

# City of Santa Fe Springs

## Natural Hazards Mitigation Plan

**Adopted: October 11, 2004**



**Prepared under contract with:**

*Emergency Planning Consultants  
San Diego, California  
Carolyn J. Harshman, President  
Revised on October 12, 2006*

## **Special Recognition**

The Disaster Management Area Coordinators (DMAC) of Los Angeles County prepared planning guidance that was utilized by the City of Santa Fe Springs in preparing this Natural Hazards Mitigation Plan. The City extends special recognition to Mike Martinet for his editing contributions to the Hazard-Specific Sections. The DMAC planning guidance was based on the FEMA-approved Mitigation Plan from Clackamas County, Oregon. The City is grateful to DMAC and the Clackamas County Natural Hazards Mitigation Committee for their contributions to this project.

### Special Thanks & Acknowledgments

#### Multi-Jurisdictional Planning Team:

- City of Santa Fe Springs
- City of Whittier
- Whittier City School District
- Whittier Union High School District
- East Whittier City School District
- Little Lake School District
- Office of Disaster Management, Area E: Fan Abel, Coordinator
- South Whittier School District
- Los Nietos School District

### Mapping

In addition to Internet-sourced maps, the City of Santa Fe Springs provided all of the maps included in this plan.

### Consulting Services

Project Management and Planning Services for this project were provided under contract by Emergency Planning Consultants.

- |                                |                                |
|--------------------------------|--------------------------------|
| - Project Management Services: | Carolyn J. Harshman, President |
| - Planning Services:           | Carolyn J. Harshman, President |
|                                | Daniel Robeson, Jr., Associate |
|                                | Eric Acacio, Assistant         |
|                                | Timothy Harshman, Intern       |

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Note: The maps in this plan were provided by the City of Santa Fe Springs or from public Internet-sourced maps. Care was taken in the creation of these maps, but they are provided "as is". The City cannot accept any responsibility for any errors, omissions or positional accuracy, and therefore, there are no warranties that accompany these products (the maps). Although information from land surveys may have been used in the creation of these products, in no way does this product represent or constitute a land survey. Users are cautioned to field verify information on this product before making any decisions.

# City of Santa Fe Springs Natural Hazards Mitigation Plan

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RESOLUTION NO. 9017

A RESOLUTION OF THE CITY OF  
SANTA FE SPRINGS TO ADOPT MODIFICATIONS  
TO THE CITY'S NATURAL HAZARDS  
MITIGATION PLAN

WHEREAS, the federal Disaster Management Act of 2000 (DMA 2000), which amended the Robert T. Stafford Disaster Relief and Emergency Services Act, requires every local, county and state government to have an approved Natural Hazards Mitigation Plan ("Plan") by November 1, 2004 in order to be eligible for pre- and post-disaster grants and funding; and

WHEREAS, Santa Fe Springs' Plan focuses on potential impacts of earthquakes and floods and includes an assessment of these natural hazards, a plan to mitigate them, and methods of monitoring, evaluating, and updating the Plan at least every five years.

WHEREAS, the Federal Emergency Management Agency (FEMA) and the State Office of Emergency Services (OES) have reviewed the City's Natural Hazards Mitigation Plan and is requesting minor modification to the existing plan.

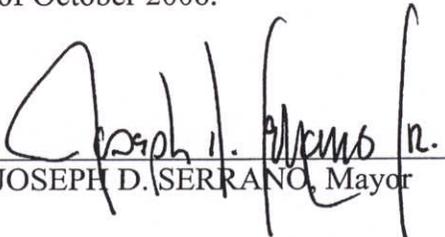
THE CITY COUNCIL OF THE CITY OF SANTA FE SPRINGS DOES RESOLVE AS FOLLOWS:

SECTION 1. The Natural Hazards Mitigation Plan is hereby amended.

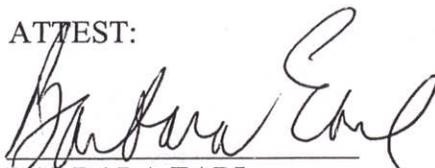
SECTION 2. Authorization is granted to the City Manager to amend and update the Plan.

SECTION 3. The City Clerk shall certify to the passage and adoption hereof.

APPROVED AND ADOPTED this 12<sup>th</sup> day of October 2006.

  
JOSEPH D. SERRANO, Mayor

ATTEST:

  
BARBARA EARL  
City Clerk



# City of Santa Fe Springs

11710 Telegraph Road • CA • 90670-3679 • (562) 868-0511 • Fax (562) 868-7112 • [www.santafesprings.org](http://www.santafesprings.org)

State of California            )  
County of Los Angeles       )ss  
City of Santa Fe Springs     )

I, Barbara Earl, City Clerk of the City of Santa Fe Springs, do hereby certify that the attached document is a true and exact copy of Resolution No. 9017 adopted by the City Council on October 12, 2006.

Dated this 16th day of October, 2006

Barbara Earl  
City Clerk

(Seal)

**Executive Summary: Hazard Mitigation Action Plan**

The City of Santa Fe Springs Natural Hazards Mitigation Plan includes resources and information to assist City residents, public and private sector organizations, and others interested in participating in planning for natural hazards. The mitigation plan provides a list of activities that may assist the City of Santa Fe Springs in reducing risk and preventing loss from future natural hazard events. The action items address multi-hazard issues, as well as activities for earthquakes and flooding.

**How is the Plan Organized?**

The Mitigation Plan contains a Mitigation Action Matrix, background on the purpose and methodology used to develop the mitigation plan, a plan maintenance section, a profile of City of Santa Fe Springs, sections on two natural hazards that might occur within the City, and a number of appendices. All of the sections are described in detail below.

**Who Participated in Developing the Plan?**

The City of Santa Fe Springs Natural Hazards Mitigation Action Plan is the result of a collaborative planning effort between City of Santa Fe Springs, City of Whittier, Whittier City School District, Whittier Union High School District, East Whittier City School District, Little Lake City School District, citizens, public agencies, non-profit organizations, the private sector, and regional and state organizations. Public participation played a key role in development of goals and action items. A Multi-Jurisdictional Planning Team guided the process of developing the plan.

**The Multi-Jurisdictional Planning Team was comprised of representatives from:**

|  |
|--|
| City of Santa Fe Springs – Fernando Tarin, Director of Police Services         |
| City of Santa Fe Springs – Neal Welland, Fire Chief                            |
| City of Santa Fe Springs – Bryan Collins, Administrative Public Safety Officer |
| City of Santa Fe Springs – Cuong Nguyen, Associate Planner                     |
| City of Santa Fe Springs - Julie Herrera, Public Relations Specialist          |
| City of Santa Fe Springs – Tony Olmos, Principal Civil Engineer                |
| City of Whittier - Ann-Marie Hayashi, Emergency Services Assistant             |
| City of Whittier – Nancy Mendez, Assistant City Manager                        |
| City of Whittier – David Muchizuki, Director of Public Works                   |
| City of Whittier – Don Dooley, Planning Services Manager                       |
| East Whittier City School District – Steve Ritter, Assistant Superintendent    |

|   |
|---|
| East Whittier City School District – Lee Bean, Director of Facilities, Maintenance and Operations |
| Whittier City School District – Bob Mazzeo, Director of Business Projects                         |
| Little Lake City School District – Maureen Evans, Asst. Superintendent – Business Services        |
| Whittier Union High School District – Paul Muschetto, Associate Superintendent                    |
| Emergency Planning Consultants – Carolyn J. Harshman, President                                   |

In addition, the City of Santa Fe Springs established a Working Group that assist with the development of the Plan and shared local expertise to ensure its comprehensiveness.

The Santa Fe Springs Working Group was comprised of the following individuals:

- City of Santa Fe Springs – Fernando Tarin, Director of Police Services
- City of Santa Fe Springs – Neal Welland, Fire Chief
- City of Santa Fe Springs – Don Jensen, Director of Public Works
- City of Santa Fe Springs – Paul Ashworth, Assistant Director of Planning and Development
- City of Santa Fe Springs – Bryan Collins, Administrative Public Safety Officer
- City of Santa Fe Springs – Cuong Nguyen, Associate Planner
- City of Santa Fe Springs – Julie Herrera, Public Relations Specialist

**What is the Plan Mission?**

The mission of the Natural Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the City towards becoming a Disaster Resistant Community.

**What are the Plan Goals?**

The plan goals describe the overall direction that City of Santa Fe Springs agencies, organizations, and citizens can take to work toward mitigating risk from natural hazards. The goals are stepping-stones between the broad direction of the mission statement and the specific recommendations outlined in the mitigation Action Matrix (Attachment 1).

**Protect Life and Property**

Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to losses from natural hazards.

Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.

Improve hazard assessment information to make recommendations for discouraging new development in high hazard areas and encouraging preventative

measures for existing development in areas vulnerable to natural hazards.

### **Public Awareness**

Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.

Provide information on tools; partnership opportunities, and funding resources to assist in implementing mitigation activities.

### **Natural Systems**

Balance natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.

Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

### **Partnerships and Implementation**

Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.

Encourage leadership within public and private sector organizations to prioritize and implement local and regional hazard mitigation activities.

### **Emergency Services**

Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry.

Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

### **How are the Action Items Organized?**

The action items are a listing of activities in which City agencies and citizens can be engaged to reduce risk. Each action item includes the assigned coordination organization and an estimate of the timeline for implementation (See Attachment 1: Mitigation Actions Matrix).

The action items are organized within the Mitigation Actions Matrix, which lists all of the multi-hazard and hazard-specific action items. The action items are prioritized by category: the highest priority items are categorized as multi-hazard, next priority are the earthquake items and lastly, the flooding items. Data collection and research and the public participation process resulted in the development of these action items (see

Appendix B: Public Participation). The Matrix includes the following information for each action item:

**Coordinating Organization.** The coordinating organization is the public agency with regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of or responsible for implementing activities and programs.

**Timeline.** Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation.

**Plan Goals Addressed.** The plan goals addressed by each action item are included as a way to monitor and evaluate how well the mitigation plan is achieving its goals once implementation begins. The plan goals are organized into the following five areas:

- Protect Life and Property**
- Public Awareness**
- Natural Systems**
- Partnerships and Implementation**
- Emergency Services**

### **How Will the Plan be Implemented, Monitored, and Evaluated?**

The Plan Maintenance Section of this document details the formal process that will ensure that the City of Santa Fe Springs Natural Hazards Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the City will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how the City of Santa Fe Springs government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City's General Plan, Capital Improvement Plans, and Building & Safety Codes.

### **Plan Adoption**

Adoption of the Natural Hazard Mitigation Plan by the local jurisdiction's governing body is one of the prime requirements for approval of the Plan. Once the Plan is completed, the City Council will be responsible for adopting the City of Santa Fe Springs Natural Hazards Mitigation Plan. The local agency governing body has the responsibility and authority to promote sound public policy regarding natural hazards. The City Council will be requested to grant authority to the City Manager to amend and update the Plan as it is revised to meet changes in the natural hazard risks and exposures in the community. The approved Natural Hazard Mitigation Plan will be significant to the

future growth and development of the community.

### **Coordinating Body**

A City of Santa Fe Springs Hazard Mitigation Working Group will be responsible for coordinating implementation of Plan action items and undertaking the formal review process. The City Manager will assign representatives from City agencies, including, but not limited to, the current Hazard Mitigation Planning Team members representing the City of Santa Fe Springs.

### **Convener**

The City Council will adopt the Natural Hazards Mitigation Plan, and the Hazard Mitigation Working Group will take responsibility for plan implementation. The Director of Police Services will serve as a convener to facilitate the Hazard Mitigation Working Group meetings, and will assign tasks such as updating and presenting the Plan to the members of the committee. Plan implementation and evaluation will be a shared responsibility among all of the Hazard Mitigation Advisory Committee

### **Implementation through Existing Programs**

The City of Santa Fe Springs addresses statewide planning goals and legislative requirements through its General Plan, Capital Improvement Plans, and City Building & Safety Codes. The Natural Hazards Mitigation Plan provides a series of recommendations that are closely related to the goals and objectives of these existing planning programs. City of Santa Fe Springs will have the opportunity to implement recommended mitigation action items through existing programs and procedures.

### **Economic Analysis of Mitigation Projects**

The Federal Emergency Management Agency's (FEMA) approaches to identify costs and benefits associated with natural hazard mitigation strategies or projects fall into two general categories: benefit/cost analysis and cost-effectiveness 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 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.

### **Formal Review Process**

The City of Santa Fe Springs Natural Hazards Mitigation Plan 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. The evaluation process includes a firm schedule and timeline, and identifies the local agencies and organizations

participating in plan evaluation. The convener will be responsible for contacting the Hazard Mitigation Advisory Committee members and organizing the annual meeting. Group members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

### **Continued Public Involvement**

The City of Santa Fe Springs is dedicated to involving the public directly in the continual review and updates of the Hazard Mitigation Plan. Copies of the plan will be catalogued and made available at City Hall, Planning & Development Department, Police Services, and at all City operated public libraries. The existence and location of these copies will be publicized in various community newsletters. The plan also includes the address and the phone number of the City's Planning and Development Department, responsible for keeping track of public comments on the Plan. 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.

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard                   | Action Item  | Coordinating Organization                            | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------------------------|--|--|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                                  |  |  |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| <b>Multi-Hazard Action Items</b> |  |  |           |                           |                  |                 |                                 |                    |
| MH #1-1                          | Establish a formal role for the City Natural Hazards Mitigation Committee to develop a sustainable process for implementing, monitoring, and evaluating City wide mitigation activities.                                       | Hazard Mitigation Working Group                      | Ongoing   |                           |                  |                 | X                               |                    |
| MH #1-2                          | Identify, improve, and sustain collaborative programs focusing on the real estate and insurance industries, public and private sector organizations, and individuals to avoid activity that increases risk to natural hazards. | Hazard Mitigation Working Group, Chamber of Commerce | Ongoing   | X                         | X                | X               | X                               | X                  |
| MH #1-3                          | Develop inventories of at-risk buildings and infrastructure and prioritize mitigation projects.  | Hazard Mitigation Working Group                      | 1-5 years | X                         |                  |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item   | Coordinating Organization   | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|---|---|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |   |   |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-4        | Strengthen emergency services preparedness and response by linking emergency services with natural hazard mitigation programs, and enhancing public education on a regional scale.            | Hazard Mitigation Working Group, Fire, Police, Public Works, Planning | Ongoing   | X                         | X                | X               | X                               | X                  |
| MH #1-5        | Develop, enhance, and implement education programs aimed at mitigating natural hazards, and reducing the risk to citizens, public agencies, private property owners, businesses, and schools. | Hazard Mitigation Working Group, Chamber of Commerce                  | Ongoing   | X                         | X                | X               | X                               | X                  |
| MH #1-6        | Integrate the goals and action items from the City of Santa Fe Springs Natural Hazard Mitigation Plan into existing regulatory documents and programs, where appropriate.                     | Hazard Mitigation Working Group                                       | 1-5 years | X                         |                  |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item   | Coordinating Organization   | Timeline   | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|---|---|------------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |   |   |            | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-7        | Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.                   | Hazard Mitigation Working Group, Police Service Department                | 1-5 years  | X                         |                  |                 |                                 | X                  |
| MH #1-8        | Recommend revisions to requirements for development within the floodplain, where appropriate.   | Hazard Mitigation Working Group, Building Department, Planning Department | 1-5 years  | X                         |                  |                 |                                 | X                  |
| MH #1-9        | Develop public and private partnerships to foster natural hazard mitigation program coordination and collaboration in the City of Santa Fe Springs. | Hazard Mitigation Working Group   | 1-5 years  | X                         | X                |                 | X                               | X                  |
| MH #1-10       | Enhance data and mapping for Floodplain information within the City, and identify and map flood-prone areas outside of designated floodplains.      | Hazard Mitigation Working Group, Technology Committee                     | 5-10 years | X                         |                  |                 |                                 |                    |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item   | Coordinating Organization                                  | Timeline    | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|---|--|-------------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |   |  |             | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-11       | Establish clear roles for participants, meeting regularly to pursue and evaluate implementation of mitigation strategies.                             | Hazard Mitigation Working Group                            | 1-5 years   | X                         |                  |                 | X                               | X                  |
| MH #1-12       | Encourage the development of unifying organizations to ensure communication and dissemination of natural hazard mitigation information.               | Hazard Mitigation Working Group                            | 1-5 years   |                           |                  |                 | X                               | X                  |
| MH #1-13       | Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, business, and industry. | Hazard Mitigation Working Group, Police Service Department | 1-5 years   | X                         | X                |                 | X                               | X                  |
| MH #1-14       | Retrofit of highway bridges/tunnels.  | Hazard Mitigation Working Group, Public Works Department   | 10-15 years | X                         |                  |                 |                                 | X                  |
| MH #1-15       | Equip existing buildings so they can be used as shelters.   | Hazard Mitigation Working Group, Police Services           | Ongoing     | X                         |                  |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item  | Coordinating Organization   | Timeline   | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|--|---|------------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |  |   |            | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
|                |  | Department  |            |                           |                  |                 |                                 |                    |
| MH #1-16       | Install and improve back-up power in critical facilities.  | Hazard Mitigation Working Group   | Ongoing    | X                         |                  |                 |                                 | X                  |
| MH #1-17       | Develop updates for the Natural Hazards Mitigation Action Plan based on new information.   | Hazard Mitigation Working Group   | Ongoing    | X                         | X                |                 | X                               | X                  |
| MH #1-18       | Integrate new earthquake hazard mapping data for the City of Santa Fe Springs and identify potential at-risk areas.                              | Police Services, Planning Department, Public Works Department                 | X          | X                         |                  |                 |                                 | X                  |
| MH #1-19       | Identify which types of repairs and/or reconstruction, if any, would be exempt from local codes, particularly zoning and land development codes. | Police Services, Planning Department, Public Works Department                 | As needed  | X                         |                  |                 |                                 | X                  |
| MH #1-20       | Determine which structures and/or facilities that will not be allowed to be repaired/reconstructed.  | Hazard Mitigation Working Group, Planning Department, and Building Department | 6-10 years | X                         | X                |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item   | Coordinating Organization   | Timeline   | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|---|---|------------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |   |   |            | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-21       | Purchase a complete GIS/GPS setup and provide training on said setup to all pertinent community personnel.  | Hazard Mitigation Working Group, Technical Committee                              | 1-5 years  | X                         |                  |                 |                                 | X                  |
| MH #1-22       | Provide technical assistance to help the community develop disaster management operations capabilities.   | Hazard Mitigation Working Group, Police Services Department                       | Ongoing    | X                         | X                |                 | X                               | X                  |
| MH #1-23       | Conduct interim planning to locate, set up, and manage temporary sites where business and government functions can continue their operations during recovery. | Hazard Mitigation Working Group   | 1-5 years  | X                         |                  |                 | X                               | X                  |
| MH #1-24       | Conduct site plan review to determine new constructions, repair and reconstruction of damaged structures.   | Hazard Mitigation Working Group, Planning Department, and Public Works Department | 1-5 years  | X                         |                  |                 |                                 |                    |
| MH #1-25       | Identify and pursue funding opportunities to develop and implement local mitigation activities.   | Hazard Mitigation Working Group, Fire, Police, Public Works, Planning             | 1-10 years | X                         |                  |                 | X                               |                    |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item  | Coordinating Organization                                   | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|--|---|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |  |   |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-26       | Record and maintain all tax parcel information and floodplain locations in a GIS system in order to build the community's capability to generate maps when needed. | Hazard Mitigation Working Group, Technology Committee       | 1-5 years |                           |                  |                 | X                               |                    |
| MH #1-27       | Provide technical assistance to help the community develop disaster management operations capabilities.  | Hazard Mitigation Working Group, Police Services Department | Ongoing   | X                         | X                |                 | X                               | X                  |
| MH #1-28       | Record and maintain all tax parcel information and floodplain locations in a GIS system in order to build the community's capability to generate maps when needed. | Hazard Mitigation Working Group, Technology Committee       | 1-5 years | X                         |                  |                 |                                 | X                  |
| MH #1-29       | Engage the private sector to contribute to disaster preparedness and loss reduction at the local level.  | Hazard Mitigation Working Group, City Managers Office       | 1-5 years |                           |                  |                 | X                               |                    |
| MH #1-30       | Promote public education to increase awareness of hazards and opportunities for mitigation.  | Public Relations, Police Services, Fire Department          | Ongoing   | X                         |                  |                 | X                               |                    |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item  | Coordinating Organization                          | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|--|--|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |  |  |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-31       | Encourage interested individuals to participate in hazard mitigation planning and training activities.                 | Public Relations, Police Services, Fire Department | Ongoing   | X                         | X                |                 | X                               |                    |
| MH #1-32       | Promote business mitigation awareness to increase knowledge of public facilities managers.                             | Public Relations, Police Services, Fire Department | Ongoing   | X                         | X                |                 | X                               |                    |
| MH #1-33       | Monitor and publicize the effectiveness of mitigation initiatives implemented in the community.                        | Public Relations, Police Services, Fire Department | 1-5 years | X                         | X                |                 |                                 |                    |
| MH #1-34       | Educate the public about procedures for reporting human-caused incidents.  | Public Relations, Police Services, Fire Department | Ongoing   | X                         | X                |                 | X                               |                    |
| MH #1-35       | Educate the public about emergency sheltering and evacuation procedures.   | Public Relations, Police Services, Fire Department | Ongoing   | X                         | X                |                 | X                               |                    |
| MH #1-36       | Manually disperse information about the community's 'state of emergency' ordinance and the relevant emergency response | Public Relations, Police Services, Fire Department | Ongoing   | X                         | X                |                 | X                               |                    |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item  | Coordinating Organization                          | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|--|--|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |  |  |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
|                | actions the public can take.   |  |           |                           |                  |                 |                                 |                    |
| MH #1-37       | Create displays for children's programs that teach safety. Examples of information to be used would be similar to that on the FEMA for Kids CD, the Sparky Fire Safety Program, and/or the American Red Cross's Masters of Disasters program. These displays can be used in conjunction with "Safetyville", the library's children's section, etc. | Public Relations, Police Services, Fire Department | 1-5 years | X                         | X                |                 | X                               |                    |
| MH #1-38       | The American Red Cross will hold a variety of courses, including: CPR, Basic First Aid, Introduction to Disaster Services, Mass Care, Shelter Operations, babysitting, Healthcare Provider, pet first-aid and others at the Red Cross Office and at other locations throughout the   | Public Relations, Police Services, Fire Department | Ongoing   | X                         | X                |                 | X                               |                    |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item   | Coordinating Organization                             | Timeline | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|---|---|----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |   |   |          | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
|                | City.   |   |          |                           |                  |                 |                                 |                    |
| MH #1-39       | Ensure that the Red Cross disaster courses are held on a frequent basis.  | Police Services, Fire Department, Chamber of Commerce | Ongoing  | X                         | X                |                 | X                               |                    |
| MH #1-40       | Provide business continuity workshops for business owners to learn the importance of disaster mitigation and how to create an emergency operations plan for their businesses. | Police Services, Fire Department, Chamber of Commerce | Ongoing  | X                         | X                |                 | X                               | X                  |
| MH #1-41       | Work with the American Red Cross, Board of Education, fire departments and churches towards upgrading all shelter resources.  | Police Services, Fire Department, Chamber of Commerce | Ongoing  | X                         | X                |                 | X                               |                    |
| MH #1-42       | Identify and prioritize needs for additional shelter supplies to include but not limited to additional cots, blankets and shelter kits.                                       | Police Services, Fire Department, Chamber of Commerce | Ongoing  | X                         | X                |                 | X                               |                    |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item  | Coordinating Organization   | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|--|---|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |  |   |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-43       | Develop and promote a communications plan to recruit and train more volunteers for sheltering assistance.  | Police Services, Fire Department, Chamber of Commerce                 | Ongoing   | X                         | X                |                 | X                               |                    |
| MH #1-44       | Conduct annual tabletop disaster exercises with local law enforcement, emergency managers, town and City officials, the LEPC and other disaster response agencies.                       | Police Services, Fire Department, Chamber of Commerce                 | Ongoing   | X                         | X                |                 | X                               | X                  |
| MH #1-45       | Identify opportunities for partnering with citizens, private contractors, and other jurisdictions to increase availability of equipment and manpower for efficiency of response efforts. | Hazard Mitigation Working Group, Fire, Police, Public Works, Planning | 1-5 years | X                         | X                |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard                 | Action Item   | Coordinating Organization   | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|--------------------------------|---|---|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                                |   |   |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| MH #1-46                       | Work with Community Planning Organizations (CPO's) and other neighborhood groups to establish community response teams.             | Hazard Mitigation Working Group, Fire, Police, Public Works, Planning | 1-5 years | X                         |                  |                 | X                               |                    |
| MH #1-47                       | Familiarize public officials of requirements regarding public assistance for disaster response.                                     | Hazard Mitigation Working Group, City Managers Office                 | Ongoing   |                           | X                |                 | X                               |                    |
| <b>Earthquake Action Items</b> |   |   |           |                           |                  |                 |                                 |                    |
| EQ #2-1                        | Integrate new earthquake hazard mapping data for Santa Fe Springs and identify potential risk areas.                                | Hazard Mitigation Working Group, Technology Committee                 | Ongoing   | X                         |                  |                 | X                               | X                  |
| EQ #2-2                        | Develop and incorporate earthquake evacuation routes into appropriate planning documents  | Hazard Mitigation Working Group, Fire, Police, Public Works, Planning | 1-5 years |                           |                  |                 |                                 | X                  |
| EQ #2-3                        | Identify funding sources for structural and nonstructural retrofitting of structures that are identified as seismically vulnerable. | Hazard Mitigation Working Group                                       | Ongoing   | X                         | X                |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard            | Action Item   | Coordinating Organization   | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|---------------------------|---|---|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                           |   |   |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| EQ #2-4                   | Encourage seismic strength evaluations of critical facilities in Santa Fe Springs to identify vulnerabilities for mitigation of schools and universities, public infrastructure, and critical facilities to meet current seismic standards. | Hazard Mitigation Working Group, Chamber of Commerce, School District                         | 1-5 years | X                         | X                |                 | X                               | X                  |
| EQ #2-5                   | Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.   | Hazard Mitigation Working Group, Chamber of Commerce, Public Works, Planning, School District | Ongoing   | X                         | X                |                 | X                               | X                  |
| <b>Flood Action Items</b> |   |   |           |                           |                  |                 |                                 |                    |
| FLD #3-1                  | Analyze each repetitive flood property within Santa Fe Springs and identify feasible mitigation options.  | Hazard Mitigation Working Group, Public Works, Planning                                       | 1-5 years | X                         |                  |                 | X                               | X                  |
| FLD #3-2                  | Recommend revisions to requirements for development within the floodplain, where appropriate.   | Hazard Mitigation Working Group, Public Works, Planning                                       | 1-5 years | X                         |                  |                 | X                               | X                  |

# City of Santa Fe Springs Mitigation Actions Matrix

| Natural Hazard | Action Item   | Coordinating Organization  | Timeline  | Plan Goals Addressed      |                  |                 |                                 |                    |
|----------------|---|--|-----------|---------------------------|------------------|-----------------|---------------------------------|--------------------|
|                |   |  |           | Protect Life and Property | Public Awareness | Natural Systems | Partnerships and Implementation | Emergency Services |
| FLD #3-3       | Develop better flood warning systems.   | Hazard Mitigation Working Group, Public Works, Fire, Police, Los Angeles Flood Control District              | 1-5 years | X                         | X                |                 | X                               | X                  |
| FLD #3-4       | Enhance data and mapping for floodplain information within Santa Fe Springs and identify and map flood-prone areas outside of designated floodplains. | Hazard Mitigation Working Group, Public Works, Planning, Technology Committee, Housing and Urban Development | 1-5 years | X                         | X                |                 | X                               | X                  |

## **Section 1: Introduction**

Throughout its history, the residents of City of Santa Fe Springs have dealt with the various natural hazards affecting the area. Photos, journal entries, and newspapers show that the residents of the area dealt with earthquakes and flooding.

