normally dry. Floods generally occur from natural causes, usually weather-related, such as a sudden snow melt, often in conjunction with a wet or rainy spring or with sudden and very heavy rainfalls. Floods can, however, result from human causes as a dam impoundment bursting. [2]

PHYSICAL SETTING

The Plan Area has no major rivers, but is traversed from east to west by four creeks. These are Bear Creek, Fahrens Creek, Cottonwood Creek, and Black Rascal Creek (see image on next page). These are not completely independent of each other. Black Rascal Creek begins many miles east of Merced near Haystack Mountain. As it flows westerly through Merced, Fahrens Creek connects into it in Merced's northwest area. Cottonwood Creek has a smaller drainage area that connects to Fahrens Creek above Black Rascal Creek. Bear Creek also begins miles east of Merced, but is south of Black Rascal Creek. Originally, both Bear Creek and Black Rascal Creek flowed independently west of town and reached the San Joaquin River. However, the Merced Irrigation District connected these two creeks west of town behind a small irrigation dam. Below the dam, the two creeks continue through their original channels.


South Fork Dry Creek
Ingalsbe Slough
Jones Drain
Edendale Creek
Burns Creek
Merced River
Fahrens Creek
Black Rascal Creek
Black Rascal Slough
Miles Creek
Bear Creek
Hartley Slough
Owens Creek
Mariposa Creek
Deep Slough
Deadman Creek
Dutchman Creek
Mariposa Slough
Sand Slough
Chowchilla River
Eastside Bypass
Fresno River
LOCAL FLOW
Legend
Merced County IRWMP Boundary
Main Waterways
500-yr Floodplain
100-yr Floodplain
1000 cfs 100 Year Flow (cfs)
1000 cfs Channel Capacity (cfs)
PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
5 2.5 0 5 Miles
1" = 5 mi.
NOVEMBER 6, 2012
MERCED IRWM
CHANNEL CAPACITIES
AND 100-YEAR FLOOD FLOWS
FIGURE

Regulatory Setting

The occurrence of flooding can be influenced by regulatory-based actions and practices such as:

- Storm-Water Management;
- National Flood Insurance Program (NFIP);
- Managing Repetitive Loss Properties (Also see section 3.4.5);
- Merced Streams Group Project; and,
- A suite of new state laws enacted in 2007 that demand specific actions and imposes deadlines.

An overview of each of these is discussed in this section.

These regulatory-based actions and practices have different approaches, but all work to reduce flooding impacts. For example, the Merced Streams Group Project is designed to control flood waters, whereas the NFIP approach is to prohibit construction in floodways and to encourage construction in low risk areas. The largest benefit of the Streams Group Project is the provision of flood control benefits to virtually the entire community, specifically to older homes and businesses built before the NFIP flood maps were developed.

STORMWATER MANAGEMENT

Overview - Changes in land use from agriculture to urban have profound effects on runoff and erosion of the land surface. Urbanization is commonly accompanied by paved and other impervious surfaces, and the construction of storm sewers. Impervious surfaces and storm drains increase the frequency of floods and the size of flood peaks.

Storm-water System Description - The City requires the construction of storm water percolation/detention basins with new development per the City's Storm Water Master Plan. Percolation basins are designed to collect storm water and filter it before it is absorbed into the soil and reaches groundwater tables. Detention basins are designed to temporarily collect runoff so it can be metered at acceptable rates into canals and streams which have limited capacity. The City's storm-water conveyance system is mainly composed of Merced Irrigation District canals and laterals, drains, and natural channels that traverse the City.

The disposal system is mainly composed of Merced Irrigation District facilities, including water distribution canals and laterals, drains, and natural channels that traverse the area.

The City has a storm drain master plan that incorporates 50 year and 10 year storm analyses as well as allowable discharge and requirements for detention volumes. The City's Storm Drainage Standards originate from the Merced Critical Area Flooding and Drainage Plan of 1983. The 1983 Drainage Plan determined allowable rates of discharge into the four local creeks for Merced and several other creeks in County areas. Storm-water discharge rates were based on pre-existing conditions and the capacities of local creeks.

The City's storm drainage master plan calls for: a 50-year design storm with 2 year allowable discharge balanced with detention volume, updated potential locations for detention basins, and master-planned storm drain pipe sizes.

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

RC#C2a

The National Flood Insurance Program (NFIP) is a program created by the Congress of the United States in 1968 through the National Flood Insurance Act of 1968. [51] Community participation in the NFIP is voluntary. Nearly 20,000 communities across the United States and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. Under the program, construction in floodplains is acceptable provided that floors are elevated to minimize the risk of damage. In exchange, the NFIP makes Federally-backed flood insurance available to homeowners, renters, and business owners in these communities. In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the Nation's floodplains. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for floodplain management programs. [2] As of April 2010, the program insured about 5.5 million homes, the majority of which were in Texas and Florida.[51]

The City of Merced has participated in FEMA's National Flood Insurance Program since the 1974,[53] is registered as Community Identification Number (CIN) #060191, and intends to continue its participation. Prior to 1974, developments were required to meet the minimum elevation and construction methods prescribed by the City Engineer in the pre-FIRM years when Federal programs were just getting started. Currently, the City of Merced Floodplain Administrator (City Engineer) actively implements and enforces the City's storm-drainage and flood prevention program through the *Merced Vision 2030 General Plan*, Uniform Building Codes, FIRM maps and the City's Flood Prevention Ordinance. Developments are conditioned to comply with code, standards, and programs to prevent vulnerability to floods from increasing. Compliance with the City's flood program is also required of certain building rehabilitations and reconstructions.

Stricter evaluation of development in all flood hazard zones would strengthen the Flood Insurance Program locally, and provide greater protection from future flooding. As an example of regulated development, certain future higher occupancy or critical facilities such as schools and hospitals, could be discouraged in floodplains and could be strictly reviewed where placement within a floodplain is necessary. The City of Merced has not deployed such optional evaluation methods, however.

Flood Insurance Rate Maps (F.I.R.M) - Flood Insurance Rate Maps (F.I.R.M.) are used to identify areas of flood risk in the community. FEMA has provided the City of Merced with all FIRM maps for City Limits and surrounding unincorporated areas. These maps provide detailed flood information for the planning area, and are periodically updated to reflect new information. FIRM maps have received large scale changes and local revisions requested by developers and independent property owners. The most recent map revision was issued by FEMA with a date of June 30, 2010, for the Fahrens Creek at "R" Street area.

Characteristics of Merced's FIRMs

To understand the dynamic nature of the changing amounts of flood-related lands within the City of Merced as it grows, comparisons were made for three boundaries. The selected boundaries include present day city limits and future growth areas, commonly known as the City's Specific Urban Development Plan (SUDP). These boundaries contain the following total acres:

- 2013 City Limit Boundary 14,927
- SUDP of the Merced Vision 2015 General Plan 21,156
- SUDP of the Merced Vision 2030 General Plan. 29,012

Table 3-7: Total Acres and Percent of Flood Related Lands in Merced's Planning Area						
Flood Zones	**2013 City Limits**		**2015 SUDP**		**2030 SUDP**	
	Acres	*%*	*Acres*	*%*	*Acres*	*%*
Floodway	282	.019	382	.018	382	.013
100-Year Floodplain	4,909	33	5735	27	6682	23
500-year Floodplain	5,748	38	6,876	32	7929	27
Total Flood-prone Acres	**10,657**	**71**	**12,611**	**59**	**14,611**	**50**

On the nearly 15,000 acres currently in the City of Merced, 71% is within the 100-year and 500-year floodplains. Upon build-out of the 2030 SUDP, this percentage will decrease to 50%, however. This is due to the fact that most future growth will be located outside flood sensitive areas.

The data also reveals that the 2030 SUDP does not add any floodway acreage to the prior 2015 SUDP. Regardless of which SUDP is compared, there is still about 100-acres of floodway outside the current City Limits that will eventually be incorporated with urban growth patterns.

Flood Damage Prevention Ordinance

On June 18, 1979, the City of Merced created Ordinance No. 1250 which thoroughly outlined methods to be enforced by the City to reduce potential loss of life and property. The ordinance's requirements were based on special flood hazard areas identified by the Federal Insurance Agency (FIA) in a document entitled, "The Flood Insurance Study for the City of Merced," dated January, 1979. The ordinance appointed the City Engineer to administer the program and processes involved.

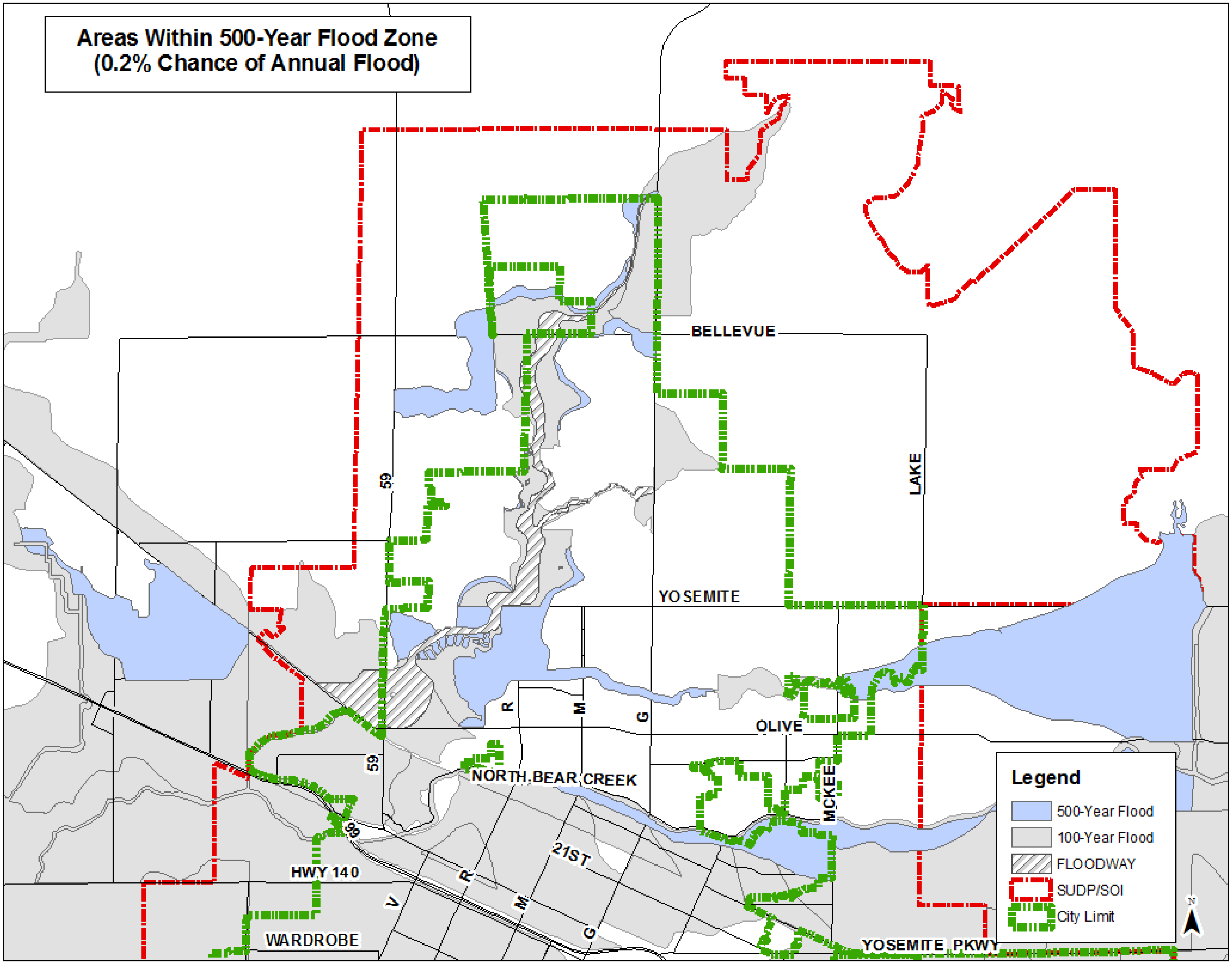
In 2008, the City's Flood Damage Prevention Ordinance was updated to make it compliant with new Federal regulations governing the National Flood Insurance Program. Should the City fail to enforce restrictions and standards, it runs the risk of losing Federal Insurance monies. The City's Flood Control Ordinance is patterned on FEMA's model ordinance.

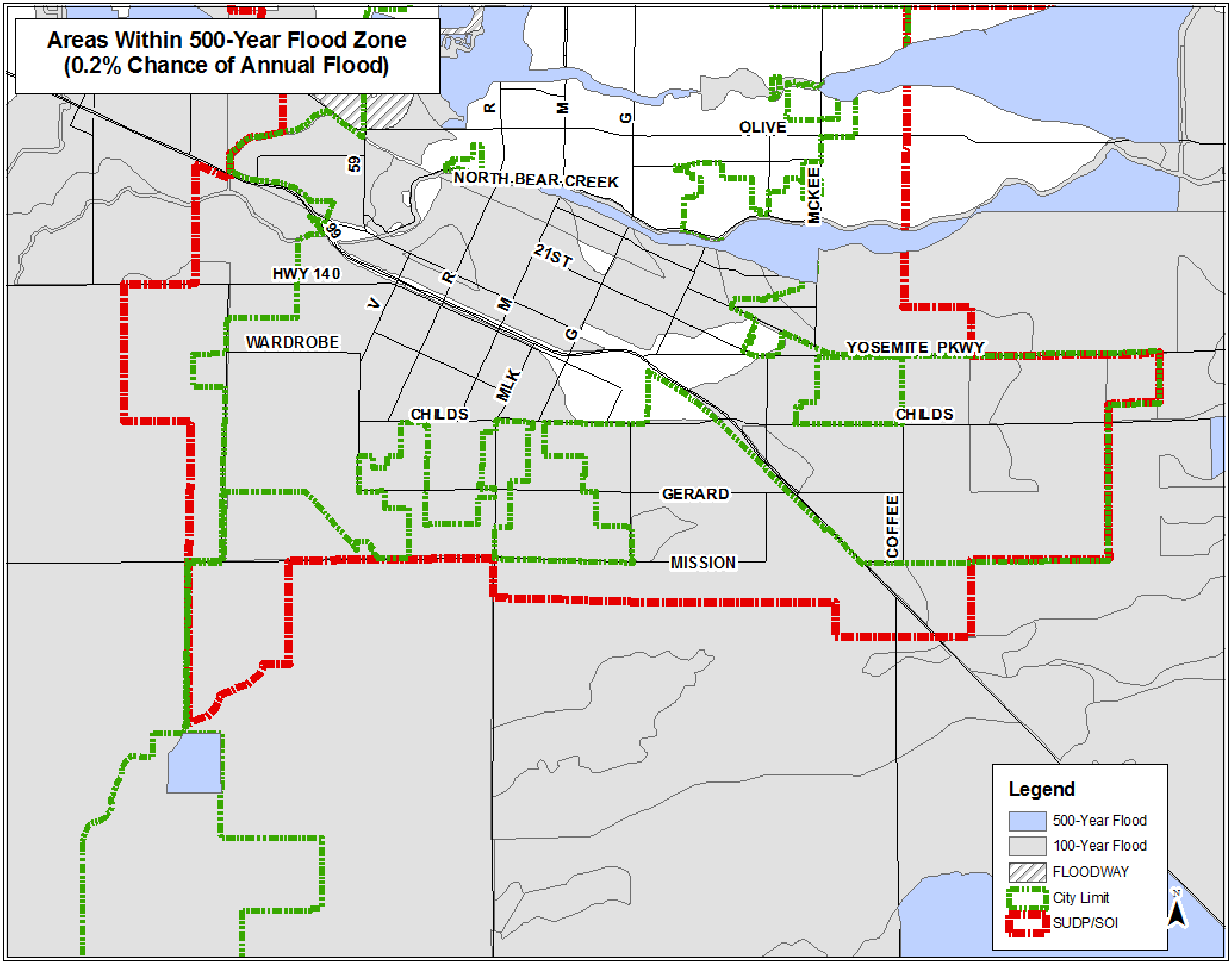
Flood Elevation Certificates / Letters of Map Revision

Prior to the final inspection of any project wherein a new building is constructed or additional area is added to an existing building, the City of Merced requires submittal of a Flood Elevation Certificate stamped and signed by a licensed surveyor.

FEMA deems that any structure that experiences changes meeting their definition of "substantial improvement" shall be raised to meet the minimum flood elevation height if not already in compliance. Although a rare occurrence, the City is required to enforce accordingly.

The City Engineer, as the floodplain administrator, reviews applications for Letter of Map Revision (LOMR), Conditional Letter of Map Revision (CLOMR), and others for content and relation to the City's flood ordinance prior to submittal to FEMA. By so doing, the City can monitor proposed changes to help avoid or reduce potentially negative effects on adjacent areas.


Areas Within 500-Year Flood Zone
(0.2% Chance of Annual Flood)
BELLEVUE
YOSEMITE
OLIVE
NORTH BEAR CREEK
LAKE
MCKEE
59
R
M
G
99
HWY 140
21ST
V
WARDROBE
YOSEMITE PKWY
Legend
500-Year Flood
100-Year Flood
FLOODWAY
SUDP/SOI
City Limit
N


Areas Within 500-Year Flood Zone
(0.2% Chance of Annual Flood)
R
M
G
OLIVE
59
NORTH BEAR CREEK
MCKEE
99
21ST
HWY 140
R
V
M
G
WARDROBE
YOSEMITE PKWY
MLK
CHILDS
CHILDS
GERARD
COFFEE
MISSION
Legend
500-Year Flood
100-Year Flood
FLOODWAY
City Limit
SUDP/SOI

MANAGING REPETITIVE LOSS PROPERTIES

A repetitive loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. An RL property may or may not be currently insured by the NFIP. Structures that flood frequently strain the National Flood Insurance Fund. Community leaders and residents are also concerned with the RL problem because residents' lives are disrupted and may be threatened by the continual flooding. In 2004, Congress found that repetitive-loss properties cost the taxpayer about $200 million annually. [51]

RC#B4a

Additional information about RL properties is included in the Hazard Vulnerability Section 3.4.5.

MERCED STREAMS GROUP PROJECT

Origin - The Merced County Stream Group (MSG) project, originally authorized by the Flood Control Act of 1944, aimed to provide flood protection as part of the comprehensive flood management plans for the Sacramento and San Joaquin Basins. The MSG is one of several USACE flood control projects in the Region. The project consisted of four flood control reservoirs on Burns, Bear, Owens, and Mariposa Creeks and was completed in 1957. Numerous subsequent projects have also been undertaken to address the problem of regional flooding.

A 1970 authorization provided for enlargement of the four original reservoirs, construction of three additional reservoirs (Castle, Haystack, and Marguerite), and channel improvements on Bear and Mariposa creek systems. These channel improvements included two diversions: Black Rascal Creek to Bear Creek (3,000 cfs capacity) and Owens Creek to Mariposa Creek (400 cfs). Re-evaluation and technical studies later modified the design to include only the construction of Castle and Haystack Reservoirs, enlargement of the Bear Reservoir, and about 33 miles of channel improvements along Bear Creek.

In addition to the reservoir projects, improvements along Black Rascal Creek, Bear Creek, Burns Creek, Miles Creek, Owens Creek, and Mariposa Creek were completed as part of the MSG. Although channels were improved, very few levees were constructed, and the incised channels are subject to periodic overflows, causing widespread but relatively shallow flooding.

Except for the Black Rascal Creek Diversion (Bypass), there are no State Plan of Flood Control (SPFC) levees in the City's Sphere of Influence, which is the plan area of the MHMP. There are no USACE project levees in the plan area.

To date, the MSG is mostly complete, but a key feature intended to protect downtown Merced has not been built.

<u>Completed</u>

- Castle Reservoir
- Castle Check Structure and Gate Rehabilitation
- Burns Reservoir
- Bear Reservoir
- Bear Creek Stream Group
- Owens Reservoir
- Owens Creek Diversion
- Mariposa Reservoir
- Black Rascal Creek Diversion
- Relocate Fahrens Creek A.T. & S.F. railroad stub line and bridge

<u>Remaining Projects</u>

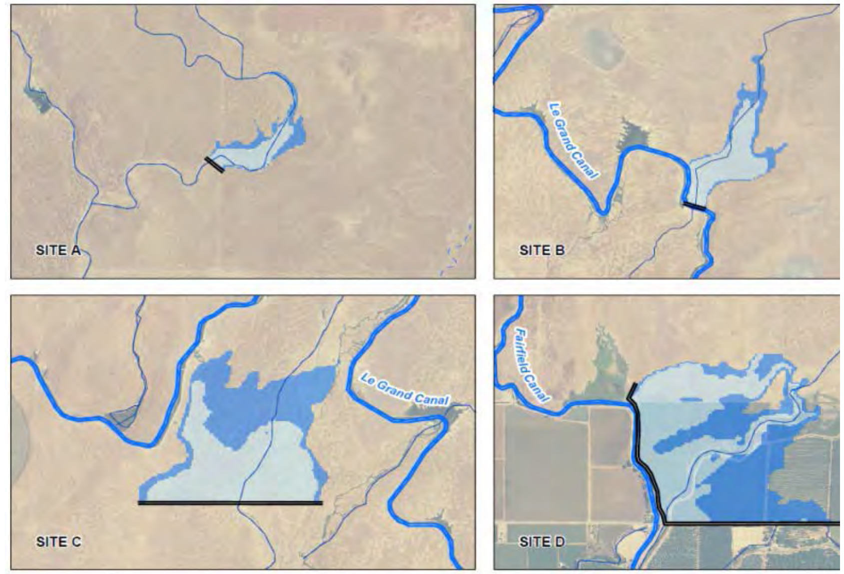
- Haystack Mountain Reservoir

The ***Haystack reservoir*** is the only component of the MSG not completed at this time. Changes in population, downstream development, and new environmental compliance issues have prompted a new analysis, which is being completed by the *USACE as the Merced County Streams Group Feasibility Study*. This study is intended to evaluate options to increase flood protection along Black Rascal Creek and Bear Creek to increase the current level of flood protection beyond a 50-year level of protection, but this study has not started due to lack of Federal funding.

East Side Bypass - Due to environmental considerations, it is unlikely that Haystack Mountain dam will be constructed. The proposed Haystack Mountain reservoir area has significant vernal pool areas. In 2004, the Army Corps of Engineers began considering as an alternative, an East side bypass, extending from the Black Rascal Diversion at Bear Creek south past Hwy 99 to the Miles and Owens Creek drainages. This would divert both Black Rascal and Bear Creek flood flows away from the City of Merced. However, there is insufficient capacity in Miles and Owens Creeks to carry flows down to the San Joaquin River, so that this solution is problematical, without an expensive further extension of a flood bypass.

Black Rascal Creek Feasibility Study - Flooding along Bear Creek and Black Rascal Creek near the City of Merced has historically been problematic. In 2008, Merced County completed a local feasibility study evaluating several alternatives for a proposed detention basin upstream of the Black Rascal Creek Diversion. The goal of this study was to identify a preferred alternative which would reduce the flows in the diversion to less than 3,000 cfs, which the County believed might significantly reduce flooding within the city of Merced. This study was updated in 2009 to evaluate 200-yr flood protection.

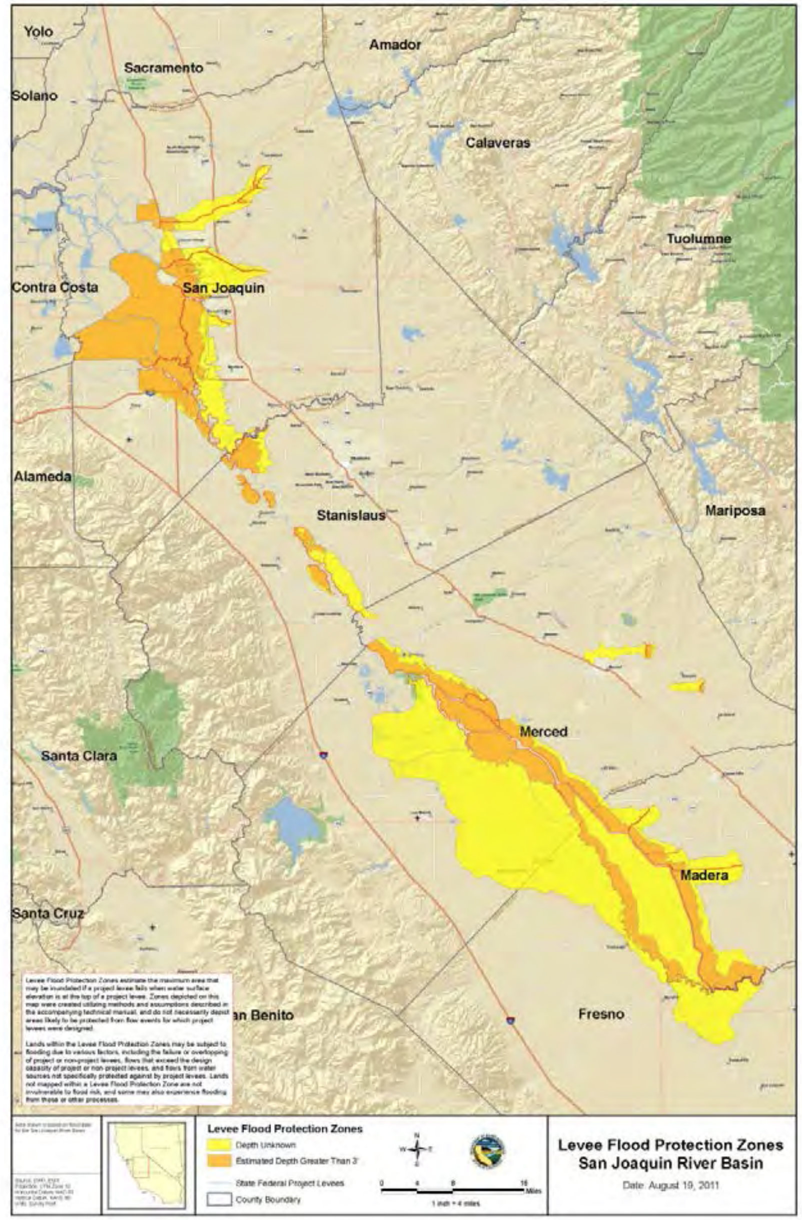
Two primary challenges were identified in this study. The first is that each of the proposed dams would be larger than the minimum size dam subject to California Division of Safety of Dams (DSOD) permitting authority. According to DSOD requirements, dams greater than 25' tall, or dams which store more than 50 acre feet of water are subject to DSOD jurisdiction. The other major challenge is sensitive biological resources (i.e. vernal pools) which would be impacted by all the alternatives. The apparent recommendation from this study was to further evaluate environmental permitting challenges associated with three of the four alternatives.



LEVEE FLOOD PROJECTION ZONES

Water Code Section 9130 (passed in 2007), requires the Department of Water Resources (DWR) to prepare Levee Flood Protection Zone (LFPZ) maps that identify the areas where flood levels would be more than three feet deep if a project levee were to fail. Under Water Code section 9110(b), "Levee Flood Protection Zone" means the area, as determined by the Central Valley Flood Protection Board or DWR, which is protected by a project levee. DWR delineated the LFPZs by estimating the maximum area that may be flooded if a project levee fails with flows at maximum capacity that may reasonably be conveyed. The maps should not be confused with Federal Emergency Management Agency's Flood Insurance Rate Maps used for the National Flood Insurance Program. They were prepared for different purposes and do not show the same type of flood hazard. [54]

A Project Levee exists along a portion of Black Rascal Creek east of Merced, generally located west of Arboleda Drive and between Olive Avenue and north of Yosemite Avenue. East of the levee, flood depths are estimated to be greater than 3 feet. “Depth Unknown” is denoted for lands highlighted yellow west of the Project Levee.



FloodSAFE INITIATIVE AND SUBSEQUENT STATE REGULATIONS

In 2007, flood risk management legislation AB 162, SB 5, AB 70 and AB 156, were signed by Governor Schwarzenegger, adding to and amending State flood and land use management laws. These new laws are intended to improve local land use and other planning decisions by strengthening the link between land use and flood management. The laws became effective in January 2008, and contain requirements and considerations that outline a comprehensive approach to improving flood management at the State and local levels.

Geographically speaking the requirements of the 2007 Flood Risk Management Legislation apply to three areas of California: (1) statewide; (2) the Sacramento-San Joaquin Valley (SSJV); and (3) the

Sacramento-San Joaquin Drainage District (SSJDD). The City of Merced is located within areas 1 and 2. Adoption of the Central Valley Flood Protection Plan (CVFPP) occurred in June 2012, establishes guidance for required updates to General Plans, adoption of Flood Emergency Plans, and zoning code amendments to occur within three years of the adopt date of the CVFPP.

Under SB5, development in a moderate or high flood hazard zone would only be allowed if the permitting agency can find, based on substantial evidence in the record, that urban or urbanizing areas will be protected to a 200-year-flood level. This applies to all developed areas with population of at least 10,000 (or with plans to reach 10,000 within 10 years), overlain by FEMA Zones A, B, or shaded X. Therefore, as of mid-2015, Merced - along with other Central Valley cities and counties - will be prevented from entering into development agreements, approving discretionary permits that would result in construction of a residence, and approving subdivision maps in urban or urbanizing areas without a finding of 200-year- flood-level protection. This is more restrictive than FEMA regulations.

SB5 was amended in September 2012 by Senate Bill 1278 (SB1278), which removed local drainage and “shallow” flooding from Urban Level of Flood Protection (ULOP) requirements, thus easing SB5 requirements on Merced. Future DWR guidance on legislation aims to define “shallow” and modify other concerns with SB5.

The Department of Water Resources is only preparing 200-yr floodplain maps for areas protected by SPFC facilities, which doesn’t apply to many areas in Merced County. Absent detailed maps will make it difficult for communities to make the findings required by state law.
The removal of interior drainage and shallow flooding help a bit since many of the FEMA floodzones for Merced County show depths less than 3’, which is what we expect to be the limit of “shallow”.

While the discussion above highlights a key benchmark of these laws, there are many facets of the laws with specific deadlines and which affect various planning documents and tools, such as General Plan Elements, funding mechanisms, local flood-related plans, zoning ordinance, development agreements, permits, and maps, among others.

The following required actions, as defined by the applicable laws, apply to the City of Merced.

<u>Beginning January 1, 2008</u>

- Identify and annually review areas subject to flooding. Consider the location of water and natural resources that are used for the purposes of groundwater recharge and stormwater management. Government Code Section 65302(a), and as it applies to the General Plan Land Use Element (Statewide);
- Any new development approved may be subject to liability provisions, if the action to approve was unreasonable, as defined by Water Code Section 8307 (SSJV).

<u>On or after January 1, 2009, upon the next revision of the General Plan Housing Element</u>

- Identify rivers, creeks, streams, flood corridors, riparian habitat and land that may accommodate floodwater for groundwater recharge and stormwater management. Water resources section must be developed in coordination with applicable flood management, water conservation, and groundwater agencies that have developed, served, controlled, managed, or conserved water of any type for any purpose in the City for which the General Plan is prepared. Government Code Section 65302(d), and as it applies to the General Plan Conservation Element (Statewide);
- Identify flood hazard information and establish goals, policies, objectives, and feasible mitigation measures to protect communities from unreasonable risk of flood. The goals, policies and objectives of the safety element must include language specified in the Government Code. In addition, after

the initial revision of the safety element, upon revision of the housing element, the safety element must be reviewed and revised, as necessary to "identify new information that was not available during the previous revision of the safety element. Government Code Section 65302(g), and as it applies to the General Plan Safety Element (Statewide).

By January 1, 2010

- Collaborate with State and local flood management agencies to develop funding mechanisms to finance local flood protection responsibilities, as defined by Water Code Section 9623, (SSJV).

Within 24-months of CVFPP Adoption (July 2015) *

- Amend applicable General Plan elements to include information per CVFPP, as defined by Government Code Section 65302.9, (SSJV).
- Within this timeframe, counties are required to collaborate with the cities within its jurisdiction to develop a flood emergency plan consistent with the adoption of the CVFPP, as defined by Water Code Section 9621, (SSJV).

Within 36-months of CVFPP Adoption (July 2016) *

- Amend the zoning ordinance for consistency per amendments made to the General Plan per the CVFPP, as described in Government Code Section 65860.1, (SSJV).

* SB5 was amended in September 2012 by Senate Bill 1278 (SB1278) and Assembly Bill 1965 (AB 1965). SB1278 and AB 1965 extended the requirement for communities to incorporate the CVFPP into their general plans and zoning ordinances by 12 months (July 2015 and 2016, respectively).

Post CVFPP adoption and amendments to the General Plan and Zoning Ordinance

- The City cannot enter into Development Agreements for any property within a flood hazard zone unless certain flood protection related findings can be made based upon substantial evidence in the record. Government Code Section 65865.5, (SSJV).
- The City cannot approve a project (discretional permits, discretionary entitlements, or ministerial permits) that would result in the construction of a new residence within a flood hazard zone unless certain flood protection related findings can be made based upon substantial evidence in the record. Government Code Section 65962, (SSJV).
- The City cannot approve Tentative Maps or Parcel Maps for any subdivision within a flood hazard zone unless certain flood protection related findings can be made based upon substantial evidence in the record. Government Code Section 66474.5 (SSJV).

By 2025

Achieve urban level of flood protection for urban and urbanizing areas protected by project levees (i.e. 200-year).

Flooding Location

The Plan Area is not affected by the regions closest major waterways, the Merced River and the San Joaquin River. In Merced, the majority of normal flooding occurs adjacent to tributaries of these rivers.

FEMA flood-hazard maps(on page 3-31 and 3-32) best depict the location of various flood boundaries. There is a potential for flooding to occur away from these water courses and associated floodplains in parts of the City experiencing storm-water drainage challenges, however.

Extent

Flood management and planning has significantly shaped the Merced region's history. Flooding in the San Joaquin River basin is typically characterized by infrequent severe winter storms, combined with snowmelt runoff from the foothills east of the region. Runoff from these storm events traverses the region via numerous creeks and rivers, ultimately draining to the San Joaquin River. The relatively flat topography of the region causes floodwaters to exceed the banks of these rivers and streams to spread out over large areas.

The City of Merced is located on the flat San Joaquin Valley floor. Stream channels, well- entrenched and steep in the mountains and foothills, have limited capacity on the valley floor. They are periodically choked with vegetation, causing channel capacities to be quickly exceeded during major floods. Overflow from the channels generally spreads out as slow-moving shallow flooding. Runoff patterns are restricted and ponding occurs behind the many irrigation canal levees and railroad and road embankments that traverse the area. [60]

Flooding is directly related to rainfall events. Most of the rainfall in Merced occurs during the winter and averages 12.21 inches (310 mm) annually. There is an average of 48 days annually with measurable precipitation. The wettest year was 1998 with 21.66 inches (550 mm) and the driest year was 1947 with 5.50 inches (140 mm). The most rainfall in one month was 8.00 inches (203 mm) in January 1909. The most rainfall in 24 hours was 2.20 inches (56 mm), which occurred on January 30, 1911, and March 9, 1911.

The extent of flooding is generally described on FEMA flood hazard maps as 100-year and 500-year floodplains.

Extent of Flooding from Bear Creek

Historically, flood flows in excess of the Bear Creek channel capacity spill over the left bank of Bear Creek approximately 6 miles east of Merced. Due to topography and embankments, overflow from Bear Creek does not return to the channel. The natural slope is southwest from Bear Creek, but some of the overflow moves westward and northwestward into Merced along the Atchison, Topeka, and Santa Fe Railway embankment. There are some flood relief structures along the embankment that allow part of the overflow to proceed southwestward, but much of the floodwater flows into Merced, where it ponds and eventually overtops the Atchison, Topeka, and Santa Fe Railway embankment between R and V Streets. The floodwater then flows as shallow flooding southwestward through downtown Merced, ponds behind the Southern Pacific Railroad embankment, eventually overtops the railroad embankment, and finally continues as shallow flooding through southwest Merced.

Overflow from Bear Creek will also occur upstream of the West 16th Street bridges at several locations near the Daisy Park residential area. This floodwater will flow west through the Daisy Park area as shallow flooding, then over the Snelling Highway and into the Industrial Park area, where it will pond behind the U.S. Highway 99 embankment and the Black Rascal Creek levee.

During the major flood events in 1969, 1997, 1998, and 2006, Bear Creek overflowed at the southwest end of the City of Merced in the vicinity of Thornton Avenue and State Highway 140. Stream gage data is not available to quantify the magnitude of these events. Historical records also indicate that Bear Creek has overflowed its banks upstream from the G Street bridge. This overflow was worsened by debris restricting flow under the bridge. [60]

Extent of Flooding from Black Rascal Creek

Black Rascal Creek flood flows are diverted into Bear Creek approximately 3 miles east of Merced. Minor flooding from local runoff has occurred along Black Rascal Creek between G Street and Parsons Avenue.

Extent of Flooding from Fahrens Creek

Fahrens Creek, which joins Black Rascal Creek near West Olive Avenue and State Highway 59 (Snelling Highway), flows through the northwestern part of Merced. Limited channel capacity, coupled with constricted bridge openings at State Highway 59, produces widespread ponding upstream from the bridges and road embankment.

Previous Occurrences

Most floods in Merced are produced by extended periods of rainfall in the watersheds of the creeks that flow through Merced. Recent flood events occurred in the Region in 1997, 1998, 2000, 2001, 2002, 2005, 2006, and 2007. The frequency of flooding events illustrates the fact that many areas in the Region are prone to flooding from storm events less severe than a 100-year event.

Below, flooding events are listed chronologically, and where known, the extent of the flood is provided.

Flood of January, 1862: On Christmas Eve, 1861, a series of massive storms struck California, which lasted for forty-five days. This caused extreme flooding. The state capital had to be moved to San Francisco, because the Sacramento Valley was flooded. "Governor Leland Stanford had to take a rowboat to his inauguration." The Central Valley was also flooded.

Locally, in Snelling, it washed away the hotel and several other buildings including Judge Fitzhugh's house, as well as the bridges located nearby at Merced Falls. It also changed the course of the river.[45]

The data in Table 3-7 was extracted from a consecutive thirty-year annual record for Sacramento, [46], and provides an indication of probable similar historic events in the Central Valley, including the City of Merced.

Table 3-7: Significant Wet-Weather Years in Sacramento

Year	Rainfall (inches)	Rainy Days
1849-50	36	53
1852-53	36.15	70
1861-62	35.54	83
1867-68	32.76	88
1873-74	22.89	80

Flood of 1925 (Highway 99)

Flood of 1935

In 1911, 1935, and 1955, large floods occurred within those portions of Merced that were developed at the time; in intervening years, flooding occurred every three to five years. Former Fire Chief Ken Mitten articulated there were significant flooding issues in Merced before the 1970's; however, actions were taken to improve drainage infrastructure and to reinforce the banks of Bear Creek. Subsequently, the number of floods dramatically reduced.

November 18, 1950: A three day heavy rain event from November 17 through November 19 in the Sierra brought more than 15 inches of rain to some areas as high as 5,500 feet and heavy rain as high as 10,000 feet, which melted snowpack resulting in historic flooding. Hardest hit were Merced, Chowchilla, Centerville, Visalia, Porterville, Oildale, Isabella, and Kernville. Damage was estimated at 12 million dollars at the time and a few lives were lost. [13]

December 1955 Flooding [42]

Extensive flooding occurred a few days before Christmas throughout central and northern California. Close to record floods occurred on most of the major Central Valley rivers and the greatest flow of record to that time occurred on the Eel River on the North Coast. Statewide disaster declared. Calculated Damages: 74 deaths, $200 million economic losses.

Christmas Eve, 1955. McKee and Bear Creek Drive

1969 Winter Storms and Floods [42]

Significant flooding on Central Valley rivers and reformation of Tulare Lake in the San Joaquin Valley occurred as extended precipitation fell across the state. Heavy snow fell in all mountain ranges and the monthly rainfall record was set in Sacramento. Forty counties were disaster-declared. Calculated Damages: 47 dead, 161 injured, $300 million economic losses.

1982-83 El Niño Storms [42]

Multiple strong storms brought high wind, heavy rain, and heavy snowfall across all of California. This led to direct wind damage, higher tides, immediate flooding to coastal and valley locations, mudslides in coastal mountain areas, record snowfall in the Sierra

Mountains, and resulting spring snowmelt river flooding. In one 36-hour period, 25 inches of rain fell in the Santa Cruz (coastal) mountains while 8.5 feet of snow fell in the Lake Tahoe region. Forty-six counties were disaster-declared.

RECENT EVENTS (1998 TO PRESENT)

Since improvements were made in the 1970's, two significant floods have occurred: March 1998 and March 2007.

Jan 4, 1997: The Flood of January '97 caused flooding in the San Joaquin Valley as well as the adjacent foothills. Numerous houses adjacent to the San Joaquin River flooded, while agricultural lands near the Merced River were inundated. Flooding also impacted areas in the South Valley, especially Earlimart and Porterville.[13]

Jan 16, 1998: Rainfall of up to 3 inches in the Sierra foothills lead to streams in Merced County reaching bankfull. Bear Creek overflowed into the City of Merced where it flooded 180 homes and up to 5,000 acres of farmland just to the southwest. This was the first flood of this creek since 1955. [13]

February of 1998: There was severe flooding that cost Merced County $1.4 million in agriculture damage and $2 million in damage.

March 1998 Flood: Former Fire Chief Mitten identified that the March 1998 flood lasted for three days and caused extensive evacuations and property damage. In certain locations of the City, the water was three to four feet deep. One gauge in the northern part of the City of Merced had 6.80" in a 48 hour period from March 23 to March 25. The Merced Airport recorded 3.25" of rain alone on March 24.

Bear Creek, at the west edge of town just west of Massasso Street, jumped its banks due to variable bank height and gopher holes. Farmlands, a few houses north of State Highway 140, and many more houses south of State Highway 140 and along Thornton Road, received flood damage, as did a City Storm pump facility. According to noaa.gov, this event was the 2nd 100-year event to occur in Merced County in two months. The City of Merced received heavy rainfall that totaled from 3.5" to 5.9." Bear Creek reached a crest of 19.3 feet on the morning of March 25, resulting in the 1,000 people being evacuated. A total of 65 homes and 19 apartments were flooded. The total damage to Merced County was 9.6 million, with agriculture suffering a $1.5 million loss. [13]

April 17 and 18, 2000: There was some minor flooding around Merced around April 17 and 18, 2000. There was some flooding around three miles north of Merced at Black Rascal. Merced received around 1.42" of rain.

November 12, 2001: There was some minor flooding in Merced on November 12, 2001. According to www.noaa.gov there wasn't any crop or property damage.

December 13 to December 17, 2002: There was a tornado and heavy rain from December 13 to December 17, 2002 that caused damage to an apartment and flooding. Merced received 1.78" of rain. This rain caused storm drains to be clogged on 16th Street, west of "V" and 18th Street.

February 15 and February 16, 2005: There was heavy rain in Merced from February 15 and February 16, 2005. Merced received 1.24" of rain. There were reports of flooding throughout the San Joaquin Valley.

March 22, 2005: Quick downpour in Merced: 0.69" fell in one hour during the afternoon. Numerous buildings and homes flooded in downtown Merced and an awning collapsed due to the weight of water on it. Gusty winds around 40 mph also added to the problems as they caused a pump house roof and carport to suffer damage resulting in power outages when they fell on nearby lines. In

Mariposa, 3.22” of rain fell in a 24 hour period resulting in flooding damage to structures. Several creeks also overflowed in Merced, Madera, and Mariposa Counties and some bridges and roads were washed away. [13]

April 4, 2006: Four consecutive days of rain from April 2 through the 5 resulted in the Black Rascal Creek swelling and flooding 300 homes in North Merced, prompting evacuations. [13] Many schools had to be shut down. Crews had to use concrete blocks and sandbags to close the break. Water levels raised at Bear Creek, Black Rascal Creek, and El Capitan Canal.

March 2007 Flood: The March 2007 flood lasted twelve hours, but it forced the evacuation of 3,400 citizens and damaged numerous structures. Another factor of the 2007 flood was that it caused a sanitary sewer treatment plant in a neighboring town to overflow, that led to widespread water contamination issues. Many believe the 2007 flood and related damage hinged on Black Rascal Creek and its complete lack of flood control facilities. The damaged school and mobile home park area is also where Black Rascal Creek used to flow prior to being connected to Bear Creek, so it is a low lying area. NOTE: This site is not located in the Planning Area.

December 28 and December 29, 2010: On December 28 and December 29, 2010, the City of Merced received about three-quarters of an inch of rain. There was a flood advisory for the central and southern San Joaquin Valley. According to the Merced Sun Star, “Bear Creek through Merced was high Wednesday, with parts of the bike path disappearing into swift brown water.” This is a picture of Bear Creek near G Street. [50]

March of 2011: There were more storms around the middle of March of 2011. Bear Creek flooded again. Inmates sandbagged Bear Creek around Highway 59. The inmates put down hundreds of 35-pound bags between Bear Creek and the road. According to the Merced Sun Star (local newspaper), Merced Airport received 1.78 inches of rain between 10 a.m. Saturday and 10 a.m. Monday (March 19- March 21).

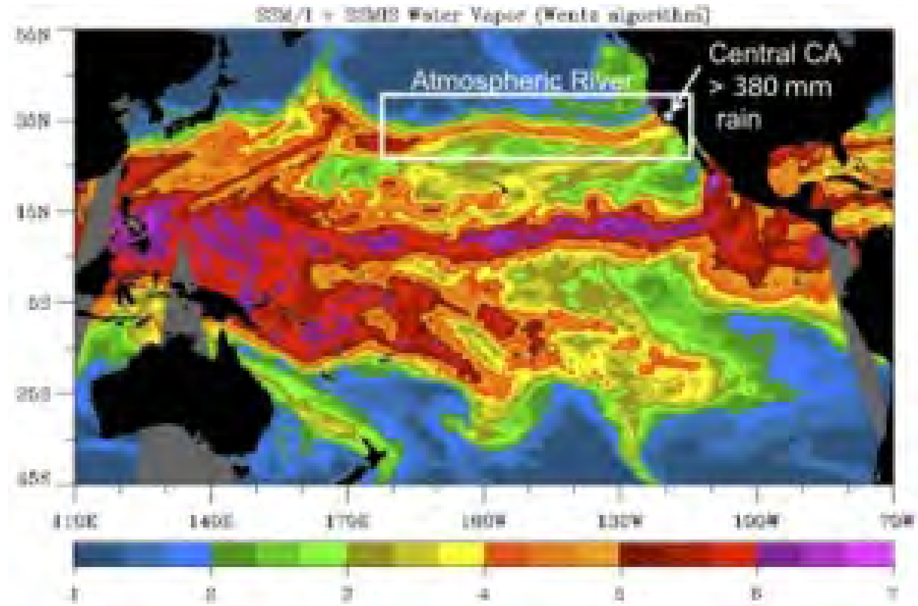
ARCSTORM

Beginning on Christmas Eve, 1861, and continuing into early 1862, an extreme series of storms lasting 45 days, struck California. The storms caused severe flooding, turning the Sacramento Valley into an inland sea. William Brewer, author of "Up and Down California," wrote on January 19, 1862, "The great central valley of the state is under water—the Sacramento and San Joaquin valleys—a region 250 to 300 miles long and an average of at least twenty miles wide, or probably three to three and a half millions of acres!"

In Southern California lakes were formed in the Mojave Desert and the Los Angeles Basin. The storms wiped out nearly a third of the taxable land in California, leaving the State bankrupt.

The 1861-62 series of storms were probably the largest and longest California storms on record. However, geological evidence suggests that earlier, prehistoric floods were likely even bigger. There is no scientific evidence to suggest that such extreme storms could not happen again. The storms of 1861-62 happened long before living memory, and the hazards associated with such extreme winter storms have not tested modern infrastructure or the preparedness of the emergency management community.

The atmospheric mechanisms behind the storms of 1861-62 are unknown; however, the storms were likely the result of an intense atmospheric river, or a series of atmospheric rivers, that approach the ferocity of hurricanes and then slam into the U.S. West Coast over several weeks. Such a storm might drop as much as 10 feet of rain on California over the course of a single month. Atmospheric Rivers are relatively narrow regions in the atmosphere that are responsible for most of the horizontal transport of water vapor outside of the tropics.



With the right preconditions, just one intense atmospheric river hitting the Sierra Nevada mountain range east of Sacramento could bring devastation to the Central Valley of California. An independent panel wrote in October 2007 to California's Department of Water Resources, "California's Central Valley faces significant flood risks. Many experts feel that the Central Valley is the next big disaster waiting to happen. This fast-growing region in the country's most populous state, the Central Valley encompasses the floodplains of two major rivers—the Sacramento and the San Joaquin—as well as additional rivers and tributaries that drain the Sierra Nevada. Expanding urban centers lie in floodplains where flooding could result in extensive loss of life and billions in damages."

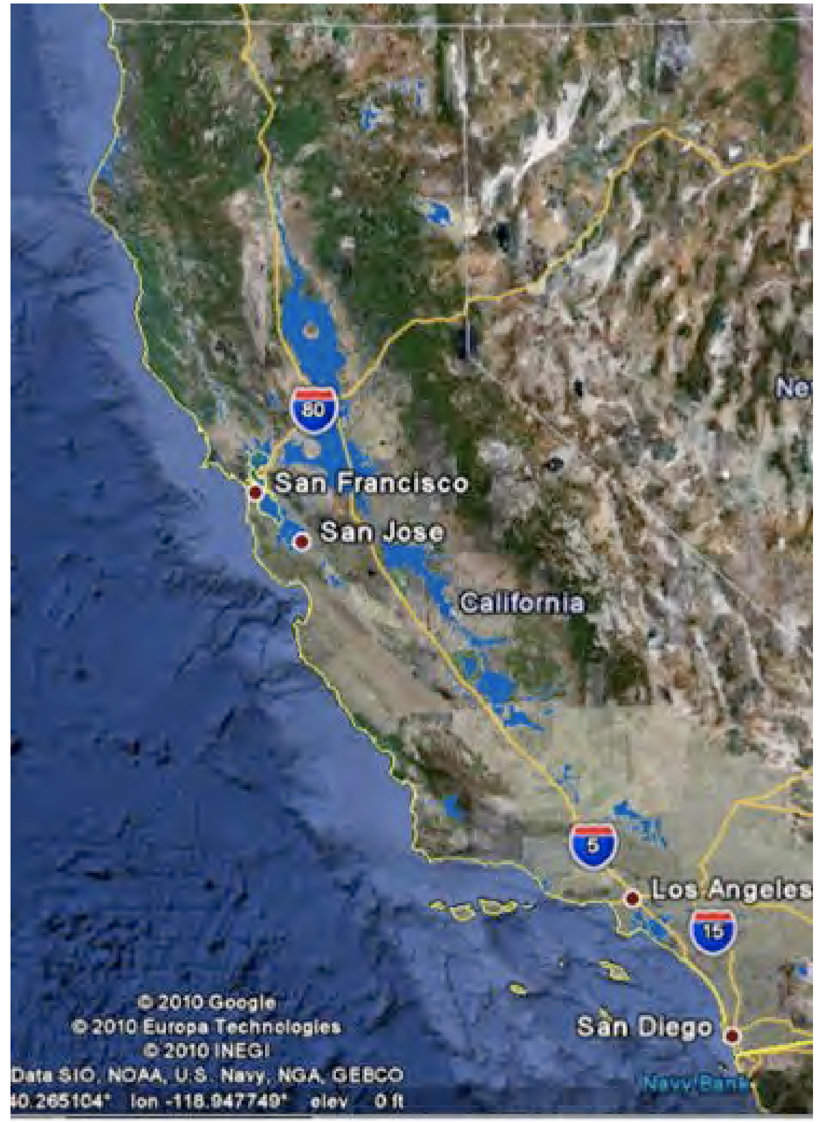
ARkStorm Scenario Project Report: The USGS Multi Hazards Demonstration Project, called ARkStorm, models the physical, economic, and social impacts of massive storms predicted to occur on the west coast of California. Scientists from the NOAA, USGS, Scripps Institute of Oceanography, FEMA, NCAR, California Department of Water Resources, CalEMA, and the University of Colorado are collaborating on this project. Some of the key findings of ARkStorm Scenario Project Report include:

Impacts of a Megastorm

Scientists believe a winter megastorm is inevitable for California. Such a storm might drop as much as 10 feet of rain on California over the course of a single month. [48] A severe California winter storm could realistically flood thousands of square miles of urban and agricultural land, result in thousands of landslides, disrupt lifelines throughout the state for days or weeks, and cost on the order of $725 billion. The $725 billion figure comprises approximately $400 billion in property damage and $325 billion in business-interruption losses. An event like the ARkStorm could require the evacuation of 1,500,000 people. At the same time, traffic from Los Angeles to the north could be cut off for weeks because of highway damage. Because the flood depths in some areas could realistically be on the order of 10-20 ft, without effective evacuation, there could be substantial loss of life.

Megastorms are California's other "Big One"

Lucy Jones, the chief scientist for the Multi-Hazards Demonstration Project, states that, "For a storm of about the same probability of occurrence as a major earthquake on the San Andreas Fault, scientists are predicting four-times as much damage from an ARkStorm flooding event. Californians are aware they face a risk from an earthquake, they are less aware of the risk they face from floods." [47]



California floods in blue from simulated winter megastorm (USGS ARkstorm report). It might not happen this year, or next. But, based on

California's history of storms in the past, another winter megastorm will happen sometime, these scientists say. [48]

An ARkStorm is Extremely Plausible, Perhaps Inevitable

Lucy Jones, Chief Scientist for the USGS Multihazards Demonstration Project, said that her team used the geologic record in order to explore the question of how often winter megastorms can be expected to strike California. They used sediment deposits offshore from some of California's big rivers. She stated, "And, as we analyzed those records – we've done one off of Ventura County and one in the Bay area – we're able to see that in fact, there have been some very, very large storms that led to huge loads of sediment coming out of the rivers. It happened six times in the previous 1,800 years. The storm of 1861-62 doesn't show up in that record. So, that one was smaller than these very big events. This tells us that the very big events are very rare [six occurrences in 1,800 years calculates to one event per 300 years on average], but they are recurring. [47] And the expectation is that the future will be like the past. In a time of global climate change, storms are going to be at least as frequent as the past, along with the potential that they'll actually increase in frequency, as we put more energy into the atmosphere." She said she wanted to be clear is that the USGS report is not a prediction of a particular event. It's a synthetic model, and every reality in the future will be different in some way, she said. But, based on the ARkstorm simulation, Jones and other USGS scientists believe a coming megastorm for California is extremely plausible. [48]

Preparedness Level

California's flood control system has worked so well that people no longer feel the impact of the small or moderate events. Fifty years ago, people experienced major flooding across California pretty frequently. Now, many people haven't really experienced a major flood. But those flood-control systems only function up to some level.

Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

- 0 Infeasible Event – not applicable due to geographic location characteristics
- 1 Rare Event – occurs less than once every 50 years
- 2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
- 3 Regular Event – Occurs between once a year and once every 7 years
- 4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for flooding in Merced is considered a regular event.

3.3.2 Fire

Merced Sun Star - Bea Ahbeck

150-acre wind-driven grass fire near the Merced Regional Airport, 4-30-13.

General Background

Fire hazards occur in three zones in the Planning area, including: 1) urban fires; 2) wildfires; and 3) urban-wildland interface fires.

An urban fire or conflagration is an uncontrolled fire occurring in developed area where the fire spreads from one structure/improvement to another structure/improvement. Similar to wildland fire, urban fire hazards are more significant in the hot, dry months, but can occur at any time of the year.

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to life and property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated. [2] Wildland fire season extends from late-May through October of each year during the hot, dry months.

The "urban-wildland interface" describes an area where urban development has been located in proximity to open space, or wildland areas. [2]

Location

WILDFIRES

There are hundreds of acres of unimproved lands within the City, which produce prolific quantities of annual grasses. These grasses cure during the late-spring and early-summer months to develop a receptive fuel bed of light, flashy fuels. The unimproved lands range in size from a portion of a residential lot, to an entire lot, to multiple lots, to several hundred contiguous acres. The northern and southern aspects of the City are at the greatest risk of a wildfire based on annexations, which have resulted in incomplete residential developments, and the comingling of structures and unimproved areas. As a rule, the central aspects of the City have been built-out; however, scattered vacant lots pose an ongoing risk.

URBAN FIRE

The risk for an urban fire exists in all developed areas of the City; however, the greatest risk exists in the central and southern portions of the City where combustible materials were widely used to construct the buildings, and the applicable fire and building codes were less stringent than are currently in effect.

Geographic Information System (GIS) analysis of structure fire incidents that have occurred within the City were inconclusive regarding the ability to identify areas that are more at-risk than other areas. The data found that structure fires have occurred and continue to occur in all areas of the City without any correlation between geographic areas, occupancy type, construction type, or socioeconomic factors.

An analysis of risk factors, including: construction materials, upkeep, proximity to other structures, and proximity to unimproved lands was conducted to identify general areas that could be at greater risk for urban fires. The analysis found that the northern aspects of the City include construction that is newer than the other areas of the City. As such, the construction materials and the applicable fire codes at the time of construction, create a lower risk for an urban fire than the other areas within the City. Conversely, the southern portion of the City contains older homes that were constructed with greater quantities of combustible materials and were built under the auspices of less stringent fire and building codes. This results in a higher risk for an urban fire.

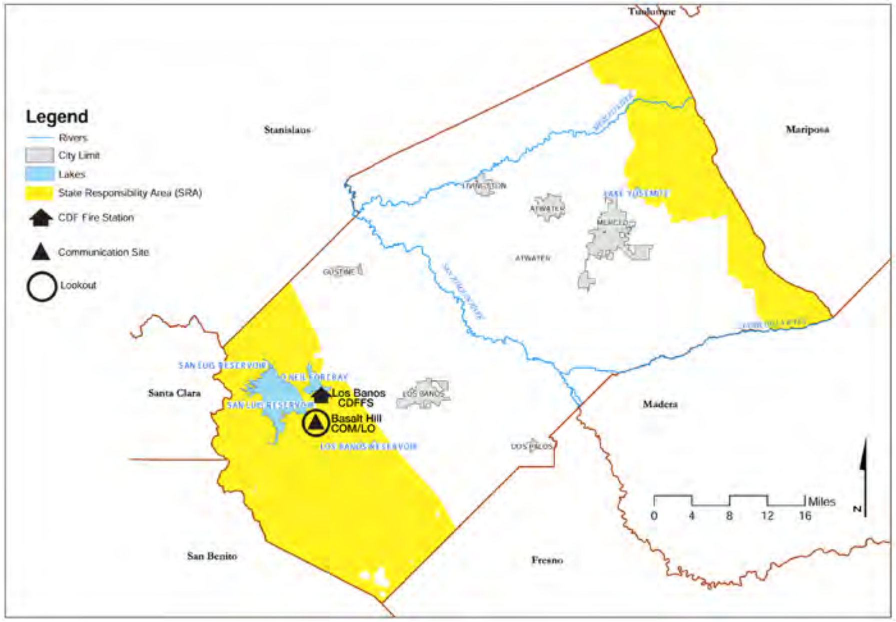
The central portion of the City consists of a mix of residential and commercial occupancies. Some of which exist on zero-clearance lots or are interconnected to neighboring structures. Additionally, this portion of the City consists of older structures that built with combustible materials, do not comply with current building/fire codes, or both. This assessment is an overall generalization of the building and construction types, but is not an absolute statement.

Extent

California Department of Forestry and Fire Protection's (CalFIRE) Fire and Resource Assessment Program (FRAP), models fuel and fire hazard severity rankings and potential fire threat, prioritizes fuel reduction projects, and determines an area's level of service (LOS) rating within State Responsibility Areas. State Responsibility Areas (SRA) occur in the eastern and western portion of Merced County, while Local Responsible Areas (LRA) occur on the floor of the Central Valley (see map on page 3-49). The City of Merced is located within just the LRA.

For both areas, CalFIRE has developed an estimate of fire risk in Wildland Urban Interface areas based a variety of factors in two categories: fire frequency and fire behavior. The State has individually mapped the fire frequency and fire behavior potential and has combined both into a single assessment called Fire Threat.

The Merced County Fire Hazard Severity Zones Map, including the area within the LRA is shown on page 50.



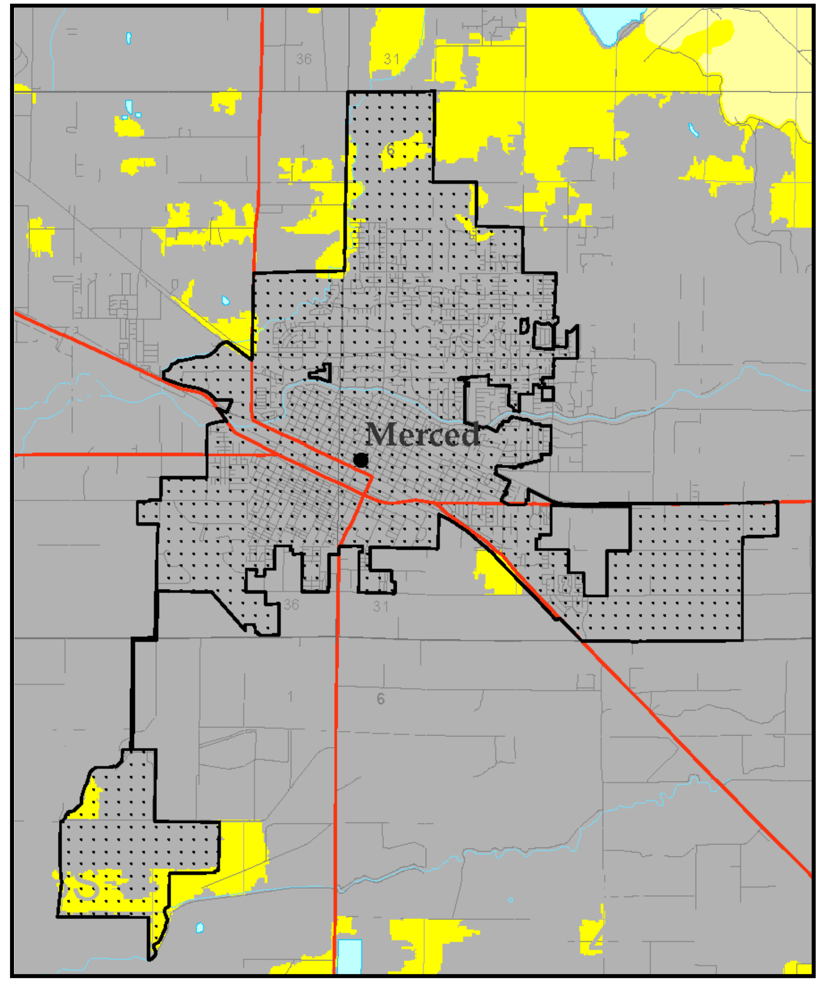
According to CalFIRE's Fire and Resource Assessment Program (FRAP), a significant fire threat is found throughout California, with 48 percent of the state's wildland areas ranked as high, very high, or extremely high. About 37 percent of the state has a moderate fire threat, and 15 percent presents non-fuel conditions. CAL FIRE determined that Merced County has no" Very High Fire Hazard Severity Zones" in the LRA, and the City has both non-fuel and moderate fire hazard threats. Merced County does not have a map of recommended VHFHSZ in LRA.

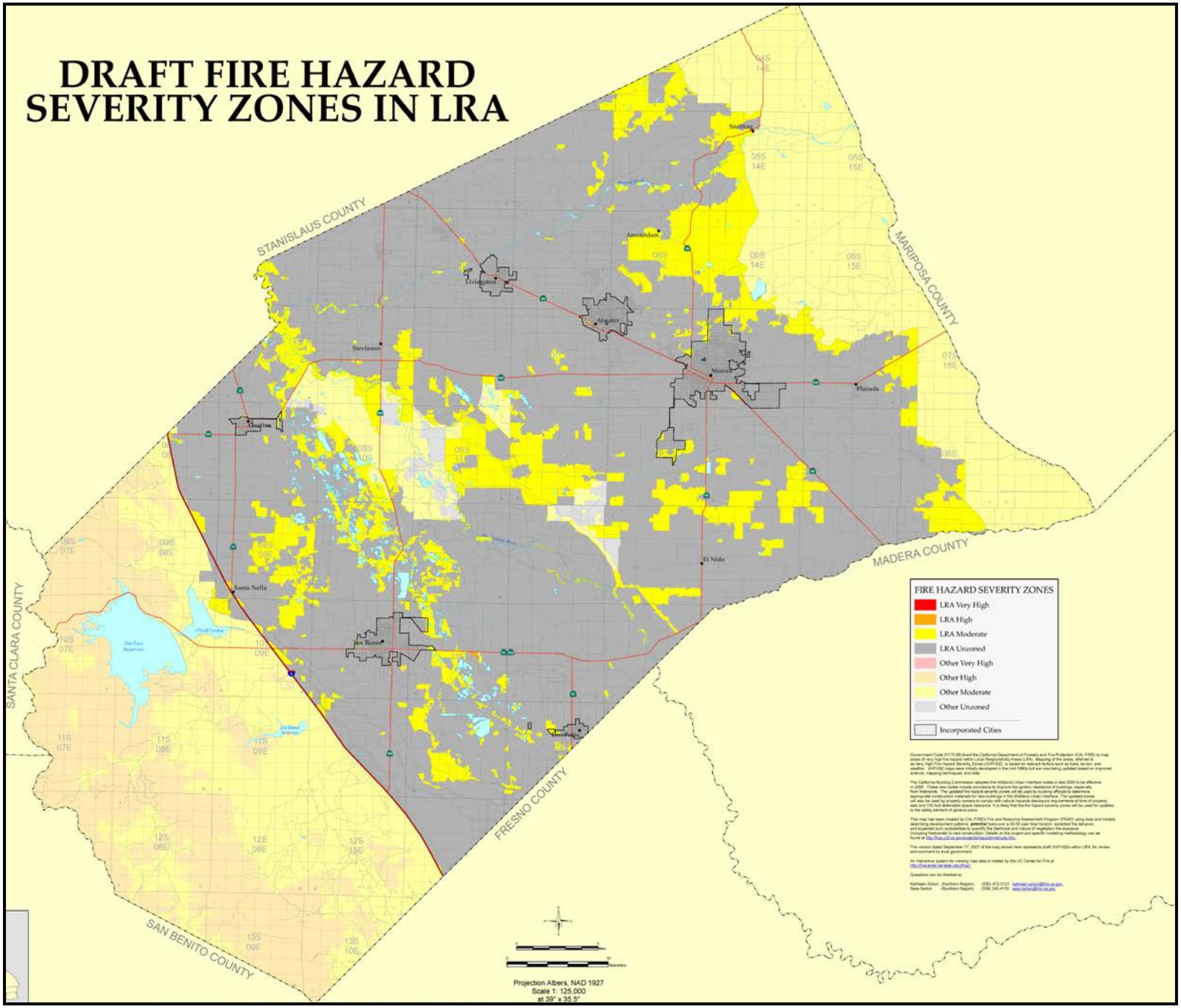
INTERFACE ZONES

According to the CalFIRE, the greatest potential for significant damage to life and property from fire exists in areas designated as Wildland Urban Interface (WUI) areas. A WUI area defines the condition where highly flammable vegetation is adjacent to developed areas.

A significant portion of the area surrounding Merced is used for agricultural purposes. Thus, the City of Merced does not include any areas designated as Wildland-Urban Interface Areas by the State.

While this definition is typically associated with wildland fires, this condition can also exist in an urban setting, where grasslands abut urban areas or where flammable construction materials exist. A LRA "Moderate Fire Hazard Severity Zone" occurs adjacent to several locales in the City of Merced, as shown in a close-up view of the 2007 Merced County Fire Hazard Severity Zone Map below.




DRAFT FIRE HAZARD
SEVERITY ZONES IN LRA
STANISLAUS COUNTY
MARIPOSA COUNTY
MADERA COUNTY
FRESNO COUNTY
SAN BENITO COUNTY
SANTA CLARA COUNTY
Snelling
Amsterdam
Livingston
Atwater
Merced
Planada
Stevinson
Gustine
Santa Nella
Los Banos
El Nido
FIRE HAZARD SEVERITY ZONES
LRA Very High
LRA High
LRA Moderate
LRA Unzoned
Other Very High
Other High
Other Moderate
Other Unzoned
Incorporated Cities
Projection Albers, NAD 1927
Scale 1: 125,000
at 39" x 35.5"

Conditions that Exacerbate or Mitigate Potential Effects

Both wildland and urban fire hazards are an ongoing threat within the City of Merced Planning Area. The significance of the fire hazard varies based on the availability of receptive fuels, topography, weather conditions, and human factors.

FUELS

As a result of being located in the Central Valley, Merced does not possess the fuel diversity that is experienced throughout the rest of the State. The City is at risk for wildfires that start in the undeveloped grasslands to the west and north of Merced, in the partially developed areas in the northern part of the City, and in the open space and preserve areas dedicated in perpetuity throughout the City.

FIRE SPREAD / TOPOGRAPHY

The effects of topographical influences on wildland/urban fire within the City are minimal. The City of Merced is essentially flat, and ranges in elevation from one hundred seventy-one feet at the Merced Municipal Airport to two hundred feet at the University of California – Merced campus. The terrain does not consist of any hills or drainages that could significantly affect fire spread.

WEATHER CONDITIONS / WINDS

Based on the geographic and topographic features of California in combination with a wind-based weather phenomenon known as subsidence, the State has annually faced extreme wind and fire conditions. Northern California has historically dealt with the North Winds, whereas Southern California has been affected by the Santa Ana Winds. These winds have caused extreme fire behavior situations by increasing temperatures, dropping the relative humidity to critical levels, and producing sustained and gusting wind speed up to seventy-five miles-per-hour.

The North Winds, in combination with the light, flashy fuels synergistically increase the risk to the City. Merced is also affected during the summer months by a marine influence and the associated diurnal cycles. These cycles can result in sustained westerly winds that can greatly increase the level of fire danger. However, unlike the North Winds, the winds associated with the cycles typically carry moisture, which can reduce the potential hazard.

HUMAN-INFLUENCE FACTORS

Human-influence factors range from preventative measures to active involvement in fire causation. Preventative measures include actions that are designed to mitigate one or more of the factors listed above. This can include fuel abatement, building construction materials, and restrictions placed on outside fires. On the other hand, a majority of fires are associated with careless use or mishandling of hot materials including smoking, campfires, equipment use, and arson.

The possibility of the presence of flammable and hazardous materials in commercial and industrial fire scenes heightens the likelihood of initially uncontrollable structural fire conditions in outbuildings or in items stored outside. Overall, this hazard is considered a moderate risk to the City of Merced. [2]

Previous Occurrences

On average, the City of Merced Fire Department responds to a total of 389.25 fires per year, of which 113.25 (29.1%) are structure fires and 80.5 (20.7%) are wildland fires. The remaining 50.2% of the fire incidents within the City included vehicle fires, rubbish fires, outside fires, and other fire types that did not involve structures or unimproved open areas. NOTE: The MFD responds to an average of 2 wildland fire incidents on an annual basis where structures/improvements are either damaged or destroyed. Former Fire Chief Mitten also identified that there have not been any structures lost within the City as a result of a wildland fire. [1]

WILDLAND FIRES

As the City annexes large blocks of undeveloped land, the potential for wildland fires (mainly grassland fires) within the City increases. The City Fire Department is typically called to 6 to 10 significant grassland fires per year which occur in County fringe areas adjacent to the City limits. The Fire Department is also frequently called to provide mutual aid to the County for grassland fires in the wider Merced area due to increasingly strained fire fighting resources within the County over the last decade. [3]

The historical data conveyed in *California Fire Perimeters – Wildfire 1950-2009* shows that there have been major wildland fires in Merced County; however, none have been in or around the City of Merced.

Major Wildland Fire Defined:

"Timber fires greater than 10-acres, brush fires greater than 50-acres, grass fires greater than 300-acres; wildland fires that destroyed 3 or more structures, or wildland fires causing more than $300,000 in damage.

In 2010, the MFD along with mutual aid responders were dispatched to mitigate a 265-acre wildland fire in the wetlands that surround the southern aspects of the City's wastewater treatment plant. This was the largest wildland fire to have occurred within the City limits in many decades. In May 2008 the City of Turlock, which is located twenty-six miles north of and has the same topography as Merced, experienced a wind-driven wildland fire that resulted in one fatality, several homes destroyed, and dozens of acres burned. Similarly, in June 2008, the City of Stockton suffered a wind driven fire that destroyed thirty-two residences. Stockton is located sixty-four miles north of Merced and is geographically and socioeconomically similar to Turlock and Merced.

On April 30, 2013, a large "wind-driven grass fire" near Merced Regional Airport burned about 150 acres. No injuries were reported and the only known property that was damaged were fence posts. The runway had to be closed for about an hour because of the fire.

ARSON

In regards to fires caused by arson, former Fire Chief Mitten (personal communication, January 20, 2009) discussed an eighteen month period in the early 1980's when there were six major fires that were determined to be arson in origin. The State Fire Marshal's Office and the Department of Alcohol, Tobacco, and Firearms were requested to investigate and seek convictions of the offenders. In total, there were six fires that caused an estimated nine million dollars in damage. [1]

Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

- 0 Infeasible Event – not applicable due to geographic location characteristics
- 1 Rare Event – occurs less than once every 50 years
- 2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
- 3 Regular Event – Occurs between once a year and once every 7 years
- 4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Fire" in Merced is considered a frequent event.

3.3.3 Drought

General Background

Drought is a gradual phenomenon, occurring slowly over multi-year periods and increasing with the length of dry conditions. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size of the affected area. There are several ways that drought can be defined.

Meteorological - a measure of departure of precipitation from normal. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.

Agricultural - refers to a situation where the amount of moisture in the soil no longer meets the needs of a particular crop.

Hydrological - occurs when surface and subsurface water supplies are below normal.

Socioeconomic – occurs when the results of drought impacts the health, well being, and quality of life, or when a drought starts to have an adverse economic impact on a region. (Source: National Drought Mitigation Center, University of Nebraska, Lincoln)

Regulatory – occurs when mandatory compliance with environmental protection laws (especially those pertaining to protection of endangered species) combined with low precipitation and runoff, produce deficiencies in agricultural and/or urban water supplies.

Location and Extent

In addition to the description below, see Appendix D that includes updated information.

In general, drought has the potential to directly and indirectly impact each and every person within the City, as well as adversely affect the local economy. Individuals and properties will be affected at varying levels, depending upon their water source and water needs. For example, a property owner with a large water demand and private well, are more likely to be impacted than a small City lot using groundwater from the City's domestic water supply system

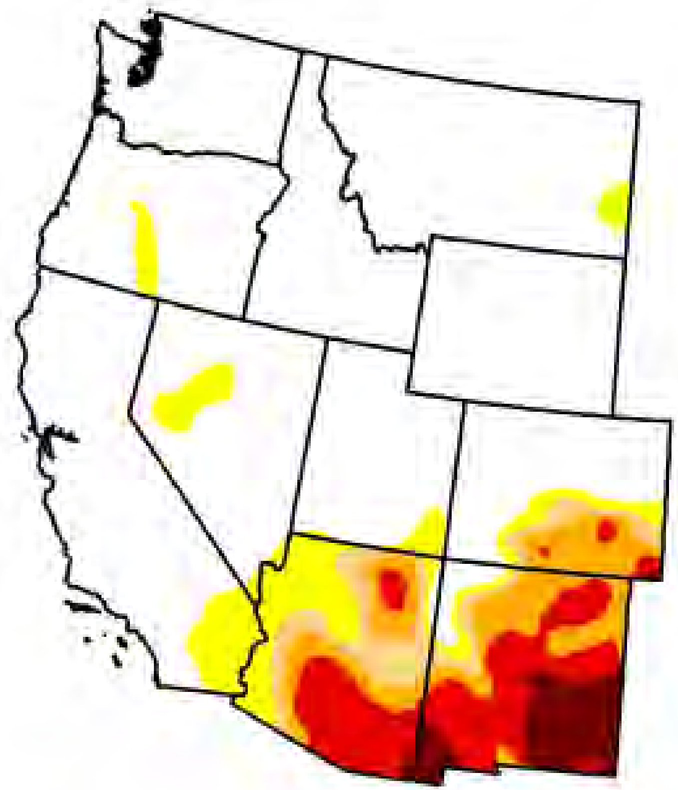
U.S. Drought Monitor

November 1, 2011
Valid 7 a.m. EST

West

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	74.16	25.84	18.67	15.19	9.60	2.87
Last Week (10/25/2011 map)	74.12	25.88	18.32	14.67	8.48	2.87
3 Months Ago (08/02/2011 map)	74.90	25.10	18.98	15.44	11.10	5.52
Start of Calendar Year (12/28/2010 map)	73.26	26.74	11.98	0.89	0.00	0.00
Start of Water Year (09/27/2011 map)	66.72	33.28	19.04	14.99	9.30	3.81
One Year Ago (10/26/2010 map)	69.02	30.98	5.39	0.19	0.00	0.00



Intensity:

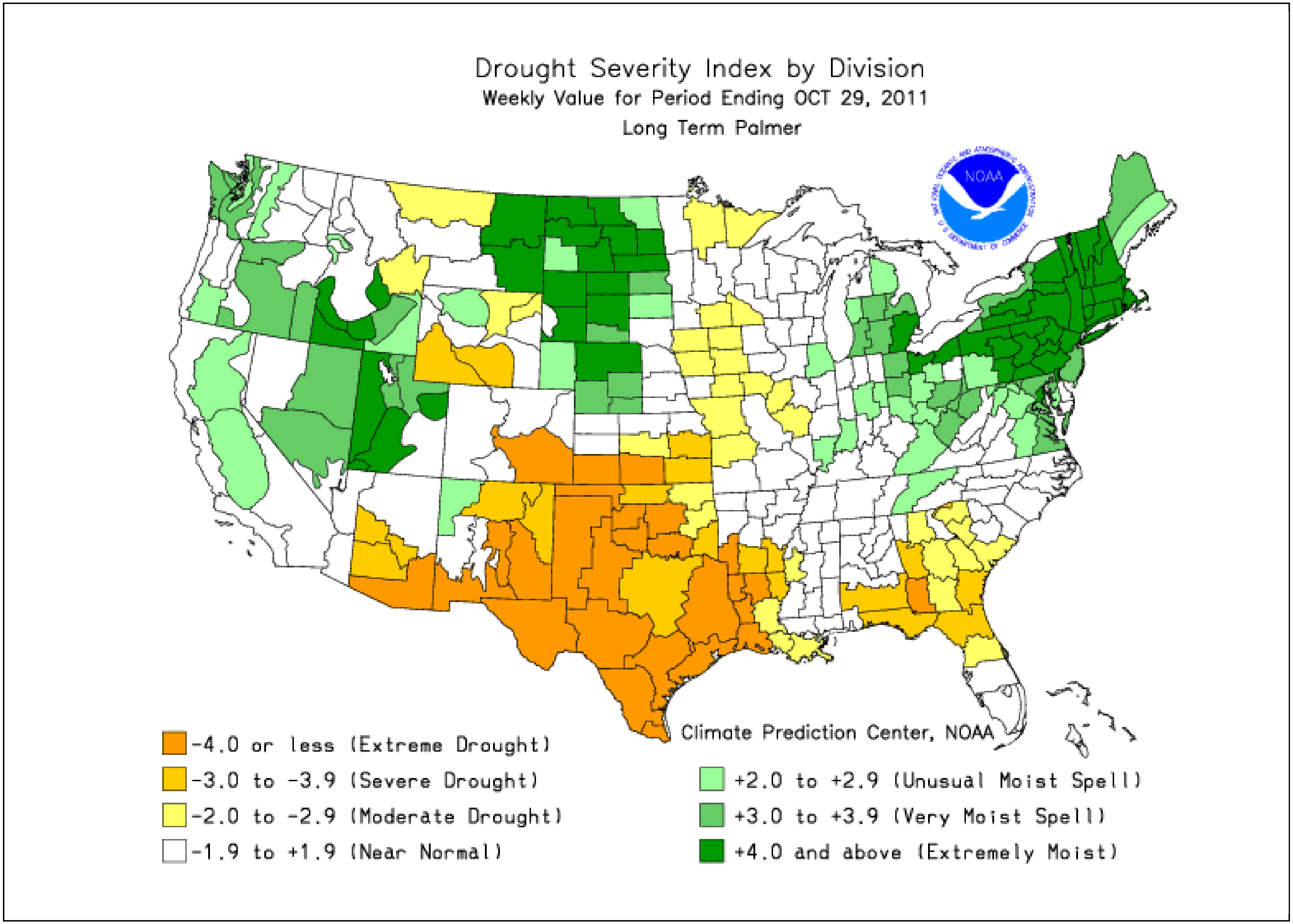
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

USDA

Released Thursday, November 3, 2011
Brian Fuchs, National Drought Mitigation Center


Drought Severity Index by Division
Weekly Value for Period Ending OCT 29, 2011
Long Term Palmer
NOAA
Climate Prediction Center, NOAA
-4.0 or less (Extreme Drought)
-3.0 to -3.9 (Severe Drought)
-2.0 to -2.9 (Moderate Drought)
-1.9 to +1.9 (Near Normal)
+2.0 to +2.9 (Unusual Moist Spell)
+3.0 to +3.9 (Very Moist Spell)
+4.0 and above (Extremely Moist)

Conditions that Exacerbate or Mitigate Potential Effects

Drought is a major determinant of wildfire hazard, in terms of greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation and reduced water supply for firefighting purposes.

Previous Occurrences

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users.

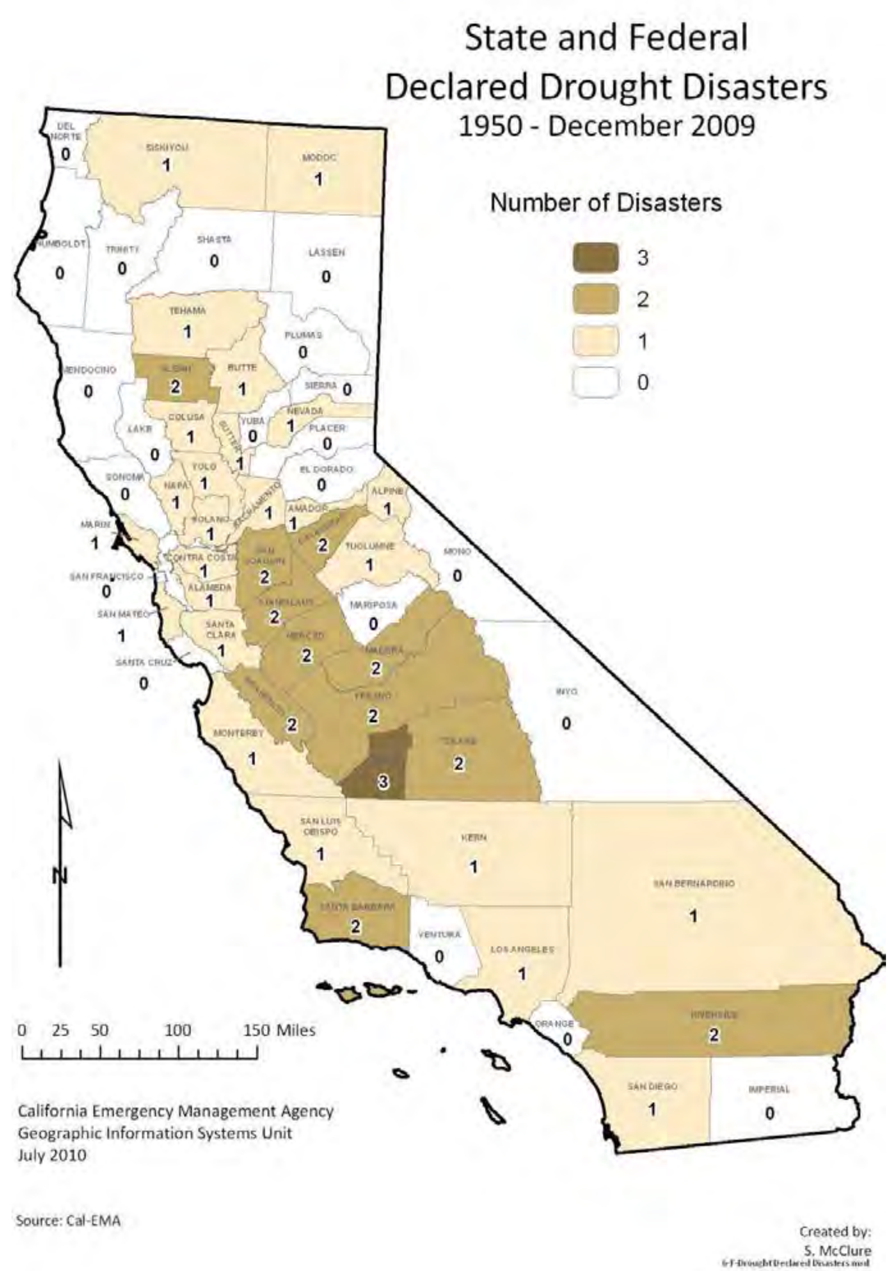
The 1975-1977 Drought: From November 1975 through November 1977, California experienced one of its most severe droughts. Thirty-one counties were disaster-declared. Although people in most areas of the state are accustomed to almost no precipitation during the growing season (April to October), they expect it in the winter. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively, leading to the state's fourth and first driest years on record. Most surface storage reservoirs were substantially drained in 1976, leading to widespread water shortages when 1977 turned out to be even drier. Due to this drought, water rights issues moved to the top of political agendas, and low-flow water fixtures and natural landscaping in California were ushered in. [42] Merced County was one of many areas that suffered crop damage, which totaled $2.67 billion statewide during this drought period.

The 1987-1992 Drought: The 1987-92 drought was notable for its six-year duration and the statewide nature of its impacts. For the central coast and central Sierra Nevada, 1987 to 1990 was the driest period on record. In 1988, 45 California counties experienced water shortages that adversely affected about 30 percent of the state's population, much of the dry farmed agriculture, and over 40 percent of the irrigated agriculture. Fish and wildlife resources suffered; recreational use of lakes and rivers decreased; forestry losses and fires increased; and hydroelectric power production decreased. Not since the 1928-34 drought had there been such a prolonged dry period.

The 2007-2009 Drought: California's last major statewide drought was 2007-2009, notably affecting Central Valley communities, including those in Merced County. Following two critically dry years, 2009 had the potential to be one of the most severe drought years in California's recorded history. Water supplies in major reservoirs and many groundwater basins were already well below average. Additionally, court-ordered restrictions on water deliveries from the Delta had significantly reduced supplies from the state's two largest water systems. [43]

STATE AND FEDERAL DECLARED DROUGHT DISASTERS

Map on this page shows the pattern of drought-declared State and Federal Declared Drought Disasters in California between 1950 and December 2009, [14]disasters. Heaviest concentrations are in the Central Valley and inland areas.



Probability/Frequency of Future Events

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Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Drought" in Merced is considered an infrequent event.

3.3.4 Hazardous Materials

General Background

Hazard Definition: Hazardous materials (Hazmats) consist of substances that by their nature, lack of containment, and reactivity, have the capability for inflicting harm. Hazmat poses a threat to health and the environment when improperly managed. Hazmat can be toxic, corrosive, flammable, explosive, reactive, an irritant, or a strong sensitizer. Hazmat substances also include certain infectious agents, radiological materials, oxidizers, oil, used oil, petroleum products, and industrial solid waste substances. [2]

Hazardous material incidents are one of the most common technological threats to public health and the environment. Incidents may occur as the result of natural disasters, human error, and/or accident.

Location

Hazardous materials are located in the following areas of the City of Merced:

- Hazardous Material Generators/Handler Facilities (Fixed-Locations)
- Hazardous Waste Cleanup Areas;
- Transport Corridors / Transportation-Related Hazardous Materials;
- Natural and Liquified Gas Pipelines;
- Agricultural Sites; and
- Intentional Release-Related Hazardous Materials.

HAZARDOUS MATERIAL GENERATORS / HANDLER FACILITIES

A fixed location may be a factory or holding tank, or any facility that produces, stores, or uses hazardous materials. Fixed facilities for potential releases can be easier to identify and prepare for because of their stationary nature. Fixed locations are also subject to Federal and State reporting requirements and inventory control methods. This category also includes groundwater remediation sites, which occur throughout Merced, and are discussed in greater detail in the "Occurrence" section of this report.

Uncontrolled releases can occur within a fixed facility, such as at a refinery, as a result of a defective industrial process or storage situation. Refineries may have equipment or valves fail. This can result in leaks into the streets or ground or even releases to the atmosphere. Many examples of refinery hazardous materials incidents have been documented. Examples of hazards from a fixed location in Merced include gas stations with fuel spillage from dispensers, delivery trucks, and above ground or underground storage tanks.

The County Department of Environmental Health uses a program called Envision to manage all of the hazardous materials generators.

HAZARDOUS CLEANUP AREAS

The Merced County Division of Environmental Health, which oversees the enforcement of the *Merced County Hazardous Waste Management Plan,* maintains an up-to-date list of known hazardous waste sites within the County. In 2009, there were approximately 63 known hazardous waste sites within the City of Merced. Cleanup is required at sites that exceed State standards for contamination prior to development or reuse of the site. Merced's contaminated sites are generally overseen by Merced County Division of Environmental Health, the State Dept of Toxics Substances Control, the State Regional Water Quality Control Board or US EPA. State Department of Health Services (DHS) has reorganized and deals with hospitals, tobacco, drug abuse, etc., human issues and not contamination sites. DHS may get involved with a contamination site if cancer rates are high in a particular area.

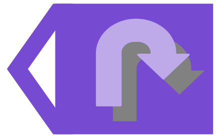
TRANSPORT CORRIDORS

Materials in transport enter and leave the jurisdictional boundaries with little or no notice to the local agency. This is of particular concern in cases of discrete vehicles, such as trains or trucks, traveling with hazardous cargo through the City at any given time. Hazardous materials can be on any road, but shipment by main highways and rail are the most common methods. Materials in pipelines are also considered to be in transit, although it is easier to identify the locations and potential effect of these hazards because pipelines do not move or change material transported. Pipelines are discussed separately in this Section. The State Route Map in the Community Profile section displays the main roads through the City, these roads having increased risk due to a greater number of vehicles moving along this with more varied cargo.

NATURAL AND LIQUIFIED GAS PIPELINES

Natural Gas

Generally speaking, *transmission* lines are large diameter steel pipes carrying natural gas at high pressure and compressed to provide higher carrying capacity. Transmission lines are both interstate and intrastate, with the latter connecting to smaller *distribution* lines delivering gas directly to homes and businesses. Data compiled by the Pipeline and Hazardous Materials Safety Administration (PHMSA) report a total of 115,291 miles of gas pipelines in California, of which 12,414 are classified as gas transmission lines, 403 are gas-gathering lines, and the majority, 102,475, are for gas distribution. Nearly 40 percent of gas transmission lines are located in Los Angeles, Kern, and San Bernardino counties.[72]



Two major natural gas *transmission* pipelines pass through the City of Merced, generally parallel to the Burlington Northern-Santa Fe Railway and the Union Pacific Railway alignments. One is an 8" diameter pipeline installed circa 1931 and the other is a 16" diameter pipeline installed circa 2008. Two additional natural gas *transmission* pipelines originate from these major pipelines and feed areas north and east. A 6" diameter pipeline originates near Childs and SR 99, traverses east to Parsons Ave where it shifts to an alignment in SR 140 (Yosemite Parkway) easterly for approximately 2.5 miles, and a 8"/6" diameter pipeline that originates near 16^{th} St and J-59, follows J-59 north to Yosemite Avenue and east to Merced College. These transmission pipelines operate at a higher pressure and are generally larger than distribution pipelines. Transmission pipelines transport the natural gas from the compressor stations and storage facilities to regulators which reduce the pressure before reaching the distribution system. The distribution system feeds the smaller pipelines at pressures under 60 psi that deliver gas to individual businesses or residences. Distribution pipelines are integrated for capacity and reliability purposes, and typically are located in most streets where there is a residence or facility that requires gas service.

Lessons from San Bruno Natural Gas Explosion

On September 9, 2010, at approximately 6:11 P.M., a 30-inch diameter underground natural gas transmission pipeline suddenly ruptured. The pipeline was located under the asphalt paving at the intersection of Glenview Drive and Earl Avenue in a residential area of San Bruno, California. Installed in 1956, the ruptured pipeline was propelled into the air and landed about 100 feet away. An explosion ensued, fueled by blowing natural gas. The explosion and fire resulted in the loss of eight lives and the total destruction of 38 homes. Seventy homes sustained damage and eighteen homes adjacent to the destroyed dwellings were left uninhabitable.

---Report of the Independent Review Panel, San Bruno Explosion. Prepared For California Public Utilities Commission Revised Copy June 24, 2011.

After the explosion in San Bruno, PG&E was required to show their records to the California Public Utilities Commission to prove that they have strength tested their transmission pipelines to establish the maximum allowable operating pressure (MAOP) of those lines. PG&E has a map on their website that shows where the pipelines are, what areas have documentation that proves that the pipelines have been tested, areas where they want to research the documentation and pipelines further, and areas where repairs are needed. PG&E has documentation that proves that they have tested most of the pipelines according to applicable code requirements. There is an area on Snelling Highway and West Yosemite Avenue that is designated "pipeline segments in high consequence areas" (HCAs) that are still under review. High consequence areas are a "federal natural gas pipeline industry term that refers to the more populated areas of a service territory" (PG&E.com). Although PG&E plans to investigate its records further, this doesn't mean that there's an imminent danger. PG&E is prioritizing its HCA areas in its records review and strength testing verification efforts.

Liquefied Petroleum Pipeline

A liquefied petroleum pipeline runs parallel along U.P.R.R on the south end. The high pressure petroleum line is 12" in diameter and varies in depth along the track.

AGRICULTURAL SITES

Merced is surrounded by agriculture activity in the adjacent countryside, including ranching to the north and orchards and field crops to the west, east, and south. This raises concerns due to the use of agricultural chemicals such as fertilizers and pesticides. Application of these items to crops and the soil has been regulated more in recent years, but decades of no regulations has left these lands and related groundwater in an undefined situation. The City is pursuing a joint effort with several entities, such as Merced Irrigation District and Merced County, to perform further groundwater studies and computer modeling.

INTENTIONAL RELEASE

Finally, another source of hazardous materials incidents is the illegal manufacturing of drugs in clandestine laboratories. In many instances, the residue and hazardous waste from these laboratories are illegally dumped, posing a threat to public health, safety, and the environment. In recent years, clandestine laboratories have become an increasingly familiar problem to the City of Merced. [2]

Extent

The magnitude of a hazardous material spill is determined by both the type of material, the size of material released during the incident, and the location of the event.

The City of Merced is home to a few companies and industries that manufacture, store, use, and dispose of toxic materials. The Study Area is highly exposed to hazardous materials transported over major interstate highways, state routes, and railways. On any given day, a vast assortment of petroleum products, agricultural pesticides, and industrial chemicals are moved within and through our City with the possibility of generating a hazardous materials incident. [2]

Hazardous materials incidents in the City of Merced would most likely occur on the transportation routes or at fixed hazardous materials facilities. Hazardous materials are often transported through the City of Merced area on State Route Highways 99 and on the Union Pacific and Burlington Northern Santa Fe Railroads. Surface streets are also used for the local transportation of hazardous materials. [2]

LOCAL CONDITIONS INFLUENCE

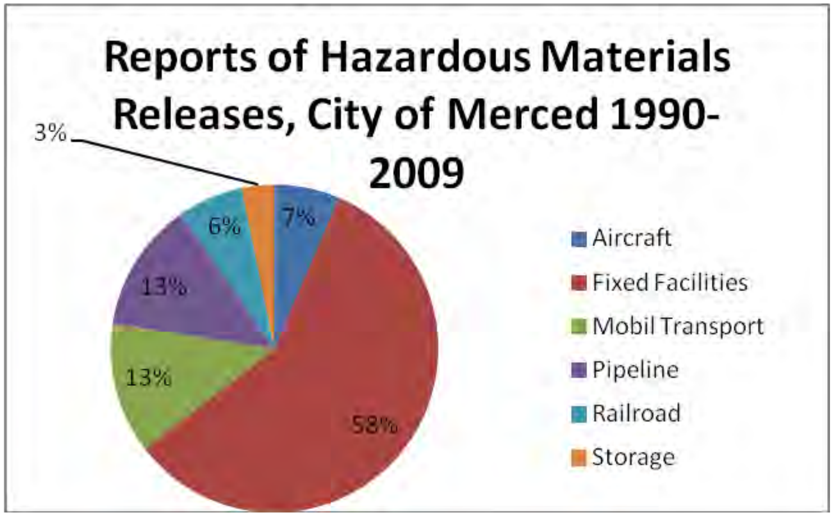
The conditions found at the location of a potential hazardous material incident can exacerbate the effects of the incident. Natural conditions such as severe rain or windy weather, permeability surfaces, and close proximity to ground and surface waters need to be considered during response actions. Additionally human-made conditions, such as storm and sewer drains, also need to be accounted for, as they could lead to an accelerated contaminate spread. The City's Emergency Operation Center (EOC) already keeps information on how to isolate hazardous releases along highways and railroads, in preparation for any such need.

Conversely, certain conditions help to allow a longer response time frame, or even mitigate need for response. Optimal natural conditions include calm weather and impermeable surfaces at the incident site. Proper containment of hazardous materials, both in transport and in fixed facilities will help to mitigate incidents. For many of these substances, secondary containment becomes imperative should these items spill or their initial containers be breached or sustains damage. Many fixed location sites have some type of secondary containment facility and these are often required by law.

For materials being transported by truck, there are two additional concerns in Merced. First, is the elevated freeway, being 20 to 24 feet above adjacent land. This gives an errant truck that much more vertical distance to tumble or roll down rather than just go off the road. The second is a heavy fog season that restricts visibility to 120-feet at times and usually occurs at night or near sunrise.

Previous Occurrences

Due to the constant presence of hazardous materials in the jurisdictional boundaries, it is possible for a hazardous material incident to occur at anytime. Merced has been fortunate enough to have had few major releases of hazardous material, however. Data obtained from the National Response Center from 1990 – 2009 shows all hazardous materials and oil releases reported federally. Of the 76 incidents reported in the City, 31 were actual material releases, the other 45 were non-releases. The pie chart below shows the sources of these material releases.



GROUNDWATER CLEANUP

Merced is involved with a number of groundwater cleanups, clearing the remains of previous materials releases. Common substances, such as gasoline from former gas stations located at 19th Street at N Street and also R Street at 14th Street, are considered hazardous materials when released in the ground. Additionally dry cleaners at several locations are receiving PCE groundwater remediation. The largest cleanup site is on Kibby Road south of Highway 140 where a groundwater extraction and treatment process is used to clean up trichloroethene (TCE). TCE is a chlorinated hydrocarbon solvent used to clean electrical transformers. The former on-site industry used to discharge spent solvents containing TCE to an unlined pond, where it spread to contaminate soil and groundwater.

NATURAL AND LIQUID GAS

Should an incident occur that either breaches or compromises the integrity of natural gas pipelines, many of the citizens within the City would become affected. Such an incident would greatly affect businesses, the railways, highway transportation routes, and the environment. [6]

Pipeline and Hazardous Materials Safety Administration (PHMSA) tracks significant incidents and losses as a result of pipeline accidents occurring on gas transmission lines and gas distribution lines. Significant incidents are those reported by pipeline operators with either: 1) fatality or injury requiring in-patient hospitalization, or 2) $50,000 or more in total costs, measured in 1984 dollars. From 2000 to 2009, a total of 22 incidents were reported on California transmission lines, causing 1 fatality, 2 injuries, and $12 million in property damage. For that period, a total of 65 incidents were reported on local gas distribution lines, resulting in 3 fatalities, 16 injuries, and $14 million in property damage.[73]

There have been gas spills caused by negligent individuals. For example, on April 8, 2008, when thieves tried to siphon gas from a Valero gas station at 655 Yosemite Parkway, the gas spilled out uncontrollably, and the thieves drove away. According to the Merced Sun Star, about 1,014 gallons of fuel spilled out. Incident responders were able to prevent the gas from pouring into the surrounding storm drains.

Regarding natural gas lines, the greatest threat posed to PG&E pipelines, including those in Merced, is damage caused by third parties that dig into buried pipelines without having them properly marked by PG&E, and, these third-party "dig-ins" may have resulted in the release of natural gas, and may also have resulted in small fires, according to James Monninger, Principal – Strategic Planner. [7]

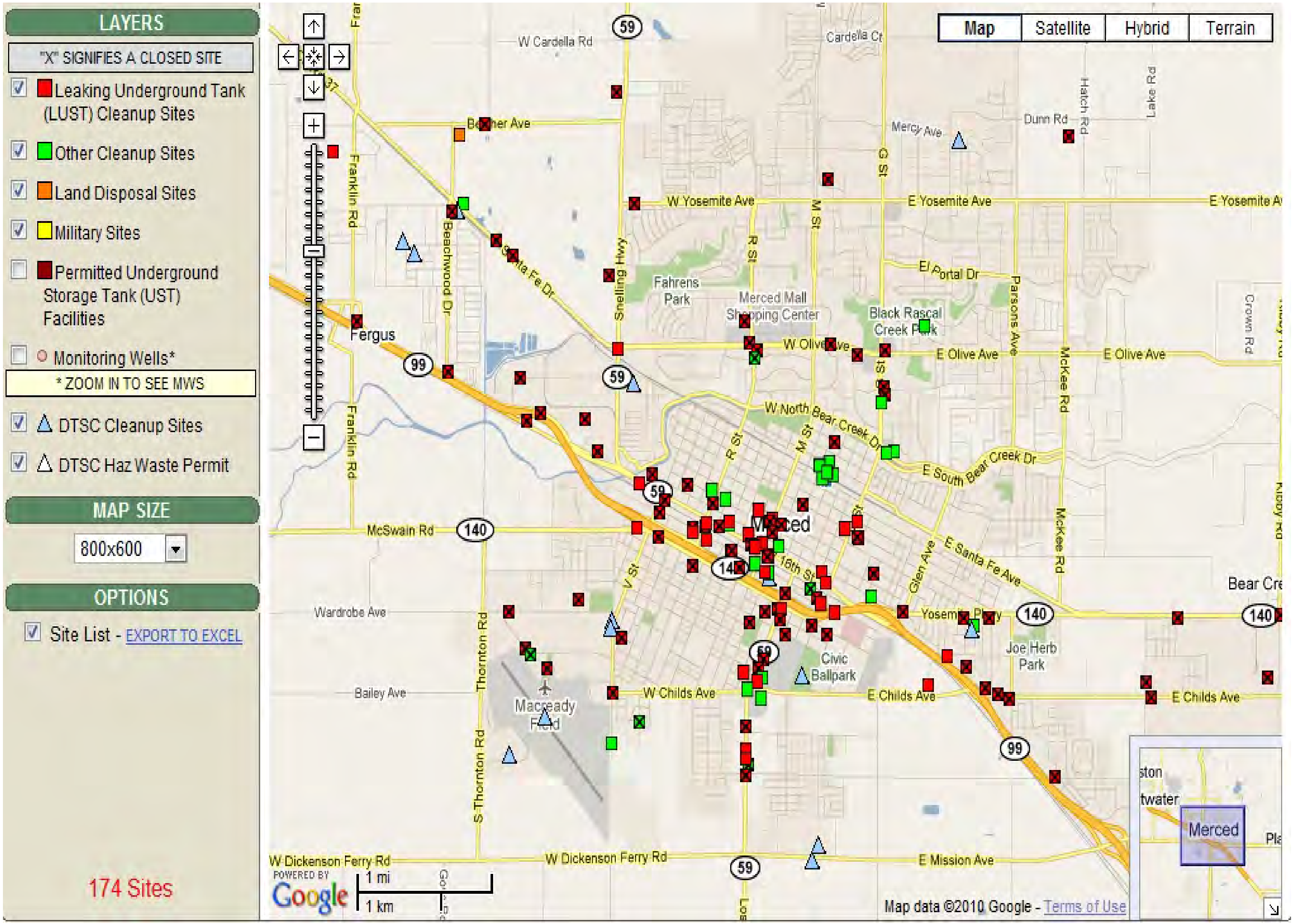
TRANSPORTATION CORRIDORS

Hazardous Materials emergencies, primarily due to surface route and rail accidents, have occurred and will continue to occur in the City of Merced. Although most of these incidents have been easily handled, the potential for and extreme threat to life and property is quite high. [2]

Critical facilities in Merced located within a mile radius of transportation corridors, including highways and railroads, pipelines, and fixed hazardous material facilities are at an elevated risk for hazardous materials incidents disrupting activities contained within these facilities. Of most concern to physical structures are incidents involving fire, water, and chemical interactions which could cause explosions. Releases of toxic substances could also result in the facilities becoming inaccessible for a period of time.

A noteworthy incident, despite hazardous material release not occurring, was the derailment of a Southern Pacific train at the northwest side of town where several train cars were overturned in 1997. The items spilled were not toxic or hazardous. The rails had apparently broken or corroded on the inside. Preparation for future accidents is essential as some rail cargo is hazardous and has the potential to spread out in just a few minutes.

The map on the following page (State Water Resources Control Boards "GeoTracker" database [5]) displays the locations of previous and current cleanup sites. A large concentration of sites is located downtown and along Highway 59, but many other areas are found throughout the City.


LAYERS
"X" SIGNIFIES A CLOSED SITE
Leaking Underground Tank (LUST) Cleanup Sites
Other Cleanup Sites
Land Disposal Sites
Military Sites
Permitted Underground Storage Tank (UST) Facilities
Monitoring Wells*
* ZOOM IN TO SEE MWS
DTSC Cleanup Sites
DTSC Haz Waste Permit
MAP SIZE
800x600
OPTIONS
Site List - EXPORT TO EXCEL
174 Sites
Map
Satellite
Hybrid
Terrain
W Cardella Rd
Cardella Ct
W Yosemite Ave
E Yosemite Ave
W Olive Ave
E Olive Ave
McSwain Rd
W Childs Ave
E Childs Ave
W Dickenson Ferry Rd
E Mission Ave
Fahrens Park
Merced Mall Shopping Center
Black Rascal Creek Park
Civic Ballpark
Joe Herb Park
Macready Field
Fergus
Merced
Map data ©2010 Google - Terms of Use
1 mi
1 km

Probability/Frequency of Future Events

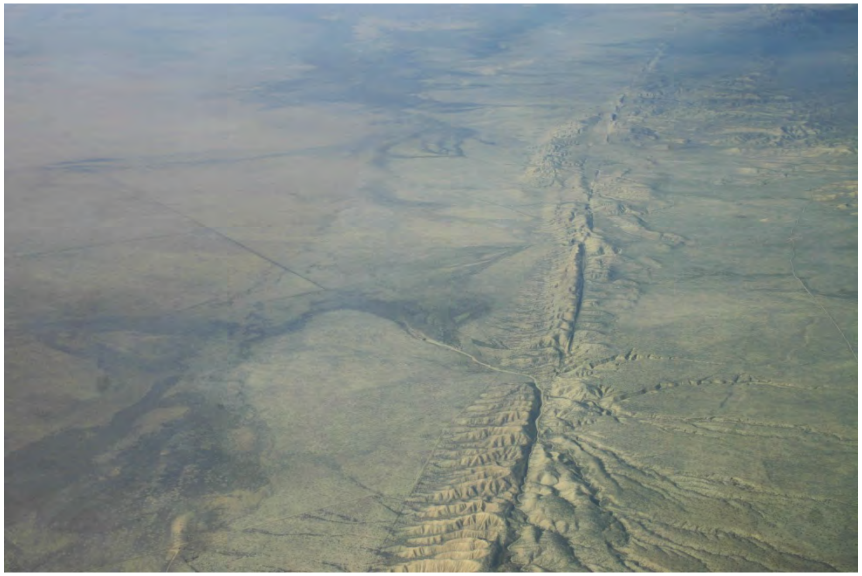
The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

0 Infeasible Event – not applicable due to geographic location characteristics
1 Rare Event – occurs less than once every 50 years
2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
3 Regular Event – Occurs between once a year and once every 7 years
4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Hazardous Materials" in Merced is considered a frequent event.

3.3.5 Earthquakes



Aerial photo of the San Andreas Fault in the Carrizo Plain

General Background

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates. [2]

California has been identified as being subject to frequent and destructive earthquakes; the State experiences more than one hundred earthquakes per day, most of which are very low on the Richter scale. Yet, scientists have determined that the chance of having one or more magnitude 6.7 or larger earthquakes in the California area over the next 30 years is greater than 99%. Furthermore, the USGS identified the possibility that an earthquake with a magnitude greater than 7.5 occurring within the next thirty years to be 46%. While the state as a whole is known for earthquakes, the size of earthquakes, vary considerably by region. The California Geological Survey (CGS) has published numerous maps and reports that were designed to identify the potential for significant shaking and ground acceleration based on specific regions in the State. The City of Merced has been identified on two of these maps, and in both instances, Merced was identified as having a low risk. Also, since Merced is distant from known active faults it will experience lower levels of shaking.

SCIENTIFIC MEASUREMENTS, INTENSITY VS. MAGNITUDE

A 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. While an earthquake has only one magnitude, it may have many intensity values, which will generally decrease with distance from the epicenter. [23] The Modified Mercalli Intensity (MMI) Scale has been used historically to describe earthquake shaking in terms related to observable effects. The Modified Mercalli (MM) scale measures the strength experienced (intensity) at some point away from where the earthquake started. It is based on damage caused and human perception. Intensity is a strength measurement at a localized point where the person or town is. While the MM Scale measures human reaction and damage, it is subjective and cannot describe the strengths in rural or open country settings due to the lack of moving or falling objects. Magnitudes of M2.5 or smaller are generally not felt by people. While the MM Scale method works for moderate-sized earthquakes, large earthquakes are beyond this method as human emotions distort their observations. The MM scale is a good overview for populated areas without local seismographs.

Magnitude is a measure at the point that initiated the earthquake and uses seismographs. Seismographs can demonstrate effects and energy released (magnitude) in a way that can be verified or determined by seismographs at other locations. Scientists no longer use the original Richter scale, but an updated version. Earthquakes should be referred to as "magnitude X" rather than "an X on the Richter scale." A magnitude 6.0 earthquake releases 32 times more energy than a magnitude 5.0 and nearly 1,000 times more energy than a 4.0. But that doesn't mean the ground shakes a thousand times harder in a 6.0 than a 4.0, because the energy is released over a much larger area.

Table D.1-2
Earthquake Magnitude Scales

Magnitude	Modified Mercalli Intensity Scale	Effects
0.1 – 0.9	I	Not felt except by a very few under especially favorable conditions.
1.0 – 2.9	II	Felt only by a few persons at rest, especially on upper floors of buildings.
3.0 – 3.9	III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 – 4.5	IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
4.6 – 4.9	V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 – 5.5	VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
5.6 – 6.4	VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.5 – 6.9	VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
7.0 – 7.4	IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.5 – 7.9	X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
8.0 – 8.4	XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
8.5 +	XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Source: http://earthquake.usgs.gov/learning/topics/mag_vs_int.php, accessed July 14, 2009.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically-induced landslides. Under the Act, seismic hazard zones are to be mapped by the state geologist to assist local governments in land use planning. The Act requires that "cities and counties shall require, prior to the approval of a project located in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard." Merced County has not been mapped under the Seismic Hazards Mapping Act yet since the State has targeted higher risk areas, such as the San Francisco Bay Area and the Los Angeles/Riverside areas. [26] Thus, geotechnical reports are required for projects in the City of Merced. Based on these local studies, the probability of liquefaction for most properties in Merced is very low with no additional measures required beyond following the minimum standards of the current edition of the California Building Codes. [27]

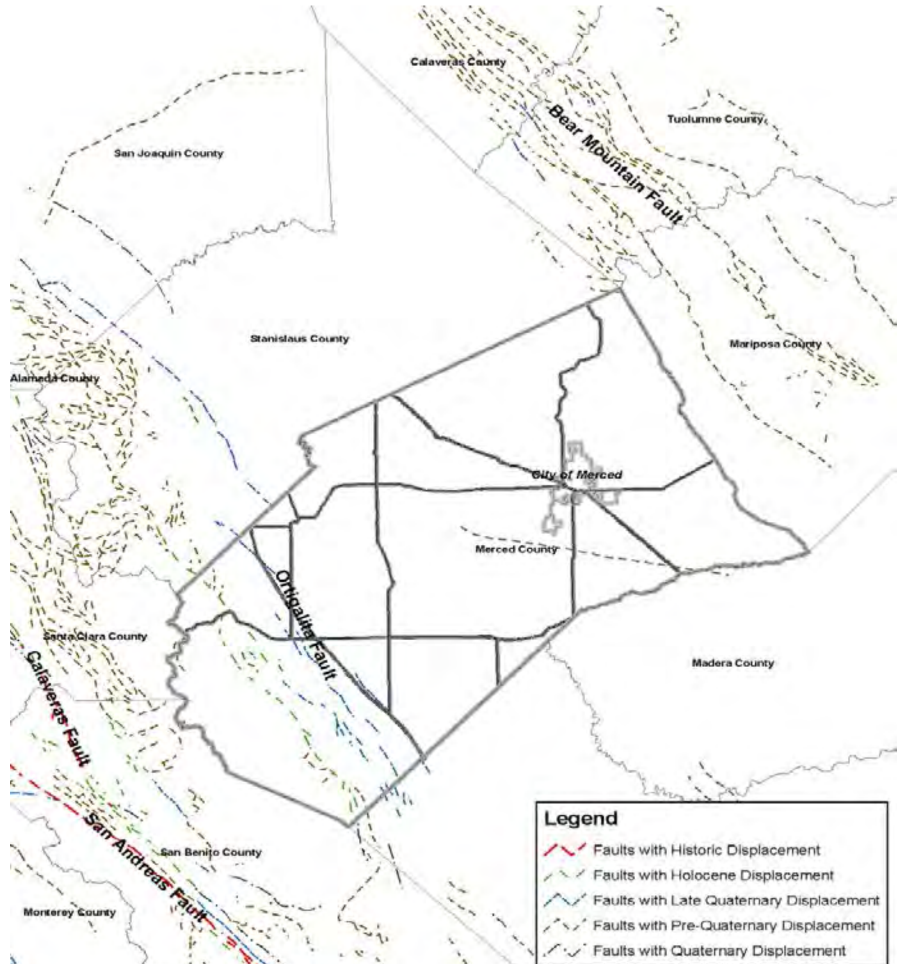
Location

Although no known faults occur in the City of Merced, Merced typically experiences reflected waves from activity on major fault lines that run through the mountains to our east and west. These have shaken Merced in the past. Of most notoriety is the San Andreas Fault, 58 miles away to the west. Other faults include the Ortigalita Fault (also known as the "Tesla-Ortigalita Fault"), the Calaveras Fault, the San Andreas Fault, and the Bear Mountain Fault. Earthquake shockwaves are "carried" by the relatively loose, wet soils that exist between Los Banos and Merced. For this reason, Merced is somewhat more likely to experience heavy shaking from surrounding parts of the state as will some of its neighbors.

TESLA-ORTIGALITA FAULT ZONE

The Tesla-Ortigalita Fault Zone consists of a series of southwest-dipping strike-slip faults separated by pull-apart basins that extend from Orestimba Creek in the north, to Panoche Creek in the south, along the eastern margin of the Coast Range. It is aligned northwest-southeast and is located approximately 40 miles west of the City of Merced. This fault zone is designated by CDMG as an active fault (i.e. a fault having surface displacement within the last 11,000 years), and it has been zoned under the Alquist-Priolo Earthquake Fault Zoning Act. The Tesla-Ortigalita Fault Zone is considered capable of generating a 6–7 Richter magnitude earthquake with a recurrence interval of 2,000 to 5,000 years (Anderson et al. 1982). The last large earthquake attributed to this fault occurred in 1981 and had a Richter magnitude of 3.7.

SAN JOAQUIN FAULT SYSTEM



The San Joaquin Fault System is located along the foothill-valley margin, and consists of a number of northeast dipping faults that offset Quaternary rock formations. The zone parallels Interstate 5 from Tracy south to Panoche Creek. Although the fault has not shown a surface displacement within the last 11,000 years by the California Division of Mines and Geology (CDMG), geomorphic evidence indicates that fault movement has occurred as recently as the Pleistocene epoch (Lettis 1982, Bartow 1991, Jennings 1994). This system is therefore considered potentially active.

Extent

As there are no seismic faults in Merced, earthquake impacts on Merced will be greatly influenced by the magnitude of an earthquake event and the distance from its epicenter to the City. The magnitude or severity of a seismic event can be described several ways, including: Seismic Effects, Peak Ground Acceleration (PGA), and Scientific Measurements (previously discussed).

CGS reports that there are not any known faults and the probability of a seismic event with an epicenter in the Central Valley is very remote (McLaughlin, 2009). The City of Merced is located in an area that has been identified to have the lowest level of Peak Ground Acceleration (PGA). For example, the "Geotechnical Investigation Report - Proposed Additions, Merced Wastewater Treatment Plant," Merced CA, June 2005, states:

"The California Division of Mines and Geology, in cooperation with the UC Geological Survey, performed a probabilistic seismic hazards study for the entire state. Their computed results show that the site area is in a region of relatively low ground motions, in the range of 0.10 to 0.20g. The minimum ground acceleration values used by the CDMG for Central Valley sites is 0.20g"; and,

"Using a probabilistic Seismic Hazards Analysis (PSHA), the PGA for the Upper Bounds Earthquake (UBE) is approximately 0.22g." This corresponds to a Modified Mercalli Intensity score of IV, which translates to a 4.0 to 4.5 magnitude, or light perceived shaking and little to no potential damages.

SEISMIC EFFECTS

The primary effect of an earthquake is fault ground rupture, also called surface faulting. The Alquist-Priolo Act was created to prohibit the location of structures designed for human occupancy across the traces of active faults, thereby reducing the loss of life and property from an earthquake. No faults exist in the City of Merced; therefore, the City does not experience "primary" seismic events, nor is subject to the Alquist-Priolo Act.

Common secondary seismic effects include ground shaking, liquefaction, ground subsidence and induced events. Other than distance from the earthquake epicenter, which is discussed above, this section also includes a discussion of conditions in the area that may exacerbate or mitigate the potential effects of hazards.

***Ground Shaking*:** Ground shaking, a motion that occurs as a result of energy released during faulting, could potentially result in the damage or collapse of buildings and other structures, depending on the magnitude of the earthquake, the location of the epicenter, and the character and duration of the ground motion. Other important factors to be considered are the characteristics of the underlying soil and rock, the building materials used, and the workmanship of the structure.

***Liquefaction*:** The shaking caused by an earthquake may cause relatively loose soil to compact, creating depressions which may cause a myriad of septic, well, pipe, and foundation problems. If the loose soil happens to be saturated with water, the water could be squeezed to the surface where it interacts with the top layers to produce a weak gelatin-like substance of dirt and water. This mixture lends no supporting capability to the buildings that stand on it and is known as liquefaction. Liquefaction poses a hazard to engineered structures. The loss of soil strength can result in bearing capacity insufficient to support foundation loads, increased lateral pressure on retaining or basement walls, and slope instability.

Although no liquefaction hazard areas have been identified to date in the SUDP/SOI, the future potential of liquefaction is recognized because unconsolidated sediments and a high water table do coincide in many areas. The California Office of Emergency Services has indicated that those areas at the time of an earthquake with the combination of fine-grain, sandy soils and perched, or a water table at a depth of 25 feet or less, may experience liquefaction providing that the shaking is of a magnitude and duration that would collapse the ground and the water is able to percolate to the upper soil levels. A deep, thick, unbroken hardpan may prohibit the necessary percolation, and thus prevent liquefaction from occurring where other conditions are present.

Liquefaction may have occurred in the newly organized town of Merced during the San Francisco Earthquake of 1906. The *Merced County Sun* of April 20, 1906, gave the following description:

"... At the Troy Laundry on Main Street where there is a brick oil tank under construction, the excavation filled with two feet of water and the walls of the tank were disturbed. Pools of water on vacant lots throughout the City rose. The earth was separated from some buildings..."

The appearance of pools of water, the "disturbance" of the tank walls, and the earth separating from the building, are common to liquefaction.

Areas of Merced with high water tables and loose soils are likely to experience more damage than their counterparts in other areas of the City because of the shockwave carrying ability of the ground and liquefaction.

Seismic Hazard Zones are regulatory zones that encompass areas prone to liquefaction (failure of water-saturated soil) and earthquake-induced landslides. Areas within Seismic Hazard Zones mean that the state has determined that it is likely that weak soil and/or rock may be present beneath the property. If present, these weak materials can fail during an earthquake and, unless proper precautions are taken during grading and construction, can cause damage to structures. Seismic Hazard Zones are determined by the California Building Code which currently shows the City of Merced to be located within a Seismic Design Category D (unless proven otherwise by a licensed architect or engineer). [22]

Ground Subsidence: Differential settlement, resulting in the compaction of loose, less cohesive soils, may be caused by earthquakes and could occur in parts of Merced. The most likely areas are those which have the following characteristics: 1) the groundwater surface is deep (otherwise liquefaction would be more likely), 2) the soils are loose to medium-dense, and 3) the soil profile includes strata of loose and uniformly graded sand. The potential for ground subsidence due to earthquake motion is largely dependent on the magnitude, duration, and frequency of the earthquake waves.

Induced Events: A hazardous spill caused by tipping and container damage becomes its own, independent concern, as would gas from broken gas mains.

Conditions that Exacerbate or Mitigate Potential Effects

While ground shaking may be the predominant agent of damage in most earthquakes, fires following earthquakes can also lead to catastrophic damage depending on the combination of building characteristics and density, meteorological conditions, and other factors. Fires following the 1906 San Francisco Earthquake led to more damage than that due to ground shaking. Most recently, fires in the Marina District of San Francisco following the 1989 Loma Prieta

Earthquake and in Los Angeles following the 1994 Northridge Earthquake demonstrate that fires following earthquakes pose a significant hazard, especially in densely populated urban areas, and are a potentially serious problem due to severe strain on the fire departments that must respond to multiple simultaneous ignitions. [23]

Previous Occurrences

While there is no record of any seismic activity originating in the City of Merced, the City has been shaken by earthquakes originating elsewhere, for example the 1906 San Francisco earthquake and the 1989 Loma Prieta (Santa Cruz Mountains) earthquake.

The USGS database shows that there is a 47.098% chance of a major earthquake (5.0) within 50 miles of Merced, California within the next 50 years. The largest earthquake within 50 miles of Merced, California was a 4.3 Magnitude in 1976. [58]

Between 1950 and 2009, a time period that is extremely short in relation to geological time, Fresno, San Benito and Santa Clara Counties (adjacent to Merced County) declared earthquake disasters. [23] These are far from Merced and include areas along the coast range, which contain several significant earthquake faults, however.

1906 SAN FRANCISCO QUAKE

The 1906 San Francisco quake resulted in a moderate Modified Mercalli (MM) shaking in the San Joaquin Valley, in which Merced is located. The following is a local first-hand account of the earthquake felt near Merced.

> *On the morning of the earthquake, I was asleep in my room at the Crooker Ranch, about three miles north of Merced on what is now Highway 99. My room was in the same building as the main dining room and kitchen. I was jolted awake by the violent shaking of the building and quickly sprang out of bed. From the door of my room I could see through the dining room and all the way to the back door of kitchen, which was open. Jue Yin Din, the Chinese cook, was clinging to the door jamb, wailing. As soon as the shaking had subsided I rushed to the kitchen where Jue Yin Din (Skinny, as he was called by the men) was safe enough, but in some hysteria that an apricot tree just back of the kitchen door had waved back and forth so violently that the limbs on either side of the tree had touched the ground. Since this was a large and sturdy tree, I suspected that in his frights, Jue Yin Din was exaggerating. Later I changed my mind when we received a report that the S.P. water tank had tipped over at Livingston, fourteen miles to the north. --- John Floyd McSwain.* [25]

Date	Place	M
June 10, 1836	S San Francisco Bay region, CA	~6.5
June 1838	San Francisco Peninsula, CA	~6.8
October 8, 1865	San Jose, CA	~6.5
June 20, 1897	Calaveras fault, CA	~6.3
April 18, 1906	S San Francisco Bay region, CA	7.8
July 1, 1911	Calaveras fault, CA	6.5
October 22, 1926	Monterey Bay, CA	6.1
October 22, 1926	Monterey Bay, CA	6.1
January 24, 1980	Livermore, CA	5.8
May 25, 1980	Mammoth Lakes, CA	6.2
May 25, 1980	Mammoth Lakes, CA	5.9
May 25, 1980	Mammoth Lakes, CA	5.9
May 27, 1980	Mammoth Lakes, CA	6.0
May 2, 1983	Coalinga, CA	6.4
April 24, 1984	Morgan Hill, CA	6.1
November 23, 1984	Round Valley, CA	5.8
October 18, 1989	Loma Prieta, CA	6.9
October 31, 2007	San Francisco Bay Area, CA	5.6

Last revised 12 January 2010 [4] (City Data.com)

The City of Merced has been very fortunate in the past and has not suffered any loss of life. However, major damage occurred in Los Banos in 1906, with minor structural damage recorded throughout the County on other occasions.

Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

0 Infeasible Event – not applicable due to geographic location characteristics
1 Rare Event – occurs less than once every 50 years
2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
3 Regular Event – Occurs between once a year and once every 7 years
4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 201,2 Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Earthquake" in Merced is considered an infrequent event.

3.3.6 Dam Failure

21

At 11:57 p.m. on March 12, 1928, the dam failed, sending a 180-foot-high wall of water crashing down San Francisquito Canyon. An estimated 470 people lay dead by the time the floodwaters reached the Pacific Ocean south of Ventura 5½ hours later (See above).

It was the second-worst disaster in California history, after the great San Francisco earthquake and fire of 1906, in terms of lives lost — and America's worst civil engineering failure of the 20th Century.

General Background

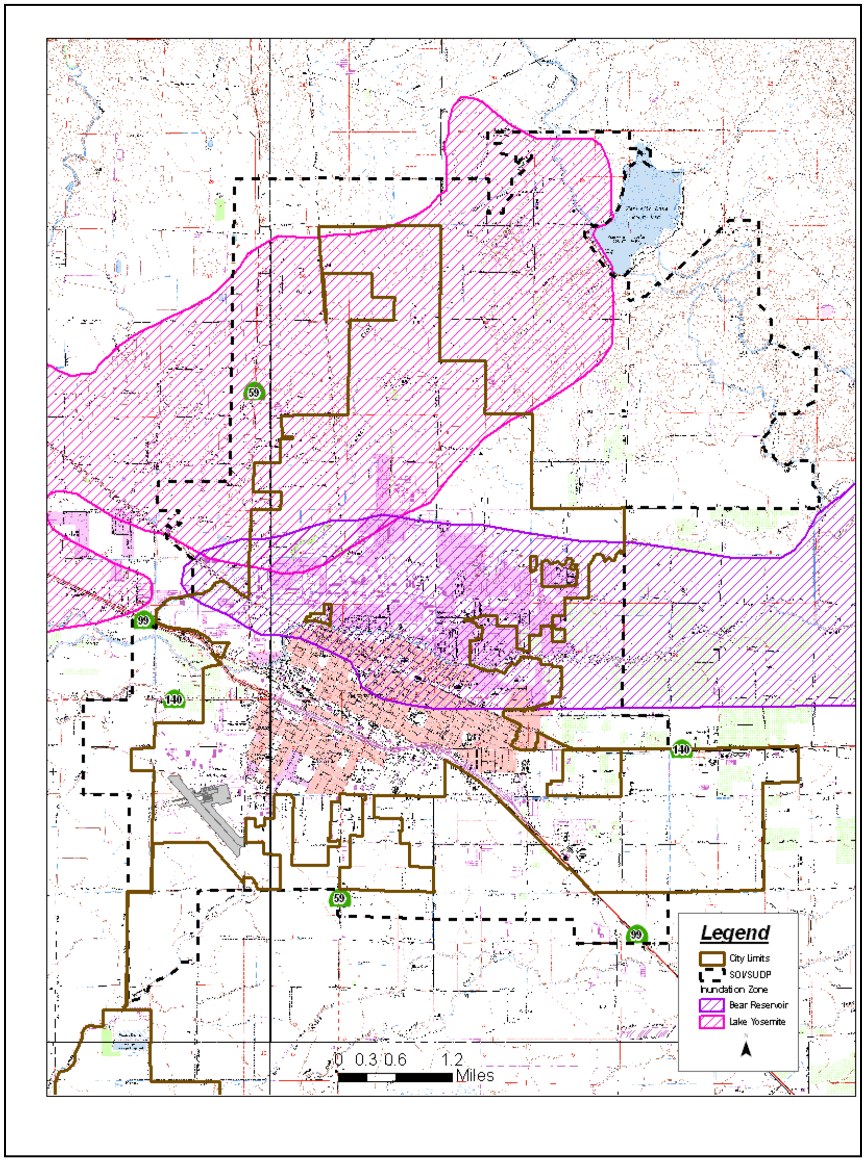
There have been a total of 45 dam failures in California. Failures have occurred for a variety of reasons, the most common failure being overtopping. Other dams have failed due to specific shortcomings in the dam itself or an inadequate assessment of the surrounding geomorphologic characteristics. The first notable dam failure occurred in 1883 in Sierra County, while the most recent failure occurred in 1965.

Dams fail as a result of one or more of the following: overflow due to exceeded capacity, sabotage, faulty dam materials, failure of the foundation, settlement or cracking, internal erosion, or insufficient maintenance. Merced is in the inundation area of two earthen dams: Lake Yosemite and Bear Reservoir (City of Merced, 1995). Both dams are earthen-fill types of structures, are very flexible, and resilient to seismic activity. The *Yosemite Lake Dam Failure Analysis for Bellevue High, 2007,* asserted that the greatest vulnerability to these types of dams is overflowing, however. Previous failures of earthen-fill dams identified that when the capacity is exceeded and overflow occurs, the structure washes-out and ultimately fails.

Location

Lake Yosemite is located northeast of Merced, outside the City limits, but within the City's Specific Urban Development Plan/Sphere of Influence (SUDP/SOI). Bear Reservoir was built approximately twenty miles east of Merced in Mariposa County.

Figure 2 depicts the flood inundation areas of Lake Yosemite and Bear Reservoir as it would affect the existing City Limits (gray line) and proposed growth boundary (yellow line).



LAKE YOSEMITE

Lake Yosemite was constructed in the 1880's on an un-named tributary of Merced River to provide regulation of irrigation flows withdrawn from the Merced River by the MID Main Canal, prior to distribution to the Le Grand and Fairfield Canals. The Main Canal is approximately 16 miles long.[18] The earthen dam was constructed between two buttressing sides of a valley where a small natural creek drained.

The reservoir dam is 45 feet high and 135 feet wide. The lake has an estimated surface area of 1.75 square miles and contains 8,000 acre feet of water. [1] It drains an area of 4.95 square miles. [19] There is no spillway; the outlet gates are adjusted to regulate outflow during storm events.

During the irrigation season, which occurs between April 15 and October 15, the Main Canal feeds irrigation releases into Yosemite Lake from the Merced. [18] For the rest of the year, the dam is used for flood control. In addition to water from the Main Canal, a 1,400 acre local watershed directly flows into Lake Yosemite. The estimated annual runoff from this watershed is 280 acre-feet per year.[18]

Today, the dam is owned by the Merced Irrigation District, and operated by the Department of Water Resources. The inundation area covers a large portion of the City's planning area in North Merced. The inundation area for the Yosemite Lake dam, should it breach, encompasses approximately 6,000 acres southwest of the dam. This area currently consists of agriculture, residential housing, and commercial development. Figure 2 shows the extent of the inundation area. [18]

BEAR RESERVOIR

Bear Reservoir on Bear Creek in Mariposa County, approximately twenty miles east of Merced is used for flood control purposes. Construction was completed in 1954. It is owned by the U.S. Army Corps of Engineers. [19]

As an earth-filled type reservoir, it could fail due to the erosion of the breach if over-topped. Failure is expected to be gradual. The initial flood wave would reach the City's SUDP/SOI six hours after failure, and would pass out of the SUDP/SOI nine hours after failure.

Its height is 92 feet with a length of 1,830 feet. Maximum discharge is 21,400 cubic feet per second. Its capacity is 7,700 acre-feet. Normal storage is 7,700 acre-feet. It drains an area of 72 square miles. It has a normal surface area of 265 acres. [19]

Extent

The extent of a possible breach of Yosemite Lake Dam could be severe. If the dam were to breach, the inundation (water) could flood about 6,000 acres to the southwest. This would affect agriculture, housing, and commercial development.

Previous Occurrences

Tom Stephens works for the Merced Irrigation District as a water resources specialist. He said, "There has never been overflow at Lake Yosemite dam that I am aware of."

In 1968, Yosemite Dam was in danger of failure because of heavy rains and flooding that had swollen the flood control canals that lead into Lake Yosemite. Reportedly, the canal dikes were dynamited and the incoming canal water was diverted to surrounding fields to prevent dam failure. The Merced Streams Group Project and Flood Control Plan authorized by Congress in 1970, which would divert the flood waters from the flood control canals, has only been partially completed due to lack of funds and other reasons. Castle Dam is complete; and a diversion structure, which diverts more than 1,200 cubic feet of water per second from MID's main canal is also complete.

Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

- 0 Infeasible Event – not applicable due to geographic location characteristics
- 1 Rare Event – occurs less than once every 50 years
- 2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
- 3 Regular Event – Occurs between once a year and once every 7 years
- 4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Dam Failure" in Merced is considered a rare event.

3.3.7 Extreme Temperatures

General Background

WILDFIRES

The City of Merced exists in an area which experiences mild temperatures in the spring and fall, some freezing temperatures in the winter, and extreme heat in the peak summer months. Heat and cold events associated with weather patterns have historically impacted the City of Merced. The National Weather Service (2009) identified the average winter temperature to be 54 degrees Fahrenheit, and the average summer temperature to be 98 degrees Fahrenheit. The NWS also noted that hard freezes, where temperatures drop below thirty-two degrees Fahrenheit for a period of several hours and typically kill vegetation, do occur in Merced, but they are limited to two to three nights per year. Conversely, Merced has been regularly challenged with heat related situations as a result of the summer weather pattern (NWS, 2009). [1]

EXTREME HEAT

Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks are defined as extreme heat. Extreme heat effects are characterized by a combination of very high temperatures and high humidity conditions. A heat wave is an unusually high combination of both for extended days in a row. Heat exhaustion occurs when the body is dehydrated resulting in an imbalance of electrolytes. Heatstroke occurs when perspiration cannot occur and the body overheats. Without intervention, heatstroke can lead to confusion, coma, and death.

Killer Heat

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that “over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined.” [23]

Heat waves do not cause damage or elicit the immediate response that floods, fires, earthquakes, and other disasters do. They have, however, claimed many lives in comparison with other disasters. For example, the 1989 Loma Prieta Earthquake resulted in 63 deaths while the 1992 Northridge Earthquake was responsible for the loss of 55 lives. The catastrophic 2003 Southern California Firestorms resulted in 24 deaths. However, according to the 2007 State Hazard Mitigation Plan (SHMP), the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave is said to have resulted in 946 deaths. The 2007 SHMP states that the July 2006 heat wave in California caused the deaths of at least 136 people over a 13-day period (6 deaths were still under investigation in 2007).[23] Nationally, on average, excessive heat claims more lives each year than floods, lightning, tornadoes, and hurricanes combined. In the disastrous heat wave of 1980, more than 1,250 people died. In the heat wave of 1995 more than 700 deaths in the Chicago area were attributed to heat. In August 2003, a record heat wave in Europe claimed an estimated 50,000 lives. [29]

Table 6.D and Table 6.E show the Heat Index (HI) as a function of heat and relative humidity. The Heat Index describes how hot the heat-humidity combination makes the air feel. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration. As the Heat Index rises, so do health risks. The index helps identify the likelihood of heat disorders, such as heat exhaustion and heatstroke, from occurring. For example, a typical July or August day in Merced, given average high air temperatures and average afternoon relative humidity results in a heat index of 90-105, which includes sunstrokes, heat cramps, and heat exhaustion as possible with prolonged exposure and/or physical activity. When air temperatures exceed this average high, especially in August and September when the humidity is higher, the heat index can be in the 105 to 130 range, where heat stroke is possible with prolonged exposure and/or physical activity. Record high air temperatures have resulted in a heat index of 130 or higher, where heatstroke/sunstroke is highly likely with continued exposure.

EXTREME COLD

Although infrequent, freezes can affect the City of Merced in a number of ways

Wind Chill

If conditions are right, wind chill can expedite the onset of frostbite in a matter of minutes. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. In 2001, the National Weather Service implemented an updated Wind Chill Temperature Index[31] to describe the relative discomfort/danger resulting from the combination of wind and temperature. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature. Applying Merced’s winter variables average low temperature (36.0 F), and average wind speed (5 mph in December and January), barely show up on the index and reveals that frostbite is not a concern. Even when Merced’s lowest recorded temperature of 13 F and a doubling of the average wind speed is plugged into the index, while the wind chill temperature will be 3 F, the onset of frostbite is still greater than 30 minutes.

Table 6.D: Air Temperature and Relative Humidity (*Source: National Weather Service)*

	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%
115	103	107	111	115	120	127	135	143	151								
110	99	102	105	108	112	117	123	130	137	143	151						
105	95	97	100	102	105	109	113	118	123	129	135	142	149				
100	91	93	95	97	99	101	104	107	110	115	120	126	132	136	144		
95	87	88	90	91	93	94	96	98	101	104	107	110	114	119	124	130	136
90	83	84	85	86	87	88	90	91	93	95	96	98	100	102	106	109	113
85	78	79	80	81	82	83	84	85	86	87	88	89	90	91	93	95	97
80	73	74	75	76	77	77	78	79	79	80	81	81	82	83	85	86	86
75	69	69	70	71	72	72	73	73	74	74	75	75	76	76	77	77	78
70	64	64	65	65	66	66	67	67	68	68	69	69	70	70	70	70	71

Table 6.E: Possible Heat Disorders by Heat Index Level

Heat Index	**Possible heat disorders for people in higher risk groups**
130 or higher	Heatstroke/sunstroke highly likely with continued exposure.
105-130	Sunstroke, heat cramps, or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
90-105	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity.
80-90	Fatigue possible with prolonged exposure and/or physical activity.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F	77.0	84.0	88.0	98.0	109.0	111.0	114.0	114.0	110.0	102.0	91.0	76.0	114.0
Average high °F	55.0	61.6	67.2	74.3	82.6	90.8	97.1	95.3	90.0	79.8	66.2	55.6	76.3
Average low °F	36.0	38.7	41.2	44.1	50.6	56.4	60.9	58.9	54.8	47.2	39.6	35.7	47.1
Record low °F	13.0	20.0	20.0	22.0)	30.0	37.0	39.0	35.0	32.0	28.0	21.0	15.0	13.0
Precipitation, inches	2.47	2.17	1.94	1.10	0.44	0.09	0.01	0.02	0.15	0.60	1.37	1.90	12.27

Location & Extent

All areas of the City are equally at risk when temperature extremes exist; there are not any topographical changes or influences that can create significant temperature changes from one part of the City to another. Annually, the City of Merced experiences summer temperatures that reach into the 100's and in the winter temperatures can drop below freezing. There is an average of 98.7 days with highs of 90°F (32°C) or higher and an average of 33.6 days with lows of 32°F (0°C) or lower. The record highest temperature of 114°F was recorded on July 24, 1902, and August 8, 1905. The record lowest temperature of 13°F was recorded on January 13, 2007. [28] Although snow is relatively rare in Merced, averaging only 0.6-inch (15 mm) annually, the City's proximity to the Sierra Nevada has resulted in some instances of remarkably heavy snowfall. The record 24 hour snowfall was 13.9 inches (35 cm) on February 16, 1946. The most snowfall in one month was 39.0 inches (99 cm) in December 1906. [28]

MERCED'S MONTHLY AVERAGE TEMPERATURE AND PRECIPITATION DATA

Table 3-10 shows daily temperature averages and extremes (in degrees Fahrenheit) measured at the representative weather station at the Merced Regional Airport (*Source:* [8]).

The key to this table is:

- "Extreme Maximum" is the maximum of all daily maximum temperatures recorded for the day of the year.
- "Average Maximum" is the average of all daily maximum temperatures recorded for the day of the year.
- "Average Minimum" is the average of all daily minimum temperatures recorded for the day of the year.
- "Extreme Minimum" is the minimum of all daily minimum temperatures recorded for the day of the year.

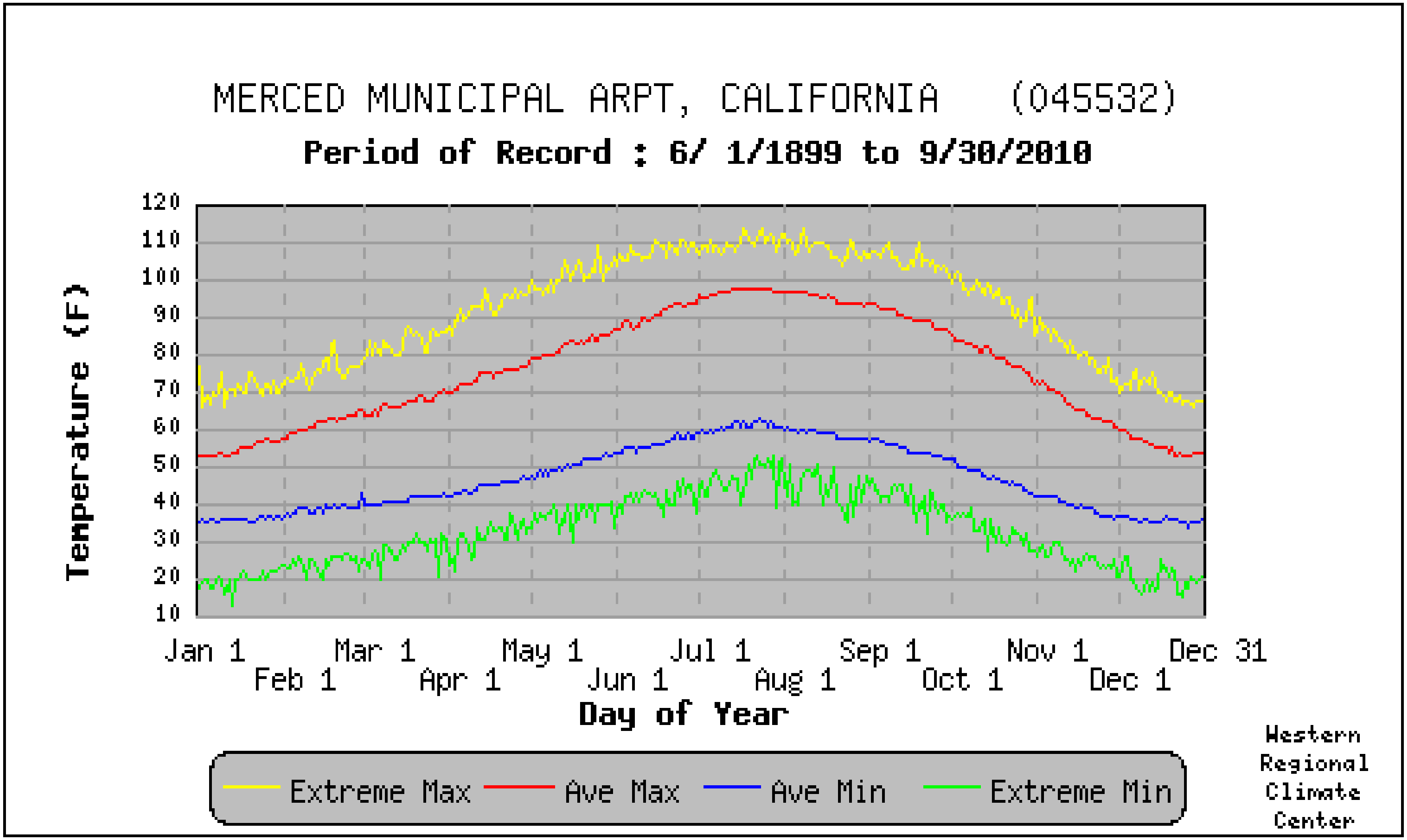
HUMIDITY

Merced's monthly average afternoon relative humidity values, based on late afternoon readings when lowest values generally occur, are depicted in Table 3-11.[34]

Table 3-11: Monthly Average Afternoon Relative Humidity Values

Month	Relative Humidity (%)
January	75
February	64
March	58
April	44
May	35
June	35
July	30
August	33
September	36
October	44
November	58
December	75

Table 3-10. Average and Extreme Minimum and Maximum Temperatures. Source: Western Regional Climate Center, wrcc@dri.edu



Previous Occurrences / Extreme Heat

The City of Merced experiences extreme heat conditions in the summer months, typically late June, July, and August, but it can start as early as May. In the event of an extreme heat occurrence, all areas of the City of Merced are affected. It is a rare year in Merced that does not see temperatures at 100°F or higher. Extended spells of these temperatures are not common. Wikipedia reports Merced as having 98.7 days per year that are 90°F or higher. That is 27% of the whole year.

Despite the fact that heat is the number one weather –related killer in the United States[29], not a single heat emergency was formally proclaimed in California or declared as a federal disaster between 1960 and 2008. Eric Klinenberg, author of an account of a heat wave which killed 739 people in the City of Chicago in July 1995, suggests that the hidden nature of social vulnerability combined with the inconspicuous nature of heat events (unlike earthquakes, floods, wildfires, tornadoes, etc.) prevent them from being declared as legitimate disasters.[23] Additionally, heat emergencies are often slow to develop. It could take a number of days of oppressive heat for a heat wave to have a significant or quantifiable impact.

EVENTS

The two highest recorded daily extremes for the City of Merced were 114°F temperatures in July 1902 (27.8 days) and in August 1905 (26 days).

In June 1925, the City experienced 16.9 days of 111°F temperatures. [33]

In July 2006, California had a two-week heat wave that resulted in 140 deaths that included 5 in Merced County. [30]

In 2000 and 2001, as a partial result of the deregulation and extreme energy prices, power distributers throughout California were required to conduct rolling blackouts to reduce costs. This practice was conducted during peak use times, specifically, the summer months when temperatures were at the highest levels (California electricity crisis). [1]

The National Climate Data Center reports the year 2006 as the second warmest year on record for the 48 contiguous states and that July of 2006 was the second hottest July ever. Merced had nine record highs in July 2006 compared to four Merced record highs in 2008, and 3 record highs in both 2005 and 2007. July 2006 also had twelve consecutive days above 100° (July 16th through July 27, inclusive).

The high for July 23, 2006, was 112°F. The average high for July 23rd is 98°F. The low temperature July 23, 2006, was 81°F compared to an average low of 60°F. At 112°F the humidity was 21%. This combination of air temperature and humidity resulted in a heat index likely to lead to sunstroke, heat cramps or heat exhaustion, and heat stroke possible with prolonged exposure and/or physical activity. In the evening, the temperature was 81°F with humidity at 74%.

Date	High	Date	High
July 16	102	July 22	110 (record)
July 17	105	July 23	112 *
July 18	108 (record)	July 24	111 (record)
July 19	102	July 25	109 (record)
July 20	104 (record)	July 26	107 (record)
July 21	107 (record)	July 27	102 (record)
**reportedly the second highest temperature ever for Merced (114° in July 24, 1902 is the highest)*			

Previous Occurrences / Extreme Cold

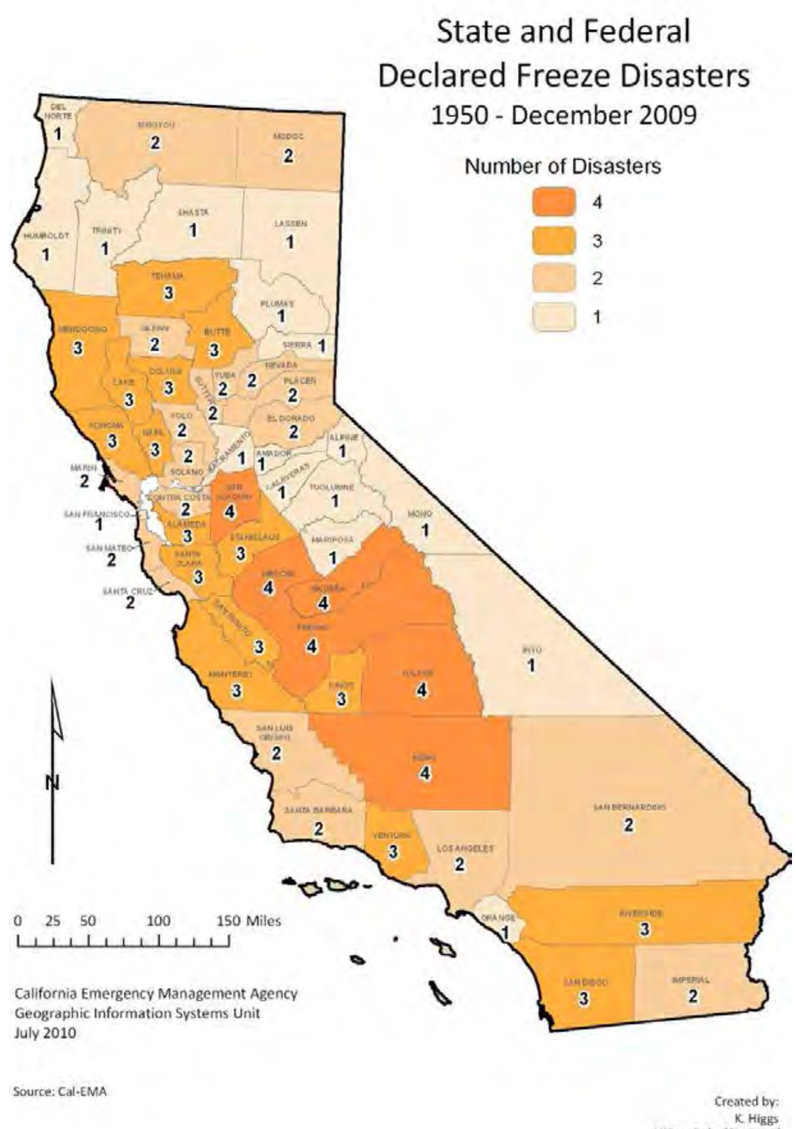
The City of Merced experiences cold weather in the winter months, typically December and January, but freeze isn't experienced every year. As seen in the map below, "State and Federal Declared Freeze Disasters from 1950- December 2009," [9] there were 4 freeze disasters in Merced County between 1950 and 2009.

EVENTS

In January 1913, there were widespread low temperatures for an extended period of time, which caused extreme damage to the fledgling California citrus industry. Temperatures dropped to 10-15°F in some areas, representing some of the coldest nights ever measured in the state. - Long-term Strategic Impact: Led directly to the U.S. Weather Bureau establishment of the fruit frost forecast program. - Calculated Damages: Not available.

In December 1990 there were record-setting low temperatures for an extended period of time during a critical growing period. Temperatures did not get above 25 degrees in parts of the San Joaquin Valley for three to five days and all time record low temperatures were set at Sacramento, Stockton, and Bakersfield. Many records were set for duration of freezing temperatures. The agricultural industry was devastated as acres of trees-not just fruit-were destroyed. Thirty-three counties were disaster-declared. - Long-term Strategic Impact: Changed the way crop protection measures were implemented.

DECLARED STATE AND FEDERAL FREEZE DISASTERS



Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. ‘Probability of Occurrence’ is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

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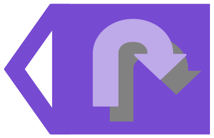


Hazard probability scoring was based on a variety of sources, including: 1) the City’s *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative “probability” scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for “Extreme Temperatures” in Merced is considered a frequent event.

3.3.8 Tornadoes

Oldest known photograph of a tornado
South Dakota, 22 miles southwest of Howard
1884 August 28

General Background

The City of Merced is susceptible to extreme weather/storm conditions. *An extreme weather condition is* a generalized term used to describe thunderstorms, tornadoes, heavy precipitation, high winds, and extreme heat or cold. Extreme weather may cause a variety of damages, depending on the type or weather situation. Damage may range from temporary power and utility outages due to thunderstorm and high wind activity to the sometimes, although rare, destruction of a tornado.

Wind speeds in tornadoes range from values below that of hurricane speeds to more than 300 miles per hour. Unlike hurricanes, which produce wind speeds of similar values over relatively widespread areas (when compared to tornadoes), the maximum winds in tornadoes are often confined to extremely small areas and vary substantially over very short distances, even within the funnel itself.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. [14]

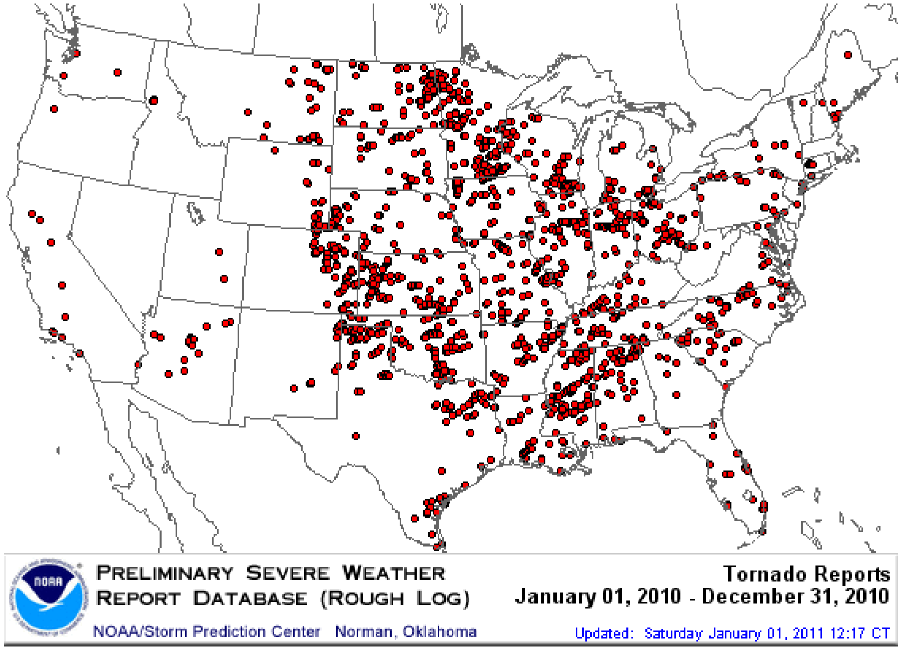
Original Fujita Scale		
Category	**Wind Speed**	**Description**
F0	40-72 miles per hour	Gale Tornado. Light Damage: Some damage to chimneys; breaks twigs and branches off trees; pushes over shallow-rooted trees; damages signboards; some windows broken; hurricane wind speed begins at 73 miles per hour.
F1	73-112 miles per hour	Moderate Tornado. Moderate Damage: Peels surfaces off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving autos pushed off the roads; trees snapped or broken.
F2	113-157 miles per hour	Significant Tornado. Considerable Damage: Roofs torn off frame houses; mobile homes demolished; frame houses with weak foundations lifted and moved; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
F3	158-206 miles per hour	Severe Tornado. Severe Damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown; weak pavement blown off roads.
F4	207-260 miles per hour	Devastating Tornado. Devastating Damage: Well-constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and disintegrated; large missiles generated; trees in forest uprooted and carried some distance away.
F5	261-318 miles per hour	Incredible Tornado. Incredible Damage: Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 300 feet (100 meters); trees debarked; incredible phenomena will occur.
F6-12	Greater than 319 miles per hour	The maximum wind speeds of tornadoes are not expected to reach the F6 wind speeds.

Enhanced Fujita Scale [15]	
Scale	**Wind Estimate (mph)**
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200

Location

Tornadoes occur throughout the year. Additionally, most tornadoes occur in the afternoon and evening hours, with a minimum frequency around dawn. However, tornadoes have occurred at all hours of the day, and nighttime occurrences may give sleeping residents of a community little or no warning. Because a tornado may occur at any time of the day or year somewhere in the U.S., there really is no national tornado "season." Instead, each region may experience increased tornadic potential at different times of the year. Like with the diurnal pattern, for the United States (and hemisphere) as a whole, the months in which tornadoes are most likely correspond to the times of year with increased solar heating and strong frontal systems. Regionally, the frequency of tornadoes in the United States is closely tied with the progression of the warm season when warm and cold air masses clash.

Although tornadoes are most commonly identified as occurring within the “Tornado Alley” in the mid-western states, California’s Central Valley experiences fairly large numbers of tornadoes (Edwards, 2005). Unlike the tornadoes in the mid-west, which occur in the cusp months between Spring and Summer, California’s tornadoes occur during the winter months. The tornadoes in California have also proven to be less severe and cause less damage than those that occur in “Tornado Alley” of the mid-western states, however. [16]



Extent

The Tornado Project (n.d.) noted that 4 tornado events occurring in Merced County had an intensity of F1 with the remainder having an intensity of F0. The National Climatic Data Center ([NCDC], n.d.) reported ninety-nine significant wind events, tornadoes and funnel clouds, in Merced County between 1950 and 2008. These events resulted in one fatality, twenty injuries, twenty-three million dollars in property damage, and sixty million dollars in crop damage.

Previous Occurrences

The Tornado Project (n.d.) identified three hundred twenty-three California tornadoes between 1880 and 2000; eleven of which were in Merced County or one every 10.9 years. Four of the tornadoes listed in Merced County had an intensity of F1 with the remainder having an intensity of F0. The National Climatic Data Center ([NCDC], n.d.) reported ninety-nine significant wind events, tornadoes and funnel clouds, in Merced County between 1950 and 2008. Based on the data provided by the NCDC (n.d.), the events have increased in regularity over the past decade; no theories were identified to support this pattern.

November 22, 1996 – 3 miles NE of Merced - Following frontal passage through Central California, an unstable airmass brought convective activity to the area this data. This small tornado, the first of four this day, was reported late to the office but eyewitness accounts and damage lead to the assessment of its being an F1 on the damage intensity scale. Its path was northwest to southeast with a length of ¼ mile through pasture and farm land except for an encounter with a farm house's garage. The garage roof was completely removed. [11]

March 25, 1998 – Spotter report of funnel almost touching the ground northwest of Merced. [11]

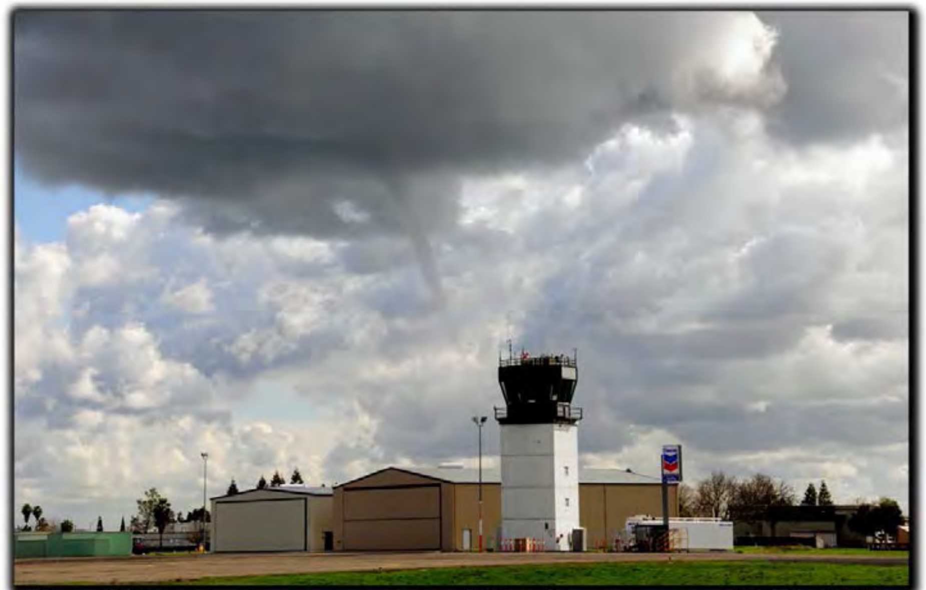
December 16, 2002 – From low-topped convection, a short duration tornado touched down northwest of Merced, California on the 16th and had a discernible damage track of 1.25 miles. The tornado dissipated but the parent cell after a distance of about 3 miles…generated another weak tornado (with a noticeable condensation funnel). This tornado was reported to have traveled about one mile over pasture land before dissipating. At its most intense, this cell spawned F1 Tornado damage for 3/8-mile when it lifted a roof from a house and carport and caused damage to various light structures along its path. There were no injuries or fatalities despite residents at home when the roof lifted from a house along Highway 59 near mid-day. [11]

October 17, 2004 – Spotter reports indicated a funnel cloud east to southeast of Merced during the early afternoon of the 17th. [11]

March 28, 2006, 2:48 p.m. PST – A trained spotter noted a funnel cloud approaching the City of Merced and tracked the northward movement of that funnel. At 1448 PST the funnel removed half of the corrugated roof of a farm maintenance shop and lifted it up and over adjacent power lines to the north. Eyewitness accounts indicated rotation and movement of the lowest level clouds toward the NE approximately 0.19 miles. Other than two ground contact points, beginning and end of the damage track, there was no evidence of any other ground contact from the funnel. Analysis by a local structural engineer aided in the assignment of the F0 rating. [11]

March 28, 2006, 3:17 p.m. PST - A late report indicated damage from this second small tornado in Merced at 1517 PST shortly after the 1448 PST tornado. There was minimal damage associated with the small track and path. There was an unconfirmed report of another touchdown in the City close to the time this confirmed 1517 PST tornado. [11]

February 9, 2009 – The Federal Aviation Administration office located in Oakland, CA, relayed a pilot report of a brief touchdown of a tornado 12 miles south of Merced Castle Airport. The tornado only lasted for a couple minutes and caused no property damage. The tornado was rated EF0. The touchdown occurred during a period of several funnel cloud reports over an area from Atwater to southeast of Merced Regional Airport (KMCE). [11]



Merced Airport - Funnel Cloud - 09 Feb 2009

Probability/Frequency of Future Events

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Based on these inputs, the Probability of Occurrence for "Tornadoes" in Merced is considered an infrequent event.

3.3.9 Fog

Above is a Satellite image of dense fog in California's San Joaquin Valley on November 20, 2002. This early morning radiation fog was responsible for several car accidents in the region. The white areas to the east of the fog are the snow-capped Sierra Nevada's. (NASA image)

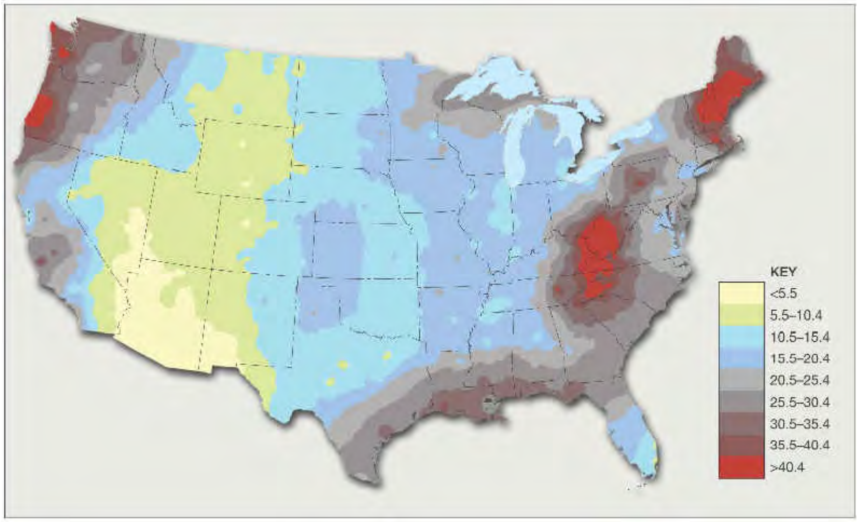
General Background

Fog begins to form when the air cools to the point where the water vapor condenses into tiny liquid droplets. Fog normally occurs at a relative humidity near 100%. For example, rain can cool and moisten the air near the surface until fog forms. There are many forms of fog, two of importance are: radiation fog and advection fog. Radiation fog is formed by cooling land and water surfaces that have warmed up during the summer and are still evaporating water into the atmosphere; and advection fog is warm moist air mass blowing over a cool surface.

After fog develops, it can linger into the late morning and even the afternoon hours before any clearing, lifting of cloud ceilings, or improvements in visibility occur. Sometimes the fog will clear, but it will still remain cloudy for several days with a deck of stratus clouds. The clouds remain after the fog lifts because a thick stratus deck that is more difficult to dissipate (which can be up to a few thousand feet thick) formed above the fog. These stratus clouds will linger for days after high pressure has settled over the area with no fog present in the valley, but in higher areas near the mountains (such as the foothills). Until the next low pressure system arrives, the fog will usually redevelop after sunset if no stratus deck lingers through the rest of the day or it clears out during the night. Until the persistent stratus deck has set up or a low pressure system returns, the valley fog can usually be expected to redevelop. [9]

Location

California's Central Valley has a unique fog called the "Tule Fog." Tule Fog is a radiation fog. High relative humidity, usually after a heavy rain, light winds, and rapid cooling condenses causing the Tule fog. The longer nights during the winter months creates this rapid ground cooling and results in a pronounced temperature inversion at a low altitude creating a thick ground fog. Above the cold, foggy layer, the air is typically warm and dry. Once the fog has formed, turbulent air is necessary to break through the inversion. Daytime heating can also work to evaporate the fog in some areas.



[10]

Extent

The Tule fog season in the City of Merced is typically in the late fall and winter (November through March) but can occur as early as October and can be as late as May. Fog typically forms rapidly in the early morning hours and nights. It has the potential to last for days, even weeks.

Fog can be widespread throughout the entire San Joaquin Valley; visibilities usually vary from less than a couple of hundred feet to up to one mile. When widespread fog is present, visibility is continuously below a quarter mile for many miles, especially near riverbeds and any low lying areas, and can last beyond the usual time of day that is associated with fog (mostly from evening to mid-morning).