The Hazard Mitigation Planning Team considered a range of natural hazards facing the region including: Earthquakes, Tsunamis, Flooding, Drought, Windstorms, Earth Movement, Liquefaction, Dam Failure, and Wildfire. The “Ranking Your Hazards” handout (Attachment 1, page 1-12) guide the team in prioritizing the natural hazards with the highest probability of significantly impacting the City of Santa Fe Springs.

At its meeting of April 5, 2004, the Planning Team agreed that any hazards receiving a Team average score of “3” or higher would be included in the Hazard Mitigation Plan. Utilizing that ranking technique, the Team identified Earthquakes and Flooding as the most prominent hazard facing the community.

Although there were fewer people in the area, the natural hazards adversely affected the lives of those who depended on the land and climate conditions for food and welfare. As the population of the City continues to increase, the exposure to natural hazards creates an even higher risk than previously experienced.

The City of Santa Fe Springs is the 20th most populous City in Los Angeles County, and offers the benefits of living in a Mediterranean-type of climate. The City is characterized by the unique and attractive landscape that makes the area so popular. However, the potential impacts of natural hazards associated with the terrain make the environment and population vulnerable to natural disasters.

The City is subject to earthquakes and flooding. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the City. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from these natural disasters.

In 1987, the Whittier Narrows Earthquake caused 8 fatalities and approximately \$358 million in property damage to nearby City of Whittier. The City of Santa Fe Springs had no fatalities and minimal damage, approximately \$55,000 in property damage. The initial earthquake on October 1, 1978 had a magnitude that was first reported to be 6.1, but was later downgraded to 5.9. A major aftershock causing more damage occurred 3 days later on October 4, 1978, with a magnitude of 5.5. Los Angeles County reports estimate the both earthquakes damaged over 9,100 residential and business structures throughout the county.

Although the City of Santa Fe Springs has experienced earthquakes in the past, the City has never proclaimed a local disaster.

The City of Santa Fe Springs most recently experienced destruction due to flooding in 1995, impacting various areas city-wide. Storms caused flooding in various parts of the City and in addition to storm damage; there were large volumes of debris. The City of Santa Fe Springs did not seek state or federal funding for damages to public facilities.

### **Why Develop a Mitigation Plan?**

As the cost of damage from natural disasters continues to increase, the community realizes 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.

The plan provides a set of action items to reduce risk from natural hazards through education and outreach programs and to foster the development of partnerships, and implementation of preventative activities such as land use programs that restrict and control development in high risk areas subject to damage from natural hazards.

The resources and information within the Mitigation Plan:

- (1) establish a basis for coordination and collaboration among agencies and the public in City of Santa Fe Springs;
- (2) identify and prioritize future mitigation projects; and
- (3) assist in meeting the requirements of federal assistance programs.

The mitigation plan works in conjunction with other City plans, including the City's General Plan and Multi-Hazard Functional Plan.

### **Whom Does the Mitigation Plan Affect?**

The Natural Hazards Mitigation Plan affects the entire city. Map 1-1 shows major roads in the City of Santa Fe Springs. This plan provides a framework for planning for natural hazards. The resources and background information in the plan is applicable City-wide, and the goals and recommendations can lay groundwork for other local mitigation plans and partnerships.

**Map 1-1: Base Map of City of Santa Fe Springs  
(Source: General Plan)**



## **Natural Hazard Land Use Policy in California**

Planning for natural hazards should be an integral element of any city's land use planning program. All California cities and counties have General Plans and the implementing ordinances that are required to comply with the statewide planning regulations.

The continuing challenge faced by local officials and state government is to keep the network of local plans effective in responding to the changing conditions and needs of California's diverse communities, particularly in light of the very active seismic region in which we live.

This is particularly true in the case of planning for natural hazards where communities must balance development pressures with detailed information on the nature and extent of hazards.

The planning for natural hazards calls for local plans to include inventories, policies, and ordinances to guide the development in hazard areas. These inventories should include the compendium of hazards facing the community, the built environment at risk, the personal property that may be damaged by hazard events and most of all, the people who live in the shadow of these hazards.

## **Support for Natural Hazard Mitigation**

All mitigation is local, and the primary responsibility for development and implementation of risk reduction strategies and policies lies with local jurisdictions. Local jurisdictions, however, are not alone. Partners and resources exist at the regional, state and federal levels. Numerous California state agencies have a role in natural hazards and natural hazard mitigation. Some of the key agencies include:

- The Governor's Office of Emergency Services (OES) is responsible for disaster mitigation, preparedness, response, recovery, and the administration of federal funds after a major disaster declaration.
- The Southern California Earthquake Center (SCEC) gathers information about earthquakes, integrates this information on earthquake phenomena, and communicates this to end-users and the general public to increase earthquake awareness, reduce economic losses, and save lives.
- The California Division of Forestry (CDF) is responsible for all aspects of wild-land fire protection on private and state land and administers forest practices regulations, including landslide mitigation, on non-federal lands.
- The California Division of Mines and Geology (DMG) is responsible for geologic hazard characterization, public education, the development of partnerships aimed at reducing risk, and exceptions (based on science-based refinement of tsunami inundation zone delineation) to state mandated tsunami zone restrictions.

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

### **Plan Methodology**

Information in the Mitigation Plan is based on research from a variety of sources. Staff from the City of Santa Fe Springs conducted data research and analysis, facilitated steering committee meetings and public workshops, and developed the final mitigation plan. The research methods and various contributions to the plan include:

### **Input from the Planning Team:**

The Multi-Jurisdictional Planning Team convened four times to guide development of the Mitigation Plan. The Team played an integral role in developing the mission, goals, and action items for the Mitigation Plan. The Team consisted of representatives of six local government entities, including:

- City of Santa Fe Springs
- City of Whittier
- East Whittier City School District
- Little Lake City School District
- Whittier Union High School District
- Whittier City School District

### **Stakeholder Reviews:**

City Staff distributed copies of the Mitigation Plan draft or notices inviting comments on the Plan Draft to 38 agencies and/or specialists from organizations interested in natural hazards planning. The data and support gained from the review process was very valuable to the overall planning effort. A complete listing of all stakeholders (reviewers) is located in Appendix B: Public Participation.

### **State and federal guidelines and requirements for mitigation plans:**

Following are the Federal requirements for approval of a Natural Hazard Mitigation Plan:

- Open public involvement, with public meetings that introduce the process and project requirements.
- The public must be afforded opportunities for involvement in: identifying and assessing risk, drafting a plan, and public involvement in approval stages of the plan.
- Community cooperation, with opportunity for other local government agencies, the business community, educational institutions, and non-profits to participate in the process.
- Incorporation of local documents, including the local General Plan, the Zoning Ordinance, the Building Codes, and other pertinent documents

The following components must be part of the planning process:

- Complete documentation of the planning process
- A detailed risk assessment on hazard exposures in the community
- A comprehensive mitigation strategy, which describes the goals & objectives, including proposed strategies, programs & actions to avoid long-term vulnerabilities.
- A plan maintenance process, which describes the method and schedule of monitoring, evaluating and updating the plan and integration of the Natural Hazards Mitigation Plan into other planning mechanisms.
- Formal adoption by the City Council.
- Plan Review by both State OES and FEMA

These requirements are spelled out in greater detail in the following plan sections and supporting documentation.

Public participation opportunities were created through use of local media, the City's website, distribution of a natural hazards questionnaire, and the City Council public hearing. In addition, the makeup of a multi-jurisdictional planning team insured a constant exchange of data and input from outside organizations.

Through its consultant, Emergency Planning Consultants, the City had access to numerous existing mitigation plans from around the country, as well as current FEMA hazard mitigation planning standards (386 series) and the State of California Natural Hazards Mitigation Plan Guidance.

Other reference materials consisted of county and city mitigation plans, including:

Clackamas County (Oregon) Natural Hazards Mitigation Plan  
Six County (Utah) Association of Governments  
Upper Arkansas Area Risk Assessment and Hazard Mitigation Plan  
Urbandale-Polk County, Iowa Plan  
Hamilton County, Ohio Plan  
Natural Hazard Planning Guidebook from Butler County, Ohio

Hazard specific research: City of Santa Fe Springs staff collected data and compiled research on two hazards: earthquakes and flooding. Research materials came from the City General Plan, the City's Threat Assessment contained in the Multi-Hazard Functional Plan, and state agencies including OES and CDF. The City of Santa Fe Springs staff conducted research by referencing historical local newspapers, interviewing long time residents, long time City employees and locating information in historical documents.

The City of Santa Fe Springs staff identified current mitigation activities, resources and programs, and potential action items from research materials and stakeholder interviews.

## **Public Input:**

The City of Santa Fe Springs encouraged public participation and input in the Natural Hazards Mitigation Plan by posting its activities in the media and on the internet. In addition, the City distributed 175 natural hazards questionnaires at the following locations: City Hall, Police Services, and the Library. Citizens were encouraged to review the Plan Draft and participate in the City Council public meetings which was held on October 11, 2004, and October 12, 2006. In addition, the Santa Fe Springs Chamber of Commerce Business Emergency Preparedness Network and the City's Safe Neighborhood Team reviewed the Plan Draft at their October 2004 and October 2006 meetings.

Following is a summary of the public comments gathered during the City Council meeting.

***The comments that were communicated at the Council meeting were all positive. Several of those in attendance stated that they had read the "draft" of the NHMP, and that they had obtained a great deal of valuable information. Everyone agreed that this plan would be a useful tool in the mitigation of damage that would be caused if either an earthquake or a flood occurred in the City of Santa Fe Springs.***

The Santa Fe Springs City Council unanimously adopted the Santa Fe Springs Hazard Mitigation Plan at its October 11, 2004 and October 12, 2006 public meeting by adopting Resolution No. 9017. The resources and information cited in the mitigation plan provide a strong local perspective and help identify strategies and activities to make City of Santa Fe Springs more disaster resistant. When the City's General Plan is next updated, the Natural Hazard Mitigation Plan will be integrated in the General Plan Safety Element.

## **How Is the Plan Used?**

Each section of the mitigation plan provides information and resources to assist people in understanding the City and the hazard-related issues facing citizens, businesses, and the environment. Combined, the sections of the plan work together to create a document that guides the mission to reduce risk and prevent loss from future natural hazard events.

The structure of the plan enables people to use a section of interest to them. It also allows City government to review and update sections when new data becomes available. The ability to update individual sections of the mitigation plan places less of a financial burden on the City. Decision-makers can allocate funding and staff resources to selected pieces in need of review, thereby avoiding a full update, which can be costly and time-consuming. New data can be easily incorporated, resulting in a natural hazards mitigation plan that evolves and remains current and relevant to the City of Santa Fe Springs.

The mitigation plan is organized into three parts. Part I contains an executive summary,

Mitigation Actions Matrix, introduction, and plan maintenance section. Part II contains a City profile, risk assessment, and hazard-specific sections. Part III contains resource materials. Each section of the plan is described below.

## **Part I: Mitigation Action Plan**

### **Executive Summary:**

The Mitigation Action Plan provides an overview of the mitigation plan mission, goals, and action items.

#### **Attachment 1: Mitigation Actions Matrix**

The Matrix identifies the priorities, action description, responsible organization, and timeline for each mitigation action item.

### **Section 1: Introduction**

The Introduction describes the background and purpose of developing the mitigation plan for the City of Santa Fe Springs.

### **Section 2: Plan Maintenance Section**

This section provides information on plan implementation, monitoring and evaluation.

## **Part II: Hazard Analysis**

### **Section 3: Community Profile**

This section presents the history, geography, demographics, and socioeconomics of the City of Santa Fe Springs. It serves as a tool to provide an historical perspective of natural hazards in the City.

### **Section 4: Risk Assessment**

This section provides information on hazard identification, vulnerability and risk associated with natural hazards in the City of Santa Fe Springs.

### **Sections 5-6: Hazard Specific Sections**

Hazard-Specific Sections on the two chronic hazards is addressed in this plan. Chronic hazards occur with some regularity and may be predicted through historic evidence and scientific methods. The chronic hazards addressed in the plan include:

Section 5: Earthquake

Section 6: Flooding

Each of the hazard-specific sections includes information on the history, hazard causes and characteristics, hazard assessment, and local, state, and national resources.

### **Part III: Resources**

The plan appendices are designed to provide users of the City of Santa Fe Springs Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and potential resources to assist them with implementation.

#### **Appendix A: Plan Resource Directory**

The resource directory includes City, regional, state, and national resources and programs that may be of technical and/or financial assistance to the City of Santa Fe Springs during plan implementation.

#### **Appendix B: Public Participation**

This appendix includes specific information on the various public processes used during development of the plan.

#### **Appendix C: Benefit/Cost Analysis**

This section describes FEMA's requirements for benefit/cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities.

#### **Appendix D: List of Acronyms**

This section provides a list of acronyms for City, regional, state, and federal agencies and organizations that may be referred to within the City of Santa Fe Springs Natural Hazards Mitigation Plan.

#### **Appendix E: Glossary**

This section provides a glossary of terms used throughout the plan.

# Ranking Your Hazards

*It is important to keep in mind that your rankings should be based on a hazard event that would overwhelm your jurisdiction's ability to respond effectively.*

For each hazard listed assign a score. Place a number in the appropriate box.

| Hazard Scoring |   |
|----------------|---|
| 1              | An event of that magnitude is not likely to occur                                     |
| 2              | There is a slight chance that an event of that magnitude will occur                   |
| 3              | It is possible that an event of that magnitude will occur                             |
| 4              | An event of that magnitude has occurred here in the past and is likely to occur again |
| 5              | There is a high probability that an event of that magnitude will occur                |

Identify any additional hazards for the jurisdiction at the end of the list labeled as "Other Hazard."

| Hazard                                 | Score |
|--|-------|
| Flooding                               |       |
| Wildfire                               |       |
| Earthquakes                            |       |
| Windstorm                              |       |
| Earth Movement (Landslide/Debris Flow) |       |
| Tsunami                                |       |
| Other Hazard                           |       |

## **Section 2:**

### **Plan Maintenance**

The Plan Maintenance Section of this document details the formal process that will ensure that the Natural Hazards Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the City will integrate public participation throughout the plan maintenance process. Finally, this Section includes an explanation of how the City of Santa Fe Springs government intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the City's General Plan, Capital Improvement Plans, and Building and Safety Codes.

The City's Natural Hazards Mitigation Plan will be integrated into the General Plan Safety Element the next time the General Plan is updated.

### **Monitoring and Implementing the Plan**

#### **Plan Adoption**

The City Council adopted the Natural Hazard Mitigation Plan on October 11, 2004. The Natural Hazard Mitigation Plan was amended on October 12, 2006. A copy of Resolution No. 9017 is included in Appendix B. As the City's governing body, the City Council has the authority to promote sound public policy regarding natural hazards. The adopted plan has been submitted to the State Hazard Mitigation Officer at the Governor's Office of Emergency Services. The Governor's Office of Emergency Services will then submit the plan to 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 of Santa Fe Springs will gain eligibility for Hazard Mitigation Grant Program funds.

#### **Coordinating Body**

The City's Hazard Mitigation Advisory Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process. The City Council (or other authority) will assign representatives from City agencies, including, but not limited to, the current Hazard Mitigation Planning Team members. The City has formed a Hazard Mitigation Advisory Committee that consists of members from City of Santa Fe Springs Working Group noted in the Executive Summary.

In order to make this Committee as broad and useful as possible, the City Manager will engage other relevant organizations and agencies in hazard mitigation. Other potential additions to the Hazard Mitigation Advisory Committee could include:

- An elected Official
- Chamber of Commerce representative

- Planning Commission – Chairperson
- Joint Powers Insurance Authority
- Additional City staff
- Local School District representatives

The Hazard Mitigation Advisory Committee will meet no less than bi-annually. Meeting dates will be scheduled once the final Hazard Mitigation Advisory Committee has been established. These 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 mitigation plan.

### **Convener**

The City Council will adopt the Natural Hazards Mitigation Plan, and the Hazard Mitigation Advisory Committee will take responsibility for plan implementation. The City Manager (or designee Director of Police Services) will serve as a convener to facilitate the Hazard Mitigation Advisory Committee meetings, and will assign tasks such as updating and presenting the Plan to the members of the Committee. Plan implementation and evaluation will be a shared responsibility among all of the Hazard Mitigation Advisory Committee members.

### **Implementation through Existing Programs**

The City addresses statewide planning goals and legislative requirements through its General Plan, Capital Improvement Plans, and City Building and Safety Codes. The Natural Hazards Mitigation Plan 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.

The City's Building & Safety Division is responsible for administering the Building & Safety Codes. In addition, the Hazard Mitigation Advisory Committee will 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.

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. Upon annual review of the CIPs, the Hazard Mitigation Advisory Committee will work with the City departments to identify action items in the Natural Hazards Mitigation Plan consistent with CIP planning goals and integrate them where appropriate.

Within six months of formal adoption of the Mitigation Plan, the recommendations listed above will be incorporated into the process of existing planning mechanisms at the City level. The meetings of the Hazard Mitigation Advisory Committee will provide an

opportunity for Committee members to report back on the progress made on the integration of mitigation planning elements into the City's planning documents and procedures.

### **Economic Analysis of Mitigation Projects**

At the Hazard Mitigation Advisory Committee's first implementation meeting, the STAPLEE Tool (Plan Maintenance – Attachment 1) or some other prioritizing tool will be utilized to prioritize the action items identified in the Mitigation Actions Matrix (Executive Summary – Attachment 1). In addition, appropriate funding sources will be identified for the "top ten" priority action items.

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. 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 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.

The City of Santa Fe Springs utilized a practical and reasonable economic perspective when formulating the City's mitigation actions. A more thorough cost-benefit analysis would be done at the time of any federal grant application. The Hazard Mitigation Advisory Committee would use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action item. For other projects and funding sources, the Hazard Mitigation Advisory Committee will use other approaches to understand the costs and benefits of each action item and develop a prioritized list. For more information regarding economic analysis of mitigation action items, please see Appendix C: Benefit/Cost Analysis.

### **Evaluating and Updating the Plan**

#### **Formal Review Process**

The Natural Hazards Mitigation Plan 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. The evaluation process includes a firm schedule and timeline, and identifies the local agencies and organizations participating in plan evaluation. The convener or designee will be responsible for contacting the Hazard Mitigation Advisory Committee members and organizing the annual meeting.

Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the Plan.

The Committee will review the goals 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 Committee 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. The coordinating organizations responsible for the various action items will report 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 convener will assign the duty of updating the plan to one or more of the committee members. The designated Committee members will have three months to make appropriate changes to the Plan before submitting it to the Committee members, and presenting it to the City Manager (or other authority). The Hazard Mitigation Advisory Committee will also notify all holders of the final version of the City's Plan when changes have been made. Every five years the updated Plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

### **Continued Public Involvement**

The City is dedicated to involving the public directly in review and updates of the Natural Hazards Mitigation Plan. The Hazard Mitigation Advisory Committee members are responsible for the annual review and update of the plan.

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 appropriate agencies in the City, and City Library, as well as on the City's website. The existence and location of these copies will be publicized annually in the city newsletter which reaches every household in the City, published in the Chamber of Commerce Newsletter and will also be published in the local newspaper. The plan also includes the address and the phone number of the City's Department of Planning and Development, which is responsible for keeping track of public comments on the Plan.

In addition, copies of the Plan and any proposed changes will be posted on the City's website one time per year. This site will also contain an email address and phone number to which people can direct their comments and concerns.

A public meeting will also be held after each annual evaluation or as deemed necessary by the Hazard Mitigation Advisory Committee. The meetings will provide the public a forum for which they can express its concerns, opinions, or ideas about the Plan. The City Public Relations Specialist will be responsible for using City resources to publicize the annual public meetings and maintain public involvement through the public access cable channel, website and local newspapers.

## **Section 3: Community Profile**

### **Why Plan for Natural Hazards in the City of Santa Fe Springs?**

Natural hazards impact citizens, property, the environment, and the economy of the City of Santa Fe Springs. Earthquakes and flooding, the hazards prioritized by the Planning Team as being the natural hazards with the highest probability of significantly impacting the City of Santa Fe Springs, have exposed City residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards.

Even in those communities that are essentially “built-out” i.e., have little or no vacant land remaining for development population density continues to increase when low density housing is replaced with medium and high density development projects.

The inevitability of natural hazards, and the growing population and activity within the City create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard events. Identifying the risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the City to create a natural hazards mitigation plan that addresses the potential impacts of hazard events.

### **Geography and the Environment**

Santa Fe Springs has an area of 8.7 square miles and is located in southeastern Los Angeles County. The City of Santa Fe Springs borders Whittier on the north, Pico Rivera and Downey on the west, La Mirada on the east, and Norwalk and Cerritos on the south.

Elevations in the City range from a high of 166 feet to a low of 67 feet. The City is located west of the Puente Hills which frame a lowland plain that slopes gently to the south and southwest to the Pacific Ocean which is approximately 14 miles away.

### **Community Profile**

The City of Santa Fe Springs is largely an industrial City rich in history. The City of Santa Fe Springs was first settled in the early 1800s and the City itself was incorporated in 1957. The City of Santa Fe Springs residential population of approximately 18,000 is located on the west end of the City.

According to the City’s General Plan, the City is served by Interstate Routes 5 and 605, and the major arterial highways are Alondra Boulevard, Rosecrans Avenue, Slauson Avenue, Valley View Avenue, Pioneer Boulevard, Orr and Day Road, Bloomfield Ave/Santa Fe Springs Road, Telegraph Road, Imperial Highway, Norwalk Boulevard, Florence Avenue, Washington Boulevard, and Carmenita Avenue.

The Union Pacific, Burlington Northern/Santa Fe, and Metrolink Railways serve the City with tracks running from the Northwest to the Southeast and from the North to the Southwest. Passenger transportation is provided by Amtrak.

### **Major Rivers**

The nearest major river is the San Gabriel River. This river has a potential impact on the City. The San Gabriel River runs north to south and is located on the west side of the city. There is also a Northfork Coyote Creek that runs north to south and is located along the east side of the city. The Milan Creek runs east to west and connects to the Northfork Coyote Creek between Foster Road and Rosecrans Avenue.

### **Climate**

Temperatures in the City range from 40 degrees in the winter months to 95 degrees in the summer months. However the temperatures can vary over a wide range, particularly when the Santa Ana winds blow, bringing higher temperatures and very low humidity.

Rainfall in the city averages 14.6 inches of rain per year. However the term “average rainfall” can be misleading in that during the month of January the City averages 3.53 inches of rain and .01 inches in July.

Furthermore, actual rainfall in Southern California tends to fall in large amounts during sporadic and often heavy storms rather than consistently over storms at somewhat regular intervals. In short rainfall in Southern California might be characterized as feast or famine within a single year. Because the metropolitan basin is largely built out, water originating in higher elevation communities can have a sudden impact on adjoining communities that have a lower elevation.

### **Minerals and Soils**

The characteristics of the minerals and soils present in the City of Santa Fe Springs indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether or not an area will be prone to geologic hazards such as earthquakes, liquefaction and landslides.

As described in the City’s General Plan, the soil characteristics are essentially the same as the entire Los Angeles Basin. The geologic units of Santa Fe Springs and much of the surrounding area include both bedrock and surficial deposits. The bedrock units include siltstones and sandstones. The surficial deposits include colluvium/alluvium and landslide debris and are generally composed of poorly consolidated sediments. These factors generally create moderate to high soil strength characteristics with some levels of expansiveness.

## **Other Significant Geologic Features**

The City of Santa Fe Springs, like most of the Los Angeles Basin, lies over the area of one or more known earthquake faults, and potentially many more unknown faults, particularly so-called lateral or blind thrust faults.

The City's General Plan identifies the following faults as active or potentially active: Whittier/Elsinore Faults, Norwalk Fault, Newport/Inglewood Fault, Sierra Madre Fault System, Puente Hills Fault, and the San Andres Fault.

The Los Angeles Basin has a history of powerful and relatively frequent earthquakes, dating back to the powerful 8.0+ San Andreas earthquake of 1857 which did substantial damage to the relatively few buildings that existed at the time. Paleoseismological research indicates that large (8.0+) earthquakes occur on the San Andreas fault at intervals between 45 and 332 years with an average interval of 140 years<sup>1</sup>. Other lesser faults have also caused very damaging earthquakes since 1857. Notable earthquakes include the Long Beach earthquake of 1933, the San Fernando Earthquake of 1971, the 1987 Whittier Earthquake and the 1994 Northridge Earthquake.

In addition, many areas in the Los Angeles Basin have sandy soils that are subject to liquefaction. The City of Santa Fe Springs is relatively free of liquefaction hazards as shown on USGS Seismic Hazard Maps in Section 5: Earthquake.

## **Population and Demographics**

Santa Fe Springs has a population of 17,438 in an area of 8.7 square miles. The population of the City has steadily increased from the mid 1800's through 2000, and increased approximately 11% from 1990 to 2000 according to the 2000 Census.

The increase of people living in Santa Fe Springs creates more community exposure, and changes how agencies prepare for and respond to natural hazards. For example, narrower streets are more difficult for emergency vehicles to navigate, the higher ratio of residents to emergency responders affects response times, and homes located closer together increase the chances of fires spreading.

The City of Santa Fe Springs is experiencing a great deal of in-fill building, which is increasing the population density, creating greater service loads on the built infrastructure including roads, water supply, sewer services and storm drains.

Natural hazards do not discriminate, but the impacts in terms of vulnerability and the ability to recover vary greatly among the population. According to Peggy Stahl of the Federal Emergency Management Agency (FEMA) Preparedness, Training, and Exercise Directorate, 80% of the disaster burden falls on the public, and within that number, a

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<sup>1</sup> Peacock, Simon M.,  
<http://aamc.geo.lsa.umich.edu/eduQuakes/EQpredLab/EQprediction.peacock.html>

disproportionate burden is placed upon special needs groups: women, children, minorities, and the poor.<sup>2</sup>

According to the 2000 Census figures, the demographic make up of the City is as follows:

|  |       |
|--|-------|
| Caucasian                                  | 19.2% |
| Hispanic                                   | 71.4% |
| African American                           | 3.9%  |
| Asian                                      | 3.9%  |
| Native American                            | 1.4%  |
| Native Hawaiian and other Pacific Islander | .2%   |

The ethnic and cultural diversity suggests a need to address multi-cultural needs and services.

Although the percentage of poverty in City of Santa Fe Springs (12.5%) is about 90% that of the state's (13.7%), 13.9% of the people living in poverty in Santa Fe Springs are under 18 years old, and 7.6% are over 65. Vulnerable populations, including seniors, disabled citizens, women, and children, as well as those people living in poverty, may be disproportionately impacted by natural hazards.

Examining the reach of hazard mitigation policies to special needs populations may assist in increasing access to services and programs. FEMA's Office of Equal Rights addresses this need by suggesting that agencies and organizations planning for natural disasters identify special needs populations, make recovery centers more accessible, and review practices and procedures to remedy any discrimination in relief application or assistance.