Previous Occurrences

Fog is a typical weather phenomenon to Merced, although as noted by the Table above, extreme events are rare. Nevertheless, when combined with other factors, fog will affect a community on a regular basis. Notable fog incidents include the following:

January 26, 1993 - 5 big rigs were involved in an accident in dense fog injuring 3 drivers.[12]

January 15, 1994 - Dense fog in the central and southern San Joaquin Valley. A pair of chain-reaction accidents near Selma involved 48 vehicles, resulting in 2 fatalities and injuring 32. Another chain-reaction accident, near Merced, involved 19 vehicles, injuring 8. [13]

November 20, 2002 – Fog was a major factor in a 50-vehicle collision on Highway 99 near Merced that resulted in 32 injuries. [13]

Probability/Frequency of Future Events

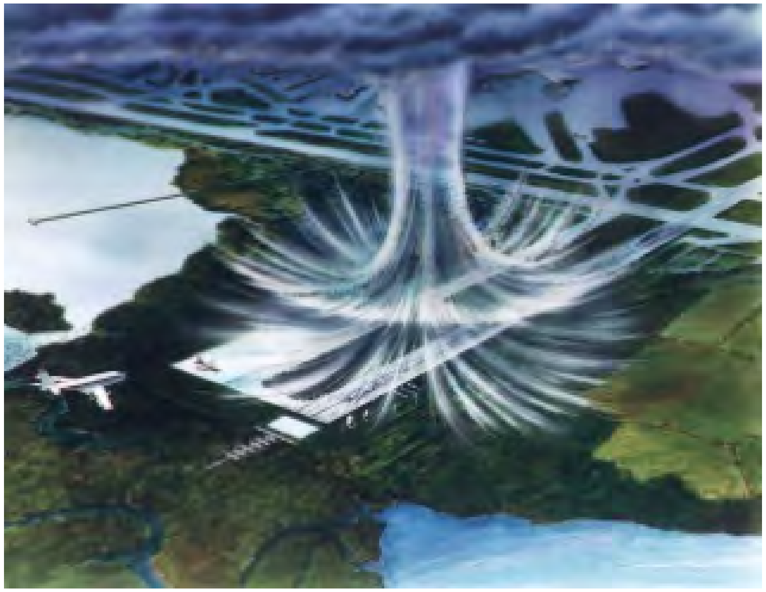
The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

0 Infeasible Event – not applicable due to geographic location characteristics
1 Rare Event – occurs less than once every 50 years
2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
3 Regular Event – Occurs between once a year and once every 7 years
4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Fog" in Merced is considered a frequent event.

3.3.10 Storm-Related Hazards



General Background

Extreme weather is generally any destructive weather event, but usually occurs in the City of Merced as localized thunderstorms that bring heavy rain, hail, lightning, and strong winds. Therefore, this section focuses on "Storm-Related Hazards."

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1950-1992). This database contains 84 severe weather events that occurred in the County of Merced between January 1, 1950, and November 30, 2010.

NCDC Hazard Event Reports for the County of Merced, 1950-2010*

Type	# of Events	Deaths	Injuries
Dense Fog	2	0	12
Funnel Clouds	20	0	0
Gusty Wind	1	0	0
Hail	4	0	0
Heavy Rain	20	0	0
Lightning	8	0	1
Severe Thunderstorm/Wind	2	0	0
Small Hail	3	0	0
Thunderstorm/Wind	6	0	0
Tornado: F0	13	0	0
Tornado: F1	4	0	1
Wind	1	0	0
TOTALS	**84**	**0**	**14**

Source: National Climatic Data Center Storm Events Database,
*Note: Losses reflect totals for all impacted areas

STORM-RELATED CHARACTERISTICS

Thunderstorms

Storms in the City of Merced are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail (three quarters of an inch or greater), winds in excess of 50 knots (57.5 mph), or a tornado. Storms can cause difficult driving conditions, especially for small cars and high profile vehicles.

Hail

Heavy storms can bring along with it hail, hail is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail is usually associated with severe storms. Hailstones vary in size; they can be less than two inches in diameter and upwards to the size of a melon. Hail can fall at speeds of 120 miles per hour (mph). Severe hailstorms can be quite destructive, causing property damage to buildings, roofs, automobiles, vegetation, and crops.

Lightning

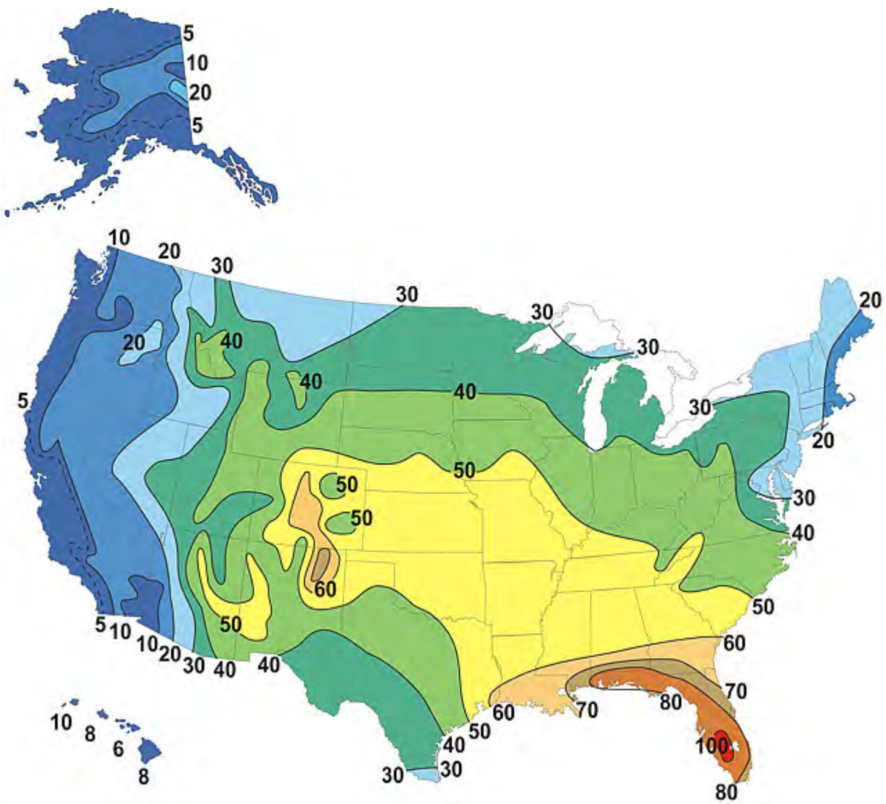
Lightning is defined as any and all of the various forms of visible electrical discharge caused by thunderstorms. Rain does not necessarily accompany thunderstorms and lightning, but every thunderstorm produces lightning. Cloud-to-ground lightning is the most common type of lightning. Lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or total destruction. Or, damage may be indirect, when lightning strikes an object and the current passes through this can cause damage to whoever is in close vicinity, which generally results in less damage.

Wind

Damaging wind from thunderstorms is much more common than damage from tornadoes. Wind speeds can reach up to 100 mph with a damage path extending many miles. Downdrafts are generated when rain-cooled, more dense air sinks inside a thunderstorm. As precipitation begins to fall, it drags some of the air with it. This "precipitation drag" initiates a downdraft. The downdraft is intensified by evaporative cooling as drier air from the edges of the storm mix with the moist air within the storm. These processes lead to a rapid downward rush of air. As the air impacts the ground it is forced to spread out laterally causing the gusty winds associated with thunderstorms. Occasionally, thunderstorms will produce intense downbursts called a **microburst** that is a very localized column of sinking air, producing damaging divergent and straight-line winds at the surface. Microbursts are recognized as capable of generating wind speeds higher than 168 mph. The scale and suddenness of a microburst makes it a great danger to aircraft due to the low-level wind shear caused by its gust front, with several fatal crashes having been attributed to the phenomenon over the past several decades. [35] A **macroburst** is more than 2½ miles in diameter and can produce winds as high as 135 mph.

Location and Extent

California has relatively few thunderstorms when compared with the rest of the United States. The figure below shows the average number of thunderstorm days each year throughout the U.S. The most frequency of occurrence is greatest in the southeastern states, with Florida having the highest incidence (80 to 100+ thunderstorm days per year). [36]



Previous Occurrences

June 15, 1995 – Sheriff's Department reported three-quarters hail in the City of Merced. Rainfall mostly within a one-hour period of time was 1.81 inches. [37]

March 28, 1998 – Locally heavy rain from a band of thunderstorms that became quasi-stationary in the previous 12-18 hours brought flooding again to the Merced City and some outlying Merced County areas. Thunderstorms developed mid-day Tuesday the 24th and locally heavy rain continued for much of that afternoon and early evening hours. Rainfall totals for 24 hours ending by the morning of the 25th showed unofficial reports for 3.5" to 5.9" in the Merced City area. [38] Power outage to 700 customers of PG&E.

March 28, 1998 – Merced County Sheriff reports plus reports from truck drivers indicated that hail was large and deep enough to cause cars to slide off State Highway 99 just north of the Merced/Madera County line. Numerous thunderstorms developed during the afternoon hours throughout much of Central California and reached severe limits in Merced and Madera counties. [39]

April 7, 2001 – Heavy rain and hail (often less than ¾-inch) accompanying widespread convective activity through interior Central California late in the afternoon and early evening of Saturday, April 7th, caused extensive damage to agriculture. Although isolated severe hail swaths occurred and some were defined as technically non-severe, widespread heavy rain in conjunction with the hail damaged young fruit, grape, grain, and early planted cotton crops in several counties. [40]

On ***June 21, 2008***, a widespread mass of unstable air passed over Northern California. This air mass enabled the development of thunderstorms, specifically dry-lightning thunderstorms, that resulted in the ignition of 3,500 wildland fires that ultimately consumed hundreds of thousands of acres (California Department of Forestry and Fire Protection [CALFIRE], 2008.

Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

0 Infeasible Event – not applicable due to geographic location characteristic.
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Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Storm-related Hazards" in Merced is considered an infrequent event.

3.4 Vulnerability

Introduction

While hazards occur at varying extent and may impact large or small areas, it is a community's vulnerability to hazards that narrow the scope and need for mitigation to help reduce impacts to local populations and buildings. This Chapter contains an assessment of vulnerability to the hazards likely to affect Merced.

Overview - Vulnerability

RC#B3

A vulnerability analysis predicts the extent of exposure that may result from a hazard event of a given intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage. Per the local mitigation planning requirements, this vulnerability analysis consists of the following seven steps:

- Asset Inventory
- Methodology
- Data limitations
- Exposure Analysis
- Repetitive Loss Properties
- Summary of Impacts

A discussion of *Land Use Patterns and Trends* is included in section 3.1.2 (Community Profile) of this Chapter.

3.4.1 Asset Inventory

Assets that were included in the MHMP's vulnerability analysis are as follows:

- Population
- Residential building stock
- Critical facilities:
  - City Hall and Departments
  - Parks, Community Services and Schools
  - Public Safety Buildings
  - Public Works Infrastructure and Facilities
  - Transportation Backbone

Merced's critical facilities are described more fully and mapped as part of the MHMP *Local Capability Assessment*, Section 4.1.4. Appendix L is the City of Merced *Comprehensive Asset Inventory*, which was included in the HAZUS model runs for flooding and earthquake hazard loss estimates.

3.4.2 Methodology

HAZUS

The MHMP includes information from HAZUS, a PC-based software, which implements the FEMA-developed loss estimate methodology.

First, an inventory of community assets was performed in order to determine the quantity of buildings, people, and asset values that lie in the different hazard areas and what proportion of the City this represents. The baseline data contained in HAZUS (census year 2000) was supplemented with recently constructed assets, (for example, the new Merced Medical Center on "G" Street). Using HAZUS, mock flood and earthquake hazard events were applied to the asset inventory to help the Disaster Council determine where resources should be allocated to address mitigation issues.

HAZUS also compiled general economic loss values for buildings and infrastructure within the City related to flood and earthquake related hazards. This task helped the City determine which assets would be subject to the greatest potential damages and which hazard event is likely to produce the greatest potential losses.

TOTAL VULNERABILITY AND VALUES

A conservative exposure-level analysis was conducted to assess the risks associated with the identified hazards. This analysis is a simplified assessment of the potential effects of the hazards on values at risk without consideration of the probability or level of damage. Using US Census 2010 City of Merced population information, geographic information system (GIS) data was used to determine the number of people located where hazards are likely to occur.

Census block level residential building information and parcel specific data was used to determine the number of residential buildings located where hazards are likely to occur.

Using GIS-data provided by the Merced Association of Governments, locations of physical assets were compared to locations where hazards are likely to occur. If any portion of an asset fell within a hazard area, it was counted as impacted.

For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). The aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared.

The data in Appendix L (Comprehensive Asset Inventory) derived from HAZUS that used census 2000 data.

3.4.3 Data Limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for a comprehensive analysis.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, and assets to the identified hazards. It was beyond the scope of this LHMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future updates of the LHMP.

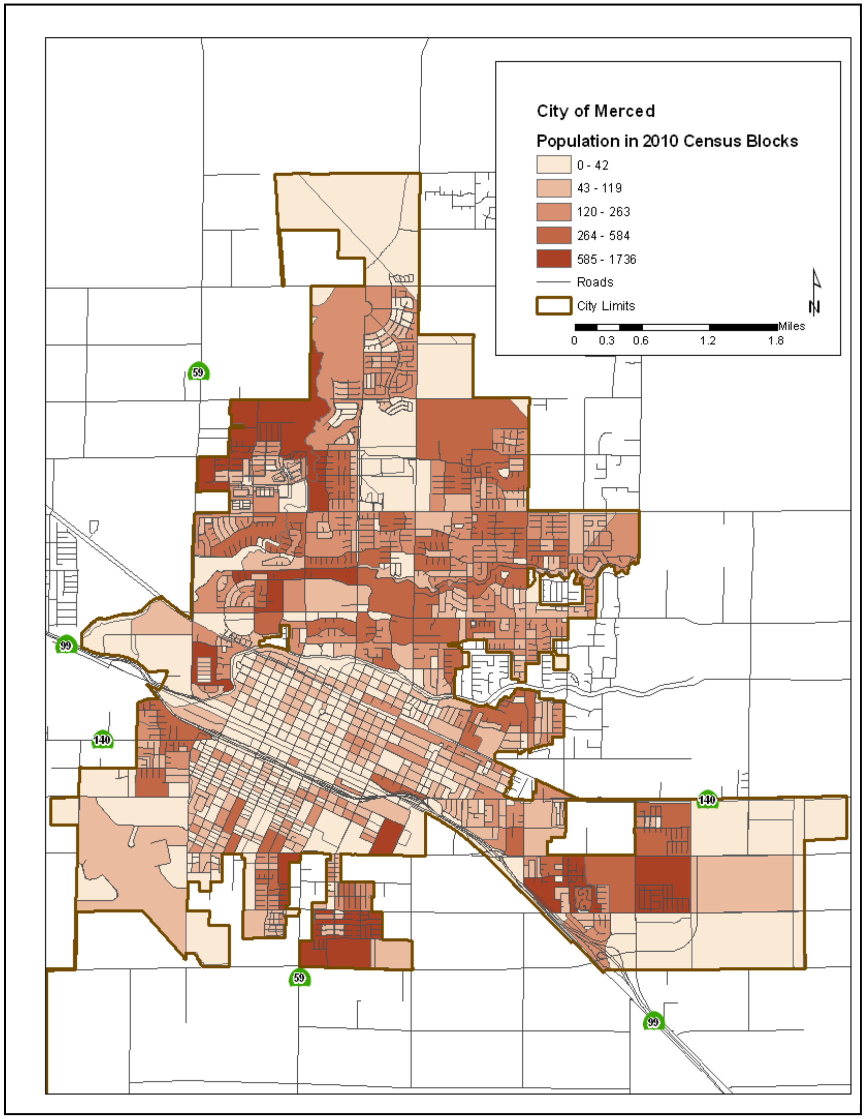
3.4.4 Exposure Analysis

Vulnerable structures, including residential buildings and critical facilities, and population at risk to each identified hazard are detailed in Table 3-12 below. The estimated potential dollar losses for critical facilities at risk to each identified hazard are also shown in this table.

HAZUS

HAZUS scenarios were also run for earthquake and flood hazards; see details in the "HAZUS Event Reports" located in Appendix K.

City of Merced 2010 Population Distribution by Census Block



City of Merced 2010 Dwelling Unit Type Distribution by Parcels

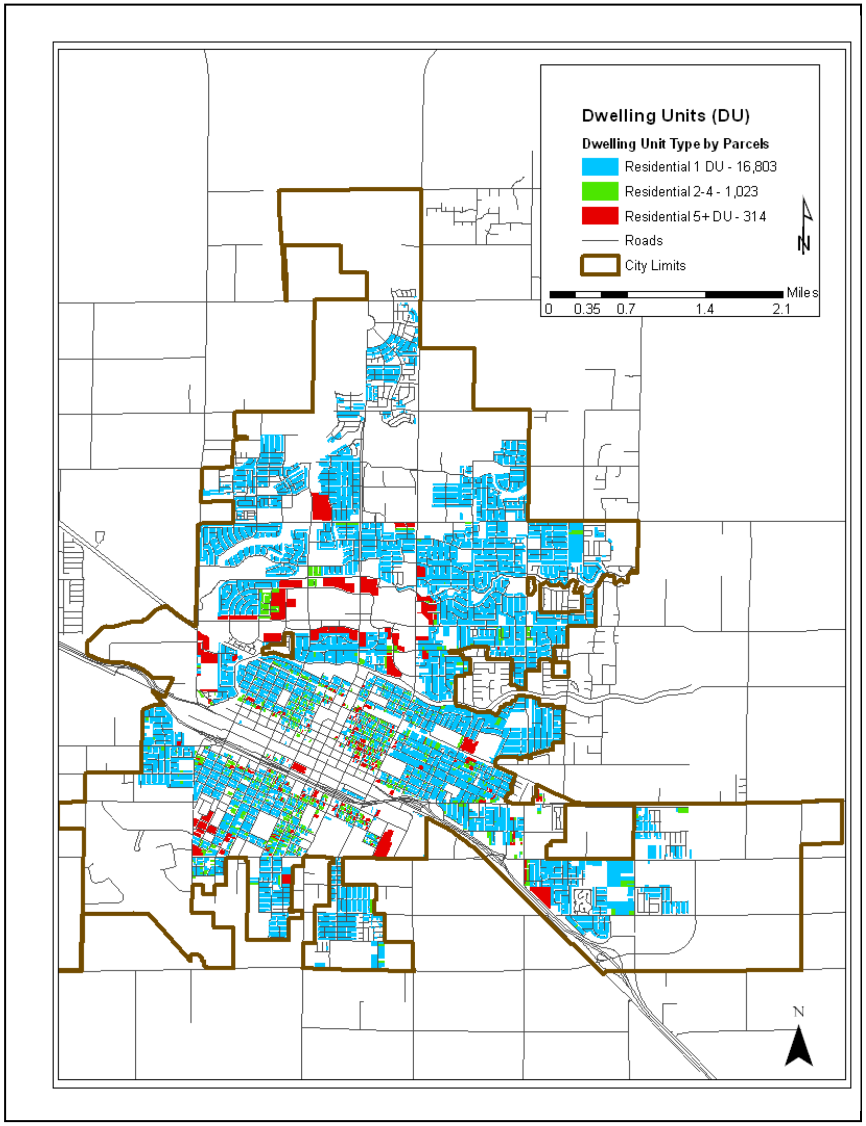


Table 3-12: City of Merced, Overall Summary of Total Assets at Risk

Hazards	Hazard Area	Population		Residential Buildings		Critical Facilities	
		No	%	No.	%	No.	%
Flooding	100-year floodplain	55,205	65	8,026	44	202	64
	500-year floodplain	67,585	79	9,271	51	37	12
Wildfire	Open Space Grasslands	3,462	4	1,695	9	53	17
Drought	Planning Area	85,190	100	18,227	100	313	100
Hazardous Materials-Transportation Corridor	Highway 99	21,235	25	4,034	22	89	28
	Railroads	33,643	39	6,753	37	127	40
Earthquake	Planning Area	85,190	100	18,227	100	313	100
Dam Failure	Inundation Areas	36,461	43	9,856	54	136	43
Extreme Temperature	Planning Area	85,190	100	18,227	100	313	100
Tornado	Planning Area	85,190	100	18,227	100	313	100
Fog	Planning Area	85,190	100	18,227	100	313	100
Storm-Related	Planning Area	85,190	100	18,227	100	313	100

3.4.5 Repetitive Loss Properties

Types and Numbers of Repetitive Loss Properties in the City's Flood Hazard Area

RC#B4

Eleven repetitive loss properties, all single family homes, occur within the Planning Area of the MHMP. Their general location is marked on the map on the following pages; most of these are located within the 100-year floodplain.

NFIP Insured Structures Repetitively Damaged by Floods

Five of the eleven repetitive loss properties were insured at the time of the flooding event. Flood damage claims to the buildings on the eleven properties, affected by flooding events between January 2008 and August 2011, totaled $552,497.19. This figure was obtained from a list of repetitive loss properties in Merced County located near the City of Merced, provided by the California Emergency Management Agency.

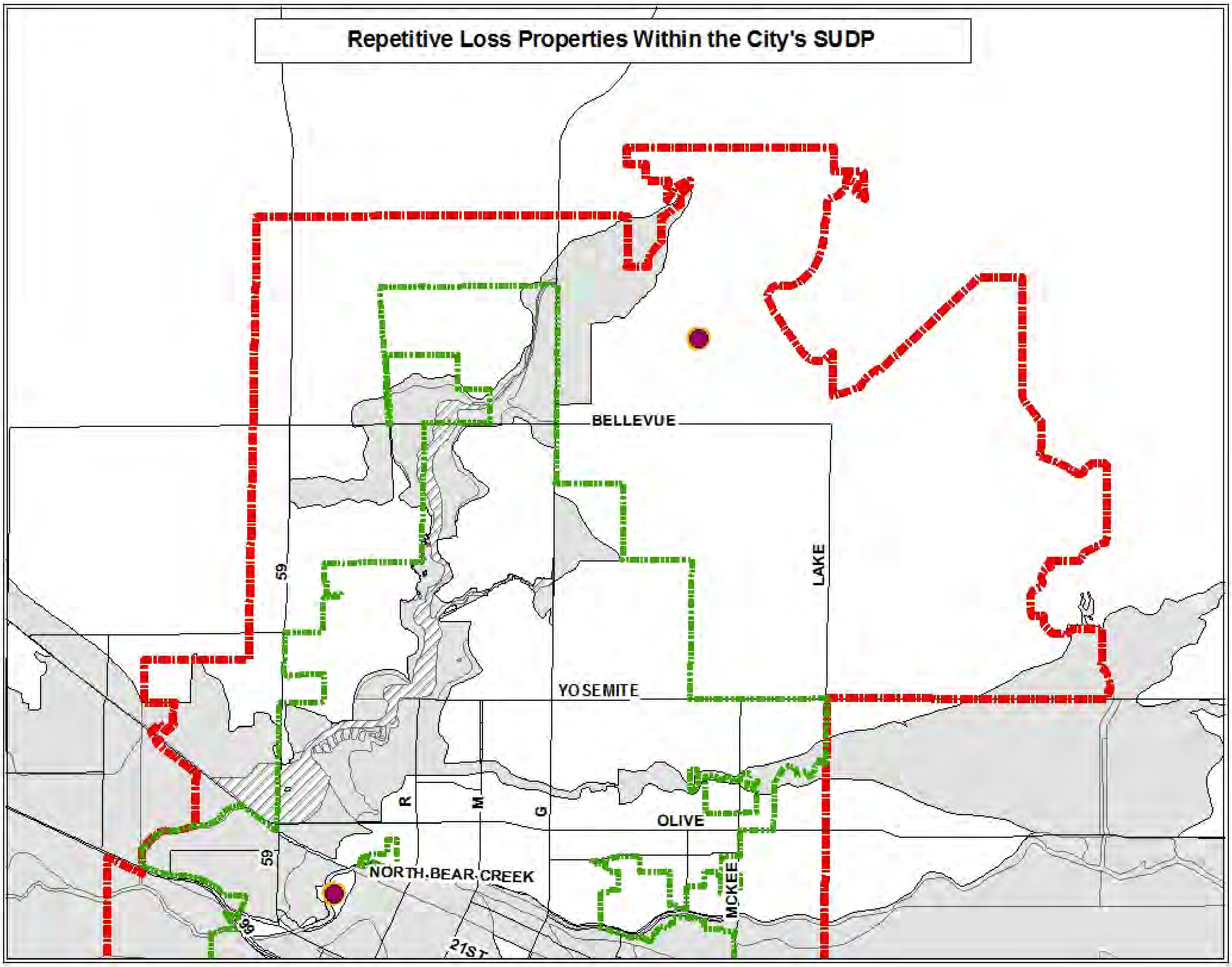
Perpetual Flood Easement Agreements

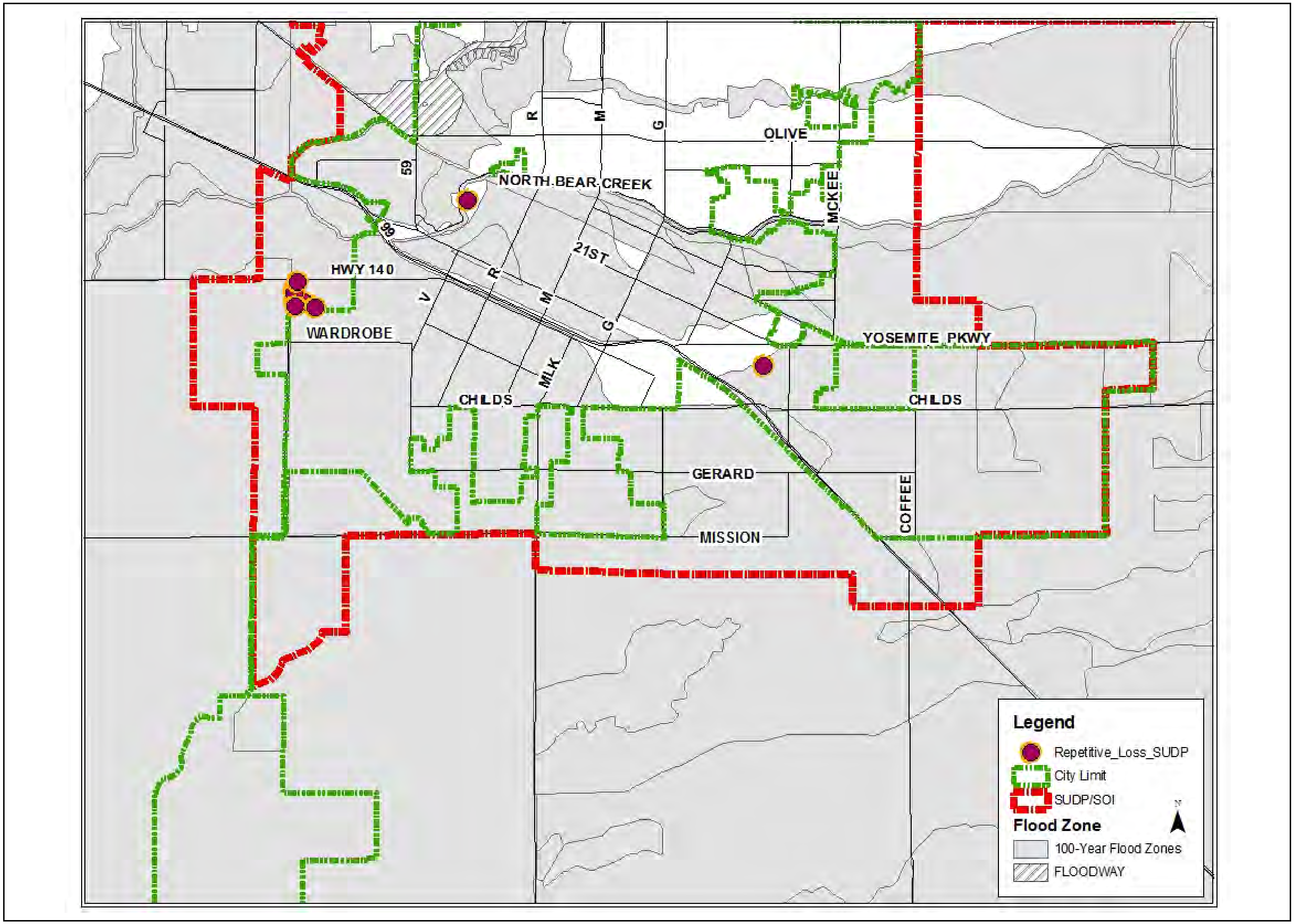
As a result of multiple flooding events in the area of West Highway 140, Thornton Road and Lopes Avenue in Merced County during January and March of 1998, several perpetual flood easement agreements were entered into between plaintiffs and the County of Merced and the Merced Irrigation District. The easement granted in these agreements is an easement for the purposes of allowing flooding of any volume or height across and upon the properties.

Land Uses and Trends in Repetitive Loss Areas

Two of the repetitive loss sites are within fully developed areas, and no further development in these areas will occur. In the vicinity of Highway 140 and Thornton Road, a large cluster of repetitive loss properties are located within the county (but within the City's growth area) on fully developed lots. These properties are located to adjacent vacant lots that have land use designations for "Low Density Single-Family Residential."

Future development will be required to comply with the requirements of the California Environmental Quality Act (CEQA) and to meet the City's Floodplain Ordinance. Due to past repetitive flooding events in this area, nearby areas will be scrutinized to assure that future development will not be impacted by future flooding events.


Repetitive Loss Properties Within the City's SUDP
BELLEVUE
LAKE
59
YOSEMITE
R
M
G
OLIVE
59
NORTH BEAR CREEK
MCKEE
99
21ST



NORTH BEAR CREEK
OLIVE
MCKEE
HWY 140
WARDROBE
59
99
21ST
R
M
G
V
MLK
CHILDS
YOSEMITE PKWY
GERARD
COFFEE
MISSION
Legend
Repetitive_Loss_SUDP
City Limit
SUDP/SOI
Flood Zone
100-Year Flood Zones
FLOODWAY
N

3.4.6 Growth and Development Trends

As part of the planning process, the HMPC looked at changes in growth and development, both past and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability.

A discussion of *Land Use Patterns and Trends* is included in section 3.1.2 (Community Profile) of this Chapter.

SOCIAL VULNERABILITY

Certain demographic and housing characteristics may amplify or reduce overall vulnerability to hazards. These characteristics, such as age, race/ethnicity, income levels, gender, building quality, and public infrastructure, all contribute to social vulnerability.

A Social Vulnerability Index compiled by the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina measures the social vulnerability of U.S. counties to environmental hazards for the purpose of examining the differences in social vulnerability among counties. Based on national data sources, primarily the U.S. census, it synthesizes 42 socioeconomic and built environment variables that research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards (i.e., social vulnerability). Eleven composite factors were identified that differentiate counties according to their relative level of social vulnerability: personal wealth, age, density of the built environment, single-sector economic dependence, housing stock and tenancy, race (African American and Asian), ethnicity (Hispanic and Native American), occupation, and infrastructure dependence. Merced County ranked "medium" to "high" in the county-to-state 2006-2010 comparison of social vulnerability to environmental hazards, and "medium" in the county-to-nation comparison.

Factors of social vulnerability hold many implications for disaster response and recovery and are important considerations when identifying and prioritizing mitigation actions and overall goals and objectives of the plan.

3.4.7 Vulnerability to Specific Hazards

Vulnerability to Flooding

The areas south of Bear Creek including downtown (except small islands) and areas along Highway 59-north are affected by potential flood. The greatest risk would come from failure of levees and/or overflow of Bear Creek or Black Rascal Creek. [6]

Evacuation Routes

As indicated previously, flooding could have extensive impacts upon the Merced SUDP/SOI. Two particular concerns relating to flooding are the potential that evacuation from South and Central Merced to the dry areas to the north could get cut-off by rising waters on the bridges over Bear Creek, and that most of the City's emergency facilities are in the floodplain and could become inundated.

Water Supply

The ability of the City to provide potable water under such circumstances, however, seems to be good because of the City's policy of keeping the entrances to the pump facilities above the 100-year flood elevation.

Integrated Regional Water Management

The following vulnerability points were provided by the *Integrated Regional Water Management Plan* (IRWMP) Project consultant on July 24, 2012, concerning *Climate Change Impacts on Surface Water* which include: 1) reduced flows) changes to snowmelt runoff timing; 3) increased low-flow period; and 4) "flashier" runoff from storm events. The consultant also identified Likely Regional Vulnerabilities, which include:

- reduced surface water availability;
- reduced water supply reliability as a result of reduced surface water availability, groundwater recharge and runoff;
- potential increase in groundwater overdraft;
- potential increase in land subsidence; declining water quality;
- loss of riparian habitat, wetlands and other sensitive natural communities;
- reduced hydroelectric generation capacity; and 8) increased flooding.

Planning Area Vulnerability to Flooding

Flooding HAZUS Data: Scenarios for the 100 and 200-year flood events were run using the HAZUS model, and are presented in Appendix K. The City's storm-drainage infrastructure is built to handle a 50-year event.

On the nearly 15,000 acres currently in the City of Merced, 71% is within the 100-year and 500-year floodplains. Upon build-out of the 2030 SUDP, this percentage will decrease to 50%, however. This is due to the fact that most future growth will be located outside flood sensitive areas.

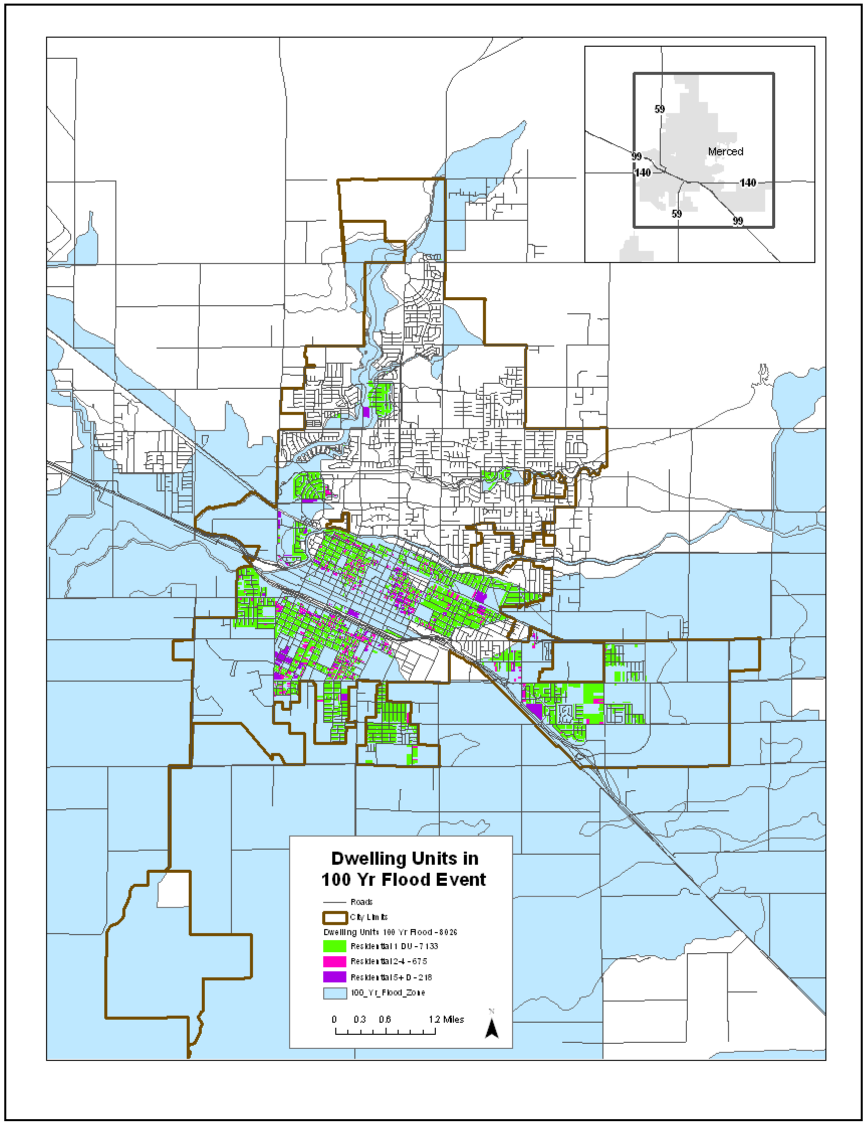
COMMUNITY VULNERABILITY MAPS

Plan Area vulnerability of residential buildings, population and critical facilities to flooding are revealed in the map set below; vulnerabilities are summarized in Table 3-12 above.

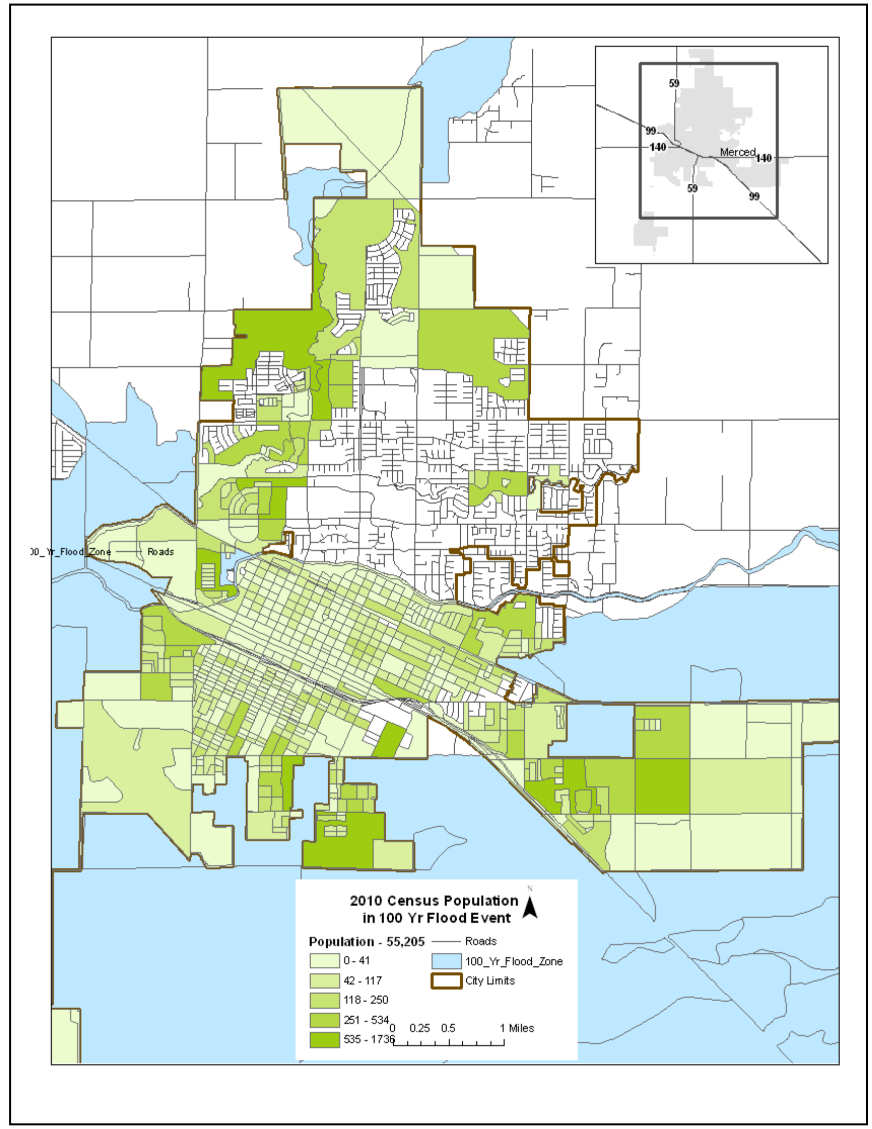
Flood Hazard Impact on Planning Area

Floods will impact the City by inundating certain areas with an overwhelming amount of water resulting in injuries/death, displacement, property damage, and impaired infrastructure. According to former Fire Chief Ken Mitten (personal communication, January 20, 2009), floods have caused millions of dollars worth of direct and indirect damage to the City over the last decade. Flood events place civilians, pets, property, crops, and livestock at risk for injury, death, or damage from the static and swift water conditions that will most certainly exist.

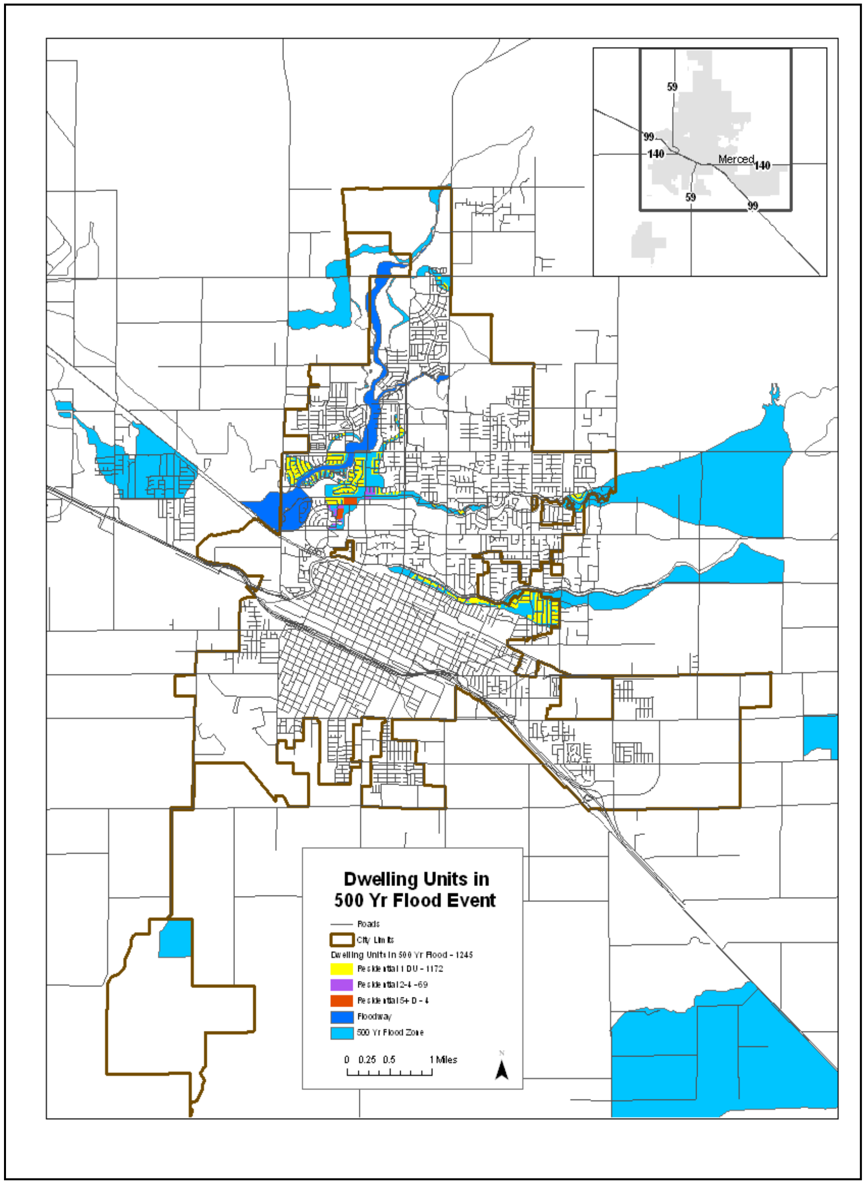
Number of Residential Buildings within the 100-yr Floodplain



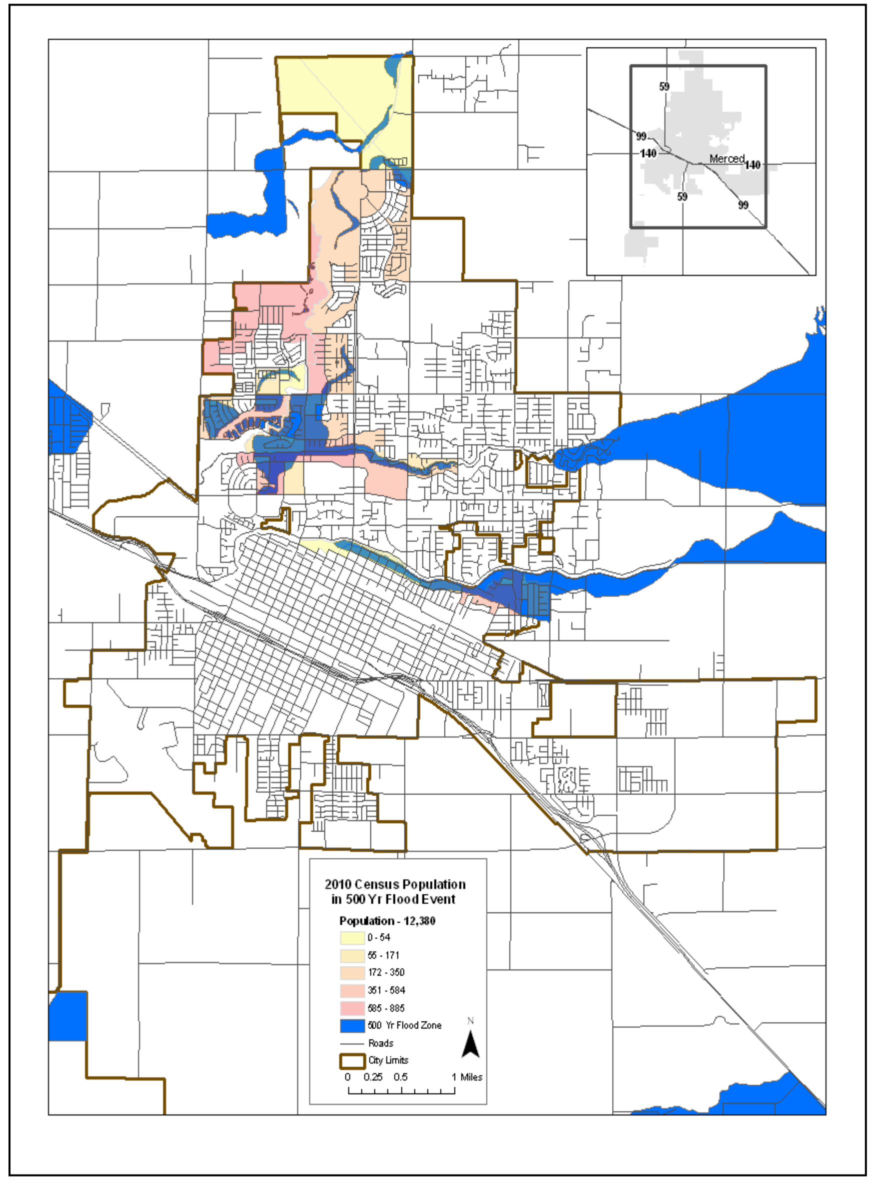
Population within the 100-yr Floodplain



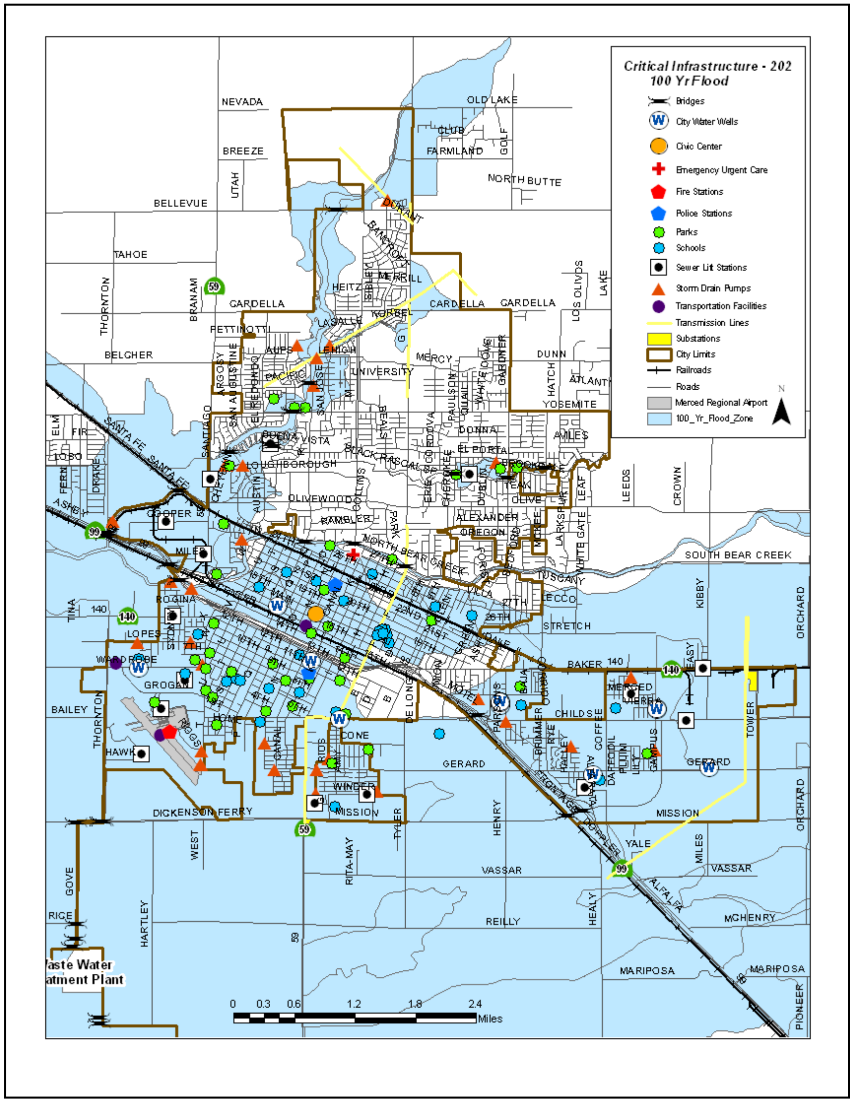
Number of Residential Buildings within the 500-yr Floodplain



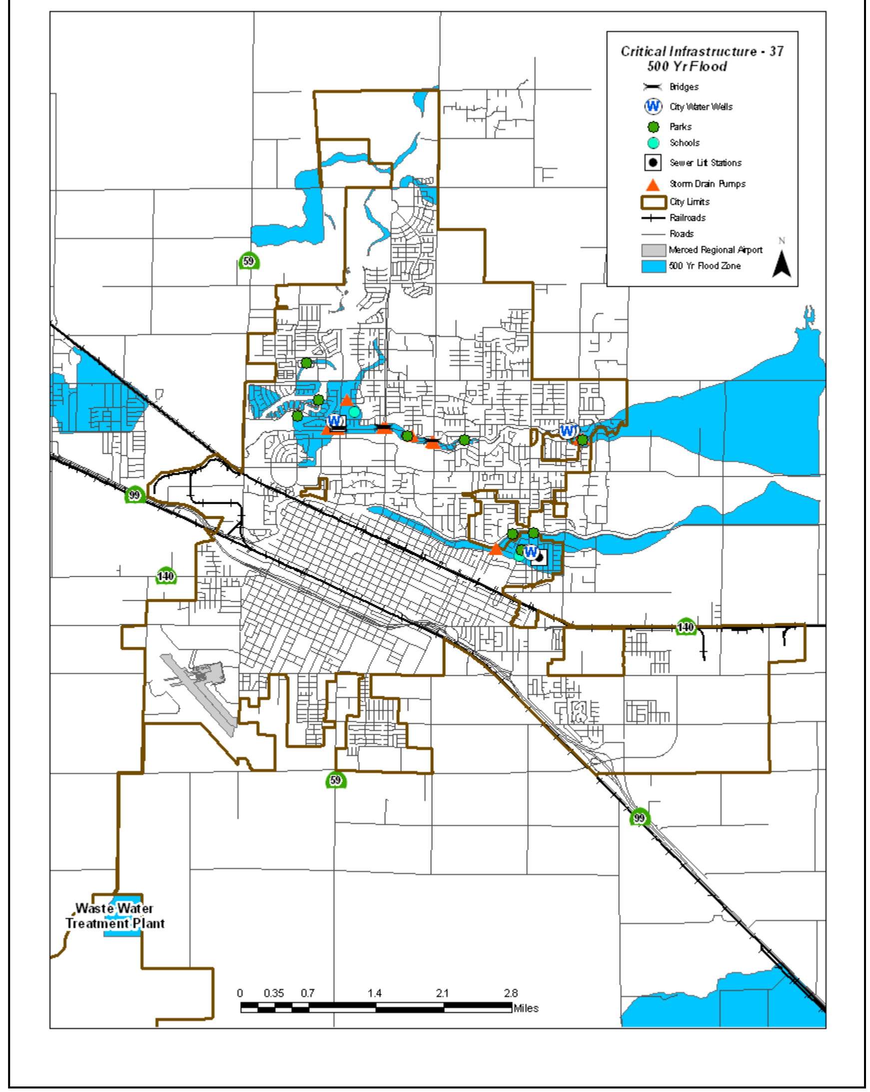
Population within the 500-yr Floodplain



Critical Facilities within the 100-yr Floodplain



Critical Facilities within the 500-yr Floodplain



Vulnerability to Fire

All residences, businesses, and open lands are at risk for fire. The degree of the risk varies based on engineered and administrative controls that are in place. In the early 1980's the City suffered from a rash of arson fires that caused more than $9 million in damage. Soon thereafter, the City adopted an ordinance to require automatic sprinkler systems for all commercial occupancies that exceed 5,000 square feet. Most residential fires within the City are a result of cooking or unattended cooking; this statistic is consistent with the national average. While the frequency of structural fires within the City remains high, the severity is low as a result of short response times and aggressive fire attack operations.

Regarding wildland fire, based on the fuel models of short and tall grasses, the fuels become receptive to fire in the late spring and continue well into the autumn months. The frequency of wildland fires in and about the City of Merced is high, but the severity is low due to the weed abatement program and response times.

The potential for serious structural damage occurs mainly in the grassland areas adjacent to development, especially during adverse wind conditions. [2]

Fire Hazard Impact on Planning Area

IMPACT ON LIFE, SAFETY, AND HEALTH

Wildland/urban fires pose a very real threat to the City of Merced. Although the terrain is flat, Merced is surrounded by grasslands that contain thousands of acres of light, flashy, grass fuels, and is subject to moderate afternoon winds that drive fires. Civilians, pets, and livestock that reside in proximity to open lands are most at risk to the effects of a wildland fire.

Potential losses from wildfire include human life, structures/improvements, and natural resources. There are no recorded incidents of loss of life from wildfires in Merced, and the risk from wildfire has been deemed moderate by both the State and the Merced Fire Department. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal; therefore, injuries and casualties were not estimated for the wildfire hazard.

Health hazards from the smoke caused by wildfires can include breathing difficulties and exacerbation of chronic breathing and cardiovascular disease. Smoke and air pollution from wildfires can be a severe health hazard especially for sensitive populations including children, the elderly, and those with respiratory and cardiovascular diseases.

Wildfire may also threaten the health and safety of those fighting the fires. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

IMPACT ON EXISTING AND FUTURE CRITICAL FACILITIES

Critical facilities are public and private structures where vital community functions are conducted. If the facility is damaged or destroyed by wildfire, there could be severe consequences to public health and safety. The City Fire Department, all first responders, and mutual aid agencies would work to protect those facilities identified in areas where wildfire is a potential.

A critical facility is defined as a facility that is vital for the City's ability to provide essential services and protect life and property and/or the loss of which would have a severe economic or catastrophic impact.

The following table provides a list of critical facilities that are adjacent to potential wildfire areas.

CRITICAL FACILITIES ADJACENT TO POTENTIALWILDLAND FIRE AREAS	
Facility Type	Number
Fire Stations	1
Power Substations	3
UC Merced Campus	1
Wastewater Treatment Plant	1
Water Well Sites	3

The MFD's weed abatement program has all but eradicated wildland fires from within the City limits; however all properties on the outer edges of the City are directly at risk.

IMPACT ON EXISTING AND FUTURE STRUCTURES AT RISK

The Merced Fire Department staff assesses the risk of existing structures annually as they maintain staff, purchase apparatus, and conduct training to protect life and property in Merced. The Fire Department has prepared for the increasing potential for a wildfire as the City has grown and the number of structures adjacent to the grasslands along the City limits has increased.

The City has invested in additional training and equipment as construction in the Bellevue Ranch area has continued to grow. The incomplete build-out on the Bellevue Ranch and other developments in the City has resulted in an increased risk for existing structures. While roads, greenbelts, and infrastructure have been planned and in some instances installed, the empty lots pose wildland fire risks to the residences and outbuilding that have already been built.

ECONOMIC IMPACT

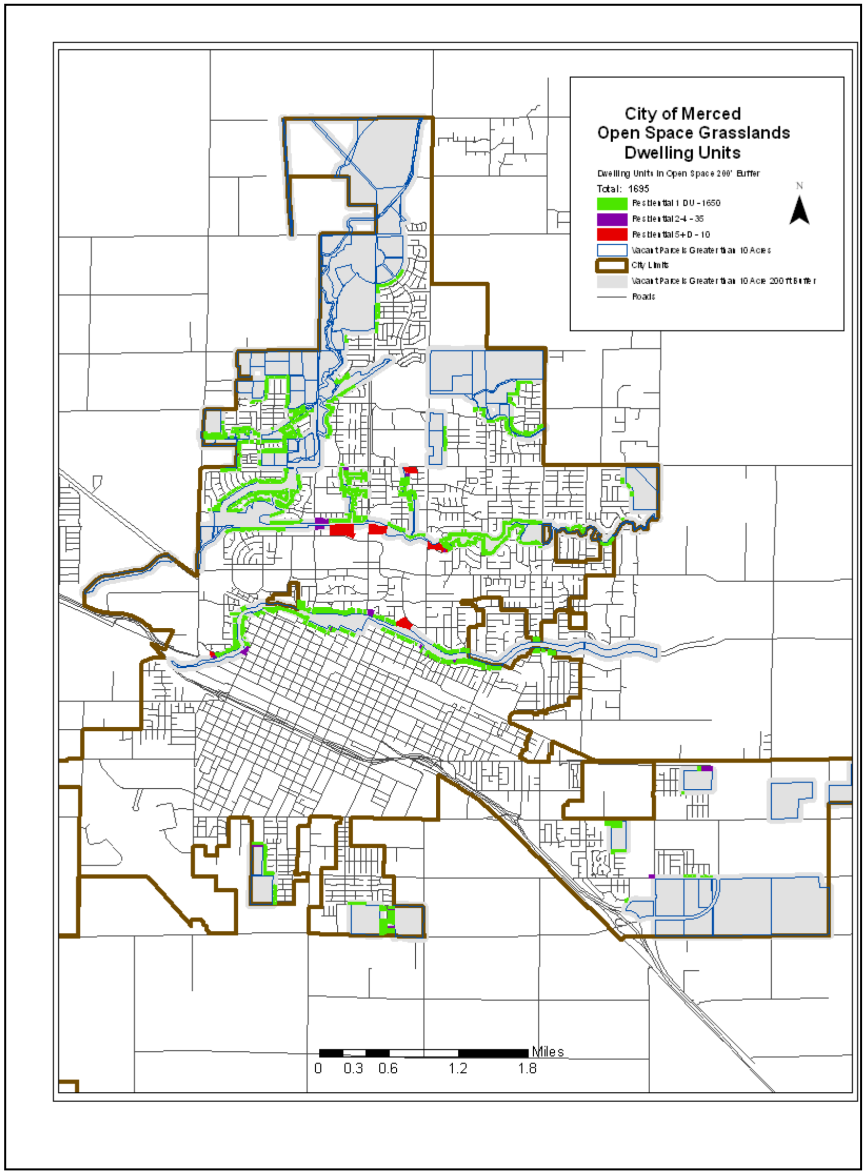
There are direct and indirect economic impacts associated with wildland/urban fires. *Direct Costs* are costs associated with life loss, property damage, suppression, recovery, and all other costs directly connected to the event. *Indirect Costs* are costs associated with business interruption, community degradation, vacant structures, and other costs that were not directly related to the event, but we created as the indirect result of the event. The National Fire Protection Association (NFPA) data finds that in 2007 there was $16.6 billion in direct economic impacts from fire in the United States. NFPA estimates that the direct costs of fire comprise 90% of total loss and the indirect costs make-up the remaining 10%.

Between January 1, 2007, and December 31, 2010, the City of Merced experienced an estimated direct fire loss of $11,770,096, which averages to $2,942,524 per year. Direct costs from structure fires resulted in an average loss of $2,669,110 (90.7%) per year, while wildland fires only resulted in $8,033 (0.003%) of the direct costs.

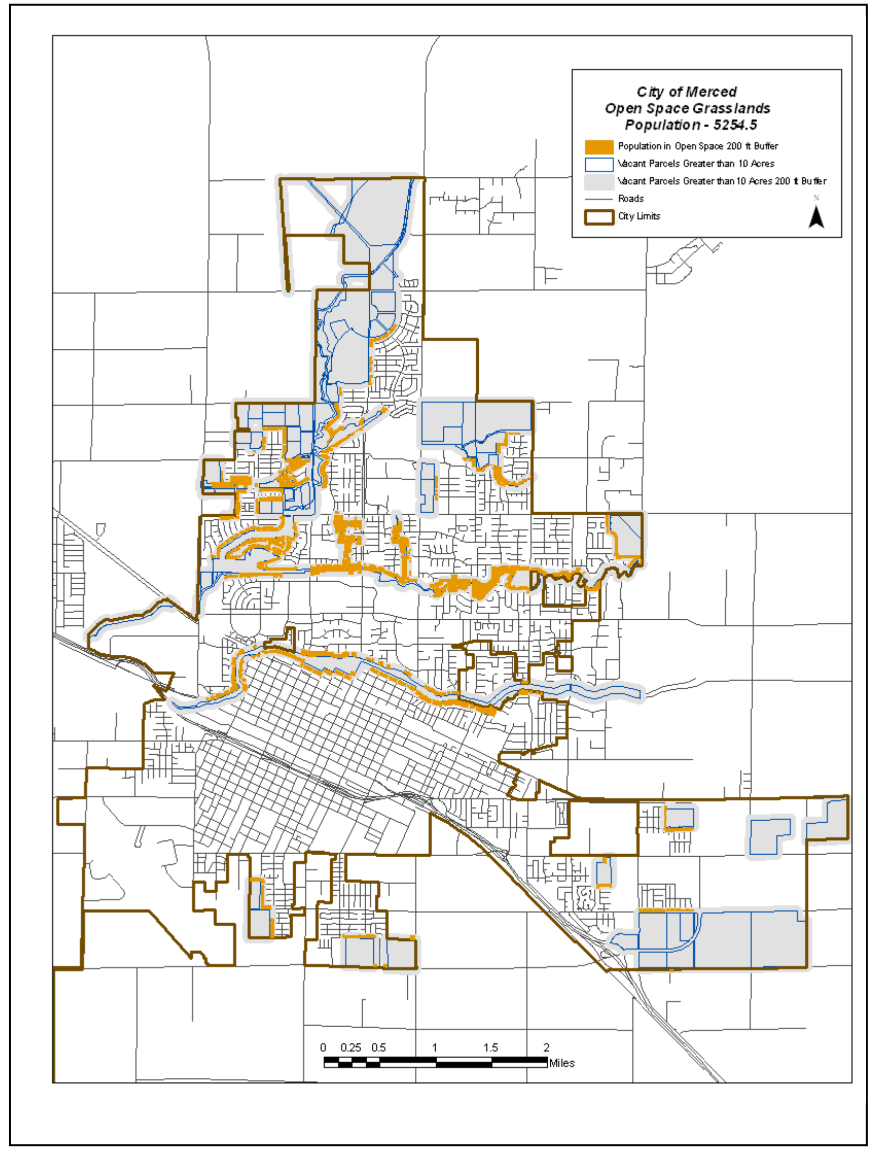
COMMUNITY VULNERABILITY MAPS

Plan Area vulnerability of residential buildings, population and critical facilities to wildfire are revealed in the map set below; vulnerabilities are summarized in Table 3-12 above.

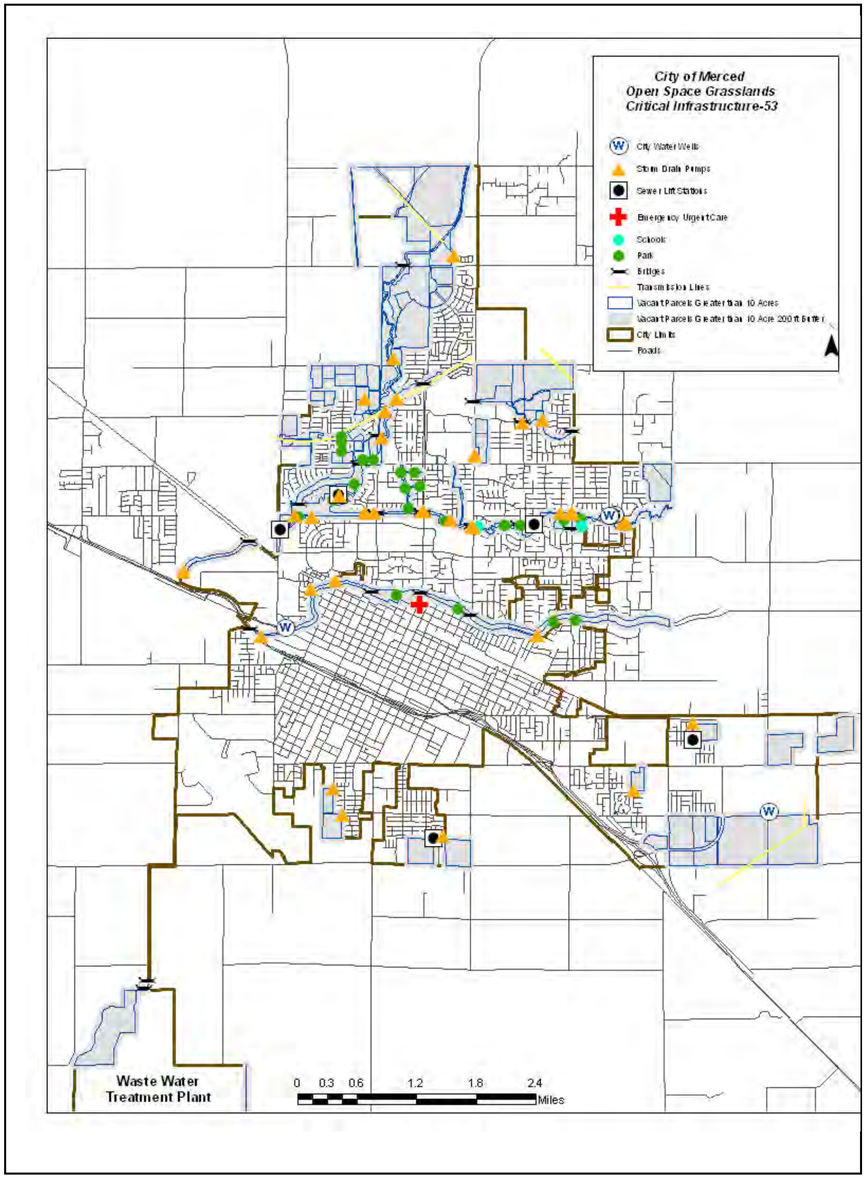
Number of Residential Buildings near Open Space Grasslands



Population near Open Space Grasslands



Critical Facilities near Open Space Grasslands



Vulnerability to Drought

Adequate water is a critical factor, necessary for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. Therefore, drought has the potential to adversely affect many sectors in different ways and with varying intensities. For example, impacts may include: water shortages and associated conservation measures; increased fire danger; reduced or failed crop yields; livestock death; reduction of electric power generation; deterioration of water quality; compact soils and hydrophobic soils, potentially making an area more susceptible to flooding; and desertification.

As an urban community, Merced's vulnerabilities to drought include water shortages, fire danger, and susceptibility to flooding.

Drought Hazard Impact on Planning Area

Past droughts demonstrated that water users affected the earliest and to the greatest extent by drought conditions were those not connected to the State's system of water supply infrastructure, but reliant solely on annual rainfall. Typical examples were rural residents supplied by marginal wells, isolated communities relying on springs or small creeks, and ranchers dependent on dryland grazing. Residential water users and small water systems experiencing the most problems were those located in isolated North Coast communities and in the Sierra Nevada foothills. Water haulage and drilling new wells were typical drought response actions in these areas.

While the City of Merced's water system is independent of the State's, and solely reliant on groundwater, the use of interconnected wells that tap into the deeper and larger aquifer, reduces the City's vulnerability to drought.

Significant economic impacts on California's agriculture industry can occur as a result of short and long term drought conditions, including hardships to farmers, farm workers, packers, and shippers of agricultural products. They can also cause significant increases in food prices to the consumer due to shortages. As an urbanized community, agricultural uses comprise a very small portion of the City.

Vulnerability to Hazardous Materials

The potential vulnerability of hazardous materials incidents is difficult to predict because the cause of these incidents are generally human error or technology failure. Generally, comprehensive regulation for the transporters and facilities producing, using, or storing hazardous materials limits the number of releases, but still a great risk is present if safeguards fail or are not followed.

The types of "hazmat" incidents that can occur and the resulting impacts are: [2]

SPILL OR RELEASE

Immediate threat from any hazardous materials release into the atmosphere is from exposure to toxic vapors, gases, liquids and solids. Even a small release of a hazardous substance can have devastating effects on those who are exposed. A release may result in requiring City residents and businesses to take protective actions such as evacuation or shelter in place. The secondary risk is to the environment. Unchecked exposure can lead to contamination of the air, ground and subsurface water sources, soil and affect the health of wildlife. Large spills can contaminate drinking water supplies that may affect entire communities, especially in rivers, underground aquifers or reservoirs. [2]

FIRE

When hazardous materials burn, toxic chemicals are often present in the smoke. The greatest danger is from inhalation, but eye damage and absorption through the skin can also be a problem. Fire fighting can be quite difficult. Large hazardous materials fires are mainly a hazard in and around industrial areas, although smoke and vapor plumes can travel for miles. [2]

EXPLOSION

The major threats from an explosion involving hazardous materials are from falling objects and flying debris, thermal exposure, released contaminants, and over pressure during detonation. Like hazardous materials fires, explosions are mainly a hazard in and around industrial areas, and along ground or marine transportation corridors. [2]

Should an incident occur that either breaches or compromises the integrity of natural gas pipelines, many of the citizens within the City would become affected. Such an incident would greatly affect businesses, the railways, highway transportation routes, and the environment. [6]

Hazardous Materials Impact on Planning Area

COMMUNITY VULNERABILITY MAPS

Plan Area vulnerability of residential buildings, population and critical facilities to hazardous materials are revealed in the map set below; vulnerabilities are summarized in Table 3-12 above.

IMPACT ON LIFE, SAFETY, AND HEALTH

Exposure to hazardous materials can result in any number of reactions, from temporary respiratory ailments to death. Impacts vary with the use & disposal of substance, population exposed, the dose (concentration) of the exposure, how the exposure happens, duration of exposure, and if the exposure is recurrent. Populations such as the elderly and youth are typically greatest at risk, but people who speak limited English or live in low income areas are at an increased risk of not being able to respond during evacuations.

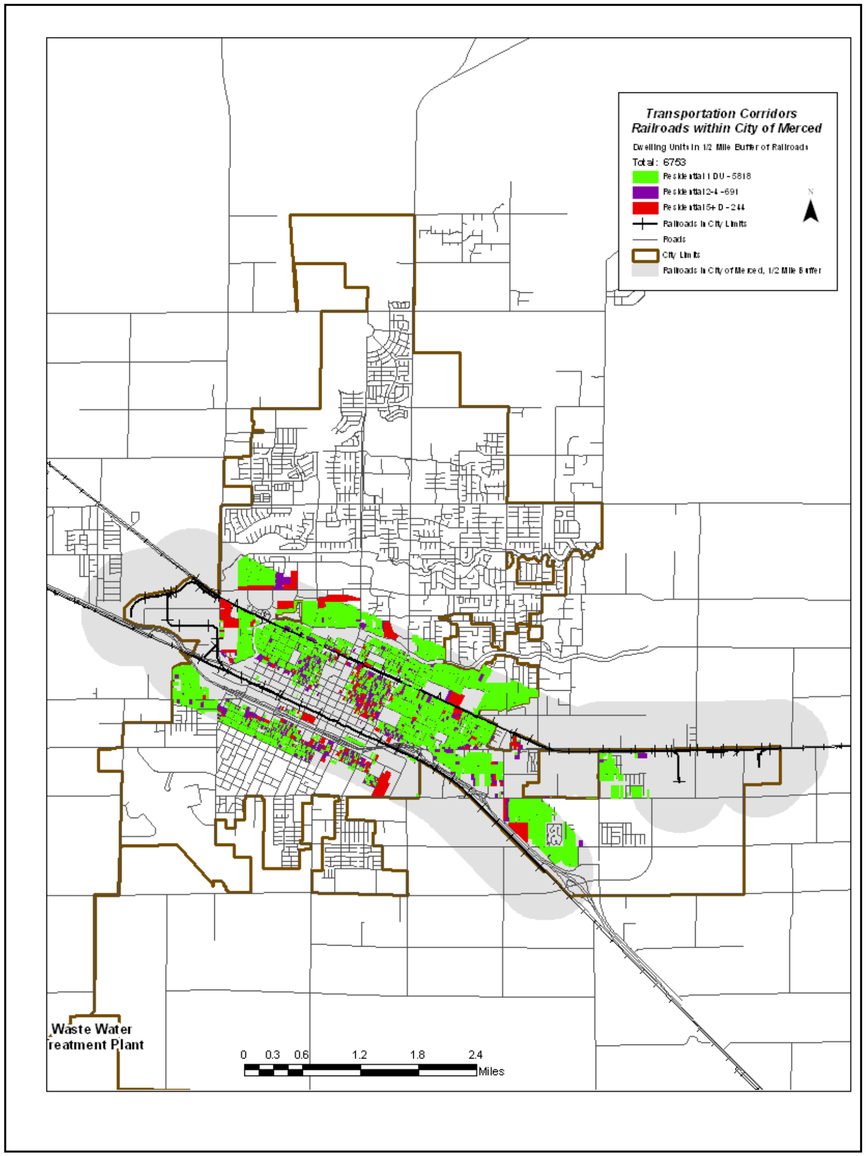
IMPACT ON EXISTING AND FUTURE CRITICAL FACILITIES

Critical facilities in Merced located within a mile radius of transportation corridors, including highways and railroads, pipelines, and fixed hazardous material facilities, are at an elevated risk for hazardous materials incidents disrupting activities contained within these facilities. Of most concern to physical structures are incidents involving fire, water, and chemical interactions which could cause explosions. Releases of toxic substances could also result in the facilities becoming inaccessible for a period of time.

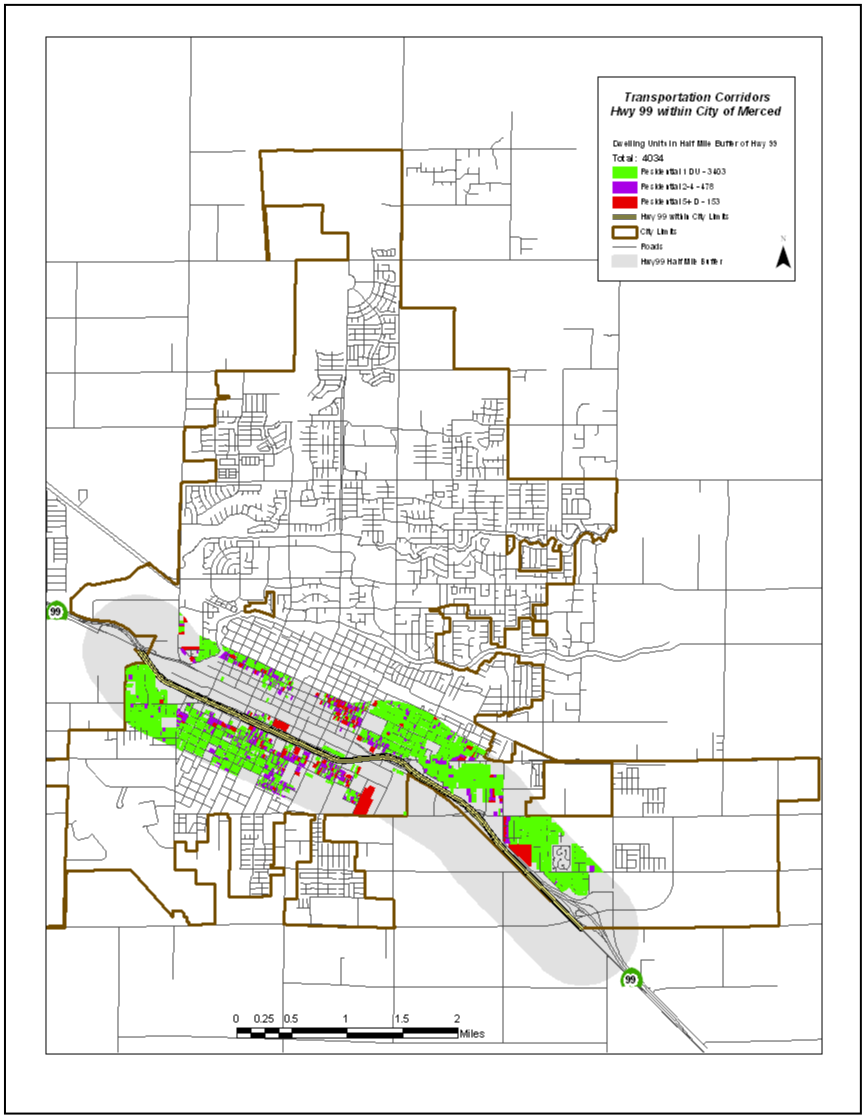
ECONOMIC IMPACT

The economic impact a hazardous material incident will have on the community is dependent on the location, size of the incident, and amount of time and money necessary to clean up the incident. The unpredictable nature of these events makes monetary losses hard to predict. Methods of modeling potential losses are beyond the typical scope of typical hazards such as floods.

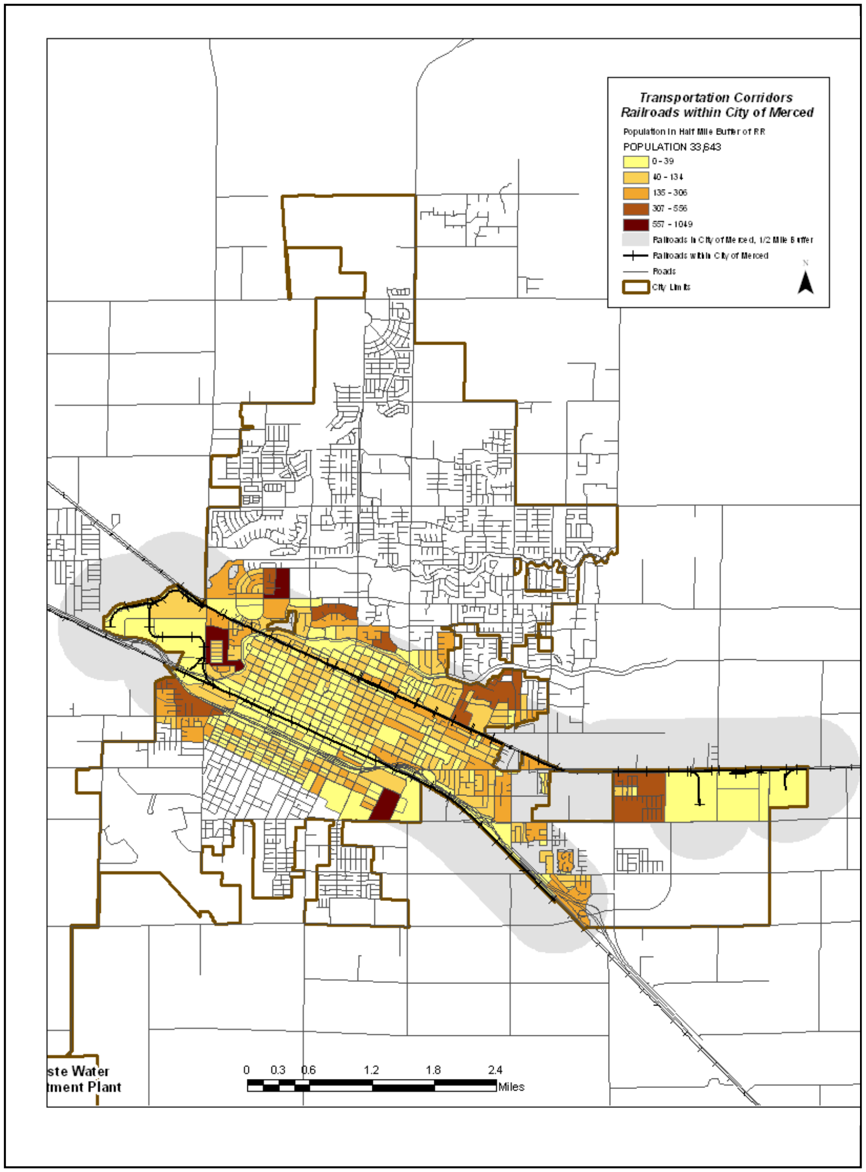
Number of Residential Buildings near Railroads



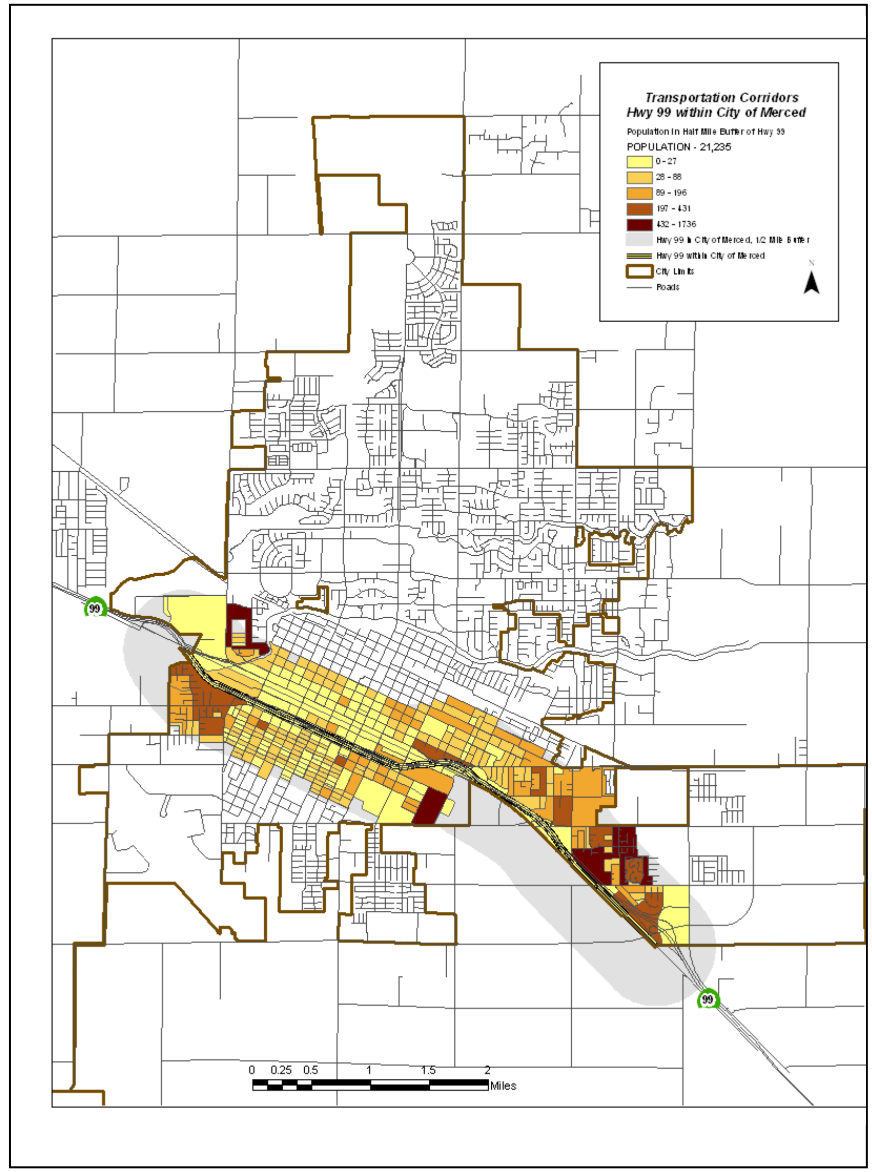
Number of Residential Buildings near Highway 99



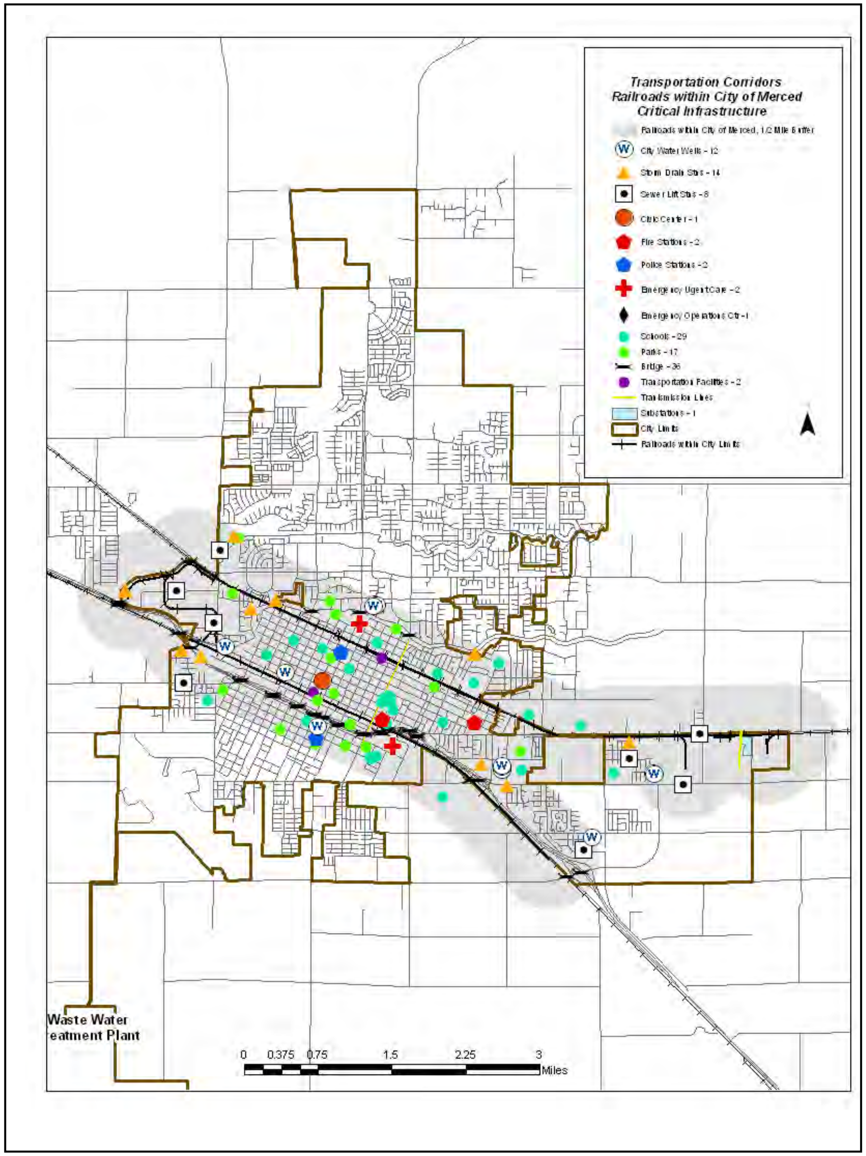
Population near Railroads



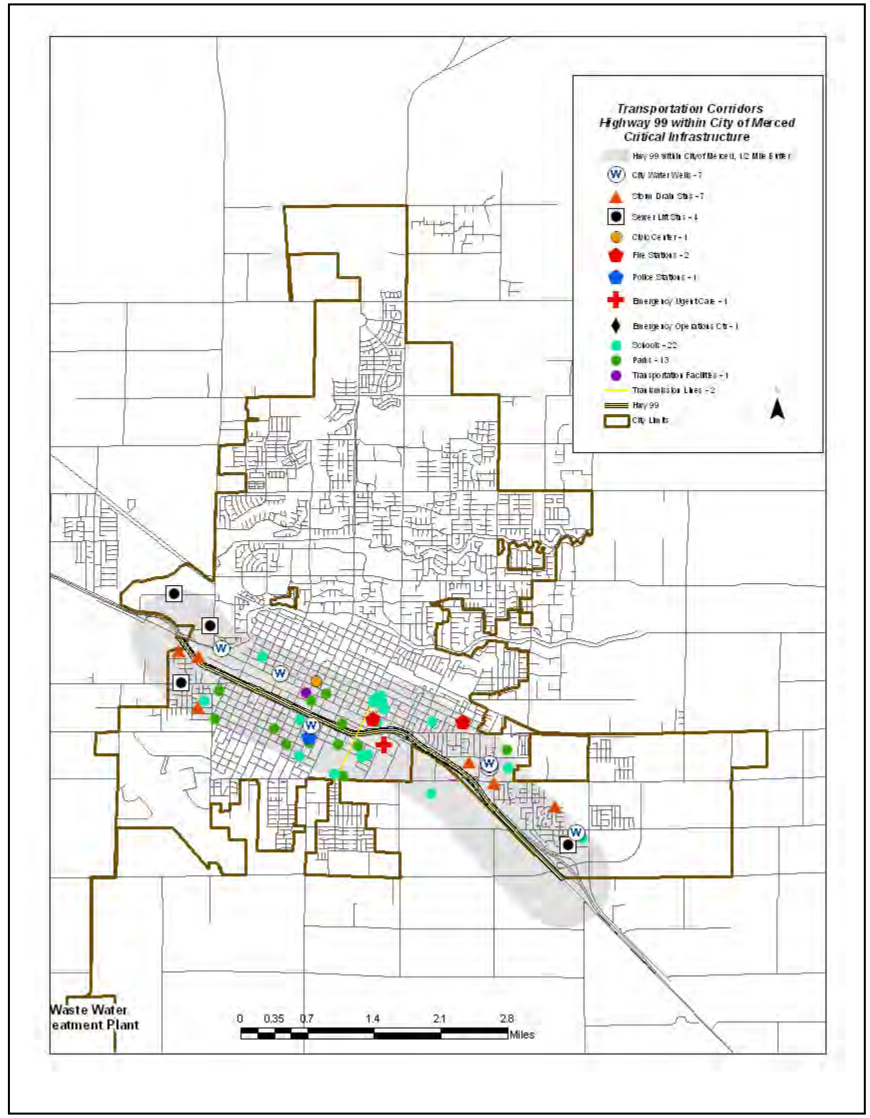
Population near Highway 99



Critical Facilities near Railroads



Critical Facilities near Highway 99



Vulnerability to Earthquakes

Earthquake vulnerability is primarily based upon population and the built environment. Urban areas in high hazard zones tend to be the most vulnerable, while uninhabited areas generally are less vulnerable. [23]

Urbanized areas are now much larger and many more people would be subject to impacts. The possibility of future earthquakes of equal or greater magnitude than those mentioned could cause a great many casualties and extensive property damage in the City. This could be aggravated by aftershocks and by secondary effects, for example, fire and hazardous materials release.