The cost of natural hazards recovery can place an unequal financial responsibility on the general population when only a small proportion may benefit from governmental funds used to rebuild private structures. Discussions about natural hazards that include local citizen groups, insurance companies, and other public and private sector organizations can help ensure that all members of the population are a part of the decision-making processes.

## **Land and Development**

Development in Southern California from the earliest days was a cycle of boom and bust. The Second World War however dramatically changed that cycle. Military personnel and defense workers came to Southern California to fill the logistical needs created by the war effort. The available housing was rapidly exhausted and existing commercial centers proved inadequate for the influx of people. Immediately after the war, construction began on the freeway system, and the face of Southern California was forever changed. Home developments and shopping centers sprung up everywhere and within a few decades the central basin of Los Angeles County was virtually built out. This pushed

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<sup>2</sup> [www.fema.gov](http://www.fema.gov)

new development further and further away from the urban center.

The City of Santa Fe Springs General Plan addresses the use and development of private land, including residential and commercial areas. This plan is one of the City's most important tools in addressing environmental challenges including transportation and air quality, growth management, conservation of natural resources, clean water and open spaces.

The environment of most of Los Angeles County cities is nearly identical with that of their immediate neighbors and the transition from one incorporated municipality to another is seamless to most people. Seamless too are the exposures to the natural hazards that affect all of Southern California.

### **Housing and Community Development**

In the City of Santa Fe Springs the demand for housing outstrips the available supply, and the recent low interest rates have further fueled a pent up demand for housing. The 2000 Census data identifies the following information about housing in Santa Fe Springs. Currently there are 4,933 housing units in the City of Santa Fe Springs. There are 3,092 single family homes (63% of available housing units) currently available. Multiple unit homes account for 29% of the total existing housing units (1,423). There are 3,040 owner occupied units in the City and 1,794 renter occupied units. Approximately 36% of the units are being rented in Santa Fe Springs and 62% of the units are owned. The average change in home prices increased from \$156,589 in 1990 to \$169,400 in 2000.

### **Employment and Industry**

According to the 2000 Census, management (22.9%), sales and office occupations (30%), as well as production, transportation, and material moving (25.6%) are Santa Fe Springs' principal employment activities. Educational, health and social services (15.8%), manufacturing (22.4%), and retail trade (11.6%) make up the major industries in the City. The City has a labor force of 6,946 persons (less than 1% of the countywide workforce).

Mitigation activities are needed at the business level to ensure the safety and welfare of workers and limit damage to industrial infrastructure. Employees are highly mobile, commuting from surrounding areas to industrial and business centers. This creates a greater dependency on roads, communications, accessibility and emergency plans to reunite people with their families. Before a natural hazard event, large and small businesses can develop strategies to prepare for natural hazards, respond efficiently, and prevent loss of life and property.

### **Transportation and Commuting Patterns**

The General Plan for the City identifies the private automobile as the dominant means of transportation in the City. For the transit dependent population, a network of public bus

routes provides access to employment center, schools, shopping, and recreational areas within the City. Regional bus service is provided by the Metropolitan Transportation Authority (MTA). Subregional bus service is provided by the City of Norwalk. Additionally, the City of Santa Fe Springs contracts with the City of Norwalk for a local, fixed-route circulator. The Cities of Norwalk and Santa Fe Springs offer an inter-city service which provides transportation between the two cities for seniors and persons with disabilities, as well as a taxi voucher program for transportation to medical appointments within the cities of Bellflower, Downey, Lakewood, Norwalk, Pico Rivera, Santa Fe Springs and Whittier. The City operates a Demand-Response service of its own, which provides transportation to medical appointments for seniors and persons with disabilities for medical appointments within Downey, Norwalk, Pico Rivera, Santa Fe Springs and Whittier. This service also provides transportation to the City's two Senior Centers for a nutritional program run out of the centers. The City fulfills its fixed-route paratransit obligation through an association with Access Services.

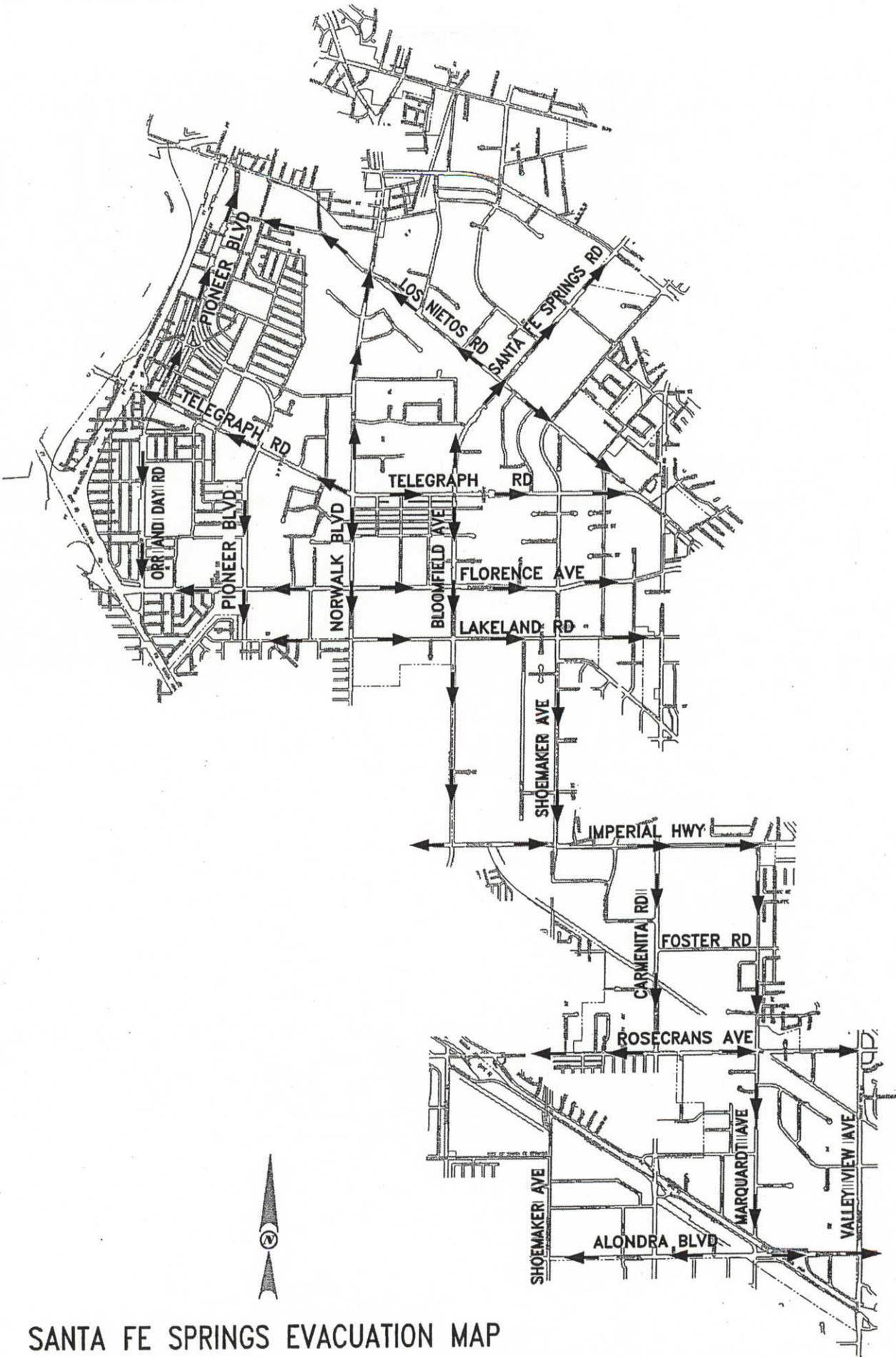
The Cities of Norwalk and Santa Fe Springs jointly own and operate a Metrolink station known as the Norwalk/Santa Fe Springs Transportation, which provides rail service for long distance commuters traveling between Santa Fe Springs and distant locations in the Counties of Los Angeles, Orange and Riverside. To encourage the use of Metrolink as an alternative mode of transportation, the City of Santa Fe Springs provides free connecting shuttle service, known as MetroExpress. MetroExpress is a curbside-to-curbside service which allows intermodal transfers for Metrolink riders between the Transportation Center and businesses within the service area. The Metrorail system does not run directly through Santa Fe Springs, but is accessible via bus service provided by Norwalk Transit. Passenger rail service is provided by Amtrak. However, the closest Amtrak station is located in Fullerton and may be accessed through Metrolink or through bus service.

According to U.S. Bureau of the Census, Census 2000 close to 35% of the City of Santa Fe Springs's population works outside of the City. This suggests that population growth is a more suburban phenomenon, where residents work in the City of Santa Fe Springs but live in other communities. However, a rapid growth rate in the high technology industry in City of Santa Fe Springs has attracted commuters to travel in the opposite direction as well, with more than one in three jobs in City of Santa Fe Springs filled by nonresidents.

The City of Santa Fe Springs is served by Interstates 5 and 605, connecting the City to adjoining parts of Los Angeles County. The City's 105.5 mile road system includes 31.5 miles of arterial highways and 74 miles of local roads, and 22 bridges. As daily transit rises, there is an increased risk that a natural hazard event will disrupt the travel plans of residents across the region, as well as local, regional and national commercial traffic.

Localized flooding can render roads unusable. A severe winter storm has the potential to disrupt the daily driving routine of hundreds of thousands of people. Natural hazards can disrupt automobile traffic and shut down local and regional transit systems.

Map 3-3: City of Santa Fe Springs Evacuation Routes (Source: City of Santa Fe Springs General Plan) Routes have been designated due to size and flow of streets.



SANTA FE SPRINGS EVACUATION MAP

## **Section 4:**

### **Risk Assessment**

#### **What is a Risk Assessment?**

Conducting a risk assessment can provide information on: the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the five levels of a risk assessment are as follows:

#### **1) Hazard Identification**

The Planning Team considered a range of natural hazards facing the region including: Earthquakes, Flooding, Earth Movement, Windstorms, Wildfires, Tsunami, and Drought. The attached Ranking Your Hazards – Attachment I handout guided the Team in prioritizing the natural hazards with the highest probability of significantly impacting the City of Santa Fe Springs. The Team agreed that any hazards receiving a Team average score of “3” or higher would be included in the Natural Hazard Mitigation Plan.

This is the description of the geographic extent, potential intensity and the probability of occurrence of a given hazard. Maps are frequently used to display hazard identification data. The City of Santa Fe Springs identified two major hazards that affect this geographic area. These hazards - earthquakes and flooding - were identified through an extensive process that utilized input from the Hazard Mitigation Planning Team. The geographic extent of each of the identified hazards has been identified by the City of utilizing the maps contained in the City General Plan and the MHFP Threat Assessment, and are illustrated by the tables, maps, and photos listed on page iii.

#### **2) Profiling Hazard Events**

The maps help to describe the causes and characteristics of each hazard and what part of the City's population, infrastructure, and environment may be vulnerable to each specific hazard. A profile of each hazard discussed in this plan is provided in each hazard section. For a full description of the history of hazard specific events, please see the appropriate hazard chapter.

#### **3) Vulnerability Assessment/Inventorying Assets**

This is a combination of hazard identification with an inventory of the existing (or planned) property development(s) and population(s) exposed to a hazard. Critical facilities are of particular concern because these entities provide essential products and services to the general public that are necessary to preserve the welfare and quality of life in the City and fulfill important public safety, emergency response, and/or disaster recovery functions. The critical facilities have been identified and are illustrated in Table 4-2 at the end of this section. A description of the critical facilities in the City is also

provided in this section. In addition, this plan includes a community issues summary in each hazard section to identify the most vulnerable and problematic areas in the City, including critical facilities and essential facilities.

#### **4) Risk Analysis**

Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models. The two measurable components of risk analysis are magnitude of the harm that may result and the likelihood of the harm occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets.

#### **5) Assessing Vulnerability/ Analyzing Development Trends**

This step provides a general description of land uses and development trends within the community so that mitigation options can be considered in land use planning and future land use decisions. This plan provides a comprehensive description of the character of the City in the Community Profile. This description includes the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns. Analyzing these components of the City can help in identifying potential problem areas and can serve as a guide for incorporating the goals and ideas contained in this mitigation plan into other community development plans.

Hazard assessments are subject to the availability of hazard-specific data. Gathering data for a hazard assessment requires a commitment of resources on the part of participating organizations and agencies. Each hazard-specific section of the plan includes a section on hazard identification using data and information from City, County or State agency sources.

Regardless of the data available for hazard assessments, there are numerous strategies the City can take to reduce risk. These strategies are described in the action items detailed in each hazard section of this Plan. Mitigation strategies can further reduce disruption to critical services, reduce the risk to human life, and alleviate damage to personal and public property and infrastructure. Action items identified in the hazard sections provide recommendations to collect further data to map hazard locations and conduct hazard assessments.

#### **Federal Requirements for Risk Assessment**

Recent federal regulations for hazard mitigation plans outlined in 44 CFR Part 201 include a requirement for risk assessment. This risk assessment requirement is intended to provide information that will help communities identify and prioritize mitigation activities that will reduce losses from the identified hazards. There are two hazards profiled in the mitigation plan, earthquakes and flooding. The Federal criteria for risk

assessment and information on how the City of Santa Fe Springs Natural Hazards Mitigation Plan meets those criteria is outlined in Table 4-1 below.

**Table 4-1. Federal Criteria for Risk Assessment**

| <b>Section 322 Plan Requirement</b>                   | <b>How is this addressed?</b>  |
|---|--|
| Identifying Hazards                                   | Each hazard section includes an inventory of the best available data sources that identify hazard areas. To the extent data are available; the existing maps identifying the location of the hazard were utilized. The Executive Summary and the Risk Assessment sections of the plan include a list of the hazard maps.                                       |
| Profiling Hazard Events                               | Each hazard section includes documentation of the history and causes and characteristics of the hazard in the City.  |
| Assessing Vulnerability: Identifying Assets           | Where data is available, the vulnerability assessment for each hazard addressed in the mitigation plan includes an inventory of all publicly owned land within hazardous areas. Each hazard section provides information on vulnerable areas in the City in the Community Issues section. Each hazard section also identifies potential mitigation strategies. |
| Assessing Vulnerability: Estimating Potential Losses  | The Risk Assessment Section of this mitigation plan identifies key critical facilities in the City and includes a map of these facilities. Vulnerability assessments have been completed for the hazards addressed in the plan, and quantitative estimates were made for each hazard where data was available.   |
| Assessing Vulnerability: Analyzing Development Trends | The Community Profile Section of this plan provides a description of the development trends in the City, including the geography and environment, population and demographics, land use and development, housing and community development, employment and industry, and transportation and commuting patterns.  |

**Critical and Essential Facilities**

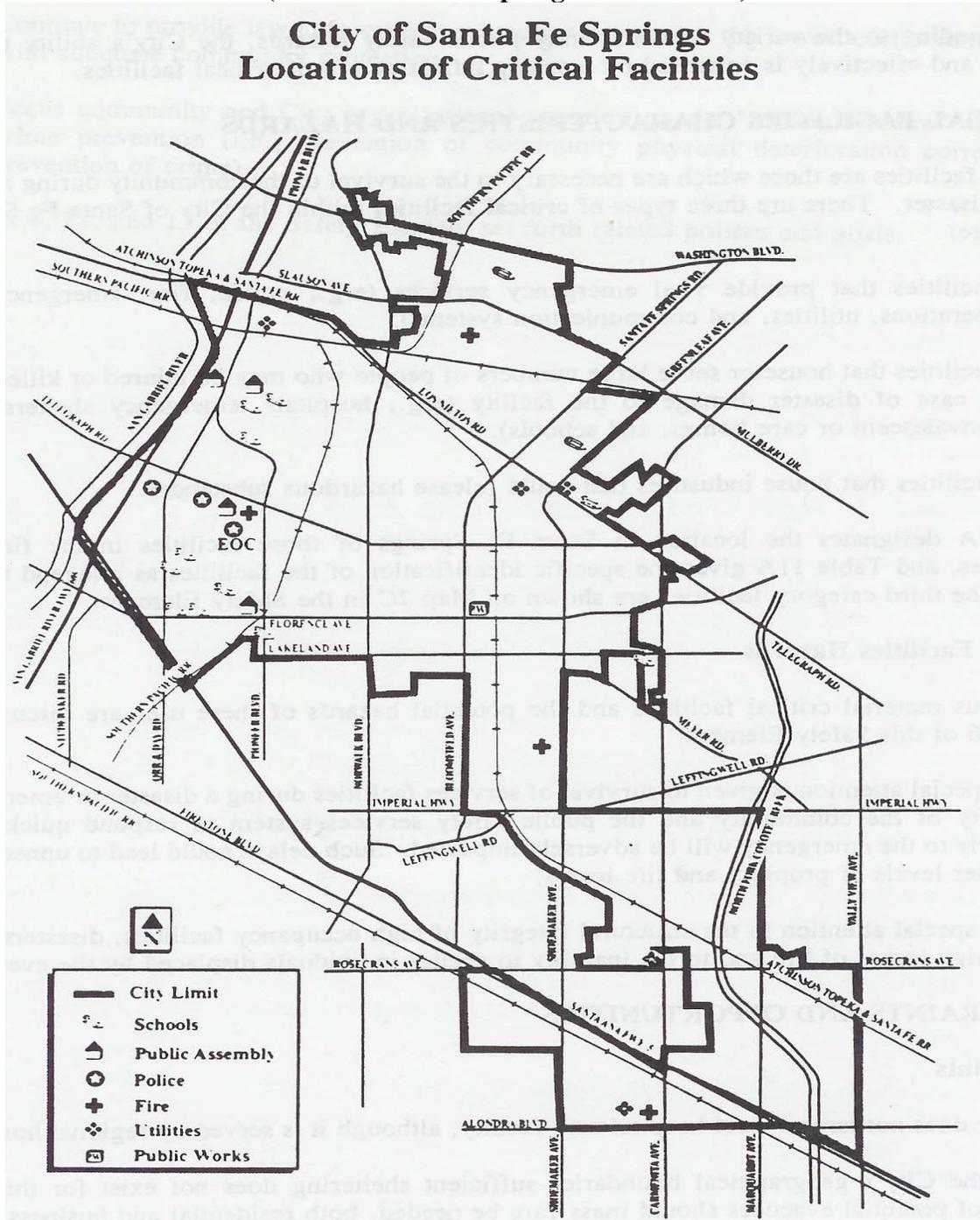
Facilities critical to government response and recovery activities (i.e., life safety and property and environmental protection) include 911 centers, emergency operations centers, police and fire stations, public works facilities, communications centers, sewer and water facilities, hospitals, bridges and roads, and shelters. Also, facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." A hazardous material facility is one example of this type of critical facility.

Critical and essential facilities are those facilities that are vital to the continued delivery

of key government services or that may significantly impact the public's ability to recover from the emergency. These facilities may include buildings such as the jail, law enforcement center, public services building, community corrections center, the courthouse, and juvenile services building and other public facilities such as schools. The following map and table illustrate the critical and essential facilities serving the City of Santa Fe Springs.

courthouse, and juvenile services building and other public facilities such as schools. The following map and table illustrate the critical and essential facilities serving the City of Santa Fe Springs.

**Map 4-1: City of Santa Fe Springs Critical and Essential Facilities**  
 (Source: Santa Fe Springs General Plan)



**Table 4-2: City of Santa Fe Springs Critical and Essential Facilities**

| <b>EQ</b> | <b>Flood</b> | <b>Critical Facilities</b>              | <b>Address</b>             |    |
|-----------|--------------|---|----------------------------|----|
| X         | X            | Emergency Operations Center             | 11736 Telegraph Road       | CF |
| X         | X            | Fire Station # 1 Headquarters           | 11300 Greenstone Avenue    | CF |
| X         | X            | Fire Station # 2                        | 8634 Dice Road             | CF |
| X         | X            | Fire Station # 3                        | 15517 Carmenita Road       | CF |
| X         | X            | Fire Station # 4                        | 11736 Telegraph Road       | CF |
| X         | X            | Police Services Center                  | 11576 Telegraph Road       | CF |
| X         | X            | Public Works City Yard                  | 12636 Emmens Way           | CF |
| X         | X            | California Highway Patrol               | 10051 Orr & Day Road       | CF |
| X         | X            | Santa Fe Springs Municipal Water System | 12636 Emmens Way           | CF |
| X         | X            | Family Center                           | 10349 Heritage Park Drive  | CF |
| X         | X            | City Hall                               | 11710 Telegraph Road       | CF |
| X         | X            | Activity Center                         | 11155 Charlesworth Road    | CF |
| X         | X            | Neighborhood Center                     | 9255 Pioneer Blvd.         | CF |
| X         | X            | Betty Wilson Center                     | 11641 Florence Avenue      | CF |
| X         | X            | Town Center Hall                        | 11740 Telegraph Road       | CF |
|           |              |   |                            |    |
| <b>EQ</b> | <b>Flood</b> | <b>Essential Facilities</b>             | <b>Address</b>             |    |
|           |              |   |                            |    |
| X         | X            | Edison Substations (3)                  | 9901 Geary Avenue          | U  |
| X         | X            | Telephone Switching Stations (2)        | 12905 East Los Nietos Road | U  |
| X         | X            | Carmela Children Center                 | 13300 Lakeland Road        | S  |
| X         | X            | Hancock Preschool                       | 11449 Florence Avenue      | S  |
| X         | X            | Jersey Elementary                       | 9400 Jersey Avenue         | S  |
| X         | X            | Lake Center Middle School               | 10503 Pioneer Boulevard    | S  |
| X         | X            | Lakeview School                         | 11500 Joslin Avenue        | S  |
| X         | X            | Los Nietos Child Development Center     | 11115 Charlesworth Road    | S  |
| X         | X            | Los Nietos Middle School                | 11425 East Rivera Road     | S  |
| X         | X            | Rancho Santa Gertrudes                  | 11233 Charlesworth Road    | S  |
| X         | X            | Santa Fe High High School               | 10400 Orr & Day Road       | S  |
| X         | X            | Santa Fe Springs Christian School       | 11457 Florence Avenue      | S  |
| X         | X            | South Whittier Middle School            | 13243 East Los Nietos Road | S  |
| X         | X            | St. Paul High School                    | 9635 Greenleaf Avenue      | S  |
| X         | X            | St. Pius X School                       | 10855 Pioneer Boulevard    | S  |
| X         | X            | Santa Fe Kid Company                    | 11304 Washington Boulevard | S  |
| X         | X            | Lake Center Athletic Park               | 11641 Florence Avenue      | P  |
| X         | X            | Santa Fe Springs Park                   | 10068 Cedardale Drive      | P  |
| X         | X            | Lakeview Recreation                     | 10225 Jersey Avenue        | P  |
| X         | X            | Little Lake Park                        | 10900 Pioneer Blvd.        | P  |
| X         | X            | Ability First Apartments                | 13331 Lakeland Road        | N  |
| X         | X            | Little Lake Villages Apartments         | 10850-52 Fulton Wells      | N  |

|   |   |                                 |                       |   |
|---|---|---------------------------------|-----------------------|---|
| X | X | South Fulton Village Apartments | 10829-35 Fulton Wells | N |
|---|---|---------------------------------|-----------------------|---|

Type of Facility

C = Commercial

CF = Critical Facility

M = Medical Facility

N = Nursing/Boarding/Disable Resident Facility

P = Public Facility

U = Utility

**Summary**

Natural hazard mitigation strategies can reduce the impacts concentrated at large employment and industrial centers, public infrastructure, and critical facilities. Natural hazard mitigation for industries and employers may include developing relationships with emergency management services and their employees before disaster strikes, and establishing mitigation strategies together. Collaboration among the public and private sector to create mitigation plans and actions can reduce the impacts of natural hazards.

Section 5:  
Earthquake Hazards  
in the  
City of Santa Fe  
Springs

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## **Why Are Earthquakes a Threat to the City of Santa Fe Springs?**

Attachment 2 is a listing of Earthquake Probable Events gathered from the Southern California Earthquake Data Center. The list includes various faults and projected magnitude earthquakes likely to impact the region. The Southern California Earthquake Data Center predicts that some where in southern California ( not everywhere, therefore many residents would not be affected) should experience a magnitude 7.0 or greater earthquake about seven times each century. Approximately half of these will be on the San Andreas “system” (the San Andreas, San Jacinto, Imperial, and Elsinore Faults) and half will be on other faults. The equivalent probability in the next 30 years is 85%.

The most recent significant earthquake event affecting Southern California was the January 17<sup>th</sup> 1994 Northridge Earthquake. At 4:31 A.M. on Monday, January 17, a moderate but very damaging earthquake with a magnitude of 6.7 struck the San Fernando Valley. In the following days and weeks, thousands of aftershocks occurred, causing additional damage to affected structures.

57 people were killed and more than 1,500 people seriously injured. For days afterward, thousands of homes and businesses were without electricity; tens of thousands had no gas; and nearly 50,000 had little or no water. Approximately 15,000 structures were moderately to severely damaged, which left thousands of people temporarily homeless. 66,500 buildings were inspected. Nearly 4,000 were severely damaged and over 11,000 were moderately damaged. Several collapsed bridges and overpasses created commuter havoc on the freeway system. Extensive damage was caused by ground shaking, but earthquake triggered liquefaction and dozens of fires also caused additional severe damage. This extremely strong ground motion in large portions of Los Angeles County resulted in record economic losses.

However, the earthquake occurred early in the morning on a holiday. This circumstance considerably reduced the potential effects. Many collapsed buildings were unoccupied, and most businesses were not yet open. The direct and indirect economic losses ran into the 10's of billions of dollars.

Historical and geological records show that California has a long history of seismic events. Southern California is probably best known for the San Andreas Fault, a 400 mile long fault running from the Mexican border to a point offshore, west of San Francisco. “Geologic studies show that over the past 1,400 to 1,500 years large earthquakes have occurred at about 130 year intervals on the southern San Andreas Fault. As the last large earthquake on the Southern San Andreas occurred in 1857, that section

of the fault is considered a likely location for an earthquake within the next few decades.”<sup>1</sup>

But San Andreas is only one of dozens of known earthquake faults that crisscross Southern California. Some of the better known faults include the Newport-Inglewood, Whittier, Chatsworth, Elsinore, Hollywood, Los Alamitos, Puente Hills, and Palos Verdes faults. Beyond the known faults, there are a potentially large number of “blind” faults that underlie the surface of Southern California. One such blind fault was involved in the Whittier Narrows earthquake in October 1987.

Although the most famous of the faults, the San Andreas, is capable of producing an earthquake with a magnitude of 8+ on the Richter scale, some of the “lesser” faults have the potential to inflict greater damage on the urban core of the Los Angeles Basin. Seismologists believe that a 6.0 earthquake on the Newport-Inglewood would result in far more death and destruction than a “great” quake on the San Andreas, because the San Andreas is relatively remote from the urban centers of Southern California.

For decades, partnerships have flourished between the USGS, Cal Tech, the California Geological Survey and universities to share research and educational efforts with Californians. Tremendous earthquake mapping and mitigation efforts have been made in California in the past two decades, and public awareness has risen remarkably during this time. Major federal, state, and local government agencies and private organizations support earthquake risk reduction, and have made significant contributions in reducing the adverse impacts of earthquakes. Despite the progress, the majority of California communities remain unprepared because there is a general lack of understanding regarding earthquake hazards among Californians.