The Merced Vision 2030 General Plan states in its Safety Element, "It has been determined that an earthquakes of 5.0 magnitude or greater on any of the surrounding faults could definitely damage some Downtown buildings and subject the general public to potential life-threatening concerns. "

After the 1989 Loma Prieta earthquake, the City conducted an evaluation of the downtown buildings. A 1999 follow-up study concluded that 30% of the downtown buildings assessed required major remodeling, rehabilitation, seismic upgrades, or demolition.

Though the likelihood of occurrence is low, the impact from any moderate to large-scale seismic event, occurring within or on the periphery of the City of Merced could produce an assortment of conditions that would adversely affect public health and safety, critical infrastructure, and economic well-being throughout the area. [2]

All areas of Merced possess the same degree of risk with minor local variations. [2]

A major earthquake is predicted to strike California within the next thirty-years; although science and technology have dramatically improved, it is not possible to accurately predict the specific timing or magnitude of the event. Merced will possibly be impacted by falling objects, collapsing structures, damaged infrastructure, transportation routes being disrupted, and possible hazardous materials releases. [1]

All citizens and visitors are equally at risk, with the only exception being the specific indoor or outdoor location where someone is present when the earthquake strikes. Public and private structures are all at risk, with a variation applied due to the age of the structure and construction materials used to build it. [1]

Earthquake HAZUS Data: Scenarios for both a magnitude 5.0 and A 7.1 earthquake were run. Under the Merced County wide 5.0 earthquake scenario, assets did not experience any impact. Impacts from a 7.1 magnitude earthquake scenario along the Ortigalita fault were estimated, and are provided in an "HAZUS Event Report" (Appendix K). According to the Risk Assessment, the Tesla-Ortigalita Fault Zone is considered capable of generating a 6 to 7 Richter magnitude earthquake with a recurrence interval of 2,000 to 5,000 years. The last large earthquake attributed to this fault occurred in 1981 and had a Richter magnitude of 3.7.

Earthquake Hazard Impact on Planning Area

IMPACT ON LIFE, SAFETY, AND HEALTH

The City of Merced is home to many companies and industries that manufacture, store, use, and dispose of toxic materials. The City of Merced is highly exposed to hazardous materials transported over major state highways and railroads. On any given day, a vast assortment of petroleum products, agricultural pesticides, and industrial chemicals are moved within the City with the possibility of generating a hazardous materials incident. A natural disaster, such as an earthquake, cannot only cause a hazardous materials event, but it can also cause it to escalate. Emergency response crews may be delayed due to effects of the earthquake by causing roadway blockages and building collapse.

IMPACT ON EXISTING AND FUTURE CRITICAL FACILITIES

A new hospital opened in 2010 that replaced 2 clinic/hospital facilities that had not been seismically retrofitted. The new hospital was built to the latest California Building Codes (2007 C.B.C.) and has been built to the latest and best available engineered design.

Communication Systems: System failures, overloads, loss of electrical power, and possible failure of some alternative power systems will affect telephone and cellular service systems. Immediately following an event, numerous failures will occur. Telephone, radio, and microwave systems are all expected to be affected and operate at a decreased capacity.

Utilities: Transmission lines are vulnerable to many hazards, due to their length and remoteness of the lines that could be affected in areas adjacent to the City of Merced in a major event.

Generator/Substations Damage to generator/substations may cause outages. Damages to generators affect production. Damage to substations affects delivery. Restoration of local power will be coordinated with regional and local utility representatives. Much of the affected areas may have service restored in days; however, a severely damaged underground distribution system may create longer service delays.

Natural Gas Facilities: Damage to natural gas facilities serving the City of Merced area may consist of isolated breaks in major transmission lines. Breaks in mains and individual service connections within the distribution system could be significant. These many leaks could pose a fire threat as well. Restoration of natural gas service could be significantly delayed.

Potable Water: Water availability and distribution for supporting life and treating the sick and injured is always a concern in any disaster. Although the City's water supply comes from numerous wells, there is still a threat that an earthquake could disrupt an area's water supply through broken distribution lines or contamination from broken sewer systems. Therefore, potable water will most likely have to be supplied in these area communities by outside sources.

Transportation Routes: Highway 99 may be impassable south into Madera and Fresno Counties. All could be impassable for up to 72 hours. Both the Burlington Northern Santa Fe and Union Pacific Railroads could sustain damage that would render them inoperative due to track damage.

IMPACT ON EXISTING AND FUTURE STRUCTURES AT RISK

The amount of damage to structures from an earthquake is determined by several factors: (1) Distance from the earthquake epicenter; (2) nature of the ground; (3) type of construction; and (4) the duration of the shaking.

Nature of the Ground: Earthquake shockwaves are "carried" by the relatively loose, wet soils that exist between Los Banos and Merced. For this reason, Merced is somewhat more likely to experience heavy shaking from surrounding parts of the state as will some of its neighbors. Areas of Merced with high water tables and loose soils are likely to experience damage because of liquefaction.

The Type of Construction Used: The areas that could potentially be most severely affected by earthquake in the City of Merced could typically include concrete or unreinforced masonry buildings built in the downtown area prior to 1976. Typically, buildings designed and constructed since the mid-1970's and according to modern codes, have generally performed very well during earthquakes. However, the following construction types have garnered some concern within the seismologist community regarding their safety in earthquakes:

- *Concrete-Frame Structures Built Before 1976*:

  Merced has relatively few buildings of this type, and the cost of strengthening the necessary connections is relatively inexpensive procedure. These buildings generally house industrial activities and their collapse could cause severe economic loss and possibly the release of hazardous materials.

- *Unreinforced Masonry Buildings*:

  Merced has relatively few buildings of unreinforced masonry. It will be necessary to reinforce these structures as modifications are proposed. If structures of this type are identified as unsafe or a potential risk to the general public, repairs/upgrades could be required. It has been determined that an earthquake of 5.0 magnitude or greater on any of the surrounding faults could definitely damage some downtown buildings and subject the general public to potential life-threatening concerns.

  During 1990, a seismic evaluation of part of downtown Merced was performed by staff of the Building Division. The survey of 78 buildings in Downtown revealed seven buildings of immediate hazard and 58 potentially hazardous buildings. Owners of the seven buildings of immediate hazard were notified and some repairs and further evaluation was performed. However, the repairs made to those structures are not to be considered in lieu of any seismic rehabilitation measures that may be required by the City.

  Of the 58 potentially hazardous buildings, 29 were found to be unreinforced masonry. The remaining 20 buildings surveyed were found to need an evaluation performed when they change use or propose removal, since they were not found potentially hazardous, but did not score high enough to be considered completely safe.

- Unbraced Parapets/Architectural Trim:

  Although a particular building may be structurally sound enough to withstand a particular earthquake, its architectural trim may prove hazardous if not adequately braced or secured.

Observations after recent earthquakes suggest that retrofitted buildings on the whole perform noticeably better than similar buildings that have not been retrofitted (ATC 31, 1992, CSSC 94-06, WJE 1994). However, in many respects their performance has been mixed. Fewer than five percent of California's existing buildings have been structurally retrofitted; the actual number has not been determined. [23]

Sensitive Populations: Additionally, numerous after-care facilities and nursing homes will be affected and should be taken into consideration in the event of a major seismic event.

Vulnerability to Dam Failure

Many parts of the City of Merced are located within the inundation areas for Yosemite Lake and Bear Reservoir. Civilians, pets, livestock, public and private properties, critical facilities, infrastructure, and crops are all potentially at risk should a dam fail. The timing of the failure will be either during or immediately following a torrential rainstorm. If a flood were to occur, initial flood waves would pass out of the SUDP/SOI two hours after failure. The center of the inundation area would have depths of approximately 20 to 30 feet (City of Merced General Plan).

Fortunately for Merced, both the Lake Yosemite and Bear Reservoir dams are earthen-fill constructed (DWS, n.d.). FEMA (n.d.) identified that earthen-fill dams are the most flexible and reliable form of dam for the type of application they are being used for. The greatest vulnerability of these types of dams is overfilling. Should a torrent of precipitation strike north or east of Merced, these bodies of water could quickly rise and result in an overflow situation where the integrity of the structures would be compromised.

The review of existing literature on dam breaches revealed that the formation time of a dam breach ranges from 0.3 hours to 1.5 hours. The literature provides a convincing body of evidence that an instantaneous breach formation time was not physically based, but rather used only as a mathematical exercise of developing a maximum outflow from the breach to produce the most conservative inundation depths.

Dam Failure Hazard Impact on Planning Area

COMMUNITY VULNERABILITY MAPS

Plan Area vulnerability of residential buildings, population and critical facilities to damn failure are revealed in the map set below; vulnerabilities are summarized in Table 3-12 above (pg 3-102).

The ***Critical Facilities near Dam Failure Zones***

The map of "***Critical Facilities near Dam Failure Zones"*** (see maps below) shows critical facilities in relationship to the potential inundation areas.

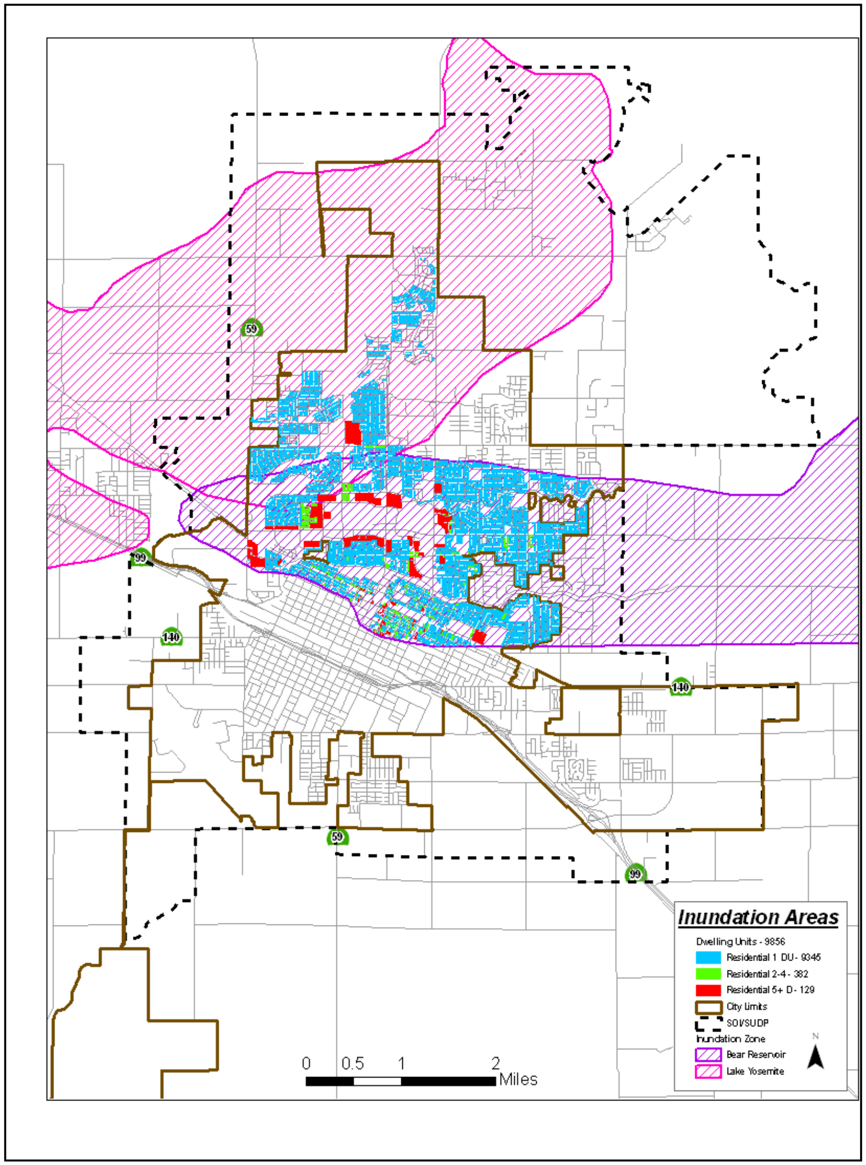
Although the UC Merced Campus and proposed University Community are outside the Lake Yosemite inundation area, there are 3 major facilities in the inundation area:

- 1 community college
- 1 high school (at G Street and Farmland Avenue)
- 1 new hospital (at G Street & Mercy Avenue)

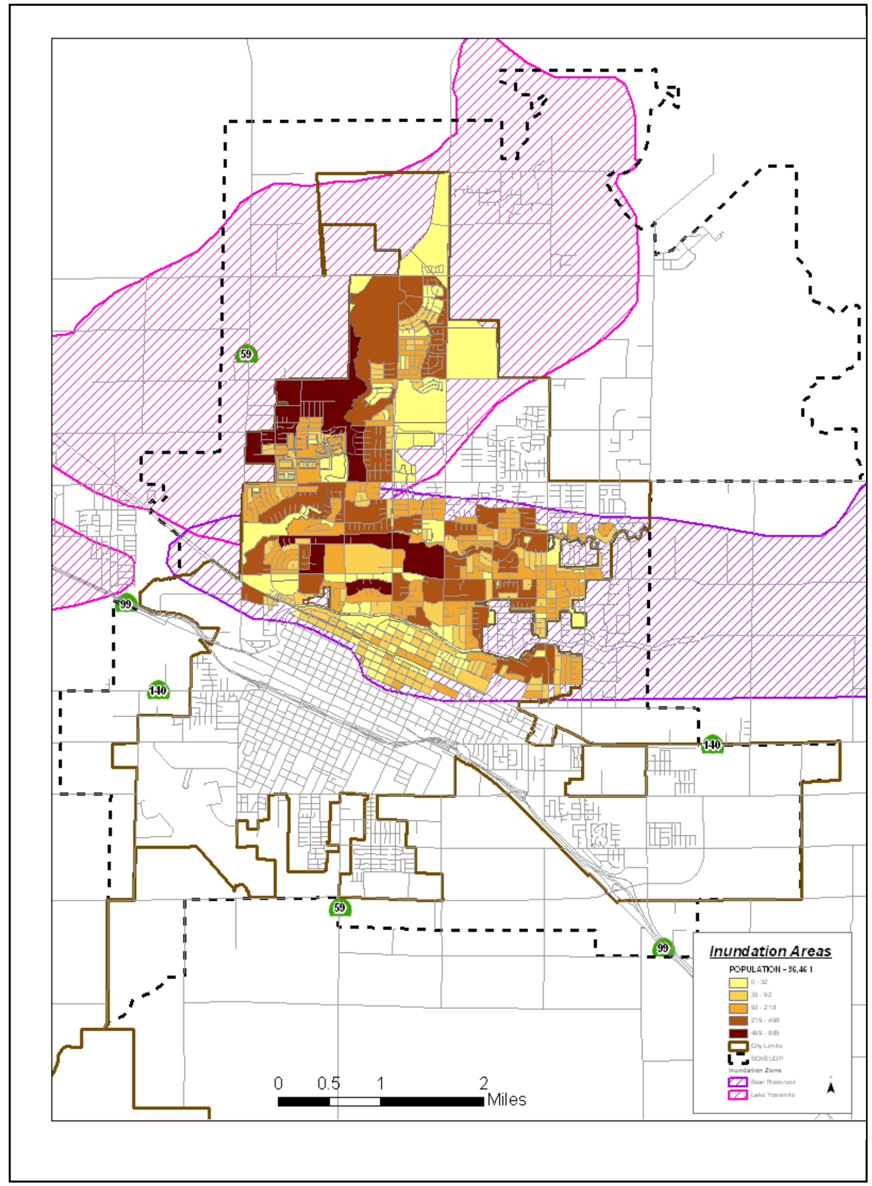
There are 26 major facilities in the Bear Reservoir inundation area, including:

- 10 K through 12 schools
- 1 jail
- 4 hospitals
- 4 of the City's 5 Bear Creek bridges

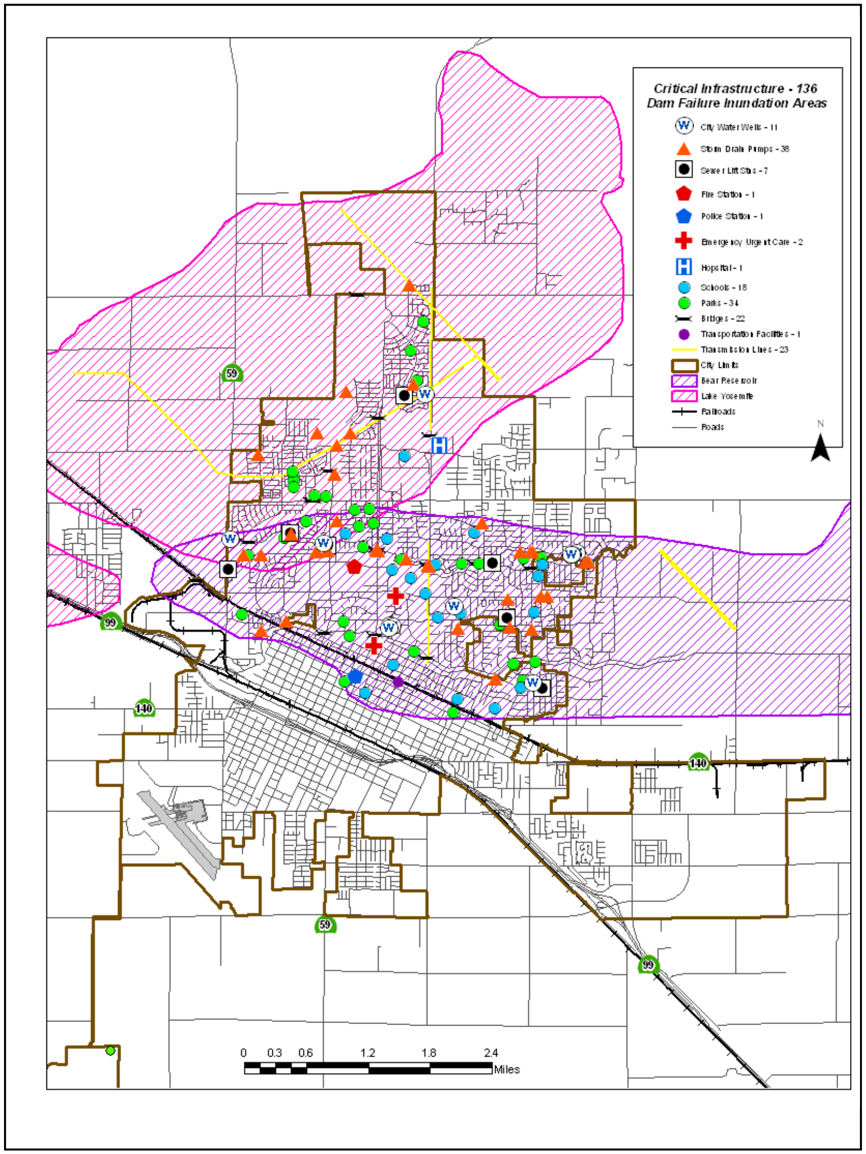
Number of Residential Buildings near Dam Failure Zones



Population near Dam Failure Zones



Critical Facilities near Dam Failure Zones



Vulnerability to Extreme Temperatures

Extreme cold often accompanies a winter storm or is left in its wake. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat. Freezing temperatures can cause significant damage to the agricultural industry.

Impact on Life, Safety, and Health

The most vulnerable populations to extreme heat and cold are the elderly or low income households, as they may not be able to afford to operate a cooling or heat source on a regular basis and may not have immediate family or friends to look out for their well being. Situational and physical characteristics help to identify vulnerable populations that may not comfortably or safely access and use disaster resources. Specifically, when discussing heat-related emergency preparedness, the following groups could be considered vulnerable or at greater risk in a heat emergency:

- Infants and small children under age three
- Women who are pregnant
- Elderly people (age 65 and older)
- The obese
- The bedridden
- Mentally ill
- Those with cognitive disorders
- Those with medical conditions (e.g., heart disease, diabetes, high blood pressure)
- Those requiring life-saving medications (e.g., for high blood pressure, depression, insomnia)
- Individuals with drug or alcohol addictions
- Those with mobility constraints
- People who are non-ambulatory
- Those under extreme working conditions
- The poor
- People who are socially isolated
- Non-English speakers who may not have access to information
- The Homeless

EXTREME HEAT

Though heat does not cause much economic damage or damage to the built environment, the number of people it has killed underscores the importance of mitigating its impacts. Everyone is subject to health risks and problems in a heat wave. A major factor is length of exposure. Long exposure periods such as lack of air conditioning, working outdoors, sports, long walks, and so on, is a large factor.

Animals, including domestic pets, livestock, and poultry are also susceptible to extreme heat. For example, dogs and cats are in danger of heat stroke in temperatures of 110°F. The heat wave of 2006 resulted in 15 reported pet deaths and more than 25,000 cattle, and 700,000 fowl heat-related deaths. [10]

EXTREME COLD

Heavy snowfall and extreme cold can immobilize an entire region. Even areas that normally experience mild winters can be hit with a major snowstorm or extreme cold. Freezing temperatures can impact crops, vegetation, and the health and safety of citizens that do not have a source of heating. Casualties resulting from extreme cold may result from a lack of adequate heat, carbon monoxide poisoning from unsafe heat sources, and possible frostbite. The City of Merced can also experience flooding and closed highways due to the snowfall and snowfall melt from the higher elevations.

Impact on Existing and Future Critical Facilities

EXTREME HEAT

Heat does not cause much economic damage or damage to the built environment, but extreme heat can cause power outages due to increased use of air conditioners. Extreme heat combined with drought can also cause a water shortage which could impact crop and other vegetation growth.

EXTREME COLD

Sustained temperatures below freezing in the City of Merced's otherwise generally mild weather region could potentially cause life loss and health risks to vulnerable populations.

Although the City of Merced is less likely to have extreme cold, homes can be affected if they are poorly insulated, without heat, or may have pipes that could freeze and burst.

Impact on Existing and Future Structures at Risk

Also at risk is the infrastructure of the City, including power grids that supply electricity to Merced.

EXTREME HEAT

Extreme heat occurs annually within the City of Merced, all existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted.

EXTREME COLD

Extreme cold/freeze occurs annually within the City of Merced, all existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted.

Economic Impact

EXTREME HEAT

Adjusted to 2008 dollars, the Spatial Hazard Events and Loss Data for the United States (SHELDUS) reports that severe heat events in California caused roughly $1.8 million in property damage and $531.7 million in crop damage. [23]

Extreme heat events in the City of Merced can cause rolling blackouts with overuse of air conditioners; this could shut down businesses. Crop damage can also be a factor which would impact the economics of the City of Merced.

EXTREME COLD

Although infrequent, freezes can severely affect the City of Merced agriculture. Freezing temperatures occurring during winter and spring growing seasons can cause extensive crop damage.

Secondary impacts of freeze disasters can include major economic impacts on farmers, farm workers, packers, and shippers of agricultural products. Freezes can also cause significant increases in food prices to the consumer due to shortages.

Vulnerability to Tornadoes

While California has tornadoes, such storms represent a relatively low risk for most areas, compared to states in the Midwestern and southern United States where risk exposure is severe and many lives and millions of dollars are lost annually due to this hazard.

Throughout the years, buildings in Merced were constructed following various methodologies to ensure construction withstood wind related hazards. Today, the California Building Code requires engineers to use a maximum 85 mph wind load when designing roof structures and the lateral force-resisting elements within a building that are needed to keep the roof tied to the structure. Those forces are then transmitted into the soil through the foundation. The result is much like holding a hat on to keep it from blowing off in the wind. Buildings typically have metal connections that hold the roof to the walls, and metal anchors that hold the walls to the foundation. Buildings should be able to fare well from the F0 events, but some damage would be expected from F1 rated tornadoes, especially with wind speeds of greater than 85 mph.

Tornado Hazard Impact on Planning Area

IMPACT ON LIFE, SAFETY, AND HEALTH

The City of Merced experiences few tornadoes and the reported incidents only result in minor property damage, one injury, and no deaths. Most injuries and deaths with tornadoes can result from flying debris. Therefore, potential severity of tornado impact is limited. Although in the case one does occur, access roads and streets may be blocked by debris, delaying necessary emergency response.

IMPACT ON EXISTING AND FUTURE CRITICAL FACILITIES

While the City of Merced is at low risk for tornadoes, when one does occur the biggest risks include light to moderate damage to homes, destruction of mobile homes, injuries caused by light object projectiles, broken windows, crop damage, and downed trees and power lines.

IMPACT ON EXISTING AND FUTURE STRUCTURES AT RISK

Because it cannot be predicted where a tornado may touchdown within the City of Merced, all existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted.

ECONOMIC IMPACT

The City of Merced can experience crop damage, property damage to houses and businesses, vehicle damage, downed trees and power lines.

Tornado impact to orchard in LeGrand (a nearby Merced County community).

Vulnerability to Fog

Fog negatively affects the transportation corridors in the City. Night time driving in the fog is dangerous and multi-car pileups have resulted from drivers using excessive speed for the road conditions. Fog contributes to transportation accidents and is a significant life safety hazard. These accidents can cause multiple injuries and deaths, and could have serious implications for human health and the environment if hazardous materials are involved. Other disruptions from fog include delayed emergency response vehicles and school delays or closures.

Historically, it has been heavy fog and excessive speed that have resulted in major incidents that have posed risk to Central Valley towns. According to former Fire Chief Mitten (personal communication, January 20, 2008) it has been several years since a major pile-up has occurred within the City [1]

On nearly an annual basis, Highway 99 has been subjected to multi-casualty collisions as a result of dense fog. On December 11, 2008, there was a fifty-three vehicle collision on Highway 99 ninety miles south of Merced near the town of Caldwell. The collision was a result of poor visibility due to foggy conditions (Jalopnik, 2008). On November 3, 2007, there was a 108 vehicle collision in Fresno that resulted in two fatalities; this collision was also the result of dense fog (KSEE 24 News [KSEE], 2007)

IMPACT ON EXISTING AND FUTURE CRITICAL FACILITIES

Heavy fog occurs annually within the City of Merced, but it has no known impact on existing and future critical facilities.

IMPACT ON EXISTING AND FUTURE STRUCTURES AT RISK

Heavy fog occurs annually within the City of Merced, but it has no known impact on existing and future structures.

ECONOMIC IMPACT

The economic impacts from extreme fog in the City of Merced are usually due to transportation issues; vehicle collisions, trucking, commercial vehicles delay or loss. However, typically these disruptions are not long lasting, nor do they carry a severe long term economic impact on the region.

Vulnerability to Storms

Based on the topography of the City of Merced, the overall severity of a thunderstorm is low and would be limited to direct lightening strikes, wind damage, and precipitation. [2]

Storm Hazard Impact on Planning Area

All thunderstorms are dangerous; every thunderstorm produces lightning. In the United States, an average of 300 people are injured and 80 people are killed each year by lightning. Although most lightning victims survive, people struck by lightning often report a variety of long-term, debilitating symptoms.

Other associated dangers of thunderstorms include tornadoes, strong winds, hail, and flash flooding. Flash flooding is responsible for more fatalities—more than 140 annually—than any other thunderstorm-associated hazard.

Dry thunderstorms that do not produce rain that reaches the ground are most prevalent in the western United States. Falling raindrops evaporate, but lightning can still reach the ground and can start wildfires.

High winds can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power outages. Windstorms in the City of Merced are typically straight-line winds. These winds can overturn mobile homes, tear roofs off of houses, topple trees, snap power lines, shatter windows, and sandblast paint from cars and buildings. Other associated hazards include utility outages, arcing power lines, debris blocking streets, dust storms, an occasional structure fire, and downed trees limbs.

IMPACT ON EXISTING AND FUTURE CRITICAL FACILITIES

Storm-related hazards can have an impact on existing and future critical facilities. Heavy rains can also bring damage to roads; road damage can come in the form of potholes which in turn can cause damage to vehicles.

IMPACT ON EXISTING AND FUTURE STRUCTURES AT RISK

Storm-related hazards occur annually within the City of Merced. Existing and future buildings, facilities, and populations are considered to be exposed to this hazard and could potentially be impacted.

ECONOMIC IMPACT

The City of Merced can experience crop damage, property damage to houses and businesses, downed trees and power lines, lightning storms can cause fires, flooding, and hail storms can cause vehicle damage.

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1950-1992). This database contains 84 severe weather events that occurred in Merced County between January 1, 1950, and November 30, 2010.

NCDC Hazard Event Reports for the County of Merced, 1950-2010*

Type	# of Events	Property Loss ($)	Crop Loss ($)
Dense Fog	2	50,000	0
Funnel Clouds	20	0	0
Gusty Wind	1	0	0
Hail	4	0	220,000
Heavy Rain	20	2,033,000	15,660,000
Lightning	8	0	0
Severe Thunderstorm/Wind	2	50,000	3,000,000
Small Hail	3	30,000	913,000
Thunderstorm/Wind	6	380,000	100,000
Tornado: F0	13	115,000	50,000
Tornado: F1	4	695,000	0
Wind	1	0	0
TOTALS	**84**	**3,353,000**	**19,943,000**

Source: National Climatic Data Center Storm Events Database,

*Note: Losses reflect totals for all impacted areas


CHAPTER 4: MITIGATION STRATEGY


Chapter 4: Mitigation Strategy

OVERVIEW OF THE“MITIGATION STRATEGY” CHAPTER

“Mitigation Strategy” of Merced’s Local Hazard Mitigation Plan focuses on what actions can be taken to minimize future loss of life and property caused by hazards studied in Chapter 3. It contains the following sections:

4.1 LOCAL CAPABILITIES ASSESSMENT

4.2 MITIGATION GOALS

4.3 MITIGATION STRATEGY

4.4 NATIONAL FLOOD INSURANCE PROGRAM (NFIP) COMPLIANT MITIGATION ACTIONS

At their public meetings of July 13, 2012, and December 7, 2012, the *Technical and Plan Preparation Team* provided the City of Merced *Disaster Council* and attending stakeholders and members of the public an overview of the draft “Mitigation Strategy” Chapter of the draft Merced Hazard Mitigation Plan (MHMP). Comments were received and the draft was amended to reflect the concerns of the Disaster Council and public.

4.1 Local Capabilities Assessment

Introduction

This Chapter describes the existing capacity of the City of Merced, together with mutual aid partners and community members, to respond to hazard events. This helps to identify gaps in service that should be filled.

4.1.1 Local Capabilities Assessment

Overview

RC#C1a

Thus far, the planning process has identified the natural hazards posing a threat to the City of Merced and described, in general, the vulnerability of the City to these risks. The next step is to assess what loss prevention mechanisms are already in place. Combining risk assessment with a capability assessment results in the City's "net vulnerability" to disasters, and more accurately focuses the selection of goals and proposed actions of the Merced Hazard Mitigation Plan (MHMP).

This capacity assessment is divided into five sections:

- Emergency Service Providers and Services
- Administrative and Technical Mitigation Capabilities
- Critical Facilities
- Key Legal and Regulatory Capabilities
- Fiscal Mitigation Capabilities

4.1.2 Emergency Service Providers and Services

Overview

This section describes the service capacity of the following key emergency service providers for the City of Merced:

- City of Merced Fire Department
- CALFire
- City of Merced Police Department
- Riggs Ambulance Service

Multi-jurisdictional Cooperation

The California Statewide Interoperability Executive Committee (CalSIEC) has chartered the Central Planning Area (CPA) as one of the four authorized regions in California to coordinate interoperability. All Operational Areas in the CPA have entered into a Regional Governance Charter to enhance cooperation in a multi-jurisdictional and multi-disciplinary manner to advance preparedness and response capabilities related to interoperable communications. [57]

City of Merced Fire Department

The City of Merced Fire Department (MFD) was initially established as the Merced Hose Company #1 on November 3, 1873, and has evolved into a state-of-the-art, Insurance Services Organization (ISO) Class 2, fire department. Today, the MFD is a fully-professional organization that provides fire suppression, rescue, and emergency medical services, 24 hours a day, seven days a week, for the urban environment in the City. On a daily basis, the MFD staff's five first-line engine companies at five stations throughout the City.

The City of Merced Fire Department provides fire protection, rescue, and emergency medical services from five fire stations throughout the urban area. Fire Department personnel are typically assigned on a three-platoon work schedule, which provides the City coverage 24 hours a day, seven days a week. The Department equipment includes first-line engine companies (carry and pump water), ladder companies, reserve engines and ladder trucks, airport emergency vehicles and other miscellaneous support vehicles.[3]

Merced's fire protection system operates according to a central station concept. Under this concept, a central station can respond to calls from within its own service area or district, and can provide back-up response to other districts as well. From 1990 to 2010, response activity doubled.[3]

The Department is rated under the auspices of the Insurance Services Office (ISO) which defines protection services on a scale of 1 to 10--1 representing the best level of protection and 10 indicating no protection at all. The Department's 2009 rating is Class 2, which is considered to be well above average, despite staffing levels below national averages. This rating helps keep the costs of fire insurance premiums low for City businesses.[3]

The Department consists of one fire chief, one deputy chief, three battalion chiefs, eighteen captains, eighteen engineers, twenty firefighters, and administrative support and fire prevention staff. The MFD is an all-risk, emergency management entity with response disciplines in fire suppression, emergency medical services, hazardous materials, technical rescue, and aircraft rescue firefighting.

RESPONSE TIME

The Department has a goal of maintaining a response time of four to six minutes for the first crew to arrive at a fire or medical emergency within an assigned district. This goal was chosen on the basis of proven factors affecting property damage and, more importantly, life.[3]

As the City continues to grow in population and area, the fire protection system will have to change if it is to maintain this response time standard. This would require two existing stations to be relocated and five new facilities with personnel and equipment to be added to the system.[3] Fire station No. 56 is currently being planned to serve the Bellevue Ranch development in northern Merced. Moreover, the relocation of Fire Station No. 54 is planned to enhance response coverage to southeastern Merced by placing the station in the area of Mission and Highway 99.

Merced's current policy is to provide emergency response within 4 to 6 minutes 90 percent of the time and to provide adequate resources to combat fires in the following occupancies within the financial constraints of the City. The current response practice provides for a first-alarm assignment of three pumpers, one ladder truck, and a chief officer for all structure fires.

High-Hazard Occupancies - (schools, hospitals, nursing homes, and other high life hazard or large fire potential occupancies)

Medium-Hazard Occupancies - (apartments, offices, mercantile and industrial occupancies)

Low-Hazard Occupancies - (one-, two-, or three-family dwellings and scattered small businesses)

Rural Operations - (scattered dwellings, outbuildings, vacant lots)
Each of these land use types requires somewhat different fire suppression resources (e.g., emergency medical services, hazardous materials response, and heavy rescue). [3]

MUTUAL AID

Mutual aid agreements enable different jurisdictions to request aid from another when necessary. Through the California Master Mutual Aid and Merced County Mutual Aid Plans, the City of Merced has entered into agreements with state and local fire departments to provide and receive aid on as needed basis. The City of Merced Fire Department has a mutual aid agreement with the City of Atwater and Merced County Fire Departments.

WILDLAND FIRES

Most wildland fires outside the City limits are responded to by Merced County or CAL-Fire although the City Fire Department is often called upon to provide mutual aid when needed. The City's response to fighting wildland fires is much the same as the response to urban fires. Typically, the Fire Department will dispatch one engine to such fires and evaluate whether there is a need for additional apparatus, especially if there is a threat to nearby structures.

HAZARDOUS MATERIALS AND WASTE

The City's Emergency Plan and the County Hazardous Waste Management Plan both deal with detailed emergency response procedures under various conditions for hazardous materials spills. The Merced City Fire Department and Environmental Health Division work with the County to prevent the uncontrolled release of toxic substances into the environment by conducting inspections of toxic materials facilities, enforcing storage and use requirements, and educating local businesses on proper storage and handling of hazardous materials.

Hazardous Materials require special care in handling because of the hazards they pose to the public’s health and safety, and the environment. For this special care the City of Merced has an Emergency Response Team. This team is staffed by City fire and police department personnel. The Merced City Fire Department responds to uncontrolled releases within the City limits, identifies the category of chemicals involved, contains the spill if possible, oversees cleanup activities, and makes sure that the site is safe to be occupied again.

The City also works with the State Department of Health Services to establish cleanup plans and to monitor the cleanup of known hazardous waste sites within the City.

CALFire

CALFire is charged with both assessing the threat of fire in California and suppressing fires on state and federal lands while providing mutual aid if needed to communities that do not include public lands. The California Fire Plan formalizes much of the work that has been done to assess the threat of wildfire statewide including California's Wildfire Urban Interface areas. Most wildland fires outside the City limits are responded to by Merced County or the California Department of

Forestry and Fire Protection (CDF) although the City Fire Department is often called upon to provide mutual aid when needed.

City of Merced Police Department

Central Police Station

Police protection for the entire City is provided by the City of Merced Police Department. The Police Department employs a mixture of sworn officers, non-sworn officer positions, and unpaid volunteers. The service standard used for planning future police facilities is approximately 1.32 sworn officers per 1,000 population.[3]

Merced is divided into three police districts, each with its own police facility and officers. The primary reason for the three districts is to place police officers closer to the neighborhoods and citizens they serve. The Police Department feels that this "community policing" concept will be successful in combating a growing incidence of crime as the City grows.

Citizen councils have been established in each district to meet with area commanders and develop strategies for combating crime in their neighborhoods. Neighborhood Watch programs are located throughout the City and have been highly successful.[3]

Calls for police service will increase due to population growth alone. By 2030, officer responses to incidents could increase from nearly 65,000 in 2009 to over 130,000 annually if current population trends hold true. To cope with this anticipated workload, additional officers, equipment, and facilities will need to be added. Police districts may be revised or added. The Central Station will be relocated in the future to a site in North Merced near Mansionette Drive and Yosemite Avenue. [3]

South Police Station

EVACUATION ROUTES

Earthquakes, fires, and flooding can all necessitate evacuation. However, it is not possible to know with certainty how many people will actually need to be evacuated in any given situation. Similarly, the rate at which people will evacuate and their specific routes of travel and ultimate destinations are subject to wide variation. Therefore, in

the case of an emergency, it is necessary to evaluate each situation on an individual basis and respond accordingly.[3]
The *Merced City Emergency Plan* addresses various emergency situations and **designates the Police Chief as Evacuation Coordinator** (in the case of a wider emergency, the County Sheriff is designated). At the time of an emergency, the Evacuation Coordinator will evaluate the situation, access various routes (many of which will have been planned out in advance), determine the best routes, alert the public via radio and/or TV of evacuation routes and procedures, and coordinate the evacuation with state and local officials, such as the Highway Patrol, Caltrans, etc.

Riggs Ambulance Service

Ambulance services within the City of Merced are provided by Riggs Ambulance, a private transporter, headquartered in Merced. Riggs Ambulance Services provide advanced and basic life support services as well as transport service. Their headquarters are located at 100 Riggs Avenue. The headquarters facility includes their administration offices, billing office, fleet services, training rooms, and a Public Safety Answering Point (PSAP). They have five crew quarters throughout the county, locations include: 65 W. 14th Street in Merced, 1311 Winton Way in Atwater, 2702 Sharon Lane in Dos Palos, 225 Chestnut Avenue in Los Banos, and 8335 Sycamore in Delhi.

Riggs Ambulance Service staffs ambulances 24 hours a day, seven days a week, which are strategically spaced throughout Merced County. They have a total of 25 type II ambulances and 6 Advanced Life Support (ALS) first response vehicles. Riggs Ambulance Service employees 50 Emergency Medical Technicians (EMT), 43 paramedics, and 13 dispatchers.

RESPONSE TIMES

Riggs Ambulance Service uses fractile response times: from the time of phone pick up in the dispatch center to on scene arrival, the response time must be >90% for each compliance zone based on ProQA prioritization.

TRAINING

Extensive ongoing training for staff members includes: Incident Command System (ICS), Mass Casualty Incidents (MCI), and Hazardous Material Awareness. Riggs Ambulance is also a lead agency in Region 5 for an ambulance strike team for disaster responses and has a disaster response unit on site. All of the operations management and supervisory staff are trained to the ICS 400 level.

4.1.3 Administrative and Technical Mitigation Capabilities

Overview

The administrative and technical capability assessment identifies the personnel and community resources available within the City to engage in mitigation planning and carry out mitigation projects. Where feasible, the City may increase its technical resources through collaboration with Merced County staff. The administrative and technical capabilities of the City are listed in Table 4-1.

Table: 4-1: Administrative and Technical Resources for Hazard Mitigation

Personnel Resources	Role/Department
Director of Emergency Services	City Manager
Provide for preparation of plans for the protection of persons and property within the City in the event of an emergency	City Disaster Council
Planner(s) or engineer(s) with knowledge of land development	Planning and Engineering Divisions
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Engineering Division
Planner(s), engineer(s) or emergency response personnel with an understanding of natural or human-made hazards	Planning, Engineering, and Fire Departments
Floodplain Manager	Engineering Division
Personnel skilled in GIS	GIS Coordinator
Purchasing	Finance
Public Information Officer	Mayor’s Office
Full-Time Building Official	Development Services
Law enforcement trained in emergency situations.	Police Department
Personnel skilled in water, sewer, storm drainage, traffic signals and lighting issues during hazardous events.	Public Works Department

4.1.4 Critical Facilities

Overview

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Critical facilities and infrastructure are those that are essential to the health and welfare of the population. Continued operation of these facilities becomes especially important after any hazard event. For the purposes of the Merced Hazard Mitigation Plan, a critical facility is defined as:

> *A facility that is vital for the City's ability to provide essential services and protect life and property and/or the loss of which would have a severe economic or catastrophic impact.*

Critical Facility Categories

A catalog of critical facilities within Merced was created to assess their potential vulnerabilities to each of the hazards addressed by this plan. The risk assessment for each hazard anecdotally discusses critical facilities with regard to specific hazards. This section of the plan identifies these facilities by type and geography. A detailed listing of the facilities with their addresses is not provided in this plan. Figures 4-1 to 4-5 illustrate their general location. The facilities are sorted into five categories:

CITY HALL AND DEPARTMENTS

- City Civic Center
- County Administrative Offices

PARKS AND COMMUNITY SERVICES

- Educational Facilities
- City Parks
- Non-profit Community Services

PUBLIC SAFETY

- Health Centers
- Fire Stations
- Police Stations

PUBLIC WORKS

- Water Supply
- Corporation Yard
- Wastewater Treatment Facilities
- Power Grid
- Storm Drainage Systems

TRANSPORTATION

- State Highways
- Major Arterial Streets
- Rail Bridges (rail and creek)
- Railroads
- Airports

This "Critical Facilities" information and associated maps on the following pages are an important component of the MHMP *Asset Inventory*, Section 3.4.1.

Critical Facilities within the MHMP Plan Area	
Facility Type	**Number**
Sewer Lift Stations	20
Storm Drainage Pumps	65
High Voltage Electric Transmission Lines	24.5 miles
Electric Power Substations	2
Bridges	64
Transportation Hubs (airport, train and bus stations)	4
Merced County Administration Buildings	1
Merced Civic Center	1
Schools	58
Parks	61
Hospital	1
Emergency Operation Center	1
Urgent Care	4
Police Stations	2
Fire Stations	5
Wastewater Treatment Plant	1
Water Wells	23
Total Number of Critical Facilities	**313**

Figure 4-1: Administrative Facilities

Figure 4-2: Parks and Schools

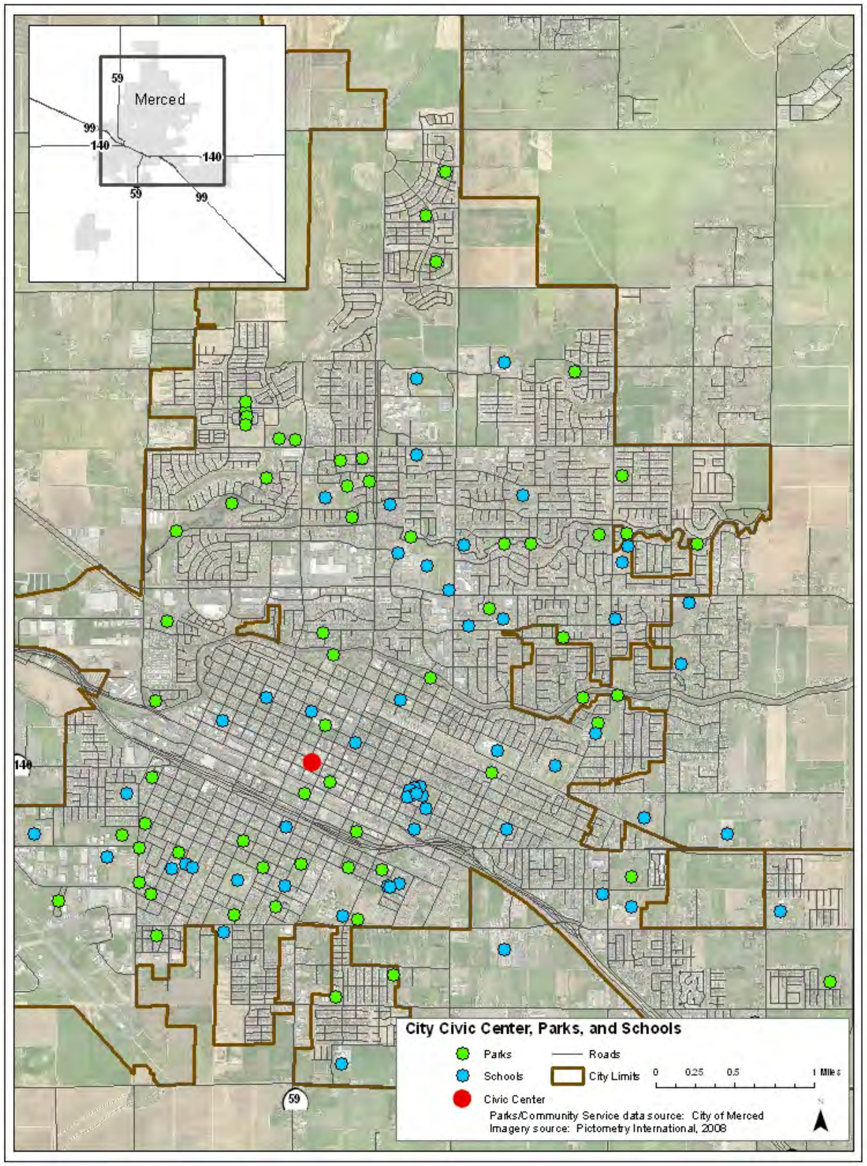


Figure 4-3: Public Safety Facilities

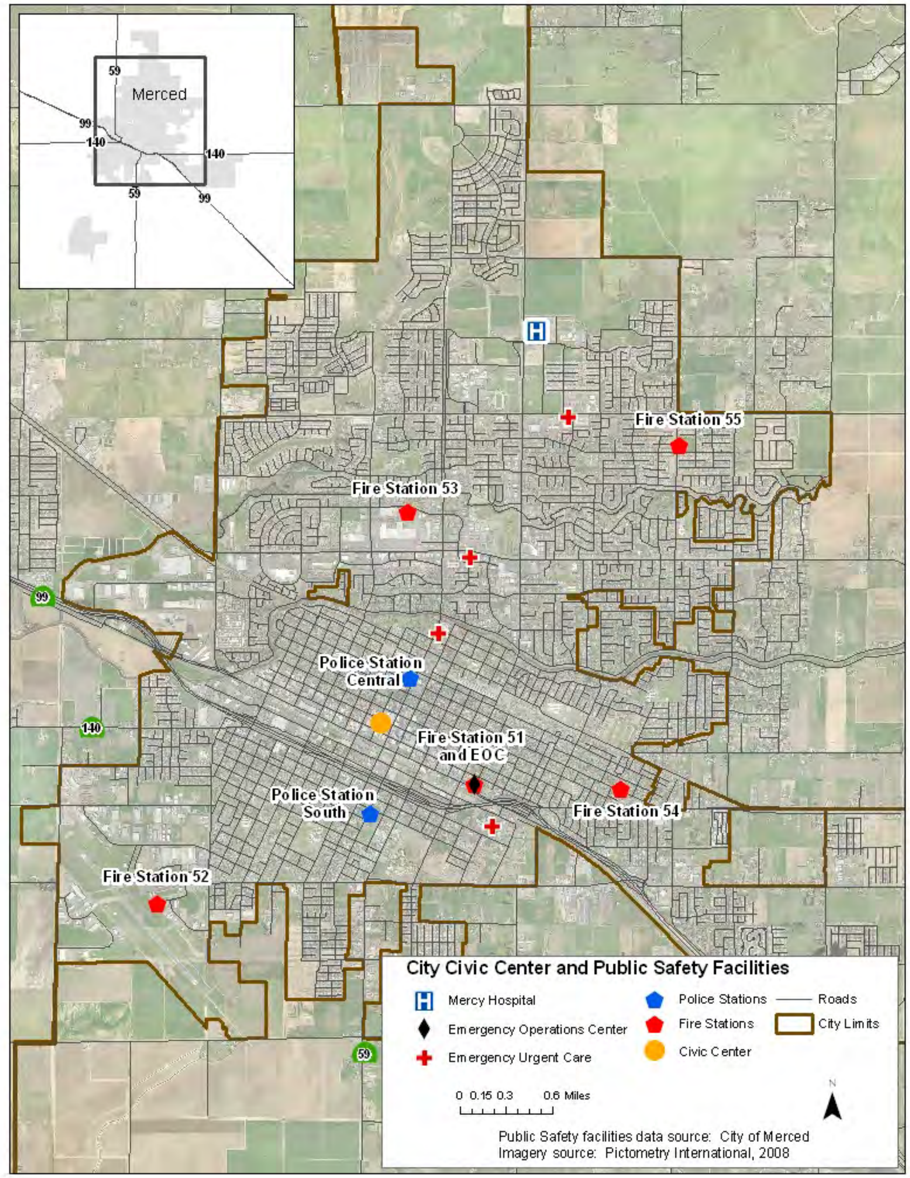


Figure 4-4: Public Works Facilities

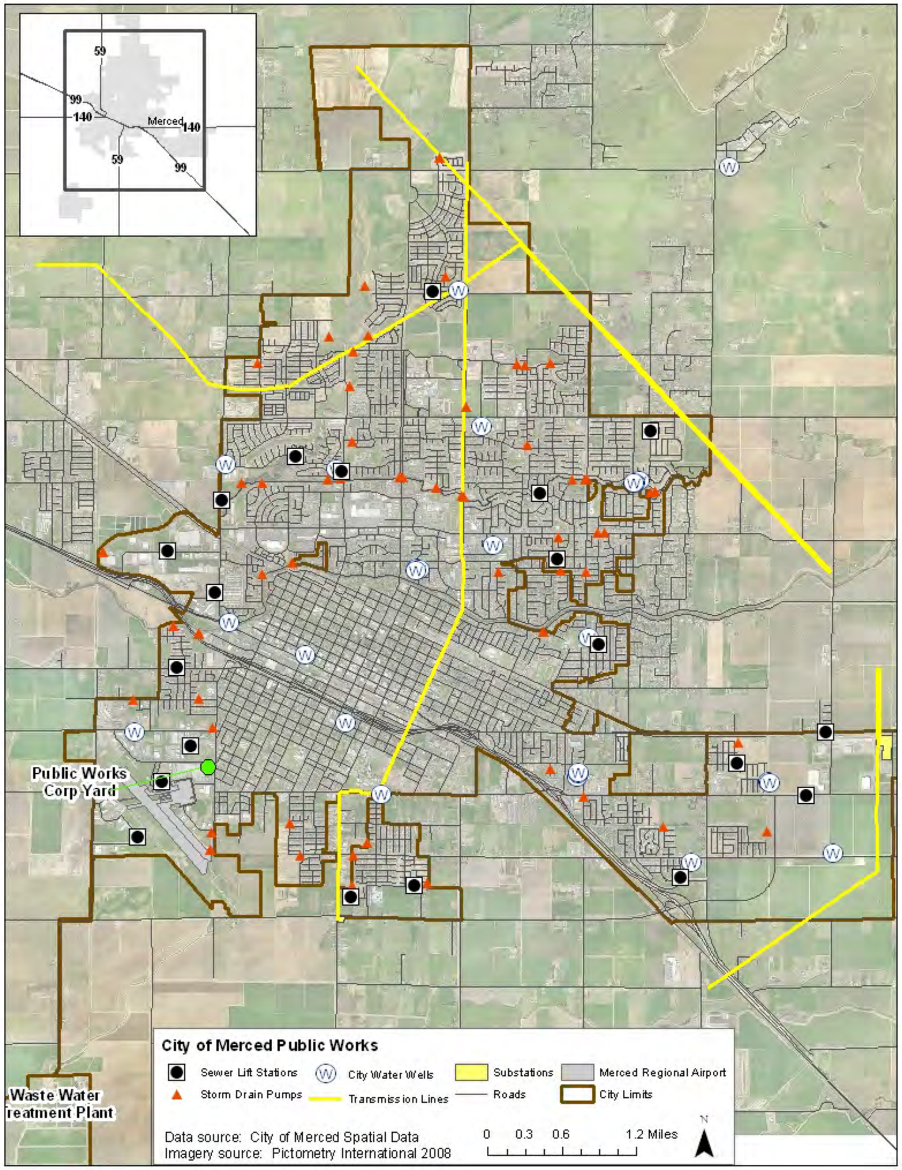
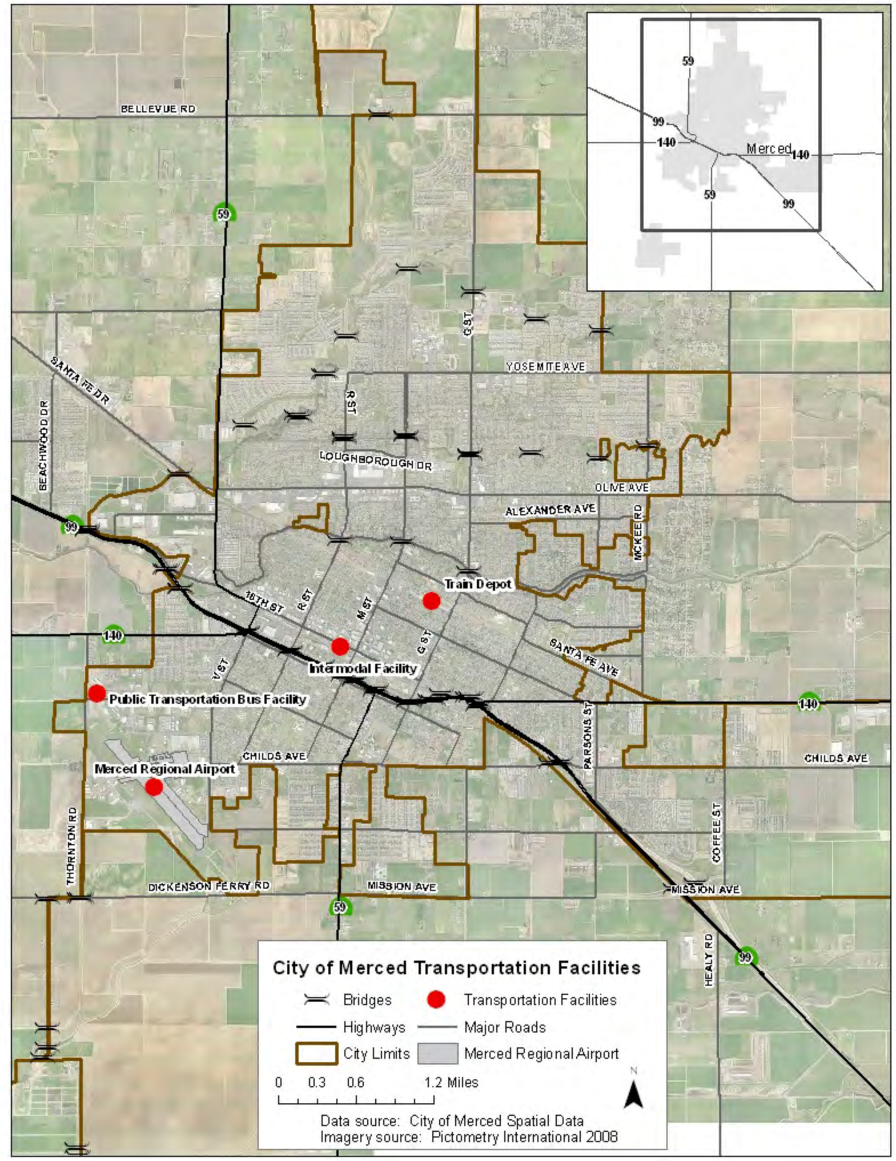


Figure 4-5: Transportation Facilities



4.1.5 Key Legal and Regulatory Capabilities

Overview

The City currently supports hazard mitigation through its regulations, plans and programs. The Merced Municipal Code contains hazard mitigation-related ordinances.

Table 4-2 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities, and indicate those that are in place in the City of Merced. Detailed descriptions of the plans, policies, regulations, and programs follow to provide more information on existing mitigation capabilities.

Table: 4-2: Legal and Regulatory Resources Available for Hazard Mitigation

Legal and Regulatory Resources	Used by City of Merced
PLANS	
General Plan – Safety Element	×
Capital Improvement Plan	×
Local Emergency Operations Plan	×
Stormwater Management Plan	×
PROGRAMS	
Fire Department ISO Rating	×
Elevation Certificates	×
National Flood Insurance Program (NFIP)	×
Weed Abatement (fire control)	×
POLICIES AND CODES	
Zoning and Subdivision Ordinance	×
Site Plan Review Ordinance	×
Growth Management Ordinance.	
Floodplain Ordinance	×
Building Code	×
Water Conservation Ordinance	X

Description of Existing Mitigation Strategies

FLOODING

RC#C2a

- City is using FEMA's model flood ordinance.
- City automatically incorporates FEMA flood map updates.
- City has adopted on-site storm water retention policies into the City design standards. These help safeguard local canals and creeks against peak flow increases due to development.
- In the last 6 years, numerous elevation certificates were completed. These help reduce or eliminate flood insurance requirements for structures in a special flood hazard area (SFHA). This also demonstrates enforcement of FEMA flood requirements through Merced Municipal Code.
- Current Wastewater Treatment Plant is installing tertiary treatment and solids handling. It is also raising adjacent berms to comply with updated State flood proofing requirements.
- Three Developer-initiated FEMA LOMR processes have been approved for Bellevue East, Compass Pointe, and Bellevue West. These updated FEMA maps removed large sections of from the floodplain.

FIRE

The City has adopted ordinances to require fire sprinkler systems in all commercial occupancies greater than 5,000 square feet, and uses a codified fire prevention inspection program to minimize the risk of fire to the community.

Planning

In order to mitigate the risk and impact of fire within Merced, the City has adopted the concepts of Community Fire Protection Master Planning (C.F.P.M.P.). As a system with many components, C.F.P.M.P. received a commitment from the City Council since 1982 to provide fire protection planning with a goal of a "fire-safe community." As a system, C.F.P.M.P. states that fire protection planning requires involvement of all City agencies, individuals, and organizations that have input and support community health, safety, development, and stability. [3]

Public Education Programs

Merced's current number one cause of residential fires is cooking. Kitchen safety revolves mainly around an individual's safety practices. For this reason, the Fire Department has developed and is conducting several public education programs. These programs stress emphasis on children and senior citizens who have been identified by the National Fire Protection Agency as high-risk groups for fire death and injuries. [3]

Inspection Programs

The California Building Codes and the California Fire Codes work together to regulate building construction and related items such as the care of vacant lots and the storage of flammable liquids. Naturally, the use of built-in protection such as fire resistant materials and automatic sprinklers in all structures beyond that required by the Building and Fire Codes significantly reduces the risk of urban fires and may reduce the City's reliance upon fire suppression crews. Each year the Fire Department engine companies conduct in excess of 4,000 inspections and eliminate approximately 8,000 Fire Code violations which could contribute to the cause and severity of a fire. The inspection program primarily targets the high and medium hazard occupancies. To provide effective fire prevention activities for low hazard land uses, the Fire Department conducts year-round hazard removal programs (primarily weed abatement).[3]

Weed Control Program

Since the 1960's there have not been any structure or life losses as a result of wildland fires (K. Mitten, personal communication, January 20, 2009; MFD, n.d.). Additionally, the Department is very proactive with fire prevention activities. As an example, the annual weed abatement program, which began in the late 1980's, has nearly eradicated the incidence of wildland fires within City limits. In order to prevent wildland fires before they start, the City's weed abatement program requires that vegetation on vacant lots be plowed under or mowed down if it is not irrigated agricultural land. Every spring, each property within the City is served with notice to remove weeds, etc. Similarly, the Police, Fire, and Inspection Services Departments collaborate to make sure that abandoned vehicles or buildings (potential fire hazards) are removed.[3]

EXTREME HEAT

The Center for Disease Control (CDC) (2006) stressed that illness from heat exposure is preventable; public awareness about heat illness and the associated risk factors could greatly reduce the number of deaths.

The National Weather Service (NWS) will initiate its Heat Index Program Alert procedures when the high temperature is expected to exceed 105° to 110° (depending on local climate) for at least two consecutive days. Based on this NWS Heat Index Program Alert, the City of Merced can assess when extreme heat is expected. The City offers instructions on what to do in an extreme heat emergency and provides locations for cooling centers where citizens have a chance to get relief from the extreme heat. In a press release on the City of Merced Website, dated 8/30/07, it stated that "….The City of Merced is prepared to open a cooling center whenever needed to give residents an escape from the searing heat. The decision to open the cooling center will be made by 1 p.m. daily based on the heat index, a guide that uses the outside air temperatures and relative humidity…." http://www.cityofmerced.org/news/displaynews.asp

Cooling centers provide air conditioning, liquids, and places to rest for the general public during heat waves. Sending out public information on these along with public health tips (drink fluids, find shade, and the like) will also contribute to the public's ability to deal with heat waves. The City (2008) identified that the creation and use of the centers have reduced the number of emergency room visits.

HAZARDOUS MATERIALS

To minimize risk of hazardous incidents effecting critical facilities it is advised that the facility be located at a distance away from hazardous materials facilities and transport zones. Locating the facilities too far from these areas will create conflict with planning a centralized city and locating facilities close to population, and thus the two needs must be weighed based on current situation.

Like critical facilities, structures within a one mile radius of transportation corridors, pipelines, and fixed hazardous materials facilities are at an elevated risk. The role of highways and roads in both being probable sites for a materials transport incident, and providing ways to exit in case of emergency, requires attention when drawing up emergency response plans. Future structures built should be built with equal consideration for the proximity to hazardous materials facilities and transport zones, but needs to be weighed against needs for users of these structures.

There is, of course, a distinction between a specific material and the harm it can cause. Thus, the safety of the public health and the environment depend on proper containers and transport of these materials. For many of these substances, secondary containment becomes imperative should these items spill or their initial containers be breached or sustained damage. Many fixed location sites have some type of secondary containment facility and these are often required by law. For in-transit materials, many efforts are made to keep materials away from sewer and storm drain inlets. Emergency response plans and personnel are familiar with what inlets are near highways and railroads. The City's Emergency Response Center keeps information on all fixed sites as well as how to isolate spills or hazardous release areas along highways and railroads.

To aid in identification of hazardous materials, US Department of Transportation Pipeline and Hazardous Materials Safety Administration uses place cards indicating properties associated with the hazardous material being transported. Examples of material properties indicated on the place card include: explosives, gases, flammable liquids, flammable solids, oxidizers and organic peroxide, poisons, radioactive, corrosive, and miscellaneous. These place cards allow responders to identify the possible dangers associated with the spill and combined with the amount and location of spill could lead to assessment of the severity of the incident.

Natural Gas Pipelines

- ***Pipeline Monitoring:*** PG&E has a comprehensive monitoring and inspection program to ensure the safety of its natural gas transmission pipeline system. They monitor the system twenty-four hours a day/365 days a year. They perform different types of inspections including patrols, leak surveys, and cathodic protection (corrosion protection) system inspections for the natural gas pipelines. They also perform integrity assessments of certain gas transmission pipelines in urban and suburban areas.

  PG&E performs patrolling of transmission pipelines aerially or on the ground at least quarterly to look for indications of pipeline leaks, missing pipeline markers, construction activity and other factors that may threaten the pipeline. The transmission line leak surveys are conducted at least annually and generally by a leak surveyor walking above the pipeline with leak detection instruments capable of detecting leaks as small as a few parts per million of gas in air. Newer leak detection instrumentation they employ utilizes infrared or laser technology. They have an active cathodic protection (CP) system on their gas transmission pipelines to protect them against corrosion. They inspect these CP systems every two months to ensure they are operating correctly.

  For transmission pipelines qualifying for an integrity assessment, there are three federally-approved methods to complete this pipeline integrity management assessment: In-Line Inspection (ILI), External Corrosion Direct Assessment (ECDA) and Pressure Testing. An In-Line Inspection involves a tool (commonly known as a "pig" or "smart pig") being inserted into the pipeline to identify any areas of concern such as potential metal loss (corrosion) or geometric abnormalities (dents) in the pipeline. An ECDA involves an indirect, above-ground electrical survey to detect coating defects and the level of cathodic protection. Pressure testing is a strength test normally conducted using water which is also referred to as a hydrostatic test. Excavations are performed in areas of concern as required by federal regulations.

  Gas transmission pipelines and facilities are generally resistant to earthquake damage and are expected to be operational following earthquakes. Where, at specific locations, there is a risk of pipeline failure from an earthquake, the common practice is to address the threats and mitigate the risk to prevent damage to the pipeline or replace this section of line with a design that is more resistant to failure during an earthquake. PG&E immediately walks the system by foot and then conducts aerial assessments by helicopter a short time later to determine whether their facilities and pipelines have been damaged as a result of the earthquake

- *Agency Coordination:* PG&E has annual meetings with first responders and joint exercises to foster open lines of communication and to improve emergency coordination. Generally, PG&E's emergency coordination plans and procedures with local first responders are intended to establish and maintain strong ties with the appropriate fire and police officials. PG&E has eight Senior Public Safety Specialists to maintain their presence within the first responder community and ensure their lines of communication are clear within that population. To further coordination, PG&E recently launched its gas transmission web portal specifically for first responders to access pipeline mapping data in real time. The portal allows a registered first responder to view certain line segment characteristics through a secure web environment and this portal is accessible by IPAD, smart phones, lap tops or desk tops. Once registered, the first responder can view line segment location, pipe size, Maximum Operating Pressure, main line valve location and line segment material.

  Coordination is important not only for potential emergencies that may arise, but also to coordinate assistance for routine matters, such as car-pole accidents, downed electrical wire, house fires requiring the interruption of gas/electric services and any maintenance work involving PG&E's gas and/or electric facilities. Further, PG&E offers a “Responding to Gas & Electric Emergencies" seminar for local first responders. Additionally, PG&E's gas transmission pipeline maintenance personnel offer informational meetings regarding safety for local first responders. Finally, PG&E sends annual communication containing safety information and resources to first responders, as well as local public officials, via the Pipeline Association for Public Awareness (PAPA).

- *Pipeline Safety Enhancement Plan (PSEP):* PG&E’s PSEP Phase 1, which is currently (August 2012) before the CPUC, is PG&E’s plan to enhance safety and improve operations by fundamentally changing the way PG&E manages its gas pipeline assets. Ultimately, PG&E will comprehensively assess all 5,786 miles of its natural gas transmission pipelines. The efforts included in PSEP are part of a broader coordinated PG&E Gas Operations strategy and are in addition to the improvements PG&E is making to its existing pipeline replacement and maintenance, risk mitigation and integrity management programs. PSEP Phase 1 covers 2011-2014, with Phase 2 commencing in 2015.

  There are four main components to PG&E’s PSEP:

  (1) *Pipeline Modernization* – PG&E will establish a known margin of safety on every gas transmission pipeline segment and verify pipeline integrity through strength testing, pipeline replacement, and pressure reductions, and will retrofit pipelines to accommodate the use of In-Line Inspection (ILI) tools.

  (2) *Valve Automation* – PG&E will install automated valves in highly populated areas and where pipelines cross active seismic faults to enable PG&E to remotely or automatically shut off the flow of gas in the event of a pipeline rupture. In addition, PG&E will upgrade its Supervisory Control and Data Acquisition (SCADA) system to allow operators in its Gas Control Center to identify and respond quickly to isolate sections of pipeline if a line rupture occurs.

  (3) *Pipeline Records Integration* – PG&E is proposing to transition away from reliance on traditional paper records and to move to a fully integrated electronic asset management system. PG&E will consolidate its gas transmission pipeline data and records systems, collect and verify all pipeline strength tests and pipeline features data necessary to calculate the MAOP for all gas transmission pipelines and associated components, and implement a new fully electronic data management system that will facilitate enhancements in

system operations, maintenance, inspections and compliance with new regulatory requirements.

(4) *Interim Safety Enhancement Measures* – To increase the safety of pipelines prior to testing or replacement, PG&E will validate the MAOP for all transmission pipeline segments in the system, has already reduced pressure on many pipelines (which will remain in effect until PSEP work on such pipe is completed), and has increased the number of patrols and leak surveys. PG&E will expand these interim safety enhancement measures under the implementation PSEP.

EARTHQUAKE

The most effective single element in mitigating earthquake losses to buildings is the consistent application of a modern set of design and construction standards, such as those incorporated in modern building codes. The codes are updated regularly to include the most effective design and construction measures that have been found by testing and research or observed in recent earthquakes to reduce building damage and losses. Local government building departments using a modern code, such as the 2010 California Building Code, regulate the vast majority of buildings. Exceptions include acute care hospitals, public K-12 schools, and state-owned buildings, which are regulated by state agencies in accordance with an even more stringent set of building code provisions that are incorporated in the 2010 California Building Code.

DROUGHT

In 1993, the City adopted a resolution for a program of mandatory prohibitions related to water conservation. The City adopted this ordinance in response to the water shortage emergency associated with the drought of 1987 through 1991. The regulations associated with this ordinance were revised in 2000, but have remained in force due to the overdraft of the Merced sub-basin. Currently, Chapter 15.42 of the City Municipal Code, implemented through Ordinance 1842, comprises the City's water shortage contingency plan. Since the ordinance was a declaration of a water emergency, stages of action are not defined and the water shortage contingency plan is currently active.[55]

Mandatory Water-Wasting Prohibitions

- Washing of sidewalks, driveways, and other outdoor surfaces
- Washing of external building or trailer walls
- Non-re-circulating fountains
- Use of water from the City's distribution system for non-domestic purposes when another adequate source of water is available
- Waste of water for reasons not stated without reasonable purpose. The ordinance also includes mandatory conservation measures consisting of prohibitions on non-essential water uses, including replacement of broken plumbing fixtures and sprinklers, limited irrigation hours, and restriction of outdoor irrigation by day of week (based on odd and even street address).

Other Active Measures

- Continue to comply with State mandates for new developments over 300 dwelling units to demonstrate the presence and adequacy of water supply.
- Continue grant funded efforts to construct access ramps at street corners for the disabled.
- Complete the existing City of Merced Water Supply Study and Report
- Continue pursuing existing multijurisdictional efforts to ensure City water supply and water quality.
- Continue City's program to comply with State mandate by installing water meters on all existing services that do not have one.
- Continue to implement siphon manhole usage in storm drainage. These remove oils from water.

DAM FAILURE

The County Evacuation Plan for both dams shows the Merced County Fairgrounds as the evacuee assembly point and addresses what evacuation routes, priorities, and procedures should be followed. The City's ability to supply the potable water requirements during this time will depend on which dam failed and the height of the inundation swell.

INFLUENZA

In recent years, both the City of Merced (2007) and Merced County (2006) have developed and adopted pandemic influenza response plans. Both plans provided a categorical approach to a pandemic outbreak, ranging from a few ill personnel, to widespread illness that could impact the daily operations of the City/County.

4.1.6 Fiscal Mitigation Capabilities

Overview

The fiscal capability assessment lists the specific financial and budgetary tools that are available to the City for hazard mitigation activities. These capabilities, which are listed in Table 4-3, include both local and Federal entitlements. Actual use of these funding sources for future hazard mitigation projects will be based on the direction of the City Manager and/or action of the City of Merced City Council.

Table: 4-3: Financial Resources for Hazard Mitigation

Financial Resources	Effect on Hazard Mitigation
Community Development Block Grants	Can be used for any Hazard Mitigation Activity
Capital Improvement Project Funding	Can be used for any Improvement-based Hazard Mitigation Activity
Authority to levy taxes for specific purposes	Can be used for any Hazard Mitigation Activity
Impact fees for new development	Improvement-based Hazard Mitigation Activity for water, wastewater, transportation, and FD or PD Stations.
Incur debt through general obligation bonds	Can be used for any Hazard Mitigation Activity
Incur debt through special tax bonds	Can be used for any Hazard Mitigation Activity
Incur debt through private activities	Can be used for any Hazard Mitigation Activity
FEMA Hazard Mitigation Grant Program (HMGP) and Pre Disaster Mitigation (PDM) grants	Can be used for any Hazard Mitigation Activity
Fire Prevention Fees and Fines	Can be used for Hazard Mitigation
Enterprise Funds	Can be used for Hazard Mitigation
General Funds	Can be used for Hazard Mitigation

4.2 Mitigation Goals

Introduction

Mitigation goals provide guidance and direction as to the selection of actions that will reduce the affect of hazards to the City, and which will improve and enhance our capacity to respond to hazards.

4.2.1 Process to Develop Plan Goals

Overview

Deliberate steps were taken to structure goals that would result in appropriate mitigation actions. Selection of the goals were based on guidance from community goals and findings of the Risk Assessment and Capability Assessment, and were confirmed by the Disaster Council in July 2012. This section describes how Plan goals and objectives were developed by the Plan Leadership Team (PLT) and Disaster Council.

Development of Goals

HAZARD MITIGATION VISION STATEMENT

The first step to create plan goals is to create a vision statement. A vision statement broadly defines the purpose of hazard mitigation planning. The Plan Leadership Team (PLT) opted to utilize the mission statement of the *2010 Hazard Mitigation Plan for the State of California* as the foundation to create the MHMP's mission statement, which is:

> *The vision of the MHMP is: To develop a safe and resilient City of Merced by integrating knowledge, laws and programs into an active mitigation program that guides the City to significantly reduce potential casualties and property damage, as well as physical, social, economic, and environmental disruption from disasters.*

IDENTIFY POSSIBLE COMMUNITY-RELATED GOALS

To establish a bulkhead of possible goals for use in the Merced Hazard Mitigation Plan, the Plan Leadership Team (PLT) collected and sorted existing goals from similar communities. To assure that these goals were an appropriate fit with the City of Merced, the PLT examined them against two filters, namely: 1) consistency with community goals; and, 2) comparison with the findings of the Plan's Risk Assessment and Capability Assessment.

COMPATIBILITY WITH COMMUNITY GOALS

The Plan Leadership Team (PLT) sought to identify greater definition of the vision based on state and local community-related goals, and collected existing goals from various sources; Section 4.3.2 of this Plan identifies four sets of these goals, including those from the:

- 2010 California State Hazard Mitigation Plan;
- Merced Vision 2030 General Plan;
- City of Merced Emergency Operations Plan; and,
- Merced County Hazardous Waste Management Plan.

RISK ASSESSMENT FINDINGS

The Plan Leadership Team (PLT) also compared the list of possible goals with the Plan's "Risk Assessment" and "Capability" findings.

4.2.2 Plan Goals

Overview

Plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from hazards. They represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Within this sub-section are provided:

- a listing of related community goals that served as broad parameters for selecting the LHMP Goals; and,
- a description of Risk Assessment and Capability Findings.

Using these filters, a final list of Hazard Mitigation Plan goals were selected, and are listed at the end of this sub-section.

Bulkhead of Possible Goals

The Plan Leadership Team (PLT) collected and sorted existing goals from similar communities in order to establish a bulkhead of possible goals for use in the Merced Hazard Mitigation Plan. These are listed in Appendix F.

Existing Community Goals

The PLT conducted a review of existing Plans to assess whether or not the goals listed in these plans conflicted with the draft LHMP goals to reduce the effects of hazards. These plans include:

- 2010 State of California Hazard Mitigation Plan
- Merced Vision 2030 General Plan
- City of Merced Emergency Operations Plan
- Merced County Hazardous Waste Management Plan

STATE OF CALIFORNIA GOALS AND OBJECTIVES

Cal EMA
CALIFORNIA EMERGENCY MANAGEMENT AGENCY

Goal 1: Significantly reduce life loss and injuries.

This goal emphasizes the theme of reducing potential casualties from disasters through long-term physical changes that make places and buildings safer through mitigation investments and actions.

Objective 1: Improve understanding of the locations, potential impacts, and linkages among hazards, vulnerability, and measures needed to protect life safety and health.

Objective 2: Provide updated information about hazards, vulnerabilities, and mitigation processes to state and local agencies.

Objective 3: Ensure that enforcement of relevant state regulations and local ordinances significantly reduces life loss and injuries.

Objective 4: Ensure that structures are modified, as necessary, over time to meet life safety standards.

Objective 5: Ensure that mitigation measures are incorporated into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial hazard risk.

Objective 6: Identify and mitigate imminent threats to life safety.

Goal 2: Minimize damage to structures and property, as well as disruption of essential services and human activities.

This goal includes structures as an important aspect of both life safety and property damage and reflects the desired outcome of minimizing disruption of essential services (e.g., police, fire, and medical response) as well as normal human activities after a disaster.

Objective 1: Encourage new development to occur in locations avoiding or minimizing exposure to hazards and enhance design requirements to improve resiliency in future disasters.

Objective 2: Encourage life and property protection measures for all communities and structures located in hazard areas.

Objective 3: Reduce repetitive property losses due to flood, fire, and earthquake by updating land use, design, and construction policies.

Objective 4: Research, develop, and promote adoption of cost-effective building and development laws, regulations, and ordinances exceeding the minimum levels needed for life safety.

Objective 5: Establish and maintain partnerships among all levels of government, private sector, community groups, and institutions of higher learning that improve and implement methods to protect life and property.

Objective 6: Ensure the protection of vital records to minimize post-disaster disruption and facilitate short-term and long-term recovery.

Goal 3: Protect the environment.

Objective 1: Review all hazard mitigation projects for compliance with applicable environmental laws.

Objective 2: Encourage hazard mitigation measures that result in the least adverse effect on the natural environment and that use natural processes.

Objective 3: Ensure that all state and local hazard mitigation planning reflects the goal of protecting the environment.

Objective 4: Implement wildfire mitigation and watershed protection strategies that reduce losses of wildlife, habitat, and water.

Objective 5: Promote the use of sustainable hazard mitigation measures.

Objective 6: Provide guidance to local jurisdictions about California Environmental Quality Act (CEQA) compliance vis-a-vis mitigation planning, particularly the local mitigation strategy.

Goal 4: Promote hazard mitigation as an integrated public policy.

This goal is the same as in the 2007 SHMP. It suggests both governmental and societal attention to the need for mitigation. Corresponding objectives are essentially the same as in the 2007 SHMP, except for minor rewording of Objective 8.

Objective 1: Encourage all cities, counties, special districts, and tribal organizations to develop, adopt, and implement a Local Hazard Mitigation Plan.

Objective 2: Encourage all cities and counties to adopt their Local Hazard Mitigation Plans as part of an updated general plan safety element.

Objective 3: Improve the quality and effectiveness of local hazard mitigation planning through effective training and guidance that strengthens linkages between the Local Hazard Mitigation Plans, general plan safety elements, and SHMP.

Objective 4: Promote general public understanding of the benefits of hazard mitigation in reducing casualty and property losses and ensuring continuity of business, institutional, and government functions.

Objective 5: Continually build operational linkages among hazard mitigation, disaster preparedness, and recovery programs within the public and private sectors.

Objective 6: Use mandatory local general plan, zoning, and subdivision requirements to create disaster-resistant sustainable communities.

Objective 7: Promote continuous regional hazard mitigation coordination among state agencies, cities, counties, special districts, and tribal organizations.

Objective 8: Encourage councils of governments, metropolitan planning organizations, and regional transportation planning agencies to use Regional Blueprint and Strategic Growth Planning processes to promote hazard mitigation and help create disaster-resistant sustainable communities within a regional context.

Objective 9: Create financial and regulatory incentives to motivate stakeholders to mitigate hazards and risk.

Objective 10: Enhance and integrate public education efforts by state and local agencies that have mitigation-directed programs.

MERCED VISION 2030 GENERAL PLAN

The General Plan is a statement of the community's vision of its long-term or ultimate physical form. The heart of the General Plan is the set of integrated and internally consistent "Goals," "Policies," and "Implementing Actions" in each chapter. *Goals* are long range; they state finished conditions--the community's vision of what should be done and where.[3] The Goals of the *Merced Vision 2030 General Plan* are as follows:

Urban Expansion

- A Compact Urban Form
- Preservation of Agriculturally Significant Areas
- Efficient Urban Expansion

Land Use

<u>Residential & Neighborhood Development</u>

- Housing Opportunities in Balance with Jobs Created in the Merced Urban Area
- A Wide Range of Residential Densities and Housing Types in the City
- Preservation and Enhancement of Existing Neighborhoods
- Quality Residential Environments
- Mixed-use, Transit, and Pedestrian-Friendly Residential Environments
- Ensure Adequate Housing is Available to All Segments of the Population

Economic Development

- Increased Employment Opportunities for the Citizens of Merced
- A Diverse and Balanced Economy
- Preservation and Expansion of the City's Economic Base
- High Quality Industrial Areas
- More High-Quality Research & Development Parks
- Ready Access to Commercial Services Throughout the City
- A Distinguished Downtown

Urban Growth and Design

- Living Environments which Encourage People to Use a Variety of Transportation Modes
- A Compact Urban Village Design for New Growth Areas
- Self-sustaining, Mixed-Use, Pedestrian-Friendly Villages
- Transit-Oriented Development Adjacent to the High Speed Rail Station

Transportation and Circulation

Streets and Roads

- An Integrated Road System that is Safe and Efficient for Motorized Uses
- A Circulation System that is Convenient and Flexible
- A Circulation System that Minimizes Adverse Impacts upon the Community
- A Comprehensive System of "Complete Streets" Which Addresses All Modes of Transportation

Bicycles, Pedestrians, and Public Transit

- An Efficient and Comprehensive Public Transit System
- A Comprehensive System of Safe and Convenient Bicycle Routes (Within the Community and Throughout the Urban Area)
- A Comprehensive System of Safe and Convenient Pedestrian ways
- A Comprehensive System of "Complete Streets" Addressing All Modes of Transportation
- Air and Rail Systems that Provide Safe and Convenient Service to the Community

Public Services and Facilities

- Maintenance and Improvement of Merced's Existing Infrastructure
- New Development Which Includes a Full Complement of Infrastructure and Public Facilities
- Efficient and Cost-Effective Public Service Delivery
- Maximum Crime and Fire Protection Services
- An Adequate Water Source, Distribution, and Treatment Infrastructure System in Merced
- An Adequate Wastewater Collection, Treatment, and Disposal System in Merced
- An Adequate Storm Drainage Collection and Disposal System in Merced
- Solid Waste Management Services That Accommodate the Local Population Without Causing Significant Damage to Environmental Resources
- Adequate School Facilities for All Students in the Merced Urban Area
- Excellent Cooperative Relationships between the City, the School Districts, and the Development Community

- Support for Cultural and Community Services that Improve and Maintain the Quality of Life for the Residents of Merced
- Development of Infrastructure and Service to Allow All Merced Residents to Utilize New Technologies to Communicate with the Region, the Nation, and the World

Urban Design

- An Integrated Urban Form
- Transit-Ready Community Design
- Pedestrian- and Bicycle-Compatible Neighborhoods
- A Unique Community Image
- Attractive Neighborhoods and Districts
- Attractive and Memorable Public Streets

Open Space, Conservation, and Recreation

- Maintenance of Merced's Biological Resources
- A High-Quality, Expanding Urban Forest
- Preservation of Scenic Corridors and Resources
- Improvement and Enhancement of Water Quality
- Protection of Regional Agricultural Resources
- High-Quality Recreational Open Space
- Adequate Public Recreation Facilities
- Comprehensive Urban Trail and Bike Path System
- A Safe Environment For Merced's Citizens
- Conservation of Water Resources
- Preservation and Protection of Soil Resources

Sustainable Development

- Clean Air With Minimal Toxic Substances and Odor
- Clean Air with Minimal Particulate Content
- Effective and Efficient Transportation Infrastructure
- Coordinated and Cooperative Inter-Governmental Air Quality Programs
- Reduction in the Generation of Greenhouse Gases (GHG) from New Development
- A Diverse and Rich Historic and Cultural Resource Environment
- A Long-Term Community Historic Preservation/Improvement Program
- Sustainable Energy Resource Use in the City of Merced
- Healthy Lives for Community Residents
- A Healthy Environment for All Residents

Housing

- Increase the Stock of Affordable Housing
- Encourage a Mix of Housing Throughout the City to Meet the Needs of Different Income Groups
- Conservation and Rehabilitation of the Existing Housing Stock
- Increase Homeownership Opportunities
- Coordinate Innovative Housing Efforts

Noise

- To Protect City residents from the Harmful and Annoying Effects of Exposure to Excessive Noise

- To Protect the Economic Base of the City by Preventing Incompatible Land Uses from Encroaching upon Existing or Planned Noise-Producing Uses
- To Encourage the Application of State of the Art Land Use Planning Methodologies in Areas of Potential Noise Conflicts

Safety

The main purpose of the Safety Element is to provide policies and implementing actions aimed at reducing injuries, death, property damage, and the economic and social dislocation resulting from natural hazards. The Safety Element is based on an analysis of geologic and other hazards relevant to Merced and on ways of protecting the community from any unreasonable risk associated with such hazards.[3]

- General Disaster Preparedness
- Reasonable Safety for City Residents from the Hazards of Earthquake and Other Geologic Activity
- A City Free From Other Than Street Flooding
- Fire and Hazardous Material Safety for the Residents of the City and For Those Working in Fire Suppression
- A Safe Airport Environment Both Above and On the Ground
- Reduced Criminal Activity and an Increased Feeling of Safety and Security in the Community
- Hazardous Materials Safety for City Residents

CITY OF MERCED EMERGENCY OPERATIONS PLAN (EOP) GOALS

The purpose of the Emergency Operations Plan (EOP) is to provide emergency planning, organization, and response. The Plan deals with emergency management through the Incident Command System (ICS)/National Incident Management System (NIMS), law enforcement, traffic control, fire, medical, rescue and radiological material, shelter and support, and resources. The plan is designed to prepare the community for responding to an emergency situation in a highly organized and efficient way so that chaotic situations are avoided.[3]

During the response phase, the agencies that are charged with responsibilities in the EOP are directed to focus on the following five goals:

- Mitigate Hazards
- Meet Basic Human Needs
- Address Needs of People with Access and Functional Needs
- Restore Essential Services
- Support Community and Economic Recovery

MERCED COUNTY HAZARDOUS WASTE MANAGEMENT PLAN GOALS

In 1986, the California legislature passed legislation requiring each county to develop a hazardous waste management plan and requiring all cities to either adopt the County plan by reference in their general plans or adopt their own plan. The 1989 Merced County Hazardous Waste Management Plan addresses waste reduction and onsite treatment, the siting of off-site hazardous waste facilities, public and industry education, transportation of hazardous wastes, cleanup of contaminated sites, and emergency response procedures. The plan also recommends a series of goals, policies, and implementation actions to deal with hazardous waste throughout the County.[3]

The goal statement of this plan is to: *Protect the health and welfare of the public, environment, and economy of Merced County through a comprehensive countywide program to ensure the safe and efficient management of hazard wastes."* The plan includes eight objectives covering the following topics:

- waste management technologies
- waste management facilities
- small quantity generator / household hazardous waste
- public education
- hazardous waste inventory
- local regulation of hazardous waste management
- clean up previous disposal sites
- emergency incident response

In 2011, an *Area Plan for Emergency Response to Hazardous Material Incidents* was prepared. This plan addresses how hazardous material incidents will be handled, and is intended to facilitate multi-agency and multi-jurisdictional coordination, to successfully counter the effects of an emergency involving hazardous material. [56]

Risk Assessment/Capability Findings

Hazard Mitigation Goals that were found to be consistent with the community's existing goals (as listed on previous pages), were retained; those that were not were removed from the list of possible goals. The remaining list of possible goals was assessed by the Disaster Council for their applicability to the Plan's "Risk Assessment" and "Capability" findings. These findings are listed below, and were presented and discussed at the May 11, 2012, Disaster Council Meeting.

Findings:

<u>Hazard Causal Factors</u>

- Floods result from heavy rains in upper watershed located in Sierra Nevada Foothills.
- Urban-interface wildfires are prone to occur at urban development sites near grasslands, especially with dry fuels and windy conditions.

<u>Note Hazard Characteristics</u>

- Earthquakes in Merced are generally low magnitude and very infrequent, but central Merced structures are highly vulnerable to such an event.
- Extreme heat events occur yearly, but generally last only a few days; hotter and longer-term events could negatively affect sensitive populations.
- Though the City experiences generally low-impact flood events, larger historical events could negatively affect the City, cutting off local and regional lifelines and services.

<u>Critical Assets in Hazard Areas</u>

- Some existing and many future arterial roads cross floodways.

<u>Characteristics of Assets that Contribute to Vulnerability</u>

- After the 1989 Loma Prieta earthquake, the City conducted an evaluation of the downtown buildings. A 1999 follow-up study concluded that 30% of the downtown buildings assessed required major remodeling, rehabilitation, seismic upgrades, or demolition.

<u>Where is the area to experience the most losses?</u>

- Flood Damage occurs repeatedly near Highway 140 and Thornton Road, at the confluence of Bear Creek and Black Rascal Creek.

Hazard Mitigation Plan Goals

At their July 13, 2012, Disaster Council meeting, the Disaster Council reviewed and confirmed the PLT's draft work and selection of the MHMP's vision and goal statements.

Goals are stated without regard to implementation, that is, implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that the goals are not dependent on the means of achievement. Goal statements form the basis for actions that will be used as means to achieve the goals.

MHMP GOALS

Listed below are the goals of the Merced Hazard Mitigation Plan to reduce or avoid long-term vulnerabilities and effects of the profiled hazards addressed in this plan's risk assessment.

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Goal 1: Provide protection for people's lives from hazards.

Goal 2: Minimize or reduce damage to property.

Goal 3: Minimize disruption of essential services, facilities, and infrastructure.

Goal 4: Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of disasters.

Goal 5: Promote hazard mitigation as an integrated policy.

Goal 6 Increase public awareness.

Table 4-5 in Section 4.3.3, the Action Plan of the MHMP, correlates these goals with the recommended prioritized list of mitigation actions.

4.3 Mitigation Strategy

Introduction

This Section identifies, evaluates, and prioritizes mitigation strategies that address the Plan's goals and objectives. These actions form the core of the mitigation plan, and will be the most outward representation of the planning process.

4.3.1 A Comprehensive Range of Mitigation Actions

Identification and Analysis of a Catalog of Potential Actions

For each hazard, City Staff created a comprehensive catalog of sample mitigation actions that were applicable to the City of Merced (Appendix G). The hazards for which sample mitigation actions were created are those in which the City is most vulnerable to, based on the MHMP Risk Assessment. The specific actions themselves were based upon the MHMP vulnerability assessment. The catalog was not meant to be exhaustive or site-specific, but rather to inspire discussion. The sample mitigation actions in the catalog derived from numerous sources, including: 1) the City's "Community Risk Assessment"; and, 2) hazard mitigation plans, notably from Central Valley California communities.

The initiatives included in the catalog was meant to be new action items, and do not include current mitigation actions, though improvement of a current activity may be listed. The catalog also addresses how the proposed actions affected new and existing buildings and infrastructure.

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Finally, recognizing that Merced's economic setting could improve, and because external funding sources may also become available, the selection process of actions was not limited due to lack of local funds.

Mitigation Sorted by Type

To facilitate a greater understanding of the nature of actions, the sample actions were also sorted by mitigation type. Mitigation efforts fall into one or more of these types:

- *Prevention*: Administrative or regulatory actions that influence the way land is developed and buildings are built, such as: planning, zoning, building codes, capital improvement projects, open space, and floodway preservation, and storm water management safeguards.
- *Property Protection* – Actions that involve the modification of existing buildings to protect them from the hazard area, such as: removal from elevation, retrofits, relocation, and flood-proofing.
- *Public Education* – Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property, such as: outreach, disclosure information for real estate transactions, information brochures along with public mailings and educational programs.
- *Resource Protection*: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems, such as: cleaning of creeks, debris removal, management of City trees, restorative plantings, and dedicating creek-side open space to the City.
- *Emergency Services*: Actions that protect people and property during and immediately after a hazard event, such as: improved response times, special training classes, standby power for critical facilities, and emergency personnel communications.
- *Structural Projects*: cleaning of creeks, cooling centers, projects to modify FEMA maps.

Review and Ranking of Catalog of Potential Actions

The catalogs were presented at the July 13, 2012, Disaster Council meeting, as well as at a general public meeting about local hazard mitigation planning held at the regular meeting of the City's Planning Commission on July 18, 2012. On August 9, 2012, the action catalogs were brought to the general public for input at the City's "Market on Main Street" event. At these venues, the PLT requested and encouraged the Disaster Council, the Planning Commission and the public to review, discuss, and comment on the draft catalogs, focusing on the following tasks:

- A numeric ranking of the ideas in each table;
- Comments of each cataloged action, as appropriate; and,
- Describe new actions.

The Planning Leadership Team (PLT) collected these comments and rankings (1 being best, 2 next best, etc.) from the Disaster Council, stakeholders, the Planning Commission, and members of the public, which are presented in Appendix G and include: 1) the original comprehensive set of suggested actions; 2) numeric rankings; and, 3) comments, including suggested new action items.

CREATING A FOCUSED LIST OF MITIGATION ACTIONS

As part of the review of a comprehensive range of potential mitigation actions, the PLT narrowed the potential mitigation actions listed in Appendix G, from 54 potential actions to 10 actions.

Changes to the comprehensive list of potential mitigation actions were based on meetings with technical City Staff, as described in "Flood Related Actions" and "Other Recommended Hazard Mitigation Actions" (see sub-sections below), as well as several factors, and include:

Scores: Scores ranged from a best (1) to least supported (7). Actions with scores of 4-7 were generally removed, while those with scores 1-3 were generally kept.

Mitigation Action and Projects: Ineligible actions, as defined by FEMA's updated regulation checklist (formerly called crosswalk) were removed from the list of recommended actions. For example, actions that are emergency response or operation preparedness in nature are ineligible, and hence, were removed from the recommended list of mitigation actions.

Hazard Threat: Actions that aligned with high threat hazards were generally kept, whereas actions that aligned with low threat hazards were generally removed.

Current or LHMP-related Actions: Actions that are currently undertaken or which have been addressed in the Local Hazard Mitigation Plan were removed.

The resulting "focused list" of 10 mitigation actions is presented in Appendix I. This list was the basis of further discussion and prioritization performed at the Disaster Council public meeting of December 7, 2012.

Although low-scoring mitigation actions are not included in the Action Plan, they can be reconsidered during the MHMP update process.

FLOOD RELATED ACTIONS

On August 7, 2012, a meeting with flood hazard specialists representing the City of Merced, the County of Merced, and the Merced Irrigation District, met to identify flood-related projects for the LHMP plan area. These recommended actions are listed below, and were included in the focused list of actions.

- Increased storm-water storage (see detail below)
- Upstream storm-water Diversions
- Black Racal Creek detention basin

A water diversion structure on Fahrens Creek, south of Yosemite Avenue, diverts water into the large basin that is located between that point and Buena Vista Avenue. Storm-water diversion currently begins when the flow in Fahrens Creek is at 50 cubic feet per second (CFS). Hicham M. Eltal of the Merced Irrigation District (MID) recommended that the diversion should occur at 200 cfs, so that storage capacity is not wasted during larger flooding events. A new diversion design and improvements would be necessary for this change.

OTHER RECOMMENDED HAZARD MITIGATION ACTIONS

On November 26, 2012, City Staff from the Airport, Fire Department, Engineering Department, Building Department, and the Public Works Department met to discuss hazard vulnerability and needs to existing buildings and infrastructure. The group offered several recommendations, specifically, the group:

RC#C4c

- supported the focused action to perform building-specific, structural seismic vulnerability assessments of City-owned critical facilities (buildings and infrastructure) constructed prior to 1980, especially as it relates to several old fire stations; the original (phase 1) of the "M" Street police station; and the public works corporation yard;
- emphasized the need to refer to shelters instead of cooling centers;
- supported the focused action to address wildland fire interface zones with an emphasis on the development interface with natural open spaces; and,
- Strongly identified the need to plan for and develop resources to provide energy-back-up systems for critical infrastructure and buildings.

INELIGIBLE ACTIONS

Some of the potential mitigation actions received high scores from the community, yet were removed due to ineligibility requirements of the Local Hazard Mitigation Program, or simply reiterated current City practices. These actions are listed here to signify their value to the community.

Response-Based Actions

- Develop Community Emergency Response Teams (CERT) of residents and businesses to aid first responders and volunteers.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, and industries. For example, standardize systems among agencies to provide for better interoperability.
- Coordinate with medical community to quicken the reporting of damage to a medical facility office, pharmacy (and so on).

Planning-Based Actions

- Support management and land use planning practices with hazard mitigation to protect life.
- Require a master drainage plan as part of the approval process for all specific plans and large development projects. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels.

MERCED INTEGRATED REGIONAL WATER MANAGEMENT PLAN

In March 2013, the "Flood Management Summary" of the *Merced Integrated Regional Water Management Plan* (IRWMP) listed potential projects that may mitigate flood risk within the planning area of the MHMP, though the majority of these projects would occur outside the planning area of the MHMP. This plan's recommended action #4 indirectly supports the list of projects below. Detailed descriptions and cost-estimates are provided in the referenced "Flood Management Summary" of the Merced IRWMP.

Options to Reduce the Flow Entering Merced

- Black Rascal Creek Dam (Haystack Reservoir)
- Black Rascal Creek Detention Basin
- Bear, Burns, Owens, and/or Mariposa Reservoir Enlargements
- Route Flood Flows to Agricultural Lands South of Merced
- Ecosystem Restoration Along Waterways
- Bear Creek Detention Basin/Groundwater Recharge Facility
- Bear Creek Diversion Channel
- Le Grand/Planada Flood Control/Conjunctive Use Expansion Study
- Bear Creek Siphon and Diversion Structure (BCSDS) Expansion

Options to Contain the Flow through Merced

- Levees along Channels
- Channel Dredging and/or Vegetation Removal
- Various local drainage improvements

Options to get out of the way of the flow

- Modify Land Use and Building Restrictions
- Develop Emergency Response Plans
- Ring Levees around Flood-Prone Areas or Critical Facilities
- Increase Public Awareness of Flooding
- Establish a Regional Flood Control District

4.3.2 Prioritization of Actions

The activities of the Plan Leadership Team (PLT) and *Disaster Council* at public meetings resulted in the selection of a focused set of 10 non-prioritized mitigation actions. At their December 7, 2012, meeting, the Disaster Council prioritized this focused list of actions. This section is a narrative of how the community prioritized the mitigation actions, and includes a discussion of "Benefit-Cost Review" and "Prioritization Methodology."

Benefit-Cost Review

This section discusses three interrelated topics: 1) the requirement for a cost-benefit assessment; 2) the approach of this Plan's Cost-Benefit Review (CBR); and, 3) future project-level Benefit-Cost Analysis (BCA).

SCOPE OF COST BENEFIT ANALYSIS

A full-blown cost-benefit analysis (CBA) is not required; rather, a Benefit-Cost Review (BCR) satisfies the DMA 2000 requirements even if it is relatively simple. As allowed by DMA 2000, the City's benefit-cost review was primarily qualitative.

BENEFIT-COST REVIEW (BCR) CRITERIA

An emphasis was placed on the importance of a benefit-cost review in determining action priority. Criteria used to assist in evaluating the benefit-cost of a mitigation action included in the "Economic" criteria discussed below, under "STAPLEE" CRITERIA.

FUTURE PROJECT-LEVEL BENEFIT-COST ANALYSIS (BCA)

For many of the actions identified in the MHMP action plan, the City of Merced may seek financial assistance under FEMA's Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation Grant Program (PDM) programs. Both of these programs require detailed benefit/cost analysis as part of the application process. These analyses will be performed on the projects at the time of application preparation. However, for projects not seeking financial assistance from grant programs that require this sort of analysis, the City reserves the right to define "benefits" according to the parameters that meet the needs and the goals of the MHMP.

Prioritization Methodology

CRITERIA USED

RC#C5a

After the focused set of mitigation actions was assembled, the *Disaster Council* utilized several decision-making tools to rank the importance and effectiveness of the actions. These tools included: 1) Benefit-Cost Review "economic" criteria; 2) FEMA's recommended prioritization criteria, STAPLEE; and, 3) community input gathered from the City's *Natural Hazard Community Awareness Survey* (Appendix C).

"STAPLEE" CRITERIA

RC#C5b

The criteria listed below were used to assess the strengths and weaknesses, opportunities and constraints, and costs and benefits associated with mitigation actions. This section includes a general description of each criterion, along with related questions to help the community and Disaster Council rate the value of potential mitigation measures.

S ***Social:*** Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.

- Will the mitigation action be socially accepted within the community where it will be implemented?
- Will the mitigation action adversely impact one particular segment of the population (neighborhood, culture, religion, etc?)

T ***Technical:*** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

- Is the mitigation action technically feasible?
- Will the mitigation action help to reduce losses in the long term?
- Will there be any secondary effects which could nullify the action's benefits?

A ***Administrative:*** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

- Does the jurisdiction have the staffing capability to implement the action, and can it be readily obtained?
- Has the jurisdiction allocated or funded the action (i.e. annual budget, CIP, grants, etc)?
- Can the community provide the necessary maintenance work required to maintain the mitigation action?

P ***Political:*** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

- Is there political support to implement and maintain the mitigation action?
- Is there a local champion (private or public) willing to help see the action to completion?
- Is there enough public support to ensure the success of the mitigation action?

L ***Legal:*** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

- Do State regulations exist that support the implementation of the mitigation actions?
- Are the proper local laws, ordinances, and resolutions in place to implement the mitigation action?
- Is the mitigation action likely to be challenged by stakeholders who may be negatively affected?

E ***Economical:*** Budget constraints can significantly deter the implementation of mitigations actions. Hence, it is important to evaluate whether an action is cost-effective.

- Do the benefits of the mitigation action exceed the associated costs?
- Does the cost seem reasonable for the size of the problem and likely benefits?
- Does the action contribute to other community economic goals, such as capital improvements or economic development?
- How many people will benefit from the action? How large an area is impacted?
- Does the action protect infrastructure, community assets, or critical facilities?
- What will the action cost? What is the timing of available funding? Will outside sources of funding be required?
- What is the action's ability to reduce expected future damages and losses?

  □ Project Cost information is presented in the MHMP Action Plan (Section 4.3.3).

  □ Economic-related vulnerabilities are discussed in section 3.4.7.

E ***Environmental:*** Mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

- Will the mitigation action significantly affect the environment?
- Is the mitigation action consistent with the community's environmental values and goals?

PROCESS

Prior to the prioritization exercise, the PLT presented these criteria to the *Disaster Council* for review and discussion at their meeting of December 7, 2012. The public was also given an opportunity to comment on the criteria and the focused list of mitigation actions (Appendix I).

The *Disaster Council* and the public present were given eighteen colored dots to prioritize the actions with the above criteria in mind, emphasizing the benefit-cost review criteria. The values of the dots were as follows:

Table 4-4: Dot Priority Values

	Red	Blue	Yellow
Priority	High	Medium	Low
Dot Value	4	3	2
Number of Dots	6	6	6

PRIORITIZATION SCORES

The PLT totaled the dot values to determine the priority of the recommended actions. The values ranged from 171 to 67, and are listed in Table 4-4: Prioritized Actions. The highest scoring action, with 171 points, was to prepare an Energy Assurance Plan.

Table 4-4: Prioritized Actions

Score	Recommended Action
171	(1) Prepare *Energy Assurance Plan*
140	(2) Enhance Storm-Water drainage Improvements
129	(3) Develop *Disaster Preparedness Program*
120	(4) Support the Haystack Alternative
108	(5) Update City's Storm-water Drainage Master Plan
105	(6) Prepare a *Shelter and Emergency-Provision Plan*
102	(7) Prepare Natural Area Fire Prevention Plan
94	(8) Seismic Vulnerability Assessments/City-owned Critical Facilities
67	(9) Retrofit Unreinforced Masonry Buildings

The draft action to convert overhead utilities to underground services was combined with the action to create an Energy Assurance Plan.

4.3.3 Administration of Actions

Implementation Factors

RC#C5

Described in the Action Plan below are the following implementation factors: 1) the goal(s) that each Action Item meets; 2) an expected schedule for completion; 3) the responsible lead of the Action Item, 4) potential funding sources; and, 5) anticipated project costs.

SCHEDULE

This describes the timeframe for completing the project. In the Action Plan, this is listed as "ongoing," or the anticipated plan year(s) to be completed.

LEAD

This may be a position, office, department, agency, or combination of who is responsible for implementing and administering the action. Other departments and/or agencies are partnered with the lead agency to implement the action.

FUNDING

These may be existing or future funding sources, not limited to local, state, or federal sources.

Action Plan

RC#C5

The recommended and prioritized mitigation strategies of the MHMP are described in Table 4-7. Implementation Factors are applied to each strategy, as well as economic information used to rank the actions.

The Planning Leadership Team, guided by FEMA plan development requirements determined which of the six Plan Goals were met for each Action, when implementation is to occur within the 5-year Plan timeline, which organization/department would be responsible for overseeing the Action, potential funding sources, and estimated project costs.

In the course of preparing the Mitigation Plan Action Strategy Matrix, the Technical Staff considered combining two Actions (Actions #9 and #10) since they were similar (one dealt with critical buildings and the other with critical infrastructure). The Disaster Council concurred with the PLT at their meeting of January 25, 2013.

Plan Goals

RC#C3b

In Section 4.2.2 of the MHMP, plan goals were selected by the Disaster Council. As shown in Table 4-5, "Alignment of Plan Goals and Actions," the nine recommended mitigation strategies are consistent with the goals of the MHMP:

Goal 1: Provide protection for people's lives from hazards.

Goal 2: Minimize or reduce damage to property.

Goal 3: Minimize disruption of essential services, facilities, and infrastructure.

Goal 4: Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of disasters.

Goal 5: Promote hazard mitigation as an integrated policy.

Goal 6 Increase public awareness.

Table 4-5: Alignment of Plan Goals and Actions						
Action	**Goal 1**	**Goal 2**	**Goal 3**	**Goal 4**	**Goal 5**	**Goal 6**
1. Prepare Energy Assurance Plan		●	●		●	
2. Enhance storm-water drainage improvements		●		●		
3. Create a Disaster Preparedness Program	●	●			●	●
4. Support the Haystack Alternative	●	●				
5. Update City's Storm-water Drainage Master Plan		●		●		
6. Prepare a Shelter and Emergency-Provision Plan	●					●
7. Prepare Natural Area Fire Prevention Plan	●	●		●		●
8. Seismic vulnerability assessment/improvements of City-owned critical facilities	●	●	●			
9. Create a program to retrofit/upgrade unreinforced masonry buildings	●	●				

Table 4-7: LOCAL HAZARD MITIGATION PLAN ACTION STRATEGY MATRIX

Strategy Actions	**Goal/Hazard**	**Implementation within the 5-Year Plan Timeline**	**Lead** and Partner **Organization(s)**	**Potential Funding Sources**	**Project Cost**
Action Item #1: Prepare an *Energy Assurance Plan* that includes: 1) the identification and assessment of power-backup capabilities for all the City's critical infrastructure (for example, pumps, data centers, dispatch) and buildings utilized for essential services (such as health-safety, water, sewer, waste, and transportation); 2) coordination of energy resources among public and private partners; 3) establishment of a program and schedule to implement recommended power upgrades and coordination programs; and, 4) an examination of a program of conversion of overhead utilities to underground service that serve critical facilities or other sensitive sites to reduce exposure to hazards, where possible.	Goals: 2, 3 & 5 Hazard: Flooding, Earthquake, Wildfire & other likely hazards	Start: 2014; Plan years 1-2.	**Public Works**	FEMA Cal E M A Rule 20A State and Federal Grants. PDM	$200,000
Action Item #2: Develop and enhance storm-water drainage improvements to reduce frequent flooding. Projects may involve canals, storm-water drains, basins, trunk lines, auxiliary pipes, and interconnections. For example, increase the current stormwater diversion (at Fahrens Creek, south of Yosemite Avenue) of 50 cubic feet per second (cfs) to 200 cfs, so that storage capacity is not wasted during larger flooding events.	Goals: 2 & 4 Hazard: Flooding	Ongoing	**Development Services**	PDM, IRWMP FMA	$2,650,000 (Average Project Price is $442,000)

Table 4-7: LOCAL HAZARD MITIGATION PLAN ACTION STRATEGY MATRIX (pg. 2 continued)

Strategy Actions	Goal/Hazard	Implementation within the 5-Year Plan Timeline	Lead and Partner Organization(s)	Potential Funding Sources	Project Cost
Action Item #3: Create a *Disaster Preparedness Program* that educates populations (residents, property owners, and businesses) that are vulnerable to Merced's natural hazards about: 1) shelter sites; 2) disaster advisory and warning systems; and, 3) "before, during, and after" resources from community entities (e.g. hospitals, schools, public works), to prepare for natural disasters. Develop and deploy methods that assure access to this information and to these resources.	Goals: 1,2, 5 & 6 Hazard: Flooding, Earthquake, Wildfire & other likely hazards	Start: 2014; Plan years 1-2.	**Fire Department**	PDM; Emergency Mgmt. Preparedness Grant; State Homeland Security Grant Program; Local Funding	$250,000
Action Item #4: Support Merced County efforts to construct the Haystack Alternative of Black Rascal Creek.	Goals: 1 & 2 Hazard: Flooding	Ongoing	**Development Services**/ Public Works Merced County MID	State Grants FEMA SRL; FMA and PDM grants	$100,000 staff time
Action Item #5: Update the City's Storm-water Drainage Master Plan.	Goals: 2 & 4 Hazard: Flooding	Start: 2014; Plan years 1-3.	**Development Services**	City Funding Capital Improvement Plan; FEMA FMA grant	$150,000
Action Item #6: Prepare a *Shelter and Emergency-Provision Plan* resulting in identification of existing and future sites and buildings, as well as improvements for their establishment or enhancement.	Goals: 1 & 6 Hazard: Flooding, Earthquake, Wildfire & other likely hazards	Start: 2016; Plan years 3-4.	**Fire Department** Cal E M A FEMA Red Cross School Districts	Emergency Mgmt. Preparedness Grant; PDM; State Homeland Security Grant Program; Local Funding	$150,000

Table 4-7: LOCAL HAZARD MITIGATION PLAN ACTION STRATEGY MATRIX (pg. 3 continued)					
Strategy Actions	**Goal/Hazard**	**Implementation within the 5-Year Plan Timeline**	**Lead** and Partner **Organization(s)**	**Potential Funding Sources**	**Project Cost**
Action Item #7: Prepare a *Natural Area Fire Prevention Plan* for those areas of Merced to be developed adjacent to natural open space areas (as opposed to agricultural fields or private property) in order to determine the best approach to address and provide a coordinated plan for conflicting needs (for example, air quality, natural resource protection, and property rights). Methods would include acceptable site designs, building designs, and weed abatement.	Goals: 1, 2, 4 & 6 Hazard: Wildfire	Start: 2018; Plan year 5.	**Fire Department/** Development Services Outside Agencies: Dept. of Fish & Game, MID, Corp of Engineers Cal Fire	State Grants; FEMA PDM grant	$75,000
Action Item #8: Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities (buildings and infrastructure) constructed prior to 1980, and take actions to upgrade or retrofit as needed.	Goals: 1, 2 & 3 Hazard: Earthquake	Start: 2016; Plan years 3-5.	**Public Works**	Cal EMA; FEMA PDM grant	$100,000
Action Item #9: Create a program to **r**etrofit or upgrade unreinforced masonry buildings in Downtown Merced, or other buildings in the Plan area.	Goals: 1 & 2 Hazard: Earthquake	Start: 2017; Plan years 4-5	**Development Services** Private Building Owners	State Grants; FEMA PDM grant	$150,000

FEMA Pre-Disaster Programs:

SRL – Severe Repetitive Loss Program

PDM – Pre-disaster mitigation program

FMA – Flood Mitigation Assistance Program

Table 4-8: Target Implementation Schedule and Responsible Leadership					
Lead Agency	**2015**	**2016**	**2017**	**2018**	**2019**
Public Works Stan Murdock, Public Works Director of Operations	Action 1		Action 8		
Fire Department Michael McLaughlin, City of Merced Fire Chief	Action 3		Action 6		Action 7
Development Services/Eng David Gonzalves, Director of Development Services	Action 4				
Development Services/Eng David Gonzalves, Director of Development Services	Action 2				
Development Services/Eng David Gonzalves, Director of Development Services	Action 5				
Development Services/Bldg David Gonzalves, Director of Development Services				Action 9	

4.4 National Flood Insurance Program (NFIP) Compliant Mitigation Actions

Introduction

The National Flood Insurance Program (NFIP) is a Federal program, created by Congress in 1968, that makes flood insurance available in communities that enact minimum floodplain management regulations. This Chapter describes Mitigation Actions of this report that are compliant with the NFIP.

4.4.1 National Flood Insurance Program (NFIP) Compliant Mitigation Actions

Overview

This section of the MHMP identifies, analyzes, and prioritizes actions related to continued compliance with NFIP requirements, as appropriate. A description of the City of Merced's participation in the National Flood Insurance Program (NFIP) is described in section 3.4.1 (Risk Assessment: Flooding) of the MHMP.

RC#C2a

NFIP Mitigation Actions

The Action Plan of the MHMP, Table 4-5, identifies three mitigation strategies intended to reduce the area's flood and levee failure risks, and include Action numbers 2, 4, and 5. The table is the result of the Plan Leadership Team (PLT) and Disaster Council's assessment and prioritization of mitigation actions.

Chapter 5: Plan Maintenance

CHAPTER 5: PLAN MAINTENANCE

OVERVIEW OF THE “PLAN MAINTENANCE” CHAPTER

“Plan Maintenance” implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized. The “Plan Maintenance” Chapter of the Merced Local Hazard Mitigation Plan (MHMP) includes a method and schedule for monitoring, evaluating, and updating the Plan at least every 5 years. The “Plan Maintenance” Chapter also includes an explanation of how the City of Merced will incorporate the mitigation strategies into existing planning mechanisms, such as the General Plan, Zoning Code, Capital Improvement Programs, etc. Lastly, the “Plan Maintenance” Chapter outlines the City’s continuing public participation process for the Plan. This chapter contains the following sections:

5.1 ADOPTION, MONITORING, EVALUATION, AND UPDATING

5.2 IMPLEMENTATION

5.3 CONTINUED PUBLIC INVOLVEMENT

At their public meeting of April 19, 2013, the *Plan Leadership Team* provided the City of Merced *Disaster Council,* attending stakeholders, and members of the public an overview of the draft “Plan Maintenance” Chapter of the draft Merced Hazard Mitigation Plan (MHMP). Comments were received and the draft was amended to reflect the concerns of the Disaster Council and public.

5.1 Adoption, Monitoring, Evaluation, and Updating

Introduction

Upon adoption of the plan, the monitoring, evaluation, and updating phases of the Merced Hazard Mitigation Plan (MHMP) will begin, yielding projects that will reduce damage from future natural hazard events.

5.1.1 Adopting the Plan

Once the Plan has been recommended for adoption by the Disaster Council, the project's Technical and Plan Preparation Team submits the LHMP to Cal EMA and the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the City will gain eligibility for Hazard Mitigation Grant Program funds. The process is as follows:

- *State and Federal Plan Approval*—The draft plan was submitted to the State Emergency Management Agency (Cal EMA), who forwarded their comments and MHMP to FEMA, who in turn reviewed, commented and provided one combined review and letter to the City. The MHMP was revised to address these comments, and then sent directly to FEMA for review and approval. ON August 6, 2014, FEMA determined that the plan is eligible for approval pending approval by the City of Merced.

- *Local Adoption*—Within one calendar year of receipt of an "approval, pending adoption" from FEMA, upon recommendation by the Disaster Council, the Merced City Council adopted the MHMP by resolution at their hearing of March 16, 2015. The City forwarded the official adoption paperwork to FEMA, and the MHMP became "officially approved"/Effective on March 19, 2015 (see inside cover of the plan).

RC#E1

- *General Plan Consistency*— Under AB 2140, adopting the FEMA "Approved" LHMP into the Safety Element of the General Plan is optional. However, doing so entitles compliant communities to additional available recovery reimbursements after a major disaster declaration. It also entitles compliant communities to receive priority consideration for hazard mitigation grant funding. The Local Adoption noted above included the action to include the MHMP as part of the *Merced Vision 2030 General Plan*.

Although the MHMP was adopted by the City Council on March 16, 2015, it was not officially approved by FEMA until March 19, 2015.

Once adopted, the City Fire Department will have the responsibility of monitoring, evaluating and updating the MHMP Plan.

RC#A6d

5.1.2 Monitoring the Plan

MITIGATION PROGRESS MONITORING

RC#A6a

The Mitigation Strategy (Chapter 5) of the Merced Hazard Mitigation Plan (MHMP) 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 City of Merced must continuously monitor and document the progress of the implementation of the mitigation actions.

To facilitate this monitoring process, Table 5-1: "MHMP Action Item Implementation" has been developed to provide a tool for monitoring overall progress of each recommended mitigation action listed in the Plan. Each recommended action in the MHMP is included in the table.

ANNUAL ASSESSMENTS OF THE PLAN

Planning is an ongoing process and as such, the Merced Hazard Mitigation Plan (MHMP) should be treated as a living document that must grow and adapt in order to keep pace with the City's changes.

Monitoring: Responsible Agent and Schedule

In order to monitor progress and update the mitigation strategies identified in the action plan, the *Disaster Council,* led by the Deputy Director of Emergency Services, will revisit the MHMP annually and after a significant hazard event. Prior to the 5th year of the revision cycle, these annual observations should be compiled and reviewed to determine what changes should be implemented in the MHMP update process.

Monitoring: Methodology

This assessment will be completed to document that changes in the basis for the site hazards (i.e., updated FIRM maps, new seismic studies, etc.) or the installation and purchase of new equipment (i.e., back-up generators, emergency response equipment, etc.) do not have any effect on City hazard vulnerabilities that would impact the conclusions or actions associated with the MHMP. Additionally, any significant modification to City land use should be considered with respect to any possible impact on the MHMP. The results of the annual evaluations should be folded back into each phase of the planning process and should yield decisions on how (or whether) to update each section of the Plan.

Sample: Table 5-1 – Merced Hazard Mitigation Plan Action Item Implementation				
Action ID No.:______________________________ ______________________________				
Year	**Responsible Department**	**Implementation Timeframe**	**Status**	**Details/Status Summary**
Year 1	Public Works	Ongoing	Open	
Changes/Updates:				
Year 2				
Year 3				
Year 4				
Year 5				

5.1.3 Evaluating the Plan

The Merced Hazard Mitigation Plan (MHMP) will be evaluated on an annual basis to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities.

RC#A6b

Evaluation: Responsible Agents

The City Manager or his designee will be responsible for contacting the *Disaster Council* and organizing the annual meeting. The coordinating organizations responsible for the various action items will report annually on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised.

The *Disaster Council* will be responsible for evaluating the progress of the mitigation strategies in the Plan. The *Disaster Council* will review the goals, objectives and action items to determine their relevance to changing situations in the City, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The *Disaster Council* will also review the Risk Assessment portion of the Plan to determine if this information should be updated or modified, given any new available data.

Evaluation Methodology

Evaluation of progress will be achieved by monitoring changes in vulnerabilities identified in the plan by the responsible entity listed in the Mitigation Action Plan (also listed in Table 5-1 on the prior page). Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or;
- Increased vulnerability as a result of new development.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the following processes will occur:

- A representative from the responsible office identified for each mitigation measure will be accountable to track and report the project status to the Disaster Council on an annual basis. The representative will provide input on whether the project as implemented meets the defined goals and is likely to be successful in reducing vulnerabilities.
- If the project does not meet identified goals, the Disaster Council will determine what additional measures may be implemented, and an assigned individual will be responsible for defining project scope, implementing the project, monitoring success of the project, and making any required modifications to the plan.

Evaluation: Schedule and Timeline

A meeting to review and assess the evaluations prepared by a representative from the responsible office identified in each mitigation measure will occur annually, at a date and place selected by the Deputy Director of Emergency Services. Additional meetings may be called as necessary. The Deputy Director of Emergency Services will compile the results of the annual assessments in preparation for use in the 5-year update process.

5.1.4 Updating the Plan

Plan Update: Schedule

RC#A6c

Every five years the updated Plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review. The City Manager may assign the duty of updating the plan to the Deputy Director of Emergency Services, who will be responsible for initiating the MHMP plan 5-year update and will consult with plan stakeholders and members of the *Disaster Council*. The Deputy Director of Emergency Services will have three months to make appropriate changes to the Plan before re-submitting it to the *Disaster Council* for recommendation, and presenting it to the City Manager for approval and action by the City of Merced City Council. The *Disaster Council* will then submit the update to the state and FEMA Region IX, unless circumstances (e.g., changing regulations) require a change to this schedule.

Plan Update: Focus and Methodology

Updates to the MHMP will:

- Consider changes in vulnerability due to project implementation.
- Document success stories where mitigation efforts have proven effective.
- Document areas where mitigation actions were not effective.
- Document any new hazards that may arise or were previously overlooked.
- Incorporate new data or studies on hazards and risks.
- Incorporate new capabilities or changes in capabilities.
- Incorporate growth and development-related changes to inventories.
- Incorporate new project recommendations or changes in project prioritization.

Changes will be made to the plan to accommodate projects that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Implementation projects that were not ranked high but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.

In keeping with the process of adopting the plan, a public involvement process to receive public comment on plan maintenance and updates will be held during the annual review period, and the 5-year Plan Update will be adopted by the City Council. The Deputy Director of Emergency Services will also notify all holders of the City's Plan when changes have been made.

Plan Addendum

Appendix D of the plan includes updated Risk Assessment information concerning drought. During the first update to the MHMP, this information should be incorporated into the Risk Assessment.

5.2 Implementation

Introduction

The MHMP will be implemented by integrating it into existing City programs such as community development, capital improvement planning, flood prevention, and emergency response plans and activities. Implementation will also occur through prioritization of hazard mitigation actions and alignment with potential funding sources.

5.2.1 Planning Mechanisms

RC#C6b

An important implementation mechanism that is highly effective and low-cost is incorporation of the MHMP recommendations and their underlying principles into other plans and mechanisms. The City and participating jurisdictions have and continue to implement policies and programs to reduce losses to life and property from natural hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing projects, where possible, through these and other existing planning mechanisms:

- *Merced Vision 2030 General Plan*
- Merced Municipal Code
- Flood/Storm Water Management Plans
- Fire Plans
- Drought Plans
- Capital Improvement Plans and Budgets
- Other plans, regulations, and practices with a mitigation focus

The City can address statewide hazard planning goals through Planning and Zoning tools, the City's National Flood Improvement Program, Capital Improvement Plans, and City Building and Safety Codes.

Planning and Zoning

The Merced Hazard Mitigation Plan (MHMP) provides a series of recommendations - many of which are closely related to the goals and objectives of existing planning programs. The City will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

Additionally, Implementing Action S-1.1.g of the General Plan calls for the preparation and updates of a Local Hazard Mitigation Plan for the City and once adopted, the MHMP will thus be incorporated by reference into the General Plan. The City has and will continue to implement policies and programs to reduce losses to life and property from natural hazards.

National Flood Improvement Program

The City Engineer, who serves as the City's "Floodplain Coordinator," will work collaboratively with the City's Chief Building Official and Planning Manager to regulate development and construction of structures in a manner consistent with the City's Floodplain Ordinance. During the initial five-year implementation period of the MHMP, these entities along with Merced County officials will make any necessary adjustments to planning documents and related ordinances, in order to implement the recommended actions of the MHMP, including the need to align new State of California 200-year floodplain requirements.

Building and Safety Codes

The City's Inspection Services Division is responsible for administering the Building & Safety Codes. The City's Building Official has opportunities to work with other agencies at the state level to review, develop and ensure Building & Safety Codes that are adequate to mitigate or prevent damage by natural hazards. This is to ensure that life-safety criteria are met for new construction.

Capital Improvement Plan

The goals and action items in the mitigation plan may be achieved through activities recommended in the City's Capital Improvement Plans (CIP). Various City departments develop CIP plans, and review them on an annual basis. City Department Directors, who also sit on the Disaster Council, will identify recommended action items in the

MHMP consistent with CIP planning goals and integrate them where appropriate.

PROCESS TO INCORPORATE MHMP INTO PLANNING MECHANISMS

RC#C6a

Within a year of formal adoption of the MHMP, the recommendations listed above will begin to be incorporated into existing planning mechanisms. The annual MHMP evaluation meetings of the Disaster Council provide an opportunity for Department Heads that oversee these mechanisms to report back on the progress made on the integration of mitigation planning elements into these various mechanisms.

Efforts will be made to monitor the progress of mitigation projects implemented through these other planning mechanisms and where appropriate, priority projects should be incorporated into updates of this MHMP.

NETWORKING CAPACITY OF THE DISASTER COUNCIL

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. This integration is accomplished by constant, pervasive, and energetic efforts to network, identify, and highlight the multi-objective, win-win benefits to each program and the Merced community, and its stakeholders. An opportunity exists in the Disaster Council for such networking to occur, as many of the City Department Heads sit on this Council.

5.2.2 Economic Analysis of Mitigation Projects

FEMA's approaches to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis.

Benefit/Cost Analysis

Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards can provide decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Given federal funding, City Staff, with oversight from the Disaster Council, may use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items.

5.2.3 Funding Opportunities

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how any required local match or participation requirement can be met. When funding does become available, the MHMP will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state or federal earmarked funds, and grant programs, including those that can serve or support multi-objective applications.

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5.3 Continued Public Involvement

Introduction

Opportunities for public input in *Plan Maintenance* activities will be provided, and take the form of public meetings, plan accessibility, and continued actions of the City's Disaster Council.

5.3.1 Disaster Council Activity

With adoption of this plan, the Disaster Council is tasked with plan implementation and maintenance duties, including:

- Act as a forum for hazard mitigation issues.
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters.
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists.
- Monitor and assist in implementation and update of this plan.
- Inform and solicit input from the public.

The Disaster Council is an advisory body, consisting of representatives from various City Departments appointed by the City Manager. One of its primary duties is to see the MHMP successfully carried out and to report to the City Council and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the City website.

The Disaster Council should meet at least once annually to perform the above noted tasks. Disaster Council meetings will provide an opportunity to discuss the progress of the action items and maintain the partnerships that are essential for the sustainability of the Plan.

5.3.2 Public Input Opportunities

RC#A5a

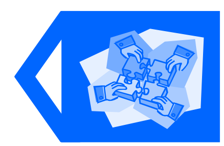
The City is dedicated to involving the public directly in the monitoring, evaluation, and updates of the MHMP. The update process provides an opportunity to publicize success stories from the plan implementation and seek additional public comment.

Disaster Council

The *Disaster Council* is a standing body, and will continue to function after adoption of the MHMP. Members will be responsible for the annual review and required 5-year update of the plan that invite participation from citizens and stakeholders of the MHMP.

Public Outreach Opportunities and Methods

Noticed public hearing(s) to receive public comment on plan maintenance and updating will be held. When the Disaster Council meets to discuss plan maintenance and future plan update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated committee meetings, web postings, and press releases to local media.



The public will also have the opportunity to provide feedback about the Plan. Copies of the Plan will be catalogued and kept at all of the participating agencies in the City and County. The existence and location of these copies will be publicized in the City newsletter which reaches every utility customer in the City. In addition, copies of the Plan and any proposed changes will be posted on the City's Website. This site will also contain an email address and phone number to which people can direct their comments and concerns.


Carpet
Town


SLIDES BY SIMON

CHAPTER 6: APPENDICES

Appendix A

Disaster Council Meetings – Agendas and Minutes

City of Merced
Hazard Mitigation Plan
Meeting Dates
Sam Pipes Room/Fire Station #51
3:00 – 5:00 p.m.

The City of Merced Disaster Council will be meeting on the following Fridays:

March 9, 2012

May 11, 2012

July 13, 2012

~~September 14, 2012~~ Cancelled - (Fire Station #51)

~~November 9, 2012; Postponed to November 30, 2012;~~ Postponed to December 7, 2012 - (Fire Station #51)

~~January 11, 2013~~ Changed to January 25, 2013 - (Fire Station #51)

~~March 29, 2013~~ New Meeting - (City Council Chambers); Postponed to April 19, 2013

CITY OF MERCED
DISASTER COUNCIL AGENDA

January 13, 2012
1400-1600 hours
3rd Floor Conference Room
City of Merced Civic Center

Meeting called by:	John Bramble, City Manager Director of Emergency Services	**Type of meeting:**	Merced Disaster Council

Attendees: John Bramble, Mike McLaughlin, Norm Andrade, Stan Murdock, Mike Wegley, David Gonzalves, Brad Grant, John Sundgren, Dr. Laurie Dickinson, Sherry Pitchford, Dan Aguilar, Richard Dye, RoseMary Parga Duran, Kelly Bentz, Bill King

Please read: Merced Municipal Code, Chapter 8.20 - Disaster Control
Merced Local Hazard Mitigation Plan, Part 2: The Planning Process

Please bring: Merced Local Hazard Mitigation Plan, Part 2: The Planning Process

AGENDA ITEMS

Topic	Presenter
✓ Call to Order	Bramble
✓ Introductions	Group
✓ Powers and Duties of the Disaster Council o MMC, Chapter 8.20.040	Bramble / McLaughlin
✓ Standardized Emergency Management System and National Incident Management System Overview o Five Organization Levels o Five Functional Areas o For those who have not, complete the ICS courses (see below)	McLaughlin
✓ City of Merced Plans o General Plan o Emergency Operations Plan o Local Hazard Mitigation Plan o Continuity of Government / Continuity of Operations Plan o Mutual Aid Plans	McLaughlin
✓ Merced Local Hazard Mitigation Plan o Overview o Completed to Date o Next Actions	Bill King
✓ Good of the Order	Group
✓ Adjourn	

OTHER INFORMATION

Next Meeting: Discuss as a group

Other: Complete Incident Command System (ICS) courses –
- ICS 100 – Introduction to ICS
- ICS 700 – National Incident Management System (NIMS), An Introduction

Course are webhosted and can be accessed through the following link:
http://www.fema.gov/emergency/nims/NIMSTrainingCourses.shtm

Disaster Council Meeting Minutes

January 13, 2012
1400hrs – 1500 hrs
3rd Floor Conference Room

Meeting called by:	John Bramble, City Manager Director of Emergency Services	**Type of meeting:**	Merced Disaster Counci
Facilitator:		**Note taker:**	Lori Mileur

Attendees: John Bramble, Mike McLaughlin, RoseMary Parga Duran, John Sundgren, Dan Aguilar, Sherry Pitchford, Richard Dy Stan Murdock, Mike Wegley, Shawn Henry, Brad Grant, David Gonzalves, Laurie Dickinson, Kelly Bentz

Minutes

Agenda item: Powers and Duties of the Disaster Council **Presenter:** John Bramble

Discussion: Director of Emergency Services - John Bramble
Deputy Director of Emergency Services - Mike McLaughlin
Duties of Disaster Council – To Plan and Prepare Local Hazard Mitigation and Risk Assessment

Agenda item: Standardized Emergency Management System and National Incident Management System. **Presenter:** McLaughlin

Discussion: In December the City adopted the Emergency Operations Plan.
Advised there are Mutual Aid Plans in place with the County of Merced.
President Bush adopted NIMS as the standardized plan, which was developed using the same tactics, techniques and strategies used by the fire service Incident Command System.
The NIMS courses stress the structure of communication, area of responsibility and chain of command.
NIMS – National Incident Management System (NIMS), Members to complete ICS 100 and ICS 700
Courses are webhosted and can be accessed through the following link:
www.fema.gov/emergency/nims/NIMSTrainingCourses.shtm
Several participants advised that they have already completed a version (developed for their specific workplace) of the NIMS courses.

Conclusions: For all council members who are not city employees Chief McLaughlin asked that a certificate of completion be forwarded to him. Need to maintain a file of certifications.

Action items **Person responsible:** Participants

- ✓ Complete ICS 100 – Introduction to ICS
- ✓ Complete ICS 700 – National Incident Management System (NIMS)
- ✓ Submit certificate of completion to Mike McLaughlin as soon as possible.
- ✓

Agenda item: Merced Local Hazard Mitigation Plan **Presenter:** Bill King (not in attendar

Discussion: Due to a personal matter, Bill king was unable to attend the meeting.
Distribution of the following documents; Local Hazard Mitigation Plan and Part 3, Risk Assessment

Conclusions: Based on plan deadlines, McLaughlin suggested meeting in February. The council concurred.

Action items **Person responsible: Participants**

- ✓ Read Local Hazard Mitigation Plan
- ✓ Read Part 3 Risk Assessment
- ✓
- ✓

Agenda item: Open Discussion **Presenter: McLaughlin**

Discussion: Date and time of future meetings

Suggestion to keep the 2nd Friday of every month but change the time to 3:00 p.m

Conclusions: All agreed to keep the 2nd Friday of each month and change the time to 3:00 p.m.
Next Meeting scheduled for February 10, 2012 at 3:00 p.m

Action items **Person responsible**

- ✓ None
- ✓
- ✓
- ✓

Other Information

Observers:

Resources:

Special notes:

CITY OF MERCED DISASTER COUNCIL AGENDA

February 10, 2012
1500-1630 hours
3rd Floor Conference Room
City of Merced Civic Center

Meeting called by:	John Bramble, City Manager Director of Emergency Services	**Type of meeting:**	Merced Disaster Council
Attendees:	John Bramble, Mike McLaughlin, Norm Andrade, Stan Murdock, Mike Wegley, David Gonzalves, Brad Grant, John Sundgren, Dr. Laurie Dickinson, Sherry Pitchford, Dan Aguilar, Richard Dye, RoseMary Parga Duran, Kelly Bentz, Bill King		

Please read: Merced Local Hazard Mitigation Plan, Part 3: Risk Assessment

Please bring: Merced Local Hazard Mitigation Plan, Part 3: Risk Assessment

AGENDA ITEMS

Topic	Presenter
✓ Call to Order	Bramble
✓ Approve Meeting Minutes – January 13, 2012	McLaughlin
✓ Introductions	Group
✓ Merced Local Hazard Mitigation Plan o Overview o Completed to Date o Part 3: Risk Assessment	Bill King
✓ Good of the Order	Group
✓ Adjourn	

OTHER INFORMATION

Next Meeting: Discuss as a group

Other: Complete Incident Command System (ICS) courses –

- ICS 100 – Introduction to ICS
- ICS 700 – National Incident Management System (NIMS), An Introduction

Course are webhosted and can be accessed through the following link:
http://www.fema.gov/emergency/nims/NIMSTrainingCourses.shtm

Meeting Minutes

February 10, 2012
3:09 pm – 4:01 pm
Civic Center/Third Floor Conference Room

Meeting called by:	John Bramble, City Manger	**Type of meeting:**	Disaster Council
Facilitator:	Michael McLaughlin, Fire Chief	**Note taker:**	German
Timekeeper:	N/A		

Attendees: Dan Aguilar, RoseMary Parga Duran, Bill King, Sherry Pitchford, Michael McLaughlin, Stan Murdock, Dr. Laurie Dickinson, Teri Albrecht for Brand Grant, Kraig Magnussen, Mike Wegley, Kelly Bentz.

Absent: John Bramble, Norm Andrade, David Gonzalves, Brad Grant., John Sundgren, and Richard Dye

Please read: Merced Local Hazard Mitigation Plan, Part 3: Risk Assessment

Please bring: Merced Local Hazard Mitigation Plan, Part 3: Risk Assessment

Minutes

Agenda item: Call to Order **Presenter:** Michael McLaughlin

Discussion:

In John Bramble's absence, Michael McLaughlin called the meeting to order at 3:09 p.m. and welcomed everyone to the Local Hazard Mitigation Plan Meeting #2.

Conclusions: Meeting Called to Order.

Action items	Person responsible	Deadline
None.		

Agenda item: Approve Meeting Minutes – January 13, 2012 **Presenter:** Michael McLaughlin

Discussion:

Approved Meeting Minutes – January 13, 2012

Conclusions: Approved Meeting Minutes – January 13, 2012

Action items	Person responsible	Deadline
None	McLaughlin	

Agenda item: Introductions **Presenter:** Michael McLaughlin

Discussion:

Self introductions for all present.

Conclusions: Self introductions for all present.

Action items	Person responsible	Deadline
✓ None		

Agenda item: Merced Local Hazard Mitigation Plan **Presenter:** Bill King

Discussion:

Hazard Mitigation Planning (HMP) is a dynamic process built on realistic assessments of past and present information used by the City to anticipate future hazards and provides meaningful strategies to address possible impacts and identified needs.

HMP is important, because since 1950, California has experience over 400 state-proclaimed emergencies and/or federally declared disasters.

HMP Participants are as follows: City Emergency Operation Team, Disaster Council, Community Stakeholders, General Public, and Elected Officials.

Components of the Planning Process: Organize Resources, Identify Hazards, Assess Risk, Establish Goals and Objectives, Review Possible Mitigation Activities, Draft Action Plan, and Implement Plan / Monitor Progress.

Meeting Schedule & Milestones:

February 10, 2012 – Hazard Mitigation

March XX, 2012 – Hazard Ranking

May XX, 2012 – Goals, Objectives, Capability

July XX, 2012 – Mitigation Actions

September XX, 2012 – Prioritization, Implementation Plan & Plan Maintenance

Existing documents to aid in the drafting of the LHMP: Merced Vision 2030 General Plan, City of Merced Emergency Response Plan (EOP), State of California Multi-Hazard Mitigation Plan, FEMA How – To Guides, and Drainage Master Plan.

Existing documents to aid in the implementation of the LHMP: Merced Vision 2030 General Plan, Floodplain Protection Ordinance, and Capital Improvement Plan.

Next meeting's topic will involve Hazard Ranking: Severity, Secondary Effects, Frequency, Warning, Duration, and Recovery.

Homework Assignment: Read Part 3 Risk Assessment, complete the "Hazard Identification and Screening for the City of Merced / Natural Hazards" form, and the "Existing Documents" form. The forms were provided has a handout at this meeting.

Action items	Person responsible	Deadline
Read Part 3 Risk Assessment.	All participants	March 9, 2012
Complete the Hazard Identification and Screening for the City of Merced / Natural Hazards" form and bring homework to next scheduled meeting.	All participants	March 9, 2012
Complete the Existing Documents form and bring homework to next scheduled meeting.	All participants	March 9, 2012

Agenda item: Good of the Order **Presenter:** Michael McLaughlin

Discussion:

Michael McLaughlin - ICS 300 and 400 flyer will was disseminated via email and the course will be held at UC Merced. ICS 300 will be held on February 26 and 27th and ICS 400 will be held on February 28th and 29th. Michael McLaughlin and Tim Marrison will be the instructors.

Sherry Pitchford-Red Cross is in need of volunteers and donations.

Kelly Bentz-The School Board approved the school's plan.

Mike Wegley-Looking for interest in submitting flood grant funding. Item # 3 is the template that the city would use in applying for making a detention pond instead of a dam.

Conclusions: None-For Information Only.

Action items	Person responsible	Deadline

Agenda item: Adjourn **Presenter:** Michael McLaughlin

Discussion:

Meeting adjourned and next meeting scheduled for March 9, 2012 at 3:00 pm at the Civic Center/Third Floor Conference Room.

Conclusions: None

Action items	Person responsible	Deadline
None		

MERCED

CITY OF MERCED
DISASTER COUNCIL AGENDA

March 9, 2012
1500-1630 hours
Sam Pipes Room
City of Merced Civic Center

Meeting called by:	**John Bramble, City Manager** **Director of Emergency Services**	**Type of meeting:**	**Merced Disaster Council**

Attendees: John Bramble, Mike McLaughlin, Norm Andrade, Stan Murdock, Mike Wegley, David Gonzalves, Brad Grant, John Sundgren, Dr. Laurie Dickinson, Sherry Pitchford, Dan Aguilar, Richard Dye, RoseMary Parga Duran, Kelly Bentz, Bill King

Please read: Merced Local Hazard Mitigation Plan, Part 3: Risk Assessment

Please bring: Merced Local Hazard Mitigation Plan, Part 3: Risk Assessment

AGENDA ITEMS

Topic	Presenter
✓ Call to Order	Bramble
✓ Approve Meeting Minutes – February 10, 2012	McLaughlin
✓ Introductions	Group
✓ Merced Local Hazard Mitigation Plan (LHMP) Community Outreach	King
✓ Identification of LHMP Stakeholders ○ Develop and validate a comprehensive list of individuals and organizations who have a vested interest in the development of the LHMP	King
✓ EXERCISE: Ranking of Community Risks ○ Pages 3-13 to 3-22 in Part 3: Risk Assessment	King
✓ Good of the Order	Group
✓ Adjourn	

OTHER INFORMATION

Next Meeting: May 11, 2012 @ 1500 hours

Other: The May meeting will discuss and validate the Goals, Objectives, and Capabilities of the LHMP.

MERCED

Disaster Council Meeting Minutes

March 9, 2012
3:09 pm – 4:40 pm
Sam Pipes Room
City of Merced Civic Center

Meeting called by:	**John Bramble, City Manger** **Director of Emergency Services**	**Type of meeting:**	Disaster Council
Facilitator:	**Michael McLaughlin, Fire Chief**	**Note taker:**	Mileur
Timekeeper:	N/A		

Attendees: Dan Aguilar, RoseMary Parga Duran, Bill King, Sherry Pitchford, Michael McLaughlin, Stan Murdock, Dr Laurie Dickinson, John Bramble, John Sundgren, Richard Dye, Kelly Bentz, Julie Sterling

Absent: David Gonzalves, Norm Andrade, David Gonzalves, Brad Grant, Mike Wegley

Please share, read, review, complete and return: Community Survey Local Hazard Mitigation Plan (may also be accomplished on line at www.cityofmerced.org (City Departments/Planning/Local Hazard Mitigation Plan/Public Survey Opportunity

Please bring: Merced Local Hazard Mitigation Plan, Part 3 Risk Assessment

Minutes

Agenda item: Call to Order **Presenter:** Michael McLaughlin

Discussion: Michael McLaughlin called the meeting to order at 3:05 p.m. and welcomed everyone to the Local Hazard Mitigation Plan Meeting #3.

Conclusions: Meeting Called to Order.

Action items None **Person responsible** **Deadline**

Agenda item: Approve Meeting Minutes – February 10, 2012 **Presenter:** Michael McLaughlin

Discussion: Motion was made by Michael McLaughlin, seconded by John Bramble to approve the minutes of February 10, 2012

Conclusions: Motion carried

Action items None **Person responsible** **Deadline**

Agenda item: Introductions **Presenter:** Group

Discussion: Self introductions of all disaster council members present, including, members of the audience representing various businesses, healthcare providers, public safety, concerns including a member of the community and a journalist.

Michael McLaughlin welcomed all stakeholders present and briefly outlined the development and purpose of the Disaster Council.

Conclusions: Self introductions for all present.

Action items None **Person responsible** **Deadline**

Agenda item: Merced Local Hazard Mitigation Plan (LHMP) Community Outreach **Presenter:** Bill King

Discussion: Welcomed all stakeholders present and council.

Distributed a listing of local and regional agencies invited to participate as stakeholders of the Local Hazard Mitigation Plan.

Conclusions: Self introductions for all present.

Action items None **Person responsible** **Deadline**

Agenda item: Exercise: Ranking of Community Risks **Presenter:** Bill King

Discussion: Pages 3-13 to 3-22 in Part 3. Risk Assessment

Risk Ranking is a component of the planning process in order to anticipate future potential hazards and provide strategies to address possible impacts and indentify needs

Risk Factor and Threat Score Assessment Group Discussion:

Rank the following factors

- Probability and Frequency
- Consequence and Severity
- Vulnerability

For Each: Flooding, Fire, Drought, Hazardous Materials, Earthquakes, Dam Failure, Extreme Temperatures, Tornadoes, Fog, Storm-Related Hazards

Due to time constraints the ranking of Earthquakes, Dam Failure, Extreme Temperatures, Tornadoes, Fog and Storm –Related Hazards were discussed briefly.

Conclusions:

Action items	Person responsible	Deadline
Complete the on-line survey Natural Hazard Community Awareness Survey at www.cityofmerced.org (City Department/Planning/Local Hazard Mitigation Plan/Public Survey Opportunity) encouraged everyone to share the information with the community and family.	All Participants	

Agenda item: Good of the Order **Presenter:** Group

Discussion:

Conclusions: None-For Information Only

Action items **Person responsible** **Deadline**

Agenda item: Adjourn **Presenter:** Michael McLaughlin

Discussion:

Meeting adjourned at 4:40 pm, next meeting scheduled for May 11, 2012, Civic Center/Sam Pipes Room

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No Disaster Council Meeting was held on Friday, May 11, 2012.

CITY OF MERCED
"Gateway to Yosemite"

WELCOME TO YOUR DISASTER COUNCIL MEETING
Regular Session at 3:00 p.m.

AGENDA
FRIDAY, JULY 13, 2012
City of Merced Fire Department, Training Room, 99 E. 16th St., Merced, CA 95340

(www.cityofmerced.org)

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INFORMATION FOR INDIVIDUALS WITH DISABILITIES:
Accommodation for individuals with disabilities may be arranged by contacting the .
For Meetings Held in the Council Chambers,
Assisted Hearing Devices are Available
Teletypewriter (TTY) 209-385-6816

A. CALL TO ORDER

B. ROLL CALL

1. Introductions of Disaster Council and Stakeholders

C. ORAL COMMUNICATIONS

AT THIS TIME, AUDIENCE MEMBERS WHO WISH TO SPEAK ON ANY MATTER NOT LISTED ON THE AGENDA, PLEASE IDENTIFY YOURSELF AND CITY OF RESIDENCE, AND IF YOU INTEND ON USING TECHNOLOGY FOR YOUR PRESENTATION PLEASE LEAVE A COPY FOR THE RECORD. WILL NOT TAKE ACTION ON AN ITEM THAT IS BROUGHT TO THEIR ATTENTION AT THIS MEETING. IF IT REQUIRES ACTION, IT WILL BE REFERRED TO STAFF AND/OR LISTED ON THE NEXT AGENDA. PLEASE BE BRIEF AND TO THE POINT. AVOID REPEATING WHAT PREVIOUS SPEAKERS HAVE SAID. IF TWO OR MORE INDIVIDUALS ARE PRESENT AS A GROUP AND WISH TO SPEAK ON ONE SIDE OF AN ISSUE, PLEASE SELECT A SINGLE SPOKESPERSON TO PRESENT YOUR VIEWS.

D. CONSENT CALENDAR

All matters listed under the Consent Calendar are considered routine by the Disaster Council and will be adopted by one action of the Disaster Council unless a member of the audience or Disaster Council Member has a question, statement or wishes to discuss an item. In that event, the Clerk will remove that item from the Consent Calendar and place it for separate consideration.

1. Approve Meeting Minutes - March 9, 2012

E. REPORTS

1. Discuss and confirm the Goal Section of the Local Hazards Mitigation Plan (LHMP)
(Presented by Bill King.)

RECOMMENDATION:
Adopt a motion approving the Goal Section of the Local Hazards Mitigation Plan (LHMP).

2. Initial Results of the LHMP Survey (Information Only) - Options for increasing participation in the survey
(Presented by Bill King.)

3. Provide overview of actions taken with the LHMP since the March Disaster Council Meeting
(Presented by Bill King.)

F. BUSINESS

1. Discuss and solicit feedback of the Capacity Section of the LHMP

(Presented by Bill King.)

2. Mitigation Actions Assignment
(Presented by Bill King.)

RECOMMENDATION:
For Information Only.

3. Good of the Order
(Presented by group.)

G. ADJOURNMENT

1. Adjourn to September 14, 2012 at 3:00 p.m.

Page 3 of 89

DISASTER COUNCIL
MINUTES
July 13, 2012

A. CALL TO ORDER

B. ROLL CALL

1. Introductions of Disaster Council and Stakeholders

C. ORAL COMMUNICATIONS

D. CONSENT CALENDAR

1. Approve Meeting Minutes - March 9, 2012

John Sundgren Moved, Richard Dye Seconded

Vote: 8-0

Voting Aye: Kelly Bentz , Richard Dye , David Gonzalves , Brad Grant , Mike McLaughlin , Stan Murdock , RoseMary PargaDuran , John Sundgren

Absent: John Bramble , Norman Andrade , Michael Wegley , Laurie Dickinson , Sherry Pitchford , Dan Aguilar

Clerk's Note: Staff recommendation approved.

E. REPORTS

1. Discuss and confirm the Goal Section of the Local Hazards Mitigation Plan (LHMP)
(Presented by Bill King.)

RECOMMENDATION:

Adopt a motion approving the Goal Section of the Local Hazards Mitigation Plan (LHMP).

John Sundgren Moved, Richard Dye Seconded

Vote: 8-0

Voting Aye: Mike McLaughlin , Stan Murdock , David Gonzalves , Brad Grant , John Sundgren , Richard Dye , RoseMary PargaDuran , Kelly Bentz

Absent: John Bramble , Norman Andrade , Michael Wegley , Laurie Dickinson , Sherry Pitchford , Dan Aguilar

Clerk's Note: Staff recommendation approved.

2. Initial Results of the LHMP Survey (Information Only) - Options for increasing participation in the survey
(Presented by Bill King.)

3. Provide overview of actions taken with the LHMP since the March Disaster Council Meeting
(Presented by Bill King.)

F. BUSINESS

1. Discuss and solicit feedback of the Capacity Section of the LHMP
(Presented by Bill King.)

2. Mitigation Actions Assignment
(Presented by Bill King.)

RECOMMENDATION:

For Information Only.

3. Good of the Order
(Presented by group.)

G. ADJOURNMENT

1. Adjourn to September 14, 2012 at 3:00 p.m.

CITY OF MERCED
"Gateway to Yosemite"

WELCOME TO YOUR

AGENDA
FRIDAY, DECEMBER 7, 2012
City of Merced Fire Dept. - 99 E. 16th St., Merced, CA 95340

(www.cityofmerced.org)

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For Meetings Held in the Council Chambers,
Assisted Hearing Devices are Available
Teletypewriter (TTY) 209-385-6816

A. CALL TO ORDER

B. ROLL CALL

C. ORAL COMMUNICATIONS

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D. CONSENT CALENDAR

All matters listed under the Consent Calendar are considered routine by the Disaster Council and will be adopted by one action of the Disaster Council unless a member of the audience or Disaster Council Member has a question, statement or wishes to discuss an item. In that event, the Clerk will remove that item from the Consent Calendar and place it for separate consideration.

1. **Approve Meeting Minutes**

   RECOMMENDATION:

   Approve Meeting Minutes - July 13, September 14, November 9 &16, 2012.

E. REPORTS

1. **Merced County Emergency Notification System (Information Only)**
   (Presented by Mike McLaughlin.)

2. **Local Hazards Mitigation Plan (LHMP)**
   (Prioritize Focused Mitigation Actions)

   RECOMMENDATION:

   Adopt a motion recommending to staff the prioritization of the focused mitigation actions.

F. ADJOURNMENT

I. Adjournment
(Adjournment to January 25, 2013 at 3:00 p.m.)

DISASTER COUNCIL MINUTES
December 7, 2012

A. CALL TO ORDER

The meeting of the City of Merced Disaster Council was called to order at 3:09 p.m.

B. ROLL CALL

C. ORAL COMMUNICATIONS

None.

D. CONSENT CALENDAR

1. Approve Meeting Minutes

RECOMMENDATION:

Approve Meeting Minutes - July 13, September 14, November 9 & 16, 2012

Stan Murdock Moved, Mike McLaughlin Seconded

Vote: 8-0

Voting Aye: Mike McLaughlin , RoseMary PargaDuran , Sherry Pitchford , Stan Murdock , Kelly Bentz , John Bramble , Michael Wegley , David Gonzalves

Clerk's Note: Staff recommendation approved.

E. REPORTS

1. Merced County Emergency Notification System (Information Only)
(Presented by Mike McLaughlin.)

2. Local Hazards Mitigation Plan (LHMP)
(Prioritize Focused Mitigation Actions)

Disaster Council Minutes December 7, 2012 Page 1 of 2

Principle Planner BILL KING and Planning Associate JULIE STERLING reviewed the plan.

Clerk's Note: After distributing the plan, a decision was made to continued the matter to allow those members not present an opportunity to review material.

F. ADJOURNMENT

1. Adjournment
(Adjournment to January 25, 2013 at 3:00 p.m.)

The meeting adjourned at 4:00 p.m.

Mike McLaughlin Moved, Stan Murdock Seconded

Vote: 8-0

Voting Aye: Mike McLaughlin , RoseMary PargaDuran , Sherry Pitchford , Stan Murdock , Kelly Bentz , John Bramble , Michael Wegley , David Gonzalves

Clerk's Note: Staff recommendation approved.

By:	Approved:
Lori Mileur Council Clerk	John M. Bramble Chairperson

CITY OF MERCED

"Gateway to Yosemite"

WELCOME TO YOUR

AGENDA

FRIDAY, JANUARY 25, 2013

Fire Department Training Room - 99 E. 16th Street, Merced at 3:00 p.m.

(www.cityofmerced.org)

COPIES OF THE BACKUP MATERIAL RELATING TO EACH ITEM OF BUSINESS REFERRED TO ON THE AGENDA ARE ON FILE IN THE OFFICE OF THE CITY CLERK. ANY PERSON WHO HAS QUESTIONS CONCERNING ANY AGENDA ITEM MAY CALL THE CITY OF MERCED FIRE DEPARTMENT AT 209-385-6891. PRIOR TO EACH REGULAR MEETING, A COMPLETE AGENDA PACKET IS AVAILABLE FOR REVIEW IN THE FIRE DEPARTMENT TRAINING ROOM - 99 E. 16TH STREET, MERCED AT 3:00 P.M. AND ON THE CITY'S WEBSITE AT WWW.CITYOFMERCED.ORG. ANY DOCUMENTS PROVIDED TO A MAJORITY OF THE MEMBERS AFTER THIS AGENDA IS POSTED WILL BE AVAILABLE FOR PUBLIC INSPECTION IN THE CITY CLERK'S OFFICE DURING NORMAL BUSINESS HOURS.

FOR CITIZEN PARTICIPATION INSTRUCTIONS, PLEASE REFER TO THE CITY'S WEBSITE AT WWW.CITYOFMERCED.ORG. A HANDOUT IS ALSO AVAILABLE AT THE MEETING ADJACENT TO THE AGENDA. INDIVIDUAL AGENDA ITEMS MAY BE HEARD IN AN ORDER THAT IS DIFFERENT THAN THEY APPEAR ON THE AGENDA TO ACCOMMODATE MEETING PARTICIPANTS.

INFORMATION FOR INDIVIDUALS WITH DISABILITIES:
Accommodation for individuals with disabilities may be arranged by contacting the City of Merced Fire Department at 209-385-6891.
For Meetings Held in the Council Chambers,
Assisted Hearing Devices are Available
Teletypewriter (TTY) 209-385-6816

A. CALL TO ORDER

B. ROLL CALL

C. ORAL COMMUNICATIONS

AT THIS TIME, AUDIENCE MEMBERS WHO WISH TO SPEAK ON ANY MATTER NOT LISTED ON THE AGENDA, PLEASE IDENTIFY YOURSELF AND CITY OF RESIDENCE, AND IF YOU INTEND ON USING TECHNOLOGY FOR YOUR PRESENTATION PLEASE LEAVE A COPY FOR THE RECORD. WILL NOT TAKE ACTION ON AN ITEM THAT IS BROUGHT TO THEIR ATTENTION AT THIS MEETING. IF IT REQUIRES ACTION, IT WILL BE REFERRED TO STAFF AND/OR LISTED ON THE NEXT AGENDA. PLEASE BE BRIEF AND TO THE POINT. AVOID REPEATING WHAT PREVIOUS SPEAKERS HAVE SAID. IF TWO OR MORE INDIVIDUALS ARE PRESENT AS A GROUP AND WISH TO SPEAK ON ONE SIDE OF AN ISSUE, PLEASE SELECT A SINGLE SPOKESPERSON TO PRESENT YOUR VIEWS.

D. CONSENT CALENDAR

All matters listed under the Consent Calendar are considered routine by the Disaster Council and will be adopted by one action of the Disaster Council unless a member of the audience or Disaster Council Member has a question, statement or wishes to discuss an item. In that event, the Clerk will remove that item from the Consent Calendar and place it for separate consideration.

1. **Minutes of December 7, 2012**

   RECOMMENDATION:

   Adopt a motion approving and filing the minutes of December 7, 2012.

E. REPORTS

1. **Merced County Emergency Notification System (Information Only) (Presented by Mike McLaughlin)**
2. **Merced County OES Continuity of Operation Plan and the Hazard Mitigation Plan (Information Only) (Presented by Mike McLaughlin)**
3. **Local Hazard Mitigation Report (Attachment 1, with Attachments A - C) (Presented by Bill King)**

F. ADJOURNMENT

1. **Adjournment to March 29, 2013 3:00 p.m. / 99 E. 16th Street, Merced, CA (City of Merced Fire Department - Training Room)**

MERCED

CITY OF MERCED DISASTER COUNCIL MEETING MINUTES

January 25, 2013
1500 hours – 1545 hours
City of Merced Fire Department
Training Room
99 E. 16th Street
Merced, CA 95340

Meeting called by: John Bramble, City Manager, Director of Emergency Services

Type of meeting: Merced Disaster Council

Facilitator: John Bramble

Note taker: Janet German

Attendees: Members: Mike McLaughlin, Kelly Bentz, John Sundgren, David Gonzalves, John Bramble. Stakeholders/Community Members: Julie Sterling, Ken Elwin, Ann Andersen, Ed Banks, Greg Petersen, Janet German, Kraig Magnussen, Bill King

Minutes

Agenda item: Merced County Emergency Notification System **Presenter:** McLaughlin

Discussion:

Conclusions: Mike McLaughlin discussed the Merced County Emergency Notification System.

Action items: **Person responsible:**

✓

Agenda item: Merced County OES Continuity of Operations Plan and the Hazard Mitigation Plan **Presenter:** McLaughlin

Discussion: Mike McLaughlin discussed the Merced County OES Continuity of Operations Plan and the Hazard Mitigation Plan.

Conclusions:

Action items: **Person responsible:**

✓

Agenda item: Local Hazard Mitigation Report **Presenter:** Sterling

Discussion: Julie Sterling discussed the report.

Conclusions:

Action items: **Person responsible:**

✓

Agenda item: Adjournment **Presenter:**

Discussion:

Conclusions:

Action items: **Person responsible:**

✓

OTHER INFORMATION

Next Meeting: Adjourn to next meeting, March 29, 2013 at 3:00 p.m.

Other:

CITY OF MERCED DISASTER COUNCIL AGENDA

AMENDED

April 19, 2013
1000-1200 hours
City Council Chambers (2nd Floor)
678 W. 18th Street
Merced, CA 95340

Meeting called by:	John Bramble, City Manager Director of Emergency Services	**Type of meeting:**	Merced Disaster Council
Attendees:	John Bramble, Mike McLaughlin, Norm Andrade, Stan Murdock, Mike Wegley, David Gonzalves, Brad Grant, John Sundgren, Dr. Laurie Dickinson, Sherry Pitchford, Dan Aguilar, Richard Dye, RoseMary Parga Duran, Kelly Bentz		
Please read:	"Draft" Local Hazard Mitigation Plan		
Please bring:	"Draft" Local Hazard Mitigation Plan		

AGENDA ITEMS

Topic	Presenter
✓ Call to Order	Bramble
✓ Roll Call	German
✓ Approve Meeting Minutes – December, 7, 2012 and January 25, 2013	McLaughlin
✓ Merced County Emergency Notification System	McLaughlin
✓ Chapter 5 – Plan Maintenance	Sterling
✓ Disaster Council – LHMP Plan Review, Action/Vote	King
✓ Good of the Order	Group
✓ Adjourn	Bramble

OTHER INFORMATION

Next Meeting:

Other:

CITY OF MERCED DISASTER COUNCIL MEETING MINUTES

April 19, 2013
1000 hours – 1135 hours
City of Merced
City Council Chambers (2nd Floor)
678 W. 18th Street
Merced, CA 95340

Meeting called by:	John Bramble, City Manager Director of Emergency Services	**Type of meeting:**	Merced Disaster Council
Facilitator:	John Bramble, City Manager Director of Emergency Services	**Note taker:**	Janet German

Attendees:

Committee Members Present: John Bramble, Mike McLaughlin, Laure Dickinson, David Gonzalves, Stan Murdock, RoseMary Parga Duran, and John Sundgren.