**Table 5-1: Earthquake Events in the Southern California Region**

| <b>Southern California Region Earthquakes with a Magnitude 5.0 or Greater</b> |                               |      |                       |
|---|-------------------------------|------|-----------------------|
| 1769  | Los Angeles Basin             | 1916 | Tejon Pass Region     |
| 1800  | San Diego Region              | 1918 | San Jacinto           |
| 1812  | Wrightwood                    | 1923 | San Bernardino Region |
| 1812  | Santa Barbara Channel         | 1925 | Santa Barbara         |
| 1827  | Los Angeles Region            | 1933 | Long Beach            |
| 1855  | Los Angeles Region            | 1941 | Carpenteria           |
| 1857  | Great Fort Tejon Earthquake   | 1952 | Kern County           |
| 1858  | San Bernardino Region         | 1954 | W. of Wheeler Ridge   |
| 1862  | San Diego Region              | 1971 | San Fernando          |
| 1892  | San Jacinto or Elsinore Fault | 1973 | Point Mugu            |

|      |                       |      |                    |
|------|-----------------------|------|--------------------|
| 1893 | Pico Canyon           | 1986 | North Palm Springs |
| 1894 | Lytle Creek Region    | 1987 | Whittier Narrows   |
| 1894 | E. of San Diego       | 1992 | Landers            |
| 1899 | Lytle Creek Region    | 1992 | Big Bear           |
| 1899 | San Jacinto and Hemet | 1994 | Northridge         |
| 1907 | San Bernardino Region | 1999 | Hector Mine        |
| 1910 | Glen Ivy Hot Springs  |      |                    |

Source:

[http://geology.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fpasadena.wr.usgs.gov%2Finfo%2Fcahist\\_eqs.html](http://geology.about.com/gi/dynamic/offsite.htm?site=http%3A%2F%2Fpasadena.wr.usgs.gov%2Finfo%2Fcahist_eqs.html)

To better understand the earthquake hazard, the scientific community has looked at historical records and accelerated research on those faults that are the source of the earthquakes occurring in the Southern California region. Historical earthquake records can generally be divided into records of the pre-instrumental period and the instrumental period. In the absence of instrumentation, the detection of earthquakes is based on observations and felt reports, and is dependent upon population density and distribution. Since California was sparsely populated in the 1800s, the detection of pre-instrumental earthquakes is relatively difficult. However, two very large earthquakes, the Fort Tejon in 1857 (7.9) and the Owens Valley in 1872 (7.6) are evidence of the tremendously damaging potential of earthquakes in Southern California. In more recent times two 7.3 earthquakes struck Southern California, in Kern County (1952) and Landers (1992). The damage from these four large earthquakes was limited because they occurred in areas which were sparsely populated at the time they happened. The seismic risk is much more severe today than in the past because the population at risk is in the millions, rather than a few hundred or a few thousand persons.

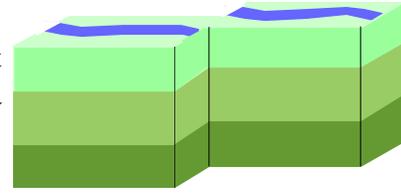
### **History of Earthquake Events in Southern California**

The City of Santa Fe Springs experienced minimal effects of the 1987 Whittier earthquake. Although the City is not directly located on a fault line, according to the City's Multi-Hazard Functional Plan, there are over 100 faults in the Los Angeles area. Since seismologists started recording and measuring earthquakes, there have been tens of thousands of recorded earthquakes in Southern California, most with a magnitude below three. No community in Southern California is beyond the reach of a damaging earthquake. Figure 5-1 describes the historical earthquake events that have affected Southern California.

### **Figure 5-1 Causes and Characteristics of Earthquakes in Southern California**

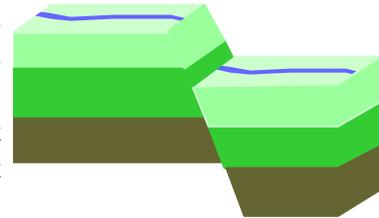
## Earthquake Faults

A fault is a fracture between blocks of the earth's crust where either side moves relative to the other along a parallel plane to the fracture.



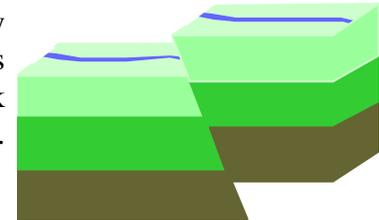
### Strike-slip

Strike-slip faults are vertical or almost vertical rifts where the earth's plates move mostly horizontally. From the observer's perspective, if the opposite block looking across the fault moves to the right, the slip style is called a right lateral fault; if the block moves left, the shift is called a left lateral fault.



### Dip-slip

Dip-slip faults are slanted fractures where the blocks mostly shift vertically. If the earth above an inclined fault moves down, the fault is called a normal fault, but when the rock above the fault moves up, the fault is called a reverse fault. Thrust faults are a reverse fault with a dip of  $45^\circ$  or less.



Dr. Kerry Sieh of Cal Tech has investigated the San Andreas Fault at Palmett Creek. "The record at Palmett Creek shows that rupture has recurred about every 130 years, on average, over the past 1500 years. But actual intervals have varied greatly, from less than 50 years to more than 300. The physical cause of such irregular recurrence remains unknown."<sup>2</sup> Damage from a great quake on the San Andreas would be widespread throughout Southern California.

## Earthquake Related Hazards

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

### Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter (where the earthquake originates). Buildings on poorly

consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

### **Earthquake-Induced Landslides**

Earthquake-induced landslides are secondary earthquake hazards that occur from ground shaking. They can destroy the roads, buildings, utilities, and other critical facilities necessary to respond and recover from an earthquake. Many communities in Southern California have a high likelihood of encountering such risks, especially in areas with steep slopes.

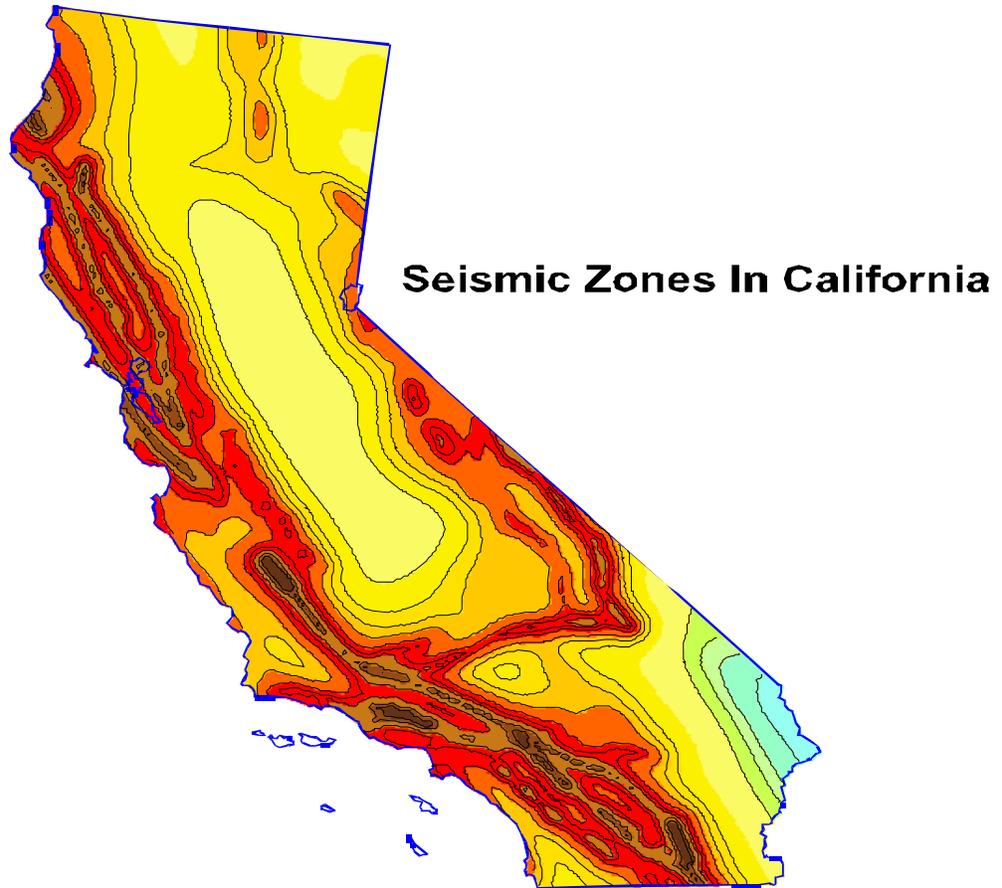
### **Liquefaction**

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. Many communities in Southern California are built on ancient river bottoms and have sandy soil. In some cases this ground may be subject to liquefaction, depending on the depth of the water table.

### **Amplification**

Soils and soft sedimentary rocks near the earth's surface can modify ground shaking caused by earthquakes. One of these modifications is amplification. Amplification increases the magnitude of the seismic waves generated by the earthquake. The amount of amplification is influenced by the thickness of geologic materials and their physical properties. Buildings and structures built on soft and unconsolidated soils can face greater risk.<sup>3</sup> Amplification can also occur in areas with deep sediment filled basins and on ridge tops.

**Map 5-1: Seismic Zones in California**



**Darker Shaded Areas indicate Greater Potential Shaking**

**Source: USGS Website**

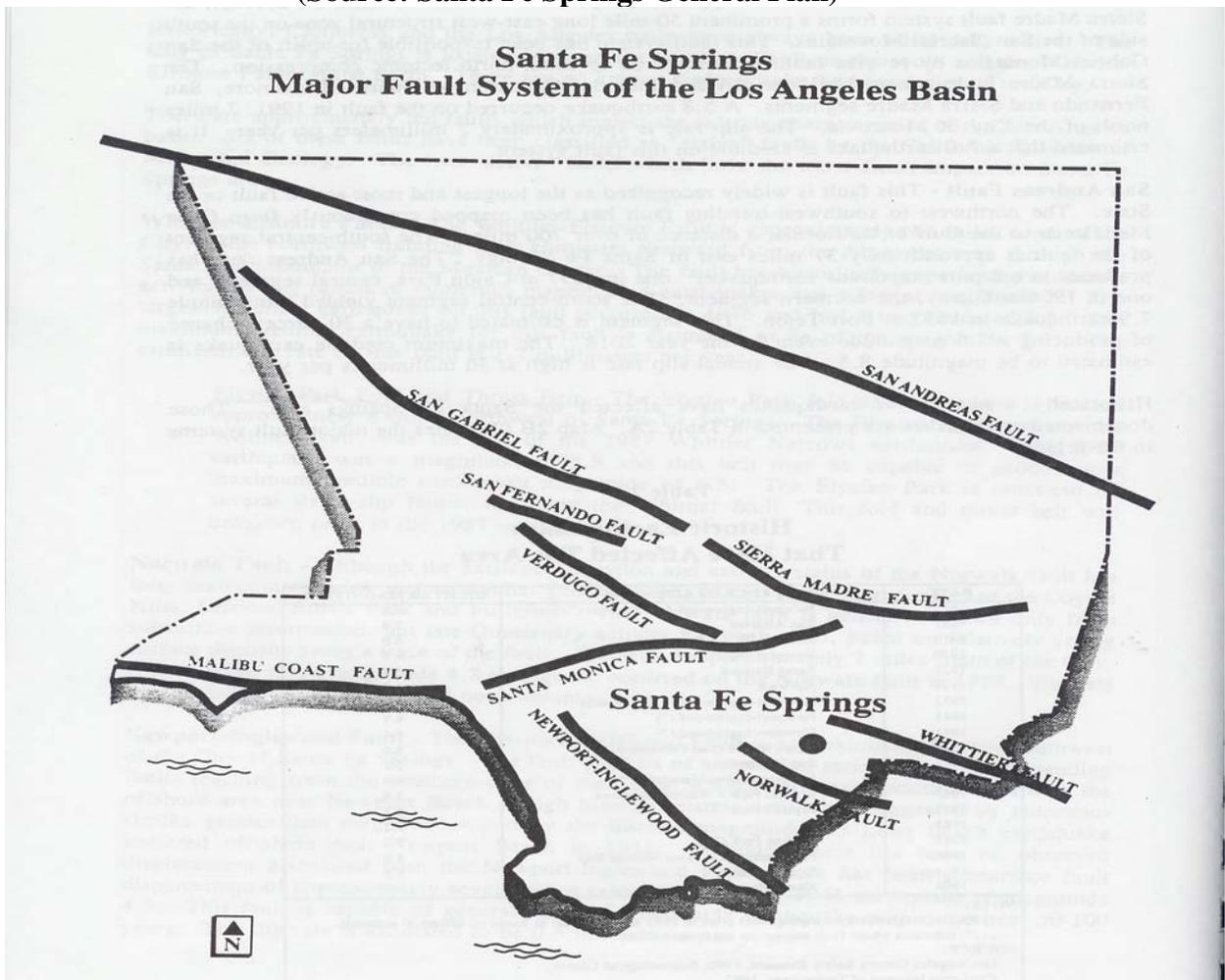
## Earthquake Hazard Assessment

### Hazard Identification

In California, many agencies are focused on seismic safety issues: the State's Seismic Safety Commission, the Applied Technology Council, Governor's Office of Emergency Services, United States Geological Survey, Cal Tech, the California Geological Survey as well as a number of universities and private foundations.

These organizations, in partnership with other state and federal agencies, have undertaken a rigorous program in California to identify seismic hazards and risks including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. Seismic hazard maps have been published and are available for many communities in California through the State Division of Mines and Geology. Map 5-2 illustrates the known earthquake faults in Southern California.

**Map 5-2: Major Fault System of the Los Angeles Basin**  
(Source: Santa Fe Springs General Plan)



According to the City of Santa Fe Springs General Plan, the City is in the vicinity of several known active and potentially active earthquake faults including the San Andreas, the San Jacinto, Whittier-Elsinore, Norwalk, Sierra Madre and Newport-Inglewood. In fact, scientist recently located a major active fault system, the Puente Hills fault, under metropolitan Los Angeles that most likely caused the 1987 Whittier Narrows earthquake, which killed eight people, injured 200, and caused \$354-million in damages. The Puente Hills fault runs in three broad segments for almost 25 miles under downtown Los Angeles, through Santa Fe Springs and into the Coyote Hills of northern Orange County.

New faults within the region are continuously being discovered. Scientists have identified almost 100 faults in the Los Angeles area known to be capable of a magnitude 6.0 or greater earthquake. The January 17, 1994 magnitude 6.7 1994 Northridge Earthquake (thrust fault) which produce severe ground motions, caused 57 deaths, 9,253 injuries and left over 20,000 displaced. Scientists have stated that such devastation shaking should be considered the norm near any large thrust earthquake.

Recent reports from scientists of the U.S. Geological Survey and the Southern California Earthquake Center say that the Los Angeles Area could expect one earthquake every year of magnitude 5.0 or more for the foreseeable future. The Southern California Earthquake Data Center's Earthquake Probable Events (Attachment 2) states that the interval between ruptures of the Whittier Fault is unknown; for the Elsinor Fault Zone, is roughly 250 years; for the San Andreas Fault Zone, varies from 140 to over 300 years; and for the San Jacinto Fault Zone is between 100 to 300 years per segment.

A major earthquake occurring in or near this jurisdiction may cause many deaths and casualties, extensive property damage, fires, and hazardous material spills and other ensuing hazards. The effects could be aggravated by aftershocks and by the secondary affects of fire, hazardous material/chemical accidents and possible failure of the waterways and dams. The time of day and season of the year would have a profound effect on the number of dead and injured and the amount of property damage sustained. Such an earthquake would be catastrophic in its affect upon the population and could exceed the response capabilities of the individual cities, Los Angeles County Operational Area and the State of California Emergency Services. Damage control and disaster relief support would be required from other local governmental and private organizations, and from the state and federal governments.

Extensive search and rescue operations would be required to assist trapped or injured persons. Emergency medical care, food and temporary shelter could be required by injured or displaced persons. Identification and burial of many dead persons would pose difficult problems; public health would be a major concern. Mass evacuation may be essential to save lives, particularly in areas downwind from hazardous material releases. Many families would be separated particularly if the earthquake should occur during working hours, and a personal inquire or locator system could be essential to maintain morale. Emergency operations could be seriously hampered by the loss of communications and damage to transportation routes within, and to and from, the disaster area and by the disruption of public utilities and services.

The economic impact on the City of Santa Fe Springs from a major earthquake was considerable in terms of loss of employment and loss of tax base. Also, a major earthquake could cause serious damage and/or outage of computer facilities. The loss of such facilities could curtail or seriously disrupt the operations of banks, insurance companies and other elements of the financial community. In turn, this could affect the ability of local government, business and the population to make payments and purchases.

In California, each earthquake is followed by revisions and improvements in the Building Codes. The 1933 Long Beach resulted in the Field Act, affecting school construction. The 1971 Sylmar earthquake brought another set of increased structural standards. Similar re-evaluations occurred after the 1989 Loma Prieta and 1994 Northridge earthquakes. These code changes have resulted in stronger and more earthquake resistant structures.

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. Surface rupture is the most easily avoided seismic hazard.<sup>4</sup>

The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.<sup>5</sup> The State Department of Conservation operates the Seismic Mapping Program for California. Extensive information is available at their website: <http://gmw.consrv.ca.gov/shmp/index.htm>

### **Vulnerability Assessment**

The effects of earthquakes span a large area, and large earthquakes occurring in many parts of the Southern California region would probably be felt throughout the region. However, the degree to which the earthquakes are felt, and the damages associated with them may vary. At risk from earthquake damage are large stocks of old buildings and bridges; many high tech and hazardous materials facilities; extensive sewer, water, and natural gas pipelines; earth dams; petroleum pipelines; and other critical facilities and private property located in the county. The relative or secondary earthquake hazards, which are liquefaction, ground shaking, amplification, and earthquake-induced landslides, can be just as devastating as the earthquake.

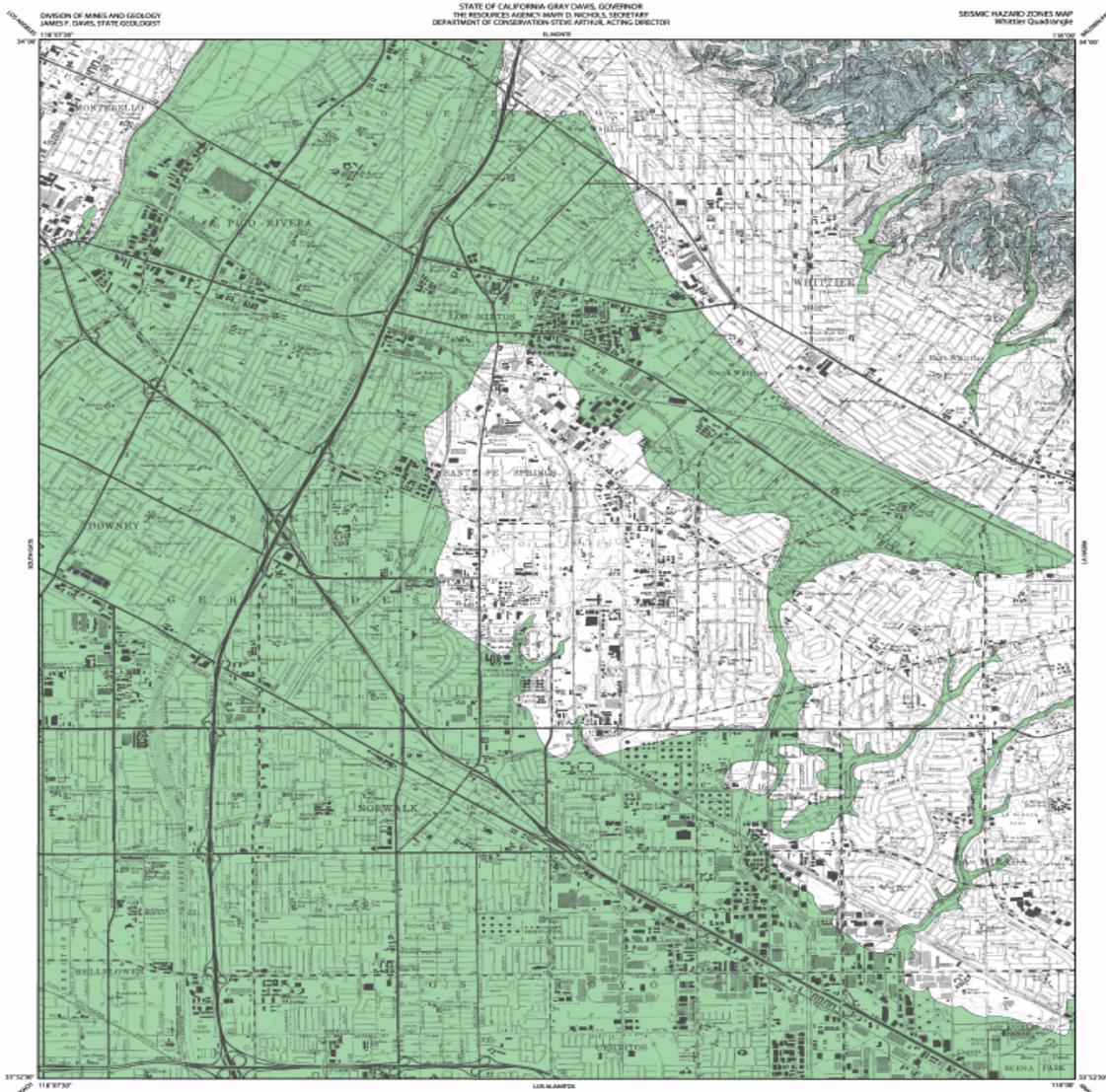
In the City of Santa Fe Springs, the types of buildings that would be affected by earthquakes primarily include residential, commercial and industrial buildings. The essential or special facilities that could be affected by an earthquake are identified Fire and Police stations, garages and shelter for emergency vehicles, structures and shelter in emergency preparedness centers, stand-by power generated equipment for essential facilities, water tanks and storage of fire suppression material or equipment and

structures containing chemical manufacturing and storage, included radioactive. The essential or special facilities that could be affected by an earthquake are identified in Table 4-2.

The City of Santa Fe Springs has conducted a vulnerability assessment on the impacts of seismic activity in the region to determine its possible loss to its buildings, structures and infrastructure. Based on available historical data and the experience from the 1987 Whittier Narrows Earthquake which occurred adjacent to the City of Santa Fe Springs, the estimated loss to buildings, structures and City infrastructure could range from 5% to 10% should an earthquake of a magnitude 6.0 or greater occur. However, this estimated percentage could increase depending on the location of the epicenter and the characteristics of earthquake.

The California Geological Survey has identified areas most vulnerable to liquefaction. Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these buildings and structures. As highlighted in the Multi-Hazard Functional Plan, liquefaction is of low probability and is not an imminent threat to the City. This is due to the water table being generally deeper than 50 feet throughout the City. Map 5-3 identifies the local population centers in City of Santa Fe Springs that have soils vulnerable to liquefaction.

# Map 5-3: Liquefaction and EQ-Induced Landslide Areas in the City of Santa Fe Springs (Source: California Seismic Hazard Maps – Whittier Quadrangle)



**PURPOSE OF MAP**  
 The public utility and counties in fulfilling their responsibilities for providing the public utility with the State Seismic Hazard Maps for the Whittier Quadrangle under the State Seismic Hazard Mapping Act (Public Resources Code Sections 2690-2698.6).

For information regarding the scope and recommended methods to be used in conducting the required investigations, see (SRM) Special Publication 111, Guidelines for Evaluating and Mitigating Seismic Hazards in California.

For a general description of the State Seismic Hazard Mapping Program, the State Seismic Hazard Mapping Act and regulations, and related information, please refer to the Draft State Seismic Hazard Mapping Act (SRM) General Publication 42.

Publication of this map was funded by the Federal Emergency Management Agency's Hazard Mitigation Program and the Department of Conservation in cooperation with the Governor's Office of Emergency Services.

**IMPORTANT - PLEASE NOTE**

- This map may not show all areas that have the potential for liquefaction, landsliding, strong earthquake ground shaking or other earthquake and geologic hazards. Maps of earthquake hazards are not intended to be used as a basis for engineering design or other actions that are required by the State Seismic Hazard Mapping Act. For more information on the subject and an index to available maps, see (SRM) General Publication 42.
- Liquefaction zones may also include areas susceptible to the effects of earthquake-induced landslides. This situation typically exists at or near the toe of existing landslides, discharge from existing or stable flow areas, or adjacent to steep relief areas.
- If this map does not show Alquist-Pulido earthquake fault zones, if any, that may exist in this area, please refer to the latest official map of earthquake fault zones for Alquist-Pulido and other actions that are required by the Alquist-Pulido Earthquake Fault Zoning Act. For more information on the subject and an index to available maps, see (SRM) General Publication 42.
- Landslide zones on this map were determined, in part, by analyzing methods first developed by the U.S. Geological Survey (USGS). A new generation of landslide hazard maps being developed by the USGS (Landslide and Landsliding Hazards) and an experimental method for determining landslide hazard zones. Although aspects of this new methodology may be incorporated in future scientific hazard zone maps, the experimental USGS maps should not be used as a substitute for these official earthquake-induced landslide zone maps.
- U.S. Geological Survey maps that do not present all data or features, be located within the horizontal accuracy of the scale of this map. The identification of location and orientation of features on the map is not intended to be used as a basis for engineering design, however, the quality of data used is varied. The same boundaries depicted have been shown as accurately as possible on this map.
- Information on this map is not sufficient to serve as a substitute for the geologic and engineering investigations required under Chapters 73 and 78 of Division 2 of the Public Resources Code.
- DISCLAIMER: The State of California and the Department of Conservation make no representation or warranty regarding the accuracy of the data from which these maps were derived. Further, the State of California and the Department of Conservation make no direct, indirect, special, incidental or consequential damages with respect to any claim for any use or any third party or executor of or arising from the use of this map.



**STATE OF CALIFORNIA  
 SEISMIC HAZARD ZONES**  
 Prepared in compliance with  
 Chapter 2.8, (Division 2) of the California Public Resources Code  
 (Seismic Hazard Mapping Act)

**WHITTIER QUADRANGLE**  
**OFFICIAL MAP**  
 Released: March 25, 1999

*James H. Davis*  
 STATE GEOLOGIST

**MAP EXPLANATION**  
**Zones of Required Investigation:**

- Liquefaction**  
 Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 26933(c) would be required.
- Earthquake-Induced Landslides**  
 Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 26933(c) would be required.

**DATA AND METHODOLOGY USED TO DEVELOP THIS MAP ARE PRESENTED IN THE FOLLOWING:**

Seismic Hazard Evaluation of the Whittier 7.5 minute quadrangle, Los Angeles and Orange Counties, California. California Division of Mines and Geology, Open File Report 98-26.

For additional information on seismic hazards in this map area, the national code for zoning, and additional references consulted, refer to (SRM) Whittier Quadrangle (http://www.cdmg.org/whq/).

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Southern California has many active landslide areas, and a large earthquake could trigger accelerated movement in these slide areas, in addition to jarring loose other unknown areas of landslide risk. In addition to having low risk of liquefaction, the City's General Plan states the City of Santa Fe Springs has a low risk of landslides.