Committee Members Absent: Dan Aguilar, Norm Andrade, Kelly Bentz, Richard Dye, Brad Grant, Mike Wegley.

Others Present: Katrina Poitens (American Red Cross), Jamie Moua (Merced College – Police), Denise Butler (Merced College), Shawn Henry (City of Merced Fire Department), Ed Banks (Office of Emergency Services), Norma Cardona (Merced Union High School District), Ann Andersen (League of Women Voters of Merced County).

Minutes

Agenda item: Call to Order. **Presenter:** John Bramble

Discussion: The meeting was called to order at 10:07 a.m. by the Director of Emergency Services, John Bramble.

Conclusions: Meeting called to order.

Action items: None **Person responsible:**

Agenda item: Roll Call **Presenter:** German

Discussion:

Committee Members in Attendance: John Bramble, Mike McLaughlin, Laure Dickinson, David Gonzalves, Stan Murdock, RoseMary Parga Duran, John Sundgren.

Committee Members Not in Attendance: Dan Aguilar, Norm Andrade, Kelly Bentz, Richard Dye, Brad Grant, Mike Wegley.

Conclusions: Quorum Exists

Action items: **Person responsible:**

Agenda item: Approve Meeting Minutes – December 7, 2012 and January 25, 2013 **Presenter:** John Bramble

Discussion: Motion was made by David Gonzalves and seconded by Michael McLaughlin. Motion carried unanimously to approve the minutes of December 7, 2012 and January 25, 2013.

Conclusions: Motion was made by David Gonzalves and seconded by Michael McLaughlin. Motion carried unanimously to approve the minutes of both December 7, 2012 and January 25, 2013.

Action items: Motion was made by David Gonzalves and seconded by Michael McLaughlin to approve the minutes of both the December 7, 2012 and January 25, 2013 meetings. Motion carried unanimously. **Person responsible:** John Bramble, Mike McLaughlin, Laure Dickinson, David Gonzalves, Stan Murdock, RoseMary Parga Duran, John Sundgren.

Agenda item: Merced County Emergency Notification System **Presenter:** Michael McLaughlin

Discussion: Michael McLaughlin provided an overview of the Merced County Emergency Notification System.

Conclusions: Michael McLaughlin provided an overview of the Merced County Emergency Notification System.

Action items: None **Person responsible:**

Agenda item: Chapter 5 – Plan Maintenance **Presenter:** Bill King

Discussion: Bill King combined this agenda item with the next agenda item, LHMP Plan Review.

Conclusions: See next item.

Action items: None **Person responsible:**

Agenda item: LHMP Plan Review **Presenter:** Bill King

Discussion: Bill King presented the LHMP Plan, which will be forwarded to Federal and State agencies upon the Disaster Council's approval of the plan.

Conclusions: It was recommended by David Gonzalves to push the Target Implementation Schedule back from the Years 2014 – 2018 to the Years 2015 – 2019. Refer to Table 4-8: Target Implementation Schedule and Responsible Leadership located in Chapter 4: Mitigation Strategy. Also, in response to some confusion regarding Action 8 in Table 4-8, staff explained that clarification would be added to the document.

Action item 1: Motion: Moved by David Gonzalves, to move the dates to begin in the Year 2015 and ending in 2019 (rather than the Year 2014 to 2018), shifting all actions appropriately, and making accommodations to Table 4-8 to make it more accurately affect those involved. Prior to being seconded by John Sundgren, he asked Mr. Gonzalves if he would include in his motion to move Action 8 to Year 2018, to which Mr. Gonzalves agreed. Motion carried unanimously. **Person responsible:** John Bramble, Mike McLaughlin, Laure Dickinson, David Gonzalves, Stan Murdock, RoseMary Parga Duran, John Sundgren.

Action item 2: Motion: Moved by Mike McLaughlin and seconded by Stan Murdock that the LHMP Plan be submitted to the State and Federal agencies. Motion carried unanimously. **Person responsible:** John Bramble, Mike McLaughlin, Laure Dickinson, David Gonzalves, Stan Murdock, RoseMary Parga Duran, John Sundgren.

Agenda item: Good of the Order **Presenter:** Group

Discussion: It was suggested that the Disaster Council Bylaws be changed to allow committee members to designate an alternate who will have the same voting powers as the actual committee member.

Conclusions: Allow the committee members to designate an alternate who will have the same voting powers as the actual committee member.

Action items: Motion: Moved by Stan Murdock and seconded by Michael McLaughlin that the Bylaws be revised to allow for committee members to designate an alternate who will have the same voting powers as the actual committee member. Motion carried unanimously. **Person responsible:** Secretary to place item on the agenda, and, Disaster Council to take action.

Secretary's note: This item will need to be placed on a future agenda and action taken at that meeting.

Agenda item: Adjournment **Presenter:** Michael McLaughlin

Discussion:

Conclusions: No regular meeting was scheduled. Meeting adjourned on 04/19/13 at 1135 hours.

Action items: None **Person responsible:**

Respectfully Submitted by

Janet German
Clerk

Date of Approval

Appendix B

Photographic Log and Credits

Image Location	Description	Credit
Chapter 1 Executive Summary		
Cover Sheet (top left)	Merced flood, 1933 or 1935. 17th Street, Hotel Tioga in background, people were stranded in hotel for 3 days.	Merced County Historical Society Archives, image # 84-1-1.
Cover Sheet (top right)	Train wreck.	Merced County Historical Society Archives, image # 95-46-267.
Cover Sheet (bottom left)	Fire at Cosmopolitan Hotel.	Merced County Historical Society Archives, image # 2004-24-1.
Cover Sheet (bottom right)	1935 flood, downtown Merced.	Merced County Historical Society Archives, image # 84-63-55.
Section 1.3.2 , Page 4-4	Photo of Disaster Council Meeting	
Chapter 2 The Planning Process		
Cover Sheet (top left)	Train Derailment	Merced County Historical Society Archives, image # 91-25-1.
Cover Sheet (top right)	Flood, downtown Merced.	Merced County Historical Society Archives, image # 2004-24-40.
Cover Sheet (bottom left)	Aerial shot of flood in Merced, Courthouse visible in upper left quadrant.	Merced County Historical Society Archives, image # 2008-115-77.
Cover Sheet (bottom right)	Old Betsy	Merced County Historical Society Archives, image # 2004-63-47.
Section 2.1, Page 2-1	Photo of Lake Yosemite (northeast of Merced)	City of Merced
Section 2.1, Page 2-7	Aerial photo of North Merced	City of Merced
Section 2.3, Page 2-14	Flooded street in Merced	City of Merced
Section 2.3, Page 2-18	Photos of Disaster Council Meeting	City of Merced
Section 2.3, Page 2-21 & 2-22	Public outreach – "Market on Main Street"	City of Merced
Section 2.3, Page 2-23	Photos of Disaster Council Meetings	City of Merced
Section 2.4, Page 2-26	Photo of a house fire	City of Merced

Image Location	Description	Credit
Chapter 3 Risk Assessment		
Cover Sheet (top left)	April 1935, men clearing brush against bridge	Merced County Historical Society Archives, image # 2003-93-16.
Cover Sheet (top right)	Train wreck; men working on tracks.	Merced County Historical Society Archives, image # 95-46-269.
Cover Sheet (bottom left)	Cross Lumber Fire Company 1951	
Cover Sheet (bottom right)	Uprooted almond trees by tornado, near Le Grand.	Merced County Historical Society Archives, image # 2008-42-49.
Section 3.1, Page 3-1	Aerial Photo of Merced with Sierra Nevada in background	Photo by Hans Marsen , January 2004
Section 3.1.1, Page 3-2	Aerial Photo of Merced	
Section 3.1.1, Page 3-5	Pedestrian Bridge over Creek	
Section 3.1.1, Page 3-6	Santa Fe Railroad Station (1892)	
Section 3.1.1, Page 3-10	Photo of Residential Neighborhood abutting agriculture	
Section 3.2, Page 3-13	Photo of an old wind mill	
Section 3.3, Page 3-24	Merced City Fire Fighter at a house fire	
Section 3.3.1, Page 3-26	California flood of 1861, K Street, Sacramento	USGS
Section 3.3.1, Page 3-39	Flood of 1925 (Highway 99)	
Section 3.3.1, Page 3-39	Flood of 1935 Downtown Merced	
Section 3.3.1, Page 3-40	McKee Rd. and Bear Creek Drive 1955 (Christmas Eve)	
Section 3.3.1, Page 3-41	Photo of a bike path near Bear Creek and G Street	
Section 3.3.1, Page 3-43	Inundation of the State Capitol, Sacramento 1862	Urbanearth.gps.caltech. edu
Section 3.3.1, Page 3-44	Simulation of a winter megastorm	2010 Google, 2010 Europa Technologies Earthsky.org/earth/lucy-jones-on-California
Section 3.3.2, Page 3-47	Fire Fighters at residential neighborhood fire	
Section 3.3.5, Page 3-65	Aerial photo of the San Andreas Fault in the Carrizo Plain	
Section 3.3.6, Page 3-72	Dam failure crashed down on San Francisco Canyon	March 12, 1928
Section 3.3.8, Page 3-84	Oldest known photograph of a tornado – South Dakota	August 28, 1884
Section 3.3.8, Page 3-87	Funnel Cloud at Merced Airport	February 09, 2009
Section 3.4, Page 3-96	Flooded farmland – Merced County	
Section 3.4.8, Page 3-106	House fire, Merced	
Section 3.4,8, Page 3-118	Tornado impact to orchard in Le Grand, Merced County	

Section 3.4.9	Satellite image of dense fog in California's San Joaquin Valley	.http://www.geography.hunter.cuny.edu/~tbw/wc.notes/5.cond.precip/clouds/radiation_fog.htm
Image Location	**Description**	**Credit**
Chapter 4 Mitigation Strategy		
Cover Sheet (top left)	Uprooted trees block roadway.	Merced County Historical Society Archives, image # 2008-42-50.
Cover Sheet (top right)	Yosemite Valley RR derailment	Merced County Historical Society Archives, image # 94-66-1.
Cover Sheet (bottom left)	2 men in field. Handle used to poke ground. Trying to put out fire.	Merced County Historical Society Archives, image # 84-66-23.
Cover Sheet (bottom right)	Flood of 1925. Hwy 99 north of Merced	Merced County Historical Society Archives, image # 83-2-257.
Chapter 5 Plan Maintenance		
Cover Sheet (top left)	Flood 1950. Flood at Star Grocery	Merced County Historical Society Archives
Cover Sheet (top right)	Horse-drawn Fire Truck	Merced County Historical Society Archives, image # 2004-100-50.
Cover Sheet (bottom left)	Christmas Eve 1955 McKee and Bear Creek Drive	Merced County Historical Society Archives, image # 2007-19-35.
Cover Sheet (bottom right)	Flooded residential area.	Merced County Historical Society Archives, image # 2006-40-4.
Image Location	**Description**	**Credit**
Chapter 6 Appendices		
Cover Sheet (top left)	Carpet Town Fire	Merced County Historical Society Archives, image # 2006-80-42.
Cover Sheet (top right)	Old Betsy	Merced County Historical Society Archives, image # 2004-63-50.
Cover Sheet (bottom left)	Flooded 16th Street	Merced County Historical Society Archives, image # 81-9-

		26.
Cover Sheet (bottom right)	Snelling, flooded aerial view, December 1950.	Merced County Historical Society Archives, image # 84-63-126.

<u>Other Photos that may be used in the document.</u>

84-63-125: Dec 24, 1955. Flooded aerial view w/courthouse.
2004-24-39: Main Street at N., flooded.
2008-42-35: fallen Westgate sign.
2008-42-36: falling Westgate sign.

Appendix C

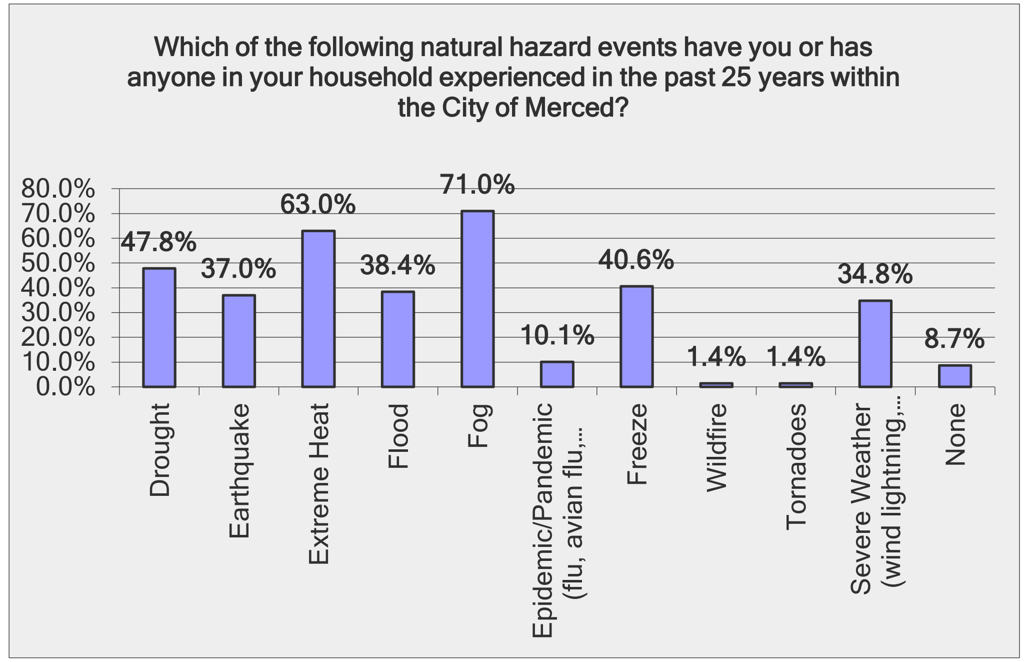
Community Hazards Public Survey

The planning process included participation of representatives from local government agencies and departments, stakeholder groups, and the general public. Public involvement helps to ensure that citizens understand what the community is doing on their behalf, and provides an opportunity for input on community vulnerabilities and mitigation activities that will inform the plan's content. Additionally, outreach efforts help to educate the public about hazards and risks in the community, types of activities to mitigate those risks, and how these impact them.

A Community Survey was created with 30 questions requesting public feedback and input to assist in creating a safer community. The survey was placed on the City's webpage, advertised in the media, utility billing, e-mail blasts to the Disaster Council and stakeholders, the Golden Valley Health Centers newsletter that serves over 250 residents, and distributed at all public outreach events resulting in 138 responses illustrated on the following pages.

Natural Hazard Community Awareness Survey
Question #1

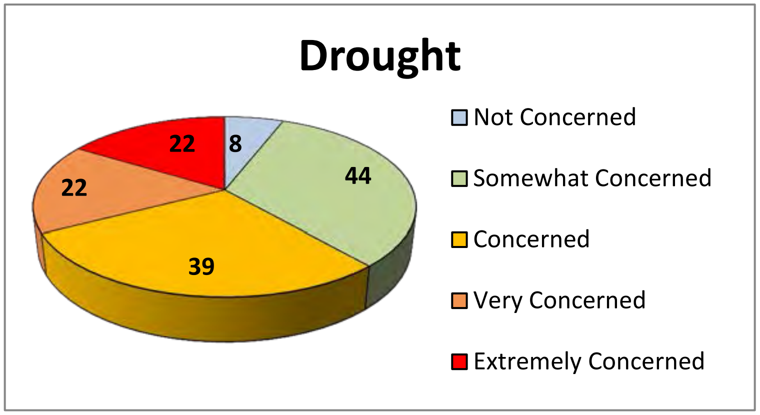
Which of the following natural hazard events have you or has anyone in your household experienced in the past 25 years within the City of Merced?		
Answer Options	**Response Percent**	**Response Count**
Drought	47.8%	66
Earthquake	37.0%	51
Extreme Heat	63.0%	87
Flood	38.4%	53
Fog	71.0%	98
Epidemic/Pandemic (flu, avian flu, H1N1, West Nile)	10.1%	14
Freeze	40.6%	56
Wildfire	1.4%	2
Tornadoes	1.4%	2
Severe Weather (wind lightning, winter storm, etc.)	34.8%	48
None	8.7%	12
Other (please specify)		1
	answered question	**138**
	skipped question	**0**

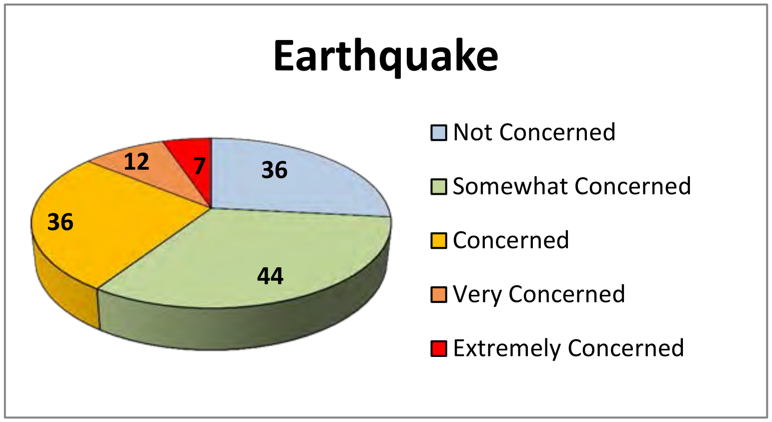


Other (please specify)	
1	Snow

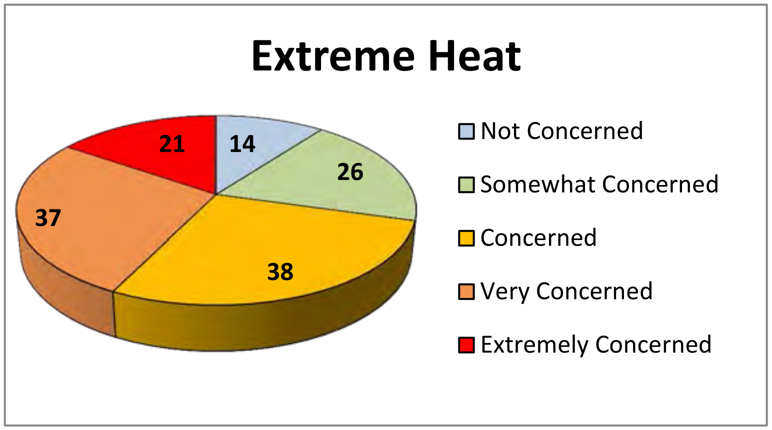
Natural Hazard Community Awareness Survey - Question #2

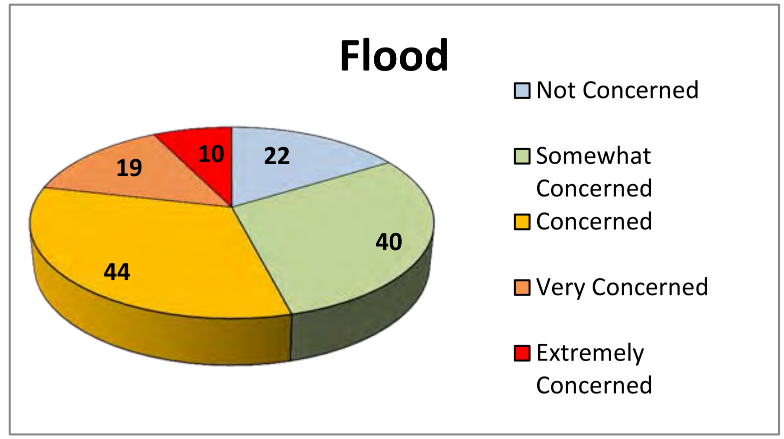
How concerned are you about the following natural hazards in the City of Merced?						
Answer Options	**Not Concerned**	**Somewhat Concerned**	**Concerned**	**Very Concerned**	**Extremely Concerned**	**Response Count**
Drought	8	44	39	22	22	135
Earthquake	36	44	36	12	7	135
Extreme Heat	14	26	38	37	21	136
Flood	22	40	44	19	10	134
Structure Fire	23	35	41	20	15	133
Train Derailment	32	37	39	19	6	133
Freeze	42	41	26	16	5	130
Wildfire	65	32	24	5	4	130
Severe Weather (wind, lightning, winter storm, etc.)	27	52	37	9	5	130
Epidemic/Pandemic (flu, avian flu, H1N1, West Nile)	23	42	40	16	10	131
					answered question	137
					skipped question	1

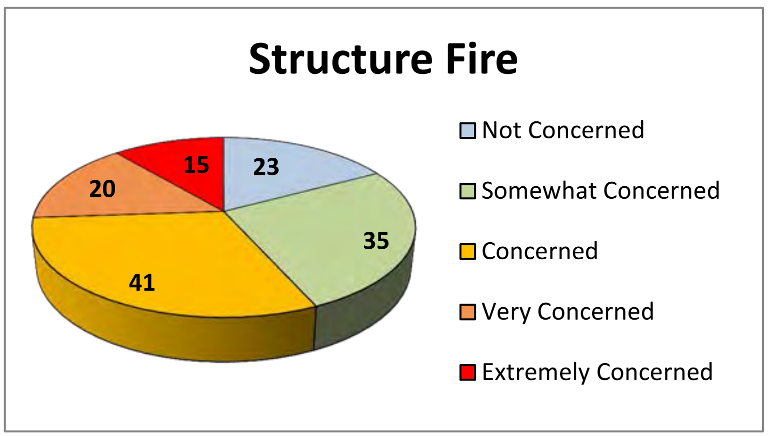


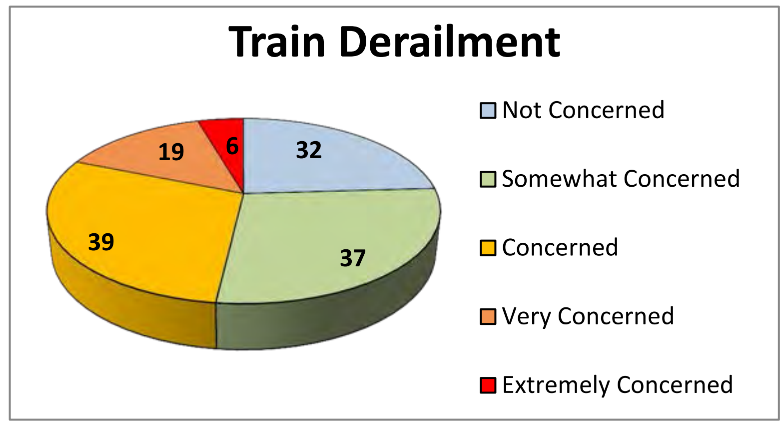


Natural Hazard Community Awareness Survey - Question #2

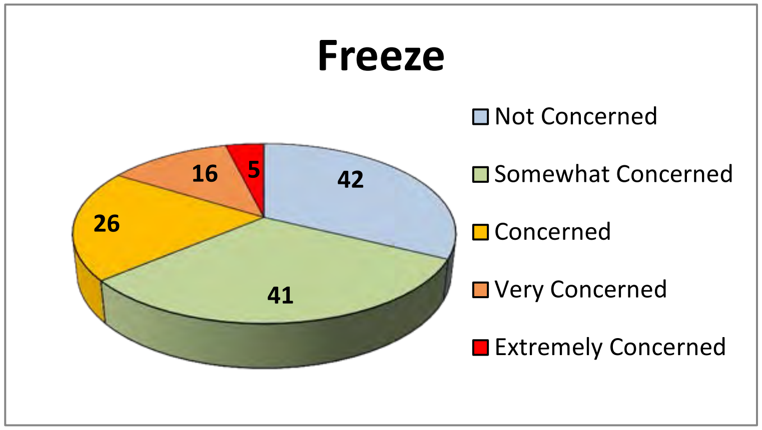


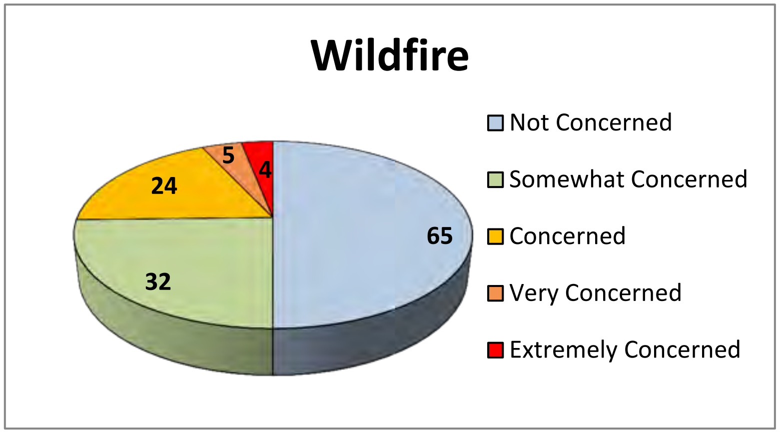


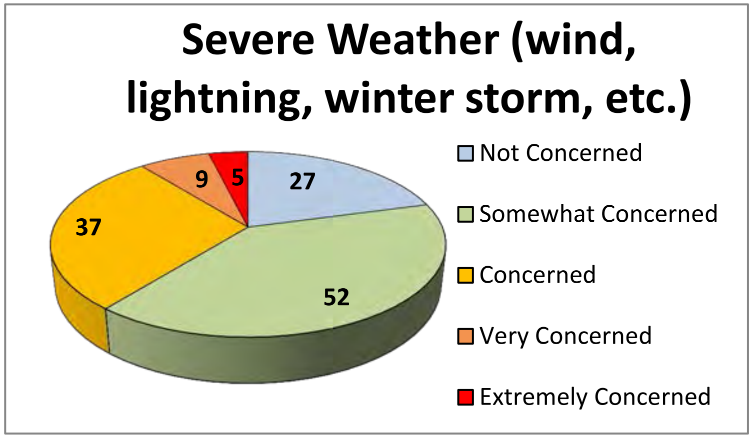


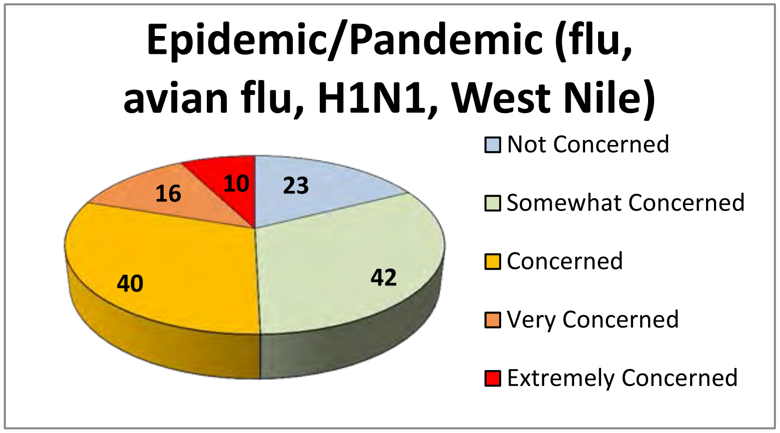


Natural Hazard Community Awareness Survey - Question #2



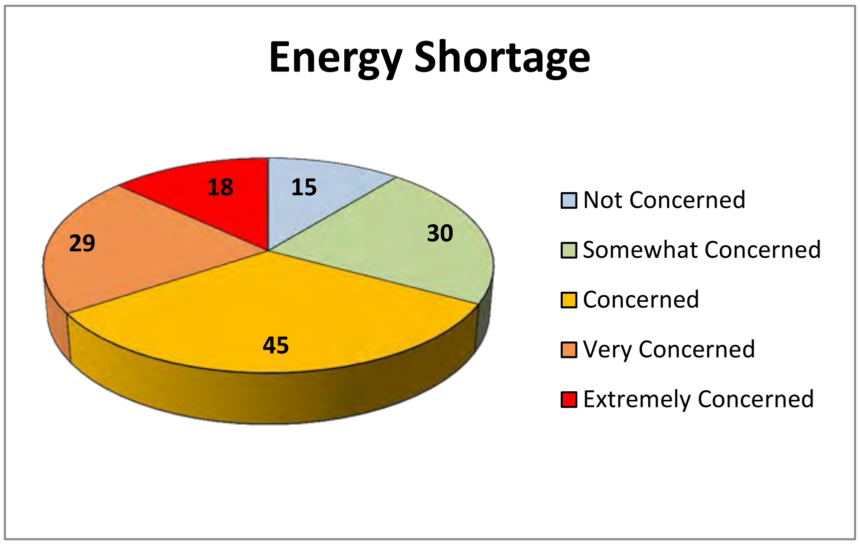


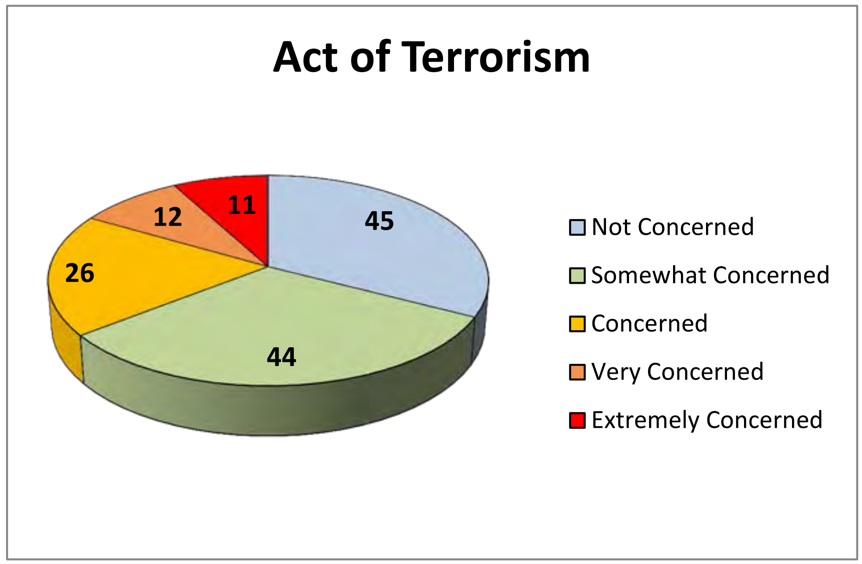




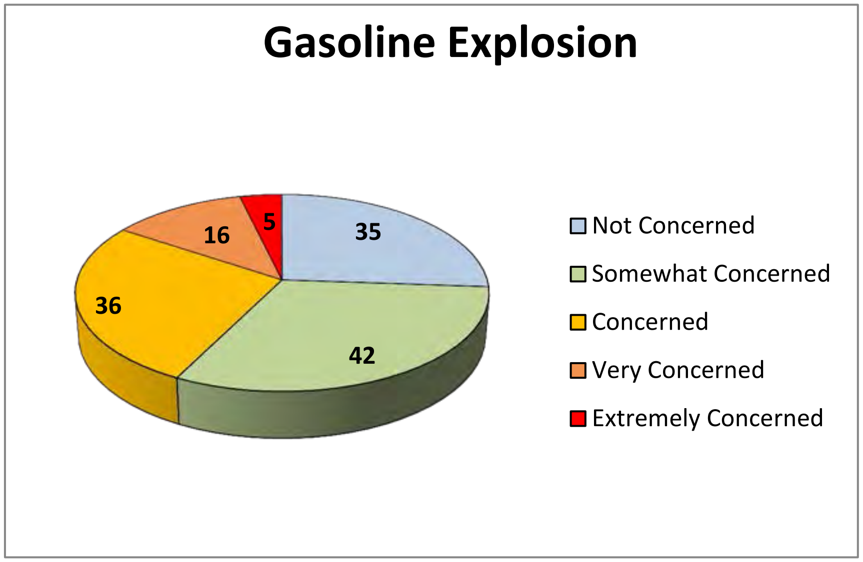
Natural Hazard Community Awareness Survey - Question #3

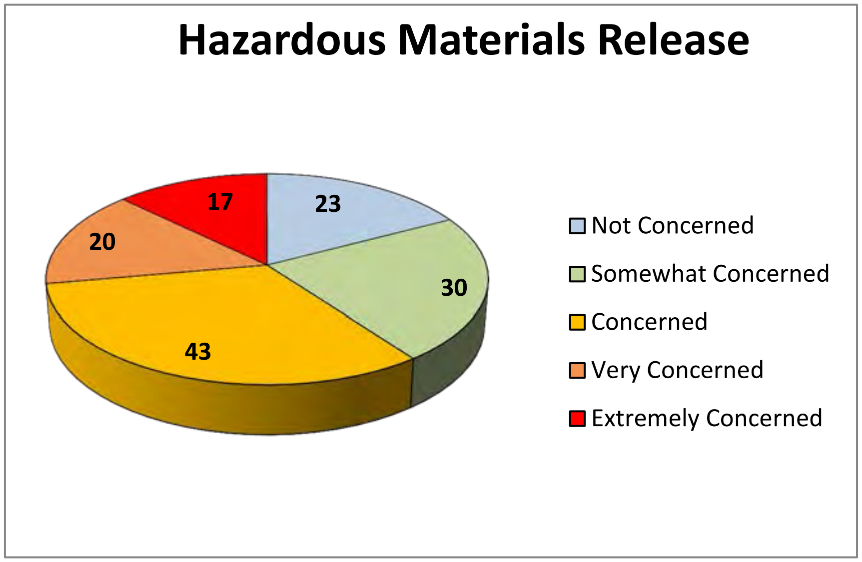
How concerned are you about the following man-made hazards in the City of Merced?						
Answer Options	**Not Concerned**	**Somewhat Concerned**	**Concerned**	**Very Concerned**	**Extremely Concerned**	**Response Count**
Energy Shortage	15	30	45	29	18	137
Act of Terrorism	45	44	26	12	11	138
Gasoline Explosion	35	42	36	16	5	134
Hazardous Materials Release	23	30	43	20	17	133
Other Human-Caused Hazard (civil unrest; data or telecommunications; explosion; infrastructure/utility failure/jail event; urban fire; technological failure; transportation incident including train and airplane; unexploded munitions; arson/commercial fire and others)	20	40	42	17	16	135
					answered question	138
					skipped question	0

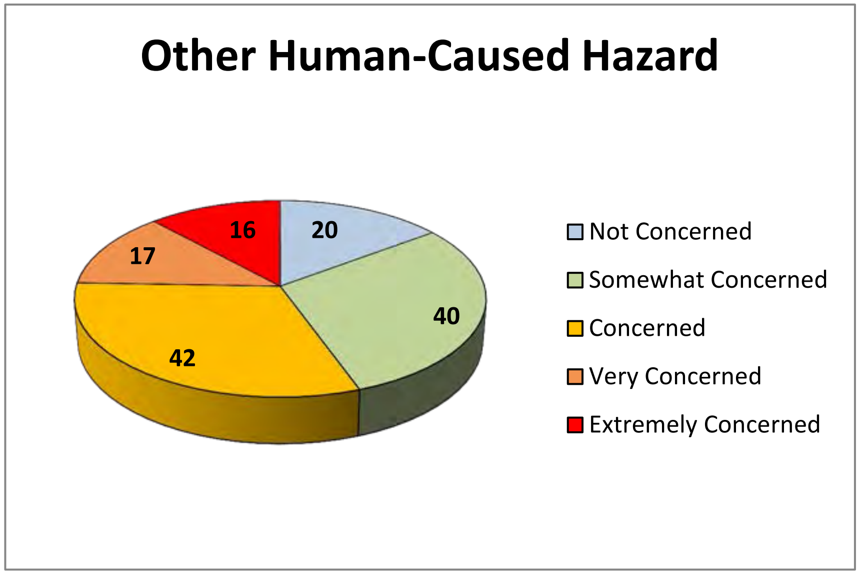




Natural Hazard Community Awareness Survey - Question #3

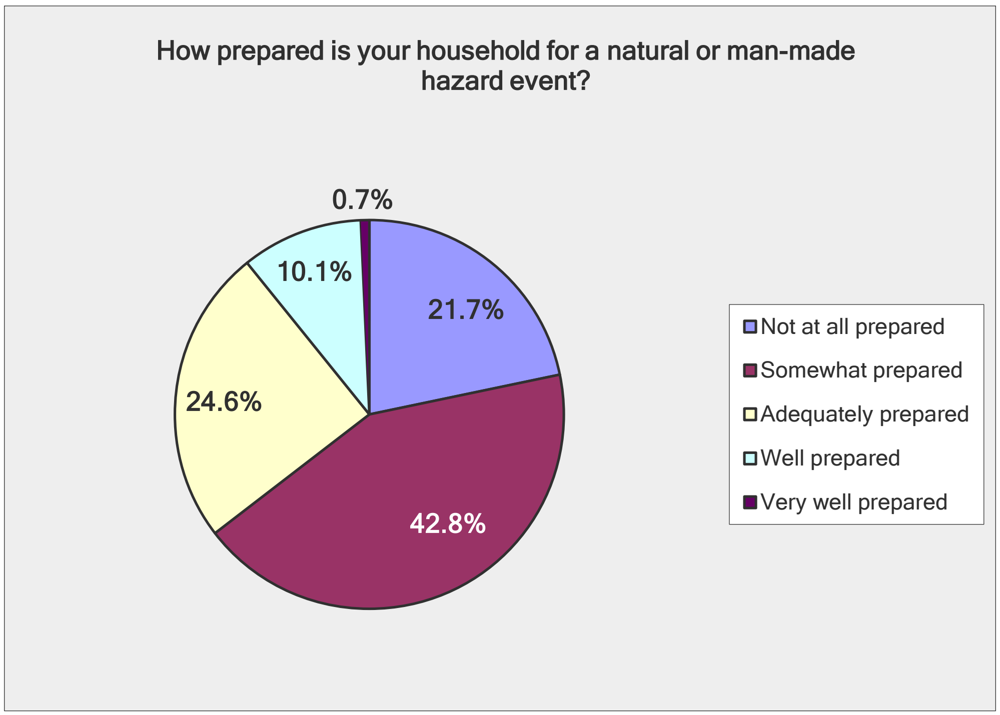




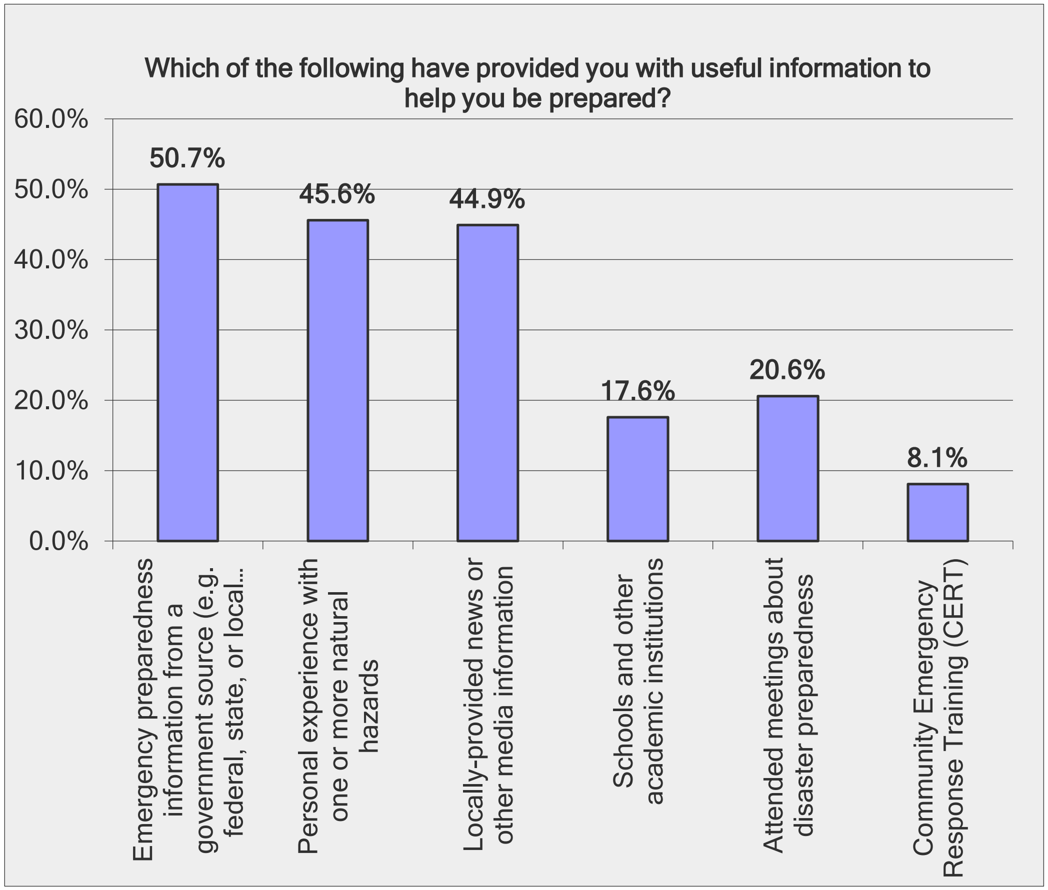


Natural Hazard Community Awareness Survey
Question #4

How prepared is your household for a natural or man-made hazard event?		
Answer Options	**Response Percent**	**Response Count**
Not at all prepared	21.7%	30
Somewhat prepared	42.8%	59
Adequately prepared	24.6%	34
Well prepared	10.1%	14
Very well prepared	0.7%	1
	answered question	**138**
	skipped question	**0**



Natural Hazard Community Awareness Survey Question 5



Which of the following have provided you with useful information to help you be prepared?		
Answer Options	**Response Percent**	**Response Count**
Emergency preparedness information from a government source (e.g. federal, state, or local emergency management)	50.7%	69
Personal experience with one or more natural hazards	45.6%	62
Locally-provided news or other media information	44.9%	61
Schools and other academic institutions	17.6%	24
Attended meetings about disaster preparedness	20.6%	28
Community Emergency Response Training (CERT)	8.1%	11
Other (please specify) - See Responses - Next Page		19
	answered question	**136**
	skipped question	**2**

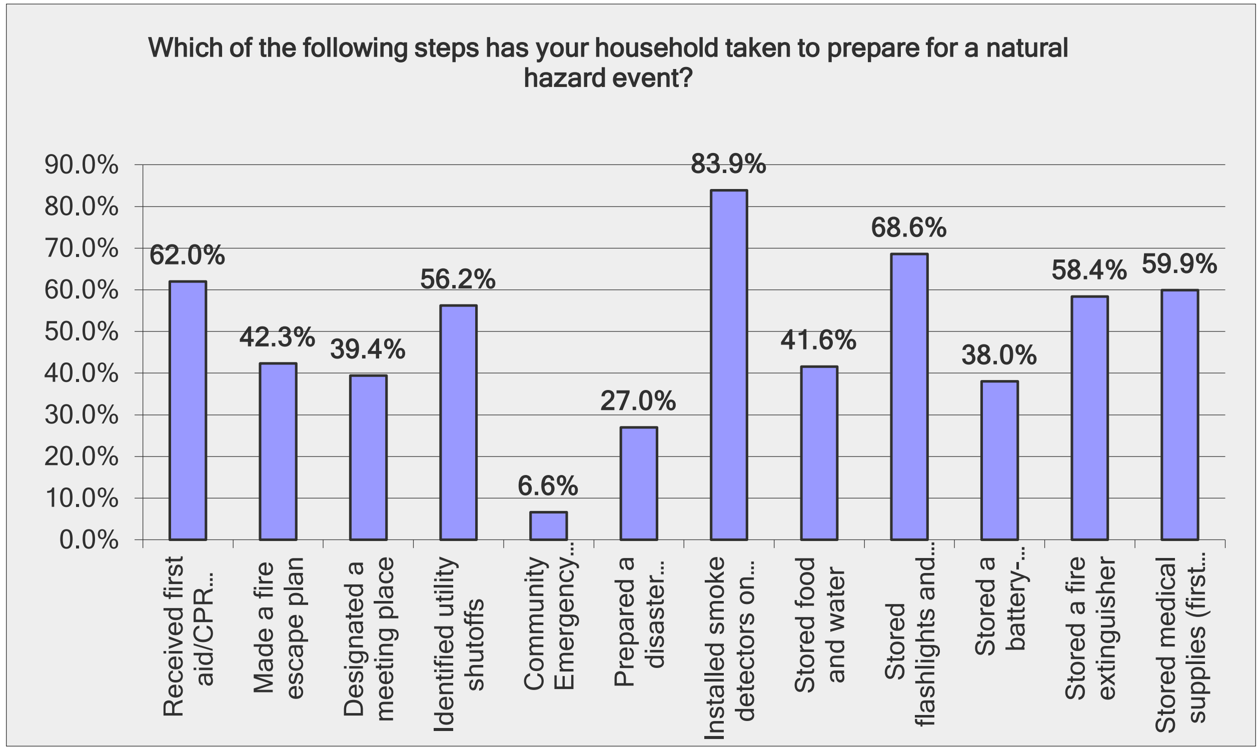
Natural Hazard Community Awareness Survey
Question 5

Other (please specify)	
1	USAF: Chief, Disaster Preparedness/Air Base Survivability, Clark AB, Philippines
2	Monthly 'City of Merced' Water Bill and 'newsletter'
3	LDS Church is heavy on Preparedness
4	None
5	common sense
6	None
7	Red Cross
8	Actually none of the above. Why does this question "require an answer"? Fix your survey.
9	Retired Military - DP Training
10	Television Programs on how to be prepared for emergency situations
11	None.
12	American Red Cross
13	Non-government emergency preparedness websites.
14	Red Cross, Boy Scouts
15	2nd Annual Disaster Management Initiative May 2011 NASA Ames rally
16	Church (LDS) I was also a Firefighter for Merced County
17	Boy Scouts and common sense
18	Health and Safety classes I take that are required to be a foster parent.
19	ICS -

Natural Hazard Community Awareness Survey
Question #6

Which of the following steps has your household taken to prepare for a natural hazard event?		
Answer Options	Response Percent	Response Count
Received first aid/CPR training	62.0%	85
Made a fire escape plan	42.3%	58
Designated a meeting place	39.4%	54
Identified utility shutoffs	56.2%	77
Community Emergency Response Training (CERT)	6.6%	9
Prepared a disaster supply kit	27.0%	37
Installed smoke detectors on each level of the house	83.9%	115
Stored food and water	41.6%	57
Stored flashlights and batteries	68.6%	94
Stored a battery-powered radio	38.0%	52
Stored a fire extinguisher	58.4%	80
Stored medical supplies (first aid kit, medications)	59.9%	82
Other (please specify) "See Responses Next Page"		6
	answered question	137
	skipped question	1

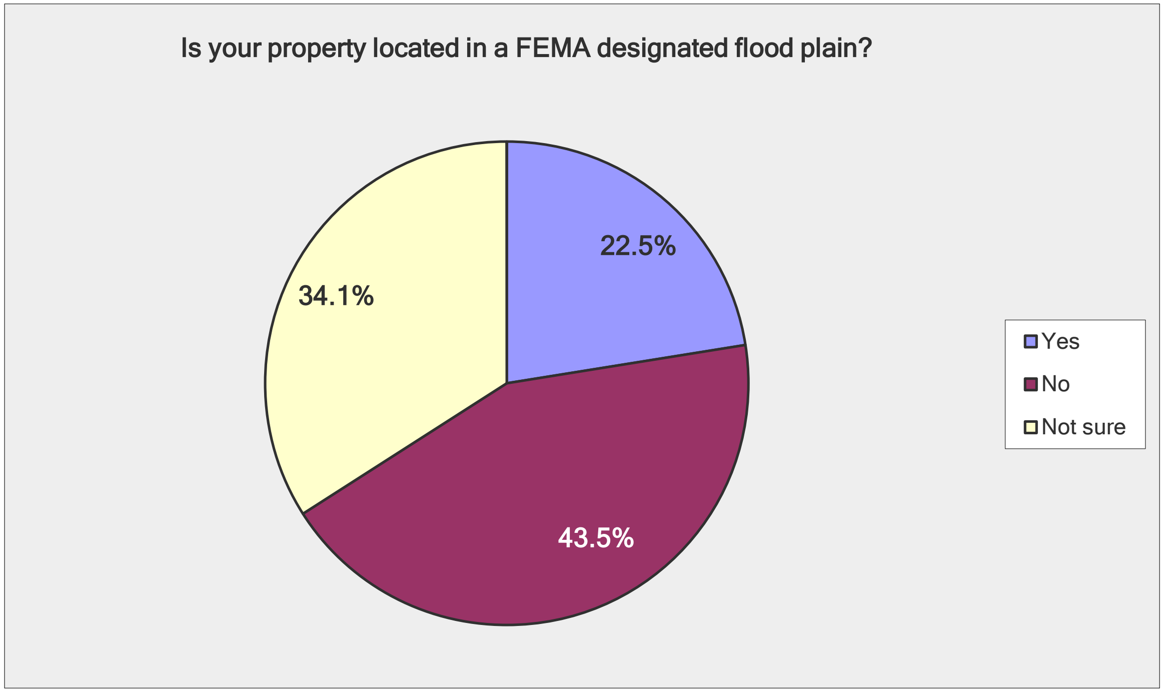
Natural Hazard Community Awareness Survey
Question #6



Other (please specify)	
1	none
2	cash
3	YIKES! We haven't done much of anything...
4	working on a disaster supply kit
5	none
6	I have a 72 hour kit and working of one year of Food and Water storage

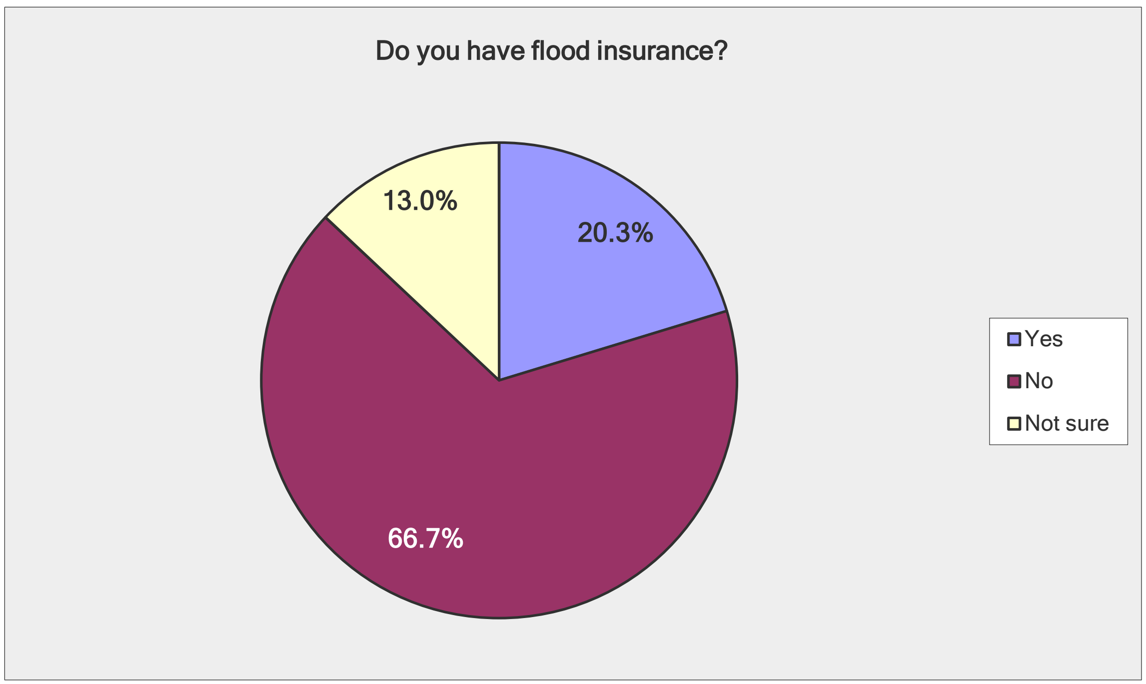
Natural Hazard Community Awareness Survey
Question #7

Is your property located in a FEMA designated flood plain?		
Answer Options	Response Percent	Response Count
Yes	22.5%	31
No	43.5%	60
Not sure	34.1%	47
	answered question	138
	skipped question	0



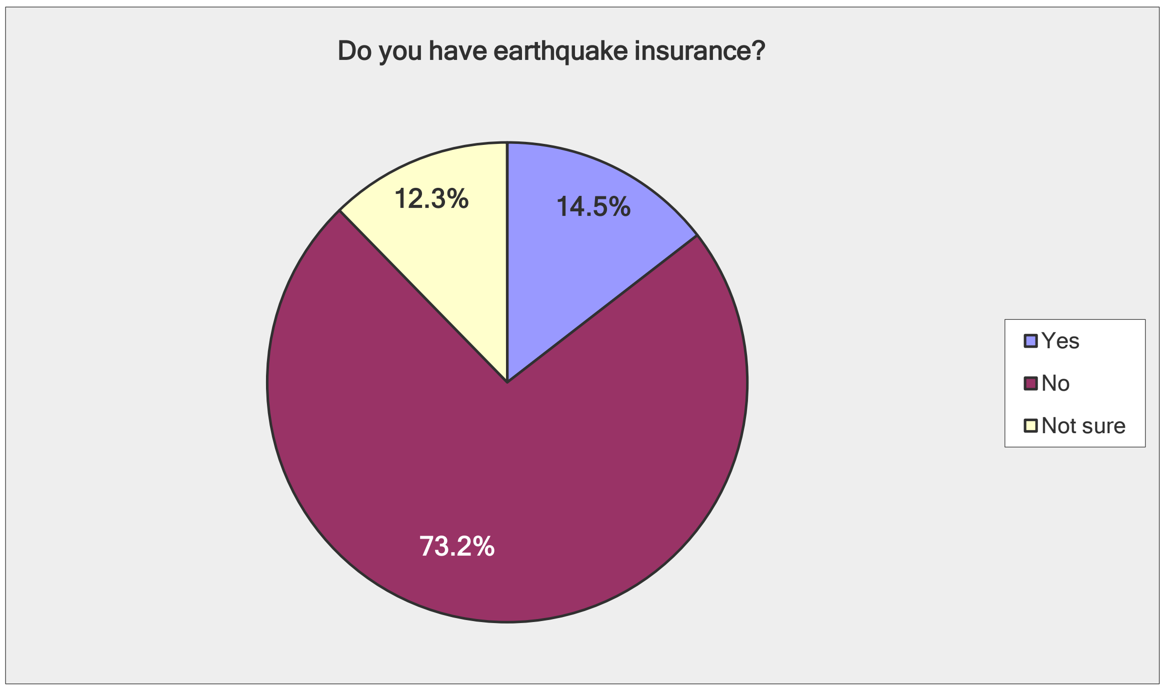
Natural Hazard Community Awareness Survey
Question #8

Do you have flood insurance?		
Answer Options	Response Percent	Response Count
Yes	20.3%	28
No	66.7%	92
Not sure	13.0%	18
	answered question	138
	skipped question	0



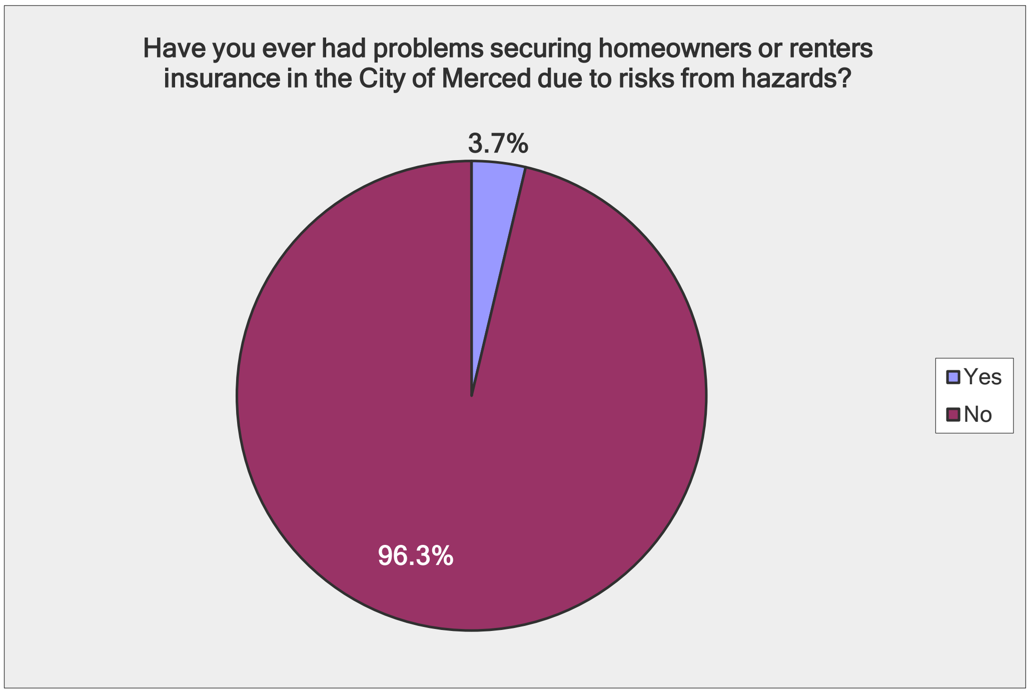
Natural Hazard Community Awareness Survey
Question #9

Do you have earthquake insurance?		
Answer Options	Response Percent	Response Count
Yes	14.5%	20
No	73.2%	101
Not sure	12.3%	17
answered question		138
skipped question		0



Natural Hazard Community Awareness Survey
Question #10

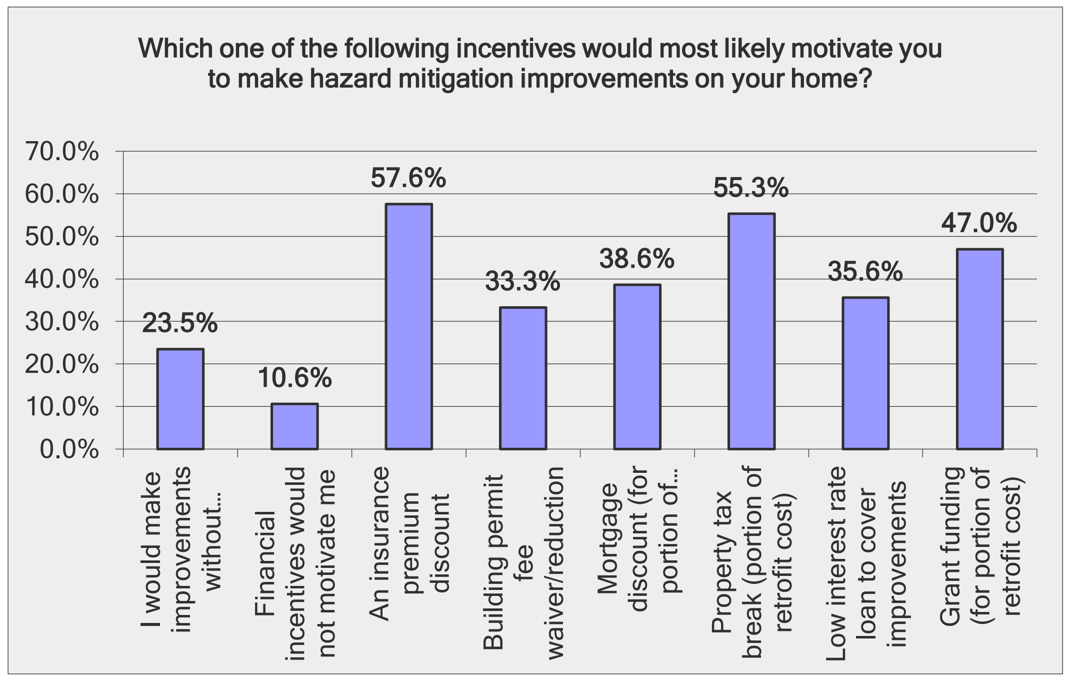
Have you ever had problems securing homeowners or renters insurance in the City of Merced due to risks from hazards?		
Answer Options	Response Percent	Response Count
Yes	3.7%	5
No	96.3%	131
If yes, what caused the difficulty? "See Responses Below"		4
	answered question	136
	skipped question	2



If yes, what hazard caused the difficulty?	
1	Have not applied
2	I rent
3	Fire & Theft
4	Flood, earthquake

Natural Hazard Community Awareness Survey
Question #11

Which one of the following incentives would most likely motivate you to make hazard mitigation improvements on your home?		
Answer Options	Response Percent	Response Count
I would make improvements without incentives	23.5%	31
Financial incentives would not motivate me	10.6%	14
An insurance premium discount	57.6%	76
Building permit fee waiver/reduction	33.3%	44
Mortgage discount (for portion of retrofit cost)	38.6%	51
Property tax break (portion of retrofit cost)	55.3%	73
Low interest rate loan to cover improvements	35.6%	47
Grant funding (for portion of retrofit cost)	47.0%	62
Other (please specify) "See Responses Next Page"		9
	answered question	132
	skipped question	6

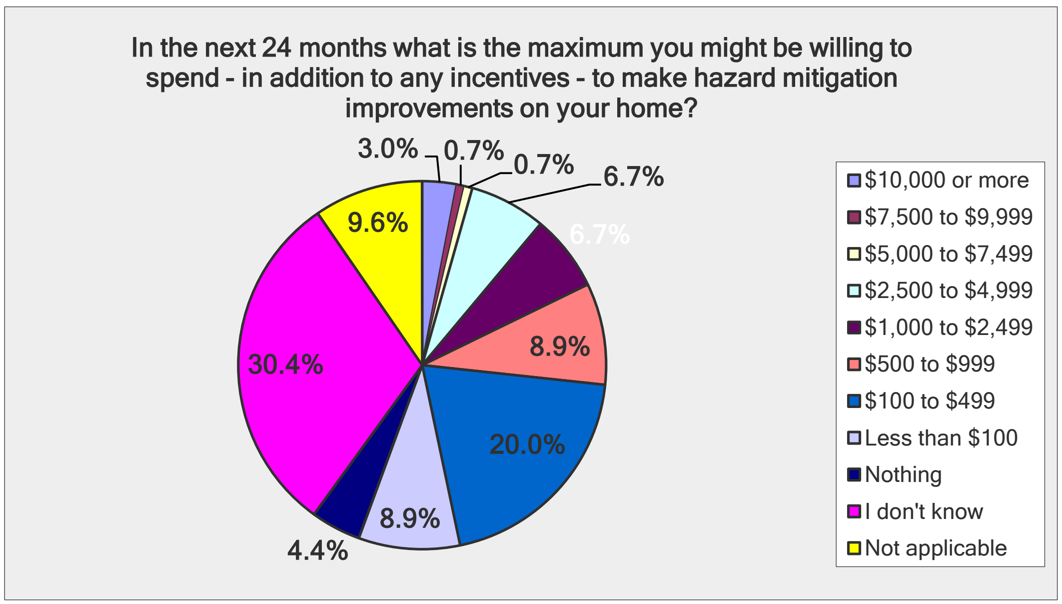


Natural Hazard Community Awareness Survey
Question #11

	Other (please specify)
1	I rent
2	Need financial assistance to make improvements and store supplies
3	NONE: Gov't Incentives = Handouts = Creating Dependency
4	We rent - up to landlord to provide
5	I'm a renter- so I'm not sure if this applies.
6	I do not own a house
7	What do you mean by "hazard mitigation improvements on my home"? Do you have suggestions?
8	What kind of improvements can be done at an individual property? This doesn't make sense. I don't think government should be spending (much) money for this.
9	however I rent

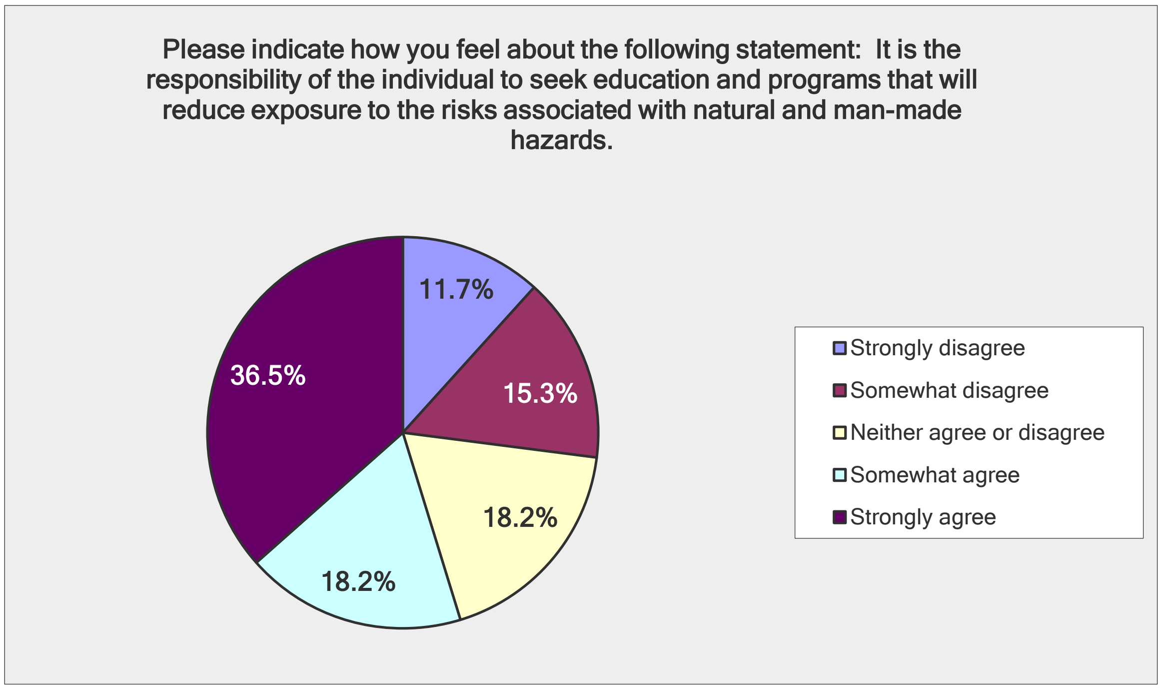
Natural Hazard Community Awareness Survey
Question #12

In the next 24 months what is the maximum you might be willing to spend - in addition to any incentives - to make hazard mitigation improvements on your home?		
Answer Options	**Response Percent**	**Response Count**
$10,000 or more	3.0%	4
$7,500 to $9,999	0.7%	1
$5,000 to $7,499	0.7%	1
$2,500 to $4,999	6.7%	9
$1,000 to $2,499	6.7%	9
$500 to $999	8.9%	12
$100 to $499	20.0%	27
Less than $100	8.9%	12
Nothing	4.4%	6
I don't know	30.4%	41
Not applicable	9.6%	13
	answered question	135



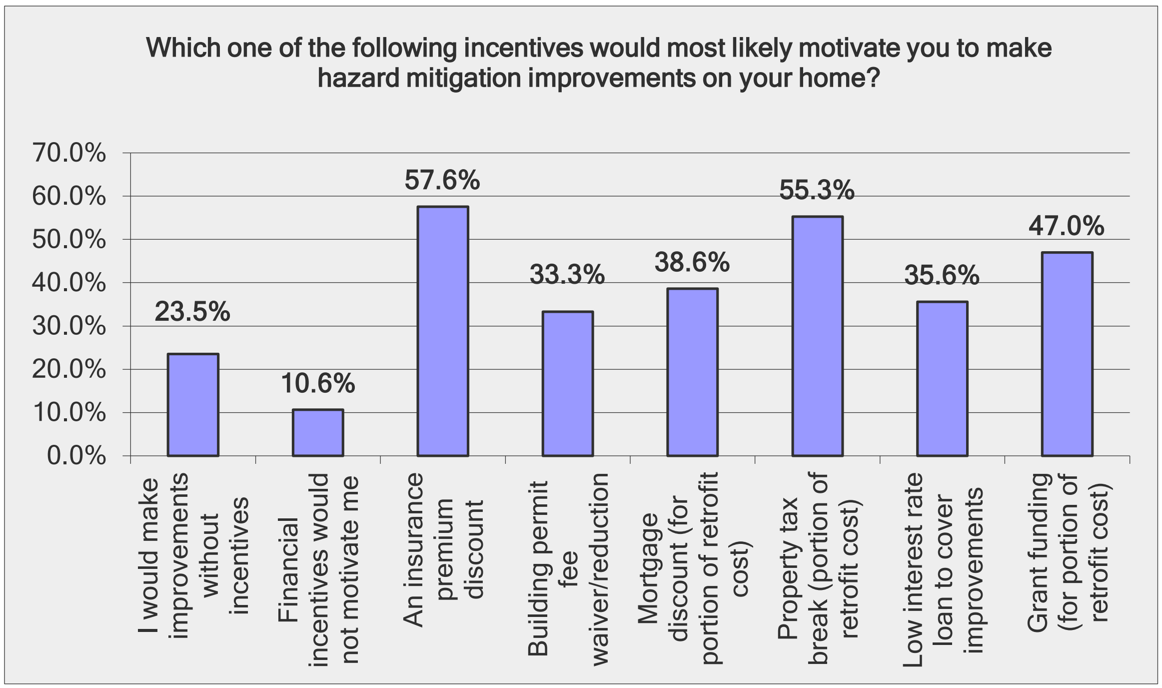
Natural Hazard Community Awareness Survey
Question #13

Please indicate how you feel about the following statement: It is the responsibility of the individual to seek education and programs that will reduce exposure to the risks associated with natural and man-made hazards.		
Answer Options	**Response Percent**	**Response Count**
Strongly disagree	11.7%	16
Somewhat disagree	15.3%	21
Neither agree or disagree	18.2%	25
Somewhat agree	18.2%	25
Strongly agree	36.5%	50
	answered question	137
	skipped question	1



Natural Hazard Community Awareness Survey
Question #14

Which one of the following incentives would most likely motivate you to make hazard mitigation improvements on your home?		
Answer Options	Response Percent	Response Count
I would make improvements without incentives	23.5%	31
Financial incentives would not motivate me	10.6%	14
An insurance premium discount	57.6%	76
Building permit fee waiver/reduction	33.3%	44
Mortgage discount (for portion of retrofit cost)	38.6%	51
Property tax break (portion of retrofit cost)	55.3%	73
Low interest rate loan to cover improvements	35.6%	47
Grant funding (for portion of retrofit cost)	47.0%	62
Other (please specify) "See Responses Next Page"		9
	answered question	132
	skipped question	6

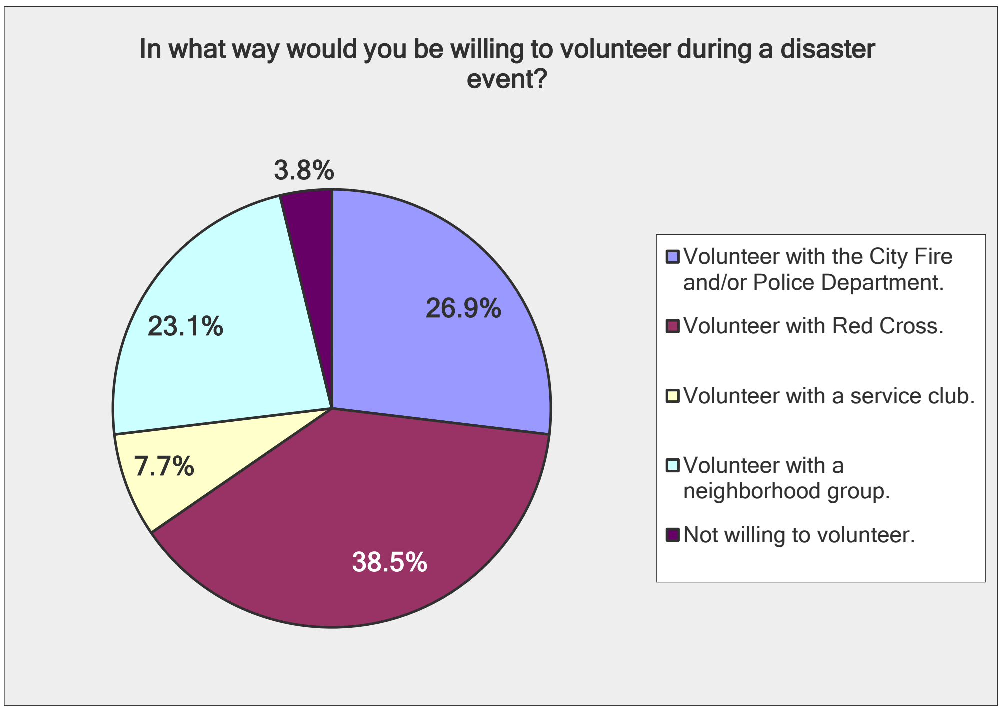


Natural Hazard Community Awareness Survey
Question #14

Other (please specify)	
1	I rent
2	Need financial assistance to make improvements and store supplies
3	NONE: Gov't Incentives = Handouts = Creating Dependency
4	We rent - up to landlord to provide
5	I'm a renter- so I'm not sure if this applies.
6	I do not own a house
7	What do you mean by "hazard mitigation improvements on my home"? Do you have suggestions?
8	What kind of improvements can be done at an individual property? This doesn't make sense. I don't think government should be spending (much) money for this.
9	however I rent

Natural Hazard Community Awareness Survey
Question #15

In what way would you be willing to volunteer during a disaster event?		
Answer Options	**Response Percent**	**Response Count**
Volunteer with the City Fire and/or Police Department.	26.9%	7
Volunteer with Red Cross.	38.5%	10
Volunteer with a service club.	7.7%	2
Volunteer with a neighborhood group.	23.1%	6
Not willing to volunteer.	3.8%	1
Other (please specify) "See Responses Next Page"		9
	answered question	26
	skipped question	112

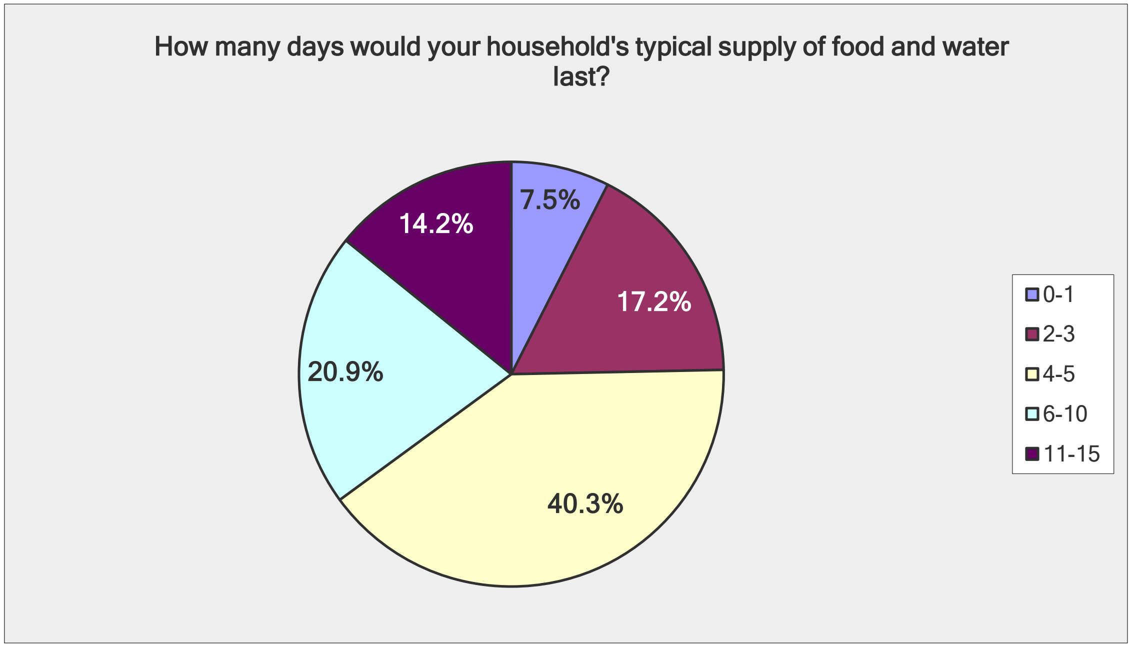


Natural Hazard Community Awareness Survey
Question #15

Other (please specify)	
1	I'm too old to do it
2	Volunteer with Red Cross also marked.
3	Also, volunteer with a neighborhood group was marked.
4	Also volunteer with a neighborhood group
5	Volunteer with a service club was also marked.
6	Volunteer w/Red Cross was marked, too.
7	Volunteer with a neighborhood group, also marked
8	I will volunteer with the first 4 entities above.
9	Volunteer with local church organization

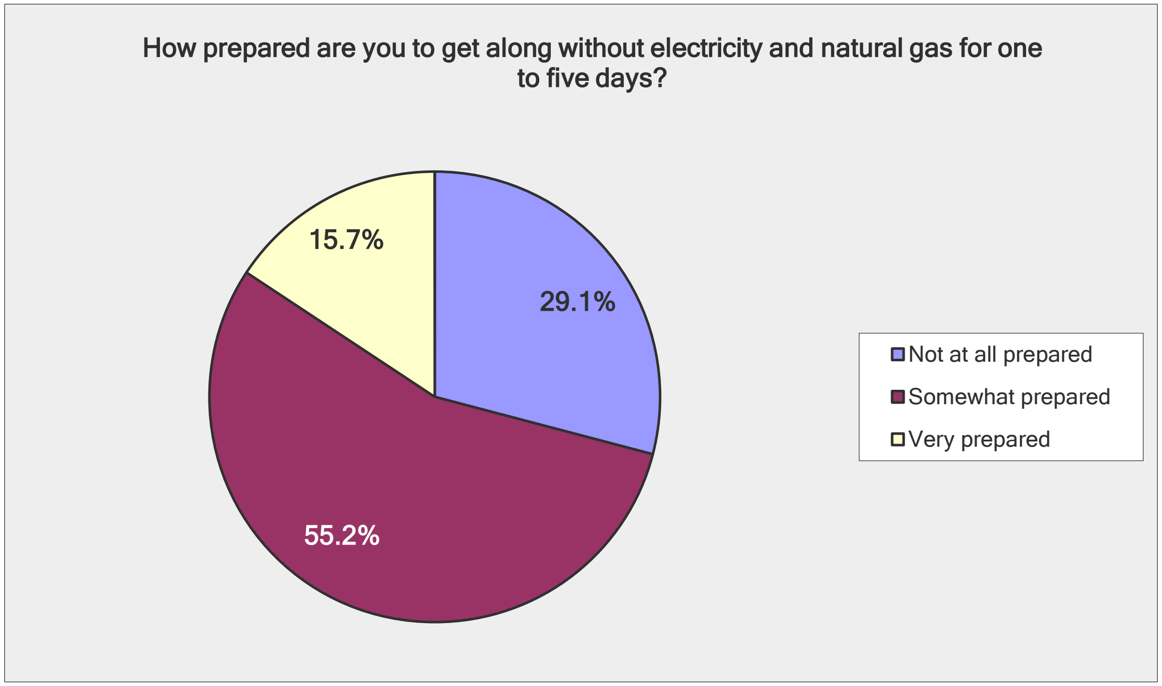
Natural Hazard Community Awareness Survey
Question #16

How many days would your household's typical supply of food and water last?		
Answer Options	Response Percent	Response Count
0-1	7.5%	10
2-3	17.2%	23
4-5	40.3%	54
6-10	20.9%	28
11-15	14.2%	19
	answered question	134
	skipped question	4



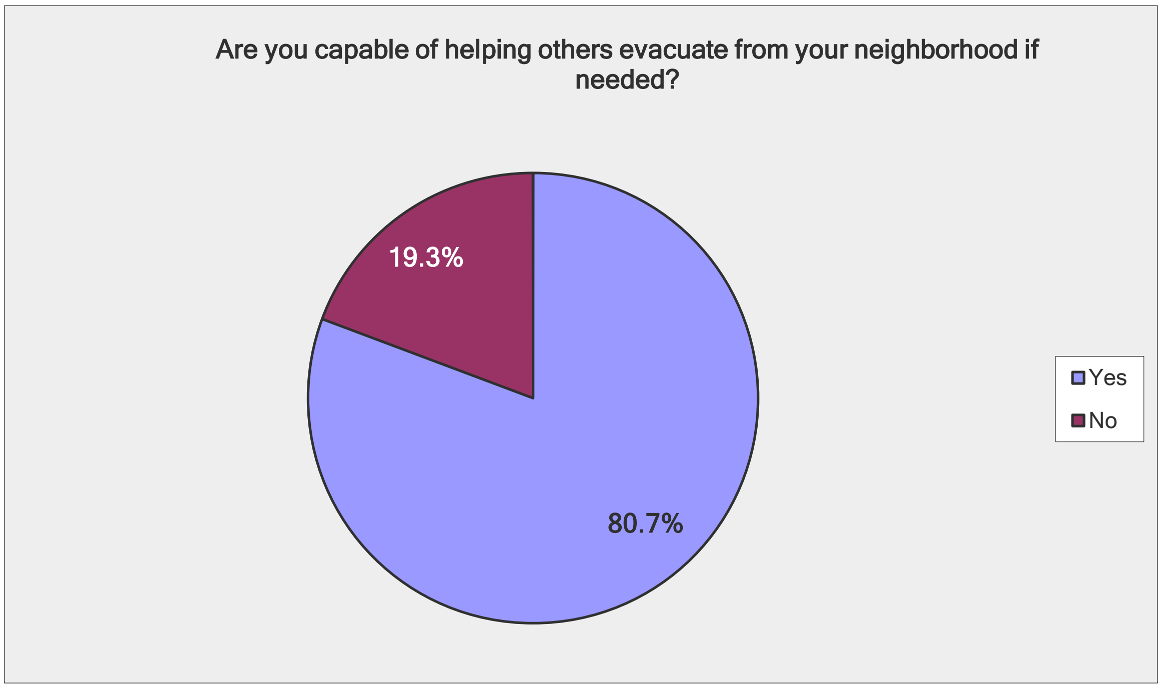
Natural Hazard Community Awareness Survey
Question #17

How prepared are you to get along without electricity and natural gas for one to five days?		
Answer Options	**Response Percent**	**Response Count**
Not at all prepared	29.1%	39
Somewhat prepared	55.2%	74
Very prepared	15.7%	21
	answered question	134
	skipped question	4



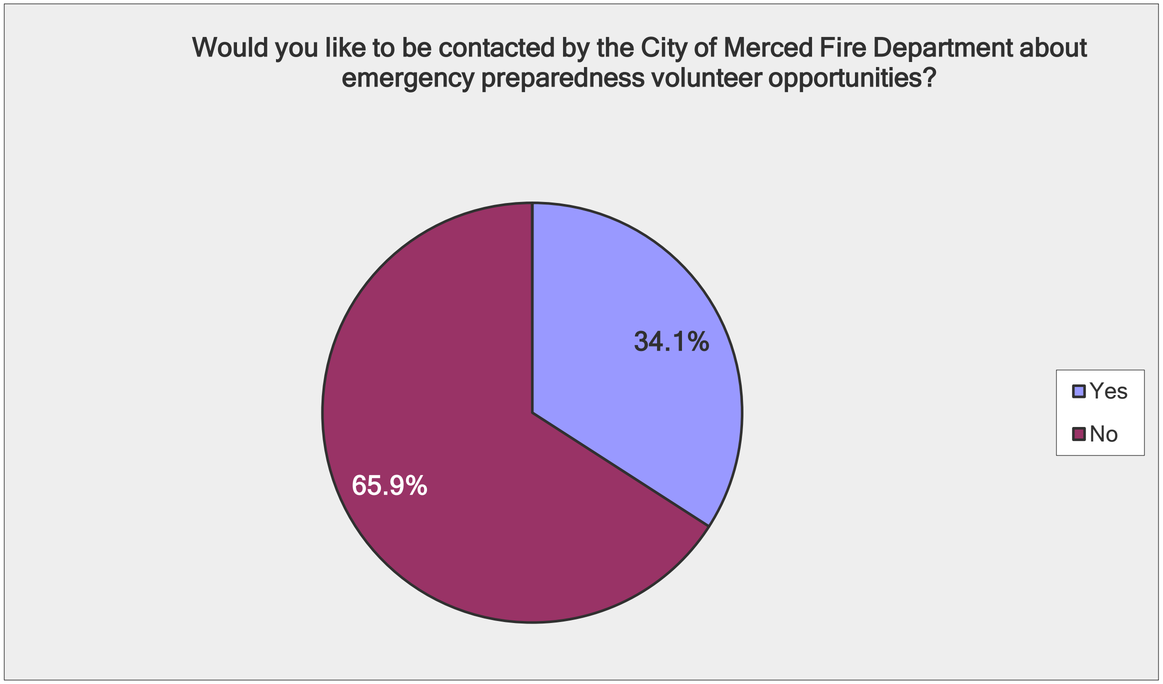
Natural Hazard Community Awareness Survey
Question #18

Are you capable of helping others evacuate from your neighborhood if needed?		
Answer Options	**Response Percent**	**Response Count**
Yes	80.7%	109
No	19.3%	26
	answered question	135
	skipped question	3



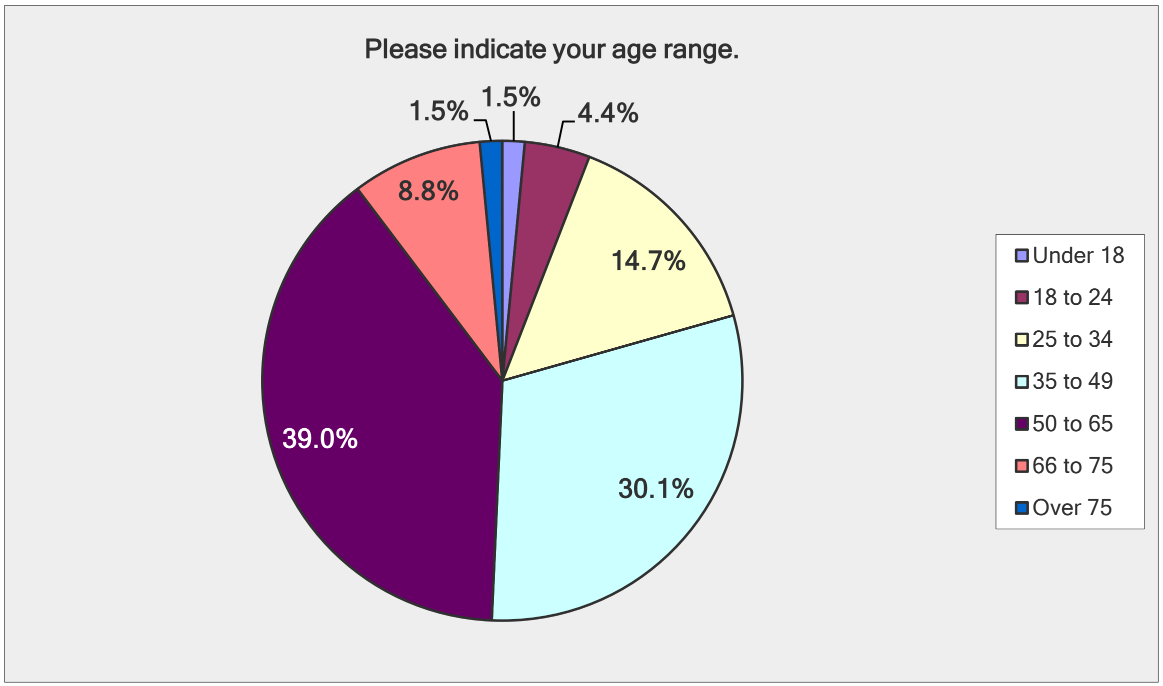
Natural Hazard Community Awareness Survey
Question #19

Would you like to be contacted by the City of Merced Fire Department about emergency preparedness volunteer opportunities?		
Answer Options	Response Percent	Response Count
Yes	34.1%	46
No	65.9%	89
	answered question	135
	skipped question	3



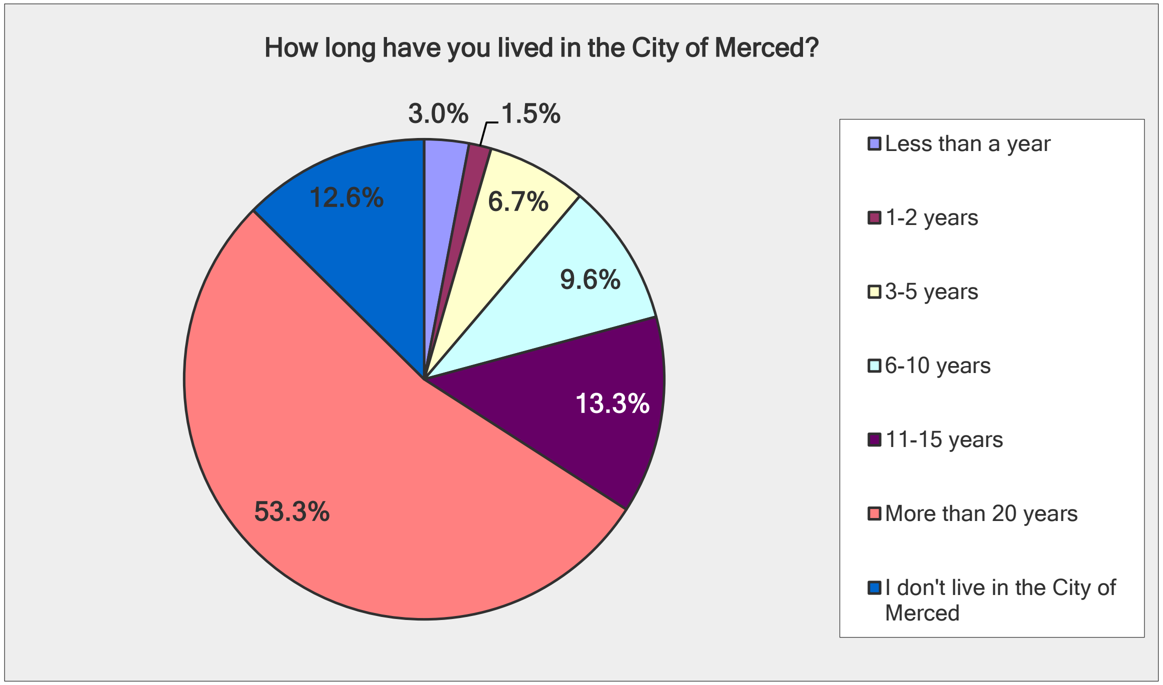
Natural Hazard Community Awareness Survey
Question #20

Please indicate your age range.		
Answer Options	Response Percent	Response Count
Under 18	1.5%	2
18 to 24	4.4%	6
25 to 34	14.7%	20
35 to 49	30.1%	41
50 to 65	39.0%	53
66 to 75	8.8%	12
Over 75	1.5%	2
	answered question	136
	skipped question	2



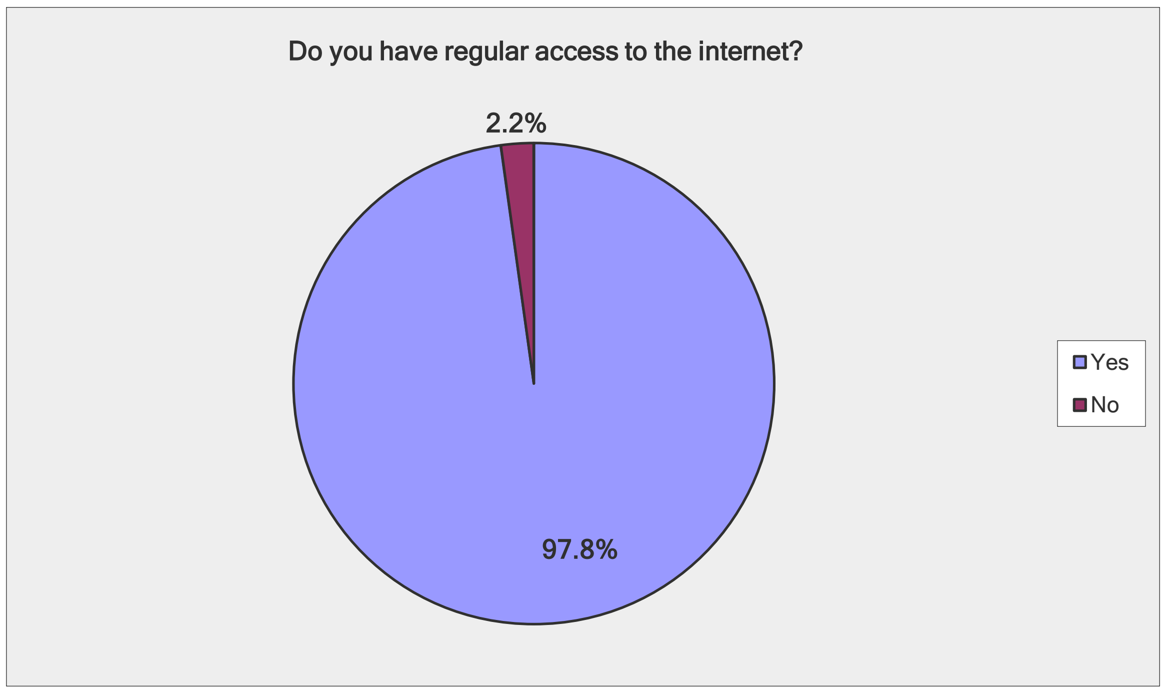
Natural Hazard Community Awareness Survey
Question #21

How long have you lived in the City of Merced?		
Answer Options	**Response Percent**	**Response Count**
Less than a year	3.0%	4
1-2 years	1.5%	2
3-5 years	6.7%	9
6-10 years	9.6%	13
11-15 years	13.3%	18
More than 20 years	53.3%	72
I don't live in the City of Merced	12.6%	17
	answered question	135
	skipped question	3



Natural Hazard Community Awareness Survey
Question #22

Do you have regular access to the internet?		
Answer Options	Response Percent	Response Count
Yes	97.8%	133
No	2.2%	3
	answered question	136
	skipped question	2



Natural Hazard Community Awareness Survey
Question #23

Are there any other issues regarding the reduction of risk or loss associated with hazards or disasters in the community that are important to you?	
Answer Options	Response Count
	34
answered question	34
skipped question	104

	Response Text
1	City parks playground equipment; some parks have slides/equipment that could cause burns due to excessive heat exposure of equipment in the sun.
2	No
3	None
4	Water contamination
5	No
6	Water and electricity in an emergency
7	..
8	Internet source for those who don't watch TV, listen to local radio, or subscribe to the local newspapers.
9	Not everyone is aware of disaster preparedness or the need for it. Perhaps having neighborhood sponsored education on such an issue will create awareness. For the poorer neighborhoods, having a minimum free kit for families will help and be an incentive for families to attend such informational meetings about this topic.
10	Did we cover transportation for the elderly? Your survey is designed for homeowners which makes it hard to answer some questions.
11	I am responding as a head of Child Welfare Attendance & Safety for the Merced Union High School District and as a citizen. Preparedness for gang-related violence in the community spilling over into the school setting is a high concern. I would like to see this addressed in the mitigation plan.
12	no
13	Can't presently think of any.

Natural Hazard Community Awareness Survey
Question #23

14	Empty unsightly structures pose a threat to homeless and fire.
15	HOMELESS PERSONS GATHERING AROUND COMMERCIAL PROPERTIES IN THE ALLEY AS WELL AS DARK CORNER OF PROPERTIES DUE TO NO LIGHTING AND NOT ENOUGH LIGHTING. LOT OF GARBAGE AND ILLEGAL DRUG USES THAT MAY CAUSE FIRE
16	The City needs to clean up the weeds before a fire breaks out
17	No
18	Assessing danger of Lake Yosemite dam failure in the case of an earthquake
19	I somewhat disagree with the statement in #13 because the public is not always aware of what hazards they may be vulnerable to, such as gas pipelines, flood potential from dams, industrial hazards, etc. It is the responsibility of those creating or knowing about those hazards to inform the public, enforced by government entities making sure that they do this.
20	waste of taxpayer's fund for surveys and action plans like this one
21	Don't allow buildings in floodplains. Don't allow insurance for buildings in floodplains. Simple.
22	no
23	No Gov't regulations should apply to only Gov't or public property not private property. Also there is enough police and fire personnel responders. Our town has too many above ground wires and wires underground not sufficiently marked.
24	Learning about any man-made hazards
25	People with the correct information are better able to help themselves. Keep getting the word out on what steps are needed to protect the people of Merced. Use billboards to get the word out it works (keep it short and simple with few words).
26	not that I can think of at the moment
27	Telephone and cable lines that hang over housing on the west side is extremely dangerous. Is the city's plans for lying above ground wiring underground?
28	THE CITY SHOULD HAVE A NUMBER OF STREETS, MARKED AS EMERGENCY EVACUATION ROUTES
29	Yes, the helicopters going to Mercy fly right over my house, from the south. Can't they approach from the north so they fly in over fields?

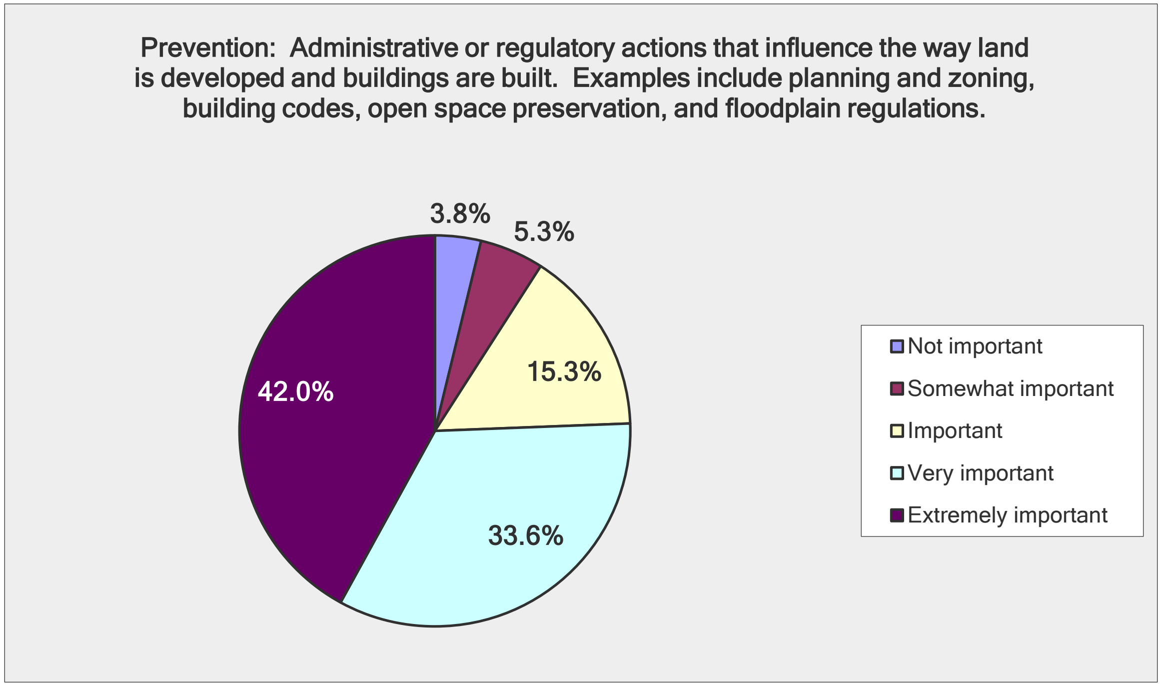
Natural Hazard Community Awareness Survey
Question #23

30	Do we have solar powered generators like Concentrated Solar mirrors?
31	Evac options for leaving the city if necessary. Locations on city emergency shelters
32	What kind of plan does the city have for an influx of refugees from the coastal areas? A couple of hundred folks showed up in Los Banos fleeing the supposed tsunami a few months back and no one had a clue as to what to do with them. Could easily happen here.
33	Illegal roadside dumping.
34	n/a

Natural Hazard Community Awareness Survey
Question #24

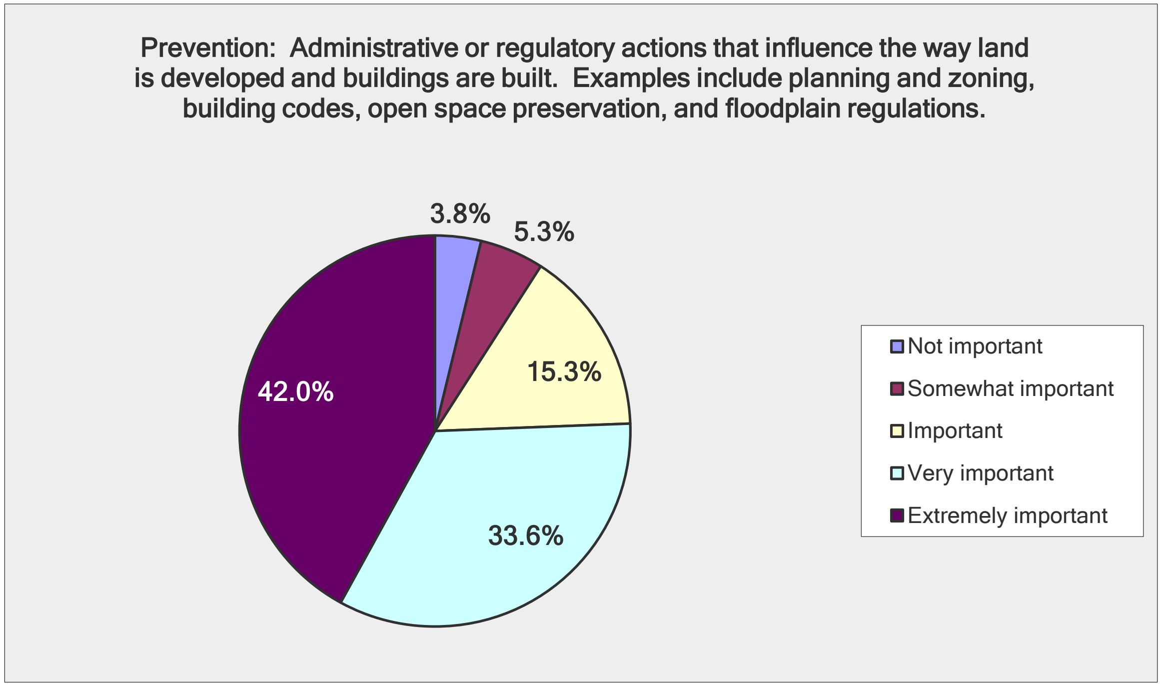
Prevention: Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.

Answer Options	Response Percent	Response Count
Not important	3.8%	5
Somewhat important	5.3%	7
Important	15.3%	20
Very important	33.6%	44
Extremely important	42.0%	55
	answered question	131
	skipped question	7



Natural Hazard Community Awareness Survey
Question #25

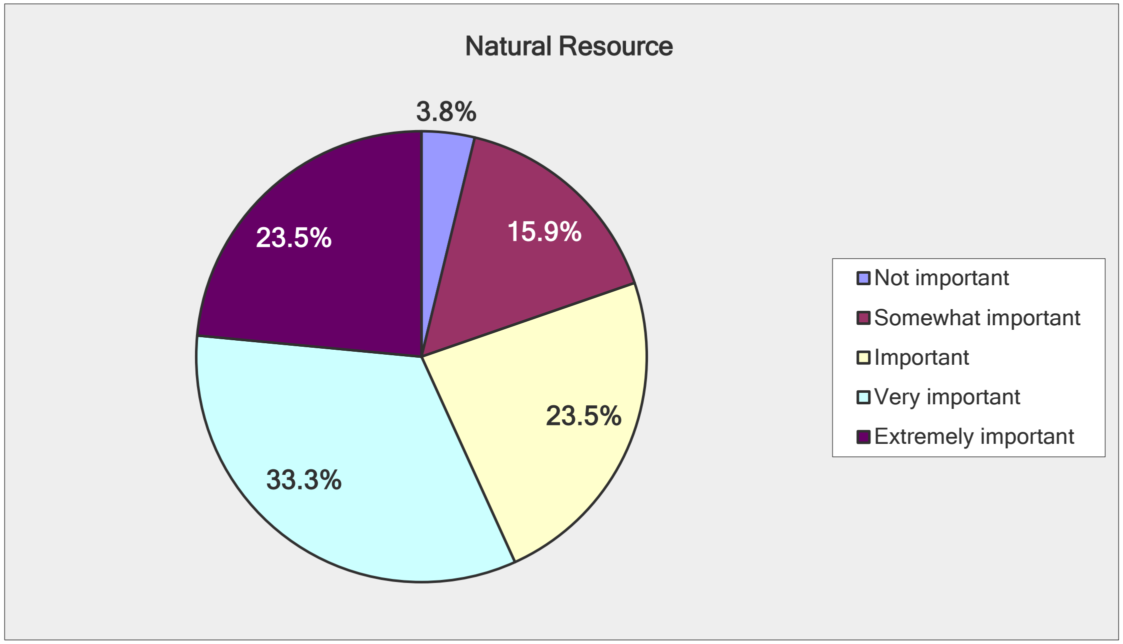
Prevention: Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.		
Answer Options	Response Percent	Response Count
Not important	3.8%	5
Somewhat important	5.3%	7
Important	15.3%	20
Very important	33.6%	44
Extremely important	42.0%	55
	answered question	131
	skipped question	7



Natural Hazard Community Awareness Survey Question #26

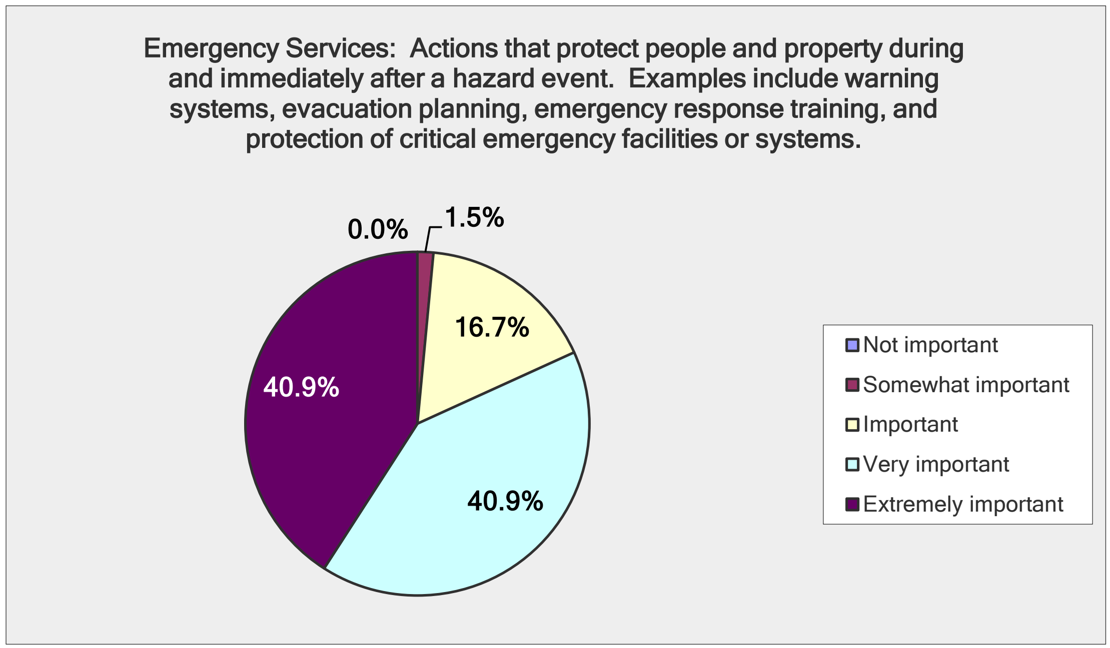
Natural Resource Protection: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.

Answer Options	Response Percent	Response Count
Not important	3.8%	5
Somewhat important	15.9%	21
Important	23.5%	31
Very important	33.3%	44
Extremely important	23.5%	31
	answered question	132
	skipped question	6



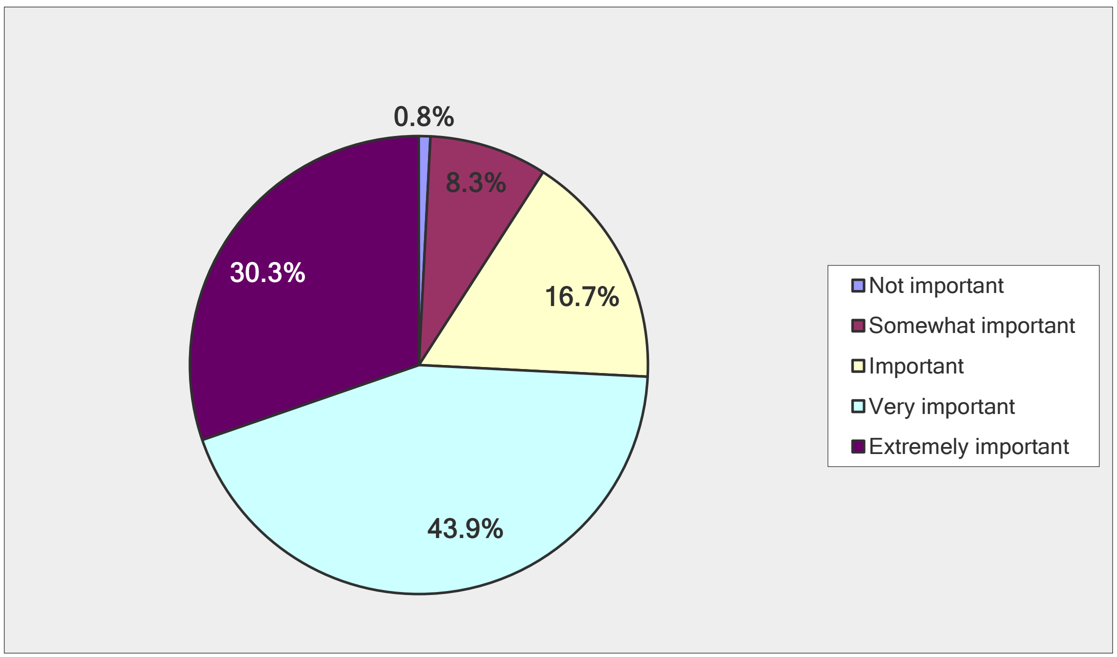
Natural Hazard Community Awareness Survey
Question #27

Emergency Services: Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.		
Answer Options	**Response Percent**	**Response Count**
Not important	0.0%	0
Somewhat important	1.5%	2
Important	16.7%	22
Very important	40.9%	54
Extremely important	40.9%	54
	answered question	132
	skipped question	6



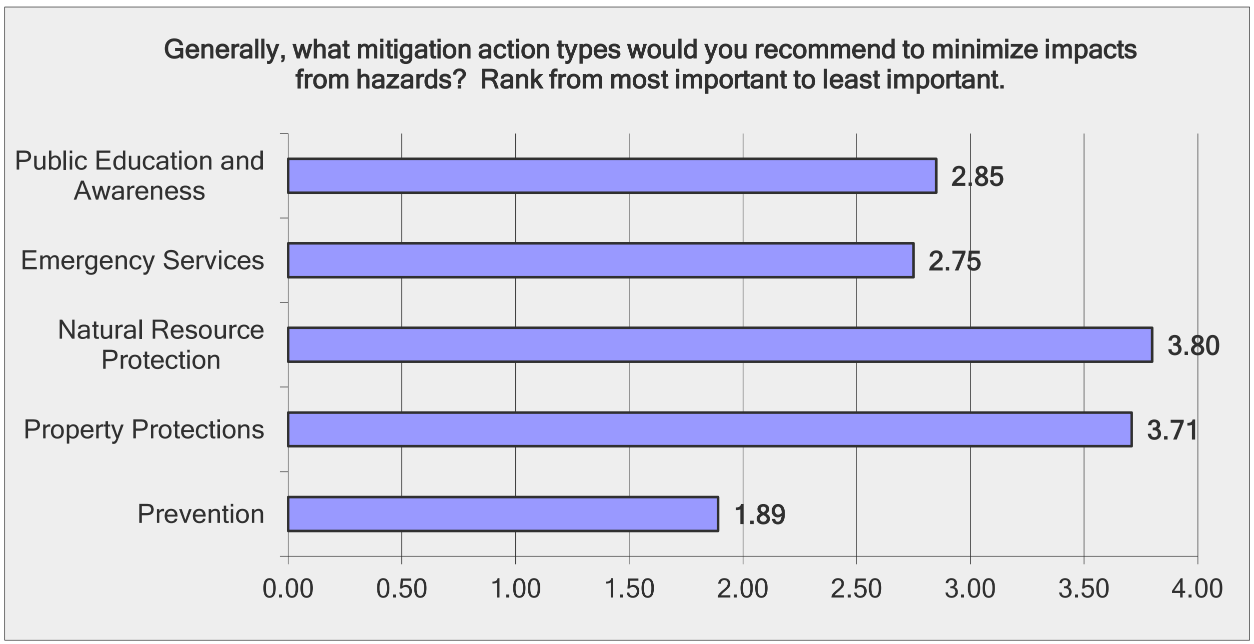
Natural Hazard Community Awareness Survey
Question #28

Public Education and Awareness: Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials, and demonstration events.		
Answer Options	**Response Percent**	**Response Count**
Not important	0.8%	1
Somewhat important	8.3%	11
Important	16.7%	22
Very important	43.9%	58
Extremely important	30.3%	40
	answered question	132
	skipped question	6



Natural Hazard Community Awareness Survey
Question #29

Generally, what mitigation action types would you recommend to minimize impacts from hazards? Rank from most important to least important.							
Answer Options	1	2	3	4	5	Rating Average	Response Count
Prevention	35	12	11	4	3	1.89	65
Property Protections	3	11	7	25	19	3.71	65
Natural Resource Protection	4	7	13	15	26	3.80	65
Emergency Services	11	16	20	14	4	2.75	65
Public Education and Awareness	12	19	14	7	13	2.85	65
						answered question	65
						skipped question	73



Natural Hazard Community Awareness Survey
Question #30

What specific action would you suggest to property owners, renters, or local governments to reduce impacts from future hazard events? These can be big or small, and occur before, during, or after a hazard event.	
Answer Options	Response Count
	22
answered question	22
skipped question	116

Options	Response Text
1	Education
2	Always practice emergency procedures so you are prepared.
3	Just be aware, and have a plan. Knowledge is the key.
4	Reassessing buildings after 10 years
5	Not sure. Maybe making people aware.
6	Better community awareness
7	To have water available. Electricity/Medical
8	With public awareness & education, home owners/renters can prepare & protect themselves as much as possible
9	The farmers, agricultural entities, suppliers, etc that deal with transportation with or handling of hazardous chemicals or dangerous mechanical equipment.
10	As an owner, I would like to have a check off list of things I can do that is low cost or no cost that will prevent major damage to the house and security of mind for my family's safety.
11	I'm elderly and my husband is disabled. I no longer drive. We would need help in event of prolonged power loss or worse.
12	Contact your child's school to find out about their plans in case they occur during school hours.

Natural Hazard Community Awareness Survey
Question #30

13	#28 is difficult to prioritize, since the City of Merced clearly has no history of or desire to actually enforce the codes already on the books! While Code Enforcement officers are quite capable, they are not given the authority or support to actually do their jobs in an effective manner. Therefore it is hard to decide on the proper priorities, given the fact the City does not utilize the tools it does have in a manner to protect its citizens - that includes continual failure to effectively ENFORCE existing codes, failure to issue citations to repeat offenders and failure to utilize the Administrative Citation process that is on the books now. So, I wouldn't see much point in adopting more codes that won't be enforced. The City Manager and Department head Mr. Gonzalves obviously don't want to actually enforce codes, so what is the point of even having them?!? Their refusal to provide simple code enforcement services in an effective manner puts people at risk and their lack of political will to actually do their jobs is itself a real hazard to the citizens of this community.
14	Don't build in areas that flood. Make them parks and nature preserves.
15	Review and Updating of Hazards Plan for the city.
16	Keep structures current on looking good and working order.
17	Do not allow contractors to build in flood zones, danger zones or any areas that may produce a future risk.
18	Be aware of the public announcement and proper information needed from government agencies.
19	Don't build where it floods. Remove buildings from flooding areas and open the flood channels back up with more parks.
20	Be aware of the potential dangers where you live.
21	Sand bags in case of flooding, materials in case of train derailment
22	Remind people they have fresh water in their hot water tanks that can be used in an emergency.

Appendix D
Plan Addendum Information

3.3.3 Drought

General Background

Drought is a gradual phenomenon, occurring slowly over multi-year periods and increasing with the length of dry conditions. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size of the affected area. There are several ways that drought can be defined.

Meteorological - a measure of departure of precipitation from normal. Due to climatic differences, what might be considered a drought in one location of the country may not be a drought in another location.

Agricultural - refers to a situation where the amount of moisture in the soil no longer meets the needs of a particular crop.

Hydrological - occurs when surface and subsurface water supplies are below normal.

Socioeconomic – occurs when the results of drought impacts the health, well being, and quality of life, or when a drought starts to have an adverse economic impact on a region. (Source: National Drought Mitigation Center, University of Nebraska, Lincoln)

Regulatory – occurs when mandatory compliance with environmental protection laws (especially those pertaining to protection of endangered species) combined with low precipitation and runoff, produce deficiencies in agricultural and/or urban water supplies.

Location and Extent

In general, drought has the potential to directly and indirectly impact each and every person within the City, as well as adversely affect the local economy. Individuals and properties will be affected at varying levels, depending upon their water source and water needs. For example, a property owner with a large water demand and private well, are more likely to be impacted than a small City lot using groundwater from the City's domestic water supply system

As described in the following pages, over the course of time to prepare the 2015 Merced Hazard Mitigation Plan, drought conditions varied considerably.

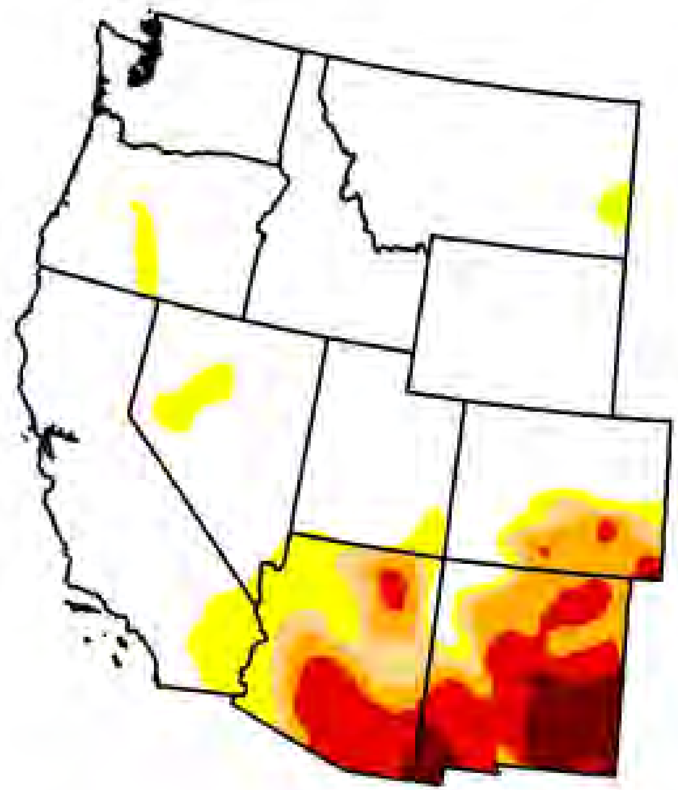
U.S. Drought Monitor

November 1, 2011
Valid 7 a.m. EST

West

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	74.16	25.84	18.67	15.19	9.60	2.87
Last Week (10/25/2011 map)	74.12	25.88	18.32	14.67	8.48	2.87
3 Months Ago (08/02/2011 map)	74.90	25.10	18.98	15.44	11.10	5.52
Start of Calendar Year (12/28/2010 map)	73.26	26.74	11.98	0.89	0.00	0.00
Start of Water Year (09/27/2011 map)	66.72	33.28	19.04	14.99	9.30	3.81
One Year Ago (10/26/2010 map)	69.02	30.98	5.39	0.19	0.00	0.00



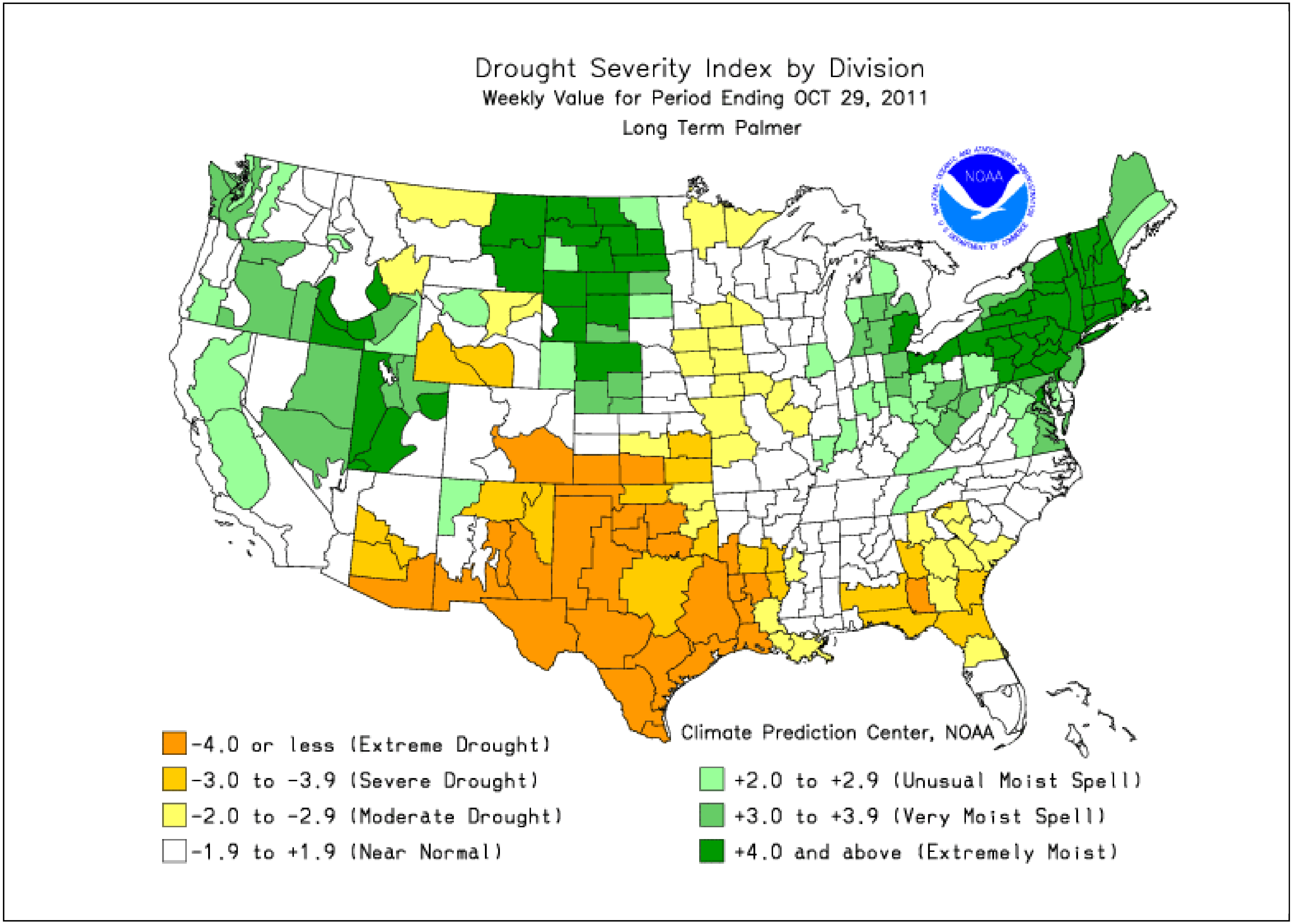
Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

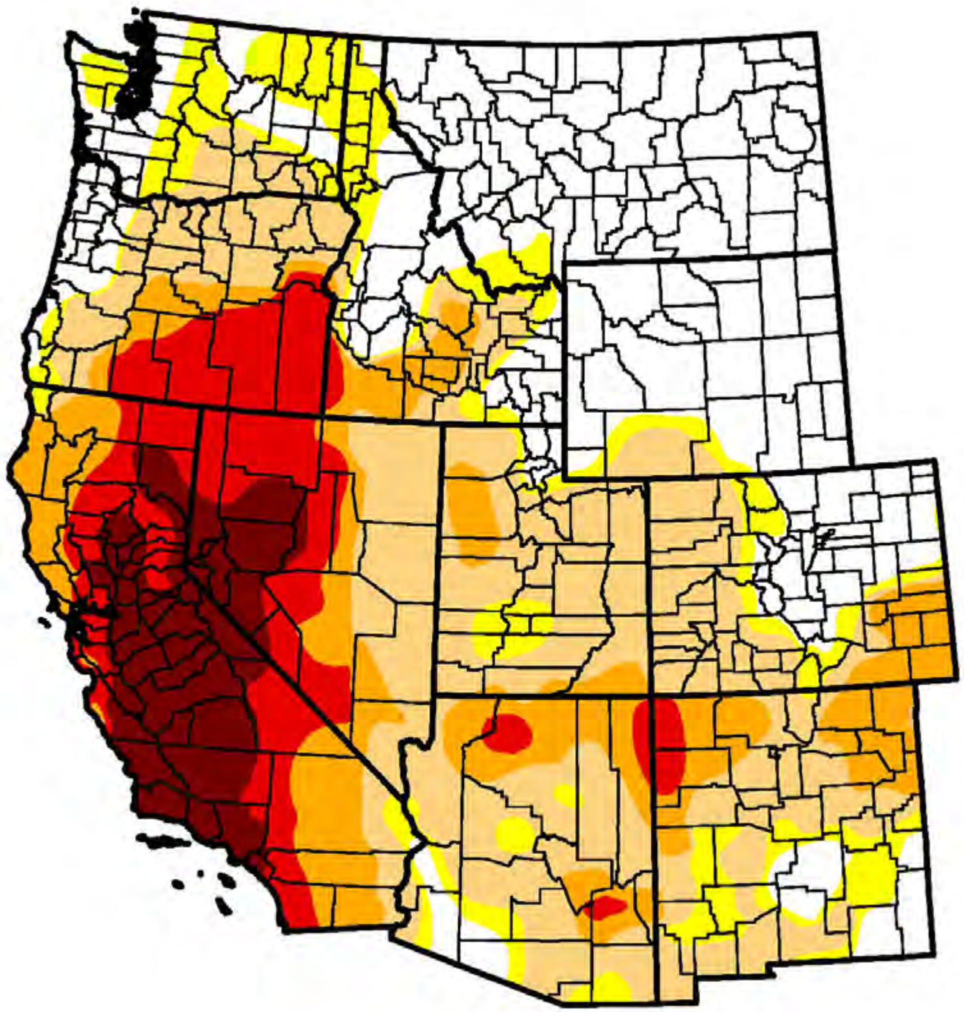
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, November 3, 2011
Brian Fuchs, National Drought Mitigation Center


Drought Severity Index by Division
Weekly Value for Period Ending OCT 29, 2011
Long Term Palmer
NOAA
Climate Prediction Center, NOAA
-4.0 or less (Extreme Drought)
-3.0 to -3.9 (Severe Drought)
-2.0 to -2.9 (Moderate Drought)
-1.9 to +1.9 (Near Normal)
+2.0 to +2.9 (Unusual Moist Spell)
+3.0 to +3.9 (Very Moist Spell)
+4.0 and above (Extremely Moist)

U.S. Drought Monitor
West



February 17, 2015
(Released Thursday, Feb. 19, 2015)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	31.20	68.80	58.53	30.61	17.23	7.21
Last Week *2/10/2015*	30.41	69.59	52.65	30.63	17.10	6.96
3 Months Ago *11/18/2014*	34.66	65.34	54.99	33.88	18.75	8.45
Start of Calendar Year *12/30/2014*	34.76	65.24	54.48	33.50	18.68	5.40
Start of Water Year *9/30/2014*	31.48	68.52	55.57	35.65	19.95	8.90
One Year Ago *2/18/2014*	21.76	78.24	59.88	40.17	14.89	2.58

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

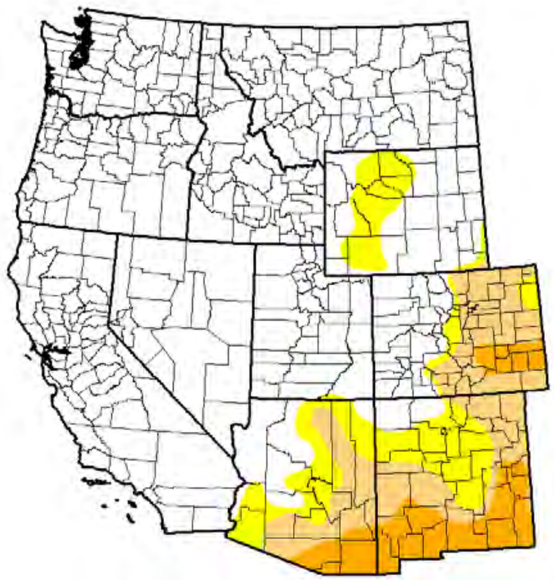
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCDC/NOAA

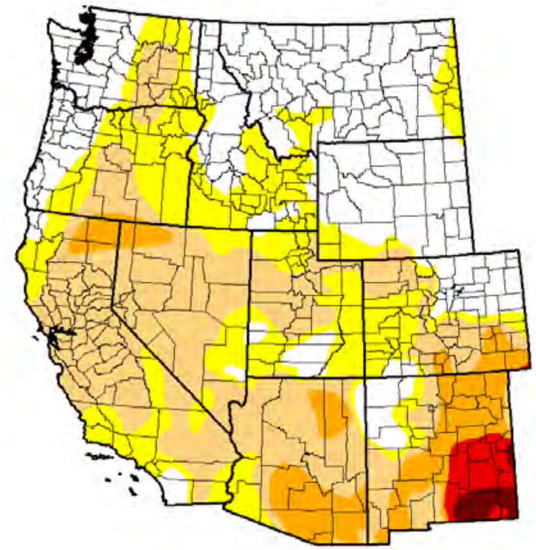
USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

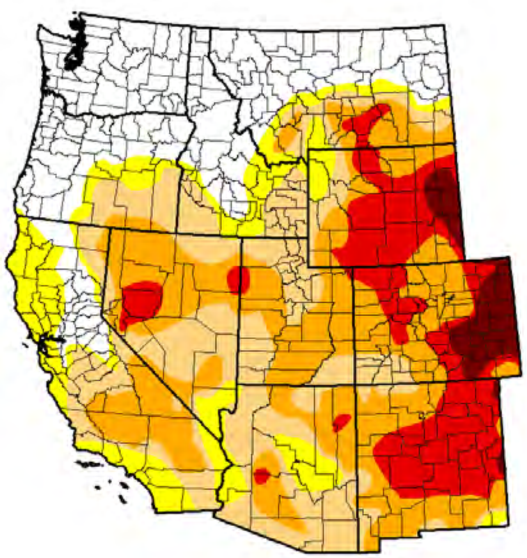
February 22, 2011



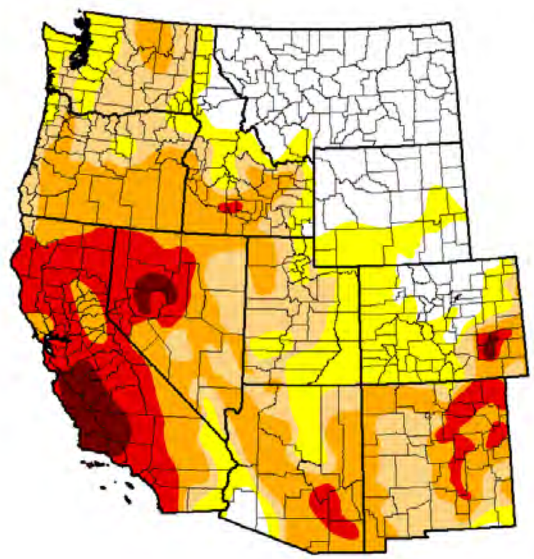
February 21, 2012



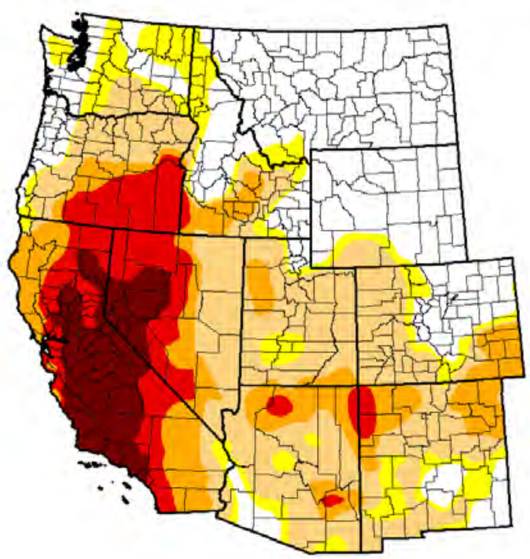
February 19, 2013



February 18, 2014



February 17, 2015



Conditions that Exacerbate or Mitigate Potential Effects

Drought is a major determinant of wildfire hazard, in terms of greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation and reduced water supply for firefighting purposes.

Previous Occurrences

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users.

The 1975-1977 Drought: From November 1975 through November 1977, California experienced one of its most severe droughts. Thirty-one counties were disaster-declared. Although people in most areas of the state are accustomed to almost no precipitation during the growing season (April to October), they expect it in the winter. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively, leading to the state's fourth and first driest years on record. Most surface storage reservoirs were substantially drained in 1976, leading to widespread water shortages when 1977 turned out to be even drier. Due to this drought, water rights issues moved to the top of political agendas, and low-flow water fixtures and natural landscaping in California were ushered in. [42] Merced County was one of many areas that suffered crop damage, which totaled $2.67 billion statewide during this drought period.

The 1987-1992 Drought: The 1987-92 drought was notable for its six-year duration and the statewide nature of its impacts. For the central coast and central Sierra Nevada, 1987 to 1990 was the driest period on record. In 1988, 45 California counties experienced water shortages that adversely affected about 30 percent of the state's population, much of the dry farmed agriculture, and over 40 percent of the irrigated agriculture. Fish and wildlife resources suffered; recreational use of lakes and rivers decreased; forestry losses and fires increased; and hydroelectric power production decreased. Not since the 1928-34 drought had there been such a prolonged dry period.

The 2007-2009 Drought: ~~California's last major statewide drought was 2007-2009, notably~~ This drought affected~~ing~~ Central Valley communities, including those in Merced County. Following two critically dry years, 2009 had the potential to be one of the most severe drought years in California's recorded history. Water supplies in major reservoirs and many groundwater basins were already well below average. Additionally, court-ordered restrictions on water deliveries from the Delta had significantly reduced supplies from the state's two largest water systems. [43]

The 2014- ??__ Drought: In 2012 and 2013 dry conditions were experienced statewide according to the Department of Water Resources and the U.S. Drought Monitor. Parts of the Central Valley and Southern California have experienced perpetually extreme drought conditions and the situation worsens with every day the state goes without rain. On Jan. 17, 2014, with California facing water shortfalls in the driest year in recorded state history, Governor Edmund G. Brown Jr. proclaimed a State of Emergency and directed state officials to take all necessary actions to prepare for these drought conditions.

Merced's water source is groundwater, which is principally replenished by local rivers fed by snowmelt. The most recent snowpack survey, conducted on January 29, 2015, recorded California snowpack at 12% of normal. A more recent update using automated devices shows snowpack at 22% of normal as of February 2, 2015.

As the dry weather continues, reservoirs fall further behind of their annual averages of water supplies. Local reservoir Levels as of January 29, 201 remain low, including: *Don Pedro* 41% of capacity (59% of year to date average), and *Exchequer* 6% of capacity (13% of average). [61]

Lake McClure. Early 2015

Water Year 2014 – overlapping with California's driest calendar year -- ended on September 30 as the San Joaquin Valley's driest in 119 years of record. [62]

Dry Water Year (October 1 –September 30) rankings, by inches of precipitation

Statewide		North Coast		North Central		Northeast		Sacramento-Delta		Sierra	
Year	Rainfall	Year	Rainfall	Year	Rainfall	Year	Rainfall	Year	Rainfall	Year	Rainfall
1924	9.23	**1924**	29.98	**1924**	20.12	**1924**	7.66	**1924**	6.46	**1924**	14.89
1977	11.81	1977	30.36	1977	23.10	1926	11.68	1920	7.87	1977	15.86
2014	12.08	2014	33.48	1920	24.17	1977	12.43	1913	8.13	2014	20.76
1898	13.35	1931	36.32	1898	26.30	1931	12.44	1977	8.57	1987	20.89
1920	13.43	2001	39.43	1931	28.67	1920	12.59	1976	9.15	1976	22.64

San Joaquin Valley		Central Coast		South Coast		South Interior		Mojave		Sonoran	
Year	Rainfall	Year	Rainfall	Year	Rainfall	Year	Rainfall	Year	Rainfall	Year	Rainfall
2014	4.81	**1924**	9.30	**2014**	5.63	**2007**	5.70	**2013**	2.77	**1956**	0.91
1924	5.30	2014	11.94	2007	5.87	2002	5.82	2014	2.90	2002	1.06
1972	5.71	1977	11.95	2002	6.34	1961	6.98	2002	2.96	1896	1.22
1977	6.18	1913	12.81	1961	7.22	1959	8.94	2007	3.45	1996	1.42
2013	6.18	1976	12.91	1898	7.30	2014	9.04	1934	3.46	1902	1.47

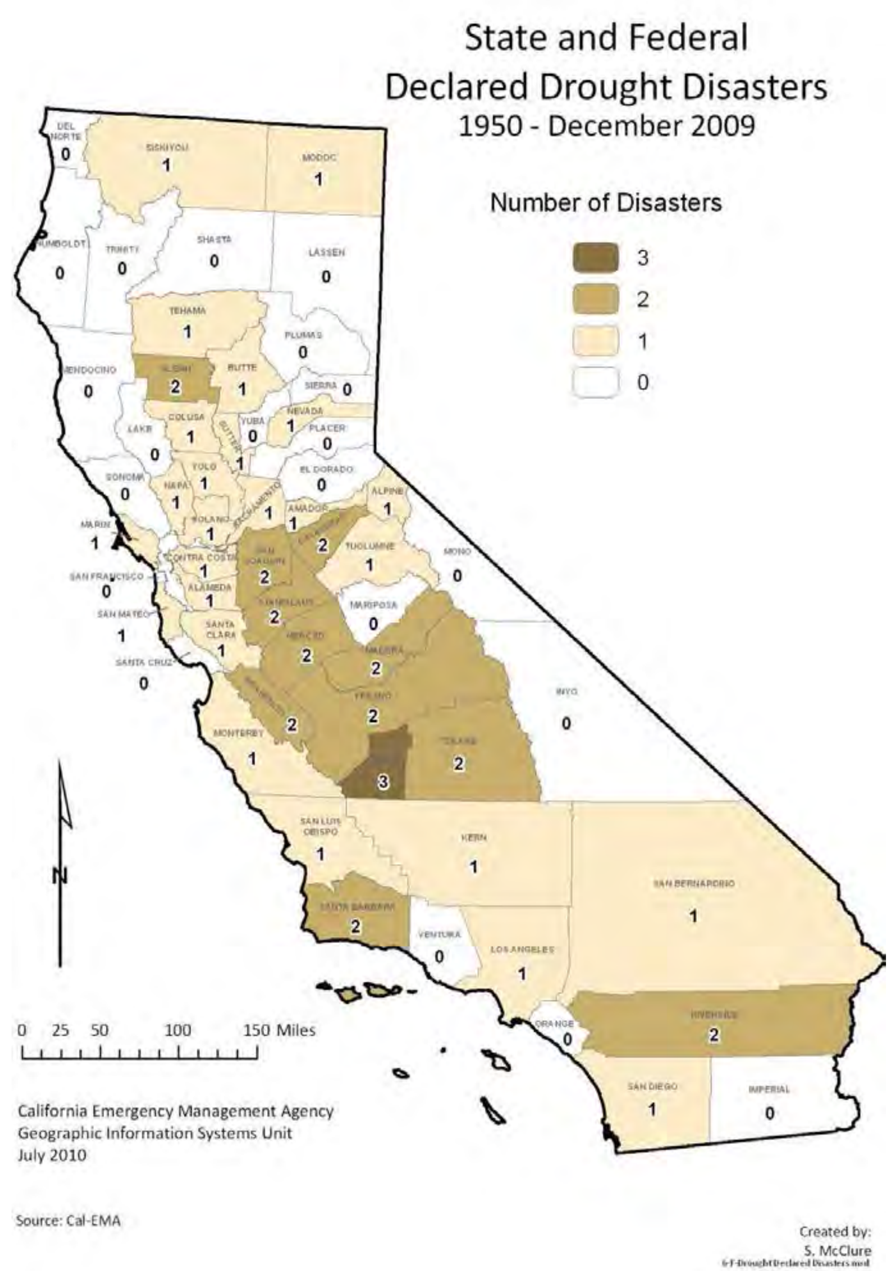
Summary of 2014 Water Year (October 1, 2013 – September 30, 2014)

Region	WY2014 Value (inches)	% of Average	Rank	# Years
Sierra	20.76	53%	3	119
Northeast	15.21	63%	15	119
North Central	28.87	56%	6	119
Sacramento Delta	10.68	54%	8	119
San Joaquin Valley	4.81	38%	1	119
North Coast	33.48	51%	3	119
Central Coast	11.94	47%	2	119
South Coast	5.63	32%	1	119
South Interior	9.04	50%	5	119
Mojave	2.9	39%	2	119
Sonoran	2.41	54%	21	119
Statewide	12.08	52%	3	119

NOAA's National Climatic Data Center reported that in the first nine months of 2014, California temperatures averaged 63.7º F, or 4.1º F above the 20th century average of 59.6 ºF. Temperatures from April to September averaged 70.0º F, breaking the old record for the period of 69.4º F set in 2013.

STATE AND FEDERAL DECLARED DROUGHT DISASTERS

Map on this page shows the pattern of drought-declared State and Federal Declared Drought Disasters in California between 1950 and December 2009, [14]disasters. Heaviest concentrations are in the Central Valley and inland areas.



Probability/Frequency of Future Events

The identification and ranking of hazards, applicable to Merced, is detailed in Section 3.2 of the LHMP. "Probability of Occurrence" is one of the risk factors used to rank each hazard. The following thresholds and numeric scoring were utilized by the LHMP Disaster Council to rank the Probability of Occurrence:

- 0 Infeasible Event – not applicable due to geographic location characteristics
- 1 Rare Event – occurs less than once every 50 years
- 2 Infrequent Event – occurs between once every 8 years and once every 50 years (inclusive)
- 3 Regular Event – Occurs between once a year and once every 7 years
- 4 Frequent Event – occurs more than once a year

Hazard probability scoring was based on a variety of sources, including: 1) the City's *ACS Firehouse Software* -- a nine-year database for fire, hazardous conditions and severe weather and other natural disasters (page 3-23 of the LHMP); 2) a qualitative "probability" scoring based on rankings by the Disaster Council and attending stakeholders at the March 9, 2012, Disaster Council meeting; 3) the 2009 City of Merced Community Risk Assessment; and 4) the hazard occurrence data presented in this hazard risk assessment.

Based on these inputs, the Probability of Occurrence for "Drought" in Merced is generally considered an infrequent event, but recent local drought events have occurred as regular events.~~.~~

Appendix E

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Appendix F

Catalog of Potential Hazard Mitigation Plan Goals

2010 State HMP Goal 1: Significantly reduce life loss and injuries.

Prevent Future Hazard Related Losses of Life
Protect Life
Prevent Loss of Life and Injuries
Provide Protection for People's Lives from Hazards *(selected goal for MHMP)*
Protect Lives and Reduce Injury

2010 State HMP Goal 2A: Minimize damage to structures and property, as well as disruption of essential services and human activities.

Prevent Future Hazard Related Losses of Property:
Minimize or reduce damage to property *(selected goal for MHMP)*
Reduce Property Damage
Protect Property
Prevent Future Hazard Related Losses of Property:
Improve Emergency Management Capability
Strengthen Emergency Operations
Maintain Essential Services, Facilities, and Infrastructure
Improve Communities Capabilities to Mitigate Hazards and Reduce Exposure to Hazard Related Losses
Provide Protection for Critical facilities, Utilities, and Services from Hazard Impacts
Protect the Continuity of Local Government to Ensure no Significant Disruption of Services during or due to a Disaster.
Minimize disruption of essential services, facilities and infrastructure *(selected goal for MHMP)*
Improve Community Emergency Management Preparedness, Collaboration, and Outreach
Strengthen Emergency Operations by Increasing Collaboration and Coordination among Public Agencies, Non-Profit Organizations, Business, and Industry.
Create a Disaster Resistant Community

2010 State HMP Goal 3: Protect the Environment.

Preserve Natural Systems
Preserve and Protect Natural Systems
Maintain, enhance, and restore the natural environment's capacity to deal with the impacts of disasters *(selected goal for MHMP)*
Preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions.

2010 State HMP Goal 4: Promote Hazard Mitigation as an Integrated Public Policy.

Encourage Partnerships and Implementation
Incorporate Hazard Mitigation Initiatives into Operation
Promote hazard mitigation as an integrated policy *(selected goal for MHMP)*
Integrate mitigation activities into existing and new community plans and policies.

No State Goal.

Increase Public Awareness *(selected goal for MHMP)*
Enhance Public Awareness
Educate the Public
Enhance Participation in LHMP Process
Improve Community and Agency Awareness about Hazards and Associated Vulnerabilities that Threaten the Community
Educate community members

No State Goal.

Maintain/provide for FEMA Eligibility and Work to Position City for Grant Funding
Develop and Implement Mitigation Strategies that optimizes public funds win an efficient and cost-effective way.

On July 13, 2012, the Disaster Council reviewed, discussed and confirmed that the bolded goals above are the goals of the MHMP.

Appendix G
Catalog of Potential Hazard Mitigation Plan Actions

Hazard Type: Extreme Temperature									
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
4	Maintain, establish, and enhance heating and cooling centers to serve the current and future population.		×	×					×
2	Prepare an "Excessive Heat Response Plan," including such items as: 1) identification of vulnerable populations; and, 2) conducting pre-season public information campaigns.				×		×		
3	Evaluate and improve heat advisory and warning methodology.						×		
5	Work with PG&E and MID to require that electricity and water are not shut off for nonpayment during heat events.		×	×	×		×		
2	Identify vulnerable residents in Merced and community groups working with vulnerable populations (e.g. hospitals, schools, Meals on Wheels) and ensure heat emergency outreach & education programs work with them						×		
4	Assess transportation options for residents (especially vulnerable populations) to reach cooling zones and improve access and awareness where possible, or provide rebates or incentives at cooling centers.						×		×

Hazard Type: Fog										
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
1	Continue to work with weather forecasting and public safety agencies to provide warning and protective information to schools, residents, travelers, and visitors about the severe valley fog conditions.						×		
2	Install Automated Fog Warning System.								×

Hazard Type: Storm-Related Hazard									
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
2	Conduct a detailed vulnerability assessment in the future in order to accurately identify the extent of damages to vulnerable buildings, infrastructure, and critical facilities.			×					
1	Pursue program of conversion of overhead utilities to underground service that serve critical facilities or other sensitive sites to reduce exposure to hazards.								×

Hazard Type: Earthquakes										
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
4	Develop inventories of historic buildings, governmental buildings, industrial buildings, unreinforced buildings, etc. to speed and target post-disaster response inspections and recovery efforts.			×					×
4	Implement programs to retrofit or upgrade unreinforced masonry buildings.			×	×				×
2	Include retrofitting and replacement of critical system elements in capital improvement program (CIP)			×	×				×
2	Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities constructed prior to 1980 (including infrastructure).			×					×
3	Seismically retrofit or replace County ramps and bridges that are categorized as structurally deficient by Caltrans and are necessary for first responders to use during an emergency.			×	×				×

Hazard Type: Wildfire										
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
2	Become a "Firewise" community.				×		×		
1	Identify high fire hazard interface areas, then create and maintain defensible space around structures and infrastructure through site and building design requirements, such as the use of fire-retardant building materials.		×	×	×				×
3	Purchase a minimum 4,000-gallon water tender with wildfire fighting capability.								×

Hazard Type: Flooding (page 1)

No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
3	Prepare an Update to the City's Storm-water Drainage Master Plan.	×			×				
3	Require a master drainage plan as part of the approval process for all specific plans and large development projects. The plan's intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels.	×			×				
4	List Specific Flood Control Projects Needed:______________________________	×			×				
6	Acquire, relocate, elevate, and/or flood-proof critical facilities located within the 100-year floodplain.	×		×	×				
6	Reinforce City ramps, bridges, and roads from flooding through protection activities which may include elevating the road and installing culverts beneath the road or building a bridge across the area that experiences regular flooding.	×			×				
5	Increase participation in the NFIP by entering the Community Rating System program which through enhanced floodplain management activities would allow property owners to receive a discount on their flood insurance.	×							

Hazard Type: Flooding, (page 2)									
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
5	Update the EOP to address emergency evacuation routes relative to flood and dam failure hazards.	×			×				
6	Review public warning procedures and methods to improve the citywide flood surveillance and early warning system.	×			×		×		
4	Provide storm-water drainage improvements to reduce frequent flooding, such as storm-water drains, basins, trunk lines, auxiliary pipes, and interconnections.	×			×				

Hazard Type: Emergency Management Capability (Part 1, Emergency Operations)									
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
4	Regularly review, revise, and validate the City of Merced Emergency Operations Plan (EOP).				×				
4	Establish a codified employee Emergency Response Training Program, and increase the frequency and complexity of planned and spontaneous drills and exercises. Provide cross-training between jurisdictions to improve capabilities.				×				
6	Annually prepare a "gap analysis" assessment of EOC organization needs and implement recommended actions.				×				
3	Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, and industries.				×				
4	Add redundancy to emergency communication systems.								×
7	Purchase portable equipment to allow live two-way picture and sound to be transmitted to the Emergency Operation Center from the site of an emergency situation.				×				
3	Standardize systems among agencies to provide for better interoperability.				×				
5	Inspect key critical facilities for vulnerability to major hazards, and upgrade or replace critical facilities as necessary.			×	×				

Hazard Type: Emergency Management Capability (Part 2, Resiliency)									
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
6	Develop strategies for debris management following an emergency or disaster.							×	×
6	Compile a directory of out-of-area contractors to help with repairs/reconstruction so that restoration occurs in a timely manner.			×					×
4	Coordinate with medical community to quicken the reporting of damage to a medical facility office, pharmacy (and so on). This involves both life safety items and hazardous material concerns.								
3	Perform assessment of critical facility vulnerability to establish a program and schedule for implementing recommended follow-ups, including standby power needs or ability to reroute power supply, for example, installation of battery back-up systems at select traffic signals.			×	×				×
6	Design, retrofit, or replace essential water and sewer facilities and systems to minimize the potential for disruption during a disaster, including seismic-related impacts.			×	×				×
7	Warehouse critical infrastructure components such as pipe, power line, and road repair materials.			×					×
5	Adopt a Post-Disaster Recovery Plan.								
5	Provide redundancy for critical functions and infrastructure.		×	×					×
2	Identify the most vulnerable critical business and infrastructure facilities to natural disasters, and encourage preparation of hazard reduction and response plans to protect against economic loss and speedy recovery.			×	×	×			

Hazard Type: Prevent Future Hazard Related Losses of Life and Property									
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
3	Support management and land use planning practices with hazard mitigation to protect life.				×				
3	Discourage inappropriate development in hazard areas.		×		×				
3	Encourage property protection measures for all structures located in hazard areas.			×	×				
4	Preserve, rehabilitate, and enhance natural systems to serve hazard mitigation functions.							×	
3	Assess suitability (vulnerability to hazards and provision of services) of select public education buildings and sites as places for people to go to during emergency situations.			×					×
4	Develop Functional Assessment Service Team (FAST) to appropriately shelter and respond to the needs of people with disabilities and older adults.				×				

Hazard Type: Public Education										
No.	Action	NFIP	New Bldg/Infra	Existing Bldg/Infra	Prevention	Property Protection	Public Education	Resource Protection	Structural
2	Develop and implement education and outreach programs to increase public awareness of the risks associated with natural, human-caused, and technological hazards.						×		
3	Institute a Disaster Preparedness Education Program for the Public.						×		
3	Develop Community Emergency Response Teams (CERT) of residents and businesses to aid first responders and volunteers.						×		
3	Identify and develop a series of initiatives, incentives, programs, and procedures to assist residents, property owners, and businesses to prepare for and recover after a natural disaster.						×		

Potential List Of Mitigation Strategies

The Disaster Council and the general public were asked to review, modify, and/or add to the above Mitigation Action Items. The following suggestions for potential actions were received from Disaster Council members and through public outreach venues:

Hazard Type: Extreme Temperature

Work with and establish a place of refuge for those who are without power, (i.e. school districts.)

Recommended Word change for the fourth Action (above) to read: "Work with PG&E and MID to ~~require~~ **ensure** that electricity and water are not shut off for nonpayment during heat events."

Recommend adding a new column to the right entitled, "Emergency Services".

The Bus is providing free transportation to and from cooling centers this year.
Access to Cooling Center is the biggest hurdle. Young and old do not have the means to reach cooling centers.

Not shutting the power off is the most important.

Multiply the sites for cooling centers.

The 2nd and the 5th Action Items is basically the same thing.

Question as to why "New" Building/Infrastructure is being proposed (see column)? Why not just retro-fit existing buildings? Not supportive of new building/infrastructure (refer Rater #12).

The 5th and 6th Action Items (respectively) are inter-related to the 2nd Action Item and need to be a coordinated effort.

Regarding the 6th (or last) Action Item (above), who are the rebates for?

Shouldn't Action Item #4 regarding PG&E/MID's shutting off electricity and water include both extreme heat and "cold" events?

Hazard Type: Fog

Provide tips for driving, walking, biking, etc., in the fog both in the City and freeway.

Technology is the key here, mass communication both electronically and community base; Social media and electronic billboards!

Recommend deleting the 2nd Action Item (does not feel it's necessary or appropriate in the City).

Provide educational information through high schools, DMV, law enforcement, and media efforts regarding vehicle safety tips while driving in fog.

Hazard Type: Storm-Related Hazard

Designate one of the High Schools or Schools as an Emergency Operations Center (EOC) during storms.

Informational material to inform people of what to do, not to do, protocols, etc. during a severe storm.

Recommended addition to second Action (above) to read: ***"***Pursue program of conversion of overhead utilities to underground service that serve critical facilities or other sensitive sites to reduce exposure to hazards **where possible**."

I'm concerned about where critical facilities are located. The Police Department is between two railroad tracks and located next to Bear Creek – flooding. We need a facility that is protected from natural and man-made disasters.

Hazard Type: Earthquakes

Include schools and hospitals in retrofit plan.

Implement/enforce that all future constructions be earthquake proof – including homes.

Identify vulnerable residents in Merced and community groups working with vulnerable populations and ensure earthquake preparation and emergency outreach and education programs work with them.

Prepare an earthquake response plan.
Delete the word, “County” and replace it with the word “City” for Action Item #5 above.

Recommend that the 2nd and 5th Action Items be deleted since the Cost eliminates these two Actions from reality.

Hazard Type: Wildfire

Work with Health & Asthma Coalition/organization to devise informational material on health/asthma impact or implications.

Recommend explanation language to Action one (above) - [Better define what becoming a “Firewise” community means for the community]

Two Raters requested an explanation of “Firewise” community (not sure what this is).

Recommend deletion of Action Item 3 above as we are not in the County.

Question: Does the Fire Department think they need the water tender? If so, it should be their priority input.

Continue with weed abatement efforts with fines for those who are noncompliant.

Hazard Type: Flooding

Recommend removal of the second and third Actions (above) as follows:

~~Require a master drainage plan as part of the approval process for all specific plans and large development projects. The plan’s intent is to ensure that the overall rate of runoff from a project does not exceed predevelopment levels.~~

~~List Specific Flood Control Projects Needed: ___________________________~~

Add to third Action as Needed (above): Haystack Dam Alternative on Black Rascal Creek

Implement a "Regional" flood plain management program.

Identify vulnerable residents in Merced and community groups working with vulnerable populations and ensure flood emergency outreach and education programs work with them.

Prepare a "flooding plan" and include such items as: 1) Identification of vulnerable populations, and 2) conducting pre-season public information campaigns.

Recommend deletion of the 2nd Action Item (i.e., Require a master drainage plan as part of the approval process………)

Add the following to Action #3 – List Specific Flood Control Projects, Needed –
Bear Creek MID/ West Town / Black Rascal (do an assessment in these areas to find out what the needs are).

Implement a Master Storm Water Fee for all uses with infrastructure needs.
Capacity of our floodways and Correct Pinch Points for flood (i.e., do you fix the pinch points or limit the flow)?

The 3rd and 7th Action Items (respectively) are inter-related or are sub-sets of an overall action – the 1st Action Item. The key is to approach them in a coordinated effort. This also pertains to the last two Actions (listed on Page 2 of the Flooding Hazard Type) with the 7th Action Item being a subset of the 6th Action.

Need to provide better warning signs on flooded streets.
Stressed the importance of the 9th (or last) Action Item (above).

More sandbag locations are recommended; and, the need for a better job of informing citizens where to get sandbags.
Need to do a better job of dealing with flooded streets and a better job with responding.

More sandbag locations needed.
The drainage systems need to be checked as they clog up with leaves and cause water to flood. City workers should focus more on areas that are more likely to flood during heavy storms. More warnings should be given to county residents.

Hazard Type: Public Education

Run Incident Command System (ICS) Training utilizing Merced Union High School District (MUHSD) Emergency Management Team.

Educate community on general evacuation routes/means/options for evacuation.

Use technology for education programs; Social media/electronic billboards.

CAER – Community Awareness & Emergency Response
"Working Together for a Safe & Informed Public"

The 1st Action Item is the "Activity" needed to fulfill the 2nd Action Item. And, the 3rd Action is part of the activities needed to accomplish the 4th Action Item.

Hazard Type: Emergency Management Capability (Part 1, Emergency Operations)

Establish one or more of the High Schools as an Emergency Operations Center (EOC) to serve during emergencies.

Identify central emergency shelter locations and inform public.

Establish an emergency or info hotline where people can call in for updates on the situation or to connect families that are separated.

The 7th and 2nd Action Items (respectively) are subsets of Action #4. The 8th and 3rd Action items (respectively) are subsets of the 1st Action Item. Since the Action Items are inter-related, they need to be approached in a coordinated effort.

Hazard Type: Emergency Management Capability (Part 2, Resiliency)

For the 2nd Action Item (above) consider deleting "out-of-area" as local contractors may be able to respond. Maybe have 2 or 3 lists based on distance (i.e., 0-20 miles, 20-50 miles, over 50 miles).

Has the City of Merced decided on an Emergency Alarm System/EAS (i.e., Reverse 911, Everbridge)?

The 9th, 4th, and 3rd Actions (respectively) are inter-related or subsets of the 7th Action Item. Also, the 5th Action is inter-related or a subset to the 8th Action Item. As such, the key is to approach these Actions in a coordinated effort.

Hazard Type: Prevent Future hazard Related Losses of Life and Property

Two raters recommend adding a new column to the right entitled, "Emergency Services".

Appendix H

Acronyms/Abbreviations/Glossary

ACRONYMS AND ABBREVIATIONS

ASCE	American Society of Civil Engineers
AST	Aboveground storage tank
BFE	Base flood elevation
CAGS	California Geological Survey
CBC	California Building Code
CCR	California Code of Regulations
CDC	Center for Disease Control
CDF	California Department of Forestry
CERT	Community Emergency Response Team
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CFS	Cubic feet per second
CIP	Capital improvement plan
COOP	Continuity of operations plan
CPTED	Crime prevention through environmental design
CRCV	Coast Range Central Valley
CRS	Community Rating System
CUPA	Certified Unified Program Agency
CVPIA	Central Valley Project Improvement Act
D	Drought hazard
DC	Disaster Council
DHS	U.S. Department of Homeland Security
DMA	Disaster Mitigation Act (Public Law 106-390)
DOF	Depth of flooding
DRP	Design review permit
EIR	Environmental impact report
EMTD	Emergency medical technician (with defibrillator)
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency

EQ	Earthquake hazard
EUD	Environmental Utilities District
FH	Flood hazard
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FIS	Flood Insurance Study
Ft	Feet
G	Gravitational acceleration
G	Goals
GIS	Geographical information system
G&O	Greenhorn and O'Mara
HAZUS-MH	Hazards U.S. Multi-Hazard
HC	Human-caused hazard
HH	Human health hazard
HMGP	Hazard Mitigation Grant Program
IBC	International Building Code
ICS	Incident command system
ISO	Insurance Service Office
Km	Kilometer
LS	Landslide hazard
M	Magnitude
MCE	Maximum credible earthquake
MCI	Mass casualty incident
MH	Multi-hazard
MHMP	Merced Hazard Mitigation Plan
ML	Local magnitude
MMC	Merced Municipal Code
Mph	Miles per hour
NA	Not applicable
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
O	Objectives
OCAP	On-line citizen's advisory panel
OCS	Oregon Climate Service

OES	California Governor's Office of Emergency Services
PCFCD	Placer County Flood Control District
PCWA	Placer County Water Agency
PDM	Pre-Disaster Mitigation Grant Program
PGA	Peak ground acceleration
PHMSA	Pipeline and Hazardous Materials Safety Administration
PLT	Planning Leadership Team
PRISM	Parameter-elevation Regression on Independent Slopes Model
PUD	Planned unit developments
RCRA	Resource Conservation and Recovery Act
RFE	Regulatory flood elevation
SARS	Severe acute respiratory syndrome
SCAS	Spatial Climate Analysis Service
Sec	Second
SEMS	Standardized Emergency Management System
SFHA	Special flood hazard area
SHELDUS	Spatial Hazard Events and Losses Database for the U.S.
SJWD	San Juan Water District
SOI	Sphere of Influence
SPCC	Spill Prevention, Control, and Countermeasure Plan
SUDP	Specific Urban Development Plan
SW	Severe weather hazard
SWOO	Strengths, weaknesses, opportunities, and obstacles
UASI	Urban Area Security Initiative
UBC	Uniform Building Code
USC	University of South Carolina
USGS	United States Geological Survey
UST	Underground storage tank
WF	Wildfire hazard
WMD	Weapons of mass destruction
WNV	West Nile virus

Glossary of Terms

100-Year Flood: The term "100-year flood" can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Acceleration: The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared. That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.

Act of Terrorism: According to the Federal Bureau of Investigation (FBI), an act of terrorism is "a violent act or an act dangerous to human life, in violation of the criminal laws of the United States or of any state, to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social goals." Acts of terrorism are intentional, criminal, and malicious and can be foreign or domestic, depending on the origin, base, and objectives of the terrorist or organization. Acts of terrorism can involve the use of weapons of mass destruction, arson, and incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyberterrorism.

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Active Fault: As defined by the California Division of Mines and Geology, a fault that has shown displace within Holocene time (last 11,000 years). For planning purposes, such faults can be expected to move within the next hundred years.

Alluvial: Pertaining to or composed of alluvium, or deposited by a stream or running water.

Alluvium: A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geological time by a stream or other body of running water as a sort of semi-sorted sediment in the bed of the stream or on its flood plain or delta, or as a cone or fan at the base of the mountain.

Aquifer: A water-bearing bed of stratum of permeable rock, sand, or gravel capable of yielding considerable amount of water to wells of springs.

Asset: Any manmade 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.

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.

Base Flood Elevation (BFE): The BFE is the water surface elevation of a 100-year flood event (a flood that has a 1 percent chance of occurring in any given year as defined by the NFIP). The base flood is a statistical concept used to ensure that all properties subject to NFIP are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water – whether from rainfall, snowmelt, springs, or other sources – flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds" and "drainage basins."

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

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Civil Disorder: Civil disorder results from incidents intended to disrupt a community to the degree that law enforcement intervention is required to maintain public safety. Civil disorder is generally associated with controversial political, judicial, or economic issues and events and may occur at any time, although statistics indicate that civil disorder is more frequent during the summer months. Although the City of Merced does not have a history of civil disorder or rioting, large public gatherings, often associated with concerts or sports events, have overburdened local law enforcement and fire protection resources in the past. The effects of civil disorder and riots vary and depend on the type of event and its severity, scope, and duration. Essential services (such as electricity, water, public transportation, and communications) may be disrupted, and property damage, injuries, and loss of life may occur.

Coastal High Hazard Area: Usually along an open coast, bay, or inlet, that is subject to inundation by storm surge and, in some instances, wave action caused by storms or seismic sources.

Coastal Zones: The area along the shore where the ocean meets the land as the surface of the land rises above the ocean. This land/water interface includes barrier islands, estuaries, beaches, coastal wetlands, and land areas having direct drainage to the ocean.

Communicable Disease: For the purposes of this plan, communicable diseases include severe acute respiratory syndrome (SARS), flu, small pox, and diseases carried by insects. Diseases carried by insects include plague (fleas), encephalitis, malaria, West Nile virus (WNV) (mosquitoes), and Lyme disease (ticks).

Community Rating System (CRS): The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Compaction: Reduction in bulk volume or thickness of, or the pore space within, a body of fine-grained sediments in response to the increasing weight of overlying material that is continually being deposited, or to the pressure resulting from the earth movements within the crust. It is expressed as a decrease in porosity brought about by a thicker packing of the sediment particles.

Computer- Aided Design And Drafting (CADD): A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/ cross-section drawings.

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

Critical Facility: A critical facility is vital to the City's ability to provide essential services and protect life and property. Loss of a critical facility would result in a severe economic or catastrophic impact. Under the Merced's Hazard Mitigation Plan (MHMP) definition, critical facilities include the following:

- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers needed for disaster response before, during, and after hazard events
- Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events
- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a hazard event
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials

Cubic Feet per Second (cfs): A cubic foot can be visualized as a box measuring 1 by 1 by 1 foot. The U.S. Geological Services (USGS) defines a cfs as "the flow rate or discharge equal to one cubic foot of water per second or about 7.5 gallons per second." The rate of flow of a creek, river, or flood is measured by quantity over time and is often referred to as "discharge," or the rate at which a volume of water passes a given point in a given amount of time. Discharge and river flow are often measured in terms of cfs.

Dam: A dam is any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris: The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.

Debris Flow: Debris flow occurs when dense mixtures of water-saturated debris move down-valley. Debris flows look and behave much like flowing concrete and form when loose masses of unconsolidated materials are saturated, become unstable, and move down slope. The source of water varies and can include rainfall, melting snow or ice, and glacial outburst floods.

Depth of Flooding (DOF): The DOF is difference between regulatory flood elevation (RFE) and the elevation of the lowest grade adjacent to a structure.

Detachment Fault: Where the dip of a normal fault's surface is very gentle or almost flat, it is referred to as a **detachment fault** or low-angle normal fault. Detachment faults are common in the desert areas of California.

Digitize: To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates [e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates] for use in computer applications.