### **Risk Analysis**

Risk analysis is the third phase of a hazard assessment. Risk analysis involves estimating the damage and costs likely to be experienced in a geographic area over a period of time<sup>6</sup>. Factors included in assessing earthquake risk include population and property distribution in the hazard area, the frequency of earthquake events, landslide susceptibility, buildings, infrastructure, and disaster preparedness of the region. This type of analysis can generate estimates of the damages to the region due to an earthquake event in a specific location. FEMA's software program, HAZUS, uses mathematical formulas and information about building stock, local geology and the location and size of potential earthquakes, economic data, and other information to estimate losses from a potential earthquake.<sup>7</sup> The HAZUS software is available from FEMA at no cost.

For greater Southern California there are multiple worst case scenarios, depending on which fault might rupture, and which communities are in proximity to the fault. But damage will not necessarily be limited to immediately adjoining communities. Depending on the epicenter of the earthquake, seismic waves may be transmitted through the ground to unsuspecting communities. In the Northridge 1994 earthquake, Santa Monica suffered extensive damage, even though there was a range of mountains between it and the origin of the earthquake.

Damages for a large earthquake almost anywhere in Southern California are likely to run into the billions of dollars. Although building codes are some of the most stringent in the world, ten's of thousands of older existing buildings were built under much less rigid codes. California has laws affecting unreinforced masonry buildings (URM's) and although many building owners have retrofitted their buildings, hundreds of pre-1933 buildings still have not been brought up to current standards.

Non-structural bracing of equipment and contents is often the most cost-effective type of seismic mitigation. Inexpensive bracing and anchoring may be the most cost effective way to protect expensive equipment. Non-structural bracing of equipment and furnishings will also reduce the chance of injury for the occupants of a building.

### **Community Earthquake Issues**

#### **What is Susceptible to Earthquakes?**

Earthquake damage occurs because humans have built structures that cannot withstand severe shaking. Buildings, airports, schools, and lifelines (highways and utility lines) suffer damage in earthquakes and can cause death or injury to humans. The welfare of homes, major businesses, and public infrastructure is very important. Addressing the reliability of buildings, critical facilities, and infrastructure, and understanding the

potential costs to government, businesses, and individuals as a result of an earthquake, are challenges faced by the City.

### **Dams**

According to the City General Plan, the City's greatest threat from dam inundation comes from the Whittier Narrows Dam located 5 miles northwest of the city's northern boundary. This earth filled dam was built in 1956 and has a capacity of 9.75 million gallons of water. The Santa Fe Springs Multihazard Functional Plan states there is a low risk that the city will experience flooding due to dam failure. If dam inundation were to occur, the northern most part of Santa Fe Springs would become flooded approximately one hour after dam failure. If a dam failure occurs the flood inundation area would be between Norwalk Blvd. on the east and the Los Angeles River to the west. The water level is predicted to be five feet in depth, gradually declining to four feet at the southern end of the City's impacted area. If the dam were to fail, the City's General Plan states it could require the evacuation of approximately 18,000 residents and 300 businesses.

There are a total of 103 dams in Los Angeles County, owned by 23 agencies or organizations, ranging from the Federal government to Homeowner Associations.<sup>8</sup> These dams hold billions of gallons of water in reservoirs. Releases of water from the major reservoirs are designed to protect Southern California from flood waters and to store domestic water. Seismic activity can compromise the dam structures, and the resultant flooding could cause catastrophic flooding. Following the 1971 Sylmar earthquake the Lower Van Norman Dam showed signs of structural compromise, and tens of thousands of persons had to be evacuated until the dam could be drained. The dam has never been refilled.

### **Buildings**

The built environment is susceptible to damage from earthquakes. Buildings that collapse can trap and bury people. Lives are at risk and the cost to clean up the damages is great. In most California communities, including the City of Santa Fe Springs, many buildings were built before 1993 when building codes were not as strict. In addition, retrofitting is not required except under certain conditions and can be expensive. Therefore, the number of buildings at risk remains high. The California Seismic Safety Commission makes annual reports on the progress of the retrofitting of unreinforced masonry buildings.

### **Infrastructure and Communication**

Residents in the City of Santa Fe Springs commute frequently by automobiles and public transportation such as buses and light rail. An earthquake can greatly damage bridges and roads, hampering emergency response efforts and the normal movement of people and goods. Damaged infrastructure strongly affects the economy of the community because it disconnects people from work, school, food, and leisure, and separates businesses from their customers and suppliers.

### **Bridge Damage**

Even modern bridges can sustain damage during earthquakes, leaving them unsafe for use. Some bridges have failed completely due to strong ground motion. Bridges are a vital transportation link - with even minor damages making some areas inaccessible. Because bridges vary in size, materials, location and design, any given earthquake will affect them differently. Bridges built before the mid-1970' s have a significantly higher risk of suffering structural damage during a moderate to large earthquake compared with those built after 1980 when design improvements were made.

Much of the interstate highway system was built in the mid to late 1960's. The bridges in the City of Santa Fe Springs are state, county or privately owned (including railroad bridges). Caltrans has retrofitted most bridges on the freeway systems; however there are still some county maintained bridges that are not retrofitted. The FHWA requires that bridges on the National Bridge Inventory be inspected every 2 years. Caltrans checks when the bridges are inspected because they administer the Federal funds for bridge projects.

### **Damage to Lifelines**

Lifelines are the connections between communities and outside services. They include water and gas lines, transportation systems, electricity, and communication networks. Ground shaking and amplification can cause pipes to break open, power lines to fall, roads and railways to crack or move, and radio and telephone communication to cease. Disruption to transportation makes it especially difficult to bring in supplies or services. Lifelines need to be usable after earthquake to allow for rescue, recovery, and rebuilding efforts and to relay important information to the public.

### **Disruption of Critical Services**

Critical facilities include police stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional after an earthquake event. Many critical facilities are housed in older buildings that are not up to current seismic codes.

### **Businesses**

Seismic activity can cause great loss to businesses, both large-scale corporations and small retail shops. When a company is forced to stop production for just a day, the economic loss can be tremendous, especially when its market is at a national or global level. Seismic activity can create economic loss that presents a burden to large and small shop owners who may have difficulty recovering from their losses.

Forty percent of businesses do not reopen after a disaster and another twenty-five percent fail within one year according to the Federal Emergency Management Agency (FEMA). Similar statistics from the United States Small Business Administration indicate that over ninety percent of businesses fail within two years after being struck by a disaster.<sup>9</sup>

### **Individual Preparedness**

Because the potential for earthquake occurrences and earthquake related property damage is relatively high in the City of Santa Fe Springs, increasing individual preparedness is a significant need. Strapping down heavy furniture, water heaters, and expensive personal property, as well as being earthquake insured, and anchoring buildings to foundations are just a few steps individuals can take to prepare for an earthquake.

### **Death and Injury**

Death and injury can occur both inside and outside of buildings due to collapsed buildings falling equipment, furniture, debris, and structural materials. Downed power lines and broken water and gas lines can also endanger human life.

### **Fire**

Downed power lines or broken gas mains may trigger fires. When fire stations suffer building or lifeline damage, quick response to extinguish fires is less likely. Furthermore, major incidents will demand a larger share of resources, and initially smaller fires and problems will receive little or insufficient resources in the initial hours after a major earthquake event. Loss of electricity may cause a loss of water pressure in some communities, further hampering firefighting ability.

### **Debris**

After damage to a variety of structures, much time is spent cleaning up bricks, glass, wood, steel or concrete building elements, office and home contents, and other materials. Developing a strong debris management strategy is essential in post-disaster recovery. Disasters do not exempt the City from compliance with AB 939 regulations.

### **Existing Mitigation Activities**

Existing mitigation activities include current mitigation programs and activities that are being implemented by county, regional, state, or federal agencies or organizations.

### **City of Santa Fe Springs Codes**

Implementation of earthquake mitigation policy most often takes place at the local government level. The City of Santa Fe Springs Department of Building and Safety enforces building codes pertaining to earthquake hazards.

The following sections of the Los Angeles County Building Code address the earthquake hazard:

- Chapter 16 – Division I, IV, V for structural design requirements
- Chapter 18 – Division I for foundation design requirements
- Sections 1921 – Seismic provisions for reinforced concrete structures.
- Chapter 22 – Division IV for Seismic provision for structural steel buildings.
- Section 2315 and 2319 Seismic provisions in wood steel structures

Generally, these codes seek to discourage development in areas that could be prone to flooding, landslide, wildfire and/or seismic hazards, and where development is permitted, that the applicable construction standards are met. Developers in hazard-prone areas may

be required to retain a qualified professional engineer to evaluate the level of risk on the site and recommend appropriate mitigation measures.

### **Coordination among Building Officials**

The City of Santa Fe Springs Building Division is responsible for compliance with the City adopted Building Code (2002 County of Los Angeles Building Code) for all new construction, tenant improvements, conversions and repairs to buildings and other structures. Adherence to the Building Code ensures that each project meets a minimum set of safety standards, which in turn help preserve the value and integrity of the buildings and structures built at higher seismic standard.

Since 1999 the City also requires that site-specific seismic hazard investigations be performed for new essential facilities, major structures, hazardous facilities, and special occupancy structures such as schools, hospitals, and emergency response facilities.

### **Businesses/Private Sector**

Natural hazards have a devastating impact on businesses. In fact, of all businesses which close following a disaster, more than forty-three percent never reopen, and an additional twenty-nine percent close for good within the next two years.<sup>10</sup> The Institute of Business and Home Safety has developed “Open for Business”, which is a disaster planning toolkit to help guide businesses in preparing for and dealing with the adverse affects of natural hazards. The kit integrates protection from natural disasters into the company's risk reduction measures to safeguard employees, customers, and the investment itself. The guide helps businesses secure human and physical resources during disasters and helps to develop strategies to maintain business continuity before, during and after a disaster occurs.

### **Hospitals**

“The Alfred E. Alquist Hospital Seismic Safety Act (“Hospital Act”) was enacted in 1973 in response to the moderate Magnitude 6.6 Sylmar Earthquake in 1971 when four major hospital campuses were severely damaged and evacuated. Two hospital buildings collapsed killing forty seven people. Three others were killed in another hospital that nearly collapsed.

In approving the Act, the Legislature noted that: “Hospitals, that house patients who have less than the capacity of normally healthy persons to protect themselves, and that must be reasonably capable of providing services to the public after a disaster, shall be designed and constructed to resist, insofar as practical, the forces generated by earthquakes, gravity and winds.” (Health and Safety Code Section 129680)

When the Hospital Act was passed in 1973, the State anticipated that, based on the regular and timely replacement of aging hospital facilities, the majority of hospital buildings would be in compliance with the Act’s standards within 25 years. However, hospital buildings were not, and are not, being replaced at that anticipated rate. In fact, the great majority of the State’s urgent care facilities are now more than 40 years old.

The moderate Magnitude 6.7 Northridge Earthquake in 1994 caused \$3 billion in hospital-related damage and evacuations. Twelve hospital buildings constructed before the Act were cited (red tagged) as unsafe for occupancy after the earthquake. Those hospitals that had been built in accordance with the 1973 Hospital Act were very successful in resisting structural damage. However, nonstructural damage (for example, plumbing and ceiling systems) was still extensive in those post-1973 buildings.

Senate Bill 1953 (“SB 1953”), enacted in 1994 after the Northridge Earthquake, expanded the scope of the 1973 Hospital Act. Under SB 1953, all hospitals are required, as of January 1, 2008, to survive earthquakes without collapsing or posing the threat of significant loss of life. The 1994 Act further mandates that all existing hospitals be seismically evaluated, and retrofitted, if needed, by 2030, so that they are in substantial compliance with the Act (which requires that the hospital buildings be reasonably capable of providing services to the public after disasters). SB 1953 applies to all urgent care facilities (including those built prior to the 1973 Hospital Act) and affects approximately 2,500 buildings on 475 campuses.

SB 1953 directed the Office of Statewide Health Planning and Development (“OSHPD”), in consultation with the Hospital Building Safety Board, to develop emergency regulations including “...earthquake performance categories with sub gradations for risk to life, structural soundness, building contents, and nonstructural systems that are critical to providing basic services to hospital inpatients and the public after a disaster.” (Source: Health and Safety Code Section 130005)

The Seismic Safety Commission Evaluation of the State’s Hospital Seismic Safety Policies

In 2001, recognizing the continuing need to assess the adequacy of policies, and the application of advances in technical knowledge and understanding, the California Seismic Safety Commission created an Ad Hoc Committee to re-examine the compliance with the Alquist Hospital Seismic Safety Act. The formation of the Committee was also prompted by the recent evaluations of hospital buildings reported to OSHPD that revealed that a large percentage (40%) of California’s operating hospitals are in the highest category of collapse risk.”<sup>11</sup>

**California Earthquake Mitigation Legislation**

California is painfully aware of the threats it faces from earthquakes. Dating back to the 19<sup>th</sup> Century, Californians have been killed, injured, and lost property as a result of earthquakes. As the State’s population continues to grow and urban areas become even more densely developed, the risk will continue to increase. For decades the legislature has passed laws to strengthen the built environment and protect the citizens. Table 5-2 provides a sampling of some of the 200 plus laws in the State’s codes.

**Table 5-2: Partial List of the Over 200 California Laws on Earthquake Safety**

|                                      |                                    |
|--------------------------------------|------------------------------------|
| Government Code Section 8870-8870.95 | Creates Seismic Safety Commission. |
|--------------------------------------|------------------------------------|

|   |  |
|---|--|
| Government Code Section 8876.1-8876.10  | Established the California Center for Earthquake Engineering Research.   |
| Public Resources Code Section 2800-2804.6   | Authorized a prototype earthquake prediction system along the Central San Andreas Fault near the City of Parkfield.  |
| Public Resources Code Section 2810-2815   | Continued the Southern California Earthquake Preparedness Project and the Bay Area Regional Earthquake Preparedness Project.                                       |
| Health and Safety Code Section 16100-16110  | The Seismic Safety Commission and State Architect, will develop a state policy on acceptable levels of earthquake risk for new and existing state-owned buildings. |
| Government Code Section 8871-8871.5   | Established the California Earthquake Hazards Reduction Act of 1986.   |
| Health and Safety Code Section 130000-130025  | Defined earthquake performance standards for hospitals.  |
| Public Resources Code Section 2805-2808   | Established the California Earthquake Education Project.   |
| Government Code Section 8899.10-8899.16   | Established the Earthquake Research Evaluation Conference.   |
| Public Resources Code Section 2621-2630 2621.   | Established the Alquist-Priolo Earthquake Fault Zoning Act.  |
| Government Code Section 8878.50-8878.52 8878.50.  | Created the Earthquake Safety and Public Buildings Rehabilitation Bond Act of 1990.  |
| Education Code Section 35295-35297 35295.   | Established emergency procedure systems in kindergarten through grade 12 in all the public or private schools.   |
| Health and Safety Code Section 19160-19169  | Established standards for seismic retrofitting of unreinforced masonry buildings.  |
| Health and Safety Code Section 1596.80-1596.879   | Required all child day care facilities to include an Earthquake Preparedness Checklist as an attachment to their disaster plan.                                    |
| Source: <a href="http://www.leginfo.ca.gov/calaw.html">http://www.leginfo.ca.gov/calaw.html</a> |  |

### **Earthquake Education**

Earthquake research and education activities are conducted at several major universities in the Southern California region, including Cal Tech, USC, UCLA, UCI, and UCSB. The local clearinghouse for earthquake information is the Southern California Earthquake Center located at the University of Southern California, Los Angeles, CA 90089, Telephone: (213) 740-5843, Fax: (213) 740-0011, Email: SCEinfo@usc.edu, Website: <http://www.scec.org>. The Southern California Earthquake Center (SCEC) is a community of scientists and specialists who actively coordinate research on earthquake hazards at nine core institutions, and communicate earthquake information to the public. SCEC is a National Science Foundation (NSF) Science and Technology Center and is co-funded by the United States Geological Survey (USGS).

In addition, Los Angeles County along with other Southern California counties, sponsors the Emergency Survival Program (ESP), an educational program for learning how to prepare for earthquakes and other disasters. Many school districts have very active emergency preparedness programs that include earthquake drills and periodic disaster response team exercises.

## End Notes

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- <sup>1</sup> <http://pubs.usgs.gov/gip/earthq3/when.html>
- <sup>2</sup> <http://www.gps.caltech.edu/~sieh/home.html>
- <sup>3</sup> Planning for Natural Hazards: The California Technical Resource Guide, Department of Land Conservation and Development (July 2000)
- <sup>4</sup> <http://www.consrv.ca.gov/CGS/rghm/ap/>
- <sup>5</sup> Ibid
- <sup>6</sup> Burby, R. (Ed.) Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities (1998), Washington D.C., Joseph Henry Press.
- <sup>7</sup> FEMA HAZUS <http://www.fema.gov/hazus/hazus2.htm> (May 2001).
- <sup>8</sup> Source: Los Angeles County Public Works Department, March 2004
- <sup>9</sup> [http://www.chamber101.com/programs\\_committee/natural\\_disasters/DisasterPreparedness/Forty.htm](http://www.chamber101.com/programs_committee/natural_disasters/DisasterPreparedness/Forty.htm)
- <sup>10</sup> Institute for Business and Home Safety Resources (April 2001),
- <sup>11</sup> [http://www.seismic.ca.gov/pub/CSSC\\_2001-04\\_Hospital.pdf](http://www.seismic.ca.gov/pub/CSSC_2001-04_Hospital.pdf)

## **Earthquake Probable Events** *Southern California Earthquake Data Center*

### **Elsinore Fault Zone**

**TYPE OF FAULTING:** right-lateral strike-slip  
**LENGTH:** about 180 km (not including the Whittier, Chino, and Laguna Salada faults)  
**NEARBY COMMUNITIES:** Temecula, Lake Elsinore, Julian  
**LAST MAJOR RUPTURE:** May 15, 1910; Magnitude 6 -- no surface rupture found  
**SLIP RATE:** roughly 4.0 mm/yr  
**INTERVAL BETWEEN MAJOR RUPTURES:** roughly 250 years  
**PROBABLE MAGNITUDES:**  $M_w6.5 - 7.5$   
**MOST RECENT SURFACE RUPTURE:** 18th century A.D.(?)

### **San Andreas Fault Zone**

**TYPE OF FAULT:** right-lateral strike-slip  
**LENGTH:** 1200 km  
550 km south from Parkfield; 650km northward  
**NEARBY COMMUNITY:** Parkfield, Frazier Park, Palmdale, Wrightwood, San Bernardino, Banning, Indio  
**LAST MAJOR RUPTURE:** January 9, 1857 (Mojave segment); April 18, 1906 (Northern segment)  
**SLIP RATE:** about 20 to 35 mm per year  
**INTERVAL BETWEEN MAJOR RUPTURES:** average of about 140 years on the Mojave segment;  
recurrence interval varies greatly -- from under 20 years (at Parkfield only) to over 300 years  
**PROBABLE MAGNITUDES:**  $M_w6.8 - 8.0$

### **San Jacinto Fault Zone**

**TYPE OF FAULTING :** right-lateral strike-slip; minor right-reverse  
**LENGTH:** 210 km, including Coyote Creek fault  
**NEARBY COMMUNITIES:** Lytle Creek, San Bernardino, Loma Linda, San Jacinto, Hemet, Anza, Borrego Springs, Ocotillo Wells  
**MOST RECENT SURFACE RUPTURE:** within the last few centuries; April 9, 1968,  $M_w6.5$  on Coyote Creek segment  
**SLIP RATE:** typically between 7 and 17 mm/yr  
**INTERVAL BETWEEN SURFACE RUPTURES:** between 100 and 300 years, per segment  
**PROBABLE MAGNITUDES:**  $M_w6.5 - 7.5$

### **Whittier Fault**

**TYPE OF FAULTING:** right-lateral strike-slip with some reverse slip  
**LENGTH:** about 40 km  
**NEARBY COMMUNITIES:** Yorba Linda, Hacienda Heights, Whittier  
**MOST RECENT SURFACE RUPTURE:** Holocene  
**SLIP RATE:** between 2.5 and 3.0 mm/yr  
**INTERVAL BETWEEN MAJOR RUPTURES:** unknown  
**PROBABLE MAGNITUDES:**  $M_w6.0 - 7.2$   
**OTHER NOTES:** The Whittier fault dips toward the northeast.

Section 6:  
Flooding Hazards  
in the  
City of Santa Fe  
Springs

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### **Why are Floods a Threat to the City of Santa Fe Springs?**

The City of Santa Fe Springs (“City”) is adjacent to the San Gabriel River, which is susceptible to flooding events. Flooding poses a threat to life and safety and can cause severe damage to public and private property.

According to the City of Santa Fe Springs’ Multi-hazard Function Plan, the City has three areas that are designated as zone “A” by the National Flood Insurance Program. These areas are as follows: 1) North of Florence Avenue between Pioneer Boulevard and Norwalk Boulevard. 2) North of Bora Drive east of North Coyote Creek Fork and City boundary. 3) North of Lakeland Road between Bloomfield Avenue and Greenstone Avenue. In Light of the FIRM Zone A Floodplain designations located in various areas in the City, the flood threat to the City is considered to be moderate. However, the sizes of the zone present a relatively minor percentage of the City’s total land area. Map 6-1 illustrates which parts of Santa Fe Springs lie in flood zones.

The City was most recently affected by the flooding in 1950 that affected the northern portion of the City. There were no damages to public facilities and a Presidential Disaster Declaration was not made.

### **History of Flooding in the City of Santa Fe Springs**

Floods have affected the citizens of the City as early as 1865, when it was reported that the San Gabriel River crested at 12 feet over the banks of the river. Since then, flood control projects have been implemented that minimize flood hazards and the number of flood zones in the City.

There are a number of rivers in the Southern California region, but the river with the best recorded history is the Los Angeles River. The flood history of the Los Angeles River is generally indicative of the flood history of much of Southern California.

### **Historic Flooding in Los Angeles County**

Records show that since 1811, the Los Angeles River has flooded 30 times, on average once every 6.1 years. Averages are deceiving though, for the Los Angeles basin goes through periods of drought and then periods of above average rainfall. Between 1889 and 1891 the river flooded every year, and from 1941 to 1945, the river flooded 5 times. Conversely, from 1896 to 1914, a period of 18 years, and again from 1944 to 1969, a period of 25 years, the river did not have serious floods.<sup>1</sup>

**Table 6-1: Major Floods of the Los Angeles River**

|         |   |
|---------|---|
| 1811    | Flooding  |
| 1815    | Flooding  |
| 1825    | L.A. River changed its course back from the Ballona wetlands to San Pedro |
| 1832    | Heavy flooding  |
| 1861-62 | Heavy flooding. Fifty inches of rain falls during December and January.   |

|  |   |
|--|---|
| 1867   | Floods create a large, temporary lake out to Ballona Creek.   |
| 1876   | The Novician Deluge   |
| 1884   | Heavy flooding causes the river to change course again, turning east to Vernon and then southward to San Pedro. |
| 1888-1891  | Annual floods   |
| 1914   | Heavy flooding. Great damage to the harbor.   |
| 1921   | Flooding  |
| 1927   | Moderate flood  |
| 1934   | Moderate flood starting January 1. Forty dead in La Canada.   |
| 1938   | Great County-wide flood with 4 days of rain. Most rain on day 4.  |
| 1941-44  | L.A. River floods five times.   |
| 1952   | Moderate flooding   |
| 1969   | One heavy flood after 9 day storm. One moderate flood.  |
| 1978   | Two moderate floods   |
| 1979   | Los Angeles experiences severe flooding and mudslides.  |
| 1980   | Flood tops banks of river in Long Beach. Sepulveda Basin spillway almost opened.                                |
| 1983   | Flooding kills six people.  |
| 1992   | 15 year flood. Motorists trapped in Sepulveda basin. Six people dead.   |
| 1994   | Heavy flooding  |
| Sources: <a href="http://www.lalc.k12.ca.us/target/units/river/tour/hist.html">http://www.lalc.k12.ca.us/target/units/river/tour/hist.html</a> and <a href="http://www.losangelesalmanac.com/topics/History/hi01i.htm">http://www.losangelesalmanac.com/topics/History/hi01i.htm</a> |   |

While the City is 13 miles southeast of downtown Los Angeles, it is not so far away as to be unaffected by the heavy rains that brought flooding to Los Angeles. In addition, the towering mountains that give the Los Angeles region its spectacular views also wring a great deal of rain out of the storm clouds that pass through. Because the mountains are so steep, the rainwater moves rapidly down the slopes and across the coastal plains on its way to the ocean.

“The Santa Monica, Santa Susana and Verdugo Mountains, which surround three sides of the valley, seldom reach heights above three thousand feet. The Western San Gabriel Mountains, in contrast, have elevations of more than seven thousand feet. These higher ridges often trap eastern-moving winter storms. Although downtown Los Angeles averages just fifteen inches of rain a year, some mountain peaks in the San Gabriels receive more than forty inches of precipitation annually”.<sup>2</sup>

Naturally, this rainfall moves rapidly down stream, often with severe consequences for anything in its path. In extreme cases, flood-generated debris flows will roar down a canyon at speeds near 40 miles per hour with a wall of mud, debris and water tens of feet high.

In Southern California, stories of floods, debris flows, persons buried alive under tons of mud and rock and persons swept away to their death in a river flowing at thirty-five miles an hour are without end.

However, flooding of the Los Angeles River, given its distance from the City of Santa Fe Springs would not directly affect the City. Although the San Gabriel River is in closer proximity to a small area of western Santa Fe Springs, most of the city is at a higher elevation and therefore the impact of river flooding would be very minimal. Data on the impact on Santa Fe Springs of past San Gabriel River flooding is not available.

**What Factors Create Flood Risk?**

Flooding occurs when climate, geology, and hydrology combine to create conditions where water flows outside of its usual course. The City’s Multi-Hazard Functional Plan (MHFP) states there are multiple low-lying areas in the City that have potential for flooding. Factors that contribute to urban flooding include debris accumulation on storm drains and in flood control channels.

**Winter Rainfall**

The average annual rainfall in Los Angeles is 14.8 inches. But the term “average” means very little as the annual rainfall during this time period has ranged from only 4.35 inches in 2001-2002 to 38.2 inches in 1883-1884 and 25.28 inches in 2004-2005. In fact, in only fifteen of the past 125 years, has the annual rainfall been within plus or minus 10% of the 14.9 inch average. And in only 38 years has the annual rainfall been within plus or minus 20% of the 14.9 inch average. This makes the Los Angeles basin a land of extremes in terms of annual precipitation.

The City is in the southeastern section of the Los Angeles Basin. It is located west of the Puente Hills, which increases the collection of rainwater.

**Monsoons**

Another relatively regular source for heavy rainfall, particularly in the mountains and adjoining cities is from summer tropical storms. Table 6-2 lists tropical storms that have had significant rainfall in the past century and the general areas affected by these storms. These tropical storms usually coincide with El Niño years.