Dip-Slip Fault: Faults on which the movement is parallel to the dip of the fault surface. Normal faults are dip-slip faults on which the hanging wall (the rocks above the fault surface) move down relative to the footwall (the rocks below the fault surface). Normal faults are the result of extension (forces that pull rocks apart). Where the dip of a normal fault's surface is steep, it is called a high-angle normal fault, or simply a normal fault. The Owens

Valley and the Sierra Nevada fault zones are examples of high-angle normal faults. Together they produce a down-dropped block which forms the Owens Valley. This type of fault-bounded valley is called a **graben**. A fault-bounded ridge is called a **horst**.

Disaster Council: The Disaster Council is the Merced City Manager-approved group that oversaw all phases of the LHMP's development. The members of this committee included key city personnel, citizens, knowledgeable individuals representative of the community, and stakeholders from within the planning area.

Disaster Mitigation Act of 2000 (DMA): The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Displacement Time: The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.

Drainage Basin: A basin is the area within which all surface water (whether from rainfall, snowmelt, springs, or other sources) flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Drainage basins are also referred to as "watersheds" and "basins."

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Duration: For the purposes of this plan, duration is defined as the length of time that a hazard occurs. For example, the duration of a tornado can be minutes, but release of a chemical warfare agent such as mustard gas can persist for hours or weeks if unremediated.

Earthquake: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes, and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Epicenter: An area of the surface of the earth directly above the focus (true center of an earthquake), within which the strain energy is first converted to elastic wave energy of an earthquake.

Erosion: Wearing away of the land surface by 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.

Erosion Hazard Area: anticipated to be lost to shoreline retreat over a given period of time. The projected inland extent of the area is measured by multiplying the average annual long-term recession rate by the number of years desired.

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.

Expansion (Shrink-Swell) Potential: The relative volume change in a soil with a gain in moisture. Expansive soils are those that greatly increase in volume when they absorb water and shrink when they dry out.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

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

Extratropical Cyclone: Cyclonic storm events like Nor'easters and severe winter low-pressure systems. Both West and East coasts can experience these nontropical storms that produce gale-force winds and precipitation in the form of heavy rain or snow. These cyclonic storms, commonly called Nor'easters on the East Coast because of the direction of the storm winds, can last for several days and can be very large – 1,000-mile wide storms are not uncommon.

Extent: The extent is the size of an area affected by a hazard.

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 Trace: The intersection of a fault with the earth’s surface. CUSD-PDMP Page 135 11/1/2008

Fault Zone: A zone in which surface disruption or rock fracture has occurred due to movement along a fault. A fault zone may be expressed as an area with numerous small fractures, **breccia** (essentially, fractured rock) as a **fault gouge**. A fault zone may be anywhere from a few meters (or yards) to two or more kilometers (1mile or more) wide.

Federal Emergency Management Agency (FEMA): FEMA is an independent agency (now part of the Department of Homeland Security) created in 1978 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Fire Hazard Zone: An area where, due to slope, fuel, weather, or other fire-related conditions, the potential loss of life and property from a fire necessitates special fire protection measures and planning before development occurs.

Fire Potential Index (FPI): Developed by USGS and USFS to assess and map fire hazard potential over broad areas. Based on such geographic information, national policy makers and on-the-ground fire managers established priorities for prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage suppression forces to high fire risk areas.

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.

Flood Depth: Height of the floodwater surface above the ground surface.

Flood Elevation: Flood elevation is the height of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Flood Hazard Area: The area shown to be inundated by a flood of a given magnitude on a map.

Flood Insurance Rate Map (FIRM): Map of a community, prepared by the Federal Emergency Management Agency that shows both the special flood hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study: A flood insurance study is published for a community by the Federal Insurance and Mitigation Administration in conjunction with the community's FIRM. The study contains background data such as base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community with a detailed FIRM will have a corresponding flood insurance study.

Flooding: Flooding is a general and temporary condition of rising and overflowing water resulting in partial or complete inundation of normally dry land areas. Floods result from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation of runoff of surface water from any source, and (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. As defined by the Federal Emergency Management Agency, any land area susceptible to being inundated by water from any source. The 100-year flood (base flood) has a one percent chance of being equaled or exceeded in any given year.

Floodway: A floodway is an area within a floodplain reserved for the purpose of conveying flood discharge without increasing the BFE by more than 1 foot. Generally speaking, no development is allowed in floodways because any structures there would block the flow of floodwater.

Fog: Fog refers to a cloud (or condensed water droplets) near the ground. Fog forms when air close to the ground can no longer hold all the moisture it contains. Fog occurs either when air is cooled to its dew point or the amount of moisture in the air increases. Heavy fog is particularly hazardous because it can restrict surface visibility. Severe fog incidents can close roads, cause vehicle accidents, cause airport delays, and impair the effectiveness of emergency response. Financial losses associated with transportation delays caused by fog have not been calculated in the United States but are known to be substantial.

Freeboard: Freeboard is the margin of safety added to the BFE.

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.

Fujita Scale of Tornado Intensity: Prior to 2007, tornado intensity was measured by the Fujita (F) Scale. This scale was revised and is now the **Enhanced Fujita scale**. Both scales are sets of wind estimated (not measurements) based on damage. The scales rate the intensity or severity of tornado events using numeric values from F0 to F5 (or greater) based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour [mph]) indicates minimal damage (such as broken tree limbs), and an F6 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

Functional Downtime: The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.

General Plan: California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The plan must consist of an integrated and internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City actions, such as those relating to land-use allocation, annexations, zoning, subdivision and design review, and capital improvements, must be consistent with such a plan. The City of Merced's General Plan serves these purposes. As the principle planning document that directs the City's growth and land use, the general plan is as an integral part of the MHMP. A comprehensive update to Merced's General Plan was approved on January 3, 2012.

Geographic Area Impacted: The physical area in which the effects of the hazard are experienced.

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

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of the RHMP, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Ground Failure: Mudslide, landslide, liquefaction, of the seismic compaction of soils.

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

Groundshaking: When movement occurs along a fault, the energy generated is released as waves, which cause groundshaking. Groundshaking intensity varies with the magnitude of the earthquake, the distance from the epicenter, and the type of rock or sediment through which the seismic waves move. The strongest ground motion, or groundshaking, typically occurs near the epicenter of the earthquake and attenuates (diminishes) as the seismic waves move away from the epicenter. In general, loose or soft saturated sediments amplify groundshaking more than dense or stiff soils or bedrock materials.

Hazard: A source of potential danger or adverse condition. Hazards in this how to series will include naturally occurring events such as flooding, fire, drought, hazardous materials, earthquakes, dam failure, extreme temperature, tornadoes, fog, and storm-related hazards 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: Hazard mitigation refers to reduction or alleviation of the loss of life, personal injury, and property damage that could result from a disaster through long- and short-term strategies. Hazard mitigation involves strategies such as planning, policy changes, programs, projects, and other activities that could mitigate the impacts of hazards.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the 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 hazard mitigation plan is a collaborative document that identifies hazards that could affect a community, assesses vulnerability to hazards, and represents consensus decisions reached on how to minimize or eliminate the effects of hazards.

Hazard Mitigation Survey Questionnaire: This questionnaire was developed by the Merced planning team to gauge household preparedness for hazards that could impact the City of Merced and the level of knowledge about tools and techniques to assist in reducing risks and losses from hazards. The questionnaire asked 30 quantifiable questions about perception of risk, knowledge of mitigation, and support of City programs. The questionnaire also asked several demographic questions in order to help analyze trends. Survey results were used by the Planning Leadership Team and the Disaster Council as a guide for establishing the MHMP's goals, objectives, and mitigation strategies.

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.

Hazards U.S. Multi-Hazard (HAZUS-MH) Loss Estimation Program: HAZUS-MH is a GIS-based program used to support the development of risk assessments as required under the DMA. The HAZUSMH software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. HAZUS-MH is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods, and wind hazards. HAZUS-MH has also been used to assess vulnerability (exposure) for other hazards facing Merced.

Hazardous Material: A hazardous material is a substance or combination of substances that (1) can cause or contribute to an increase in mortality or serious irreversible or incapacitating reversible illnesses, or (2) pose a present or potential hazard to human life, property, or the environment. Hazardous materials could cause these effects because of their quantity, concentration, or physical, chemical, or infectious characteristics. Hazardous waste is included in the City's working definition of hazardous material.

Hazardous Material Incident: This type of incident involves the accidental or intentional release of hazardous materials to the environment. Such incidents typically occur as fixed facility incidents or transportation incidents. It is possible to identify and prepare for a fixed facility incident because federal and state laws require facilities to notify state and local authorities about hazardous materials used or produced at the facility. Transportation incidents are more difficult to prepare for because there is little (if any) notice about the materials involved.

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.

Hydraulics: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Inactive Fault: A fault which shows no evidence of movement in recent geologic time and no potential for movement in the relatively near future.

Inferred Fault: A fault whose location is based largely on qualitative knowledge of the geologic characteristics of the location and for which no known surface displacement has been observed or quantified.

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.

Intensity: A measure of the effects of a hazard event at a particular place.

Intensity (of an earthquake): A measure of the effects of earthquake waves on people, structures, and earth's surface at a particular place. The intensity at a specific point depends not only upon the strength of the earthquake, or the earthquake magnitude, but also upon the distance from the point to the epicenter and the local geology. Intensity may be contrasted with magnitude, which is a measure of the total energy released by an earthquake.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide: Downward movement of a slope and materials under the force of gravity. A general term for relatively rapid mass movement, such as slump, rock slide, debris slide, mudflow, and earthflow.

Large Gathering Places: For the purposes of this plan, such places are defined as follows:

- Any facility listed as a Type A in the California Building Code (UBC) because it has an assembly room with an occupant load of 300 or more or, any facility likely to have an occupancy of greater than 300, such as cultural centers, and places of worship
- Any buildings listed as E used for educational purposes through the 12th grade by 50 or more persons

Lateral Spreads: Develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies in a seismic event. The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000 degrees Fahrenheit. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

Liquefaction: Liquefaction is the complete failure of soils when soils lose shear strength and flow horizontally during earthquakes. Liquefaction is most likely to occur in fine-grained sands and silts with high water content. These materials behave like viscous fluids when liquefaction occurs. Liquefaction undermines the ground's ability to solidly support building structures. Foundations on liquefiable soils can lose their ability to support load and can experience settlement on the order of several inches or more. This situation is extremely hazardous and generally results in extreme property damage and threats to life and safety. Differential settlement can cause significant damage to buildings, lifelines, and transportation structures with partial or total collapse.

Local Government: Local government includes any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of government (regardless of incorporation as a nonprofit corporation under state law), regional or interstate government entity, agency or instrumentality of a local government, Indian tribe or authorized tribal organization, Alaska Native village or organization, rural community, unincorporated town or village, and other public entities.

Lowest Floor: Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.

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.

Magnitude (earthquake): Magnitude is the measure of the strength of an earthquake, typically measured by the Richter scale. Magnitude is most commonly measured by local magnitude (ML) used by the Richter Scale or by Mercalli Intensity. In the Richter Scale, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

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 description of actions to minimize future vulnerability to hazards.

National Flood Insurance Program (NFIP): In 1968, Congress created the NFIP in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. The Mitigation Division is the FEMA section that manages the NFIP and oversees the floodplain management and mapping components of the program. Nearly 20,000 communities across the United States and its territories participate in NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. FEMA contracted the U.S. Army Corps of Engineers to map the floodplains, floodways, and floodway fringes.

National Geodetic Vertical Datum of 1929 (NGVD): Datum established in 1929 and used in the NFIP as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.

National Weather Service (NWS): Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans.

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

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Outflow: Follows water inundation creating strong currents that rip at structures and pound them with debris, and erode beaches and coastal structures.

Peak Ground Acceleration: Peak ground acceleration is a measure of the highest amplitude of ground shaking that accompanies an earthquake based on a percentage of the force of gravity.

Planimetric: Describes maps that indicate only man-made features like buildings.

Planning: The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.

Planning Leadership Team (Technical Subcommittee): The City of Merced Technical Leadership Team (Staff) convened to provide guidance, support, and feedback to the Disaster Council during all phases of MHMP development. The technical subcommittee consisted of key staff from City departments integral to implementing City programs pertinent to hazard mitigation. The PLT engaged other City Staff members having specialized skills and or knowledge to craft specific components of the plan.

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

Potentially Active Fault: As defined by the California Division of Mines and Geology, a fault that has shown displacement during Quaternary time (last 1.6 million years).

Pre- and Post-FIRM Rates: These categories of rates are published in the NFIP manual and apply to buildings in a community qualifying for the regular flood program. Post-FIRM rates are used for buildings whose construction started after December 31, 1974, or after the community's initial FIRM was published, whichever is later. Post-FIRM rates are lower than pre-FIRM rates.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Recovery: Recovery refers to actions taken by an individual or community after a catastrophic event to restore order and community lifelines.

Recurrence Interval: The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.

Regulatory Floodplain: This term refers to an area regulated by the City of Merced as floodplain through its land-use regulations and improvement standards. It includes areas identified by FEMA and published on FIRMs and additional areas identified by Merced as being susceptible to flooding. These areas are delineated based on detailed hydrologic and hydraulic floodplain modeling that meets or exceeds FEMA criteria for mapping and modeling floodplains. The flood event used to delineate these boundaries is referred to as "the regulatory flood" in this plan to differentiate it from the "base flood" used by FEMA.

Repetitive Loss Property: A repetitive loss property is any NFIP-insured property that, since 1978 and regardless of any change(s) of ownership during that period, has experienced any of the following:

- Four or more paid flood losses exceeding $1,000 each
- Two paid flood losses exceeding $1,000 each within any 10-year period since 1978
- Three or more paid losses that equal or exceed the current value of the insured property

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.

Return Period (or Mean Return Period): This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Reverse faults: are dip-slip faults in which the hanging wall moves up relative to the footwall. Reverse faults are the result of compression (forces that push rocks together). The Sierra Madre fault zone of southern California is an example of reverse-fault movement. There the rocks of the San Gabriel

Mountains are being pushed up and over the rocks of the San Fernando and San Gabriel valleys. Movement on the Sierra Madre fault zone is part of the process that created the San Gabriel Mountains.

Richter Scale: A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and 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 occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social, and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking: This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on the people, property, and economy of Merced.

Riverine: Riverine refers to anything of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Scale: A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.

Scarp: A steep slope.

Scour: Removal of soil or fill material by the flow of floodwaters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.

Seismic: Pertaining to earthquake or earth vibration, including those that are artificially induced.

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

Seiche: A standing wave (periodic oscillation) produced in a body of water such as a reservoir, lake, or harbor, by wind, atmospheric changes, or earthquakes.

Settlement: Physical rearrangement of soil materials caused by a reduction in void space between the particles, resulting in a less stable alignment of individual minerals.

Sinkhole: A sinkhole is a collapse depression in the ground with no visible outlet. Its drainage is subterranean; its size is typically measured in meters or tens of meters, and it is commonly vertical-sided or funnel-shaped.

Special Flood Hazard Area (SFHA): An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100- 107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Stakeholder: Stakeholders are individuals or groups that could be affected by the MHMP and/or who can provide specialized knowledge or be individuals working with populations or areas at risk from natural hazards such as business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others.

State Hazard Mitigation Officer (SHMO): The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post- disaster mitigation activities.

State Responsibility Area (SRA): Areas in which the California State Board of Forestry has determined that the State has financial responsibility for fire prevention and suppression.

Storm Surge: Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.

Strike-Slip Fault:-The movement along a **strike-slip fault** is approximately parallel to the strike of the fault, meaning the rocks move past each other horizontally. The San Andreas is a strike-slip fault that has displaced rocks hundreds of miles. As a result of horizontal movement along the fault, rocks of vastly different age and composition have been placed side by side. The San Andreas Fault is a fault zone rather than a single fault, and movement may occur along any of the many fault surfaces in the zone. The surface effects of the San Andreas Fault zone can be observed for over 600 miles (1,000 km).

Structure: Something constructed. (See also Building)

Subsidence: Gradual settling or sinking of the earth’s surface with little or no horizontal motion, usually as the result of the withdrawal of oil, natural gas, or groundwater, or hydrocompaction.

Substantial Damage: Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before- damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.

Super Typhoon: A typhoon with maximum sustained winds of 150 mph or more.

Surface Faulting: The differential movement of two sides of a fracture – in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Surface Rupture: An observable break in the ground surface and associated deformation resulting from movement along a fault.

Technological Hazard: A technological hazard arises from human activities such as the manufacture, transportation, storage, and use of hazardous materials. Technological hazards are assumed to be accidental in nature, with unintended consequences.

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.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Thrust Fault: a reverse fault with a gently-dipping fault surface. Thrust faults are very common in the Klamath Mountains of northern California.

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 tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically a few hundred meters in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Tropical Cyclone: A generic term for a cyclonic, low-pressure system over tropical or subtropical waters.

Tropical Depression: A tropical cyclone with maximum sustained winds of less than 39 mph.

Tropical Storm: A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.

Tsunami: Great sea wave produced by submarine earth movement or volcanic eruption.

Typhoon: A special category of tropical cyclone peculiar to the western North Pacific Basin, frequently affecting areas in the vicinity of Guam and the North Mariana Islands. Typhoons whose maximum sustained winds attain or exceed 150 mph are called super typhoons.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. 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. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

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.

Water Displacement: When a large mass of earth on the ocean bottom sinks or uplifts, the column of water directly above it is displaced, forming the tsunami wave. The rate of displacement, motion of the ocean floor at the epicenter, the amount of displacement of the rupture zone, and the depth of water above the rupture zone all contribute to the intensity of the tsunami.

Water Table: The upper surface of saturated earth material below which all materials are saturated.

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wave Runup: The height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).

Weapon of Mass Destruction (WMD): WMDs include chemical, biological, radiological, nuclear, and explosive weapons associated with terrorism.

West Nile Virus (WNV): WNV is a recent natural hazard affecting California. Mosquitoes transmit this potentially deadly disease to livestock and humans alike.

Wildland: A non-urban, natural area that contains uncultivated land, timber, range, watershed, brush, or grasslands.

Wildfire or Wildland Fire: These terms refer to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography, and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use, and arson.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Zone: A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

Appendix I

Focused Catalog of Hazard Mitigation Plan Actions (not final or prioritized)

Note: This is not the final or prioritized list of Mitigation Plan Actions.

1. Prepare an *Energy Assurance Plan* that includes: 1) the identification and assessment of power-backup capabilities for all City's critical infrastructure (for example, pumps, data centers, dispatch) and buildings utilized for essential services (such as health-safety, water, sewer, waste and transportation); 2) coordination of energy resources among public and private partners; and, 3) establishment of a program and schedule to implement recommended power upgrades and coordination programs.

2. Create a *Disaster Preparedness Program* that educate populations (residents, property owners, and businesses) that are vulnerable to Merced's natural hazards about: 1) shelter sites; 2) disaster advisory and warning systems; and, 3) "before, during" and after" resources from community entities (e.g. hospitals, schools, public works), to prepare for natural disasters. Develop and deploy methods that assure access to this information and to these resources.

3. Support Merced County efforts to construct the Haystack Alternative of Black Rascal Creek.

4. Develop and enhance storm-water drainage improvements to reduce frequent flooding. Projects may involve canals, storm-water drains, basins, trunk lines, auxiliary pipes, and interconnections. For example, increase the current stormwater diversion (at Fahrens Creek, south of Yosemite Avenue) of 50 cubic feet per second (cfs) to 200 cfs, so that storage capacity is not wasted during larger flooding events.

5. Update the City's Storm-water Drainage Master Plan.

6. Prepare a *Natural Area Fire Prevention Plan* for those areas of Merced to be developed adjacent to natural open space areas (as opposed to agricultural fields or private property) in order to determine the best approach to address and provide a coordinated

plan for conflicting needs (for example, air quality, natural resource protection, and property rights). Methods would include acceptable site designs, building designs, and weed abatement.

7. Perform building-specific, structural seismic vulnerability assessment of City-owned critical facilities (buildings and infrastructure) constructed prior to 1980, and take actions to upgrade or retrofit as needed.

8. Retrofit or upgrade unreinforced masonry buildings in Downtown Merced, or other buildings in the Plan area.

9. Pursue program of conversion of overhead utilities to underground service that serve critical facilities or other sensitive sites to reduce exposure to hazards, where possible.

10. Prepare a *Shelter and Emergency-Provision Plan* resulting in identification of existing and future sites and buildings, as well as improvements for their establishment or enhancement

Appendix J

Local Hazard Mitigation Plan Public Outreach Notices

After Approval of Plan, What Kind of Projects Can the City Apply For?

- Property Protection
- Emergency Measures
- Structural Projects
- Conservation
- Public Awareness

Plan Area

The Merced Hazard Mitigation Plan includes territory located within the City's planned growth area. Mitigation measures of the Merced Hazard Mitigation Plan will apply to City-owned facilities and properties. As the City grows, the application of this Plan will expand to the larger geographic area located within the City Limits.

For More Information, Please Contact:

CITY OF MERCED
Planning & Permitting Division
678 West 18th Street
Merced, CA 95340

Phone: 209-385-6858
Fax: 209-725-8775
Email:
planningweb@cityofmerced.org
Website: www.cityofmerced.org

MERCED

Local Hazard Mitigation Plan

Grantor / Timeline

- **In April 2010, the City of Merced was awarded $150,000 from the Federal Emergency Management Agency (FEMA) to prepare a *Local Hazard Mitigation Plan* (LHMP).**
- **A Draft Plan for review and comment by the Federal Emergency Management Agency is expected to be complete in Fall 2012.**

Facts about the Plan

- Hazard Mitigation Planning is the process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented.
- A City of Merced "*Disaster Council*" was formed to help craft the plan, and will assist City Staff in developing plan goals and objectives, and identifying and prioritizing mitigation initiatives.

Public Outreach

- **All Merced citizens will be invited to participate in public outreach events.**
- **The Project is posted for public review and comment on the Planning Department's webpage at:**

  www.cityofmerced.org
- **We value your input and wish to hear from you!**

Your City
Your Community

City Planning seeks your comments!

Details of the plan can be seen on the Planning Department's webpage at www.cityofmerced.org.

Local Hazard Mitigation Plan

The City is preparing a ***Local Hazard Mitigation Plan*** where potential natural hazards that threaten communities are identified such as flooding, earthquakes, fire, and fog. The plan will also explain how these natural hazards would affect the community and then figure out the best way to save lives and reduce property damage in the event that one of these types of natural disasters occurs in Merced. By planning ahead we can save lives and prevent injuries!

Please help the City by doing one or two things such as:

- Take a brief online survey to share what kinds of hazards worry you the most, and give your opinion on how we should prepare for those emergencies. Please go to this link to begin the survey: http://www.surveymonkey.com/s/LC76XGK
- Review and comment on the Draft Hazard Mitigation Plan or the Sample Mitigation Actions which are currently under construction at www.cityofmerced.org.
- Request a Meeting/Presentation by contacting either Bill King at (209) 385-4768 or Julie Sterling at (209) 385-6929.

When the draft is finished later this year, it will be submitted to the Federal Emergency Management Agency (FEMA) to ensure consistency. Once the Plan is approved, the City will be able to apply for improvement projects to reduce impacts that natural disasters can create.

Tú Ciudad
Tú Comunidad

Departamento de Planificacion busca tus comentarios!

Detalles del plan pueden ser vistos en la pagina de internet del Departamento de Planificacion; www.cityofmerced.org

Plan Para Mitigar Riesgos Locales

La Ciudad esta preparando un Plan Para Mitigar Riesgos Locales donde riesgos naturals potenciales que amenazen comunidades son identificados como; inundaciones, terremotos, incendios y niebla. El plan tambien explica como estos riesgos naturales pueden affectar la comunidad y resolver la mejor manera para salvar vidas y reducir daños en propiedades en el evento que uno de estos desastres naturales occura en Merced. Planeando para el futuro podemos salvar vidas y prevenir lesiones.

Por favor ayuda la Ciudad haciendo una o dos de los siguientes:

- Toma una breve encuesta para compartir que clase de riesgos te preocupan y da tu opinion en Como prepararse para esas emergencias. Por favor ve a esta pagina para empezar la encuesta: http://www.surveymonkey.com/s/LC76XGK
- Revisa y comenta en el Plan Preliminar Para Mitigar Riesgos o el Ejemplo de Acciones de Mitigacion los cuales estan actualmente siendo construidos en; www.cityofmerced.org.
- Solicita una reunion/presentacion contactando a Bill King al (209) 385-4768 o Julie Sterling al (209) 385-6929.

Cuando el Plan Preliminar este terminado durante este año; sera presentado ante la Federal Emergency Management Agency (FEMA) para asegurar su consistencia. Una vez que el plan se apruebe, la Ciudad podra ser elegible para solicitar proyectos para mejoras y reducir el impacto que desastres naturales puedan crear.

Koj lub Nroog
Koj lub Zej zos

Nco ntsoov saib City of Merced lub website txog yuav muaj kev sib tham tawm rau yav tom ntej no, thiab thov teb cov lus noog (survey) ntawd: www.cityofmerced.org

Lub Nroog Merced yuav pib ib lub tswv yim hu ua Hazard Mitigation Plan. Lub tswv yim no yuav qhia rau kom paub tiv thaiv yus cov neeg thiab tej khoom uas yuav raug los ntawm natural hazards.

- Cawm tau txoj sia thiab khoom
- Tseg tau nyiaj.
- Thaum muaj ib yam kev puas ntsoog loj (disaster) tshwm sim lawm thiaj pab tau sai.
- Ua kom lub zej zos muaj kev noj qab nyob zoo thiab muaj kev kaj huv.
- Kom yooj yim rau yav tom ntej no yuav tau npaj nyiaj los pab rau tej kev puas ntsoog loj (disaster).

Hluav taws kub **Dej nyab** **Pos huab** **Av qeeg** **Tshav ntuj kub** **Ntau yam ntxiv mus**

"Peb xav tau koj cov lus noog, koj lub tswv yim, thiab koj txoj kev paub rau qhov chaw uas koj nyob."

- Yam dabtsi ua tiav lawm?
  - Yuav ua yam twg thiaj tiav mus?
    - Lub neej tom ntej yuav ua dabtsi?

Hu rau Bill King
AICP Principal Planner
(209) 385-4788

Julie Sterling
Associate Planner
(209) 385-6929

Local Hazard Mitigation Plan

Each year, in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

In April 2010, the City of Merced received funds from the Federal Emergency Management Agency (FEMA) to prepare a *Local Hazard Mitigation Plan.*

Hazard Mitigation Planning is the process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. On average, each dollar spent on mitigation saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2005).

Public Survey Opportunity: You can help with this project by completing a short survey. What hazards are of concern to you? How should we prepare for those hazards? Sharing your voice and ideas would be very much appreciated. Please go to this link to begin the survey.

http://www.surveymonkey.com/s/YKHZZ6P

Alternatively, go to the City's main webpage at www.cityofmerced.org to find this link.

If you'd like to comment, have a question, or would like to know how you can be involved in this Project, then please call Principal Planner Bill King at 209 385 6858.

NOTICE OF PUBLIC MEETING
ABOUT THE CITY OF MERCED LOCAL HAZARD MITIGATION PLANNING EFFORTS

A public meeting will be held by the Merced City Planning Commission on Wednesday, July 18, 2012, at 7:00 p.m., or as soon thereafter as may be heard in the City Council Chambers located in the Civic Center at 678 W. 18th Street, Merced, California, concerning the City of Merced Local Hazard Mitigation Planning effort and opportunity for public input during the development of this plan. Once completed, the City of Merced Local Hazard Mitigation Plan will describe the hazards that threaten Merced, such as flooding, earthquakes, and fog, and then figure out the best way to save lives and reduce property damage in the event that one of these types of natural disasters occurs.

Some draft sections of the Merced Hazard Mitigation Plan are posted on the City's website at http://www.cityofmerced.org/depts/cd/planning/draft_local_hazard_mitigation_plan/default.asp

All persons interested in the development of the Merced Hazard Mitigation Plan and its eventual adoption are invited to attend this public meeting or forward written comments to the Director of Development Services, City of Merced, 678 West 18th Street, Merced, California 95340. Another opportunity to review and comment on the completed draft plan, at a later date, will be offered to the public.

Please feel free to call the Planning Department at (209) 385-6858 for additional information.

June 25, 2012

KIM ESPINOSA
Planning Manager

City of Merced Local Hazard Mitigation Plan

The City is preparing a ***Local Hazard Mitigation Plan*** that will identify natural hazards that threaten Merced such as flooding, earthquakes, heat, and fog. The plan will also explain how these natural hazards would affect the community and then figure out the best way to save lives and reduce property damage in the event that one of these types of natural disasters occurs. By planning ahead we can save lives, prevent injuries, and minimize post-event restoration costs.

A public meeting about Merced's Local Hazard Mitigation Planning effort will be one of the items at the Planning Commission Meeting on July 18, 2012, at 7:00 p.m. in the Council Chambers located at 678 W. 18th Street. At the meeting, the Commission's role in land use planning to minimize the City's vulnerability to hazards, and receipt of public comments on the developing plan will be emphasized. Details of the planning effort can be viewed on the Planning Department's webpage at:

http://www.cityofmerced.org/depts/cd/planning/draft_local_hazard_mitigation_plan/default.asp.

You are invited to take a quick online survey (or pick one up at the Planning Department) to share what kinds of hazards worry you the most, and give your opinion on how we should prepare for those emergencies. The web link to the survey is: http://www.surveymonkey.com/s/LC76XGK.

CityofMerced.org

Your City Connection

APRIL 2012

Market on Main comes back to Downtown Merced this Spring and runs through October with lots of farm-fresh produce and plenty of fun. Along with all the fresh fruits and veggies, there will be hand-made crafts, jams, honey and entertainment. The market will have a variety of theme nights and offer fun for all ages. Look for more details on the City website and on "The Streets of Merced" Facebook page.

Yosemite Avenue Project moves ahead with work

The next phase of the Yosemite Avenue Improvement Project begins Monday, March 19. During this phase the north side of Yosemite Avenue will be widened to accommodate a fourth lane of traffic and a sidewalk and a new traffic signal system will be installed at G Street and Mansionette Drive.

The end of Mansionette Drive at Yosemite Avenue will be blocked during the construction from March 19 through May 11. Traffic is being diverted around the neighborhood. Motorists are asked to use Paulson Road, Mercy Avenue or G Street to access the neighborhood.

Yosemite Avenue will remain open during the construction, however traffic lanes will be shifted as needed so that work can proceed.

The entire Yosemite Avenue Improvement Project is expected to be finished in August. Once completed, the project will eliminate the bottleneck at the G Street intersection and allow better flow of traffic along Yosemite Avenue. There will be four full lanes along that stretch of Yosemite, plus a left turn lane at G Street, improved driveway access and improvements to the sewer and water lines that run under the street.

The project timeline was stretched out after lengthy talks with businesses in the area. They requested that construction be halted during certain periods when their business would be heavy to allow their customers better access to their stores.

People with questions or problems about the project can call 209-724-8235, calls will be returned by Public Works Director/Operations Stan Murdock or his representative.

Long-range plans eye development and reducing hazards

Long-term urban growth will occur in the area between the City and UC Merced and there is a need to plan for that growth.

The Bellevue Corridor Community Plan covers a 3.5 square-mile area that will guide future growth along Bellevue Road between G Street and Lake Road.

It will establish a land-use map, a mobility plan, and tackle questions such as the location and demand for student housing, research and development parks, and the design of Bellevue Road.

The City's *Local Hazard Mitigation Plan* will be crafted in a process through which natural hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized and implemented.

The goal is to save lives and reduce property damages. On average, each dollar spent dealing with the hazards ahead of time saves society an average of $4 in avoided future losses in addition to saving lives and preventing injuries.

Both plans are primarily funded through state and federal grants that cannot be used for general fund purposes such as road repair or paying for public safety personnel.

City Planning Staff encourages public participation. Project details for both these projects can be viewed at the Planning Department's webpage at www.cityofmerced.org.

There are online surveys (or forms in Planning) to share your concerns and how the City should deal with those hazards.

City Scene

July 2012

Holiday Pet Safety

By: Kim Herzog

July 5th is Animal Control's Busiest Day. The fireworks absolutely terrify ALL animals. Some cope with it differently. Most animals want to be near their human. If you are going to leave your pet, PLEASE make sure they are secure either in a crate or inside of your house. Most of all….***MAKE SURE YOUR PET HAS IDENTIFICATION ON !!!!*** We cannot return them to you, if we don't know who they belong to.

1. Have your animal in a room with few or no windows. The sudden flashes from fireworks getting set off can startle and upset quite a few pets.
2. Put on soft music or a TV so that the sudden bangs from fireworks don't upset your pets. Anything that is usually making noise at home and can help cover up the booms and bangs will help your pets see this as just any old night.
3. Make sure your pets get plenty of exercise the day you know fireworks are going to be around. The idea here is to get your pets worn out and ready to call it a night before most of the partying starts.
4. **Scaredy Dog.** Your dog can become easily frightened by 4th of July fireworks and loud celebrations. Make sure your pet is wearing a properly fitted collar with proper identification & tags just in case your pet becomes scared and runs away from home. Better yet, you might want to have your pet micro-chipped as a precaution to make it easier for your pet to be returned home safely & promptly. Around the 4th of July their appears to be an upsurge in lost pets and strays so keep a watchful eye on your pet whereabouts at all time.
5. You may want to consider a mild sedative for your dog. Contact your Veterinarian for this medication.

City of Merced Local Hazard Mitigation Plan

The City is preparing a ***Local Hazard Mitigation Plan*** that will identify natural hazards that threaten Merced such as flooding, earthquakes, heat, and fog. The plan will also explain how these natural hazards would affect the community and then figure out the best way to save lives and reduce property damage in the event that one of these types of natural disasters occurs. By planning ahead we can save lives, prevent injuries, and minimize post-event restoration costs.

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Published for City Employees　　Dawn Walker, Editor

SHINING OVER CALIFORNIA'S GREAT CENTRAL VALLEY SINCE 1869

MERCED SUN-STAR

WEDNESDAY, March 7, 2012

SAFETY

City to identify, prioritize local hazards

Mitigation plan will be submitted to FEMA in order to fund improvement projects.

By AMEERA BUTT
abutt@mercedsunstar.com

City of Merced residents can show up Friday at the Civic Center to voice concerns on any natural or man-made hazards they think they might face.

The city is drafting a hazard mitigation plan, along with help from its disaster council. The plan focuses on identifying likely hazards that would affect the city — extreme temperatures, hazardous materials, fire, fog — and ranks the hazards.

Then the plan identifies and prioritizes the recommended mitigation measures to reduce those impacts, said Bill King, principal planner for the city.

Once the draft is finished late this year, it will be submitted to the Federal Emergency Management Agency, which will make sure the content of the plan is consistent, King said. "Once you have a plan, you can apply for projects," he said.

For example, the city experiences flood-

SEE HAZARDS, BACK PAGE

More online

The public can take a survey on what hazards concern them and other questions at http://is.gd/14amui.

HAZARDS

CONTINUED FROM PAGE A1

ing from time to time. To reduce the impacts to residents and property, the plan would help make way for improvement projects, according to King. One possible project could be constructing detention basins, or structures that temporarily hold water back from flowing downstream. That would help slow flooding in Black Rascal Creek or other creeks.

Flooding is the city's largest hazard, he said.

In 2009, the city received $500,000, by way of Rep. Dennis Cardoza, D-Merced, for hazard mitigation from FEMA. The city has used $150,000 to put the plan together, while the rest will be earmarked for potential hazard mitigation projects the city may pursue in the future.

The disaster council, appointed by the city manager, serves as a transition between the city and incorporating the community when it comes to the hazard mitigation plan, according to Fire Chief Mike McLaughlin. McLaughlin is deputy director of emergency services on the council, and City Manager John Bramble is the director. The 14-member group includes city employees and officials from the Merced Irrigation District, Pacific Gas & Electric Co. and others.

King said portions of the plan will be posted on the city of Merced's website for public comment. However, the city plans to hold more formal public outreach workshops sometime this year.

"Public involvement is a key component of it," McLaughlin said.

The city disaster council meets 3 p.m. Friday in the Sam Pipes Room at the Civic Center.

Reporter Ameera Butt can be reached at (209) 385-2477 or abutt@mercedsunstar.com.

MERCED CITY COUNCIL MEETINGS

Next Council meetings:
April 2nd and April 16th at 7 p.m.
678 W. 18th St. Merced, CA
For more information call :
(209) 388-7100

MERCED

To voice your concern to the council, fill out a "Request to Speak" card before the meeting.

Local Hazard Mitigation Plan

The City is preparing a ***Local Hazard Mitigation Plan*** where potential natural hazards that threaten communities are identified such as flooding, earthquakes, fire, and fog. The plan will also explain how these natural hazards would affect the community and then figure out the best way to save lives and reduce property damage in the event that one of these types of natural disasters occurs in Merced. By planning ahead we can save lives and prevent injuries!

City Planning Staff want to hear from you!
Details of the plan can be seen on the Planning Department's webpage at www.cityofmerced.org.

You are invited to take an online survey (or pick one up at City Hall) to share what kinds of hazards worry you the most, and give your opinion on how we should prepare for those emergencies.

If you or someone you know are interested in being added to our mailing list to be updated South Merced events.

PLEASE CALL US AT:
Phone: (209) 385-5490
MINERVA PEREZ mlperez@gvhc.org
FABIAN ALBERTO falberto@gvhc.org

WORD SEARCH

Can you find words related to Golden Valley Health Centers?

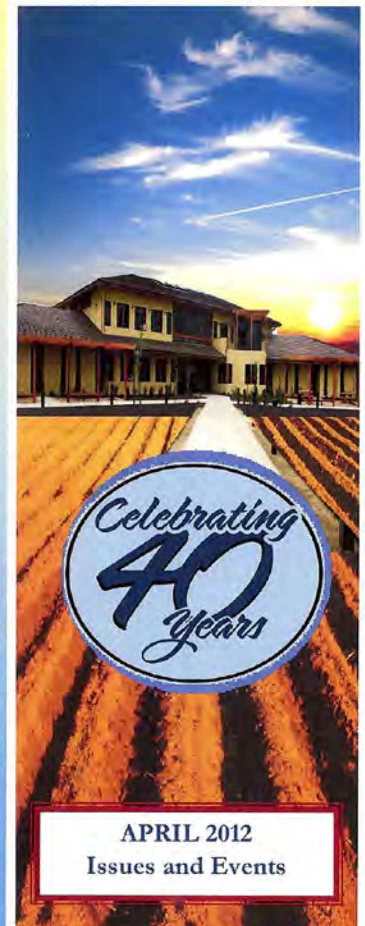
D	N	R	P	K	A	A	X	Y	M	S	G	E	S	G
H	Z	O	H	R	C	P	C	W	O	E	O	C	S	Q
B	E	A	I	C	I	A	Q	U	U	R	L	N	X	U
S	U	A	E	T	C	M	T	O	E	V	D	E	U	T
G	S	S	L	O	A	H	A	R	H	I	E	L	Q	U
W	S	K	V	T	M	V	I	R	X	C	N	L	H	K
Y	L	D	N	E	H	E	O	I	Y	E	V	E	K	V
V	A	U	R	V	E	C	H	N	F	S	A	C	O	I
O	E	C	P	A	L	Z	E	H	N	B	L	X	I	W
G	E	N	Y	T	R	O	F	N	I	I	L	E	U	U
D	Q	U	A	L	I	T	Y	B	T	G	E	V	V	Z
E	R	A	C	H	T	L	A	E	H	E	Y	P	P	K
X	E	Z	X	K	U	B	L	D	C	Z	R	G	Z	X
S	S	R	P	L	J	O	V	N	E	M	L	S	P	C
F	V	D	C	X	B	U	A	T	A	P	Y	F	Z	W

ACCESS	ADVOCACY	EXCELLENCE
FORTY	GOLDEN VALLEY	HEALTH CENTERS
HEALTH CARE	INNOVATION	PRIMARY
QUALITY	SERVICE	SOUTH MERCED

GOLDEN VALLEY HEALTH CENTERS
737 W. Childs Ave. Merced CA 95341

GOLDEN VALLEY HEALTH CENTERS

Working together for a Healthier South Merced



APRIL 2012
Issues and Events

Appendix K

HAZUS Loss Estimates (Flooding and Earthquake)

HAZUS-MH: Earthquake Event Report

Region Name City of Merced_2

Earthquake Scenario: Merced County Ortigalita Fault Zone

Print Date: May 12, 2011

Totals only reflect data for those census tracts/blocks included in the user's study region.

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,970.53 square miles and contains 47 census tracts. There are over 63 thousand households in the region and has a total population of 210,554 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 69 thousand buildings in the region with a total building replacement value (excluding contents) of 12,947 (millions of dollars). Approximately 93.00 % of the buildings (and 78.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 3,078 and 445 (millions of dollars), respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 69 thousand buildings in the region which have an aggregate total replacement value of 12,947 (millions of dollars). Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 84% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 4 hospitals in the region with a total bed capacity of 288 beds. There are 122 schools, 10 fire stations, 23 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 13 dams identified within the region. Of these, 8 of the dams are classified as 'high hazard'. The inventory also includes 23 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 3,523.00 (millions of dollars). This inventory includes over 441 kilometers of highways, 471 bridges, 14,182 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	471	379.10
	Segments	124	2,365.70
	Tunnels	0	0.00
		Subtotal	**2,744.80**
Railways	Bridges	2	0.70
	Facilities	2	5.30
	Segments	117	179.00
	Tunnels	0	0.00
		Subtotal	**185.00**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	2	2.60
		Subtotal	**2.60**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	3	32.00
	Runways	3	113.90
		Subtotal	**145.80**
		Total	**3,078.20**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	141.80
	Facilities	46	0.00
	Pipelines	0	0.00
		Subtotal	**141.80**
Waste Water	Distribution Lines	NA	85.10
	Facilities	4	314.40
	Pipelines	0	0.00
		Subtotal	**399.40**
Natural Gas	Distribution Lines	NA	56.70
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**56.70**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	1	129.80
		Subtotal	**129.80**
Communication	Facilities	14	1.70
		Subtotal	**1.70**
		Total	**729.40**

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Merced County Ortigalita Fault Zone
Type of Earthquake	Source
Fault Name	Ortigalita
Historical Epicenter ID #	170
Probabilistic Return Period	NA
Longitude of Epicenter	-121.14
Latitude of Epicenter	37.10
Earthquake Magnitude	7.10
Depth (Km)	0.00
Rupture Length (Km)	50.58
Rupture Orientation (degrees)	0.00
Attenuation Function	WUS Shallow Crustal Event - Extensional

Building Damage

Building Damage

HAZUS estimates that about 2,436 buildings will be at least moderately damaged. This is over 3.00 % of the total number of buildings in the region. There are an estimated 209 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 3 below summaries the expected damage by general occupancy for the buildings in the region. Table 4 summaries the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	600	0.98	73	1.19	38	2.13	11	2.36	4	2.04
Commercial	2,382	3.90	240	3.94	142	8.05	40	8.60	12	5.61
Education	121	0.20	10	0.16	4	0.23	1	0.19	0	0.10
Government	87	0.14	7	0.12	4	0.23	1	0.30	1	0.26
Industrial	553	0.91	59	0.96	36	2.03	10	2.16	3	1.40
Other Residential	11,430	18.72	1,392	22.83	800	45.52	368	78.62	181	86.22
Religion	235	0.38	20	0.33	10	0.55	2	0.53	1	0.31
Single Family	45,663	74.77	4,297	70.47	725	41.25	34	7.23	9	4.07
Total	**61,072**		**6,098**		**1,758**		**469**		**210**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	52,616	86.15	4975	81.58	856	48.70	41	8.74	12	5.54
Steel	1,139	1.86	117	1.92	90	5.09	33	6.96	11	5.22
Concrete	1,163	1.90	112	1.83	54	3.08	18	3.90	6	3.01
Precast	732	1.20	78	1.27	56	3.21	15	3.25	3	1.51
RM	1,804	2.95	118	1.93	78	4.41	21	4.45	4	1.85
URM	374	0.61	50	0.81	28	1.60	8	1.79	4	1.87
MH	3,244	5.31	650	10.66	596	33.91	332	70.92	170	81.01
Total	**61,072**		**6,098**		**1,758**		**469**		**210**	

*Note:

RM Reinforced Mesonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 288 hospital beds available for use. On the day of the earthquake, the model estimates that only 282 hospital beds (98.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	4	0	0	4
Schools	122	0	0	121
EOCs	0	0	0	0
PoliceStations	23	0	0	23
FireStations	10	0	0	10

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 % After Day 1	With Functionality > 50 % After Day 7
Highway	Segments	124	0	0	124	124
	Bridges	471	12	0	454	471
	Tunnels	0	0	0	0	0
Railways	Segments	117	0	0	117	117
	Bridges	2	0	0	2	2
	Tunnels	0	0	0	0	0
	Facilities	2	0	0	2	2
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	2	0	0	2	2
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	3	0	0	3	3
	Runways	3	0	0	3	3

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 % After Day 1	with Functionality > 50 % After Day 7
Potable Water	46	0	0	46	46
Waste Water	4	0	0	3	4
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	1	0	0	1	1
Communication	14	1	0	14	14

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	7,091	1845	461
Waste Water	4,255	1459	365
Natural Gas	2,836	1560	390
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	63,815	18,115	15,153	9,126	0	0
Electric Power		796	457	168	28	1

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 6 ignitions that will burn about 0.01 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 16 people and burn about 1 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.050 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 46.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 1,920 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 28 households to be displaced due to the earthquake. Of these, 27 people (out of a total population of 210,554) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1:Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2:Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3:Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4:Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	1	0	0	0
	Industrial	0	0	0	0
	Other-Residential	33	7	0	1
	Single Family	14	1	0	0
	Total	**49**	**8**	**0**	**1**
2 PM	Commercial	16	3	0	1
	Commuting	0	0	0	0
	Educational	9	2	0	1
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	8	2	0	0
	Single Family	3	0	0	0
	Total	**37**	**7**	**1**	**2**
5 PM	Commercial	20	5	1	1
	Commuting	5	7	12	2
	Educational	1	0	0	0
	Hotels	0	0	0	0
	Industrial	1	0	0	0
	Other-Residential	12	2	0	0
	Single Family	5	0	0	0
	Total	**45**	**14**	**13**	**4**

Economic Loss

The total economic loss estimated for the earthquake is 214.51 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 167.28 (millions of dollars); 16 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 57 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.36	4.98	0.16	0.33	5.83
	Capital-Related	0.00	0.15	5.13	0.10	0.10	5.48
	Rental	1.00	1.10	2.31	0.09	0.15	4.65
	Relocation	3.48	2.94	3.19	0.52	1.14	11.27
	Subtotal	**4.48**	**4.56**	**15.61**	**0.87**	**1.72**	**27.24**
Capital Stock Losses							
	Structural	7.46	4.16	4.60	1.58	3.15	20.95
	Non_Structural	41.85	16.33	15.98	6.01	5.56	85.73
	Content	13.60	3.35	7.66	4.11	3.36	32.08
	Inventory	0.00	0.00	0.24	0.76	0.29	1.28
	Subtotal	**62.91**	**23.84**	**28.47**	**12.45**	**12.36**	**140.04**
	Total	**67.39**	**28.40**	**44.08**	**13.32**	**14.09**	**167.28**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2,365.68	$0.00	0.00
	Bridges	379.11	$11.29	2.98
	Tunnels	0.00	$0.00	0.00
	Subtotal	**2744.80**	**11.30**	
Railways	Segments	178.98	$0.00	0.00
	Bridges	0.71	$0.00	0.01
	Tunnels	0.00	$0.00	0.00
	Facilities	5.33	$0.17	3.19
	Subtotal	**185.00**	**0.20**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	2.57	$0.10	4.00
	Subtotal	**2.60**	**0.10**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	31.95	$2.84	8.90
	Runways	113.89	$0.00	0.00
	Subtotal	**145.80**	**2.80**	
	Total	**3078.20**	**14.40**	

Table 13: Utility System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Line	141.80	$8.30	5.85
	Subtotal	**141.82**	**$8.30**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	314.40	$9.52	3.03
	Distribution Line	85.10	$6.57	7.72
	Subtotal	**399.44**	**$16.09**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Line	56.70	$7.02	12.37
	Subtotal	**56.73**	**$7.02**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	129.80	$1.36	1.05
	Subtotal	**129.80**	**$1.36**	
Communication	Facilities	1.70	$0.05	2.73
	Subtotal	**1.65**	**$0.05**	
	Total	**729.45**	**$32.81**	

Table 14. Indirect Economic Impact with outside aid
(Employment as # of people and Income in millions of $)

LOSS		Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	(1)	-0.07
Second Year			
	Employment Impact	0	0.00
	Income Impact	(4)	-0.20
Third Year			
	Employment Impact	0	0.00
	Income Impact	(5)	-0.26
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	(5)	-0.26
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	(5)	-0.26
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(5)	-0.26

Appendix A: County Listing for the Region

Merced,CA

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
California					
	Merced	210,554	10,116	2,830	12,947
Total State		**210,554**	**10,116**	**2,830**	**12,947**
Total Region		**210,554**	**10,116**	**2,830**	**12,947**

HAZUS-MH: Flood Event Report

Region Name: 100 Yr Flood Merced

Flood Scenario: 100 Year Flood

Print Date: Tuesday, April 26, 2011

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- California

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,900 square miles and contains 5,793 census blocks. The region contains over 64 thousand households and has e total population of 210,554 people (2000 Census Bureau data). The distribution of population by State end County for the study region Is provided in Appendix B.

There are an estimated 69,606 buildings in the region with a total building replacement value (excluding contents) of 12,948 million dollars (2006 dollars). Approximately 93.24% of the buildings (and 78.14% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 69,606 buildings in the region which have an aggregate total replacement value of 12,948 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	10,116,811	78.1%
Commercial	1,504,286	11.6%
Industrial	608,550	4.7%
Agricultural	283,558	2.2%
Religion	171,822	1.3%
Government	76,087	0.6%
Education	186,479	1.4%
Total	**12,947,593**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,366,561	76.8%
Commercial	504,151	16.4%
Industrial	89,259	2.9%
Agricultural	19,964	0.6%
Religion	41,904	1.4%
Government	30,460	1.0%
Education	31,101	1.0%
Total	**3,083,400**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 288 beds. There are 121 schools, 6 fire stations, 23 police stations and no emergency operation centers.

Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	100 Yr Flood Merced
Scenario Name:	100 Year Flood
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

HAZUS estimates that about 4,084 buildings will be at least moderately damaged. This is over 52% of the total number of buildings in the scenario. There are an estimated 131 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	7	9.59	62	84.93	4	5.48	0	0.00	0	0.00	0	0.00
Education	1	00.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	13	92.86	1	7.14	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	9	75.00	0	0.00	3	25.00	0	0.00	0	0.00
Religion	0	0.00	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	1,196	29.89	2,402	60.03	238	5.95	34	0.85	131	3.27
Total	**21**		**1,272**		**2,406**		**241**		**34**		**131**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	7	25.93	19	70.37	1	3.70	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	131	100.00
Masonry	5	21.74	12	52.17	6	26.09	0	0.00	0	0.00	0	0.00
Steel	4	26.67	11	73.33	0	0.00	0	0.00	0	0.00	0	0.00
Wood	1	0.03	1,205	31.19	2,386	61.77	237	6.14	34	0.88	0	0.00

Essential Facility Damage

Before the flood analyzed in this scenario, the region had hospital beds available for use. On the day of the scenario flood event, the model estimates that hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	6	0	0	0
Hospitals	3	0	0	0
Police Stations	23	6	0	6
Schools	121	17	0	17

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 37,552 tons of debris will be generated. Of the total amount, Finishes comprises 93% of the total, Structure comprises 2% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,502 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 11,417 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 32,516 people (out of a total population of 210,554) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 798.62 million dollars, which represents 25.90 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 789.03 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 55.31% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	258.43	54.12	12.68	10.34	335.57
	Content	182.16	181.97	36.15	61.73	442.00
	Inventory	0.00	4.19	6.16	1.12	11.47
	Subtotal	440.59	220.27	54.99	73.19	789.03
Business Interruption						
	Income	0.02	0.92	0.01	0.17	1.12
	Relocation	0.79	0.31	0.01	0.01	1.13
	Rental Income	0.23	0.21	0.00	0.00	0.44
	Wage	0.05	1.06	0.01	5.78	6.90
	Subtotal	1.10	2.50	0.03	5.96	9.59
ALL	Total	441.69	222.78	55.01	79.14	798.62

Appendix A: County Listing for the Region

California
- Merced

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
California				
Merced	210,554	10,116,811	2,830,782	12,947,593
Total	**210,554**	**10,116,811**	**2,830,782**	**12,947,593**
Total Study Region	**210,554**	**10,116,811**	**2,830,782**	**12,947,593**

HAZUS-MH: Flood Event Report

Region Name: 200 Year Flood - Merced

Flood Scenario: 200 Year Flood

Print Date: Wednesday, June 01, 2011

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 1,900 square miles and contains 5,793 census blocks. The region contains over 64 thousand households and has a total population of 210,554 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 69,606 buildings in the region with a total building replacement value (excluding contents) of 12,948 million dollars (2006 dollars). Approximately 93.24% of the buildings (and 78.14% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 69,606 buildings in the region which have an aggregate total replacement value of 12,948 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	10,116,811	78.1%
Commercial	1,504,286	11.6%
Industrial	608,550	4.7%
Agricultural	283,558	2.2%
Religion	171,822	1.3%
Government	76,087	0.6%
Education	186,479	1.4%
Total	**12,947,593**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,573,198	76.3%
Commercial	540,018	16.0%
Industrial	92,484	2.7%
Agricultural	55,558	1.6%
Religion	49,171	1.5%
Government	31,370	0.9%
Education	32,255	1.0%
Total	**3,374,054**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 3 hospitals in the region with a total bed capacity of 288 beds. There are 121 schools, 6 fire stations, 23 police stations and no emergency operation centers.

Flood Scenario Parameters

HAZUS used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	200 Year Flood - Merced
Scenario Name:	200 Year Flood
Return Period Analyzed:	200
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

HAZUS estimates that about 4,899 buildings will be at least moderately damaged. This is over 52% of the total number of buildings in the scenario. There are an estimated 149 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS Flood technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Tabla 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	3	3.66	73	89.02	3	3.66	3	3.66	0	0.00	0	0.00
Education	1	00.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	11	84.62	2	15.38	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	8	66.67	1	8.33	3	25.00	0	0.00	0	0.00
Religion	0	0.00	6	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	692	18.60	3,244	67.64	456	9.51	55	1.15	149	3.11
Total	**15**		**985**		**3,248**		**462**		**55**		**149**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	6	18.75	22	68.75	3	9.38	1	3.13	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	148	100.00
Masonry	3	7.89	16	42.11	17	44.74	2	5.26	0	0.00	0	0.00
Steel	3	15.79	14	73.68	2	10.53	0	0.00	0	0.00	0	0.00
Wood	1	0.02	905	19.55	3,213	69.43	453	9.79	55	1.19	1	0.02

Essential Facility Damage

Before the flood analyzed in this scenario, the region had hospital beds available for use. On the day of the scenario flood event, the model estimates that hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	6	1	0	0
Hospitals	3	1	0	0
Police Stations	23	6	0	6
Schools	121	18	0	18

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 45,659 tons of debris will be generated. Of the total amount, Finishes comprises 93% of the total, Structure comprises 2% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,826 truckloads (@25 tons/truck) to remove the debris generated by the flood.

Social Impact

Shelter Requirements

HAZUS estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. HAZUS also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 13,008 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 37,051 people (out of a total population of 210,554) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 974.32 million dollars, which represents 28.88 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 963.37 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 55.28% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	318.30	64.19	14.59	12.97	410.05
	Content	219.07	202.76	41.90	75.10	538.83
	Inventory	0.00	5.59	6.88	2.03	14.49
	Subtotal	537.37	272.53	63.36	90.10	963.37
Business Interruption						
	Income	0.02	1.12	0.01	0.25	1.40
	Relocation	0.92	0.39	0.01	0.01	1.33
	Rental Income	0.28	0.26	0.00	0.00	0.54
	Wage	0.06	1.31	0.01	6.32	7.69
	Subtotal	1.27	3.07	0.03	6.58	10.95
ALL	Total	538.64	275.61	63.39	96.68	974.32

Appendix A: County Listing for the Region

California
- Merced

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars) Residential	Non-Residential	Total
California				
Merced	210,554	10,116,811	2,830,782	12,947,593
Total	**210,554**	**10,116,811**	**2,830,782**	**12,947,593**
Total Study Region	**210,554**	**10,116,811**	**2,830,782**	**12,947,593**

Appendix L
City of Merced Comprehensive Asset Inventory

Note: Address data is not shown in the Plan, but is on record with the City.

Site Description	Address	Total Real Property ($)	Total Personal Property ($)	Total Values ($)
MERCED THEATRE	301 W MAIN ST	4,798,369	230,328	5,028,697
MCCOMBS YOUTH CENTER	615 WEST 15TH ST	3,431,795	0	3,431,795
COLUMBIA PARK PLAYGROUND	520 COLUMBIA	0	68,166	68,166
BOUNCE HOUSES	678 W 18TH ST	0	7,384	7,384
APPLEGATE PARK	1045 W 25TH ST	79,694	0	79,694
STORM PUMP STATION 35	3092 QUEENS CIRCLE	254,192	0	254,192
STORM PUMP STATION 19	71 E GERARD AVE	254,192	0	254,192
STORM PUMP STATION 38	ACROSS FROM 4011 TANAGER	254,192	0	254,192
STORM PUMP STATION 37	426 HALLEY AVE (STARLIGHT)	254,192	0	254,192
STORM PUMP STATION 40	1200 E EL PORTAL DR	254,192	0	254,192
STORM PUMP STATION 36	3356 N PARSONS AVE	254,192	0	254,192
STORM PUMP STATION 39 (BIKE PATH)	ACROSS FROM 4011 TANAGER &	254,192	0	254,192
STORM PUMP STATION 41	ACROSS FROM 4313 BIXBY & REVELLE	254,192	0	254,192
STORM PUMP STATION 42	1883 CHEYENNE DR	102,995	454,192	557,187
STORM PUMP STATION 43	2350 CREEK VIEW DR	102,995	454,192	557,187
STORM PUMP STATION 44	4000 BLK HORIZON (PROXIMITY OF AVIGON)	102,995	454,192	557,187
STORM PUMP STATION 45	BEHIND 877 ROUNDHILL DR	102,995	454,192	557,187
SPORTS COMPLEX	1803 WARDROBE	136,618	0	136,618
OLD FAHRENS PARK & BIKE PATH	3433 BISMARCK DR	0	81,227	81,227
CAROL GABRIAULT PARK	1601 WILLOWBRROOK DR	0	64,982	64,982
SEWER PUMP No 17	3400 SAN FRANCISCO ST	110,000	50,000	160,000
MACREADY FIELD	20 MACREADY DR	300,000	0	300,000
MACREADY FIELD	20 MACREADY DR	300,000	0	300,000
FEDERAL BUILDING	415 W 18TH ST	3,100,000	100,000	3,275,798
MULTI FAMILY DWELLING	25-29 E SANTA FE	280,000	0	280,000
MULTI FAMILY DWELLING	2490/2498 G ST	130,000	0	130,000
U STREET NEIGHBORHOOD PARK	203 RANCHO CAMINO DR	0	0	0
12TH & G ST NEIGHBORHOOD PARK	73 E 12TH ST	0	0	0
ADA GIVENS	2904 GREEN ST	0	0	0

APPLEGATE PARK	1045 W 25TH ST	0	0	0
APPLEGATE PARK	1045 W 25TH ST	0	0	0
APPLEGATE PARK	1045 W 25TH ST	0	0	0
APPLEGATE PARK	1045 W 25TH ST	0	0	0
APPLEGATE PARK	1045 W 25TH ST	0	0	0
ROSSOTTI ED-ZOO-CATION CENTER	1045 W 25TH ST	200,000	0	200,000
DWIGHT AMEY PARK	3375 BLIX AVE	0	0	0
ELMER MURCHIE PARK	355 ARROWWOOD DR	0	0	0
ELMER MURCHIE PARK	355 ARROWWOOD DR	0	0	0
FAHRENS PARK (NEW)	1283 BUENA VISTA DR	0	0	0
GILBERT MACIAS PARK	229 E CHILDS AVE	0	0	0
JOE HERB (LOWER)	2200 YOSEMITE PKWY	0	0	0
JOE HERB (LOWER)	2200 YOSEMITE PKWY	0	0	0
JOE HERB (LOWER)	2200 YOSEMITE PKWY	0	0	0
MCNAMARA PARK	1040 CANAL ST & 470 W 11TH ST (2)	0	0	0
MCNAMARA PARK	1040 CANAL ST & 470 W 11TH ST (2)	0	0	0
MERCED DOG PARK	1175 YOSEMITE AVE	0	0	0
RAHILLY PARK	3400 PARSONS AVE	0	0	0
RAY FLANNAGAN PARK	440 CONE AVE	0	0	0
RICHARD BERNASCONI PARK	3795 VIA MORAGA	0	0	0
RICHARD BERNASCONI PARK	3795 VIA MORAGA	0	0	0
RUDOLPH J MERINO PARK	1275 PACIFIC DR	0	0	0
COVERED STALLS	1776 GROGAN AVE	0	0	0
OFFICES / COVERED STALLS / MAINTENANCE GARAGE	1776 GROGAN AVE	0	0	0
WATER WELL STATION No 1	477 LAWRENCE DR	0	0	0
WATER WELL STATION No 1	477 LAWRENCE DR	0	0	0
WATER WELL STATION No 1	477 LAWRENCE DR	0	0	0
WATER WELL STATION No 1	477 LAWRENCE DR	0	0	0
WATER WELL STATION No 2	1201 PARSONS AVE	0	0	0
WATER WELL STATION No 2	1201 PARSONS AVE	0	0	0
WATER WELL STATION No 7	3362 MCKEE	0	0	0
WATER WELL STATION No 7	3362 MCKEE	0	0	0

WATER WELL STATION No 8	1520 WN BEAR CREEK DR	0	0	0
WATER WELL STATION No 13	2890 GERARD AVE	0	0	0
WATER WELL STATION No 14	2110 WARDROBE	0	0	0
WATER WELL STATION No 10R2	4250 E GERARD AVE	0	0	0
WATER WELL STATION No 18	440 E OLIVE AVE	0	0	0
WATER WELL STATION No 3C	511 W 12TH ST	0	0	0
WATER WELL STATION No 6	32 E CHILDS AVE	0	0	0
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	0	250,000	250,000
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	0	100,000	100,000
SEWER PUMP No 12	N HWY 59	100,000	50,000	150,000
SEWER PUMP No 23	203 RANCHO CAMINO DR	100,000	50,000	150,000
SEWER PUMP No 16	BUENA VISTA & SAN FRANSCISCO	100,000	50,000	150,000
SEWER PUMP No 20	305 CARDELLA RD	100,000	50,000	150,000
SEWER PUMP No 21	2309 MALASPINA DR	100,000	50,000	150,000
SEWER PUMP No 22	481 WINDER AVE	100,000	50,000	150,000
SINGLE FAMILY DWELLING	518 N ST	80,000	0	80,000
SINGLE FAMILY DWELLING	306 LAS BRISAS ST	0	89,500	89,500
CONDO (ZONING R1-PD)	1778 MERCED AVE	50,000	0	50,000
SINGLE FAMILY DWELLING	210 OLIVIA COURT	97,000	0	97,000
SINGLE FAMILY DWELLING	127 W 23RD ST	73,000	0	73,000
SINGLE FAMILY DWELLING	1844 ASHLEY COURT	91,500	0	91,500
SINGLE FAMILY DWELLING	26 SAN CLEMENTE DR	90,000	0	90,000
SINGLE FAMILY DWELLING	3239 CHEYENNE DR	70,000	0	70,000
SINGLE FAMILY DWELLING	946 W 23RD ST	61,000	0	61,000
SINGLE FAMILY DWELLING	2668 N STATE HWY 59	45,000	0	45,000
SINGLE FAMILY DWELLING	1403 W 11TH ST	45,000	0	45,000
SINGLE FAMILY DWELLING	1798 GLEN AVE	43,000	0	43,000
CONTRACTOR'S EQUIPMENT	678 W 18TH ST	0	2,695,709	2,695,709
PARKS & REC. STORAGE	20 MACREADY DR	2,747	851	3,598
GENERATOR HOUSING BUILDING	20 MACREADY DR	47,001	31,139	78,140
AIRPORT TERMINAL/OFFICES	20 MACREADY DR	228,508	4,967	233,475
COMMERCIAL AVIATION CTR.	44 MACREADY DR	379,173	0	379,173

AIRPORT ELECTRICAL VAULT	20 MACREADY DR	31,243	35,271	66,514
HANGAR 11	20 MACREADY DR	10,084	0	10,084
ONE AIRCRAFT HANGAR	20 MACREADY DR	56,631	0	56,631
HANGAR 16	20 MACREADY DR	10,084	0	10,084
FBO LEASED HANGAR 18	20 MACREADY DR	329,580	0	329,580
HANGAR 19	20 MACREADY DR	277,304	0	277,304
GENERAL AVIATION TERMINAL	48 MACREADY DR	85,828	1,417	87,245
HANGAR 20	20 MACREADY DR	453,769	0	453,769
MACREADY FIELD	20 MACREADY DR	294,046	0	294,046
HANGAR CAFE/3HANGARS	26 MACREADY DR	324,084	0	324,084
FIVE AIRCRAFT HANGARS/AIRPORT SHOP	20 MACREADY DR	149,066	11,356	160,422
FOUR AIRCRAFT HANGARS	20 MACREADY DR	219,719	0	219,719
MACREADY FIELD	20 MACREADY DR	438,968	0	438,968
SIX AIRCRAFT HANGARS	20 MACREADY DR	194,452	0	194,452
FUEL FARM EQUIPMENT	20 MACREADY DR	223,152	0	223,152
COMMERCIAL AVIATION CTR.	44 MACREADY DR	169,938	0	169,938
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	28,322	0	28,322
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	28,322	0	28,322
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	28,322	0	28,322
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	28,322	0	28,322
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	27,343	0	27,343
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910

AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	27,343	0	27,343
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	27,343	0	27,343
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	20,910	0	20,910
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	27,343	0	27,343
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	34,333	0	34,333
AIRCRAFT HGR/PORT-A-PORT	20 MACREADY DR	28,322	0	28,322
MERCED CHAMBER & VISITOR'S BUREAU	690 WEST 16TH ST	746,700	0	746,700
CIVIC CENTER	678 W 18TH ST	11,264,339	677,494	11,941,833
CIVIC CENTER - LIBRARY BOOKS & COMPUTER SOFTWARE	678 W 18TH ST	0	146,560	146,560
PURCHASING	2525 "O" ST	208,786	59,861	268,647
PURCHASING	2525 "O" ST	68,457	42,243	110,700
PURCHASING COVERED BAYS WITH WAREHOUSE	2525 O ST	68,660	42,088	110,748
FIRE STATION No 52	1400 FALCON WAY	2,574,420	66,423	2,640,843
FIRE STATION No 53	800 LOUGHBROUGH	2,755,263	70,002	2,825,265
FIRE STATION No 54 O.E.S.	1425 E 21ST ST	1,803,455	31,720	1,835,175
TRAINING TOWER	99 E 16TH ST	381,029	502	381,531

FIRE STORAGE BUILDING	364 W 27TH ST	191,928	10,218	202,146
FIRE STATION No 51	99 EAST 16TH ST	3,306,266	192,746	3,499,012
FIRE STATION No 55	3520 N PARSONS AVE	2,822,309	70,002	2,892,311
FD DRILL GROUND COVERED STALLS	99 E 16TH ST	15,126	17,998	33,124
FIRE DEPT ANNEX	364 W 27TH ST	246,981	94,677	341,658
SINGLE FAMILY DWELLING	721 W 4TH ST	139,772	5,625	145,397
COMPUTER EQUIPMENT	678 W 18TH ST	0	4,569,000	4,569,000
MCNAMARA PARK	11TH & K STS	83,251	4,967	88,218
APPLEGATE PARK	1045 W 25TH ST	195,137	45,418	240,555
ADA GIVENS PARK	2904 GREEN ST	20,602	1,848	22,450
APPLEGATE PARK	1045 W 25TH ST	6,865	0	6,865
RAHILLY PARK	3400 N PARSONS	24,590	0	24,590
APPLEGATE PARK	25TH & O ST (2)	85,828	2,555	88,383
STEPHEN LEONARD HALL	640 T ST	359,707	21,850	381,557
ARTS & CRAFT EXHIBITS	678 W 18TH ST	0	338,040	338,040
MERCED SENIOR CENTER	755 WEST 15TH ST	4,036,073	125,285	4,161,358
MCNAMARA PARK	11TH & K STS	23,830	0	23,830
MERCED POLICE CENTRAL	611 W 22ND ST	3,124,122	205,097	3,329,219
MERCED POLICE	611 W 22ND ST	1,289	25,489	26,778
MERCED POLICE NORTH	1109 LOUGHBROUGH ST	0	48,990	48,990
POLICE SPECIAL SERVICES	450-460 GROGAN AVE	0	26,058	26,058
MERCED POLICE CENTRAL	611 W 22ND ST	33,868	0	33,868
MERCED POLICE SOUTH	11TH & CANAL STS	1,146,124	63,299	1,209,423
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	554,943	0	554,943
SEWER PUMP No 18	3197 MERCED AVE	100,838	50,000	150,838
SEWER PUMP No 19	540 ALFARATA BLVD	100,838	50,000	150,838
YOSEMITE TO DONNA CLASS 1 BIKE PATH	BIKE PATH - NO ADDRESS	35,293	0	35,293
PUBLIC WORKS OFFICES	1776 GROGAN AVE	181,953	78,775	260,728
MAINTENANCE GARAGE	1776 GROGAN AVE	446,301	163,936	610,237
OFFICES/STORAGE/COVERED PARKING	1776 GROGAN AVE	74,155	70,687	144,842
FUEL STORAGE	1776 GROGAN AVE	514,966	0	514,966
WATER DEPT STORAGE	1776 GROGAN AVE	60,079	122,064	182,143

CHEMICAL / WATER METER STORAGE ROOM	1776 GROGAN AVE	31,243	26,258	57,501
COVERED STALLS	1776 GROGAN AVE	178,522	76,986	255,508
APPLEGATE PARK	1405 W 25TH ST (2)	41,193	1,848	43,041
APPLEGATE PARK	1405 W 25TH ST (2)	100,000	0	100,000
FAHRENS PARK	1283 BUENA VISTA DR (1)	51,497	1,848	53,345
JOE HERB PARK	2200 YOSEMITE PKWY	111,575	1,848	113,423
GILBERT MACIAS PARK	229 E CHILDS AVE	10,300	1,848	12,148
MCNAMARA PARK	1040 CANAL ST &	68,660	17,031	85,691
RAHILLY PARK	3400 N PARSONS AVE (1)	20,602	1,848	22,450
SEWER PUMP No 10	1842 VALLEY FORGE	102,995	0	102,995
SEWER PUMP No 13	3381 "R" ST @ BUENA VISTA	102,995	0	102,995
STORM PUMP STATION No 1	285 RIGGS AVE	171,657	0	171,657
STORM PUMP STATION No 3	2540 COOPER AVE	343,309	0	343,309
STORM PUMP STATION No 4	1317 WN BEAR ST	51,497	0	51,497
STORM PUMP STATION No 5	3343 BISMARK ST	85,828	0	85,828
STORM PUMP STATION No 6	1150 PASEO VERDE	128,741	0	128,741
STORM PUMP STATION No 7	BEHIND 1704 WILDWOOD	51,497	0	51,497
STORM PUMP STATION No 9	1190 ES BEAR CREEK	85,828	0	85,828
STORM PUMP STATION No 11	100 PARSON AT CHILDS	51,497	0	51,497
STORM PUMP STATION No 16	1425 WN BEAR CRK@ SUNSET	51,497	0	51,497
STORM PUMP STATION No 18	1813 W LOPES AVE	85,828	0	85,828
STORM PUMP STATION No 20	1510 E HANSEN AVE	51,497	0	51,497
STORM PUMP STATION No 21	986 W AUBURN COURT	51,497	0	51,497
STORM PUMP STATION No 22	912 W DONNA DR	85,828	0	85,828
STORM PUMP STATION No 24	2090 LOPES AVE	51,497	0	51,497
STORM PUMP STATION No 25	1801 W WARDROBE AVE	137,325	0	137,325
STORM PUMP STATION No 27	1850 AUTO CENTER	257,482	0	257,482
STORM PUMP STATION No 28	LEHIGH BIKE TUNNEL	51,497	0	51,497
STORM PUMP STATION No 30	3508 N PAULSON ROAD	137,325	0	137,325
UNDERGROUND PUMP STATION	3304 COLUMBIA	102,995	50,000	152,995
UNDERGOUND PUMP STATION	KIBBY RD & HIGHWAY 140	51,497	50,000	101,497
UNDERGROUND PUMP STATION	SYDNEY LANE & HIGHWAY 140	102,995	50,000	152,995

UNDERGROUND PUMP STATION	1831 GROGAN AVE	102,995	50,000	152,995
UNDERGOUND PUMP STATION	NEW AIRPORT / ALBATROSS AVE	102,995	50,000	152,995
UNDERGROUND PUMP STATION	OLD AIRPORT / WASH RACK	85,828	50,000	135,828
UNDERGROUND PUMP STATION	COOPER AVE	102,995	50,000	152,995
UNDERGOUND PUMP STATION	3254 E CHILDS AVE	102,995	50,000	152,995
MAINTENANCE GARAGE	1776 GROGAN AVE	236,024	8,514	244,538
PUBLIC WORKS CORP. YARD/ HEAVY EQUIP WASH	1776 GROGAN AVE	10,300	0	10,300
TRANSPO & WELCOME CENTER	710 WEST 16TH ST	1,004,179	21,291	1,061,616
WASTEWATER TREATMENT PLANT-ADMIN BLDG	10260 GOVE ROAD	494,127	42,607	536,734
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	46,372	7,606	53,978
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	22,044	2,621	24,665
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	72,371	12,125	84,496
TRANSFORMER No 1	10260 GOVE ROAD	30,898	0	30,898
TRANSFORMER No 2	10260 GOVE ROAD	30,898	0	30,898
TRANSFORMER No 3	10260 GOVE ROAD	30,898	0	30,898
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	339,532	30,284	369,816
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	554,942	0	554,942
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	554,942	0	554,942
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	554,942	0	554,942
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	554,942	0	554,942
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	357,959	30,284	388,243
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	321,110	7,606	328,716
METHANE GAS	10260 GOVE ROAD	222,464	8,235	230,699
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	1,672,428	0	1,672,428
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	1,106,842	0	1,106,842
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	1,106,842	0	1,106,842
WATER WELL STATION No 1	477 LAWRENCE DR	102,995	425,805	528,800
WATER WELL STATION No 2	1201 PARSONS	102,995	425,805	528,800
WATER WELL STATION No 3C	511 W 12TH ST	102,995	354,840	457,835
WATER WELL STATION No 5B	1632 R ST	102,995	454,192	557,187
WATER WELL STATION No 6	32 E CHILDS AVE	51,497	212,905	264,402
WATER WELL STATION No 7	3362 MCKEE	102,995	454,192	557,187

WATER WELL STATION No 8	1520 WN BEAR CREEK	51,497	212,905	264,402
WATER WELL STATION No 9	3391 R ST	102,995	354,840	457,835
WATER WELL STATION No 11	346 E YOSEMITE AVE	102,995	454,192	557,187
WATER WELL STATION No 13	2890 GERARD AVE	102,995	454,192	557,187
WATER WELL STATION No 14	2110 WARDROBE	102,995	454,192	557,187
APPLEGATE PARK	633 W 26TH ST	51,497	4,967	56,464
PUMP STATION No 12	2575 N HIGHWAY 59	429,138	50,000	479,138
WATER TANK STATION No 1	477 ST LAWRENCE DR	1,665,394	0	1,665,394
WATER TANK STATION No 2	1201 PARSONS AVE	1,665,394	0	1,665,394
WATER TANK STATION No 7	3362 MCKEE ROAD	1,665,394	0	1,665,394
WATER TANK STATION No 3	511 W 12TH @ L ST	1,665,394	0	1,665,394
STORM PUMP STATION No 32	1257 BURNA VISTA DR	82,687	0	82,687
STORM PUMP STATION No 31	1590 MASSASSO	82,687	0	82,687
STORAGE / TRAINING ROOM	1776 GROGAN AVE	178,943	9,834	188,777
PARCADE/PARKING LOT	638 W 18TH ST	4,645,912	0	4,794,639
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	1,993,341	0	1,993,341
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	1,993,341	0	1,993,341
SEWER PUMP No 15	1348 EAST ALEXANDER	99,802	0	99,802
STORM PUMP STATION No 33	3340 R ST	80,121	0	80,121
STORM PUMP STATION No 34	EAST OF M ST @ BLACK RASCAL	80,121	0	80,121
STORM PUMP STATION No 14	3110 KIMBERLY AVE	80,121	0	80,121
STORM PUMP STATION No 15	3312 G ST & BLACK RASCAL BIKE PATH	80,121	0	80,121
STORM PUMP STATION No 8	BEHIND 2980 WAINWRIGHT	80,121	0	80,121
PUBLIC WRKS SERVICE CTR	1776 GROGAN AVE	510,985	62,890	573,875
RESTORED AIRPLANE DISPLAY	20 MACREADY DR	33,868	0	33,868
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	12,188,030	0	12,188,030
WASTEWATER TREATMENT PLANT	10260 GOVE ROAD	1,979,830	0	1,979,830
WATER WELL STATION No 10R2	4250 E GERARD AVE	102,995	0	102,995
WATER WELL STATION No 17 (UC MERCED)	5010 N LAKE RD	102,995	454,192	557,187
WATER WELL STATION No 15	1855 BUENA VISTA DR	102,995	454,192	557,187
WATER WELL STATION No 16	125 CARDELLA RD	102,995	454,192	557,187
BOB CARPENTER PARK	1801 SILVERADO AVE	0	62,815	62,815

APPLEGATE PARK	1045 W 25TH ST	0	81,227	81,227
JOE HERB PARK (UPPER)	2200 YOSEMITE PARKWAY	0	146,209	146,209
JOE HERB PARK (UPPER)	2200 YOSEMITE PARKWAY	36,000	30,000	66,000
MCNAMARA PARK	1040 CANAL & 470 W 11TH ST	0	59,567	59,567
MCNAMARA PARK	1040 CANAL & 470 W 11TH ST	182,784	0	182,784
STEPHEN LEONARD PARK	650 T ST	0	81,227	81,227
STEPHEN LEONARD PARK	640 T ST	355,122	0	355,122
BURBANK PARK	440 E OLIVE AVE	0	70,397	70,397
SANTA FE STRIP PARK No 2	749 BUENA VISTA DR	0	86,643	86,643
BLACK RASCAL STRIP PARK & BIKE PATH	520 COLUMBIA	0	37,906	37,906
GILBERT MACIAS PARK	229 E CHILDS AVE	0	70,397	70,397
RAHILLY PARK	3400 PARSONS	0	129,964	129,964
FAHRENS PARK (NEW)	1283 BUENA VISTA DR	0	106,137	106,137
CIRCLE DRIVE PARK	2301 CIRCLE DR	0	48,736	48,736
HANSEN PARK	1357 HANSEN AVE / 2960 YORKSHIRE CT	0	37,906	37,906
DIEGO RIVERA PARK	940 P ST	0	32,491	32,491
FREDERICK DOUGLAS PARK	1528 W 8TH ST	0	32,491	32,491
BENJAMIN TANNAGER MEMORIAL PARK	1301 2ND ST	0	32,491	32,491
CHARLES RICHARD DREW PARK	820 N ST	0	59,567	59,567
HARRIET TUBMAN PARK	706 W 4TH ST	0	64,982	64,982
THE LOVE VEASLEY FAMILY PARK	452 W 6TH ST	0	27,076	27,076
U STREET NEIGHBORHOOD PARK	303 U ST	0	37,906	37,906
WILLIAM LLOYD GARRISON PARK	76 S S ST	0	59,567	59,567
DAVENPORT PARK	1495 DUNN RD	0	70,397	70,397
BROOKS PARK	71 W GERARD AVE	0	51,985	51,985
DENNIS CHAVEZ PARK	1120 W DR	0	59,567	59,567
RAY FLANNAGAN PARK	440 CONE AVE	0	70,397	70,397
SANTA FE STRIP PARK No 3	809 DONNA DR	0	27,076	27,076
NEIGHBORHOOD PARK No 2	149 11ST ST	26,112	27,076	53,188
STEPHAN GRAY PARK	1755 WN BEAR CREEK DR	0	48,736	48,736
STORM DRAIN PUMP STATION 2	100 CAMPUS DR	102,995	254,192	357,187
STORM DRAIN PUMP STATION 10	3600 BLOCK MANSIONETTE DR	102,995	254,192	357,187

STORM DRAIN PUMP STATION 12	1660 MERCED AVE	102,995	254,192	357,187
STORM DRAIN PUMP STATION 13	1883 E OLIVE AVE	102,995	254,192	357,187
STORM DRAIN PUMP STATION 17	4150 HORIZON AVE	102,995	254,192	357,187
STORM DRAIN PUMP STATION 23	310 SOUTH N ST	102,995	254,192	357,187
STORM DRAIN PUMP STATION 26	97 E GERARD AVE	102,995	254,192	357,187
STORM DRAIN PUMP STATION 29	1304 CORMORANT DR	102,995	254,192	357,187
STORM DRAIN PUMP STATION 46	3359 BLIX AVE	102,995	254,192	357,187
STORM DRAIN PUMP STATION 47	DINKEY CREEK	102,995	254,192	357,187
STORM DRAIN PUMP STATION 48	3951 SAN AUGUSTINE DR	102,995	254,192	357,187
STORM DRAIN PUMP STATION 49	505 S M ST	102,995	254,192	357,187
STORM DRAIN PUMP STATION 50	495 WINDER AVE	102,995	254,192	357,187
RUDOLPH J MERINO PARK	1275 PACIFIC DR	47,001	0	47,001
SUSSI ROSSI FOUNTAIN, ROCK, KIOSK & CLOCK	470 W MAIN ST	0	98,556	98,556
TRANSPORTATION FOUNTAIN	690 W 17TH ST	0	12,997	12,997
ADA GIVENS	290 GREEN ST	83,559	0	83,559
VEHICLES	678 W 18TH ST	0	15,118,000	15,118,000
STREET LIGHT WAREHOUSE	1720 W 16TH ST	129,480	245,022	374,502
MERCED MULTICULT. ARTS CTR	615 W MAIN	3,992,056	0	3,992,056
MERCED CENTER PARKING GARAGE W/RETAIL	1801 M ST	9,153,877	0	9,153,877
MCNAMARA PARK	11TH & K STS	14,590	0	14,590
APPLEGATE PARK	1045 W 25TH ST	29,182	134,838	164,020
APPLEGATE PARK	1045 W 25TH ST	29,182	0	29,182
M.O.A.T	1045 W 25TH ST	171,657	14,191	185,848
JOE HERB PARK	2248 YOSEMITE PARKWAY	106,636	0	106,636
APPLEGATE PARK	1045 W 25TH ST	48,420	0	48,420
JOE HERB PARK	2200 YOSEMITE PARKWAY	83,089	1,705	84,794
GILBERT MACIAS PARK	229 E CHILDS AVE	24,590	3,549	28,139
TOTAL VALUES		**120,694,400**	**40,613,887**	**161,568,958**