**Table 6-2: Tropical Storms of Southern California**

| <b>Tropical Storms that have affected Southern California during the 20th Century</b> |                         |                              |                 |
|---|-------------------------|------------------------------|-----------------|
| <b>Month-Year</b>   | <b>Date(s)</b>          | <b>Area(s) Affected</b>      | <b>Rainfall</b> |
| July 1902   | 20th & 21 <sup>st</sup> | Deserts & Southern Mountains | up to 2"        |

| <b>Tropical Storms that have affected Southern California during the 20th Century</b>           |  |   |          |
|---|--|---|----------|
| Aug. 1906   | 18th & 19th                            | Deserts & Southern Mountains  | up to 5" |
| Sept. 1910  | 15th                                   | Mountains of Santa Barbara County                                     | 2"       |
| Aug. 1921   | 20th & 21st                            | Deserts & Southern Mountains  | up to 2" |
| Sept. 1921  | 30th                                   | Deserts   | up to 4" |
| Sept. 1929  | 18th                                   | Southern Mountains & Deserts  | up to 4" |
| Sept. 1932  | 28 <sup>th</sup> - Oct 1st             | Mountains & Deserts, 15 Fatalities                                    | up to 7" |
| Aug. 1935   | 25th                                   | Southern Valleys, Mountains & Deserts                                 | up to 2" |
| Sept. 1939  | 4th - 7th                              | Southern Mountains, Southern & Eastern Deserts                        | up to 7" |
|   | 11th & 12th                            | Deserts, Central & Southern Mountains                                 | up to 4" |
|   | 19th - 21st                            | Deserts, Central & Southern Mountains                                 | up to 3" |
|   | 25th                                   | Long Beach, W/ Sustained Winds of 50 Mph                              | 5"       |
| Sept. 1945  | 9th & 10th                             | Central & Southern Mountains  | up to 2" |
| Sept. 1946  | 30 <sup>th</sup> - Oct 1 <sup>st</sup> | Southern Mountains  | up to 4" |
| Aug. 1951   | 27th - 29th                            | Southern Mountains & Deserts  | 2 to 5"  |
| Sept. 1952  | 19th - 21st                            | Central & Southern Mountains  | up to 2" |
| July 1954   | 17th - 19th                            | Deserts & Southern Mountains  | up to 2" |
| July 1958   | 28th & 29th                            | Deserts & Southern Mountains  | up to 2" |
| Sept. 1960  | 9th & 10th                             | Julian  | 3.40"    |
| Sept. 1963  | 17th - 19th                            | Central & Southern Mountains  | up to 7" |
| Sept. 1967  | 1st - 3rd                              | Southern Mountains & Deserts  | 2"       |
| Oct. 1972   | 6th                                    | Southeast Deserts   | up to 2" |
| Sept. 1976  | 10th & 11th                            | Central & Southern Mountains. Ocotillo, CA was Destroyed 3 Fatalities | 6 to 12" |
| Aug. 1977   | n/a                                    | Los Angeles   | 2"       |
|   |  | Mountains   | up to 8" |
| Oct. 1977   | 6th & 7th                              | Southern Mountains & Deserts  | up to 2" |
| Sept. 1978  | 5th & 6th                              | Mountains   | 3"       |
| Sept. 1982  | 24th - 26th                            | Mountains   | up to 4" |
| Sept. 1983  | 20th & 21st                            | Southern Mountains & Deserts  | up to 3" |
| <a href="http://www.fema.gov/nwz97/el_n_scal.shtm">http://www.fema.gov/nwz97/el_n_scal.shtm</a> |  |   |          |

### **Geography and Geology**

The greater Los Angeles Basin is the product of rainstorms and erosion for millennia. "Most of the mountains that ring the valleys and coastal plain are deeply fractured faults

and, as they (the mountains) grew taller, their brittle slopes were continually eroded. Rivers and streams carried boulders, rocks, gravel, sand, and silt down these slopes to the valleys and coastal plain....In places these sediments are as much as twenty thousand feet thick”<sup>3</sup>

Much of the coastal plain rests on the ancient rock debris and sediment washed down from the mountains. This sediment can act as a sponge, absorbing vast quantities of rain in those years when heavy rains follow a dry period. But like a sponge that is near saturation, the same soil fills up rapidly when a heavy rain follows a period of relatively wet weather. So even in some years of heavy rain, flooding is minimal because the ground is relatively dry. The same amount of rain following a wet period of time can cause extensive flooding.

The greater Los Angeles Basin is for all intents and purposes developed. This leaves precious little open land to absorb rainfall. This lack of open ground forces water to remain on the surface and rapidly accumulate. If it were not for the massive flood control system with its concrete lined river and stream beds, flooding would be a much more common occurrence. In-fill building is becoming a much more common practice in many areas. Developers tear down an older home which typically covers up to 40% of the lot size and replacing it with three or four town homes or apartments which may cover 90-95% of the lot.

Another potential source of flooding is “asphalt creep.” The street space between the curbs of a street is a part of the flood control system. Water leaves property and accumulates in the streets, where it is directed towards the underground portion of the flood control system. The carrying capacity of the street is determined by the width of the street and the height of the curbs along the street. Often, when streets are being resurfaced, a one to two inch layer of asphalt is laid down over the existing asphalt. This added layer of asphalt subtracts from the rated capacity of the street to carry water. Thus the original engineered capacity of the entire storm drain system is marginally reduced over time. Subsequent re-paving of the street will further reduce the engineered capacity even more.

## **Flood Terminology**

### **Floodplain**

A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess flood water. The floodplain is made up of two sections: the floodway and the flood fringe.

### **100-Year Flood**

The 100-year flooding event is the flood having a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood. Map 5-1 illustrates the 100-year floodplain in the City.



### **Floodway**

The floodway is one of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For NFIP purposes, floodways are defined as the channel of a river or stream, and the overbank areas adjacent to the channel. The floodway carries the bulk of the flood water downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties.

The City regulations prohibit all development in the floodway. The NFIP floodway definition is "the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot. Floodways are not mapped for all rivers and streams but are generally mapped in developed areas.

### **Flood Fringe**

The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward.

### **Development**

For floodplain ordinance purposes, development is broadly defined by the City Zoning Ordinance to mean "any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation, or drilling operations." The definition of development for floodplain purposes is generally broader and includes more activities than the definition of development used in other sections of local land use ordinances.

### **Base Flood Elevation (BFE)**

The term "Base Flood Elevation" refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities choose to use higher frequency flood events as their base flood elevation for certain activities, while using lower frequency events for others. For example, for the purpose of storm water management, a 25-year flood event might serve as the base flood elevation; while the 500-year flood event may serve as base flood elevation for the tie down of mobile homes. The regulations of the NFIP focus on development in the 100-year floodplain.

### **Characteristics of Flooding**

Two types of flooding primarily affect the City: riverine flooding and urban flooding (see descriptions below). In addition, any low-lying area has the potential to flood. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's capability to remove it.

### **Riverine Flooding**

Riverine flooding is the overbank flooding of rivers and streams, historically has not been

an issue. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers. Map 6-1 shows the various river basins (or flood zones) in the City.

Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 100-year flood with flood depths of only one to three feet. These areas are generally flooded by low velocity sheet flows of water.

### **Urban Flooding**

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization of a watershed changes the hydrologic systems of the basin. Heavy rainfall collects and flows faster on impervious concrete and asphalt surfaces. The water moves from the clouds, to the ground, and into streams at a much faster rate in urban areas. Adding these elements to the hydrological systems can result in flood waters that rise very rapidly and peak with violent force.

A majority of the area in the City of Santa Fe Springs has a high concentration of impermeable surfaces that either collect water, or concentrate the flow of water in unnatural channels. During periods of urban flooding, streets can become swift moving rivers and basements can fill with water. Storm drains often back up with vegetative debris causing additional, localized flooding.

### **Dam Failure Flooding**

Loss of life and damage to structures, roads, and utilities may result from a dam failure. Economic losses can also result from a lowered tax base and lack of utility profits. According to the City's General Plan, the greatest threat from dam inundation comes from the Whittier Narrows Dam located 5 miles northwest of the City's northern boundary. This earth filled dam was built in 1956 and has a capacity of 9.75 million gallons of water. The City of Santa Fe Springs Multi-Hazard Functional Plan states there is a low risk that the City will experience flooding due to dam failure. If dam inundation should occur, the northern most part of Santa Fe Springs would become flooded approximately one hour after dam failure. If a dam failure occurs the flood inundation area would be between Norwalk Blvd. on the east and the Los Angeles River to the west. The water level is predicted to be five feet in depth, gradually declining to four feet at the southern end of the City's impacted area. If the dam were to fail, the City's General Plan states it could require the evacuation of 17,500 residents and 300 businesses. Map 6-2 shows the portion of Santa Fe Springs that would be affected by dam failure.



Because dam failure can have severe consequences, FEMA requires that all dam owners develop Emergency Action Plans (EAP) for warning, evacuation, and post-flood actions. Although there may be coordination with county officials in the development of the EAP, the responsibility for developing potential flood inundation maps and facilitation of emergency response is the responsibility of the dam owner. For more detailed information regarding dam failure flooding, and potential flood inundation zones for a particular dam in the county, refer to the City Emergency Action Plan.

There have been a total of 45 dam failures in California since the 19<sup>th</sup> century. The significant dam failures in Southern California are listed in Table 6-3.

**Table 6-3: Dam Failures in Southern California**

|   |                         |      |  |
|---|-------------------------|------|--|
| Sheffield   | Santa Barbara           | 1925 | Earthquake slide   |
| Puddingstone  | Pomona                  | 1926 | Overtopping during construction                                |
| Lake Hemet  | Palm Springs            | 1927 | Overtopping  |
| Saint Francis   | San Francisquito Canyon | 1928 | Sudden failure at full capacity through foundation, 426 deaths |
| Cogswell  | Monrovia                | 1934 | Breaching of concrete cover                                    |
| Baldwin Hills   | Los Angeles             | 1963 | Leak through embankment turned into washout, 3 deaths          |
| <a href="http://cee.engr.ucdavis.edu/faculty/lund/dams/Dam_History_Page/Failures.htm">http://cee.engr.ucdavis.edu/faculty/lund/dams/Dam_History_Page/Failures.htm</a> |                         |      |  |

The two most significant dam failures are the St. Francis Dam in 1928 and the Baldwin Hills Dam in 1963.

“The failure of the St. Francis Dam, and the resulting loss of over 500 lives in the path of a roaring wall of water, was a scandal that resulted in the almost complete destruction of the reputation of its builder, William Mulholland.

Mulholland was an immigrant from Ireland who rose up through the ranks of the City of Los Angeles Water Department to the position of Chief Engineer. It was he who proposed, designed, and supervised the construction of the Los Angeles Aqueduct, which brought water from the Owens Valley to the Los Angeles. The St. Francis Dam, built in 1926, was 180 feet high and 600 feet long; it was located near Saugus in the San Francisquito Canyon.

The dam gave way on March 12, 1928, three minutes before midnight. Its waters swept through the Santa Clara Valley toward the Pacific Ocean, about 54 miles away. 65 miles of valley were devastated before the water finally made its way into the ocean between Oxnard and Ventura. At its peak the wall of water was said to be 78 feet high; by the time it hit Santa

Paula, 42 miles south of the dam, the water was estimated to be 25 feet deep. Almost everything in its path was destroyed: livestock, structures, railways, bridges, and orchards. By the time it was over, parts of Ventura County lay under 70 feet of mud and debris. Over 500 people were killed and damage estimates topped \$20 million.”<sup>4</sup>

The Baldwin Hills dam failed during the daylight hours, and was one of the first disaster events documented by a live helicopter broadcast.

The Baldwin Hills Dam collapsed with the fury of a thousand cloudbursts, sending a 50-foot wall of water down Cloverdale Avenue and slamming into homes and cars on Dec. 14, 1963.

Five people were killed. Sixty-five hillside houses were ripped apart, and 210 homes and apartments were damaged. The flood swept northward in a V-shaped path roughly bounded by La Brea Avenue and Jefferson and La Cienega Boulevards.

The earthen dam that created a 19-acre reservoir to supply drinking water for West Los Angeles residents ruptured at 3:38 p.m. As a pencil-thin crack widened to a 75-foot gash, 292 million gallons surged out. It took 77 minutes for the lake to empty. But it took a generation for the neighborhood below to recover. Two decades passed before the Baldwin Hills ridge top was reborn.

**Photo 6-1: Baldwin Hills Dam**



The cascade caused an unexpected ripple effect that is still being felt in Los Angeles and beyond. It foreshadowed the end of urban-area earthen dams as a major element of the Department of Water and Power's water storage system. It prompted a tightening of Division of Safety of Dams control over reservoirs throughout the state.

The live telecast of the collapse from a KTLA-TV helicopter is considered the precursor to airborne news coverage that is now routine everywhere.”<sup>5</sup>

### **Debris Flows**

Another flood related hazard that can affect certain parts of the Southern California region are debris flows. Most typically debris flows occur in mountain canyons and the foothills against the San Gabriel Mountains. However, any hilly or mountainous area with intense rainfall and the proper geologic conditions may experience one of these very sudden and devastating events.

“Debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, are common types of fast-moving landslides. These flows generally occur during periods of intense rainfall or rapid snow melt. They usually start on steep hillsides as shallow landslides that liquefy and accelerate to speeds that are typically about 10 miles per hour, but can exceed 35 miles per hour. The consistency of debris flow ranges from watery mud to thick, rocky mud that can carry large items such as boulders, trees, and cars. Debris flows from many different sources can combine in channels, and their destructive power may be greatly increased. They continue flowing down hills and through channels, growing in volume with the addition of water, sand, mud, boulders, trees, and other materials. When the flows reach flatter ground, the debris spreads over a broad area, sometimes accumulating in thick deposits that can wreak havoc in developed areas.”<sup>6</sup>

### **What is the Effect of Development on Floods?**

When structures or fill are placed in the floodway or floodplain water is displaced. Development raises the river levels by forcing the river to compensate for the flow space obstructed by the inserted structures and/or fill. When structures or materials are added to the floodway or floodplain and no fill is removed to compensate, serious problems can arise. Flood waters may be forced away from historic floodplain areas. As a result, other existing floodplain areas may experience flood waters that rise above historic levels. Local governments must require engineer certification to ensure that proposed developments will not adversely affect the flood carrying capacity of the Special Flood Hazard Area (SFHA). Displacement of only a few inches of water can mean the difference between no structural damage occurring in a given flood event, and the inundation of many homes, businesses, and other facilities. Careful attention should be given to development that occurs within the floodway to ensure that structures are prepared to withstand base flood events. In highly urbanized areas, increased paving can lead to an increase in volume and velocity of runoff after a rainfall event, exacerbating the potential flood hazards. Care should be taken in the development and implementation of storm water management systems to ensure that these runoff waters are dealt with effectively.

### **How are Flood-Prone Areas Identified?**

Flood maps and Flood Insurance Studies (FIS) are often used to identify flood-prone areas. The NFIP was established in 1968 as a means of providing low-cost flood insurance to the nation's flood-prone communities. The NFIP also reduces flood losses through regulations that focus on building codes and sound floodplain management. In the City, the NFIP and related building code regulations went into effect on April 15, 1980. NFIP regulations (44 Code of Federal Regulations (CFR) Chapter 1, Section 60, 3) require that all new construction in floodplains must be elevated at or above base flood level.

Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS) Floodplain maps are the basis for implementing floodplain regulations and for delineating flood insurance purchase requirements. A Flood Insurance Rate Map (FIRM) is the official map produced by FEMA which delineates SFHA in communities where NFIP regulations apply. FIRMs are also used by insurance agents and mortgage lenders to determine if flood insurance is required and what insurance rates should apply.

Water surface elevations are combined with topographic data to develop FIRMs. FIRMs illustrate areas that would be inundated during a 100-year flood, floodway areas, and elevations marking the 100-year-flood level. In some cases they also include base flood elevations (BFEs) and areas located within the 500-year floodplain. Flood Insurance Studies and FIRMs produced for the NFIP provide assessments of the probability of flooding at a given location. FEMA conducted many Flood Insurance Studies in the late 1970s and early 1980s. These studies and maps represent flood risk at the point in time when FEMA completed the studies. However, it is important to note that not all 100-year or 500-year floodplains have been mapped by FEMA. It is estimated that the flood maps cover 1.6% of the total population in the City.

FEMA flood maps are not entirely accurate. These studies and maps represent flood risk at the point in time when FEMA completed the studies, and does not incorporate planning for floodplain changes in the future due to new development. Although FEMA is considering changing that policy, it is optional for local communities. The FEMA FIRM map for the City was completed in 1980. Man-made and natural changes to the environment have changed the dynamics of storm water run-off since then.

### **Flood Mapping Methods and Techniques**

Although many communities rely exclusively on FIRMs to characterize the risk of flooding in their area, there are some flood-prone areas that are not mapped but remain susceptible to flooding. These areas include locations next to small creeks, local drainage areas, and areas susceptible to manmade flooding.

Communities find it particularly useful to overlay flood hazard areas on tax assessment parcel maps. This allows a community to evaluate the flood hazard risk for a specific parcel during review of a development request. Coordination between FEMA and local planning jurisdictions is the key to making a strong connection with GIS technology for the purpose of flood hazard mapping.

FEMA and the Environmental Systems Research Institute (ESRI), a private company, have formed a partnership to provide multi-hazard maps and information to the public via the Internet. ESRI produces GIS software, including ArcViewC9 and ArcInfoC9 . The ESRI web site has information on GIS technology and downloadable maps. The hazards maps provided on the ESRI site are intended to assist communities in evaluating geographic information about natural hazards. Flood information for most communities is available on the ESRI web site. Visit [www.esri.com](http://www.esri.com) for more information.

## **Hazard Assessment**

### **Hazard Identification**

Hazard identification is the first phase of flood-hazard assessment. Identification is the process of estimating: (1) the geographic extent of the floodplain (i.e., the area at risk from flooding); (2) the intensity of the flooding that can be expected in specific areas of the floodplain; and (3) the probability of occurrence of flood events. This process usually results in the creation of a floodplain map. Floodplain maps provide detailed information that can assist jurisdictions in making policies and land-use decisions.

### **Data Sources**

The U.S. Department of Housing and Urban Development (HUD) study, which mapped the floodplain in April of 1980. This is when the City initially entered into the NFIP. Los Angeles County has updated portions of the USACE and FEMA maps through smaller drainage studies in the county since that time.

### **Vulnerability Assessment**

Vulnerability assessment is the second step of flood-hazard assessment. It combines the floodplain boundary, generated through hazard identification, with an inventory of the

property within the floodplain. Understanding the population and property exposed to natural hazards will assist in reducing risk and preventing loss from future events. Because site-specific inventory data and inundation levels given for a particular flood event (10-year, 25-year, 50-year, 100-year, 500-year) are not readily available, calculating a community's vulnerability to flood events is not straightforward. The amount of property in the floodplain, as well as the type and value of structures on those properties, should be calculated to provide a working estimate for potential flood losses.

The City of Santa Fe Springs has conducted a vulnerability assessment on the impacts of flooding occurring within the City to determine its possible loss to structures, buildings and infrastructure in the floodplain areas or the result of dam failure or urban flooding. The City of Santa Fe Springs estimates a 1% loss in its infrastructure and buildings, primarily the result of urban flooding in the floodplain prone areas due to systems or equipment failure.

### **Disruption of Critical Services**

Critical facilities include police stations, fire stations, hospitals, shelters, and other facilities that provide important services to the community. These facilities and their services need to be functional after a flooding event.

### **Risk Analysis**

Risk analysis is the third and most advanced phase of a hazard assessment. It builds upon the hazard identification and vulnerability assessment. A flood risk analysis for the City should include two components: (1) the life and value of property that may incur losses from a flood event (defined through the vulnerability assessment); and (2) the number and type of flood events expected to occur over time. Within the broad components of a risk analysis, it is possible to predict the severity of damage from a range of events. Flow velocity models can assist in predicting the amount of damage expected from different magnitudes of flood events. The data used to develop these models is based on hydrological analysis of landscape features. Changes in the landscape, often associated with human development, can alter the flow velocity and the severity of damage that can be expected from a flood event.

Using GIS technology and flow velocity models, it is possible to map the damage that can be expected from flood events over time. It is also possible to pinpoint the effects of certain flood events on individual properties. At the time of publication of this plan, data was insufficient to conduct a risk analysis for flood events in the City. However, the current mapping projects will result in better data that will assist in understanding the potential risk. This plan includes recommendations for building partnerships that will support the development of a flood risk analysis in the City of Santa Fe Springs.

### **Community Flood Issues**

#### **What is Susceptible to Damage during a Flood Event?**

The largest impact on communities from flood events is the loss of life and property. During certain years, property losses resulting from flood damage are extensive.

Development in the floodplains of the City will continue to be at risk from flooding because flood damage occurs on a regular basis throughout the county. Property loss from floods strikes both private and public property.

### **Property Loss Resulting from Flooding Events**

The type of property damage caused by flood events depends on the depth and velocity of the flood waters. Faster moving flood waters can wash buildings off their foundations and sweep cars downstream. Pipelines, bridges, and other infrastructure can be damaged when high waters combine with flood debris. Extensive damage can be caused by basement flooding and landslide damage related to soil saturation from flood events. Most flood damage is caused by water saturating materials susceptible to loss (i.e., wood, insulation, wallboard, fabric, furnishings, floor coverings, and appliances). In many cases, flood damage to homes renders them unlivable.

### **Manufactured Homes**

Statewide, the 1996 floods destroyed 156 housing units. Of those units, 61% were mobilehomes and trailers. Many older manufactured home parks are located in floodplain areas. Manufactured homes have a lower level of structural stability than stick-built homes, and must be anchored to provide additional structural stability during flood events. Because of confusion in the late 1980s resulting from multiple changes in NFIP regulations, there are some communities that do not actively enforce anchoring requirements. Lack of enforcement of manufactured home construction standards in floodplains can contribute to severe damages from flood events.

There are two mobilehome parks located in the City of Santa Fe Springs, however neither one is located in the 100-year floodplain:

- Lakeland Villa Mobilehome Park (Northwest corner of Lakeland Road and Norwalk Boulevard)
- Elmwood Trailer Park (Southeast corner of Sorensen Avenue and Washington Boulevard)

### **Business/Industry**

Flood events impact businesses by damaging property and by interrupting business. Flood events can cut off customer access to a business as well as close a business for repairs. A quick response to the needs of businesses affected by flood events can help a community maintain economic vitality in the face of flood damage. Responses to business damages can include funding to assist owners in elevating or relocating flood-prone business structures.

### **Public Infrastructure**

Publicly owned facilities are a key component of daily life for all citizens of the county. Damage to public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and offices can hinder the ability of local government to deliver services. Government can take action to reduce the risk to public infrastructure from flood events, as well as craft public policy that reduces risk to private property from flood events.

## **Roads**

During natural hazard events or any type of emergency or disaster, dependable road connections are critical for providing emergency services. Roads systems in the City are maintained by multiple jurisdictions. Federal, state, county, and City governments all have a stake in protecting roads from flood damage. Road networks often traverse floodplain and floodway areas. Transportation agencies responsible for road maintenance are typically aware of roads at risk from flooding.

## **Bridges**

Bridges are key points of concern during flood events because they are important links in road networks, river crossings, and they can be obstructions in watercourses, inhibiting the flow of water during flood events. The bridges in the City are state, county, City, or privately owned. A state-designated inspector must inspect all state, county, and City bridges every two years; but private bridges are not inspected, and can be very dangerous. The inspections are rigorous, looking at everything from seismic capability to erosion and scour.

## **Storm Water Systems**

Local drainage problems are common throughout the City. There is a drainage master plan, and City Public Works staff is aware of local drainage threats. The problems are often present where storm water runoff enters culverts or goes underground into storm sewers. As stated in the City's General Plan, the drainage system in Santa Fe Springs can generally manage storm water from a 10 year storm.

## **Water/Wastewater Treatment Facilities**

The City receives its water from three sources: well water, the Central Basin Water Authority, and the Metropolitan Water District. The well water is controlled by the Water Replenishment District of Southern California. The cities of Whittier, Pico Rivera, and the Southern California Water Company have agreements to provide water service to Santa Fe Springs in an emergency situation.

## **Water Quality**

The Santa Fe Springs General Plan states the City's water resources are protected and managed by the State Department of Water Resources. Environmental quality problems include bacteria, toxins, and pollution. The water rights are administered by the State Water Resources Control Board. The Board also regulates the water quality for Santa Fe Springs.

## **Flood Endnotes**

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1. <http://www.lalc.k12.ca.us/target/units/river/tour/hist.html>
  2. Gumprecht, Blake, 1999, Johns Hopkins University Press, Baltimore, MD.

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3. Ibid
  4. [http://www.usc.edu/isd/archives/la/scandals/st\\_francis\\_dam.html](http://www.usc.edu/isd/archives/la/scandals/st_francis_dam.html)
  5. <http://www.latimes.com/news/local/surroundings/la-me-surround11dec11,0,1754871.story?coll=la-adelphia-right-rail>
  6. <http://www.fema.gov/rrr/talkdiz/landslide.shtm#what>

## Appendix A: Master Resource Directory

The Resource Directory provides contact information for local, regional, state, and federal programs that are currently involved in hazard mitigation activities. The Hazard Mitigation Advisory Committee may look to the organizations on the following pages for resources and technical assistance. The Resource Directory provides a foundation for potential partners in action item implementation.

The Hazard Mitigation Advisory Committee will continue to add contact information for organizations currently engaged in hazard mitigation activities. This section may also be used by various community members interested in hazard mitigation information and projects.

|  |                    |  |                  |
|--|--------------------|--|------------------|
| <b>American Public Works Association</b>   |                    |  |                  |
| Level: National  | Hazard: Multi      | <a href="http://www.apwa.net">http://www.apwa.net</a>      |                  |
| 2345 Grand Boulevard   |                    | Suite 500  |                  |
| Kansas City, MO 64108-2641   |                    | Ph: 816-472-6100   | Fx: 816-472-1610 |
| Notes: The American Public Works Association is an international educational and professional association of public agencies, private sector companies, and individuals dedicated to providing high quality public works goods and services. |                    |  |                  |
| <b>Association of State Floodplain Managers</b>  |                    |  |                  |
| Level: Federal   | Hazard: Flood      | <a href="http://www.floods.org">www.floods.org</a>         |                  |
| 2809 Fish Hatchery Road  |                    |  |                  |
| Madison, WI 53713  |                    | Ph: 608-274-0123   | Fx:              |
| Notes: The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery       |                    |  |                  |
| <b>Building Seismic Safety Council (BSSC)</b>  |                    |  |                  |
| Level: National  | Hazard: Earthquake | <a href="http://www.bssconline.org">www.bssconline.org</a> |                  |
| 1090 Vermont Ave., NW  |                    | Suite 700  |                  |
| Washington, DC 20005   |                    | Ph: 202-289-7800   | Fx: 202-289-109  |
| Notes: The Building Seismic Safety Council (BSSC) develops and promotes building earthquake risk mitigation regulatory provisions for the nation.  |                    |  |                  |

| <b>California Department of Transportation (CalTrans)</b>   |                  |   |
|---|------------------|---|
| Level: State  | Hazard: Multi    | <a href="http://www.dot.ca.gov/">http://www.dot.ca.gov/</a>                             |
| 120 S. Spring Street  |                  |   |
| Los Angeles, CA 90012   | Ph: 213-897-3656 | Fx:   |
| Notes: CalTrans is responsible for the design, construction, maintenance, and operation of the California State Highway System, as well as that portion of the Interstate Highway System within the state's boundaries. Alone and in partnership with Amtrak, Caltrans is also involved in the support of intercity passenger rail service in California. |                  |   |
| <b>California Resources Agency</b>  |                  |   |
| Level: State  | Hazard: Multi    | <a href="http://resources.ca.gov/">http://resources.ca.gov/</a>                         |
| 1416 Ninth Street   |                  | Suite 1311  |
| Sacramento, CA 95814  | Ph: 916-653-5656 | Fx:   |
| Notes: The California Resources Agency restores, protects and manages the state's natural, historical and cultural resources for current and future generations using solutions based on science, collaboration and respect for all the communities and interests involved.   |                  |   |
| <b>California Division of Forestry (CDF)</b>  |                  |   |
| Level: State  | Hazard: Multi    | <a href="http://www.fire.ca.gov/php/index.php">http://www.fire.ca.gov/php/index.php</a> |
| 210 W. San Jacinto  |                  |   |
| Perris CA 92570   | Ph: 909-940-6900 | Fx:   |
| Notes: The California Department of Forestry and Fire Protection protects over 31 million acres of California's privately-owned wildlands. CDF emphasizes the management and protection of California's natural resources.  |                  |   |
| <b>California Division of Mines and Geology (DMG)</b>   |                  |   |
| Level: State  | Hazard: Multi    | <a href="http://www.consrv.ca.gov/cgs/index.htm">www.consrv.ca.gov/cgs/index.htm</a>    |
| 801 K Street  |                  | MS 12-30  |
| Sacramento, CA 95814  | Ph: 916-445-1825 | Fx: 916-445-5718  |
| Notes: The California Geological Survey develops and disseminates technical information and advice on California's geology, geologic hazards, and mineral resources.  |                  |   |
| <b>California Environmental Resources Evaluation System (CERES)</b>   |                  |   |
| Level: State  | Hazard: Multi    | <a href="http://ceres.ca.gov/">http://ceres.ca.gov/</a>                                 |
| 900 N St.   |                  | Suite 250   |
| Sacramento, Ca. 95814   | Ph: 916-653-2238 | Fx:   |
| Notes: CERES is an excellent website for access to environmental information and websites.  |                  |   |

| <b>California Department of Water Resources (DWR)</b>  |                  |   |
|--|------------------|---|
| Level: State   | Hazard: Flood    | <a href="http://www.dwr.water.ca.gov">http://www.dwr.water.ca.gov</a> |
| 1416 9th Street  |                  |   |
| Sacramento, CA 95814   | Ph: 916-653-6192 | Fx:   |
| Notes: The Department of Water Resources manages the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.   |                  |   |
| <b>California Department of Conservation: Southern California Regional Office</b>  |                  |   |
| Level: State   | Hazard: Multi    | <a href="http://www.consrv.ca.gov">www.consrv.ca.gov</a>              |
| 655 S. Hope Street   |                  | #700  |
| Los Angeles, CA 90017-2321   | Ph: 213-239-0878 | Fx: 213-239-0984  |
| Notes: The Department of Conservation provides services and information that promote environmental health, economic vitality, informed land-use decisions and sound management of our state's natural resources.   |                  |   |
| <b>California Planning Information Network</b>   |                  |   |
| Level: State   | Hazard: Multi    | <a href="http://www.calpin.ca.gov">www.calpin.ca.gov</a>              |
|  |                  |   |
|  |                  | Ph:   |
|  |                  | Fx:   |
| Notes: The Governor's Office of Planning and Research (OPR) publishes basic information on local planning agencies, known as the California Planners' Book of Lists. This local planning information is available on-line with new search capabilities and up-to-the-minute updates. |                  |   |
| <b>EPA, Region 9</b>   |                  |   |
| Level: Regional  | Hazard: Multi    | <a href="http://www.epa.gov/region09">http://www.epa.gov/region09</a> |
| 75 Hawthorne Street  |                  |   |
| San Francisco, CA 94105  | Ph: 415-947-8000 | Fx: 415-947-3553  |
| Notes: The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment through the themes of air and global climate change, water, land, communities and ecosystems, and compliance and environmental stewardship.       |                  |   |

**Federal Emergency Management Agency, Region IX**

|  |               |  |
|--|---------------|--|
| Level: Federal   | Hazard: Multi | <a href="http://www.fema.gov">www.fema.gov</a> |
| 1111 Broadway  |               | Suite 1200                                     |
| Oakland, CA 94607  |               | Ph: 510-627-7100   Fx: 510-627-7112            |
| Notes: The Federal Emergency Management Agency is tasked with responding to, planning for, recovering from and mitigating against disasters. |               |  |

**Federal Emergency Management Agency, Mitigation Division**

|  |               |  |
|--|---------------|--|
| Level: Federal   | Hazard: Multi | <a href="http://www.fema.gov/fima/planhowto.shtm">www.fema.gov/fima/planhowto.shtm</a> |
| 500 C Street, S.W.   |               |  |
| Washington, D.C. 20472   |               | Ph: 202-566-1600   Fx:   |
| Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities of which provide citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country. |               |  |

**Floodplain Management Association**

|  |               |  |
|--|---------------|--|
| Level: Federal   | Hazard: Flood | <a href="http://www.floodplain.org">www.floodplain.org</a> |
| P.O. Box 50891   |               |  |
| Sparks, NV 89435-0891  |               | Ph: 775-626-6389   Fx: 775-626-6389                        |
| Notes: The Floodplain Management Association is a nonprofit educational association. It was established in 1990 to promote the reduction of flood losses and to encourage the protection and enhancement of natural floodplain values. Members include representatives of federal, state and local government agencies as well as private firms. |               |  |

**Gateway Cities Partnership**

|   |               |  |
|---|---------------|--|
| Level: Regional   | Hazard: Multi | <a href="http://www.gatewaycities.org">www.gatewaycities.org</a> |
| 7300 Alondra Boulevard  |               | Suite 202  |
| Paramount, CA 90723   |               | Ph: 562-817-0820   Fx:   |
| Notes: Gateway Cities Partnership is a 501 C 3 non-profit Community Development Corporation for the Gateway Cities region of southeast LA County. The region comprises 27 cities that roughly speaking extends from Montebello on the north to Long Beach on the South, the Alameda Corridor on the west to the Orange County line on the east. |               |  |

| <b>Governor's Office of Emergency Services (OES)</b>  |                   |   |
|---|-------------------|---|
| Level: State  | Hazard: Multi     | <a href="http://www.oes.ca.gov">www.oes.ca.gov</a>  |
| P.O. Box 419047   |                   |   |
| Rancho Cordova, CA 95741-9047   | Ph: 916 845- 8911 | Fx: 916 845- 8910   |
| Notes: The Governor's Office of Emergency Services coordinates overall state agency response to major disasters in support of local government. The office is responsible for assuring the state's readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response and recovery efforts.   |                   |   |
| <b>Greater Antelope Valley Economic Alliance</b>  |                   |   |
| Level: Regional   | Hazard: Multi     |   |
| 42060 N. Tenth Street West  |                   |   |
| Lancaster, CA 93534   | Ph: 661-945-2741  | Fx: 661-945-7711  |
| Notes: The Greater Antelope Valley Economic Alliance, (GA VEA) is a 501 (c)(6) nonprofit organization with a 501(c)(3) affiliated organization the Antelope Valley Economic Research and Education Foundation. GA VEA is a public-private partnership of business, local governments, education, non-profit organizations and health care organizations that was founded in 1999 with the goal of attracting good paying jobs to the Antelope Valley in order to build a sustainable economy. |                   |   |
| <b>Landslide Hazards Program, USGS</b>  |                   |   |
| Level: Federal  | Hazard: Landslide | <a href="http://landslides.usgs.gov/index.html">http://landslides.usgs.gov/index.html</a> |
| 12201 Sunrise Valley Drive  |                   | MS 906  |
| Reston, VA 20192  | Ph: 703-648- 4000 | Fx:   |
| Notes: The NLIC website provides good information on the programs and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications, and current projects. USGS scientists are working to reduce long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.                                 |                   |   |

| <b>Los Angeles County Economic Development Corporation</b>  |                  |   |
|---|------------------|---|
| Level: Regional   | Hazard: Multi    | <a href="http://www.laedc.org">www.laedc.org</a>                  |
| 444 S. Flower Street  |                  | 34th Floor  |
| Los Angeles, CA 90071   | Ph: 213-236-4813 | Fx: 213- 623-0281   |
| Notes: The LAEDC is a private, non-profit 501 (c) 3 organization established in 1981 with the mission to attract, retain and grow businesses and jobs in the Los Angeles region. The LAEDC is widely relied upon for its Southern California Economic Forecasts and Industry Trend Reports. Lead by the renowned Jack Kyser (Sr. Vice President, Chief Economist) his team of researchers produces numerous publications to help business, media and government navigate the LA region's diverse economy. |                  |   |
| <b>Los Angeles County Public Works Department</b>   |                  |   |
| Level: County   | Hazard: Multi    | <a href="http://ladpw.org">http://ladpw.org</a>                   |
| 900 S. Fremont Ave.   |                  |   |
| Alhambra, CA 91803  | Ph: 626-458-5100 | Fx:   |
| Notes: The Los Angeles County Department of Public Works protects property and promotes public safety through Flood Control, Water Conservation, Road Maintenance, Bridges, Buses and Bicycle Trails, Building and Safety, Land Development, Waterworks, Sewers, Engineering, Capital Projects and Airports   |                  |   |
| <b>National Wildland/Urban Interface Fire Program</b>   |                  |   |
| Level: Federal  | Hazard: Wildfire | <a href="http://www.firewise.org/">www.firewise.org/</a>          |
| 1 Batterymarch Park   |                  |   |
| Quincy, MA 02169-7471   | Ph: 617-770-3000 | Fx: 617 770-0700  |
| Notes: FIREWISE maintains a Website designed for people who live in wildfire- prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.  |                  |   |
| <b>National Resources Conservation Service</b>  |                  |   |
| Level: Federal  | Hazard: Multi    | <a href="http://www.nrcs.usda.gov/">http://www.nrcs.usda.gov/</a> |
| 14th and Independence Ave., SW  |                  | Room 5105-A   |
| Washington, DC 20250  | Ph: 202-720-7246 | Fx: 202-720-7690  |
| Notes: NRCS assists owners of America's private land with conserving their soil, water, and other natural resources, by delivering technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases.   |                  |   |

|   |                   |   |
|---|-------------------|---|
| <b>National Interagency Fire Center (NIFC)</b>  |                   |   |
| Level: Federal  | Hazard: Wildfire  | <a href="http://www.nifc.gov">www.nifc.gov</a>  |
| 3833 S. Development Ave.  |                   |   |
| Boise, Idaho 83705-5354   | Ph: 208-387- 5512 | Fx:   |
| Notes: The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations.   |                   |   |
| <b>National Fire Protection Association (NFPA)</b>  |                   |   |
| Level: National   | Hazard: Wildfire  | <a href="http://www.nfpa.org/catalog/home/index.asp">http://www.nfpa.org/catalog/home/index.asp</a> |
| 1 Batterymarch Park   |                   |   |
| Quincy, MA 02169-7471   | Ph: 617-770-3000  | Fx: 617 770-0700  |
| Notes: The mission of the international nonprofit NFPA is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training and education  |                   |   |
| <b>National Floodplain Insurance Program (NFIP)</b>   |                   |   |
| Level: Federal  | Hazard: Flood     | <a href="http://www.fema.gov/nfip/">www.fema.gov/nfip/</a>  |
| 500 C Street, S.W.  |                   |   |
| Washington, D.C. 20472  | Ph: 202-566-1600  | Fx:   |
| Notes: The Mitigation Division manages the National Flood Insurance Program and oversees FEMA's mitigation programs. It has of a number of programs and activities providing citizens Protection, with flood insurance; Prevention, with mitigation measures and Partnerships, with communities throughout the country. |                   |   |
| <b>National Oceanic /Atmospheric Administration</b>   |                   |   |
| Level: Federal  | Hazard: Multi     | <a href="http://www.noaa.gov">www.noaa.gov</a>  |
| 14th Street & Constitution Ave NW   |                   |   |
| Washington, DC 20230  | Ph: 202-482-6090  | Fx: 202-482-3154  |
| Notes: NOAA's historical role has been to predict environmental changes, protect life and property, provide decision makers with reliable scientific information, and foster global environmental stewardship.  |                   |   |

| <b>National Weather Service, Office of Hydrologic Development</b>   |                       |   |
|---|-----------------------|---|
| Level: Federal  | Hazard: Flood         | <a href="http://www.nws.noaa.gov/">http://www.nws.noaa.gov/</a> |
| 1325 East West Highway  |                       | SSMC2   |
| Silver Spring, MD 20910   | Ph: 301-713-1658      | Fx: 301-713-0963  |
| Notes: The Office of Hydrologic Development (OHD) enhances National Weather Service (NWS) products by: infusing new hydrologic science, developing hydrologic techniques for operational use, managing hydrologic development by NWS field office, providing advanced hydrologic products to meet needs identified by NWS customers   |                       |   |
| <b>National Weather Service</b>   |                       |   |
| Level: Federal  | Hazard: Multi         | <a href="http://www.nws.noaa.gov/">http://www.nws.noaa.gov/</a> |
| 520 North Elevar Street   |                       |   |
| Oxnard, CA 93030  | Ph: 805-988- 6615     | Fx:   |
| Notes: The National Weather Service is responsible for providing weather service to the nation. It is charged with the responsibility of observing and reporting the weather and with issuing forecasts and warnings of weather and floods in the interest of national safety and economy. Briefly, the priorities for service to the nation are: 1. protection of life, 2. protection of property, and 3. promotion of the nation's welfare and economy.   |                       |   |
| <b>San Gabriel Valley Economic Partnership</b>  |                       |   |
| Level: Regional   | Hazard: Multi         | <a href="http://www.valleynet.org">www.valleynet.org</a>        |
| 4900 Rivergrade Road  |                       | Suite A310  |
| Irwindale, CA 91706   | Ph: 626-856-3400      | Fx: 626-856-5115  |
| Notes: The San Gabriel Valley Economic Partnership is a non-profit corporation representing both public and private sectors. The Partnership is the exclusive source for San Gabriel Valley-specific information, expertise, consulting, products, services, and events. It is the single organization in the Valley with the mission to sustain and build the regional economy for the mutual benefit of all thirty cities, chambers of commerce, academic institutions, businesses and residents. |                       |   |
| <b>Sanitation Districts of Los Angeles County</b>   |                       |   |
| Level: County   | Hazard: Flood         | <a href="http://www.lacsd.org/">http://www.lacsd.org/</a>       |
| 1955 Workman Mill Road  |                       |   |
| Whittier, CA 90607  | Ph:562-699-7411 x2301 | Fx:   |
| Notes: The Sanitation Districts provide wastewater and solid waste management for over half the population of Los Angeles County and turn waste products into resources such as reclaimed water, energy, and recyclable materials.  |                       |   |

|   |                    |  |
|---|--------------------|--|
| <b>Santa Monica Mountains Conservancy</b>   |                    |  |
| Level: Regional   | Hazard: Multi      | <a href="http://smmc.ca.gov/">http://smmc.ca.gov/</a>                        |
| 570 West Avenue Twenty-Six  |                    | Suite 100  |
| Los Angeles, CA 90065   |                    | Ph: 323-221-8900 Fx:   |
| Notes: The Santa Monica Mountains Conservancy helps to preserve over 55,000 acres of parkland in both wilderness and urban settings, and has improved more than 114 public recreational facilities throughout Southern California.  |                    |  |
| <b>South Bay Economic Development Partnership</b>   |                    |  |
| Level: Regional   | Hazard: Multi      | <a href="http://www.southbaypartnership.com">www.southbaypartnership.com</a> |
| 3858 Carson Street  |                    | Suite 110  |
| Torrance, CA 90503  |                    | Ph: 310-792-0323 Fx: 310-543-9886  |
| Notes: The South Bay Economic Development Partnership is a collaboration of business, labor, education and government. Its primary goal is to plan and implement an economic development and marketing strategy designed to retain and create jobs and stimulate economic growth in the South Bay of Los Angeles County.  |                    |  |
| <b>South Coast Air Quality Management District (AQMD)</b>   |                    |  |
| Level: Regional   | Hazard: Multi      | <a href="http://www.aqmd.gov">www.aqmd.gov</a>                               |
| 21865 E. Copley Drive   |                    |  |
| Diamond Bar, CA 91765   |                    | Ph: 800-CUT-SMOG Fx:   |
| Notes: AQMD is a regional government agency that seeks to achieve and maintain healthful air quality through a comprehensive program of research, regulations, enforcement, and communication. The AQMD covers Los Angeles and Orange Counties and parts of Riverside and San Bernardino Counties.  |                    |  |
| <b>Southern California Earthquake Center (SCEC)</b>   |                    |  |
| Level: Regional   | Hazard: Earthquake | <a href="http://www.scec.org">www.scec.org</a>                               |
| 3651 Trousdale Parkway  |                    | Suite 169  |
| Los Angeles, CA 90089-0742  |                    | Ph: 213-740-5843 Fx: 213/740-0011  |
| Notes: The Southern California Earthquake Center (SCEC) gathers new information about earthquakes in Southern California, integrates this information into a comprehensive and predictive understanding of earthquake phenomena, and communicates this understanding to end-users and the general public in order to increase earthquake awareness, reduce economic losses, and save lives. |                    |  |

|  |                  |   |
|--|------------------|---|
| <b>Southern California Association of Governments (SCAG)</b>   |                  |   |
| Level: Regional  | Hazard: Multi    | <a href="http://www.scag.ca.gov">www.scag.ca.gov</a>                              |
| 818 W. Seventh Street  |                  | 12th Floor  |
| Los Angeles, CA 90017  |                  | Ph: 213-236-1800      Fx: 213-236-1825  |
| Notes: The Southern California Association of Governments functions as the Metropolitan Planning Organization for six counties: Los Angeles, Orange, San Bernardino, Riverside, Ventura and Imperial. As the designated Metropolitan Planning Organization, the Association of Governments is mandated by the federal government to research and draw up plans for transportation, growth management, hazardous waste management, and air quality.   |                  |   |
| <b>State Fire Marshal (SFM)</b>  |                  |   |
| Level: State   | Hazard: Wildfire | <a href="http://osfm.fire.ca.gov">http://osfm.fire.ca.gov</a>                     |
| 1131 "S" Street  |                  |   |
| Sacramento, CA 95814   |                  | Ph: 916-445-8200      Fx: 916-445-8509  |
| Notes: The Office of the State Fire Marshal (SFM) supports the mission of the California Department of Forestry and Fire Protection (CDF) by focusing on fire prevention. SFM regulates buildings in which people live, controls substances which may, cause injuries, death and destruction by fire; provides statewide direction for fire prevention within wildland areas; regulates hazardous liquid pipelines; reviews regulations and building standards; and trains and educates in fire protection methods and responsibilities. |                  |   |
| <b>The Community Rating System (CRS)</b>   |                  |   |
| Level: Federal   | Hazard: Flood    | <a href="http://www.fema.gov/nfip/crs.shtm">http://www.fema.gov/nfip/crs.shtm</a> |
| 500 C Street, S.W.   |                  |   |
| Washington, D.C. 20472   |                  | Ph: 202-566-1600      Fx:   |
| Notes: The Community Rating System (CRS) recognizes community floodplain management efforts that go beyond the minimum requirements of the NFIP. Property owners within the County would receive reduced NFIP flood insurance premiums if the County implements floodplain management practices that qualify it for a CRS rating. For further information on the CRS, visit FEMA's website.  |                  |   |
| <b>United States Geological Survey</b>   |                  |   |
| Level: Federal   | Hazard: Multi    | <a href="http://www.usgs.gov/">http://www.usgs.gov/</a>                           |
| 345 Middlefield Road   |                  |   |
| Menlo Park, CA 94025   |                  | Ph: 650-853-8300      Fx:   |
| Notes: The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.  |                  |   |

| <b>U.S. Army Corps of Engineers</b>  |                    |  |
|--|--------------------|--|
| Level: Federal   | Hazard: Multi      | <a href="http://www.usace.army.mil">http://www.usace.army.mil</a>    |
| P.O. Box 532711  |                    |  |
| Los Angeles CA 90053- 2325   | Ph: 213-452- 3921  | Fx:  |
| Notes: The United States Army Corps of Engineers work in engineering and environmental matters. A workforce of biologists, engineers, geologists, hydrologists, natural resource managers and other professionals provide engineering services to the nation including planning, designing, building and operating water resources and other civil works projects. |                    |  |
| <b>USDA Forest Service</b>   |                    |  |
| Level: Federal   | Hazard: Wildfire   | <a href="http://www.fs.fed.us">http://www.fs.fed.us</a>              |
| 1400 Independence Ave. SW  |                    |  |
| Washington, D.C. 20250-0002  | Ph: 202-205-8333   | Fx:  |
| Notes: The Forest Service is an agency of the U.S. Department of Agriculture. The Forest Service manages public lands in national forests and grasslands.  |                    |  |
| <b>USGS Water Resources</b>  |                    |  |
| Level: Federal   | Hazard: Multi      | <a href="http://www.water.usgs.gov">www.water.usgs.gov</a>           |
| 6000 J Street  |                    | Placer Hall  |
| Sacramento, CA 95819-6129  | Ph: 916-278-3000   | Fx: 916-278-3070   |
| Notes: The USGS Water Resources mission is to provide water information that benefits the Nation's citizens: publications, data, maps, and applications software.  |                    |  |
| <b>Western States Seismic Policy Council (WSSPC)</b>   |                    |  |
| Level: Regional  | Hazard: Earthquake | <a href="http://www.wsspc.org/home.html">www.wsspc.org/home.html</a> |
| 125 California Avenue  |                    | Suite D201, #1   |
| Palo Alto, CA 94306  | Ph: 650-330-1101   | Fx: 650-326-1769   |
| Notes: WSSPC is a regional earthquake consortium funded mainly by FEMA. Its website is a great resource, with information clearly categorized - from policy to engineering to education.   |                    |  |

| <b>Westside Economic Collaborative C/O Pacific Western Bank</b>  |                  |   |
|--|------------------|---|
| Level: Regional  | Hazard: Multi    | <a href="http://www.westside-ia.or">http://www.westside-ia.or</a> |
| 120 Wilshire Boulevard   |                  |   |
| Santa Monica, CA 90401   | Ph: 310-458-1521 | Fx: 310-458-6479  |
| <p>Notes: The Westside Economic Development Collaborative is the first Westside regional economic development corporation. The Westside EDC functions as an information gatherer and resource center, as well as a forum, through bringing business, government, and residents together to address issues affecting the region: Economic Diversity, Transportation, Housing, Workforce Training and Retraining, Lifelong Learning, Tourism, and Embracing Diversity.</p> |                  |   |

## **Appendix B: Public Participation**

Public participation is a key component to any strategic planning process. It is very important that such broad-reaching plans not be written in isolation. Agency participation offers an opportunity for impacted departments and organizations to provide expertise and insight into the planning process. Citizen participation offers citizens the chance to voice their ideas, interests, and opinions. The Federal Emergency Management Agency also requires public input during the development of mitigation plans.

The City of Santa Fe Springs Natural Hazards Mitigation Plan integrates a cross-section of public input throughout the planning process. To accomplish this goal, the City of Santa Fe Springs Multi-Jurisdictional Planning Team developed a public participation process through five components: (1) developing a Planning Team comprised of knowledgeable individuals representative of the City, City of Whittier, Little Lake City School District, East Whittier City School District, Whittier Union High School District, and Whittier City School District; (2) conducting a survey of “Levels of Concerns” to verify the primary concerns of citizens and business owners as relates to natural hazards; (3) soliciting the assistance of local media representatives and community newsletters to announce the progress of the planning activities and to announce the availability of the Draft Natural Hazards Mitigation Plan; (4) creating opportunities for the citizens and public agencies to review the Draft Natural Hazards Mitigation Plan; (5) conducting public hearings with the Planning Commission and City Council where the public had an opportunity to express their views concerning the Draft Natural Hazards Mitigation Plan.

Integrating public participation during the development of the Natural Hazards Mitigation Plan has ultimately resulted in increased public awareness. Through public involvement, the mitigation plan reflects community issues, concerns, and new ideas and perspectives on mitigation opportunities and plan action items.

### Working Group

Hazard mitigation in the City of Santa Fe Springs is overseen by the Hazard Mitigation Working Group, which consists of representatives from various city departments. The Working Group members have an understanding of how the community is structured and how residents, businesses, and the environment may be affected by natural hazard events. The Working Group guided the development of the plan, and assisted in developing plan goals and action items, identifying stakeholders and plan reviewers, and sharing local expertise to create a more comprehensive plan. The majority of the Working Group also participated on the Multi-Jurisdictional Planning Team.

### Meeting Summary

Training Session – January 28, 2004: This training session was sponsored by the Disaster Management Area Coordinators. The training session was provided to

essentially help familiarize local agencies with the requirements of DMA 2000. The training session lasted 4 hours.

**The following meetings were facilitated by Emergency Planning Consultants, the consulting firm hired to prepare the Natural Hazards Mitigation Plan for the City of Santa Fe Springs:**

**Meeting #1: Pre-Training April 5, 2004**

The meeting was hosted by the City of Santa Fe Springs. EPC delivered pre-training to the Planning Team and Working Groups. The pre-training consisted of the history of the Disaster Mitigation Act of 2000, the purpose and role of hazard mitigation, and the planning process. The Pre-Training lasted approximately 2 hours.

**Meeting #2: Kick-Off Meeting April 5, 2004**

EPC facilitated a workshop where participants had an opportunity to learn about various natural hazards, assess and rank the local threats, examine hazard maps, and complete the FEMA Worksheets contained in FEMA 386-2 Understanding Your Risks. Part of the discussion included a presentation by EPC of historical disaster events across the country. Those slides served as a backdrop for discussing potential mitigation activities.

There was an extensive discussion on various methods of engaging the public in the mitigation process. The Planning Team prepared a draft media release and discussed a public opinion survey provided by EPC. EPC committed to revising the media release and survey and distributing electronic copies to each of the Planning Team entities. The Kick-Off Meeting lasted approximately 7 hours.

**Meeting #3 Pre-Training: Mitigation June 8, 2004**

The meeting was hosted by the City of Whittier and held at the East Whittier City School District Offices. EPC delivered pre-training to the Planning Team. The pre-training consisted of the concepts and issues related to developing mitigation actions. The pre-training lasted approximately 1 hour.

**Meeting #4 Mitigation Actions June 8, 2004**

EPC delivered the Draft Hazard Analysis and the Planning Team discussed missing information, data, and maps. EPC distributed copies of the Mitigation Actions Planning Tools to assist the Team in developing Goals and Action Items appropriate to their natural hazards. The Planning Tools provided a process for collecting the mitigation actions presently in practice in the City of Santa Fe Springs, as well as identifying future mitigation actions.

A brainstorming process was then conducted to develop the goals for the Plan. The entire Multi-Jurisdictional Planning Team quickly agreed to adopt the same mitigation goals. Following a discussion of alternative ranking techniques, the Team agreed to cluster the rankings of the hazards in the following order: #1 Multi-Hazard, #2 Earthquakes, and #3 Flooding.

The next task was to examine a FEMA-approved Mitigation Plan to get an idea of how mitigation actions are written. Each of the jurisdictions was pleased to announce the broad range of mitigation actions already being practiced. The Planning Tools, developed by EPC, consisted of nearly 300 mitigation actions gathered from dozens of Mitigation Plans across the country.

The Planning Team broke into individual jurisdictions to develop their own mitigation actions, utilizing the sample plans and Planning Tools list. Because of the plan samples and Tools, the process of identifying appropriate mitigations actions was accomplished in a very efficient manner.

#### Public Meetings

City of Santa Fe Springs conducted two public meetings where the Draft Natural Hazard Mitigation Plan was presented and discussed. Both the Planning Commission (August 23, 2004) and City Council (October 11, 2004) were impressed with the range of mitigation actions already in practice throughout the City. The City Council was very supportive of the overall goal established by the Multi-Jurisdictional Planning Team to become a Disaster Resistant Community. The results of the citizen survey were discussed and the City Council commended the Planning Team for its expeditious efforts to satisfy the DMA 2000 requirements.

#### Invitation Process

The City's Director of Police Services identified possible public notice sources. A press release was submitted to the Chambers of Commerce, local daily and weekly print media. A notice was also placed in the city newsletter that is mailed to all residents.

#### Results

The Committee's Chairperson began the presentation by providing an overview of meeting objectives to the participants. The citizens were encouraged to present their views and make suggestions on possible mitigation actions. The Committee's Chairperson presented the staff report on the Plan, including an overview of the Hazard Analysis, Mitigation Goals, and Mitigation Actions. The staff presentation concluded with a summary of the input received during the public review of the document. The Chairperson then fielded questions from the City Council. The meeting lasted approximately 2 hours.

The Planning Commission and City Council were unanimous in their adoption of the City of Santa Fe Springs Natural Hazards Mitigation Plan.

On October 12 , 2006, adopted Resolution No. 9017 amending the City's Hazard Mitigation Plan.

**Appendix B – Attachment 1**  
**Media Release Announcing Mitigation Project**

**NEWS RELEASE**  
FOR IMMEDIATE RELEASE  
\_\_\_\_\_  
(Date of Release)  
Contact: Fernando Tarin (562) 409-1850

**CITY OF SANTA FE SPRINGS PREPARES HAZARD  
MITIGATION PLAN DOCUMENT**  
*Plan to Cover Natural Hazards Impacting the Community*

The City of Santa Fe Springs has begun the process of preparing a Hazard Mitigation Plan which will identify ways to minimize potential damage from natural hazards before a disaster occurs. The Plan is being prepared by the City of Santa Fe Springs with assistance from Emergency Planning Consultants. The City is part of a Multi-Jurisdictional Planning Team including the City of Whittier, Whittier City School District, East Whittier City School District, Whittier Union High School District, and Little Lake School District. The Planning Team was created in an effort to better utilize the resources of the various jurisdictions and to more effectively address the hazards that impact the entire region.

The planning document will focus on potential impacts of natural hazards including earthquakes, floods, and wildfires. Upon completion of the Draft Local Hazard Mitigation Plan, a copy of the document will be available for review at the Santa Fe Springs Police Services Center during the month of August. Following the review period, the Plan will be forwarded to the City Council for approval.

"Public input into this process is very important so we encourage residents and business owners to review the document and participate in the public hearing that will be scheduled for later in the year", said Fernando Tarin, City of Santa Fe Springs Director of Police Services.

## **Appendix B – Attachment 2 List of Reviewers**

### City of Whittier

Bob Chavez, Park Director  
Ann-Marie Hayashi, Emergency Services Assistant  
Carl Reese, Building Services Manager  
Dave Mochizuki, Public Works Director  
Don Dooley, Planning Services Manager  
Joe Dyer, Asst. Director of Public Works  
Nancy Mendez, Assistant City Manager  
David Singer, Whittier Police Chief

### City of Pico Rivera

Michael Moore, Acting Deputy Director of Public Works

### City of Downey

Gerald Caton, City Manager

### City of Norwalk

Kevin Gano, Director of Public Safety  
Ernie Garcia, City Manager

### City of La Mirada

Andrea Travis, City Manager

### Santa Fe Springs Chamber of Commerce

Lou Booker, Santa Fe Springs Executive Director

### Planning Commission (five members)

### City Council (five members)

### City of Santa Fe Springs

Frederick W. Latham, City Manager  
Robert G. Orpin, Director of Planning & Development  
Don Jensen, Director of Public Works  
Susan Bergeron-Vance, Director of Finance/Admin Services  
Neal Welland, Fire Chief  
Fernando L. Tarin, Director of Police Services  
Bryan Collins, Admin Public Safety Officer  
Cuong Nguyen, Associate Planner  
Tony Olmos, Principle Civil Engineer

### Little Lake City School District

Maureen Evens, Asst. Superintendent – Business Services  
Phil Perez, Superintendent Little Lake City School District

Whittier Union High School District

Paul Muschetto, Associate Superintendent

Sandy Thorstenson, Superintendent Whittier Union High School

Whittier City School District

Bob Mazzeo, Director of Business Projects

East Whittier School District

Steve Ritter, Assistant Superintendent

Lee Bean, Director of Facilities, Maintenance and Operations

South Whittier School District

Dr. David Morton, Senior Director of Fiscal Services & Classified  
Personnel

Los Nietos School District

Dr. Florentino G. Noriega, Superintendent

Douglas C. Mc Master, Director of Business Services

St. Paul High School

Frank A. Laurenzello, Principal

Rio Hondo Community College

Rose Marie Joyce, President

The Gas Company

Julia Emerson, Public Affairs Manager

Southern California Edison

Sylvia Sutherland, Region Manager

State of California Governor's Officer of Emergency Services

John Rowden, Chief, Hazard Mitigation

San Gabriel Water Company

Robert Young, Safety Manager



# City of Santa Fe Springs

11710 Telegraph Road • CA • 90670-3679 • (562) 868-0511 • Fax (562) 868-7112 • www.santafesprings.org

## APPENDIX B – ATTACHMENT 3

### EXCERPT FROM MINUTES OF CITY COUNCIL MEETING

State of California            )  
County of Los Angeles        )ss.  
City of Santa Fe Springs        )

I, Marilyn Jannak, City Clerk of the City of Santa Fe Springs, California, do hereby certify that the attached is a full, true, and complete excerpt from the minutes of the meeting of the City Council of the City of Santa Fe Springs held on the 11<sup>th</sup> day of October, 2004, concerning item:

#### **PUBLIC HEARING**

15. Santa Fe Springs Natural Hazards Mitigation Plan.



  
Marilyn Jannak  
City Clerk

Date: October 26, 2004

**EXCERPT FROM MINUTES OF MEETING OF  
THE CITY COUNCIL, CITY OF SANTA FE SPRINGS,  
HELD ON  
OCTOBER 11, 2004**

**PUBLIC HEARING**

15. Santa Fe Springs Natural Hazards Mitigation Plan.

**Recommendation:** That the City Council (1) open the Public Hearing for those wishing to speak on this matter; (2) adopt the Santa Fe Springs Natural Hazards Mitigation Plan; and (3) direct the Director of Police Services to forward the City's Natural Hazards Mitigation Plan to the State Office of Emergency Services for review, and then forward the plan to the Federal Emergency Management Agency (FEMA).

Fernando Tarin, Director of Police Services, stated that the plan will be reviewed annually, and he introduced Carolyn Harshman, President of Emergency Planning Consultants, who gave a presentation on the goals and objectives of the Natural Hazards Mitigation Plan.

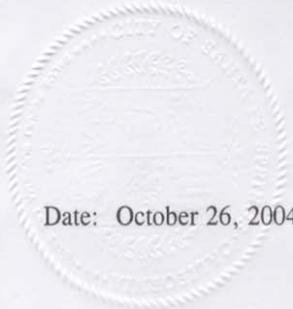
Fred Latham, City Manager, stated that this plan does not replace the City's Emergency Response Plan.

Councilmember Velasco asked if the Los Nietos School District was part of the Planning Team. Mr. Tarin stated that the Los Nietos School District is part of the South Whittier School District team.

Mr. Latham stated that the Los Nietos School District and South Whittier School District can be integrated into the Planning Team.

Mayor Putnam, at 8:03 p.m., opened the Public Hearing and asked if anyone wished to comment on this matter. There being no one wishing to address the City Council, Mayor Putnam, at 8:04 p.m., closed the Public Hearing.

Councilmember Velasco moved approval of recommendation nos. 2 and 3, and added that the Los Nietos School District and the South Whittier School District be included as part of the City's Planning Team. Councilmember Gonzalez seconded the motion, which carried unanimously.



Date: October 26, 2004

  
Marilyn Jannak  
City Clerk

Newspaper Clipping Announcing Mitigation Process  
*Daily News - May 4, 2004*

# Officials creating disaster procedure

## Input being sought from area residents

By Tracy Garcia  
STAFF WRITER

WHITTIER -- Earthquakes, fires, floods — these are three natural disasters that could realistically cripple the Whittier and Santa Fe Springs areas, city and school officials say.

That is why representatives of both cities and four local school districts are putting their heads together now to come up with the best plan to respond to these kinds of disasters, as well as develop ways to reduce the chances of potential damage.

The cities of Whittier and Santa Fe Springs, and the East Whittier City, Little Lake City, Whittier City and Whittier Union High school districts have been meeting since last month to prepare a new Hazard Mitigation Plan.

Local governments are required now — for the first time ever — to come up with the Hazard Mitigation Plan under new regulations from the Federal Emergency Management Agency, said Ann Marie Hayashi, emergency services assistant for the city of Whittier.

"FEMA's goal is to see how cities deal with natural hazards and that they have a plan to mitigate them, so that if and when a natural disaster strikes, the damage is minimized," Hayashi said.

Most importantly, FEMA has said areas without a hazard mitigation plan may not qualify for federal funds if a natural disaster does occur, officials said.

The 15-member group expects to have final drafts available for review by the public at city libraries and school districts in August. Each governing body is expected to approve the document in the fall.

Public participation in the plan is also important, officials said, because residents can alert them to potential problems that they may not have been aware of, such as a street that floods easily. Mailings and Web site postings will be made at a later date to instruct residents on how to participate.

"Awareness is the critical element," said Paul Muschello, assistant superintendent for the Whittier Union High School District. "For the community, it's beneficial for them to know local agencies are taking the extra step and that in the event of a disaster we will be eligible for

**FEMA has said areas without a hazard mitigation plan may not qualify for federal funds if a natural disaster does occur.**

## NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that a Public Hearing, as provided by law, will be held by the Santa Fe Springs City Council, to consider the approval of the City's Natural Hazard Mitigation Plan.

The Public Hearing is scheduled to be held on Monday, October 11, 2004 at 7:00 p.m., in the City Council Chambers, City Hall, 11710 Telegraph Road, Santa Fe Springs, California. Any person may attend to provide input with regard to the spending of the funds. Inquiries concerning this Public Hearing may be directed to the Department of Police Services, (562) 409-1850.

Dated: September 14, 2004  
Fernando L. Tarin, Director of Police Services  
City of Santa Fe Springs, California

Publish: October 1, 2004 & October 8, 2004

Whittier Daily News Ad

**SAN GABRIEL VALLEY NEWSPAPER GROUP**

San Gabriel Valley Tribune / Pasadena Star-News / Whittier Daily News  
Highland Newspaper

210 N. Azusa Canyon Road, West Covina, CA 91790  
626-962-8811 Fax 626-856-2750

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OCT 11 2006

CITY OF  
SANTA FE SPRINGS

LEGAL AD SCHEDULE

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DATE ORDERED: 10/03/06  
PAGE: 1

CITY OF SANTA FE SPRINGS  
11710 TELEGRAPH ROAD  
ATTN: TINA HOANG

SANTA FE SPRINGS, CA 90670

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PRINCIPAL CLERK (000 )

**NOTICE OF PUBLIC HEARING**

NOTICE IS HEREBY GIVEN that a Public Hearing, as provided by law, will be held by the Santa Fe Springs City Council, to consider the adoption of Resolution No. 9017 to amend the City's Natural Hazard Mitigation Plan.

The Public Hearing is scheduled to be held on **Thursday, October 12, 2006 at 7:00 p.m.** in the City Council Chambers, City Hall, 11710 Road, Santa Fe Springs, California. Any person may attend to provide input with regard to the amendments of the City's Natural Hazard Mitigation Plan. For copies of the City's Natural Hazard Mitigation Plan and all inquiries concerning this Public Hearing may be directed to the Department of Police Services, (562) 409-1850.

Dated: October 2, 2006  
Fernando L. Tarin, Director of Police Services  
City of Santa Fe Springs, California

Publish: **October 6, 10, 2006**  
Whittier Daily News Ad No. 110009

## **Appendix C: Benefit/Cost Analysis**

Benefit/Cost Analysis is a key mechanism used by the California Office of Emergency Services (OES), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This Appendix outlines several approaches for conducting economic analysis of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation.

This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

### **Why Evaluate Mitigation Strategies?**

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred.

Evaluating natural hazard mitigation provides 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. Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools.

Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster’s social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

### **What are Some Economic Analysis Approaches for Mitigation Strategies?**

The approaches used 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. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

### **Benefit/Cost Analysis**

Benefit/Cost Analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. 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. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

### **Cost-Effectiveness Analysis**

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

#### **Investing in public sector mitigation activities**

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and non-market benefits.

#### **Investing in private sector mitigation activities**

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known

defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

Estimating the costs and benefits of a hazard mitigation strategy can be a complex process.

Employing the services of a specialist can assist in this process.

### **How can an Economic Analysis be Conducted?**

Benefit/cost analysis and cost-effectiveness analysis are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating alternative mitigation activities is outlined below:

**1. Identify the Alternatives:** Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

**2. Calculate the Costs and Benefits:** Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.

- **Estimate the benefits.** Projecting the benefits or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- **Consider costs and benefits to society and the environment.** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical

environment or to society should be considered when implementing mitigation projects.

- **Determine the correct discount rate.** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

**3. Analyze and Rank the Alternatives:** Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

- **Net present value.** Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.

- **Internal Rate of Return.** Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk; project effectiveness; and economic, environmental, and social returns in choosing the appropriate project for implementation.

## **How are Benefits of Mitigation Calculated?**

### **Economic Returns of Natural Hazard Mitigation**

The estimation of economic returns, which accrue to building or land owner as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an

event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

### **Additional Costs from Natural Hazards**

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed “indirect” effects, but they can have a very direct effect on the economic value of the owner’s building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

### **Additional Considerations**

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

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## Appendix D: Acronyms

### Federal Acronyms

|        |  |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ATC    | Applied Technology Council   |
| b/ca   | benefit/cost analysis  |
| BFE    | Base Flood Elevation   |
| BLM    | Bureau of Land Management  |
| BSSC   | Building Seismic Safety Council                                    |
| CDBG   | Community Development Block Grant                                  |
| CFR    | Code of Federal Regulations  |
| CRS    | Community Rating System  |
| DOE    | Department of Energy   |
| EDA    | Economic Development Administration                                |
| EPA    | Environmental Protection Agency                                    |
| ER     | Emergency Relief   |
| EWP    | Emergency Watershed Protection (NRCS Program)                      |
| FAS    | Federal Aid System   |
| FEMA   | Federal Emergency Management Agency                                |
| FIRM   | Flood Insurance Rate Map   |
| FMA    | Flood Mitigation Assistance (FEMA Program)                         |
| FTE    | Full Time Equivalent   |
| GIS    | Geographic Information System                                      |
| GNS    | Institute of Geological and Nuclear Sciences (International)       |
| GSA    | General Services Administration                                    |
| HAZUS  | Hazards U.S.   |
| HMGP   | Hazard Mitigation Grant Program                                    |
| HMST   | Hazard Mitigation Survey Team                                      |
| HUD    | Housing and Urban Development (United States, Department of)       |
| IBHS   | Institute for Business and Home Safety                             |
| ICC    | Increased Cost of Compliance                                       |
| IHMT   | Interagency Hazard Mitigation Team                                 |
| NCDC   | National Climate Data Center                                       |
| NFIP   | National Flood Insurance Program                                   |
| NFPA   | National Fire Protection Association                               |
| NHMP   | Natural Hazard Mitigation Plan (also known as "409 Plan")          |
| NIBS   | National Institute of Building Sciences                            |
| NIFC   | National Interagency Fire Center                                   |
| NMFS   | National Marine Fisheries Service                                  |
| NOAA   | National Oceanic and Atmospheric Administration                    |
| NPS    | National Park Service  |
| NRCS   | Natural Resources Conservation Service                             |
| NWS    | National Weather Service   |

|       |   |
|-------|---|
| SBA   | Small Business Administration           |
| SHMO  | State Hazard Mitigation Officer         |
| TOR   | Transfer of Development Rights          |
| UGB   | Urban Growth Boundary                   |
| URM   | Unreinforced Masonry                    |
| USACE | United States Army Corps of Engineers   |
| USBR  | United States Bureau of Reclamation     |
| USDA  | United States Department of Agriculture |
| USFA  | United States Fire Administration       |
| USFS  | United States Forest Service            |
| USGS  | United States Geological Survey         |
| WSSPC | Western States Seismic Policy Council   |

### California Acronyms

|          |  |
|----------|--|
| A&W      | Alert and Warning  |
| AA       | Administering Areas  |
| AAR      | After Action Report  |
| ARC      | American Red Cross   |
| ARP      | Accidental Risk Prevention   |
| ATC20    | Applied Technology Council20   |
| ATC21    | Applied Technology Council21   |
| BCP      | Budget Change Proposal   |
| BSA      | California Bureau of State Audits                                      |
| CAER     | Community Awareness & Emergency Response                               |
| CalARP   | California Accidental Release Prevention                               |
| CalBO    | California Building Officials  |
| CalEPA   | California Environmental Protection Agency                             |
| CalREP   | California Radiological Emergency Plan                                 |
| CALSTARS | California State Accounting Reporting System                           |
| CalTRANS | California Department of Transportation                                |
| CBO      | Community Based Organization   |
| CD       | Civil Defense  |
| CDF      | California Department of Forestry and Fire Protection                  |
| CDMG     | California Division of Mines and Geology                               |
| CEC      | California Energy Commission   |
| CEPEC    | California Earthquake Prediction Evaluation Council                    |
| CESRS    | California Emergency Services Radio System                             |
| CHIP     | California Hazardous Identification Program                            |
| CHMIRS   | California Hazardous Materials Incident Reporting System               |
| CHP      | California Highway Patrol  |
| CLETS    | California Law Enforcement Telecommunications System                   |
| CSTI     | California Specialized Training Institute                              |
| CUEA     | California Utilities Emergency Association                             |
| CUPA     | Certified Unified Program Agency                                       |
| DAD      | Disaster Assistance Division (California Office of Emergency Services) |

|           |   |
|-----------|---|
| DFO       | Disaster Field Office   |
| DGS       | California Department of General Services   |
| DHSRHB    | California Department of Health Services, Radiological Health Branch              |
| DO        | Duty Officer  |
| DOC       | Department Operations Center  |
| DOF       | California Department of Finance  |
| DOJ       | California Department of Justice  |
| DPA       | California Department of Personnel Administration                                 |
| DPIG      | Disaster Preparedness Improvement Grant   |
| DR        | Disaster Response   |
| DSA       | Division of the State Architect   |
| DSR       | Damage Survey Report  |
| DSW       | Disaster Service Worker   |
| DWR       | California Department of Water Resources  |
| EAS       | Emergency Alerting System   |
| EDIS      | Emergency Digital Information System  |
| EERI      | Earthquake Engineering Research Institute   |
| EMA       | Emergency Management Assistance   |
| EMI       | Emergency Management Institute  |
| EMMA      | Emergency Managers Mutual Aid   |
| EMS       | Emergency Medical Services  |
| EOC       | Emergency Operations Center   |
| EOP       | Emergency Operations Plan   |
| EPEDAT    | Early Post Earthquake Damage Assessment Tool                                      |
| EPI       | Emergency Public Information  |
| EPIC      | Emergency Public Information Council  |
| ESC       | Emergency Services Coordinator  |
| FAY       | Federal Award Year  |
| FDAA      | Federal Disaster Assistance Administration  |
| FEAT      | Governor's Flood Emergency Action Team  |
| FEMA      | Federal Emergency Management Agency   |
| FFY       | Federal Fiscal Year   |
| FIR       | Final Inspection Reports  |
| FIRESCOPE | Firefighting Resources of Southern California Organized for Potential Emergencies |
| FMA       | Flood Management Assistance   |
| FSR       | Feasibility Study Report  |
| FY        | Fiscal Year   |
| GIS       | Geographical Information System   |
| HAZMAT    | Hazardous Materials   |
| HAZMIT    | Hazardous Mitigation  |
| HAZUS     | Hazards United States (an earthquake damage assessment prediction tool)           |
| HAD       | Housing and Community Development   |
| HEICS     | Hospital Emergency Incident Command System  |
| HEPG      | Hospital Emergency Planning Guidance  |
| HIA       | Hazard Identification and Analysis Unit   |

|        |  |
|--------|--|
| HMEP   | Hazardous Materials Emergency Preparedness                             |
| HMGP   | Hazard Mitigation Grant Program  |
| IDE    | Initial Damage Estimate  |
| IA     | Individual Assistance  |
| IFG    | Individual & Family Grant (program)                                    |
| IRG    | Incident Response Geographic Information System                        |
| IPA    | Information and Public Affairs (of state Office of Emergency Services) |
| LAN    | Local Area Network   |
| LEMMA  | Law Enforcement Master Mutual Aid                                      |
| LEPC   | Local Emergency Planning Committee                                     |
| MARAC  | Mutual Aid Regional Advisory Council                                   |
| MHFP   | Multi-Hazard Functional Plan   |
| MHID   | Multi-Hazard Identification  |
| MOU    | Memorandum of Understanding  |
| NBC    | Nuclear, Biological, Chemical  |
| NEMA   | National Emergency Management Agency                                   |
| NEMIS  | National Emergency Management Information System                       |
| NFIP   | National Flood Insurance Program                                       |
| NOAA   | National Oceanic and Atmospheric Association                           |
| NPP    | Nuclear Power Plant  |
| NSF    | National Science Foundation  |
| NWS    | National Weather Service   |
| OA     | Operational Area   |
| OASIS  | Operational Area Satellite Information System                          |
| OCC    | Operations Coordination Center   |
| OCD    | Office of Civil Defense  |
| OEP    | Office of Emergency Planning   |
| OES    | California Governor's Office of Emergency Services                     |
| OSHPD  | Office of Statewide Health Planning and Development                    |
| OSPR   | Oil Spill Prevention and Response                                      |
| PA     | Public Assistance  |
| PC     | Personal Computer  |
| PDA    | Preliminary Damage Assessment  |
| PIO    | Public Information Office  |
| POST   | Police Officer Standards and Training                                  |
| PPA/CA | Performance Partnership Agreement/Cooperative Agreement (FEMA)         |
| PSA    | Public Service Announcement  |
| PTAB   | Planning and Technological Assistance Branch                           |
| PTR    | Project Time Report  |
| RA     | Regional Administrator (OES)   |
| RADEF  | Radiological Defense (program)   |
| RAMP   | Regional Assessment of Mitigation Priorities                           |
| RAPID  | Railroad Accident Prevention & Immediate Deployment                    |
| RDO    | Radiological Defense Officer   |
| RDMHC  | Regional Disaster Medical Health Coordinator                           |
| REOC   | Regional Emergency Operations Center                                   |

|       |  |
|-------|--|
| REPI  | Reserve Emergency Public Information         |
| RES   | Regional Emergency Staff                     |
| RIMS  | Response Information Management System       |
| RMP   | Risk Management Plan                         |
| RPU   | Radiological Preparedness Unit (OES)         |
| RRT   | Regional Response Team                       |
| SAM   | State Administrative Manual                  |
| SARA  | Superfund Amendments & Reauthorization Act   |
| SAVP  | Safety Assessment Volunteer Program          |
| SBA   | Small Business Administration                |
| SCO   | California State Controller's Office         |
| SEMS  | Standardized Emergency Management System     |
| SEPIC | State Emergency Public Information Committee |
| SLA   | State and Local Assistance                   |
| SONGS | San Onofre Nuclear Generating Station        |
| SOP   | Standard Operating Procedure                 |
| SWEPC | Statewide Emergency Planning Committee       |
| TEC   | Travel Expense Claim                         |
| TRU   | Transuranic                                  |
| TTT   | Train the Trainer                            |
| UPA   | Unified Program Account                      |
| UPS   | Uninterrupted Power Source                   |
| USAR  | Urban Search and Rescue                      |
| USGS  | United States Geological Survey              |
| WC    | California State Warning Center              |
| WAN   | Wide Area Network                            |
| WIPP  | Waste Isolation Pilot Project                |

## Appendix E

### Glossary

|   |  |
|---|--|
| 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.   |
| 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)                | Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.   |
| Bedrock                                   | The solid rock that underlies loose material, such as soil, sand, clay, or gravel.   |
| Building                                  | A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.  |
| Coastal High Hazard Area                  | 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.  |
| Community Rating System (CRS)             | An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.   |
| 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     | Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.   |
| Debris                | 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.   |
| 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.  |
| 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.  |
| Duration              | How long a hazard event lasts.  |
| Earthquake            | A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.   |
| 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   | Area anticipated being 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 important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.  |
| Extent                | The size of an area affected by a hazard or hazard event.   |
| Extratropical Cyclone | Cyclonic storm events like Nor'easters and severe winter low-pressure systems. Both West and East coasts can experience these non-tropical 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. |

|  |   |
|--|---|
| 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.  |
| Federal Emergency Management Agency (FEMA) | Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.   |
| 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 flood water surface above the ground surface.   |
| Flood Elevation                            | Elevation 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.   |
| 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 (FIS)                | A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.   |
| Floodplain                                 | Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.   |

|                                      |   |
|--------------------------------------|---|
| Frequency                            | A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered. |
| Fujita Scale of Tornado Intensity    | Rates tornadoes with numeric values from F0 to F5 based on tornado wind speed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained.   |
| 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.   |
| 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 a database to be used for mapping and analysis.  |
| Ground Motion                        | The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.  |
| Hazard                               | A source of potential danger or adverse condition. Hazards in this how to series will include naturally occurring events such as floods, earthquakes, tornadoes, tsunamis, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.   |
| Hazard Event                         | A specific occurrence of a particular type of hazard.   |
| Hazard Identification                | The process of identifying hazards that threaten an area.   |
| Hazard Mitigation                    | Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.   |
| Hazard 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.   |

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| HAZUS (Hazards U.S.) | A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.  |
| Hurricane            | An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74-miles-per-hour or more and blow in a large spiral around a relatively calm center or "eye." Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.   |
| Hydrology            | The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.  |
| Infrastructure       | Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry docks, piers and regional dams. |
| Intensity            | A measure of the effects of a hazard event at a particular place.   |
| Landslide            | Downward movement of a slope and materials under the force of gravity.  |
| 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.   |
| Liquefaction         | Results when the soil supporting structures liquefies. This can cause structures to tip and topple.   |
| 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.  |

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| Mitigation Plan                                 | A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the state and includes a description of actions to minimize future vulnerability to hazards.   |
| National Flood Insurance Program (NFIP)         | Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.   |
| 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.   |
| Outflow   | Follows water inundation creating strong currents that rip at structures and pound them with debris, and erode beaches and coastal structures.  |
| 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.  |
| Probability                                     | A statistical measure of the likelihood that a hazard event will occur.   |
| 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.  |
| Repetitive Loss Property                        | A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least \$1000 each have been paid within any 10-year period since 1978.  |
| 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.  |
| Richter Scale                                   | A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.   |

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| Risk                                   | The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard. |
| Riverine                               | Of or produced by a river.  |
| 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 flood waters. 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.   |
| Seismicity                             | Describes the likelihood of an area being subject to earthquakes.   |
| 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, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.   |
| 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.   |
| 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.  |
| Structure                              | Something constructed. (See also Building)  |
| 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 exceeds 50 percent of the market value of the structure before the damage.  |

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| 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.   |
| Tectonic Plate           | Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.  |
| Topographic              | Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.  |
| Tornado                  | A violently rotating column of air extending from a thunderstorm to the ground.   |
| 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            | Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones. |
| Vulnerability Assessment | The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.  |

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| 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. |
| Wave Run-up        | 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).   |
| Wildfire           | An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.   |
| Zone               | A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.   |